RAILROAD CROSSING STUDY
FOR
TWO PROPOSED RAILROAD CROSSINGS

Prepared for the
TOWN OF ADDISON

TOWN OF
ADDISON

Prepared By

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Prepared by:

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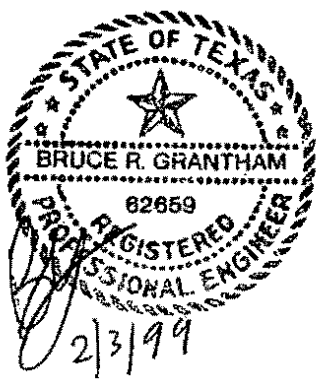

January, 1999

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Railroad Crossing Study for
Two Proposed Railroad Crossings
For the Town of Addison

LIST OF TABLES

LIST OF EXHIBITS

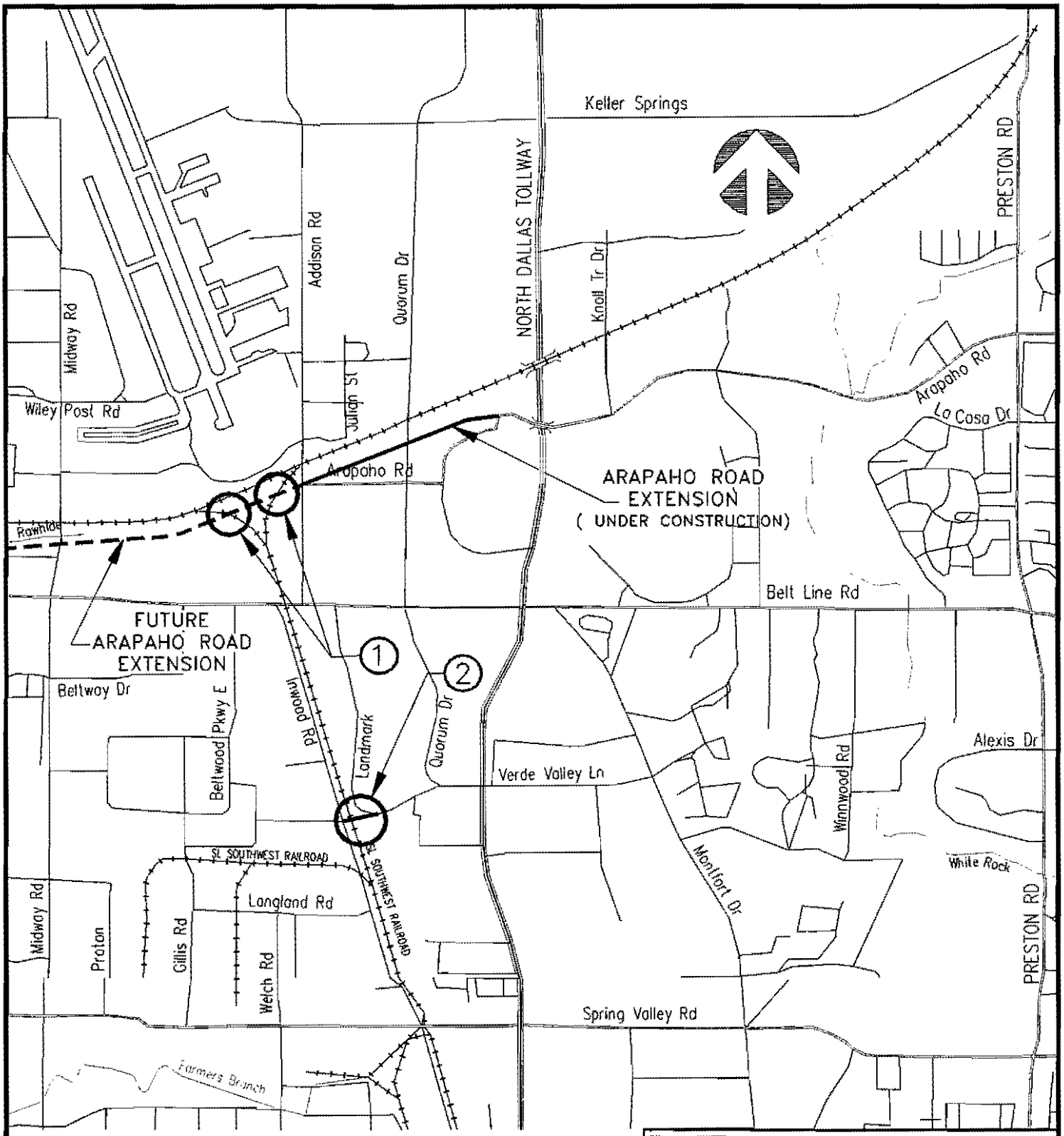
Section 1 *Introduction*

The Town of Addison is a community in north Dallas County that contains highly concentrated commercial and residential land uses. It is generally bordered by similar high density developments in the cities of Carrollton, Farmers Branch and Dallas. The hotels, office buildings, retail businesses and restaurants in Addison are daily destinations for many Dallas/Forth Worth residents and visitors. As a result, the primary transportation arteries in Addison are frequently overloaded with traffic.

