This report summarizes the results of a comprehensive and Traffic and Revenue study for the proposed IH 635 LBJ Managed Lanes project in Dallas, Texas. It was third in a series of more progressive detailed studies of the project, conducted by Wilbur Smith Associates (WSA) for the Texas Department of Transportation (TxDOT). The overall goal of the study was to provide an independent estimate of the potential toll revenue generating capability of the project under six (6) project alternatives over a 40-year forecast period.

The six distinct project alternatives were evaluated as stand-alone projects, as if each alternative was the only portion of the project that would be implemented over the 40-year period. Each of the project alternatives were analyzed under the following operating scenarios:

- All Pay;
- HOV 2 + Free; and
- HOV 3 + Free .

The study analysis assumed the proposed LBJ Managed Lanes would be open to passenger cars and light commercial vehicles only. Heavy commercial vehicles (3-axles or greater) would not be allowed in the managed lanes.

The overall study work program was designed and conducted to a sufficient level of detail to be used in support of possible project financing. As such, it included the conduct of both travel pattern and stated preference surveys, a detailed independent economic corridor review and detailed travel demand modeling. The work was conducted between 2003 and 2005.

Background and Authority for Study

The LBJ Freeway (LBJ) is the major circumferential roadway in the Dallas region. As such, its traffic loadings have grown steadily as the region has grown. Traffic on certain sections of the LBJ is heavily congested for many hours of each day. Given the continued economic growth of the region, this condition is likely to deteriorate further if no improvements are made.

Recognizing the important role the LBJ Freeway plays in corridor mobility, the TXDOT in 1999 engaged WSA under a subcontract to HNTB Corporation, to conduct an initial feasibility assessment regarding the Managed Lanes project. This initial feasibility assessment culminated with WSA developing the "LBJ Freeway HOT Lanes Preliminary Feasibility Study" submitted to TxDOT in February 2000. Subsequent to this submittal, TxDOT made the decision to move ahead with an intermediate level study in late 2000. Once again working in association with HNTB, this analysis resulted in the development and submittal of the "LBJ Managed Lanes Traffic and Revenue Study" in March 2002. It was performed at an "Intermediate" level of forecasting.

Based on the results contained in the March 2002 report, the TTA determined it would be prudent to proceed to the investment-grade study level. Therefore in July 2003, TTA contracted WSA to conduct the LBJ Managed Lanes Investment-Grade Traffic and Revenue Study.

Scope of Study

The purpose of this study was to develop traffic and toll revenue forecasts for the LBJ Managed Lanes project under six (6) unique project alternatives, under the three operating scenarios described previously. Three of the project alternatives (1,2 and 3) assumed 2012 as the opening-year and 2015, 2020 and 2025 as future years. Three other alternatives (4,5 and 6) assumed 2015 as the opening year and 2020 and 2025 as future years. The study analysis examined the six project alternatives assuming each as a stand alone facility. Based on the results of the overall study analysis these six project alternatives were narrowed down to two (2) preferred project configurations. (Alternatives 2 and 6).

The potential traffic and toll revenue estimates addressed in this document focus on the results developed under the two preferred project configurations. Traffic and toll revenue estimates related to the four remaining project configurations can be obtained through requests to TxDOT.

The overall work program included a review of existing LBJ traffic conditions, the conduct of motorist travel pattern surveys, and independent assessment of corridor growth considerations, as well as estimates of managed lanes traffic and toll revenue. In addition, impacts of the revised West Gate access configuration were also examined.

Existing LBJ Traffic Conditions

WSA conducted a comprehensive data collection program focused on identifying existing LBJ operating conditions. This included an extensive traffic count program, conduct of speed and delay runs along the existing LBJ, as well as a review of historical traffic trends on the LBJ Freeway. Much of this information was gathered as part of the February 2000 study work program and used in this analysis due to the potential impacts of the High-Five Interchange construction project that was underway during the conduct of this study. This information along with other data sources were used to develop an updated 2003 traffic operations profile for the existing LBJ Freeway.

Motorists Travel Pattern Surveys

The overall study analysis included the conduct of motorists travel pattern surveys specific to the LBJ Managed Lane corridor. Video license plate surveys were conducted at four mainline locations along the existing LBJ in order to capture motorist currently utilizing the LBJ Freeway. Six arterial survey sites were positioned along routes paralleling the LBJ that are currently carrying traffic considered potential for the proposed managed lanes. These motorists surveys were used to supplement existing trip tables developed by NCTCOG.

LBJ Corridor Growth Considerations

A detailed evaluation of socioeconomic conditions in the LBJ Corridor was conducted as part of the proposed LBJ Managed Lanes Comprehensive Traffic and Toll Revenue Study. This included a review of historical population and employment growth trends, as well as the future growth projects of these two major socioeconomic categories. A complete and independent review of the NCTCOG growth estimates as indicated in their most recent socioeconomic data was conducted. This included a review of current and future residential and commercial developments for the LBJ Corridor that potentially might not be included in the NCTCOG socioeconomic data set.

