Final Report

TEXAS STATE HIGHWAY 161 TOLLROAD PRE-FEASIBILITY STUDY

Prepared for:

CITY OF IRVING

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ENGINEERS • LANDSCAPE ARCHITECTS • PLANNERS

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I. PROJECT INITIATION

Introduction

Vollmer Associates has contracted with the City of Irving to conduct a pre-feasibility study of Texas State Highway 161 (SH 161) as a toll road between SH 183 and I-635. A portion of the highway has been constructed and is open to traffic on a toll-free basis. The frontage roads are complete within these limits and the mainline is complete from just north of SH 183 to just north of Belt Line Road. The project as currently defined would complete the mainline to I-635 and the interchanges with SH 183 as well as I-635.

Site Visits

Field visits were made in July and August of 1995 to gain a familiarization with the study area and meet with representatives of the City of Irving as well as the North Central Texas Council of Governments (NCTCOG).

Travel time studies were conducted during the peak hours along study area roadways with results ranging from 20 to 45 mph. On SH 161, average speeds range from 30 to 45 mph using a combination of mainline and frontage road routings. Peaking characteristics in the morning show east/northeast-bound traffic is heaviest, and in the afternoon, west/southwest-bound traffic dominates.

The project would facilitate these movements in a diagonal direction (Arlington to North Dallas) and serve new development in the northern portion of Irving. Ultimately SH 161 would extend to I-35E/SH 190 to the north and to I-20 on the south forming an outer beltway around Dallas.

A meeting was held with the NCTCOG Transportation Department to discuss their traffic modeling techniques and how it would be of use to the SH 161 study. Due to time

and resource constraints, it was decided that a new model for the Irving study area would not be undertaken, but rather a focused version of the existing regional model would be used. The primary difference in the results is the level of confidence in forecasted volumes on the various functional classes of roadways.

The intent of the regional model is to test the effect of systemwide changes primarily on the freeway system and, as such, volumes on individual non-freeway facilities (arterials, collectors, local streets) are not particularly reliable. The study area was selected to be bounded by I-635, SH 183, International Parkway and I-35E. Analysis cases would consist of 1990 (with and without SH 161), 2000 with SH 161 (toll-free and toll) and 2010 with SH 161 (toll-free and toll). The base case would include SH 161 between SH 183 and I-635 but not the northerly or southerly extensions, nor would it include the East-West Connector across D/FW Airport.

II. NCTCOG TRAFFIC MODEL

Methodology

The North Central Texas Council of Governments (NCTCOG) functions as the Metropolitan Planning Organization (MPO) for transportation in the Dallas-Fort Worth area and is responsible for the regional planning of all modes of transportation. Its travel demand forecasting model has four sequential steps consisting of trip generation, trip distribution, mode choice and roadway/transit assignment. The key inputs to this process include demographic data, roadway network assumptions, traffic zone structure, and travel time/cost data.

Demographics

In the current traffic model, the demographics are based on projections made in the late 1980's using 1980 census data. At that time, according to NCTCOG, the population of the Dallas-Fort Worth region was expected to be approximately 3.6 million in 1990 and would increase to some 4.6 million by 2010. This represents an overall increase of 27 percent or an average annual increase of 1.2 percent over the twenty-year period. Within the Irving study area defined for this traffic modeling exercise are some 164,000 residents in 1990 (4.6 percent of region), and by 2010 there would be some 191,000 residents representing 4.2 percent of the region. The City of Irving is expected to experience lower population growth than the regional average.

Total employment in the Dallas-Fort Worth region was expected to be approximately 2.3 million in 1990 and would grow to 3.2 million by 2010, an overall increase of 40 percent or 1.7 percent compounded annually. Starting at some 131,000 in 1990 (5.8 percent of region) the Irving study area employment is expected to increase to some 201,000 representing 6.3 percent of the overall region. Unlike the population

trends, the City of Irving employment growth is expected to exceed the regional average over the twenty-year period.

NCTCOG has produced updated projections based on 1990 census data which will be incorporated into the traffic model within the next year or so. A review of these new regional demographics indicates actual conditions for 1990 are somewhat lower than previously expected for both population (by 54,000 or 1.5 percent) and employment (by 214,000 or 9.5 percent). For the year 2010, the new population forecast is higher than previously expected (by 162,000 or 3.4 percent), whereas the new employment forecast is lower (by 107,000 or 3.4 percent). Within the Irving study area, the actual population is slightly lower than expected for 1990 (by 8,000 or 4.9 percent) and the updated projections are higher for 2010 (by 11,000 or 5.7 percent); employment levels for 1990 and 2010 are virtually unchanged with the updated projections.

Roadway Network

A review of the NCTCOG model plots was undertaken to determine the network changes from 1990 to 2010. Most of the changes appear to be expansions of existing roadways, upgraded interchanges and incorporation of HOV lanes. Following are the major changes incorporated into the NCTCOG model:

2000 vs. 1990

Lane Expansion
- SH 183
- I-635
- I-35E
- SH 121
- SH 190
- Belt Line Road
- MacArthur Boulevard
- O'Connor Boulevard
- Rochelle Road and Rochelle Boulevard
- Northgate Drive

2010 vs. 2000

Lane Expansion
- SH 114
- SH 121

HOV Lane
- SH 183
- I-635
- SH Loop 12
- I-35E

Interchange Upgrade
- SH 183/SH Loop 12/SH 114
- I-35E/I-635
- SH 190/I-35E

It should be noted that there are some differences between these assumptions and the current plans, which for the most part should not have a material effect on SH 161 traffic. However, the current plans for widening Valley View Lane from two to four lanes should be considered as part of the base case and, as a result, manual adjustments will be made to the traffic model output.

Toll Diversion

The desirability of alternative routings between zones is a function of the travel time, trip length and travel cost. These parameters are converted into cost equivalents and combined into a single value known as impedance. In the roadway assignment portion of the traffic model zone to zone trips are assigned to the roadway network on an incremental basis in which a portion of the trips are assigned in each of three successive iterations.

As trips are added to a particular routing, it becomes more congested and travel time as well as overall impedance increases, thereby making it less attractive than

alternatives In each successive iteration the impedance (cost) of routings is recalculated prior to assigning additional trips.

In this current study, NCTCOG has incorporated the SH 161 network into their 2000 and 2010 models and treated it as a toll free highway and separately as a toll facility. As a toll facility, the attractiveness of SH 161 declines due to the higher travel cost and impedance and as a result less traffic is assigned to the facility. In the base case runs, each link on the SH 161 mainline (from SH 183 to I-635) is assumed to cost the equivalent of 12 cents per mile in tolls. This is roughly equal to a one dollar toll over the seven mile length. Alternative runs were made using lower toll rates and also for tolls only on specific links to more closely simulate the effect of a toll plaza at a single location.

