

*FM 691 CORRIDOR PLAN*

For  
SHERMAN-DENISON  
METROPOLITAN PLANNING ORGANIZATION



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# Table of Contents

**Executive Summary ..... iii**

**1.0 Introduction ..... 1**

*Project Description..... 1*

*Need and Purpose ..... 3*

*Study Goals ..... 3*

*Methodology..... 4*

*Trip Generation ..... 5*

*Trip Distribution ..... 9*

*Trip Assignment ..... 10*

**2.0 The US 75/FM 691 Interchange ..... 16**

*Short-term (2010) Traffic Analysis ..... 17*

*Long-term (2015) Traffic Analysis ..... 19*

*US 75 Ramp Alternatives..... 21*

**3.0 The FM 691 Corridor ..... 27**

*Future Development and Roadway Network Changes..... 27*

*Functional Classification..... 27*

*Evaluation of FM 691 Corridor Improvements (SH 289 to FM 131/  
Loy Lake Road)..... 31*

*Evaluation of FM 691 Corridor Improvements (FM 131/  
Loy Lake Road to SH 91) ..... 35*

*Phasing of FM 691 Corridor Improvements ..... 35*

*Access Management..... 37*



<b>4.0</b>	<b>Public Involvement Process .....</b>	<b>45</b>
	<i>Technical Steering Committee Meeting .....</i>	<i>45</i>
	<i>Sherman-Denison MPO Transportation Policy Board Meeting .....</i>	<i>46</i>
	<i>Public Meeting.....</i>	<i>46</i>
<b>5.0</b>	<b>Study Recommendations and Phasing Plan.....</b>	<b>47</b>
	<i>Study Recommendations.....</i>	<i>47</i>
	<i>Phasing Plan.....</i>	<i>49</i>
 <b>Appendix A</b>		
 <b>Appendix B</b>		



## Executive Summary

The FM 691 Corridor Study was initiated to determine short and long term improvements of the US 75/FM 691 interchange as well as capacity improvements along the entire length of FM 691. With a significant level of development planned near the interchange, the study will present capacity improvements that will accommodate projected traffic volumes. With the planned extension of SH 289, located west of the North Texas Regional Airport/Perrin Field, the study will also evaluate potential FM 691 alignment extensions. The input of Texoma Council of Governments (TexomaCOG), Cities of Denison and Sherman officials, TxDOT, Grayson County officials and the general public was extremely important to the development of the specific goals of this study. Through meetings with these stakeholders, the following study goals for the project were determined.

- Improve mobility at the US 75/FM 691 interchange by developing an implementation plan with the addition of the Texoma Medical Center, the hotel/conference center, proposed Town Center and ancillary development;
- Improve east-west mobility by developing an implementation plan for the FM 691 corridor with the extension of FM 691 to future SH 289;
- Minimize environmental and social impacts; and,
- Maximize future opportunity for development.

The Study Team recommended the short and long-term needs for the road, helped the public officials and local community identify the desired “look and feel” of the facility and the right-of-way, and develop a general approach to access management that will achieve the safety, operational efficiency, and capacity of FM 691 that can be implemented through a partnership of Grayson County, TxDOT, the Cities of Sherman and Denison, and the Grayson County Regional Mobility Authority. A rural four-lane roadway with the ability to expand to six-lanes in the future is recommended for the section of FM 691 between the future SH 289 extension and FM 131/Loy Lake Road. An expandable four-lane to six-lane urban roadway section is recommended between FM 131/Loy Lake Road and SH 91. The rural roadway section will require between 140 and 160 feet of right-of-way while the urban roadway section would be able to fit within a right-of-way width of approximately 120 feet.

As part of the long-term solutions to the US 75/FM 691 interchange, three conceptual ramping configurations along US 75 are presented. The ramping solutions build on the planned ultimate ramping scheme south of FM 691 that has been developed conceptually by TxDOT. While these potential ramping solutions are developed, additional detail will need to be gathered and analyzed prior to determining a final recommendation.

The success of implementing the recommended solutions is dependent on the coordination between a variety of entities. Understanding that funding is a significant component in the development and construction of these recommendations, a phased approach of the actions that need to be taken in order to provide a successful transportation network along this corridor is developed. A summary of this phasing plan is provided in **Table 1**.



**Table 1 Summary of Phased Recommendations**

	Phase 1	Phase 2	Phase 3
<b>US 75/FM 691 Interchange</b>	<ul style="list-style-type: none"> <li>• Southbound frontage road driveway into NW quadrant should be limited to inbound only traffic.</li> <li>• Construct new driveway north of existing SB Exit ramp.</li> <li>• Implement traffic signals for NB and SB Frontage Roads. Implement additional traffic signals as warranted.</li> <li>• Conduct feasibility study and design process of US 75 ramping options.</li> </ul>	<ul style="list-style-type: none"> <li>• Construct exclusive turn lanes for Southpoint Blvd, NB and SB Frontage Roads, Milton Drive and Pool Road.</li> <li>• Implement additional traffic signals as warranted.</li> </ul>	<ul style="list-style-type: none"> <li>• Construct US 75 ramping configuration based on study performed in Phase 1.</li> </ul>
<b>FM 691 Corridor</b>	<ul style="list-style-type: none"> <li>• Conduct alignment study, environmental requirements and perform design for upgrading FM 691 to an urban 4/6-lane divided through interchange area.</li> <li>• Develop FM 691 Corridor Access Management Plan.</li> <li>• Conduct alignment study, environmental requirements and perform design for FM 691 extension to future SH 289.</li> <li>• Conduct environmental requirements and perform design for FM 691 expansion to a rural 4/6-lane divided roadway.</li> </ul>	<ul style="list-style-type: none"> <li>• Construct urban 4/6-lane divided section through interchange area. As development is planned the urban section should expand length between FM 131/Loy Lake to SH 91 (Texoma Pkwy.)</li> <li>• Construct new rural 4/6-lane divided section from SH 289 extension to FM 691.</li> <li>• Implement recommendations determined as part of FM 691 Corridor Access Management Plan.</li> </ul>	<ul style="list-style-type: none"> <li>• Construct new rural 4/6-lane divided section from FM 691 extension to FM 131/Loy Lake Road.</li> </ul>



## 1.0 Introduction

### *Project Description*

FM 691 is an east-west Farm-to-Market (FM) route that serves central Grayson County from the North Texas Regional Airport/Perrin Field on the west to SH 91 (Texoma Parkway) on the east (See **Figure 1**). Serving the City of Sherman to the south and Denison to the north, it is the nominal city limit line where the two major urban areas of Grayson County share a boundary. The two-lane, rural section roadway begins at the intersection with FM 1417 and, proceeding eastward, crosses Preston Road (FM 131 to the south), Loy Lake Road (FM 131 to the north), US 75, Theresa Drive, and terminates at SH 91 on the east, for a total designated route of 5.3 miles.

There are several growth factors that make the FM 691 Corridor a key facility in the future of Grayson County and the Cities of Sherman and Denison. Development of the property at US 75/FM 691 includes the Texoma Medical Center on the northeast quadrant and a hotel/conference center along with retail to open in 2010. A proposed Town Center development which could include restaurants and retail is forecasted to open in 2015. This is in addition to the Cigna Operations Center that opened in 2007 and other office and commercial sites on FM 691 and Pool Road. Additional residential development located west of the proposed Town Center as well as near Theresa Drive are potential developments that were incorporated into the study.

The west end of FM 691 is anchored by the North Texas Regional Airport/Perrin Field. This facility encompasses nearly 1,400 acres of property and currently has 34 businesses, employing more than 1,000 workers. More than 400 acres are suitable for aviation and industrial development including heavy aircraft maintenance, flight operations, aviation and industrial manufacturing and intermodal (air/rail/truck) cargo facilities. The site also includes several facilities of the Grayson County College. The College's main campus is located just over a mile to the east of the North Texas Regional Airport on FM 691.

The extension of State Highway 289 will affect development in the area and the future requirements for FM 691. From its current terminus at SH 56, SH 289 is being extended to FM 120 in Pottsboro. It will be adjacent to and west of the Airport. It will provide ready access to more than 160-acres of property on the west side of the Airport for intermodal, aviation and industrial development.

These factors have prompted the TexomaCOG to initiate the FM 691 Corridor Study. These aspects and others identified by the Study Team will be analyzed from an engineering, environmental and traffic evaluation of the corridor alternatives. Through the study process, the Study Team met with an identified Technical Steering Committee comprised of local City and State officials, the Transportation Policy Board as well as the general public.

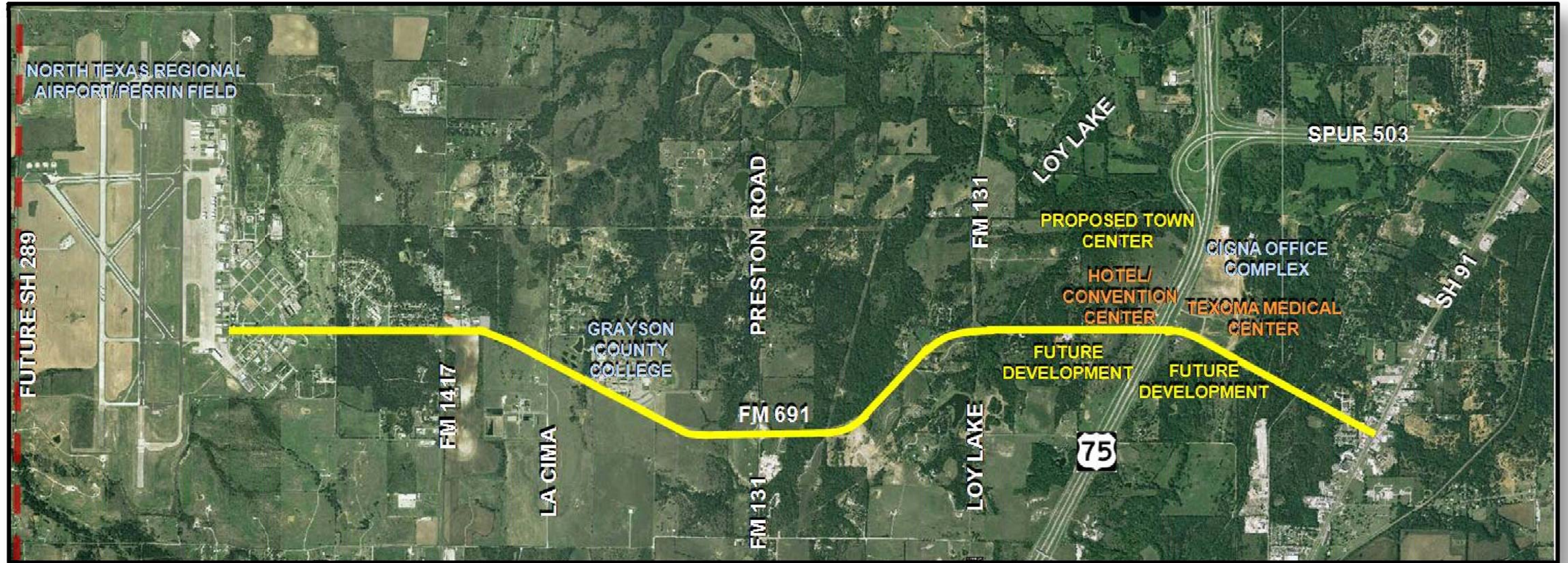


Figure 1 FM 691 Corridor Study Area



## ***Need and Purpose***

Through a collaboration of the Technical Steering Committee, Transportation Policy Board, Study Team, and general public, a study need and purpose statement was developed. The purpose of this study is to improve mobility for the US 75/FM 691 interchange as well as along the entire FM 691 corridor and allow for the development of a safe and efficient roadway for both local and regional travelers. The result of this study was the identification of a group of alternatives that best meet the study area's transportation needs while minimizing impacts to the surrounding area. The proposed improvements will serve both the regional and local transportation needs of the area.

Given the significant amount of traffic projected to travel from Oklahoma, the Texoma Medical Center will serve as a regional traffic generator. Additionally, planned developments such as the proposed Town Center will create a regional activity center that will attract travelers from several north Texas and southern Oklahoma counties. Therefore, it is necessary to provide the needed capacity at the interchange and along the entire FM 691 corridor to accommodate the hospital as well as the additional planned developments. With the potential extension of FM 691 to future SH 289, FM 691 becomes more of a major east-west connection to the major north-south roadways such as US 75 and SH 91. It is expected that additional developments along future SH 289, the North Texas Regional Airport and Grayson County College will increase the traffic load on FM 691 requiring additional capacity. The mobility goals center on safety, circulation, access to retail centers, residences, the North Texas Regional Airport and Grayson County College.

## ***Study Goals***

The FM 691 Corridor Study resulted in the identification of proposed solutions that would meet project goals. The study included focusing on both the immediate needs near the US 75/FM 691 interchange as well as improvements along the entire corridor. These improvements to mobility include regional traffic that travels north-south along US 75 to access future development at the interchange as well as east-west mobility between the future SH 289 extension and SH 91 (Texoma Parkway).

The TexomaCOG recognizes that a well-defined plan for the development of the roadway facility will facilitate the orderly development of the entire corridor. Without an FM 691 Corridor Plan, the inevitable development along the two-lane farm-to-market highway could lead to a haphazard expansion of the road that is inefficient, expensive, and less safe than desirable.

The input of TexomaCOG, Cities of Denison and Sherman officials, TxDOT, Grayson County officials and general public was extremely important to the development of the specific goals of this study. Through meetings with these stakeholders, the following study goals for the project were determined.





- Improve mobility at the US 75/FM 691 interchange by developing an implementation plan with the addition of the Texoma Medical Center, the hotel/conference center, proposed Town Center and ancillary development; and,
- Improve east-west mobility by developing an implementation plan for the FM 691 corridor with the extension of FM 691 to future SH 289;
- Minimize environmental and social impacts; and,
- Maximize future opportunity for development.

Through a technical process, the corridor study recommended the near and long-term needs for the road, helped the public officials and local community identify the desired “look and feel” of the facility and the right-of-way, and develop a general approach to access management that achieved the safety, operational efficiency, and capacity of FM 691 that can be implemented through a partnership of Grayson County, TxDOT, the Cities of Sherman and Denison, and the Grayson County Regional Mobility Authority.

### **Methodology**

The proposed FM 691 corridor solutions were measured against the stated need and purpose of the project as well as the study goals defined by the public officials and the Study Team. The following methodology was used to determine potential solutions to accommodate future transportation needs along the FM 691 corridor.

### **Identify Existing Conditions**

The existing conditions for the study area were compiled through field reconnaissance, performing traffic counts, and data research that allowed the Study Team to understand area constraints. Turning movement counts were performed at the intersections shown in **Table 2** from west to east and the data can be found in the **Appendix**.

**Table 2 Locations of Turning Movement Counts**

<b>Intersection</b>	<b>Signalization</b>
FM 691 and FM 1417	Signalized
FM 691 and N. Travis St. (FM 131S) / Preston Rd.	Signalized
FM 691 and N. Loy Lake (FM 131N)	Unsignalized
FM 691 and US 75 Southbound Frontage Road (SBFR)	Unsignalized
FM 691 and US 75 Northbound Frontage Road (NBFR)	Unsignalized
FM 691 and TX 91 (Texoma Parkway)	Signalized



AM peak counts were performed from 6:30-8:30am. PM peak counts were performed from 5:00-7:00 pm. Counts were performed on Tuesday, May 6 or Wednesday, May 7, 2008.

24-hour tube counts were performed at the following 13 locations on Monday, May 5; Tuesday, May 6 or Wednesday May 7, 2008:

- FM 691 eastbound and westbound east of Airport Dr.
- FM 691 east of FM 1417
- FM 691 west of N. Travis St. / Preston Road
- FM 691 east of Loy Lake Road
- FM 691 east of US 75
- NB US 75 entrance ramp from FM 691
- NB US 75 exit ramp to FM 691
- NB US 75 Frontage Road prior to NB entrance ramp from FM 691
- NB US 75 Frontage Road prior to NB exit ramp to FM 691
- SB US 75 entrance ramp from FM 691
- SB US 75 exit ramp to FM 691
- SB US 75 Frontage Road prior to entrance ramp from FM 691
- SB US 75 Frontage Road prior to SB exit ramp to FM 691

These 24-hour tube counts can also be found in the **Appendix**.

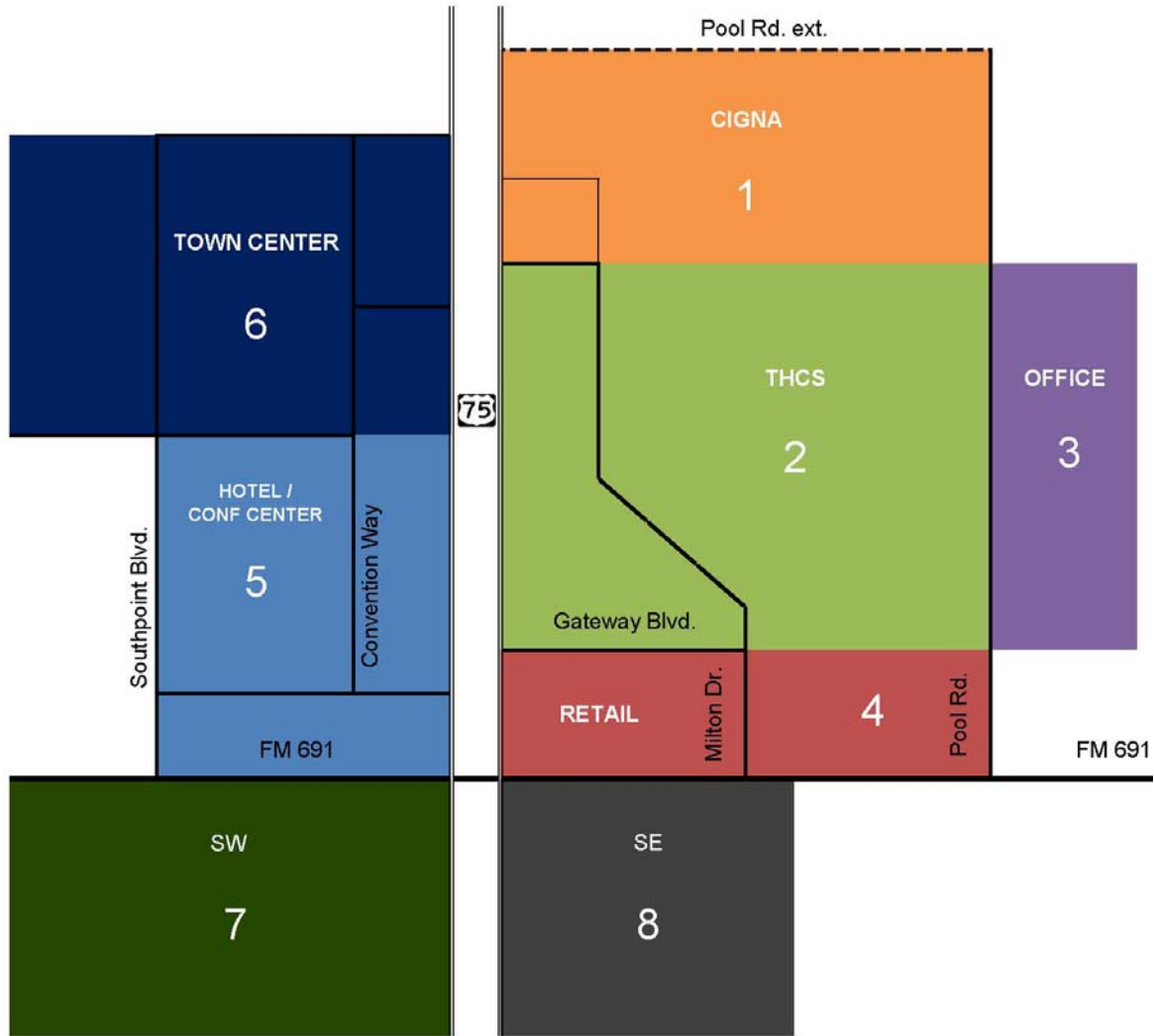
An operational analysis was performed for the existing interchange which established a baseline to compare against future conditions.