This independent review was conducted by Insight Research Corporation, a well known Dallas based economic consultant. The independent economic review resulted in the development of a revised set of socioeconomic assumptions. This revised information was provided to NCTCOG who then developed updated trip tables based on the revised data set for use in this study analysis.

LBJ Managed Lanes Traffic And Toll Revenue Estimates

As stated previously, the LBJ Managed Lanes facility was analyzed under six unique project configurations. Based on a detailed evaluation of each alternative, TxDOT selected Alternatives 2 and 6 to be considered the preferred project configurations. The traffic and toll revenue estimates contained in this report focuses on these two preferred project alternatives.

The traffic and toll revenue forecasts for each preferred project alternative is predicated on the results developed as part of the trend analysis, as well as the updated estimates of growth indicated in the socioeconomic data developed by the independent economist and included in the updated trip tables developed by NCTCOG.

Forecasts were calculated from 2012 through 2040 under Alternative 2 and from 2015 through 2040 for Alternative 6. This section also includes a detailed toll sensitivity analysis for each preferred project configuration.

Regional Location

The LBJ Freeway (IH 635) is a circumferential highway around the City of Dallas. The portion of the LBJ that comprises the ML Study corridor extends from Luna Road on the west to the IH 30 on the east and covers a distance of approximately 19.4 miles as shown in Figure 1-1. Three major east-west facilities compete directly with this segment of the LBJ Freeway. To the north is the President George Bush Turnpike (PGBT) toll facility which currently extends from SH 78 on the east to its current termini on the west at IH 35E . Segment V of the PGBT provides a continuous link between the LBJ and SH 183. Segment IV, the section between IH 35E and the LBJ is scheduled to open in late 2005. Completion of this section would provide a continuous outer loop around the City of Dallas from SH 78 to SH 183.

Loop 12 located to the south of the LBJ provides a continuous east-west link from SH 78 on the east to SH 183 on west. IH 30 is a limited access high speed facility which disects the City of Dallas. This facility provides motorists traveling from the communities east of Dallas an express route to destinations west of Dallas.

North-south travel in the regional context is provided by IH 35E, the Dallas North Tollway (DNT) and US 75 (Central Expressway). These three facilities provide high-speed direct connects with the existing LBJ Freeway.

