Errata to the Technical Memorandum "Summary of 2025 Interchange Level of Service Data Collection, Analysis, and Results for the U.S. 287 at Lamar Project" dated May 2003

PREPARED FOR: U.S. 287 at Lamar - CDOT Region 2

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This errata sheet updates the Technical Memorandum "Summary of 2025 Interchange Level of Service Data Collection, Analysis, and Results for the U.S. 287 at Lamar Project," dated May 2003, with interchange graphics presented to the public at a March 25, 2003 public meeting.

Figure 1 illustrates the interchanges presented to the public for discussion at the meeting. Figure 2 illustrates the interchange alternatives evaluation matrix presented to the public for discussion at the meeting. The graphics include eliminated alternatives and the ultimate recommended alternatives (interchanges S-6, E-2, and N-4). The E-2 Interim interchange alternative would be a construction option for the two-lane Interim Phase of the reliever route.

FIGURE 1. Interchange Alternative Graphics Presented at March 25, 2003 Public Meeting

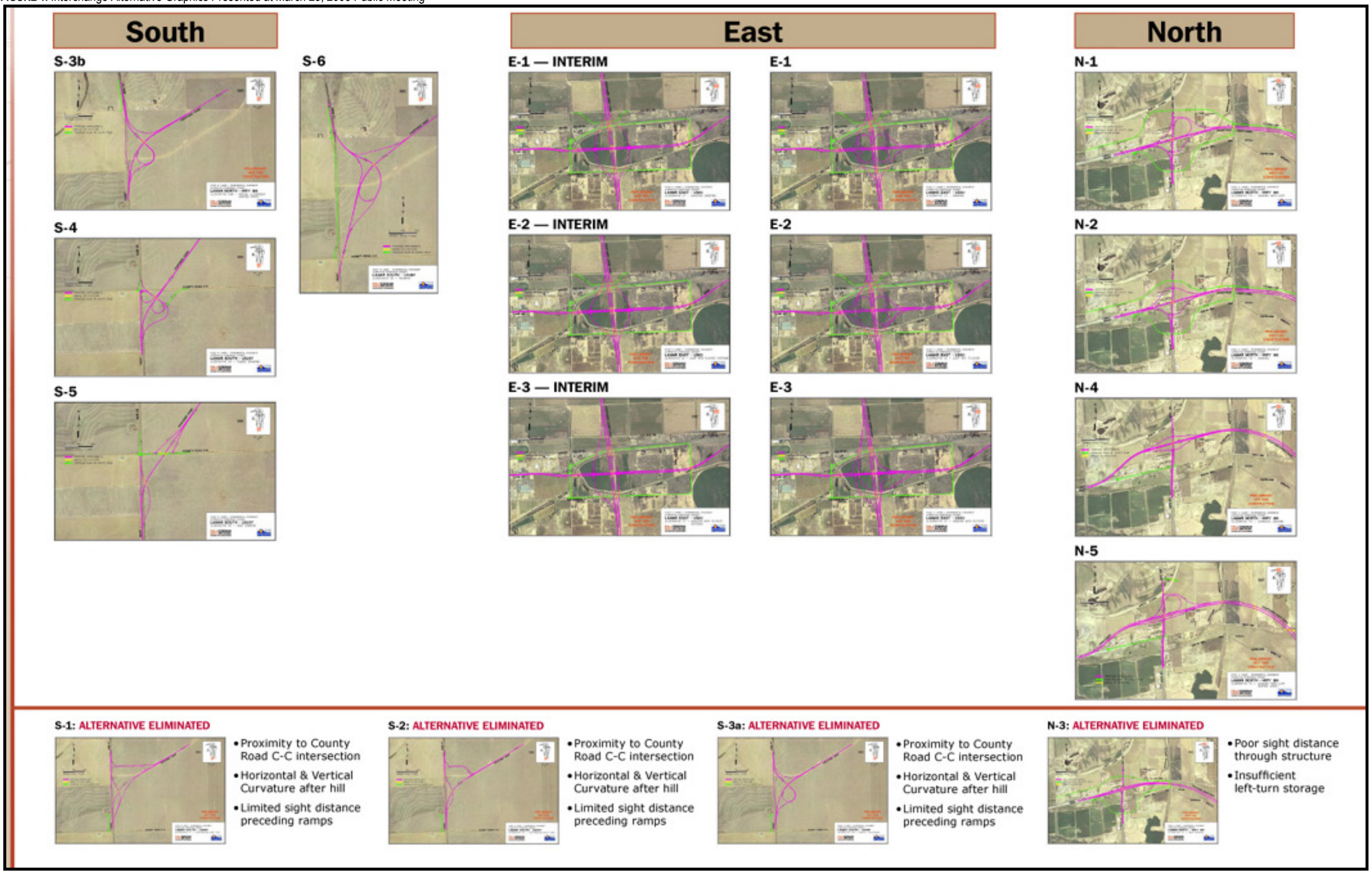

FIGURE 2. Interchange Alternatives Evaluation Matrix Presented at March 25, 2003 Public Meeting

U.S. 287 at Lamar Interchange Alternatives Evaluation Matrix			ALTERNATIVES for Southern Access				Notes/Assumptions	ALTERNATIVES for Eastern Access			Notes/Assumptions	ALTERNATIVES for Northern Access				Notes/Assumptions
	Criteria	Performance Measures	S3 B	S4	S5	S6		E1	E2	E3		N1	N2	N4	N5	
	Accessibility															
A1	Access for Residential Properties	Qualitative scale incorporating vehicular access to residential properties: 1=access reduced or made longer, 3=maintain current access, 5=access is improved/distance made shorter.	3	4	4	5	Requires new access for West property	1	1	1	Impacts to many residents with out-of-direction travel	1	1	3	3	N1, N2 access now from frontage roads
A2	Access to Agricultural Facilities	Qualitative scale incorporating vehicular access to local agricultural facilities: 1=access reduced or made longer, 3=maintain current access, 5=access is improved/distance made shorter.	1	3	3	3	Complicates access for West ranch	3	3	3		2	3	1	1	N1 Pierson farm separated from fields by frontage road; N4, N5 Pierson farm separated by highway
A3	Access to Existing Businesses	Qualitative scale incorporating maintaining access to existing local businesses: 1=access reduced or made longer, 3=maintain current access, 5=access is improved/distance made shorter.	na	na	na	na		1	1	1	All businesses lose US 50 access, require frontage road	1	1	1	1	All businesses lose US 50/287 access, require frontage road
A4	Accommodate Future Crystal St. Connection	Qualitative scale to evaluate flexibility to accommodate future Crystal Street connection: 1=access reduced or made longer, 3=maintain current access, 5=access is improved/distance made shorter.	na	na	na	na		3	3	1	E3 S-E ramp extends N into Crystal Street connection area	na	na	na	na	
	Average Rating for Category		2.0	3.5	3.5	4.0		1.7	1.7	1.7		1.3	1.7	1.7	1.7	
	Interchange Operations															
O2	Interchange Ramp Operations -(2025)	LOS at ramp intersections - During design year (2025) 1 = E, 5 = A	5	5	5	5		5	5	5		5	5	5	5	
O3	Interchange Performance	Qualitative scale to address whether interchange meets all identified performance objectives? 1 = Does not meet, 3= meets most, 5 = meets all	5	5	5	5		5	5	3		5	5	5	5	
	Average Rating for Category		5	5	5	5		5	5	4		5	5	5	5	
	Safety/Design															
D1	Safety	Qualitative scale to address accident rates for interchange types: 1 = more accident statistics for interchange form, 3 = few accident statistics for interchange form, 5 = least accident statistics for interchange form	5	2	4	5	S4 loop intersections impair safety; S5 has oblique angles and stop intersection west of overpass	4	4	3	E3 has 3 left turns	4	4	4	4	
D2	Accommodate Future Improvements	Qualitative scale for ability to accommodate future roadway improvements and capacity increases 1 = poor accommodate, 3 = good accommodate, 5= excellent accommodate	4	4	4	4		5	5	5		5	5	5	5	
D3	Driver Expectancy	Qualitative scale for whether interchange configuration meets driver expectancy 1 = low in meeting driver expectancy 3 = medium in meeting driver expectancy 5 = high in meeting driver expectancy	4	2	3	5	S4 loop intersections not expected; S5 split interchange not expected in rural area; S6 allows constant higher speeds	4	5	3	E4 requires loop movement to remain on mainline US 50; E3 has stop conditions	4	4	5	5	N1, N2 have double-ramp configuration in SW quadrant
	Average Rating for Category		4.3	2.7	3.7	4.7		4.3	4.7	3.7		4.3	4.3	4.7	4.7	
	Environmental Impacts															
E1	Visual Exposure	Qualitative scale to evaluate whether alternative encourages visibility into town: 1 = low visibility, 3 = moderate visibility, 5 = high visibility.	3	1	1	3	S4, S5 interchanges' decision point is south of hill at County Road C-C	4	4	4		2	2	2	2	
E2	Noise Levels in Residential Areas	Number of residences falling within 66 dBA noise level contour from highway mainline or ramps.	0	0	0	0	Noise contours are about 110' from centerline N of US 50, 80' S of US 50	1	1	1	Noise contours are about 110' from centerline N of US 50, 80' S of US 50	4	3	0	0	Noise contours are about 110' from centerline N of US 50, 80' S of US 50
E3	Hazardous Materials Sites	Number of listed hazardous materials sites crossed/impacted by alternative	0	0	0	0		3	3	3		1	1	1	1	
E4	Water Quality	Number of waters of US crossings.	0	0	0	0		3	3	3		3	3	3	4	Assumes Hwy 196 cross Markham in all; N5 incl. new canal crossings
E5	Wetlands	Acres of disturbed wetlands within corridor width (1200' north of U.S. 50, 600' south of U.S. 50).	0	0	0	0		1.2	1.0	0.8		1.7	1.7	1.6	1.6	
E6	Historic Sites	Number of sites impacted.														Pending
		Length of historic irrigation canals impacted. (feet - historic status not confirmed)	0	0	0	0		1735.5	1167.1	1577.6		0	0	127	126	Northern shift affects historic canal
		Length of Santa Fe Trail impacted (feet)	0	0	0	0		0	0	0		300	300	300	300	Impact occurs on mainline
E7	Archeological Sites	Number of sites impacted														Pending
E8	Paleontological Sites	Number of sites impacted														Pending
E9	Prime/Unique Farmlands	Acres of prime/unique farmlands impacted (Prime (irrigated) + Prime if irrigated)	93.8	97.9	105.5	117.9		24.7	24.8	25.4		2.0	2.1	35.1	29.6	Northern shift is into prime farmland
E10	Threatened and Endangered Species	Acres of habitat for listed and sensitive species (Black-tailed prairie dog, black-footed ferret, burrowing owl, raptors, mountain plover, piping plover, Arkansas Darter, swift fox)	95.9	100.0	107.5	119.9		11.2	11.2	11.2		17.4	16.8	12.8	13.0	
E11	Economic Impacts	Qualitative scale to evaluate impedance of free flow traffic into town: 1 = high impedance, 3 = moderate impedance, 5 = no impedance.	4	3	5	4	S4 loop intersections slow free-flow, S5 has least out-of-direction	4	4	1	E3 has stop condition for N-W movement	5	5	5	5	All have free right-turns onto southbound Main Street
	Implementation															
I1	Utility Impacts	Qualitative scale addressing magnitude of impact to power, water, sewer, gas, cable, and fiber optic utility lines: 1=significant impact to utilities, 3=moderate impacted to utilities, 5=no impact to utilities.	4	4	4	4		3	3	3		1	1	1	1	
I2	Construction Cost	Order of magnitude construction cost of alternative **(approximate cost in millions of dollars)**	$7.9	$9.5	$10.4	$9.8		$41.1	$43.9	$42.1		$14.6	$13.6	$17.2	$18.2	
I3	Maintenance Cost	Estimated cost of annual roadway maintenance for new facilities. **(Approximate cost in thousands of dollars per year)**	$10.9	$14.2	$16.4	$12.0		$28.0	$28.6	$29.1		$14.0	$11.9	$15.6	$18.3	
	Right-of-Way															
R1	Potential impacts to Business Parcels	Approximate number of business parcels intersected.	0	0	0	0	No business parcels	3	3	3		3	3	5	5	Interchange footprints only
		Area of business properties intersected (acres)	0	0	0	0		4	5	3		2	1	6	6	03/25/2003
R2	Potential impacts to Farm Parcels	Approximate number of farm parcels intersected	6	3	3	5		7	7	8		8	8	7	7	Interchange footprints only
		Area of farm parcels intersected (acres)	79	37	42	105		99	96	102		65	54	76	88	
R3	Potential impacts to Residential parcels	Approximate number of residential parcels intersected.	0	0	0	0	Ranch properties with residences are counted as farm parcels because homesteads are not affected	1	1	1		8	8	3	3	Interchange footprints only
		Area of residential parcels intersected (acres)	0	0	0	0		4	4	4		13	17	1	1	

Summary of 2025 Interchange Level of Service Data Collection, Analysis, and Results for the U.S. 287 at Lamar Project

PREPARED FOR: U.S. 287 at Lamar – CDOT Region 2

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COPIES: CH2MHill

DATE: May 2003

Introduction

The function of this memorandum is to summarize and detail the Level of Service (LOS) analysis performed for the proposed U.S. 287 bypass of the City of Lamar, Colorado as part of the project's environmental assessment. The new roadway would serve primarily regional truck and automobile traffic as an alternative to the existing Main Street route through the city. The proposed bypass would connect to existing portions of U.S. 287 at locations north and south of Lamar. Access to U.S. 50 east of the city would also be provided.