## **Project Traffic Volumes**

The characteristics of each proposed development were determined in projecting traffic volumes for future development. These characteristics are used in generating the number of vehicle trips generated by each development. The number of trips is then distributed throughout the transportation network so that intersection turning movement volumes can be established. The turning movement volumes were used to perform the traffic analysis for the interchange.

## ***Trip Generation***

The amount of traffic to and from a site is determined through a process known as trip generation. Rates and equations are applied to the proposed land use to estimate traffic generated by the development during a specific time interval. In order to accurately assign the traffic, the site was broken up into eight blocks, as shown in **Figure 2**. ITE's *Trip Generation Manual (7<sup>th</sup> Ed.)* was used to forecast the number of daily, AM peak, PM peak, and Saturday peak trips generated by each block according to the intensity of the proposed use, as shown in **Table 3**. Blocks 1 – 5 are expected to be built-out by 2010 while it was assumed that Blocks 6 – 8 would be built by 2015. Blocks 7 and 8 are currently not planned but as the City of Sherman is currently constructing utilities to these quadrants, it was assumed that the southeast and southwest quadrants would eventually be developed.



\*Identification of conceptual development areas, not representative of actual tracts or city blocks

**Figure 2 Site Blocks**

Reductions to the base trip generation estimates are sometimes applied due to internal capture or pass-by trips. Internal capture trips are desired trips that could be satisfied by other uses within the site rather than traveling to another isolated site, such as retail customers traveling to a restaurant. Pass-by trips are existing vehicles on the surrounding roadways which are attracted into the site by the presence of the development. Pass-by trips do not reduce the overall trip generation, but do reduce the number of new trips added to the roadway system. **Table 3** shows the trip generation and all adjustments for the existing site and proposed developments.

**Table 3 Trip Generation**

BLOCK	LAND USE	INTENSITY	UNITS	ITE CODE	DAILY TOTAL	AM PEAK			PM PEAK			SAT PEAK			% OF TOTAL
						IN	OUT	TOTAL	IN	OUT	TOTAL	IN	OUT	TOTAL	
1	Office (CIGNA)	875	Emp	710	2,905	370	50	420	68	334	403	43	36	79	4%
	<b>Block 1 Trip Generation</b>				<b>2,905</b>	<b>370</b>	<b>50</b>	<b>420</b>	<b>68</b>	<b>334</b>	<b>403</b>	<b>43</b>	<b>36</b>	<b>79</b>	<b>4%</b>
2	Hospital	340	Bed	610	4,015	269	115	384	152	270	422	160	180	340	6%
	Medical-Dental Office	120,000	SF	720	4,336	235	62	298	121	326	446	248	187	436	6%
10%	<b>Internal Capture</b>	<b>Block 2 Trip Generation</b>			<b>8,351</b>	<b>454</b>	<b>160</b>	<b>614</b>	<b>245</b>	<b>536</b>	<b>781</b>	<b>367</b>	<b>331</b>	<b>698</b>	<b>12%</b>
3	Medical-Dental Office	56,000	SF	720	2,023	110	29	139	56	152	208	116	87	203	3%
	Medical-Dental Office	80,000	SF	720	2,890	157	42	198	80	217	298	166	125	290	4%
	Medical-Dental Office	14,000	SF	720	506	27	7	35	14	38	52	29	22	51	1%
10%	<b>Internal Capture</b>	<b>Block 3 Trip Generation</b>			<b>5,420</b>	<b>264</b>	<b>70</b>	<b>335</b>	<b>136</b>	<b>367</b>	<b>502</b>	<b>279</b>	<b>211</b>	<b>490</b>	<b>8%</b>
4	Office (Bank)	25,000	SF	710	275	34	5	39	6	31	37	6	5	10	0%
	Shopping Center	25,000	SF	820	1,074	16	10	26	45	49	94	62	62	124	2%
	Drive-In Bank	5,000	SF	912	1,232	35	27	62	114	114	229	95	91	185	2%
	Drive-In Bank	4,000	SF	912	986	28	22	49	91	91	183	76	73	148	1%
	High-Turnover (Sit-Down) Restaurant	10,000	SF	932	1,272	60	55	115	67	43	109	126	74	200	2%
	Fast-Food Restaurant w Drive-Through Window	4,000	SF	934	1,984	108	104	212	72	67	139	121	116	237	3%
10%	<b>Internal Capture</b>	<b>Block 4 Trip Generation</b>			<b>6,823</b>	<b>252</b>	<b>201</b>	<b>453</b>	<b>356</b>	<b>355</b>	<b>711</b>	<b>436</b>	<b>378</b>	<b>815</b>	<b>10%</b>
5	Hotel	135	Rooms	310	1,103	46	29	76	42	37	80	54	43	97	2%
	Drive-In Bank	4,000	SF	912	986	28	22	49	91	91	183	76	73	148	1%
	High-Turnover (Sit-Down) Restaurant	20,000	SF	932	2,543	120	111	230	133	85	218	252	148	400	4%
	High-Turnover (Sit-Down) Restaurant	12,000	SF	932	1,526	72	66	138	80	51	131	151	89	240	2%
15%	<b>Internal Capture</b>	<b>Block 5 Trip Generation</b>			<b>6,158</b>	<b>226</b>	<b>194</b>	<b>420</b>	<b>295</b>	<b>225</b>	<b>520</b>	<b>453</b>	<b>299</b>	<b>753</b>	<b>9%</b>
<b>Total Trip Generation (2010)</b>					<b>29,656</b>	<b>1,566</b>	<b>675</b>	<b>2,241</b>	<b>1,100</b>	<b>1,817</b>	<b>2,917</b>	<b>1,579</b>	<b>1,255</b>	<b>2,834</b>	<b>43%</b>
6	Shopping Center	458,000	SF	820	19,667	288	184	472	824	893	1718	1138	1138	2276	28%
15%	<b>Internal Capture</b>	<b>Block 6 Trip Generation</b>			<b>19,667</b>	<b>288</b>	<b>184</b>	<b>472</b>	<b>824</b>	<b>893</b>	<b>1,718</b>	<b>1,138</b>	<b>1,138</b>	<b>2,276</b>	<b>28%</b>
7	Unknown				15,000	605	520	1,125	850	650	1,500	903	597	1,500	22%
	<b>Block 7 Trip Generation</b>				<b>15,000</b>	<b>786</b>	<b>339</b>	<b>1,125</b>	<b>566</b>	<b>934</b>	<b>1,500</b>	<b>836</b>	<b>664</b>	<b>1,500</b>	<b>22%</b>
8	Unknown				5,000	229	146	375	240	260	500	250	250	500	7%
	<b>Block 8 Trip Generation</b>				<b>5,000</b>	<b>229</b>	<b>146</b>	<b>375</b>	<b>240</b>	<b>260</b>	<b>500</b>	<b>250</b>	<b>250</b>	<b>500</b>	<b>7%</b>
<b>Total Trip Generation (2015)</b>					<b>69,323</b>	<b>2,868</b>	<b>1,345</b>	<b>4,213</b>	<b>2,730</b>	<b>3,904</b>	<b>6,635</b>	<b>3,802</b>	<b>3,308</b>	<b>7,110</b>	<b>100%</b>

\* Blocks 1 – 5 are expected to be built-out by 2010 while it was assumed that Blocks 6 – 8 would be built by 2015



**Figures 3 and 4** graphically show the projected 2010 and 2015 site generated vehicle trips for each development. Given that the CIGNA Office Park currently generates approximately 2,900 trips per day, the additional development is projected to produce an additional 26,700 trips per day for 2010. With the anticipated development of the Town Center as well as the southern quadrants of the interchange, it is projected that an additional 40,000 vehicle trips would be generated in 2015. Therefore, with all of the development planned near the interchange it is anticipated that a total of nearly 67,000 additional daily trips could be generated.



**Figure 3 2010 Site Generated Daily Vehicle Trips**

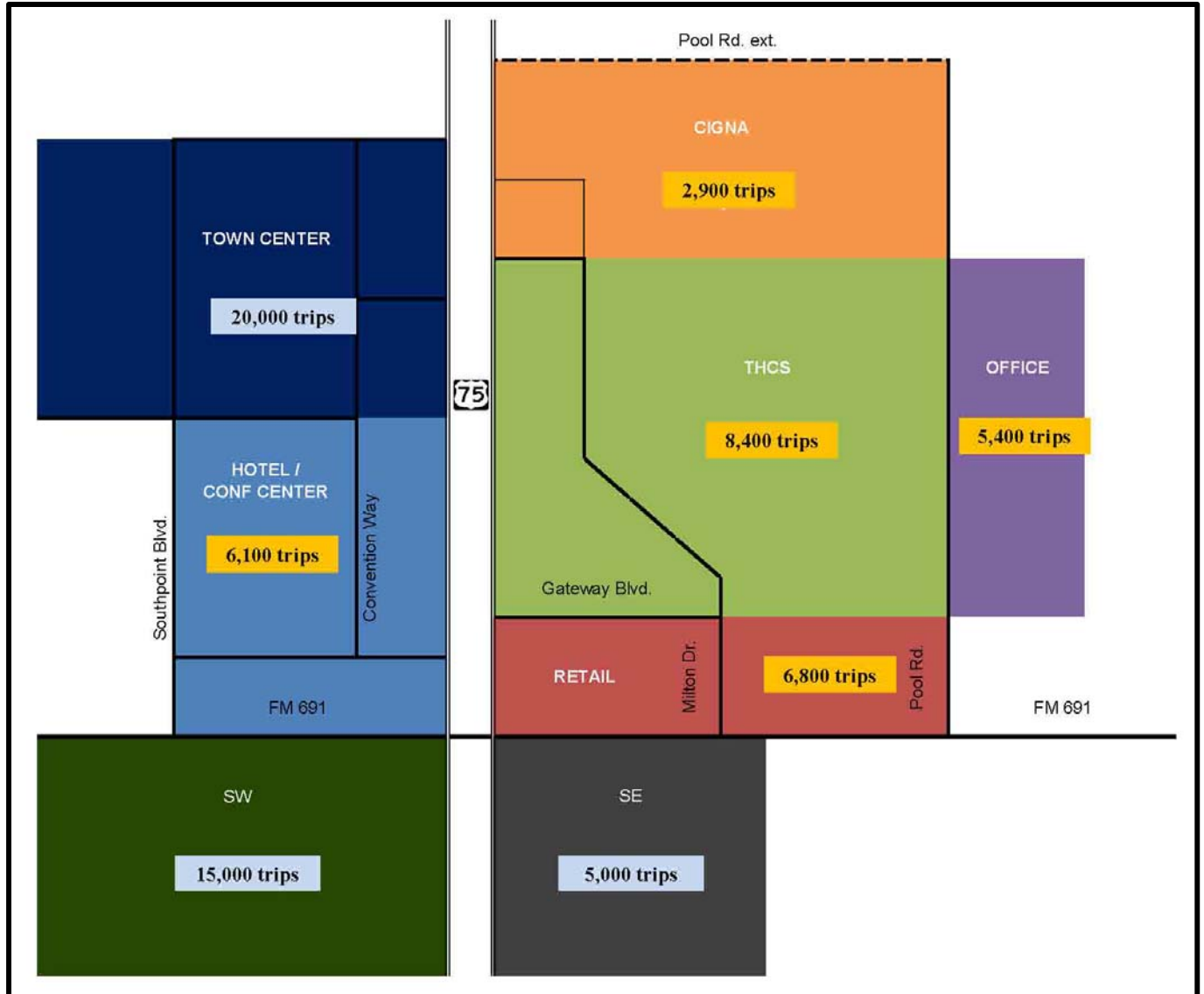
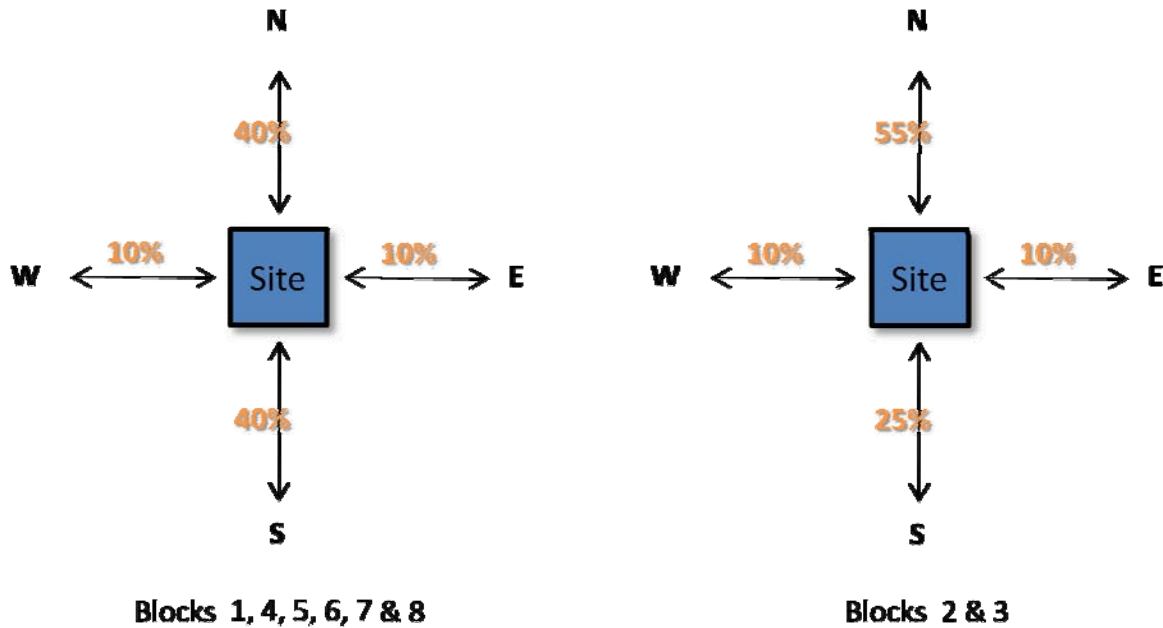


Figure 4 2015 Site Generated Daily Vehicle Trips

### Trip Distribution

Trip distribution of site traffic onto the street system was based on the street system characteristics and regional demographic patterns as well as the locations of the proposed driveway access to and from the proposed sites. Trip directions were broken up into the four cardinal directions: north and south (US 75); east and west (FM 691). The percent distributions are shown in Figure 5.



**Figure 5 Trip Distribution of Site Traffic**

For Block 1 – CIGNA the north-south distribution is equal based on an employee home zip code mapping exercise done with data provided by CIGNA. For Blocks 2 and 3, the medical-related uses, there is a greater volume anticipated to come from the north than the south because a significant number of employees and patients will be coming from Denison, Pottsville, and southern Oklahoma. For Blocks 4, 5, 6, 7 and 8 the north-south distribution is equal due to the nature of the trips and even distribution of population to the north and south in the region.

### ***Trip Assignment***

Once the trip distribution was established, the individual turning movements were determined from the shortest path routes. To summarize:

- Block 1 (CIGNA):** Trips were distributed between the US 75 northbound frontage road and Pool Road.
- Block 2 (Texoma Health Care System):** Trips were distributed among US 75 northbound frontage road, Milton Drive and Pool Road.
- Block 3 (Office):** Trips were distributed between FM 691 and Gateway Blvd.
- Block 4 (Retail):** Trips were distributed between the blocks west and east of Milton Dr. All of the trips ingress and egress from FM 691. Gateway Blvd. was not used for the west block ingress and egress because the US 75 southbound U-turn was above capacity and the westbound right turn was near capacity at the US 75 northbound frontage road.
- Block 5 (Hotel/Convention Center):** Trips were distributed between FM 691 and US 75 SBFR.
- Block 6 (Town Center):** Trips were distributed between Southpoint Boulevard and US 75 SBFR.



**Block 7 (Southwest quadrant):** Trips were distributed between FM 691 and US 75 SBFR.

**Block 8 (Southeast quadrant):** Trips were distributed between Southpoint Boulevard and US 75 NBFR.

The combined site generated AM and PM peak hour turning movements are shown in **Figures 6** through **9**. **Figures 6** and **7** show the projected 2010 traffic volumes which do not include the proposed Town Center or the southern quadrant developments while the 2015 traffic volumes provided in **Figures 8** and **9** include all of the proposed future developments. The figures include both the site generated and background traffic. The location of signalized and unsignalized intersections is assumed for this study.