III. PROJECT ANALYSIS BASE CASE

Project Limits

The project boundaries for analysis purposes are defined by a rectangle that is set by SH 183 on the south, the airport access road (International Parkway) on the west, I-635 on the north, and I-35E and SH Loop 12 on the east. Major arterials in the network are presented in Figure III-1. As the diagram indicates, SH 161 runs some seven miles diagonally from the southwest beginning at SH 183 to the northeast, terminating for this project at I-635.

SH 161 is intended to allow traffic to bypass the use of SH Loop 12 and I-35E, both heavily congested in this portion of the metropolitan area, and allow a direct connection from SH 183 to I-635. The highway currently consists of a two-lane mainline and a three-lane frontage road in each direction. The frontage roads are complete from the SH 183 westbound frontage road to I-635 and the mainline is currently complete from just north of SH 183 to just north of Belt Line Road. The interchange at SH 183 is available only to and from the westbound service road of SH 183. The current project would complete the interchange with SH 183 and complete the roadway to I-635. The future extension of SH 161 to the northwest would continue to meet SH 190 at I-35E and possibly to the south with a connection at I-20.

Toll System

The SH 161 corridor combines a mainline arterial route with frontage roads in each direction throughout its length. This poses some unusual problems in terms of developing a toll structure. As shown in Figure III-2, the current project would allow traffic to readily bypass toll plazas and use the road with only minimal delay defeating the purpose of the toll project. Figure III-3 provides a modified interchange structure

focusing on the toll system, removing several ramps which allow free access to the mainline.

Ramps proposed for removal include the southbound exit from the mainline and northbound entry to the mainline between Las Colinas and O'Connor Boulevards; southbound entry to the mainline and northbound exit from the mainline between SH 114 and Royal Lane; and the southbound exit from the mainline and the northbound entry to the mainline between Northgate Drive and Walnut Hill Lane. These changes will continue to provide access to/from the arterial street system but will minimize opportunities for toll-free travel on SH 161. In addition, direct connections between mainline sections of SH 161 and SH 183 or SH 161 and I-635 would only be possible as a toll movement.

An alternative which could be considered in the next phase of study may be to retain some of these movements by adding toll lanes on the ramps themselves, creating a more typical ramp and barrier system The disadvantage of this approach is that operating and maintenance costs of the additional toll lanes may exceed the toll revenues collected, particularly on low volume ramps.

Toll Rates

We have selected a rate of approximately 10¢ per mile as the appropriate rate to begin operations in year 2000. For this seven-mile road (SH 183 to I-635), this would be a toll for passenger cars of $.75, or $.50 at the SH 183 plaza and $.25 at the SH 114 plaza, roughly representing the distance traveled on each segment of the facility. Tolls would be commensurately higher for other vehicle types.

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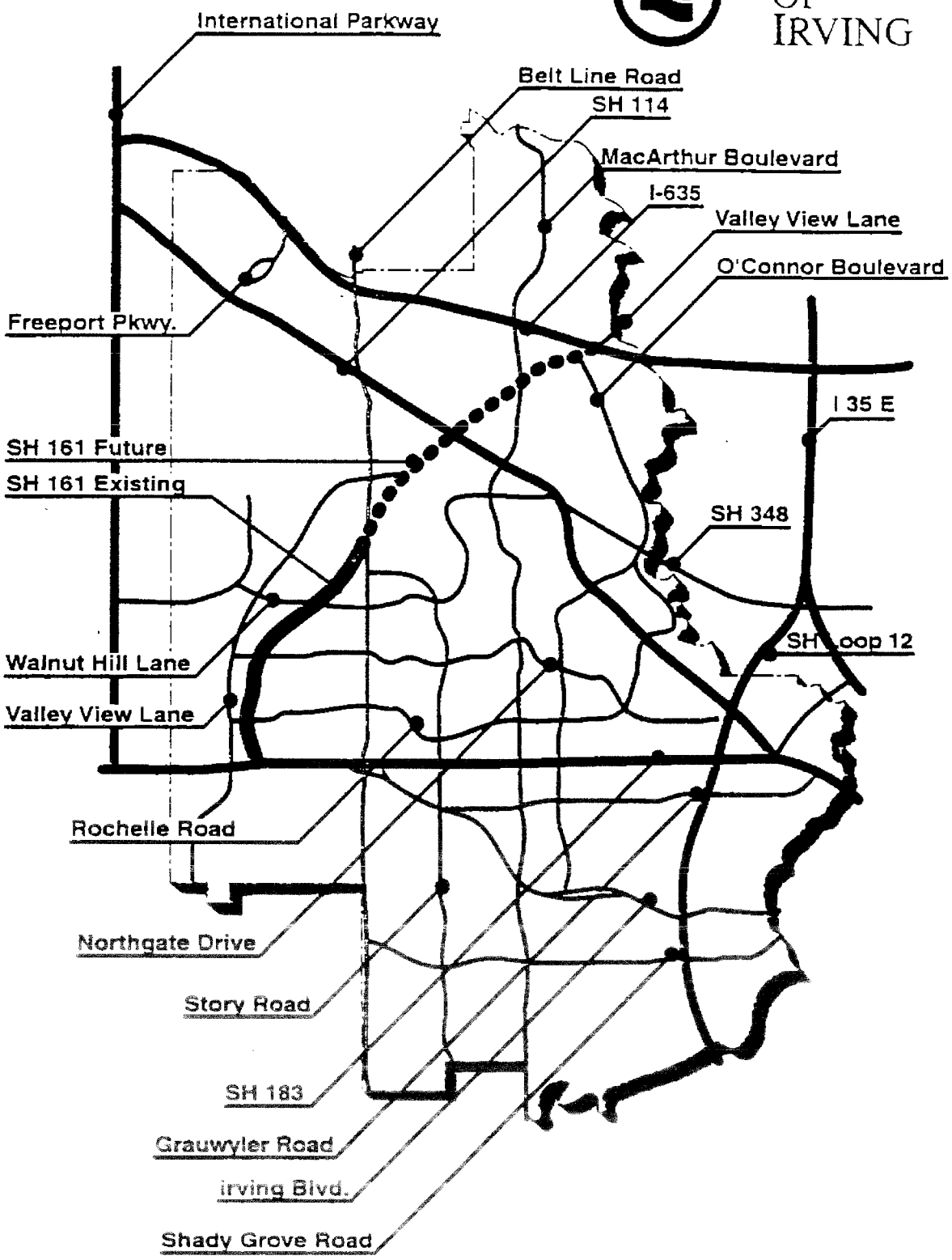
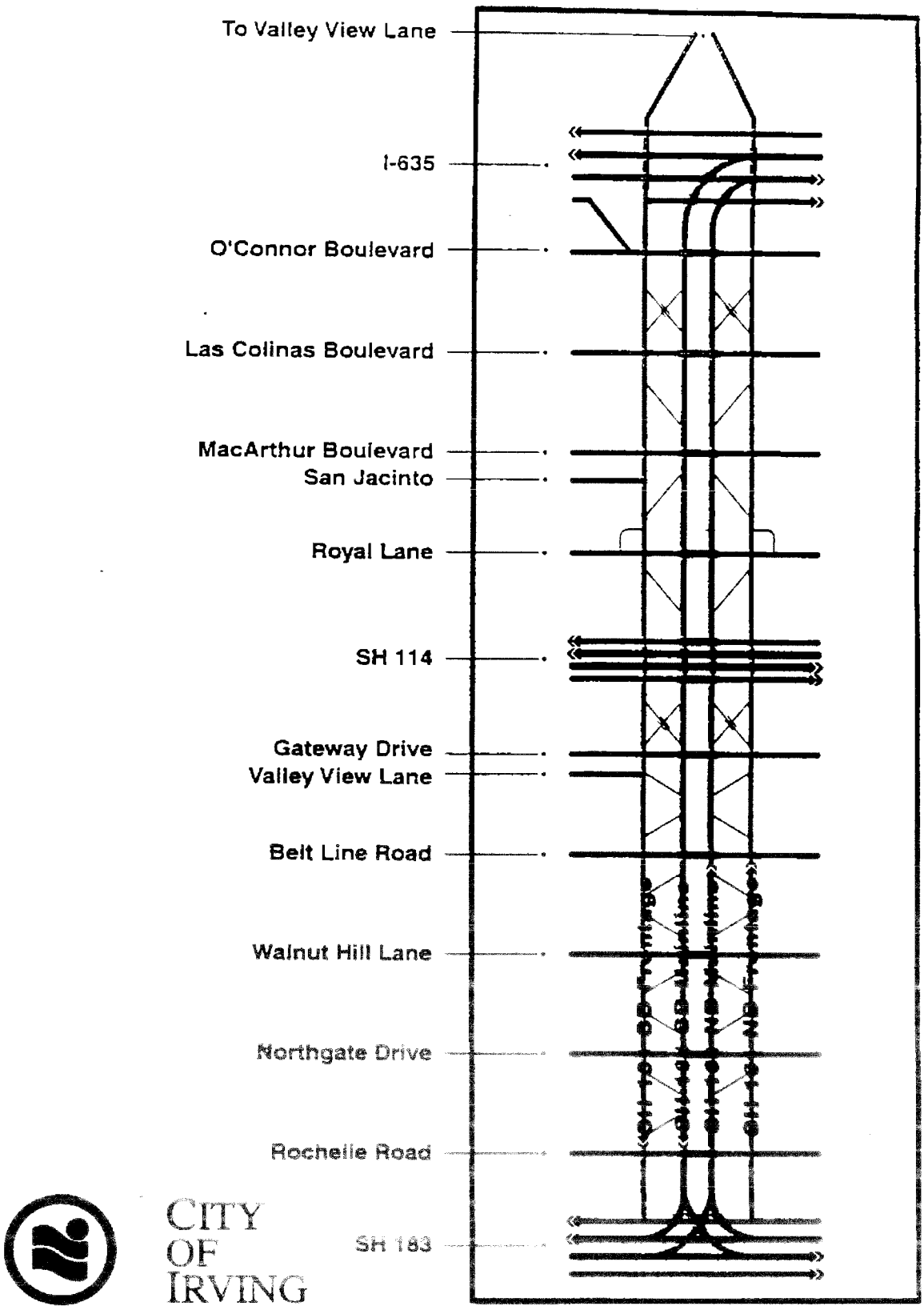


