1993 Keller Springs Tunnel Correspondence

BARTON-ASCHMAN ASSOCIATES, INC.

5485 Belt Line Road, Suite 199 • Dallas, Texas 75240 USA • (214) 991-1900 • Fax: (214) 490-9261

File
Keller Springs

DRAFT MEMORANDUM

To: Ron Whitehead
Town of Addison

From: Gary Jost

Date: June 9, 1993

Subject: **Addison Toll Tunnel Analysis**

This memorandum presents the findings and recommendations of the analysis of various transportation issues related to the proposed Addison Toll Tunnel. Specifically, the following three issues are addressed:

- Impact of Arapaho Road extension on toll tunnel projections.
- Impact of proposed toll tunnel on Addison Airport circulation and access.
- Impact on adjacent signalized intersections by toll tunnel traffic.

These three key issues are discussed separately below:

Arapaho Road Extension

The extension of Arapaho Road from its existing terminus at Addison Road to Marsh Lane has been proposed to alleviate traffic congestion on Belt Line Road and provide increased mobility for Addison residents. The roadway is included in the Addison Thoroughfare Plan as a four lane divided arterial. The estimated traffic volumes and the impact of the roadway on projected toll tunnel volumes have been evaluated on two occasions: as part of the development of the Addison Transportation Plan and more recently by Wilbur Smith Associates (WSA).

The first evaluation utilized the regional traffic forecasting models for the area developed by the North Central Texas Council of Governments (NCTCOG). The evaluation of traffic assignments with and without the extension of Arapaho Road concluded that there was no significant impact on project toll tunnel volumes by the Arapaho Road extension. A copy of our December 18, 1992 memorandum reporting these results is attached.

The second evaluation, conducted by WSA and reported in their May 13, 1993 letter, utilized WSA's model specifically developed to develop traffic volumes and revenue projections for the Toll Tunnel. This report is attached for your review. The WSA evaluation indicated a fifteen percent (15%) decrease in vehicles per day assuming full build-out of the Arapaho extension in the year 2010. This also assumes a $.50 toll for the tunnel.

Barton-Aschman has reviewed WSA's report and subsequent limited information provided by WSA and offer the following comments:

- The reduction of the toll from $.75 to $.50 results in a fourteen percent (14%) decrease in revenues in the year 2010 exclusive of the extension of Arapaho.

- The report confirms that the Arapaho Road extension serves primarily to reduce traffic volumes on Belt Line Road. Although this indirectly affects the toll tunnel projections, the Arapaho Road extension does not directly compete with the tunnel. A significant increase in Belt Line Road capacity (i.e. grade separations and/or additional lanes) could have a similar effect on toll tunnel volumes.

- The originally forecast volumes (at a $.50 toll and without the Arapaho extension) indicated that 25,500 vehicles per day (vpd) would use the proposed tunnel. Based on peak hour factors and directional splits assumed in the original traffic and revenue report prepared by WSA, approximately 1,800 vehicles would utilize the tunnel in one direction during the AM peak hour. This volume equals the saturation flow rate of a single arterial lane unaffected by delays at traffic signals. With this volume of traffic, the opportunity for the toll tunnel to offer an advantage in time and operating conditions could be significantly affected and traffic volumes could decrease until this advantage is once more achieved. An analysis of delays at the intersection on either side of the tunnel is presented later in this memorandum.

Addison Airport

The proposed tunnel impacts circulation and access within the Addison Airport. At its eastern terminals, a vehicular access drive has been proposed immediately adjacent to the tunnel intersection with Addison Road. This proposal would present operational and safety concerns because it would, in effect, create a fifth approach to the intersection. The proposed driveway location also does not address potential expansion opportunities of the tunnel and would have to be relocated if the tunnel is expanded. An alternative access and circulation plan for this area of the airport has been prepared and submitted to the Town of Addison for review. Costs for implementing this revised plan have not been prepared, but should be included in the total tunnel project costs.

Properties adjacent to the western terminus of the tunnel will lose access to the signalized intersection at Keller Springs Road and Midway Road. Other properties along the west side of the airport will be provided access only from Dooley Road which will in be converted to a cul-de-sac under the present proposal. Dooley Road is accessed from Midway Road at a unsignalized intersection. A revised access plan should be prepared for this area which provides additional access to these properties and considers future expansion of the Addison Airport.

Intersection Analysis

The proposed toll tunnel will complete Keller Springs Road between IH 35 and Preston Road and provide an important regional transportation link for the area. The existing segments of

Keller Springs Road has critical signalized intersections which will be impacted by tunnel traffic. These intersections have been analyzed and findings reported in the attached memorandum dated May 5, 1993. The analysis identifies the following specific intersection improvements to mitigate the impact of the proposed tunnel:

Keller Springs at Midway

- Widen the north, west, and south approaches to provide dual left turn lanes.
- Widen the east approach to include a single left, two throughs, and an exclusive right turn lane.
- Provide exclusive right turn lanes on the west and south approaches.

Keller Springs at Addison Road

- Widen the west approach to provide a single left, two throughs, and an exclusive right turn lane.
- Widen the east, south, and north approaches to provide dual left turn lanes.

Keller Springs at the Dallas North Tollway

- Additional analysis is currently underway at this intersection.

Without the traffic that is projected to use the tunnel, these intersections, excluding the Keller Springs/DNT intersection during the PM peak hour would operate at acceptable levels of service. Without the recommended improvements described above, all intersections will operate at unacceptable levels of service when toll tunnel traffic is included. Vehicular delays at these intersections could equal or exceed delays currently being experienced at major intersections along Belt Line Road if intersection improvements are not implemented. The cost of these improvements should be included in the total toll project costs.

Recommendations

Based upon the findings of this study, we would offer the following conclusions and recommendations:

- The extension of Arapaho Road will serve it intended purpose of providing improved mobility to Addison residents by offering additional east/west capacity for local travel. We therefore recommend that the Arapaho Road extension remain on the Addison Thoroughfare plan and Right-of-Way be reserved for its construction.

- The proposed toll tunnel impacts circulation and access to the Addison Airport. Additional planning should be undertaken to develop a comprehensive circulation and access plan for the airport considering both the existing conditions and future expansion plans for the airport and the costs of implementation included in the toll project costs.

- The proposed intersection improvements are directly attributable to the traffic using the proposed toll tunnel. These improvements should be implemented prior to the opening of the tunnel and included in the toll project costs.

- The proposed toll tunnel offers an excellent opportunity for improving regional mobility in the area but will not, by itself, relieve traffic congestion on Belt Line Road.

Gary\whitehea.mem

FILE
Keller Springs

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May 27, 1993

Mr. Robert Wunderlich
Principal Associate
Barton-Aschman Associates, Inc.
5485 Beltline Road
Suite 199
Dallas, Texas 75240

Dear Mr. Wunderlich:

I received your letter of May 19, 1993 concerning the additional information you requested on the Arapaho Road Extension project as it relates to the Addison Toll Tunnel. You indicated in that letter that you required some additional information in order to complete your evaluation of the information provided.

Enclosed for your use is a listing of the network attributes for the focus area involved in the assignment process. It should be self-explanatory and useful for your continued evaluation. The item concerning the percentage of traffic that would use the Dallas North Tollway and the proposed Toll Tunnel from our original projections indicated that approximately 6.8 percent of all the trips using the project would make use of the Dallas North Tollway to access the Downtown Dallas region. This is unchanged from the final feasibility report provided to the Texas Turnpike Authority. Finally, the information that you requested for the travel time and cost algorithms used in the assignment process cannot be provided to you. You can certainly appreciate that this information is proprietary to Wilbur Smith Associates and is not available for transmission to Barton-Aschman for your use.

In any case we have now provided all the information that we believe can reasonably be expected on this project and trust that it meets your requirements.

If you have any questions regarding the information provided, please do not hesitate to call.

Sincerely,

WILBUR SMITH ASSOCIATES

John Smolley, Jr.
Associate

JS/mla
cc: Gary D. Jost - Barton-Aschman
John Baumgertner - Town of Addison

5/27/93

Town of Addison
KELLER SPRINGS TOLL TUNNEL
POSITION PAPER

The Town of Addison feels strongly that both the proposed Keller Springs Toll Tunnel project and the extension of Arapaho Road within the Town limits are needed to help meet transportation needs of the region and the Town. The Town has long recognized the importance of an effective transportation system to its success and continued growth. The Town has worked with neighboring cities, Dallas County, the Texas Department of Transportation (TxDOT), the North Central Texas Council of Governments (NCTCOG), and the Texas Turnpike Authority (TTA) to encourage and assist in the planning and implementation of a transportation system that meets both the needs of the Town and region.

The Keller Springs Tunnel has long been recognized as a logical transportation link that would significantly increase east-west roadway capacity in the highly congested North Dallas County Corridor. The Tunnel would link two existing segments of Keller Springs Road creating a major regional arterial that would increase accessibility to the Dallas North Tollway (DNT). Recently, the Tunnel has been proposed as a tollroad project by the TTA. The Keller Springs Toll Tunnel offers an excellent opportunity for improving regional mobility in the area but will not, by itself, relieve traffic congestion currently being experienced within the Town of Addison.

The improvement of local mobility and accessibility is an equally high priority for the Town. The extension of Arapaho Road, from its existing terminus at Addison Road, to Marsh Lane has been planned to alleviate traffic congestion on Belt Line Road and provide increased local accessibility to serve the needs of both businesses and citizens of the Town. The Town began acquiring right-of-way for the Arapaho Road extension in 1987 and more recently has prepared schematic design plans for the extension. The roadway is included in the Town of Addison Thoroughfare Plan as a four-lane divided arterial. The Town Council is unanimously committed to the construction of Arapaho Road.

The Town of Addison heartily supports the continued study, planning, and implementation of these two important projects for the area. The recent study conducted by Wilbur Smith and Associates (WSA) for the Town confirmed the Town's belief that the two facilities do not directly compete. Arapaho Road serves to reduce traffic volumes and congestion on Belt Line Road rather than providing a desirable alternative to the Keller Springs Tunnel. Although the WSA report identifies a marginal impact on Toll Tunnel volumes with the Arapaho Road extension in place, the Town maintains its position that the construction of the Arapaho Road extension will have no appreciable impact of the projected Toll Tunnel volumes for the following reasons:

- Travel forecasts developed by the NCTCOG, as part of the Town of Addison Transportation Plan Development Study, projected no decrease in traffic volume using the Keller Springs Tunnel resulting from the extension of Arapaho Road.

- East/west travel demand in the corridor continues to increase as evidenced by the increasing levels of congestion in the area. Traffic volumes on Belt Line Road are increasing at an annual rate of three percent (3%). Any increased

capacity in the corridor will be effectively utilized.

- Projected year 2010 volumes (at a $0.75 toll) on Arapaho Road between Addison Road and Midway Road are in excess of 32,000 vehicles per day (VPD). This equates to a volume to capacity ratio of (v/c) of 1.30. This v/c ratio indicates a high level of congestion on this roadway segment. Drivers typically divert to alternate routes when levels of congestion reach this level. Both Belt Line Road and the Keller Springs Toll Tunnel are projected to have lower v/c ratios.

- Arapaho Road will serve local traffic while the Keller Springs Toll Tunnel will serve to improve accessibility to the Dallas North Tollway for vehicle trips originating or having destinations in the Keller Springs corridor west of Addison Airport.

The extension of Arapaho Road and the Keller Springs Toll Tunnel are two important elements of a transportation system for the North Dallas County Area. Properly planned and implemented, these projects will provide improved mobility to local and regional traffic in the area.

The Town of Addison also maintains that, in order to maximize the success of the proposed Keller Springs Toll Tunnel, the project should be planned and developed as part of a system rather than a singular roadway segment. The ability of the Tunnel to attract traffic will be dependent on its ability to offer motorists reduced travel time. This advantage can only be achieved through an efficient transportation system serving the Toll Tunnel. The failure of any segment of the system will decrease the ability of the Tunnel to provide a travel time advantage. Therefore, the Town proposes that the following items be included in future planning and analysis of the Keller Springs Toll Tunnel project:

- **Impact on Keller Springs Road** - Keller Springs Road will be the primary roadway serving the Tunnel. There are several critical intersections along Keller Springs Road that will be impacted by the additional traffic using the Tunnel. These intersections include Keller Springs and the Dallas North Tollway, Keller Springs and Addison Road, Keller Springs and Midway Road and Keller Springs and Marsh. The intersections of Keller Springs with the Dallas North Tollway, Midway, and Marsh currently experience extremely high volumes during the peak hours. The Town has conducted an evaluation of the intersections within its Town limits and has concluded that significant roadway improvements will be necessary to provide an acceptable level of service at these critical intersections.

  The ability of Keller Springs to provide access to adjacent properties while providing acceptable levels of service should also be evaluated. Keller Springs Road is currently a four-lane divided facility both east and west of the proposed Tunnel. Adjacent property along these segments is mostly undeveloped. The ability to meet both local access needs, which require a higher level of access, and regional transportation needs, which desire limited access to adjacent properties, must be carefully studied to insure that both needs are met.

- **Impact on Addison Airport** - The proposed Tunnel impacts the operations of Addison Airport including vehicular and aircraft circulation, and access to adjacent businesses. The Airport provides a major economic benefit to the Town and maintaining its economic viability is of the utmost importance. The engineering report prepared as part of the Keller Springs Toll Tunnel Feasibility Analysis included four million dollars for Right-of-Way acquisition. The Town feels that this amount is not adequate to properly address the impacts of the Toll Tunnel on the Airport and proposes that additional study be conducted to identify the total cost of recommendations to mitigate all impacts to the Addison Airport.

- **Impact of Toll Booths on Intersection Operations** - The proposed location of the Tunnel toll booths is approximately 150 feet east of the intersection of Keller Springs Road and Midway Road. This location has raised concerns that traffic waiting to enter the Tunnel will queue up into the intersection creating an unsafe condition. No analysis to date has been presented to alleviate these concerns. Further study should be undertaken to ensure that queues created at the toll booths do not create unsafe conditions at adjacent intersections.

- **Impact on Dallas North Tollway** - The proposed Tunnel will provide a direct link to the Dallas North Tollway via Keller Springs Road. This will provide increased volumes for the DNT directly resulting from the Toll Tunnel. Because of this direct benefit, the Town of Addison feels that the proposed Tunnel should be included as part of the DNT system rather than be a separate project. This inclusion into the DNT system would insure the financial success for the Tunnel.

  As stated earlier, the proposed Tunnel will impact the intersection of Keller Springs Road and the Dallas North Tollway. The ability of this intersection to operate at an acceptable level of service will be important to the desirability of the Toll Tunnel route. The additional analysis to identify improvements to this intersection should include alternatives that would provide a direct link between the Toll Tunnel and the DNT.

The inclusion of an analysis to identify the improvements that will create a safe and effective transportation system to serve the proposed Toll Tunnel will certainly identify additional costs that should be included in the financial feasibility analysis of the project.

In summary, the Town of Addison supports the Keller Springs Toll Tunnel as well as the extension of Arapaho Road. Both projects are necessary to provide a safe and effective transportation system to meet the needs of the Town and the region. The Town is committed to the extension of Arapaho Road and feels strongly that this extension will have no significant impact to Toll Tunnel projections. The Town advocates the additional analysis of the Toll Tunnel project to ensure that the proper transportation system is in place to support the Toll Tunnel, that adequate improvements are implemented at the Addison Airport to ensure its continued economic success, and that the Toll Tunnel is a cost-effective expenditure of funds. The Town further supports the inclusion of the Keller Springs Toll Tunnel Project into the Dallas North Tollway Project.

FILE
Keller Springs

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May 27, 1993

Mr. Robert Wunderlich
Principal Associate
Barton-Aschman Associates, Inc.
5485 Beltline Road
Suite 199
Dallas, Texas 75240

Dear Mr. Wunderlich:

I received your letter of May 19, 1993 concerning the additional information you requested on the Arapaho Road Extension project as it relates to the Addison Toll Tunnel. You indicated in that letter that you required some additional information in order to complete your evaluation of the information provided.

Enclosed for your use is a listing of the network attributes for the focus area involved in the assignment process. It should be self-explanatory and useful for your continued evaluation. The item concerning the percentage of traffic that would use the Dallas North Tollway and the proposed Toll Tunnel from our original projections indicated that approximately 6.8 percent of all the trips using the project would make use of the Dallas North Tollway to access the Downtown Dallas region. This is unchanged from the final feasibility report provided to the Texas Turnpike Authority. Finally, the information that you requested for the travel time and cost algorithms used in the assignment process cannot be provided to you. You can certainly appreciate that this information is proprietary to Wilbur Smith Associates and is not available for transmission to Barton-Aschman for your use.

In any case we have now provided all the information that we believe can reasonably be expected on this project and trust that it meets your requirements.

If you have any questions regarding the information provided, please do not hesitate to call.

Sincerely,

WILBUR SMITH ASSOCIATES

John Smolley, Jr.
Associate

JS/mla
cc: Gary D. Jost - Barton-Aschman
John Baumgertner - Town of Addison

BARTON-ASCHMAN ASSOCIATES, INC.

5485 Belt Line Road, Suite 199 • Dallas, Texas 75240 USA • (214) 991-1900 • Fax: (214) 490-9261

May 19, 1993

Mr. John Smolley, Jr.
Associate
Wilbur Smith Associates
135 College Street
New Haven, Ct. 06534

Dear Mr Smolley:

We have received your letter dated May 13, 1993 regarding Wilbur Smith's analysis of the impacts that the extension of Arapaho Road from the Dallas North Tollway to Marsh Lane would have on the proposed Addison Toll Tunnel Project. In order For Barton-Aschman to complete its evaluation and present a report to the Town of Addison, we require the following information:

- A listing of Roadway network attributes for all roadways within the focus area including number of lanes, capacity, and speeds.
- The volume plots associated with the traffic assignments conducted under this contract.
- The percentage of traffic using the Dallas North Tollway that also uses the proposed toll tunnel.
- The travel time and cost algorithms used for the traffic assignment process.

Please furnish this information by Wednesday, May 26, 1993 so we can finalize our report to the Town of Addison.

In addition, please keep in mind that Wilbur Smith is under contract to Barton-Aschman for this study. All data, reports, analyses and other information collected or developed as part of this contract are confidential and shall not be made available to third parties unless authorized in writing by Barton-Aschman or the Town of Addison.

If you have any questions regarding the information requested, please do not hesitate to call.

Sincerely

BARTON-ASCHMAN ASSOCIATES, INC.

Gary D. Jost, P.E.
Vice President

Robert C. Wunderlich, P.E.
Principal Associate

cc: Mr. John Baumgertner - Town of Addison

KELLER SPRINGS TUNNEL

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May 13, 1993

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To John Baumgartner	From Barry Gast
Co. Town of Addison	Co. B.A.A.
Dept.	Phone #
Fax # 931-6643	Fax # 490-9261

Mr. Robert Wunderlich
Barton-Aschman Associates, Inc.
5485 Belt Line Road, Suite 199
Dallas, TX 75240

Dear Mr. Wunderlich:

Pursuant to your Authorization to proceed of March 2, 1993, Wilbur Smith Associates (WSA) has completed a review of the impacts which the Extension of Arapaho Road west of the Dallas-North Tollway would have on the proposed Addison Airport Toll Tunnel assessment project. The study findings presented build upon the initial feasibility assessment study of the Addison Airport Toll Tunnel completed by WSA in June of 1991 and the Final Feasibility Report completed in February of 1992 for the Texas Turnpike Authority (TTA).

As agreed, WSA has updated the traffic models used in the earlier study to accommodate certain assumptions made in the proposal. This included modifying some roadway capacities in the travel corridor, and developing several different traffic networks which would accurately portray the three different implementation phases of the Arapaho Extension, as described by Barton-Aschman. All other assumptions from the Final Feasibility Report of February 1992 remain unchanged.

A series of capacity- constrained toll diversion traffic assignments were run, including assignments at both 1995 and 2010 traffic levels, as well as $0.50 and $0.75 toll rates at the Addison Tunnel. The results of the new traffic assignments which incorporated the extended Arapaho Road were then compared to the traffic assignments originally run in the previous Addison Toll Tunnel study to evaluate the impact that this would have on the forecasted toll revenue.

Traffic Modeling Procedure

The first step involved retrieval of the traffic modeling network used by WSA in

the previous Addison study. This windowed network was originally developed for the northern Dallas region from a comprehensive traffic network supplied to WSA by the North Central Texas Council of Governments (NCTCOG). Modifications were made to the links in both the 1995 opening year network as well as the 2010 design year network, to ensure consistency between the network assumptions and the data supplied by Barton-Aschman. A total of 15 different traffic assignments scenarios were then completed, which included alternate tunnel toll rates, alternate assignment years, and the various phases of the Arapaho Road Extension. For each of the scenarios, traffic assignments were made for the A.M. peak hour, P.M. peak hour, and the off-peak average hour, which were then combined into an average total daily traffic figure.

The impacts that the extended Arapaho Road would have on the forecasted traffic and revenue of the Addison Tunnel were determined for each planned phase of the Extension. The phasing information was supplied by Barton-Aschman, and assumes the following:

- Phase I consists of upgrading Arapaho Road for the entire length of its existing alignment, ending at Addison Road, and open to traffic on January 1, 1996;

- Phase 2 would extend Arapaho on new alignment from its present junction at Addison Road to Midway Road, and would be completed five to ten years after Phase I;

- Phase 3 would extend Arapaho on new alignment from its junction with Midway Road to Marsh Lane, and would be completed 10+ years after Phase I.

For the traffic modeling analysis, WSA used a completion or opening year of January 1, 2000 for Phase II and January 1, 2010 for Phase III.

Estimated Annual Revenue Impacts

After completing the traffic assignments, plotting and summarizing the results,

the new traffic forecasts for the Addison Airport Toll Tunnel were compared to the traffic forecasts developed without the Arapaho Road Extension included in the network. As summarized in Table A, the Extension of Arapaho Road has a moderate impact on the forecasted tunnel traffic figures. If the Addison Tunnel toll rate is set at $0.50 for all traffic, the completion of Phase I of the Extension will have little measurable impact on tunnel traffic and revenue forecasts. Approximately a 10 percent decrease in traffic is forecast upon completion of Phase II, with an annual toll revenue impact of $347,000. Assuming the entire Arapaho Extension is in place, tunnel traffic in the year 2010 is expected to be slightly over 15 percent less than originally forecast, with $712,000 less annual toll revenue realized as a result.

Under the $0.75 toll forecasts, the completion of Phase I will also have a negligible impact on tunnel traffic and revenue. When Phase II of the Arapaho Road Extension is completed in 2000, it would result in an estimated 15 percent drop in the average daily traffic using the Addison Airport Toll Tunnel, with a corresponding decrease in annual revenue of slightly over $600,000. When the full construction of the Arapaho Road Extension is completed to Marsh Lane and evaluated in terms of its impact on the design year traffic, approximately 18 percent less traffic can be expected on the Tunnel, with a corresponding drop of $985,000 in annual revenue.

The extension of Arapaho Road will have the greatest impact on the future traffic levels of the Beltline Road. Although some traffic diversion is expected on the other major east-west arterials in the study corridor, most of the impacts will occur between Arapaho Road and Belt Line Road in the area studied. Rather than directly competing with the Addison Toll Tunnel, the Arapaho Road Extension's primary impact will be to improve conditions on the Belt Line Road, thus making Belt Line Road more competitive with the proposed Tunnel.

During the course of quantifying the impacts which Arapaho Road would have on the Addison Toll Tunnel, the most current, accepted professional practices and

Table A

ESTIMATED TRAFFIC AND REVENUE IMPACTS ON ADDISON TUNNEL

From Extension of Arapaho Road

PHASE OF ARAPAHO ROAD EXTENSION	EXPECTED COMPLETION DATE	ADDISON TUNNEL TOLL OF $0.50					
		Original Forecasts		Modified Forecasts		Total Impacts	
		Average Daily Traffic	Annual Toll Revenue	Average Daily Traffic	Annual Toll Revenue	Average Daily Traffic	Annual Toll Revenue
Phase I	1996	14,200	$ 2,592,000	14,200	$ 2,592,000	--	--
Phase II	2000	18,600	3,395,000	16,700	3,048,000	(1,900)	$ (347,000)
Phase III	2010	25,500	4,654,000	21,600	3,942,000	(3,900)	(712,000)
		ADDISON TUNNEL TOLL OF $0.75					
Phase I	1996	11,600	$ 3,176,000	11,600	$ 3,176,000	--	--
Phase II	2000	14,400	3,942,000	12,200	3,340,000	(2,200)	$ (602,000)
Phase III	2010	19,800	5,420,000	16,200	4,435,000	(3,600)	(985,000)

procedures were used. However, there are sometimes differences between forecasted and actual results caused by events and circumstances beyond the control of the forecasters and these differences could be material.