The land adjacent to many of the busiest thoroughfares in Addison has been fully developed up to the existing right-of-way lines; consequently, it is not feasible to widen them. This has dictated that the Town of Addison look for alternative ways to relieve the local transportation network.

The extensions of Arapaho Road and Quorum Drive are two important thoroughfare improvement projects which have been identified by Addison's staff. These improvements involve crossing a Union Pacific railroad spur at the two locations shown in Exhibit A.

GBW Engineers, Inc. (GBW) was retained by the Town of Addison to update a previous 1994 study of the two proposed railroad crossings. The subsequent sections in this report contain a description of traffic conditions in the vicinity of the proposed crossings, alternatives to the crossings, and the construction impacts.



1 ARAPAHO ROAD CROSSING

2 QUORUM DRIVE CROSSING

Grantham, Burge & Waldbauer Engineers, Inc.

PROPOSED RAILROAD CROSSINGS

TOWN OF ADDISON

EXHIBIT A

Section 2 Traffic Conditions

The first phase of the previous study involved an evaluation of traffic conditions in the general area of the proposed railroad crossings. This phase included the following steps:

- Examine land use in the general area.
- Review existing historical and projected traffic volumes within the transportation network.
- Evaluate whether the proposed railroad crossings would help to alleviate traffic congestion.
- Determine if viable alternatives exist to the proposed crossings.

2.1 General Description of the Area

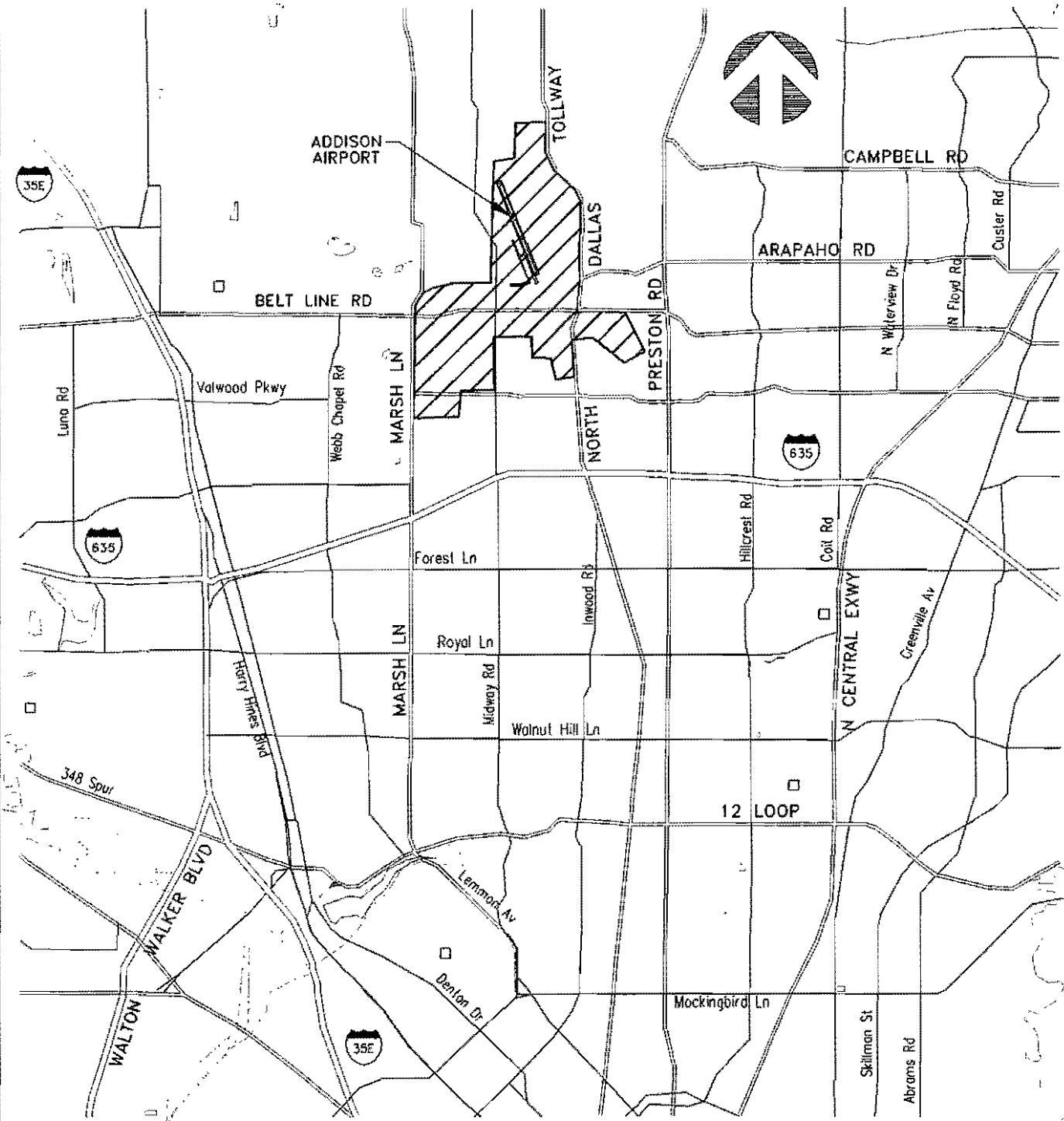
The Town of Addison is a north Dallas community with a residential population of 11,500 located in four and a half square miles. Exhibit B is a location map for the Town of Addison. Addison's population swells during the daytime hours to approximately 100,000 people who travel to work or to eat at one of the Town's 140 restaurants. There are approximately 1,500 single family homes, 22 apartment complexes and 17 hotels within the Town limits.