LOS analysis offers a measure of the quality of traffic operations provided at specific locations within roadway facilities with respect to speed and travel time, delay, comfort, and convenience. The level of service scale ranges from A to F, with each character representing increasingly deficient traffic service conditions. Although LOS definitions vary by transportation facility type, a general qualitative scale relating level of service to operating conditions is shown below.

Table 1: Level of Service Definitions

Level of Service	General Operating Conditions
A	Free flow
B	Reasonably free flow
C	Stable flow
D	Approaching unstable flow
E	Unstable flow
F	Forced or breakdown of flow

The LOS evaluation was completed in support of the traffic analysis portion of the Environmental Assessment (EA) for this project. LOS analysis of each project alternative was completed to determine the anticipated operating conditions for each proposed roadway facility. This analysis considers interchange alternatives at north, south, and east junctions of the proposed bypass. The performance of each alternative was evaluated using anticipated conditions in the year 2025.

A summary of data collection and analysis procedures is contained in this memorandum. Alternative descriptions and subsequent results are likewise presented in following sections.

Data Collection

Anticipated turning movement traffic volumes using each proposed highway facility in the year 2025 were necessary for level of service analysis. Turning movement volumes in this report were obtained from analysis conducted by CH2MHill using a travel demand forecasting model. A license plate origin destination survey and traffic counts in and around the City of Lamar were used in the development of this model. Population and employment growth rates in and around the city were then used to determine year 2025 traffic volumes and turning movements expected to utilize each proposed interchange alternative. Refer to the technical memorandum *Summary of Data Collection, Travel Demand Forecasting Model Development, and Traffic Results for the U.S. 287 at Lamar Project* for a more in depth explanation of forecasting methods, procedures, and results.

Interchange Level of Service Analysis

Level of service analysis was conducted for a total of fifteen interchange alternatives under year 2025 traffic conditions. Five facilities were evaluated at the junction of the proposed U.S. 287 bypass and existing U.S. 287 roadway north of the City of Lamar, and analysis of seven alternatives was conducted at the junction of the proposed route and existing U.S. 287 south of the city. Analysis was also carried out for three interchange alternatives at the junction of the proposed route and U.S. 50 east of the city.

Three time periods for each interchange alternative, the AM, noon, and PM peak hours were analyzed. This range ensured full coverage of directional traffic composition and distribution.

The level of service was determined at specific areas within each alternative. These areas included basic freeway or two-lane segments, locations of vehicle merge or diverge, areas in which weaving occurs, and at roadway intersections. It should be noted that interaction between facility components was generally taken into account in the evaluations, though not specifically in the LOS analysis. A description of the analysis procedures for each facility component follows.

Freeway and Two-Lane Segment Analysis

Operational level of service evaluations of freeway and two-lane segments were conducted according to specifications set forth by the *2000 Highway Capacity Manual* using Highway Capacity Software 2000 (HCS2000). For each analysis, good weather and visibility and the absence of traffic accidents was assumed.

Freeway sections were analyzed on a directional basis as a proportion of the average annual daily traffic (AADT). It should be noted that the peak hour design factor was 6.0% of the AADT for AM analysis, 7.4% for noon analysis, and 8.1% for PM analysis.

A base free flow speed (BFFS) of 65 mph was assumed for freeway analysis. Level terrain, two 12 feet lanes in each direction, shoulder widths of 10 feet, and sparse interchange density contributed no adjustments to the BFFS, yielding a free flow speed (FFS) of 65 mph. It should be noted that a maximum truck and bus volume of 25% was utilized in all analysis procedures. This value represents the highest proportion that can be used for freeway analysis with respect to *Highway Capacity Software 2000*. A recreational vehicle (RV) proportion of 2% was also used throughout analysis procedures.

Level of service analysis for Class 1 two-lane segments was conducted on a two-way basis. Total hourly traffic volumes and directional split were used for each peak hour analysis. Again, lane widths of 12 feet and shoulder widths of 10 feet were assumed. For similar analysis, a truck and bus proportion of 25%, and a recreational vehicle proportion of 2% was used. It was assumed that 50% of roadway segments consist of no-passing zones. Although future development along the proposed bypass is anticipated to be minimal, four access points per mile were assumed for conservative analysis.

Merge/Diverge Analysis

Highway Capacity Software 2000 was utilized for determination of levels of service at ramp-freeway junctions. The LOS for merge and diverge areas is based on the density of vehicles within the influence area.

Volumes immediately upstream of the ramp as well as the merge or diverge volume for the specified ramp were necessary for LOS determination. Speeds of 65 mph and 35 mph were used for the freeway free-flow speed and ramp speeds respectively. All ramps were determined to be composed of a single lane, with acceleration or deceleration lengths determined from preliminary alternative design drawings. Adjustments resulting from adjacent ramps were taken into account using adjacent ramp position, type, and volume.

The terrain was assumed level throughout analysis procedures, and a maximum value of 25% trucks and buses was utilized. RVs represented 2% of the total vehicle volume in each analysis.

Weave Analysis

HCS2000 was again utilized in LOS analysis of weaving sections. All weaving areas evaluated were determined to be of Type A configuration in which vehicles must make one lane change to successfully complete the weaving maneuver. All weaving segments within project alternatives occurred in conjunction with multilane highways.

Operating conditions of weaving sections are dependent on the number of lanes, length, volume of specific movements, and degree of congestion of the section. LOS determination of weaving sections combines these factors and is based on average vehicle running speed.

In all cases of analysis, weaving segments were composed of two lanes only. The lengths of these segments were determined from preliminary design drawings. Basic assumptions again included a 65 mph FFS and level roadway. A 25% proportion of trucks and buses were utilized while RVs composed 2% of analysis volumes.

Intersection Analysis

Intersections were evaluated using Synchro 5.0 traffic analysis software. The program replicates intersection delay and capacity as specified in the *2000 Highway Capacity Manual.* Level of service measurements at intersections were based on vehicle control delay experienced under anticipated operating conditions.

All proposed intersections included in LOS analysis were analyzed as unsignalized stop-controlled intersections. Lane configurations from the design drawings were used.

Project Alternatives and Results

Level of service analysis was conducted for each interchange alternative for the 2025 AM, noon, and PM peak hours using the evaluation procedures and assumptions previously described. LOS was determined for freeway and two-lane segments, points of merge and diverge, areas of weaving, and intersections for each alternative, where applicable. The following is a brief description of each project alternative. Level of service results as determined by analysis procedures, and a discussion of advantages and disadvantages of each alternative from a traffic operations and safety perspective is included.

North Interchange Alternatives

Interchange alternatives at the junction of the proposed bypass and U.S. 287 north of the City of Lamar provide movements to all four directions. Freeway approaches of existing U.S. 287 and the proposed bypass are divided with two lanes in each direction. Highway 196 to the north of each interchange alternative is a two-way two-lane facility.

Alternative N1 is composed of a diamond interchange with a loop provided for northbound to westbound vehicles. This loop eliminates vehicle conflict with southbound through vehicles. The design incorporates frontage roads that provide access to Highway 196 to the north and existing U.S. 287 to the south of the interchange. This alternative requires significant right-of-way acquisition. However, openness of the design provides adequate sight distance and queue storage for turning vehicles at both intersections.

N2, the second northern interchange alternative, is a diamond design with frontage roads. This option shares many of the same advantages as N1, including adequate sight distance and left turn storage distances. This alternative does not offer the northbound to westbound loop ramp for vehicles from the bypass to existing U.S.287, creating an increased number of conflicts with southbound through traffic. However, delay resulting from these movements was determined to be minimal through LOS analysis. Extensive right-of-way acquisition is again anticipated.

Alternative N3 is the third interchange option at the north junction of the proposed bypass and existing U.S. 287. This alternative incorporates a tight diamond design. Frontage roads again offer access to Highway 196 and existing U.S. 287 north and south of the interchange respectively. Although this option significantly decreases land acquisition requirements, sight distance at intersections is extremely limited and it is anticipated that northbound traffic turning left to go westbound could queue back through the south intersection.

Alternative N4 is a standard diamond design. This facility is similar to alternative N2, though it is shifted north. Likewise, the diamond is tighter, minimizing right-of-way requirements. Intersections are utilized at both crossroad terminals of the interchange. This option offers adequate sight distance and left turn storage distances. No special considerations are offered for the predominate turning movement of northbound left turning vehicles. However, delay that results from this movement was determined to be minimal through LOS analysis.

Alternative N5 is composed of a diamond interchange with a loop provided for northbound to westbound vehicles. This loop eliminates vehicle conflict with the southbound through movement. The design is similar to alternative N1, though the diamond is tightened to reduce right-of-way requirements, and the interchange is shifted north. Adequate sight distance and queue storage for turning vehicles at both intersections is anticipated due to the distance provided between them.

Each of the five alternative facilities at the junction of the proposed bypass and existing U.S. 287 north of Lamar operated at high levels of service. All freeway sections, merge and diverge areas, weaving sections, and intersections of each northern alternative operated at LOS A during the AM, noon, and PM peak hours. Analysis of two-lane Highway 196 north of each interchange alternative showed operation at LOS B during peak hours. Results of northern alternative analysis are displayed in Figures 1,2, 7, 8, 13, and 14 of this memorandum.

East Interchange Alternatives

Each of the three interchange alternatives at the junction of Proposed U.S. 287 and U.S. 50 east of Lamar provide movements to all four directions. Interchange approaches are composed of divided highway with two lanes in each direction.

Alternative E1 is a full cloverleaf. All turning movements are accommodated without the use of intersections, minimizing vehicle conflicts and wrong way movements. However, it should be noted that extensive right-of-way acquisition is required.

E2 is the second eastern interchange alternative at the junction of the proposed U.S. 287 bypass and existing U.S. 50. The facility's ultimate design is a partial cloverleaf with a flyover for southbound to eastbound vehicles on Proposed U.S. 287 to U.S. 50. The flyover is provided for the largest anticipated turning movement, and eliminates two weaving areas within the interchange. However, increased right-of-way and travel time and distance are anticipated. Furthermore, an increased number of structures are necessary to accommodate the proposed flyover.

Alternative E3 is a diamond interchange with a flyover provided for southbound to eastbound vehicles. Right-of-way acquisition is likely reduced compared to preceding alternatives. However, numerous structures are again necessary.

Extremely high operating conditions were again determined for each of the three interchange alternatives at the junction of proposed U.S. 287 and U.S. 50 east of the City of Lamar. During all peak hours, LOS A conditions were established for all facilities of each interchange option. High operating conditions result from relatively minimal anticipated traffic volumes during all peak hours. LOS results are displayed in Figures 3, 9, and 15.

South Interchange Alternatives

Interchange alternatives for the proposed bypass south of the City of Lamar are each three-leg designs. The facilities include the north Main Street portion, the south existing U.S. 287 leg, and the Proposed U.S. 287 segment to the northeast. All legs are composed of roadways with two-lane cross-sections.

Alternative S1 consists of a left exit from existing northbound U.S. 287 to Main Street. The use of left-hand exits on high-speed free flow ramp terminals is not generally recommended. Vehicle conflict points are avoided for through movements, though two intersections are required. However, turning movement volumes utilizing the intersections are anticipated to be minimal, creating no decrease in operational service. Sight distance for this alternative is good due to the openness of the design. This alternative requires only one grade separation and structure. Driver expectancy is violated using the northbound left exit.

Alternative S2 is similar to S1. The primary difference is that the northbound exit is on the right, complying with driver expectancy. Traffic volumes utilizing intersections are again expected to be minimal, creating no operational problems.

S3A and S3B are the third and forth interchange options. The two alternatives are identical from an operational standpoint. The only difference is that alternative S3B is located approximately ¼ mile to the north. Intersections are eliminated using a loop connection from southbound Main Street to the proposed northeast bound U.S. 287 bypass.