### **Traffic Analysis of the US 75/FM 691 Interchange**

A traffic operational analysis was conducted for the area near the interchange between the future Southpoint Boulevard and Pool Road for the years 2010 and 2015. The Texoma Medical Center, located in the northeast quadrant, and hotel/convention center, located in the northwest quadrant, are anticipated to be constructed by 2010. A Town Center, featuring a mix of retail and restaurants, is planned to open in the northwest quadrant while it is assumed that the southern quadrants would also be developed. The build-out for all four quadrants is projected as 2015 which was considered the long-term future year of analysis. The long-term analysis also included developing conceptual alternative ramping configurations for US 75 that would benefit interchange operation.

### **Development of FM 691 Corridor Alternatives**

Typical roadway sections that include number of lanes, median, shoulders, pedestrian realm and a clear zone area were developed for FM 691. The existing and potential land use as well as the available right-of-way was considered when developing these typical roadway sections. Additionally, conceptual alignments for an extension of FM 691 to the future SH 289 were developed. A comparison of these alignments included presenting right-of-way impacts and benefits to development as well as general planning level cost estimates. Finally, a general discussion of access management was presented for the FM 691 corridor. The purpose of this discussion was not to present a specific access management plan for the FM 691 corridor but to develop a tool box of solutions that could be implemented in a future implementation plan.



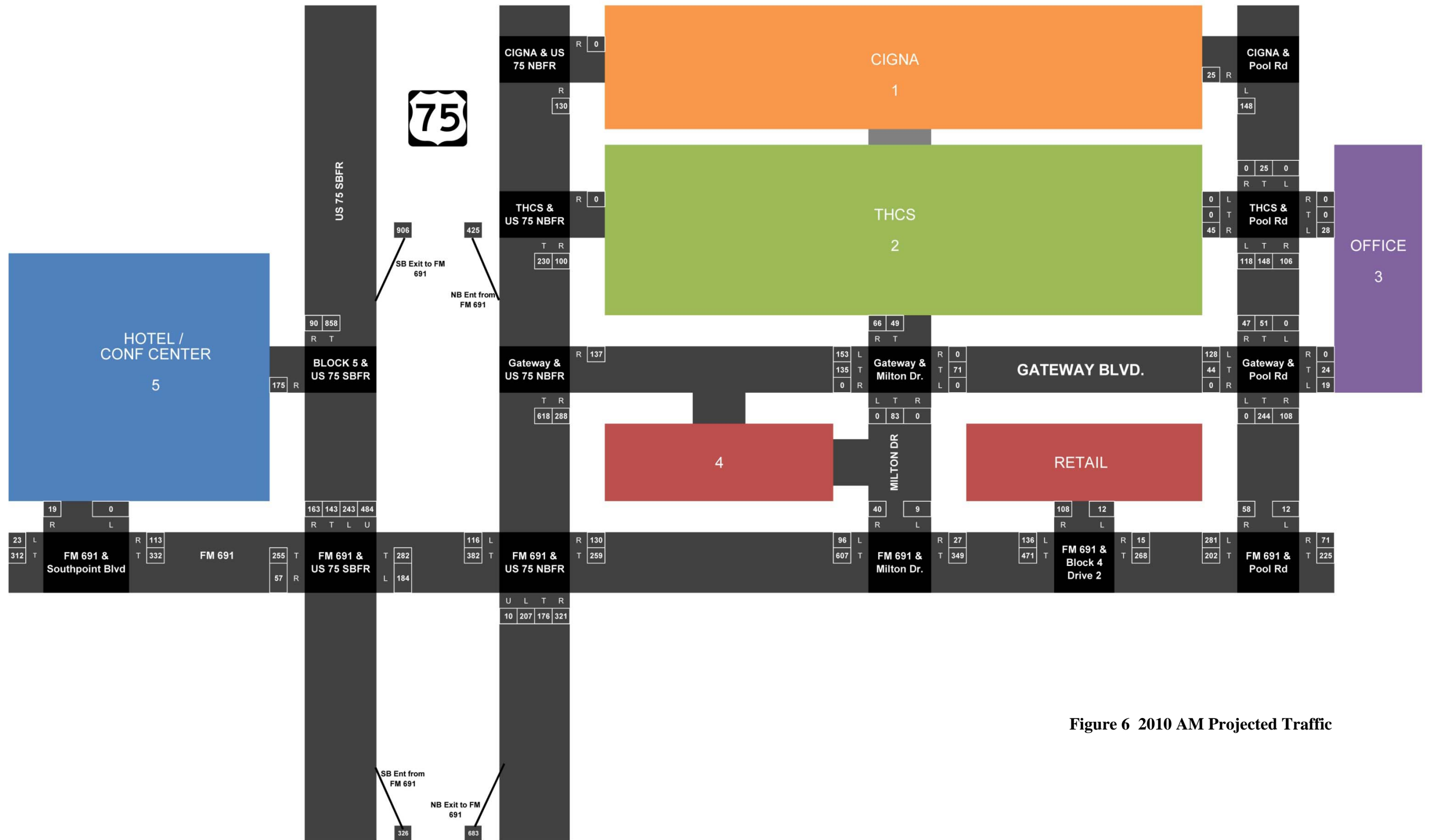


Figure 6 2010 AM Projected Traffic

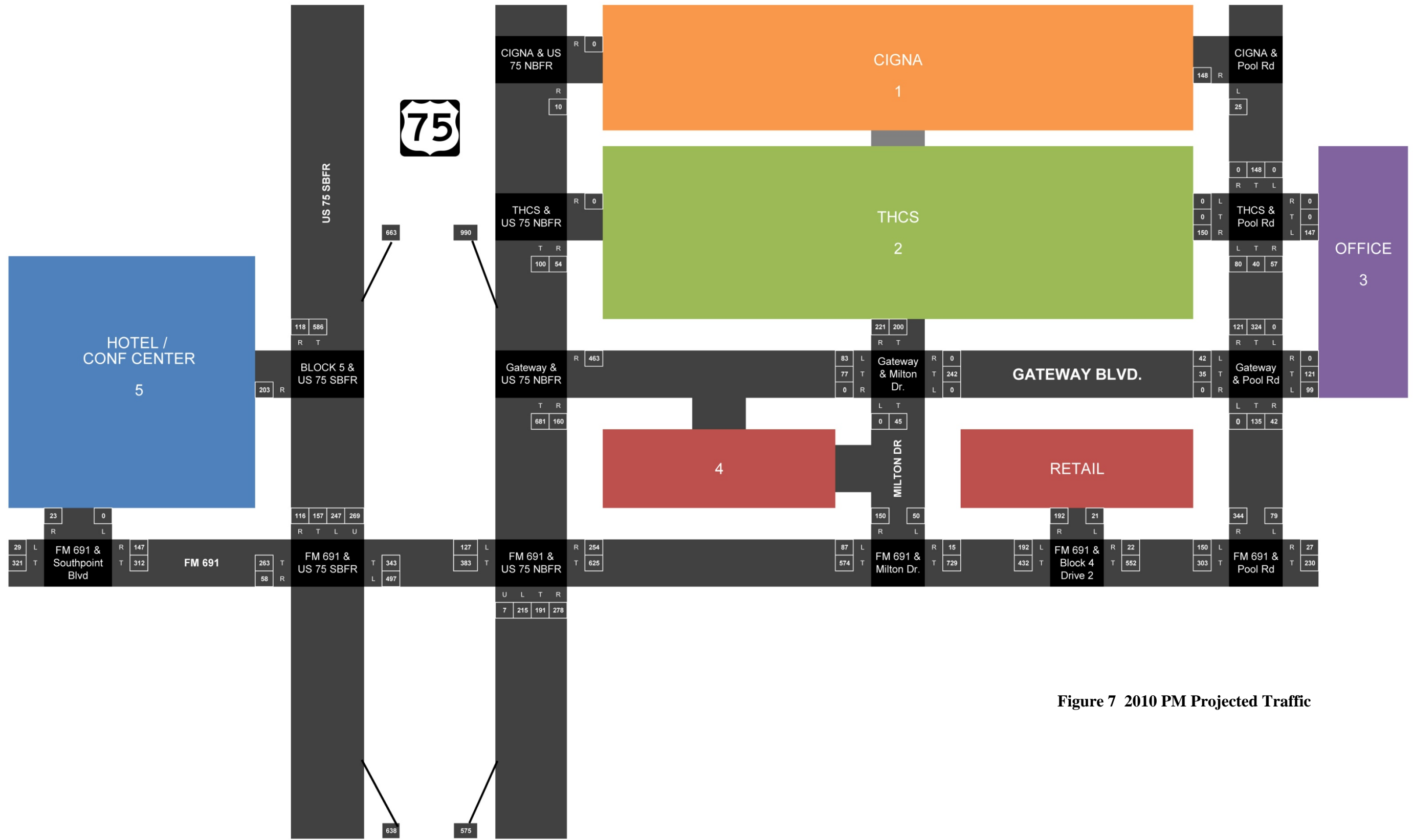


Figure 7 2010 PM Projected Traffic

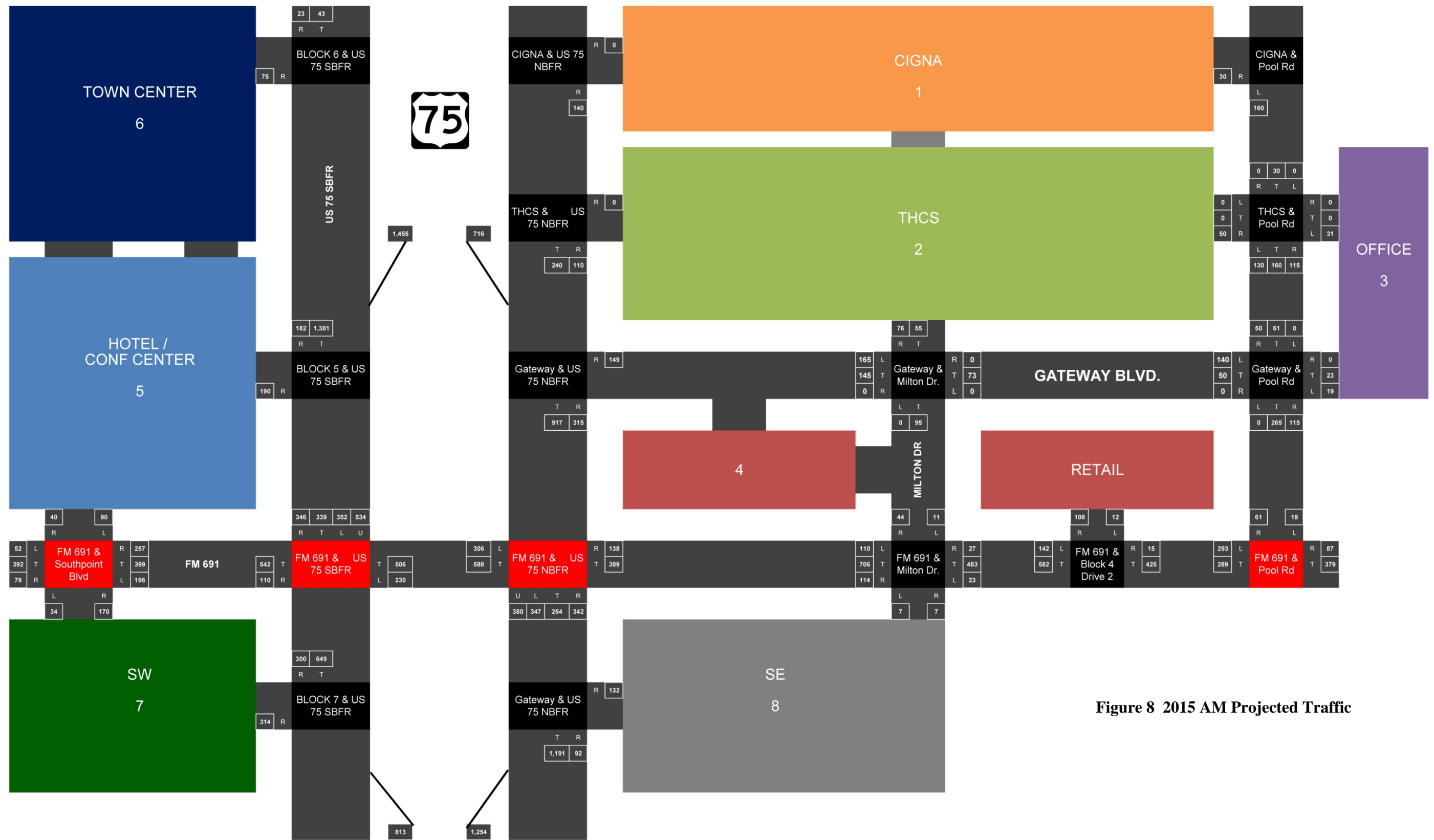


Figure 8 2015 AM Projected Traffic

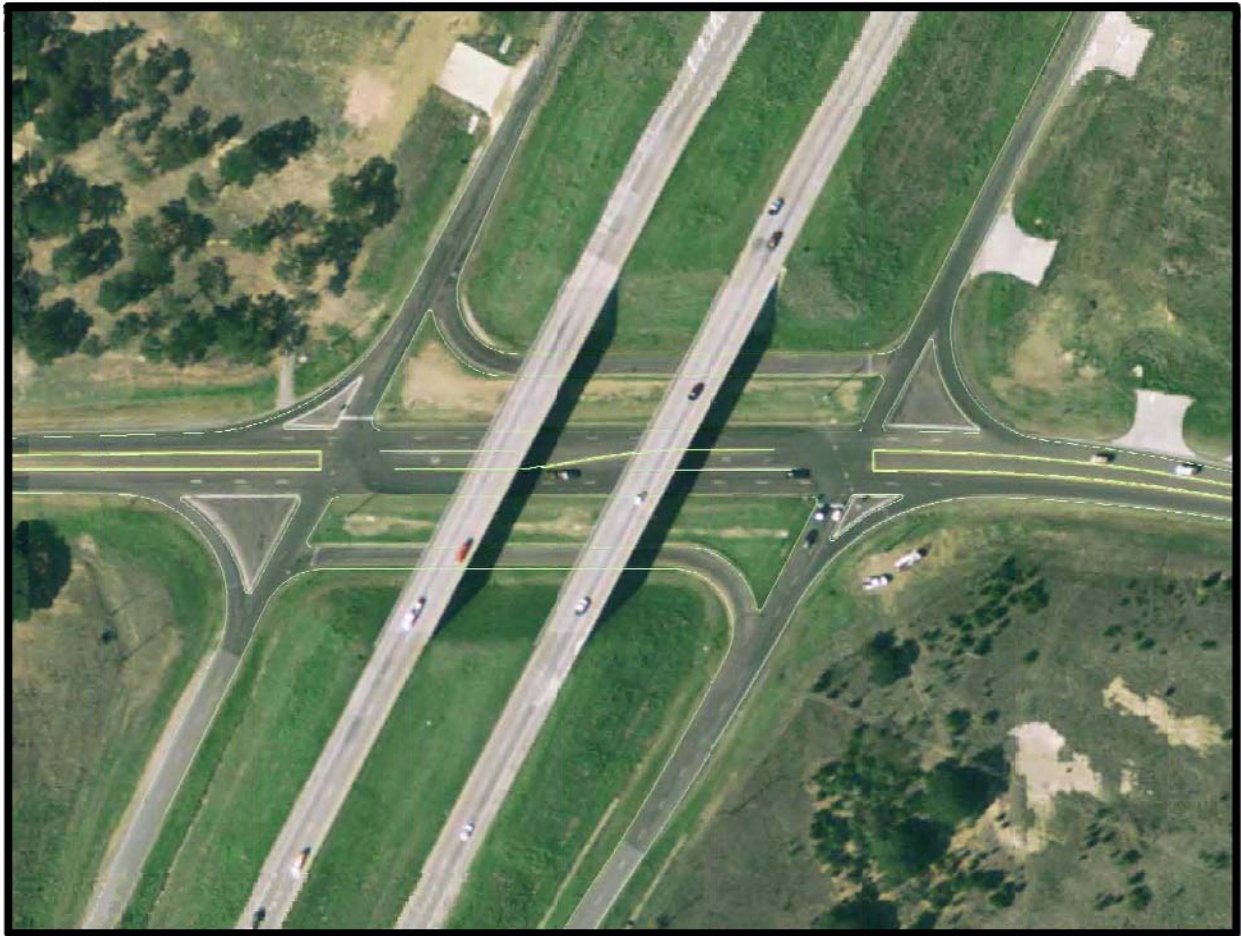


Figure 9 2015 PM Projected Traffic



## 2.0 The US 75/FM 691 Interchange

FM 691 has two through lanes and an exclusive left turn bay with 225 feet of deceleration and storage in the interior of the interchange in both directions. The exterior approaches on FM 691 expand from one lane to two lanes approximately 175 feet from the intersection. The exterior departure lanes on FM 691 contract from two lanes to one lane approximately 100 feet from the intersection. The US 75 frontage roads are two lanes in width with U-turns, a shared left-through and a shared through-right. All four exterior approaches to the intersection have right turn islands. **Figure 10** shows an aerial photograph of the interchange.



**Figure 10 Existing US 75 Interchange**



### ***Short-term (2010) Traffic Analysis***

A short-term and long-term trip generation and traffic analysis for the four quadrants of the FM 691 and US 75 interchange was performed. It was forecasted that by 2010, approximately 26,600 additional daily trips would be added to the US 75/FM 691 interchange due to the planned developments. The southbound U-turn at US 75 and FM 691 is forecasted to operate near capacity because most of the traffic from the north destined for the northeast quadrant will be using this U-turn to avoid the signal at FM 691. The southbound exit ramp site traffic volume for all peak periods in year 2010 ranged from 497 to 734 vehicles per hour.

The site plan shows an access point to the northwest quadrant approximately 300 feet south of the southbound exit ramp to FM 691. Given the projected frontage road and ramp volumes as well as the number of frontage road lanes, the TxDOT *Roadway Design Manual (Table 3-16)* suggests a desirable distance of 520 feet with a minimum of 250 feet. Due to the high speeds of between 660 and 900 exiting vehicles per hour in the morning and evening peak hours, distance to the driveway and number of vehicles accessing the site (projected between 90 and 118 vehicles per hour in the morning and evening peak hours), this configuration could result in potentially unsafe conditions and poor traffic operations. The ability for vehicles (projected between 175 and 203 vehicles per hour in the morning and evening peak hours) exiting the development to access the southbound U-turn lane is another potential operational concern. The vehicles exiting the northwest quadrant via the described driveway and desiring to travel north by way of the U-turn lane would need to perform this maneuver within approximately 150 feet.

