

## APPENDIX B

# Feasible Alternatives

An initial screening in the EIS yielded the following range of Reasonable Alternatives. These are alternatives that were considered technically and economically feasible and capable of addressing the purpose and need of the project.

- No-Action alternative<sup>1</sup>
- 31<sup>st</sup> Street
- 32<sup>nd</sup> Street corridor and its five alternative alignments
- 35<sup>th</sup> Street corridor and its two alternative alignments
- 38<sup>th</sup> Street corridor and its two alternative alignments
- 42<sup>nd</sup> Street corridor and its two alternative alignments

After the corridor screening, the 32<sup>nd</sup> Street corridor with its five alignments (A, B, C, D & E) and the 42<sup>nd</sup> Street corridor with its two alignments (A & B) remained for further evaluation. These two remaining corridors have distinctly different characteristics and impacts. Each corridor has benefits as well as disadvantages that were considered. In order to further refine the remaining alternatives, and to provide a clear basis for decisions regarding preferred alternatives in the subsequent screening, the seven remaining alternative alignments were narrowed down to two, with one in each corridor; 1) the 32<sup>nd</sup> Street Alignment B Alternative and 2) the 42<sup>nd</sup> Street Alignment A Alternative.

The following text discusses the two Feasible Alternatives and the No-Action Alternative in detail regarding alignment, access points, relationship to local roadways, traffic, and cost.

### A. No-Action Alternative

The No-Action alternative assumes that KDOT would not construct the proposed facility between existing US 59 Highway and K-10 Highway during the planning period. Kansas Highway 10 traffic would continue to be routed through Lawrence on US 59 Highway and 23<sup>rd</sup> Street, as shown on Exhibit 4f-7. The No-Action alternative does not assume that the city of Lawrence and Douglas County will provide an improved major arterial connection along or in the vicinity of the existing 31<sup>st</sup> Street alignment. It should be noted, however, that the city and county are currently studying possible improvements in the 31<sup>st</sup> Street corridor.

A No-Action alternative with a comprehensive regional public transit system has been considered and disregarded as not meeting the purpose and need for the project. A reasonable estimate of transit mode share would not reduce traffic demand enough to significantly reduce traffic congestion. If significant traffic congestion remains on US 59 Highway and 23<sup>rd</sup> Street, K-10 Highway cannot be considered a safe and efficient link in the regional highway system for the movement of goods, services, and people.

#### *Traffic Forecast*

Daily traffic volume forecasts for the year 2025 were developed for the No-Action and reasonable build alternatives. A travel demand model and socioeconomic input data developed

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<sup>1</sup> As is described below, the No-Action alternative fails to satisfy the purpose and need of the project. However, NEPA requires the inclusion of this alternative in detail and to retain it as a basis of comparison for other alternatives.

for use in the preparation of the Lawrence-Douglas County Long Range Transportation Plan were used to make traffic forecasts. Under the No-Action alternative, traffic volumes on US 59 Highway and 23<sup>rd</sup> Street are significantly higher. As shown in Table 1, the change in average daily traffic (ADT) volumes under the No-Action alternative when compared to reasonable build alternatives ranges from 8,300 more to 12,300 less along US 59 Highway for the build alternatives and from 8,500 to 37,200 less along 23<sup>rd</sup> Street for the Build alternatives.

**Table 1**  
**Year 2025 Traffic Forecast Results**  
**Vehicles Per Day (VPD)**

Roadway Segment	No-Action	Build	Difference
<b>US 59 Highway (South Iowa Street)</b>			
West SLT to 31 <sup>st</sup> St.	41,000	28,700 to 49,300	+8,300 to -12,300
31 <sup>st</sup> St. to 27 <sup>th</sup> St.	37,800	37,400 to 43,000	+5,200 to -400
27 <sup>th</sup> St. to 23 <sup>rd</sup> St.	38,000	37,200 to 40,800	+2,800 to -800
<b>23<sup>rd</sup> Street</b>			
US 59 Highway to Louisiana St.	48,400	35,900 to 39,900	-8,500 to -12,500
Louisiana St. to Haskell Ave.	52,500	33,300 to 42,900	-9,600 to -19,200
Haskell Ave. to E 1600 Rd.	53,200	24,500 to 32,100	-21,100 to -28,700
E 1600 Rd. to 1750 Rd.	61,300	24,100 to 32,100	-29,200 to -37,200

When evaluating operating conditions on urban arterial roadways, it is useful to consider not only traffic volumes but also the capacity of the facility and the level of service (LOS). The capacity of any transportation facility is the number of vehicles that can use the facility within a given time period. LOS for transportation facilities is based on criteria outlined in the *Highway Capacity Manual*<sup>2</sup>. Levels of service range from A to F, with LOS A indicating optimal conditions and minimal delay and LOS F indicating very poor conditions and excessive delays.

