

INTERSTATE ACCESS JUSTIFICATION

IH 35E FROM IH 635 (LBJ) TO US 380

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TEXAS DEPARTMENT OF TRANSPORTATION

DALLAS DISTRICT

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TABLE OF CONTENTS

INTRODUCTION4
 SECTION 1: PURPOSE AND NEED.....7
 SECTION 2: ALTERNATIVES.....14
 Transportation System Management (TSM) Alternatives.....14
 Transportation Demand Management (TDM) Alternatives19
 Freeway/Roadway Alternatives.....22
 SECTION 3: OPERATIONAL ANALYSIS.....32
 Proposed Schematic33
 Volumes33
 Freeway Mainlanes Analysis33
 Ramp Junctions Analysis.....46
 Weaving Analysis54
 Direct Connector Analysis.....56
 SECTION 4: ACCESS CONNECTIVITY57
 SECTION 5: REGIONAL PLAN.....58
 SECTION 6: COMPREHENSIVE NETWORK.....59
 SECTION 7: AGENCY COORDINATION60
 SECTION 8: ENVIRONMENTAL DOCUMENTATION.....60
 SUMMARY AND CONCLUSIONS61
 REFERENCES62

LIST OF FIGURES:

FIGURE 1: PROJECT MAP - IH 35E FROM IH 635 TO US 3804
 FIGURE 2: UNOFFICIAL RAMPS NORTH OF VALLEY VIEW LANE.....9
 FIGURE 3: UNOFFICIAL RAMP AT N LUNA ROAD10
 FIGURE 4: UNOFFICIAL RAMPS SOUTH OF SANDY LAKE ROAD10
 FIGURE 5: UNOFFICIAL RAMPS SOUTH OF FM 40711
 FIGURE 6: UNOFFICIAL RAMP SOUTH OF SH 121 BUSINESS11
 FIGURE 7: UNOFFICIAL RAMPS SOUTH OF ROUND GROVE STREET.....12
 FIGURE 8: UNOFFICIAL RAMPS SOUTH OF CORINTH STREET.....12
 FIGURE 9: UNOFFICIAL RAMP NORTH OF POST OAK DRIVE13
 FIGURE 10: UNOFFICIAL RAMPS AT IH 35E/IH 35W SPLIT.....13

LIST OF TABLES:

TABLE 1: PROPOSED ARTERIAL IMPROVEMENTS.....	15
TABLE 2: PROPOSED INTERSECTION IMPROVEMENT LOCATIONS	17
TABLE 3: PROPOSED BOTTLENECK IMPROVEMENTS	18
TABLE 4: PROPOSED ITS IMPROVEMENTS.....	19
TABLE 5: REGIONAL VANPOOL MARKETS AND POTENTIAL VANPOOLS.....	20
TABLE 6: PARK-AND-RIDE FACILITIES.....	21
TABLE 7: IH 35E EXISTING AND PROPOSED ACCESS	23
TABLE 7: IH 35E EXISTING AND PROPOSED ACCESS (CONTINUED)	24
TABLE 7: IH 35E EXISTING AND PROPOSED ACCESS (CONTINUED)	25
TABLE 7: IH 35E EXISTING AND PROPOSED ACCESS (CONTINUED)	26
TABLE 7: IH 35E EXISTING AND PROPOSED ACCESS (CONTINUED)	27
TABLE 8: IH 35E EXISTING AND PROPOSED ACCESS	27
TABLE 8: IH 35E EXISTING AND PROPOSED ACCESS (CONTINUED)	28
TABLE 8: IH 35E EXISTING AND PROPOSED ACCESS (CONTINUED)	29
TABLE 8: IH 35E EXISTING AND PROPOSED ACCESS (CONTINUED)	30
TABLE 8: IH 35E EXISTING AND PROPOSED ACCESS (CONTINUED)	31
TABLE 9: GENERAL PURPOSE LANES BUILD LOS (NORTHBOUND).....	34
TABLE 9: GENERAL PURPOSE LANES BUILD LOS (NORTHBOUND) (CONTINUED)....	35
TABLE 10: MANAGED LANES BUILD LOS (NORTHBOUND).....	36
TABLE 11: GENERAL PURPOSE LANES BUILD LOS (SOUTHBOUND)	37
TABLE 11: GENERAL PURPOSE LANES BUILD LOS (SOUTHBOUND) (CONTINUED) ..	38
TABLE 12: MANAGED LANES BUILD LOS (SOUTHBOUND)	39
TABLE 13: BASIC FREEWAY NO-BUILD LOS (NORTHBOUND).....	40
TABLE 13: BASIC FREEWAY NO-BUILD LOS (NORTHBOUND) (CONTINUED).....	41
TABLE 14: BASIC FREEWAY NO-BUILD LOS (SOUTHBOUND)	42
TABLE 14: BASIC FREEWAY NO-BUILD LOS (SOUTHBOUND) (CONTINUED)	43
TABLE 15: GENERAL PURPOSE RAMP JUNCTION BUILD LOS (NORTHBOUND).....	46
TABLE 16: MANAGED LANES RAMP JUNCTION BUILD LOS (NORTHBOUND).....	47
TABLE 17: GENERAL PURPOSE RAMP JUNCTION BUILD LOS (SOUTHBOUND)	48
TABLE 18: MANAGED LANES RAMP JUNCTION BUILD LOS (SOUTHBOUND)	49
TABLE 19: RAMP JUNCTION NO-BUILD LOS (NORTHBOUND).....	50
TABLE 19: RAMP JUNCTION NO-BUILD LOS (NORTHBOUND) (CONTINUED)	51
TABLE 20: RAMP JUNCTION NO-BUILD LOS (SOUTHBOUND).....	52
TABLE 20: RAMP JUNCTION NO-BUILD LOS (SOUTHBOUND) (CONTINUED).....	53
TABLE 21: GENERAL PURPOSE WEAVING BUILD LOS (NORTHBOUND).....	54
TABLE 22: GENERAL PURPOSE WEAVING BUILD LOS (SOUTHBOUND)	55
TABLE 23: WEAVING NO-BUILD LOS (NORTHBOUND).....	55
TABLE 24: WEAVING NO-BUILD LOS (SOUTHBOUND)	56
TABLE 25: COLLECTOR-DISTRIBUTOR LOS.....	57
TABLE 26: MOBILITY 2030 – 2009 AMENDMENT RECOMMENDATIONS	59

APPENDIX:

APPENDIX A

Figures 11 and 19

APPENDIX B

Freeway Segment

APPENDIX C

Ramp Junction

APPENDIX D

Weaving Analysis

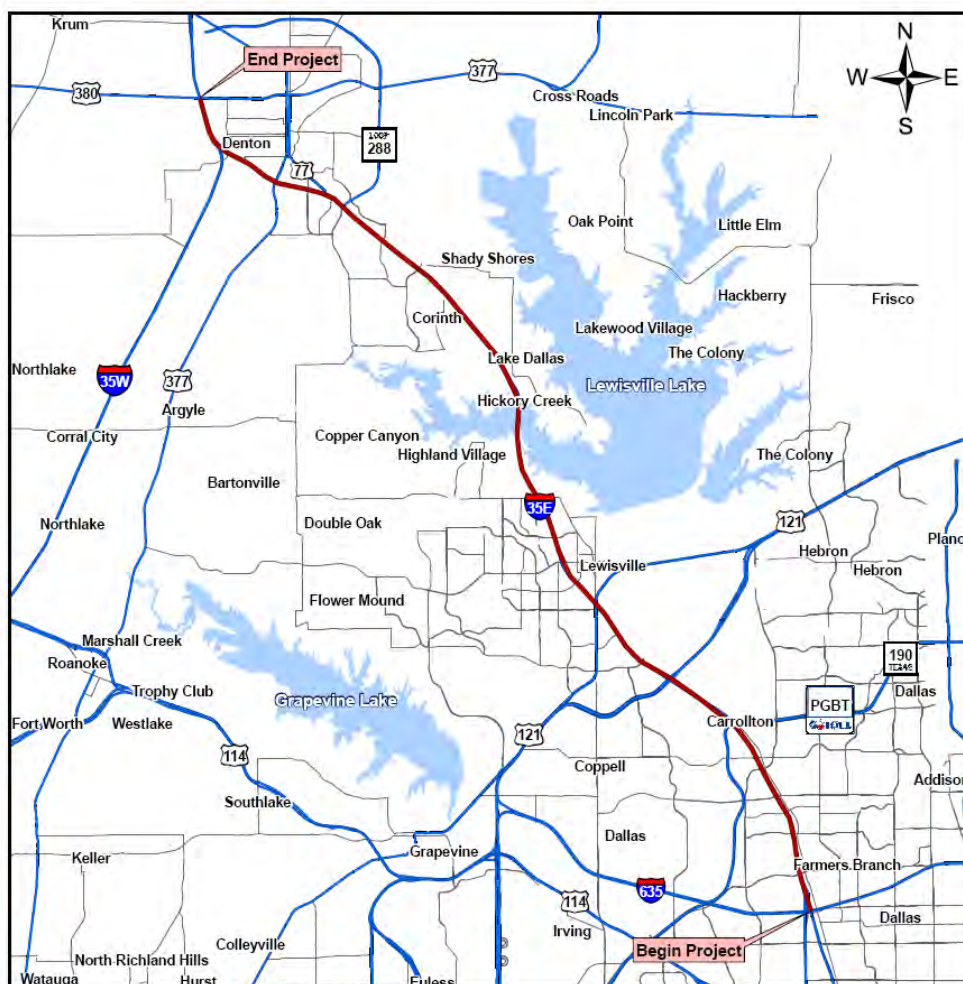
INTRODUCTION

For over a decade, the steady increase in population and urban development of nearby cities and communities in Denton County have added an influx of daily workforce commuters along IH 35E. The current infrastructure is slowly deteriorating and becoming unable to meet current demand. This is easily understood considering that IH 35E is the only major freeway that serves north-south traffic through Denton County from Dallas. Roadway improvements and new roadways need to be constructed in order to meet the growing travel demand of the area.

IH 35E is also part of a North American Free Trade Agreement (NAFTA) corridor, extending from Mexico to Canada. Historically, the IH 35E corridor has functioned as a principle route of national and international commerce due to its centralized location both nationally and statewide. Therefore, this corridor accommodates important interests to both the local and national economy.

The focus of this report is on the area located along IH 35E between IH 635 (LBJ) in Dallas County and US 380 in Denton County, Texas, a distance of **28.25 miles**. **Figure 1** shows the project area.

FIGURE 1: PROJECT MAP - IH 35E FROM IH 635 TO US 380



The proposed improvements including widening the general purpose lanes (free mainlanes), upgrading the interim concurrent high occupancy vehicle (HOV) by adding a barrier separated bidirectional managed lane facility, adding access to the proposed managed lanes, and improving the operations of existing access.

The existing IH 35E is a six lane freeway from IH 635 to Quail Run, just north of the Lake Lewisville Bridge, and from Quail Run to US 380 it is a four lane freeway. The southern portion of IH 35E from IH 635 to SH 121 has an interim concurrent HOV with a single lane in each direction. To implement the interim HOV the three mainlanes in each direction were reduced to 11 feet and the inside shoulder was reconstructed to provide the width for the HOV.

The IH 35E proposed improvements include:

- Increasing capacity by widening the general purpose lanes to eight from IH 635 to US 377, to six from US 377 to IH 35W, and to ten from IH 35W to US 380.
- Increasing capacity by adding a barrier separated bidirectional managed lane facility with four lanes from IH 635 to US 77, with two lanes from US 77 to IH 35W, and with four lanes from IH 35W to US 380.
- Providing access to the barrier separated bidirectional managed lane facility at major traffic demand locations such as major intersections and major developed areas along the corridor.
- Modifying access to the general purpose lanes to benefit mainlane traffic by decreasing the amount of weaving interaction while maintaining accessibility and conforming to current design standards.

Through the IH 35E corridor, adding enough additional capacity to meet future demands is not possible without rebuilding the entire freeway.

The Federal Highway Administration (FHWA) previously approved an IAJ Report for the South [IH 635 to SH 190 (PGBT)] and Middle [SH 190 (PGBT) to FM 2181 (Swisher Road)] sections that are combined and resubmitted in this IAJ. The previous South section IAJ Report had a ten lane freeway and a two lane reversible HOV. The previous Middle section of IAJ Report also had a ten lane freeway and a two lane reversible HOV. Throughout the Dallas-Fort Worth Metroplex, managed lanes are being planned instead of HOV lanes. This project revises the previously approved reversible HOV lanes to bidirectional managed lanes and reduces the mainlanes from ten to eight which requires a new IAJ Report for this corridor.

Ramp revisions (deletions, reversals) have been made in both directions to provide Collector Distributors to serve SH 121(Toll), Business SH 121 and SH 190 (PGBT). Other ramp revisions have been made to consolidate ramps near Fox and Main, shift ramps near Frankford and between SH 121 Toll and Corporate.

As required by the FHWA, justification is needed when the access on an interstate system is added or modified. This report will describe the justification of modified access for the project along **IH 35E between IH 635 (LBJ) in Dallas County and US 380 in Denton County, Texas**. Within the report, the following criteria will be discussed, as required by the FHWA (February 11, 1998 Federal Register, Volume 63, Number 28):

Purpose and Need: The existing interchanges and/or local roads and streets in the corridor can neither provide the necessary access nor be improved to satisfactorily accommodate the design-year traffic demands while at the same time providing the access intended.

Alternatives Analysis: All reasonable alternatives for design options, location and transportation system management type improvements (such as ramp metering, mass transit and HOV facilities) have been assessed and provided for if currently justified, or provisions are included for accommodating such facilities if a future need is identified.

Operational Analysis: The proposed access point does not have a significant adverse impact on the safety and operation of the interstate facility based on an analysis of current and future traffic. The operational analysis for existing conditions shall, particularly in urbanized areas, include an analysis of sections of Interstate to and including at least the first adjacent existing or proposed interchange on either side. Crossroads and other roads and streets shall be included in the analysis to the extent necessary to assure their ability to collect and distribute traffic to and from the interchange with new or revised access points.

Access Connectivity: The proposed access connects to a public road only and will provide for all traffic movements. Less than “full interchanges” for special purpose access for transit vehicles, for HOV’s, or into park and ride lots may be considered on a case by case basis. The proposed access will be designed to meet or exceed current standards for Federal-aid projects on the Interstate System.

Regional Plan: The proposal considers and is consistent with local and regional land use and transportation plans. Prior to final approval, all requests for new or revised access must be consistent with the metropolitan and/or statewide transportation plan, as appropriate, the applicable provisions of 23 CFR Part 450 and the transportation conformity requirements of 40 CFR Parts 51 and 93.

Comprehensive Network: In areas where the potential exists for future multiple interchange additions, all requests for new or revised access are supported by a comprehensive Interstate network study with recommendations that address all proposed and desired access within the context of a long-term plan.

Agency Coordination: The request for a new or revised access generated by new or expanded development demonstrates appropriate coordination between the development and related or otherwise required transportation system improvements.

Environmental Documentation: The request for new or revised contains information relative to the planning requirements and the status of the environmental processing of the proposal.

SECTION 1: PURPOSE AND NEED

The existing interchanges and/or local roads and streets in the corridor can neither provide the necessary access nor be improved to satisfactorily accommodate the design-year traffic demands while at the same time providing the access intended.

The existing IH 35E is a six lane freeway from IH 635 to Quail Run, just north of the Lake Lewisville Bridge, and from Quail Run to US 380 it is a four lane freeway. The southern portion of IH 35E from IH 635 to SH 121 has an interim concurrent HOV with a single lane in each direction. To implement the interim HOV, the three mainlanes in each direction were reduced to a lane width of 11 feet and the inside shoulder was reconstructed to provide the width for the HOV.

The studied portion of IH 35E was constructed in the late 1950's and early 1960's as part of the United States' Interstate Highway System. Roadway design standards have improved greatly since its initial design and construction. The current roadway exhibits design deficiencies, including: inadequate shoulder and lane widths, inadequate ramp acceleration and deceleration distances, inadequate ramp lengths, inadequate ramp spacing to cross streets, inadequate bridge clearances and unofficial ramps. Additionally, the existing configuration (No-Build) does not adequately serve current traffic and is not projected to accommodate future demand.

The need of the proposed project is to address the transportation needs of the area resulting from an increase in populations and the subsequent increase in travel demand. The proposed project, which traverses Dallas and Denton Counties, is an essential element of the local and regional transportation system. Within the project area, IH 35E functions as an interstate, serves as the primary north/south transportation corridor and serves local trips to and from work, school, shopping, etc. IH 35E is an important regional commuter route connecting the Cities of Dallas, Farmers Branch, Carrollton, Lewisville, Highland Village, Lake Dallas, Corinth, Town of Hickory Creek, and Denton as well as neighboring developing communities.