* * *

WSA has sincerely appreciated the opportunity to continue working on such an important project concerning the future of the Town of Addison. Please do not hesitate to contact us if there are questions or if we can continue to be of service.

Thanks and best regards.

Very truly yours,

WILBUR SMITH ASSOCIATES

John Smolley, Jr. /lao

John Smolley, Jr.
Associate

JS/lao

cc: Mr. James W. Griffin - TTA

BARTON-ASCHMAN ASSOCIATES, INC.

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MEMORANDUM

To: Ron Whitehead

From: Gary Jost
Kathi Mullins

Date: May 5, 1993

Subject: **Analysis of Keller Springs at Dallas North Tollway, Addison, and Midway**

Purpose

The purpose of this memo is to document the analysis of the operating conditions at the intersections of Keller Springs at Dallas North Tollway, Keller Springs at Addison and Keller Springs at Midway after implementation of the Airport Toll Tunnel. These intersections will support the proposed toll tunnel and are important to the success and efficiency of the tunnel.

Traffic conditions at the study intersections will be dependent upon total traffic volumes, intersection configuration, and traffic signal timing efficiency. Total traffic volumes will be comprised to traffic utilizing the toll tunnel and background traffic, or traffic on the roadway system that does not use the tunnel.

Analysis

Traffic volume projections for the toll tunnel were prepared as part of the feasibility study for the year 2010. To develop background traffic for this design year, a growth rate of 13% was applied to existing turning movement volumes. The projected year 2010 AM and PM peak hour turning movement volumes without the toll tunnel are depicted in Figure 1.

Toll tunnel site volumes were taken directly from the feasibility study. It is anticipated that 1,850 vehicles will travel through the tunnel in the AM peak hour and 2,200 vehicles in the PM peak hour. These volumes are based on the $.75 toll scenario. The toll tunnel volumes were added to the projected year 2010 turning movement volumes to get the projected year 2010 with toll tunnel scenario shown in Figure 2.

Intersection level of service (LOS) for signalized intersection is determined by average delay, in seconds per vehicle, experienced at the intersection and is a function of the volume, capacity and amount of green time allocated to each movement at the intersection. Capacity is a function of the number of lanes, the type of movement and the make-up of the traffic in that movement. The methodology used in this study for determining capacity, delay and LOS

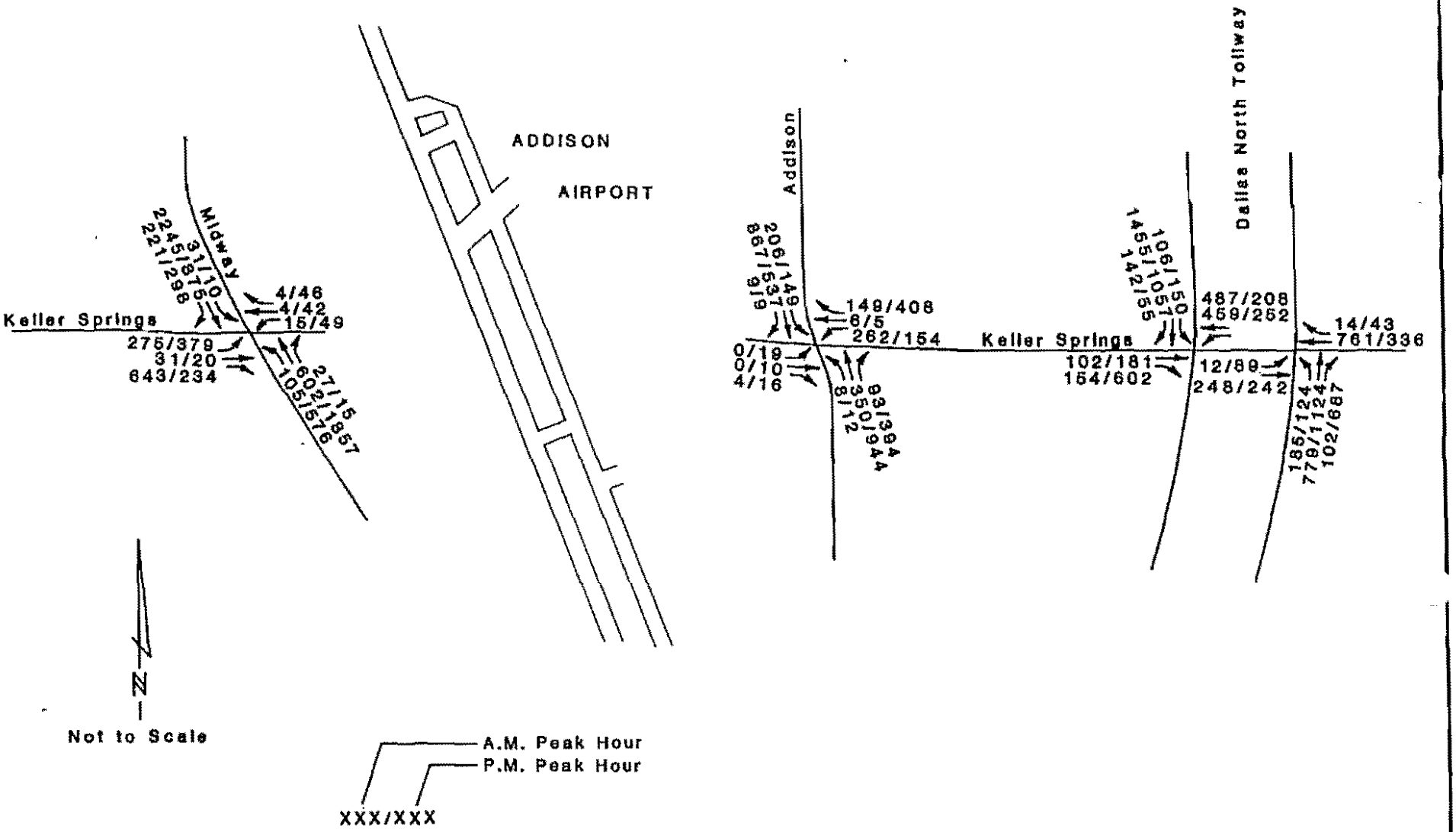


FIGURE 1

PROJECTED YEAR 2010
TRAFFIC VOLUMES
WITHOUT TOLL TUNNEL

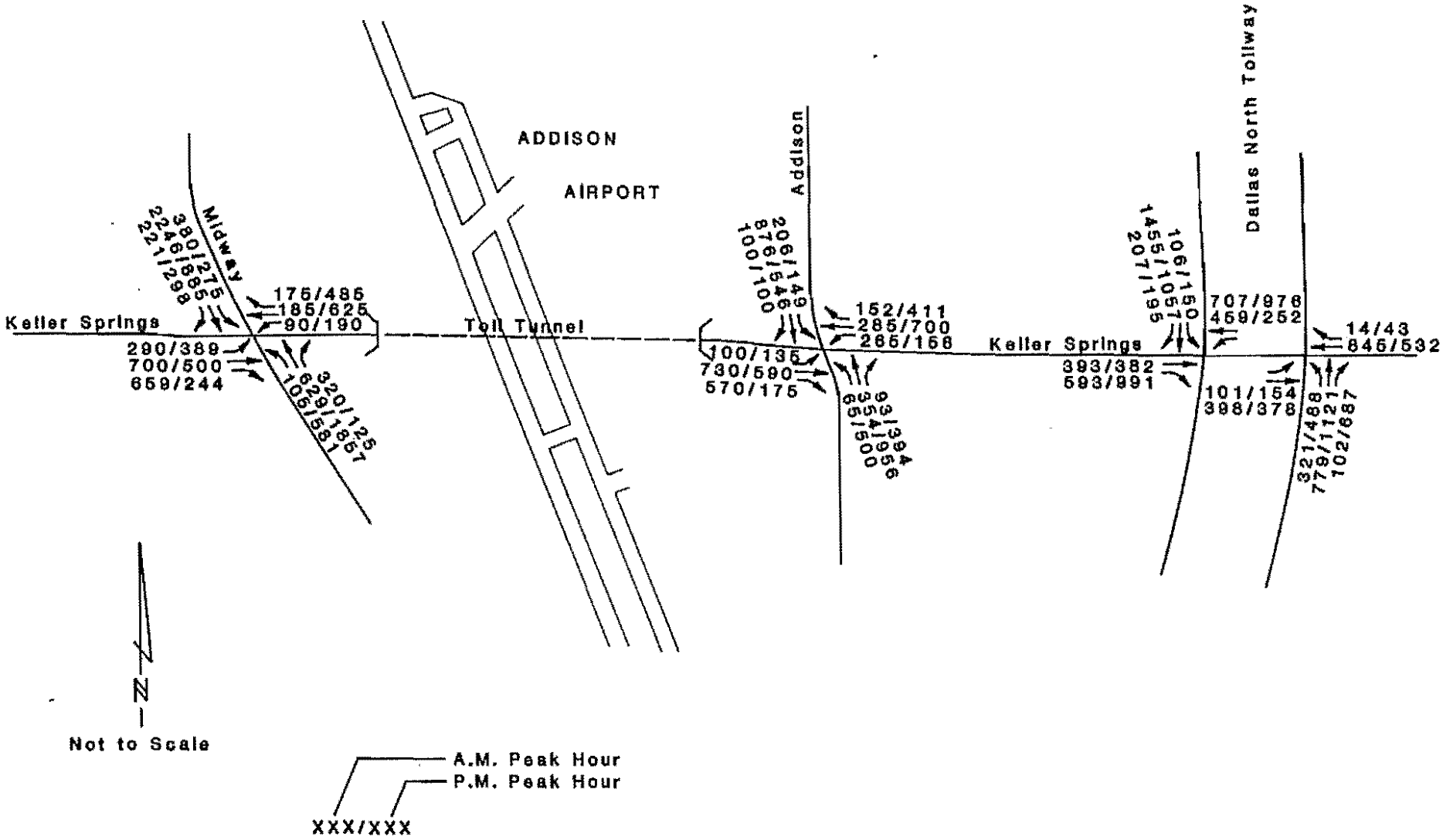


FIGURE 2

PROJECTED YEAR 2010
TRAFFIC VOLUMES
WITH TOLL TUNNEL

at an intersection is outlined in Chapter 9 of the nationally recognized and accepted Highway Capacity Manual (HCM). Level of service is a qualitative measure of identifying how effectively traffic is managed at an intersection and is defined by Categories A through F. Table 1 provides descriptions for each LOS for signalized intersections. For planning purposes, LOS D conditions are considered acceptable.

Level of Service	Description	Stopped Delay Per Vehicle (sec)
A and B	No delays at intersections with sooth progression of traffic. Uncongested operations; all vehicles clear in a single signal cycle.	< 15.0
C	Moderate delays at intersections with satisfactory to good progression of traffic. Light congestion; occasional back-ups on critical approaches.	15.1 to 25.0
D	Forty percent (40%) probability of delays of one cycle or more at every intersection experiencing "D" condition. Significant congestion on critical approaches, but intersectional function. Vehicles required to wait through more than one cycle during short peaks. No long standing lines formed.	25.1 to 40.0
E	Heavy traffic flow condition. Delays of two or more cycles probable. No progression. Limit stable flow. Blockage of intersection may occur if traffic signal does not provide for protected turning movements.	40.1 to 60.0
F	Unstable traffic flow. Heavy congestion. Traffic moves in forced flow condition. Three or more cycles to pass through intersection. Total breakdown with stop-and-go operation.	> 60.0

Capacity analyses were performed for the signalized intersections at Keller Springs and Dallas North Tollway, Keller Springs at Addison, and Keller Springs at Midway. The analyses were performed for the projected base condition (year 2010 without the toll tunnel traffic) and projected year 2010 with the toll tunnel traffic to provide an additional basis for comparison of any impacts associated with the toll tunnel's development and to identify any change in level of service which may be anticipated as a result of normal growth in areawide traffic volumes over time.

The results of these analysis are presented in Table 2 on the following page.

Table 2
CAPACITY ANALYSIS - YEAR 2010

Intersection Keller Springs (a)	WITHOUT TUNNEL				WITH TUNNEL			
	AM		PM		AM		PM	
	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay
Dallas North Tollway	D	38.3	F	*	F	*	F	*
Addison	B	13.3	C	17.3	D	28.1	F	*
Midway	D	38.9	C	23.6	F	82.8	F	*

* Delay not applicable at these levels of congestion.

Based on the intersection analysis performed Keller Springs at Addison and Keller Springs at Midway operate at acceptable levels of service for the projected Year 2010 volumes without the toll tunnel. Keller Springs and Dallas North Tollway operates at LOS F for projected Year 2010 volumes without the toll tunnel during the PM peak period. Keller Springs at Dallas North Tollway, Keller Springs at Addison, and Keller Springs at Midway all operate below the acceptable levels of service for projected Year 2010 volumes with toll tunnel volumes.

Roadway improvements are recommended at these intersections in order to maintain the base line level of service with the toll tunnel. The improvements include:

Keller Springs at Midway

- Widen north, west, and south approaches to provide dual left turn lanes.
- Widen east approach to include a left, two through, and right turn lanes.
- Provide right turn lanes on the west and south approaches

Keller Springs at Addison

- Widen west approach to provide a left, two through, and a right turn lane.
- Widen the east, south and north approaches to provide dual left turn lanes.

Keller Springs at North Dallas Tollway

- Extensive improvements are needed for northbound frontage road and southbound frontage road intersections to operate at acceptable levels of service and will need further analysis.

The intersection analysis results with the recommended roadway improvements incorporated are shown in Table 2. Figure 3 shows the recommended roadway improvements.

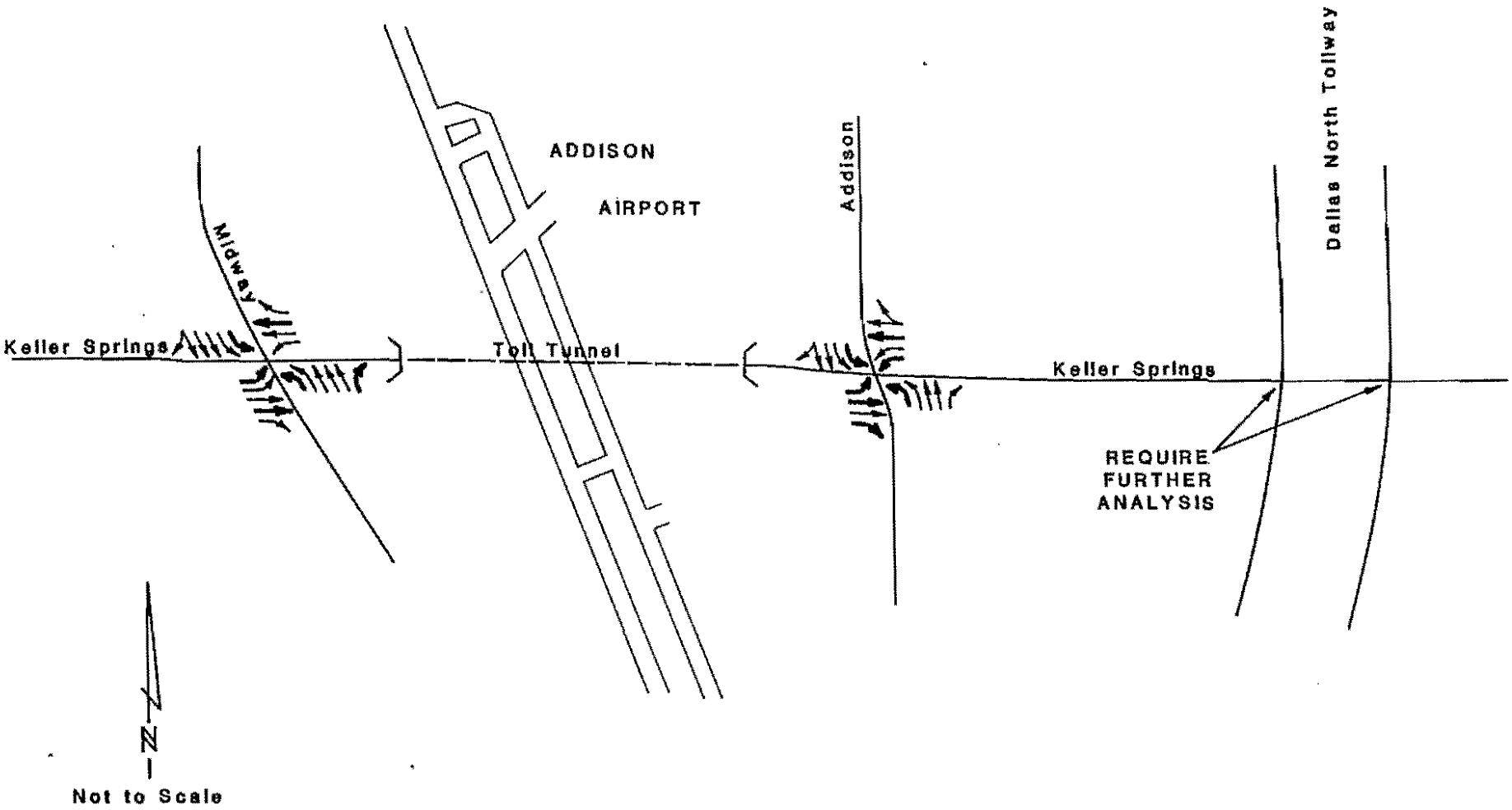


FIGURE 3

RECOMMENDED
ROADWAY IMPROVEMENTS

Table 3
CAPACITY ANALYSIS - PROJECTED YEAR 2010 WITH ROADWAY IMPROVEMENTS

Intersection Keller Springs:	AM		PM	
	LOS	Delay	LOS	Delay
Addison	C	20.4	D	37.8
Midway	D	36.9	D	31.7

Conclusions

In order for the toll tunnel to be successful and efficient, the intersection of Keller Springs at Midway, Keller Springs at Addison, and Keller Springs at Dallas North Tollway must operate at acceptable levels of service and should be designed to meet design year traffic demands. Roadway improvements recommended to maintain the base line level of service for Keller Springs at Addison and Keller Springs at Midway have been outlined in this memo. Keller Springs at Dallas North Tollway will need extensive roadway improvements to operate at an acceptable level of service and will need to be analyzed further.

c:\wp\kathi\tolltunn.mem

FILE KELLERSPRINGS

HAYNES AND BOONE, L.L.P.

ATTORNEYS AND COUNSELORS AT LAW

3100 NATIONSBANK PLAZA
DALLAS, TEXAS 75202-3789
TELEPHONE 214/651-5000
TELEX 73-0197
TELECOPY 214/651-5940

AUSTIN
DALLAS
FORT WORTH
HOUSTON
SAN ANTONIO

WRITER'S DIRECT DIAL NUMBER:

214/651-5600

MAR 02 93

CITY MANAGER

February 26, 1993

Post-it™ brand fax transmittal memo 7671 | # of pages ▸ |

To Jonas Baumgartner	From Michele Covino
Co. PWD	Co.
Dept.	Phone # 450-7029
Fax # 248-7814	Fax # 450-7684

H. Nayne Ginn, P.E.
The Ginn Corporation
Consulting Engineers
17103 Preston Road
Suite 205
Dallas, Texas 75248

Re: Addison Airport Tunnel

Dear Mr. Ginn:

We represent CB Institutional Fund VII, the owner of the multi-building office project at the northeast corner of the intersection of Keller Springs Road and Midway Road (the "Property"). As I mentioned in our telephone discussion of last week, our client is attempting to obtain as much information as possible regarding the possible impact of the Addison Airport Tunnel on the Property. In our discussion of last week, you indicated you would contact Mr. Jim Griffin of the Texas Turnpike Authority to determine whether the Turnpike Authority would object to the release of the estimated right-of-way acquisition cost as it relates to the Property. (I spoke to Mr. Jim Griffin today who indicated this information is not available to the public). However, if the Turnpike Authority does approve the release of this information, I would appreciate your sending it to me at the address listed above. If the Turnpike Authority declines to authorize the release of this information, I would appreciate your confirming this in writing to me as well.

Please place my name and address on your mailing list for any further communications that relate to this project. Thanks in advance for your help.

Sincerely,

Robt A. McCulloch

Robert A. McCulloch

RAM:rpm
1d4727m

COPY

TOTAL P.01

TOWN OF ADDISON, TEXAS

SERVICE CENTER FAX NO: (214) 931-6643

TO: Gary Jost **COMPANY:** Barton Aschman **FAX NUMBER:** ( ) 490-9261	**FROM:** John Baumgartner **DEPT:** City Engineer **PHONE:** 450-2886

DATE: 3-3-93	**NUMBER OF SHEETS (including cover sheet):** 2

COMMENTS:

********** -IND. XMT JOURNAL- ********** DATE 03-03-1993 ****** TIME 08:23AM ******

JOURNAL No. = 32

DATE/TIME = 03-03-1993 08:20AM

DURATION = 00:01'03

COMM.RESULT = OK

PAGE(S) = 002

MODE = TRANSMISSION

DESTINATION = 4909261

RECEIVED ID =

RESOLUTION = STD

-Town of Addison -

**********(FAX-200 V2.17)* - 214 248 7814- **********

DALLAS COUNTY
PUBLIC WORKS

February 23, 1993

Mr. Ron Whitehead, City Manager
Town of Addison
5300 Belt Line Road
P. O. Box 144
Addison, Texas 75001

RE: Keller Springs Road Project 490-407
(Midway Road to Addison)
Addison Airport Tunnel Preliminary Alignment

Dear Mr. Whitehead:

Howard Needles Tammen and Bergendoff (HNTB), design consultant for this project, has submitted the attached drawing titled Figure 3. Though preliminary, this drawing is suitable to define the project limits and approximate rights-of-way. The final calculated alignment has not been made, but will be based upon this preliminary alignment and profile.

The City is encouraged to acquire or reserve right-of-way for the construction of the project if the opportunity presents itself.

If you wish to discuss this further or need additional information, please call me at 653-7151.

Sincerely,

Allen Bud Beene

Allen Bud Beene, P.E.
Director of Public Works

ABB:TRK:rem

cc: Jim Jackson, Commissioner, Road and Bridge District No. 1

Attachments

file:4a#8:tunnel.407

Real Estate Investment Builders • Developers

One Galleria Tower
13355 Noel Road, LB 3
Suite 1900
Dallas, TX 75240-6603
(214) 934-2244
FAX (214) 991-5184

1940 West Orangewood Avenue
Suite 207
Orange, CA 92668-2050
(714) 978-1244
FAX (714) 978-1268

FRITZ DUDA COMPANY

John B ? 3-1-93

~~JWG~~ PD JDP

FEB 2 5 93

File

February 22, 1993

Mr. James W. Griffin
Deputy Director
TEXAS TURNPIKE AUTHORITY
P. O. Box 190369
Dallas, Texas 75219-0369

RE: Proposed Keller Springs Tunnel under Addison Airport

Dear Mr. Griffin:

It has come to our attention that construction of the captioned project has been approved.

As property owners directly and severely impacted by the proposed project, we are perplexed by the fact that we received no notices of meetings with respect thereto. The project, as proposed, adversely impacts our property to the extent that it takes away our Keller Springs access, as well as the fact that if we correctly interpret your drawings, some 25,000 to 30,000 square feet of our property will be required for right-of-way; as our tract is presently only three acres, this would severely limit the potential for development of the site. We would appreciate the intentions of the Authority regarding these impacts.

Please regard this letter as registering our concern to the concept of this project and its impact on the value of our property.

Very truly yours,

M & F Development Company,

By: _____
Fritz L. Duda
President

cc: Ginn Corporation

RECEIVED
FEB 25 1993
Texas Turnpike Authority

TEXAS TURNPIKE AUTHORITY

3015 Raleigh Street • P.O. Box 190369
Dallas, Texas 75219
Phone 214/522-6200
Fax 214/528-4826

February 16, 1993

FEB 17 93

Mr. Ron Whitehead
City Manager
Town of Addison
P.O. Box 144
Addison, TX 75001

Dear Ron:

Pursuant to statements made at the recent public hearing on the Addison Airport Toll Tunnel, I am forwarding you a copy of a letter received from Mr. Donald Lookadoo stating his concerns with the project. You will note from the attached exhibits that he is referring to property at the northwest corner of Dooley Road and Keller Springs Road.

In regard to the second item in his letter, I am not sure that the property will be denied access or frontage to Dooley Road. In fact, he may be able to gain square footage to the total property by our relocating Dooley Road.

In regard to Item 3, we need to determine what that assessment covered, has that assessment been paid and been invested in Keller Springs Road improvements by Addison or has it been held in escrow for future paving improvements to Keller Springs Road. I am sure you can clarify this point for us. If the assessment has been collected and expended, a copy of the legal assessment agreement for this property could be useful to us.

Thank you for your assistance.

