I.H. 635 (LBJ) Corridor Study

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This paper was written in the summer of 1997 for an ASCE paper submission. The context of the public involvement for the project is captured in the paper. The resulting planning project is reflected in the future work products described on the web site.

The Project - Corridor:

Corridor Description:

I.H. 635 (LBJ Freeway) Corridor is located in the Dallas-Fort Worth metropolitan area. The study corridor (Fig. 1) is approximately 21 miles (33.8 km) long, extending from west of I.H. 35E to U.S. 80. The corridor is bounded by Belt Line Road and Loop 12. Municipalities located along I.H. 635 include the cities of Dallas, Farmers Branch, Garland, and Mesquite.

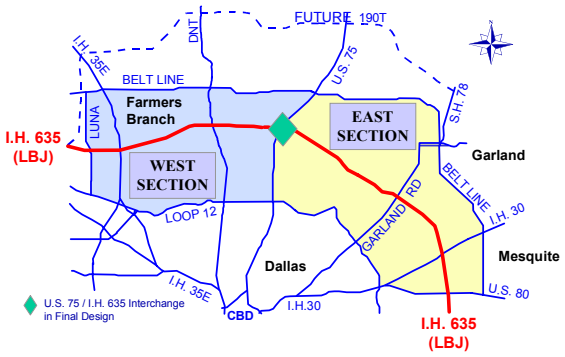

Figure 1 - LBJ Corridor Study Limits

The existing LBJ Freeway generally consists of eight mainlanes (ML) except at interchanges. One-way service roads are generally two and three lanes and are not continuous. Right-of-way (ROW) width varies from 330' (100.6 m) to 450' (137.2 m) along the freeway. Operation of HOV lanes have recently begun on I.H. 35E, north of LBJ Freeway; and from I.H. 35E to U.S. 75 (Central Expressway) on LBJ Freeway. These HOV lanes are 2+ occupancy, concurrent flow, buffer separated and open 24 hours a day. An Intelligent Transportation System (ITS) project is being constructed to include cameras, CMS, detectors and a highway advisory radio all tied to a satellite control center. Several immediate action projects are under study for early implementation to maximize available use of the existing facility in advance of major construction activities. These include minor intersection improvements, ramp additions, auxiliary lanes and HOV extensions.

Other major transportation projects in the area will have an impact on traffic movements and mobility for the LBJ corridor. The ongoing reconstruction of Central Expressway from the Dallas CBD to I.H. 635 will be completed by the year 2000, just in time for the reconstruction of the I.H. 635 / U.S. 75 Interchange, a $168 million project. The local transit authority, Dallas Area Rapid Transit (DART), has an operating light rail system with three planned extensions crossing LBJ Freeway. Work efforts are underway to complete the George Bush Turnpike (190T) by the year 2001 providing relief for northern suburban traffic now using LBJ. All of these projects will be factored into the decision-making process for the corridor study.

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Current Status:

In January of 1997, the LBJ Corridor Study received Long Range Planning status moving from feasibility to planning (Fig. 2). The LBJ Major Investment Study (MIS) was completed in the fall of 1996, with the LBJ Executive Board's recommended Locally Preferred Alternative (LPA) receiving full local and regional consensus support. The project has been incorporated into the adopted Regional Transportation Plan - *Mobility 2020*, as prepared by the North Central Texas Council of Governments (NCTCOG). The project is in the early stages of planning which includes Schematic Development, Environmental Assessment Preparation and Traffic & Revenue studies. Upon completion and following all required approvals, the project will proceed to the final design phase for preparation of plans, specifications, and estimates.