The area adjacent to the IH 35E corridor between Dallas and Denton is in a state of rapid growth and continues to need substantial improvements to the existing transportation system. This growth pattern necessitates substantial transportation improvements to accommodate the projected increases in traffic demand to the already insufficient regional transportation system.

The purpose of the proposed project is to address the transportation needs by increasing capacity, reducing traffic congestion, improving mobility, and improving roadway deficiencies within the DFW metropolitan area. The project will also serve to enhance the regional and national transportation system.

The proposed improvements for the project include widening the general purpose lanes (free mainlanes), upgrading the interim concurrent high occupancy vehicle (HOV) by adding a barrier separated bidirectional managed lane facility, adding access to the proposed managed lanes, and improving the operations of existing access.

The IH 35E proposed improvements include:

- Increasing capacity by widening the general purpose lanes to eight from IH 635 to US 377, to six from US 377 to IH 35W, and to ten from IH 35W to US 380.

- Increasing capacity by adding a barrier separated bidirectional managed lane facility with four lanes from IH 635 to US 77, with two lanes from US 77 to IH 35W, and with four lanes from IH 35W to US 380.
- Providing access to the barrier separated bidirectional managed lane facility at major traffic demand locations such as major intersections and major developed areas along the corridor.
- Modifying access to the general purpose lanes to benefit mainlane traffic by decreasing the amount of weaving interaction while maintaining accessibility and conforming to current design standards.

Through the IH 35E corridor, adding enough additional capacity to meet future demands is not possible without rebuilding the entire freeway. Additional comments include:

Capacity Exceeds Demand: The IH 35E corridor provides the only major direct access from Dallas to Denton across Lake Lewisville. IH 35E also provides direct access from the PGBT to SH 121 providing east-west access across the Dallas/Fort Worth Metroplex relieving other routes connecting through other congested corridors. Adding additional capacity to the IH 35E corridor by adding additional mainlanes and/or adding managed lanes (locally preferred over HOV lanes) would require reconstruction of the corridor. Without reconstruction the IH 35E corridor will not only see excessive congestion and delay but will cause additional congestion and delay on the IH 635, IH 35W, SH 121, PGBT corridors directly and many other corridors as traffic shifts to alternate routes.

Access to Managed lanes: The locally preferred alternative would provide increased capacity to the general purpose lanes along with barrier separated managed lanes facility within the corridor. Access to the managed lanes is needed to accommodate major traffic demand at major intersections and major developed areas along the corridor. Access from the general purpose lanes to the managed lanes is a properly designed entrance and exit ramps consistent with Interstate Design Standards.

Inadequate shoulders and lane width: Many segments of the IH 35E corridor do not have full shoulders. In the case of a freeway incident, the involved vehicle or vehicles do not have an adequate area to maneuver off the main lanes; this creates excessive queuing of traffic and unsafe conditions along the interstate. Furthermore, emergency vehicles do not have easy access to the incident. Also, some portions of the IH 35E segment under consideration do not have adequate lane width. Narrow lanes cause traffic to move slow creating unsafe conditions for the drivers. The majority of shoulder and lane width deficiencies occur in the section where the interim HOV lane (IH635 to PGBT) reduced the inside shoulder to less than two feet and lane widths to eleven feet.

Acceleration and Deceleration lengths: Drivers must be provided with sufficient distance in order to accelerate or decelerate safely. Some ramps along the corridor do not provide adequate acceleration or deceleration lengths at the freeway junctions. Short acceleration lengths do not allow entering vehicles the needed distance to reach the speeds of freeway vehicles, thus slowing down the main lane speeds. The friction between freeway vehicles and entering vehicles can cause unsafe and undesirable operational conditions. In addition, short deceleration lengths cause

exiting vehicles to slow on the freeway mainlanes which will result in lower freeway speeds and increased congestion.

Ramp lengths: A few ramps are of very short length causing significant speed variation for entering and exiting vehicles. The location of these ramps is generally at the intersection of major arterials which creates long queues that back up into the mainlanes of the freeway. These short ramps create safety issues considering the speeds along IH 35E. The location of these ramps are generally at the intersection of major arterials which creates long queues that back up into the mainlanes of the freeway.

Modified access to general purpose lanes: Access to general purpose lanes has been modified to decrease the amount of weaving interaction while maintaining accessibility and conforming to current design standards,

Unofficial ramps: The current ramp configurations do not provide efficient and easy access to the locations the motorists wish to travel or bypass congestion that is recurrent or incident related. As a result many motorists are bypassing or not using the official on and off-ramps of the interstate system and creating unofficial ramps or using the parkways or medians to cross to and from the frontage roads. This creates a dangerous situation for both the motorist creating this offense and the unassuming motorist traveling along the interstate or frontage road. At this time there are several unofficial ramps along this section of IH 35E. **Figures 2 through 10** highlight some of the unofficial ramps.

FIGURE 2: UNOFFICIAL RAMPS NORTH OF VALLEY VIEW LANE



FIGURE 3: UNOFFICIAL RAMP AT N LUNA ROAD



FIGURE 4: UNOFFICIAL RAMPS SOUTH OF SANDY LAKE ROAD



FIGURE 5: UNOFFICIAL RAMPS SOUTH OF FM 407

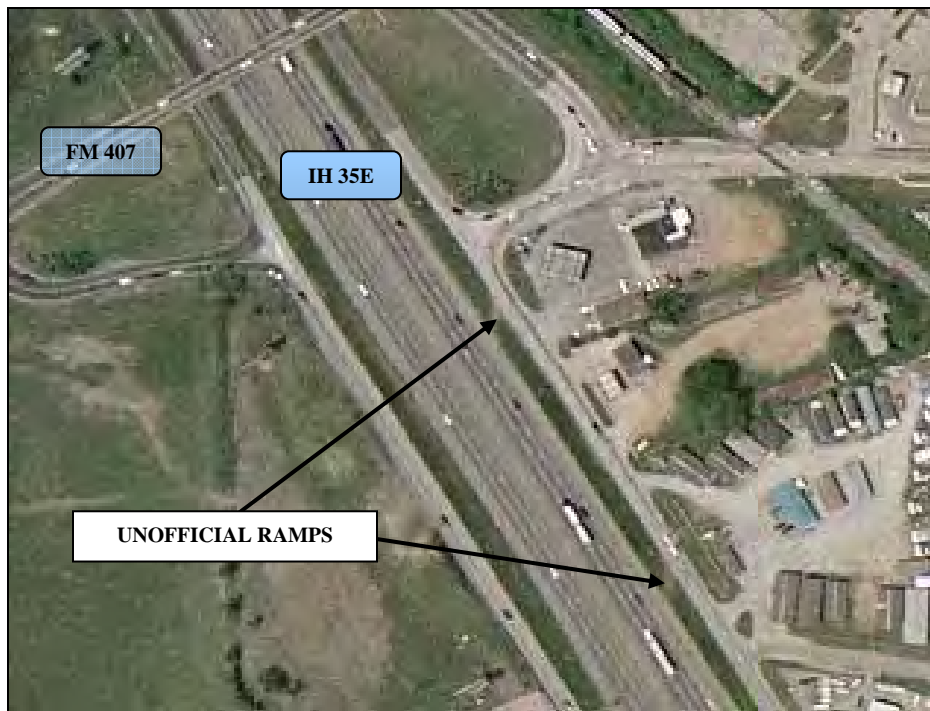


FIGURE 6: UNOFFICIAL RAMP SOUTH OF SH 121 BUSINESS



FIGURE 7: UNOFFICIAL RAMPS SOUTH OF ROUND GROVE STREET



FIGURE 8: UNOFFICIAL RAMPS SOUTH OF CORINTH STREET

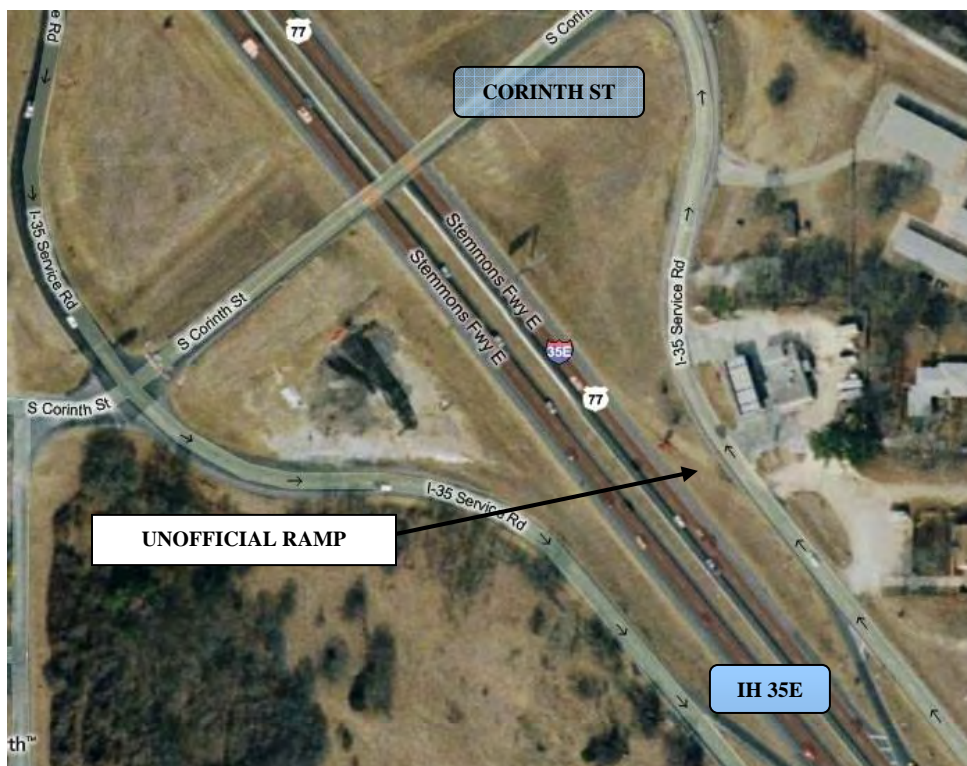


FIGURE 9: UNOFFICIAL RAMP NORTH OF POST OAK DRIVE

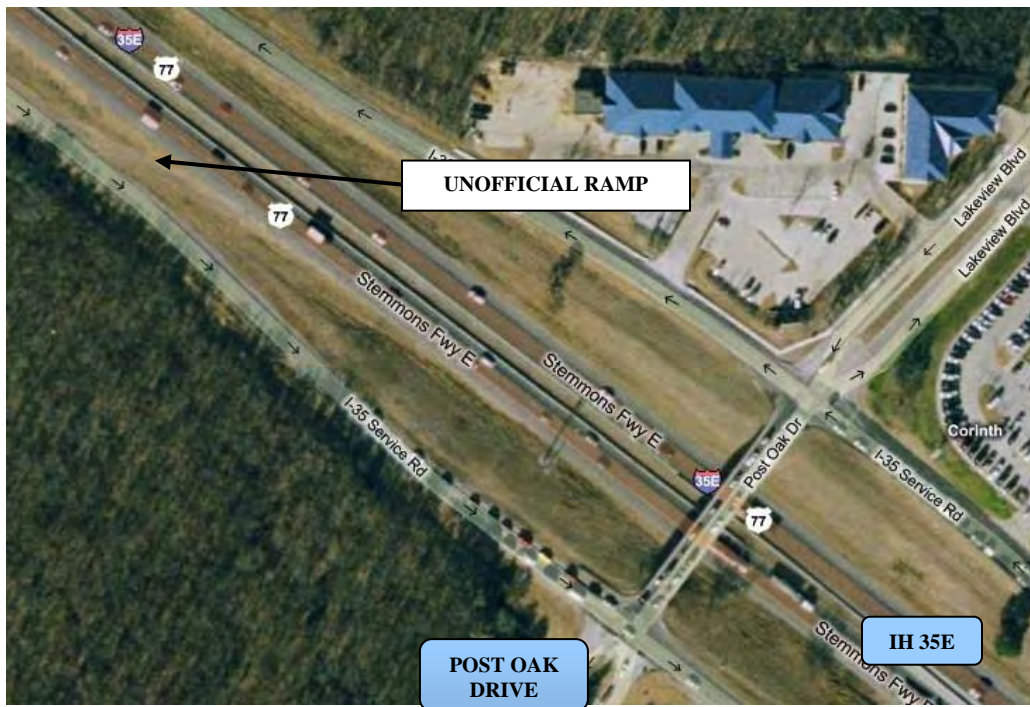
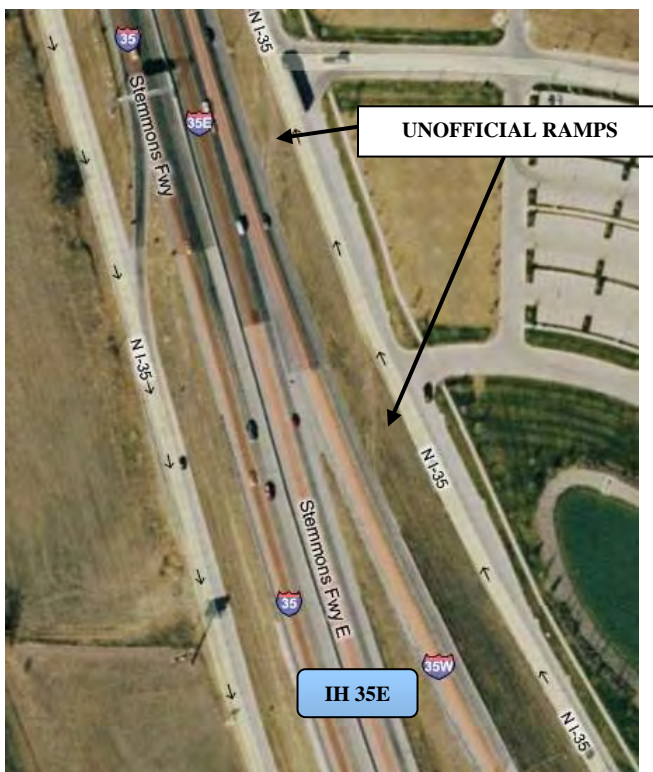


FIGURE 10: UNOFFICIAL RAMPS AT IH 35E/IH 35W SPLIT



SECTION 2: ALTERNATIVES

All reasonable alternatives for design options, location and transportation system management type improvements (such as ramp metering, mass transit and HOV facilities) have been assessed and provided for if currently justified, or provisions are included for accommodating such facilities if a future need is identified.

Several non-freeway alternatives were evaluated during the Major Investment Study process¹ for the mitigation of congestion within the study corridor. These alternatives include:

Transportation System Management (TSM) Alternatives: This alternative seeks to mitigate traffic congestion by identifying improvements of an operational nature. TSM improvements are designed to improve traffic flow and safety through better management and operation of transportation facilities, at a much lower cost and construction time as compared to major infrastructure improvements. Operational improvements promoted include: Traffic Signal Enhancements, Intersection Improvements, Arterial Improvements, Bottleneck Removals and Intelligent Transportation System (ITS) deployment.

Transportation Demand Management (TDM) Alternatives: This alternative seeks to mitigate traffic congestion and improve air quality by focusing on travel behavior. TDM improvements focus on reducing the number of vehicular demands and single occupancy vehicle (SOV) trips on the roadway by offering alternatives to driving alone. Alternate modes of travel promoted include: Employee Trip Reduction (ETR) Programs, Rail and Transit Service, Transportation Management Associations, and Bicycle and Pedestrian facilities.

Freeway/Roadway Alternatives: This alternative seeks to construct additional lane miles for travel. The alternate roadway designs include HOV and Managed HOV facilities, Express Lanes, and lane creation and widening.

Although the non-freeway alternatives (TSM/TDM) provide mode of travel choice and travel options for the users of the study segment, freeway alternatives have to be considered to meet the traffic demand and mitigate the congestion expected in the future.

TRANSPORTATION SYSTEM MANAGEMENT (TSM) ALTERNATIVES

Transportation System Management (TSM) programs are cost-effective, easy to implement and short-term solutions to solving traffic flow and capacity problems. The TSM strategies that were evaluated during the MIS process include:

1. **Arterial Street Improvements:** The regional arterial system is expected to grow nearly 48% from 5,712 lane miles to 8,849 lane miles across the Dallas-Fort Worth region from 1999 to 2030, while carrying approximately 20 percent of the vehicular traffic, both today and in the future. **Table 1** shows arterial street improvements within the study area that have been proposed. These improvements include both the widening and reconstructing of existing facilities by TxDOT and other local agencies.

¹ The Recommendation of Transportation System Management Projects and Travel Demand Management Programs and Strategies for the Interstate Highway 35/35E Major Investment Study Corridor (April 2009 Update) report, the Northwest Corridor Major Investment Study (October 2000) final report and the Mobility 2030 (January 2007) report provide the basis for the information in this section. More detailed information about the alternatives and their evaluation can be found in the above mentioned reports.