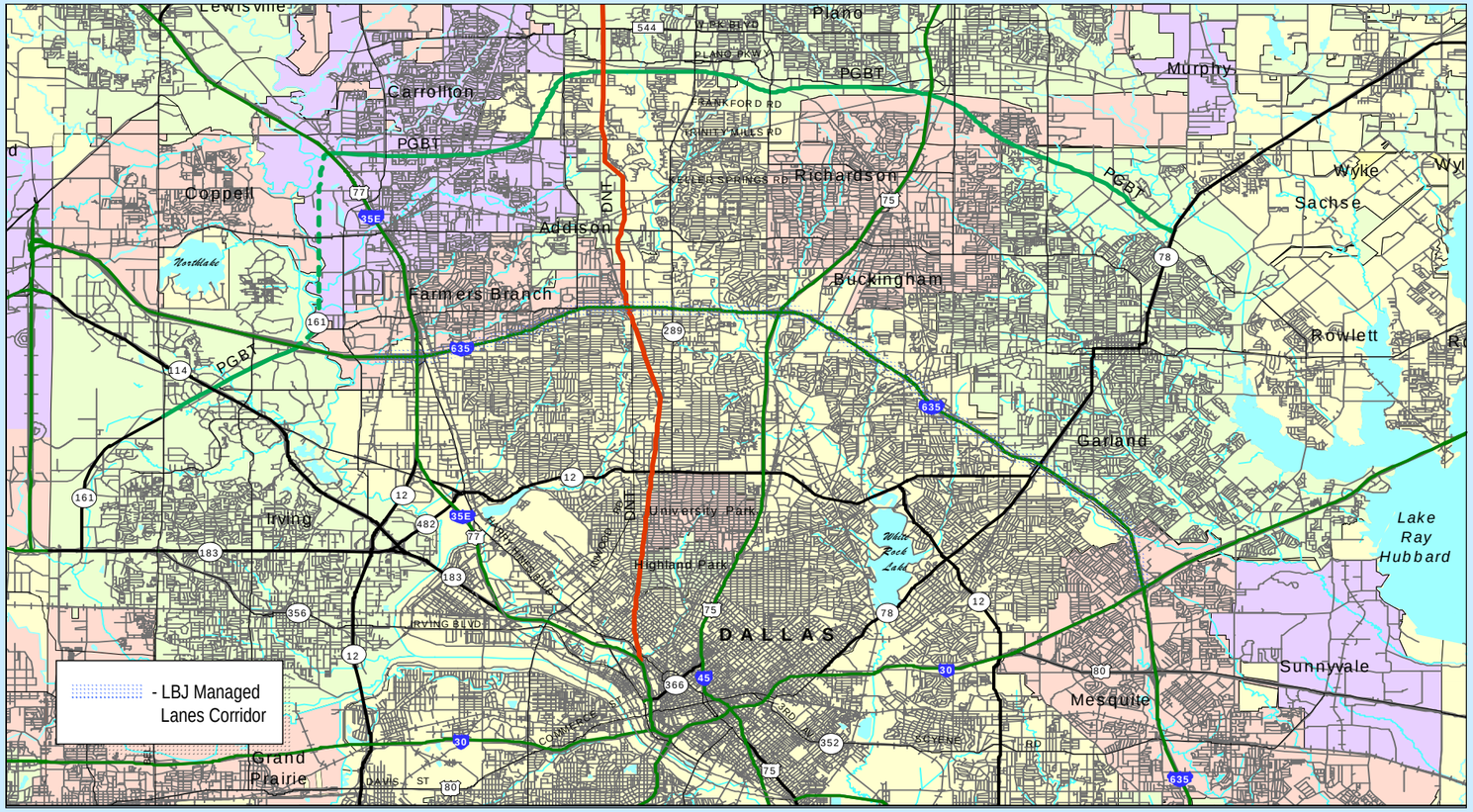
Project Alternatives Descriptions

This portion of the report provides a description of the proposed LBJ Managed Lanes project alternatives. The various project alternatives are composed of multiple subsections under both the interim and ultimate project configuration. The following provides a description of the proposed project sections as well as identifying how each of these sections are employed to produce the six unique project alternatives. The assumed opening years for the project alternatives are also indicated in this portion of the document.

In addition, this section provides a description of the three operating scenarios used to evaluate the six project alternatives. Information regarding the various time periods utilized in the study analysis is also addressed.

Description of Project Sections

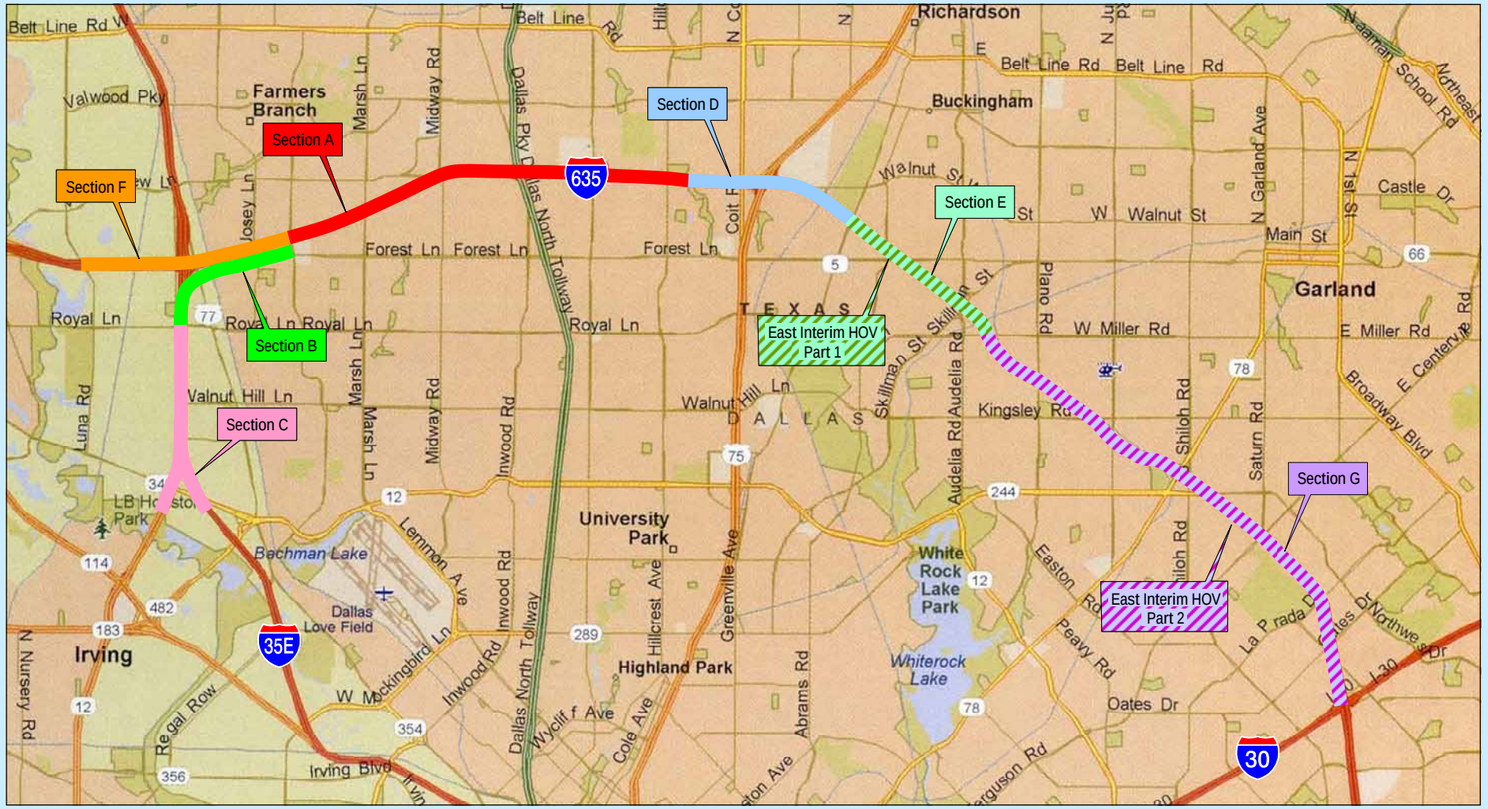
The LBJ Managed Lanes facility considered six (6) unique alternatives. The six alternatives are composed of the following twelve (12) sections. Figure 1-2 graphically depicts the sections:



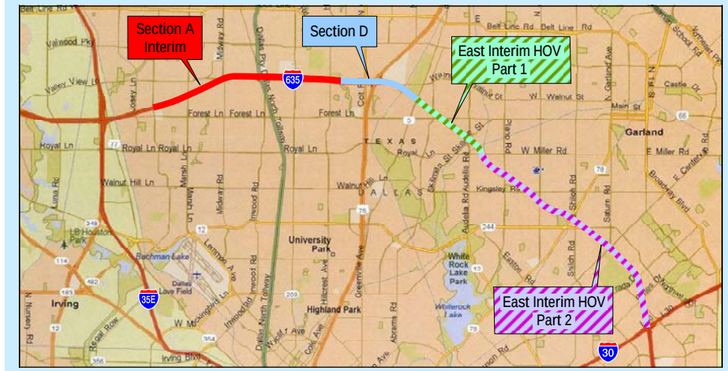
REGIONAL LOCATION MAP — Figure 1-1

Sections:

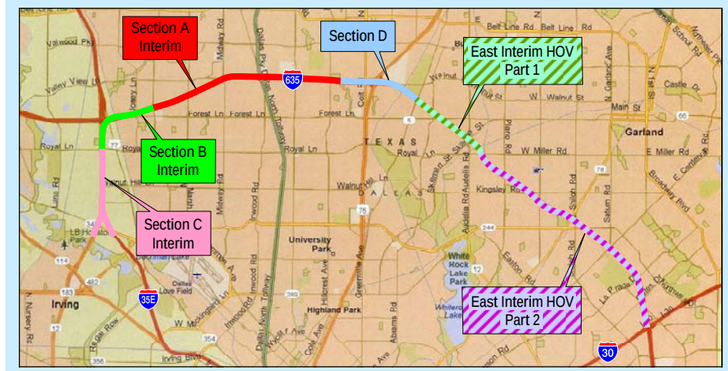
1. A (Interim) – Tunnel section 3 new managed lanes each direction and frontage roads between Webb Chapel Road and US 75 Interchange.
2. A (Ultimate) – Surface work including 4 main lanes in each direction between IH 35E and US 75 Interchange.
3. B (Interim) – 2 direct connectors (WB IH 635 to SB IH 35NE and NB IH 35E to EB IH 635).
4. B (Ultimate) Non Tolled—Remainder of the IH 35E Interchange with modified managed lane access.
5. C (Interim) – Managed Lanes on Loop 12/IH 35E.
6. C (Ultimate) – Main Lanes, managed lanes and frontage roads on Loop 12/IH 35E from the split to IH 635.
7. D – US 75 Interchange Section.
8. E – Ultimate schematic with main lanes, managed lanes and frontage roads (5-2- 2-5) to east of Miller Road.
9. F– Ultimate Schematic from Luna Road to IH 35E.
10. G – Ultimate schematic with main lanes, managed lanes and frontage road (5-2-5) form east of Miller Road to IH 30 with reconstruction of IH 30 Interchange.
11. East Interim HOV Part 1 – limits from US 75 Section to east of Miller Road opens Nov. 2007.
12. East of Interim HOV Part 2 – limits east of Miller Road to north of IH 30 open Nov. 2007.



