

31st Street Corridor Study Iowa Street to County Route 1057

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Prepared for:
**City of Lawrence, Kansas
Douglas County, Kansas**



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Plans are currently underway to complete the South Lawrence Trafficway (SLT) around the southern portion of the City. While this roadway would greatly improve east-west access across the southern portion of the City, it will be a freeway type facility and thus will not provide the local access and circulation component also needed. Should the SLT project be significantly delayed, or abandoned altogether, traffic demands on 31st Street will grow at an even more rapid pace.



In order to accommodate the anticipated need for improvements to the existing 31st Street and its extension to the east, the City of Lawrence and Douglas County have undertaken this study. The three main components of the study are as follows:

- ***Iowa to Louisiana Street*** – Evaluate this section for needs to support both the increased traffic volumes on 31st Street as well as to accommodate planned adjacent development through implementation of access management policies.
- ***Louisiana Street to Haskell Avenue*** – Determine short- and long-term improvements to this section of the corridor that will both support the projected traffic growth and minimize impact to the adjacent environmentally sensitive areas.
- ***Haskell Avenue to County Route 1057 (E 1700 Road)*** – Identify an approximate route for a new arterial roadway through this section of the study area. Currently the sections between Haskell Avenue and O’Connell Road and between Noria Road and County Route 1057 do not exist. The section between O’Connell Road and Noria road is currently a rural two-lane roadway.

Section 2 – Existing Conditions

This section will review existing roadway conditions, traffic volumes, key intersection operations and constraints for the three study areas.

Study Areas

Iowa Street to Louisiana Street

Iowa Street to Louisiana Street is a one-mile stretch of four-lane undivided roadway. The western half is generally commercial type development. Portions of the mobile home park on the north side of 31st Street are currently being redeveloped as a new retail center. On the south side are existing businesses, including K-Mart, a Post Office and several smaller businesses. With the development of the Home Depot project, improvements are also being made to 31st Street from Iowa Street to east of Ousdahl Road. These improvements include constructing the roadway to four-lane city arterial standards, with a raised median in most areas. Separate left-turn lanes will be provided at the new retail center entrance and at Ousdahl Road. Both of these intersections will be signalized.



Figure 2-1 – Existing Conditions, Iowa Street to Louisiana Street

East of Ousdahl Road there is minimal development. The area on the north side of the road is currently planned as multi-family residential. The area on the south side is planned for office development. Much of the area on both sides of the roadway is also designated as open space due to the creeks and drainage channels running through the area.

Within about 1200 feet west of Louisiana Street, the existing roadway is generally in fair to poor condition and has no curbs and minimal shoulders. The cross section of the roadway in this area, as illustrated in **Figure 2-2**, is constrained by the drainage channels running on each side of the road.

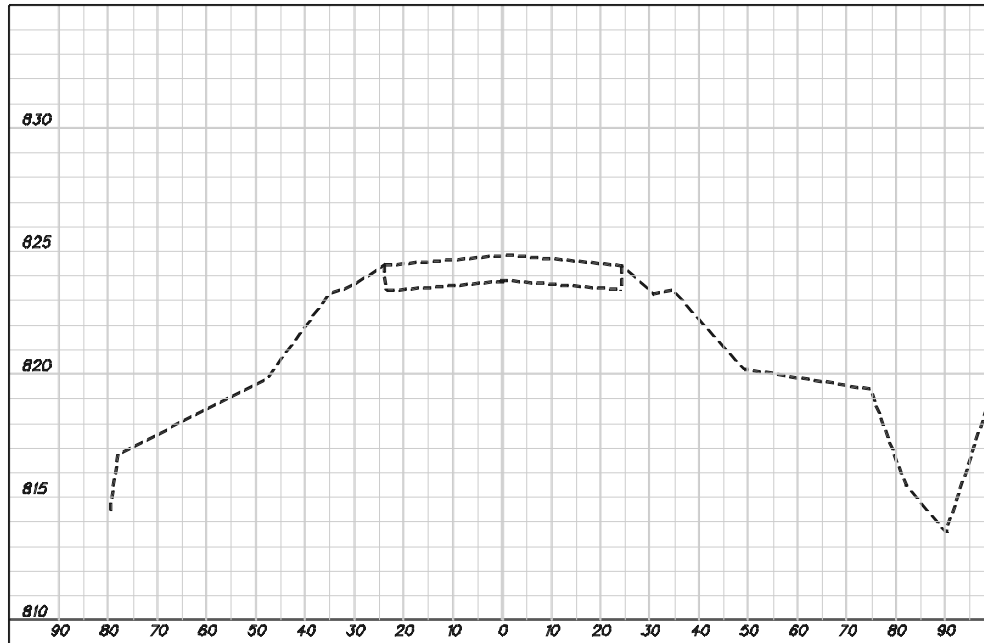


Figure 2-2 - Cross-Section, 31st Street 450' West of Louisiana, Looking East

Louisiana Street to Haskell Avenue

The area between Louisiana Street and Haskell Avenue will be the most challenging area to improve due to the many environmental constraints. The roadway is currently two lanes, with a rural-type cross section. The roadway was originally constructed with four lanes, however, the outer two lanes have been converted to shoulders for maintenance reasons. The pavement on the two travel lanes is in fair to poor condition. The ground along much of this section drops off on either side of the roadway into wetland-type areas. A typical cross-section of this portion of the roadway is shown on **Figure 2-3**.

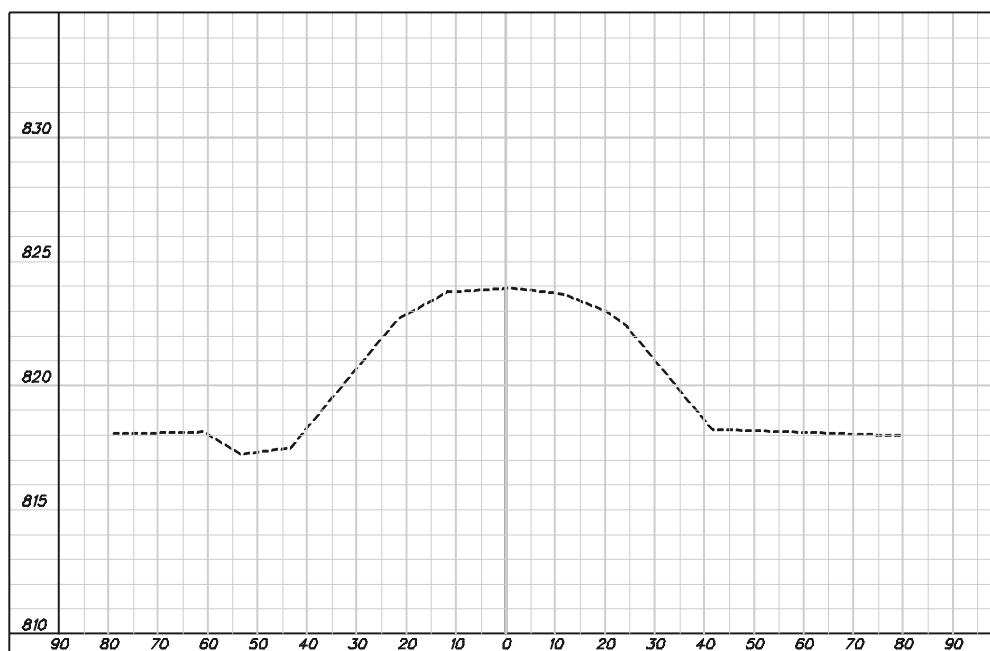


Figure 2-3 - Cross-Section, 31st Street 1600' West of Haskell Avenue, Looking East



Figure 2-4 - Existing Conditions, Louisiana Street to Haskell Avenue

The intersection of 31st Street and Louisiana Street is controlled by a four-way stop. There the left eastbound through lane on 31st Street ends as a left-turn lane at the intersection. There is also a short westbound left-turn lane at the intersection. No separate turn lanes are provided on Louisiana Street.

The intersection of 31st Street and Haskell Avenue is also controlled by a four-way stop. Thirty-first Street widens to provide a 150-foot eastbound left-turn lane at the intersection. The north leg of Haskell Avenue has been improved to City collector street standards, with curb and gutter and a continuous center turn lane, ending as a southbound left turn lane at 31st Street. The east and south legs of the intersection are two-lane rural sections with no separate turn lanes.