TABLE 1: PROPOSED ARTERIAL IMPROVEMENTS

City	Location	Improvement
Dallas	Luna Road form Spur 348 on/off ramps to Royal Lane	Widen from 2 to 6 Lanes
Dallas/Farmers Branch	Harry Hines Blvd from IH 35E NB FRTG to Royal Ln	Widen from 4 to 6 lanes
Carrollton/Farmers Branch	Valley View Lane from Nicholson Road to IH 635	Widen from 2 to 4 lanes
Lewisville	McGee Ln from IH 35E Frontage Rd to Grandy's Lane	Widen from 2 to 4 lanes
Lewisville	FM 1171/Main Street from IH 35E to SH 121	Widen from 4 to 6 lanes
Lewisville	Lake Park Rd from IH 35E to Mill St	Widen from 2 to 4 lanes
Lewisville	Garden Ridge Blvd from Bellaire to Thrush	Create a 4-lane roadway
Lewisville	Garden Ridge Blvd from Fox Ave to Bellaire Blvd	Widen from 2 to 6 lanes
Lewisville	Garden Ridge Blvd from Main St to Fox Ave	Widen from 2 to 4 lanes
Lewisville	FM 2499 from Waketon Rd to College Parkway	Widen from 2 to 4 lanes
Lewisville	FM 2499 from Waketon Rd to FM 407	Widen from 2 to 6 lanes
Denton/Flower Mound	FM 2499 from Loop 288 to FM 407	Create a 4-lane roadway
Flower Mound/Lewisville	FM 407 from Chinn Chapel to Sellmeyer	Widen from 2 to 6 lanes
Denton/ Corinth	Main St from Railroad to SH 121	Widen from 2 to 4 lanes
Lakewood Village/Lake Dallas	FM 2181 (Swisher Road) to East End of Lewisville Toll Bridge to then FM 720	Widen from 2 to 4 lanes
Denton	FM 2181 from Lillian Miller Pkwy to IH 35 E	Widen from 2 to 6 lanes
Denton	Mayhill Road from IH 35E to US 380	Widen from 2 to 6 lanes
Denton	US 377 from IH 35E to FM 1830	Widen from 2 to 6 lanes
Denton	US 77 from IH 35 North of Denton to US 380	Widen from 4 to 6 lanes
Denton	Bonnie Brae from IH 35E to Vintage Road	Widen from 2 to 4 lanes
Denton	US 380 from US77/US 377 to IH 35E	Widen from 4 to 6 lanes
Denton	US 380 from IH 35E to FM 156	Widen from 4 to 6 lanes
Denton	US 380 from FM 156 to County Line Road	Widen from 2 to 4 lanes
Denton	Spencer Road from Loop 288 to Woodrow Ln	Widen from 2 to 4 lanes
Denton	Loop 288 from IH 35 to US 77	Create a 2 lane roadway
Denton	Loop 288 from Spencer to US 380	Widen from 2 to 6 lanes

Reference: Recommendation of Transportation System Management Projects and Travel Demand Management Programs and Strategies for the Interstate Highway 35/35E Major Investment Study Corridor, North Central Texas Council of Governments, July 2000.

Reference: Mobility 2030-2009 Amendments "The Metropolitan Transportation Plan.

Reference: TRIP 2008, Denton County 2008 Transportation Road Improvement Program

Reference: TIPINS-Transportation Improvement Program Information System.

The purpose of the arterial improvements is primarily is to serve local traffic. Some of the arterials will however provide access to/from IH 35E. Although these arterials will improve the capacity in the corridor, the added capacity of these roadways will NOT accommodate the expected increase in traffic in the corridor. IH 35 E is the primary North/South corridor for North Texas. One reason for the importance of IH 35E is that additional North/South access is restricted by Lake Grapevine and Lewisville Lake.

2. **Traffic Signal Improvements:** The proper functioning and design of signalized intersections is essential for good traffic flow. Signal improvements consist of modifications to traffic control devices to better accommodate traffic demand on the arterial and collector street networks. Traffic signal improvements may include signal optimization, signal upgrade, and signal interconnection. Signal improvements also benefit the air quality of the region, due to the shortened idling times at intersections. The Mobility Plan estimates 205,000 person-hours per day reduction in congestion delay across the Dallas-Fort Worth region will full traffic signal improvement implementation in 2030. Traffic Signal improvements in the study area include a Central Computer System for Carrollton, Dallas, Farmers Branch, and Addison, citywide upgrades to signals, intersections, technology, and changeable message signs in Dallas, signal interconnect in Farmers Branch, Spread Spectrum Radio System Upgrade in Carrollton, SH 121 at Valley View Drive, a Citywide Advanced Traffic Management System (Phase 1), and a region-wide signal optimization (Phase 2), new signal and intersection improvement modifications in Lewisville, The Colony, Hebron, and Flower Mound, upgrading traffic signals and signal timing along US 380 from the east city limit to the west city limit, traffic signal improvements at FM 426 at Mayhill, Loop 288 at Colorado, and IH 35E at McCormick.
3. **Intersection Improvements:** Intersection improvements were evaluated as a part of the TSM strategies as geometric enhancements that can help to better facilitate the movement of traffic through intersections. Deficiencies in intersection design result in slower moving traffic and delays. Various infrastructure improvements can greatly improve the traffic flow operation and safety of intersections, including: turning lanes, pavement striping and lane additions. The Mobility Plan estimates 52,000 person-hours per day reduction in congestion delay across the Dallas-Fort Worth region with full intersection improvement implementation in 2030. NCTCOG recommends intersection improvements within the study corridor. **Table 2** lists the recommended intersection improvement located within the study corridor. The project details for each of the recommended locations can be found in the Recommendation of Transportation System Management Projects and Travel Demand Management Programs and Strategies for the Interstate Highway 35/35E Major Investment Study Corridor report by NCTCOG.

TABLE 2: PROPOSED INTERSECTION IMPROVEMENT LOCATIONS	
City	Location
Farmers Branch	IH 35E frontage roads @ Valley View Lane
Farmers Branch	IH 35E frontage roads @ Valwood Parkway
Carrollton	Intersections improvements at various intersections.
Lewisville	IH 35E Southbound Frontage Road and FM 1171
Lewisville	IH 35E Southbound Frontage Road and SH 121 Business
Lewisville	Southbound SH 121 Business and IH 35E Northbound Frontage Road
Lewisville	Southbound SH 121 Business and FM 1171
Lewisville	Eastbound FM 3040 / Round Grove Road and Denton Tap Road
Lewisville	Northbound SH 121 and FM 544
Lewisville	Northbound SH 121 and Huffines Blvd
Lewisville	FM 2499 and FM 3040
Lewisville	IH 35E SB Frontage Road at FM 3040.
Denton	Carroll Blvd at US 380
Denton	US 377 at US 380
Denton	US 377 at IH 35E
Denton	IH 35 E at US 380
Denton	IH 35 E at North Texas Blvd

Reference: Recommendation of Transportation System Management Projects and Travel Demand Management Programs and Strategies for the Interstate Highway 35/35E Major Investment Study Corridor, North Central Texas Council of Governments, July 2000.

Reference: Mobility 2030-2009 Amendments "The Metropolitan Transportation Plan.

Reference: TIPINS-Transportation Improvement Program Information System

4. **Freeway Bottleneck Removal Improvements:** Traffic bottlenecks can seriously impede the flow of traffic and safety through a region, especially during peak periods. They may be due to sharp curves, insufficient ramp design, poor signing, and various other geometric characteristics. The key bottleneck in this study area is IH 35 E which will be addressed with this project. **Table 3** shows bottleneck removal improvements within the study area that have been proposed.

TABLE 3: PROPOSED BOTTLENECK IMPROVEMENTS

Highway	Location	Improvement
IH 35E-NB	FM 3040 exit	Construct an exit ramp for FM 3040 that does not pass through the IH 35E/Spur 553 interchange
	Between Fox and FM 1171	Reverse ramps
	Between Frankford entrance and Vista Ridge exit	Add auxiliary lane
IH 35E-SB	FM 3040 entrance	Construct an entrance ramp for FM 3040 that does not pass through the IH 35E/Spur 553 interchange
	Frankford exit	Construct a 2-lane exit ramp
	Between Vista Ridge and Frankford exit	Add auxiliary lane
IH 35 E	FM 1171/Main Street	Bottleneck removal-additional lanes, signal improvements
IH 35E	Unicorn Lake/Sundown Ranch Development From Wind River Lane & to State School Road Connector	Ramp Reversal
Dallas-Fort Worth Regional Outer Loop system	East Denton County Line to West Denton County Line	One of several segments of new outer loop of Dallas and Fort Worth. Project will include reconstruction, tolled managed lanes, new general purpose lanes, rebuilt frontage road lanes, new bridges and improved ramping.

Reference: Recommendation of Transportation System Management Projects and Travel Demand Management Programs and Strategies for the Interstate Highway 35/35E Major Investment Study Corridor, North Central Texas Council of Governments, July 2000.

Reference: Mobility 2030-2009 Amendments "The Metropolitan Transportation Plan.

5. **Intelligent Transportation System (ITS) Improvements:** ITS improvements attempt to reduce the traffic congestion caused by traffic incidents such as crashes and stalled vehicles. Various components of ITS include: Mobility Assistance Patrols, Communication Systems, Advanced Traffic Management Systems, Advanced Traveler Information Systems (ATIS), and an Advanced Public Transportation System (APTS). Elements of these components include: incident detection and response technologies, such as traffic sensors and closed circuit TV cameras, and variable (dynamic) message signs. Mobility Assistance Patrols (TxDOT) and video surveillance cameras represent the current extent of ITS deployment along this study corridor. **Table 4** indicates ITS ATMS improvements within the study area that have been proposed.

TABLE 4: PROPOSED ITS IMPROVEMENTS

City	Location	Improvement
Carrollton	Frankford @ IH 35E	ITS – Cameras/System Detection/DMS
Farmers Branch	IH 635/IH 35E	ITS-Corridor Video, Communications, Cameras, DMS
Lewisville	SH 121 @ IH 35E	ITS – Cameras
Lewisville	Railroad Street @ Corporate Drive	ITS – Cameras
Lewisville	FM 1171 @ FM 3504	ITS – Cameras
Lewisville	IH 35E @ FM 407	ITS – Cameras
Lewisville	FM 407 @ Garden Ridge Blvd	ITS – Cameras
Lewisville	FM 3040 @ MacArthur Blvd	ITS – Cameras
Lewisville	IH 35E Corridor	ITS_ Corridor Video Surveillance

Reference: Recommendation of Transportation System Management Projects and Travel Demand Management Programs and Strategies for the Interstate Highway 35/35E Major Investment Study Corridor, North Central Texas Council of Governments, July 2000

Reference: Mobility 2030-2009 Amendments “The Metropolitan Transportation Plan.

The TSM improvements will improve the overall capacity of the area but most of these alternatives only provide an alternate route for localized traffic and through traffic is limited to IH 35E. The limiting factors include the lack of continuous north-south streets from North Dallas including Addison, Carrollton, and Farmers Branch to Lewisville and Flower Mound and then to Denton. The only north-south connection across Lake Lewisville is IH 35E and all alternate routes go around the lake and the Lake Lewisville flood plain.

Therefore the TSM improvements will be localized and not improve the overall operation of IH 35E.

TRANSPORTATION DEMAND MANAGEMENT (TDM) ALTERNATIVES

The TDM strategies that were evaluated during the MIS process include:

1. **Employer Trip Reduction (ETR) Program:** The ETR program is a voluntary program marketed at companies with at least 100 employees, in an effort to provide alternatives to driving alone. Various options include: rideshare programs (carpooling and vanpooling), telecommuting, flexible work hour programs and transit pass subsidies. The study corridor is located inside the existing service area of DART (Dallas Area Rapid Transit). The corridor has interim HOV lanes along the facility although strong participation in ETR programs is not evident. It has been estimated by NCTCOG that by year 2020, with anticipated infrastructure improvements, approximately 2.0 to 4.5 percent of Home Based Work (HBW) trips would be reduced due to the ETR program.
 - a. **Vanpool Program:** Ridesharing programs are instrumental in the success of any region’s TDM effort. This program is targeted at home-based work (HBW) trips of at least 16 miles in distance. Only a relatively small number of daily regional HBW

trips are expected to have their destinations in the study area. As such, NCTCOG estimates only four study area vanpool markets could potentially be formed. Regional vanpool markets would have a much greater impact on this study corridor, as many of the HBW trips using this corridor are through trips. NCTCOG estimates 245 vanpool markets could be formed to target these commuters. **Table 5** indicates the origin/destination combinations and potential vanpools for various regional HBW trips.

TABLE 5: REGIONAL VANPOOL MARKETS AND POTENTIAL VANPOOLS			
Trip Origins	Trip Destinations	Total HBW Person Trips	Potential Vanpools
Predominantly south of lake Lewisville including the Communities of Lewisville, Highland Village, Copper Canyon, Lake Dallas, and Hickory Creek	LBJ/Tollway, Las Colinas, LBJ/US 75, Stemmons Corridor, Dallas CBD, and areas in proximity to DFW International Airport	> 6300	65
North and west of Denton	Las Colinas, Dallas CBD, LBJ/DNT, and Stemmons Corridor	> 3500	15
Corinth, Denton, and areas north of Denton	Alliance Airport, Fort Worth CBD and areas west and south of the Fort Worth CBD	> 9300	63
North of Lewisville including the communities of Corinth, Lake Dallas, Hickory Creek and southeast Denton	Alliance Airport, Fort Worth CBD and areas west and south of the Fort Worth CBD	> 6300	55
Lewisville	Alliance Airport, Fort Worth CBD and areas west and south of the Fort Worth CBD	> 2900	28
Southwest Denton	LBJ/Tollway, Las Colinas, LBJ/US 75, and Stemmons Corridor	> 1500	16
Total HBW Person Trips		> 29800	
Total Potential Vanpools			245

Reference: Recommendation of Transportation System Management Projects and Travel Demand Management Programs and Strategies for the Interstate Highway 35/35E Major Investment Study Corridor, North Central Texas Council of Governments, July 2000.

Reference: Mobility 2030-2009 Amendments "The Metropolitan Transportation Plan.

2. **Rail Transit:** No commuter or light rail service currently exists in the study area. The *Mobility 2030* identified a commuter rail corridor that would impact the study area. The planned service would operate parallel to IH 35E and connect the City of Denton with other rail and transit services throughout the Dallas-Ft Worth region. The Denton County Transportation Authority (DCTA) is the agency that was approved by registered voters of Denton County in the fall of 2003 to provide the light rail services to the Denton region. DCTA currently provides regional connector bus service along the IH 35E corridor. The DCTA service plan includes a single-phase construction of 21 miles of regional rail, five rail stations, a bicycle/pedestrian trail, and a regional rail operations and maintenance facility.

The objective is to have full service between Denton and Carrollton to interface with Dallas Area Rapid Transit's light rail system by December 2010. This timing will coincide with DART's opening of the northern section of the DART Green line.

The DART Green line expansion will connect Victory Plaza in Dallas to North Carrollton/Frankford in 2010. This will then be connected with regional rail service to UNT-Denton.

3. **Transportation Management Associations (TMAs):** Transportation Management Associations (TMAs) are private and public/private organizations made up of employers, local government representatives, developers and building owners. TMAs provide a forum for the private sector to participate in the strategy development and implementation of transportation issues. At present, there are no TMAs in the study area but a TMA is being considered for the East Side of Farmers Branch. The corridor does not have significant concentrations of employment and trip generators at this time to warrant the creation of a new TMA, but future employment and trip generators could be coordinated with the proposed TMA on the east side of Farmers Branch that includes the Galleria area.
4. **Park-and-Ride Facilities:** Park-and-ride facilities serve as locations where motorists transfer from their vehicle to various modes of high occupancy travel, including, bus, rail, and vanpool. When used in combination with HOV lanes, these lots can provide an effective incentive for multi-occupancy travel modes, thus reducing congestion and vehicle emissions. Several factors influence the success and effectiveness of these facilities: high levels of traffic congestion, a large population working in common locations, and facility location relative to a freeway. There are two such facilities located in the project area at this time, shown in **Table 6**.