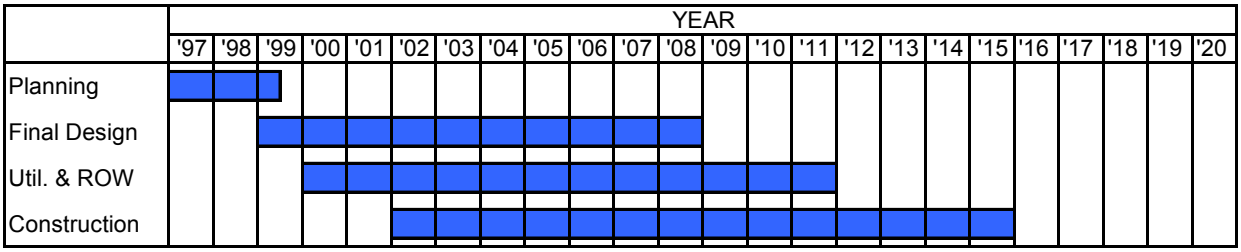


Figure 2 - LBJ Corridor Study Schedule

This progress represents a major achievement for the corridor participants. The LBJ Corridor has been under study since 1987. There were significant community concerns about prior alternatives being considered in the early 1990's, so the Texas Department of Transportation (TxDOT) returned the study to the feasibility stage in the fall of 1992. Many hours of community and technical work efforts have resulted in this successfully recommended LPA. The schedule is ambitious for a project estimated to cost $1.4 billion. The project schedule and estimated probable cost is likely to change throughout the planning phase as the work progresses.

The Problem - Congestion:

Problem Statement:

The LBJ Freeway corridor encompasses one of the most highly developed commercial and residential areas in north Texas. The completion of the LBJ Freeway in the 1970's contributed to significant population and employment growth. This growth and the opening of DFW International Airport led to traffic demand which greatly exceeded predictions. The ADT (Fig. 3) for the Freeway grew steadily until the mid 80's when growth began to slow due to limited

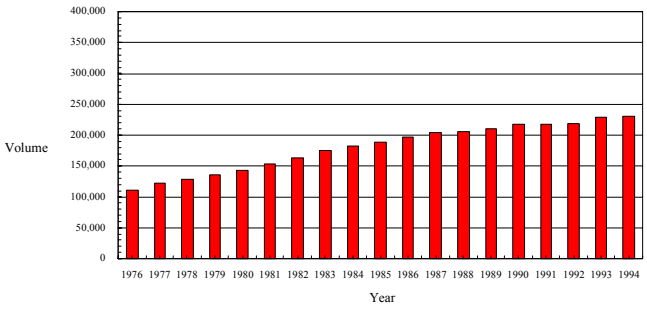


Figure 3 - Average Daily Traffic

freeway capacity. Unconstrained traffic projections for LBJ indicate a future demand of 600,000 vehicles per day (vpd) resulting in a latent demand of +/-350,000 vpd.

The freeway serves a variety of trip purposes: ***Through*** (a freeway to a freeway), ***Destination*** (a freeway to the LBJ corridor), ***Origin*** (the LBJ corridor to a freeway) and ***Local*** (within the LBJ corridor). The freeway serves long distance trips by interchanging with other regional facilities including I.H. 35E, Dallas North Tollway, U.S. 75, I.H. 30 and U.S. 80. Residential and commercial developments within the corridor serve as origins and destinations for shorter, local trips. The balance between these trips (Fig. 4) shows the LBJ Corridor as an elongated origin and destination for local trips while providing a conduit for longer use through trips.

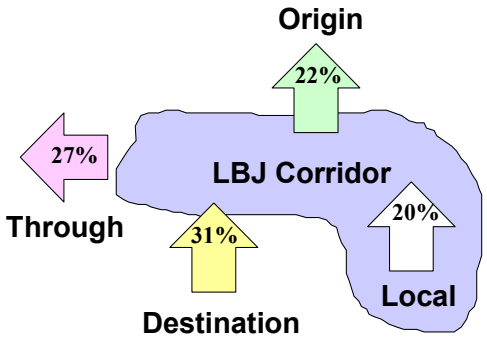


Figure 4 - A.M. Origin & Destination Data

The combination of users has resulted in significant congestion for many hours each day. Predicted development and travel demand growth for the area indicate that the problem will continue to worsen for the foreseeable future. Figure 5 shows a high level of traffic in the weekday afternoons with limited weekend relief. Any disturbance or incident causes significant disruption and contributes to driver frustration.