SH 161 Study-Major Arterials

Figure III-1

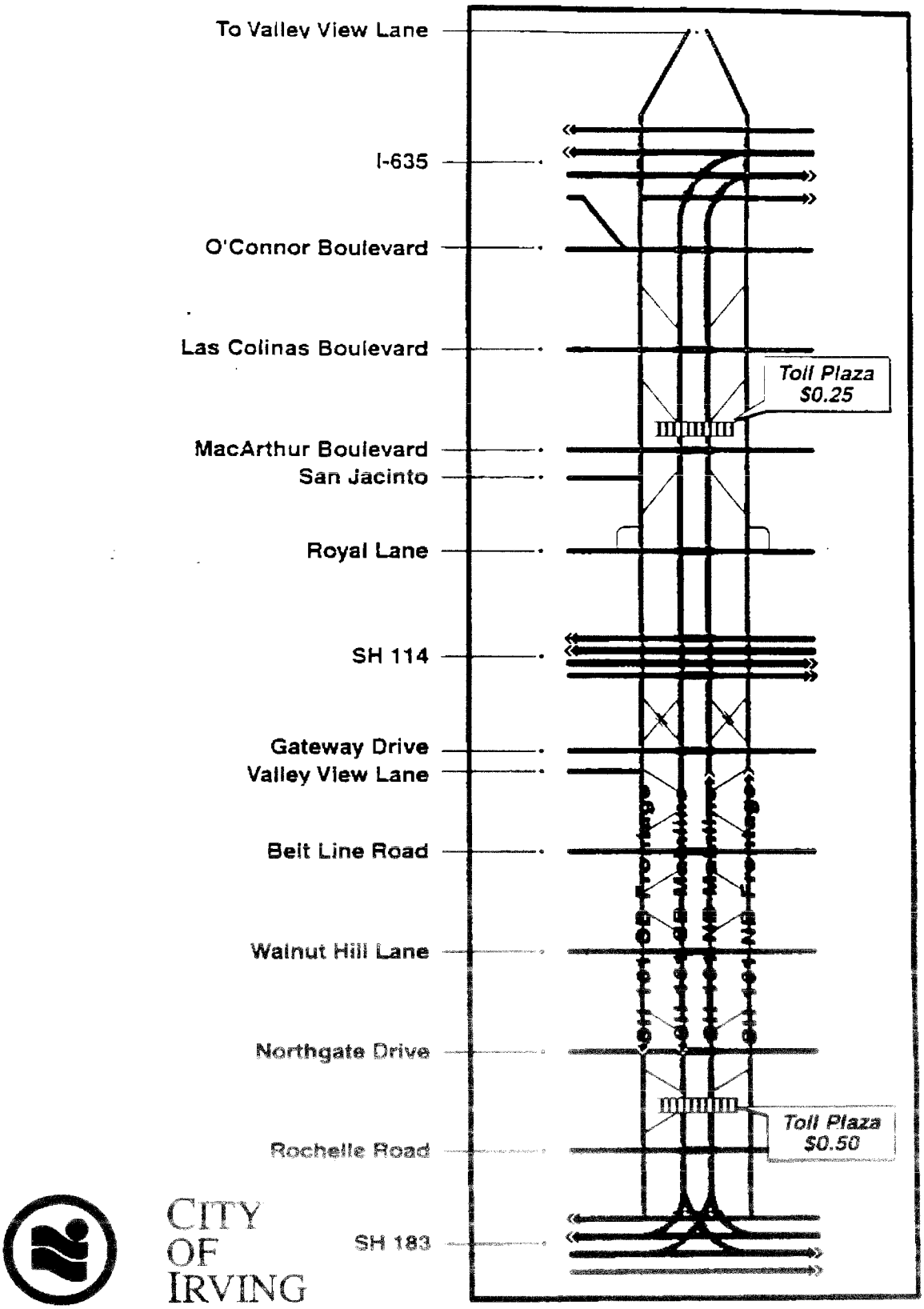
Existing SH 161

Proposed SH 161



SH 161 Study-Alignment

Figure III-2



SH 161 Study-Proposed Toll System

Figure III-3

IV. NCTCOG BASE CASE TRAFFIC MODEL OUTPUT

Introduction

NCTCOG has provided key parameters from traffic model runs for the years 1990, 2000 and 2010. State Highway 161 is included in all analysis years and, for the years 2000 and 2010, it is treated as a toll-free as well as a toll facility. Model output includes average weekday traffic volumes, level-of-service, loaded speeds, screenline analyses, systemwide performance reports and select link analyses.

Traffic Volumes

Table IV-1 presents a summary of two-way daily traffic volumes on SH 161 mainline obtained from NCTCOG plots of various model runs. In the 1990 pro forma case (assuming SH 161 is in place), volumes are generally lower in the south end, below Belt Line ranging from 70,000 to 80,000 per day; north of Belt Line, volumes would be 90,000 or more per day except at the connection to I-635 where there would be some 63,000 vehicles per day.

In the future toll-free conditions, year 2000 traffic would increase by 30 to 50 percent over 1990 levels exceeding 100,000 vehicles per day and by 2010 an additional 5 to 10 percent growth is forecast. As in the 1990 pro forma condition, volumes are generally lower in the south end and higher north of Belt Line Road.

The effect of tolling SH 161 reduces traffic substantially, particularly in the year 2000 when volumes are 30 to 45 percent of the toll free levels and, in fact, lower than the 1990 pro forma levels. By the year 2010, traffic levels would be very similar to the toll-free 1990 pro forma conditions.

TABLE IV-1 SH 161 Mainline Average Weekday Daily Traffic					
Link	1990 Pro forma	2000 FREE	2000 TOLL	2010 FREE	2010 TOLL