Numerous retail areas are located in and adjacent to Addison, totaling around 1.6 million square feet of retail space. Major Dallas retail centers, including the Galleria and Valley View Mall are adjacent to Addison.

The Addison Airport is the third busiest general aviation airport in the nation. It is home to approximately 750 aircraft.

One of the commercial areas that will benefit from the railroad crossings is the Quorum Drive/Landmark Boulevard business park, bounded by Belt Line Road, the North Dallas Tollway, Spring Valley Road and the Union Pacific railroad spur. This area currently contains 2.0 million square feet of office space. One-third of this land is vacant and open to future development.

A significant amount of high density commercial, retail, and residential construction is presently underway on the west side of the North Dallas Tollway. This includes multi-story office buildings just north and south of Spring Valley Road, and the mixed use Addison Circle development just north of Arapaho Road. Exhibit C is an aerial photograph which highlights the development density in the vicinity of the requested railroad crossings.



ADDISON CITY LIMITS

Grantham, Burge & Waldbauer Engineers, Inc.

LOCATION MAP

TOWN OF ADDISON

EXHIBIT B

1	CROSSING 1	6	BELTLINE ROAD
2	CROSSING 2	7	UNION PACIFIC RAILROAD
3	NORTH DALLAS TOLLWAY	8	ADDISON AIRPORT
4	MIDWAY ROAD	9	INWOOD ROAD
5	SPRING VALLEY ROAD	10	QUORUM DRIVE

Grantham, Burge & Waldbauer Engineers, Inc.

EXHIBIT C
AERIAL PHOTOGRAPH

2.2 Description of the Transportation Network

The Dallas North Tollway is a major north-south freeway which passes through Addison. It serves as a link between the north Dallas urban and suburban communities and downtown Dallas. Interstate Highway 635 (I.H. 635) is an east-west freeway located just south of Addison.

Preston Road (U.S. 289) is a six-lane divided urban thoroughfare which runs north and south on the east side of Addison. Midway Road and Marsh Lane are north-south urban thoroughfares which pass through Addison on the west side of town. Inwood Road/Addison Road is a four-lane undivided north-south thoroughfare which passes through the center of Addison.

The major thoroughfares which pass through Addison from east to west are Belt Line Road and Spring Valley Road, although only the portion of Spring Valley Road between Midway Road and Marsh Lane is located within Addison's city limits. Belt Line Road, which is a continuous loop around Dallas County, is one of the most congested urban roadways in the region.