The recommended solution for traffic movement at this southernmost driveway is to only accommodate inbound traffic. The inbound vehicles should be accommodated by an exclusive right turn lane into the new development on the northwest quadrant. A new driveway located just north of the southbound exit ramp to FM 691 is recommended and would allow sufficient weaving distance to the U-turn maneuver. Based on the TxDOT *Access Management Manual (Table 2-1)*, the driveway would need to be at least 360 feet from an existing driveway.

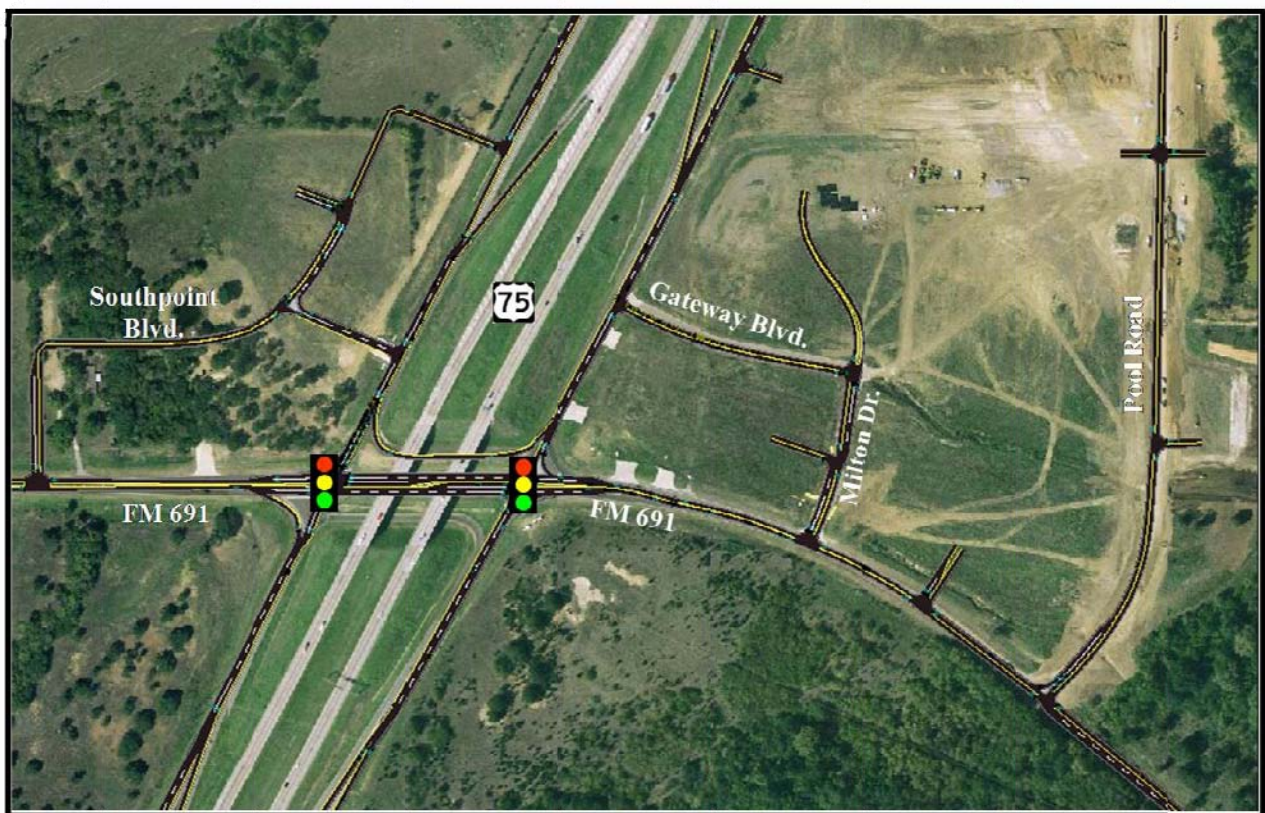
The main entrance at Southpoint Boulevard into the development from FM 691 was projected to accommodate between 136 and 176 vehicles per hour in 2010 in the morning and evening peak periods, respectively. It is not projected that the intersection of Southpoint Boulevard and FM 691 would warrant a traffic signal with the initial development in 2010. However, it is necessary to measure the volumes once the proposed developments are constructed in order to determine if traffic signal warrants are met.

The interchange intersections meet traffic signal warrants based on projected traffic volumes. Therefore, it is recommended that the US 75/FM 691 interchange intersections provide traffic signal control. With these intersections signalized, the interchange will be able to maximize the capacity to accommodate the planned developments. It is also anticipated that the intersection of Pool Road and FM 691 will require traffic signal control based on the projected volumes. Again, it will be necessary to evaluate this intersection as the development is constructed to determine the necessity of a traffic signal.



The location of the northbound US 75 entrance ramp is approximately 400 feet from Gateway Boulevard, which is a primary entrance to the Texoma Medical Center from the frontage road. Traffic from the CIGNA office complex and the hospital will only be able to access the northbound entrance ramp via Gateway Boulevard or the FM 691/US 75 northbound frontage road. The combination of the existing and site generated traffic volume is projected to range between 425 and 990 vehicles per hour in the morning and evening peak hours on the northbound entrance ramp, respectively. The existing access is expected to accommodate projected 2010 traffic levels; however, additional ramp capacity and improved access options is recommended when development near the interchange is completely built-out. These ramping options will be discussed in a later section.

The **Figure 11** shows the 2010 proposed interchange roadway network.



**Figure 11 2010 Proposed Interchange Roadway Network**



## ***Long-term (2015) Traffic Analysis***

The long-term analysis predicts land use will generate an additional 40,000 trips using the interchange between 2010 and 2015. These 40,000 additional daily trips bring the total up to a projected 67,700 daily trips through the interchange. Approximately 20,000 of these trips can be attributed to the proposed Southpoint Town Center, 15,000 trips generated by the southwest quadrant, and 5,000 trips generated by the southeast quadrant. As the southern quadrants have not been planned, the site trips were assumed based on developable land. The site generated trips were assigned to the roadway network and modeled to determine its operational performance.

FM 691 should be upgraded to a four-lane facility in order to accommodate projected long-term traffic volumes generated by the Town Center and assumed development on the southern quadrants. The major intersections along FM 691 that will provide access to the developments include Southpoint Boulevard, Northbound/Southbound Frontage Roads, Milton Drive and Pool Road. The Northbound and Southbound Frontage Road intersections were recommended to be signalized during the short-term analysis.

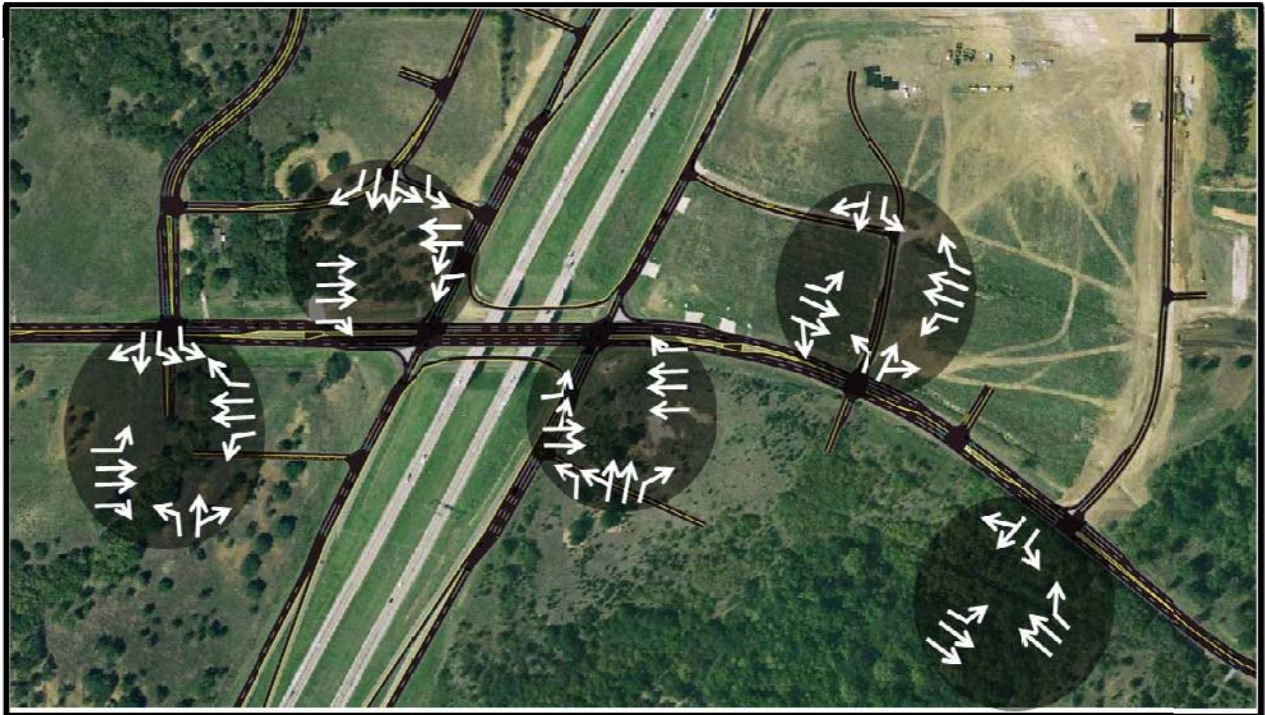
The increased volume on the northbound and southbound frontage road will impact the traffic operations of the intersection at FM 691. It is recommended that the northbound/southbound frontage road approaches be expanded to accommodate the lane geometry shown in **Figure 12**. With the additional traffic generated from the planned development, there is a significant increase in left-turning traffic from FM 691 to the US 75 frontage roads. For instance the eastbound left turning volume was projected to increase from 127 to 400 vehicles per hour in the evening peak hour. Therefore, it is recommended that an exclusive eastbound and westbound left turn lane be added approximately 300' prior to each intersection. Additionally, it is recommended that the center travel lane is converted in both directions to a shared left-through in the interior of the interchange.

Additionally, it is recommended that the intersections of Southpoint Boulevard, Milton Road and Pool Road be expanded as shown in **Figure 12**. The intersections along FM 691 at Southpoint Boulevard and Milton Road are projected to accommodate four approaches once the southern quadrants are developed. As site plans do not currently exist for the southern quadrants, these intersections will need to be evaluated once plans have been developed in order to determine geometry needs.

The intersection of FM 691 and Southpoint Boulevard meets traffic signal warrants based on projected volumes. The 2015 southbound evening approach for Southpoint Boulevard was projected to exceed 550 vehicles per hour while FM 691 would accommodate approximately 850 vehicles per hour. The through volume for FM 691 near Milton Drive was projected to range between 706 and 968 vehicles per hour in the morning and evening peak periods. These projected volumes would meet traffic signal warrants. It is anticipated that Pool Road and FM 691 will require a traffic signal as part of the short-term improvements. However, it will be necessary to evaluate these intersections as the development is constructed to determine the necessity of a traffic signal.

**Figure 12** shows a depiction of the proposed interchange geometry.





**Figure 12 2015 Proposed Interchange Geometry**

The southbound FM 691 exit ramp is projected to range between 1,284 and 1,455 vehicles per hour in the morning and evening peak periods. A portion of this traffic would weave to the driveway accessing the northwest quadrant development within approximately 300 feet. With the addition of the traffic generated by the planned Town Center, the volume on the southbound frontage road approximately doubled by 2015. Therefore, the southbound exiting traffic desiring to access the northwest quadrant would be required to weave across significantly more traffic than was required in the short-term scenario. For southbound traffic desiring to utilize the U-turn in order to access the hospital or travel back to the north then it is recommended that an exclusive U-turn lane from the southbound ramp be provided.

The northbound entrance ramp to US 75 is projected to range between 700 and 1,863 during the morning and evening peak hours, respectively, with the planned development. Nearly 35 percent of the northbound ramp volume was projected to originate from the northeast quadrant which accommodates the Texoma Medical Center, planned restaurants and retail as well as the CIGNA Office Park. These trips funnel south to Gateway Boulevard or FM 691 to head north on US 75 causing significant delay on Gateway Boulevard and congestion on the northbound frontage road. It is recommended to provide more access points from the Texoma Medical Center and CIGNA to the US 75 northbound frontage road prior to the northbound entrance ramp and provide more acceleration distance to make the merge into the left lane easier for traffic using the northbound US 75 entrance ramp. In order to accommodate these recommendations it is necessary to modify the existing ramping configuration, which will be discussed in the following section.



## US 75 Ramp Alternatives

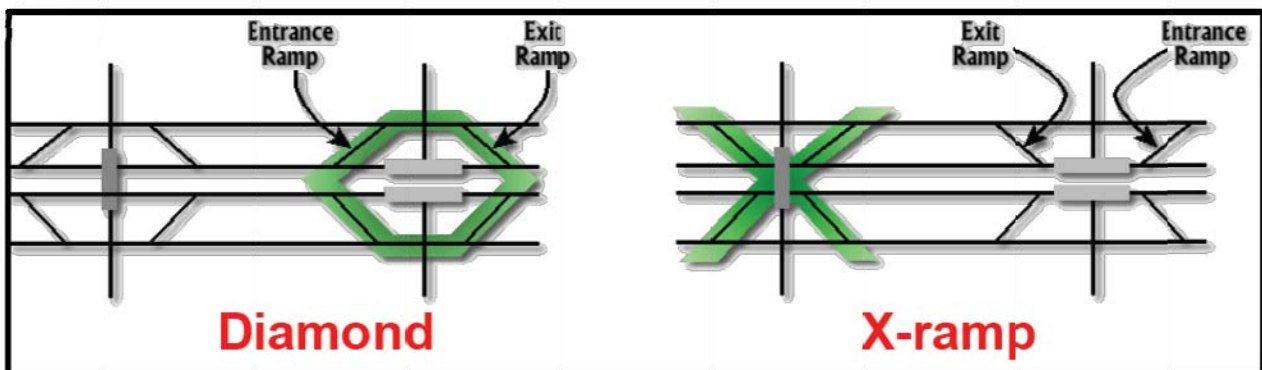
Many of the safety and congestion issues associated with the planned development can be alleviated by changing the ramping configuration of US 75. The primary issue is the high volume of traffic interaction, much of it weaving, in the short distance between the ramps to and from FM 691. Altering the ramping configurations could provide the following benefits to both US 75 and the FM 691/US 75 interchange:

- Improve local access to proposed developments;
- Minimize safety and operational impacts to the interchange and local roadways; and,
- Improve regional movement along FM 691 and US 75.

However, in order to ensure safety and maximize vehicle operations it is important to follow a methodology that is in line with TxDOT guidelines. The following methodology was followed in developing conceptual ramping options:

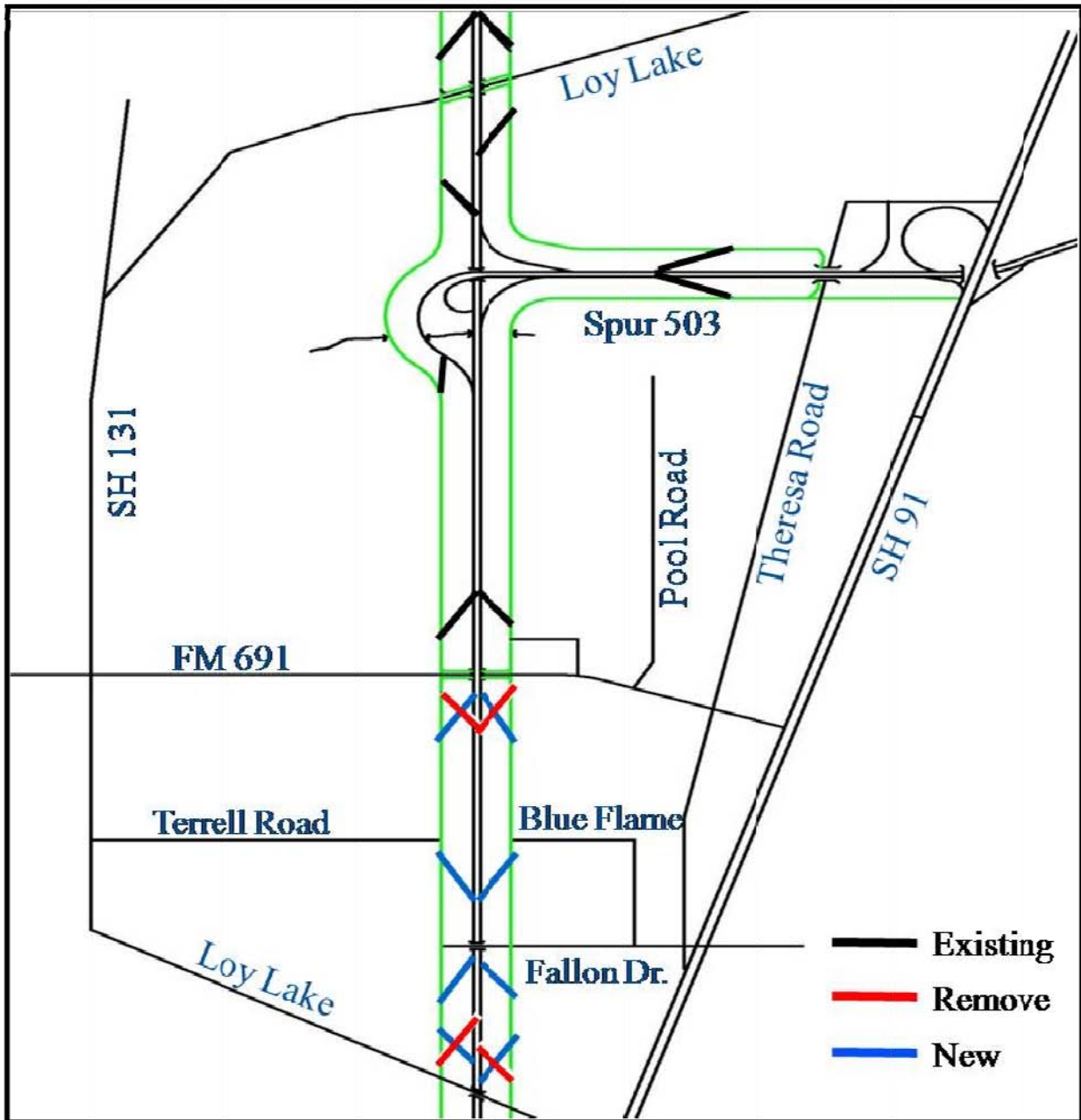
- Provide necessary distance between ramp and access road;
- Maintain proper weaving distances between ramps;
- Maximize interchange operation; and,
- Maintain existing access to properties.