Rochelle - Northgate	73,000	109,000	62,000	115,000	80,000
Northgate - Walnut Hill	72,000	107,000	43,000	108,000	64,000
Walnut Hill - Belt Line	77,000	117,000	49,000	124,000	76,000
Belt Line - Valley View	95,000	123,000	38,000	138,000	94,000
Valley View - SH 114	90,000	115,000	35,000	123,000	84,000
SH 114 - MacArthur	91,000	123,000	57,000	132,000	84,000
MacArthur - I-635	63,000	75,000	25,000	75,000	35,000

Source: NCTCOG SH 161 volume plots, November, December 1995

Screenline Analysis

The analysis of traffic volumes across a screenline is used for a variety of purposes:

- to understand the overall trend and growth of traffic in a region of the study area;
- to understand the relative allocation of traffic among the major and minor routes along the screenline; and
- to evaluate the market share of a given roadway versus the screenline as a whole.

We worked closely with NCTCOG to identify and evaluate traffic for five screenlines in the study area, as depicted in Figure IV-1.

Screenline 1 covers all north-south traffic in the area between SH 114 and I-635. The major arterial roads include International Parkway, SH 161 and I-35E.

Screenline 2 is a screenline for north-south traffic south of SH 114; the only arterial highways for this screenline are International Parkway and SH 161.

Screenline 3 also covers north-south traffic, paralleling Screenline 2 immediately north of SH 183.

Screenline 4 includes all traffic proceeding east-west immediately east of International Parkway. The major arterial routes in this set are I-635, SH 183 and SH 114.

Screenline 5 also covers east-west traffic, but in the eastern portion of the study area. The major routes in this screenline are SH 183, SH 114, SH 161 and I-635.

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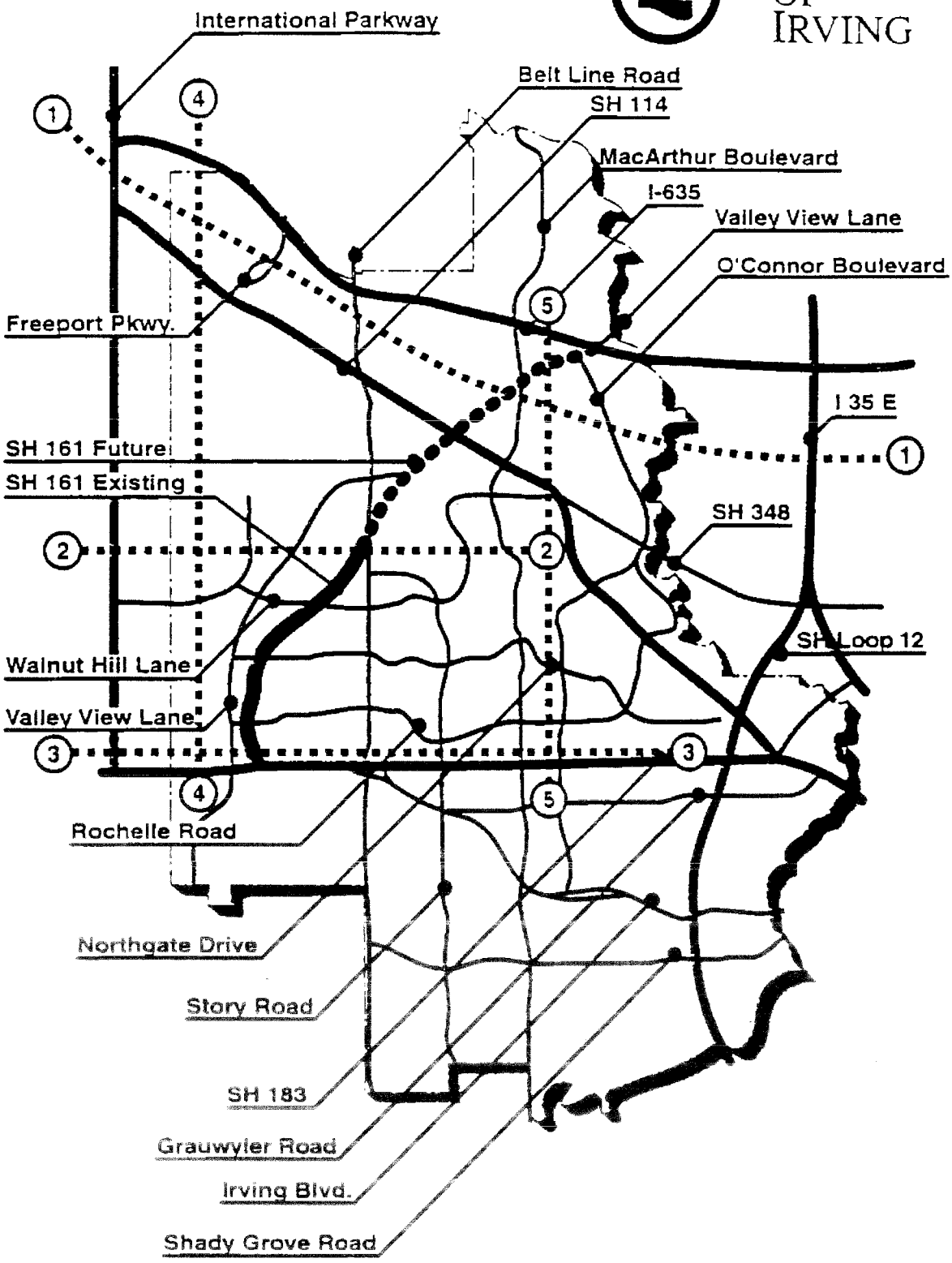