TABLE 6: PARK-AND-RIDE FACILITIES	
Location	Parking Spaces
North Carrollton Transit Center	1,047
Farmer Branch Park and Ride	300
Lewisville Park and Ride (Cinemark Movies 8)	30
Lewisville Park and Ride (Texas Twister)	30
FM 407 @ IH 35E	715
SH 121 @ IH 35E	693
State School/Mayhill Rd @ IH 35E	118
Denton Park and Ride (Cinemark 14)	N/A
Denton County Traffic Authority (DCTA) Rail Stations with Park and Ride Facilities at Hebron Station, Old Town, Highland Village/Lewisville Lake, Med park Station, and Downtown Denton Transit	N/A

5. **Bicycle and Pedestrian Facilities:** The *Mobility 2030* states that five percent of the region's total trips are by pedestrians or bicyclists. The goal of the Mobility Plan is to increase the number of non-motorized trips to eight percent, through the creation of or improvement to

sidewalks and bicycle facilities. Currently, there are no existing on-street bicycle routes in this segment of study. Off-street bicycle facilities of approximately 6 miles exist near in the cities of Lake Lewisville, Flower Mound and Coppell. NCTCOG and the Bicycle and Pedestrian Transportation Task Force have included 10.6 miles of Off Street bicycling facilities located along IH 35E between Lake Lewisville and central Denton and in Flower Mound as part of the programmed developments in Mobility 2030. There is approximately 286 miles of recommended facilities and over 202 miles of candidate projects that have been designated in Mobility 2030 as part of the Regional Veloweb Project– an inter-regional bicycle route and a connector of on and off street bicycle routes. It is expected that further bicycle and pedestrian facility planning will occur to encourage non-motorized trips to the new Rail Stations in Farmers Branch, Carrollton, and Denton.

FREEWAY/ROADWAY ALTERNATIVES

To achieve the stated goals and objectives of this study, several alternatives were considered ranging from a “No-Build” alternative to relatively low-cost operational improvements along existing facilities, and finally higher cost reconstruction, or new construction, of transportation facilities that would better serve the corridor demand.

Travel demand was determined for the study corridor under existing conditions and for a 20-year outlook using the North Central Texas Council of Governments (NCTCOG) regional model, the *Dallas-Fort Worth Regional Travel Model*. The model is used to prepare long-range vehicle and transit ridership forecasts for the Dallas-Fort Worth metropolitan area based on demographic and land use forecasts. Transportation needs within the study area for the year 2030 were determined, and a “long-list” set of alternatives was initially identified to address the forecast demand. Safety and environmental issues were also taken into consideration.

The selection of a preferred alternative was the result of a two-stage process. First, a “long list” of alternative strategies was narrowed down to those alternatives showing the greatest promise in meeting the needs of the IH 35E corridor, eliminating those that did not meet the stated goals and objectives, or were significantly ineffective in meeting any one of the stated project goals. The resulting “short list” of alternatives was then evaluated using more detailed performance measures that included quantitative as well as qualitative criteria. The outcome of this second phase of the process was the selection of a recommended preferred alternative, strategies for further analysis through the preliminary engineering (design schematic and environmental assessment) process. The preferred alternative includes TDM /TSM / Improvements, and Highway Improvements.

The reasonable alternatives were refined through a Value Engineering Study. The project limits of the Value Engineering Study were from SH 183 to US 380. The Value Engineering Study Team included representatives of the Design Team, TxDOT, FHWA, NCTCOG, the Texas Transportation Institute (TTI), and cities within the study corridor. The Value Engineering Study was held March 6-7, 2003 and the report was submitted March 24, 2003.

Figures 11 through 19 (Appendix A) show line diagrams of the configuration of the No-Build alternative compared to the preferred alternative. The diagrams show the differences in ramps, direct connectors, and frontage roads between the two alternatives. **Table 7 and 8** tabulates the No-Build alternative compared to the preferred alternative.

TABLE 7: IH 35E EXISTING AND PROPOSED ACCESS

Fig	Existing	Proposed	Purpose
NORTHBOUND			
11	Valley View Lane On-Ramp to General Purpose Lanes	Valwood Parkway Off-Ramp from General Purpose Lanes	Ramps reversed to reduce weaving on the freeway
11	Valwood Parkway Off-Ramp from General Purpose Lanes	Valley View Lane On-Ramp to General Purpose Lanes	
11	Valwood Parkway On-Ramp to General Purpose Lanes	Valwood Parkway On-Ramp to General Purpose Lanes	Adjusted these ramps so Crosby Street Off-Ramp is closed to allow for access from Managed Lanes
11	Crosby Street Off-Ramp from General Purpose Lanes	Belt Line Road Off-Ramp from Managed Lanes	
11	Belt Line Road Off-Ramp from General Purpose Lanes	Belt Line Road Off-Ramp from General Purpose Lanes	Same approximate location
11	Belt Line Road On-Ramp to General Purpose Lanes	Sandy Lake Road Off-Ramp from General Purpose Lanes	Reversed Belt Line Road On-Ramp and Sandy Lake Road Off-Ramp to reduce weaving on the freeway and braided Belt Line Road On-Ramp to Managed Lanes over Sandy Lake Road Off-Ramp
11	No Existing Managed Lane Ramp	Belt Line Road On-Ramp to Managed Lanes	
11	Sandy Lake Road Off-Ramp from General Purpose Lanes	Belt Line Road On-Ramp to General Purpose Lanes	
12	Sandy Lake Road On-Ramp to General Purpose Lanes	Dickerson Parkway Off-Ramp from General Purpose Lanes	Reduces through traffic at Sandy Lake Road Frontage Road Intersection
12	No Existing Managed Lane Ramp	PGBT & SH 121 DC Off-Ramp from Managed Lanes	Provides Managed Lane access to PGBT & SH121
12	PGBT Off-Ramp from General Purpose Lanes	PGBT & SH 121 DC Off-Ramp from General Purpose Lanes	Provides new General Purpose Lanes access to PGBT & SH121 and begins the Direct-Connect(DC) that is a collector distributor reducing weaving and access point along IH 35E between PGBT and SH 121
12	WB PGBT On-Ramp to General Purpose Lanes	Moved to Direct Connect (DC)	
12	EB PGBT On-Ramp to General Purpose Lanes	Moved to Direct Connect (DC)	
13	Frankford Road On-Ramp to General Purpose Lanes	Frankford Road On-Ramp to General Purpose Lanes	Ramp location adjusted for constructability with other structures
12	SH 121 Toll Off-Ramp from General Purpose Lanes	Moved to Direct Connect (DC)	Provides new General Purpose Lanes access from PGBT & SH121 and ends the Direct-Connect(DC) that is a collector distributor reducing weaving and access point along IH 35E between PGBT and SH 121
12	SH 121 Off-Ramp from General Purpose Lanes	Moved to Direct Connect (DC)	
12	SH 121 On-Ramp to General Purpose Lanes	SH 121 & PGBT DC On-Ramp to General Purpose Lanes	

TABLE 7: IH 35E EXISTING AND PROPOSED ACCESS (CONTINUED)

Fig	Existing	Proposed	Purpose
NORTHBOUND (CONTINUED)			
12	No Existing Managed Lane Ramp	SH 121 & PGBT DC On-Ramp to Managed Lanes	Provides PGBT & SH121 access to Managed Lane
13	FM 3040 Off-Ramp from General Purpose Lanes	FM 3040 Off-Ramp from General Purpose Lanes	Ramp location adjusted for constructability with other structures
13	No Existing Managed Lane Ramp	Managed Lane Off-Ramp/On-Ramp to General Purpose Lanes	Provides Managed Lanes access to IH 35E off-ramps in Lewisville
13	FM 3040 On-Ramp to General Purpose Lanes	FM 3040 On-Ramp to General Purpose Lanes	Ramp location adjusted for constructability with other structures
14	Corporate Drive Off-Ramp from General Purpose Lanes	Corporate Drive Off-Ramp from General Purpose Lanes	Same approximate location
14	Corporate Drive On-Ramp to General Purpose Lanes	Business SH 121 Off-Ramp from General Purpose Lanes	Ramps reversed to reduce weaving on the freeway
14	Business SH 121 Off-Ramp from General Purpose Lanes	Corporate Drive On-Ramp to General Purpose Lanes	
14	Business SH 121 On-Ramp to General Purpose Lanes	FM 1171 & Fox Avenue Off-Ramp from General Purpose Lanes	Access to and from IH 35E reduced from two on-ramps and two off-ramps to one of each since a continuous uninterrupted frontage road is provided
14	Fox Avenue Off-Ramp from General Purpose Lanes		
14	FM 1171 Off-Ramp from General Purpose Lanes	Business SH 121 & Fox Avenue On-Ramp to General Purpose Lanes	
14	Fox Avenue On-Ramp to General Purpose Lanes		
14	Valley Ridge Boulevard Off-Ramp from General Purpose Lanes	Valley Ridge Boulevard Off-Ramp from General Purpose Lanes	Same approximate location
15	FM 1171 On-Ramp to General Purpose Lanes	FM 1171 On-Ramp to General Purpose Lanes	Same approximate location
15	No Existing Managed Lane Ramp	Valley Ridge Boulevard Off-Ramp from Managed Lanes	Provides Managed Lanes access to Valley Ridge Boulevard
15	No Existing Managed Lane Ramp	Valley Ridge Boulevard On-Ramp to Managed Lanes	Provides Valley Ridge Boulevard access to Managed Lanes

TABLE 7: IH 35E EXISTING AND PROPOSED ACCESS (CONTINUED)

Fig	Existing	Proposed	Purpose
NORTHBOUND (CONTINUED)			
15	Valley Ridge Boulevard On-Ramp to General Purpose Lanes	None	Access removed and a continuous uninterrupted frontage road to the next on-ramp is provided
15	FM 407 Off-Ramp from General Purpose Lanes	FM 407 Off-Ramp from General Purpose Lanes	Same approximate location
15	Jones Street On-Ramp to General Purpose Lanes	Jones Street & Valley Ridge Boulevard On-Ramp to General Purpose Lanes	Same approximate location
15	FM 407 On-Ramp to General Purpose Lanes	Garden Ridge Boulevard Off-Ramp from General Purpose Lanes	Ramps reversed to reduce weaving on the freeway and a continuous frontage road is provided
15	Garden Ridge Boulevard Off-Ramp from General Purpose Lanes	FM 407 On-Ramp to General Purpose Lanes	
15	No Existing Managed Lane Ramp	Lake Park Road On-Ramp to Managed Lanes	Provides Lake Park Road access to Managed Lanes
15	Garden Ridge Boulevard On-Ramp to General Purpose Lanes	None	Access removed due to construction limitations and a continuous frontage road to the next on-ramp is provided
16	South Denton Drive Off-Ramp from General Purpose Lanes	South Denton Drive Off-Ramp from General Purpose Lanes	Same approximate location
16	Turbeville/Hundley Off-Ramp from General Purpose Lanes	Turbeville/Hundley Off-Ramp from General Purpose Lanes	Ramp location adjusted for constructability with other structures
16	No Existing Managed Lane Ramp	FM 2181 Off-Ramp from Managed Lanes	Provides Managed Lanes access to FM 2181
16	None	Turbeville/Hundley On-Ramp to General Purpose Lanes	Turbeville/Hundley On-Ramp reduces through traffic at the FM 2181 intersection with the frontage road
17	FM2181 On-Ramp to General Purpose Lanes	Meadow Oaks Drive Off-Ramp from General Purpose Lanes	Ramps reversed and moved north to reduce weaving on the freeway
16	Dobbs Road Off-Ramp from General Purpose Lanes	FM 2181/Quail Run On-Ramp to General Purpose Lanes	
17	Quail Run Road On-Ramp to General Purpose Lanes	Corinth Parkway Off-Ramp from General Purpose Lanes	Corinth Parkway Off-Ramp adjusted to minimize weaving issues
17	Corinth Parkway Off-Ramp from General Purpose Lanes		

TABLE 7: IH 35E EXISTING AND PROPOSED ACCESS (CONTINUED)

Fig	Existing	Proposed	Purpose
NORTHBOUND (CONTINUED)			
17	No Existing Managed Lane Ramp	General Purpose Lanes Off-Ramp to Managed Lanes On-Ramp	Provides access to Managed Lanes
17	Corinth Parkway On-Ramp to General Purpose Lanes	Post Oak Road Off-Ramp from General Purpose Lanes	Ramp reversed to reduce weaving on the freeway
17	Post Oak Road Off-Ramp from General Purpose Lanes	Corinth Parkway On-Ramp to General Purpose Lanes	
17	Post Oak Road On-Ramp to General Purpose Lanes	FM 2499 Off-Ramp from General Purpose Lanes	Ramp reversed to reduce weaving on the freeway
17	FM 2499 Off-Ramp from General Purpose Lanes	Post Oak Road On-Ramp to General Purpose Lanes	
17	Loop 288 Off-Ramp from General Purpose Lanes	Loop 288 Off-Ramp from General Purpose Lanes	Same approximate location
18	No Existing Managed Lane Ramp	Loop 288 Off-Ramp from Managed Lanes	Provides Managed Lane access to Loop 288
18	FM 2499 On-Ramp to General Purpose Lanes	FM 2499 On-Ramp to General Purpose Lanes	Same approximate location
18	Loop 288 On-Ramp to General Purpose Lanes	US 77 Off-Ramp from General Purpose Lanes	Ramps reversed to reduce weaving on the freeway and continuous uninterrupted frontage road added to maintain existing access
18	US 77 Off-Ramp from General Purpose Lanes		
18	No Existing Managed Lane Ramp	US 77 Off-Ramp from Managed Lanes	Provides Managed Lanes access to US 77
18	US 77 On-Ramp from General Purpose Lanes	FM 2181 Off-Ramp from General Purpose Lanes	Ramp reversed to reduce weaving on the freeway
18	FM 2181 Off-Ramp from General Purpose Lanes	Loop 288 & US 77 On-Ramp from General Purpose Lanes	
18	FM 2181/Teasley Lane On-Ramp to General Purpose Lanes	Fort Worth Drive Off-Ramp from General Purpose Lanes	Ramps braided to reduce/eliminate weaving on the freeway
18	Fort Worth Drive Off-Ramp from General Purpose Lanes	FM 2181/Teasley Lane On-Ramp to General Purpose Lanes	
19	Fort Worth Drive On-Ramp to General Purpose Lanes	McCormick Street Off-Ramp from General Purpose Lanes	Ramps braided to reduce/eliminate weaving on the freeway
19	McCormick Street Off-Ramp from General Purpose Lanes	Fort Worth Drive On-Ramp to General Purpose Lanes	
19	McCormick Street On-Ramp to General Purpose Lanes	None	Ramp closed to reduce weaving
19	N Texas Boulevard Off-Ramp from General Purpose Lanes	N Texas Boulevard Off-Ramp from General Purpose Lanes	Same approximate location

TABLE 7: IH 35E EXISTING AND PROPOSED ACCESS (CONTINUED)

Fig	Existing	Proposed	Purpose
NORTHBOUND (CONTINUED)			
19	N Texas Boulevard On-Ramp to General Purpose Lanes	Bonnie Brae Street Off-Ramp from General Purpose Lanes	N Texas Boulevard on-ramp reversed to provide an off-ramp to Bonnie Brae Street separate from the southbound IH 35W off-ramp
19	SB IH 35W & Bonnie Brae Street Off-Ramp from General Purpose Lanes	SB IH 35W Off-Ramp from General Purpose Lanes	
19	None	Oak Street Off-Ramp from General Purpose Lanes	Off-ramp was added to reduce traffic on the frontage road
19	None	Bonnie Brae Street On-Ramp to General Purpose Lanes	McCormick Street and N Texas Boulevard on-ramps were closed or reversed and this on-ramp provides that access
19	No Existing Managed Lane Ramp	Managed Lanes On-Ramp from IH 35W Managed Lanes	Provides IH 35W Managed Lanes access to IH 35 Managed Lanes
19	IH 35W & On-Ramp to General Purpose Lanes	IH 35W & On-Ramp to General Purpose Lanes	Same approximate location
19	Oak Street On-Ramp to General Purpose Lanes	US 380 Off-Ramp from General Purpose Lanes	Ramps braided to reduce/eliminate weaving on the freeway
19	US 380 Off-Ramp from General Purpose Lanes	Oak Street On-Ramp to General Purpose Lanes	

TABLE 8: IH 35E EXISTING AND PROPOSED ACCESS

Fig	Existing	Proposed	Purpose
SOUTHBOUND			
19	US 380 On-Ramp to General Purpose Lanes	Oak Street Off-Ramp from General Purpose Lanes	Ramp reversed to reduce weaving on the freeway
19	Oak Street Off-Ramp from General Purpose Lanes	US 380 On-Ramp to General Purpose Lanes	
19	No Existing Managed Lane Ramp	IH 35 Managed Lanes Off-Ramp to IH 35W Managed Lanes	Provides IH 35 Managed Lanes access to IH 35W Managed Lanes
19	N Texas Boulevard Off-Ramp from General Purpose Lanes	N Texas Boulevard/McCormick Street Off-Ramp from General Purpose Lanes	Ramp relocated to provide access for closed off-ramps to N Texas Boulevard & McCormick Street
19	IH 35W & On-Ramp to General Purpose Lanes	IH 35W & On-Ramp to General Purpose Lanes	Same approximate location
19	N Texas Boulevard On-Ramp to General Purpose Lanes	N Texas Boulevard On-Ramp to General Purpose Lanes	Same approximate location