There are numerous drainage structures along this section of the roadway and on Louisiana Street and Haskell Avenue near the intersection. These include a triple 14-foot by 8-foot box that runs diagonally under the Louisiana intersection, four large boxes across 31st Street, two large boxes across Louisiana Street, and two pipes crossing under the east and south legs of the Haskell intersection. There is also a bridge across a stream on Haskell Avenue about 800 feet south of the intersection.

Land use along this section is dominated by the Haskell University property on the north side and the Baker Wetlands on the south side. On the northeast corner of 31st Street and Louisiana Street is Broken Arrow Park and a township maintenance facility. On the northwest corner of 31st Street and Haskell Avenue is a partially developed industrial park. Other than the remaining development possible in this industrial park, no new development is anticipated in this area.

Haskell Avenue to County Route 1057

The study area between Haskell Avenue and County Route 1057 can be broken down into three sub-areas. In the one-mile section between Haskell Avenue and O'Connell Road, 31st Street does not currently exist, except for a short section serving the development near Haskell Avenue. The one and one-half mile section between O'Connell Road and Noria Road is a two-lane rural gravel road. Thirty-first Street between Noria Road and County Route 1057 also does not currently exist.



Figure 2-4 - Existing Conditions, Haskell Avenue to E 1700 Road



Figure 2-5 - Existing Conditions, E 1700 Road to County Road 1057

The area between Haskell Avenue and O'Connell Road has a number of challenges. The alignment of a new roadway will likely have to swing south to avoid the dam at Mary's Lake, as well as the bluffs to the east of this area. Improvements to O'Connell Road from 31st Street north are currently under design and will upgrade this road to the City's collector street standards. Development in this area is residential on the north side east of Mary's Lake. South of the 31st Street alignment is a combination of industrial and open space. Much of the area to the south is within the floodplain for the Wakarusa River.

Between O'Connell Road and Noria Road, land adjacent to the existing 31st Street is predominately undeveloped, limited to a cluster of single-family homes along the south side of 31st Street near O'Connell Road. The property on the north side of 31st Street within one-half mile of O'Connell Road is part of the O'Connell Youth Ranch. From this point east, the remaining property is mostly large agricultural tracts. The area north and west of the intersection of 31st Street and Noria Road is planned for industrial development. A creek runs along the north side of 31st Street between E 1700 Road and Noria Road.

East of Noria Road, the land along the 31st Street alignment generally drops into the flat floodplain of the Wakarusa River. Most of this land is currently agricultural and there are no future plans for development. One half mile north of the 31st Street alignment on County Route 1057 is an interchange with K-10 highway. A direct extension of the 31st Street alignment to the west intersects County Route 1057 at the County Route 1057 bridge over the Wakarusa River.

Existing Traffic Volumes

Existing traffic volumes were collected from several sources. A.M. and P.M. peak hour turning movement counts were conducted by TranSystems in April, 2001, at intersections along 31st Street including at Iowa Street, Ousdahl Road, Louisiana Street, Haskell Avenue, O'Connell Road, and Noria Road, plus at many of the driveways between Iowa Street and Ousdahl Street. Additional counts were conducted at 23rd Street and Haskell Avenue, K-10 and Noria Road and at the K-10 and CR 1057 interchange. Copies of these counts are included in the Appendix. Turning movement counts at major intersections are shown on **Figure 2-6**. Average daily traffic volumes in the study area were taken from the Kansas Department of Transportation (KDOT) traffic volume map for 2001. These counts are also shown on **Figure 2-6**.

Current traffic volumes on 31st Street between Iowa Street and Haskell Avenue are about 14,000 vehicles per day. There are heavy eastbound-to-northbound and southbound-to-westbound turning movements at the intersections of 31st Street with Haskell Avenue and with Louisiana Street. Traffic volumes are fairly evenly split eastbound and westbound on 31st Street in this area during the A.M. and P.M. peak periods, although traffic is slightly heavier eastbound during the P.M. peak. A profile of the traffic volumes on 31st Street is shown on **Figure 2-7**.

Daily traffic volumes on Iowa Street north of 31st Street are about 21,000, on Louisiana Street are about 10,000 and on Haskell Avenue are about 12,000. Traffic volumes on 31st Street west of Noria Road and on Noria Road north of 31st Street are currently about 200 vehicles per day. Daily traffic volumes on 31st Street on Saturday and Sunday are similar to the weekday traffic volumes.

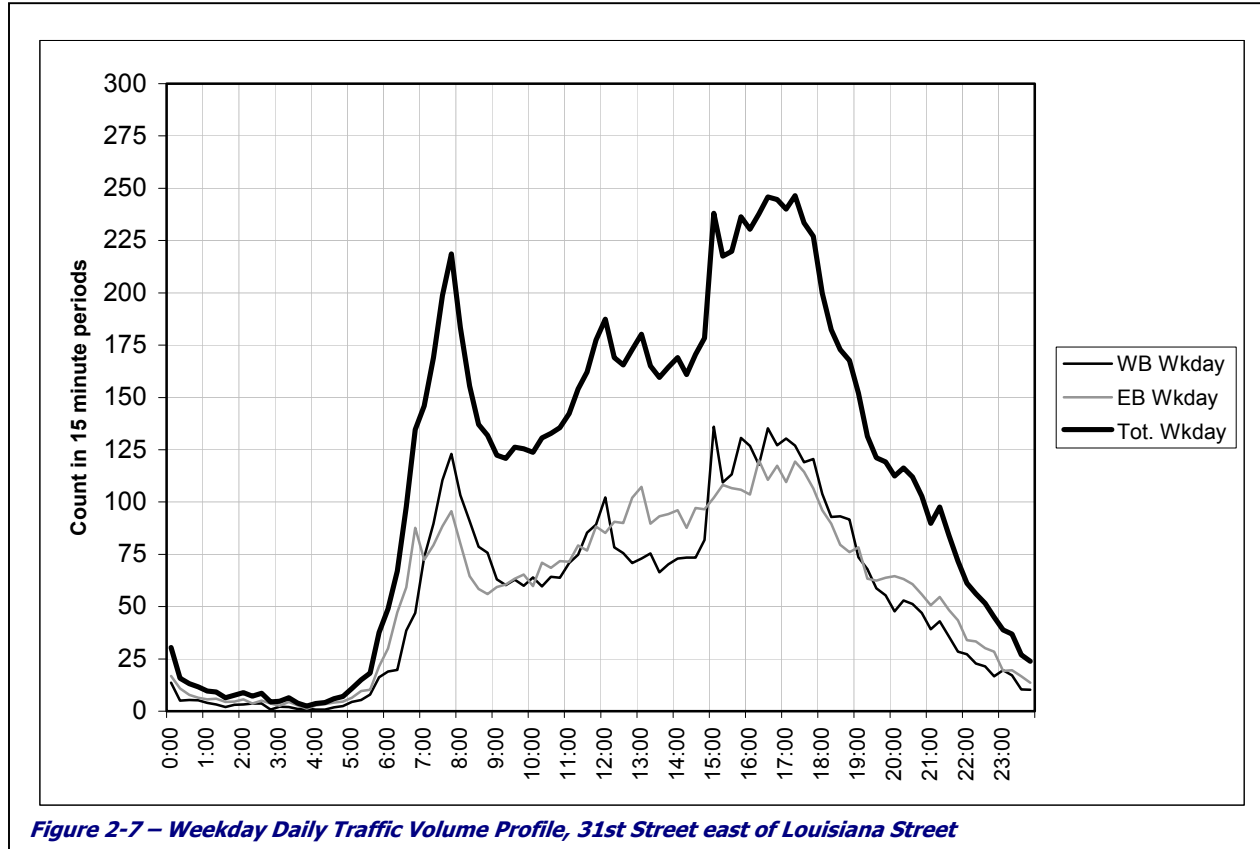


Figure 2-7 – Weekday Daily Traffic Volume Profile, 31st Street east of Louisiana Street

Capacity Analysis

Intersections within the study areas were evaluated based on the methodologies outlined in the *Highway Capacity Manual*, 2000 Edition, published by the Transportation Research Board. The operating conditions at an intersection are graded by the “level of service” experienced by drivers. Level of service (LOS) describes the quality of traffic operating conditions and is rated from “A” to “F”. LOS A represents the most desirable condition with free-flow movement of traffic with minimal delays. LOS F generally indicates severely congested conditions with excessive delays to motorists. Intermediate grades of B, C, D, and E reflect incremental increases in the average delay per stopped vehicle. **Table 2-1** shows the upper limit of delay associated with each level of service for signalized and unsignalized intersections.