SH 161 Study-Screenlines

Figure IV-1

Existing SH 161

Proposed SH 161

NCTCOG provided traffic forecasts for a pro forma 1990 year (as if SH 161 were fully constructed), a year 2000 with SH 161 either toll-free (2000 FREE) or tolled (2000 TOLL), and year 2010 with SH 161 either toll-free (2010 FREE) or tolled (2010 TOLL). The results for Screenline 1 are presented in Table IV-2. The overall screenline is projected pro forma to have 390,900 vehicles per day, of which more than 20% would choose to use SH 161 as a toll-free road. By year 2000, the screenline demand increases to 553,200 vehicles per day toll-free, 42% greater than the 1990 volume or 3½ percent annual growth. SH 161 would maintain its 22 percent market share. As a tolled route, however, SH 161 traffic volumes would decline to less than one-half the toll-free volume. Traffic is primarily shifted to I-35E and the SH 161 frontage roads, with less dramatic shifts to International Parkway and local roads. The overall growth from year 2000 is 16 percent, or 1½ percent annual growth. As a toll-free route, both SH 161 and I-35E are saturated with traffic and, therefore, grow very little, with most of the growth occurring on International Parkway. The heavy overall saturation of the network produces an increased market share on SH 161 as a tolled route, which is 65 percent of the toll-free volume.

Screenlines 2 and 3 are presented in Tables IV-3 and IV-4 and provide a similar pattern of traffic growth and shifts. Screenlines 4 and 5 provide less insight into the relative merits of SH 161, but provide a regional backdrop for traffic growth.

The traffic patterns indicated by the screenline analysis provide a reasonable assurance as to the validity of the modeling effort. We are comfortable with the overall pattern of growth, the corridor allocations, and the market share of SH 161.

Performance Reports

Systemwide performance reports were prepared by NCTCOG to show operating characteristics of the highway system for each of the model runs. The system is broken into seven functional classifications (freeways, arterials, collectors, etc.) and for each

TABLE IV-2 Screenline 1 Traffic Forecasts					
Roadway	**1990 Pro forma**	**2000 FREE**	**2000 TOLL**	**2010 FREE**	**2010 TOLL**
International Parkway	51,200	79,600	85,800	140,100	152,000
SH 161 Main Line	86,000	121,700	56,600	126,700	82,200
SH 161 Frontage	4,100	12,400	24,000	14,800	17,900
I-35E	110,900	236,200	252,300	244,200	253,700
Local Roads	138,700	103,300	109,400	118,600	124,200
Total	390,900	553,200	528,100	644,400	630,000

TABLE IV-3 Screenline 2 Traffic Forecasts					
Roadway	**1990 Pro forma**	**2000 FREE**	**2000 TOLL**	**2010 FREE**	**2010 TOLL**
International Parkway	60,500	73,900	75,300	74,000	75,400
SH 161 Main Line	86,200	116,200	48,200	124,500	74,700
SH 161 Frontage	800	3,600	19,200	5,800	17,700
Local Roads	33,400	63,800	72,200	86,200	89,600
Total	180,900	257,500	214,900	290,500	257,400

TABLE IV-4 Screenline 3 Traffic Forecasts					
Roadway	**1990 Pro forma**	**2000 FREE**	**2000 TOLL**	**2010 FREE**	**2010 TOLL**
International Parkway	53,900	63,700	66,100	66,700	67,400
SH 161 Main Line	73,400	109,800	62,100	106,900	81,800
SH 161 Frontage	1,000	800	1,000	3,600	3,600
Local Roads	155,700	186,000	192,600	217,200	221,900
Total	284,000	360,300	321,800	394,400	364,700

classification, statistics provided include mileage, capacity, speeds, vehicle miles of travel (VMT), delay and level-of-service.

A review of these statistics indicates over time (1990 to 2010) that the trend is a relatively modest expansion of the highway system along with a substantial increase in travel (VMT), congestion and delays. Compared to the region as a whole, the City of Irving, particularly north of the SH 183, is expected to experience higher than average traffic growth. On a regional basis, the tolling of SH 161 does not change systemwide performance characteristics in a material way. However, there is a redistribution of traffic from the SH 161 mainline to the toll-free frontage roads and other alternative routings.

Select Link Analysis

It is possible with a traffic model to break down the traffic volumes on a specific link into the estimated number of trips between individual pairs of origin and destination zones, thereby providing insight into the expected users. In this current study, NCTCOG prepared for the year 2010 select link analyses of the ramps connecting SH 161 with SH 183 mainlines and the SH 161 mainline north of SH 114. It was assumed that there would be tolls at both locations roughly equivalent to 10 cents per mile—50 cents at the SH 161/SH 183 ramps and 25 cents on the SH 161 mainline north of SH 114. The select link analysis identified those trips which pass through both toll points and those which pass through one of the two toll points.

The analysis indicates that the majority of the trips using the full length of SH 161 are connecting points south and west of Irving with points north and east. To the south and west, these trips appear to be using SH 183 for access to and from areas such as Grand Prairie, Arlington, Euless and Bedford. To the north and east, these trips appear to be using I-635 for access to and from areas such as Farmers Branch, Addison, Carrollton and North Dallas.

Trips passing through one of the two toll points would generally be of a more local nature. Many of these trips would be generated by the continued development of Las Colinas and other parts of North Irving.

