FEASIBILITY STUDY
MANAGED LANE ACCESS ISSUE REPORT

INTERSTATE 35E FROM INTERSTATE 635 TO PRESIDENT GEORGE BUSH TURNPIKE

TEXAS DEPARTMENT OF TRANSPORTATION

DALLAS DISTRICT

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FREEWAY MAINLANE/MANAGE LANE ANALYSIS

Introduction

The purpose of this analysis is to evaluate the lane requirements based upon 2030/2040 ADT traffic volumes along IH35E between IH635 and PGBT. This approach will include proposed managed lanes that are designated lanes that would be tolled and may be utilized by both High Occupancy Vehicles (HOV) and Single Occupancy Vehicles (SOV). The primary purpose of managed lanes is to provide additional capacity in the corridor, provide trip reliability for HOV and transit, improve air quality, increase vehicle occupancy and generate revenue to construct, operate and maintain facilities.

Corridor Lane Configuration

In order to effectively analyze the IH35E corridor, an estimated number of lanes had to be determined using an estimated (assumed) vehicles per day (vpd) that each mainlane could support. The estimated total corridor average daily traffic (ADT) at any given time was determined to be 20,000 vpd per each mainlane. However, using the information provided by TxDOT as seen in Table 1 resulted in an estimated total corridor ADT at any given time to be 21,800 vpd per mainlane.

Table 1: Peaking Information for Calculations

Peak Hour Factor	=	0.9
Terrain	=	Level
K factor	=	0.083
Directional Distribution, "D" factor	=	0.58
Design Speed Mainlanes	=	70 mph
Design Speed Managed Lanes	=	70 mph
Design Speed Ramps	=	50 mph
Percent Trucks (DHV)	=	5.10%

Utilizing both 20,000 and 21,800 vpd the number of lanes per each segment of IH35E between IH635 and SH190 were determined and can be seen in Tables 2 and 3 below.

Table 2: IH35E Traffic Volumes (20,000 vpd)

			IH35E 2030 Traffic Counts (ADT)		# of Lanes	
Cross-Streets			Northbound	Southbound	Northbound	Southbound
IH 635	-	Valley View	134700	137300	7	7
Valley View	-	Valwood	124100	127300	6	6
Valwood	-	Crosby	125400	127100	6	6
Crosby	-	Belt Line	124800	127500	6	6
Belt Line	-	Sandy Lake	113700	114700	6	6
Sandy Lake	-	SH 190	103300	99200	5	5

			IH35E 2040 Traffic Counts (ADT)		# of Lanes	
Cross-Streets			Northbound	Southbound	Northbound	Southbound
IH 635	-	Valley View	145900	148800	7	7
Valley View	-	Valwood	134600	138100	7	7
Valwood	-	Crosby	136300	138200	7	7
Crosby	-	Belt Line	135800	138800	7	7
Belt Line	-	Sandy Lake	123900	125100	6	6
Sandy Lake	-	SH 190	112800	108600	6	5

Table 3: IH35E Traffic Volumes (21,800 vpd)

			IH35E 2030 Traffic Counts (ADT)		# of Lanes	
Cross-Streets			Northbound	Southbound	Northbound	Southbound
IH 635	-	Valley View	134700	137300	6	6
Valley View	-	Valwood	124100	127300	6	6
Valwood	-	Crosby	125400	127100	6	6
Crosby	-	Belt Line	124800	127500	6	6
Belt Line	-	Sandy Lake	113700	114700	5	5
Sandy Lake	-	SH 190	103300	99200	5	5
			IH35E 2040 Traffic Counts (ADT)		# of Lanes	
Cross-Streets			Northbound	Southbound	Northbound	Southbound
IH 635	-	Valley View	145900	148800	7	7
Valley View	-	Valwood	134600	138100	6	6
Valwood	-	Crosby	136300	138200	6	6
Crosby	-	Belt Line	135800	138800	6	6
Belt Line	-	Sandy Lake	123900	125100	6	6
Sandy Lake	-	SH 190	112800	108600	5	5

Utilizing the information presented in both Table 2 and 3, the analysis indicated that a 12 to 14-lane configuration would be needed in order to accommodate the future traffic volumes along IH35E. The current lane configuration for IH35E between IH635 and PGBT is a 3-1-1-3 that utilizes reversible HOV lane at the IH35E/IH635 interchange. The existing freeway configuration cannot provide adequate capacity for the future traffic volumes.

IH 35E Mainlanes Tying to the South

IH35E under IH635 under previous schematics were assumed be have a 4-2-4 configuration with two lanes entering/exiting IH635 to/from the north. Northbound, the four IH35E through lanes would gain two additional lanes (making a total of 6 lanes northbound) from IH635 with a lane drop at Valley View Lane to achieve a 5-2-5 configuration.

Per the IH635 project, IH35E is projected as a 3-1-1-3 section with managed lane connections just south of Valley View Lane to/from the IH635 interchange. Direct connectors to IH35E mainlanes are also anticipated from the IH635 frontage roads.