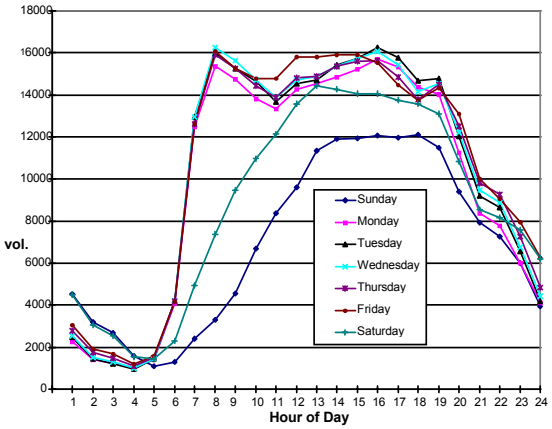


Figure 5 - 1994 Hourly Volumes

Figure 6 indicates that over the four year period, from 1990 to 1994, the freeway continued to absorb traffic during the non-peak hours. This resulted in an increased period of time in which the LBJ Freeway was experiencing congestion. As this additional travel demand for the corridor increased, the adjacent arterial street system continued to absorb freeway traffic and have extended periods of congestion.

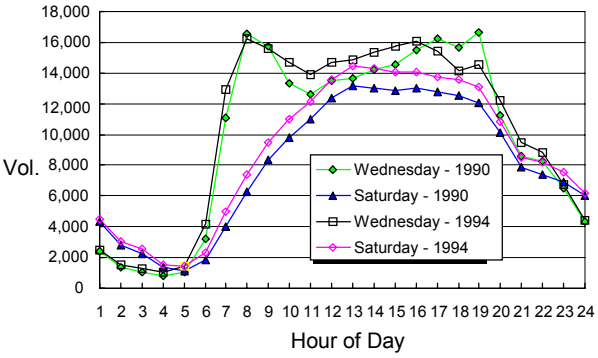


Figure 6 - Hourly Volumes - 1990 and 1994

The Public Involvement Process - Consensus Through Collaboration:

LBJ Committee Formation and the Major Investment Study (MIS) Process:

The LBJ Corridor Study began forming a new broad based committee structure to encompass the customers affected by the facility. This included homeowner, business, environmental, commuter, technical, governmental (City, County & Regional) and transportation (Transit, Toll, Federal & State) participants. During the three and one-half year study, April 1993 to September 1996, over 134 project meetings were held. These meetings ranged from a few people to over 300 in attendance. Significant committee member participation and involvement from agenda setting to idea inclusion resulted in a successful culmination to a long feasibility process.

The guidance provided for MIS's did not become available until a year after the renewed study efforts for the corridor had begun. The basic committee structure for the study had already anticipated some of the guiding principles for MIS's, and was able to quickly transition the study into a criteria based methodology through screening of alternatives to arrive at a consensus for the LPA. The LBJ planning participants were not bound by a time goal to reach a consensus. There was an open understanding to arrive at a consensus when it was reached. The study participants accepted the role of an MIS test case for ideas with open arms and worked together as a team. Future MIS's should and will be able to accelerate many of the work processes and tasks identified and attempted during the study.

Areas of Concern:

Early in the study process the community identified four specific areas of concern which should be addressed as part of the study effort. For the LBJ Freeway Corridor these were:

1. Compromises to mobility and safety at current and predicted congestion levels.
2. The inability to respond to changing traffic conditions, travel patterns and travel choices in a flexible manner.
3. The impacts of the Freeway and arterial street network on the community.
4. Limited funding for needed and identified transportation improvements.

Project Goals:

Throughout the evolving study process it was necessary to establish goals to connect the areas of concern to the study's decision-making process. The four goals, listed below, were developed and connected to specific criteria for measurement in the MIS process. These same goals will be utilized in planning, with additional environmental criteria added, to ensure that a comprehensive and efficient approach is maintained for the study.