Alternative S4 is a folded diamond concept with a county road realignment. The design provides adequate levels of service for all of the movements based on the projected volumes and capacity. However, the inclusion of the county road into the interchange violates driver expectancy and reduces the design speed of the existing U.S. 287 to Main Street movement.

Alternative S5 incorporates a half-diamond design. An intersection is required at the junction of the exit ramp from existing U.S. 287 and Main Street. Likewise, intersections are necessary at on and off-ramps to the proposed bypass from County Road C-C. In all cases, minimal traffic volumes dictate no loss in service. This design offers good sight distance.

Alternative S6 eliminates intersections using the trumpet design from southbound Main Street to the proposed northeast bound U.S. 287 bypass. Traffic flow is anticipated to be excellent as a result. Sight distance for this alternative is good due to the openness of the design. This alternative requires only one grade separation and structure, though extensive right-of-way requirements are anticipated.

Analysis of the seven alternatives at the junction of the proposed bypass and U.S. 287 south of Lamar again resulted in high levels of service. Conditions at all areas of merge, diverge, and intersections were determined to be operating at LOS A. Two-lane segments on Main Street and Proposed U.S. 287 were determined to operate at LOS A, while the existing two lane U.S. 287 will operate at LOS B during the noon and PM peak hours. LOS results are displayed in Figures 4-6, 10-12, and 16-18.

Initial analysis of interchange alternatives south of Lamar was conducted with existing and proposed portions of U.S. 287 as a two-lane facility. However, it is anticipated that these roadways will be divided four-lane sections under the ultimate design. Therefore, level of service analysis was completed for these roadways under four-lane conditions.

High levels of service for four-lane sections with projected 2025 traffic volumes are anticipated. Freeway sections at the south interchange are anticipated to operate at LOS A during the AM, noon, and PM peak hours. It should be noted that LOS results displayed for south interchange alternatives represent analysis under ultimate four-lane conditions.

Recommendations

Generally, the removal of heavy truck traffic outside of Lamar will significantly improve traffic operations through the area. Based on the traffic volumes from the 2025 projections, the majority of the roadway connections along the bypass do not require interchanges and could be serviced with intersections. However, because of the significant truck traffic present, a phased approach to construction is recommended. Listed below are the recommendations.

General

Complete the environmental assessment (EA) for the ultimate facility. Purchase right-of-way for the ultimate design or provide corridor protection to ensure access at future interchange locations. Construct an initial two-lane facility with standard at-grade intersections until traffic volumes warrant four-lane and interchange construction.

North Junction

Given the 2025 traffic projections, each northern interchange alternative is anticipated to provide excellent levels of service. Alternative N3 should be abandoned due to poor sight distance and queue stacking problems. Although alternative N2 provides driver familiarity and operational effectiveness, Alternative N4 is recommended due to the northern shift and tightening of the diamond. These attributes are expected to minimize right-of-way acquisition. Alternative N4 should be implemented due to driver familiarity with the standard diamond design and an anticipated high level of operational service. It was determined that this design will easily accommodate the major traffic movements without queue stacking problems at the intersections. Although interchange alternative N4 is recommended, it should be noted that a standard intersection at this location would accommodate anticipated 2025 traffic volumes.

East Junction

Anticipated traffic volumes at this location again do not warrant construction of an interchange, as a standard intersection will provide adequate levels of service. However, evaluation of each interchange alternative resulted in adequate LOS. Alternative E2 provides the best operational effectiveness, as it incorporates a direct connection for the heaviest turning southbound to eastbound movement.

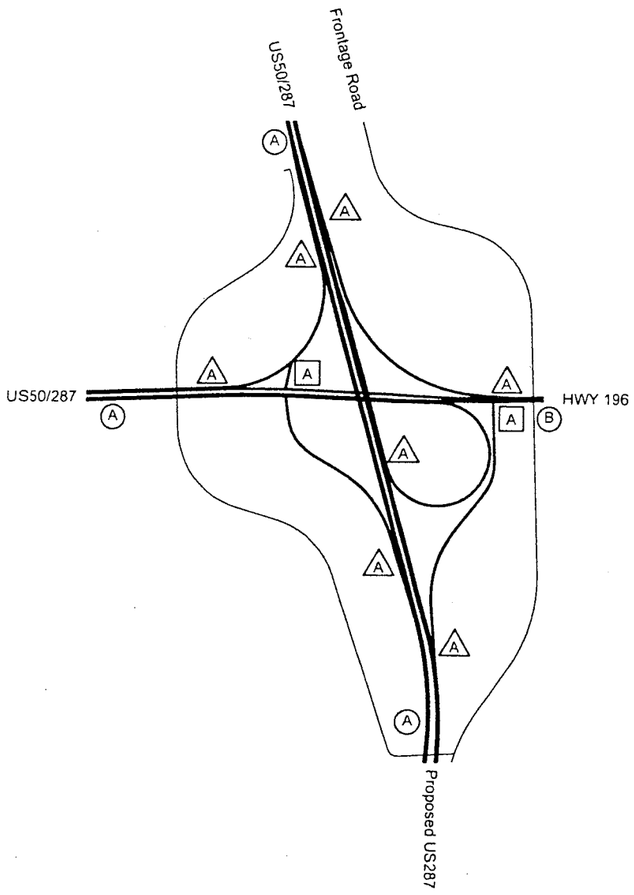
South Junction

Each southern interchange alternative is anticipated to provide excellent levels of service. However, Alternative S6 provides an open design that includes no intersections. Traffic flow is expected to be optimized as a result. However, it should be noted that anticipated traffic volumes at the south bypass junction could be adequately served with a standard intersection.

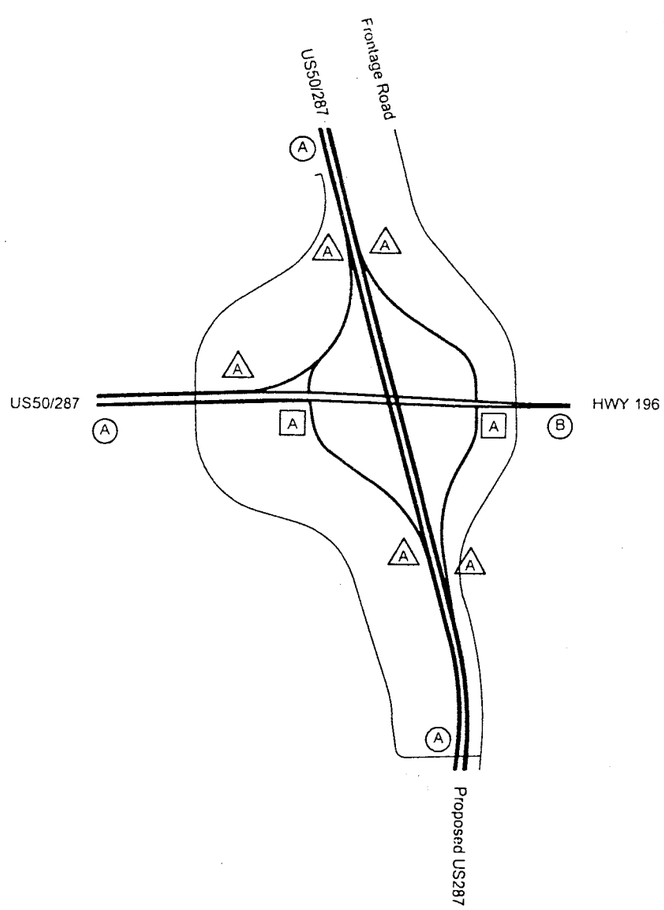
N

No Scale

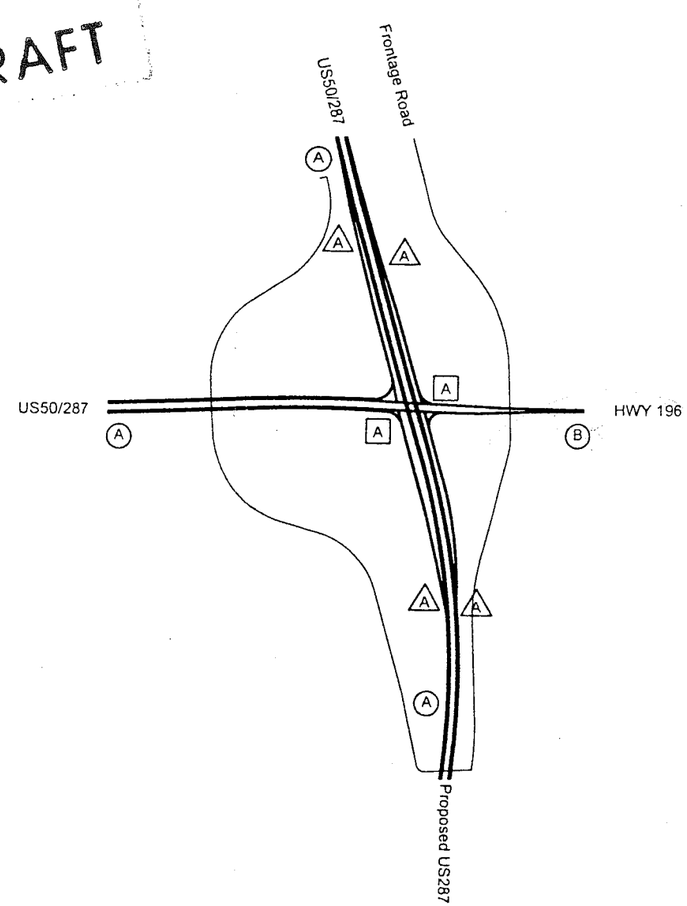
Alternative N1



Alternative N2



Alternative N3



Legend:

- A = Freeway Level of Service
- B = Merge/Diverge Level of Service
- C = Weave Level of Service
- D = Intersection Level of Service

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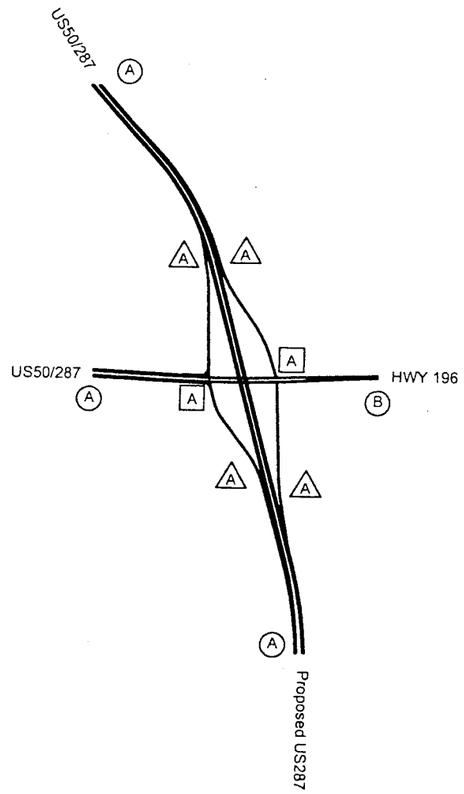
Figure 1
Lamar North Alternatives
AM LOS Analysis

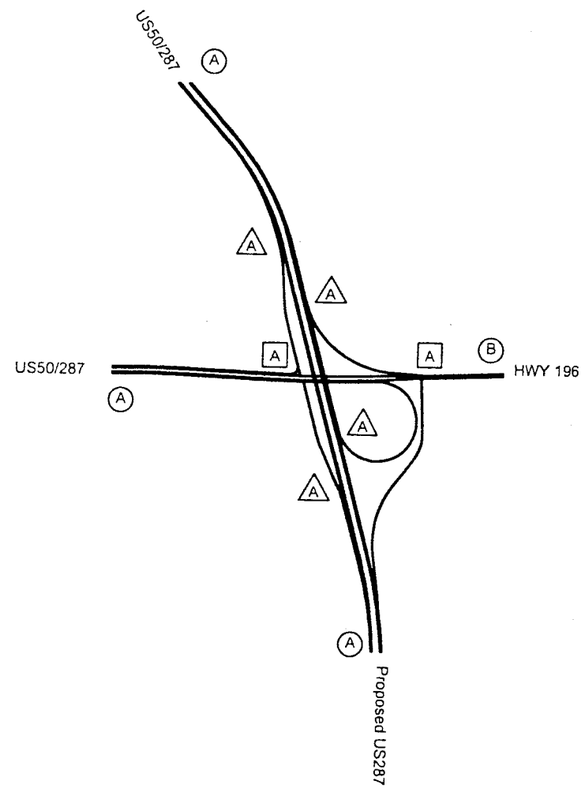
N

No Scale

Alternative N4



Alternative N5



Legend:

A = Freeway Level of Service

B = Merge/Diverge Level of Service

C = Weave Level of Service

D = Intersection Level of Service

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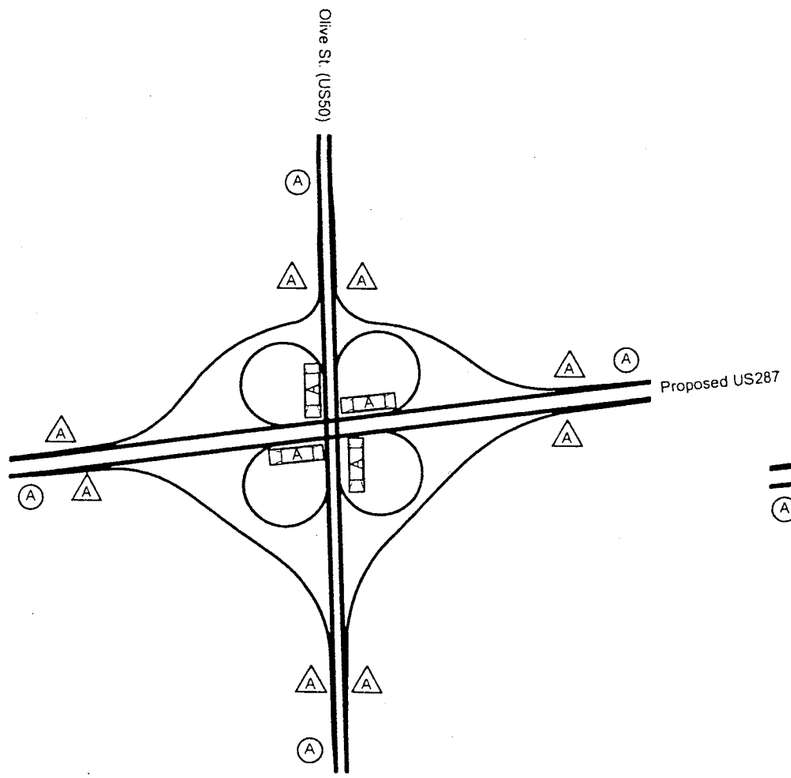
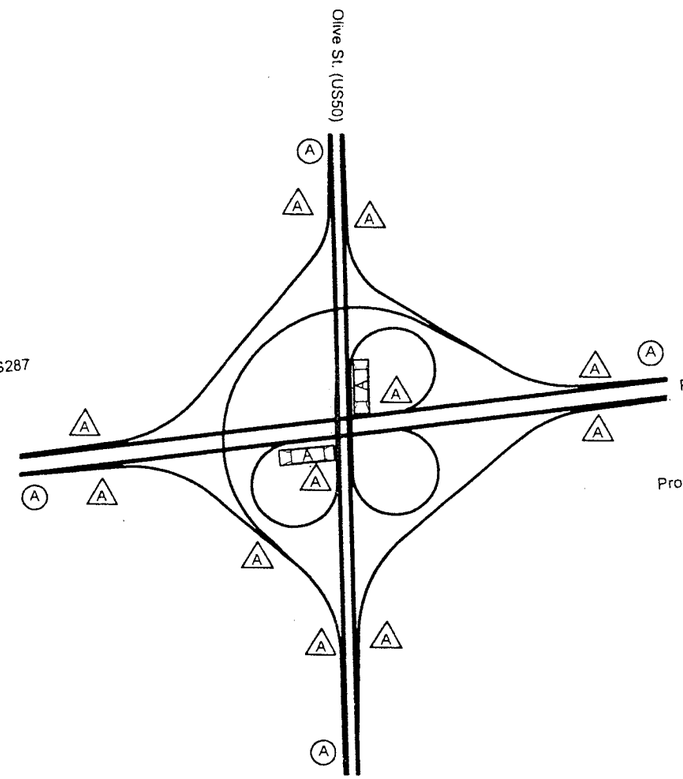
Figure 2
Lamar North Alternatives
AM LOS Analysis

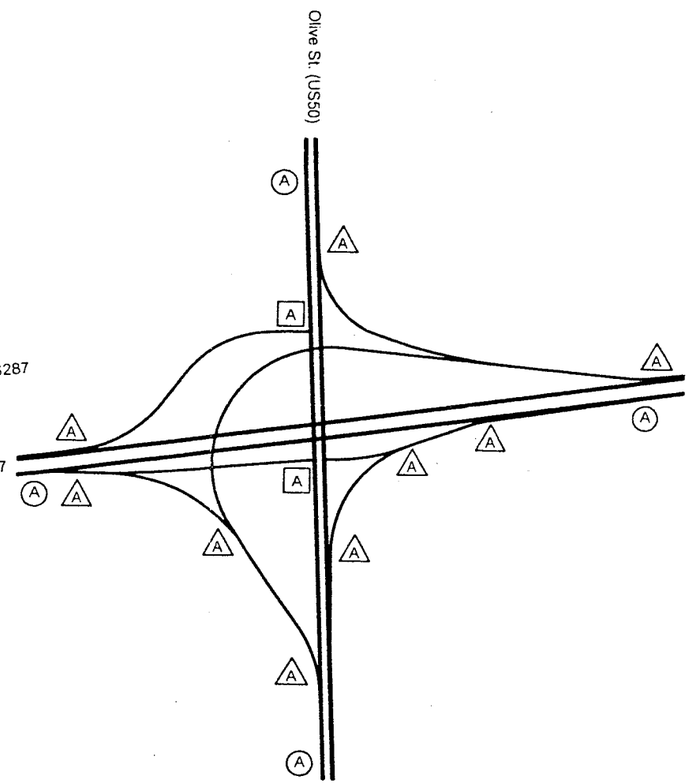
Alternative E1



Alternative E2



Alternative E3



N

No Scale

Legend:

A = Freeway Level of Service

B = Merge/Diverge Level of Service

C = Weave Level of Service

D = Intersection Level of Service

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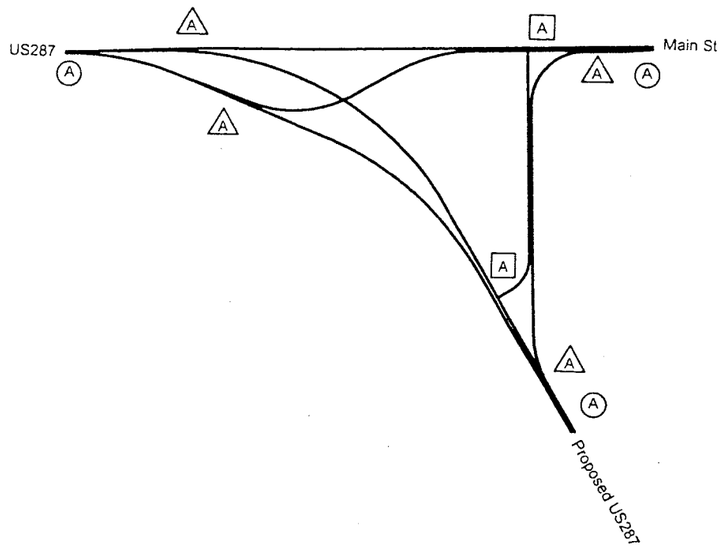
Figure 3
Lamar East Alternatives
AM LOS Analysis

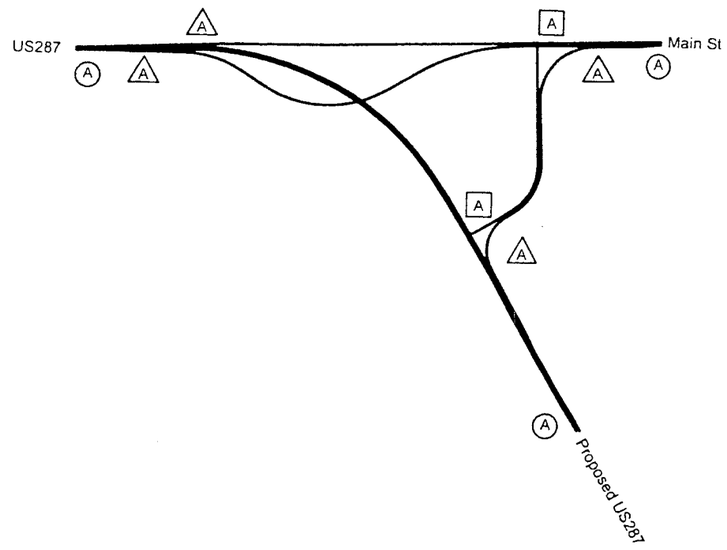
N

No Scale

Alternative S1



Alternative S2



Legend:

- (A) = Freeway Level of Service
- (B) = Merge/Diverge Level of Service
- [C] = Weave Level of Service
- [D] = Intersection Level of Service

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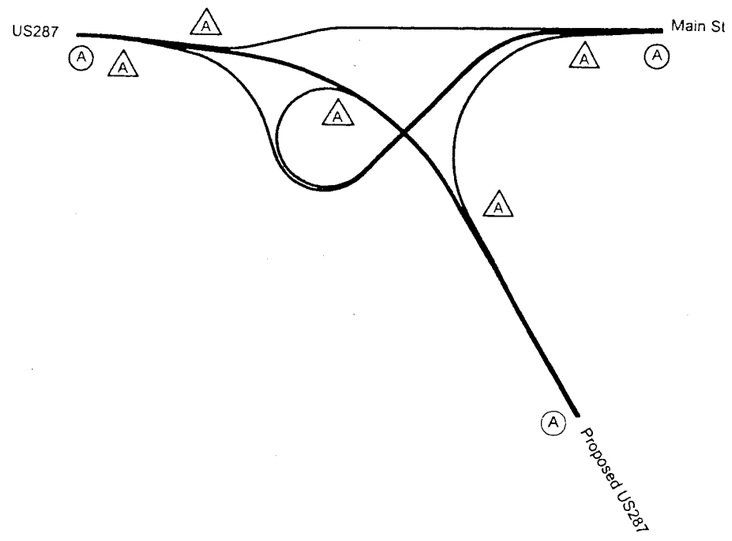
Figure 4
Lamar South Alternatives
AM LOS Analysis

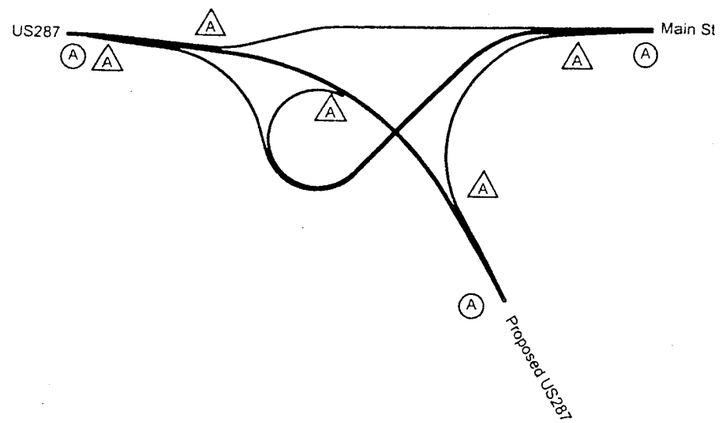
N

No Scale

Alternative S3A



Alternative S3B



Legend:

A = Freeway Level of Service

B = Merge/Diverge Level of Service

C = Weave Level of Service

D = Intersection Level of Service

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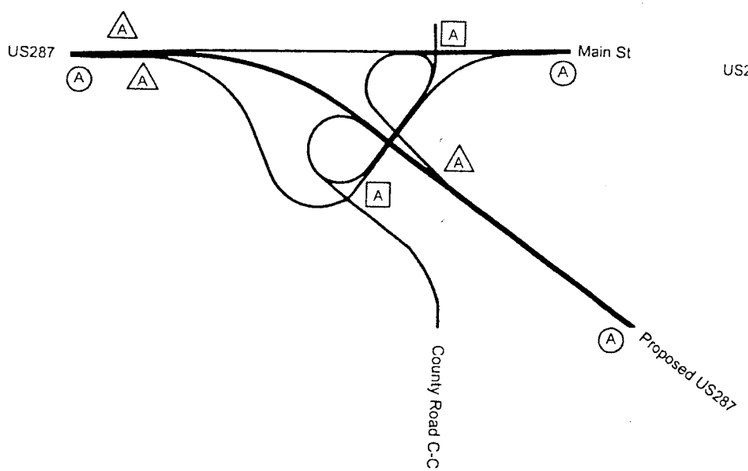
Figure 5
Lamar South Alternatives
AM LOS Analysis