TABLE 8: IH 35E EXISTING AND PROPOSED ACCESS (CONTINUED)

Fig	Existing	Proposed	Purpose
SOUTHBOUND (CONTINUED)			
19	McCormick Street Off-Ramp from General Purpose Lanes	None	Ramp closed to reduce weaving
19	McCormick Street On-Ramp to General Purpose Lanes	Fort Worth Drive Off-Ramp from General Purpose Lanes	Ramps braided to reduce/eliminate weaving on the freeway
19	Fort Worth Drive Off-Ramp from General Purpose Lanes	McCormick Street On-Ramp to General Purpose Lanes	
18	Fort Worth Drive On-Ramp to General Purpose Lanes	FM 2181 Off-Ramp from General Purpose Lanes	Ramp reversed to reduce weaving on the freeway
18	FM 2181 Off-Ramp from General Purpose Lanes	Fort Worth Drive On-Ramp to General Purpose Lanes	
18	FM 2181 On-Ramp to General Purpose Lanes	Fm 2181 On-Ramp to General Purpose Lanes	Ramps braided to reduce/eliminate weaving on the freeway
18	Loop 288 Off-Ramp from General Purpose Lanes	Loop 288 Off-Ramp from General Purpose Lanes	
18	No Existing Managed Lane Ramp	US 77 On-Ramp to Managed Lanes	Provides US 77 access to Managed Lanes
18	US 77 On-Ramp to General Purpose Lanes	US 77 On-Ramp to General Purpose Lanes	Same approximate location
18	Loop 288 Off-Ramp from General Purpose Lanes	None	Ramp closed since two ramps provide access to Loop 288
18	FM 2499/Teasley Lane Off-Ramp from General Purpose Lanes	FM 2499/Teasley Lane Off-Ramp from General Purpose Lanes	Same approximate location
18	No Existing Managed Lane Ramp	Loop 288 On-Ramp to Managed Lanes	Provides Loop 288 access to Managed Lane
17	Loop 288 On-Ramp to General Purpose Lanes	Loop 288 On-Ramp to General Purpose Lanes	Same approximate location
17	FM 2499/State School Road On-Ramp to General Purpose Lanes	Post Oak Road Off-Ramp from General Purpose Lanes	Ramp reversed to reduce weaving on the freeway
17	Post Oak Road Off-Ramp from General Purpose Lanes	FM 2499/State School Road On-Ramp to General Purpose Lanes	
17	No Existing Managed Lane Ramp	Managed Lanes Off-Ramp to General Purpose Lanes On-Ramp	Provides access to Managed Lanes
17	Post Oak Road On-Ramp to General Purpose Lanes	Corinth Parkway Off-Ramp from General Purpose Lanes	Ramp reversed to reduce weaving on the freeway
17	Corinth Parkway Off-Ramp from General Purpose Lanes	Post Oak Road On-Ramp to General Purpose Lanes	

TABLE 8: IH 35E EXISTING AND PROPOSED ACCESS (CONTINUED)

Fig	Existing	Proposed	Purpose
SOUTHBOUND (CONTINUED)			
17	Corinth Parkway On-Ramp to General Purpose Lanes	Meadow Oaks Drive Off-Ramp from General Purpose Lanes	Corinth Parkway On-Ramp closed and Off-Ramp adjusted to include access to Meadow Oaks Drive
17	Meadowview Drive Off-Ramp from General Purpose Lanes		
16	Meadow Oaks Drive On-Ramp to General Purpose Lanes	FM 2181 Off-Ramp from General Purpose Lanes	Ramp reversed and moved north to reduce weaving on the freeway
17	FM 2181 Off-Ramp from General Purpose Lanes	Meadow Oaks Drive On-Ramp to General Purpose Lanes	
16	No Existing Managed Lane Ramp	FM 2181 On-Ramp to Managed Lanes	Provides FM 2181 access to Managed Lanes
16	FM 2181 On-Ramp to General Purpose Lanes	Turbeville/Hundley Off-Ramp from General Purpose Lanes	FM 2181 on-ramp relocated south after Turbeville/Hundley and an exit to Turbeville/Hundley is in its place to reduce through traffic at the FM 2181 intersection with the frontage road
16		Turbeville/Hundley On-Ramp to General Purpose Lanes	
16	South Denton Drive On-Ramp to General Purpose Lanes	South Denton Drive On-Ramp to General Purpose Lanes	Same approximate location
15	Copperas Branch/Highland Village Off-Ramp from General Purpose Lanes	Highland Village Off-Ramp from General Purpose Lanes	Ramp location adjusted for constructability with other structures and continuous frontage road provides access
15	No Existing Managed Lane Ramp	FM 407 Off-Ramp from Managed Lanes	Provides Managed Lanes access to FM 407
15	Garden Ridge Boulevard On-Ramp to General Purpose Lanes	FM 407 Off-Ramp from General Purpose Lanes	Ramps reversed to reduce weaving on the freeway
15	FM 407 Off-Ramp from General Purpose Lanes	Garden Ridge Boulevard On-Ramp to General Purpose Lanes	
15	Valley Ridge Boulevard Off-Ramp from General Purpose Lanes	Valley Ridge Boulevard Off-Ramp from General Purpose Lanes	Same approximate location
15	No Existing Managed Lane Ramp	Valley Ridge Boulevard Off-Ramp from Managed Lanes	Provides Managed Lanes access to Valley Ridge Boulevard
15	No Existing Managed Lane Ramp	Valley Ridge Boulevard On-Ramp to Managed Lanes	Provides Valley Ridge Boulevard access to Managed Lanes
15	FM 1171 Off-Ramp from General Purpose Lanes	FM 1171 Off-Ramp from General Purpose Lanes	Same approximate location
14	Valley Ridge Boulevard On-Ramp to General Purpose Lanes	Valley Ridge Boulevard On-Ramp to General Purpose Lanes	Same approximate location

TABLE 8: IH 35E EXISTING AND PROPOSED ACCESS (CONTINUED)

Fig	Existing	Proposed	Purpose
SOUTHBOUND (CONTINUED)			
14	FM 1171 On-Ramp to General Purpose Lanes	FM 1171 On-Ramp to General Purpose Lanes	Fox Avenue Off-Ramp is no longer available and the FM 1171 On-Ramp is in its location, a continuous uninterrupted frontage road is provided
14	Fox Avenue Off-Ramp from General Purpose Lanes		
14	Fox Avenue On-Ramp to General Purpose Lanes	Business SH 121 Off-Ramp from General Purpose Lanes	Ramps reversed to reduce weaving on the freeway
14	Business SH 121 Off-Ramp from General Purpose Lanes	Fox Avenue On-Ramp to General Purpose Lanes	
14	Business SH 121 On-Ramp to General Purpose Lanes	Corporate Drive Off-Ramp from General Purpose Lanes	Ramps reversed to reduce weaving on the freeway
14	Corporate Drive Off-Ramp from General Purpose Lanes	Business SH 121 On-Ramp to General Purpose Lanes	
13	Corporate Drive On-Ramp to General Purpose Lanes	None	Access removed and a continuous uninterrupted frontage road to the next on-ramp is provided
14	FM 3040 Off-Ramp from General Purpose Lanes	FM 3040 Off-Ramp from General Purpose Lanes	Ramp location adjusted for constructability with other structures
13	No Existing Managed Lane Ramp	Managed Lane On-Ramp/Off-Ramp from General Purpose Lanes	Provides IH 35E on-ramps in Lewisville access to Managed Lanes
13	FM 3040 On-Ramp to General Purpose Lanes	FM 3040 On-Ramp to General Purpose Lanes	Ramp location adjusted for constructability with other structures
13	No Existing Managed Lane Ramp	SH 121 & PGBT DC Off-Ramp From Managed Lanes	Provides Managed Lane access to PGBT & SH121
13	SH 121 Off-Ramp from General Purpose Lanes	SH 121 & PGBT DC Off-Ramp From General Purpose Lanes	Provides new General Purpose Lanes access to PGBT & SH121 and begins the Direct-Connect(DC) that is a collector distributor reducing weaving and access point along IH 35E between PGBT and SH 121
13	SH 121 On-Ramp to General Purpose Lanes	Moved to Direct Connect (DC)	
13	SH 121 Toll On-Ramp to General Purpose Lanes	Moved to Direct Connect (DC)	
13	Frankford Road Off-Ramp from General Purpose Lanes	Frankford Road Off-Ramp from General Purpose Lanes	Ramp location adjusted for constructability with other structures

TABLE 8: IH 35E EXISTING AND PROPOSED ACCESS (CONTINUED)

Fig	Existing	Proposed	Purpose
SOUTHBOUND (CONTINUED)			
13	EB PGBT Off-Ramp from General Purpose Lanes	Moved to Direct Connect (DC)	Provides new General Purpose Lanes access from PGBT & SH121 and ends the Direct-Connect(DC) that is a collector distributor reducing weaving and access point along IH 35E between PGBT and SH 121
13	WB PGBT Off-Ramp from General Purpose Lanes	Moved to Direct Connect (DC)	
13	PGBT On-Ramp to General Purpose Lanes	PGBT & SH 121 DC On-Ramp to General Purpose Lanes	
13	No Existing Managed Lane Ramp	PGBT & SH 121 DC On-Ramp to Managed Lanes	Provides PGBT & SH121 access to Managed Lane
13	Sandy Lake Road Off-Ramp from General Purpose Lanes	Dickerson Parkway On-Ramp to General Purpose Lanes	Reduces through traffic at Sandy Lake Road Frontage Road Intersection
11	Sandy Lake Road On-Ramp to General Purpose Lanes	Belt Line Road Off-Ramp from General Purpose Lanes	Reversed Belt Line Road Off-Ramp and Sandy Lake Road On-Ramp to reduce weaving on the freeway and braided Belt Line Road Off-Ramp from Managed Lanes over Sandy Lake Road On-Ramp
11	No Existing Managed Lane Ramp	Belt Line Road Off-Ramp from Managed Lanes	
12	Belt Line Road Off-Ramp from General Purpose Lanes	Sandy Lake Road On-Ramp to General Purpose Lanes	
11	Belt Line Road On-Ramp to General Purpose Lanes	Belt Line On-Ramp to General Purpose Lanes	Same approximate location
11	Crosby Street On-Ramp to General Purpose Lanes	Belt Line On-Ramp to Managed Lanes	Adjusted these ramps so Crosby Street On-Ramp is closed to provide an entrance to Managed Lanes
11	Valwood Parkway Off-Ramp from General Purpose Lanes	Valwood Parkway Off-Ramp from General Purpose Lanes	
11	Valwood Parkway On-Ramp to General Purpose Lanes	Valley View Lane Off-Ramp from General Purpose Lanes	Ramps reversed to reduce weaving on the freeway
11	Valley View Lane Off-Ramp from General Purpose Lanes	Valwood Parkway On-Ramp to General Purpose Lanes	

SECTION 3: OPERATIONAL ANALYSIS

The proposed access point does not have a significant adverse impact on the safety and operation of the interstate facility based on an analysis of current and future traffic. The operational analysis for existing conditions shall, particularly in urbanized areas, include an analysis of sections of Interstate to and including at least the first adjacent existing or proposed interchange on either side. Crossroads and other roads and streets shall be included in the analysis to the extent necessary to assure their ability to collect and distribute traffic to and from the interchange with new or revised access points.

An operational analysis was performed using the procedures outlined in the Highway Capacity Manual 2000 to confirm that the proposed access points do not significantly impact the safety and operation of IH 35. The analysis included determining the Level of Service (LOS) freeway sections, ramp junctions and weaving areas. The LOS is a measure of effectiveness used to evaluate the traffic operation based on density where LOS A represents the least congested conditions and LOS F is considered unacceptable operational conditions. The planning horizon year for the purpose of this study is assumed to be 2030. The base year and projected year volumes were approved by TxDOT Transportation Planning and Programming Division (TP&P).

The IH 35E Managed Lanes volumes were developed based on the NCTCOG 2030 travel demand model provided on October 22, 2008. For developed areas, managed lanes volumes range between 13% to 23% of the main lanes volumes; and for low developed areas, managed lanes volumes range from 4% to 12% of the main lane volumes which is reasonable for this kind of corridor. The % of trucks for this corridor was provided by the TxDOT TP&P Division with the approved projections. The truck percentages for the ADT range from 5.9 % to 7.7 %.

Since the distribution between AM and PM traffic did not show a significant disparity with a 55/44 split, design hourly volumes were used in the analysis. An analysis was performed for IH 35E with and without the proposed improvements.

Some assumptions made about the IH 35E study corridor and design elements that were used to perform the analysis are as follows:

- Directional Distribution (D) = 0.56
- Peak Hour Factor (PHF) = 0.90
- K Factor (K) = .079
- Highways have a design speed of 70 miles per hour (mph)
- Ramps have a design speed of 40 mph
- Free flow speeds were calculated with speed adjustments for heavy vehicles, interchange density, terrain, driver population adjustment factor, and number of travel lanes.
- Heavy vehicles = 3 % of DHV south of US 377 and 4 % north of US 377
- Level terrain

- Driver population factor = 1.0
- URBAN Freeways with a Base Free Flow Speed (BFFS) of 70 mph.
- Interchange Density (interchanges per mile) = 1.0
- Main Lane Widths = 12 feet with 10-foot shoulders.
- Managed Lanes have a design speed of 70 miles per hour (mph)

PROPOSED SCHEMATIC

The proposed IH 35E alternative from IH 635 (LBJ) to US 380 has a six or eight lane section with two or four concurrent managed lanes replacing the current four to six lanes freeway configuration. The final schematic alternative that was developed included significant ramping and geometric changes including:

- Reverse orientation of some ramps to provide better access
- Providing full shoulders on the freeway for vehicle breakdown and emergencies
- Providing adequate lane widths for the freeway mainlanes
- Providing adequate ramp lengths including acceleration and deceleration lanes so that entering/exiting traffic is traveling at freeway speed
- Providing barrier separated managed lanes with access ramps

The existing and proposed accesses to IH 35E are illustrated in **Figures 11 through 19 located in the attached Appendix A.**

VOLUMES

In order to properly perform the operational analysis, it was important to determine the volumes within the study area. The 2030 projected volumes along IH 35E, between IH 635 (LBJ) and US 380, were developed by Wilbur Smith Association and approved by TP&P on December 12, 2008 and February 6, 2009. Projected volumes account for regional growth and future improvements to the transportation system. The proposed average daily traffic and design hourly volumes for the Build scenario are shown in **Figures 11 through 19 in the attached Appendix A.**

FREEWAY MAINLANES ANALYSIS

A basic freeway segment as described by the HCM is the area of the freeway mainlanes outside of the influence area of ramps and weaving sections of the freeway. The operation of basic freeway segments are dependant on several characteristics including free flow speed, lane width, lateral clearance, terrain, driver population, percentage of heavy vehicles, interchange density and number of freeway lanes.

The purpose of this portion of the analysis is to indicate the freeway operation for the proposed geometric improvements. The following tables indicate the LOS analysis for the proposed Northbound and Southbound General Purpose Lanes and the Managed Lanes.

The analysis indicates that the freeway segments for the General Purpose Lanes would mostly not operate at an acceptable level of service. A poor LOS for General Purpose Lanes would provide incentives for increased use on the Managed Lanes since the Managed Lanes LOS is adequate. The no-build indicates that the freeway will not operate at an acceptable LOS in the Year 2030 without improvements to capacity. **Appendix B** and **Appendix C** indicate the results of the operational analysis.

Tables 9 through 12 show the LOS analysis for the build scenario in the northbound and southbound directions and **Tables 13 and 14** show the LOS analysis for the no-build scenario.