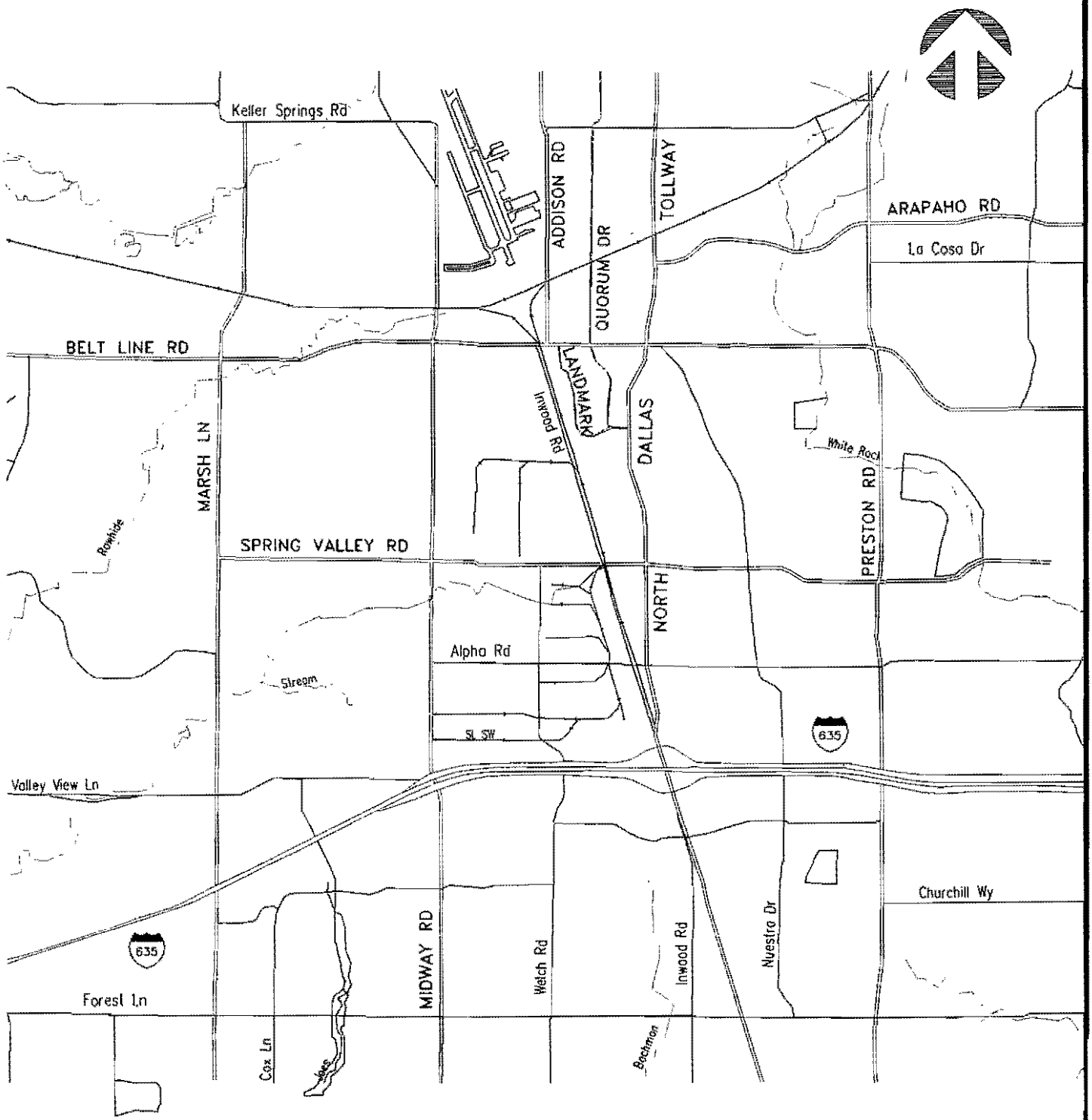
Arapaho Road is a major thoroughfare which enters Addison from the east and currently ends just west of the Dallas North Tollway. An extension of Arapaho Road, from just west of the Tollway to Addison Road, is presently under construction. The further extension of Arapaho Road from Addison Road west to Marsh Lane would require one of the two proposed railroad spur crossings.

These major freeways and thoroughfares are shown on Exhibit D.

2.3 Capacity of the Transportation Network

Traffic congestion on Belt Line Road within the city limits prompted the Town of Addison to commission a traffic study. This study included a tabulation of the recorded traffic volumes for different segments of Belt Line Road from 1982 to 1996. This tabulation, which is provided in Table 1, indicates the steady increase in traffic volumes during this period.

In addition, the study included a comparison of traffic volumes and Level of Service (LOS) between 1996 traffic volumes on Belt Line Road and projected volumes for the year 2020. This comparison for the section of Belt Line Road just west of Addison Road and east of Midway Road is summarized in Table 2.



Grantham, Burge & Waldbauer Engineers, Inc.