Yours very truly,

James W. Griffin, P.E.
Deputy Director

cc: The Ginn Corporation

Enclosure
nlg

METCO ENVIRONMENTAL
P.O. Box 598
Addison, TX 75001
(214) 931-7127

FAX TRANSMITTAL

FEB 15 93

DELIVER THE FOLLOWING PAGES TO:

Name: RON WHITEHEAD
Company: CITY OF ADDISON
Location:
FAX No.: 960-7684

FROM:

Name: ELMER POWELL
FAX No.: (214) 931-8398
Date: 2-15-93
Total Number of Pages Including Cover Sheet: 3

If you do not receive all of the pages, please contact us as soon as possible.

MESSAGE

RE: COMMENTS TO THE TEXAS TURNPIKE AUTHORITY CONCERNING THE ADDISON TUNNEL AND ELIMINATION OF CONTROLLED ACCESS FROM DOOLEY TO MIDWAY VIA THE LIGHT AT MIDWAY AND KELLER SPRINGS

"Quality Source Sampling"

METCO ENVIRONMENTAL

February 15, 1993

Mr. James Griffin
Deputy Director
Texas Turnpike Authority
P.O. Box 190369
Dallas, Texas 75219-0369

Dear Mr. Griffin:

On Thursday, February 11th, I attended the public hearing at the Addison Conference Center concerning the Addison Tunnel.

For the benefit of several parties, I would like to express the concerns of METCO Environmental regarding the tunnel design and its effect on our company in particular.

1. No notification was sent to the property owners affected by the tunnel. Therefore, the public hearing needs to be reconvened after proper notification has been sent to surrounding owners.

2. METCO Environmental purchased the property at 16115 Dooley Road and built its corporate offices with the main consideration that the company vehicles, visitors and employees would have access to a controlled intersection at Midway Road and Keller Springs. The tunnel plan eliminates any controlled access to Midway Road for METCO Environmental.

3. The tunnel design will impose a hardship on companies and land owners along Dooley and Keller Springs by eliminating any controlled access to Midway Road.

P.O. Box 598
Addison, TX 75001
(214) 931-7127
FAX (214) 931-8356

Field office:
Houston, TX

4. A severe safety hazard will be created for METCO Environmental's employees, visitors and drivers of our 5 ton vans and cargo vans in attempting to cross Midway Road without the help of controlled access due to the elimination of access to Keller Springs.

5. METCO Environmental's property value will be impacted due to the elimination of controlled access to Midway Road.

6. In regards to the Toll Plaza location, it is the feeling of METCO Environmental that east bound traffic will back-up into Midway Road creating a traffic problem. The Toll Plaza needs to be moved further east on Keller Springs or relocated.

7. In addition, the tunnel entrance on the east side of the airport needs to be moved east of Addison Road where traffic is lighter rather than dumping the traffic onto Addison Road.

In summary, METCO Environmental is not opposed to the concept of the tunnel, as long as the logistical impact on the company is eliminated.

Sincerely,

METCO ENVIRONMENTAL

Elmer Powell
Manager, Human Resources

EP/ds

METCO ENVIRONMENTAL

File - Kellersprings Tunnel

February 15, 1993

Mr. James Griffin
Deputy Director
Texas Turnpike Authority
P.O. Box 190369
Dallas, Texas 75219-0369

Dear Mr. Griffin:

On Thursday, February 11th, I attended the public hearing at the Addison Conference Center concerning the Addison Tunnel.

For the benefit of several parties, I would like to express the concerns of METCO Environmental regarding the tunnel design and its effect on our company in particular.

1. No notification was sent to the property owners affected by the tunnel. Therefore, the public hearing needs to be reconvened after proper notification has been sent to surrounding owners.

2. METCO Environmental purchased the property at 16115 Dooley Road and built its corporate offices with the main consideration that the company vehicles, visitors and employees would have access to a controlled intersection at Midway Road and Keller Springs. The tunnel plan eliminates any controlled access to Midway Road for METCO Environmental.

3. The tunnel design will impose a hardship on companies and land owners along Dooley and Keller Springs by eliminating any controlled access to Midway Road.

P.O. Box 598
Addison, TX 7500
(214) 931-7127
FAX (214) 931-839

Field office:
Houston, TX
(713) 869-7372

4. A severe safety hazard will be created for METCO Environmental's employees, visitors and drivers of our 5 ton vans and cargo vans in attempting to cross Midway Road without the help of controlled access due to the elimination of access to Keller Springs.

5. METCO Environmental's property value will be impacted due to the elimination of controlled access to Midway Road.

6. In regards to the Toll Plaza location, it is the feeling of METCO Environmental that east bound traffic will back-up into Midway Road creating a traffic problem. The Toll Plaza needs to be moved further east on Keller Springs or relocated.

7. In addition, the tunnel entrance on the east side of the airport needs to be moved east of Addison Road where traffic is lighter rather than dumping the traffic onto Addison Road.

In summary, METCO Environmental is not opposed to the concept of the tunnel, as long as the logistical impact on the company is eliminated.

Sincerely,

METCO ENVIRONMENTAL

Elmer Powell
Manager, Human Resources

EP/ds

DONALD E. LOOKADOO
P.O. BOX 515496
OFFICE: (214) 458-8670 DALLAS, TEXAS 75251-5496 FAX: (214) 458-8284

February 12, 1993

Mr. James W. Griffin
Deputy Director
Texas Turnpike Authority
P.O. Box 190369
Dallas, Texas 75219-0369

RE: Addison Airport Tunnel

Dear Mr. Griffin:

EKL Realty Partners owns 75,967 square feet of land located at the northwest corner of Keller Springs Road and Dooley Road in Addison, Texas. The "conceptual design" of the Addison Airport Tunnel adversely impacts the value of this property because:

1. The property currently has access and frontage on two streets, Keller Springs Road and Dooley Road.

2. The conceptual design shows no access on Keller Springs Road and the relocation eastward of Dooley Road, which would then deny this property both frontage and access on Dooley Road.

3. This property has paid a $55,827 paving assessment for the improvement of Keller Springs Road, which will no longer be accessible to this site.

This property is outlined in red on the attached exhibits consisting of a plat and the conceptual design. We will appreciate your consideration of the severe adverse impact on the market value of this property due to the proposed Addison Airport Tunnel.

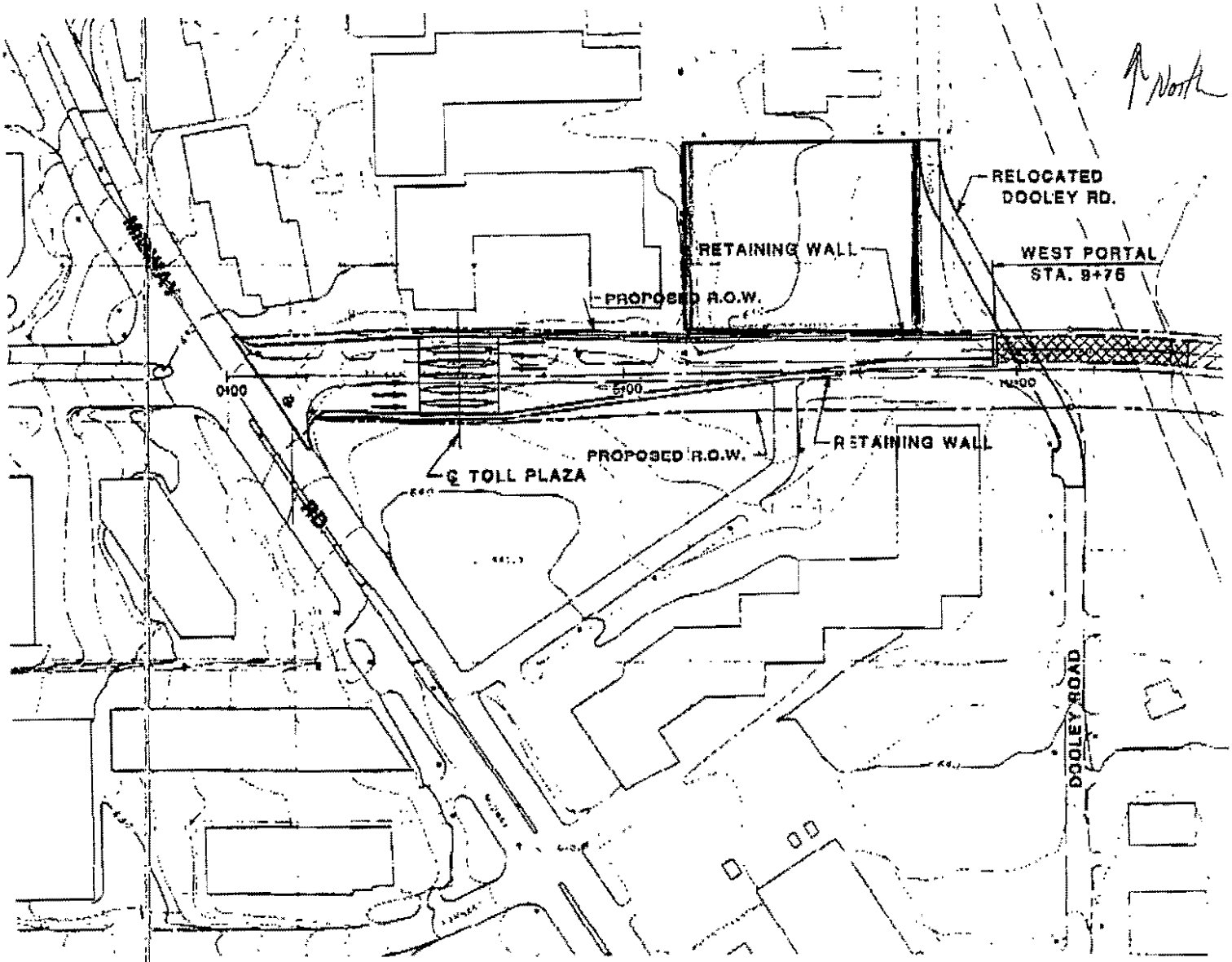
Sincerely,

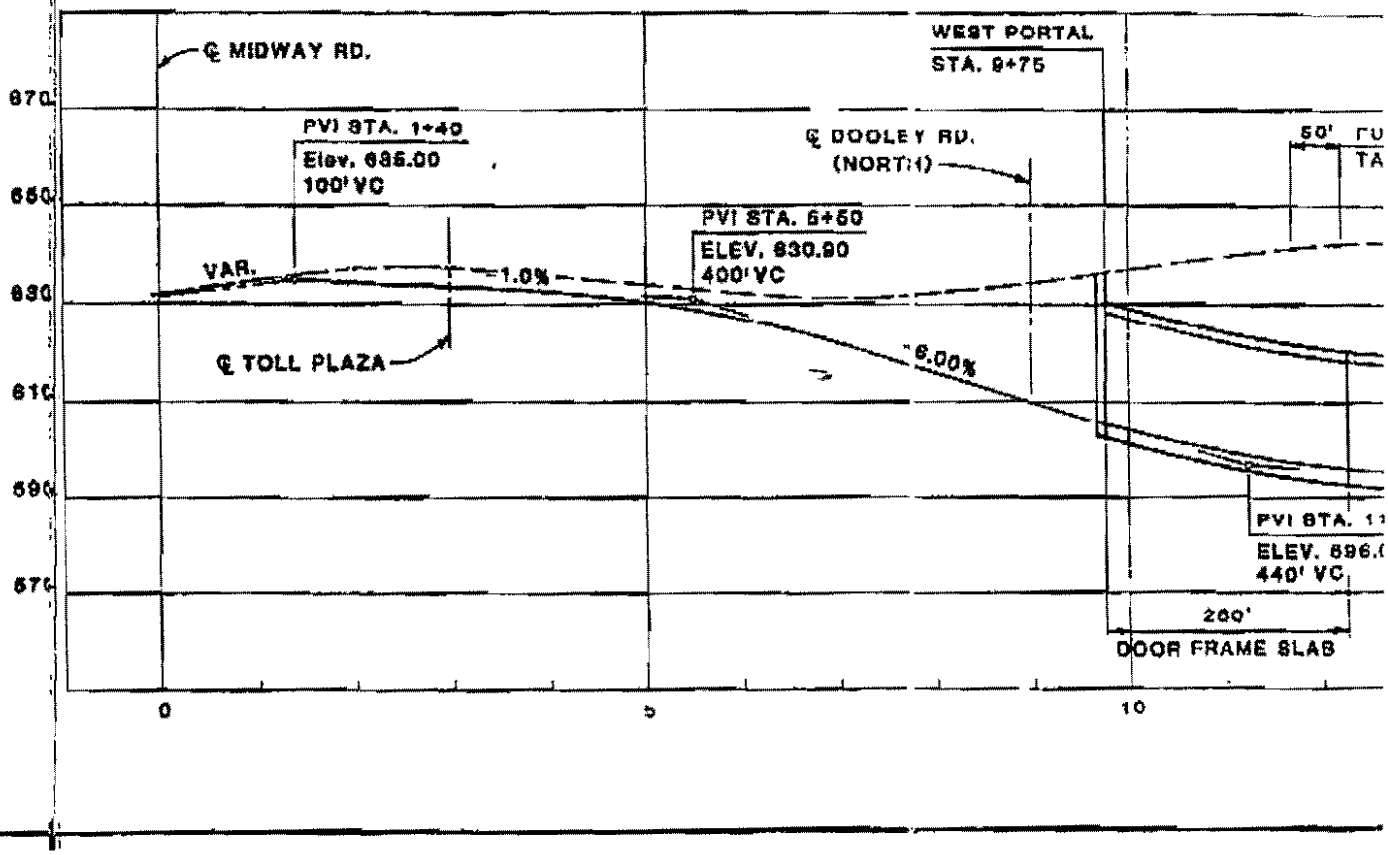
EKL REALTY PARTNERS

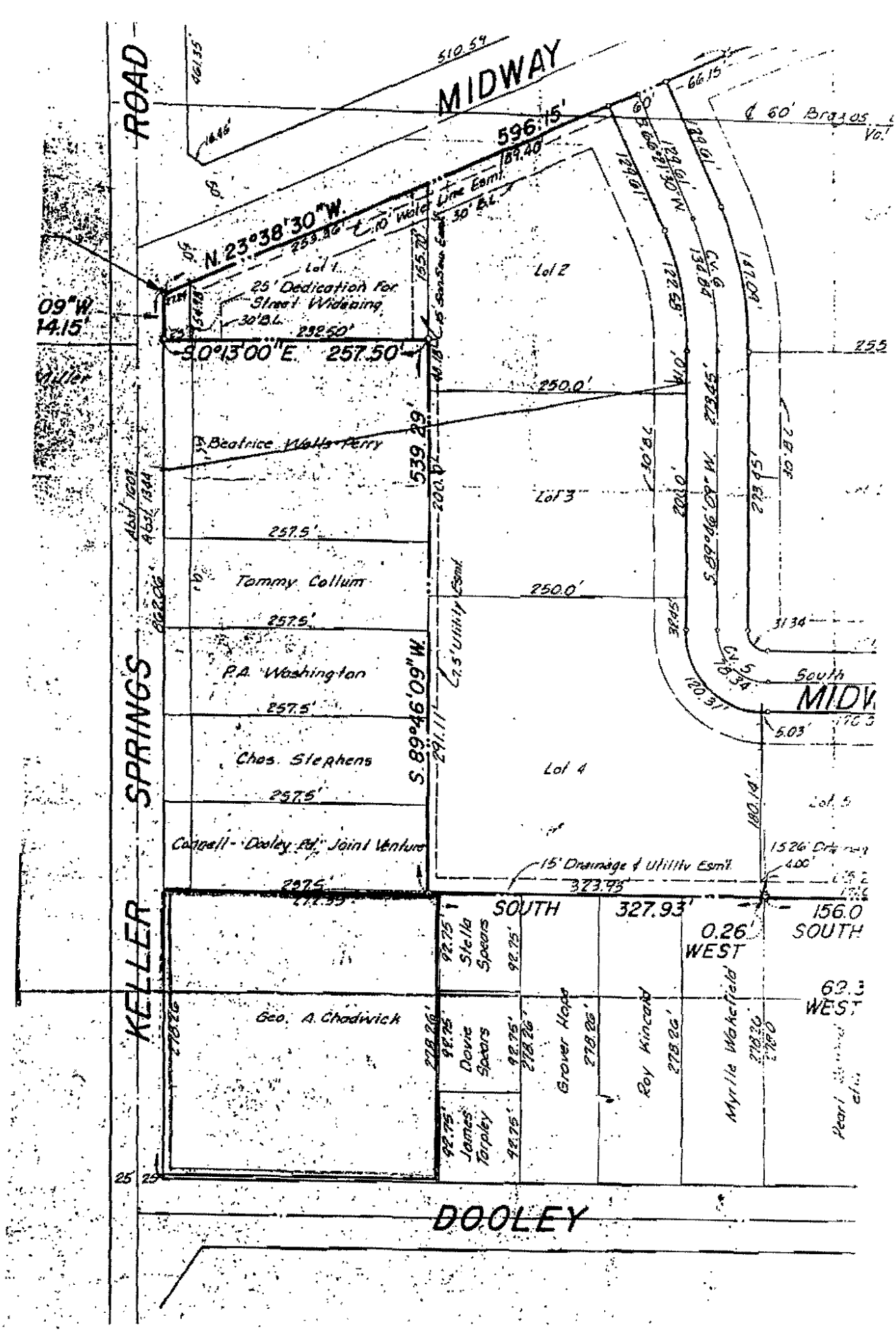
Donald E. Lookadoo

A:\93044

RECEIVED
Texas Turnpike Authority


North
RELOCATED
DOOLEY RD.
RETAINING WALL
WEST PORTAL
STA. 9+75
PROPOSED R.O.W.
0+00
5+00
10+00
PROPOSED R.O.W.
RETAINING WALL
℄ TOLL PLAZA
DOOLEY ROAD


℄ MIDWAY RD.
WEST PORTAL
STA. 9+75
PVI STA. 1+40
Elev. 635.00
100' VC
℄ DOOLEY RD.
(NORTH)
PVI STA. 5+50
ELEV. 630.90
400' VC
VAR.
-1.0%
℄ TOLL PLAZA
6.00%
PVI STA. 11
ELEV. 696.
440' VC
200'
DOOR FRAME SLAB
650
630
610
590
570
0
5
10


MIDWAY
KELLER SPRINGS ROAD
DOOLEY
596.15'
N. 23°38'30"W.
253.36'
Lot 1
25' Dedication for Street Widening
30' B.L.
292.50'
S.0°13'00"E. 257.50'
Lot 2
Lot 3
Lot 4
250.0'
Beatrice Wells Perry
539.29'
257.5'
Tommy Collum
P.A. Washington
Chas. Stephens
Cottrell - Dooley Rd. Joint Venture
S.89°46'09"W.
291.11'
7.5' Utility Esmt.
15' Drainage & Utility Esmt.
323.93'
SOUTH
327.93'
156.0
SOUTH
0.26'
WEST
Stella Spears
Dovie Spears
James Torpley
Geo. A. Chadwick
Grover Hood
Roy Kincaid
Myrtle Wakefield
Pearl
278.26'
92.75'
180.14'
5.03'
4.00'
S.89°46'09"W.
27.45'
CURVE DATA
INNER
OUTER
INNER

FEB 0 9 93

FAX TRANSMITTAL

from (214) 404-9721

TO: Roy Whitehead
Addison cm

FAX NUMBER: 960-7684

DATE: 2-9-93

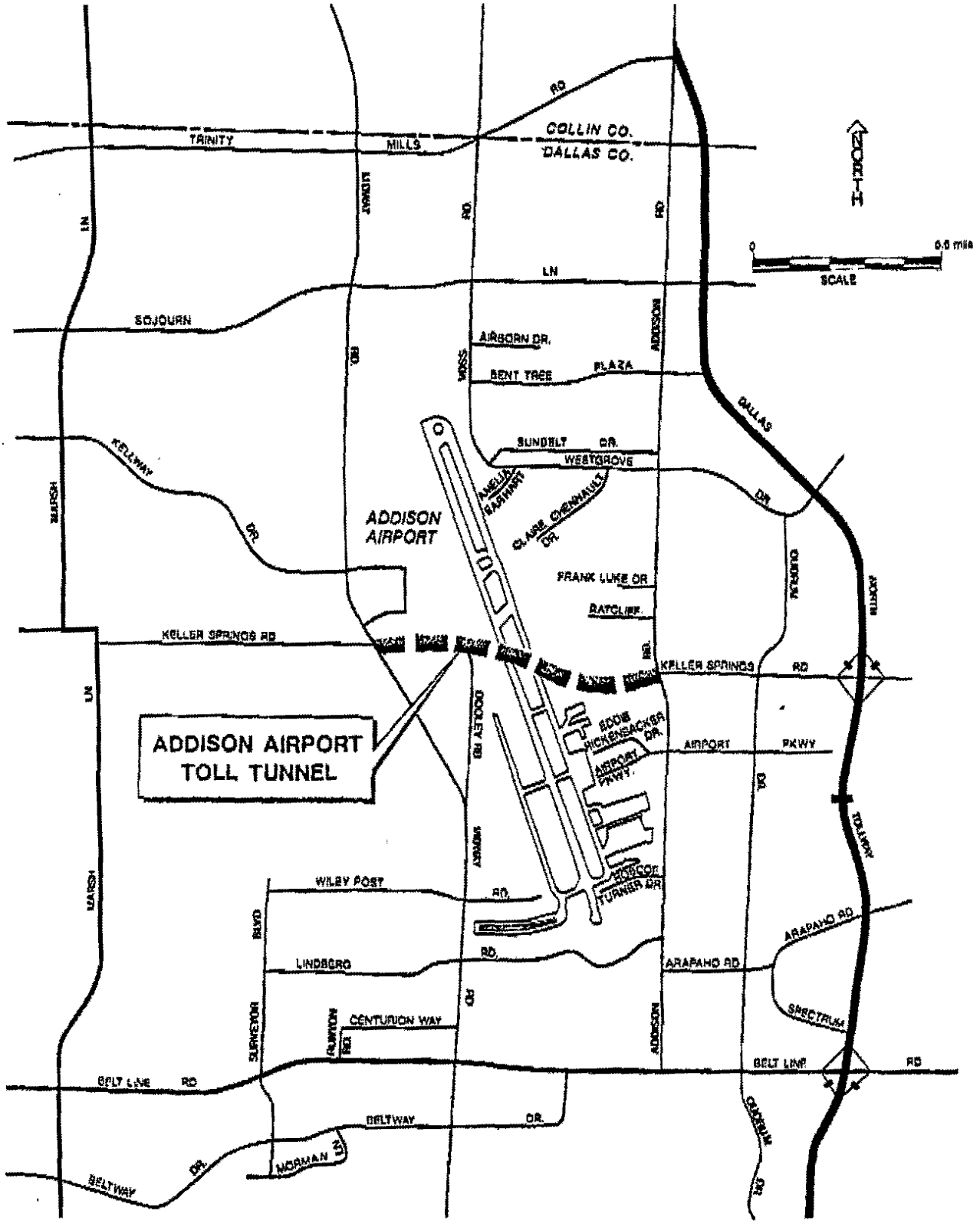
RE: Toll Tunnel

MESSAGE:

Both Dan Johnson & Milburn Crowley have expressed a concern about the impact of the "new" traffic on that will result from the Keller Springs Tunnel on the March / Keller Springs intersection. Have they voiced this concern to you? Do you think (if its a genuine issue) that it should be looked into as a part of the Arapaho study?

Pages to Follow: 0

DALLAS REGIONAL MOBILITY COALITION
12655 N. Central Expwy, Suite 820
Dallas, TX 75243



LOCATION MAP

WILBUR SMITH ASSOCIATES

FIGURE 2

TEXAS TURNPIKE AUTHORITY

3015 Raleigh Street • P.O. Box 190369
Dallas, Texas 75219
Phone 214/522-6200
Fax 214/528-4826

January 8, 1993

Mr. Ron Whitehead
City Manager
Town of Addison
P.O. Box 144
Addison, TX 75001

Dear Ron:

I thought it advisable to record principle elements of the discussion held at 3:00 p.m. on December 22, 1992, in the Addison Town Hall exploring parameters for financing of the Addison Airport Toll Tunnel (the "Tunnel") and the sequencing of actions needed to prepare a revenue bond issue for marketing. In attendance at the meeting were Richard Litton and David Medanich of First Southwest Company, Gary Jost and Bob Wunderlich of Barton-Aschman Associates, Inc., Ron Whitehead of the Town of Addison ("Addison"), and James Griffin of the Texas Turnpike Authority (the "TTA").

Stated Position of the Texas Turnpike Authority.

1. Civil engineering studies, traffic and revenue analyses and financing investigations suggest, that with a $3,000,000 investment by Dallas County for right-of-way acquisition, the Tunnel is feasible based on revenues projected from a basic $ .75 toll.

2. All parties involved in the Tunnel study believe a $ .50 basic toll will be more acceptable to the public and will result in increased traffic volumes using the Tunnel.

