

This report details the results of a comprehensive traffic and revenue study for the proposed IH 635 project in Dallas, Texas LBJ Managed Lanes (ML). The purpose of the Study conducted by Wilbur Smith Associates (WSA) was to evaluate potential travel demand and toll revenue for the proposed Managed Lanes. The implementation of MLs is being considered by the Texas Department of Transportation so that the LBJ facility can maintain corridor mobility as travel demand continues to increase.

The concept of MLs has been defined in Texas by the planning community as follows: "A managed lane facility is one that increases freeway efficiency by packaging various operational and design actions. Lane management operations may be adjusted at any time to better match regional goals."

In the case of the LBJ ML, the term relates to the potential addition of real time, variable tolling and the potential for broadened buy-in by multiple vehicle types and modes including light-duty trucks, single-occupant vehicles, and varying occupancy levels of HOVs.

Six distinct project alternative configurations were initially evaluated as stand-alone projects as outlined in Chapter 1. Each of the initial project alternatives were analyzed under three operating scenarios (All Pay, HOV 2+ Free and HOV 3 + Free).

From the outset it has been envisioned that the LBJ ML 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 Lanes 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 (Figure 1-8) the preferred "interim" project configuration and Alternative 6 (Figure 1-9) as the preferred "ultimate" project configuration.

The Alternative 2 LBJ project configuration would cover a distance of approximately 16.5 miles from IH 35E on the west to IH 30 on the east. The number of lanes range from one to three concurrent flow lanes between IH 35E and Skillman Road and a single reversible lane between Skillman Road and IH 30.

The Alternative 6 project configuration would cover a distance of approximately 19.4 miles from Luna Road on the west to IH 30 on the east. The number of lanes range from two to three concurrent flow lanes along the entire length of this project alternative.

The Alternatives 2 and 6 project configurations were evaluated under the following operating scenarios:

- 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; and
- HOV 3 + 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.

The study analysis for the preferred alternatives was conducted dividing the day into six unique time periods. These time periods included:

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

The study effort involved the following key elements:

- Evaluation of Existing LBJ Traffic Conditions and Motorists Travel Characteristics
WSA collected traffic counts along the LBJ corridor to develop an existing traffic volume profile by time periods. Speed and delay runs were conducted to determine current LBJ travel speeds during the a.m. period from 6:00 until 10:00 a.m., and the p.m. period from 2:00 through 7:00 p.m. Vehicle occupancy counts were undertaken for the purpose of developing trip purpose by mode of transportation. Motorist travel pattern and trip characteristic surveys were also conducted along selected segments of the existing LBJ to obtain a measure of the "real world" travel pattern of motorists currently traveling in the LBJ Corridor. Details of these evaluations are outlined in Chapter 2.
- Detailed Review of Demographic Growth
A detailed review of the historic and projected demographic characteristics embedded in the traffic modeling trip tables developed by NCTCOG was conducted. This was done at a regional level as well as a detailed corridor level. A detailed summary of this analysis is provided in Chapter 3.
- Modeling Methodology
The traffic and revenue estimate process involved three levels of analysis including global demand estimates, travel time simulation model and a market share micro-model. The methodology utilized for this comprehensive study is described in detail in Chapter 4.
- Toll Sensitivity Analysis
To choose the selected per mile toll rates, a toll rate revenue sensitivity analysis was implemented as shown in Chapter 5. The process involved a series of traffic assignments at progressively higher per mile toll rates to determine when revenue potential would be optimized, subject to the requirements that speeds in the MLs would be always at an acceptable operational level. Based on the results of the toll sensitivity analysis, per mile toll rates were selected by year and time of day as detailed in Tables 5-2 and 5-3. A minimum toll equal to a five-mile trip was assumed to discourage short trips, which would reduce the traffic performance of the facility.

- Transaction of Toll Revenue Estimates
WSA estimated transactions and toll revenues for the LBJ ML Facility. Assuming Alternatives 2 and 6 project configurations. Estimates of daily transactions and annual toll revenue under the All Pay and HOV 3 + Free operating scenarios for Alternative 2 and Alternative 6 are summarized in Tables 5-5 through 5-7.

Key findings include:

- Alternative 2 was selected by TxDOT as the "interim" preferred project configuration and Alternative 6 as the "ultimate" preferred project configuration.
- Alternative 2 – optimum per mile toll rates under both the All Pay and HOV 3 + Free operating scenarios at 2012 levels range from a low of \$0.05 per mile to a high of \$0.55 per mile depending on time of day and travel direction. By 2020 it was necessary to introduce differential toll rates by roadway section during selected travel periods to more effectively manage demand along the single lane sections of the LBJ MLs. These same trends continued into 2025 and based on increased levels of demand along the LBJ MLs additional travel periods were affected.
- Alternative 6 – optimum per mile toll rates for Alternative 6 under the All Pay and HOV 3 + Free operating scenarios for opening-year 2015 range between \$0.10 and \$0.35 per mile under both operating conditions. During 2020 per mile rates under the All Pay Option range between \$0.10 and \$0.50 and \$0.10 and \$0.55 per mile recognizing the HOV 3 + Free option. Similar ranges of optimum per mile rates are indicated at 2025 levels.
- The HOV 3 + Free operating scenarios typically generate slightly more daily ML transactions than those provided under the All Pay operating scenario.
- During 2015 Alternative 2 MLs would carry 11.3 percent of travel demand in the LBJ Corridor during the morning peak and 9.7 percent during the afternoon period under the All Pay operating scenario. By 2025 A.M. Peak MLs utilization increases to 12.3 percent, with P.M. peak ML usage increasing to 12.6 percent under the All Pay operating condition as shown in Table 5-4.
- Assuming the Alternative 2 HOV 3 + Free option 12.0 percent of LBJ Corridor travel demand would utilize the MLs during the A.M. Peak and 7.8 percent during the P.M. peak period as shown in Table 5-4. These ML utilization levels would increase to 12.3 and 13.8 percent, respectively, for the A.M. and P.M. peak travel periods by 2025 under the Alternative 2 HOV 3 + Free operating scenario.
- Under the Alternative 6 All Pay operating scenario LBJ MLs would carry 17.3 percent of total corridor demand during the morning peak period and 24.8 percent in afternoon peak travel period. By 2025 these utilization rates are expected to increase to 23.2 and 25.2 percent, respectively, for Alternative 6.
- At opening-year 2012 levels the Alternative 2 LBJ MLs are expected to generate

