Purpose and Need

April 2024

K10 CORRIDOR

Kansas Department of Transportation

KDOT IKE THE EISENHOWER LEGACY TRANSPORTATION PROGRAM

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1. Purpose and Need

A Purpose and Need Statement describes the transportation problems that a proposed project is to address. This statement provides a description of the purpose of the K-10 Capacity Improvements Project and a demonstration of the need for improvements the proposed project is to address within the study area.

1.1. Project Overview and Background

1.1.1. Project Limits and Termini

The proposed project is located within the cities of Lenexa, Olathe, and DeSoto in Johnson County, Kansas as well as unincorporated portions of Johnson County, Kansas. The overall study limits are on K-10 from west of the interchange at Evening Star Road to the I-435/I-35/K-10 Interchange. Portions of I-435 from W 95th Street to I-35 and portions of I-35 at the I-435 Interchange are also included. Major roads at interchanges on K-10 are included within the study area, and include Evening Star Road, Edgerton Road, Lexington Avenue, Kill Creek Road, Cedar Creek Parkway/Canyon Creek Boulevard, Woodland Road, Ridgeview Road, and Renner Boulevard service interchanges. As well as potential connections from Clare Road and Lone Elm Road. Additionally, K-7 is included from Prairie Star Parkway to College Boulevard. **Figure 1-1** shows the study area for the project. The overall length is approximately 17.0 centerline miles along K-10. The study area boundaries represent the logical limits for the infrastructure improvements and environmental review.

1.1.2. Project Background

K-10 is one of Kansas' most important and fastest growing corridors. Serving nearly 70,000 vehicles per day, K-10 provides a vital connection between the southwest region of the Greater Kansas City metro area to Lawrence and I-70. The K-10 Transportation Study was conducted by the Kansas Department of Transportation (KDOT), Mid-America Regional Council (MARC), and the Lawrence-Douglas County Metropolitan Planning Organization (MPO) in 2005. The purpose of the study was to identify needed future improvements for the K-10 Corridor between the City of Lawrence and the Kansas City metro area. The study evaluated existing and future traffic conditions, developed mainline widening and interchange configurations, and provided public engagement activities. Recognizing the importance of this corridor, KDOT has made significant investments starting with the K-10 Transportation Study, which led to projects like the South Lawrence Trafficway (SLT) East Leg in Lawrence and the Johnson County Gateway at the K-10/I-435 Interchange. Progress continues with the SLT West Leg now in the Eisenhower Legacy Transportation (IKE) Program pipeline.

Although these investments addressed critical needs, challenges remain on K-10 including aging infrastructure throughout much of the corridor. Additionally, routine congestion during the morning and evening peak periods, particularly east of K-7, impacts commuter traffic daily. Geometric configurations are outdated and inadequate to support current demand and contribute to safety issues. K-10 is poised to experience unprecedented new growth dynamics. Additionally, planned development of a large manufacturing operation on the west end of the project corridor near De Soto is anticipated to further stress traffic conditions along the entire study corridor.

1.1.3. Proposed Action

The National Environmental Policy Act (NEPA) requires the FHWA to assess the environmental effects of projects that include federal funding or require a federal action. The NEPA process allows transportation officials to make project decisions that balance engineering and transportation needs with social, economic, and natural environmental factors. At the direction of FHWA, an Environmental Assessment (EA) is being prepared for the K-10 Corridor project to determine whether or not the proposed action has the potential to cause significant environmental effects to the natural or man-made environment. Within the EA, FHWA and KDOT are evaluating a 'No Action' or 'No-Build' alternative, the improvement of alternative routes, existing capacity management, multimodal options, and the addition of capacity through traditional widening or the use of express toll lanes as the proposed action to satisfy the purpose and need for the project. Roadway and interchange configurations are also being evaluated throughout the corridor.

1.2. Purpose and Need

1.2.1. Need for Proposed Project

The proposed project is needed to modernize and expand the K-10 Corridor from west of the interchange at Evening Star Road to the I-435/I-35/K-10 Interchange in Johnson County, Kansas. The corridor has become insufficient to meet current and future mobility needs, resulting in worsening safety, reliability, and congestion. There is also a need to address the corridor's issues with transportation improvements that offer long-term sustainability and flexibility for all users.

The proposed project is needed to:

- **Enhance safety performance** to address high crash areas and congestion related crashes
- **Improve traffic operations** by reducing congestion and delay within the corridor to meet existing and future travel demands.
- **Improve infrastructure condition** and address ongoing operations and maintenance needs impacting long-term travel reliability and life-cycle costs.
- **Provide flexible transportation choices** by accommodating the needs of all users and modes.

- **Support local and regional growth** through coordinated transportation improvements consistent with current and future land use.

1.2.2. Purpose of the Proposed Project

The purpose of the K-10 Capacity Improvements Project is to provide the traveling public with an efficient transportation facility on K-10 and the broader highway system within the Kansas City metropolitan area, resulting in enhanced safety performance, improved traffic operations, improved infrastructure conditions, flexible transportation choices, and support of local and regional growth.

The proposed project is in alignment with identified needs and goals that are expressed within KDOT's Kansas Long Range Transportation Plan (LRTP) and MARC's metropolitan transportation plan, which is called *Connected KC 2050*. Goals that MARC identified for the region are as follows:

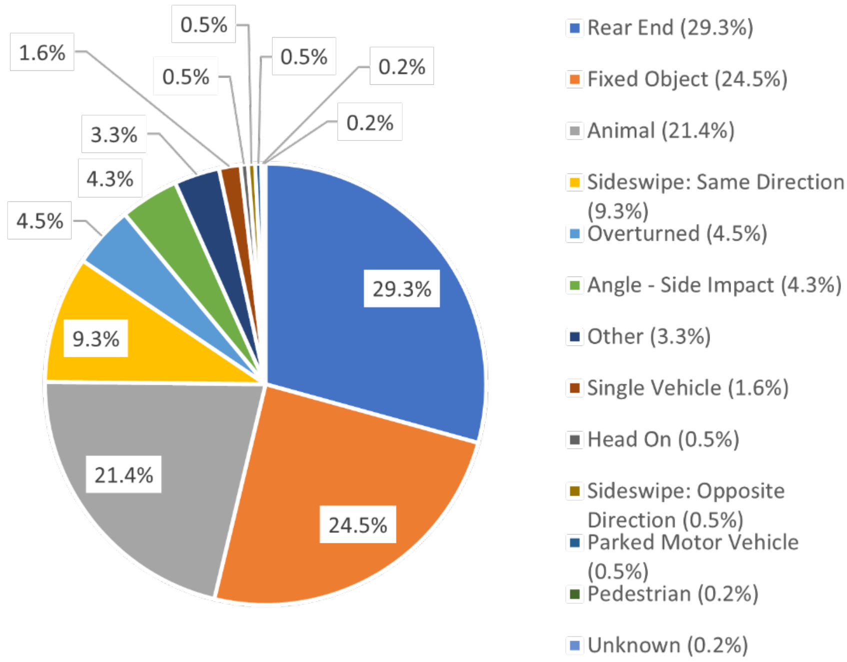
- Access to opportunity — Support a connected system that anables access to all activities, allowing people to succeed by removing transportation barriers.
- Public health and safety — Foster healthy communities and individuals by providing safe and secure places to live, walk, bike, ride the bus and drive with clean air to breathe.
- Healthy environment — Prioritize and support investments that reduce pollution and greenhouse gas emissions and preserve and restore ecosystem health.
- Transportation choices — Provide a range of transportation choices for communities across the region to allow for ease of travel as well as public health and environmental benefits.
- Economic vitality — Maintain a multimodal transportation system that supports the efficient movement of people and goods and promotes economic development.

The following sections summarize the project need for each project purpose.