3. First Southwest analyses have indicated that $4,000,000 of capital contribution by Addison would, based on a $ .50 toll, provide acceptable debt coverage ratios for the reduced capital cost of the Tunnel.

4. The TTA staff is of the opinion that a Tunnel bond indenture could provide for the establishment of a surplus fund whose proceeds would be dedicated to repayment of capital loans to the project by Addison and Dallas County, $4,000,000 and $3,000,000, respectively.

5. There does not appear to be a reasonable right-of-way acquisition plan nor practical roadway design geometry along Keller Springs Road west of the Dallas North Tollway (the "DNT") which would physically allow the connection of the Tunnel to the DNT. In order to use surplus funds of the DNT to construct the Tunnel or to provide financial security for the Tunnel bonds, extensive deliberations among staff, consultants, and attorneys must be pursued to attempt to identify a logical interpretation of the DNT Trust Indentures and applicable law that would permit the Tunnel to be considered an extension, an enlargement, or an expansion of the DNT.

6. Current law does not permit the pledge of surplus DNT revenues to another project unless additional bonds are issued for DNT funding or for refunding existing bonds. The 73rd Legislature could, however, enact legislation allowing surplus DNT revenue to be used to assist in financing or in providing security to the debt of other turnpike projects.

7. Based on their experience in revenue bond financing, the staff and consultants of the TTA believe the market for Tunnel revenue bonds is highly suspect, given the Wilbur Smith Associates ("WSA") report dated February 1992, unless the Town of Addison (i) contracts with the TTA not to construct nor permit to be constructed a Tunnel competing parallel thoroughfare(s) between Belt Line Road and Westgrove Road from Addison Road to Midway Road during the bonded indebtedness of the Tunnel or (ii) Addison would contract with the TTA to guarantee the payment of any debt service shortfall of the Tunnel should Addison construct a parallel competing thoroughfare(s) during the life of the bonded indebtedness of the Tunnel.

8. Lease/purchase, licensing, or refinancing of the DNT by Dallas County, conceivably, would permit, subject to support of the Dallas County Commissioners, financial support of the Tunnel from surplus funds of a single county-wide turnpike corporation.

9. County Judge Lee Jackson has suggested in negotiations with the TTA that the County turnpike corporation would retain the current staff of TTA and desires that that staff and its consultants continue their efforts to develop and finance the Tunnel.

10. The TTA staff and its financial advisor plan to make a Tunnel progress report to the TTA Board of Directors (the "Board") on January 22, 1993. A Resolution from the council of the Town of Addison supporting the Tunnel, committing a $4,000,000 secondary loan to construction capital, and postponing the construction of a parallel thoroughfare across the Airport property probably would generate Board support for continuing with the development of the Tunnel.

11. The TTA will authorize WSA to discuss with Barton-Aschman, traffic volumes each firm projects will use the Tunnel.

Stated Position of Addison as Expressed by Addison staff:

1. Addison does not want to abandon its support of extending Arapaho Road from Addison Road to Midway Road.

2. Addison does not deem it reasonable to make up any debt service deficit of the Tunnel should it elect to construct a competing thoroughfare between Belt Line Road and Westgrove Road.

3. Addison would rather not invest $4,000,000 in the capital cost of Tunnel as it has other uses for that capital.

4. Addison would like to see a physical connection between the DNT and the Tunnel, thereby allowing surplus funds of the DNT to be used in Tunnel financing.

5. Lacking the implementation of No. 4 above, Addison desires that surplus funds of the DNT to be used to supplement the capital cost of the Tunnel and/or guarantee any Tunnel debt service deficit.

6. Addison prefers a $ .50 basic toll rate.

7. Addison has no preference for the Tunnel being financed under the aegis of a Dallas County turnpike corporation or the TTA. In either circumstance, Addison prefers that the Tunnel be financed as a unit of a turnpike system rather than as a stand alone turnpike project.

8. Addison authorized its traffic consultant, Barton-Aschman, to contact WSA with a goal of narrowing the gap between the two consultants' projected traffic volumes that would use the Tunnel. Barton-Aschman projects traffic volumes are sufficient to justify both the Arapaho Road extension and the Tunnel in the future. WSA has responded with a proposal to evaluate the impact of a competing parallel Arapaho Road on the feasibility of the Tunnel. The Addison City Council will consider the WSA proposal on January 12, 1993.

9. Addison feels a two month delay to further evaluate the Tunnel feasibility is reasonable.

The staff of the TTA and its consultants are anxious to receive project and financial support of the Town Council of Addison for the Tunnel and are prepared to engage in meetings with the staff of Addison as often as may be required to achieve this goal.

Yours very truly,

James W. Griffin, P.E.
Deputy Director

cc: John Ramming
Luther Jones
First Southwest
Ginn Corporation

nlg

Kellerspring

TOWN OF ADDISON

CITY MANAGER'S OFFICE (214) 450-7027

Post Office Box 144 Addison, Texas 75001 5300 Belt Line Road

January 6, 1993

Mr. Jim Griffin
Texas Turnpike Authority
P. O. Box 190369
Dallas, Texas 75219

Dear Jim:

I have reviewed your draft of the stated positions of the Texas Turnpike Authority (TTA) and the Town of Addison (TOA). It is important to note a number of items:

1. In Item 7 Page 2 it is stated:
"Unless the Town of Addison (i) contracts with the TTA not to construct nor permit to be constructed a competing thoroughfare across the Addison Airport (the Airport) property between Addison Road and Midway Road."

   The proposed alignment of Arapaho Road does not go across Airport property. The proposed alignment is entirely south of the railroad tracks and would be in public rights-of-way obtained from private land owners. None of the Arapaho extension is on Airport land.

2. The stated position of the Town are items discussed with you by the Town's staff. The Addison City Council has not taken an official position regarding the TTA proposal. In fact, prior to the presentation at the board meeting at the Airport, town officials had not seen the proposal from Wilbur Smith or First Southwest Company. We will discuss the proposal with Council at its January 12, 1993 Council Meeting, but we still have a number of questions.

   We have supported the concept of a tunnel under the airport, but we want to make sure the proposed scenarios are feasible.

   We have information from Barton Aschman that reflects that the Arapaho extension will be needed in addition to the tunnel to address Addison's future traffic needs. We have a proposal from Wilbur Smith to review the Barton Aschman information. The proposal will take a month to complete and cost $8,456. We will be proposing that the Council authorize this work on January 12, 1993.

   The staff feels that a couple of months delay to answer questions about funding, construction design, toll rates, and the likelihood of the success of the project is reasonable and should not jeopardize the Texas Turnpike's authorized funding of the project. We will seek Council's concurrence on January 12, 1993.

3. Item 2 Page 3, stated position of Addison:
"construct a parallel thoroughfare across the airport property."

   Again, none of the proposed Arapaho extension is on Airport property.

We will want to make a presentation to the Board at your January 22, 1993 meeting as well as the February 11 Public Hearing if that is permissible.

Sincerely,

Ron Whitehead
City Manager

#22-5

Administration
3015 Raleigh Street
P.O. Box 190369
Dallas, Texas 75219
Phone (214) 522-6200

Fax No. (214) 528-4826

Date: December 30, 1992

Time: 8:15 a.m.

TO: Ron Whitehead, Manager **FAX:** 960-7684

Company Name: The Town of Addison

FROM: James W. Griffin **TEL:**

DOCUMENT:
(Name/Type)

Draft letter recording minutes of December 22 meeting

Number of pages FAXED: (including cover sheet) 5

☐	CONFIDENTIAL	☐	Per your request
☒	For your information	☐	For your approval
☐	Handle	☐	File
☒	Review/Comment Need answer by_____	☐	Destroy
☐	Requested by:_____		

Route To:

Additional Comments:

(If you have any questions concerning the FAX, please call (214) 522-6200).

December 30, 1992

Mr. Ron Whitehead
City Manager
Town of Addison
P.O. Box 144
Addison, TX 75001

Dear Ron:

I thought it advisable to record principle elements of the discussion held at 3:00 p.m. on December 22, 1992, in the Addison Town Hall exploring parameters for financing of the Addison Airport Toll Tunnel (the "Tunnel") and the sequencing of actions needed to prepare a revenue bond issue for marketing. In attendance at the meeting were Richard Litton and David Medanich of First Southwest Company, Gary Jost and Bob Wunderlich of Barton-Aschman Associates, Inc., Ron Whitehead of the Town of Addison ("Addison"), and James Griffin of the Texas Turnpike Authority (the "TTA").

Stated Position of the Texas Turnpike Authority.

1. Civil engineering studies, traffic and revenue analyses and financing investigations suggest, that with a $3,000,000 investment by Dallas County for right-of-way acquisition, the Tunnel is feasible based on revenues projected from a basic $ .75 toll.

2. All parties involved in the Tunnel study believe a $ .50 basic toll will be more acceptable to the public and will result in increased traffic volumes using the Tunnel.

3. First Southwest analyses have indicated that $4,000,000 of capital contribution by Addison would, based on a $ .50 toll, provide acceptable debt coverage ratios for the reduced capital cost of the Tunnel.

4. The TTA staff is of the opinion that a Tunnel bond indenture could provide for the establishment of a surplus fund whose proceeds would be dedicated to repayment of capital loans to the project by Addison and Dallas County, $4,000,000 and $3,000,000, respectively.

5. There does not appear to be a reasonable right-of-way acquisition plan nor practical roadway design geometry along Keller Springs Road west of the Dallas North Tollway (the "DNT") which would physically allow the connection of the Tunnel to the DNT. In order to use surplus funds of the DNT to construct the Tunnel or to provide financial security for the Tunnel bonds, extensive deliberations among staff, consultants, and attorneys must be pursued to attempt to identify a logical interpretation of the DNT Trust Indentures and applicable law that would permit the Tunnel to be considered an extension, an enlargement, or an expansion of the DNT.

6. The 73rd Legislature could enact legislation allowing surplus DNT revenue to be used to assist in financing or in providing security to the debt of other turnpike projects.

7. Based on their experience in revenue bond financing, the staff and consultants of the TTA believe the market for Tunnel revenue bonds is highly suspect, given the Wilbur Smith Associates ("WSA") report dated February 1992, unless the Town of Addison (i) contracts with the TTA not to construct nor permit to be constructed a competing thoroughfare across the Addison Airport (the "Airport") property between Addison Road and Midway Road during the bonded indebtedness of the Tunnel or (ii) Addison would contract with the TTA to guarantee the payment of any debt service shortfall of the Tunnel should Addison construct a parallel competing thoroughfare across the Airport during the life of the bonded indebtedness of the Tunnel.

8. Lease/purchase, licensing, or refinancing of the DNT by Dallas County, conceivably, would permit, subject to support of the Dallas County Commissioners, financial support of the Tunnel from surplus funds of a single county-wide turnpike corporation.

9. County Judge Lee Jackson has suggested in negotiations with the TTA that the County turnpike corporation would retain the current staff of TTA and desires that that staff and its consultants continue their efforts to develop and finance the Tunnel.

10. The TTA staff and its financial advisor plan to make a Tunnel progress report to the TTA Board of Directors (the "Board") on January 22, 1993. A Resolution from the council of the Town of Addison supporting the Tunnel, committing a $4,000,000 secondary loan to construction capital, and postponing the construction of a parallel thoroughfare across the Airport property would probably generate Board support for continuing with the development of the Tunnel.

11. The TTA will authorize WSA to discuss with Barton-Aschman, traffic volumes each firm projects will use the Tunnel.

Stated Position of Addison.

1. Addison does not want to abandon its support of a thoroughfare parallel to the Tunnel across Airport property.

2. Addison does not deem it reasonable to make up any debt service deficit of the Tunnel should it elect to construct a parallel thoroughfare across the Airport property.

3. Addison would rather not invest $4,000,000 in the capital cost of Tunnel as it has other uses for that capital.

4. Addison would like to see a physical connection between the DNT and the Tunnel, thereby allowing surplus funds of the DNT to be used in Tunnel financing.

5. Lacking the implementation of No. 4 above, Addison desires that surplus funds of the DNT to be used to supplement the capital cost of the Tunnel and/or guarantee any Tunnel debt service deficit.

6. Addison prefers a $ .50 basic toll rate.

7. Addison has no preference for the Tunnel being financed under the aegis of a Dallas County turnpike corporation or the TTA. In either circumstance, Addison prefers that the Tunnel be financed as a unit of a turnpike system rather than as a stand alone turnpike project.

8. Addison authorized its traffic consultant, Barton-Aschman, to contact WSA with a goal of narrowing the gap between the two consultants' projected traffic volumes that would use the Tunnel.

The staff of the TTA and its consultants are anxious to receive project and financial support of the Town Council of Addison for the Tunnel and are prepared to engage in meetings with the staff of Addison as often as may be required to achieve this goal.

Yours very truly,

James W. Griffin, P.E.
Deputy Director

cc: John Ramming
Luther Jones
First Southwest
Ginn Corporation

nlg

WILBUR
SMITH
ASSOCIATES
ENGINEERS • ECONOMISTS • PLANNERS

136 COLLEGE STREET • P.O. BOX 9412 • NEW HAVEN, CT 06534 • (203) 865-2191 • FAX (203) 624-0484

December 31, 1992

Mr. Robert Wunderlich
Barton-Aschman Associates, Inc.
5485 Beltline Road
Suite 199
Dallas, Texas 75240

Dear Mr. Wunderlich:

Enclosed for your review and information is a summary of charges that are associated with an update to the Addison Airport Tunnel Study Wilbur Smith Associates (WSA) conducted earlier this year for the Texas Turnpike Authority (TTA). You will find the summary addresses costs for the modeling efforts and other ancillary items required for the Arapaho Road Extension Project.

You will recall that your phone discussions with John Smolley concerned the addition of the Arapaho Road Extension to the modeling efforts for the Addison Airport Tunnel. Specifically WSA's earlier report did not have as part of the programmed highway improvements, the addition of the Extension to Arapaho Road. We have reviewed the files on this project and have determined that the addition of the Arapaho Road Extension to the modeling effort would require some reworking to the model in order to bring it up to a necessary level for assignment procedure. We estimate that the total fee to model this project would be $8,456. Please note that some $900 of this total fee is absorbed in the cost of a trip to Dallas to discuss the results of the effort once it is completed. This can obviously be removed from the study costs should you decide that the results could be presented to you by letter report and discussed by telephone. In any case, please review the attached summary of costs and let us know whether you wish to make any suggested changes.

You should also be made aware of the TTA's concurrence in this assignment. Jim Griffin has been apprised of the level of effort involved in this analysis and is supportive of WSA's accepting the assignment. Assuming therefore, that you are interested in pursuing this effort, we would need to make certain that all information provided to us concerning the Arapaho Road Extension would be available in a timely manner. Once that information is received we would need approximately one month to perform the work efforts regarding this project. If this is acceptable this document can then serve as a contract by signing in the appropriate space provided.

WILBUR
SMITH
ASSOCIATES

We look forward to the possibility of working with you on this project and would be pleased to answer any questions that you might have concerning any of the material provided. Please do not hesitate to contact John Smollcy or me should you require additional clarification.

Respectfully submitted,

WILBUR SMITH ASSOCIATES

Norman H. Wuestefeld
Executive Vice President

NHW/mla/JS

cc: James W. Griffin - TTA

ACCEPTED BY CONTENT AND TERMS:

_____
NAME

_____
TITLE

_____
ORGANIZATION

_____
SIGNATURE

_____
DATE

Exhibit A

SUMMARY OF ESTIMATED STUDY COST

Addison Airport Tunnel Update

1. Salaries and Wages

CLASSIFICATION	HOURS	AVERAGE	ESTIMATED COST
Senior Officer	4	$68.00	$272
Officers	4	45.00	180
Associate Engineer/Planner/Economist	16	36.00	576
Principal Engineer/Planner/Economist	16	30.00	480
Senior Engineer/Planner/Economist	20	25.00	500
Technician	20	14.00	280
Technical Typist/Word Processor	8	13.00	104
Junior Analyst/Clerical	8	12.00	96
TOTAL			$2,488
2. Fringe Benefits (49.28 Percent of Salary Cost)			1,226
3. Overhead (106.05 Percent of Salary Cost)			2,639
Subtotal			$6,353
4. Fee (15 Percent)			953
5. Direct Expenses			
a) Travel	$ 800		
b) Subsistence	100		
c) Reproduction and Publication	100		
d) Telephone, FAX and Office	50		
e) Postage and Express	50		
f) Materials and Supplies	50		
Subtotal			1,150
TOTAL COST			$8,456

#287

Barton-Aschman Associates, Inc.

5485 Belt Line Road, Suite 199
Dallas, Texas 75240
USA

Phone: (214) 991-1900
Fax: (214) 490-9261
Metro: 263-9138

MEMORANDUM

To: Ron Whitehead
Town Manager

From: Robert Wunderlich
Gary Jost

Date: December 18, 1992

Subject: **Analysis of East/West Roadway Capacity in Addison**

Belt Line Road serves as the primary conduit of east/west traffic flow north of the LBJ freeway (Figure 1). The combination of continuity from I-35E on the west to US 75 on the east and the concentration of employment and residential centers along its route and an interchange with the Dallas North Tollway (DNT), have resulted in a heavily travelled corridor with significant congestion during the peak hour. Currently, Belt Line Road carries approximately 37,783 vehicles per day just west of the DNT.

Travel demand estimates project that congestion is to continue and worsen. Very little opportunity exists to expand Belt Line Road due to adjacent property impacts and aesthetic considerations. Therefore, it is essential that alternate routes be developed to relieve Belt Line Road.

POSSIBLE RELIEVER ROUTES

Between Belt Line and Spring Valley, opportunities to provide relief are limited due to the presence of residential neighborhoods. Therefore, attention has focused on the corridor north of Belt Line Road where a connection of Keller Springs and an extension of Arapaho Road are the most likely candidates for relieving Belt Line Road (see figure 2).

KELLER SPRINGS

Keller Springs Road currently extends to the east and west from Addison Airport. Keller Springs extends from the Airport past Preston Road to Campbell Road on the east side of the Airport. On the west, the road continues through Carrollton to I-35E. Tunnelling under the Airport has been identified as the only feasible way to connect the eastern and western sections of Keller Springs while maintaining Airport operations. Because of the substantial cost of such a project, funding is proposed through tolls. A two-lane (one lane in each direction) tunnel with a $.75 toll is under consideration at this time.

ARAPAHO ROAD

Arapaho Road is continuous from the Dallas North Tollway to US 75 west of the tollway, Arapaho intersects with Spectrum, at an all-way stop right angle intersection. Arapaho then continues west to Addison Road. An alignment has been proposed which would extend Arapaho west from the DNT to Marsh Lane.

PROJECT TRAFFIC ANALYSIS

As part of the Addison Transportation Plan project, the NCTCOG modeled several alternative roadway networks. One of the purposes of this effort was to explore the interaction between the two alternative roadways and their ability to relieve Belt Line Road. Representative volumes are shown for this alternative model in Table 1.

Table 1
COMPARISON OF VOLUMES JUST WEST OF ADDISON ROAD
YEAR 2010

	No Keller Springs or Arapaho	Keller Springs Free 4-Lane Facility; No Arapaho	2 -Lane Keller Springs Tollroad; No Arapaho	2 Lane Keller Springs Tollroad; Arapaho Extended to Marsh
SH 190	113,000	113,000	114,000	112,000
Trinity Mills	17,000	19,000	20,000	18,000
Keller Springs	--	30,000	16,000	16,000
Lindburg	15,000	10,000	13,000	1,000
Arapaho	--	--	--	40,000
Belt Line	61,000	56,000	58,000	49,000
TOTAL	254,000	273,000	267,000	267,000

Without either of the alternative routes, Belt Line Road is projected to have a demand of 61,000 vehicles per day. When the Keller Springs tunnel connection is modeled as a four-lane, free-access roadway, the volume of Belt Line Road is reduced by about 5,000 vehicles, and the resulting volume on Keller Springs is 30,000 vehicles per day.

When access to Keller Springs is restricted by charging a toll and reducing the width to two lanes, the volumes on Keller Springs drops to 16,000 and the volume on Belt Line Road is reduced by only 3,000 vehicles.

When Arapaho is added between the North Tollway and Marsh, the volumes on Keller Springs toll tunnel are not affected, but volumes on Belt Line Road are reduced by 12,000 vehicles per day to 49,000 vehicles per day. The daily traffic volume on Arapaho is projected to be 40,000 under these conditions.

SUMMARY

It is apparent from the projected volumes that the Keller Springs toll tunnel and the Arapaho Road extension generally serve different travel needs and projected volumes on Keller Springs are not diminished when Arapaho is extended. The projected traffic volumes also support the need for all three facilities (Arapaho Road, Keller Springs Toll Tunnel, and SH 190) to meet future east-west travel demand. Each facility meets a specific need for travel in the area.

Arapaho serves as a relief facility for Belt Line Road and provides a continuous circulation route for adjacent land uses. The proposed Keller Springs Toll Tunnel chiefly links areas west of the Airport to the Dallas North Tollway. Land uses within Addison are generally not served directly although the toll tunnel could be used to access areas within Addison.

It does not appear that even a four-lane, free Keller Springs connection would relieve Belt Line Road. On the other hand, the Arapaho extension does carry traffic that could otherwise travel on Belt Line, but does not attract trips that would use Keller Springs.