The LOS rating deemed acceptable varies by community, facility type and traffic control device. At unsignalized intersections LOS E and better is often accepted for low to moderate traffic volumes where the installation of a traffic signal is not warranted by the conditions at the intersection or the location has been deemed undesirable for signalization for other reasons, e.g., the close proximity of

an existing traffic signal or the presence of a convenient alternative path. For signalized intersections, level of service and average delay relate to all vehicles using the intersection. Most urban cities have adopted LOS D as the minimum desirable rating for a signalized intersection.

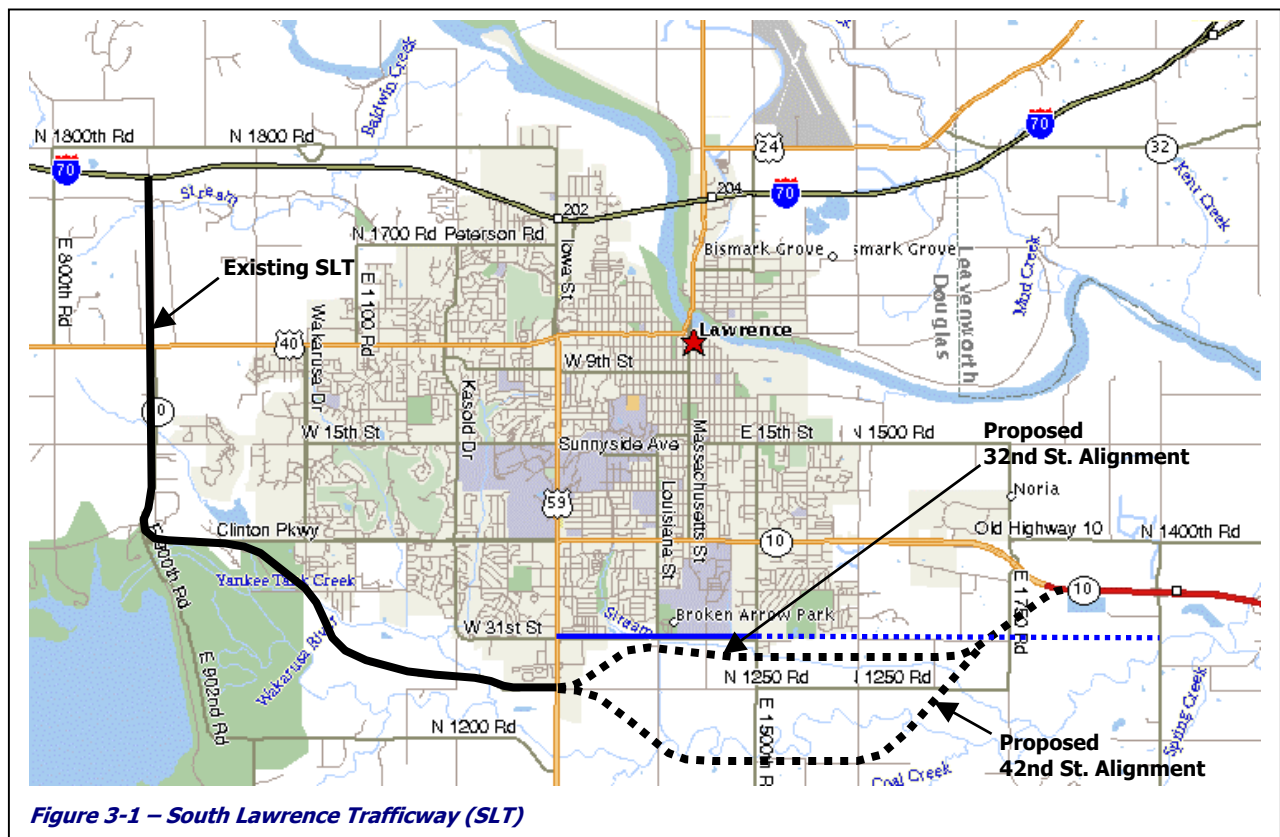
Table 2-1 Intersection Level of Service Delay Thresholds		
Level of Service (LOS)	Signalized	Unsignalized
A	< 10 Seconds	< 10 Seconds
B	< 20 Seconds	< 15 Seconds
C	< 35 Seconds	< 25 Seconds
D	< 55 Seconds	< 35 Seconds
E	< 80 Seconds	< 50 Seconds
F	≥ 80 Seconds	≥ 50 Seconds

The results of the capacity analyses for key intersections are summarized on **Table 2-2**. Note that these results are based on current traffic volumes and do not include projected traffic or improvements for the Home Depot development currently under construction. The results indicate that the two key intersections on the 31st Street corridor, at Haskell Avenue and at Louisiana Street both currently operate at level of service F. In addition, the intersection of 23rd Street and Haskell Avenue, which feeds many of the trips on 31st Street, operates at level of service E.

Table 2-2 Intersection Level of Service – Existing Conditions				
Intersection	A.M. Peak Hour		P.M. Peak Hour	
<i>Movement</i>	LOS	Delay	LOS	Delay
31st Street and Iowa Street <i>All Movements (Signalized)</i>	D	38.3	D	49.8
31st Street and Louisiana Street <i>All Movements (All-Way Stop)</i>	C	24.6	F	60.1
31st Street and Haskell Avenue <i>All Movements (All-Way Stop)</i>	C	24.8	F	81.0
23rd Street and Haskell Avenue <i>All Movements (Signalized)</i>	E	64.0	E	69.2

Section 3 – South Lawrence Trafficway

The South Lawrence Trafficway has been in the planning stages for many years as a freeway around Lawrence. This route would provide improved east-west access across the City as well as access between west Lawrence and Kansas City and as an alternate route to I-70 for traffic traveling between Kansas City and areas west of Lawrence. The western portion of this roadway was completed a number of years ago, extending west from Iowa Street at about 35th Street and then curving north west of Lawrence and connecting to I-70. The eastern portion of this route, however, has been held up due to environmental and cultural concerns, particularly where the route would pass through the Haskell or Baker wetlands.



A Final Environmental Impact Statement (EIS), dated December 2002, has been prepared by the United States Army Corps of Engineers, Kansas City District (USACE-KCD). The Final EIS recommends the 32nd Street alignment, as shown on **Figure 3-1**. This route would begin at the existing interchange at Iowa Street and extend east about 1000 feet south of 31st Street until curving north near Noria Road and connecting to K-10 at a new interchange. Comments on the Final EIS are being accepted until mid-February 2003. Following the 30-day comment period, a Record of Decision will be issued by the USACE-KCD.

The roadway would be a four-lane freeway with grade-separated interchanges at Iowa Street, Haskell Avenue and K-10. In addition, KDOT has indicated that they may consider an additional

interchange between Haskell and Noria Road. As a part of the 32nd Street alignment, 31st Street would be relocated to just north of the SLT route between Louisiana Street and Haskell Avenue and the existing 31st Street would be eliminated in this area. Additionally, Louisiana Street south of 31st Street would be relocated one-half mile to the west and Haskell Avenue would be relocated about one-quarter mile to the east to create a larger wetlands area south of the proposed SLT alignment. Note that should the SLT be constructed, the existing intersection on Noria Road at K-10 would be converted to an overpass, with no access for traffic on Noria Road to K-10.

Following the issuance of a Record of Decision by the USACE-KCD, KDOT will determine a schedule to proceed with letting a grading contract for the 32nd Street alignment.

Section 4 – Future Traffic Projections

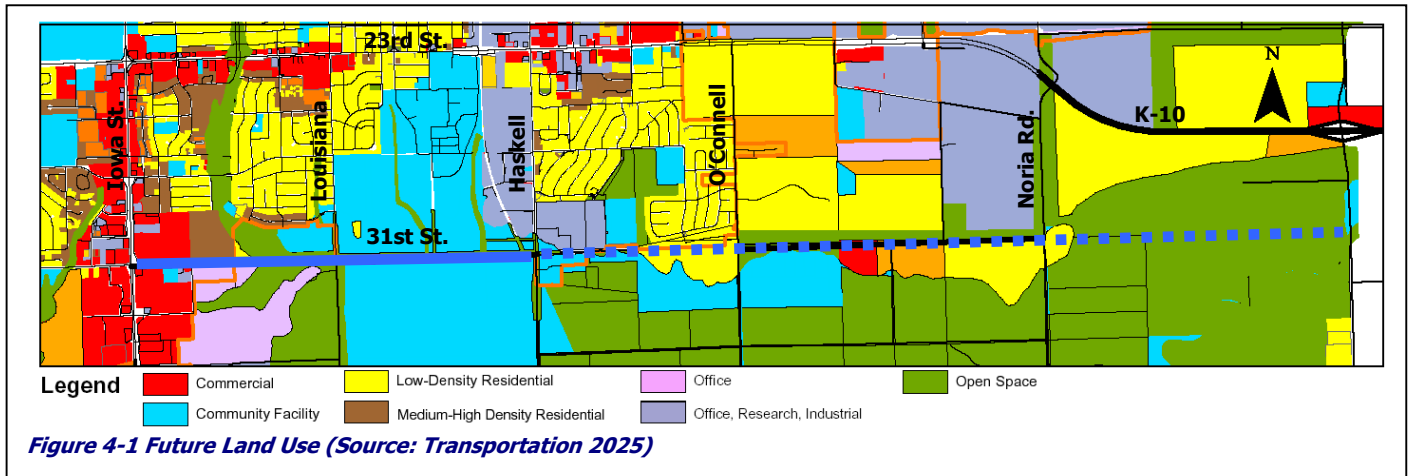
The Lawrence/Douglas County Metropolitan Planning Office (LDCMPO) has recently adopted the area transportation plan, *Transportation 2025*. This planning process included an iterative cycle of forecasting future land uses, using these land uses to project traffic growth for the area, identifying road improvements to support existing needs and the additional traffic generated by this development, and comparing costs for these improvements with funds available.