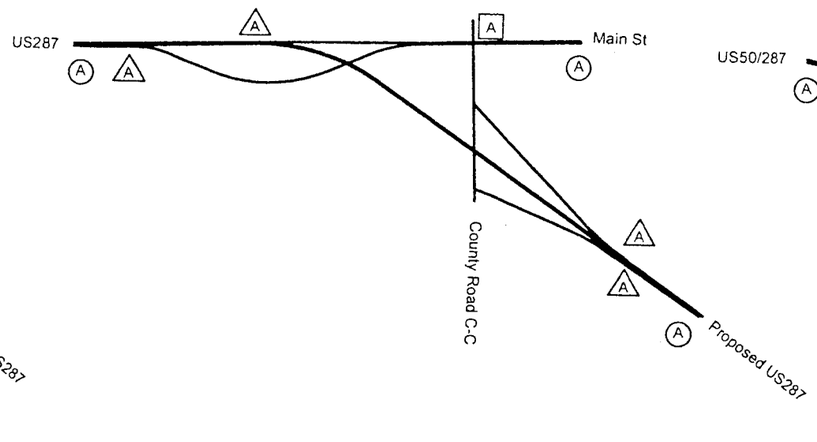
N

No Scale

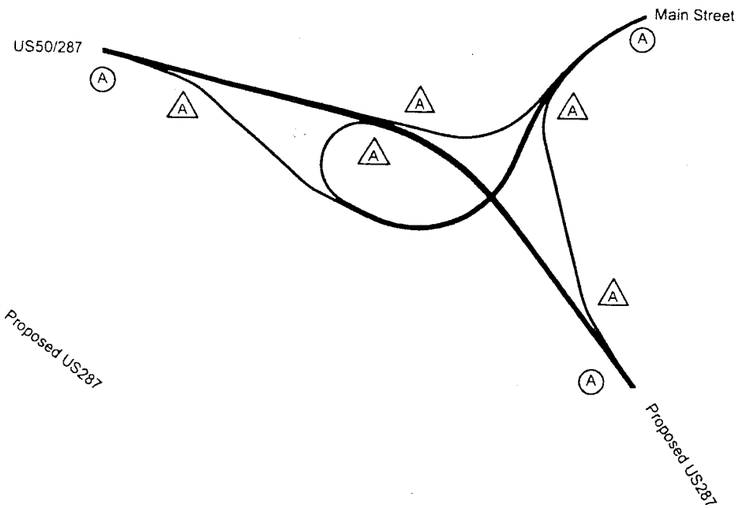
Alternative S4



Alternative S5



Alternative S6



Legend:

A = Freeway Level of Service

B = Merge/Diverge Level of Service

C = Weave Level of Service

D = Intersection Level of Service

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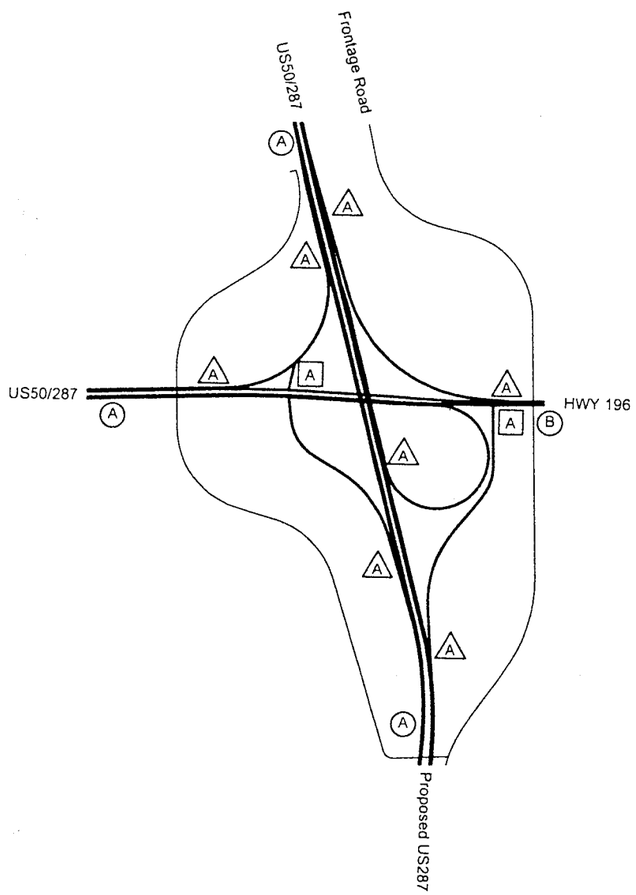
Figure 6
Lamar South Alternatives
AM LOS Analysis

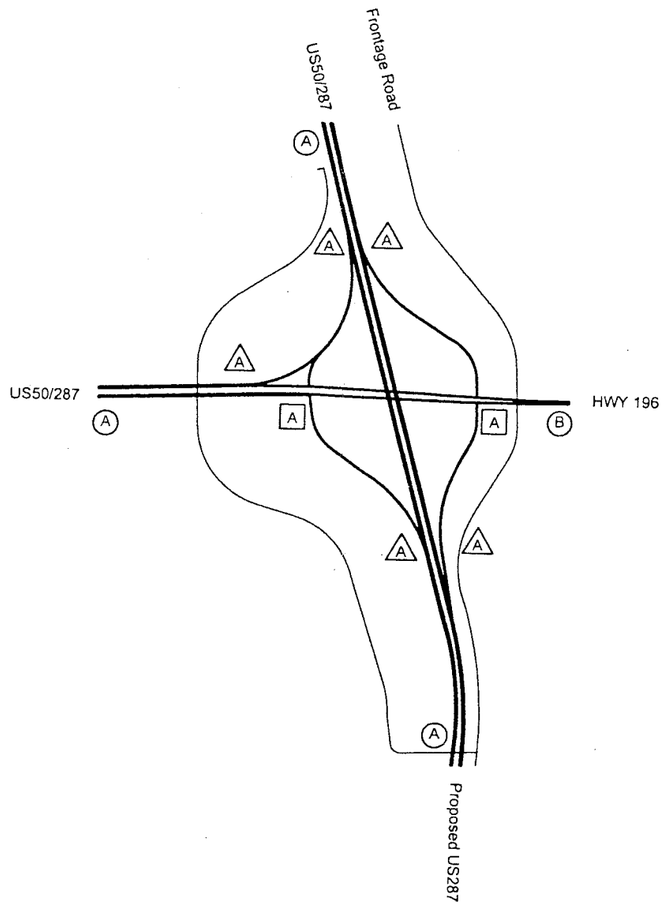
N

No Scale

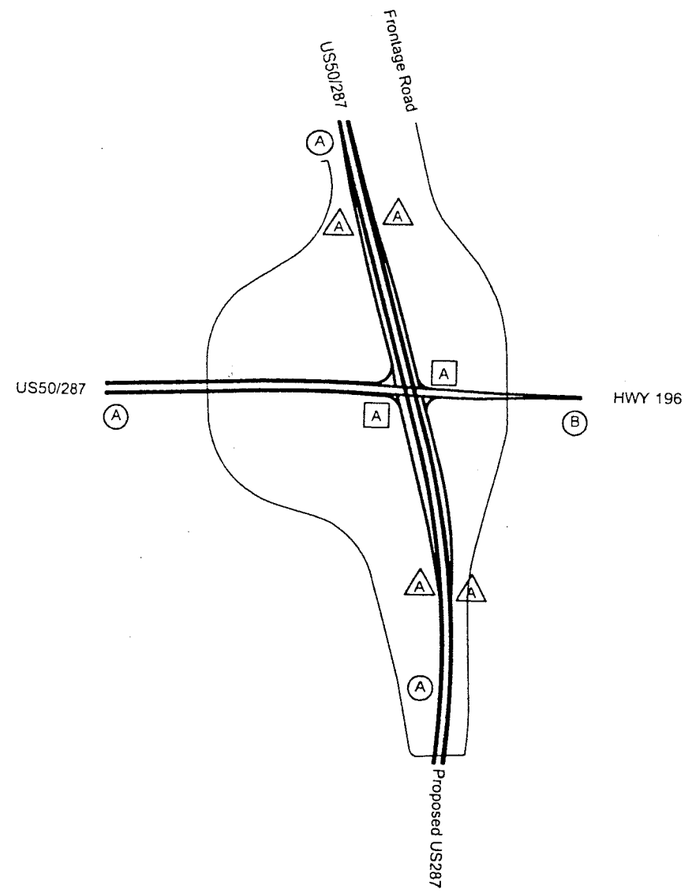
Alternative N1



Alternative N2



Alternative N3



Legend:

A = Freeway Level of Service

B = Merge/Diverge Level of Service

C = Weave Level of Service

D = Intersection Level of Service

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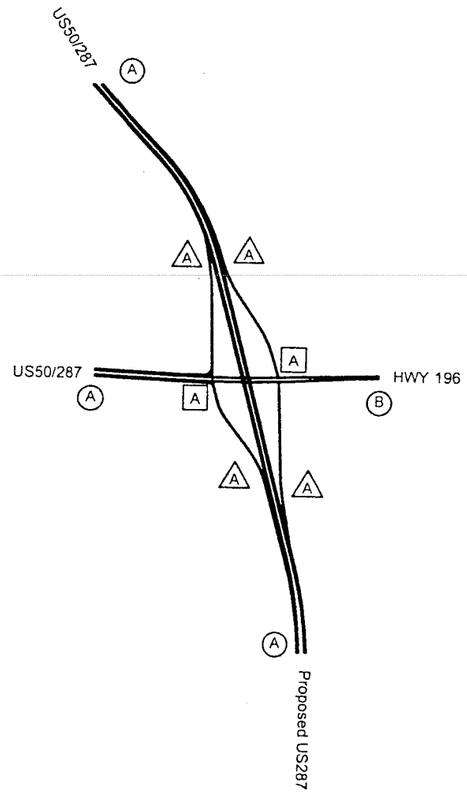
Figure 7
Lamar North Alternatives
Noon LOS Analysis

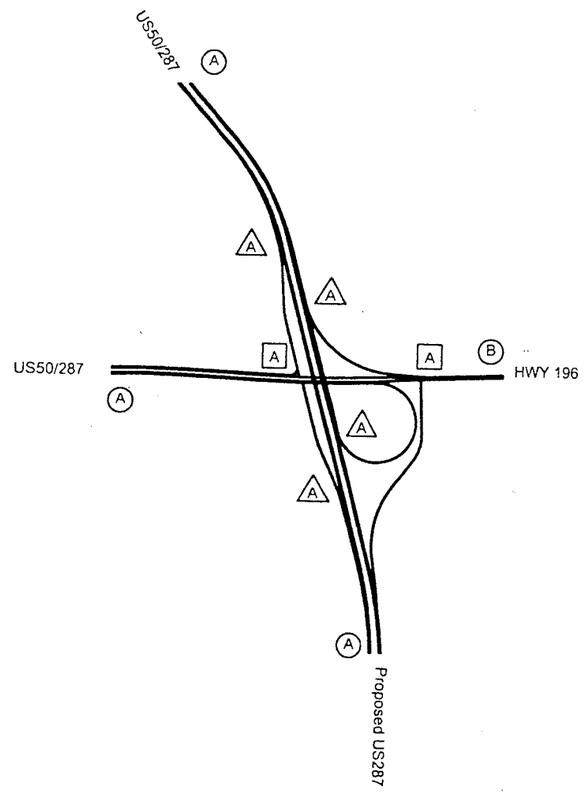
N

No Scale

Alternative N4



Alternative N5



Legend:

A = Freeway Level of Service

B = Merge/Diverge Level of Service

C = Weave Level of Service

D = Intersection Level of Service

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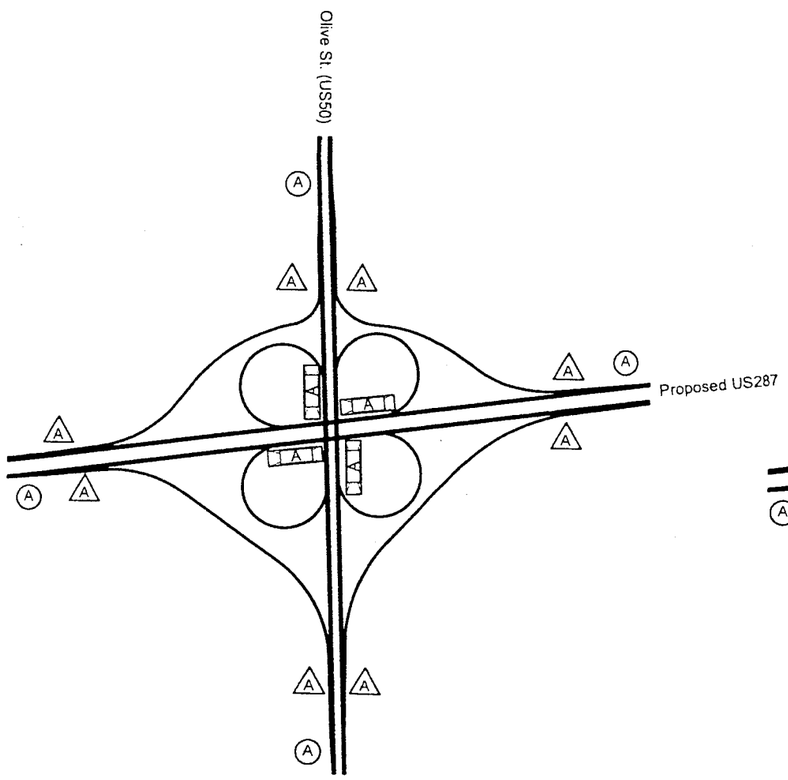
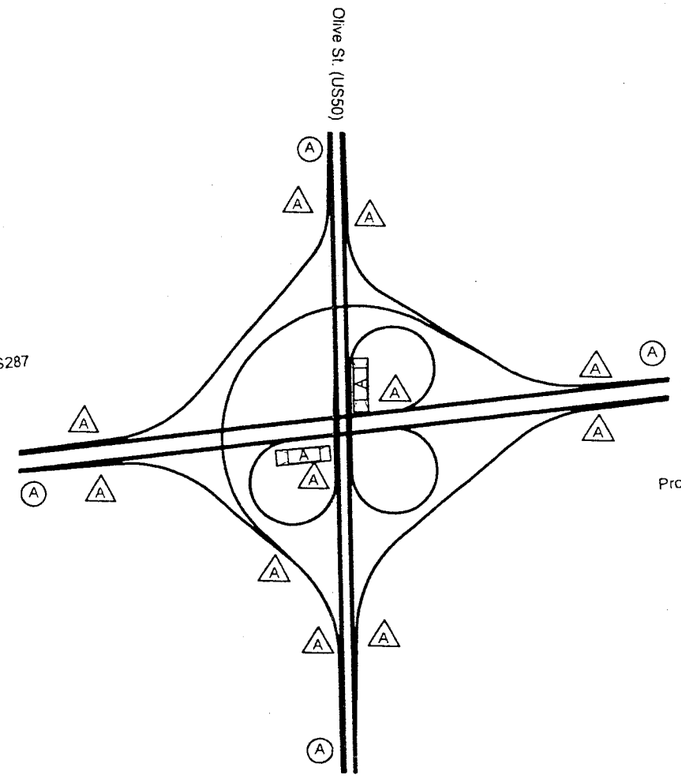
Figure 8
Lamar North Alternatives
Noon LOS Analysis

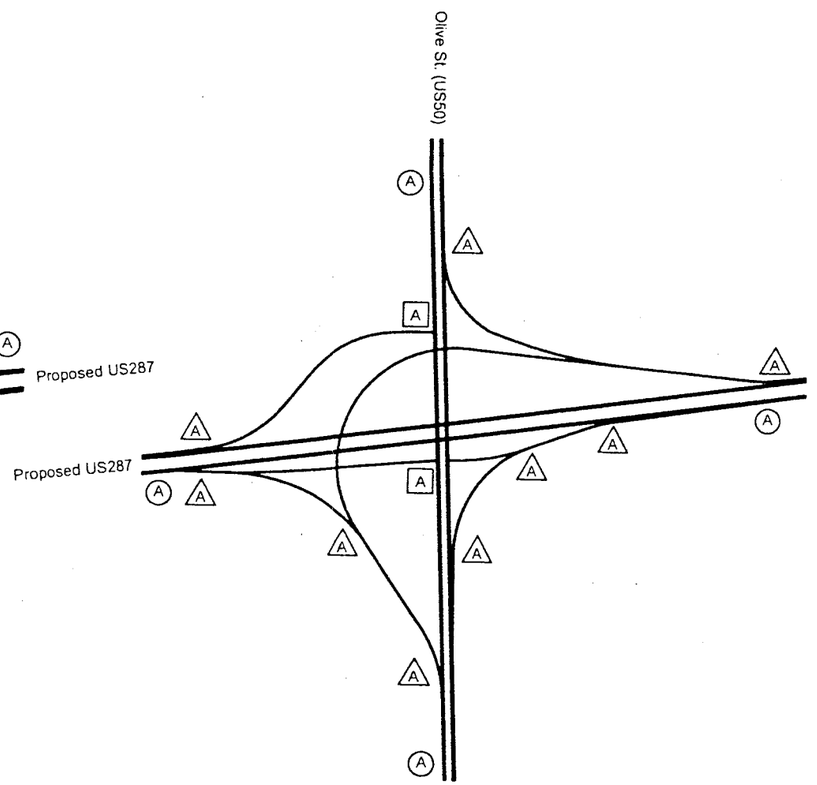
Alternative E1



Alternative E2



Alternative E3



N

No Scale

Legend:

A = Freeway Level of Service

B = Merge/Diverge Level of Service

C = Weave Level of Service

D = Intersection Level of Service

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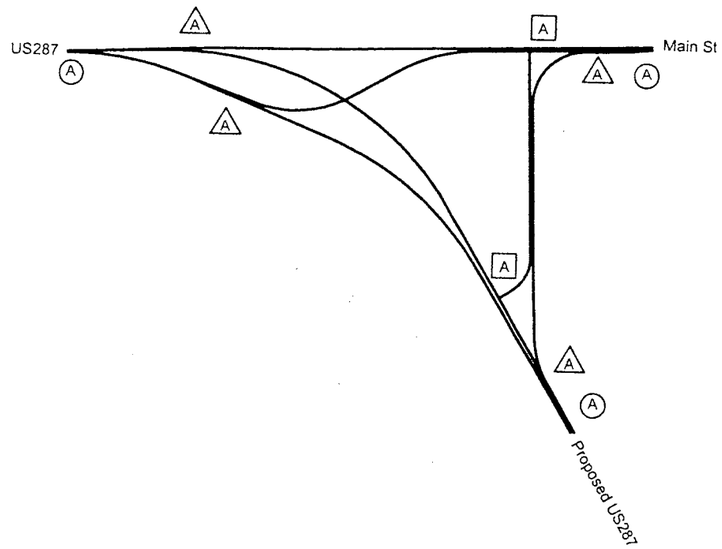
Figure 9
Lamar East Alternatives
Noon LOS Analysis

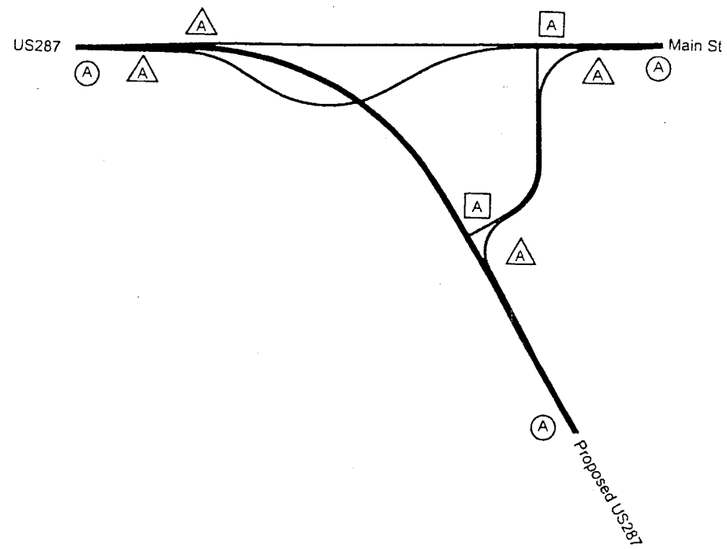
N

No Scale

Alternative S1



Alternative S2



Legend:

- (A) = Freeway Level of Service
- A = Merge/Diverge Level of Service
- C = Weave Level of Service
- D = Intersection Level of Service

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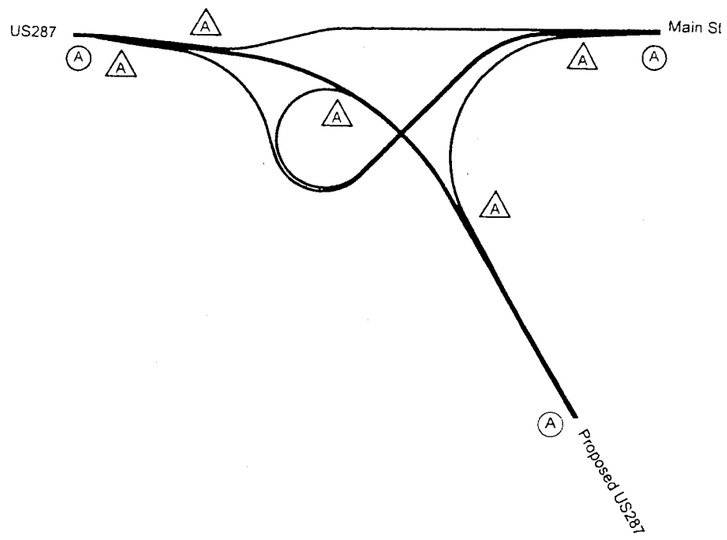
Figure 10
Lamar South Alternatives
Noon LOS Analysis

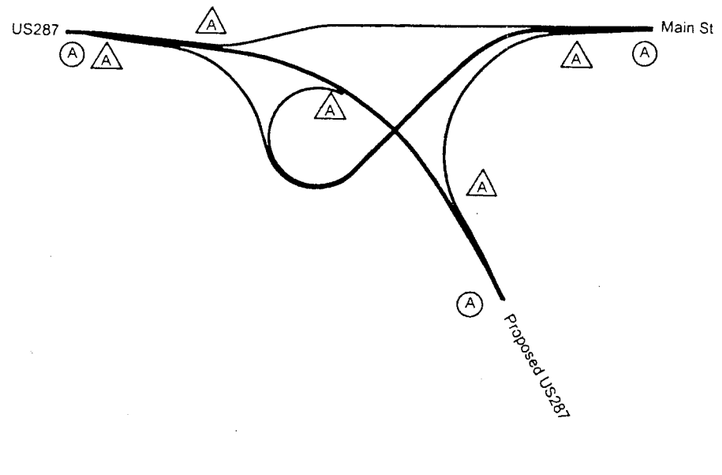
N

No Scale

Alternative S3A



Alternative S3B



Legend:

A = Freeway Level of Service

B = Merge/Diverge Level of Service

C = Weave Level of Service

D = Intersection Level of Service

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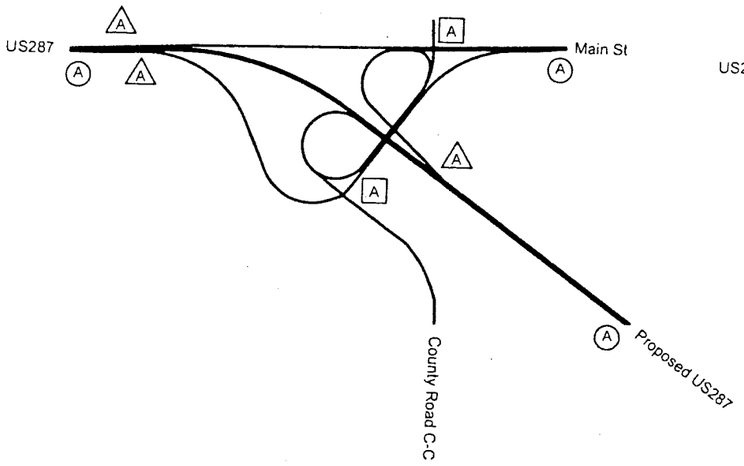
Figure 11
Lamar South Alternatives
Noon LOS Analysis

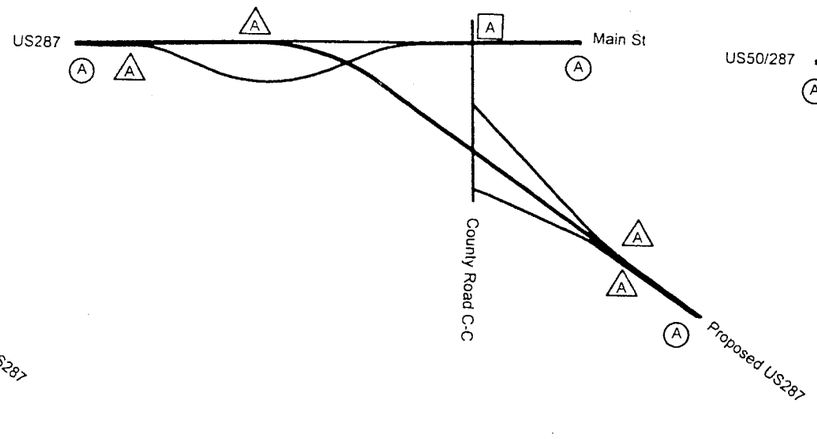
N

No Scale

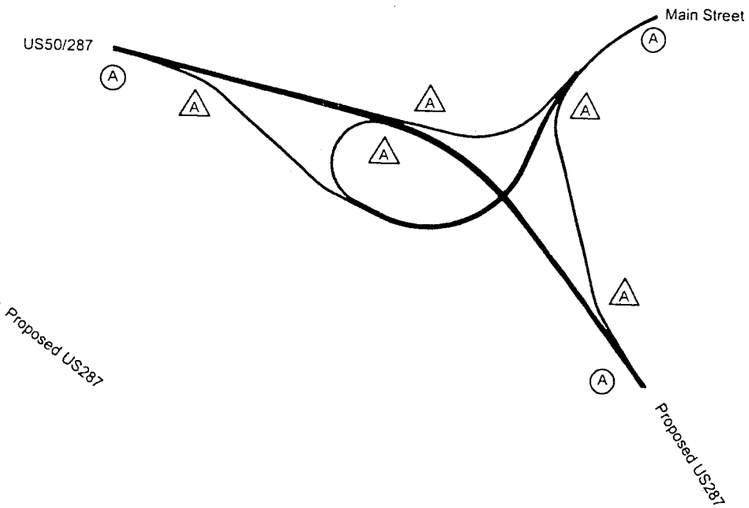
Alternative S4



Alternative S5



Alternative S6



Legend:

A = Freeway Level of Service

B = Merge/Diverge Level of Service

C = Weave Level of Service

D = Intersection Level of Service

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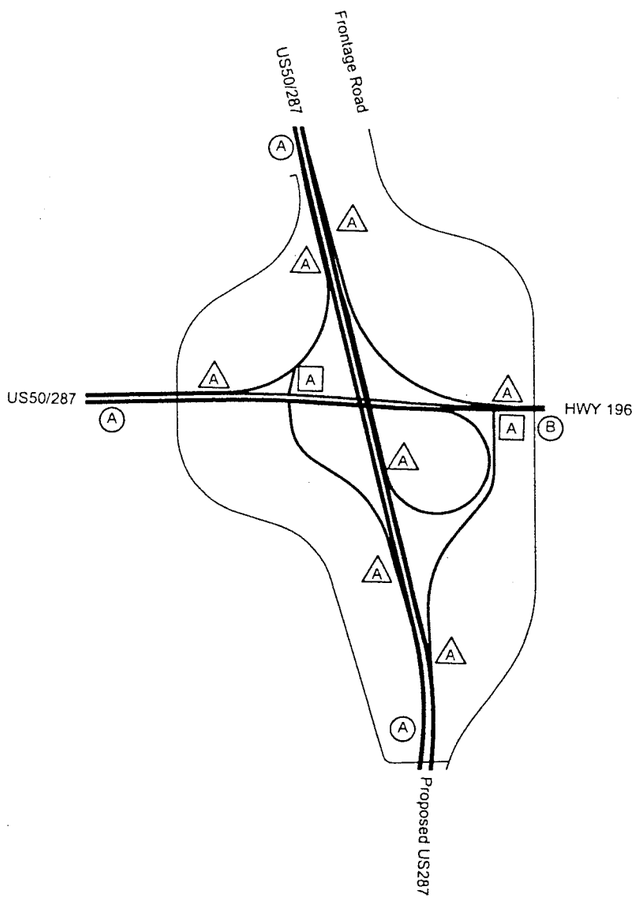
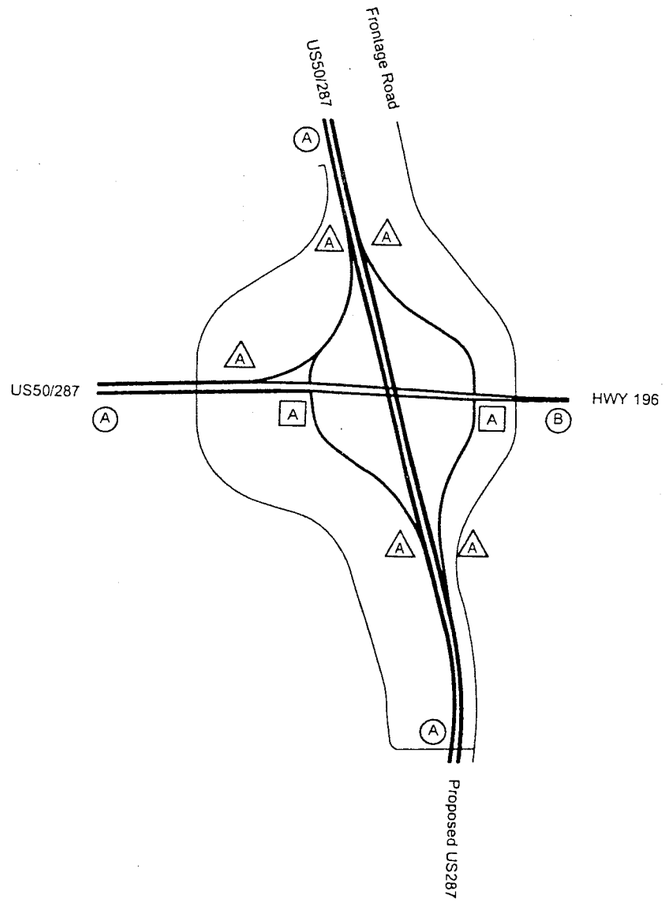
Figure 12
Lamar South Alternatives
Noon LOS Analysis

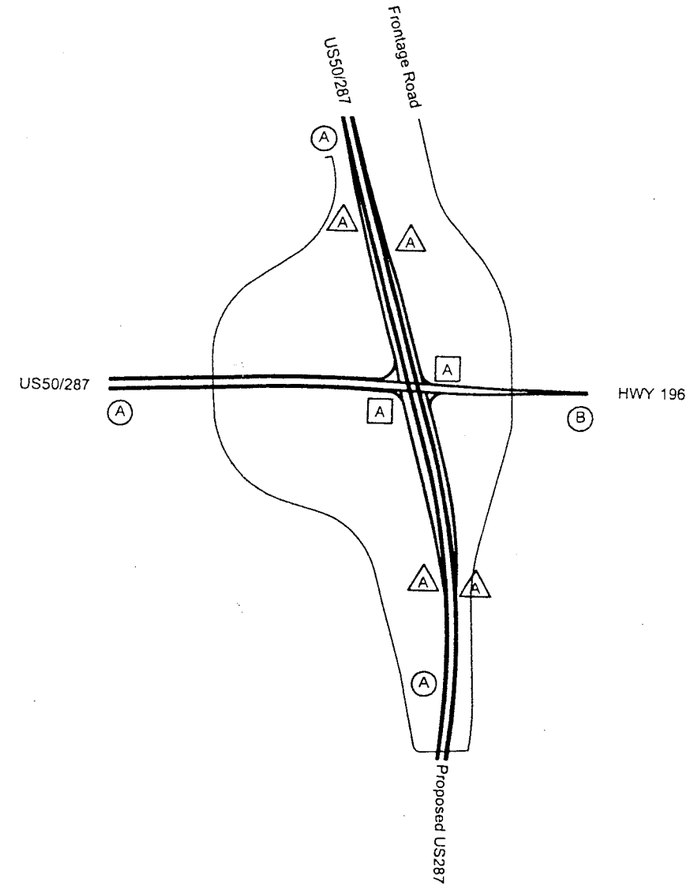
Alternative N1



Alternative N2



Alternative N3



N

No Scale

Legend:

A = Freeway Level of Service

B = Merge/Diverge Level of Service

C = Weave Level of Service

D = Intersection Level of Service

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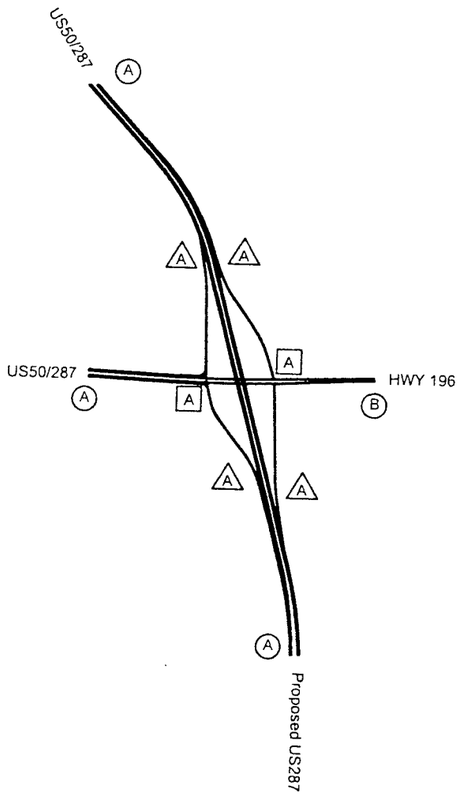
Figure 13
Lamar North Alternatives
PM LOS Analysis

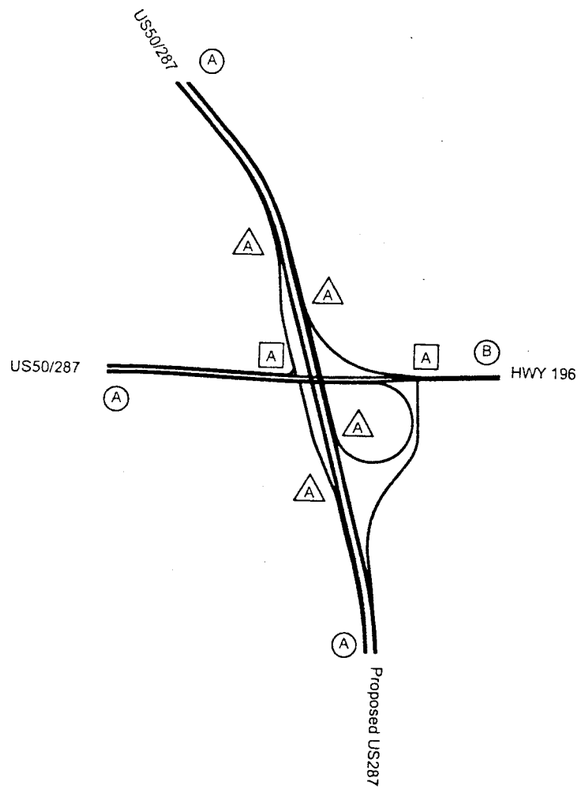
N

No Scale

Alternative N4



Alternative N5



Legend:

A = Freeway Level of Service

B = Merge/Diverge Level of Service

C = Weave Level of Service

D = Intersection Level of Service

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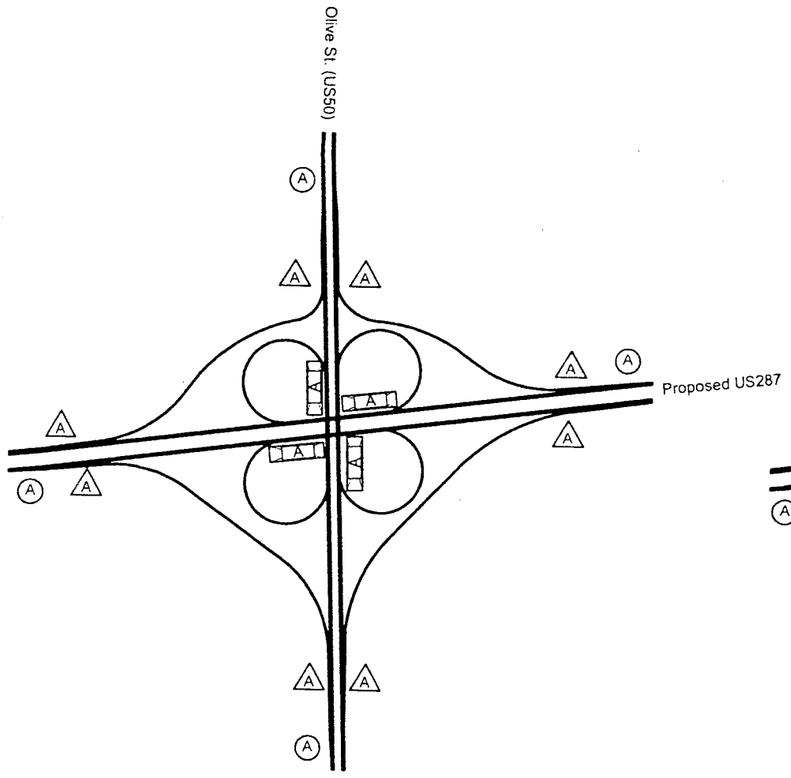
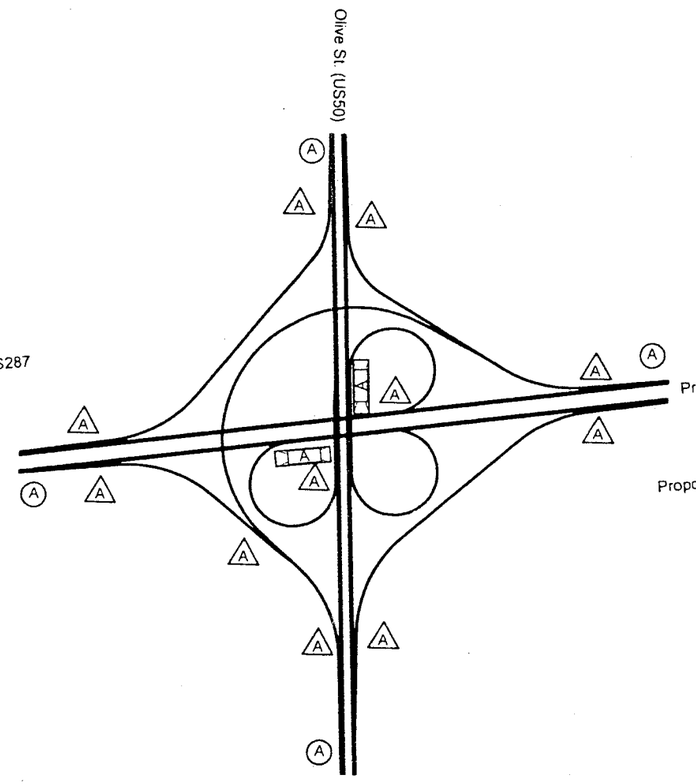
Figure 14
Lamar North Alternatives
PM LOS Analysis

