

# K-10 Capacity Improvements

Alternatives Analysis Memo

April 2024



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# 1.0 Introduction and Background History

The purpose of this technical report is to describe the alternatives for screening, proposed screening criteria, and to document the results of the Initial (Tier 1) and Reasonable (Tier 2) screening process for the K-10 Capacity Improvements Project Environmental Assessment (EA).

## 1.1. 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 Geometric configurations are outdated and inadequate to support current demand and contribute to safety issues.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.

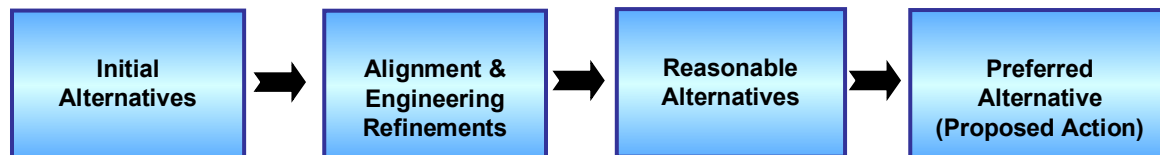
## 2.0 Overview of K-10 Alternatives Development Process

The alternatives development process entailed screening of the alternatives to determine which warrant further consideration for the project. The Initial Alternatives Screening, or Tier 1, was qualitative in nature as described later in this document. Under the Tier 1 screening, all Initial Alternatives were evaluated against the Purpose and Need criteria established for the project.

Based on the screening of the Initial Alternatives, the alternatives development process transitioned into a second round called Reasonable Alternative(s), or Tier 2 screening, as more than one alternative proved feasible and prudent to consider as the Preferred Alternative for the project. These Reasonable Alternatives were further evaluated quantitatively to determine their potential impacts in comparison to the No-Build Alternative and each other.

Through the screening of the Reasonable Alternatives a Preferred Alternative, or Proposed Action, was selected. This Preferred Alternative is the alternative that meets the Purpose and Need for the project while avoiding, minimizing, or mitigating impacts to both the natural and human environment, and considers engineering and costs, and public and stakeholder input. **Figure 2-1** illustrates the alternatives development process for the project.

**Figure 2-1: Alternatives Development Process**



The Preferred Alternative will be carried forward and evaluated alongside the No-Build alternative as part of the EA. The process of screening alternatives with an ascending level of detail assures decision-makers of the fulfillment of the improvement’s goals, while fostering informed consent with reviewing agencies, stakeholders, and the public.

## 3.0 Alternatives Development and Screening

### Alternatives Considered

As part of the environmental clearance process, a No-Build Alternative is used as a benchmark for comparison against the other improvement alternatives being evaluated. A total of six alternatives were considered. The range of potential alternatives include the following:

- No-Build
- Improvement of Alternate Routes
- Existing Capacity Management
- Multimodal
- Add Capacity – Traditional Widening
- Add Capacity – Express Toll Lanes

### 3.1. No-Build

As part of the environmental clearance process, a No-Build Alternative is used as a benchmark for comparison against other alternatives being evaluated to improve a project. The No-Build Alternative means that no roadway and/or bridge reconstruction or capacity improvements would be constructed on the K-10 corridor. This alternative will include ongoing maintenance of the K-10 corridor along with minor pavement and bridge rehabilitation and ongoing maintenance. This alternative also includes all future projects that are currently planned and already committed within the corridor's project area and noted in state, regional, and local transportation improvement plans through the 2060 design year of the project.

The following improvements are committed within the corridor:

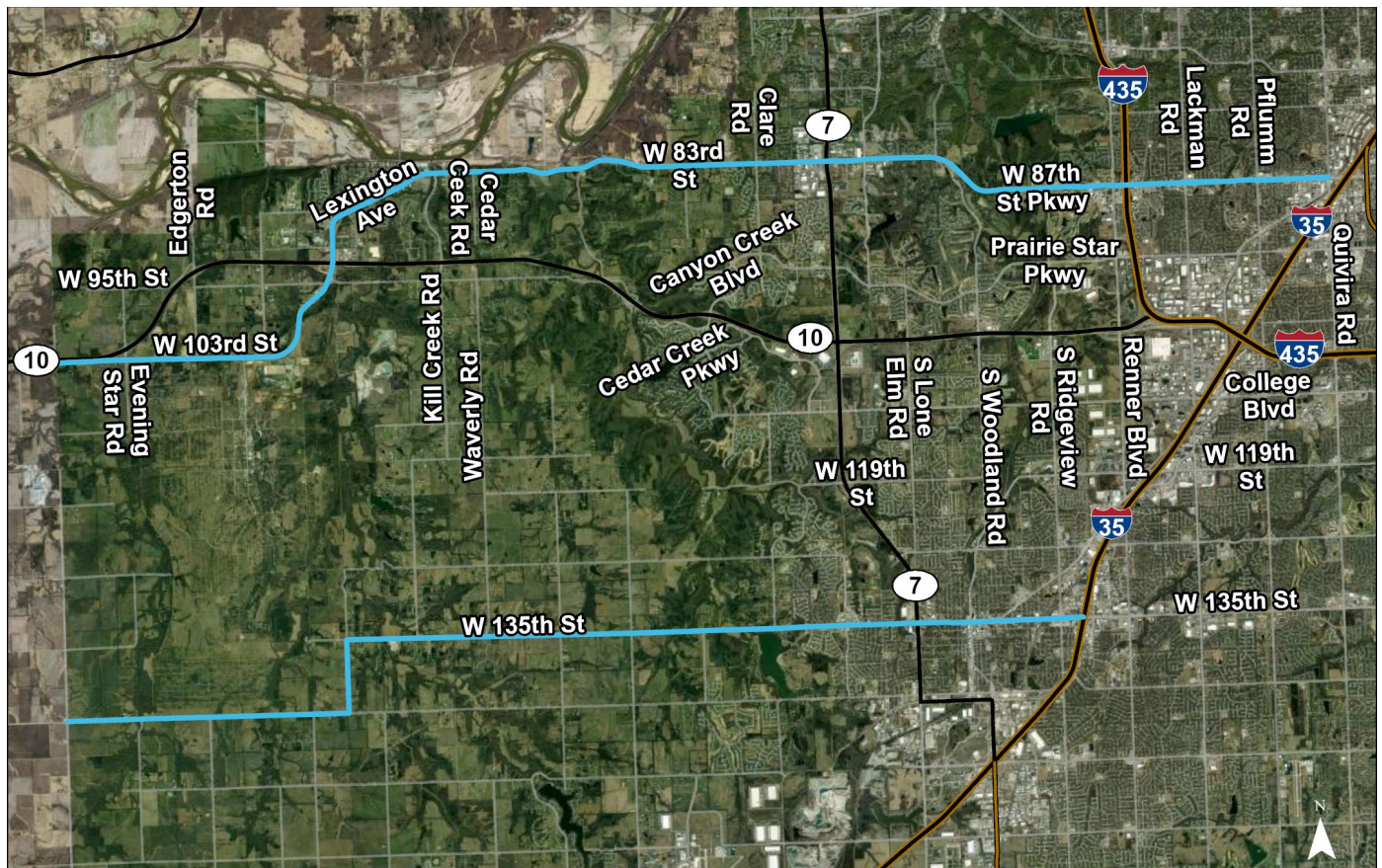
- Cedar Creek Bridge Rehabilitation (Bridge #185) on K-10 (Metro Area TIP)
- West-bound and east-bound bridges (Bridges #178 & #179) over Kill Creek on K-10, Bridge Rehabilitation (Metro Area TIP)
- K-7 improvements south of K-10 to Harold Road (Metro Area TIP)
- Local Road Improvement at various locations around the K-10/Lexington Avenue Interchange (Metro Area TIP)
- Lone Elm Road from K-10 to Prairie Star Parkway (Connected KC)
- Improve Prairie Star Parkway from Canyon Creek Boulevard to K-10 (Connected KC)
- Widening 95<sup>th</sup> Street from Renner Boulevard to Loiret Boulevard (Connected KC)
- Widening Woodland Road between K-10 and College Boulevard (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)
- Add capacity to K-10 from the Douglas/Johnson County line to I-435 (Connected KC)
- K-10 from the Douglas/Johnson County line to I-435 Discovery Phase (Metro Area TIP)
- Add capacity to K-10 and Woodland Road Interchange (Connected KC)
- New 4-Lane Roadway: Clare Road from Prairie Star Parkway to K-10 (Connected KC)

- Reconfiguration of the K-10/K-7 interchange as part of The Gateway Project (Connected KC)
- Widening Ridgeview Road between K-10 and College Boulevard (Connected KC)
- Widening Lackman Road from 101<sup>st</sup> Street to 105<sup>th</sup> Street (Connected KC)

### 3.2. Improvement of Alternate Routes

This alternative includes improvements to parallel and supporting arterial roadways on the local city or country roadway network such as W 87<sup>th</sup> Street, W 83<sup>rd</sup> Street, Lexington Avenue, and W 103<sup>rd</sup> Street or Santa Fe Street, W 135<sup>th</sup> Street, and W 143<sup>rd</sup> Street rather than directly improving K-10 as shown in **Figure 3-1**.