To the north of FM 691, the at-grade Spur 503 direct-connect ramps create an obstacle to moving the southbound exit and northbound entrance ramps. TxDOT has a minimum distance between an entrance and exit ramp to allow entering and exiting vehicles to weave across safely. With the existing ramping distance between the ramps for FM 691 and Spur 503 less than 1800 feet apart, if the FM 691 ramps were moved north, the minimum weaving distance would be violated. In order to move the FM 691 ramps to the north, the ramping configuration must be reversed from a diamond configuration to an X-ramp configuration as seen in the **Figure 13**.



**Figure 13 Diamond and X-ramp configurations  
(courtesy of Texas Transportation Institute)**

TxDOT already has plans to reverse the ramping configuration to the south of FM 691 to N. Loy Lake Road in Sherman, as shown in **Figure 14**.



**Figure 14 TxDOT Planned Ultimate US 75 Ramping Configuration**



To the north, three different ramping alternatives for US 75 and Spur 503 have been developed. TxDOT's planned ultimate US 75 ramping configuration has been incorporated into each of the three ramping options. The ramping options have been developed at a conceptual level. While the methodology described above was followed, schematic drawings showing horizontal and vertical characteristics were not developed as part of this study. Due to the significant cost of implementing these ramping schemes, it is understood that these options would be incorporated as part of a long-term solution.

### **US 75 Ramping Option 1 (Figure 15)**

The ramps on the north side of FM 691 are flipped to provide a full X-ramp configuration at FM 691. A northbound entrance ramp is provided prior to Spur 503 to allow more direct access points for the traffic coming from the development in the northeast quadrant and increased weaving distance on the northbound frontage road. The northbound frontage road is extended under the Spur 503 to provide a continuous, uninterrupted, at-grade frontage road connection to Loy Lake Road. To allow for the northbound entrance ramp and continuous at-grade frontage road, the existing at-grade direct connectors must be removed. To maintain the mobility provided by these direct connectors, an additional eastbound entrance ramp and westbound exit ramp are braided with the existing ramps. These braided ramps would require additional distance between Spur 503 and the frontage road. Therefore, additional right-of-way is needed to provide these ramps.

In order to move the southbound exit ramp to the north, the westbound to southbound mainlane direct connect ramp must be removed. To maintain the mobility provided by that direct connector, an additional southbound entrance ramp has been provided prior to FM 691. This entrance ramp will also serve traffic leaving the northwest quadrant without forcing travelers through the signal at FM 691.

### **US 75 Ramping Option 2 (Figure 16)**

The second ramping scheme developed included elevating the northbound frontage over Spur 503, allowing the northern westbound to northbound direct connect ramp to remain. The southbound exit ramp to FM 691 is moved back prior to Spur 503 allowing the westbound to southbound direct connector ramp to remain. A disadvantage of this option is that traffic destined for the FM 691 interchange may be unaware that they will need to exit well before the development or the interchange is visible, which may cause confusion. This ramping configuration will also cause all southbound traffic from the Loy Lake Road interchange to mix with the traffic near the planned Town Center and Hotel/Convention Center.

### **US 75 Ramping Option 3 (Figure 17)**

Prior to the construction of US 75 around the west and north side of Denison, the current Spur 503 served as the primary connection to Denison. Once the extension of US 75 was built to the north, traffic volumes on the current Spur 503 dropped to a level that can be accommodated with an arterial street capacity.



In this ramping scheme, Spur 503 is converted to a rural diamond interchange with US 75. Continuous uninterrupted northbound and southbound frontage roads are provided under Spur 503. A northbound entrance ramp has been provided prior to Spur 503. Similar to Option 1, the existing at-grade direct connectors must be removed to allow for the northbound entrance ramp and continuous at-grade frontage road. Further, the Spur 503 frontage roads are removed because Spur 503 will function as a typical arterial. The future arterial street may be extended to Loy Lake Road for additional mobility if desired.

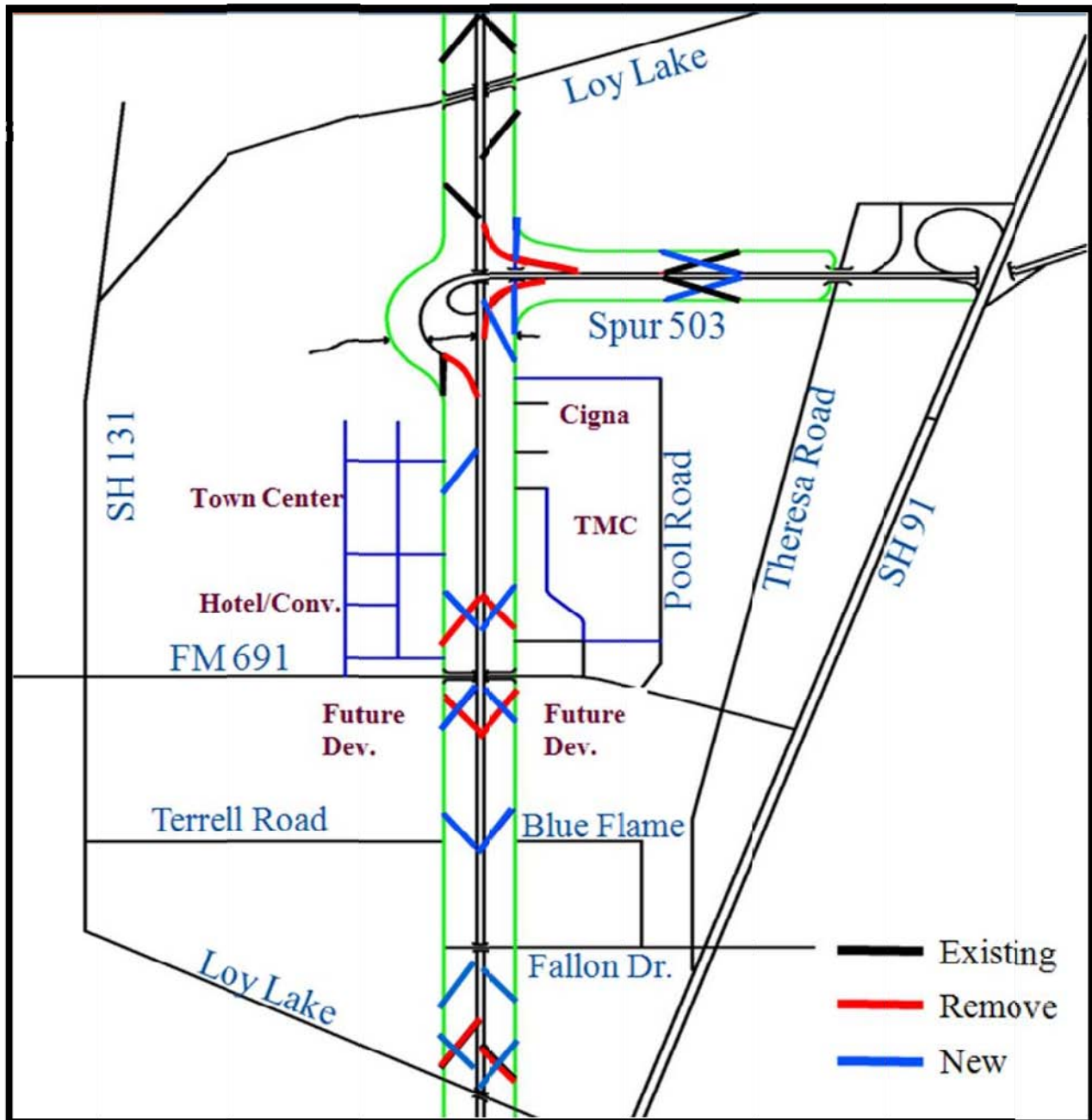


Figure 15 US 75 Ramping Option 1

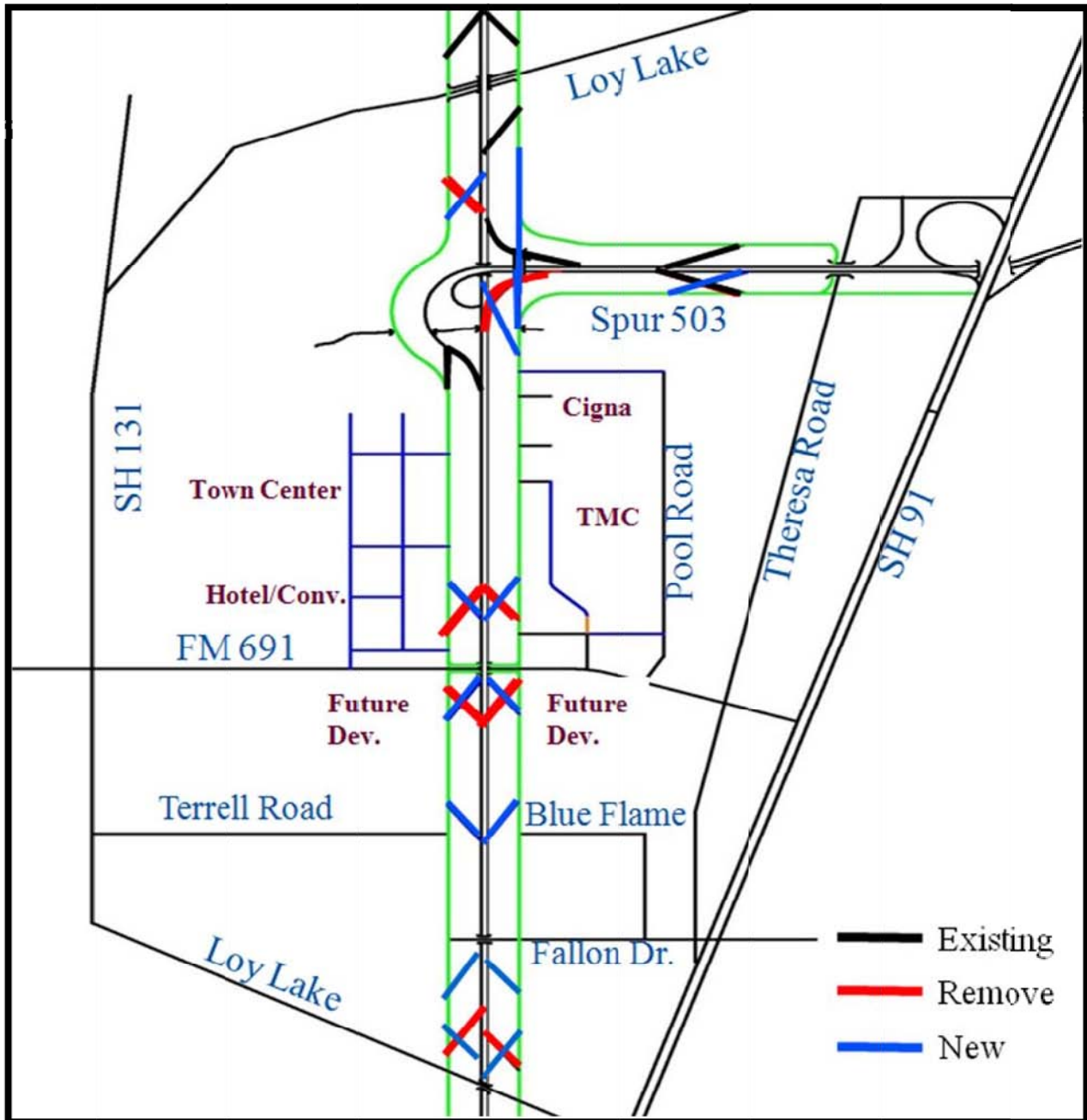


Figure 16 US 75 Ramping Option 2

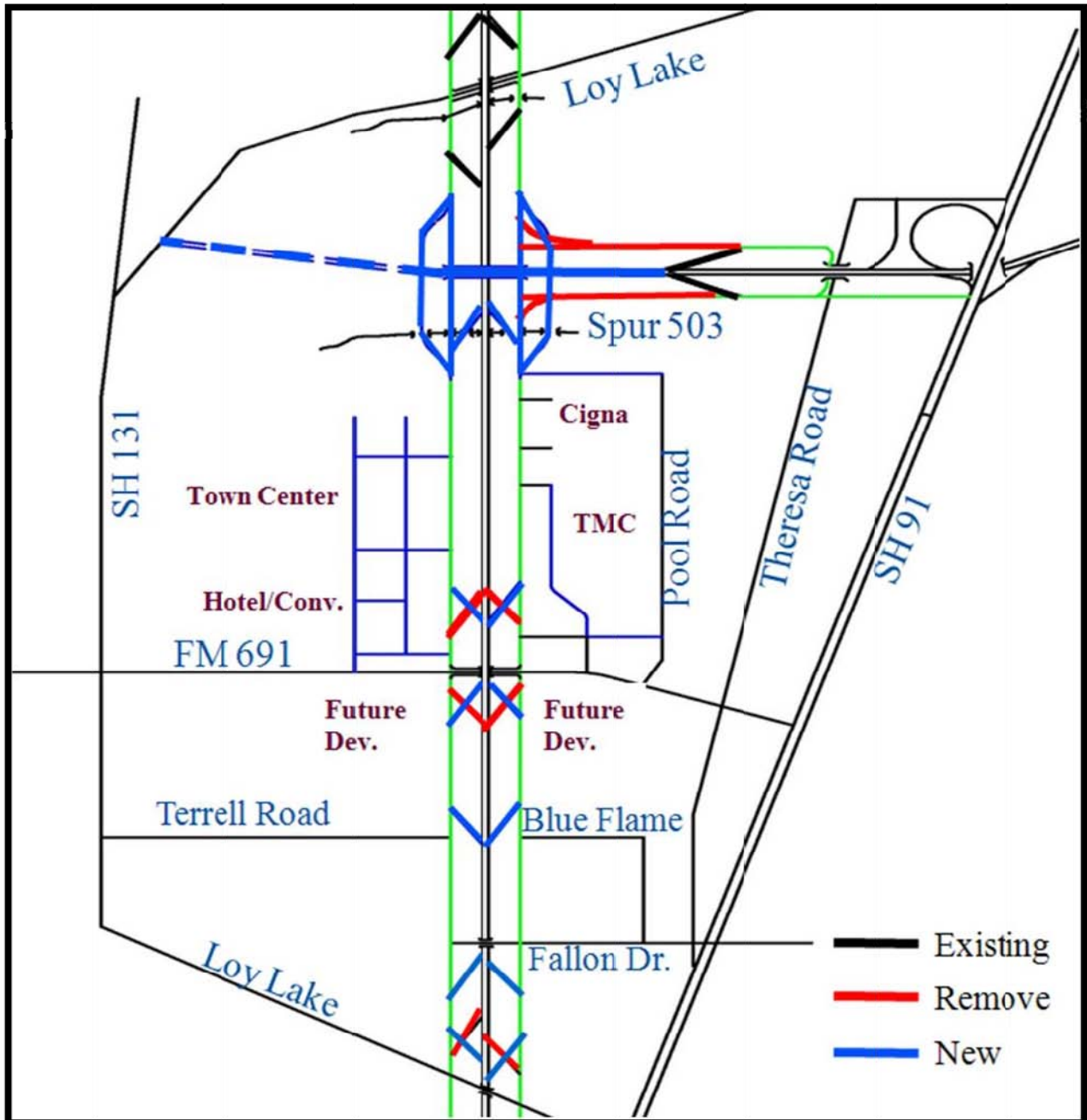


Figure 17 US 75 Ramping Option 3



### 3.0 The FM 691 Corridor

FM 691 currently fulfills mostly a corridor-specific role in the Grayson County transportation network. A relatively short (5.3 mile) east-west arterial with an interchange at US 75, it also connects FM 1417 on the west and SH 91 on the east, both major north-south routes in central Grayson County. The route serves three major activity nodes: North Texas Regional Airport/Perrin Field, Grayson County College, and a developing major activity center at US 75. The potential for future development anchored by these three regional activity centers and the potential to connect to the extension of SH 289, now under development, combine to ensure that FM 691 will be a route of regional significance that will require an appropriate design to meet these needs.

#### *Future Development and Roadway Network Changes*

Throughout the corridor there are numerous opportunities for development. The airport has 325 acres ready for business development. In 2007, the Grayson County College Board of Trustees approved a \$45 million bond to expand and improve its campus. The interchange of FM 691 and US 75 will see a tremendous level of development as described in the previous section. Finally, there are many large, vacant tracts that are potential residential communities or business developments.

The other significant change to the area is that SH 289 will be extended from SH 56 to FM 120, on the north side of Pottsboro, as a four-lane highway. The extension of SH 289 will provide a parallel route to US 75, direct from downtown Dallas, through the northern suburbs, to the Texoma region. The extension of FM 691 will be an alternative route to US 82 for vehicles traveling between US 75 and SH 289/DNT and ultimately between the Metroplex and the Texoma region. This planned extension of FM 691 to the planned extension of SH 289 is illustrated in **Figure 18**.

#### *Functional Classification*

Based on the planned development around the interchange, the future development potential in the corridor, and the draw of traffic from SH 289, it is recommended that FM 691 be built as a 4-lane divided arterial with enough available right-of-way to expand to six lanes. The existing traffic volume along FM 691 is between 5,400 and 7,500 vehicles per day, which is in the allowable range of a two-lane rural roadway. However, as traffic increases due to development and an additional major connection to future SH 289, the capacity of FM 691 will be exceeded. The capacity of the current two-lane configuration is approximately 15,000 vehicles per day. Two potential typical sections were developed that would accommodate the future needs of FM 691 and are shown in **Figure 19**.