MAJOR THOROUGHFARES

TOWN OF ADDISON

EXHIBIT D

TABLE 1

TRAFFIC STUDY TABULATION

Street	Location	VPD 1982	VPD 1986	VPD 1989	VPD 1993	VPD 1996	Difference 1996-1989	% Increase From 1989
ARAPAHO ROAD	Addison Road to Spectrum	7000	10115	6205	16097	13266	7061	113.80%
	Spectrum to Dallas Parkway	8300	11640	10379	11731	11181	802	7.73%
BELT LINE ROAD	West of Marsh Lane	23000	41115	39539	42847	54212	14673	37.11%
	Marsh Lane to Surveyor Blvd.	29600	41411	36171	41054	54846	18675	51.63%
	Surveyor Blvd. To Midway Road	25200	38435	36395	40010	52709	16314	44.82%
	Midway Road to Beltway	33300	48249	41928	54199	59148	17220	41.07%
	Beltway to Addison Road	38200	54442	44772	52243	69591	24819	55.43%
	Addison Road to Quorum Drive	NA	42387	42340	49028	68757	26417	62.39%
	Quorum Drive to Dallas Parkway	NA	38084	40788	44949	66777	25989	63.72%
	Dallas Parkway to Montfort	36000	34882	37332	42046	49905	12573	33.68%
	Montfort to White Rock Creek	37500	32612	43037	42192	51045	8008	18.61%

VPD = Vehicles Per Day

TABLE 2

COMPARISON OF TRAFFIC VOLUMES AND LEVEL OF SERVICE (LOS)
FOR BELT LINE ROAD

Scenario	Daily Volume Just West of Addison Road	Link LOS	Volume Capacity	Daily Volume Just East of Marsh Lane	Link LOS	Volume Capacity
1996 Count	69,591	F	1.60	54,846	F	1.26
Yr 2020 w/Arapaho to Marsh Lane	54,000	F	1.24	43,000	E	.99

The capacity of Belt Line Road was established using data obtained from the North Central Texas Council of Governments (NCTCOG), which is a regional planning agency. NCTCOG has developed a regional traffic model for the Dallas-Fort Worth metroplex which can be accessed by local municipalities for transportation planning purposes. A daily capacity of 43,500 vehicles was used for the Volume/Capacity calculations. The year 2020 scenario assumes that Arapaho Road is extended from Addison Road to Marsh Lane.

LOS is a quantitative measure identifying how effectively traffic is managed along a roadway link and is defined by categories A through F. The Highway Capacity Manual (Special Report 209) provides the following general statements regarding arterial LOS:

> *Level-of-service A* describes primarily free flow-operations at average travel speeds usually about 90 percent of the free flow speed for the arterial class. Vehicles are completely unimpeded in their ability to maneuver within the traffic stream. Stopped delay at signalized intersections is minimal.
>
> *Level-of-service B* represents reasonably unimpeded operations at average travel speeds usually about 70 percent of the free flow speed for the arterial class. The ability to maneuver within the traffic stream is only slightly restricted and stopped delays are not bothersome. Drivers are not generally subjected to appreciable tension.

*Level-of-service C represents stable operation. However, ability to maneuver and change lanes in mid-block locations may be more restricted than in LOS B, and longer queues and/or adverse signal coordination may contribute to lower average travel speeds of about 50 percent of the average free flow speed for the arterial class. Motorists will experience an appreciable tension while driving.

*Level-of-service D borders on a range in which small increases in flow may cause substantial increases in approach delay and, hence, decreases in arterial speed. This may be due to adverse signal progression, inappropriate signal timing, high volumes, or some combination of these. Average travel speeds are about 40 percent of free flow speed.

*Level-of-service E is characterized by significant approach delays and average travel speeds of one-third of the free flow speed or lower. Such operations are caused by some combination of adverse progression, high signal density, extensive queuing at critical intersections, and inappropriate signal timing.

*Level-of-service F characterizes arterial flow at extremely low speeds below one-third to one-quarter of the free flow speed. Intersection congestion is likely at critical signalized locations with high approach delays resulting. Adverse progression is frequently a contributor to this condition.

Table 2 confirms that the extension of Arapaho Road reduces the projected increase in traffic volumes on Belt Line Road through the year 2020. In the vicinity of Addison Road, the Arapaho project is to projected to divert 14,000 to 15,000 vehicles per day from Belt Line Road resulting in a net improvement in LOS from the existing condition. Near Marsh Lane, the NCTCOG traffic model predicts that the Arapaho Road extension will result in a 28% net diversion of traffic from Belt Line Road of about 11,000 vehicles per day with a resulting improvement in the LOS. Consequently, the Arapaho Road extension, with the associated railroad spur crossing, is considered vital to the improvement of Addison's transportation network.

In addition to the Arapaho Road railroad spur crossing at Location 1, a second spur crossing located between Belt Line Road and Spring Valley Road, was evaluated (See Exhibit A). The primary factors that provide the impetus for a second railroad crossing are outlined below:

- Westbound traffic crossing under the Dallas North Tollway on Valley Verde cannot connect with a north-south arterial south of Belt Line Road.

- The North Dallas Tollway service road on the west side between Verde Valley and Spring Valley only provides access for southbound vehicles.

- The Quorum Drive/Landmark Boulevard business park contains high-rise commercial and hotel development. The remaining undeveloped land in this business park is slated for similar high-density development. Traffic from these developments cannot connect with a north-south arterial south of Belt Line Road.