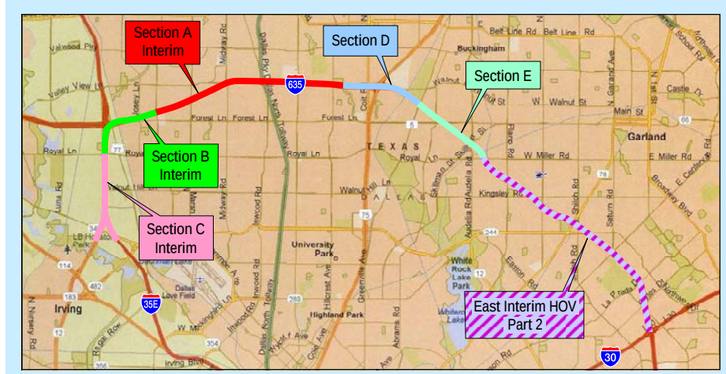
PROJECT CONFIGURATION KEY MAP Figure 1-2



ALTERNATIVE 1 PROJECT CONFIGURATION Figure 1-3



ALTERNATIVE 2 PROJECT CONFIGURATION Figure 1-4



ALTERNATIVE 3 PROJECT CONFIGURATION Figure 1-5

Description of Project Alternatives

The six alternatives were developed by employing in some form these 12 unique sections. The following provides a description of the composition of each of the alternatives as well as the assumed opening year for each.

Alternative 1—This project alternative is assumed to open in 2012. As shown in figure 1-3, Alternative 1 is comprised of Section A, the interim three lane tunnel section which begins in the vicinity of Webb Chapel and ends east of Preston Road. Alternative 1 then continues eastward along section D which provides two concurrent flow MLs through the US 75 Interchange. From this point the East Interim HOV Part 1 section is employed which provides single concurrent flow MLs from approximately Greenville Avenue to Miller Road. The final section (East Interim HOV Part 2) provides a single reversible ML between Miller Road and IH 30.

Alternative 2—This project alternative is very similar to Alternative 1 with the exception of the additional access provided in the vicinity of the IH 35E as shown in Figure 1-4 and carries an opening-year of 2012. This project alternative incorporates interterm sections B and C which provide three lane direct connects to an from the section between IH 35E /Loop 12 and the LBJ MLs.

Alternative 3—As shown in Figure 1-5 the Alternative 3 ML project configuration builds upon Alternatives 1 and 2 and also assumes 2012 as its opening year. The major difference between Alternative 3 and the others is the inclusion of Section E which assumes the ultimate project configuration from Greenville Avenue to Miller

Road. The introduction on Section E would provide two concurrent flow MLs from east of Preston Road to Miller Road under the ultimate project configuration.

Alternative 4—This project configuration is very similar to Alternative 3 with the exception of the western section and assumes 2015 as its opening year. As indicated in Figure 1-6, Alternative 4 would incorporate the ultimate project configuration along the western terminus of the LBH ML facility. This would include Ultimate Sections A,B and C as well as extending the facility to its ultimate western terminus east of Luna Road. This project configuration would assume the completion of the new IH 35 E/LBJ Interchange as well as the completion of the up-graded IH 3E/Loop 12 segment between the LBJ and IH 35E/Loop 12 split. It would also assume the completion of the ultimate tunnel configuration and provide two concurrent flow MLs westward to just east of Luna Road.

Alternative 5—Alternative 5 assumed the ultimate project configuration over the entire length of the facility as shown in Figure 1-7 and carries an opening year of 2015. This includes ultimate Sections A through F as described previously, as well as the addition of Section G which assumes five general purpose lanes in each direction along with two reversible MLs between Miller Road and IH 30.

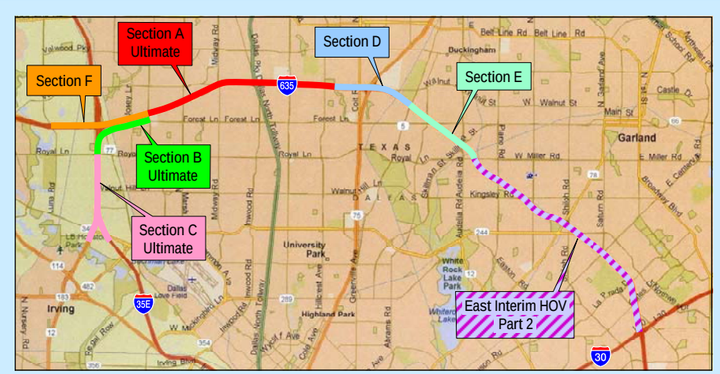
Alternative 6—As shown in Figure 1-8, Alternative 6 is almost identical to Alternative 5. The only differences are the assumed land configurations along Section 6. Under Alternative 6, Section G would incorporate four general purpose lanes in each travel direction as well as two concurrent flow MLs between Miller Road and IH 30.