V. ANALYSIS OF REVENUE POTENTIAL

Based upon the toll structure and rate identified in Chapter III and using the traffic projections provided by NCTCOG for Screenlines 1 and 3 as presented in Chapter IV, we are able to identify the revenue potential for SH 161.

Model Adjustments

As shown in Table V-1, we have adjusted the model output during the years 2000 to 2010 to reflect the individual growth at each toll plaza as well as a period of adjustment as users become familiar with SH 161 and its highway function within the metropolitan area. The volumes were further adjusted to provide for a consistent trend of traffic growth over time. A final adjustment was made to reflect the expansion of Valley View Lane from two to four lanes which is expected to be complete by 2004—based on a review of the sensitivity analysis, traffic volumes were reduced by 5 percent from 2004 to 2010. The resulting traffic volumes became the basis for the application of tolls.

Base Case Toll Revenues

The base toll schedule has a $.25 toll for the toll plaza north of SH 114 and a $.50 toll at the interchange toll north of SH 183. We assume there will be a commercial vehicle toll set proportionately higher on a per-axle basis. We assume the commercial vehicles will be a small portion of total traffic (1%) for first five years increasing to 5% by the tenth year; the average commercial vehicle will pay two times the passenger car rate. The commuter nature of this area indicates that weekend traffic will be below average weekday levels. If weekend traffic is one-half the level of average weekday traffic, there will be approximately 300 equivalent weekdays per year. The calculation of base revenue levels is as follows:

Screenline 1	Year 2000
Adjusted Traffic (Toll: $.25)	34,000
Average Daily Revenue	$ 8,500
Annual Revenue (300 days per year)	$ 2.55 million
Adjusted Annual Revenue (Commercial Vehicles)	$ 2.58 million

Screenline 3	Year 2000
Adjusted Traffic (Toll: $.50)	37,200
Average Daily Revenue	$ 18,600
Annual Revenue (300 days per year)	$ 5.58 million
Adjusted Annual Revenue (Commercial Vehicles)	$ 5.64 million

Applying this procedure to each toll plaza for each year provides the revenue stream shown in Table V-2.

Table V-3 presents the coverage analysis for the base case reflecting the ability of toll revenues to cover the costs of operations and maintenance as well as debt service. Operating expenses are estimated to be 25 percent of gross toll revenues on the average. Debt service estimates prepared by the City of Irving are based on a project cost of $85 million, a total bond issue of $107 million, an interest rate of 6 percent and a term of 25 years.

As shown, by the second year of operation, toll revenues would be adequate to cover operating expenses and debt service (1.16 coverage). With gross toll revenues increasing more quickly than expenses, the coverage ratio would increase annually reaching 1.47 by the year 2010. It should be noted that the base case analysis assumes a constant toll level and therefore any programmed increase will increase revenues over time.

TABLE V-1 SH 161 Traffic Forecasts				
	Screenline 1 (SH 114 to I-635)		Screenline 3 (SH 183 to Rochelle)	
Year	Model	Adjusted	Model	Adjusted
2000	56,600 [A]	34,000	62,100 [A]	37,200
2001	58,800	41,200	63,800	44,600
2002	61,200	49,000	65,600	52,500
2003	63,700	57,300	67,400	60,700
2004	66,200	59,800	69,300	61,800
2005	68,900	65,100	71,300	66,400
2006	71,600	67,900	73,200	69,500
2007	74,500	70,800	75,300	71,500
2008	77,500	73,600	77,400	73,500
2009	80,600	76,600	79,600	75,600
2010	82,200 [A]	78,100	81,800 [A]	77,700

[A] Model Output: intermediate years extrapolated using average annual growth of 4% per year for Screenline 1 and 2.8% per year for Screenline 3.

TABLE V-2 SH 161 Base Case Gross Toll Revenues			
Year	Toll Plaza at Screenline 1	Toll Plaza at Screenline 3	Total
	(millions)		
2000	$ 2.6	$ 5.6	$ 8.2
2001	3.1	6.8	9.9
2002	3.7	8.0	11.7
2003	4.3	9.2	13.5
2004	4.5	9.4	13.9
2005	5.0	10.2	15.2
2006	5.2	10.6	15.8
2007	5.5	11.0	16.5
2008	5.7	11.5	17.2
2009	6.0	11.9	17.9
2010	6.2	12.2	18.4

TABLE V-3

SH 161 Base Case Coverage Analysis

Year	Gross Toll Revenues	Operating Expenses	Net Toll Revenues	Debt Service	Coverage Ratio
2000	$ 8,200,000	$ 2,100,000	$ 6,100,000	$ 6,400,000	0.95
2001	$ 9,900,000	$ 2,500,000	$ 7,400,000	$ 6,400,000	1.16
2002	$ 11,700,000	$ 2,900,000	$ 8,800,000	$ 7,100,000	1.24
2003	$ 13,500,000	$ 3,400,000	$10,100,000	$ 7,900,000	1.28
2004	$ 13,900,000	$ 3,500,000	$10,400,000	$ 8,100,000	1.28
2005	$ 15,200,000	$ 3,800,000	$11,400,000	$ 8,700,000	1.31
2006	$ 15,800,000	$ 4,000,000	$11,800,000	$ 8,500,000	1.39
2007	$ 16,500,000	$ 4,100,000	$12,400,000	$ 8,900,000	1.39
2008	$ 17,200,000	$ 4,300,000	$12,900,000	$ 8,700,000	1.48
2009	$ 17,900,000	$ 4,500,000	$13,400,000	$ 9,300,000	1.44
2010	$ 18,400,000	$ 4,600,000	$13,800,000	$ 9,400,000	1.47

Sources: Gross Toll Revenues - Vollmer Associates Estimates (2/96)
Operating Expenses - Assume 25 Percent Gross Toll Revenues
Debt Service - City of Irving Estimates Based on $107 Million Bond Issue; 6 Percent Interest; 25-Year Term

VI. SENSITIVITY ANALYSIS

Introduction

The traffic and revenue potential described previously is based on numerous assumptions and estimates. In reviewing the various inputs, several parameters have been identified which may vary somewhat from the base case. Changes to these parameters have been incorporated into the 2010 traffic model by NCTCOG to determine the effect on traffic and revenues. Following is a description of these changes with resulting traffic at the three east-west screenlines shown in Tables VI-1 and VI-2.

Case 1 - Regional Growth - Reducing 2010 demographic estimates by 10 percent over the entire region is analogous to limiting growth over the 1990 to 2010 period to 60 or 65 percent of the expected levels. Total traffic over the three east-west screenlines in this case would be some 8 to 12 percent below base case levels (2010 Toll). Traffic on the SH 161 mainline would be 6 to 9 percent below the base case in the southern end (screenlines 2 and 3) and 15 percent below the base case at the northern end (screenline 1). Gross toll revenues in this case would be 9 percent below base case levels.