The resulting product includes a recommended land use map and a list of recommended roadway improvements. Traffic volume projections are made utilizing a traffic model developed by KDOT and the MPO's transportation plan consultant. This traffic model was also used to analyze traffic impacts of the proposed South Lawrence Trafficway. Some preliminary analysis runs were also performed by KDOT for several 31st Street scenarios at the request of TranSystems for this study.

Future Land Use

Future land uses identified for the year 2025 in *Transportation 2025* are shown on **Figure 4-1** for the area along the 31st Street corridor. Planned development along the corridor would include the following:

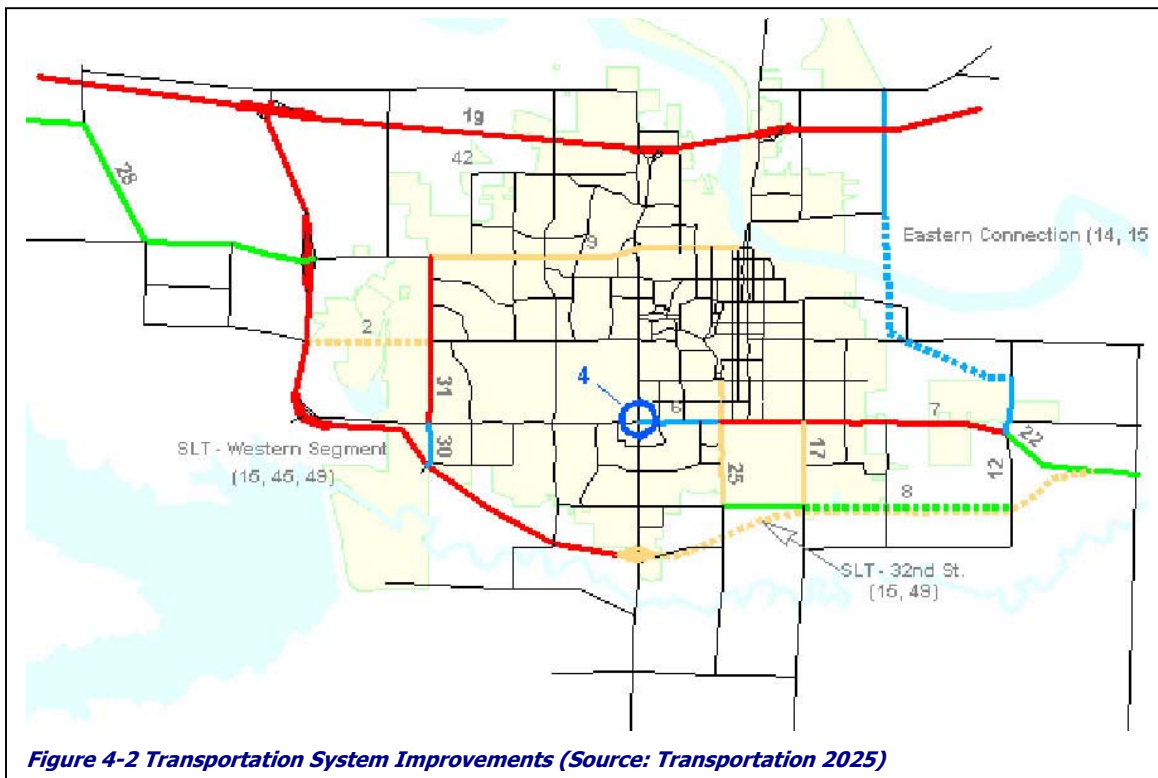
- Office development on the south side of 31st Street between Ousdahl and Louisiana
- High density residential development north of 31st Street east of the Home Depot development.
- Continued low-density residential development near 31st Street and O'Connell Road, with expansion eastward.
- A small area of commercial and high-density residential development on the south side of 31st Street near the extension of Franklin Road.
- Low-density residential development on the southwest and northeast corners of 31st Street and Noria Road.
- A large industrial development area on the northwest corner of 31st Street and Noria Road.



Street System

Transportation 2025 identified a list of 15 recommended projects in the financially constrained program. These projects are identified in **Figure 4-2**. Projects that directly impact traffic on the 31st Street corridor include the following:

- 31st Street, Louisiana to Noria Road – Construct/widen to four lanes.
- South Lawrence Trafficway – Construct 32nd Street alignment, widen existing section to four lanes.
- Haskell Avenue, 23rd Street to 31st Street – Widen to 4/5 lanes.
- Louisiana Street, 19th Street to 31st Street – Widen to four lanes.
- 23rd Street, Iowa to Noria Road – Intersection improvements, widen to six lanes Louisiana to Noria.
- Noria Road, 23rd Street to 31st Street – Improve two-lane road.
- K-10, Noria Road to Johnson County – Widen to six lanes.



Future Traffic Projections

At the request of TranSystems, KDOT modified the traffic model to simulate two scenarios for the 31st Street Corridor Study. These scenarios included the land use and transportation network improvement described above. In addition, they included the following improvements:

- Realignment of Louisiana Street south of 31st Street one-half mile west, per the recommended SLT improvements.
- Extension of Franklin Road south from 23rd Street to 35th Street with an interchange on the SLT at this location. This roadway would provide access to developing areas north of 31st Street between O'Connell Road and Noria Road.
- Grade separation of K-10 and Noria Road, with no access between the two facilities. This improvement is included in the SLT plan, but does not appear to be accommodated in the *Transportation 2025* plan. The close proximity of this intersection to the proposed SLT interchange would prohibit an at-grade intersection or an interchange with ramps.
- Relocation of the "Eastern Connection" to connect to K-10/23rd Street at Franklin Road instead of Noria Road. This is done due to the lack of access at Noria Road as described above. In addition, with the Franklin Street extension and an interchange at the SLT, this route would provide a good north-south route on the east side of the City. Also included would be a connection between Noria Road and Franklin Road on the north side of K-10 to provide access for the East Hills Business Park.

- Extension of 31st Street from Noria Road to County Route 1057/E 1700 Road. Similarly, as access between Noria Road and K-10 would not be provided at the current location, extending 31st Street to CR 1057 provides access to an interchange on K-10, otherwise traffic from the east destined for areas around Noria Road would have to travel west to at least Franklin Road to access K-10, backtracking more than a mile.

Two scenarios were modeled, one with the SLT 32nd Street alignment, and one with no SLT. The traffic volumes projected for each of these scenarios are depicted on **Figure 4-3** and **Figure 4-4**. Some key traffic volumes are also summarized on **Table 4-1**. The results indicate that 31st Street will carry significant traffic volumes for much of its length with or without the SLT. The link between Noria Road and County Route 1057 does not carry a substantial traffic volume with the SLT, however, the role of this link also needs to be considered in the overall street network system, particularly without access to Noria Road at K-10. Based on these traffic volume projections, it may also be possible to meet traffic demand with a three-lane facility on 31st Street east of Haskell Avenue for some time (While a three-lane facility may provide adequate capacity for the projected traffic, an undivided roadway limits the ability to provide effective access management – see Section 6 for additional discussion of access management).