1.2.3. Enhance Safety Performance

A detailed study of traffic safety was conducted for the K-10 Corridor consisting of approximately 18-miles of roadway from the west side of the interchange at N 1400 Road to the interchange at I-435 using the most recent available crash data from KDOT for 2017 through 2021. In total, 1,325 crashes occurred on the K-10 Corridor during this time period, resulting in four fatalities. Of the 1,325 total crashes, 1,075 resulted in property damage only and 246 resulted in some form of injury to vehicle occupants. Three predominant crash types occurred within the corridor including rear end, fixed object, and animal collisions. These three crash types accounted for approximately 75 percent of all crashes within the corridor, with rear end collisions accounting for 29 percent of all crashes (**Figure 1-2**).

Figure 1-2: Crash Types Along K-10 Corridor



Source: KDOT Crash Data 2017-2021

When compared to other four-lane divided urban and rural highway facilities in Kansas, 13 of the 20 roadway segments along the K-10 Corridor exceed the Statewide Average Crash Rate for either total crashes or fatal crashes.

Table 1-1: K-10 Crash Rates

K-10 Segments		Segment Length (Mile)	Average Daily Two-Way Traffic	Crash Rate (MVMT)		Fatal Crash Rate (HMVMT)	
Segment Numbers	Segments' Names			Segment Crash Rate	Statewide 5-Year Average (2017-2021)	Segment Crash Rate	Statewide 5-Year Average (2017-2021)
1	E 2200th Rd to N 1400 Rd	0.49	29,310	0.191	0.591[1]	0.000	0.615[3]
2	N 1400 Rd Interchange	0.32	28,820	0.297	0.591[1]	0.000	0.615[3]
3	N 1400 Rd to Evening Star Rd	1.58	30,740	0.463	0.591[1]	**1.128***	0.615[3]
4	Evening Star Rd Interchange	0.42	29,760	**0.789***	0.591[1]	0.000	0.615[3]
5	Evening Star Rd to Edgerton Rd	1.09	30,400	0.546	0.591[1]	0.000	0.615[3]
6	Edgerton Rd Interchange	0.35	30,160	**0.727***	0.591[1]	0.000	0.615[3]
7	Edgerton Rd to Lexington Ave	1.5	31,180	**0.785***	0.591[1]	0.000	0.615[3]

K-10 Segments		Segment Length (Mile)	Average Daily Two-Way Traffic	Crash Rate (MVMT)		Fatal Crash Rate (HMVMT)	
Segment Numbers	Segments' Names			Segment Crash Rate	Statewide 5-Year Average (2017-2021)	Segment Crash Rate	Statewide 5-Year Average (2017-2021)
8	Lexington Ave Interchange	0.37	27,880	**1.647***	0.591[1]	0.000	0.615[3]
9	Lexington Ave to Kill Creek Rd	1.25	34,760	**1.236***	0.591[1]	0.000	0.615[3]
10	Kill Creek Rd Interchange	0.35	33,160	**1.369***	0.591[1]	0.000	0.615[3]
11	Kill Creek Rd to Canyon Creek Blvd/Cedar Creek Pkwy	3.65	38,460	**0.945***	0.591[1]	0.000	0.615[3]
12	Canyon Creek Blvd/Cedar Creek Pkwy Interchange	0.35	37,430	0.795	0.925[2]	**4.183***	0.641[4]
13	Canyon Creek Blvd/Cedar Creek Pkwy to K-7	1.39	43,860	0.476	0.925[2]	0.000	0.641[4]
14	K-7 Interchange	0.52	56,050	**2.726***	0.925[2]	0.000	0.641[4]
15	K-7 to Woodland Rd	1.54	49,960	0.442	0.925[2]	0.000	0.641[4]
16	Woodland Rd Interchange	0.35	61,990	**1.793***	0.925[2]	0.000	0.641[4]
17	Woodland Rd to Ridgeview Rd	0.62	79,630	0.522	0.925[2]	0.000	0.641[4]
18	Ridgeview Rd Interchange	0.43	72,840	**2.484***	0.925[2]	**3.499***	0.641[4]
19	Ridgeview Rd to Renner Blvd	0.44	83,570	0.700	0.925[2]	0.000	0.641[4]
20	K-10 ramp merging into I-435	1.24	64,450	**1.070***	0.925[2]	0.000	0.641[4]

Source: KDOT Crash Data 2017-2021

MVMT- Million vehicles miles traveled for total crash rates. HMVMT-Hundred million vehicles miles traveled for fatal crash rates.

[1] - Kansas Statewide 5-year average (2017-2021) total crash rate for rural four-lane divided highways.

[2] - Kansas Statewide 5-year average (2017-2021) total crash rate for urban four-lane divided highways.

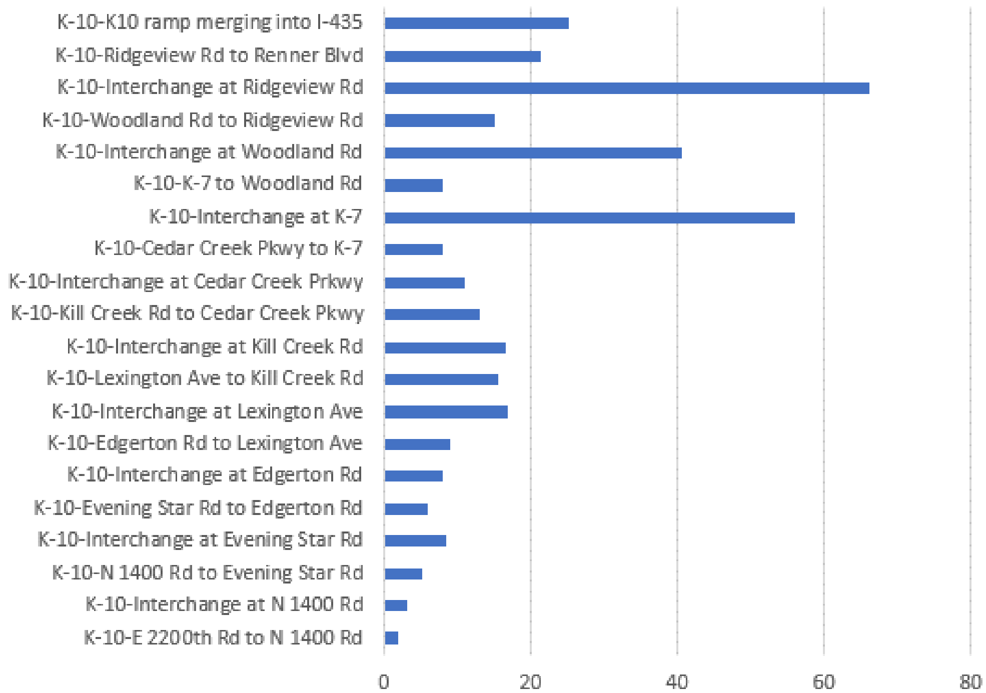
[3] - Kansas Statewide 5-year average (2017-2021) fatal crash rate for rural four-lane divided highways.

[4] - Kansas Statewide 5-year average (2017-2021) fatal crash rate for urban four-lane divided highways.

* - Segment exceeds the statewide crash rate for similar facilities.

In addition to crash rates, crash frequencies were calculated for all K-10 segments within this study area. As depicted in **Figure 1-3**, two segments, the K-7 interchange, and the Ridgeview Road interchange experienced the highest number of crashes per year per mile. The Ridgeview Road interchange is the only segment to exceed the statewide average for total crashes as well as for fatal crashes.

Figure 1-3: Crashes Per Year Per Mile Along K-10 Corridor



Source: KDOT Crash Data 2017-2021

Figure 1-4 shows the existing crash spots and breaks down the locations of rear-end crashes and fatal crashes.