- There is no way for eastbound traffic to enter the Quorum Drive/Landmark Boulevard business park other than from Belt Line Road.

- In order to access the Inwood Road/Addison Road arterial at the nearest point, traffic from Verde Valley and the Quorum Drive/Landmark Boulevard business park must first travel west on Belt Line Road or go south on the Tollway service road and west on Spring Valley.

- The property south of Quorum Drive/Landmark Boulevard, including the Princeton and Wellington office buildings, can only be entered from the north and exited to the south on the Tollway service road. Not only is this difficult for the users of the property, it is also difficult for emergency service vehicles that have to deal with limited access and severe congestion.

- A railroad crossing between Belt Line Road and Spring Valley Road at Location 2, Exhibit A, would provide additional relief to the severely congested southbound Tollway service road and provide relief for Belt Line Road.

2.4 Alternatives to the Railroad Crossings

Belt Line Road, from the Dallas North Tollway to Marsh Lane, has been largely developed on both sides up to a 100-foot wide road right-of-way (R.O.W.). Nine-foot-wide parkways are typical behind the curb on both sides of the roadway. The existing commercial, retail and restaurant developments that abut most of this portion of Belt Line road make a roadway widening project impractical. Consequently, upgrading the existing railroad by widening the crossing at Belt Line Road is not feasible.

A similar condition exists with the existing developments along Spring Valley Road between the Dallas North Tollway and Marsh Lane. In addition, the railroad crossing at Spring Valley Road is located within the city limits of Farmers Branch. As a result, the Town of Addison does not have the jurisdiction required to widen this crossing. Given the degree of traffic

congestion in the general area, and the difficulty emergency vehicles have in accessing the Quorum Drive/Landmark Boulevard business park, an additional railroad crossing (No. 2 on Exhibit A) between Belt Line Road and Spring Valley Road is essential.

Grade-separated crossings at the Arapaho Road and Quorum Drive extensions were also considered. At Quorum Drive, there is not sufficient room to construct the ramps required for a grade-separated crossing. At Arapaho Road, a grade-separated crossing would have to span a wye portion of the spur and Addison Road. The height of an elevated crossing at this location would represent a safety hazard for the aircraft at neighboring Addison Airport, as the bridge would be located across the flight path. In addition, there is not sufficient room between Addison Road and the railroad spur to construct an underpass. Therefore, grade-separated crossings are not viable alternatives to the proposed at-grade crossings.

Section 3 Construction Impacts

The second phase of the previous study involved a review of the construction impacts associated with the proposed railroad crossings. This phase included the following considerations:

- Geometric considerations of the railroad crossings.
- Impact of the crossings on railroad operations.

3.1 Geometric Considerations

The extension of Arapaho Road (see Location 1 - Exhibit A) across a wye portion of the an industrial spur will require dual at-grade railroad crossings. These crossings would occur at approximate elevations of 628 and 630 mean sea level (msl). The intersection of Addison Road and Arapaho Road is at an approximate elevation of 630 msl. Consequently, the road extension across the wye would be relatively flat. The future horizontal alignment for the Arapaho Road extension shown in Exhibit E maintains an approximate minimum horizontal clearance of 50 feet from the southernmost trunk railroad track (see Exhibit E).

An extension of Quorum Drive/Landmark Boulevard across the railroad spur (see Location 2 - Exhibit A) will require a single at-grade crossing. This crossing, as shown in Exhibit F, occurs at an approximate elevation of 633. The Inwood Road intersection would occur at an approximate elevation of 630. A straight grade of 5.5%± would result between the track and Inwood Road (see Exhibit F).