**Figure 3-1 – Improvement of Alternate Routes**



Strategies for improving alternate routes could include:

- Intersection improvements;
- Upgrading and coordinating traffic signals;
- Building additional travel lanes;

- Transit improvements such as new bus routes, more frequent routes, or bus rapid transit; or
- Enhanced traveler information and other technology improvements to better manage traffic flow and safety.

In order to make these types of improvements to alternate routes, local (city or county) or area transit agency funding and programming commitments would be required.

### 3.3. Existing Capacity Management

This alternative evaluates strategies to better manage the capacity of the existing lanes and access points on the K-10 corridor. These strategies include low-cost ways to improve traffic operations and safety of the existing roadway to increase traveler mobility, improve safety, and reduce traffic bottlenecks.

These types of strategies fall into two key categories:

- Travel Demand Management (TDM) Strategies – Strategies that manage the travel demand along the corridor such as ridesharing, staggering work shifts, alternative work hours, and telecommuting by working from home.
- Transportation Systems Management (TSM) Strategies – Strategies that manage traffic operations and safety through the use of technology or enhanced traveler information. This includes:
  - KC Scout type traveler information on travel times, incidents, or delays;
  - Traffic signal coordination and modernization;
  - Roadway signage improvements;
  - Ramp metering through traffic signals on ramps that help regulate the flow of vehicles entering the corridor from local interchanges; and
  - Queue warning systems that alert motorists of approach slowdowns or traffic backups ahead on the roadway.

### 3.4. Multimodal

This alternative considers strategies to improve travel for all modes of transportation, rather than just passenger vehicles. This includes addition of or improvements to bicycle and pedestrian facilities and trails parallel to or crossing K-10, as well as transit service enhancements including intercity bus services, fixed route transit, on-demand, demand-response or Paratransit services, micro transit, and rail to improve corridor throughput.



Bicycle and Pedestrian improvements could include:

- Improving trails located parallel to or crossing the corridor;
- Adding sidewalks or designated bicycle and pedestrian areas to corridor bridge crossings in urban areas; and
- Other bicycle and pedestrian improvement strategies identified in state, regional, and local plans including the following:
  - The K-10 Transportation Study indicated that, due to safety concerns, additional bicycle/pedestrian trails around K-10 would not be accepted without sufficient amount of ROW around the corridor. If additional ROW was purchased, a trail system could be constructed along K-10. The proposed trail would need to be separated by fencing or some other physical barrier to promote safety for pedestrians and bicyclists.
  - Recommended bicycle and pedestrian-ways improvements from the De Soto 2021 Comprehensive Plan include the addition of sidewalks along all roads within the city and the creation of local and regional trails to support driverless families/individuals and promote more healthy and active lifestyles within the community. Some specific recommendations include sidewalks installed from apartments adjacent to the K-10 corridor to Harps, install new and connect existing trails along rivers and creeks, and to expand current bike routes and trails.
  - Recommended bicycle and pedestrian-ways improvements from the City of Lenexa Parks, Recreation, and Open Space Comprehensive Plan include the expansion of the bikeways and trails to better connect the various parks, commercial, and residential areas, development of major and minor trailheads, and the development of trail design and maintenance standards.
  - The Plan Olathe Comprehensive Plan includes a system of interconnected trails that connects people to neighborhoods, services, and adjacent regional trails.

### *Transit Options Analysis*

A standalone evaluation of transit alternatives was completed for this study, the full results can be found in **Appendix A**. The evaluation considered strategies to improve and expand transit service within the study area. This included transit service enhancements to improve corridor throughput. The evaluation included a detailed analysis of existing transit conditions and providers, a needs assessment, and a two-tiered evaluation of potential solutions. An evaluation was completed for seven transit alternatives:

- Microtransit
- Addition of a new interregional bus line (Manhattan – KCMO Interregional Line)
- K-10 Connector Improvements
- Private Shuttle Service
- Vanpool Service
- Passenger Rail
- Redesign the K-10 Connector into an Interregional Line

### 3.5. Add Capacity – Traditional Widening

This alternative considers the reconstruction of pavement and bridges along the corridor and constructing an additional general-purpose lane in each direction of travel. The alternative also incorporates additional capacity to improve connections to and from interchange ramps along the corridor, such as auxiliary lanes, which provide a continuous lane of travel between closely spaced interchange entrance ramps and exit ramps.