An analysis of the intersections of Midway Road at Keller Springs and Addison Road at Keller Springs will be sent under separate cover. These intersections support the toll tunnel and will be important to the success of the toll tunnel.

robertleast-west.rdw

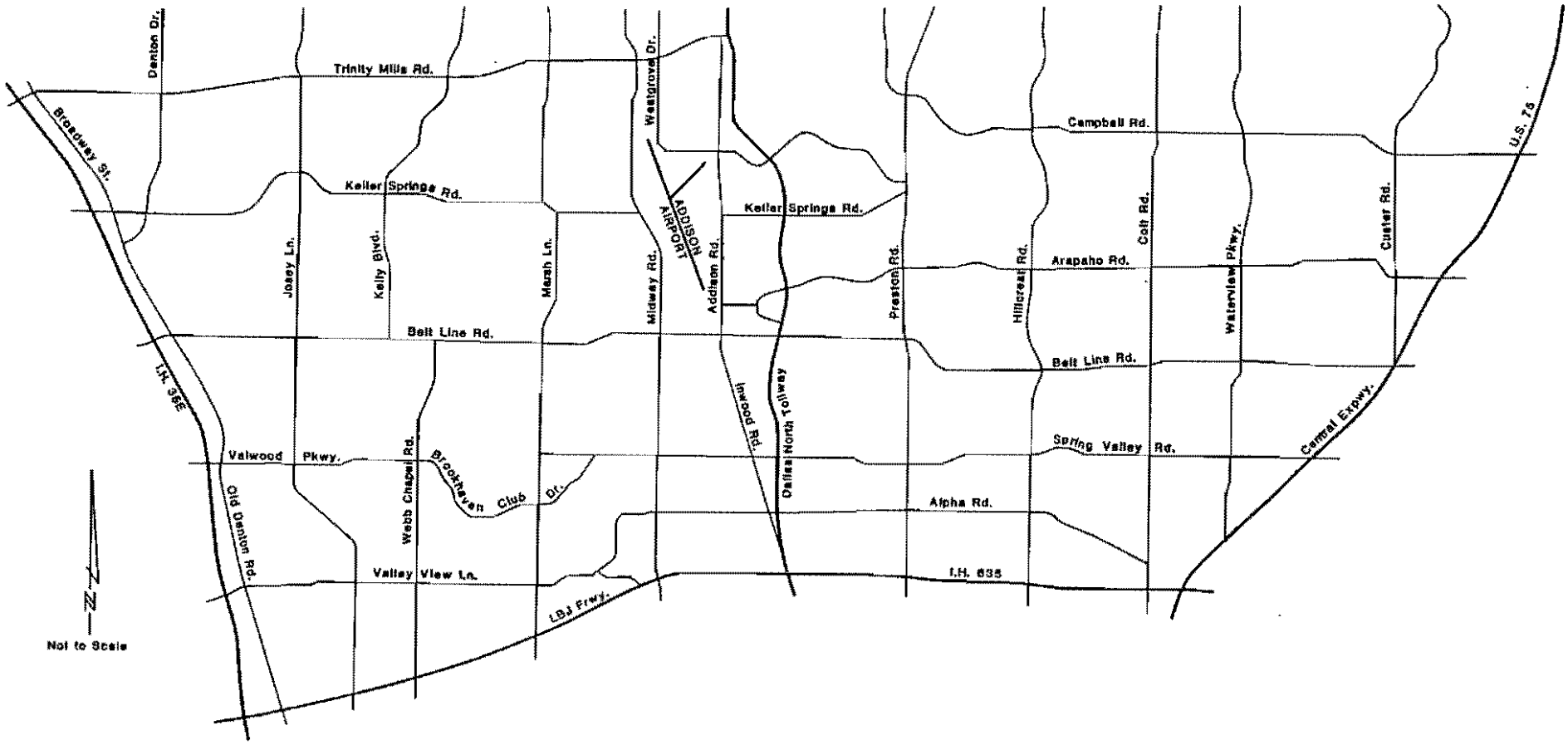


FIGURE 1

EXISTING ROADWAY CONFIGURATION

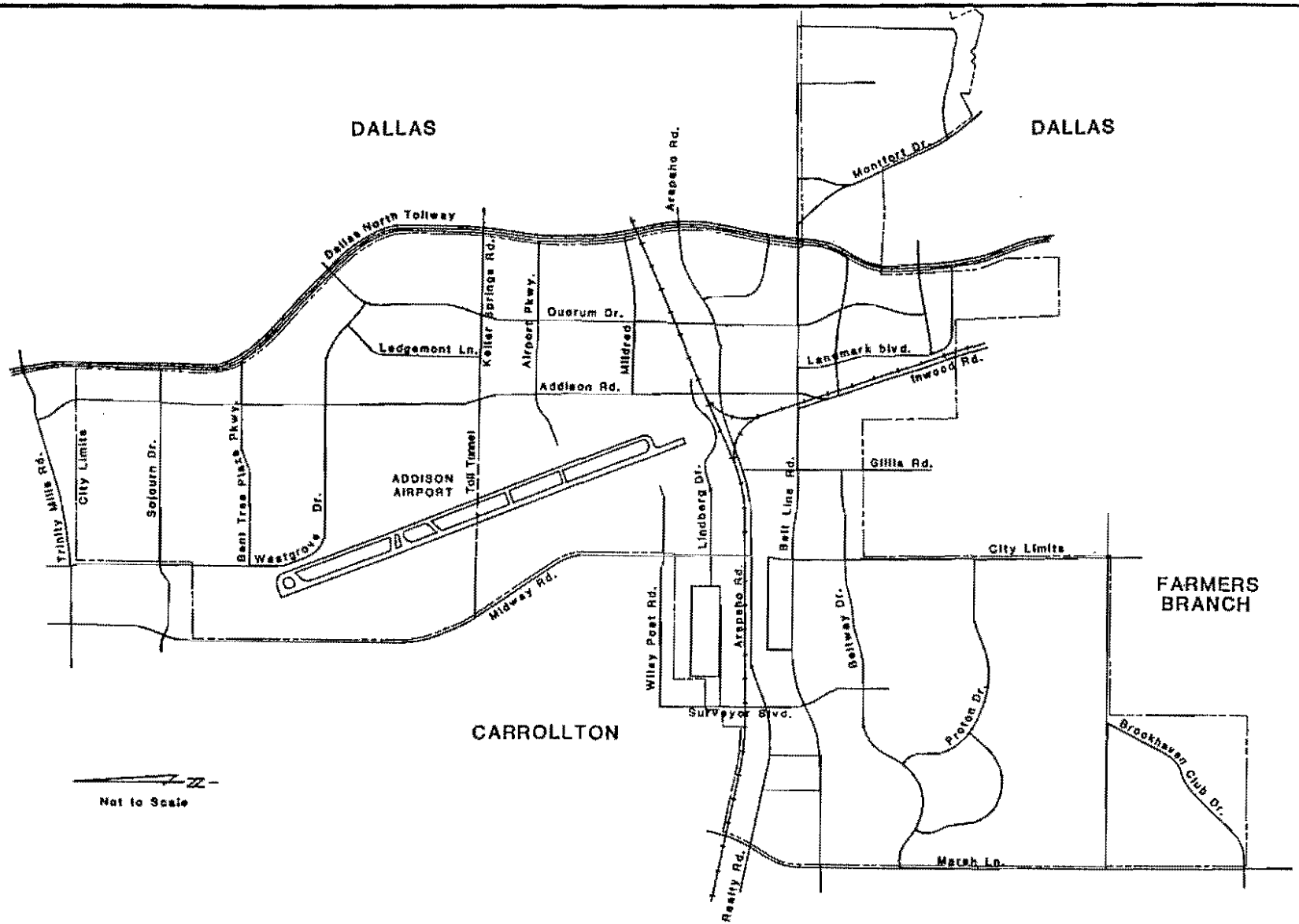


FIGURE 2

CONCEPTUAL ROADWAY CONFIGURATION

WILBUR
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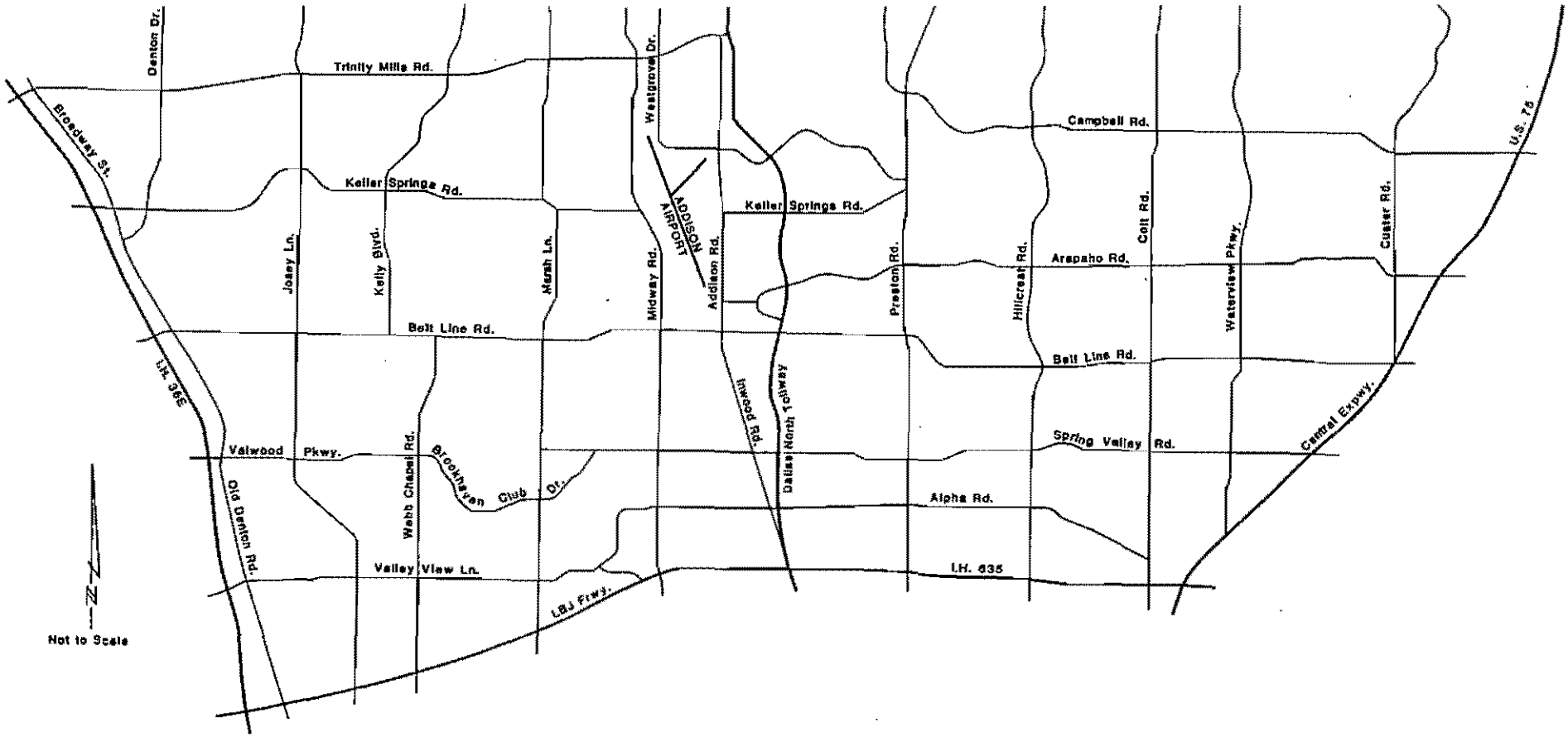


FIGURE 1

EXISTING ROADWAY CONFIGURATION

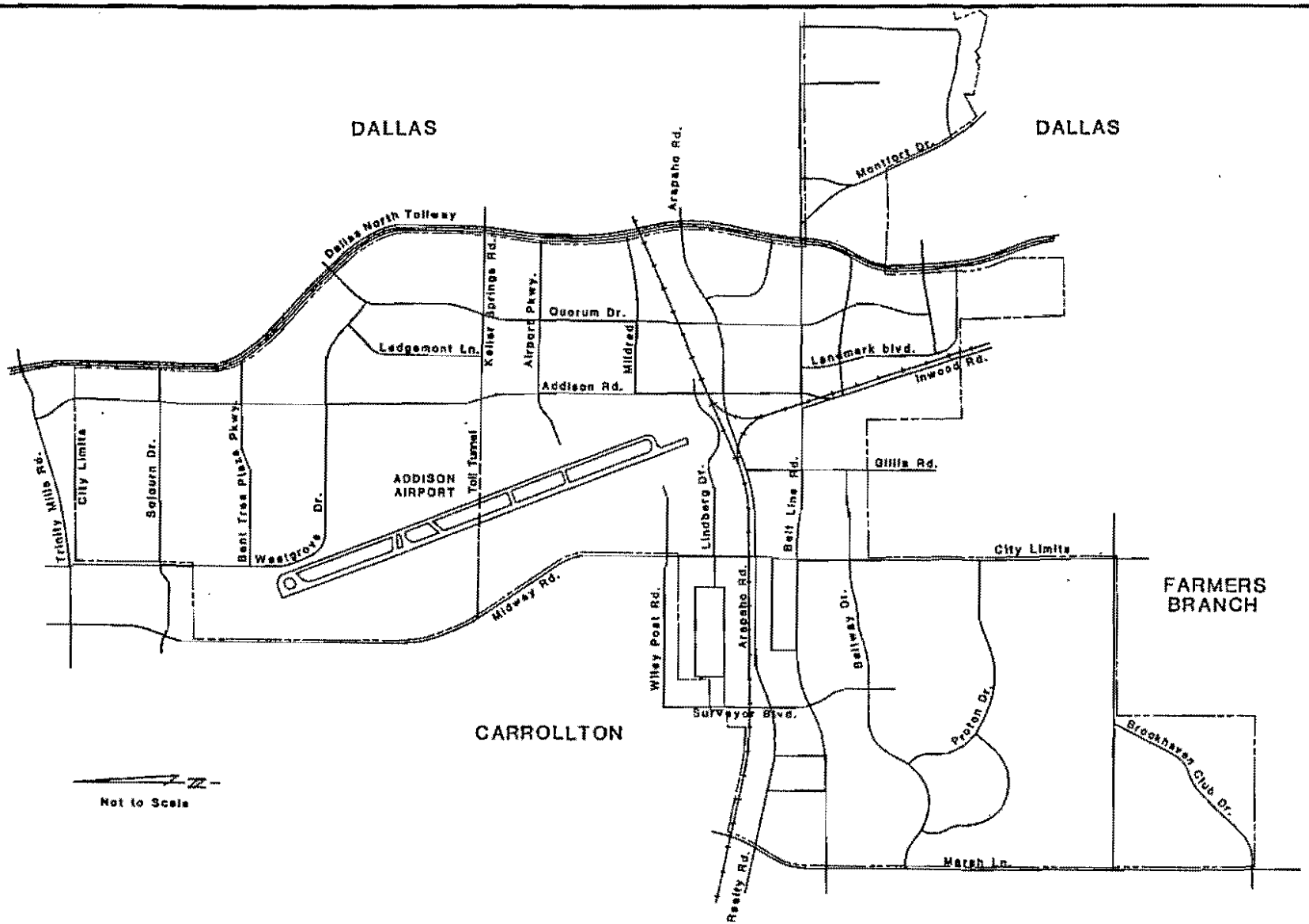


FIGURE 2

CONCEPTUAL ROADWAY CONFIGURATION

GINN, INC. CONSULTING ENGINEERS

December 9, 1985

Honorable Mayor Jerry Redding & Council
Post Office Box 144
Addison, Texas 75001

Dear Mayor Redding:

Ginn, Inc., in association with Barton-Aschman Associates, Inc. and Howard Needles Tammen & Bergendoff is pleased to present our report for the Addison Airport-Keller Springs Underpass.

The report addresses two major elements: a traffic analysis of future traffic volumes surrounding the Addison Airport; and a feasibility study which evaluates several alignments and tunnel designs. The findings and recommendations are summarized in the Executive Summary.

We appreciate the opportunity to be of continued service to the Town of Addison and look forward to working with the City staff on this important project.

Sincerely,

H. Wayne Ginn, P.E.

RH/HWG/sr

Enclosure

16135 Preston Road • Suite 106 • Dallas, Texas 75248 • Phone 214/386-6611

ADDISON AIRPORT - KELLER SPRINGS UNDERPASS STUDY

Table of Contents

EXECUTIVE SUMMARY

The Executive Summary presents a synopsis of the preliminary feasibility studies for the Keller Springs Underpass prepared for the Town of Addison by Ginn, Inc., in association with Barton-Aschman Associates, Inc. and Howard Needles Tammen & Bergendoff. The studies investigated future traffic volumes, design schemes and associates preliminary costs to determine if the Keller Springs Underpass warranted further study.

A traffic study was conducted to determine the volume of traffic which would use the proposed Keller Springs Underpass upon build-out of Addison, Farmers Branch, Carrollton, Plano, and the North Dallas area. The Cities of Dallas and Carrollton plan for Keller Springs Road to be a major thoroughfare consisting of six-lane divided roadway. According to the projected traffic volumes along Keller Springs, the underpass needs to carry 40,000 vehicles per day. This volume of traffic requires a six-lane divided roadway. Consequently, without the underpass to provide continuity to the North Dallas area thoroughfare plan, east/west roads such as Trinity Mills and Belt Line Road will have to carry the additional east/west traffic.

The second part of study investigated various alignments for the Keller Springs Underpass and developed preliminary project costs for the alignment. These alignments are

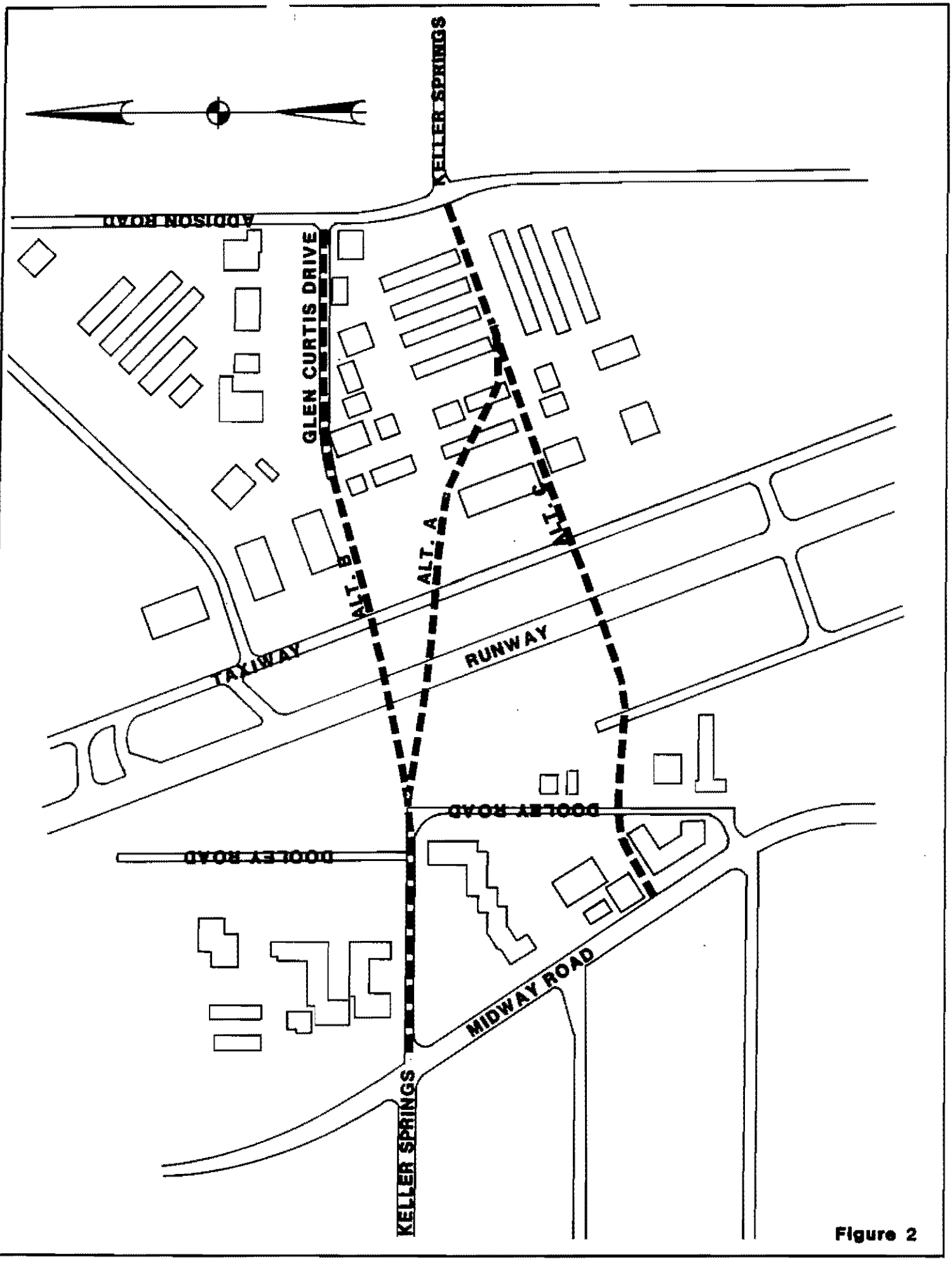
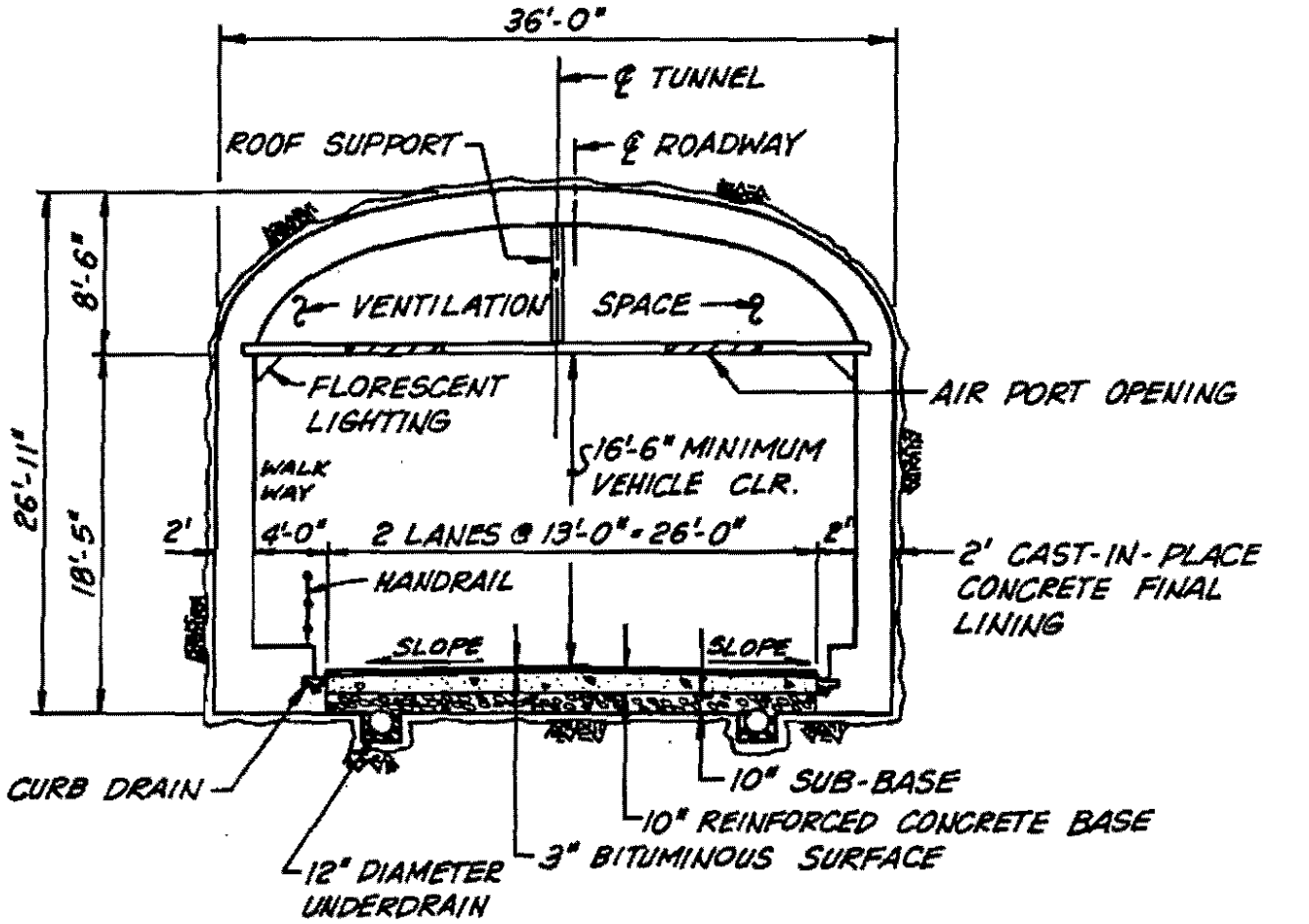

KELLER SPRINGS
ADDISON ROAD
GLEN CURTIS DRIVE
ALT. B
ALT. A
ALT. C
TAXIWAY
RUNWAY
DOOLEY ROAD
DOOLEY ROAD
MIDWAY ROAD
KELLER SPRINGS

Figure 2

presented in Figure 2. Items such as airport runway clearance, access to adjacent properties, and tunnel construction were considered in evaluating the various alternatives. Based on these items, Alignment A was recommended for the underpass.

Upon establishment of an alignment, several tunnel methods were evaluated. The tunnel methods considered for traversing the airport were cut-and-cover, shallow tunneling, and deep tunneling. A cut-and-cover method of construction would suspend airport operations for extended periods of time. Therefore, this method was not given further consideration. A shallow tunnel with approximately 10 feet of cover has less approach roadway and retaining walls. However, this asset is offset by the added structural costs associated with a shallow tunnel system. The deep tunnel method with approximately 30 feet of cover would provide natural structural support and thus decrease the cost of tunnel construction. The deep tunnel approach allows for the construction of 2 - two lane tunnels with the possibility of 2 - three lane tunnels. The shallow tunnel would only allow for tunnels to be constructed in multiples of two lanes. Figures 4 and 5 present typical tunnel sections for the two-lane and three-lane roadways.