Proposed Operating Scenarios

The six project alternatives were evaluated under three specific operating scenarios. They include the following:

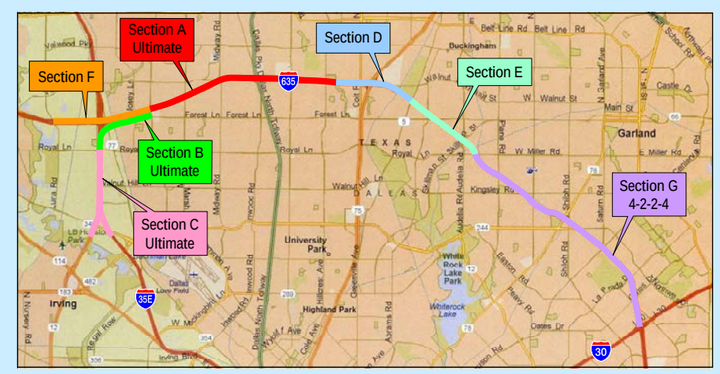
- Scenario 1 All Pay – Only recognized transit vehicles (plus other state recognized emergency vehicles) would be toll free - all passenger vehicles, regardless of occupancy, would be required to pay a toll;
- Scenario 2 HOV-2+Free – Vehicles with two or more occupants. Plus transit vehicles would be exempt from tolls; single occupant vehicles (SOV) would be required to pay electronic tolls for use of managed lanes; and
- Scenario 3 HOV + Free – Vehicles with three or more occupants, plus transit vehicles, would be allowed toll-free use-vehicles with one or two occupants would be required to pay tolls.

Furthermore, the study analysis was conducted dividing the day into six unique time periods. This time period disaggregation provided the ability to test various per mile toll rates based on the varying levels of traffic demand that occur throughout the day.



ALTERNATIVE 4 PROJECT CONFIGURATION Figure 1-6

ALTERNATIVE 5 PROJECT CONFIGURATION Figure 1-7



ALTERNATIVE 6 PROJECT CONFIGURATION Figure 1-8

These time periods included:

- A.M. Peak – 6:00-8:00 a.m.;
- A.M. Shoulder – 8:00-9:00 a.m.;
- Midday – 9:00 a.m.-3:00 p.m.;
- P.M. Pre-Peak Shoulder – 3:00-4:00 p.m.;
- P.M. Peak – 4:00-6:00 p.m.; and
- P.M. Post-Peak Shoulder 6:00-7:00 p.m.

Preferred Project Alternatives

For some time it has been envisioned that the LBJ Managed Lane facility would open under a phased implementation schedule. Recognizing the planning and financial implications associated with a facility the size and magnitude of the LBJ Managed Lane project, TxDOT made the decision to choose a preferred "interim" and preferred "ultimate" project configuration from the six project alternatives analyzed.