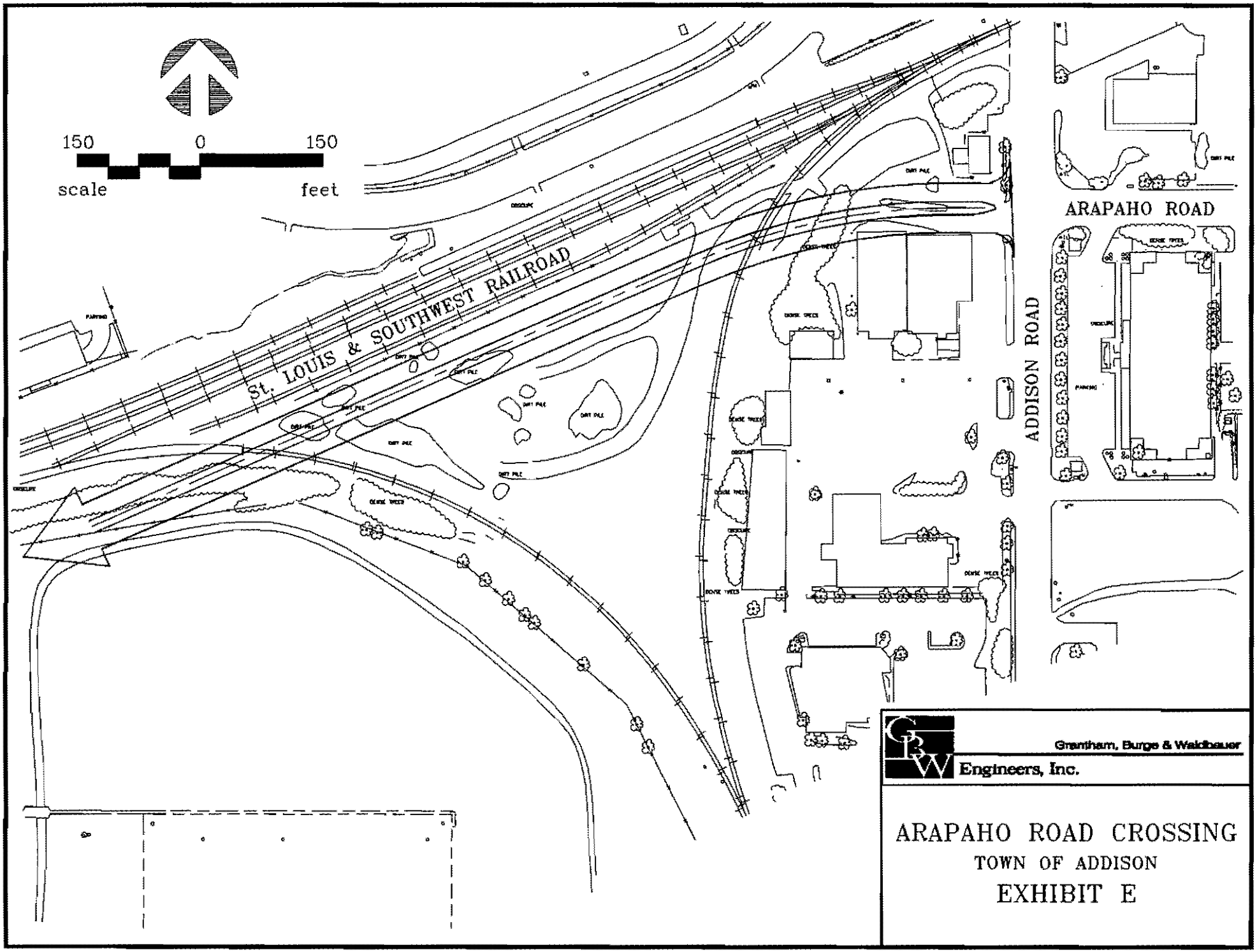
Although the horizontal and vertical geometrics would need to be evaluated in more detail during the design phase, there appear to be no geometric constraints which would prohibit the aforementioned railroad crossings.

3.2 Railroad Impacts

The following are three impacts on the railroad which have been identified as a result of the two proposed crossings.

- The two tracks at the Arapaho Road wye crossing would not be crossed at right angles, resulting in a less than ideal line of sight condition. A fully signalized crossing with gates would be proposed to mitigate this condition.
- The impact on switching movements at the wye would need to be considered. Addison previously completed an upgrade of the Addison Road railroad crossing which relocated a switch out of the road crossing and realigned one of the wye tracks.

- Three spur tracks would be crossed at the Quorum Drive/Landmark Boulevard location. Coordination with railroad operations would be required to determine the impact of the multiple track crossing. A fully signalized crossing with gates would be proposed to mitigate the concerns associated with this crossing.