Figure 1-4: Crash Hot Spots

Source: KDOT Crash Data 2017-2021

Future No-Build (FNB)

A 2060 Future No Build (FNB) predictive crash analysis was completed and includes the mainline K-10, spanning from west of the N 1400th Road interchange to the I-435 interchange and K-7, from the north facing ramps of College Blvd to the south facing ramps of Prairie Star Parkway. All the arterials crossing K-10 and K-7 within the study limit, as well as all the ramps, were included in the analysis.

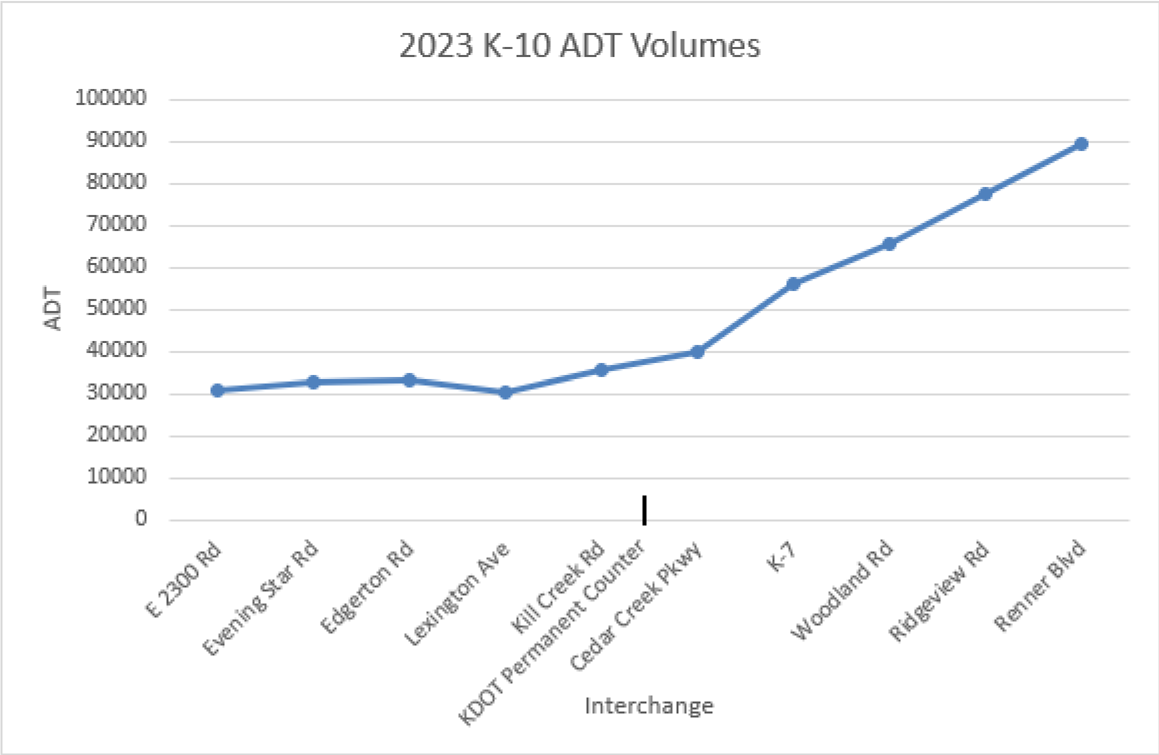
FNB analysis results show that rear end and fixed object collisions will continue to be the most frequent types of crashes on K-10 and K-7. The analysis also predicts that K-10 is likely to experience an increase in crashes, particularly along the segments from Lexington Avenue to Canyon Creek/Cedar Creek Parkway, near the K-7 interchange, at the Ridgeview Road interchange, and at the Renner Boulevard interchange. This result aligns with the findings of the existing safety analysis. Several arterials, including Ridgeview Road, Woodland Road, and Lexington Avenue, are predicted to experience a higher number of crashes, mostly attributed to rear end and angle collisions at ramp terminals. The future predictive analysis also revealed that system-to-system ramps would experience higher predicted crashes, mostly attributed to rear end collisions.

1.2.4. Improve Traffic Conditions

The K-10 Corridor is in need of improvements to provide congestion relief today and capacity improvements in the future. Using the National Performance Management Regional Data Set (NPMRDS) to analyze travel speeds for the year 2019 and 2022, severe congestion causing speeds to decrease to below 30 mph was identified from I-435 to Woodland Road in the PM peak period in the westbound direction. During the AM peak period, congestion caused speeds to decrease to between 30-50 mph from K-7 to Ridgeview Road. In addition, the development of the Sunflower Ammunition site into an electric vehicle battery manufacturing facility along with ancillary development will increase traffic volumes along the K-10 Corridor.

Under existing conditions in 2023, the corridor serves approximately 30,000 vehicles per day (vpd) on the west end of the corridor at E 2300 Rd and about 90,000 vehicles per day on the east end at Renner Boulevard.

Figure 1-5: 2023 K-10 ADT Volumes

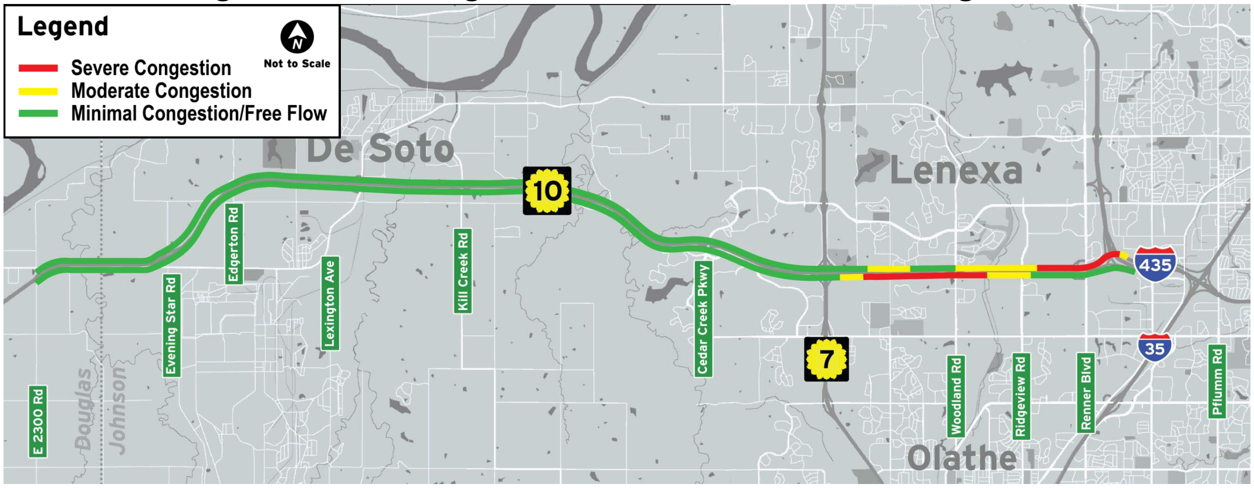


Source: HNTB calculated volumes from KDOT data

Daily traffic volumes are anticipated to grow in the no-build scenario between 0.3 to 2.3 percent annually by the project design year of 2060 depending on location in the corridor and which corridor improvement scenario is selected. This projected increase in daily volume will add an additional 2,800 to 41,000 vehicles per day to K-10. The largest increase in daily traffic is along K-10 between Lexington Avenue and Kill Creek Parkway. This additional traffic volume is projected to degrade operations in this area further over time, leading to more congestion and the increasing presence of bottlenecks if no improvements are made.

Figure 1-6 shows the existing (2023) congestion along the K-10 mainline occurs between K-7 and I-435.

Figure 1-6: Existing Conditions 2023: Areas of Congestion



Source: HNTB calculated values

Table 1-2 displays the 2023 base year operations along the K-10 mainline.