Tunnel construction would require a ventilation system to exhaust CO and CO2 emitted from the vehicles; a drainage system to handle unexpected spills of water or fluids from tank trucks, rainwater and washdown water; a lighting system

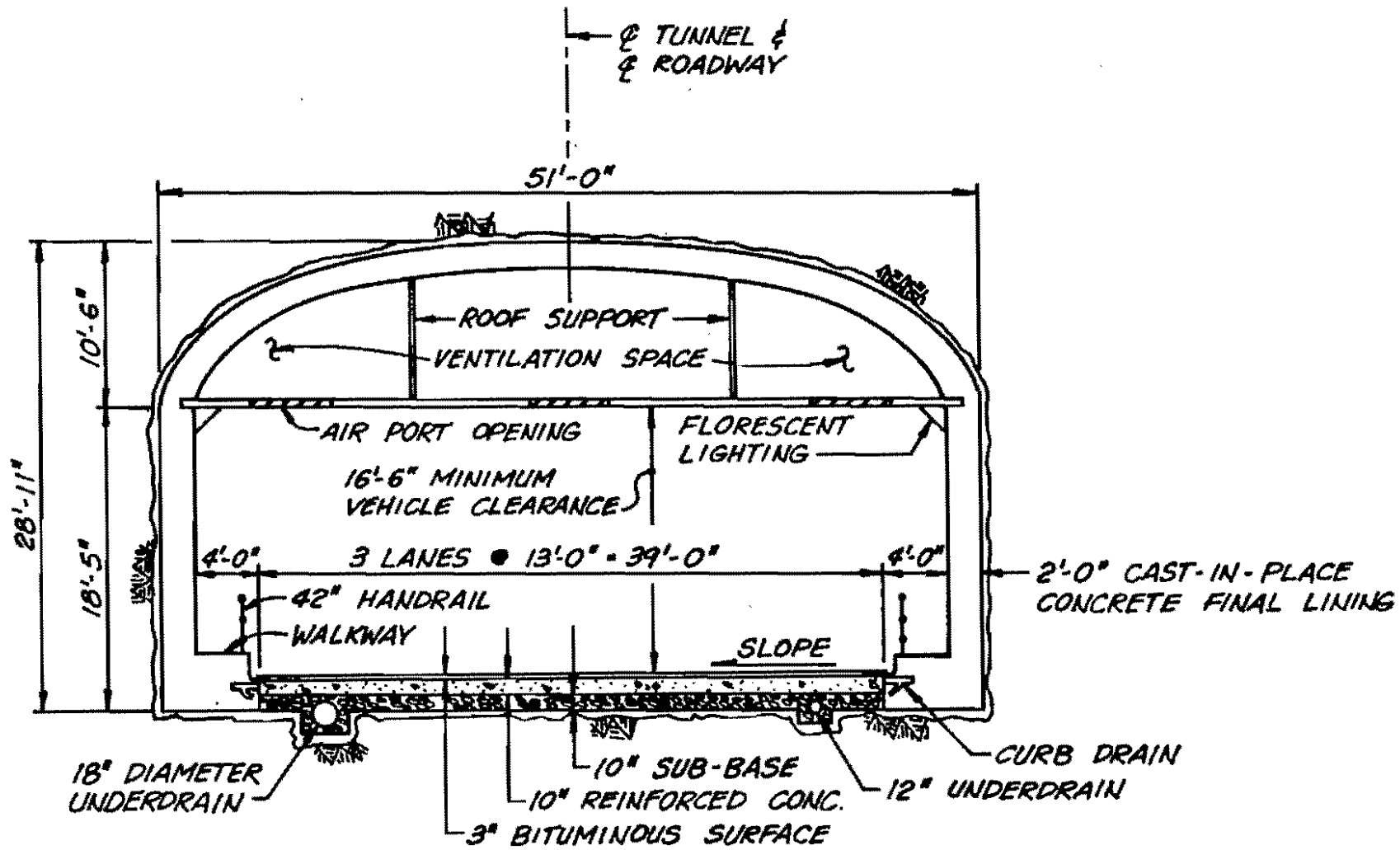


Note!
APPLICABLE TO BOTH SHALLOW AND DEEP TUNNEL ALTERNATIVES

HNTB
HOWARD NEEDLES TAMMEN & BERGENDOFF

Figure 4

TYPICAL 2 - LANE
TUNNEL SECTION



Note!
APPLICABLE TO THE DEEP TUNNEL ALTERNATIVE ONLY

Figure 5

TYPICAL 3 - LANE TUNNEL SECTION

HNTB
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to provide adequate light for driving and fire hose connections every 200 feet along the tunnel. These systems would be investigated further during the design phase of the project.

Preliminary construction costs were prepared for the various tunneling alternatives for Alignment A. Estimates were prepared for 2 - two lane tunnels and for 2 - three lane tunnels for the deep tunnel alternative under the Addison Airport. Estimates were prepared only for 2 - two lane tunnels for the shallow tunnel alternative. The costs of these are as follows:

Item	Preliminary Construction Cost
Shallow tunnel 2 - two lane	$30,000,000
Deep tunnel 2 - two lane	$28,800,000
Deep tunnel 2 - three lane	$40,200,000

Recommendations: It is recommended that more extensive studies be conducted in the following major areas:

* Subsurface Explorations - It is recommended that at least six (6) soil borings and their associated soil analyses be developed in an effort to more accurately develop soil/rock characteristics and profiles. These soils analyses are also intended to provide data to further assess the feasibility and costs associated with shallow tunneling.
* Obtain Updated Mapping - The recent construction of an FBO abutting the taxiway in the vicinity of the

project and also recent construction near the terminals of the project necessitate the requirement for updated mapping.

* Refinement of Geometry and Capital Costs - Whereas the initial study considered several alignments, the selected alignment will be further refined to confirm its viability.
* Develop Operations and Maintenance (O&M) Costs - O&M costs will be developed relying on experience from tunnel projects in other parts of the country as they relate to the subject project.
* Develop Right-of-Way Costs - It is recommended that development of right-of-way costs through the services of an independent appraiser be obtained. This would include costs of lease buy-outs and relocation.
* Develop Preliminary Cost Estimates - Preliminary construction cost estimates will be prepared based on estimates of the quantities of major construction items and application of the approximate current unit prices to the preliminary quantities.
* Develop Operational Plan - An operational plan illustrating procedures during emergencies will be developed.
* Coordinate these findings with FAA and other appropriate governmental agencies.
* Develop a source of potential funding.

DRAFT REPORT

KELLER SPRINGS UNDERPASS AT ADDISON AIRPORT

FEASIBILITY STUDY - TRAFFIC PROJECTION

ADDISON, TEXAS

BARTON-ASCHMAN ASSOCIATES, INC.

August, 1985

INTRODUCTION

The purpose of this report is to present the results of a study conducted for the City of Addison and Ginn, Inc. concerning the potential extension of Keller Springs Road under Addison Airport. Projected traffic volumes for the proposed extension are presented in this report together with an evaluation of the impact of the extension on traffic volumes along Belt Line Road and Trinity Mills.

KELLER SPRINGS ROAD

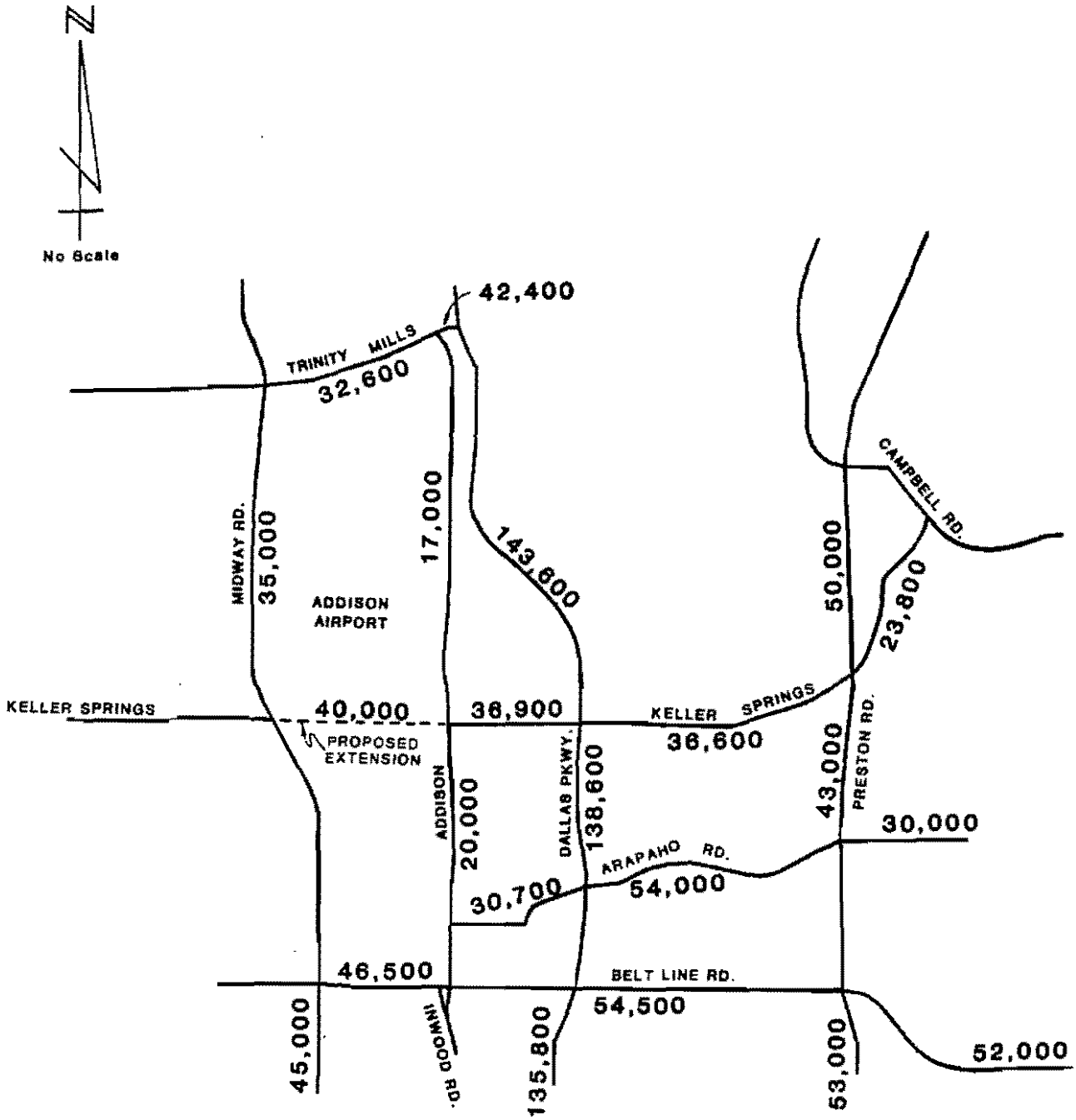
Keller Springs Road is an east/west thoroughfare street that currently is constructed from Campbell Road to Addison Road on the eastside of Addison Airport. West of Addison Airport, Keller Springs Road will eventually connect with Whitlock Road to provide a direct link with Interstate Highway 35E (IH 35E). West of IH 35E, Whitlock becomes Sandy Lake Road and extends into the City of Coppell.

The City of Dallas has recently upgraded Keller Springs Road to major thoroughfare status as a six-lane divided roadway between Preston Road and the Dallas North Tollway. West of Midway Road, in the City of Carrollton, Keller Springs Road is designated as a six-lane divided thoroughfare.

TRAFFIC PROJECTIONS

Projected traffic volumes for Keller Springs Road and its proposed extension under Addison Airport are shown in Figure 1. Traffic volumes for other major thoroughfares in the vicinity of the proposed Keller Springs extension are also shown in Figure 1. These traffic volume projections were developed in conjunction with the recent Parkway Center Study conducted for the City of Dallas and reflect those volumes that are projected to occur upon build-out of the Addison, Farmers Branch, Carrollton, Plano, and North Dallas area. The projected traffic volumes are projected to occur beyond the Year 2000.

Keller Springs is projected to carry approximately 40,000 vehicles per day, if it is constructed under the airport. As can be seen in Figure 1, other parallel major thoroughfares (i.e. Belt Line Road and Trinity Mills) are projected to have traffic volumes in excess of 40,000 vehicles per day along certain sections of roadway.



LEGEND

40,000 - Traffic Volume in Vehicles Per Day

FIGURE 1

PROJECTED TRAFFIC VOLUMES

The proposed extension of Keller Springs Road will have a positive impact on projected traffic along Trinity Mills and Belt Line Road as well as certain sections of Preston Road due to the fact that it will provide an additional continuous east/west thoroughfare between Central Expressway (U.S. 75) and IH 35E. With the proposed extension of Keller Springs Road, projected traffic volumes on Belt Line Road can be expected to be reduced by as much as 5,000 vehicles per day. Likewise, projected volumes along Trinity Mills can also be reduced.

ROADWAY SIZING

Roadway capacity is a measure of a roadway's ability to accommodate a volume of traffic at an acceptable level of traffic operation. The wider the street, the higher the traffic volume that can be accommodated. Listed below are the maximum traffic volumes that can be accommodated for various sizes of roadways.

Size of Roadway	Traffic Capacity (Vehicles Per Day)
4-Lane Undivided	22,000
4-Lane Divided	24,000
6-Lane Undivided	33,000
6-Lane Divided	42,000

Based on the projected traffic volume of 40,000 vehicles per day, Keller Springs Road needs to be a six-lane thoroughfare.

CONCLUSIONS

Based on the projected traffic volumes for the extension of Keller Springs Road under Addison Airport, the following conclusions can be reached.

1. Keller Springs Road needs to be extended under Addison Airport to accommodate east/west traffic flow that is projected to occur at total development of the Addison/North Dallas area.

2. Keller Springs Road needs to be constructed as a six-lane thoroughfare street.

3. The extension of Keller Springs Road under the Addison Airport will provide an additional, much needed, east/west thoroughfare and should help relieve projected traffic on Belt Line Road and Trinity Mills.

DRAFT REPORT

KELLER SPRINGS UNDERPASS AT ADDISON AIRPORT

FEASIBILITY STUDY

ADDISON, TEXAS

HOWARD NEEDLES TAMMEN & BERGENDOFF

August, 1985

KELLER SPRINGS UNDERPASS AT
ADDISON AIRPORT
FEASIBILITY STUDY

TABLE OF CONTENTS

1.0 INTRODUCTION

Keller Springs Road is a major east-west traffic artery serving the City of Addison and the rapidly developing urban area of northern Dallas County, Texas. The roadway is interrupted by the Addison Airport just south of the Dallas County line. Proposed improvements to Keller Springs Road would increase its capacity by connecting adjacent segments through the airport property. Completion of Keller Springs Road through the airport would also serve to reduce congestion on parallel arterials such as Belt Line Road and Trinity Mills Road. Tunneling is considered the only alternative to enable the proposed improvement to Keller Springs Road and maintain the airport as fully operational during construction.

2.0 PURPOSE AND SCOPE

The purpose of this study is to develop a recommended alignment for the extension of Keller Springs Road and to develop project costs for that alignment. It addresses items such as airport runway clearance, access to adjacent properties, and construction costs and considerations with specific emphasis on tunnel construction. Although a cut-and-cover method for traversing under the airport was considered and is addressed in this report, tunneling appears to be the only reasonable method of construction.

The feasibility of any tunneling project is ultimately dependent on the cost of the project. To adequately predict such costs, an assessment must be made as to the geologic conditions which may reasonably be encountered. Geotechnical engineering assumptions lead to an appraisal of ground behavior, applicable construction alternatives, and a feasibility level cost estimate.

This report identifies and isolates geologic and engineering parameters specific to the Addison, Texas area as they relate to tunnel construction. Recommendations for suitable tunnel geometries and excavation and support methods are presented along with special concerns including tunnel ventilation, drainage, lighting, and fire protection.

This report is organized as follows:

Section 1.0	Introduction
Section 2.0	Purpose and Scope
Section 3.0	Project Description
Section 4.0	Geologic Assumptions of Engineering Significance
Section 5.0	Tunnel Excavation and Initial Support
Section 6.0	Final Lining and Support
Section 7.0	Special Considerations
Section 8.0	Construction Estimate
Section 9.0	Conclusions and Recommendations
Section 10.0	References

It should be emphasized that no geotechnical exploration and testing program was conducted for this feasibility study. Conditions anticipated were inferred from generally available geotechnical data including state geologic reports, project data from the nearby Dallas North Tollway extension, and a limited number of shallow borings taken at the airport site for construction of a sewer line.

3.0 PROJECT DESCRIPTION

The Addison Airport is located as shown in Figure 1, in the center of the City of Addison and just north of the city of Dallas. The airport is bounded on the south by the St. Louis-Southwest Railroad tracks, Dooley Road on the west, Sojourn Drive on the north, and Addison Road on the east. The topography is an open, rolling plain with a maximum elevation different of approximately 15 feet. The airport facilities include the 7,000 foot long runway, several taxiways, and numerous hangar buildings. Airport facility usage is general aviation and corporate-type aircraft.

Design Parameters

Design parameters were established to provide the most economical facility that would still serve the traffic demand. The following basic design parameters were used in this study:

Design Speed	- 35 mph
Maximum Horizontal Curvature	- 500 feet
Maximum Grade	- 6%
Runway Clearances	- 150 feet from ℄ runway
	- 100 feet from ℄ taxiway

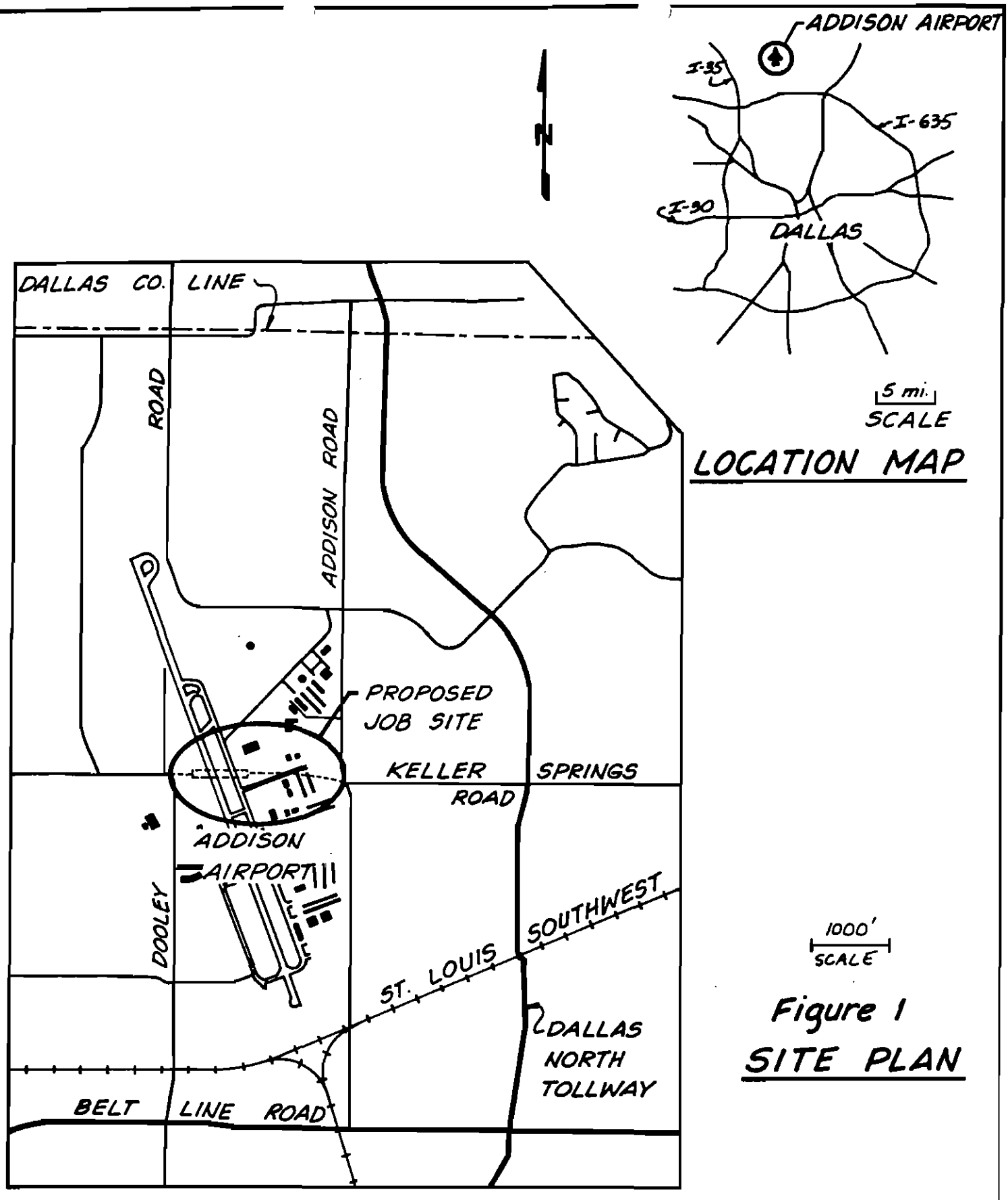


Figure 1
SITE PLAN

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Other items such as right-of-way requirements, lane widths, turn lane widths, etc., are consistent with major thoroughfare design standards used in the City of Addison.

Alternative Alignments

Alternative alignments were investigated as shown in Figure 2. Each alignment was evaluated based upon its total project cost, length of tunnel section, impact on adjacent properties, and relative traffic service.

The recommended alignment, (Alternate A), begins at the intersection of Midway Road and Keller Springs Road, extends easterly along Keller Springs Road under the runway and taxiway, then curves to south and easterly between FBOs along the existing taxiway. The roadway would then extend ENE to Addison Road along an extension of existing Keller Springs Road. The total length of the project would be 3,600 feet, including an 800-foot tunnel section under the airport runway and taxiway. The alignment requires the relocation of some existing T-hangers. Access to existing facilities interrupted by the open cut section of the facility would be restored by bridging the open cut section through conventional methods. Costs for this bridging is included in the project cost summary presented later in this report. A 1"=100' plan depicting this alignment and its impact on existing streets and airport facilities accompanies this report.

Alternative Alignment B, (Alt. B in Figure 2), would begin at the intersection of Midway Road and Keller Springs Road, extend easterly along Keller Springs Road under the runway and taxiway to Glen Curtis Drive, then continue ENE along Glen Curtis Drive to Addison Road. This alternative offers a slightly lower tunneling cost then Alternate A due to a more normal crossing of the runway and taxiway, and it would probably have a lesser impact on existing airport facilities. However, this alignment would require Keller Springs Road through traffic to travel on Addison Road between existing Keller Springs and Glen Curtis Roads, negatively affecting the capacity of both Keller Springs and Addison Roads. For this reason, together with the minimal cost savings over Alternate A, Alternate B is not recommended.

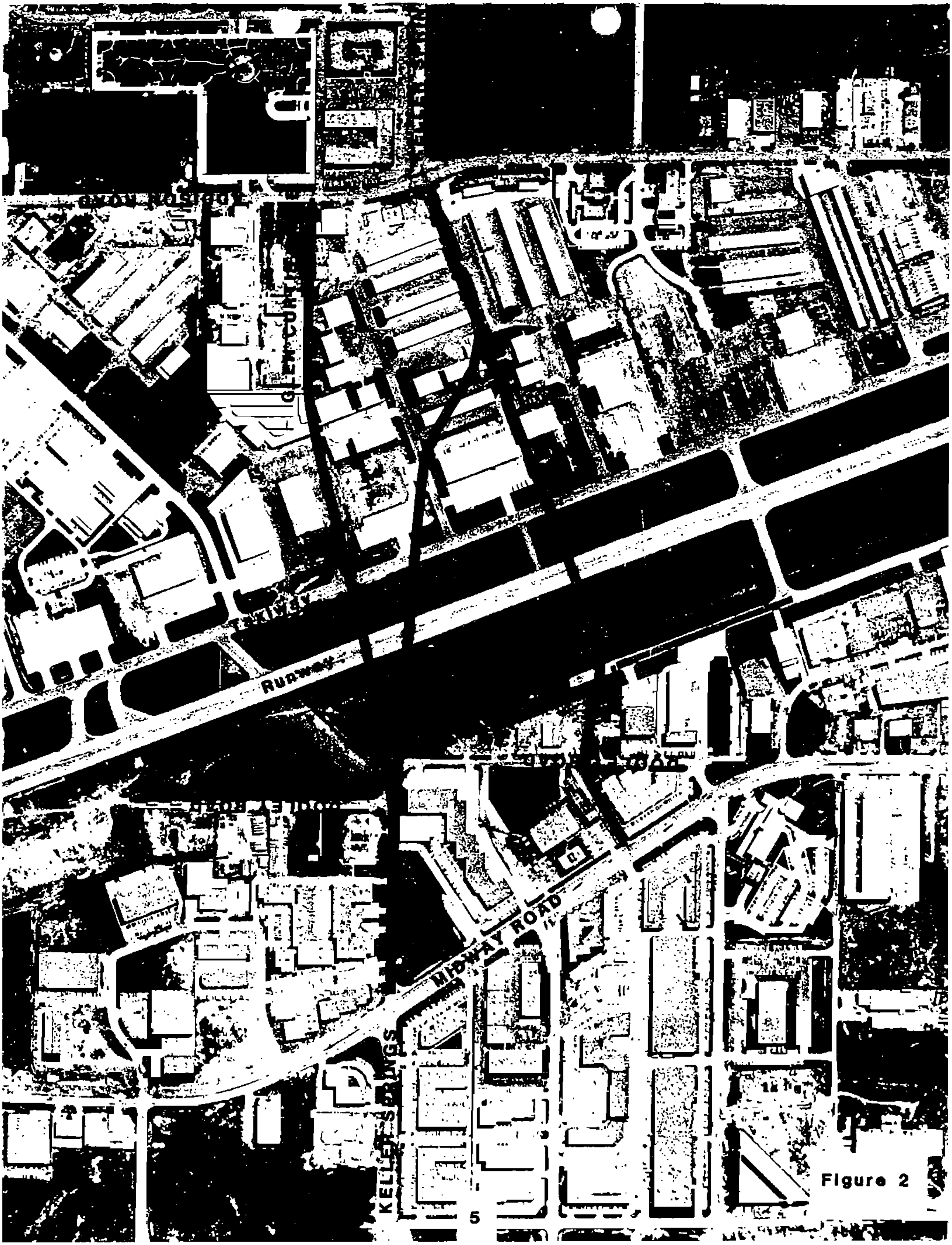


Figure 2

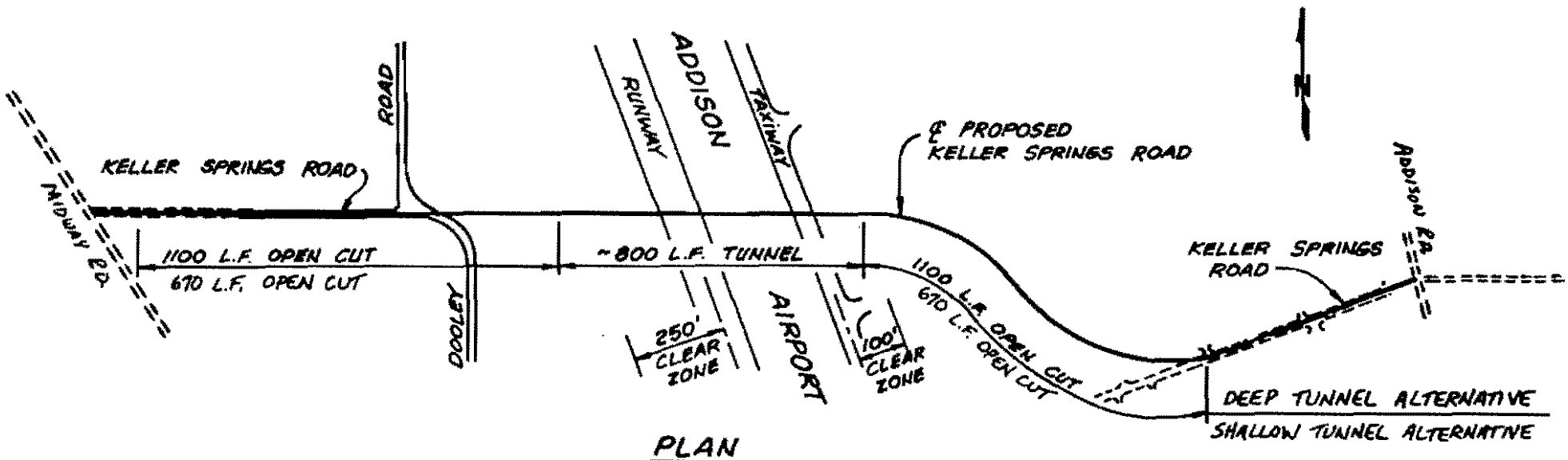
Again, in an effort to minimize tunneling costs, a third alternate (Alternate C) was developed. This alternate would begin south of the intersection of Midway Road and Keller Springs Road, extend ENE and tunnel under the taxiway and runway, and continue ENE and terminate at the intersection of Addison Road and Keller Springs Road. However, this alignment would require the acquisition of at least one business between Dooley Road and Midway Road and an FBO along the taxiway. Similarly to Alternate B but on the west side of the airport, it would offset the proposed and existing intersection of Keller Springs Road and Midway Road, negatively impacting overall traffic capacity as compared to Alternate A. For these reasons, this alternate is not recommended.