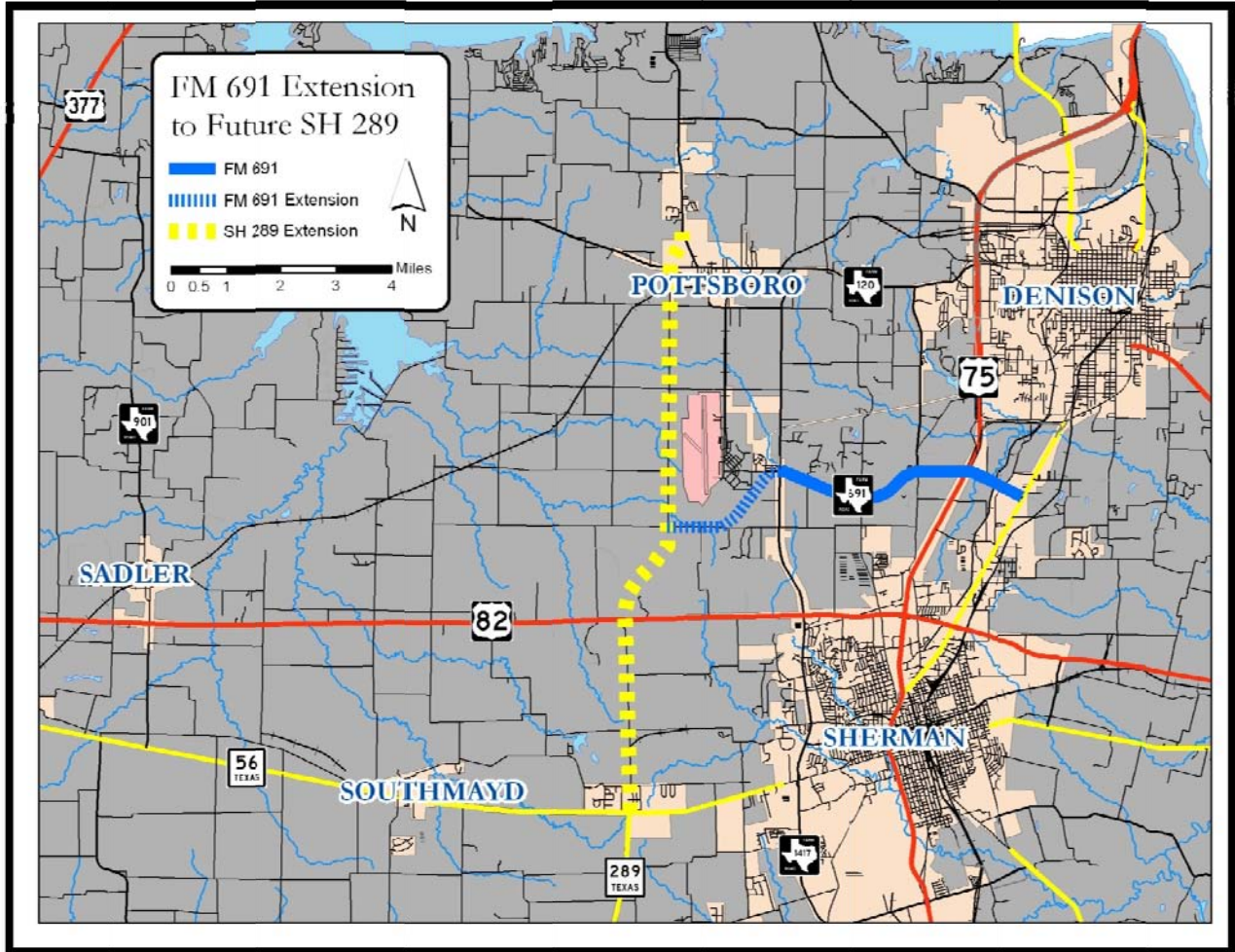


Figure 18 FM 691 Extension to Future SH 289

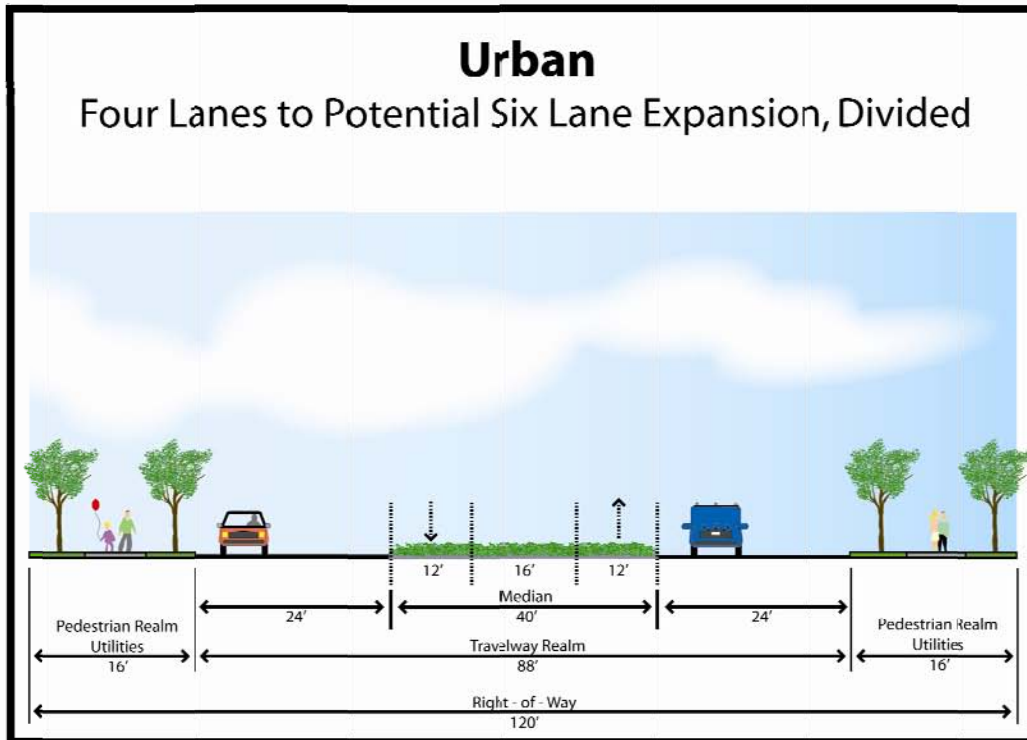
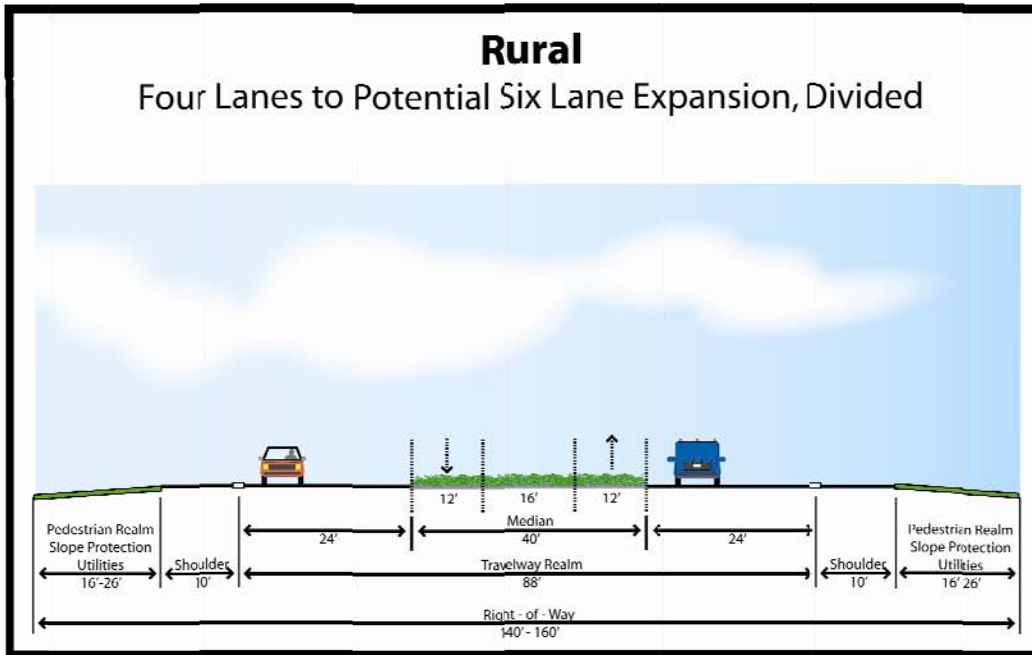


Figure 19 FM 691 Typical Sections

The primary difference between these two cross-sections is how the right-of-way is utilized outside of the travel lanes. In the rural section, a 10' shoulder is provided for vehicle pull-off and safety purposes. There is also a variable width of right-of-way used for slope protection to provide erosion control and vegetative establishment; utilities easement; and to accommodate potential pedestrian facilities. With Grayson County College as well as surrounding residences and future businesses along FM 691 it will be important to accommodate pedestrian movement. The typical rural section has a right-of-way requirement of 140 to 160 feet. Based on the adjacent future land uses of industrial, residential, and agriculture, this section would fit the physical setting between the future SH 289 extension and FM 131/Loy Lake Road as shown in **Figure 20**. The average existing right-of-way along this section of FM 691 is approximately 100 feet; therefore, implementing a typical rural section would require acquiring additional right-of-way. The right-of-way needs for the potential extension to FM 691 will be discussed in the following section.

The typical urban section has a right-of-way requirement of 120 feet. Based on the adjacent land uses of commercial and office, an urban roadway typical section would fit the physical characteristics between FM 131/Loy Lake Road and SH 91/Texoma Parkway, as illustrated in **Figure 20**. The average existing right-of-way within this section of FM 691 is approximately 120 feet; therefore, minimal right-of-way would be required in implementing the recommended urban roadway section.



**Figure 20 Location of Typical Sections**



### ***Evaluation of FM 691 Corridor Improvements (SH 289 to FM 131/ Loy Lake Road)***

The planned development along FM 691 at the North Texas Regional Airport, Grayson County College and the US 75/FM 691 interchange will contribute to the need for expansion of the roadway cross section. Additionally, SH 289 will be extended from SH 56 to FM 120, on the north side of Pottsboro, as a four-lane highway, as shown previously in **Figure 19**. SH 289 will be a significant route into the Grayson County region. Providing a roadway connection between FM 691 and SH 289 is important to the economic vitality of the region as well as serving east-west mobility needs. While development along SH 289 has yet to be planned, it is anticipated that development would require sufficient east-west capacity. With the ability to utilize various transportation modes the North Texas Regional Airport plans include providing an intermodal development that would require sufficient access to major north-south roadways. An extension of FM 691 to SH 289 would link two major north-south highways. As a result, FM 691 would become a sub-regional alternative route to US 82 serving the area between FM 120 and US 82.

As a result of the need for the FM 691 extension, three potential alignments were developed based on Technical Steering Committee, Transportation Policy Board, and the Study Team input. These alignments are just three *potential* alignments and have not been amended to any City, County, or MPO Master Thoroughfare Plan. While available information was used in the evaluation of each option, the scope of this study did not allow for sufficient detail that would lead to a recommended alternative. From the input gathered from public officials and the general public, three alternatives were developed. These alternatives will need to be evaluated in more detail as part of a feasibility study in order to determine the final recommended option. However, this study will lay the ground work for analyzing these options.

The total right-of-way needed was calculated according to **Table 4**. Plainview Road is currently a 2-lane rural county road. It was assumed in **Table 5** that the entire roadway would have to be rebuilt in order to facilitate the higher volume of traffic and to meet TxDOT’s standards. Plainview Road is utilized for each of the alignment options as it will ultimately connect to the future SH 289. Based on North Texas Regional Airport planned right-of-way, Plainview Road will cross approximately 2,000 feet of airport property. With an anticipated additional 100 feet of right-of-way needed along Plainview Road, approximately 4.5 acres would be needed within airport property. The following sections describe each of the potential options.

**Table 4 Right-of-Way Calculation Between SH 289 and FM 131/Loy Lake Road**

Description	Calculation
Length Used Along Existing Plainview Road (miles)	Length x 100'
Total Length of New Roadway (miles)	Length x 150'
Total Length along existing FM 691	Length x 50'



**Table 5 Comparison of the FM 691 Alternatives (Future SH 289 to FM 131/  
Loy Lake Road)**

Feature	Option A	Option B	Option C
Length Used Along Existing Plainview Road (miles)	0.75	2.5	3.0
Total Length of New Roadway (miles)	2.5	3.5	4.1
Total Length along existing FM 691	2.65	1.5	1.0
Total New ROW Needed (acres)	56	57	62
Estimated Cost of New Alignment Roadway	\$10 million	\$14 million	\$16.4 million
Estimated Total Construction Cost	<b>\$21 million</b>	<b>\$19.6 million</b>	<b>\$20.4 million</b>

### Option A

Option A, as illustrated on **Figure 21**, extends the current alignment of FM 691 from its terminus at FM 1417 south to Plainview Road. This option would utilize the existing Plainview Road alignment for approximately  $\frac{3}{4}$  of a mile and require nearly 1.75 miles of new location roadway. It was estimated that thirteen parcels would be crossed for Option A that would result in approximately 41 acres of new right-of-way needed. While most of the alignment crossed open land, a heavily forested area near the FM 691 connection would be impacted. Option A would provide the closest connection to the North Texas Regional Airport which is projected to be a major economic catalyst for the future growth of Grayson County. Also, Option A would maintain the FM 1417 intersection as this north-south roadway serves a significant purpose for the area. It is not expected that the access for the existing neighborhood and school just east of the airport would be altered. Grayson County College will also be served by Option A as it would be included as part of the upgraded FM 691. Based on a per lane-mile cost of \$1,000,000, it was estimated that the total cost of a new four-lane divided roadway between SH 289 and FM 691 would be approximately \$10,000,000.

It is recommended that FM 691 be upgraded to a rural four-lane roadway between the new alignment and FM 131/Loy Lake Road for an estimated length of 2.75 miles. Since the right-of-way in this portion of FM 691 is consistently 100 feet, it is estimated that between 40 and 60 feet of additional right-of-way would be needed which would result in an estimated 17 additional acres. Given the amount of vacant land, the roadway could be designed such that impacts to existing buildings such as Grayson County College would be minimized. A floodplain is located approximately 1,800 feet east of FM 131/Preston Road on the north side of FM 691, which would limit the ability to widen to this side. The only major intersection impacted would be FM 131/Preston Road. It is expected that a transition to the urban roadway section requiring 120 feet of available right-of-way would occur prior to FM 131/Loy Lake Road. Upgrading FM 691 to a rural four-lane roadway section from the new alignment to FM 131/Loy Lake Road was estimated to cost approximately \$11,000,000 for a total estimated cost between SH 289 and FM 131/Loy Lake Road of \$21,000,000.



## Option B

Option B, also shown on **Figure 21**, deviates from the current alignment of FM 691 about 1,100 feet west of its intersection with FM 131/Preston Road. This option would utilize the existing Plainview Road alignment for approximately 2.5 mile and require 1 mile of new location roadway, crossing a total of 39 parcels and require 49 acres of new right-of-way. The estimated cost of Option B between SH 289 and FM 691 was approximately \$14,000,000. As Option B would connect to the existing FM 691 alignment just west of FM 131/Preston Road, it would bypass the Grayson County College and not provide as close of a connection to the airport. However, the connection to FM 691 would be located approximately 1,500 feet east of the Grayson County College property.

FM 691 is recommended to be upgraded to a rural four-lane roadway between the new alignment and FM 131/Loy Lake Road for an estimated length of 1.4 miles. With an additional 40 to 60 feet of additional right-of-way required along this section of FM 691, an estimated 9 additional acres would be needed. Given the amount of vacant land, the roadway could be designed such that impacts to existing buildings would be minimized. However, a floodplain is located approximately 1,800 feet east of FM 131/Preston Road on the north side of FM 691, which would limit ability to widen to this side. The only major intersection impacted would be FM 131/Preston Road. It is expected that a transition to the urban roadway section requiring 120 feet of available right-of-way would occur prior to FM 131/Loy Lake Road. Upgrading FM 691 to a rural four-lane roadway section from the new alignment to FM 131/Loy Lake Road was estimated to cost approximately \$5,600,000 for a total estimated cost between SH 289 and FM 131/Loy Lake Road of \$19,600,000.

## Option C

Option C is also shown on **Figure 21** and shows the deviation from the current alignment of FM 691 about 1,800 feet east of its intersection with FM 131/Preston Road. This option would utilize the existing Plainview Road alignment for approximately 3 miles and require 1.5 miles of new location roadway. Option C would require approximately 56 acres of additional right-of-way and could impact 48 parcels. The estimated total cost of Option C would be approximately \$16,400,000. Option C appears to have the largest number of constraints of all the potential alignments. Approximately ½ mile of the new alignment east of FM 131 would travel between existing developments as well as require the clearing of approximately 8.5 acres of heavily forested area. Additionally, Option C would cross FM 131 at a skewed angle, which could result in a more complicated design geometry, and then connect to the existing FM 691 in a curve. These issues would need to be addressed in a future feasibility study. Similar to Option B, this alignment would not result in an upgraded FM 691 that would benefit the Grayson County College or provide as close of a connection to the North Texas Regional Airport.

The length of the upgrade portion of FM 691 between the new alignment and FM 131/Loy Lake Road would be approximately 1 mile which would translate to approximately 6.1 additional acres of right-of-way needed to upgrade to a rural four-lane roadway. Upgrading FM 691 to a rural four-lane roadway section from the new alignment to FM 131/Loy Lake Road was estimated to cost approximately \$4,000,000 for a total estimated cost between SH 289 and FM 131/Loy Lake Road of \$20,400,000.