Table 1-2: Base Year Operations: K-10 Mainline

Segment	Segment Type	AM Peak Hour			PM Peak Hour		
		Min. Speed (mph)	Density (pc/mi/ln)	LOS	Min. Speed (mph)	Density (pc/mi/ln)	LOS
Eastbound K-10							
West end of Model to E 2300 Rd	basic	74.2	15.5	B	75.9	10.1	A
E 2300 Rd Exit	diverge	73.6	13.6	B	75.8	8.8	A
Between E2300 Rd Ramps	basic	73.0	14.8	B	74.6	10.0	A
E 2300 Rd Entrance	merge	69.7	13.4	B	70.4	9.1	A
E 2300 Rd Entrance to Evening Star Exit	basic	73.4	15.6	B	75.5	10.5	A
Evening Star Exit	diverge	72.9	13.3	B	74.4	9.0	A
Between Evening Star Ramps	basic	72.2	15.6	B	74.0	10.6	A
Evening Star Entrance	merge	66.9	13.6	B	67.4	9.3	A
Evening Star Entrance to Edgerton Exit	basic	72.7	15.5	B	74.0	10.6	A
Edgerton Exit	diverge	73.1	12.8	B	75.0	8.7	A
Between Edgerton Ramps	basic	72.2	15.3	B	73.1	10.7	A
Edgerton Entrance	merge	72.4	11.9	B	73.4	8.3	A
Edgerton Entrance to Lexington Exit	basic	73.1	15.1	B	75.1	10.5	A
Lexington Exit	diverge	72.4	13.4	B	74.5	9.3	A
Between Lexington Ramps	basic	73.2	13.7	B	75.0	9.8	A
Lexington Entrance	merge	69.5	11.1	B	69.9	8.9	A

Segment	Segment Type	AM Peak Hour			PM Peak Hour		
		Min. Speed (mph)	Density (pc/mi/ln)	LOS	Min. Speed (mph)	Density (pc/mi/ln)	LOS
Lexington Entrance to Kill Creek Exit	basic	73.1	16.0	B	74.9	12.6	B
Kill Creek Exit	diverge	72.7	14.1	B	74.3	11.1	B
Between Kill Creek Ramps	basic	73.0	15.6	B	74.8	11.9	B
Kill Creek Entrance	merge	70.2	15.3	B	73.2	11.2	B
Kill Creek Entrance to Cedar Creek Exit	basic	71.1	18.0	C	72.3	13.6	B
Cedar Creek Exit	diverge	72.8	15.4	B	73.9	11.8	B
Between Cedar Creek Ramps	basic	70.4	17.6	B	71.1	13.4	B
Cedar Creek Entrance	merge	68.7	18.2	B	71.9	12.8	B
Cedar Creek Entrance to K-7 SB Exit	basic	72.0	20.5	C	73.5	14.9	B
K-7 SB Exit	diverge	71.7	17.9	B	73.5	13.1	B
K-7 SB Exit to K-7 Loop Ramps	basic	73.5	15.9	B	74.9	12.7	B
K-7 Loop Ramps	weave	60.0	20.6	C	63.5	15.3	B
K-7 Loop Ramps to K-7 NB Entrance	basic	65.9	20.7	C	70.2	16.9	B
K-7 NB Entrance	merge	51.2	40.2	E	70.1	18.5	B
K-7 NB Entrance to Woodland Exit	basic	30.0	73.3	F	73.6	21.4	C
Woodland Exit	diverge	16.8	88.7	F	71.8	19.4	B
Between Woodland Ramps	basic	16.3	104.8	F	73.4	20.5	C
Woodland Entrance	merge	30.5	75.4	F	66.4	22.2	C
Woodland Entrance to Ridgeview Exit	basic	52.7	42.8	E	68.1	27.2	D
Ridgeview Exit	diverge	54.4	36.1	E	67.1	24.3	C
Between Ridgeview Ramps	basic	65.4	32.5	D	71.8	23.5	C
Ridgeview Entrance to Renner/CD Exit	weave	66.9	20.6	C	67.6	17.4	B
Renner/CD Exit to Renner Entrance	basic	64.9	20.4	C	65.0	17.5	B
Renner Entrance to Lackman Exit	weave	62.0	16.3	B	62.0	15.8	B
K-10 at I-435 EB	basic	66.1	18.4	C	65.2	18.9	C
Westbound K-10							
K-10 at I-435 WB	basic	65.1	15.2	B	46.1	38.4	E
Lackman/CD Rd Entrance	merge	46.4	25.3	C	33.9	50.6	F
Lackman/CD Rd Entrance to I-435 SB Entrance	basic	44.5	33.8	D	33.2	60.2	F
I-435 SB Entrance to Renner Exit	weave	55.7	25.2	C	32.3	55.1	F
Between Renner Ramps	basic	66.0	23.5	C	36.3	61.7	F
Renner Entrance	merge	69.4	18.7	B	42.8	44.9	F
Renner Entrance to Ridgeview Exit (Overlap)	basic	70.1	23.4	C	49.1	45.7	F

Segment	Segment Type	AM Peak Hour Min. Speed (mph)	AM Peak Hour Density (pc/mi/ln)	AM Peak Hour LOS	PM Peak Hour Min. Speed (mph)	PM Peak Hour Density (pc/mi/ln)	PM Peak Hour LOS
Ridgeview Exit	diverge	69.0	21.0	C	55.2	35.8	E
Between Ridgeview Ramps	basic	71.0	18.6	C	59.7	36.8	E
Ridgeview Entrance	merge	70.0	16.2	B	48.5	37.3	E
Ridgeview Entrance to Woodland Exit	basic	70.5	20.0	C	62.5	34.3	D
Woodland Exit	diverge	69.0	18.4	B	66.0	29.2	D
Between Woodland Ramps	basic	71.0	16.1	B	70.5	24.0	C
Woodland Entrance	merge	70.8	12.0	B	70.2	18.0	B
Woodland Entrance to K-7 NB Exit	basic	70.4	17.3	B	69.3	26.0	D
K-7 NB Exit	diverge	68.2	16.0	B	67.2	24.0	C
K-7 NB Exit to K-7 Loop Ramps	basic	70.8	12.0	B	70.0	20.3	C
K-7 Loop Ramps	weave	64.6	12.0	B	62.2	20.5	C
K-7 Loop Ramps to K-7 SB Entrance	basic	70.1	11.1	B	67.5	18.0	C
K-7 SB Entrance	merge	71.2	10.2	B	70.0	16.0	B
K-7 SB Entrance to Cedar Creek Exit	basic	71.6	12.0	B	70.7	18.6	C
Cedar Creek Exit	diverge	70.5	11.0	B	69.2	17.1	B
Between Cedar Creek Ramps	basic	67.6	11.2	B	66.9	17.2	B
Cedar Creek Entrance	merge	69.7	9.1	A	71.4	13.4	B
Cedar Creek Entrance to Kill Creek Exit	basic	70.1	11.3	B	72.0	16.5	B
Kill Creek Exit	diverge	70.7	10.4	B	72.5	14.8	B
Between Kill Creek Ramps	basic	71.4	10.7	A	74.6	13.9	B
Kill Creek Entrance	merge	70.5	9.7	A	70.9	12.5	B
Kill Creek Entrance to Lexington Exit	basic	71.1	11.6	B	70.8	14.8	B
Lexington Exit	diverge	70.1	9.6	A	70.2	12.1	B
Between Lexington Ramps	basic	72.0	8.0	A	71.2	12.8	B
Lexington Entrance	merge	68.3	7.6	A	69.3	12.1	B
Lexington Entrance to Edgerton Exit	basic	71.9	9.0	A	71.0	14.2	B
Edgerton Exit	diverge	69.0	8.0	A	68.1	12.7	B
Between Edgerton Ramps	basic	68.8	9.2	A	68.4	14.6	B
Edgerton Entrance	merge	70.6	7.4	A	69.9	11.7	B
Edgerton Entrance to Evening Star Exit	basic	71.7	8.9	A	70.9	14.3	B
Evening Star Exit	diverge	71.3	7.6	A	70.3	12.2	B
Between Evening Star Ramps	basic	71.8	8.8	A	70.8	14.2	B
Evening Star Entrance	merge	69.6	7.5	A	68.5	12.1	B
Evening Star Entrance to E 2300 Rd Exit	basic	71.6	9.0	A	70.6	14.4	B
E 2300 Rd Exit	diverge	67.3	7.9	A	66.7	12.7	B