Based upon the above-mentioned section, for managed lane consistency and to provide a traffic pathway for managed lane traffic if a vehicle breaks down, a minimum of two lanes should be anticipated for the IH35E corridor between IH635 and PGBT. Therefore, a 3-2-2-3 configuration is assumed under IH635. Traffic counts for IH635 to northbound IH35E justify a three-lane direct connector.

Because lane proportions between the managed lanes and the main lanes are unknown at this time, two separate lane configurations were evaluated for the above-mentioned section of IH35E, a 4-3-3-4 and a 5-2-2-5 lane configuration. Both configurations accommodate the seven lanes in each direction needed from the capacity tables above but each has some benefits and assumptions which would recommend each alternative. Both configurations would have a two-lane ramp from IH635 to IH35E mainlanes and one lane to the IH35E managed lanes. The major differences are in how the ramps are accommodated. Under the 5-2-2-5, scenario the ramp from IH635 to the IH35E managed lanes would be a merge configuration, while the two lanes entering the mainlanes would be lane additions. Under the 4-3-3-4 configuration the ramp from IH635 to the IH35E managed lanes would be a lane addition and the Valley View Lane exit would be a lane drop on the mainlanes similar to the current schematic to achieve four mainlanes in each direction.

4-3-3-4 Lane Configuration

This lane configuration would maximize the managed lane concept. This could generate revenue beyond what the 5-2-2-5 configuration could achieve. This configuration is also based on the assumption that the traveling public would rather “pay as you go” than attempt to navigate their way through the general purpose lanes. The “3rd” managed lane would be added/dropped at the entrance/exit ramps from IH635 & PGBT. Because the

IH35E lane configuration south of IH635 is proposed as a 3-2-2-3, the transition to a 4-3-3-4 would be not be impacted significantly. Since the 3rd managed lane would act as an add/drop lane the "free lanes" would experience a shifting taper to accommodate for the wider managed lane section. This configuration would assume more balance traffic from IH 635 between the managed lanes and the mainlanes with an approximate 30-70 split with a significant amount of traffic from IH 635 destined for north of PGBT.

5-2-2-5 Lane Configuration

This lane configuration will not generate as much revenue as the 4-3-3-4 lane configuration. The transition from the 4-2-2-4 lane configuration would not impact the managed lanes. However, to accommodate for the director connector from IH635 to the IH35E managed lanes, the IH35E footprint would have to "bubble" large enough to accommodate for proper merge length. In order to reduce ROW impacts, a separate structure for the managed lanes would be anticipated to accommodate for the direct connector from IH635. This structure may have to cantilever over the mainlanes for proper merge distance. Under this option, a shifting taper is not anticipated to occur as in the 4-3-3-4 lane configuration since the direct connector merge would be on structure. This configuration would assume reduced traffic from IH635 between the managed lanes and the mainlanes with less than a 20-80 split with a significant amount of traffic from IH 635 destined for south of PGBT.

Conclusion

Because of the significant amount of traffic from IH635 destined for northbound IH35E, two additional lanes along IH35E are anticipated. Because the 4-3-3-4 configuration is more conservative as far as ROW is concerned, it is recommended that the IH35E corridor accommodate for this footprint. This would allow the designer flexibility to convert to a 5-2-2-5 if future traffic demands it.

IH635 Interchange Design Connection

The eastbound to northbound IH635 direct connector will most likely fly over the direct connector from westbound IH635 to northbound IH35E and merge to the right rather than the left as shown in the currently approved IH635 concept. This is under the assumption that eastbound IH635 traffic to northbound IH35E traffic is destined to south of PGBT or the mainlanes. Eastbound IH635 traffic destined for the IH35E managed lanes would have utilized PGBT prior to IH35E. The managed lane ramp from the westbound IH635 direct connector to northbound IH35E will have to move further south than currently shown on the approved IH635 concept. This will allow for proper ramp spacing, traffic merge and signing.

Order of Design

For northbound IH35E the order of design would be as follows:

1. Direct Connector for westbound IH635 to northbound IH35E.
2. Direct Connector for eastbound IH635 to northbound IH35E.
3. Exit Ramp from IH635 Direct Connectors to northbound IH35E frontage road.
4. Exit Ramp from west/eastbound IH635 Direct Connectors to northbound IH35E mainlanes.
5. Direct Connector for westbound IH635 frontage road to northbound IH35E mainlanes.
6. Exit Ramp from westbound IH635 Direct Connector to northbound IH35E managed lanes.

For southbound IH35E the order of design would be as follows:

1. Direct Connector from southbound IH35E to eastbound IH635.
2. Direct Connector from southbound IH35E to westbound IH635.
3. Exit Ramp from southbound IH35E frontage road to east/westbound IH635 Direct Connectors.
4. Exit Ramp from southbound IH35E managed lanes to east/westbound IH635 Direct Connectors.
5. Exit Ramp from southbound IH35E mainlanes to east/westbound IH635 Direct Connectors.
6. Exit Ramp from southbound IH35E mainlanes to westbound IH635 frontage road.
7. Exit Ramp from southbound IH35E frontage road to southbound IH35E mainlanes.