Table 4-1 Daily Traffic Volume Projections			
Location	Existing	2025 With SLT	2025 No SLT
31st – East of Ousdahl	13,800	35,400	42,300
31st – East of Louisiana	14,600	25,000	41,200
31st – East of Haskell	n/a	13,900	23,100
31st – East of O’Connell	200	5,300	16,000
31st – East of Noria	n/a	1,000	11,900
Haskell – North of 31st	11,700	28,200	34,200
Louisiana – North of 31st	9,300	21,400	26,400

Note that these traffic volumes should be used only for order of magnitude type projections. KDOT ran these projections by simply modifying links on the existing model, without the more detailed calibration that would normally be done for a full modeling analysis. Additionally, the land use zones, particularly in the area of Noria Road, are not connected to the street system in a way that would be done with a more detailed analysis, thus the distribution of traffic amongst the streets in the area may fluctuate significantly.

Section 5 – Short-Term Improvements

The capacity analysis results for existing conditions indicated that there is an immediate need for improvements at the 31st Street intersections with Haskell Avenue and Louisiana Street. Both of these intersections operate at level of service F during the P.M. peak hour, therefore, it may not be possible to wait until the SLT improvements are finalized to proceed with modifications to these intersections. Several short-term improvements have been identified to bring the operation of these intersections back to acceptable levels until the SLT and/or overall 31st Street improvements can be implemented.

The initial improvement at both intersections would be to install traffic signals. As this would be a short-term solution, it would probably be more cost effective to use temporary signals on wood poles instead of “permanent” traffic signals with metal mast arm poles. Vehicle detection could be achieved through video detection – although at a higher initial cost, this equipment can be relocated to a new signal or another location. No geometric modifications would be required to handle existing traffic volumes, although the traffic signals should be designed to accommodate the additional improvements described below. One alternative that may be worth considering would be re-designating the southbound lanes on Haskell at 31st Street to one right turn lane and one through/left-turn lane (currently there is a left-turn lane and a through/right-turn lane). This would create an offset through the intersection for southbound through traffic, but results in improved operation. The results of the capacity analysis are summarized on **Table 5-1**.

The installation of traffic signals alone will only be able to maintain acceptable operation for approximately two to three years (this duration is based on linear growth of traffic between current counts and the projected 2025 traffic volumes – if growth in this section of Lawrence is slower to occur than in other areas, this timeline may be extended). At this point, additional geometric improvements are recommended. These improvements include:

31st Street and Louisiana Street

- Widen the southbound approach to provide separate left-turn, through and right-turn lanes, each with 200 feet of vehicle storage.
- Extend the westbound left-turn lane to provide 100 feet of vehicle storage and widen the northbound approach to provide a separate left-turn lane with 200 feet of vehicle storage (these modifications are dependent on traffic growth to the south and would not be required until increased traffic volume on this approach were realized).

31st Street and Haskell Avenue

- Widen the southbound approach to provide a separate right-turn lane with 300 feet of vehicle storage.
- Extend the eastbound left-turn lane to provide 600 feet of vehicle storage.
- Widen the northbound approach to provide a separate left-turn lane with 175 feet of vehicle storage.
- Widen the westbound approach to provide a separate left-turn lane with 100 feet of vehicle storage.

The improvements are depicted on *Figure 5-1* and *Figure 5-2*. The resulting levels of service for these improvements are summarized on *Table 5-1*. Within five to 10 years the capacity of these improvements will also be exceeded at which point the long-term improvements described later in this report will need to be considered, however, this time frame may allow issues with the SLT to be resolved and for funding to be put in place to construct the longer term improvements.

Table 5-1 Intersection Level of Service With Recommended Short-Term Improvements				
Intersection	A.M. Peak Hour		P.M. Peak Hour	
	LOS	Delay	LOS	Delay
<i>Install Traffic Signals – Existing Traffic Volumes and Geometrics</i>				
31st Street and Louisiana Street	C	31.5	D	36.4
31st Street and Haskell Avenue	C	32.8	C	23.3
<i>Install Traffic Signals, Reconfigure Southbound Lanes – Existing Traffic Volumes</i>				
31st Street and Haskell Avenue	C	21.8	B	17.8
<i>Recommended Improvements – "2007" Traffic Volumes (No SLT)</i>				
31st Street and Louisiana Street	C	23.3	C	23.3
31st Street and Haskell Avenue	D	37.4	E	60.1

Construction Cost Estimate

Construction cost estimates have been prepared for the improvement scenarios described above, these estimates are summarized on *Table 5-2*. These cost estimates assume that these improvements would be temporary in nature – construction to “permanent” design standards would add considerably to the costs. It does not appear that additional right-of-way will be required for any of these improvements. The improvements to the south leg of Louisiana Street were separated from the rest of the project since, as stated above, these improvements will not be required until traffic volumes on this leg begin to increase, and due to the fact that the improvements will require a relatively costly extension of a box culvert just south of the intersection. This culvert extension represents about \$100,000 of the cost of this improvement.

Table 5-2 Construction Cost Estimates Short-Term Improvement	
Improvement	Estimated Cost¹
<i>31st Street and Louisiana Street</i>	
Install Temporary Traffic Signal	\$50,000
Widen North and East Legs of Intersection	\$100,000
Widen South Leg of Intersection	\$125,000
<i>31st Street and Haskell Avenue</i>	
Install Temporary Traffic Signal	\$50,000
Widen All Legs of Intersection	\$150,000
¹ Estimated construction cost in 2002 dollars. Does not include right-of-way acquisition, utility relocation, environmental mitigation, design or construction inspection costs.	

Environmental Impacts

Environmental impacts are of particular concern at these two intersections due to their close proximity to the Haskell and Baker wetlands and the scrutiny this area has received as a part of the SLT design process. The recommended short-term improvements were developed with the desire to try to minimize environmental impacts while maintaining adequate levels of traffic service.

The environmental permitting requirements will be described in more detail in the following section of this report; however, the most significant issue with the proposed short-term improvements is wetlands impacts. In order to construct the improvements under what is known as a “nationwide” permit, wetlands impacts must be less than ½ acre. It appears that each of these projects, if constructed individually, could be constructed without exceeding that threshold, however, there are a number of caveats to that assumption:

- Wetlands in this area have not been formally delineated for this project, thus the exact level of impact cannot be assessed.
- Areas in the vicinity of the culverts may be classified as “crossings” and thus excluded from the wetlands, but this determination must be made by the Corps of Engineers during the permitting process.
- What areas north and west of 31st Street and Louisiana Street and north and east of 31st Street and Haskell Avenue are classified as wetlands will require additional study and review by the Corps.
- Scrutiny of these projects will likely be at a higher level than similar projects at other locations due to the on-going SLT controversy.

Section 6 – Long-Term Improvements

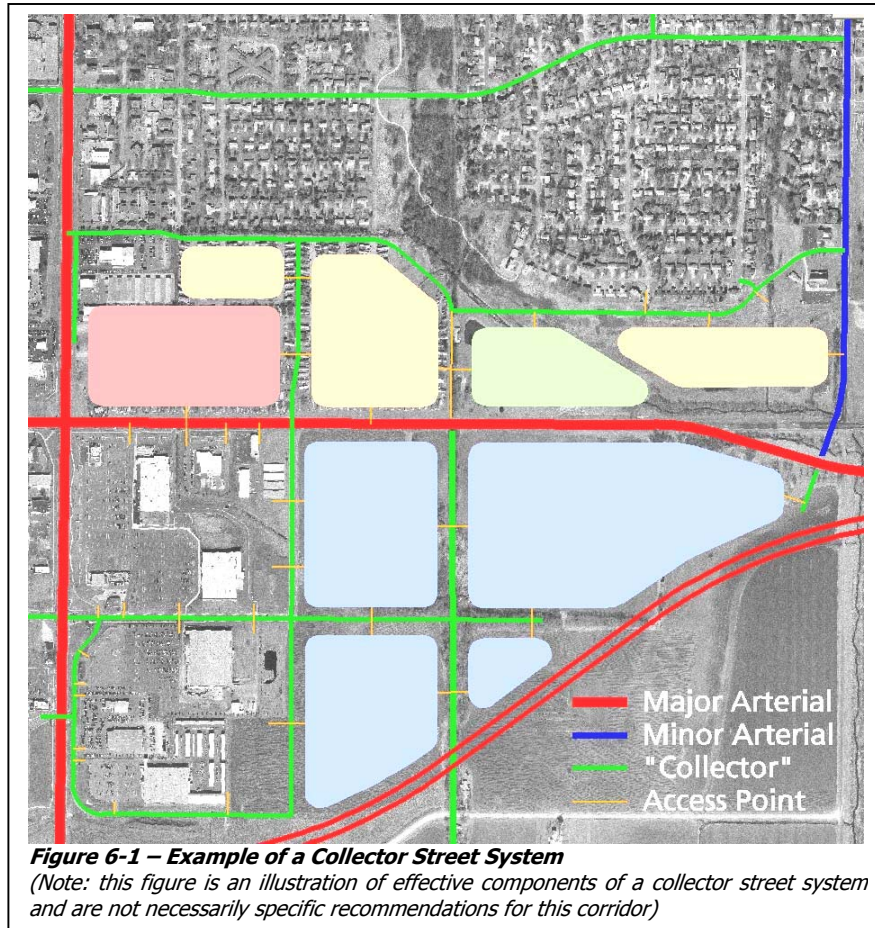
Regardless of the outcome of the South Lawrence Trafficway (SLT) project, 31st Street will serve as the primary east-west route on the south side of the City of Lawrence, providing for cross-town trips and access to the commercial and industrial areas at each end of the corridor and the residential areas in between as well as relieving traffic on 23rd Street. If the SLT is not constructed, 31st Street will also continue to serve as an alternate route for traffic traveling from K-10 east of town to the existing section of the SLT west of Iowa. Long-term improvements for the 31st Street Corridor have been broken down into two areas: Iowa Street to Haskell Avenue and east of Haskell Avenue to County Route 1057. Each section also has two sub-parts, the western section divided east and west of Louisiana and the eastern section divided east and west of Noria Road. Additionally, the recommendations vary by whether the SLT is constructed.