almost 39,000 transactions daily under the All Pay scenario and more than 41,000 under the HOV 3 + Free operating option. These daily transaction levels are estimated to produce average daily toll revenues of approximately \$67,700 and \$64,900, respectively.

- By 2025 Alternative 2 daily transactions are forecasted to increase to over 58,000 assuming the All Pay option and \$53,000 under the HOV 3 + Free operating scenario. These 2025 transactions are expected to generate average daily toll revenues of \$141,000 for the All Pay scenario and \$132,000 under the HOV 3 + Free scenario.
- At opening-year 2015 levels Alternative 6 is expected to generate almost 68,000 transactions daily under the All Pay scenario and almost 71,000 under the HOV 3 + Free operating option. These daily transaction levels are estimated to produce average daily toll revenues of approximately \$115,000 and \$111,000 thousand, respectively.
- By 2025 daily transactions are forecasted to increase about 83,000 assuming the All Pay option and almost 88,000 under the HOV 3 + Free operating scenario. These 2025 transactions are expected to generate average daily toll revenues of \$211,000-\$217,000 depending on operating scenario.
- The annual toll revenue generated by the LBJ MLs for Alternative 2 ranges from \$15.1 million in 2012 to \$86.5 million in 2040 under the All Pay operating scenario and \$14.4 million to \$79.9 million under the HOV 3 + Free operating condition as shown in Table ES-1.
- Alternative 6 annual toll revenue estimates range between \$25.5 million in opening-year 2015 to \$132.6 million in 2040 under the All Pay operating scenario and \$24.7 million to \$128.8 million from opening-year 2015 through the final year of the forecast period 2040 under the HOV 3 + Free scenario.

Current accepted professional practices and procedures were used in the development of these traffic and revenue estimates. However, as with any forecast of the future, it should be assumed that there will be differences between forecast and an actual results caused by events and circumstances beyond the control of the forecasters. These differences could be material. For example, traffic and revenue estimates in this report are based heavily on future socioeconomic growth projections for the LBJ Corridor. There is always uncertainty regarding the specific nature and timing of future development.

It also should be recognized that traffic and toll revenue forecasts in this document are intended to reflect the overall estimated long-term trend. Actual experience in any given year may vary due to economic conditions or other factors. Finally, ultimate utilization of the LBJ Managed Lanes will be influenced significantly by technology, signing and other promotional activities. This is also largely outside the control of the forecasters.

Table ES-1
Estimated Annual Toll Revenue Comparison By Project Alternative (1)

(thousands)

| Year | Alternative 2 | | Alternative 6 | |
|------|---------------|------------|---------------|------------|
| | All Pay | HOV 3+Free | All Pay | HOV 3+Free |
| 2012 | \$15,071 | \$14,444 | - | - |
| 2013 | 21,001 | 20,032 | - | - |
| 2014 | 25,523 | 24,230 | - | - |
| 2015 | 28,239 | 26,682 | \$25,503 | \$24,689 |
| 2016 | 30,439 | 28,691 | 37,090 | 35,770 |
| 2017 | 32,811 | 30,850 | 47,044 | 45,197 |
| 2018 | 35,368 | 33,173 | 54,321 | 51,991 |
| 2019 | 38,124 | 35,670 | 59,275 | 56,517 |
| 2020 | 41,095 | 38,355 | 64,680 | 61,437 |
| 2021 | 43,010 | 40,060 | 67,347 | 64,259 |
| 2022 | 45,015 | 41,841 | 70,124 | 67,211 |
| 2023 | 47,113 | 43,701 | 73,015 | 70,298 |
| 2024 | 49,309 | 45,644 | 76,026 | 73,527 |
| 2025 | 51,607 | 47,673 | 79,161 | 76,904 |
| 2026 | 53,413 | 49,342 | 81,932 | 79,596 |
| 2027 | 55,283 | 51,069 | 84,799 | 82,381 |
| 2028 | 57,218 | 52,856 | 87,767 | 85,265 |
| 2029 | 59,220 | 54,706 | 90,839 | 88,249 |
| 2030 | 61,293 | 56,621 | 94,018 | 91,338 |
| 2031 | 63,438 | 58,602 | 97,309 | 94,535 |
| 2032 | 65,659 | 60,653 | 100,715 | 97,843 |
| 2033 | 67,957 | 62,776 | 104,240 | 101,268 |
| 2034 | 70,335 | 64,973 | 107,888 | 104,812 |
| 2035 | 72,797 | 67,247 | 111,664 | 108,481 |
| 2036 | 75,345 | 69,601 | 115,573 | 112,278 |
| 2037 | 77,982 | 72,037 | 119,618 | 116,207 |
| 2038 | 80,711 | 74,558 | 123,804 | 120,274 |
| 2039 | 83,536 | 77,168 | 128,137 | 124,484 |
| 2040 | 86,460 | 79,869 | 132,622 | 128,841 |

Note: All revenues are in future year dollars.
(1) Annual toll revenues have been adjusted to reflect ramp-up during the first three years of operation.