Upon selection of Alternate A as the recommended alignment, tunneling schemes were developed for two alternates differing in depth to roadway grade.

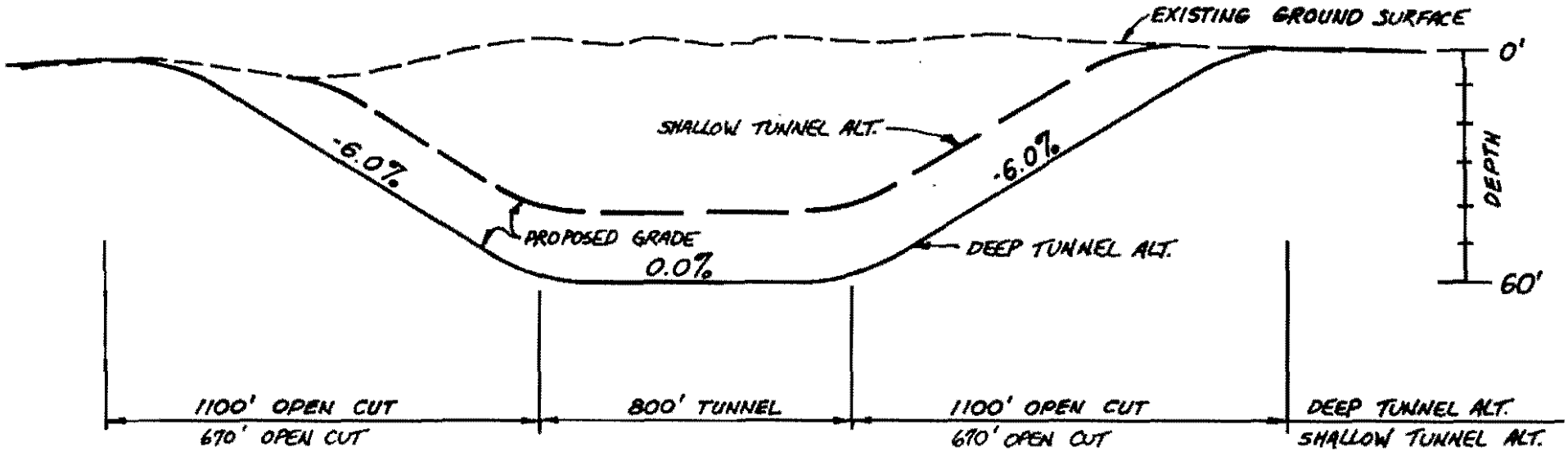
The deep tunnel alternative consists of approximately 3,000 feet of roadway of which approximately 800 feet would be in tunnel, (2 tunnels, each 800 feet long), with roadway grade approximately 60 feet below the runway, and 1,100 feet of approach roadway on each side of the tunnel in retained open cut. The second alternative is a shallow tunnel with roadway grade approximately 40 feet below the runway and 670 feet of approach roadway on each side of the tunnel in retained open cut (see Figure 3.) The approach roadways would be sloped at 6% grade.

A cut-and-cover method of constructing that portion of the project under the runway and taxiway has been explored. However, this method of construction requires the suspension of airport operations for extended periods of time. Also, due to the substantial loading requirements of the members spanning the roadway, the cost savings when compared to tunneling are expected to be minimal, if at all. For these reasons, the cut-and-cover method has been eliminated from further consideration.

Generally, highway tunnels constructed within the United States have been limited to two-lane size widths. Where more traffic capacity is required, multiple two-lane tunnels are constructed. However, for this feasibility



PLAN



PROFILE

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Figure 3
PROPOSED PLAN & PROFILE

study, both two-lane and three-lane tunnel sections are developed and are presented in Figures 4 and 5. The two-lane tunnel section is applicable to both the shallow and deep tunneling alternatives. The three-lane tunnel section is considered to be applicable only to the deep tunnel alternative for reasons related to geologic and construction considerations which are discussed later in this report.

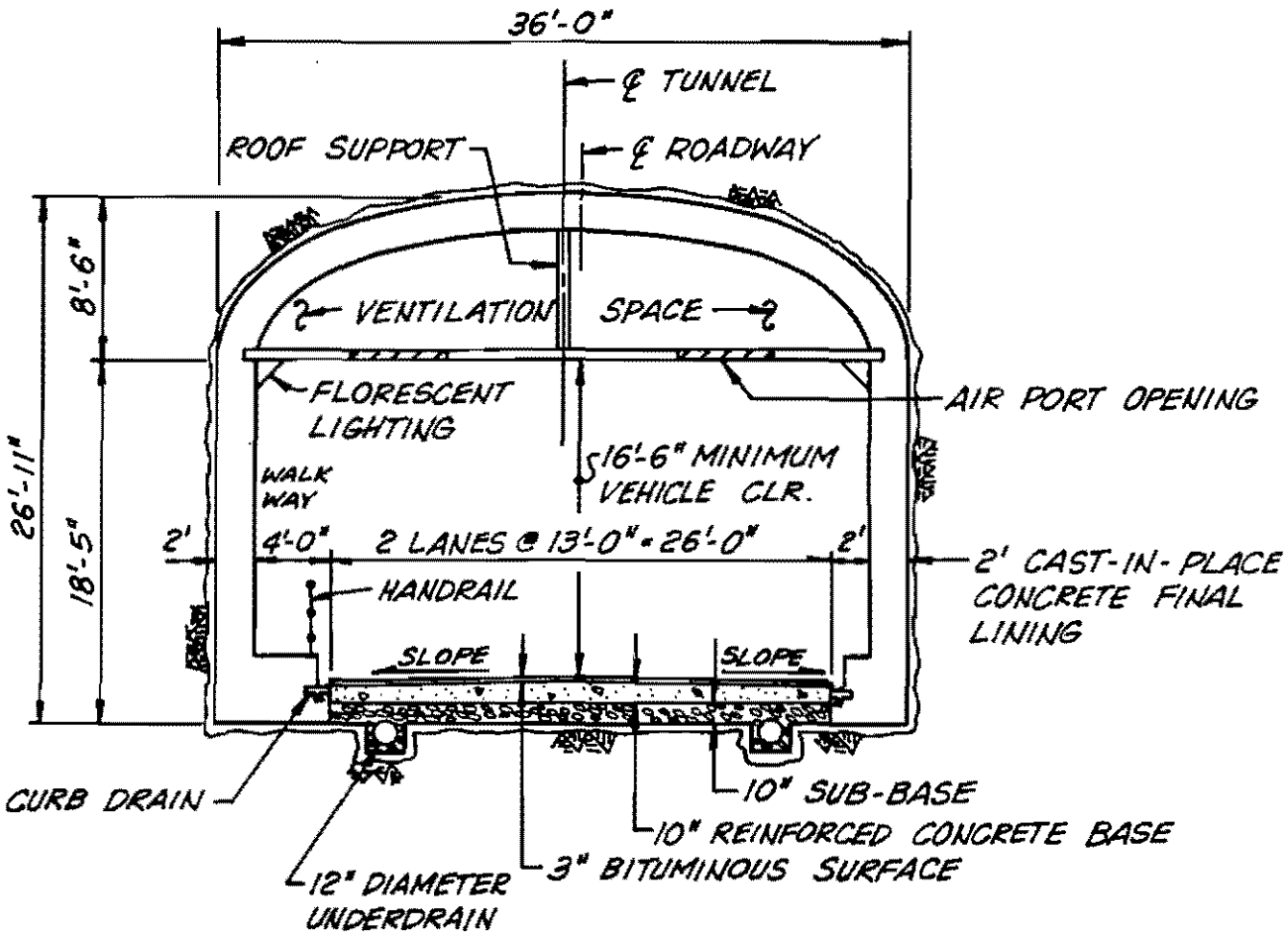
The two-lane tunnel section is wide enough to provide a clear inside opening of 32 feet, adequate for two 13-foot wide lanes of traffic, a 4-foot manway and curbs or alternately two 11-foot roadways and a 6-foot shoulder (breakdown lane) and curbs. The three-lane tunnel section provides for three 13-foot wide traffic lanes and two, 4-foot walkway or alternately three, 11-foot wide traffic roadways and a 6-foot and 3-foot wide breakdown lane plus curbs. Separation between adjacent tunnels is approximately 18 feet for two 2-lane tunnels and 28 feet for two 3-lane tunnels at the tunnel portals as depicted by Figure 6. Entering approachways are in conformance with the City of Addison's Standard four and six-lane design roadway sections.

4.0 GEOLOGIC PARAMETERS OF ENGINEERING SIGNIFICANCE

Geology

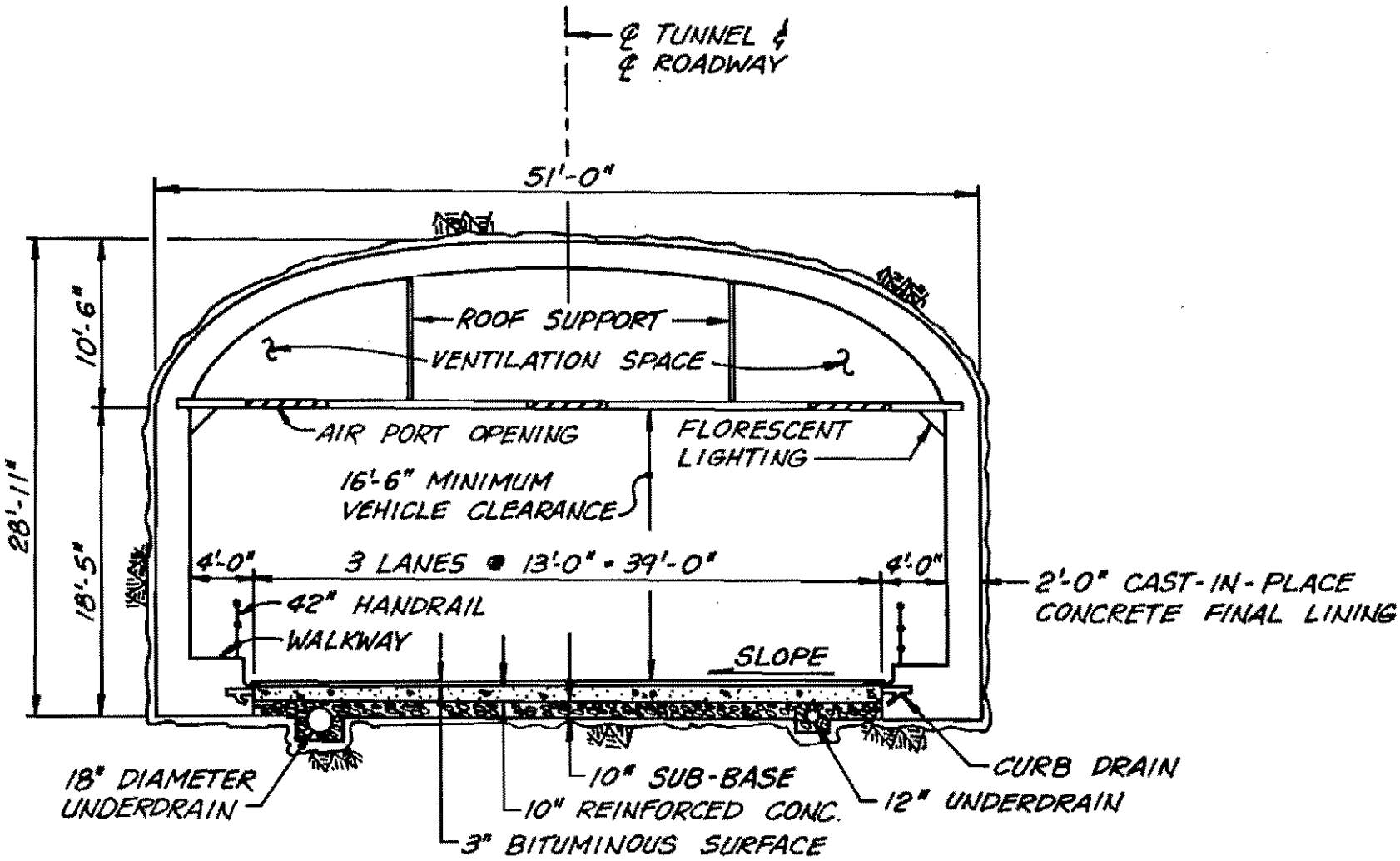
The rocks in Dallas County are Upper Cretaceous in age, underlain unconformably by Paleozoic Era strata (see Figure 7.) Around the City of Addison, the rock near the ground surface is the Austin Formation which has been described by Shuler, (1918):

> The Austin formation, or Austin chalk, consists of a thick series, about 500 feet, of alternating beds of chalk and shaly limestone and marls which have a blue color when saturated with underground water, but which are cream colored or glaring white upon exposure to weathering. Although the formation is termed the Austin chalk, in Dallas County only a few layers near the base are properly termed chalk.
>
> The lower division of the Austin formation is also characterized by an abundance of nodular, spherical, or cylindrical concretions of iron pyrites, "fool's gold", which on weathering gives rise to streaks of rust stain down the chalk wall.



Note!
APPLICABLE TO BOTH SHALLOW AND DEEP TUNNEL ALTERNATIVES

Figure 4
TYPICAL 2-LANE TUNNEL SECTION



Note!
APPLICABLE TO THE DEEP TUNNEL ALTERNATIVE ONLY

Figure 5

TYPICAL 3-LANE TUNNEL SECTION

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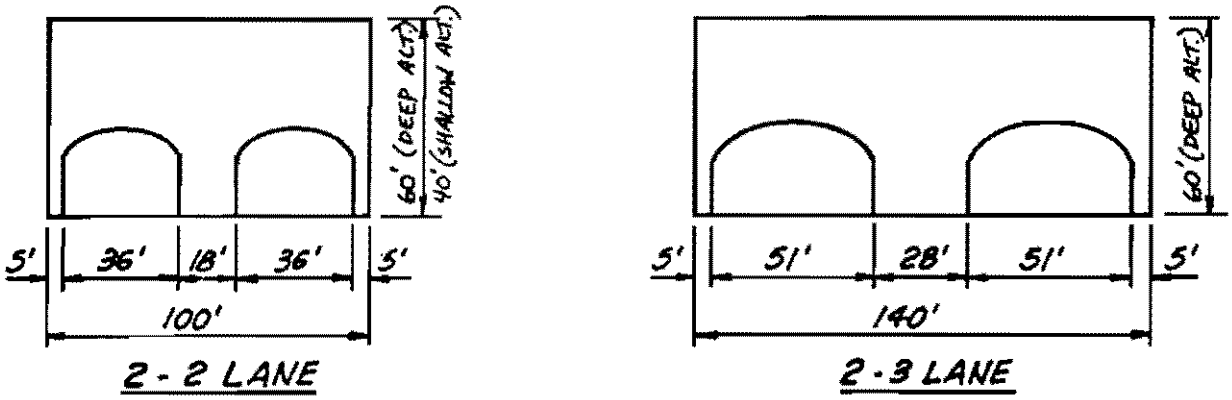
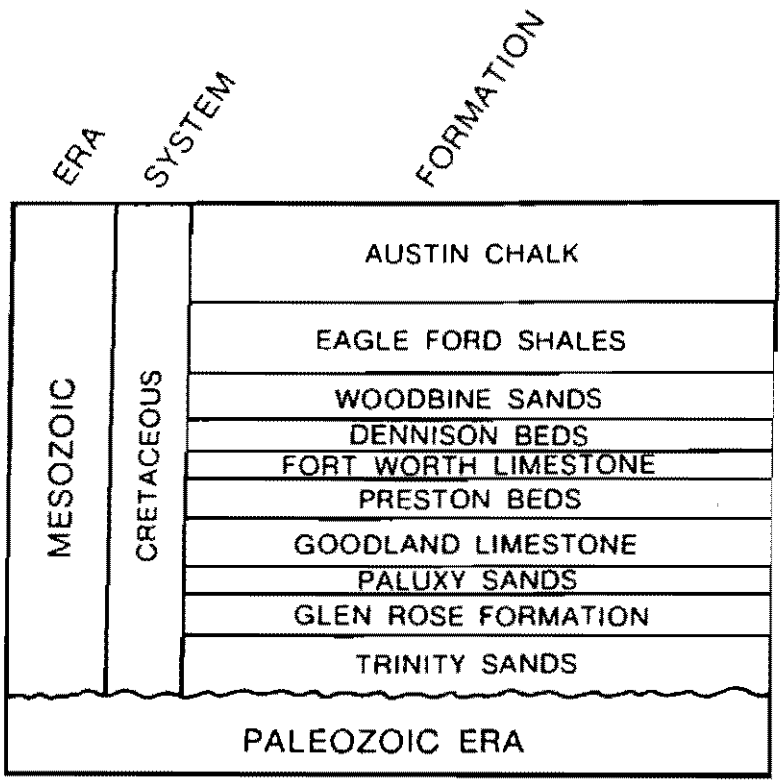


Figure 6

TYPICAL TUNNEL PORTAL SECTION



After Shuler, 1918

FIGURE 7
GENERAL GEOLOGIC COLUMN FOR DALLAS COUNTY

The middle division of about 250 feet has fewer massive layers and is characterized by thick, and often indurated shaly layers which show remarkable lamination, many layers to the inch.

In the uppermost division of the Austin formation, the proportion of shaly limestone is larger and the chalk layers are rare. The top of the rock is weathered to depths ranging from 0 to approximately 10 feet. the colors are predominantly blue and yellow. Occasionally sandy layers are found.

The dip of the Austin chalk is gentle, varying from 40 to 100 feet per mile, with an average dip of 50 to 60 feet. One of the most characteristic features of the chalk as it occurs in Dallas County is the small scaled faulting. The chalk has been broken into innumerable irregular blocks by fissure planes along which most often slight movements have taken place. The faulting may be barely perceptible, or as much as 2 or 3 feet at a maximum. The faulting is normal. Horst and graben structures alternate in rapid succession. The blocks vary in size from 50 to 100 and more feet in length. The plane of faulting varies from 40° to 80°, the larger number varying from 45° to 60°. The strike of the fault planes is extremely variable and has no preferred orientation. Two types of jointing are found in the chalk: ordinary joint planes at right angles to the bedding planes, and particularly in the more massive beds, curved joint surfaces which look as if they were made by localized pressure on small surfaces--such surfaces as would be made by a punch in a uniform mass.

Previous Geotechnical Exploration

Previous geotechnical exploration programs conducted for projects near the airport site suggest a typical geologic profile for the area as detailed in Figure 8. At the surface, residual soils of inorganic to organic silts and clays are found in layers ranging from 0 to 10 feet thick underlain by a zone of highly weathered Austin chalk of thickness ranging from 0 to 10 feet. Under the weathered zone lies a more competent Austin chalk.

Previous exploration programs characterize the overlying soils near the project site as residual soils which are derived from the disintegration of the rock below by the agents of weathering and erosion. These residual soils consist mostly of stiff clays, CL to CH material with some zones of MH, ML, and OH materials as defined by the Unified Classification System. Water contents range from approximately 10% to 40% with liquid limits of between 20% and 85% and plasticity indices ranging from 5% to 60%. The overburden soil exhibits swelling characteristics when subjected to changes in moisture content. The unit weight is approximately 100 to 110 pcf and

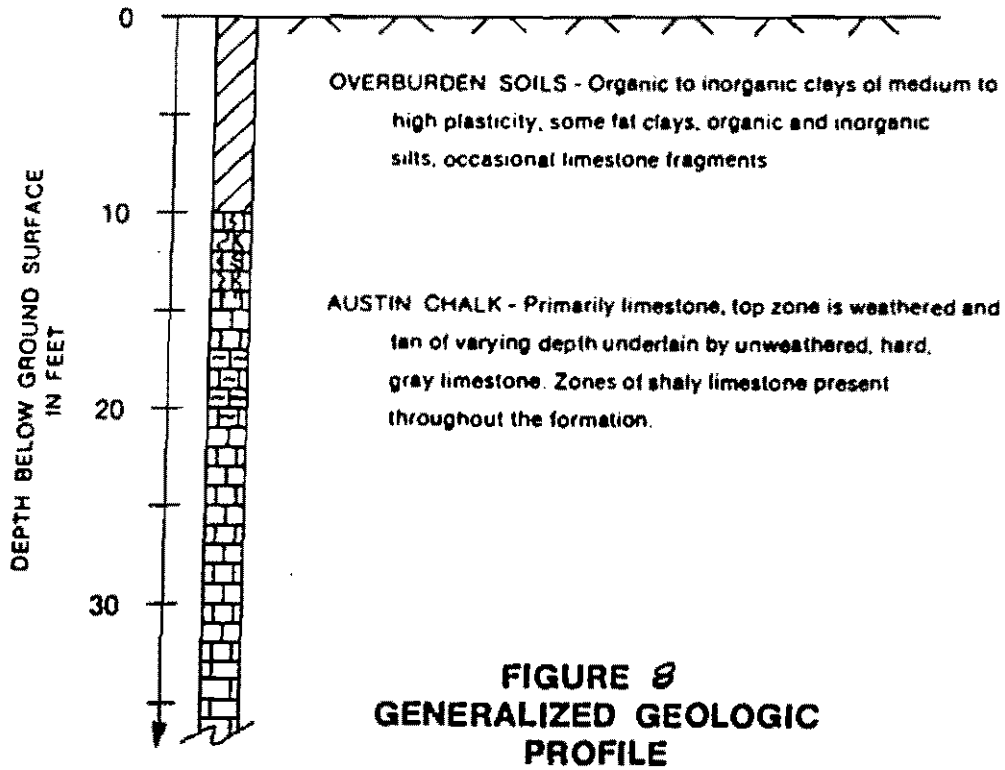


FIGURE 8
GENERALIZED GEOLOGIC PROFILE

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the unconfined compressive strength ranges from 0.8 to 8.8 TSF with most samples between 1 to 3 TSF. The internal angle of friction Ø, ranges from 10 to 18 degrees with a cohesion intercept, c, varying between 0.4 to 3.0 TSF.

The engineering properties of the Austin chalk vary with the degree of weathering and the presence or absence of shaly zones within the sample. Table A presents mechanical properties of weathered, tan, shaly gray, and hard gray limestone samples of the Austin formation as obtained from the exploration program for the Dallas North Tollway project.

Expected Ground Behavior

Tunnel Excavation

The Austin chalk is a rock of relatively constant composition with relatively low strength and varied bedding conditions and should be easily excavated. "When freshly quarried the rock is soft and easily cut with a knife or saw, but on exposure to air many layers develop considerable hardness." (Shuler, 1918).