The recommendations in this section are based on the traffic volume projections described in Section 4 of this report.

Access Management

Access management is an approach to maximizing the capacity and safety of major roadways by limiting the number of access point to a roadway and by designing those access points that are provided to operate as safely and efficiently as possible. Numerous studies have shown that the frequency of access points along a roadway are directly related to increased delays and accident rates. By focusing traffic to a limited number of access points, providing adequate distance between these points so that drivers can distinguish between them and make decisions in a timely manner, safety is improved. In addition, the access points are designed with auxiliary lanes to separate right and left turning traffic from the through traffic stream, so that through traffic is not disrupted by the slowing of turning traffic.

Access management must also balance the needs of traffic flow and access to adjacent properties, however. The key component to doing this is developing property in a way that allows the use of collector streets and common driveways. Planning the development of a piece of property must take into account the development potential of adjacent properties as well so that access for an entire area can be planned in a consistent manner. An example of how a collector street system might be developed between Iowa Street and Louisiana Street is shown on **Figure 6-1**. Note that the term “collector street” in this sense is more broad than what might be shown on a Functional Classification map in the Transportation Plan. These collector streets could even include private drives as long as they function to collect traffic from multiple properties to efficiently gather the traffic into limited access points onto the major street system.



Along the 31st Street Corridor, the following access management standards are recommended:

- Raised Medians – Use throughout the corridor
- Access Points – Minimum spacing 660 feet
- Median Openings – Minimum spacing $\frac{1}{4}$ mile
- Traffic Signals – Minimum Spacing $\frac{1}{4}$ mile
- Left and Right-Turn Lanes – Provide at all public street intersections and commercial drives

For the area between Ousdahl Road and Haskell Avenue, special considerations will need to be made due to the environmental constraints. In order to limit the amount of roadway widening required in this area, it is recommended that access points be limited to the intersections of Ousdahl Road, Louisiana Street and Haskell Avenue. This will allow 31st Street to be narrowed and the median omitted, except adjacent to the turn lanes at the permitted access locations. A four-foot separation is recommended between the eastbound and westbound travels lanes to improve safety due to the anticipated high traffic volumes and relatively high speeds.

East of Haskell Avenue, if the SLT is constructed, 31st Street may operate satisfactorily with a two-lane facility along much of this section for the near future. Obviously, in this case, the median can be omitted, however, this street will be an important facility for the City and the County well beyond

the 20-year planning horizon and this access should be planned in a way that allows the corridor to maintain the access management standards proposed.

Iowa Street to Haskell Avenue

The westernmost portion of this area, Iowa Street to east of Ousdahl Road is currently being improved to a four-lane, median divided section. New traffic signals will be installed at the new Home Depot drive and at Ousdahl. The intersection of 31st Street and Iowa Street will also be improved to provide dual left-turn lanes and a separate right-turn lane on each approach. These improvements will effectively maximize the amount of roadway capacity in this section of the roadway short of constructing a third through traffic lane in each direction. Should redevelopment occur on the south side of the roadway, it is recommended that attempts be made to reduce the number of drives and to add right turn lanes to bring this area more into conformance with the recommended access management standards.

As stated previously, between Ousdahl Road and Haskell Avenue, it is recommended that access points be limited to Ousdahl Road, Louisiana Street and Haskell Avenue. This will allow the cross section of the roadway to be narrowed through the wetlands area. Should the South Lawrence Trafficway be constructed, the recommended 32nd Street alignment will include the relocation of 31st Street to just north of the SLT. Louisiana Street south of 31st Street would be relocated one-half mile west to enlarge the wetlands area. In addition, Haskell Avenue would be shifted approximately 900 feet to the east. An interchange would be provided on the SLT at Haskell Avenue. The north ramps of this interchange would intersect Haskell Avenue about 600 feet south of 31st Street.

Capacity analyses were performed for the Haskell Avenue, Louisiana Street and SLT ramp intersections to determine the recommended lane configurations and levels of service. The results of these analyses are summarized on *Table 6-1* through *Table 6-4*.

Table 6-1 Recommended Geometrics and Queue Storage 2025 Traffic Volumes, No South Lawrence Trafficway												
	Southbound			Northbound			Westbound			Eastbound		
	Right	Thru	Left	Right	Thru	Left	Right	Thru	Left	Right	Thru	Left
31st Street & Iowa Street												
Number of Lanes	1	2	2	1	2	2	1	2	2	1	2	2
Turn Lane Length	300	--	300	450	--	200	600	--	400	200	--	250
31st Street & Louisiana Street												
Number of Lanes	2	2	2	1	2	2	1	2	2	1	2	2
Turn Lane Length	450	--	325	200	--	200	325	--	225	200	--	525
31st Street & Haskell Avenue												
Number of Lanes	2	2	2	1	2	2	1	2	2	1	2	2
Turn Lane Length	425	--	200	200	--	300	200	--	200	425	--	650
Turn lane lengths in feet.												

Table 6-2
Recommended Geometrics and Queue Storage
2025 Traffic Volumes with South Lawrence Trafficway

	Southbound			Northbound			Westbound			Eastbound		
	Right	Thru	Left	Right	Thru	Left	Right	Thru	Left	Right	Thru	Left
31st Street & Iowa Street												
Number of Lanes	1	2	2	1	2	2	1	2	2	1	2	2
Turn Lane Length	300	--	400	200	--	200	600	--	250	200	--	250
31st Street & Louisiana Street (West)												
Number of Lanes	1	1	2	1	1	2	1	2	2	1	2	2
Turn Lane Length	150	--	150	200 ¹	--	400	200	--	300	300	--	200
31st Street & Louisiana Street (East)												
Number of Lanes	1	1	2	--	1	1	1	2	1	1	2	2
Turn Lane Length	650 ¹	--	300	--	--	150	350	--	150	200	--	500
31st Street & Haskell Avenue												
Number of Lanes	1	2	2	1	2	2	1	2	2	1	2	2
Turn Lane Length	550	--	200	200	--	400	200	--	200	400	--	350
Haskell Avenue & SLT WB Ramps												
Number of Lanes	1	2	2	1	2	1	2	1	1	--	1	1
Turn Lane Length	200	--	500	200	--	200	250	--	250	--	--	150
Haskell Avenue & SLT EB Ramps												
Number of Lanes	--	2	2	1	2	--	2	--	1	--	--	--
Turn Lane Length	--	--	200	200	--	--	300	--	300	--	--	--
Turn lane lengths in feet.												
¹ Through lane drop.												