- Goal # 1: Enhanced Mobility and Safety
- Goal # 2: Project Flexibility
- Goal # 3: Community Enhancement
- Goal # 4: Cost Effectiveness

The Product - Concept:

Corridor Consensus:

The consensus Locally Preferred Alternative (LPA) was presented by the LBJ Executive Board in September 1996. The corridor is divided into West (Luna Road to U.S. 75) and East (U.S. 75 to U.S. 80) sections with separate LPA recommendations. Generally, the West LPA consists of eight mainlanes plus six high-occupancy vehicle/toll (HOT) lanes. The HOT lanes and other HOV lane components with excess capacity are geared for congestion (value) pricing. The East LPA is subdivided into three subsections all of which have ten mainlanes. In addition, four HOV lanes are proposed between U.S. 75 and Skillman, and two reversible HOV lanes are proposed between Skillman and I.H. 30. There are no HOV lanes proposed between I.H. 30 and U.S. 80. New frontage roads, by-pass frontage roads and ramp improvements are also part of the LPA for the West and East sections of the LBJ Freeway.

Locally Preferred Alternative(LPA):

The consensus LPA described above has an early estimate of probable cost as shown in Figure 7. These numbers reflect the preliminary nature of the MIS effort and will be refined as progress continues. The total cost for the West and East sections could range from $1.3 to $ 1.4 billion.

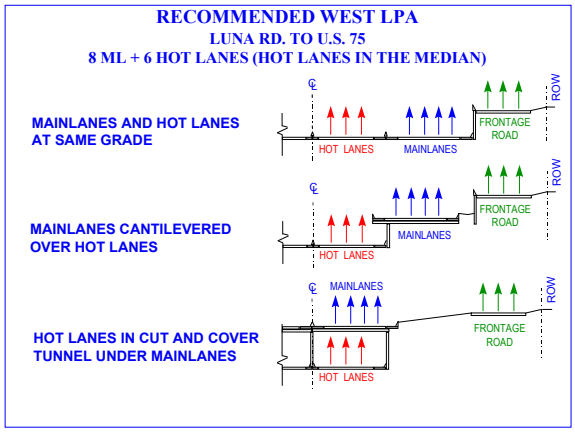
	West (Low) Cost	West (High) Cost	East Cost
Construction	$ 570.0	$ 700.0	$ 411.0
Right-of-Way	$ 47.8	$ 47.8	$ 60.0
Miscellaneous	$ 110.4	$ 129.9	$ 61.7
Total	$ 728.2	$ 877.7	$ 532.7

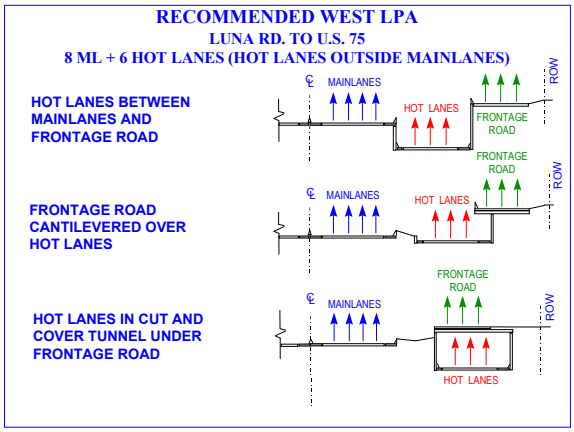
Notes:

1. Cost figures are in Millions of Dollars (1996).
2. Low estimate based on HOT in median with non-continuous frontage roads.
3. High estimate based on HOT outside with continuous frontage roads.
4. Misc. includes utility relocation, engineering, and O&M costs.
5. No credit for revenue generated from HOT lanes.
6. Does not include $168 million for US 75/IH 635 Interchange.