Segment	Segment Type	AM Peak Hour Min. Speed (mph)	AM Peak Hour Density (pc/mi/ln)	AM Peak Hour LOS	PM Peak Hour Min. Speed (mph)	PM Peak Hour Density (pc/mi/ln)	PM Peak Hour LOS
Between E 2300 Rd Ramps	basic	71.0	8.5	A	70.6	13.5	B
E 2300 Rd Entrance	merge	71.5	7.2	A	70.5	11.3	B
E 2300 Rd Entrance to West end of model	basic	71.5	8.8	A	70.5	13.7	B

Source: VISSIM Model Results

2023 Base Year AM Peak Period Summary

Freeway operations on I-435 are generally acceptable during the AM peak hour in the westbound/northbound direction, with all segments operating at LOS C or better. I-435 experiences more congestion in the southbound/eastbound direction during the AM peak hour with LOS E occurring at the weaving segment between the I-35 northbound entrance ramp and exit ramp to Quivira Road. The congestion at this weaving segment and lane-drop from the I-35 southbound entrance ramp results in LOS F occurring at the four-lane segment of I-435 eastbound prior to the weave. Additionally, all intersections of the arterials within the I-435 area of influence operate at an acceptable LOS C or better.

Mainline operations on K-10 are generally acceptable during the AM peak hour in the westbound direction, with all segments operating at LOS D or better. Eastbound K-10 experiences significantly more congestion east of the K-7 interchange. A bottleneck occurs on eastbound K-10 between the Ridgeview Road exit and Woodland Road entrance ramp which causes LOS E and F for the segments from the Ridgeview Road exit to the northbound K-7 entrance ramp. The bottleneck and congestion results in queues that extend past the Woodland Road interchange toward K-7 with speeds dropping below 20 mph. All arterial intersections along the K-10 area of influence operate at an acceptable LOS C or better.

2023 Base Year PM Peak Period Summary

Freeway operations on I-435 are generally acceptable during the PM peak hour in both southbound/eastbound and westbound/northbound directions, with LOS D or better at all segments. However, congestion was observed to occur periodically on I-435 northbound between 95th Street and the K-10/CD Road entrance ramp as a result of the weaving of traffic merging onto I-435 as it reduces from a five-lane to three-lane section after the 95th Street exit. This segment of northbound I-435 operates at a density of 33.8 pc/mi/ln, under the 35 pc/mi/ln LOS E threshold during the peak hour. Additionally, the arterial intersections along the I-435 area of influence operate at an acceptable LOS C or better.

Mainline operations on K-10 are generally acceptable during the PM peak hour in the eastbound direction, with all segments operating at LOS D or better. Westbound K-10 experiences significantly more congestion between Ridgeview Road and I-435. On westbound K-10, LOS E occurs from the Ridgeview Road entrance ramp back to the Ridgeview Road exit ramp. The primary bottleneck occurs at the 2-lane section between Ridgeview Road and Renner Boulevard causing LOS F from this segment to the Lackman Road/CD Road ramp merge onto K-10. Queueing on westbound K-10 is observed along these segments extending beyond the Lackman/CD Road ramp toward I-435 mainline but does not impact I-435. Additionally, all arterial intersections along the K-10 area of influence operate at LOS C or better, with only one intersection operating at LOS D at westbound K-10 and Woodland Road. This intersection is a one-way-stop-controlled intersection with the westbound exiting traffic stopping to Woodland Road traffic which causes the worst movement delay of 33.1 seconds, under the 35 second LOS E threshold.

Future No-Build AM Peak Summary

Eastbound mainline operations on K-10 for the 2060 FNB AM peak hour are mostly projected to operate at an acceptable LOS. A small segment from E 2300 Road to Evening Star Road operates at LOS F. A segment near Woodland Road operates at LOS D. This K-10 eastbound segment operates slightly better than in the existing condition, but this is because of the extreme congestion on K-7 metering the traffic demand onto K-10. However, much of the westbound mainline is projected to be LOS D or worse. Areas of concern along the westbound mainline include Edgerton Road to Cedar Creek Parkway and K-7 to the I-435 interchange with several areas predicted to operate at LOS F.

The K-7 corridor is projected to operate at a LOS F on the northbound mainline from College Boulevard to Prairie Star Parkway and along the southbound mainline from I-435 to College Boulevard. LOS D was recorded along the southbound mainline through the K-10 interchange. All ramps at Prairie Star Parkway and College Boulevard are projected to operate at LOS F.

The northbound/westbound I-435 mainline is projected to operate at a LOS F from Quivira Road to the K-10 exit ramp. All other segments have acceptable LOS. The southbound/eastbound mainline is projected to operate at a LOS F from West 87th Street to the K-10 exit ramp and from Lackman Road to Quivira Road.

Northbound I-35 is projected to operate at a LOS F from West 119th Street to I-435. The southbound mainline is projected to operate at a LOS F from W 95th Street to the I-435 exit ramp. All other segments are projected to have acceptable LOS.

The I-435 intersections analyzed are all projected to operate at an acceptable LOS. However, most intersections along the K-10 corridor operate at a LOS F in the AM peak. No arterials were analyzed for I-35 in this study.

Future No-Build PM Peak Summary
More segments of K-10 in the 2060 FNB PM peak are projected to operate at a LOS F in both the eastbound and westbound directions. Areas of concern along the eastbound mainline were from Edgerton Road to Cedar Creek Parkway and from K-7 to Woodland Road. Areas of concern along the westbound mainline were from Edgerton Road to Lexington Avenue, from Cedar Creek Parkway to K-7, and from K-7 to I-435.

The K-7 southbound mainline is projected to operate at a LOS C or better service with the exception of a small segment of LOS F just north of Prairie Star Parkway. The northbound mainline is projected to operate at a LOS F from College Boulevard to Prairie Star Parkway. All ramp intersections at Prairie Star Parkway and College Boulevard are projected to operate at a LOS F.

The I-435 southbound/eastbound mainline service is mostly projected to be LOS C or better with the exception of a segment projected at LOS F from West 95th Street to West 87th Street. The northbound/westbound mainline is projected for the majority of the corridor to operate at LOS D or worse. LOS F is reported from the U.S. 69 entrance ramps to West 95th Street, and LOS D is reported from West 95th Street to West 87th Street.

I-35 northbound from West 119th Street to I-435 is projected to operate at a LOS F along with I-35 southbound from West 95th Street to the I-435 ramp. All other segments are projected to operate at acceptable LOS C or better.

1.2.5. Improve Infrastructure Condition

The K-10 Corridor in the study area is located on the edge of the Kansas City region in an area that is becoming more densely populated and heavily traveled. Growing congestion means safety, capacity, and reliability improvements will be needed to meet the needs of the corridor so the corridor can experience long-term sustainability. Because of the age of the existing infrastructure and projected traffic volumes, improvement of infrastructure condition is necessary. As part of this project, Infrastructure conditions, along with ongoing operations and maintenance will be addressed in alignment with environmental sustainability.

The existing alignment of the K-10 was constructed in sections starting from Lexington Avenue to K-7 in 1976, then from De Soto to Lawrence in 1978, and finally from K-7 to I-435 in 1980. Over the years, the original pavement has been overlaid several times throughout the sections of K-10 in an effort to keep the corridor in a serviceable condition. Routine maintenance will continue to be needed to keep the corridor in service, with reconstruction being necessary in the future.