Table 6-3
Intersection Level of Service
2025 Traffic Volumes, No South Lawrence Trafficway

Intersection <i>Movement</i>	P.M. Peak Hour	
	LOS	Delay
31st Street and Iowa Street <i>All Movements (Traffic Signal)</i>	E	74.6
31st Street and Louisiana Street <i>All Movements (Traffic Signal)</i>	D	52.5
31st Street and Haskell Avenue <i>All Movements (Traffic Signal)</i>	D	49.0

Table 6-4 Intersection Level of Service 2025 Traffic Volumes, with South Lawrence Trafficway		
Intersection <i>Movement</i>	P.M. Peak Hour	
	LOS	Delay
31st Street and Iowa Street <i>All Movements (Traffic Signal)</i>	E	68.1
31st Street and Louisiana Street (West) <i>All Movements (Traffic Signal)</i>	D	39.6
31st Street and Louisiana Street (East) <i>All Movements (Traffic Signal)</i>	D	49.2
31st Street and Haskell Avenue <i>All Movements (Traffic Signal)</i>	D	38.5
Haskell Avenue and SLT WB Ramps <i>All Movements (Traffic Signal)</i>	D	42.4
Haskell Avenue and SLT EB Ramps <i>All Movements (Traffic Signal)</i>	C	21.7

The results indicate that all of the intersections can be designed to accommodate the projected traffic volumes at acceptable levels of service with the exception of the intersection of 31st Street and Iowa Street. However, right-turn lanes and dual left-turn lanes with adequate storage capacity will be critical elements in achieving the desired results. In the scenario without the SLT, the very heavy southbound-to-westbound right-turn movements at the Haskell Avenue and Louisiana Street intersections will require dual southbound right-turn lanes. At 31st Street and Iowa Street, an additional through lane would have to be added to Iowa Street to bring the operation of the intersection to level of service D.

With the SLT, the close proximity of intersections on Haskell Avenue with 31st Street and the SLT westbound ramps does not allow the full left turn storage capacity to be provided between the intersections, even with the left-turn movements provided side-by-side. The intersections are spaced at approximately 600 feet apart, leaving about 500 feet between the stop lines. After developing the turn bay, only about 400 feet is available for storage. The queue storage needs for these two movements is between 400 and 500 feet. If possible, it is recommended that more separation be provided between these intersections. At least 800 feet is recommended.

Right-of-way along 31st Street is generally recommended to be 150 feet. This allows for four 12-foot through lanes, up to 34 feet in the median to allow for dual left-turn lanes and a 10-foot island, and right-turn lanes on each side, for a total pavement width of 110 feet, including curbs. This leaves 20 feet on each side for sidewalks, a bike path and utilities. This width could also accommodate an additional through lane in each direction at locations where it may become necessary. Between Louisiana Street and Haskell Avenue the right-of-way can be narrowed to 100 feet away from the intersections. The section of Haskell Avenue south of 31st Street will require approximately 170 feet of right of way due to the side-by-side left turn lanes.

The layout of the proposed roadway for the two scenarios, with and without the South Lawrence Trafficway, are illustrated on **Figure 6-5** and **Figure 6-6**.

East of Haskell Avenue to County Route 1057

The section of 31st Street between Haskell Avenue and County Route 1057 was evaluated for potential alignments for a new roadway. The existing road is a rural, two-lane, mostly gravel road and will require complete reconstruction to meet city arterial roadway standards. The traffic volume projections indicate that this section of 31st Street will need to be constructed as a four-lane facility with a raised median should the South Lawrence Trafficway not be built. If the SLT is constructed, the 2025 projections indicate that only the westernmost portion of this section, between Haskell Avenue and O'Connell Road would need to be four lanes. The rest of the roadway could be constructed as a two or three-lane road. However, it is recommended that right-of-way be acquired and the road be constructed in a manner that it can be expanded to a four-lane, median divided facility throughout its length. This portion of the roadway should also conform to the access management standards defined in Section 5 of this report.

Typical Section

The typical section for the roadway is recommended to consist of four 12-foot lanes plus a 22-foot median, for a total width of 74 feet back of curb to back of curb. At major intersection points near Haskell Avenue, O'Connell Road, Franklin Road, Noria Road and CR 1057, it is recommended that the median widen to 34 feet within 300 feet of the intersection to allow for future dual left-turn lanes. A similar cross section is recommended for on these cross streets.

Our analysis assumes that a six-foot sidewalk would be provided with a six foot green space on the north side of the roadway and a ten-foot multi-use path with a six-foot green space would be provided on the south side of the roadway. As an alternative, the sidewalk/path could be constructed near the edges of the right-of-way to reduce disruptions during future widening.

For the area east of O'Connell Road, should only a two-lane section be built at this time, it may be desirable to construct this roadway at a width of 30 to 34 feet wide (40 feet near intersections) and offset it to one side or the other of the right-of-way to allow the other two lanes to be constructed at a future time with minimal disruption to the operating roadway.

Right of Way

With the recommended four-lane roadway cross section plus sidewalks, and allowing an additional 12 feet on each side for right-turn lanes at cross streets and driveways, the recommended right of way width is 150 feet, similar to the section west of Louisiana Street.

Horizontal and Vertical Alignment

A variety of alignments were evaluated for the future roadway, taking into account the various topographical, environmental and development constraints found along the corridor. The various alignments considered are shown on **Figure 6-7** and **Figure 6-8**. The band surrounding these alignments on the figures generally indicates the outer limits of what might be required for grading or right of way acquisition plus some room for fine-turning of the alignments.

Between Haskell Avenue and O'Connell Road, two main constraints were considered, the dam for Mary's Lake and the bluff south and east of Mary's Lake. Three alignments were considered in this area. Each of them curve south heading east from Haskell Avenue, but to varying degrees. The farther south the alignment extends, the less the impact on excavation and grades result from passing through the bluff. All of the alignments maintain between a 2.5% and 3.5% grade through the bluff, but the northern most alignment requires a cut of nearly 25 feet, where the southern alignment has only a small cut through the bluff. The southern alignment has the tightest horizontal curve with a radius of about 950 feet. All of the alignments were designed to maintain a 45 M.P.H. posted speed. All three alignments would pass through generally undeveloped parcels, with the exception of the west end, near Haskell Avenue, where some right-of-way would have to be acquired from developments in the industrial park. It does not appear that any commercial buildings would have to be acquired. South of Mary's Lake there is one property that contains several structures under review by the Kansas Historical Society. Some or all of the structures on this property may have to be removed for some of the alignments.

Between O'Connell Road and the future Franklin Road, the alignments are fairly straight. One remains generally on the existing 31st Street alignment and the other shifts about 150 feet north mid-way between O'Connell and Franklin. The shift north is to avoid some of the residential properties that are along the south side of the existing 31st Street through this section as well as to avoid some features farther to the east as will be discussed later. This section also has the roughest terrain and will require a number of large cuts and fills. Grades are generally maintained at 2% to 3%, but rise to 4% near Franklin Road. Depending on the alignment, some residential properties on the south side may need to be acquired. The property on the north side through this section is part of the O'Connell Youth Ranch.

Between Franklin Road and E 1700 Road, the alignments generally continue straight from the section to the west. The north alignment would impact two parcels, both under the same ownership and would require acquisition of one residence. The south alignment would also impact these parcels as well as four tracts on the south side under two ownerships. It may be possible to avoid structures with this alignment, but the roadway would wind up very close to some of these residences.

Between E 1700 Road and Noria Road, the main feature is a creek that runs along the north side of the existing 31st Street. The two alignments generally pass on the north and south sides of this creek to avoid the associated environmental impacts and the costs to realign this channel. The north alignment would require crossing this channel twice. This alignment also passes through a property containing several spoil piles that could create some hazardous waste concerns.

As the exact alignment for 31st Street in this area is not defined, coordination will be required with the SLT to ensure that the SLT structures are located appropriately and accommodate the proposed 31st Street cross section.

Between Noria Road and County Route 1057 the terrain is relatively flat and a large portion of the corridor is in the floodplain for the Wakarusa River. The two primary horizontal alignment options are to either follow along the property line that extends along the existing 31st Street alignment to the west and then curve north at the east end to avoid the Wakarusa River, or to shift the entire alignment farther north to intersect County Route 1057 at a point that an east leg could be provided at the intersection to serve property to the east of the County Road. Vertically, the design assumes

that the road will be raised out of the floodplain and that drainage structures will be required to allow floodwaters to utilize the floodplain area north of the roadway.

Cross Streets

The design also includes significant improvements on the major cross streets along the alignment where they intersect with 31st Street. At O'Connell Road, Noria Road and County Route 1057, improvements are assumed to provide a four-lane cross section with dual left-turn lanes and a right turn lane on the cross streets near the intersection and then taper back to the existing two-lane section. Along the alignment of the future Franklin Road, similar improvements are assumed. On County Route 1057, the improvements are extended north to the south K-10 Ramp. On E 1650 Road and E 1700 Road a three-lane cross section is assumed at the intersection, tapering back to the existing two lanes. The extensive improvements described for many of the cross streets will likely not be necessary in the short-term, but are included as they are necessary considerations for grading and right-of-way impacts.