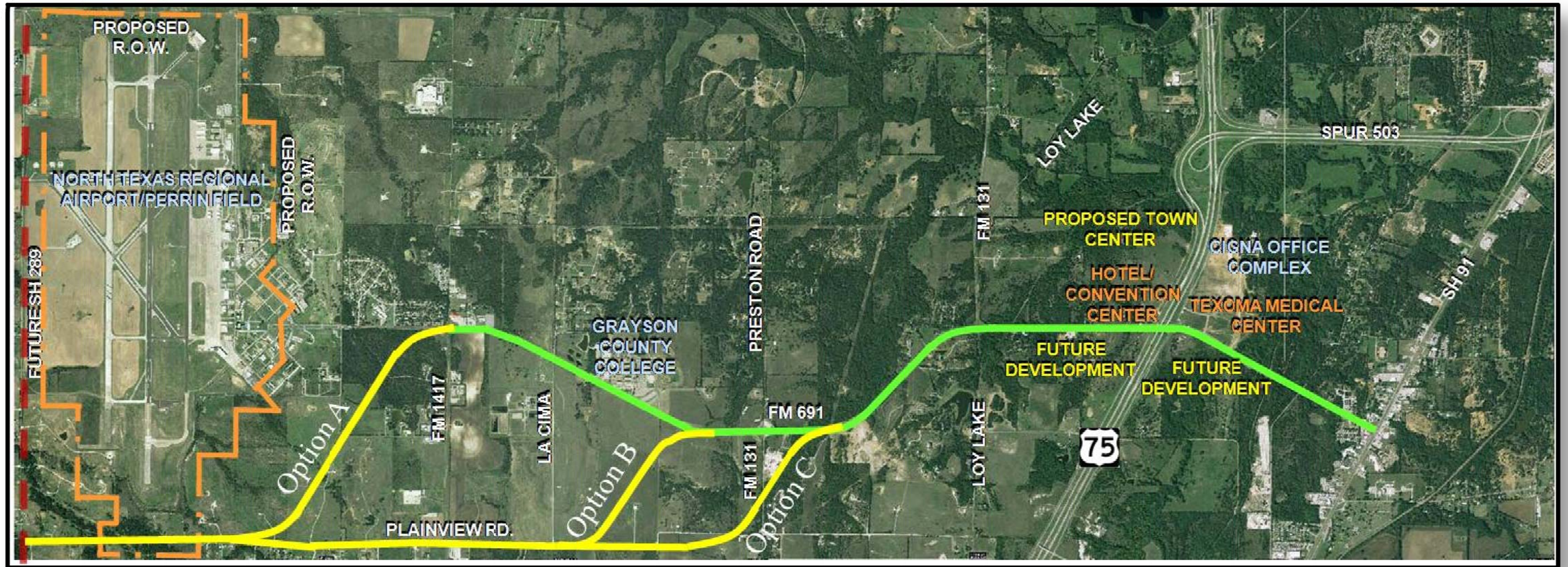


Figure 21 Alignment Options for the FM 691 Extension

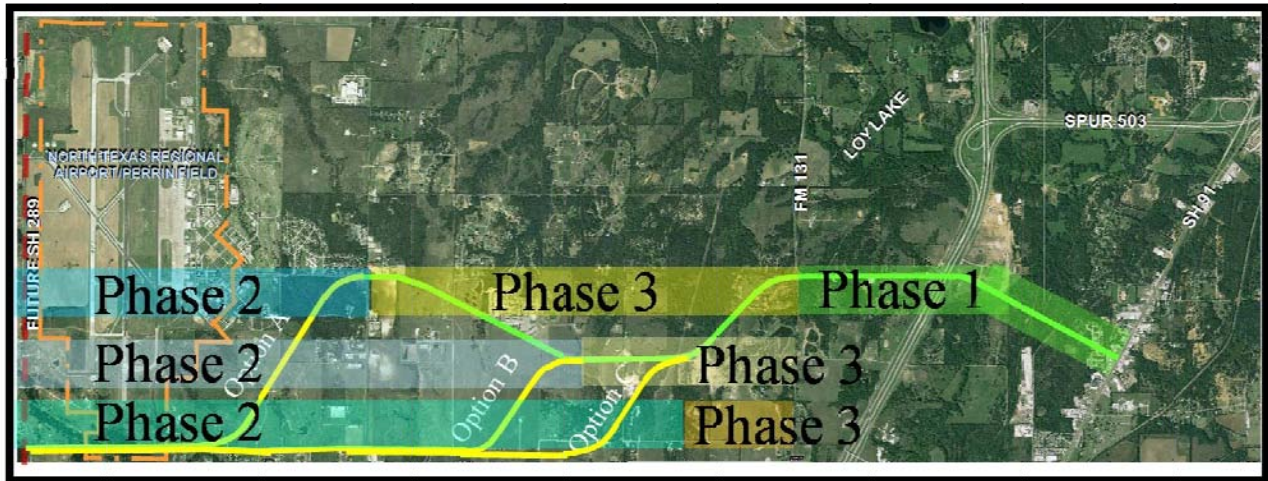


## ***Evaluation of FM 691 Corridor Improvements (FM 131/ Loy Lake Road to SH 91)***

The recommended four-lane urban roadway section between FM 131/Loy Lake Road and SH 91 (Texoma Parkway) would result in minimal right-of-way impacts. The proposed typical section for FM 691 east of FM 131/Loy Lake Road results in a right-of-way footprint of 120 feet which fits inside the existing right-of-way along this section of FM 691. The total length of improvement for this section would be approximately 1.9 miles and result in an estimated cost of \$11,400,000. The cost is based on a per lane-mile cost of \$1,500,000. Recognizing the need to provide additional capacity near the US 75/FM 691 interchange due to planned development, the Sherman-Denison MPO Transportation Policy Board approved updating the SDMP Master Thoroughfare Plan to include a four-lane roadway section through the interchange. In addition to SH 91 the major intersection along this section of FM 691 is Theresa Drive. Currently, Theresa Drive is a minor two-lane roadway. However, development plans exist that could add retail as well as multi-family land uses to the FM 691/Theresa Drive area.

### ***Phasing of FM 691 Corridor Improvements***

The major improvements to the FM 691 corridor can be made in three logical phases to streamline their implementation. Depending on which alignment option is ultimately chosen, **Figure 22** shows the phased implementation plan.



**Figure 22 Phased Implementation of FM 691 Corridor Improvements**

### **Phase 1**

As discussed earlier, the planned development in the vicinity of the interchange of US 75 will generate a significant amount of traffic on FM 691, especially within approximately ½ mile of the interchange. The planned development of the Texoma Medical Center on the northeast quadrant as well as the hotel/convention Center and Town Center on the northwest quadrant will produce an immediate need for capacity improvements. It is recommended that the area near the interchange be the first phase of improvements. This phase involves its expansion from a two-





lane undivided facility to a four-lane divided urban roadway with room to expand to six-lanes, as shown in the cross-section in a previous section. The implementation of this phase should take place prior to the opening of the Southpoint Town Center or significant development on the southern quadrants of the interchange. The remaining portion of the section between FM 131/Loy Lake Road and SH 91 should be developed as needed. As mentioned earlier, there are currently preliminary development plans for a mixed-use facility near Theresa Drive. Therefore, it would be logical to upgrade the roadway past Theresa Drive prior to the coming development. The total length between FM 131/Loy Lake Road and SH 91 is approximately 2 miles. The upgrade of this roadway is projected to result in minimal right-of-way impacts and carries an estimated cost of \$11,400,000.

## Phase 2

The next logical phase of implementation would be to construct the new section of roadway between the existing FM 691 alignment and the future extension of SH 289. The alignment of this new section of roadway should be determined through a feasibility study in coordination with TxDOT. This phase involves the construction of a new four-lane divided rural arterial with potential expansion to six-lanes, as shown in the typical section. Traffic would funnel onto the existing two-lane alignment of FM 691 until Phase 3 is complete. The implementation of this phase should be done in conjunction with or shortly subsequent to the extension of SH 289.

## Phase 3

The final phase of implementation would be to widen existing FM 691 between where its future extension diverges from the existing alignment and FM 131/Loy Lake Road. This phase involves the expansion of the two-lane undivided facility to a four-lane divided rural roadway with room to expand to six-lanes, as shown in the typical section. For Option A, the conversion of the roadway adjacent to the Grayson County College property from a five-lane undivided roadway to a 4-lane divided roadway should be done in an agreement among TxDOT, Grayson County College, and the adjacent property owner to the south. For Option C, this phase could be implemented in conjunction with Phase 2 due to the short length of improvement required and the absence of major intersection improvements.

**Table 6** provides a comparison, by phase, of the FM 691 alignment options.



**Table 6 Phased Comparison of FM 691 Alignment Options**

	Feature	Option A	Option B	Option C
PHASE 1	Length		1.9	
	Right-of-Way Needed (acres)		0.4	
	Cost		\$11,400,000	
PHASE 2	Length	2.5	3.5	4.1
	Right-of-Way Needed (acres)	41	49	56
	Cost	\$10,000,000	\$14,000,000	\$16,400,000
PHASE 3	Length	2.75	1.40	1
	Right-of-Way Needed (acres)	17	9	6.1
	Cost	\$11,000,000	\$5,600,000	\$4,000,000
TOTAL	Length	7.15	6.80	7.0
	Right-of-Way Needed (acres)	58.4	58.4	62.5
	Cost	\$32,400,000	\$31,000,000	\$31,800,000

### ***Access Management***

This section provides general guidance for the management of access along the FM 691 corridor. While many of the agencies involved in this study are well aware of these options, it nevertheless provides insight to people who are new to access management or safety projects. The purpose of this section is not to present a corridor access management plan but to present general concepts to be used as part of a corridor plan that would assist TxDOT as well as the Cities of Sherman and Denison in directing future development. It is recommended as part of a separate study that a specific corridor access management plan be developed for the FM 691 corridor. With the planned development along the FM 691 corridor, now is the time to begin developing a corridor plan that would address specific access issues. Developing a corridor plan for FM 691 would be a very proactive step in maximizing the transportation system used to serve local, regional and future site generated traffic.

As part of a plan, the access management considerations for this corridor have several dimensions. For instance, there are policy recommendations and safety, operational, pedestrian, and bicycle considerations. The following five separate categories have been created to organize these considerations:



- Safety
- Operational/Intersections
- Policy
- Bicycle and pedestrian
- Transit
- Other

## Safety

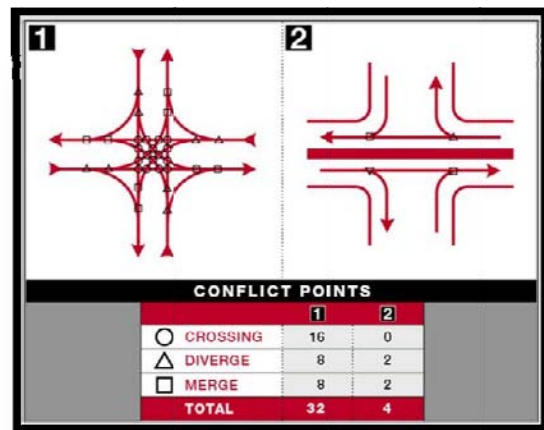
As safety is always of the utmost importance for any corridor, it is vital to plan and design for the safe operation of the users of a roadway corridor. Safety improvements are largely concepts derived from access management techniques. Below are two techniques that can be planned for in this study.

- Median Installation
- Driveway Consolidation

### *Raised Median Installation*

This technique involves adding a raised median barrier to restrict the movement of traffic, thereby reducing the number of conflicts in the corridor.

**Figure 23** illustrates that any of the 32 full-access locations creates potential conflict points. With the introduction of a raised median barrier to restrict the left-out maneuver, the conflict points are reduced by 50%.



**Figure 23 Conflict Points**

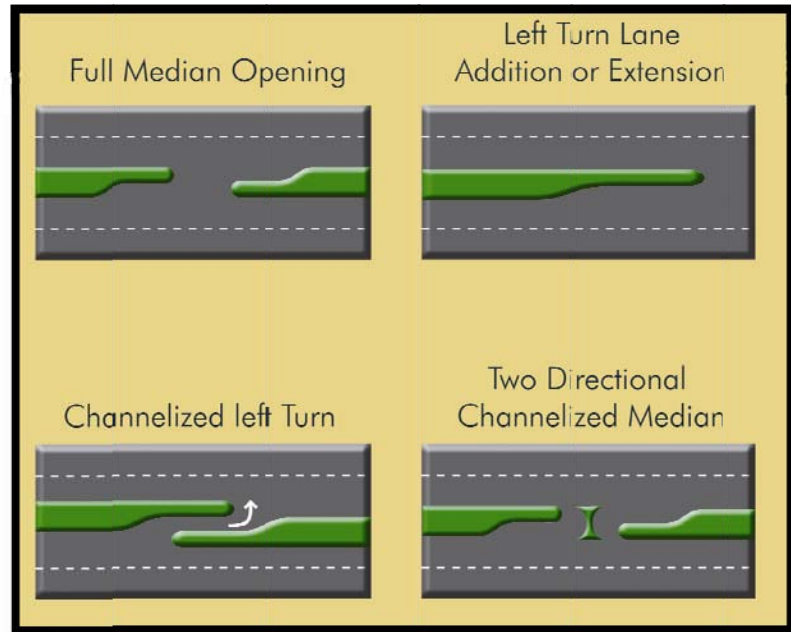
Roadways with non-traversable medians are safer at higher speeds and higher traffic volumes than undivided roadways or those with continuous two-way left turn lanes (TWLTL). Numerous national studies have been conducted relating to undivided, TWLTL, and divided roadways with a non-traversable median. Based on these studies, roadways with a non-traversable median have an average crash rate about 30% lower than roadways with a TWLTL.

A raised median should be considered for locations where average daily traffic (ADT) exceeds 20,000 vehicles and the demand for mid-block turns is high. With raised medians, additional safety benefits are found for pedestrian and bicycle activity by providing a refuge area when crossing a thoroughfare.



### ***Raised Median Types***

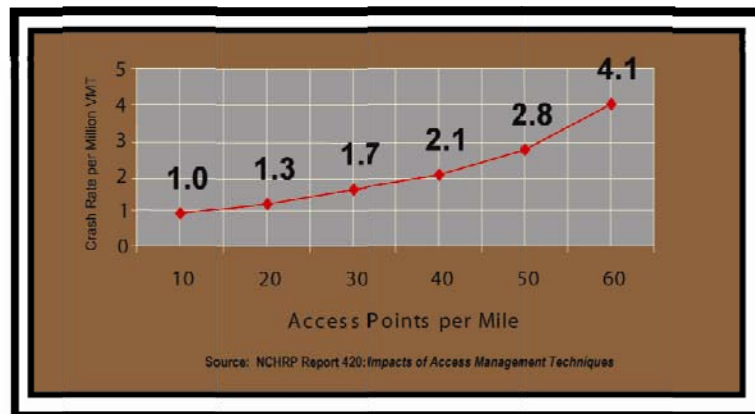
With a raised median, consideration of the median opening and opening type is necessary. The placement of the median opening first depends on the type of thoroughfare system. Priority should be given to those thoroughfares providing mobility and access throughout the community. Following that, other traffic generators along the corridor can be used when considering the opening. The median treatment can also take on many different forms. **Figure 24** illustrates four variations available for median openings.



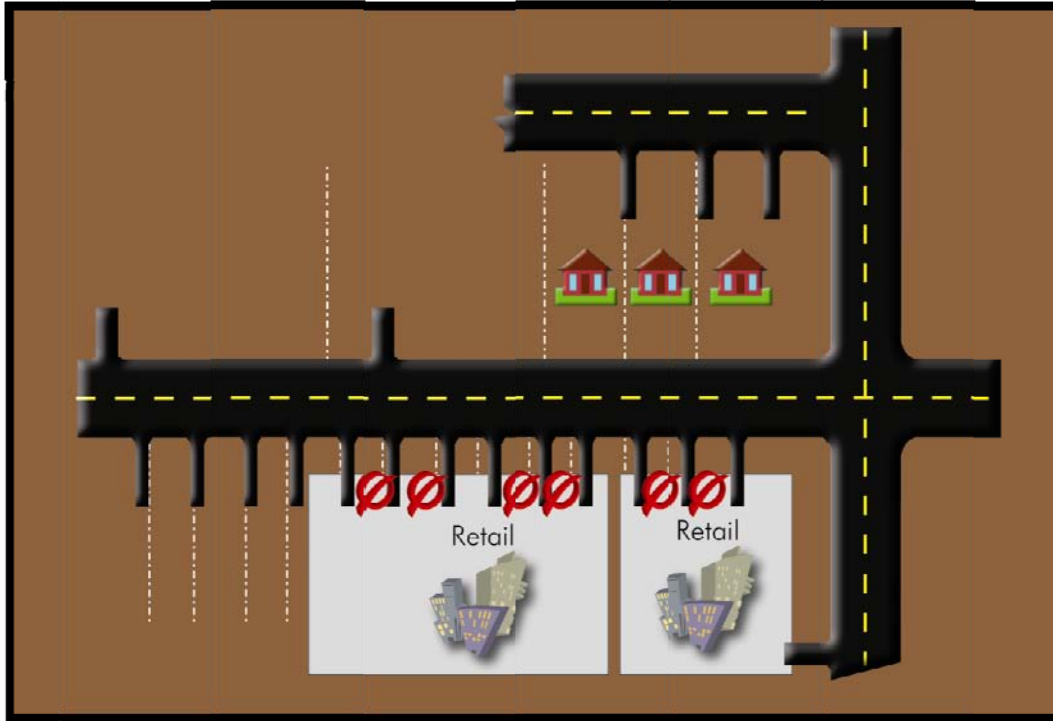
**Figure 24 Median Openings**

### ***Driveway Consolidation***

This technique involves removing or relocating existing access connections (driveways) for the sole purpose of improving safety. Research shows that driveways that are closely spaced have a direct impact on safety along a roadway. Moreover, research has found that a nexus exists between access connection density and crash rates, as indicated in **Figures 25** and **26**. Simply put, as the density of access connections increase, crash rates increase.



**Figure 25 Effects of Driveway Spacing on Crash Rate**



**Figure 26 Demonstration of Driveway Consolidation**

Driveway consolidation is only possible through a cooperative agreement between the property owner and the agency attempting to consolidate the driveway. Application of this technique will be focused on the greatest need. For instance, the areas in the corridor with the highest crash rates will be evaluated for possible consolidation. Each situation is unique and a great deal of negotiation will need to occur between all parties involved.

## **Operations**

In addition to safety, an acceptable level of service for the corridor is another vital goal of the development of this corridor. Operational considerations for this corridor can be broken down into the following distinct intersection improvements:

- Right-Turn Lane
- Left-Turn Lane
- Signal Timing

### ***Right-Turn Lane***

The addition of acceleration and deceleration lanes can provide operational benefits throughout the corridor. These lanes allow turning vehicles to exit the roadway without affecting the through movement of traffic. This allows for a more efficient flow of traffic in the corridor and for vehicles to form “platoons” at the signalized intersections, thereby maximizing the flows each signal can handle.