As-built plans were analyzed to identify geometric design deficiencies for the study area and there was an emphasis on three major design aspects:

- Horizontal curve and superelevation combinations

- Vertical profile grades, curves, and clearances
- Acceleration, deceleration, and weaving lengths in areas of interchange ramps

A majority of the horizontal curve deficiencies that were identified result from comparison to AASHTO's 8 percent maximum superelevation tables. Vertical grade deficiencies fall into the category of exceeding minimum grade maximums or minimums, while the vertical curve deficiencies that were identified are related to stopping sight distance. Areas that were identified as having acceleration and deceleration length deficiencies were identified relative to the distance needed to transition from the posted K-10 to K-7 speed to the speed an entrance or exit curve meets per current design guidelines. Weave length deficiencies were identified by field observation of traffic movements and AAHSTO Greenbook recommended lengths. Overall, much of the K-10 geometric design and corresponding ramp geometry that was designed and constructed between 1970 and 1990 does not meet current minimum design criteria. Based on these results, a recommendation has been made to include geometric improvements to bring the geometrics in line with current criteria, especially for ramp improvements. In most locations, reconstruction would be required as well as the lengthening of many of the ramps in the project area.

Structures

On the K-10 Corridor within the study area, bridges are identified as open span or 10 feet (ft) to 20 ft structures. In total, there are currently 42 open span bridges and four 10 ft to 20 ft bridge structures. Open span bridges are made up of 30 mainline bridges, 6 ramp bridges, and 6 side road bridges. The lowest rating for all bridge types and structures identified on the K-10 Corridor was fair and no existing bridges or structures were considered to be in poor, serious, critical, or failed condition.

Of the 30 mainline bridges, 28 were built between 1974 and 1981, with the two remaining mainline bridges being built in 2016 as part of the Johnson County Gateway project. Structural evaluation of mainline bridges was completed in 2022, and 3 bridges were rated as fair, 9 were rated as satisfactory, 16 were rated as good, and 2 were rated as very good. Bridges within the K-10 Corridor have involved several heavy maintenance actions for all the bridges that were built between 1974 and 1981, aside from one bridge. The two mainline bridges that were constructed in 2016 have not undergone any major repairs to date. Age and structure type is anticipated to result in required frequent maintenance in the future for the mainline bridges to remain in service.

The six ramp bridges on the K-10 Corridor within the study area were built as a result of the Johnson County Gateway project in 2015 and 2016. No major repairs are currently identified for the ramp bridges. One of the ramp bridges is rated as good and the remaining ramp bridges are rated as very good. Five of the side road bridges were built between 1974 and 1993, with the remaining sideroad bridge being built in 2014 during the Johnson County Gateway project. Two of the bridges built in the late 1900s have undergone deck patching and overlays. One bridge is rated as fair, one is rated as satisfactory, one is rated as very good, and the remaining sideroad bridges are rated as good. The four 10 ft to 20 ft structures all serve as drainage structures, with one being built in 1981 and the rest being built in 1976. All four structures are rated as satisfactory.

Overall, of the 42 total open-span bridges on the K-10 Corridor, inventory ratings of HS (trucks with multiple axles) live load capacity have shown that 6 mainline and 1 sideroad bridges fall short of the 36-ton load capacity and 5 mainline and 3 sideroad bridges fall below the minimum vertical clearance of 16 feet and 4 inches. That being said, almost one-third of the open-span bridges on the K-10 corridor qualify for a replacement or rehabilitation in order to function in a serviceable condition. When considering the projected future congestion increases and safety concerns, the replacement and rehabilitation of those bridges will be necessary in order to accommodate those changes. The 14 bridges identified for replacement or rehabilitation based on falling short of the 36-ton live-load capacity and/or the minimum vertical clearance of 16 feet and 4 inches are listed below in **Table 1-3.**

Table 1-3: Bridges Identified for Replacement or Rehabilitation

Bridge ID	Bridge Location	Type of Bridge	Year Built	Reason for Bridge Replacement or Rehabilitation
180	Kill Creek Rd over K-10	Sideroad	1974	Below minimum vertical clearance
181	Local Rd (Corliss Rd) over K-10	Sideroad	1975	Below minimum vertical clearance and the live load capacity
186	WB K-10 over Cedar Creek Rd	Mainline	1974	Below minimum vertical clearance
189	WB K-10 over Cedar Creek Pkwy	Mainline	1974	Below minimum vertical clearance
190	EB K-10 over Cedar Creek Pkwy	Mainline	1974	Below minimum vertical clearance
192	NB K-7 over K-10	Mainline	1974	Below minimum vertical clearance
195	WB K-10 over Evening Star Rd	Mainline	1976	Below minimum vertical clearance and live load capacity
196	EB K-10 over Evening Star Rd	Mainline	1976	Below the live load capacity
197	WB K-10 over Edgerton Rd	Mainline	1976	Below the live load capacity
198	EB K-10 over Edgerton Rd	Mainline	1976	Below minimum vertical clearance and the live load capacity
236	WB K-10 over BNSF Railway & Mill Creek	Mainline	1980	Below live load capacity
237	EB K-10 over BNSF Railway & Mill Creek	Mainline	1980	Below the live load capacity
240	EB K-10 over Renner Boulevard	Mainline	1981	Below minimum vertical clearance
241	Prairie Star Parkway over K-7	Sideroad	1982	Below minimum vertical clearance

1.2.6. Provide Flexible Transportation Choices

A flexible transportation system is one that accommodates the needs of all users and modes. Typically, this includes walking, cycling, public transit and commercial trucks in addition to passenger automobiles. The Preferred Alternative for the K-10 Capacity Improvements Project should be consistent with planned and proposed multimodal uses within the study area. These planned and proposed multimodal uses are outlined in local and regional planning documents, including, but not limited to:

- *Connected KC 2050* – The plan calls for a range of transportation choices to be provided to communities. The plan states that if an increased range of transportation choices were provided to communities, travel for all would be easier and public health and environmental benefits could be provided.
- *City of Lenexa Comprehensive Plan* – Lenexa's comprehensive plan identifies the importance of mass transit and pedestrian and bicycle trails and the importance of continued future focus and development. One of the identified goals in the 2016 update that is anticipated to further Lenexa's reputation as a regional leader in infrastructure and transportation planning implementation is, "promote multi-modal transportation options, including pedestrian, bicycle, transit, and personal vehicles, in both public and private development.
- *City of Olathe Comprehensive Plan (PlanOlathe)* – Olathe's comprehensive plan states that in 2040, people will have multiple, convenient options to travel within Olathe and the region and that Olathe will be an innovative and collaborative leader in regional transportation. The plan lays out the necessary goals and steps for achieving a connected multimodal transportation system in 2040.
- *City of De Soto Comprehensive Plan* – De Soto's comprehensive plan identifies transportation objectives and implementation strategies. The 2019 update included a major goal that consisted of maintaining a safe and efficient transportation system that provides the necessary improvements to accommodate future traffic volumes, generate economic vitality, and provide connections for pedestrians and bicyclists. The plan does not outline detailed goals and steps for incorporating specific mass transit transportation modes.

The K-10 Corridor is served by one public transit agency, Johnson County Transit in the study area. While Johnson County Transit owns and operates the routes, they are branded as RideKC in a branding partnership with the Kansas City Area Transportation Authority. Johnson County Transit operates five routes (95th Street, K-10 Connector, Olathe Express, Shawnee Express, and Gardener-OP Express) within the study area that cross or utilize K-10 directly. The K-10 Connector is the only route that utilizes K-10 and runs along the inside and the outside of the study area from Lawrence, Kansas to Overland Park, Kansas. There are currently no bus stops within the study area on the K-10 Connector route. The construction of the Panasonic factory in De Soto has the ability to encourage the modification of existing bus routes or the potential development of new bus routes in order to serve the factory. In addition to bus routes, park and ride options could be encouraged as well. Increased development and traffic congestion within the K-10 Corridor can also play a role in the push for more flexible transportation choices to be provided.