TABLE 9: GENERAL PURPOSE LANES BUILD LOS (NORTHBOUND)			
Freeway Segment	# of Lanes	DHV	LOS
		2030	2030
From Beginning of Project to Valwood Parkway Off	5	10,839	F
From Valwood Parkway Pkwy off to Valley View On	4	9,662	F
Valley View On to Valwood Parkway On	4	10,405	F
Beltline Road Off to Whitlock Off	4	10,422	F
Whitlock Off to Beltline Rd On	4	9,750	F
Beltline Road On to Dickerson Off	5	10,856	F
Dickerson Off to SH 190 Off	4	10,051	F
<i>SH 190 Off to Frankford Off</i>	3	5,928	E
Frankford Off to Frankford On	3	5,132	D
Frankford On to Fm 3040 off/Hebron Pkwy	3	6,503	F
FM 3040off/Hebron Pkwy to SH 121 On	3	5,547	E
Corporate Drive Off to HOV Off	5	9,369	D
HOV off to BUS 121 Off	5	9,201	D
Bus 121 Off to Corporate Drive On	4	7,998	E
Corporate Drive On to FM 1171 Off	5	8,785	D
Fm 1171 Off to Fox Ave On	4	7,130	D
Valley Ridge Blvd Off to FM 1171 On	4	7,395	D
Lake Park Road off to Valley Ridge On	4	7,457	D
Garden Ridge Blvd Off to Lake Park Road On	4	7,439	D
Lake Park Road On to S. Denton Drive Off	4	8,120	E

TABLE 9: GENERAL PURPOSE LANES BUILD LOS (NORTHBOUND) (CONTINUED)

Freeway Segment	# of Lanes	DHV	LOS
		2030	2030
S. Denton Drive Off to Hundley Off	4	7,571	E
Hundley Off to HOV on	4	6,208	D
HOV ON To Hundley Drive On	4	6,659	D
Dobbs Road Off to Swisher Road On	4	6,783	D
Corinth Pkway Off to HOV Off	4	7,252	D
HOV off to Post Oak Off	4	7,057	D
Post Oak Off to Corinth Pkwy On	4	5,871	C
Mayhill off to Post Oak On	4	5,738	C
Loop 288 Off to Mayhill On	4	5,367	C
US 77 Off to Teasley Off	4	5,455	C
Teasley Off to HOV On	4	5,190	C
HOV On to US 77 On	4	5,349	C
US 77 On to Fort Worth Avenue Off	5	6,543	C
Fort Worth Avenue Off to HOV Off	3	5,773	E
HOV Off to Teasley On	3	5,596	E
McCormick Street Off to Fort Worth On	3	5,649	E
N. Texas Off to Bonnie Brae Off	3	5,985	E
Bonnie Brae Off to DC from IH 35 W	3	5,003	D
DC from IH 35 W to Oak Street Off	3	3,764	C
Oak Street Off to Bonnie Brae On	3	3,543	C
Bonnie Brae On to IH 35 W On	3	3,720	C
IH 35 W On to US 380 Off	6	6,746	C
US 380 Off to Oak Street On	5	4,888	B
Oak Street On to End of Project	5	5,273	B

TABLE 10: MANAGED LANES BUILD LOS (NORTHBOUND)			
Freeway Segment	# of Lanes	DHV	LOS
		2030	2030
End of Project to Crosby Exit	2	2,185	C
Crosby Exit to Beltline Entrance	2	1,583	B
Beltline Entrance to SH 121 Exit	2	2,530	C
SH 121 Exit to Corporate Exit	2	1,114	A
Corporate Exit to SH 121 Entrance	2	415	A
SH 121 Entrance to Corporate Entrance	2	1,698	B
Corporate Entrance to Valley Ridge Exit	2	1,866	B
Valley Ridge Exit to Valley Ridge Entrance	2	1,061	A
Valley Ridge Entrance to Lake Park Entrance	2	1,114	A
Lake Park Entrance to Hundley Exit	2	1,441	B
Hundley Exit to Swisher Exit	2	981	A
Swisher Exit to Dobbs Entrance	2	530	A
Dobbs Entrance to Loop 288 Exit	2	725	A
Loop 288 Exit to US 77 Exit	2	424	A
US 77 Exit to Teasley Exit	2	229	A
Teasley Exit to Teasley Entrance	2	70	A
Teasley entrance IH 35 DC	2	247	A
IH 35W DC to End	2	380	A

TABLE 11: GENERAL PURPOSE LANES BUILD LOS (SOUTHBOUND)

Freeway Segment	# of Lanes	DHV	LOS
		2030	2030
End of Project to Oak Off ramp	5	5,406	C
Oak Off Ramp to US 380 On	5	5,079	B
DC to IH 35W to Bonnie Brae Off	3	4,000	C
From Bonnie Brae Off to IH 35W DC	3	3,841	C
From IH 35W DC to N. Texas ON	3	5,018	D
From Fort Worth Drive Off to McCormick Street On	3	5,743	E
Off ramp to Teasley Lane to HOV On	3	5,266	D
HOV On to HOV Off	3	5,399	D
HOV off to Fort Worth On	3	5,213	D
Fort Worth On to US 377 Off	4	6,018	C
US 377 Off to Teasley Lane On	4	4,815	C
Teasley On to US 77 On	4	5,080	C
US 77 On to Mayhill Off	4	5,921	C
Mayhill Off to Loop 288 On	4	5,247	C
Post Oak Off to Mayhill On	4	5,903	C
Corinth Pkwy Off to HOV On	4	6,380	D
HOV On to Post Oak On	4	6,700	D
Meadow Oaks Off to Swisher Off	4	7,621	E
Swisher Off to Dobbs On	4	6,975	D
Hundley Drive Off to HOV Off	4	6,895	D
HOV Off to Swisher On	4	6,373	D
Swisher On to S. Denton Drive On	4	7,585	E
Denton Drive On to Highland Village Off	4	8,204	E
Highland Village Off to FM 407 Off	4	8,054	E
FM 407 Off to Garden Ridge On	4	7,532	E
Garden Ridge On to Valley Ridge Off	5	8,107	D
Valley Ridge Off to FM 1171 Off	4	7,771	E
FM 1171 Off to Valley Ridge On	4	6,700	D
Valley Ridge On to FM 1171 On	4	8,301	E
BUS 121 Off to Fox Ave On	4	8,088	E
Off ramp to Corporate to HOV On	4	8,247	E

TABLE 11: GENERAL PURPOSE LANES BUILD LOS (SOUTHBOUND) (CONTINUED)

Freeway Segment	# of Lanes	DHV	LOS
		2030	2030
HOV On to BUS SH 121 On	5	8,433	D
Hebron Off to FM 3040 off	5	9,035	D
FM 3040 Off to HOV Off	3	5,027	D
HOV Off to FM 3040 On	3	4,744	D
FM 3040 On to Frankford Off	3	6,549	F
Frankford Off to Frankford On	3	5,001	D
Frankford On to SH 190/PGBT On	3	5,912	E
SH 190/PGBT On to Dickerson On	5	9,973	E
Dickerson On to Beltline Off	5	10,539	F
Beltline Off to Whitlock On	4	9,610	F
Whitlock On to Beltline On	4	10,477	F
Beltline On to Valwood Off	5	11,247	F
Valwood Off to Valley View Off	4	10,468	F
Valley View off to Valwood On	4	9,625	F
Valwood On to End of Project	5	10,660	F

TABLE 12: MANAGED LANES BUILD LOS (SOUTHBOUND)

Freeway Segment	# of Lanes	DHV	LOS
		2030	2030
End of Project to IH35W exit	2	416	A
IH 35 W Exit to Teasley Exit	2	266	A
Teasley Exit to Teasley Entrance	2	133	A
Teasley Entrance to US 77 Entrance	2	319	A
US 77 Entrance to Loop 288 entrance	2	363	A
Loop 288 Entrance to Corinth Pkwy Exit	2	726	A
Corinth Pkwy Exit to Swisher Entrance	2	407	A
Swisher Entrance to Hundley Entrance	2	1,009	A
Hundley Entrance to Lake Park Exit	2	1,531	B
Lake Park Exit to Valley Ridge Exit	2	991	A
Valley Ridge Exit to Valley Ridge Entrance	2	885	A
Valley Ridge Entrance to Corporate Drive Exit	2	1,469	B
Corporate Drive Exit to FM 3040 Exit	2	1,283	B
FM 3040 Exit to Dickerson Entrance	2	1,000	A
Dickerson Entrance to Belt Line Exit	2	2,389	C
Belt Line Exit to Crosby Entrance	2	1,389	B
Crosby Entrance to end of Project	2	2,079	C

TABLE 13: BASIC FREEWAY NO-BUILD LOS (NORTHBOUND)

Freeway Segment	# of Lanes	DHV	LOS
		2030	2030
End of Project to Valley View Lane On Ramp	3	13,024	F
Valley View Lane On Ramp to Valwood Parkway Off Ramp	3	13,767	F
Valwood Parkway Off Ramp to Valwood Parkway On Ramp	3	12,590	F
Valwood Parkway On Ramp to Crosby Street Off Ramp	3	13,439	F
Crosby Street Off Ramp to Belt Line Road Off Ramp	3	12,837	F
Belt Line Road Off Ramp to Belt Line Road On Ramp	3	12,005	F
Belt Line Road On Ramp to Whitlock Road Off Ramp	3	14,058	F
Whitlock Road Off Ramp to Whitlock Road On Ramp	3	12,626	F
Whitlock Road On Ramp to PGBT Off Ramp	3	13,253	F
PGBT Off Ramp to Frankford Road Off Ramp	3	11,024	F
Frankford Road Off Ramp to EB PGBT On Ramp	3	10,228	F
EB PGBT On Ramp to WB PGBT On Ramp	3	12,935	F
WB PGBT On Ramp to Frankford Road On Ramp	3	14,078	F
Frankford Road On Ramp to SH 121 Toll Off Ramp	3	14,822	F
SH 121 Toll Off Ramp to SH 121 Off Ramp	3	11,654	F
SH 121 Off Ramp to FM 3040 Off Ramp	3	11,211	F
FM 3040 Off Ramp to SH 121 On Ramp	3	10,255	F
SH 121 On to FM 3040 On Ramp	3	11,343	F
FM 3040 On Ramp to Corporate Drive Off Ramp	3	12,431	F
Corporate Drive Off Ramp to Corporate Drive On Ramp	3	11,113	F
Corporate Drive On Ramp to Bus SH 121 Off Ramp	3	11,900	F
Bus SH 121 Off Ramp to Bus SH 121 On Ramp	3	10,697	F
Bus SH 121 On Ramp to Fox Avenue Off Ramp	3	11,457	F
Fox Avenue Off Ramp to FM 1171 Off Ramp	3	11,014	F
FM 1171 Off Ramp to Fox Avenue On Ramp	3	9,802	F
Fox Avenue On Ramp to Valley Ridge Boulevard Off Ramp	3	10,245	F
Valley Ridge Boulevard Off Ramp to Fm 1171 On Ramp	3	8,502	F
Fm 1171 On Ramp to Valley Ridge Boulevard On Ramp	3	9,254	F
Valley Ridge Boulevard On Ramp to Lake Park Road Off Ramp	3	10,032	F
Lake Park Road Off Ramp to E Jones Street On Ramp	3	9,342	F
E Jones Street On Ramp to Lake Park Road On Ramp	3	9,519	F
Lake Park Road On Ramp to Garden Ridge Boulevard Off Ramp	3	10,863	F

TABLE 13: BASIC FREEWAY NO-BUILD LOS (NORTHBOUND) (CONTINUED)			
Freeway Segment	# of Lanes	DHV	LOS
		2030	2030
Garden Ridge Boulevard Off Ramp to On Ramp	3	9,607	F
Garden Ridge Boulevard On Ramp to S. Denton Drive Off Ramp	3	10,359	F
S. Denton Drive Off Ramp to Hundley Drive Off Ramp	2	9,012	F
Hundley Drive Off Ramp to Swisher Road On Ramp	2	7,189	F
Swisher Road On Ramp to Dobbs Road Off Ramp	2	8,587	F
Dobbs Road Off Ramp to Quail Run On Ramp	2	8,047	F
Quail Run On Ramp to Corinth Parkway Off Ramp	2	8,224	F
Corinth Parkway Off Ramp to Corinth Parkway On Ramp	2	7,959	F
Corinth Parkway On Ramp to Post Oak Road Off Ramp	2	8,543	F
Post Oak Road Off Ramp to Post Oak Road On Ramp	2	7,357	F
Post Oak Road On Ramp to Mayhill Road Off Ramp	2	7,729	F
Mayhill Road Off Ramp to Loop 288 Off Ramp	2	6,835	F
Loop 288 Off Ramp to Mayhill Road On Ramp	2	5,791	F
Mayhill Road On Ramp to Loop 288 On Ramp	2	6,578	F
Loop 288 On Ramp to US 77 Off Ramp	2	7,472	F
US 77 Off Ramp to US 77 On Ramp	2	6,578	F
US 77 On Ramp to Teasley Road Off Ramp	2	6,878	F
Teasley Road Off Ramp to Teasley Road On Ramp	2	6,613	F
Teasley Road On Ramp to Fort Worth Drive Off Ramp	2	7,480	F
Fort Worth Drive Off Ramp to Fort Worth Drive On Ramp	2	6,710	F
Fort Worth Drive On Ramp to McCormick Street Off Ramp	2	7,471	F
McCormick Street Off Ramp to McCormick Street On Ramp	2	6,657	F
McCormick Street On Ramp to N. Texas Boulevard Off Ramp	2	6,746	F
N. Texas Boulevard Off Ramp to N. Texas Boulevard On Ramp	2	6,321	F
N. Texas Boulevard On Ramp to DC to IH 35W Off Ramp	2	6,409	F
DC to IH 35W Off Ramp to IH 35W On Ramp	2	3,967	E
IH 35W On Ramp to Oak Street On Ramp	2	7,126	F
Oak Street On Ramp to US 380 Off Ramp	2	7,506	F
US 380 Off Ramp to End Project	2	5,648	F

TABLE 14: BASIC FREEWAY NO-BUILD LOS (SOUTHBOUND)

Freeway Segment	# of Lanes	DHV	LOS
		2030	2030
End of Project to US 380 On Ramp	2	5,817	F
US 380 On Ramp to Oak Street Off Ramp	2	7,622	F
Oak Street Off Ramp to IH 35W Off Ramp	2	7,295	F
IH 35W Off Ramp to IH 35DC On Ramp	2	4,260	F
IH 35DC On Ramp to N. Texas Boulevard Off Ramp	2	5,437	F
N. Texas Boulevard Off Ramp to N. Texas Boulevard On Ramp	2	5,358	F
N. Texas Boulevard On Ramp to McCormick Street Off Ramp	2	6,853	F
McCormick Street Off Ramp to McCormick Street On Ramp	2	6,773	F
McCormick Street On Ramp to Fort Worth Drive Off Ramp	2	7,490	F
Fort Worth Drive Off Ramp to Fort Worth Drive On Ramp	2	6,720	F
Fort Worth Drive On Ramp to Teasley Lane Off Ramp	2	7,526	F
Teasley Lane Off Ramp to Teasley Lane On Ramp	2	6,332	F
Teasley Lane On Ramp to Loop 288 Off Ramp	2	6,598	F
Loop 288 Off Ramp to US 77 On Ramp	2	6,288	F
US 77 On Ramp to Loop 288 Off Ramp	2	7,172	F
Loop 288 Off Ramp to FM 2499 Off Ramp	2	6,278	F
FM 2499 Off Ramp to Loop 288 On Ramp	2	5,614	F
Loop 288 On Ramp to Mayhill On Ramp	2	6,968	F
Mayhill On Ramp to Post Oak Road Off Ramp	2	7,986	F
Post Oak Road Off Ramp Off to Post Oak Road On Ramp	2	8,411	F
Post Oak Road On Ramp to Corinth Parkway Off Ramp	2	8,951	F
Corinth Parkway Off Ramp to Corinth Parkway On Ramp	2	8,411	F
Corinth Parkway On Ramp to Meadowview Dr Off Ramp	2	8,854	F
Meadowview Dr Off Ramp to Dobbs Road On Ramp	2	8,465	F
Dobbs Road On Ramp to Swisher Road Off Ramp	2	8,650	F
Swisher Road Off Ramp to Swisher Road On Ramp	2	7,297	F
Swisher Road On Ramp to Country Lane On Ramp	2	9,111	F
Country Lane On Ramp to Copperas Branch Off Ramp	3	10,810	F
Copperas Branch Off Ramp to Garden Ridge Boulevard On Ramp	3	9,580	F
Garden Ridge Boulevard On Ramp to FM 407 Off Ramp	3	10,155	F
FM 407 Off Ramp to Valley Ridge Boulevard Off	3	9,093	F

TABLE 14: BASIC FREEWAY NO-BUILD LOS (SOUTHBOUND) (CONTINUED)			
Freeway Segment	# of Lanes	DHV	LOS
		2030	2030
Valley Ridge Boulevard Off Ramp to FM 1171 Off Ramp	3	8,651	F
FM 1171 Off Ramp to Valley Ridge Boulevard On Ramp	3	8,023	F
Valley Ridge Boulevard On Ramp to FM 1171 On Ramp	3	10,213	F
FM 1171 On Ramp to Fox Avenue Off Ramp	3	11,178	F
Fox Avenue Off Ramp to Fox Avenue On Ramp	3	10,735	F
Fox Avenue On Ramp to Bus 121 Off Ramp	3	11,726	F
Bus 121 Off Ramp to Bus 121 On Ramp	3	10,549	F
Bus 121 On Ramp to Corporate Road Off Ramp	3	12,018	F
Corporate Road Off Ramp to Corporate Road On	3	11,186	F
Corporate Road On Ramp to FM 3040 Off Ramp	3	12,088	F
FM 3040 Off Ramp to SH 121 On Ramp	3	11,221	F
SH 121 On Ramp to FM 3040 On Ramp	3	10,000	F
FM 3040 On Ramp to SH 121 On Ramp	3	10,903	F
SH 121 On Ramp to SH 121 Toll On Ramp	3	11,603	F
SH 121 Toll On Ramp to Frankford Road Off Ramp	3	14,683	F
Frankford Road Off Ramp to EB PGBT Off Ramp	3	13,841	F
EB PGBT Off Ramp to WB PGBT Off Ramp	3	11,168	F
WB PGBT Off Ramp to Frankford Road On Ramp	3	10,079	F
Frankford Road On Ramp to PGBT On Ramp	3	10,990	F
PGBT On Ramp to Whitlock Road Off Ramp	3	13,068	F
Whitlock Road Off Ramp to Whitlock Road On Ramp	3	12,361	F
Whitlock Road On Ramp to Belt Line Road Off Ramp	3	13,794	F
Belt Line Road Off Ramp to Belt Line Road On Ramp	3	11,865	F
Belt Line Road On Ramp to Crosby Road On Ramp	3	12,635	F
Crosby Road On Ramp to Valwood Parkway Off Ramp	3	13,325	F
Valwood Parkway Off Ramp to Valwood Parkway On Ramp	3	12,546	F
Valwood Parkway On Ramp to Valley View Lane Off Ramp	3	13,582	F
Valley View Lane Off Ramp to End of Project	3	12,738	F

The freeway segment analysis reveals that all segments will not operate at an acceptable LOS without improvements and that the proposed improvements improved freeway operations throughout even though the LOS of some segments remained below an acceptable LOS. The following segments remain below an acceptable LOS for the Proposed Improvements.