Geometric and condition improvements include:

- Add an additional travel lane in each direction;
- Reconfigure portions of interchange at K-10 and K-7;
- Reconfigure portions of interchange at K-10 and I-435;
- Reconfigure portions of interchange at I-435 and I-35;
- Reconfigure the interchange at K-7 and Prairie Star Parkway;
- Reconfigure the interchange at Lackman Road and I-435.
- Reconfigure interchanges along K-10 at Evening Star Road, Lexington Avenue, Woodland Road, and Renner Road;
- Additional interchange at Lone Elm Road;
- Improvements to local interchanges and supporting cross streets; and,
- Reconstruction of existing pavement and bridges.

If this alternative is selected, improvements likely would be constructed in phases. Decisions on phasing would be based on funding availability and when traffic congestion and safety needs warrant the improvements along the corridor. For this analysis, the full buildout of the alternative prior to the project design year is considered when rating against the screening criteria.

### 3.6. Add Capacity – Express Toll Lanes

This alternative includes adding an additional lane in each direction of travel that would provide express toll service along the corridor by managing congestion in the lanes through pricing, vehicle eligibility, and access strategies. This alternative also includes reconstruction of bridges and pavement in the corridor.

Geometric and condition improvements include:

- Add an additional travel lane in each direction for express toll lane service;
- Reconfigure portions of interchange at K-10 and K-7;
- Reconfigure portions of interchange at K-10 and I-435;
- Reconfigure portions of interchange at I-435 and I-35;
- Reconfigure the interchange at K-7 and Prairie Star Parkway;
- Reconfigure the interchange at Lackman Road and I-435.
- Reconfigure interchanges along K-10 at Evening Star Road, Lexington Avenue, Woodland Road, and Renner Road;
- Additional interchange at Lone Elm Road;
- Improvements to local interchanges and supporting cross streets; and,
- Reconstruction of existing pavement and bridges.

If this alternative is selected, improvements likely would be constructed in phases. Decisions on phasing would be based on funding availability and when traffic congestion and safety needs warrant the improvements along the corridor. For this analysis, the full buildout of the alternative prior to the project design year is considered when rating against the screening criteria.

## 4.0 Screening Criteria

Screening Criteria were developed across four broad categories covering various aspects of the project and community input.

### **Screening Criteria Categories:**

- Project Purpose and Need
- Natural and Human Environment (Tier 2 Screening Only)
- Engineering and Cost (Tier 2 Screening Only)
- Public and Stakeholder Input (Tier 2 Screening Only)

Each broad category contains several criteria, discussed below. Ratings for each alternative are summarized in a Screening Matrix.

#### 4.1. Purpose and Need Screening Criteria

The Purpose and Need for the project is defined as follows:

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.

The screening criteria to evaluate meeting the Purpose and Need are defined as:

- **Enhance Safety Performance** – This group of screening criteria evaluates the extent to which each alternative addresses crash frequency and congestion-related crashes.
  - **Change in Congestion-Related Crashes** – This screening criteria evaluates the extent to which an alternative potentially reduces the number and severity of congestion-related crashes, such as rear-end, sideswipe and sudden changes in speed.
  - **Improve Bicycle and Pedestrian Safety Along Crossroads** – This screening criteria evaluates the extent to which an alternative improves safety for bicycles and pedestrians along crossings over or under K-10.
- **Improve Traffic Operations** – This group of screening criteria evaluates the extent to which each alternative improves traffic operations to meet existing and future travel demands.