A review of the existing bikeway and shared use paths took into consideration on-street bike lanes, sidewalks, and multi-use recreational trails. Within or adjacent to the study area, there are 14 trails, two are regional trails and the remaining 12 are local trails. All the trails within or adjacent to the study area are paved shared use paths, with most being ten-foot-wide. Additionally, there are eight roadways within the study area where bike routes currently exist. Of the 14 trails within the study area, none have bicycle facilities that are shared use with K-10 travel lanes, but there are trails that are shared use lanes that run parallel to and cross the highway's right-of-way (ROW) and serve an integral purpose as part of the region's transportation facilities.

Commercial trucks are a component of the traffic stream within the study area. The K-10 Corridor has regional significance in goods movement, connecting eastern Douglas County, Kansas and western Johnson County, Kansas to the Kansas City metro area. According to KDOT's 2021 state traffic counts for K-10, around five percent of the ADT is identified as being heavy vehicles, ranging from 1,450 heavy vehicles on the west end of the corridor to 4,175 heavy vehicles on the east end of the corridor per day.

1.2.7. Support Local and Regional Growth

A key purpose of the K-10 Corridor project is to accommodate local and regional growth through coordinated transportation improvements consistent with planned and proposed community land use. Regional land use and development patterns provide insight into a community's potential transportation needs. MARC growth trends project between now and 2050 population will grow by 39 percent and employment by 49 percent within Johnson County. As the region grows and future land development occurs in harmony with local and regional land use plans, it is anticipated that traffic volumes will increase across the K-10 Corridor.

Connected KC 2050 (2020)

Connected KC 2050, adopted in 2020, is the current Long Range Transportation Plan (LRTP) for the nine-county Kansas City metropolitan region and was developed by the Mid-America Regional Council (MARC). *Connected KC 2050* serves as the Kansas City metro's regional transportation plan and is a blueprint for managing the region's transportation system. According to MARC, "the plan identifies and sets out a budget for federal transportation funds that the metro area expects to receive over the next three decades." A goal of the plan is to "continue to facilitate integrated land use, transportation and environmental planning in areas with significant pedestrian activity and transit services." The plan also aims to anticipate both positive and negative impacts on land use. *Connected KC 2050* encompasses the entire study area.

City of Lenexa Comprehensive Plan (2013)

The *City of Lenexa Comprehensive Plan*, adopted in 2013, is the guide for the future growth and development for the City. Current efforts are underway to update this plan with adoption in Spring 2024. Segments of the study area discussed in the plan are on the north side of K-10 from the City of De Soto boundary in the west near the junction of K-10 and Cedar Creek Road and to the intersection of K-10 and Renner Road. The plan includes both the north and south segments of K-10 from the intersection of K-10 and Renner Road to the intersection of I-435 and K-10.

Future land uses in the study area include low density residential, suburban density residential, medium density residential, high density residential, public & open space, mixed use, neighborhood commercial center, community commercial center, regional commercial center, office/employment center, office/research & development, and business park. An additional plan mentioned in the *City of Lenexa Comprehensive Plan* that includes land in the study area is the *Lenexa Trails Alignment Analysis*.

Lenexa Trails Alignment Analysis (2009)

The *Lenexa Trail Alignment Analysis*, adopted in 2009, guides the City of Lenexa staff on trail planning and development. The analysis builds on the 2002 Bicycle and Pedestrian Study and illustrates existing and proposed trails within the study area in Lenexa. The plan provides proposed alignments of future and built trails in Lenexa near K-10. These trails include the K-10 Corridor Trail, the Mill Creek Streamway Trails, and the K-10 Corridor Trailhead at Renner.

City of Olathe Comprehensive Plan (PlanOlathe, 2021)

The *City of Olathe, KS Comprehensive Plan (PlanOlathe)*, was adopted in 2010 and updated in 2021. *PlanOlathe* is utilized by the City as a policy guide for future land use and development. The comprehensive plan covers information on greenways, corridors, centers, neighborhoods, districts, street hierarchy, transit routes and facilities, natural features, parks and trails, population density, growth in Olathe, zoning, existing land use, surrounding jurisdictions, schools, school districts, sanitary sewer service, water service, public facilities, cultural facilities, and ward boundaries. The comprehensive plan includes the south side of K-10 and the study area from Gardner Road in the west to Renner Boulevard in the east.

Additional studies completed by the City of Olathe that include portions of the K-10 Corridor study area are the *Woodland Road Corridor Plan (2004)* and the *K-7 Corridor Study and Design Guidelines (2002)*.

- ***Existing Land Use*** – The existing land use in the study area includes agriculture/vacant, single family residential, two family residential, commercial, hotel/motel, office, industrial, public/semi-public, park/open space, and ROW.
- ***Future Land Use (2016)*** – The Future Land Use Map was updated in 2016 under Ordinance No. 16-16. The goal of the Future Land Use Map was to illustrate the future growth of the City. Future growth areas include space for roads, transit, parks, utilities, and community facilities. Future land use area types in the Study Area include primary greenway, secondary greenway, employment areas, urban mixed-use centers, regional commercial centers, and conventional neighborhoods.

Woodland Road Corridor Plan (2004)

The Woodland Road Corridor Plan is the corridor plan for Woodland Road for the City of Olathe between Harold Street to the south, K-10 to the north, Lone Elm Road to the east, and Ridgeview Road to the west. The areas from the *Woodland Road Corridor Plan* in the study area are in the City of Olathe just south of the K-10 Corridor from Lone Elm Road to Ridgeview Road. The Woodland Road Corridor area was annexed by the City of Olathe in 1999.

- ***Existing Land Use*** – The majority of the corridor (61 percent) is classified as residential, and the second largest land use is agriculture at approximately 22 percent of the corridor area. Other existing land uses in the plan include public facilities, utility facilities, parks, and open space.
- ***Future Land Use (2006)*** – The plan consisted of two open houses to discuss the future and use of the area with the public. Residents stressed the need for public parkland in the area as well as tree preservation.

K-7 Corridor Study and Design Guidelines (2002)

The *K-7 Corridor Study and Design Guidelines* was the plan for the expansion of K-7 in the City of Olathe. The design guidelines limits are K-10 to the north, 127th Street to the south, Clare Road to the west, and Lone Elm Road to the east. The area of the study and guidelines within the study area are along K-7 from the interchange of K-7 and Prairie Star Parkway to the north to the interchange of K-7 and College Boulevard to the south.

- ***K-7 Corridor Future Land Use Map (2002)*** – The future land use map is part of the *K-7 Corridor Study and Design Guidelines.* Uses for parcels of land use within in the study area included on the future land use map uses include office, employment, research/development/flexible, parks/open space, and low density residential.

K-7 Corridor Management Plan Future Land Use Map (2006)

A K-7 Corridor Future Land Use Map is included in the *K-7 Corridor Management Plan* prepared by the City of Olathe and the City of Lenexa along with other partners. The parcels of Land within in the study area are classified as public, commercial, employment, and parks/open space.

Olathe 2040 Trails: Trails and Greenways Guiding Plan (2023)

The Olathe 2040 Trails: Trails and Greenways Guiding Plan (Olathe 2040 Trails), dated January 2023, is Olathe's trails and greenways plan that:

- Identifies the future trails network;
- Recommends trailheads, access points, and wayfinding throughout the trail network;
- Preserves greenways and provides guidance to allow access, maintain habitats, and mitigate impacts; and,
- Guides implementation of trails with policy recommendations, maintenance standards, and possible cost.

The Olathe 2040 Trails future land use map shows mixed uses, primary and secondary greenways, employment area, neighborhoods, and commercial land uses within the study area.