Northbound General Purpose Lanes (LOS F for Proposed Improvements) (2030 traffic forecast)

- Beginning of Project to Valwood Parkway Off – 10,839 in 5 lanes (2,168/hour/lane)
- Valwood Parkway Pkwy off to Valley View On – 9662 in 4 lanes (2,415/hour/lane)
- Valley View On to Valwood Parkway On – 10,405 in 4 lanes (2,602/hour/lane)
- Beltline Road Off to Whitlock Off – 10,422 in 4 lanes (2,607/hour/lane)
- Whitlock Off to Beltline Rd On – 9,750 in 4 lanes (2,438/hour/ane)
- Beltline Road On to Dickerson Off – 10,856 in 5 lanes (2,172/hour/lane)
- Dickerson Off to SH 190 Off – 10,051 in 4 lanes (2,513/hour/lane)
- Frankford On to Fm 3040 Off/Hebron Pkwy – 6,503 in 4 lanes (2,168/hour/lane)

The capacity of a single northbound lane is 2100 vehicle/hour/lane and for the managed lanes the capacity should be capped around 1500 vehicles/hour/lane. Assuming that additional traffic in the general purpose lanes could pay to ride in the managed lane, around 500 vehicles could be shifted from the general purpose lanes to the managed lanes. Out of the eight sections listed above three would operate at an acceptable LOS after shifting traffic (Beginning of Project to Valwood Parkway Off, Beltline Road On to Dickerson Off, and Frankford On to FM 3040 Off/Hebron Pkwy). The other five segments will not operate at an acceptable LOS without adding an additional lane of capacity to the general purpose lanes or the managed lanes but will operate better than a No-Build Alternative.

The vehicles per hour per lane for the No-Build Alternative with the 2030 traffic forecast would range from 3700 vehicles/hour/lane to 5100 vehicles/hour/lane which greatly exceeds the capacity of 2100 vehicles/hour/lane.

Comparing the No-Build alternative to the forecasted 2010 traffic volumes for the section from IH 635 (LBJ) to the Direct Connectors to/from SH 190 (PGBT) provides a vehicle/hour/lane range from 2300 vehicles/hour/lane to 2600 vehicles/hour/lane which also exceeds the capacity. The proposed improvements will definitely provide needed benefits.

Southbound General Purpose Lanes (LOS F for Proposed Improvements) (2030 traffic forecast)

- FM 3040 On to Frankford Off – 6,549 in 3 lanes (2,183/hour/lane)
- Dickerson On to Beltline Off – 10,539 in 5 lanes (2,108/hour/lane)
- Beltline Off to Whitlock On – 9,610 in 4 lanes (2,403/hour/lane)
- Whitlock On to Beltline On – 10,477 in 4 lanes (2,620/hour/lane)
- Beltline On to Valwood Off – 11,247 in 5 lanes (2,250/hour/ane)
- Valwood Off to Valley View Off – 10,468 in 4 lanes (2,617/hour/lane)
- Valley View off to Valwood On – 9,636 in 4 lanes (2,409/hour/lane)
- Valwood On to End of Project – 10,671 in 5 lanes (2,135/hour/lane)

The capacity of a single southbound lane is 2100 vehicles/hour/lane and for the managed lanes the capacity should be capped around 1500 vehicles/hour/lane. Assuming that additional traffic in the general purpose lanes could pay to ride in the managed lane, around 600 vehicles could be shifted from the general purpose lanes to the managed lanes. Out of the eight sections listed above three would operate at an acceptable LOS after shifting traffic (FM 3040 On to Frankford Off, Dickerson On to Beltline Off, and Valwood On to End of Project). The other five segments will not operate at an acceptable LOS without adding an additional lane of capacity to the general purpose lanes or the managed lanes but will operate better than a No-Build Alternative.

The No-build alternative with 2030 traffic forecast indicates that the vehicles per lane would range from 3390 vehicles/hour/lane to 4600 vehicles/hour/lane which also greatly exceeds the capacity of 2100 vehicles/hours/lane.

Comparing the No-Build alternative to the forecasted 2010 traffic volumes for the section from the Direct Connectors of SH 190 to IH 635 (LBJ) provides a vehicle/hour/lane range from 2300 vehicles/hour/lane to 2700 vehicles/hour/lane which also exceeds the capacity. As indicated in the northbound direction, the proposed improvements for southbound IH 35 will definitely provide needed benefits.

RAMP JUNCTIONS ANALYSIS

A ramp is a portion of the roadway that provides connectivity between two highway segments. The freeway volume and ramp volume are the controlling features in a ramp junction analysis. Due to auxiliary lanes several sections were analyzed as weaving sections. In places where a lane addition or lane drop is caused by a ramp junction, the section was analyzed as a freeway segment.

A summary of the ramp junction analysis is indicated in **Table 15 and 20**. The following table shows the LOS analysis for the build scenario in the northbound direction. **Appendix D** indicates the results of the operational analysis.

TABLE 15: GENERAL PURPOSE RAMP JUNCTION BUILD LOS (NORTHBOUND)		
RAMP JUNCTION	TYPE	LOS
		2030
Valley View On	Merge	F
Whitlock Exit	Diverge	F
SH 190/PGBT Exit	Diverge	F
Frankford Exit	Diverge	D
Frankford Entrance	Merge	F
FM 3040 Exit	Diverge	F
SH 121 Entrance	Merge	E
HOV Entrance	Merge	C
HOV Exit	Diverge	E
Fox Exit	Diverge	F
Lake Park Entrance	Merge	D
S. Denton Drive Exit	Diverge	E
Hundley Exit	Diverge	E
HOV Exit	Diverge	D
Post Oak Exit	Diverge	E
Teasley Exit	Diverge	C
HOV Entrance (Hundley)	Merge	D
HOV Entrance (Loop 288)	Merge	C
US 77 Entrance	Merge	D
Fort Worth Exit	Diverge	D
Bonnie Brae Exit	Diverge	E
IH35W DC (Exit)	Diverge	D
Bonnie Brae Entrance	Merge	C
Oak Street Exit	Diverge	C
Oak Street Entrance	Merge	B

TABLE 16: MANAGED LANES RAMP JUNCTION BUILD LOS (NORTHBOUND)		
RAMP JUNCTION	TYPE	LOS
		2030
Crosby Exit	Diverge	C
Belt Line Road Entrance	Merge	B
Dickerson Exit	Diverge	C
GPL-Corporate Drive Exit	Diverge	B
SH 121FM 3040 Entrance	Merge	C
Corporate Drive On	Merge	B
Valley Ridge Exit	Diverge	B
Valley Ridge Entrance	Merge	B
Lake Park Entrance	Merge	B
Hundley Exit	Diverge	B
Swisher Exit	Diverge	A
Dobbs Entrance	Merge	A
Loop 288 Exit	Diverge	A
US 77 Exit	Diverge	A
Teasley Exit	Diverge	A
Teasley Entrance	Merge	A

TABLE 17: GENERAL PURPOSE RAMP JUNCTION BUILD LOS (SOUTHBOUND)		
RAMP JUNCTION	TYPE	LOS
		2030
Oak Street Exit	Diverge	C
Bonnie Brae Exit	Diverge	C
IH 35 D. C. Entrance	Merge	D
HOV (Teasley)Entrance	Merge	C
HOV (Teasley) Exit	Diverge	D
Fort Worth Entrance(US 377)	Merge	C
US 77 Exit	Diverge	D
Teasley Lane Entrance	Merge	C
US 77 Entrance	Merge	C
FM 2499 Exit	Diverge	D
HOV (Corinth) Entrance	Merge	D
Swisher Exit	Diverge	B
HOV (Denton)Exit	Merge	D
Swisher Entrance	Merge	C
S. Denton Dr. Entrance	Merge	D
Highland Village Exit	Diverge	E
FM 407 Exit	Diverge	E
Garden Ridge Entrance	Merge	D
Valley Ridge Exit	Diverge	D
FM 1171 Exit	Diverge	E
Valley Ridge Entrance	Merge	D
HOV Entrance	Merge	E
FM 3040/BUS121 Exit	Diverge	F
HOV Exit	Diverge	C
FM 3040 Entrance	Merge	F
Frankford Rd Exit	Diverge	F
Frankford Rd Entrance	Merge	E
SH 190/PGBT Entrance	Merge	F
Whitlock Lane Entrance	Merge	F
Valley View Ln Exit	Diverge	F
Valwood Pkwy Entrance	Merge	F

TABLE 18: MANAGED LANES RAMP JUNCTION BUILD LOS (SOUTHBOUND)		
RAMP JUNCTION	TYPE	LOS
		2030
Teasley Exit	Merge	A
US 377 Entrance	Merge	A
US 77 Entrance	Merge	A
Loop 288 Entrance	Merge	A
Corinth Exit	Diverge	A
Swisher Entrance	Merge	B
GPL-Hundley Entrance	Merge	B
FM 407 Exit	Diverge	B
Lake Park Exit	Diverge	B
Valley Ridge Exit	Diverge	A
Valley Ridge Entrance	Merge	B
Corporate Exit	Diverge	B
SH 121 Exit	Diverge	B
Dickerson Entrance	Merge	C
Beltline Road Exit	Diverge	C
Crosby Entrance	Merge	C

TABLE 19: RAMP JUNCTION NO-BUILD LOS (NORTHBOUND)

Freeway Segment	TYPE	LOS
		2030
Valley View Lane On Ramp	Merge	F
Valwood Parkway Off Ramp	Diverge	F
Belt Line Road Off Ramp	Diverge	F
Belt Line Road On Ramp	Merge	F
Whitlock Road Off Ramp	Diverge	F
Whitlock Road On Ramp	Merge	F
PGBT Off Ramp	Diverge	F
Frankford Road Off Ramp	Diverge	F
EB PGBT On Ramp	Merge	F
WB PGBT On Ramp	Merge	F
Frankford Road On Ramp	Merge	F
SH 121 Toll Off Ramp	Diverge	F
SH 121 Off Ramp	Diverge	F
FM 3040 Off Ramp	Diverge	F
SH 121 On Ramp	Merge	F
FM 3040 On Ramp	Merge	F
Corporate Drive Off Ramp	Diverge	F
Corporate Drive On Ramp	Merge	F
Bus SH 121 Off Ramp	Diverge	F
FM 1171 Off Ramp	Diverge	F
Fox Avenue On Ramp	Merge	F
Valley Ridge Boulevard Off Ramp	Diverge	F
Fm 1171 On Ramp	Merge	F
Valley Ridge Boulevard On Ramp	Merge	F
Lake Park Road Off Ramp	Diverge	F
E Jones Street On Ramp	Merge	F
Lake Park Road On Ramp	Merge	F
Garden Ridge Boulevard Off Ramp	Diverge	F
Garden Ridge Boulevard On Ramp	Merge	F
S. Denton Drive Off Ramp	Diverge	F
Hundley Drive Off Ramp	Diverge	F
Dobbs Road Off Ramp	Diverge	F

TABLE 19: RAMP JUNCTION NO-BUILD LOS (NORTHBOUND) (CONTINUED)		
Freeway Segment	TYPE	LOS
		2030
Quail Run On Ramp	Merge	F
Corinth Parkway Off Ramp	Diverge	F
Corinth Parkway On Ramp	Merge	F
Post Oak Road Off Ramp	Diverge	F
Post Oak Road On Ramp	Merge	F
Mayhill Road Off Ramp	Diverge	F
Loop 288 Off Ramp	Diverge	F
Mayhill Road On Ramp	Merge	F
Loop 288 On Ramp	Merge	F
US 77 Off Ramp	Diverge	F
US 77 On Ramp	Merge	F
Teasley Road Off Ramp	Diverge	F
Teasley Road On Ramp	Merge	F
Fort Worth Drive Off Ramp	Diverge	F
IH 35W On Ramp	Merge	E
Oak Street On Ramp	Merge	F
US 380 Off Ramp	Diverge	F

TABLE 20: RAMP JUNCTION NO-BUILD LOS (SOUTHBOUND)		
Freeway Segment	TYPE	LOS
		2030
US 380 On Ramp	Merge	F
Oak Street Off Ramp	Diverge	F
IH 35W Off Ramp	Diverge	F
IH 35DC On Ramp	Merge	F
N. Texas Boulevard Off Ramp	Diverge	F
Fort Worth Drive On Ramp	Merge	F
Teasley Lane Off Ramp	Diverge	F
Teasley Lane On Ramp	Merge	F
US 77 Off Ramp	Diverge	F
US 77 On Ramp	Merge	F
Loop 288 Off Ramp	Diverge	F
FM 2499/Mayhill Off Ramp	Diverge	F
Loop 288 On Ramp	Merge	F
FM 2499/Mayhill On Ramp	Merge	F
Post Oak Road Off Ramp	Diverge	F
Post Oak Road On Ramp	Merge	F
Corinth Parkway Off Ramp	Diverge	F
Corinth Parkway On Ramp	Merge	F
Meadowview Dr Off Ramp	Diverge	F
Dobbs Road On Ramp	Merge	F
Swisher Road On Ramp	Merge	F
Country Lane/S. Denton On Ramp	Merge	F
Garden Ridge Boulevard Off Ramp	Diverge	F
Garden Ridge Boulevard On Ramp	Merge	F
Ramp to FM 407 Off Ramp	Diverge	F
Valley Ridge Boulevard Off Ramp	Diverge	F
FM 1171 Off Ramp	Diverge	F
Valley Ridge Boulevard On Ramp	Merge	F
Bus 121 On Ramp	Merge	F
Corporate Road Off Ramp	Diverge	F
Corporate Road On Ramp	Merge	F

TABLE 20: RAMP JUNCTION NO-BUILD LOS (SOUTHBOUND) (CONTINUED)		
Freeway Segment	TYPE	LOS
		2030
FM 3040 Off Ramp	Diverge	F
SH 121 Off Ramp	Merge	F
FM 3040 On Ramp	Merge	F
SH 121 On Ramp	Merge	F
SH 121 Toll On Ramp	Merge	F
Frankford Road Off Ramp	Diverge	F
EB PGBT Off Ramp	Diverge	F
WB PGBT Off Ramp	Diverge	F
Frankford Road On Ramp	Merge	F
PGBT On Ramp	Merge	F
Sandy Lake/Whitlock Road Off Ramp	Diverge	F
Sandy Lake/Whitlock Road On Ramp	Merge	F
Belt Line Road Off Ramp	Diverge	F
Belt Line Road On Ramp	Merge	F
Valwood Parkway On Ramp	Merge	F
Valley View Lane Off Ramp	Diverge	F

The analysis shows that some of the ramp sections along IH 35E will not operate at an acceptable LOS for the 2030 traffic forecast. The ramps between SH 190 and IH 635 (LBJ) have poor ramp junction analysis because of poor LOS for the General Purpose Lanes. **Appendix D** includes the HCS output results of the operational analysis.

A total of six ramps northbound and seven ramps southbound will operate at a LOS F. The ramps on the southern end of the corridor, (northbound: Valley View On, Whitlock Exit, and SH 190/PGBT Exit) (southbound: SH 190/PGBT Entrance, Whitlock Lane Entrance, Valley View Lane Exit, and Valwood Pkwy Entrance) have too much congestion on the general purpose lanes to operate effectively. The other ramps (northbound: Frankford Entrance, FM 3040 Exit, and Fox Exit) (southbound: FM 3040 Exit, FM 3040 Entrance, and Frankford Rd Exit) all have high ramp volumes above the capacity of a single merge/diverge.