Figure 7 - Estimate of Probable Cost

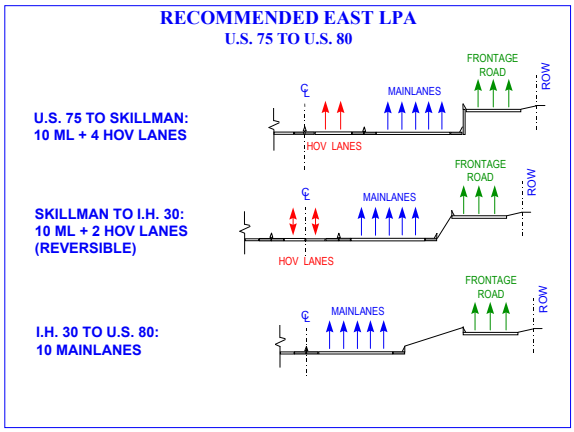
Theoretical typical sections for the LPA are shown in Figure 8 for the West and East Sections. The West typical sections shown between I.H. 35E and U.S. 75 are not alternative choices but simply serve to reflect possible 8 ML + 6 HOT Lane configurations. The ultimate I.H. 635 (LBJ Freeway) facility will consist of some combination of these types of configurations. The East typical sections are shown as depressed sections for illustrative purposes only. I.H. 635 between U.S. 75 and U.S. 80 will have depressed, at-grade, and fill sections.





West Section - LPA Description

8 Free General Purpose Lanes Plus Auxiliary Lanes
6 High-Occupancy Vehicle/Toll (HOT) Lanes
Continuous Frontage Roads with Bypass Lanes
Bicycle and Pedestrian Accommodation
Extensive “Structural” Sections to Minimize or Eliminate ROW Impacts
ITS, CMS, Urban Design and Environmental Mitigation Packages



East Section - LPA Description

10 Free General Purpose LanesPlus Auxiliary Lanes
4 High-Occupancy Vehicle (HOV) Lanes - US 75 to Skillman
2 Reversible HOV Lanes - Skillman to IH 30
Continuous Frontage Roads with Bypass Lanes
Bicycle and Pedestrian Accommodation
ITS, CMS, Urban Design and Environmental Mitigation Packages

West and East Benefits

Significant Capacity Increase
Reduced Congestion on Arterials
Increased Accessibility and Safety
Operational Flexibility
Design to Minimize/Eliminate ROW
No Elevated Linear Structures
Improved Regional Air Quality
Revenue Generation Potential

Figure 8 - LPA Typical Sections & Benefits

Value Pricing as a Revenue Stream:

The introduction of the HOV/Toll (HOT) Lane concept to the LBJ Freeway LPA can provide an opportunity to generate revenue through value pricing. The Single Occupant Vehicle trip is assessed a fee to travel in the less congested HOT lanes. The price would vary by length of trip and time of day to optimize the management aspects of the HOT lanes and the LBJ Freeway lanes. There will be multiple access locations for the HOT lanes all developed with automated fare collection technology. The simple graphic shown in Figure 9 illustrates the concept. The HOT lane concept can be applied to both the West and East sections. Current LBJ MIS targets have utilized a goal of 1800 vehicles per lane (vpl) to develop a possible annual revenue stream of $16 to $38 million. This would help pay for general revenue bonds to build the HOT lanes.

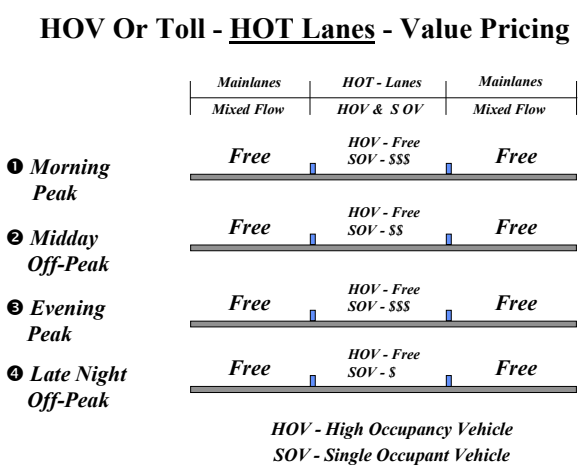


Figure 9 - Value Pricing

Funding/Revenue Model:

The full funding and financing mechanisms for the LBJ Freeway have not been completed. Preliminary studies made as part of the LBJ MIS indicate multiple sources of funding will be needed. The passage and development of recent transportation legislation at the federal and state level will permit future funding and implementation partnerships to be formed with local governments, toll authorities, transit authorities and private entities for project development. A possible funding and revenue sharing model (Fig. 10) may permit an opportunity for all funding participants to benefit from a revenue stream generated by the HOT lanes. This benefit would be to a degree commensurate with their investment, liabilities and responsibilities. There may be a mechanism to pool resources to pay the debt service in advance of generating revenue.