Major Structures

A preliminary analysis of drainage needs indicates that there would be approximately four to five concrete box structures required between Haskell Avenue and Noria Road. From Noria Road east to County Route 1057, two additional large boxes would be required, plus a new bridge across the Wakarusa River on County Route 1057 to accommodate the widening to this roadway. It is assumed that the SLT bridge over 31st Street will be constructed in the appropriate location and with sufficient width to accommodate the proposed cross section as a part of the SLT project.

Environmental Impacts and Permitting

Several key environmental issues should be considered in the planning and design of the 31st Street Improvements project. A preferred alignment often minimizes the impact to identified natural resources and sensitive receptors. Design factors including, but not limited to, environmental issues will shape the preferred alignment. These key issues are highlighted in bold text and discussed below. A more comprehensive summary of the data collected and the anticipated permitting requirements for the project are included in the environmental report in the appendix of this study.

South Lawrence Trafficway Alignment

The final scope of the western portion of the project is highly dependent upon the final selection of an alignment resulting from the Final Environmental Impact Statement (FEIS) to be prepared by the U.S. Army Corps of Engineers' (USACE) for the South Lawrence Trafficway (SLT). The alignment selected may shift some of the 31st Street improvements from Haskell Avenue west to the SLT project. The SLT alignment may also have some influence on the design of the project east of Haskell Avenue. For example, potential conflicts with the two roadways south of the Mary's Lake area, or the need for an additional bridge at the crossing of the two roads near the K-10 interchange will influence the project.

Waters of the United States, including Wetlands

The study area contains numerous confirmed and potential wetland areas, as well as surface water resources that may be affected by the proposed project. Wetland areas include the Baker University Wetlands and associated adjacent wetland tracts managed by Baker University, potential wetlands adjacent to 31st Street between Louisiana Street and Haskell Avenue, and several small potential wetland areas within the study area. More definitive information on the location and boundaries of potential wetlands will be necessary to determine impacts associated with any alignment, therefore, a wetland identification/delineation study should be performed to aid in the selection of an alignment.

Impacts to waters of the United States, including wetlands, are regulated by the USACE's Section 404 Permit Program under the Clean Water Act. Due to the dependence of the scope of this project on the selected alignment of the SLT, it is not possible at this time to estimate the amount of wetland impacts associated with the project. However, it is safe to assume that some impacts to wetlands will occur because of the numerous wetland areas in the vicinity of the project. Also, since there are numerous points along the evaluated alignments where bridges and culverts must be placed for surface water crossings, it is inevitable that a 404 permit will be required for the project. Depending upon the final scope of the project, there are several possibilities for the type of permit that will be required by the USACE.

Nationwide Permit

Nationwide Permits (NWP) are categorical general permits which have been previously authorized by Congress, and which cover activities with minimal impacts. An example of an NWP is #14, Linear Transportation Crossings, which authorizes impacts associated with a roadway or other linear transportation facility crossing of waters of the U.S. This permit allows up to ½ acre of impacts to waters of the U.S. for a crossing that is a single and complete project. The USACE will make the determination whether a crossing is a single and complete project, and may allow the use of this permit for several or all of the crossings for the project, depending on level of impacts. Normal timeframe for a NWP review and authorization by the USACE is approximately 60-90 days.

If the SLT 32nd Street Alignment is constructed, then the portion of 31st Street through the major wetlands areas would be constructed, and permitted, as a part of that project. Under that scenario, if wetland impacts can be avoided east of Haskell Avenue, it is possible that the rest of the 31st Street project may be authorized by one or more NWPs.

Individual Permit

An Individual Permit (IP) is a permit tailored to a specific project. Since this type of permit does not include previous public interest review or determination of minimal impacts, the proposed project is subject to review by all interested parties, including federal, state and local environmental agencies, environmental organizations and affected landowners. All projects with impacts that exceed the threshold of minimal impacts provided by the NWPs or whose activities don't fit into a NWP category must be authorized by IP. The review process for an IP is more in-depth, and in addition to the public interest review, the USACE may require the applicant to provide an Analysis of Alternatives to demonstrate that the proper sequence of avoidance, minimization and mitigation of impacts was followed in the

selection of the proposed plan. The normal timeframe for IP review and authorization is approximately 90-180 days, but complex and/or controversial projects often take longer. In addition, the USACE may determine that the production of an Environmental Assessment or Environmental Impact Statement is necessary to properly assess impacts and alternatives in accordance with National Environmental Policy Act (NEPA) requirements.

Based on the amount of wetland impacts (up to approximately 39 acres) potentially effected, an Individual Permit is likely to be required if the scope of the project includes the entire alignment as studied (from Louisiana to E. 1900 Rd.).

Combination Nationwide/Individual Permit

A combination permit may be issued by the USACE if they determine that some of the project impacts (i.e., some of the crossings) are single and complete projects, while others may be tied to each other by proximity or impacts.

For example, if two crossings are in proximity to each other and closely located to the same wetland area, and impacts to the wetland exceed ½ acre, then it may be determined that impacts to this project area must be authorized by an IP. However, other crossings on the same roadway may each be determined by the USACE to be single and complete projects, and therefore may be authorized by NWP #14.

The State of Kansas, Department of Health and Environment (KDHE) administers the Section 401 Water Quality Certification program, as part of the Clean Water Act. The 404 Permit issued by the USACE is completed by the issuance of Water Quality Certification by the KDHE for the project.

Archaeological and Cultural Resources

The requirement of a federal permit (such as a 404 Permit) for the project brings into play some other federal environmental regulations that must be complied with, in accordance with NEPA. Section 106 of the National Historic Preservation Act requires Federal agencies to take into account the effects of their undertakings on historic properties, through consultation with the Advisory Council on Historic Preservation (ACHP) and interested parties. The goal of this consultation is to identify properties potentially affected by the undertaking, assess its effects, and seek ways to avoid, minimize or mitigate any adverse effects on historic properties. Federal agencies must comply with this regulation. The Kansas State Historic Preservation Officer (SHPO) is responsible for this review.

The Haskell Indian Nations University Campus, along with the Baker Wetlands, has been determined to be eligible for listing on the National Register of Historic Places as a “Historic District”. A stone house south of the Mary’s Lake area (1535 N. 1300 Road) has been identified as an architectural historic property, and lies in the path of the preliminary alignment. Activity III investigations, research and reporting are being carried out currently, as recommended by the SHPO. If the final project scope includes these areas, it will be necessary to mitigate impacts to the Historic District or structure.

State Historic Preservation laws apply for this project, and require that the SHPO receive notice of proposed activities within 500 feet of any state or federally listed historic property within an

incorporated area, or within 1,000 feet of any state or federally listed historic property within an unincorporated area.

Hazardous Waste

Several areas containing potential hazardous waste sites have been identified in this report and the DEIS. This information should be carefully considered during alignment selection in order to avoid discovery and remediation of hazardous waste.

Cost Estimates

Construction cost estimates have been prepared for the improvement scenarios described above, these estimates are summarized on **Table 6-5**. For the section between Ousdahl and Haskell, the only scenario evaluated was if the SLT is not constructed. If the SLT is constructed on the 32nd Street alignment, it is assumed that the relocation of 31st Street will be completed as a part of this project. Two scenarios were evaluated for the eastern sections, one with a two-lane roadway that could later be expanded to a four-lane, median-divided facility and one for construction of the full four-lane facility under the initial project. More detailed breakdowns of the cost estimates are included in the appendix. See previous parts of this section of the report above for more details on what is included in the cost estimates.

Table 6-5 Construction Cost Estimates Long-Term Improvement	
Improvement	Estimated Cost¹
<i>East of Ousdahl Road to East of Haskell Avenue</i>	
Construct Four-Lane Facility on Existing Alignment	\$8,700,000
<i>East of Haskell Avenue to Noria Road</i>	
Construct Two-Lane Facility	\$7,700,000
Construct Four-Lane Facility	\$11,000,000
<i>East of Noria Road to County Route 1057</i>	
Construct Two-Lane Facility	\$6,500,000
Construct Four-Lane Facility	\$9,700,000
¹ Estimated construction cost in 2002 dollars. Does not include right-of-way acquisition, utility relocation, environmental mitigation, design or construction inspection costs. Costs include cross street improvements on Haskell, Louisiana, O'Connell, Franklin, E1650, E1700, Noria and CR 1057 as described in the report. Costs do not include improvements to any other cross streets (e.g. collector street east of Ousdahl, new street connections in industrial parks)	

**To view additional figures for the 31st St. Corridor Study, [click here](#).