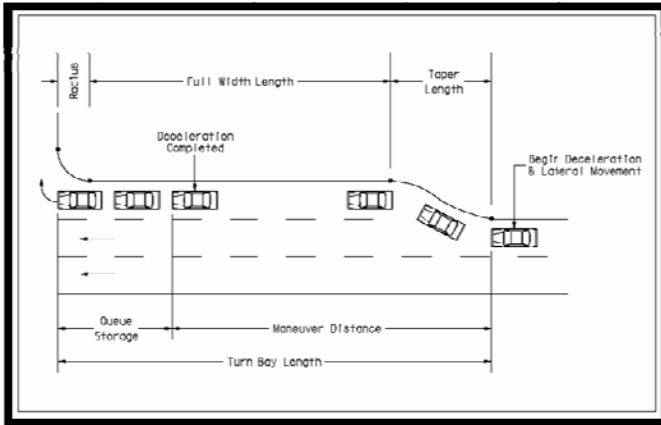


Figure 27 Right Turn Lane

Lengths of auxiliary lanes are a function of posted speed, but queue lengths are normally established on a case-by-case basis. The *Highway Capacity Manual* and TxDOT's *Operations and Procedures Manual* provide guidance on this matter. **Figure 27** illustrates the general layout and design for a right-turn lane. These improvements are not one size fits all. Consideration must be given for posted speed, traffic volume and development type.

### Left-Turn Lane

Much like right-turn lanes, left-turn lanes also allow the turning vehicles to exit the through lanes without affecting the through traffic. However, these lanes generally provide more queue storage for left-turning vehicles for both signalized and unsignalized intersections. **Figure 28** illustrates the general design elements for a left-turn lane. The length of deceleration should consider the posted speed and the amount of speed differential acceptable for the thoroughfare.

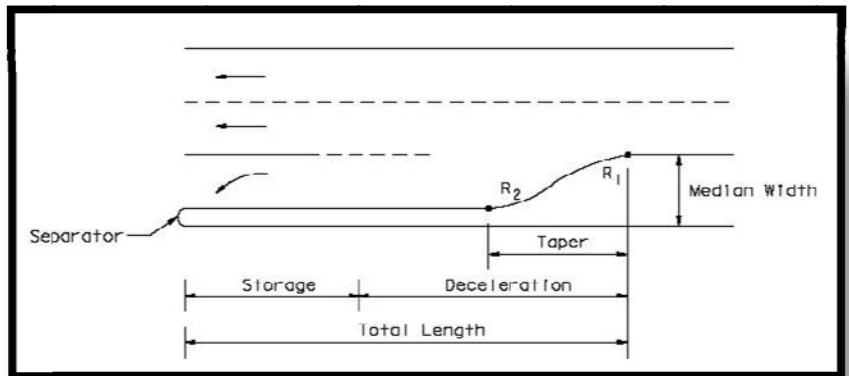


Figure 28 Left Turn Lane

### Signal Timing

Signal timing is a critical technique to improve the overall traffic flow where coordination is possible between closely spaced signals along the FM 691 corridor. The timing of signals often involves coordinating an entire signal system. Any recommendation related to signal timing should consider the ramifications of the system as a whole rather than an isolated signal.



## **Policy Improvements**

### ***Authority and Purpose***

A corridor access management plan document for FM 691 will ultimately serve as an overlay for land use and design-related issues throughout the corridor. The access policy direction must be established in terms of:

- Coordination with TxDOT
- Shared- and Cross-Access Provisions
- Thoroughfare Planning
- Design Guidelines

### ***Coordination with TxDOT***

On September 25, 2003, the TxDOT Transportation Commission adopted the State's proposed rules on access management. The newly adopted rules direct TxDOT to apply access management statewide. In addition, the rules activate TxDOT's new *Access Management Manual*. The manual includes general policy implications and minimum driveway spacing criteria along state highways. There is a provision in the manual for local agencies to develop a corridor access plan in coordination with TxDOT which could become a corridor overlay.

This corridor overlay would then supersede any criteria established by the local agency and/or TxDOT. In other words, a specific plan that is developed for FM 691 would supersede any criteria stated in TxDOT's *Access Management Manual*. The benefit of this approach is to allow for a more coordinated effort among all agencies involved. Moreover, it provides an interactive mechanism for developers and landowner to understand the vision for the corridor and gain general confidence of future access decisions in the corridor. If agreed to, all the agencies involved can enter into an inter-local agreement to activate this corridor access plan and provide for a clear delineation of access authority in the corridor.

### ***Shared- and Cross-Access Provisions***

Access management is much more than just spacing of driveways and providing raised medians. In order to fully realize the benefits of access management, certain land use provisions should be provided in the development regulations of the respective local municipalities.

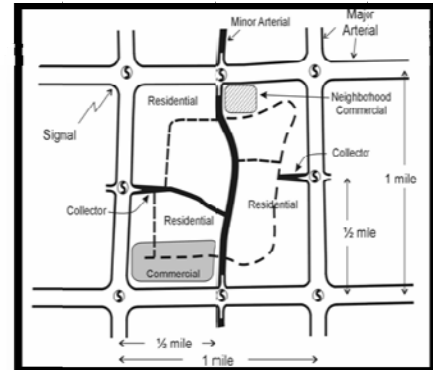
Development regulations can require property owners to dedicate land on their common property lines or develop joint access easements. A parking lot cross-access provision assures that a single driveway can serve two or more properties. The result is greater internal circulation between neighboring properties, allowing vehicles to circulate between businesses without having to re-enter the major roadway. This effort may take on two separate forms. In the first, the consultant identifies specific locations that would benefit from sharing access through the use of aerial photos and project lists. The second involves changing local agencies' guidelines to initiate a shared-access provision.



### Thoroughfare Planning

The local government code provides the authority for local agencies to adopt and implement thoroughfare plans. These plans generally describe the alignment and ROW requirements for major thoroughfares through a community. This policy goes a step further and investigates the potential for the use of collector roads and backage roads to serve local developments without adding more turning traffic onto the major thoroughfares. These roads will generally be localized and dependent on site development and property boundaries. **Figure 29** is an example of a thoroughfare plan.

**Figure 29** Thoroughfare Planning



### Design Guidelines

These guidelines will form the basis for technical guidance with regard to access decisions along FM 691. Specific guidelines have been developed for access connection (driveway) spacing and median opening spacing.

### Access Connections

The access connection distances in the following sections are intended for passenger cars on a level grade. These distances may be increased for downgrades, truck traffic, or where otherwise indicated for the specific circumstances of the site and the roadway. In other cases, shorter distances may be appropriate to provide reasonable access, and such decisions should be based on safety and operational factors supported by an engineering study.

Connection Spacing	
Posted Speed (MPH)	Distance (Ft)
< 30	200
35	250
40	305
45	360
> 50	425

The distance between access connections is measured along the edge of the traveled way from the closest edge of pavement of the first access connection to the closest edge of pavement of the second access connection. **Table 7** shows the necessary connection spacing distance needed based on the posted speed limits for the roadways.

**Table 7. Connection Spacing**





### ***Minimum Spacing for Access Points***

A lesser connection spacing than set forth in a specific corridor access plan or by TxDOT's *Access Management Manual* may be allowed in the following situations:

- To keep from land-locking a property; or,
- Replacement or re-establishment of access to the highway under a reconstruction/rehabilitation project.

### ***Median Installation***

Openings should only be provided for street intersections or at intervals for major developed areas. Spacing between median openings must be adequate to allow for introduction of left-turns with proper deceleration and storage lengths. Please refer to the TxDOT *Design Guidelines Manual* for proper deceleration and storage lengths.

### ***Deceleration Lane Tolerances***

When a raised median is present, a left-turn deceleration lane will be provided for every opening. Right-turn deceleration lanes will be required when the peak hour turning movement is greater than 60 vehicles.

### ***Bicycle and Pedestrian Amenities***

The bicycle and pedestrian improvements can be characterized by three different types of improvements. First, hike and bike trail additions, second, sidewalk and pedestrian connections, and finally, intersection pedestrian elements such as curb ramps, decorative cross walks and lighting and signal poles. Many of these improvements can be jointly funded between local agencies and TxDOT while others would be completely funded by local agency resources. Phasing of bicycle and pedestrian improvements is dependent on available funding.



## 4.0 Public Involvement Process

Public involvement was a significant portion of the FM 691 Corridor Study. A proactive public involvement program provides opportunities for the general public, business owners, and various interest groups to participate in the overall process. The public involvement process for this study included one Technical Steering Committee Meeting, one Transportation Policy Board Meeting and one Public Meeting. The Technical Steering Committee consisted of representatives from the SDMPO, TxDOT, Cities of Sherman and Denison as well as Grayson County. The role of the Technical Steering Committee was to provide local support and assistance in the evaluation of each alternative. By participating in the planning process, local community leaders were able to distribute accurate information about the study. The Technical Steering Committee was vital in providing the Study Team with insight into the mobility and safety needs of the area. The Transportation Policy Board consisted of representatives from Grayson County, Sherman, Denison, TxDOT and a small city representative from Van Alstyne. These meetings were open to the public. The Public Meeting was used by the Study Team, Technical Steering Committee and Transportation Policy Board members to present the analysis and the most recent decisions to the general public. During these meetings, the public was able to identify issues and express concerns of the study process and potential solutions.

### *Technical Steering Committee Meeting*

The Technical Steering Committee Meeting was conducted during the study process in order to provide local officials and major stakeholders the opportunity to direct the decision-making process. The meeting was conducted at the TxDOT-Sherman Area Office on June 25, 2008 at 10:00 AM. The presentation given by the Study Team covered the following topics in regards to FM 691:

- Project Overview
- Short-term and long-term US 75/FM 691 interchange
- US 75 ramping options
- FM 691 Typical Sections
- Extension Options of FM 691 to future SH 289
- Access Management
- Schedule

The Committee gave feedback as to their recommendations for the US 75/FM 691 interchange as well as the extension options of FM 691 to the future SH 289 and potential ramping options. The following information was learned by the Study Team from the Committee:

- The driveway between US 75 northbound frontage road and Milton Drive on the north side of FM 691 will not be constructed as part of the development on the northeast quadrant.
- A northern wing of CIGNA employees is planned.
- The Area Office plans to use the traffic projections from this study to give to the District Office in warranting the signals.
- TxDOT's ultimate ramping plans should be incorporated into the US 75 Ramp Options.
- The Park Lane entrance ramp to Spur 503 accommodates heavy volumes.



- Plainview Rd should be utilized as much as possible on the proposed alignment. The Study Team will add an alternative to the east of FM 131 near the natural curve.

### ***Sherman-Denison MPO Transportation Policy Board Meeting***

The Transportation Policy Board Meeting was conducted in anticipation of the Public Meeting that was to be held the following week. The meeting was conducted at the Grayson County Courthouse on August 13, 2008 at 10:00 AM. The Study Team incorporated the comments and changes from the Technical Steering Committee prior to presenting the results of the study to the Transportation Policy Board. This meeting consisted of the current voting members representing Grayson County, TxDOT, Cities of Sherman and Denison as well as a small city representative from Van Alstyne. The Study Team stressed that the improvements for the interchange needed to be completed prior to the planned long-term developments being constructed. The US 75 ramping changes were discussed as a long-term solution that would require additional study and significant funding prior to implementation. The evaluation of the FM 691 extension options was presented. It was explained that additional study consisting of a higher level of detail would need to be performed prior to a final recommendation being made.

### ***Public Meeting***

The public meeting provided similar feedback as the other meetings in that they were used to identify issues and constraints, make modifications based on input received, and ultimately reach a consensus on the project process. The Public Meeting was formatted in such a way that the Study Team was able to interact with the business owners, homeowners, public officials, and other interested parties in both group and one-on-one settings. Comments were encouraged through surveys and group question/answer times. Input received from the public was used by the Study Team in order to assist in the evaluation of the process and conclusions.

The public meeting was held on Wednesday, August 20, 2008 at the Sherman Municipal Ballroom. The open house officially began at 5:30 PM. Citizens were allowed to view the displays prior to the presentation. Boards showing a study area map, recommended short- and long-term improvements, need for an FM 691 extension, future typical sections for the FM 691 Corridor and project schedule were displayed. Registration was taken at the entrance of the building. Survey and comment forms were available. Eight public officials and 68 private citizens attended the Public Meeting.

The project purpose and goals were summarized along with the progress of the study. The recommendations for the short- and long-term interchange were presented. The need for the FM 691 extension was explained as well as the comparison of the three alternative alignments. A general discussion of access management was given. The presentation was followed by a question and answer time.



## 5.0 Study Recommendations and Phasing Plan

Through a corridor analysis and input from the Technical Steering Committee, Transportation Policy Board and the general public, the Study Team developed several potential transportation solutions. The transportation recommendations were then categorized into a phased plan that prioritized projects.

### *Study Recommendations*

The following summarizes the conclusions and recommendations for the FM 691/US 75 interchange, US 75 ramping options and the FM 691 corridor.

#### **FM 691/US 75 Interchange Short-Term**

- It is projected that the existing interchange geometry will accommodate future traffic caused by the developments proposed to be implemented.
- Proposed hotel/convention center driveway on the southbound frontage road should be limited to inbound only traffic.
- The site plan should indicate a new driveway, located north of the existing southbound exit ramp to accommodate exiting traffic from the development on the northwest quadrant.
- Traffic signals for the intersections along FM 691 at Southpoint Boulevard, Northbound and Southbound Frontage Roads and Pool Road should be implemented as warranted. It is anticipated that the interchange intersections of US 75/FM 691 will be warranted for the short-term with the development of the Texoma Medical Center and hotel/convention center.

#### **FM 691/US 75 Interchange Long-Term**

- Provide four through lanes on FM 691 through the interchange area with exclusive turn lanes for Southpoint Boulevard, Milton Drive and Pool Road as well as the Northbound and Southbound frontage roads, as shown in **Figure 12**.
- Ultimately, some traffic and safety issues are caused by a combination of the existing ramp configuration and projected traffic generated by future development. Specifically, the short weaving area between the southbound exit ramp to FM 691 and proposed driveway into the southwest quadrant could potentially create safety and operational concerns. Additionally, the location of the northbound entrance from FM 691 limits the number of vehicles that could access US 75 without having to travel through the intersection of FM 691/US 75 northbound frontage road. It is recommended that an ultimate ramping plan be studied. Some potential recommendations are presented in the following section.



## US 75 Ramping Options

- TxDOT has developed a conceptual plan for the ultimate ramping scheme south of FM 691 as shown in **Figure 14**. The plan reconfigures the ramping scheme while maintaining access for FM 691 and Loy Lake and providing additional access to Fallon Drive.
- A significant part of each option is providing a continuous northbound frontage road across Spur 503. Providing this connection will impact Spur 503 direct connections to US 75.
- Due to the anticipated operational and safety issues for the existing ramping configuration serving FM 691, it is recommended that the southbound exit ramp and northbound entrance ramp be relocated to the north. The relocation of these ramps will impact the Spur 503 ramps.
- The scope of this study did not provide for a detailed feasibility study of each of these ramping options. However, based on the analysis of the conceptual layouts we believe that Ramping Option 3 would be the best long-term solution to the area. While probably the most costly since the entire interchange would need to be re-built, a rural diamond interchange at Spur 503 would provide more logical ramping connections and ultimately better serve the entire area.

## FM 691 Corridor

- The recommended roadway section between the future SH 289 and FM 131/Loy Lake Road is a rural four-lane divided arterial with the ability to expand to six-lanes in the future. The right-of-way requirements for the rural typical section are projected to vary between 140 and 160 feet. The recommendation for the section of FM 691 between FM 131/Loy Lake Road and SH 91 (Texoma Parkway) is an urban four-lane divided roadway section with the ability to expand to six lanes in the future. The right-of-way requirement for the urban section is projected as 120 feet.
- A connection between FM 691 and future SH 289 is recommended. Three alternative alignments are presented. While the detail of this study is not such that a final alignment recommendation is presented, a general comparison of characteristics as well as input from the general public show that Option A could potentially provide the greatest benefit.
- It is recommended that a FM 691 Corridor Access Management Plan be developed that will assist TxDOT, Cities of Sherman and Denison as well as developers. The study presents access management tools that can be implemented to accommodate existing local and regional traffic as well as future capacity demands due to the upcoming development. This plan will help developers understand access requirements along the corridor as well as assist in site planning their internal circulation to best meet their needs. In working with TxDOT, city officials, general public and the developers a corridor access management plan will provide a solid framework in providing a reliable transportation system for local, regional and site development traffic.



## ***Phasing Plan***

The success of implementing the recommended solutions is dependent on the coordination between a variety of entities. Understanding that funding is a significant component in the development and construction of these recommendations, this section attempts to identify a phased approach of the actions that need to be taken in order to provide a successful transportation plan along this corridor. A summary of this phasing plan is provided in **Table 8**.



**Table 8 Summary of Recommended Phasing Plan**

	Phase 1	Phase 2	Phase 3
<b>US 75/FM 691 Interchange</b>	<ul style="list-style-type: none"> <li>• Southbound frontage road driveway into NW quadrant should be limited to inbound only traffic.</li> <li>• Construct new driveway north of existing SB Exit ramp.</li> <li>• Implement traffic signals for NB and SB Frontage Roads. Implement additional traffic signals as warranted.</li> <li>• Conduct feasibility study and design process of US 75 ramping options.</li> </ul>	<ul style="list-style-type: none"> <li>• Construct exclusive turn lanes for Southpoint Blvd, NB and SB Frontage Roads, Milton Drive and Pool Road.</li> <li>• Implement additional traffic signals as warranted.</li> </ul>	<ul style="list-style-type: none"> <li>• Construct US 75 ramping configuration based on study performed in Phase 1.</li> </ul>
<b>FM 691 Corridor</b>	<ul style="list-style-type: none"> <li>• Conduct alignment study, environmental requirements and perform design for upgrading FM 691 to an urban 4/6-lane divided through interchange area.</li> <li>• Develop FM 691 Corridor Access Management Plan.</li> <li>• Conduct alignment study, environmental requirements and perform design for FM 691 extension to future SH 289.</li> <li>• Conduct environmental requirements and perform design for FM 691 expansion to a rural 4/6-lane divided roadway.</li> </ul>	<ul style="list-style-type: none"> <li>• Construct urban 4/6-lane divided section through interchange area. As development is planned the urban section should expand length between FM 131/Loy Lake to SH 91 (Texoma Pkwy.)</li> <li>• Construct new rural 4/6-lane divided section from SH 289 extension to FM 691.</li> <li>• Implement recommendations determined as part of FM 691 Corridor Access Management Plan.</li> </ul>	<ul style="list-style-type: none"> <li>• Construct new rural 4/6-lane divided section from FM 691 extension to FM 131/Loy Lake Road.</li> </ul>