Case 2 - Corridor Growth - Another test of the sensitivity to demographics assumed that the Irving study area population and employment were reduced by 20 percent leaving the rest of the regional growth unaffected. In this case the corridor growth in employment would be about 40 to 45 percent of expected levels and the population would actually be slightly below 1990 levels. Total traffic crossing the three east-west screenlines would be 6 to 19 percent below base case levels. SH 161 mainline traffic would be 8 to 11 percent below the base case in the southern end and 14 percent below the base in the northern end. Gross toll revenues would be 10 percent below base case levels.

Case 3 - Free Flow Speeds - This analysis assumed that the competitive toll-free roads in the corridor would operate at higher speeds and that the SH 161 mainline would operate at lower speeds than assumed in the base case. Valley View Lane, Belt Line Road and the SH 161 frontage road speeds would be increased by 5 mph reflecting possible signalization and other traffic engineering improvements. The SH 161 mainline speeds were reduced by 5 mph reflecting possible delays at the new mainline toll plazas. Total traffic crossing the screenlines would be very similar to base case levels—within 2 to 3 percent; however, there would be a major redistribution of traffic from the SH 161 mainline to the toll free roadways particularly the frontage roads. Some 20,000 to 30,000 vehicles per day would shift away from the toll road between Belt Line Road and I-635 representing up to one-third of the base case traffic levels. Gross toll revenues would be 18 percent below base case levels. This indicates that speeds are a particularly sensitive assumption and need careful evaluation.

Case 4 - Network Assumptions - In this case, Valley View Lane was assumed to be upgraded from two to four lanes between SH 183 and SH 161, along with corresponding increases in capacity and free flow speeds (+ 5 mph). Total screenline traffic would be very similar to base case levels. Traffic on the SH 161 mainline would be some 3,000 to 6,000 vehicles per day below base case levels representing a 4 to 8 percent reduction. In this analysis, the gross toll revenues would be 5 percent less than base case levels. As this improvement is planned for completion during the analysis period, traffic volumes were reduced by 5 percent from 2004 to 2010.

Case 5 - Toll Sensitivities - Three of the sensitivity runs prepared by NCTCOG were variations of the toll cost per mile as imposed by the model. The results of these runs are shown as Case 5 (6¢), Case 5 (8¢), Case 5 (10¢), all compared to the base case of 12¢ per mile. Taken at face value these results would produce the following traffic and revenues for 2010:

	SCREENLINE 1		SCREENLINE 3			
	Daily Traffic	Daily Revenue	Daily Traffic	Daily Revenue	Total Traffic	Daily Revenue
Case 5 (6¢)	106,700 (15¢)	$ 16,700	101,700 (25¢)	$ 25,400	208,400	$ 42 100
Case 5 (8¢)	93,100 (20¢)	18,600	92,500 (35¢)	32,400	185,600	51,000
Case 5 (10¢)	89,900 (25¢)	22,500	86,100 (45¢)	38,700	176,000	61,200
Base Case (12¢)	82,200 (30¢)	24,700	81,800 (55¢)	45,000	164,000	69,700

Plotting this data on a graph produces Figure VI-1. As shown, traffic declines at a relatively modest level, providing nearly evenly increasing revenues as the toll rate rises. While this may be appropriate as the road matures in 2010, we assume that the response in the first ten years of the toll road would be more elastic, and use the traffic output for 12¢ per mile and apply a rate closer to 10¢ per mile. This assumption implies that toll rates beyond the initial rates would not produce significantly more revenues in the early years. This is a reasonably conservative adjustment to the modeling process. Following are the adjusted model results used in calculating base case revenues, also shown on Figure VI-1.

	SCREENLINE 1		SCREENLINE 3			
	Daily Traffic	Daily Revenue	Daily Traffic	Daily Revenue	Total Traffic	Daily Revenue
Base Case	82,200 (0.25)	$ 20,600	81,800 (0.50)	$ 40,900	164,000	$ 61,500

Case 6 - Combination - This analysis assumed that lower growth in the corridor (Case 2) would occur in conjunction with higher speeds on the toll-free competitors (Case 3). Total screenline traffic would be 6 to 19 percent below base case levels as in the Case 2 analysis. Traffic on the SH 161 mainline would be affected more than either Case 2 or Case 3 individually but less than the addition of the Case 2 and Case 3 results. Between Belt Line Road and I-635, traffic on the toll road would be 20,000 to 35,000 vehicles per day less than base case levels representing about a 30 to 40 percent reduction; and in the southern end the affect would be less dramatic—some 10,000 vehicles per day

(14 percent) below the base case. Gross toll revenues would be 24 percent less than the base case in this analysis.

Case 7 - SH 190 Superconnector - This analysis assumes SH 161 is extended to the northeast connecting with SH 190, thereby completing a significant portion of the outer beltway. Total screenline traffic is relatively unchanged from the base case, within 4,000 to 6,000 vehicles per day (1 to 2 percent). Traffic on the SH 161 mainline would increase by 5,000 to 10,000 vehicles per day over base case levels (7 to 14 percent). Gross toll revenues would be about 9 percent greater than the base case. The relatively small change in revenues indicates that most trips desiring to use SH 161 are relatively short in length.

TABLE VI-1A Screenline 1 Traffic Forecasts						
Roadway	2010 Free	2010 Toll	2010 Sensitivity Case 1	2010 Sensitivity Case 2	2010 Sensitivity Case 3	2010 Sensitivity Case 4
International Parkway	140,100	152,000	138,200	144,500	150,400	150,600
SH 161 Main Line	126,700	82,200	70,200	70,500	53,600	76,000
SH 161 Frontage	14,800	17,900	16,500	17,200	41,800	23,200
I-35E	244,200	253,700	245,600	250,000	252,700	254,100
Local Roads	118,600	124,200	108,300	108,100	131,400	126,500
Total	644,400	630,000	578,800	590,300	629,900	630,400