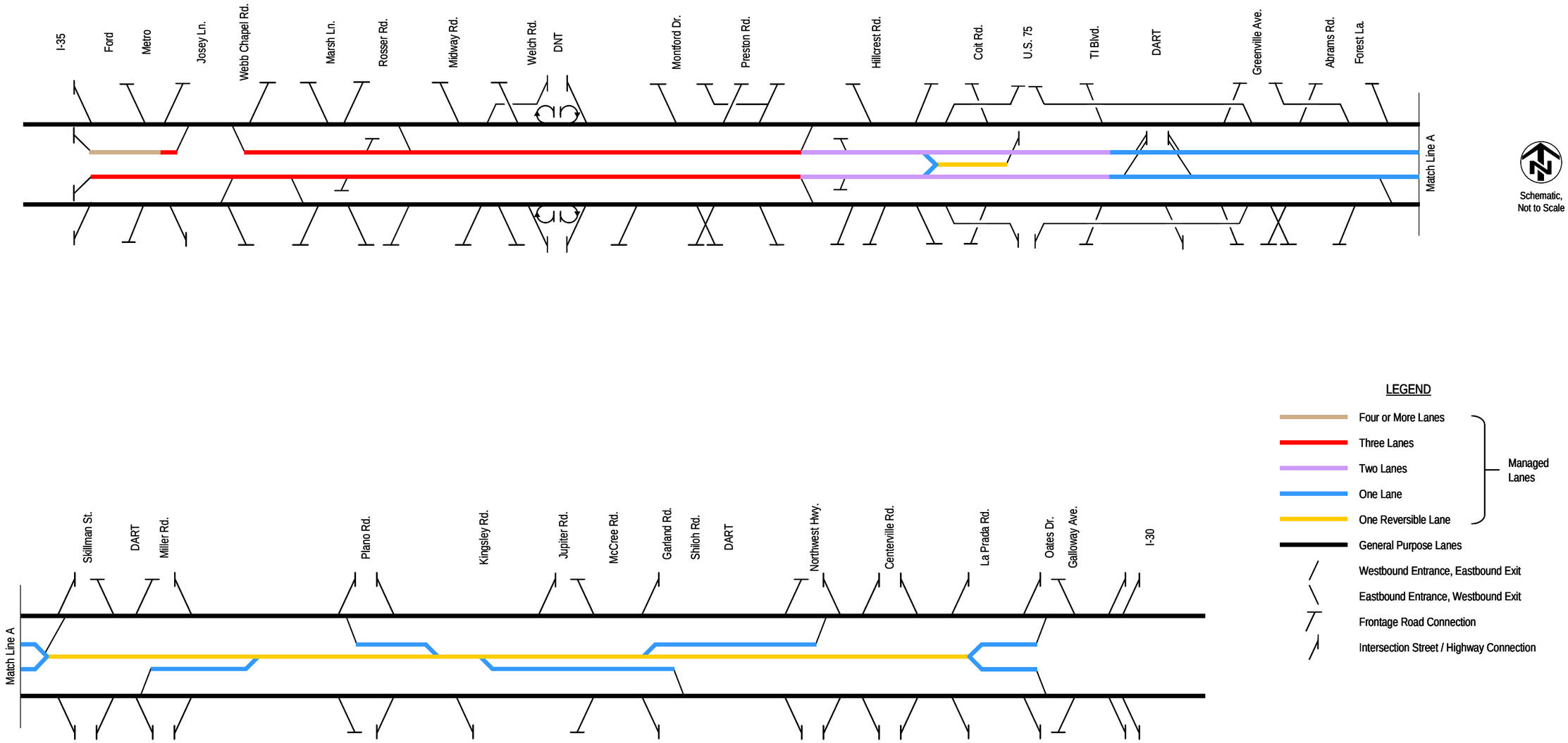
Based on the results of this initial analysis TxDOT chose Alternative 2 as the preferred "interim" project configuration and Alternative 6 as the preferred "ultimate" project configuration.

The estimates of traffic and toll revenue provided subsequently in this report focuses on theses two preferred project alternatives. Traffic and toll revenue information associated with the remaining four alternatives were presented to TxDOT under separate cover.

Alternative 2 – This alternative was chosen as the preferred "interim" project configuration. As such, Alternative 2 was assumed to open on January 1, 2012. The proposed project configuration for Alternative 2 is presented in Figure 1-9.

As shown in Figure 1-8, Alternative 2 would provide concurrent flow managed lanes between IH 35E and Skillman Road. From Skillman Road to IH 30 a single reversible managed lane would be provided. Alternative 2 would cover a distance of approximately 16.5 miles. In the concurrent flow section, three managed lanes would be provided through the tunnel segment from just west of Webb Chapel Road to just east of Preston Road. Two managed lanes in each travel direction would be provided from just east of Preston Road to TI Boulevard. From this point, single concurrent flow managed lanes would continue eastbound to Skillman Road. From Skillman Road eastbound to IH 30 managed lane travel would be provided via a single reversible lane.

Access from the LBJ Frontage Roads to the Managed Lanes would be accomplished at various locations via direct connections in the vicinities of Marsh, Midway and Preston Roads. Access to and from the LBJ General Purpose Lanes with the Managed



PROPOSED ACCESS LOCATIONS - ALTERNATIVE 2

Figure 1-9

Lanes is provided along the concurrent flow sections via direct connectors in the areas of Josey Lane, Webb Chapel Road, Marsh Lane as well as Hillcrest and Skillman Roads. Access to and from the single reversible lane segment is provided via ramps located in the vicinity of Centerville and Miller Roads.

Additional access to and from the Managed Lanes would be provided to the DART Transit Center just east of TI Boulevard. Finally, managed lane access would be provided via direct connector ramping to and from the south at IH 35E and to and from the north at US 75 and IH 30.

The general purpose lanes would typically carry for four or five lanes in each travel direction under Alternative 2. These would fluctuate based on the need for auxiliary lanes between ingress and egress points along the general purpose lanes. The major departure from those lane configurations is between Webb Chapel Road and Josey Lane where seven lanes are provided in the westbound direction. These additional lanes are provided to accommodate the merging of general purpose and ML traffic which occurs along the short segment of the facility.

Alternative 6 – This alternative was selected to represent the preferred "ultimate" project configuration with an assumed opening date of January 1, 2015. The proposed project configuration for Alternative 6 is presented in Figure 1-10.

As shown in Figure 1-10, Alternative 6 would provide concurrent flow managed lanes for the full length of the facility between Luna Road and IH-30. Alternative 6 would cover a distance of approximately 19.4 miles.