City of De Soto Comprehensive Plan (2007)

The City of De Soto Comprehensive Plan was adopted by the Planning Commission and the City Council in 2007 and updated in 2019 and 2021. The comprehensive plan is utilized by the City as the "foundation of the City's zoning code and all other land use policies and regulations within the City and its exterritorial planning area." The comprehensive plan includes the western most part of the study area in De Soto from the Douglas County line in the west to just west of where Cedar Creek Road crosses under K-10 in the east. This plan covers both the north and south sides of K-10.

- ***Plan Update (2021)*** – The comprehensive plan was updated in 2021. The plan update added information on infrastructure investments that occurred between 2007 and 2018 as well as identified strengths, weaknesses, opportunities, and threats for the City. Public participation was the main focus of the 2018 update. This included "meetings with the City's Comprehensive Plan Steering Committee and City Staff, a series of focus sessions, several one-on-one stakeholder interviews, and a citizen survey."
- ***Future Land Use Map (2019)*** – This map shows recommended future uses of land in De Soto. The uses in the study area include park & open space, public/ semi-public, agricultural, residential low density, residential medium density, multifamily, mixed use, commercial, light industrial, and heavy industrial.

Cedar Creek Area Plan (2012)

The Cedar Creek Area Plan was approved by the City of Olathe, Cedar Creek Development, the Cedar Creek Homes Association, and the Cedar Creek Future Land Use Committee in 2012. The area of the Plan is located south of K-10 between the City of De Soto and the City of Olathe from Waverly Road to the west and to K-7 in the east.

- ***Existing Land Use*** – *The Cedar Creek Area Plan* land uses within the study area include commercial & business, low density residential, medium density residential, and green & open space.

1.3. Planned and Committed System Improvements

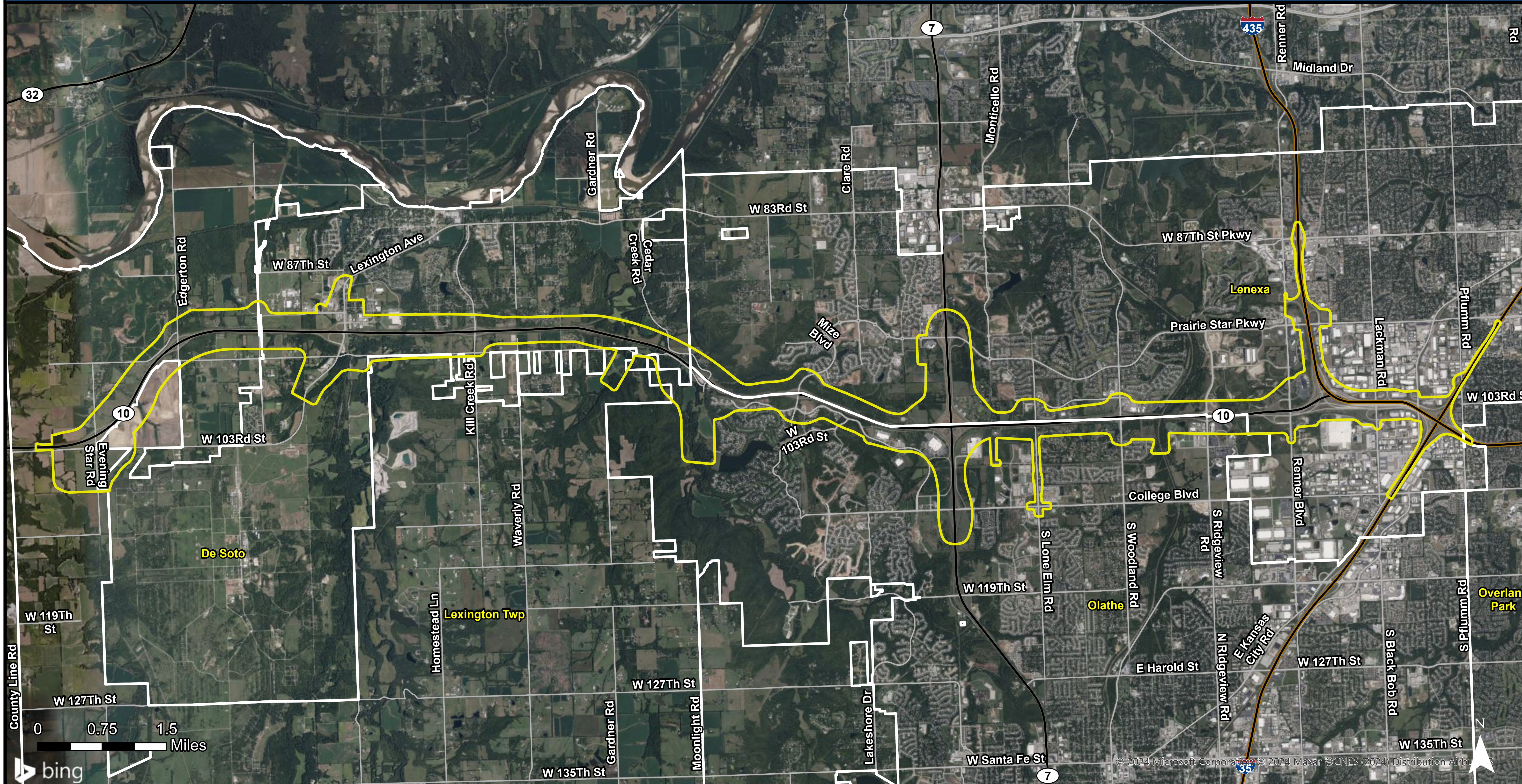
Several other projects are planned for the Johnson County area that need to be taken into consideration as the proposed improvements for the K-10 Corridor are developed. The projects include:

- Widening 95th Street from Renner Boulevard to Loiret Boulevard (Connected KC)
- Widening Woodland Road between K-10 and College Boulevard from two lanes to four lanes and adding turn lanes at each intersection (Connected KC)
- Add capacity to the interchange at the intersection of Cedar Creek Parkway and K-10 (Connected KC)
- New interchange at K-10 and Lone Elm Road (Connected KC)
- Improve the interchange at K-7 and Prairie Star Parkway with sidewalk and mixed-use trail, streetlights, and enclosed storm drainage (Connected KC)
- Add capacity to K-10 from the Douglas/Johnson County line to I-435 (Connected KC)
- K-10 Reconstruction (no added capacity, surfacing) from K-10/K-7 Junction east to I-435/K-10 Junction (Metro Area TIP)
- East-Bound Lexington Avenue Bridge Rehabilitation (Bridge #177) on K-10 (Metro Area TIP)
- West-Bound Lexington Avenue Bridge Rehabilitation (Bridge #176) on K-10 (Metro Area TIP)
- Westbound and eastbound bridges (Bridges #178 & #179) over Kill Creek on K-10, Bridge Rehabilitation (Metro Area TIP)
- K-7 improvements south of K-10 to Harold Road (Metro Area TIP)
- I-435 Guardrail Updates beginning at Junction K-10 to Midland Drive (Metro Area TIP)
- Local Road Improvements at various locations around the K-10/Lexington Avenue Interchange (Connected KC)
- New Interchange at K-10 and Moonlight Road/Prairie Star Parkway (Connected KC)
- Add capacity to K-10 and Woodland Road Interchange (Connected KC)

- New 4-Lane Roadway: Clare Road from Prairie Star Parkway to K-10
- Reconfiguration of the K-10/K-7 interchange as part of The Gateway Project (Connected KC)
- Widening Ridgeview Road to 6-Lanes between K-10 and College Boulevard (Connected KC)
- Widening Lackman Road from 101st Street to 105th Street (Connected KC)

Study Area

Figure 1-1



Legend

- Study Area
- City Boundary

K-10 Capacity Improvements

KDOT # 10-46 KA-6549-01

K10 CORRIDOR

Kansas Department of Transportation