The No-Build alternative analysis indicates that All of the ramps would operate with unacceptable LOS (F). The LOS analysis of the proposed ramp improvements, (improved geometry, increased spacing between ramps, reversal and combining of ramps) clearly indicates that revisions are needed to the access for IH 35. Some ramps could not be relocated due to the existing spacing of crossovers (destinations).

WEAVING ANALYSIS

A weaving segment is defined by the Highway Capacity Manual as the crossing of two or more traffic paths traveling in the same general direction along a roadway without the aid of traffic control devices. The weaving area occurs between the merge and diverge points. The ramp spacing, weaving segment length and volumes are the major factors contributing to the performance. The Highway Capacity Manual methodology can be applied to weaving segments less than 2,500 feet. Weaving areas that are longer than 2,500 were analyzed separately as merge and diverge sections.

As shown in the Figures in Appendix A, weaving areas will exist in the proposed configuration, but shifting from a ramp diamond- to X-configuration will improve the overall operation. The proposed configuration alters the ramping scheme in an effort to minimize weaving impacts on the IH 35E mainlanes.

TABLE 21: GENERAL PURPOSE WEAVING BUILD LOS (NORTHBOUND)

Segment	2030 DDHV Mainlanes	2030 DDHV On-Ramp	2030 DDHV Off-Ramp	LOS	Density (pc/mi/ln)
Valwood Entrance to Beltline Exit	9573	849	832	F	52.21
Belt Line Road Entrance to Dickerson Exit	8945	1106	805	F	49.0
FM 3040 Entrance to Corporate Exit	8281	1318	1088	F	54.38
Fox Entrance to Valley Ridge Exit	6192	1203	938	F	47.96
FM 1171 Entrance to Lake Park Exit	6705	752	690	F	46.16
Valley Ridge Entrance to Garden Ridge Exit	6537	920	902	F	46.02
Hundley Entrance to Dobbs Exit	6119	664	540	E	39.6
Corinth Entrance to Mayhill Exit	4977	894	761	D	34.08
Post Oak Entrance to Loop 288 Exit	4995	743	372	D	31.46
Mayhill Entrance to US 77 Exit	4668	787	699	D	33.32
Teasley Entrance to McCormick Exit	4782	867	814	D	30.66
US 377 Entrance to N. Texas Exit	5224	761	425	D	31.41

TABLE 22: GENERAL PURPOSE WEAVING BUILD LOS (SOUTHBOUND)

Segment	2030 DDHV Mainlanes	2030 DDHV On-Ramp	2030 DDHV Off-Ramp	LOS	Density (pc/mi/ln)
N. Texas entrance to US 377 (Ft Worth Ave) Exit	4248	1495	770	D	33.67
McCormick Entrance to Teasley Exit	4549	1194	717	D	31.47
Loop 288 Entrance to Post Oak Exit	4902	991	345	D	31.29
Mayhill Entrance to Corinth Exit	5363	1018	540	D	31.77
Post Oak Entrance to Meadow Oaks Exit	6311	1310	389	E	36.22
Dobbs Entrance to Hundley Exit	6267	708	628	D	34.88
FM 1171 Entrance to BUS 121 Exit	7174	1177	964	F	51.31
BUS 121 on to FM 3040 Exit	7566	1469	867	F	49.43
Fox Entrance to Corporate Exit	7256	991	832	F	49.53
Dickerson Entrance to Belt Line Road Exit	9044	929	566	F	48.83
Beltline Road Entrance to Valwood Exit	9698	779	566	F	53.07

TABLE 23: WEAVING NO-BUILD LOS (NORTHBOUND)

Segment	2030 DDHV Mainlanes	2030 DDHV On-Ramp	2030 DDHV Off-Ramp	LOS	Density (pc/mi/ln)
Valwood Entrance to Crosby Exit	11988	849	602	F	101.20
BUS SH121 On to Fox Off	10254	760	443	F	63.29
US 377 Entrance to McCormick Exit	5896	761	814	F	75.27
McCormick Entrance to N. Texas Exit	6232	89	425	F	56.00
N. Texas Entrance to IH 35W Exit	3878	89	2442	F	69.05

TABLE 24: WEAVING NO-BUILD LOS (SOUTHBOUND)

Segment	2030 DDHV Mainlanes	2030 DDHV On-Ramp	2030 DDHV Off-Ramp	LOS	Density (pc/mi/ln)
N. Texas entrance to McCormick Exit	5278	1495	80	F	70.65
McCormick Entrance to US 377 Exit	6003	717	770	F	66.50
FM 1171 On to Fox Off	9770	965	443	F	74.71
Fox On to BUS 121 Exit	9558	991	1177	F	82.34
Crosby Entrance to Valwood Exit	11856	690	779	F	100.29

A total of six weaving sections northbound and five southbound will operate at a LOS F for the 2030 traffic forecast. These weave sections are from the southern end of the corridor up into Lewisville. All of these sections have heavy congestion and heavy ramp volumes. Many of these occur where X ramp configuration is used so that more traffic is moved on to the frontage road. During the MIS process many of these ramps were evaluated for braiding but due to the complex nature of total reconstruction it was determined that this layout was the locally preferred alternative and it does improve the conditions compared to the no-build scenario.

All of the No Build Weaving sections operate with a LOS F.

DIRECT CONNECTOR ANALYSIS

There is no detailed HCS analysis procedure for direct connectors (freeway to freeway connectors); however, an approximation can be made to evaluate the Collector-Distributors as basic freeway sections. The direct connectors that are affected pertain to the connection with PGBT and SH 121 Toll that are connected IH 35E through a pair of collector-distributor ramp connectors.

COLLECTOR-DISTRIBUTOR (DIRECT CONNECTORS)

Collector-distributor (C/D) roads are one-way roads parallel to the main traffic lanes providing access to or from more than one ramp. The C/D road collects traffic from on-ramps or the main lanes, and distributes traffic to off-ramps or back to the main lanes. This minimizes the number of interactions with through traffic, which can increase capacity and safety on the main lanes of the freeway. In this study the C/D road provides access to PGBT and SH 121 Toll and can be divided into seven segments. **Table 25** provides the analysis for the four segments northbound and southbound that are within the limits of this study.

TABLE 25: COLLECTOR-DISTRIBUTOR LOS			
Collector-Distributor Segment	Number of Lanes	2030 DHV	LOS
Northbound Collector-Distributor Analysis 2030 DHV			
Managed Lanes Off ramp to General Purpose Lanes Merge	1	1416	F
Merge From General Purpose Lanes to PGBT Off-Ramp	4	5,539	D
PGBT Off-Ramp to On-Ramp	2	3,310	D
PGBT On-Ramp to SH 121 Toll Off-Ramp	4	7,160	E
SH 121 Toll Off-Ramp to On-Ramp	4	3,992	C
SH 121 Toll On-Ramp to Diverge to Managed Lanes	4	4,637	C
Diverge to Managed Lanes to General Purpose Lanes	4	3,353	B
DC from IH 35W to IH 35	3	3466	B
Southbound Direct Connect Analysis 2030 DHV			
DC to IH 35W Westbound	3	3300	C
General Purpose Lanes to Merge Form Managed Lanes	2	4,008	F
Merge Form Managed Lanes to SH 121 Toll Off-Ramp	3	4,575	D
SH 121 Toll On-Ramp to Off-Ramp	2	4,054	E
SH 121 Toll On-Ramp to PGBT Off-Ramp	4	7,134	E
PGBT Off-Ramp to On-Ramp	2	3,372	F
PGBT On-Ramp to Diverge to General Purpose Lanes	4	5,450	D
Diverge to General Purpose Lanes to Managed Lanes On-ramp	2	4,061	F

SECTION 4: ACCESS CONNECTIVITY

The proposed access connects to a public road only and will provide for all traffic movements. Less than “full interchanges” for special purpose access for transit vehicles, for HOV’s, or into park and ride lots may be considered on a case by case basis. The proposed access will be designed to meet or exceed current standards for Federal-aid projects on the Interstate System.

The proposed design improves local circulation, increases capacity and improves safety. Local access is maintained with ramps and frontage roads that meet current design standards. The increased capacity of this design improves local, regional and interstate commerce. This facility provides northbound and southbound freeway to freeway connections between IH 35E-SH 190 (PGBT) and between IH 35E-SH 121. These improvements meet or exceed all current design standards for Federal aid projects on the Interstate System.

SECTION 5: REGIONAL PLAN

The proposal considers and is consistent with local and regional land use and transportation plans. Prior to final approval, all requests for new or revised access must be consistent with the metropolitan and/or statewide transportation plan, as appropriate, the applicable provisions of 23 CFR Part 450 and the transportation conformity requirements of 40 CFR Parts 51 and 93.

Federal, state and local transportation expenditures are guided by the regional transportation plan. Eight regional transportation plans have been developed: 1) *The Total Transportation Plan for the North Central Texas Region for 1990*, published 1974; 2) *Mobility 2000 – The Regional Transportation Plan for North Central Texas*, published May 1986; 3) *The Regional Transportation Plan for North Central Texas*, published October 1993; 4) *Mobility 2020: The Metropolitan Transportation Plan*, published 1997; 5) *Mobility 2025: The Metropolitan Transportation Plan*, published May 2001; 6) *Mobility 2025-2004 Update: The Metropolitan Transportation Plan*, published January 2004; 7) *Mobility 2030: The Metropolitan Transportation Plan*, published January 2007; and 8) *Draft Mobility 2030: The Metropolitan Transportation Plan—2009 Amendment* approved in April 2009.

Mobility 2030 was prepared by the North Central Texas Council of Governments (NCTCOG) and coordinated among local and state authorities. The plan outlines the transportation needs identified through travel demand forecasting, evaluating system alternatives and selecting those options that best meet the long-term regional mobility needs. The plan includes adding freeway capacity to IH 35E within the study area. The proposed configuration adds additional mainlane and managed HOV capacity. The recommendations from the *Draft Mobility 2030-2009 Amendment* are shown in **Table 26**.

The revised access points are consistent with the policies and goals set forth by the North Central Texas Council of Governments (NCTCOG) in the *Mobility 2030–2009 Amendment*. These proposed improvements are also incorporated in all improvement plans for Dallas County, the Texas Department of Transportation, and the Federal Highway Administration.

TABLE 26: MOBILITY 2030 – 2009 AMENDMENT RECOMMENDATIONS

Freeway	Location	Existing Configuration	Mobility 2030 Configuration	Proposed Configuration
NCTCOG Mobility 2030				
IH 35E	LBJ-to President George Bush Turnpike (PGBT)	6 Lanes + 2 (HOV-C)	8 Lanes +4 (Managed Lanes)	8 Lanes +4 (Managed Lanes)
IH 35E	PGBT to SH 121	6 Lanes + 2 (HOV-C)	6 Lanes + 6/8 CD Lanes +4 (Managed Lanes)	6 Lanes+ 6/8 CD Lanes +4 (Managed Lanes)
IH 35E	SH 121 to FM 407	6 Lanes	8 Lanes +4 (Managed Lanes)	8 Lanes +4 (Managed Lanes)
IH 35E	FM 407 to FM 2181	6 Lanes	8 Lanes +4 (Managed Lanes)	8 Lanes +4 (Managed Lanes)
IH 35E	FM 2181 to Quail Run	6 Lanes	8 Lanes +4 (Managed Lanes)	8 Lanes +4 (Managed Lanes)
IH 35E	Quail Run to US 77 (South)	4 Lanes	8 Lanes +4 (Managed Lanes)	8 Lanes +4 (Managed Lanes)
IH 35E	US 77(South) to US 377	4 Lanes	8 Lanes +2 (Managed Lanes)	8 Lanes +2 (Managed Lanes)
IH 35E	US 377 to IH 35W	4 Lanes	6 Lanes +2(Managed Lanes)	6 Lanes +2 (Managed Lanes)
IH 35E	IH 35W to US 380	4 Lanes	10 Lanes +4(Managed Lanes)	10 Lanes +4 (Managed Lanes)

SECTION 6: COMPREHENSIVE NETWORK

In areas where the potential exists for future multiple interchange additions, all requests for new or revised access are supported by a comprehensive Interstate network study with recommendations that address all proposed and desired access within the context of a long-term plan.

This section of IH 35E is included in the *IH 35E Major Investment Study* by the Dallas District of the Texas Department of Transportation, and the *I-35 Trade Corridor Study* by the FHWA. Sections of IH 35E adjacent to this project are being studied in the *IH 35E Major Investment Study* (to the north), and the *Northwest Corridor Major Investment Study* (to the south). The North Central Texas Council of Governments (NCTCOG) also includes this section in their *Mobility 2030*, a long-term transportation plan for the DFW area. Improvement evaluations for IH 35E were conducted within the context of these comprehensive studies, and ***no future interchanges are proposed within or adjacent to the study area.*** Continuity of the interstate system is maintained.

SECTION 7: AGENCY COORDINATION

The request for a new or revised access generated by new or expanded development demonstrates appropriate coordination between the development and related or otherwise required transportation system improvements.

It is TxDOT's intent to improve safety and efficiency of travel on IH 35E. These improvements will directly impact the cities of Farmers Branch, Carrollton, Coppell, Corinth, Hickory Creek, Highland Village, Lake Dallas and Lewisville. Representatives of these cities, along with DART, North Texas Tollway Authority, TxDOT, TTI and NCTCOG have attended policy workgroup meetings to review the proposed changes and ensure that it matched the current and proposed development in the study area.

SECTION 8: ENVIRONMENTAL DOCUMENTATION

The request for new or revised contains information relative to the planning requirements and the status of the environmental processing of the proposal.

The draft Environmental Assessment (EA) is currently being resubmitted for review to TxDOT Environmental Affairs. The draft EA does include discussion of the proposed Managed lanes and new general purpose lanes.

The Public Involvement activities have been significant. Improvements to the IH 35E corridor were initially investigated as part of the IH 35E MIS beginning in 1998. Nine meetings of a Project Coordination Work Group (PCWG) were held between 1998 and 2000. Seven public meetings were held between 1999 and 2003 (at various locations along the corridor).

Following project design changes, three additional public meetings were held in November 2008 within the Cities of Denton, Lewisville, and Farmers Branch. Additional Stakeholder meetings were held in December 2008, February 2009, and May 2009.

SUMMARY AND CONCLUSIONS

The proposed design is to upgrade IH 35E from a four to six lane interstate (2 to 3 lanes in each direction) freeway to an six to eight lane interstate highway with two to four concurrent Managed Lanes from IH 635 (LBJ) to US 380.

With auxiliary lanes, some sections of the interstate will be six and seven lanes in each direction. Although current access is maintained, the ramping scheme will be altered in an effort to benefit mainlane traffic by decreasing the weaving interaction. In addition to the lack of current mainlane capacity, the weaving areas cause poor operation. The proposed configuration reduces the amount of traffic weaving on the mainlanes by switching the ramping scheme from a diamond- to an X-configuration, and forcing the weaving to occur on the frontage roads. The purpose of the ramping changes was to benefit the mainlane traffic by eliminating weaving areas.

Due to significant urban development along the corridor, ramp weaving distances were maximized but limited by numerous arterial cross streets

The analysis supports the justification for upgrading IH 35E to the proposed design. If IH 35E were to remain in its current design, all freeway and ramp segments in the study area would operate at LOS F for the design year. Although the non-freeway alternatives would alleviate a portion of the congestion, the projected traffic demand requires that modifications be made to the freeway as well. The *Mobility 2030* report written by the NCTCOG supports this conclusion, and an upgraded IH 35E is the local governments preferred solution. Due to limiting factors, the freeway is limited to a future growth of ten-lanes, and future reliever routes need to be created to address IH 35E's growing traffic volumes.

Since the 1960's when IH 35E was built, specific design elements have been modified to increase the safety of our freeways. The ramps in this study section do not currently provide sufficient distance to accelerate or decelerate safely. A few ramps are of very short length causing significant speed variation for entering and exiting vehicles. The location of these ramps is generally at the intersection of major arterials which creates long queues that back up into the mainlanes of the freeway. These short ramps create safety issues considering the speeds along IH 35E.

In conclusion, increased capacity and the alteration of the current ramping scheme are necessary to accommodate local and regional travel demand. Therefore, the proposed configuration has shown to accommodate this future demand.

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APPENDIX A

FIGURES 11 AND 19

YEAR 2030 ANTICIPATED ADT AND DDHV VOLUMES

APPENDIX B

FREEWAY SEGMENT

LEVELS OF SERVICE HCS OUTPUT

APPENDIX C

RAMP JUNCTION

LEVELS OF SERVICE HCS OUTPUT

APPENDIX D

WEAVING ANALYSIS

HCS OUTPUT