Variations in the intact rock mass and its discontinuities may affect the rate and cost of excavation but are not expected to affect the feasibility of tunneling.

Ground Stability

In general, underground excavations may be affected by several conditions that lead to a requirement for support or protection of the excavated surface, such as:

- o Stress redistribution resulting in plastic yielding, creep, or formation of fractures.
- o Loosening and movement along discontinuities.
- o Swelling of the ground due to a reaction with water producing a volume increase of the material surrounding the excavation and inducing movement into the excavation.
- o Surface deterioration or decomposition of the material of the excavated perimeter due to such mechanisms as air drying, slaking, or softening due to the presence of water.
- o Piping or washing by flowing water.

TABLE A
ROCK PROPERTIES OF
THE AUSTIN FORMATION

ALL VALUES ARE IN PSI		WEATHERED TAN LIMESTONE	SHALY GRAY LIMESTONE	HARD GRAY LIMESTONE
TANGENT MODULUS OF ELASTICITY*	MEAN	7.8×10^4	1.2×10^5	2.8×10^5
	ST. DEVIATION	7.1×10^4	2.6×10^4	1.3×10^5
	HIGH	1.4×10^5	1.5×10^5	4.9×10^5
	LOW	2.2×10^3	9.4×10^4	1.2×10^5
	NO. OF SAMPLES	3	4	11
UNCONFINED COMPRESSIVE STRENGTH	MEAN	503	1085	2040
	ST. DEVIATION	503	250	584
	HIGH	1250	1389	3653
	LOW	42	597	667
	NO. OF SAMPLES	5	7	92

*Measured tangent at 50% of peak stress

NOTE: ALL VALUES OBTAINED FROM DALLAS NORTH TOLLWAY PROJECT - CONTRACT NO. DNT101- December 1, 1982

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A literature search of available geotechnical information indicates that the tunnels will be in good to excellent quality rock (RQD $\geq$ 75%) when sited below the weathered zones within the Austin chalk. Thus, tunnel excavation is not expected to result in significant stress redistribution or accompanying elastic or plastic rock movements.

The rock mass consists of blocks formed by faulting or bounded by intersecting inclined joints or a combination of intersecting joints, bedding planes, and other discontinuities or planes of weakness. Loosening and movement of these rock blocks are expected to occur during excavation. The mechanisms that can cause loosening and movement include:

- o Blast Damage - Gases under pressure may penetrate joints and loosen rock wedges. Wedges may also be loosened by ground vibration.
- o Gravity - Gravity forces acting on wedges may cause separation or shearing movements along joints or bedding planes.
- o Strain Around the Opening - Creation of an opening in a stressed mass causes strain and deformation in the mass. Such strains tend to concentrate along natural planes of weakness (such as joints and bedding planes) and may loosen wedges, allowing gravity to move them.
- o Shear Failure - Failure in shear may occur along joints oriented at a critical angle in the redistributed stress field about the opening.
- o Loss of Strength - The strength and tightness of the joint system may decrease because of absorption of water by, or air drying of, joint filling materials.
- o Hydrostatic Pressure - The hydrostatic pressure due to groundwater in joints may induce loosening and movement of wedges.

Loosening and movement of rock wedges, slabs, and blocks may occur at any location in the tunnel excavations. The dip of joints or other planes of weakness and their strike with respect to the tunnel axis determine the size and stability of a wedge, its position on the tunnel perimeter, and its potential for loosening or falling.

If supports are not installed, rock movement and the loosening process may continue until a stable opening is formed. Most typically, the arch may break upward, across one or several bedding planes, until a competent roof or corbelled arch is formed. For tunnels mechanically excavated, the excavation perimeter should generally require less support than that required for a drill and blast excavation of similar size.

Swelling of the ground is not expected if alternate wetting and drying of the rock surface can be avoided. Slaking of some areas may occur in shaly zones of rock when exposed to the air by excavation. Surface protection and scaling of the exposed rock surface will be required. Piping or washing-out of ground may occur in heavily weathered rock or in fault zones at tunnel elevation but should not occur within competent rock.

Groundwater Infiltration

Infiltration into the unlined tunnels may be considerable as the fractured and broken nature of the rock mass and observed high porosity would indicate. Further investigation is needed to quantify the infiltration. For the concrete lined tunnel sections, water infiltration is not considered a major problem. The use of a permanent, impermeable membrane may be considered to minimize nuisance drips and seeps within the tunneled roadway.

5.0 TUNNEL EXCAVATION AND INITIAL SUPPORT

Excavation Alternatives

The Keller Springs Road tunnel may be excavated using either drill and blast techniques or mechanically by means of a roadheader type of machine. The approaches to the tunnel may be excavated using conventional surficial earthmoving techniques near the ground surface and drill and blast or a roadheader type machine at depth. Final determination of the method or methods to be used should properly lie with the contractor. The short length of tunnel generally prohibits the use of a roadheader or similar equipment purchased exclusively for this job; however, appropriately sized existing machines could be used. Drill and blast tunnels may require additional support because of weakening and fracturing induced by blasting. Concrete quantities may also increase due to overbreak.

The required size and shape of the tunnels generally dictate that the tunnels, whether constructed using drill and blast or mechanical means, be constructed with a top heading and bench excavation sequence. Such an excavation sequence allows the support and stabilization of the rock arch before the removal of the lower tunnel sections in a quarry-type removal operation. In areas of faulted or weathered rock, in which at least some

of the tunnel length should be expected, the heading and bench method is adaptable to conditions as they are exposed allowing variation in length of round, size of opening, and support technique. Normally, the tunnel top heading would be excavated and supported from one end (portal) to the other followed by the benching down to invert. This sequence of excavation is directly applicable to the deep tunnel alternative, located below weathered rock zones, but requires some modification for use in the construction of the shallow tunnel alternative. Because the shallow excavation alternative is sited within mixed face zones of soil, weathered rock and good quality rock, excavation must be performed in more stages of smaller size than would be required in tunnels constructed in better ground conditions. A typical excavation sequence for the shallow tunnel alternative is shown in Figure 9.

Following the excavation the final cast-in-place lining would be placed; ceiling panels, wall tiles, and the required utilities and finished roadway would then be installed.

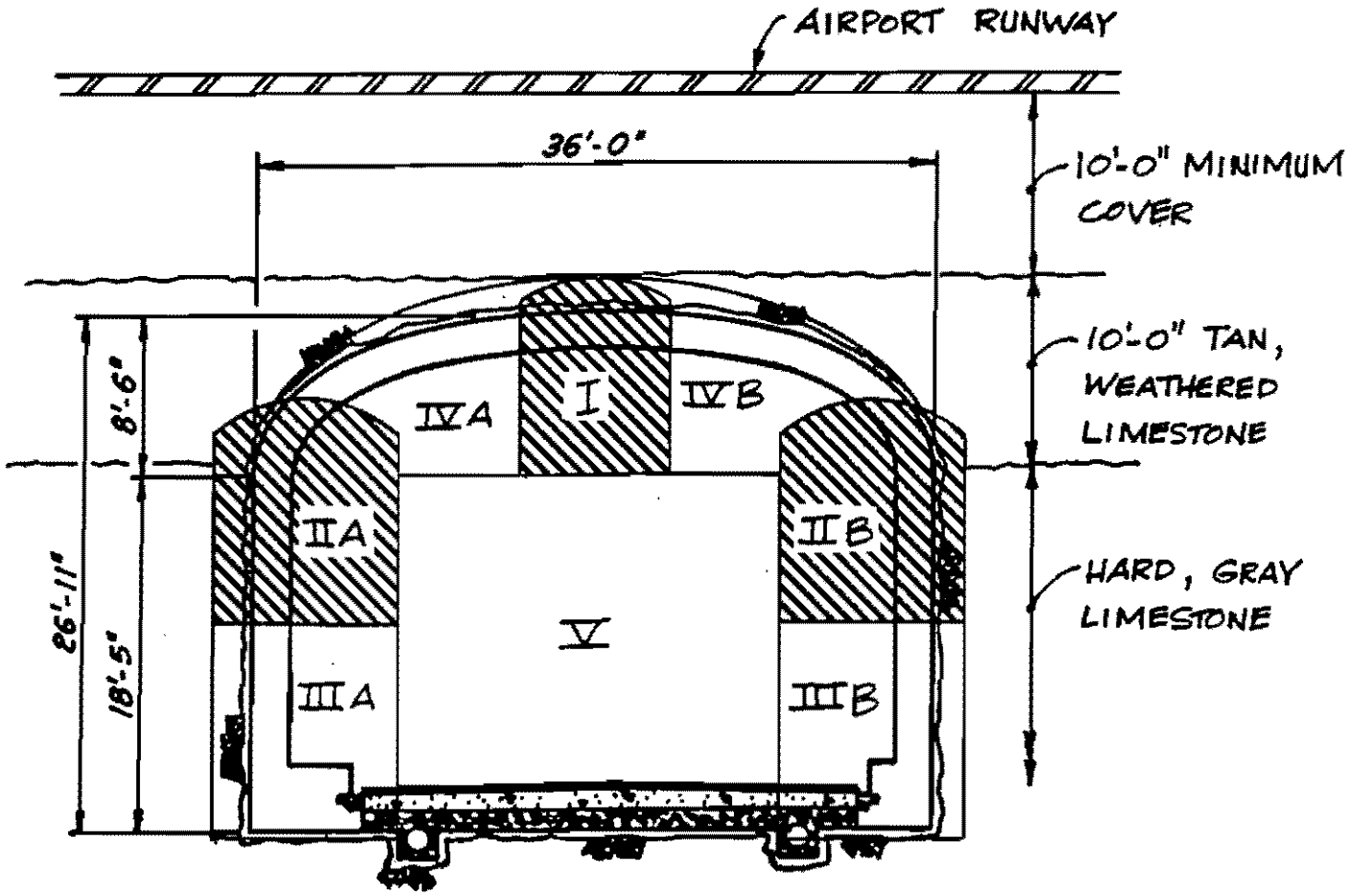
Initial Support and Surface Protection

The initial support systems used must be adaptable and capable of supporting the range of loads anticipated. The following alternative initial support systems may be used:

- o Structural steel supports
- o Rock reinforcement
  - Rock bolts (tensioned, fully grouted, or encapsulated)
  - Rock anchors or dowels (untensioned, fully grouted, or encapsulated)
- o Shotcrete

Any of these support systems or combinations of them may be used within the limitations of compatibility with the ground behavior encountered. The choice and design of the initial support system for all excavations should be made by the contractor and should be compatible with the final support and lining requirements.

To minimize loosening loads and degradation of the rock mass around the excavation, the initial support system should be installed closely behind the newly exposed working face. Ground control in typical tunnel reaches



SEQUENCE OF EXCAVATION:

I. PILOT TUNNEL
II A & II B. TOP SIDE DRIFTS
III A & III B. BOTTOM SIDE DRIFTS
IV A & IV B. CROWN DRIFTS
V. BENCH EXCAVATION

Figure 9
EXCAVATION SEQUENCE FOR SHALLOW TWO-LANE TUNNEL

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may be limited to removal of loosened wedges or the installation of spot rock reinforcement. The number and location of loosened wedges will vary with discontinuity and bedding patterns and the other factors described above. Wedge loosening may be generally less frequent in small openings and in openings excavated by mechanical means. Close-spaced joints, faults, shear zones, and weathered rock may affect initial support requirements.

Minimizing ground control problems may be accomplished by an extensive program of pre-grouting the tunnel interval from the ground surface prior to construction. Such a program is considered to be essential to the success of the shallow tunnel alternative because of the extensive weathered rock zone known to exist within Dallas County.

Based upon the anticipated geologic conditions, the construction cost estimate of Section 8.0 assumes the use of structural steel rib support for the tunnel excavations of both shallow and deep tunnel alternatives. These ribs would be cast integrally within the concrete final lining forming the tunnel final support. While both shotcrete and rock reinforcement either singularly or in combination generally appear more economical than using steel ribs, they require greater technical proficiency and skilled workmanship to install and are not easily adapted to ground conditions which may be exposed if weathered or faulted zones of major extent reach tunnel level.

Groundwater Control

Groundwater inflows will be encountered during tunnel construction and the contractor should have a plan to deal with inflows that will affect construction operations.

Most of the large groundwater inflows are expected to be in the form of flows from rock discontinuities which must be controlled in the completed tunnel. Infiltration should be controlled by grouting as the excavation progresses to prevent loss of ground from piping or washing by water and the development of waterways outside the tunnel.

6.0 FINAL SUPPORT AND LINING

At some time following the erection of the initial support system consisting of rock reinforcement and/or shotcrete or structural steel ribs, a final lining will be erected within the tunnel opening similar to that shown in Figures 4 and 5. The final lining is designed to withstand all loads that may be imposed during the tunnel's service life. The beneficial effects of any initial support system are generally neglected in the design of the final lining; however, structural steel ribs used as initial support may be included as a composite design for tunnel final support. The loading considered in the design of the final lining are:

1. Ground Loading - Due to the shallow cover present at the airport site and the weathered rock profile, the tunnel should be designed to sustain a uniform ground load of full overburden of approximately 30 feet of ground measured to tunnel crown for the deep tunnel alternative and 10 feet of ground plus impact loadings for the shallow tunnel alternative.
2. External Hydrostatic Pressure - Tunnels should be designed to sustain external hydrostatic pressures.

7.0 SPECIAL CONSIDERATIONS

Tunnel Ventilation

Ventilation of roadway tunnels is normally provided to ensure dilution of exhaust fumes to acceptable concentrations. At present, for gasoline powered engines, the dominant constituents for which dilution is required are CO and CO_2. Provided these constituents of the exhaust gases are adequately diluted, there will be no harmful effects from other substances such as SO_2 and lead. Determination of ventilation air volumes for design purposes, the length, inclination of the roadway, the number of lanes, vehicle capacity, and traffic composition are taken into account. The tunnel user will normally be exposed to the atmosphere of the tunnel for a period of only one minute for which a maximum level of 125 ppm CO for a normally congested urban expressway is considered acceptable.

The proposed tunnel lengths are generally within the range at which artificial ventilation should be considered, especially since traffic flow within these tunnels may be subject to congestion during peak flow periods.

This traffic flow will be controlled by the traffic signal timing at the nearby intersection of Keller Springs Road and Addison Road on the east and Midway Road on the west. While detailed analysis may, during final design, conclude that only exhaust ventilation will be required, provision is made in this study for a semi-transverse ventilation system for both shallow and deep tunnel alternatives.

In this system, air is delivered along the entire length of the tunnel at a uniform rate and the noxious fumes and smoke emitted are diluted and removed via the portals. The size of the supply air duct is a function of air flow requirements, allowable air duct velocities and the tunnel internal geometry. Generally, air flows are maintained to a maximum air duct speed less than 5,000 feet per minute for optimal operation.

Providing for semi-transverse ventilation ensures that the tunnel size is large enough to provide the required ducting above the traveled roadway. If an automatically activated exhaust only system or a longitudinal type system is later determined the most efficacious, sufficient airway and headroom capacity is provided without enlargement of the tunnel excavation requiring a simpler and less costly mechanical system.

Assumed characteristics for ventilation design

Geometry:	Length: 1,000 feet each Altitude: 640 feet above MSL Grade: Level
Traffic:	Heavy from date of first service, particularly during A.M. and P.M. rush hours. Approaches normally uncongested except at peak periods. Heavy truck traffic less than 150/lane-hour.
Pollution Levels:	(CO) Nature of Tunnel: City street; one way traffic each tunnel; normally congested Uncongested: 30 ppm Threshold of Congestion: 125 ppm
Maximum Traffic Volume:	Congested Roadway - 900 vehicles/lane at 5 mph Free Moving Roadway - 2,000 vehicles/lane at 35 mph

Required Ventilation per Lane:	860 cubic feet/second/lane for CO dilution 1,640 cubic feet/second/lane for fire protection (controls) 2 lane tunnel = 196,800 cubic feet/min 3 lane tunnel = 295,200 cubic feet/min
Installed Horsepower per Tunnel (2 tunnels required):	200 horsepower (268 KW) (2 lane tunnel) 300 horsepower (402 KW) (3 lane tunnel)

To ensure tunnel ambient atmosphere conditions are adequate at all times a carbon monoxide monitoring system should be provided in the tunnel. These self-contained systems monitor concentration in air of CO at a number of remote sample points with up to three levels of alarm indication and ventilation control. These systems are now fabricated in modular construction and solid state circuitry to enhance reliability and simplify maintenance.

Tunnel Drainage

Within the tunnels, major concerns for drainage are:

1. handling the unexpected spills of water or fluids from tank trucks or inflows of water through the tunnel walls,
2. handling of rainwater intercepted at portals and runoff from traveling vehicles, and
3. handling of washdown water.

Trench drains may be provided at tunnel portals to intercept water from approach roadways. Each trench drain at tunnel portals should be equipped with individual sumps to prevent the introduction into the tunneled sections of flammable or hazardous materials spilled near portals.

At tunnel low points, approximately mid-length, a common sump built into a cross passage between tunneled roadways may be constructed. Here a trench-type drain may collect runoff or fluids spilled inside the tunnels.

The approach roadway and portal trench drains are generally handled by a single pump station and conveyed to local storm drainage systems. The pump

station at the tunnel midpoint may be packaged units with outfall conveyance outside the tunnel by a drainage force main constructed within the tunnel walls.

Tunnel Lighting

The amount and type of tunnel lighting depend on the tunnel geometry, the materials comprising the inside finished surface, and the size of the excavation. The lighting provided should be adequate to provide time and brightness for the eyes of drivers entering the tunnels to adapt to the change of lighting intensity, from a working daylight (8,000 footcandles (fc)) to approximately 5-10 fc, the level maintained for general tunnel artificial lighting.

To minimize the length of transition zones from the exterior brightness to interior levels of brightness requires transition, generally taken at such levels so no reduction of level of brightness exceeds a ratio of 10:1 for brightness of adjacent zones of tunnel.

To eliminate threshold lighting at portals and intermediate brightness transition required, sunscreens should be used. These sunscreens are interposed between the open depressed roadway and tunnel portals. The sunscreen cut the brightness level from the 8,000 fc to 800 fc followed by a threshold zone requiring 80 fc and interior tunnel zone at 8 fc, with no transition zone required.

Interior tunnel lighting may be provided by fluorescent lamps. (Two fluorescent lamps in opposite corners of the tunnels will yield sufficient levels of average interior illumination of the running tunnel section.) Where lighting requirements require larger intensity, such as the transition zone at portals, combinations of fluorescent lamps and the more efficient low pressure sodium lamps may be used.

Wall and Ceiling Treatment

The interior of a vehicular tunnel is a harsh environment. The lining must be capable of withstanding the punishment of road grime, exhaust fumes,

hose cleaning, as well as impact from vehicles, and in emergencies, the temperatures from fire. Such linings must not be capable of sustaining combustion nor give off toxic or hazardous combustion by-products.

Structural glazed facing tile appears to be the one element which best fulfills these requirements for tunnel sidewalls and has been successfully used in other tunnels of similar type throughout the United States. Mineral wool sprayed to a depth of approximately one inch has been used for a ceiling coating. Mineral wool, besides providing lightweight fireproof material has an excellent noise reduction coefficient.

Fire Fighting

No special fire prevention and protection methods are proposed for the tunnels.

Fire hose connections will be made via Siamese connection located every 200 feet along the tunnels. Siamese connections should be located at each tunnel portal. This will allow fire fighters to gain access from either end of the tunnels and connect their hoses to standpipes without having to lay lines along the entire length of tunnels. The stand pipes should be dry until needed.

Fire detectors may be deployed within the tunnel to detect heat generated by fire. These alarms may be directly wired to the central alarm station for immediate fire department response. Tunnel ventilation systems should be reversible and capable of exhausting fumes and smoke from the tunnels. In such cases, air will enter tunnel portals and be exhausted from the ventilation system ensuring dilution of smoke and a respirable environment.

8.0 CONSTRUCTION COSTS AND ESTIMATES

Feasibility level construction estimates were made for comparison of alternatives and are given in Tables B and C. Estimates were prepared for two 2-lane tunnels and for two 3-lane tunnels for the deep tunnel alternative under the Addison City Airport. Estimates were prepared only for two, 2-lane tunnels for the shallow tunnel alternative.

TABLE B

DEEP TUNNEL ALTERNATIVE
PRELIMINARY CONSTRUCTION COST ESTIMATE

Item	Four-Lane Option	Six-Lane Option
Preparation of R/W & Removals	$ 130,000	$ 160,000
Concrete Paving	425,000	600,000
Bridges, Retaining Walls	6,500,000	7,500,000
Excavation (Non-Tunnel)	3,500,000	5,200,000
Drainage	600,000	800,000
Tunnel (Complete)	11,400,000	17,100,000
Signing, Striping, Lighting	40,000	45,000
Utility Relocations	50,000	60,000
Mobilization	450,000	600,000
Contingencies	3,455,000	4,835,000
Engineering, Administration, Materials Testing	2,250,000	3,300,000
Total	$28,800,000	$40,200,000

TABLE C

SHALLOW TUNNEL ALTERNATIVE
PRELIMINARY CONSTRUCTION COST ESTIMATE
(4-Lane Facility Only)

Item	Amount
Preparation of R/W & Removals	$ 130,000
Concrete Paving	425,000
Bridges, Retaining Walls	3,500,000
Excavation (Non-Tunnel)	1,375,000
Drainage	450,000
Tunnel (Complete)	17,600,000
Signing, Striping, Lighting	40,000
Utility Relocations	50,000
Mobilization	500,000
Contingencies	3,530,000
Engineering, Administration, Materials Testing	2,400,000
Total	$30,000,000

The estimated construction cost for the deep two, 2-lane option is $28.8 million, and $40.2 million for the deep two, 3-lane option. The cost for the shallow two, 2-lane option is estimated to be $30.0 million.

The estimates are based upon:

1. Prevailing prices as of July, 1985.
2. Tunnels are excavated by drill and blast methods.
3. The excavation sequence shown in Figure 9 is used for the shallow tunnel alternative.
4. Structural steel ribs are used for tunnel initial support.
5. Tunnel final lining and geometry are as shown in Figures 4, 5, and 6.
6. Tunnel plan and profiles are as shown in Figure 3.
7. Open cut roadway approach sections are included.
8. Costs do not include right-of-way acquisition costs.

9.0 CONCLUSIONS AND RECOMMENDATIONS

Based upon a review of the subsurface conditions applicable construction techniques and support methods, it is generally concluded:

Tunneling

1. Tunneling is a feasible construction technique.
2. Subsurface conditions are generally similar throughout the study area.
3. (a) The deep tunnel alternative will be constructed within the Austin chalk with approximately 30 feet of cover.
   (b) The shallow tunnel alternative will be constructed in soils or weathered rock with approximately 10 feet of cover.
4. Tunnels will be constructed using conventional drill and blast techniques although a roadheader-type excavation is feasible.
5. In weathered rock and soils, multiple small drifts are required to allow safe tunneling.
6. Applicable alternative initial support systems are:
   (a) Structural steel ribs
   (b) Rock reinforcement and shotcrete
7. Final lining will consist of reinforced cast-in-place concrete.
8. Tunnels will be provided with semi-transverse ventilation systems.

9. Tunnels will be provided with lighting systems to obtain a minimum of 5 to 10 footcandles illumination.

10. Tunnels will be provided with a drainage system to collect portal inflow and internal collected water.

Recommendations

1. Unless traffic flow predictions justify otherwise, the 2-lane alternative appears significantly less costly.

2. While the depth of approach roadway open cut should be minimized to reduce the cost of approach roadway the increased cost of shallow tunneling generally negates such savings.

3. The possibility of increased surface subsidence and unpredictable catastrophic losses of ground increase with shallow tunneling in weathered rock and soil generally dictating deeper tunneling as the preferred alternative.

4. An open cut alternative with cut-and-cover (decked) portion at within the runway/taxiway area would not appear feasible. Construction of such sections would greatly impact airport operations and construction cost savings are not apparent.

5. If further studies indicate feasibility, a geotechnical investigation should be undertaken within the study area to confirm the cover and rock quality assumptions made herein.

10.0 REFERENCES

American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE) Application Handbook, 1982, Chapter 13.

Bickel, J.O., and T.R. Kuesel, editors, 1982 "Tunnel Engineering Handbook," Van Nostrand Reinhold Company, Inc., New York.

Mason-Johnson & Associates, Inc., 1982, "Geotechnical Engineering Report, Phase I, Dallas North Tollway, Dallas, Texas," Contract No. DNT 101, prepared for the Texas Turnpike Authority, December 1, 1982.

Shuler, Ellis W., 1918, "The Geology of Dallas County," University of Texas Bulletin, Bureau of Economic Geology and Technology, No. 1818, March 25, 1918, Austin, Texas.