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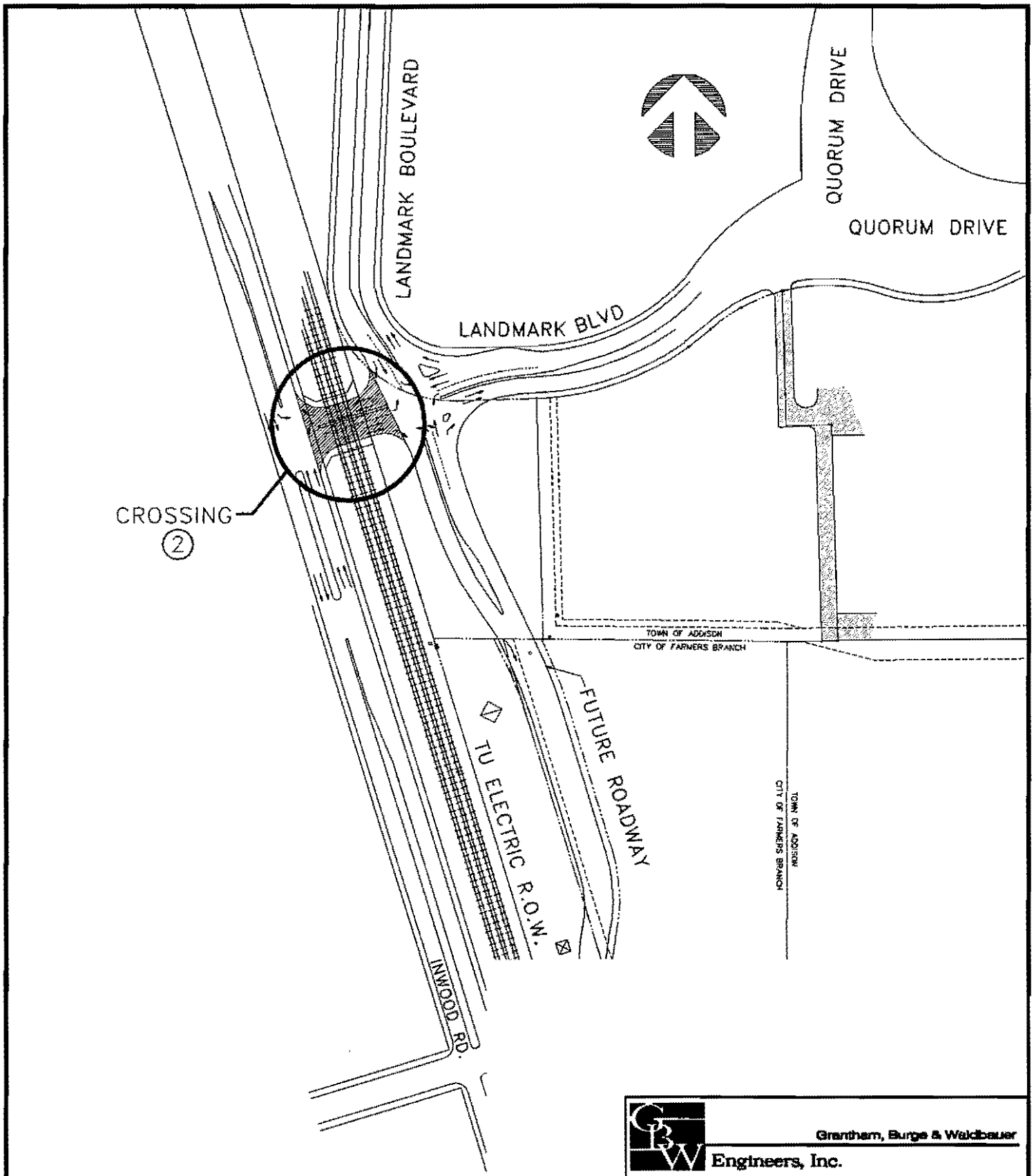
ARAPAHO ROAD CROSSING

TOWN OF ADDISON

EXHIBIT E



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Engineers, Inc.

QUORUM DRIVE
PROPOSED
SOUTHERN ALIGNMENT
TOWN OF ADDISON
EXHIBIT F

Section 4 Conclusions and Recommendations

Rapid growth in north Dallas and the neighboring suburban communities has resulted in traffic congestion on many urban thoroughfares. The Town of Addison, which is in the center of the growth corridor, is highly developed with commercial, hotel, retail and restaurant developments either inside or adjacent to its city limits; consequently, its primary thoroughfares are particularly congested.

A traffic study commissioned by Addison demonstrates the existing poor level of service on Belt Line Road, the busiest east-west thoroughfare. There is no room for the expansion of Belt Line Road within the present right-of-way, and existing developments on both sides of this roadway make a widening project impractical. The most feasible way to relieve one of the most congested segments of Belt Line Road is to continue the extension of Arapaho Road from Addison Road west to Marsh Lane. This extension involves the crossing of a wye on the Union Pacific spur just west of Addison Road. This is the first railroad crossing requested by the Town of Addison.

The second railroad crossing requested by Addison is also designed to relieve the severely congested southbound Tollway service road along with Belt Line Road. In addition, this railroad crossing will provide better access for emergency vehicles to and from the Quorum Drive/Landmark Boulevard business park. Presently, there is no way for eastbound traffic to access this business park other than from Belt Line Road. If Quorum Drive were extended across the Union Pacific spur, access to the business park would be provided to Inwood Road, a north-south thoroughfare which connects with alternative east-west thoroughfares.

The Town of Addison recognizes that the proposed railroad crossings affect railroad operations, however, the pressing need to upgrade an already overloaded road network in this area provides the Town with no other practical alternative. Addison has a strong desire to work with Union Pacific to mitigate any concerns regarding the impact of the proposed crossings on the affected railroad spur.