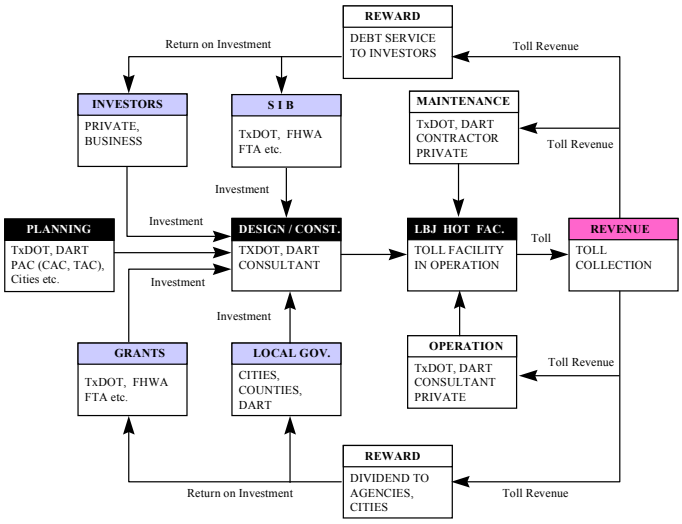


Figure 10 - Funding and Revenue Model

Other Ideas:

Other ideas from the MIS may be worth including as part of the projects preparation to move forward into the 21st century. Other projects around the country are beginning to apply emerging ITS technologies. The HOT lanes will be designed to take advantage of the latest toll collection, occupant detection and user interface technologies. This would be through the use of a transponder or similar technology that would permit access to transportation facilities by use of a pre-paid account for HOT Lanes, Toll Lanes, Transit (Bus & Rail) fares, CBD Parking, and other special uses.

The Planning Process - Challenge to Maintain Consensus:

Public Involvement:

Extensive and pro-active public involvement was instrumental in completing the LBJ MIS and developing the consensus LPA for the corridor. Likewise, the planning phase will only be successful if a commitment is made to develop and maintain a public involvement plan which will continue to ensure valuable input and review opportunities for all interested and affected persons and groups. Public involvement in the planning phase will continue to integrate three main participant groups for communication working within the boundaries established for the LPA. These are the Community, Planning Advisory Committees and the Technical Support Team (Fig. 11). This structure is designed to move forward in a collaborative effort to build partnerships through communication resulting in continued consensus solutions.

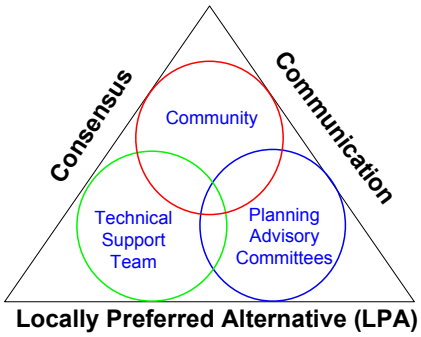


Figure 11 - Public Involvement

Planning - Development of a Final Preferred Design:

The work efforts during the planning phase will use the LBJ MIS results as the framework and boundaries for working toward developing the refined preferred design. During the planning phase, the work tasks identified below will be completed to methodically step through the decision-making process to include all elements into the refined preferred design. Schematic design drawings of the refined preferred design will be created to serve as the basis for the final design phase. Concurrently, environmental assessments will be prepared documenting environmental, economic and social impacts and the mitigation efforts that will be undertaken by TxDOT.