Significant congestion is expected along US 59 Highway between the interchange with the existing western leg of the SLT and 23<sup>rd</sup> Street. Based on methodologies provided in the *Highway Capacity Manual*, the capacity of US 59 Highway ranges from 33,300 to 35,100 vehicles per day assuming a typical traffic peaking pattern. A typical peaking pattern would have nine percent of daily traffic occurring in the peak hour and the peak direction carrying 55 percent of the peak hour traffic flow. Under the No-Action scenario the LOS on US 59 Highway between 23<sup>rd</sup> Street and 33<sup>rd</sup> Street would be F. The forecasted daily volumes exceed the capacity by approximately 14 to 23 percent assuming typical peaking characteristics.

The volumes forecast for 23<sup>rd</sup> Street under the No-Action alternative would result in very severe traffic congestion spreading outside of the traditional peak periods. Twenty-third street in this section of roadway has a capacity similar to US 59 Highway. The capacity is 33,300 vehicle per day assuming typical traffic peaking characteristics. The forecast daily traffic volume for the No-Action alternative is 36 to 52 percent above the capacity of 23<sup>rd</sup> Street. Given the degree to which traffic exceeds typical capacities, all of 23<sup>rd</sup> Street would experience LOS F conditions for a significant period of time under the No-Action alternative.

The severity of traffic congestion and the amount of time congestion would be expected to occur indicates that the use of US 59 Highway and 23<sup>rd</sup> Street as part of the K-10 Highway connection will not meet the purpose and need for the proposed action. Severe congestion will not allow the US 59 Highway and 23<sup>rd</sup> Street connecting link to provide safe and efficient travel on K-10 Highway.

<sup>2</sup> *Highway Capacity Manual*, Transportation Research Board, National Academy of Sciences, 2000.

## **B. 32<sup>nd</sup> Street Alignment B Alternative**

The 32<sup>nd</sup> Street Alignment B Alternative parallels 31<sup>st</sup> Street at a location where 32<sup>nd</sup> Street would be located, if it existed.

### ***Alignment***

Beginning at the western terminus at US 59 Highway, the alignment extends northeast to a point just south of the Louisiana and 31<sup>st</sup> Street intersection. At Louisiana Street the alignment turns in a more easterly direction generally paralleling 31<sup>st</sup> Street. The alignment extends between Louisiana Street and Haskell Avenue approximately 600 to 800 feet south of 31<sup>st</sup> Street. East of Haskell Avenue the alignment passes along the south side of an industrial park southeast of the Haskell Avenue and 31<sup>st</sup> Street intersection. At E 1700 Road the alignment turns northward following a northeasterly projection to an interchange with K-10 Highway east of 1750 Road.

The alignment is located just south of HINU's southern boundary between Louisiana Street and Haskell Avenue. This location confines impacts to the northern edge of Baker Wetlands, thus avoiding bisecting the wetlands. The alignment's location between Haskell Avenue and E 1700 Road is routed south of a creek to minimize impacts to the stream and any adjacent wetlands.

### ***Access Points***

The 32<sup>nd</sup> Street Alignment A Alternative has access points at the western and eastern termini of the project. These interchanges are system interchanges providing access to the state highway system along with access to local roads. The interchange on the western terminus is the completion of a diamond interchange at US 59 Highway. The interchange at the eastern terminus is a fully directional interchange providing all the movements between the SLT and the existing K-10 Highway/23<sup>rd</sup> Street. There is one local access point between the two 32<sup>nd</sup> Street termini interchanges and local roadways. It is a folded diamond<sup>4</sup> interchange providing access to a relocated Haskell Avenue.