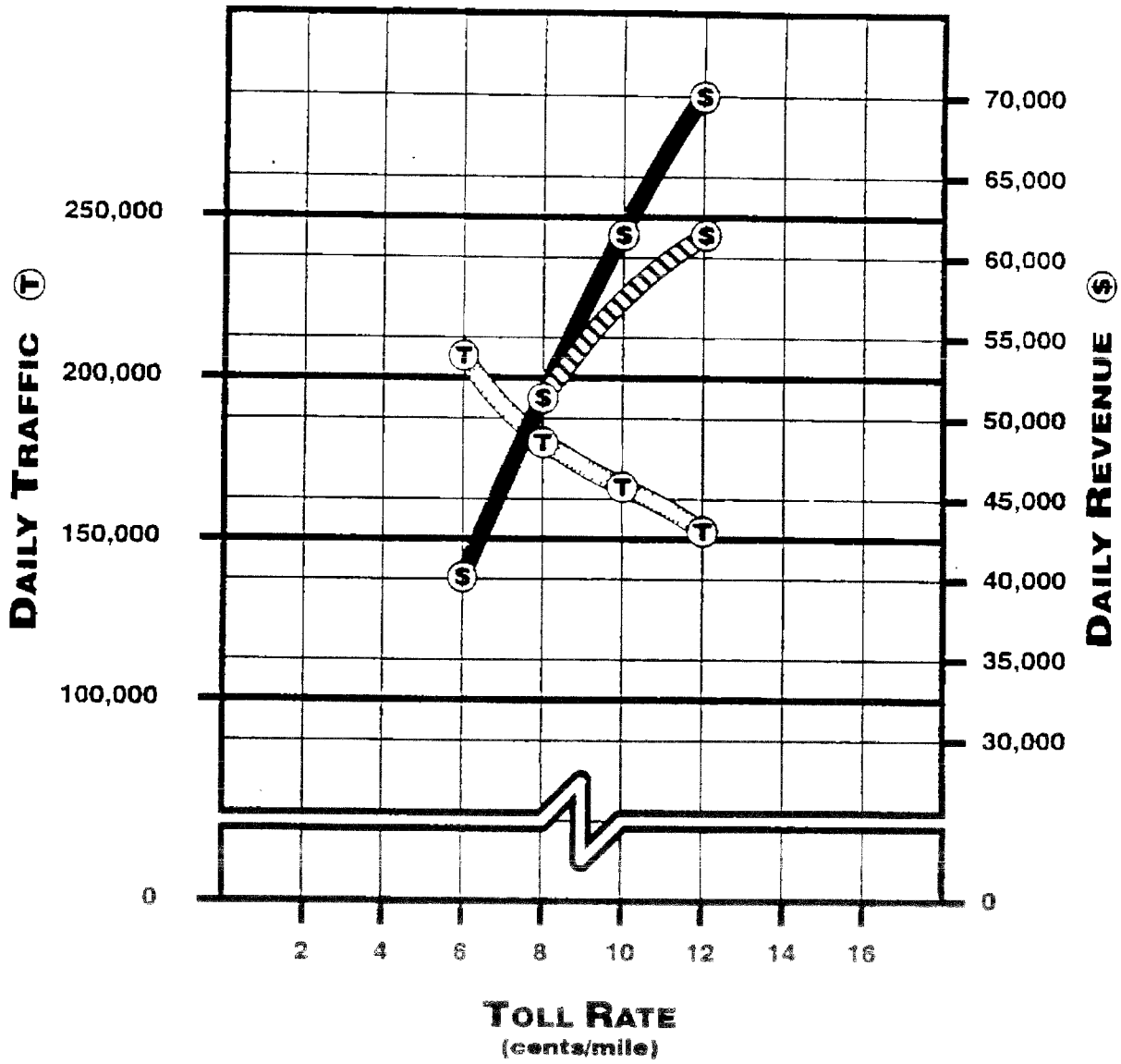
TABLE VI-1B Screenline 2 Traffic Forecasts						
Roadway	2010 Free	2010 Toll	2010 Sensitivity Case 1	2010 Sensitivity Case 2	2010 Sensitivity Case 3	2010 Sensitivity Case 4
International Parkway	74,000	75,400	67,000	62,000	74,900	75,100
SH 161 Main Line	124,500	74,700	68,000	67,000	58,000	70,100
SH 161 Frontage	5,800	17,700	16,400	16,100	24,900	15,400
Local Roads	86,200	89,600	79,500	71,900	104,400	97,100
Total	290,500	257,400	230,900	217,000	262,200	257,700

TABLE IV-1C Screenline 3 Traffic Forecasts						
Roadway	2010 Free	2010 Toll	2010 Sensitivity Case 1	2010 Sensitivity Case 2	2010 Sensitivity Case 3	2010 Sensitivity Case 4
International Parkway	66,700	67,400	58,500	54,600	66,500	67,200
SH 161 Main Line	106,900	81,800	76,600	75,600	75,000	78,800
SH 161 Frontage	3,600	3,600	2,300	1,600	4,000	1,600
Local Roads	217,200	221,900	191,100	172,300	217,900	215,900
Total	394,400	374,700	328,500	304,100	363,400	363,500

TABLE VI-2A Screenline 1 Traffic Forecasts							
Roadway	2010 Free	2010 Toll	2010 Sensitivity Case 5 (6¢)	2010 Sensitivity Case 5 (8¢)	2010 Sensitivity Case 5 (10¢)	2010 Sensitivity Case 6	2010 Sensitivity Case 7
International Parkway	140,100	152,000	146,100	147,700	147,900	143,600	147,600
SH 161 Main Line	126,700	82,200	106,700	93,100	89,900	47,400	93,800
SH 161 Frontage	14,800	17,900	16,300	18,800	17,300	38,300	20,000
I-35E	244,200	253,700	246,500	250,600	252,200	249,200	251,800
Local Roads	118,600	124,200	121,800	124,600	125,900	112,500	121,900
Total	644,400	630,000	637,400	634,800	633,200	591,000	635,100

TABLE VI-2B Screenline 2 Traffic Forecasts							
Roadway	2010 Free	2010 Toll	2010 Sensitivity Case 5 (6¢)	2010 Sensitivity Case 5 (8¢)	2010 Sensitivity Case 5 (10¢)	2010 Sensitivity Case 6	2010 Sensitivity Case 7
International Parkway	74,000	75,400	75,200	74,800	75,300	61,500	74,300
SH 161 Main Line	124,500	74,700	89,000	89,000	80,100	52,800	80,100
SH 161 Frontage	5,800	17,700	14,000	14,200	15,900	24,500	17,200
Local Roads	86,200	89,600	86,400	87,500	88,500	83,700	91,500
Total	290,500	257,400	274,600	265,500	259,700	222,500	263,100

TABLE IV-2C Screenline 3 Traffic Forecasts							
Roadway	2010 Free	2010 Toll	2010 Sensitivity Case 5 (6¢)	2010 Sensitivity Case 5 (8¢)	2010 Sensitivity Case 5 (10¢)	2010 Sensitivity Case 6	2010 Sensitivity Case 7
International Parkway	66,700	67,400	67,500	66,600	67,100	53,900	67,000
SH 161 Main Line	106,900	81,800	101,700	92,500	86,100	70,300	87,300
SH 161 Frontage	3,600	3,600	3,500	3,500	3,600	2,100	3,000
Local Roads	217,200	221,900	211,700	208,300	211,800	177,800	213,200
Total	394,400	374,700	384,400	370,900	368,600	304,100	370,500



SH 161 Study-Toll Rate Sensitivity

Figure VI-1