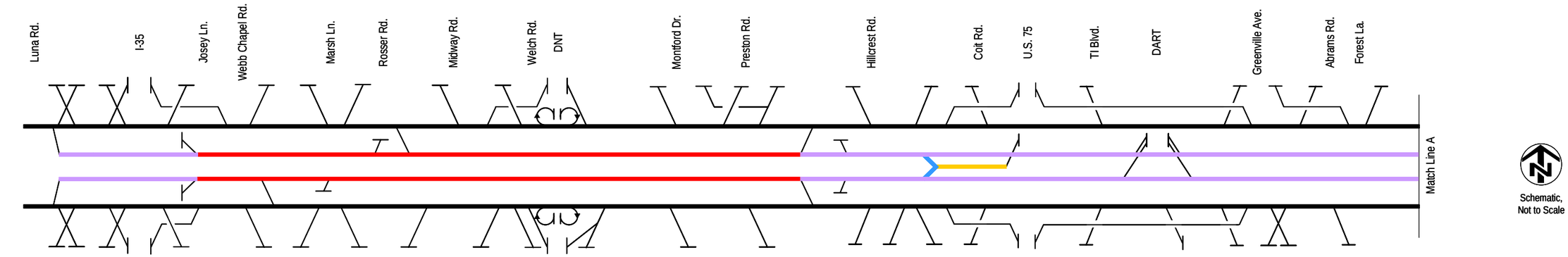
In general, Alternative 6 would provide two concurrent flow managed lanes. The only exception would be the proposed tunnel section, where three managed lanes would be provided in each travel direction.

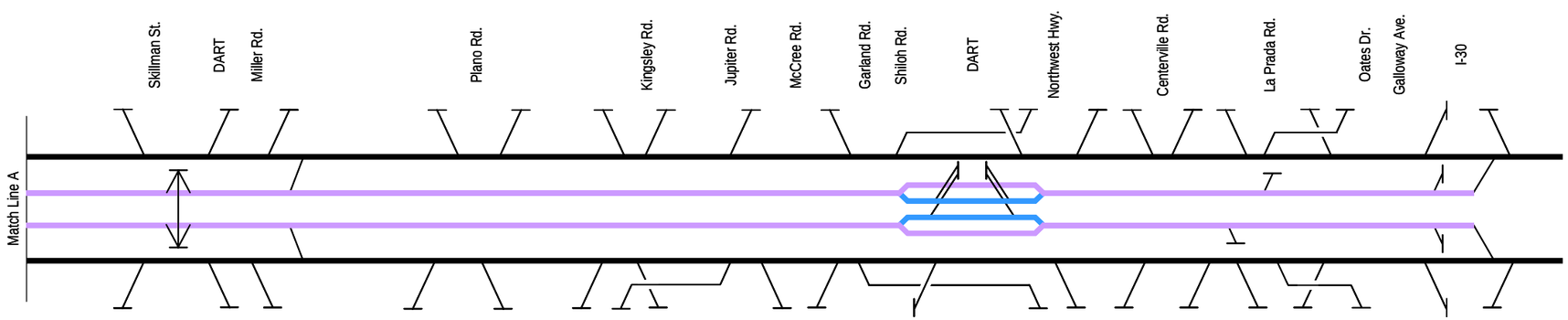
As indicated in Figure 1-10, LBJ Frontage Road access to the Managed Lanes would be provided at various locations via direct connections in the vicinity of Marsh, Midway and Preston Roads. Additional Frontage Road access would be available via ramps near the DART facility east of Skillman Road and ramps in the area of Oates Drive.

Direct connections between the LBJ general purpose lanes and managed lanes is accomplished at the termini points located east of Luna Road and east of IH 30. Additionally, general purpose lanes to managed lanes access is provided ramp connections in the areas of Marsh Lane, Hillcrest Road and Plano Road.

Direct connectors to the managed lanes are also provided at IH 35E, IH 30 and to and from the north at US 75. Supplemental access to and from the managed lanes is accomplished at the three DART Transit centers located east of TI Boulevard, east of Skillman Road and east of Shiloh Road, respectively.

The general purpose lanes under Alternative 6 would generally assume between four and six lanes in each travel direction. These varying lane assumptions would typically assume five or six lanes in selected sections to accommodate merging and weaving conditions between ingress and egress locations along the general purpose lane segments of the LBJ facility.





LEGEND

- Four or More Lanes
- Three Lanes
- Two Lanes
- One Lane
- One Reversible Lane
- General Purpose Lanes

Managed Lanes

- Westbound Entrance, Eastbound Exit
- Eastbound Entrance, Westbound Exit
- Frontage Road Connection
- Intersection Street / Highway Connection

PROPOSED ACCESS LOCATIONS - ALTERNATIVE 6

Figure 1-10