### ***Local Roadways***

Local roadway modifications are planned for E 1750 Road for the 32<sup>nd</sup> Street Alignment B Alternative. Access to 1750 Road from K-10 Highway/23<sup>rd</sup> Street must be modified as a result of the directional interchange on the eastern terminus of the SLT, The at-grade intersection must be eliminated and access from K-10 Highway to 1750 Road provided by a new frontage road connecting to East Hills Drive. The new frontage road will intersect with 1750 Road at the existing County Route 442 intersection. The frontage road will parallel K-10 Highway/23<sup>rd</sup> Street to the west connecting with East Hills Drive at a location with appropriate spacing between the K-10 Highway/23<sup>rd</sup> Street and Greenway Drive intersections.

The 32<sup>nd</sup> Street Alignment B Alternative relocates Haskell Avenue approximately 1,000 feet east of its existing alignment between 31<sup>st</sup> and 35<sup>th</sup> Streets on a new alignment at N 1250 Road. This alternative also relocates Louisiana Street to the west between the proposed 32<sup>nd</sup> Street route and the Wakarusa River, and relocates 31<sup>st</sup> Street to the south between Louisiana Street and Haskell Avenue. Louisiana Street will be relocated a maximum of 2,461 feet west of its existing alignment to provide additional land contiguous to Baker Wetlands for wetland mitigation. Thirty-first Street will be relocated south and off of HINU property and will be

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<sup>4</sup> A split diamond interchange splits the diamond interchange ramps between two cross streets. One-way frontage roadways connect the split ramp terminals allowing a motorist to access either cross street.

adjacent to and parallel with 32<sup>nd</sup> Street. Thirty- first Street will be relocated 295 feet south of its present location on the west end near Louisiana Street and 492 feet south of its present location on the east end near Haskell Avenue. Relocated 31<sup>st</sup> Street will have at-grade intersections with Haskell Avenue and Louisiana Street.

### Traffic

The forecasted daily volume on the SLT between US 59 Highway and Louisiana Street is 55,700. The forecast daily volume on the SLT between Louisiana Street and Haskell Avenue is 55,700 vpd and east of Haskell Avenue it is 42,600 vpd.

Forecast year 2025 daily traffic volumes on 23<sup>rd</sup> Street are 8,500 to 37,200 vpd lower than forecasted volumes under the No-Action alternative. Forecasted volumes on US 59 Highway between 31<sup>st</sup> and 23<sup>rd</sup> Streets are higher (100 to 5,200 vpd) than the No-Action alternative. The forecasted daily volumes on Louisiana Street and Haskell Avenue between 23<sup>rd</sup> and 31<sup>st</sup> Streets decreases under the 32<sup>nd</sup> Street Alignment B Alternative. The magnitude of the decrease is from 200 to 12,200 vpd.

To assess the type of traffic service the SLT alternatives would provide, daily traffic volume thresholds are used to estimate year 2025 LOS provided by the proposed conceptual alternative. The LOS daily traffic volume thresholds were developed using the basic freeway analysis procedures from the *Highway Capacity Manual*. Table 3 summarizes the results. Segments of the SLT predicted to have a LOS of E will experience some delays during the AM and PM peak hour periods in the year 2025.

**Table 2**  
**32<sup>nd</sup> Street Alignment B Alternative, Year 2025**  
**Level of Service / Average Daily Traffic Volume**

SLT Segment	Alt. B
US 59 Highway (South Iowa Street) to Louisiana Street*	D / 55,700
Louisiana Street to Haskell Avenue	D / 55,700
Haskell Avenue to K-10 Highway/23 <sup>rd</sup> St.	C / 42,600

### Cost Estimate

Planning level cost estimates were developed for the 32<sup>nd</sup> Street Alignment B Alternative using typical unit costs. Table 3 summarizes the project costs for the fully built-out four-lane freeway.

**Table 3**  
**Project Cost Estimate 32<sup>nd</sup> Street Alignment B Alternative**  
**(Costs in Millions of 2007 Dollars)**

Cost Item	Alt. B
Mitigation	13.3 <sup>5</sup>
Road Construction	43.9
Bridge Construction	35.9
Utility Relocation	0.8
Preliminary Engineering	9.3
Construction Engineering	7.4
Right-of-Way & Displacement	12.4
<b>Total Project</b>	<b>\$123.1</b>

<sup>5</sup> Mitigation cost for 32<sup>nd</sup> Street Alternative B includes relocation of 31<sup>st</sup> Street, Haskell Avenue and Louisiana Street, as well as noise walls and additional landscaping.