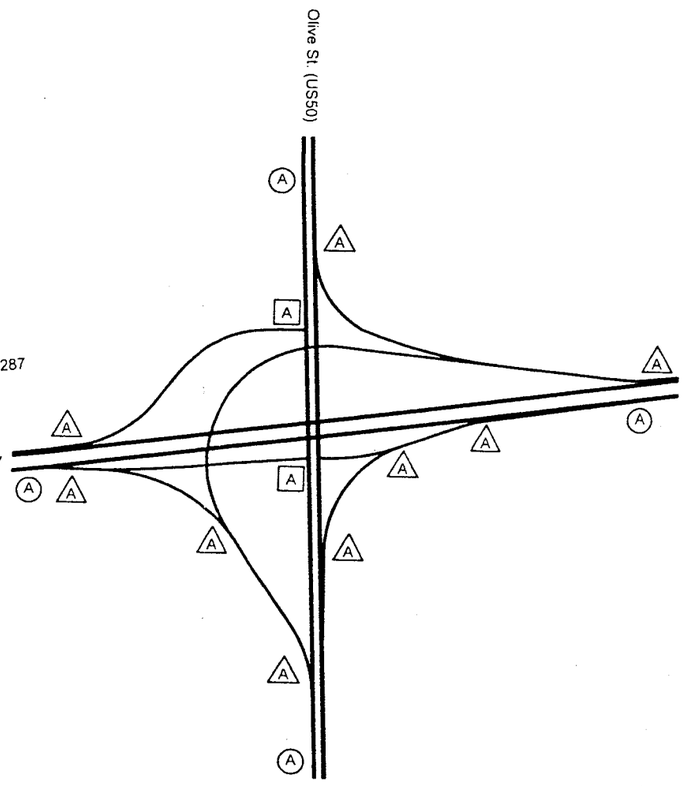
Alternative E1



Alternative E2



Alternative E3



N

No Scale

Legend:

- (A) = Freeway Level of Service
- (B) = Merge/Diverge Level of Service
- [C] = Weave Level of Service
- [D] = Intersection Level of Service

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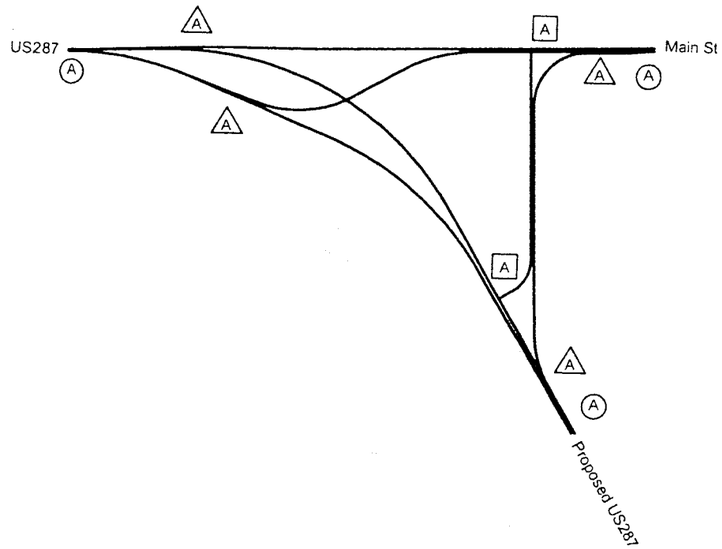
Figure 15
Lamar East Alternatives
PM LOS Analysis

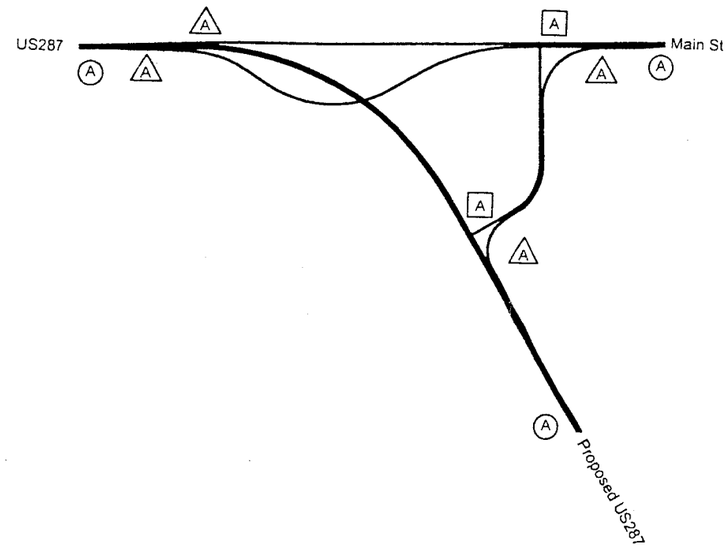
N

No Scale

Alternative S1



Alternative S2



Legend:

A = Freeway Level of Service

B = Merge/Diverge Level of Service

C = Weave Level of Service

D = Intersection Level of Service

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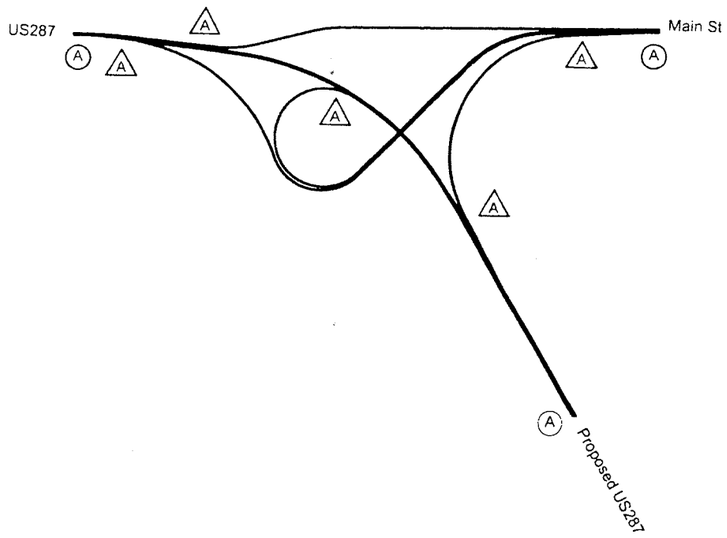
Figure 16
Lamar South Alternatives
PM LOS Analysis

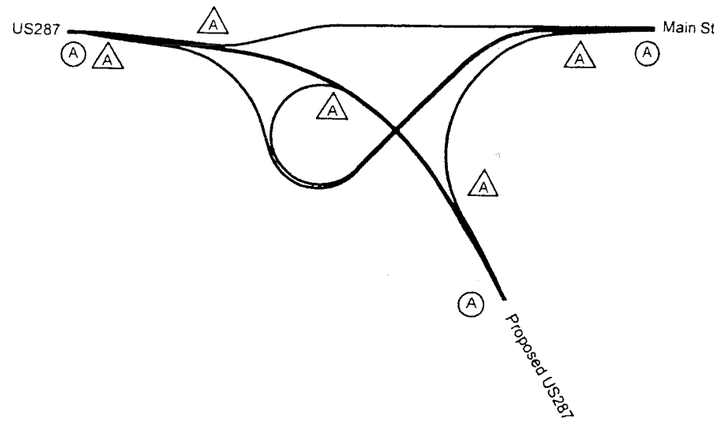
N

No Scale

Alternative S3A



Alternative S3B



Legend:

A = Freeway Level of Service

B = Merge/Diverge Level of Service

C = Weave Level of Service

D = Intersection Level of Service

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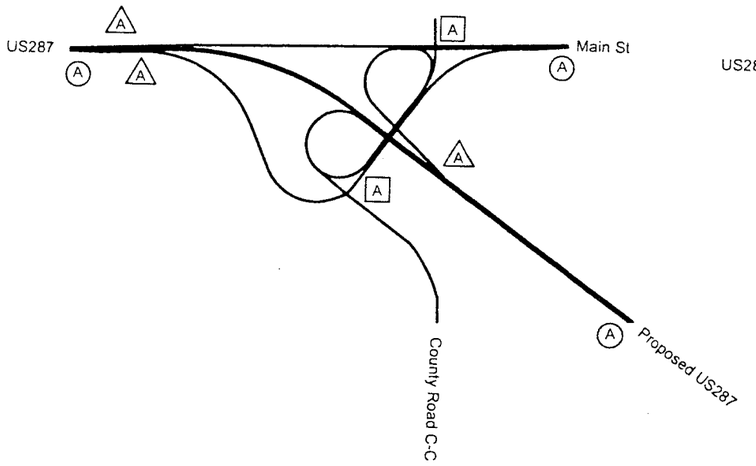
Figure 17
Lamar South Alternatives
PM LOS Analysis

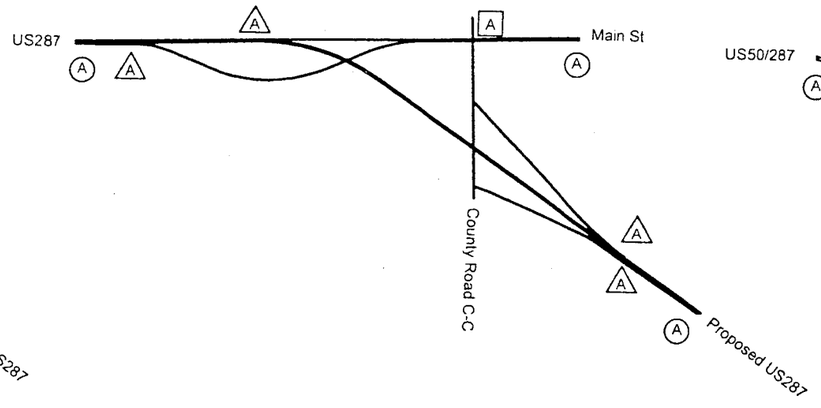
N

No Scale

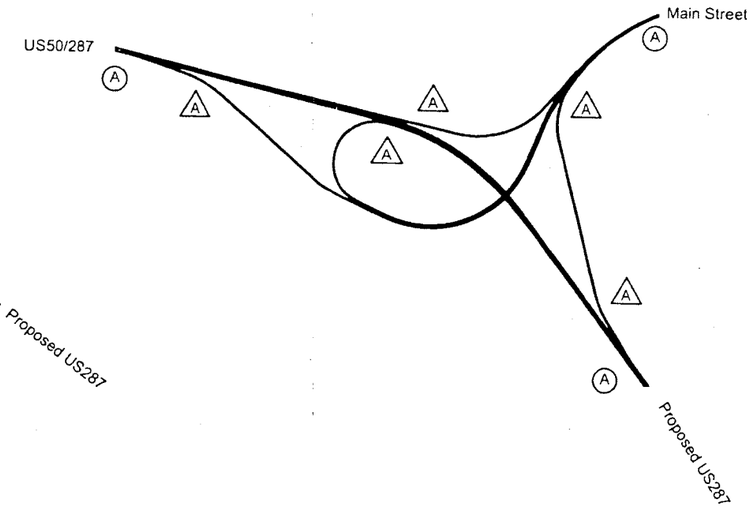
Alternative S4



Alternative S5



Alternative S6



Legend:

A = Freeway Level of Service

B = Merge/Diverge Level of Service

C = Weave Level of Service

D = Intersection Level of Service

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Figure 18
Lamar South Alternatives
PM LOS Analysis