Planning Work Tasks:

Assembly and Review of Data - To ensure the most accurate design and environmental analysis is completed, all data and information previously received and cataloged will be reviewed and information which needs to be updated will be identified, located and obtained for use in the study.

Development of Evaluation Criteria - The previously established evaluation criteria from Criteria Sets 1 and 2 and the "Decision-Making Framework" will be updated and supplemented for use in analyzing the design options framed by the MIS LPA. Updating and finalizing the evaluation criteria will be coordinated with the LBJ Planning Advisory Committees.

Development of Travel Forecasts and Modal Split - The year 2020 travel forecasts developed during the MIS will be updated to provide more detailed traffic movements for HOV lanes, ramps and intersections. This travel forecast information will be used in completing detailed design items such as number of ramp lanes, auxiliary lane designs, number of by-pass lanes, intersection designs, etc.

Unresolved Issues Analysis - The MIS West and East LPA's identified a number of major unresolved issues listed below. These issues, and others encountered during the planning phase, will be addressed in order to develop a preferred design. Design options will be identified and defined which will represent the range of solutions for the unresolved issues. Schematic drawings and other data will be developed as necessary to evaluate the design options using the Evaluation Criteria discussed previously. Coordination on transit issues, freight movement, and bicyclists and pedestrians issues will be part of this task.

East Major Unresolved Issues
Continuous Frontage Roads vs. ROW
Project Constructibility

West Major Unresolved Issues
HOT Lane Location: Median vs. Outside
Continuous Frontage Roads vs. ROW
Continuous Bypass Lanes vs. ROW
Project Constructibility
At-Grade vs. Structural / ROW vs. Cost

Traffic and Revenue Study - The High-Occupancy Vehicle/Toll (HOT) lanes will require detailed and specialized traffic and revenue forecasts. Toll sensitivity analyses, congestion (value) pricing options and overall revenue estimates will be completed. Based on these analyses, financial feasibility will be evaluated.

Refine Preferred Design - The preferred designs for the West and East sections identified in the *Unresolved Issues Analysis* task will be refined and complete schematic design drawings will be prepared. These schematic design drawings will be used to obtain final approval and will be the basis for the final design work effort that will follow planning.

Environmental Assessment - Environmental Assessments will be prepared for the West and East preferred designs which will include analysis of all environmental, economic and social impacts and the mitigation efforts proposed by TxDOT.

Implementation Plan - LBJ Freeway will not be improved as one, two or even three big projects due to funding and constructibility constraints. Therefore, an Implementation Plan will be developed which will identify the fastest, most efficient process for completing an improved LBJ Freeway given the real world constraints associated with a project of this magnitude.

Urban Design - The LBJ Freeway is a major part of the community and its environment and, as such, visual impacts are an important item that will be addressed. "Softscape" and "Hardscape" elements will be addressed as part of this effort.

Intelligent Transportation System (ITS) Plan - Regional ITS solutions to more efficiently manage traffic and minimize congestion resulting from incidents will be integrated with LBJ Freeway specific solutions to ensure the most advanced and efficient facility possible.

Immediate Action Projects (IAP) - A fully constructed and improved LBJ Freeway is many years away. In order to minimize congestion in the interim, short-term improvements will continue to be identified and implemented.

Partnerships:

The ability of the various constituents to stay focused will be instrumental in maintaining a consensus and forming partnerships for implementation. These partnerships may form across new lines and to varying degrees of complexity throughout the West and East sections of the corridor. The simple graphic below (Fig. 12) illustrates the range of options.

Through communication, trust and patience, the resulting study solutions can be implemented in a timely manner. The improvements to LBJ Freeway will need to be integrated into the regional transportation planning efforts. The LBJ Freeway Corridor project, like other significant projects in the region, will present the DFW area with new learning opportunities for transportation improvements. Each project and associated constituents will need to learn from each other to maintain a balanced economic approach for the viability of each project.

Figure 12 - Partnerships for Implementation

Acknowledgments: The entire LBJ Corridor Study Team whose work made this LPA possible.