## **C. 42<sup>nd</sup> Street Alignment A Alternative**

The 42<sup>nd</sup> Street Alignment A Alternative follows a route from US 59 Highway at the western leg of the SLT, to the eastern terminus at K-10 Highway.

### ***Alignment***

From the western terminus at US 59 Highway the alignment extends eastward then turns in a southeasterly direction crossing the north branch of the Wakarusa River floodway and the Wakarusa River. West of Louisiana Street the alignment turns due east and parallels N 1100 Road approximately 1,970 feet north of the existing road. At E 1600 Road the alignment turns northeast and extends to its eastern terminus at K-10 Highway. A bridge 4,265 feet long crosses the Wakarusa River and its floodway. Grade separations are required to cross 31<sup>st</sup> Street and E 1750 Road.

### ***Access Points***

The 42<sup>nd</sup> Street Alignment A Alternative has access points at the western and eastern termini of the project and at Haskell Avenue. The termini interchanges are system interchanges providing access to the state highway system along with local access. The interchange at the eastern terminus is fully directional providing all the movements between the SLT and K-10 Highway/23<sup>rd</sup> Street. The interchange with Haskell Avenue is a typical diamond interchange. The 42<sup>nd</sup> Street Alignment A Alternative completes the diamond interchange at the location of the existing SLT western leg interchange with US 59 Highway.

### ***Local Roadways***

The 42<sup>nd</sup> Street Alignment A Alternative requires some local roadway modifications as a result of the system interchange on the eastern termini. As a result of the directional interchange on the eastern terminus of the road, access to E 1750 Road from K-10 Highway/23<sup>rd</sup> Street must be modified. The at-grade intersection must be eliminated and access from K-10 Highway/23<sup>rd</sup> Street to E 1750 Road will be provided by a new frontage road connecting to East Hills Drive. The new frontage road will intersect with E 1750 Road at the existing County Route 442 intersection. The frontage road will parallel 23<sup>rd</sup> Street until it connects with East Hills Drive on the west.

### ***Traffic***

The forecasted daily volume on the SLT between US 59 Highway and Haskell Avenue is 52,000 vpd, and east of Haskell Avenue is 37,700 vpd for the 42<sup>nd</sup> Street Alignment A alternative.

Forecast year 2025 daily traffic on 23<sup>rd</sup> Street is 8,500 to 31,400 vpd lower than forecasted volumes under the No-Action alternative. Forecasted volumes on US 59 Highway between 23<sup>rd</sup> and 27<sup>th</sup> Streets are slightly higher (800 and 600 vpd) and between 27<sup>th</sup> and 31<sup>st</sup> Streets are slightly lower (800 and 200 less) than the No-Action alternative. The forecasted daily volumes on Haskell Avenue and Louisiana Street between 23<sup>rd</sup> and 31<sup>st</sup> Streets decreases under the 42<sup>nd</sup> Street Alignment A Alternative. The magnitude of the decrease is from 400 to 6,700 vpd.

To assess the type of traffic service the SLT alternatives would provide, daily traffic volume thresholds are used to estimate year 2025 LOS provided by the proposed alternative. The LOS daily traffic volume thresholds were developed using the basic freeway analysis procedures from the *Highway Capacity Manual*. Table 4 summarizes the results.

**Table 4**  
**42<sup>nd</sup> Street Alignment A Alternative, Year 2025**  
**Level of Service / Average Daily Traffic Volume**

SLT Segment	Alt. A
US 59 Highway (South Iowa Street) to Haskell Avenue	D / 52,000
Haskell Avenue to K-10 Highway/23 <sup>rd</sup> St.	C / 37,700

**Cost Estimate**

Planning level cost estimates were developed for the 42<sup>nd</sup> Street Alignment A Alternative using typical unit costs. A detailed summary of the cost estimate is provided in Volume 2, Appendix A-2 of the Final EIS. Table 5 summarizes the project costs for the alignment.

**Table 5**  
**Project Cost Estimate 42<sup>nd</sup> Street Alignment A Alternative**  
**(Costs in Millions of 2007 Dollars)**

Cost Item	Alt. A
Mitigation	1.9
Road Construction	50.9
Bridge Construction	82.6
Utility Relocation	0.7
Preliminary Engineering	13.5
Construction Engineering	10.8
Right-of-Way & Displacement	15.3
<b>Total Project</b>	<b>\$175.8</b>