- **Change in Travel Level of Service on K-10** – This screening measure is rated using LOS reporting, with a scale encompassing LOS A (best) through LOS F (worst). This measure evaluates the change in LOS along the corridor over existing and future No-Build conditions.
- **Change in Travel Speed** – This measure evaluates the change in travel speed along the corridor over existing and future No-Build conditions.
- **Improve Infrastructure Condition** - This group of screening criteria evaluates the extent to which each alternative addresses infrastructure condition and ongoing operations and maintenance needs, supporting environmental stewardship, as well as improving long-term traveler reliability.
  - **Change in Roadway and Bridge Condition** – This measure is a high-level indicator of an alternative’s ability to address existing roadway and bridge infrastructure condition deficiencies.
  - **Support Environmental Sustainability** – This measure evaluates the alternative’s ability to support environmental stewardship best management practices.
- **Provide Flexible Transportation Choices** – This group of screening criteria evaluates the extent to which the alternative provides flexible choices for all users and modes.
  - **Access and Connectivity to Bicycle and Pedestrian Facilities** – This measure evaluates each alternative’s ability to maintain or improve access and connectivity of bicycle and pedestrian facilities along and across the corridor. This factor is not evaluating a bicycle and pedestrian facility on the K-10 travel lanes or shoulder.
  - **Reliability for Transit Riders** – This measure evaluates each alternative’s ability to provide a reliable transit experience for users through the corridor.
- **Support Local and Regional Growth** – This group of screening criteria evaluates the extent to which an alternative accommodates planned population, land use, and other growth and development in the study area and the Kansas City region.
  - **Compatibility with Local Planning** – This measure evaluates an alternative’s compatibility and consistency with city and county planning and land use goals for future growth and development.
  - **Compatibility with Regional Planning** – This measure evaluates an alternative’s compatibility and consistency with regional Metropolitan Planning Organization (MPO), MARC, planning and land use goals for future growth and development.

## 4.2. Natural and Human Environment Screening Criteria

All initial alternatives are evaluated against the Purpose and Need criteria for the project. Only those alternatives that satisfy the Purpose and Need criteria are then carried through for qualitative analysis as Reasonable Alternatives against Natural and Human Environment criteria, Engineering and Cost criteria, and Public Stakeholder Input criteria.

The natural environmental impacts are related to physical features of the landscape. The human environmental impacts include any community, neighborhood, environmental justice, and business resources that may be affected by the proposed project alternatives.

- **Park and Recreational Impacts** – This measure includes the number and extent of parks or designated recreational areas impacted by each alternative.
- **Community Facility Impacts** – This measure includes the number of community facilities impacted by each alternative.
- **Environmental Justice Impacts** – This measure considers direct and indirect impacts to identified environmental justice (EJ) populations, including low-income and minority populations. Direct impacts include factors such as relocations as related to needed right-of-way or potential funding mechanisms. Indirect impacts are any indirect or cumulative impacts to EJ populations.
- **Natural Resource Impacts** – This measure assesses impacts to natural resources including wetlands, streams, floodplains (100-year floodplain and floodway), critical habitat, and threatened and endangered (T&E) species.
- **Hazardous Material Impacts** – This screening measure includes a relative rating based on the number of hazardous materials and contaminated sites potentially impacted by each alternative.
- **Cultural and Historical Site Impacts** – This screening measure indicates impacts to archeological, cultural, and historic sites including those listed or eligible for listing on the state or national register of historic places.
- **Air Quality, Emissions, and Energy Impacts** – This screening measure indicates an alternative's potential impact on local and regional air quality, greenhouse gas emissions, and energy resources.
- **Indirect and Cumulative Impacts** – This screening measure indicates positive, neutral, or negative indirect and combined impacts from any environmental criteria.

### 4.3. Engineering and Cost Screening Criteria

The study team is evaluating each alternative for potential engineering and cost considerations including roadway and interchange geometrics, right-of-way and displacement impacts, project construction timeline, phasing, maintenance of traffic and constructability, as well as the ability to address project costs and funding needs. Like the Natural and Human Environment criteria, only Initial Alternatives that satisfy the Purpose and Need criteria are evaluated qualitatively against the Engineering and Cost criteria.

- **Roadway and Interchange Geometrics** – This is a high-level assessment of the alternative’s ability to improve roadway and interchange geometric deficiencies, such as horizontal and vertical curves, weaving and merging distances, and turning radii.
- **Right-of-Way Impacts** – This is a high-level assessment of right-of-way needs from private property for each alternative. A more comprehensive, quantifiable assessment will be made as the study progresses.
- **Residential or Business Displacements** – This is a high-level assessment of potential displacements to residences and/or businesses for each alternative. A more comprehensive, quantifiable assessment will be made as the study progresses.
- **Timing of Construction** – This criterion is a high-level assessment to determine which alternative(s) can be advanced through the project development pipeline and constructed under the fastest timeline.
- **Ease of Project Phasing, Maintenance of Traffic, and Constructability** – This high-level measure is intended to determine the ease or complexity of project phasing, staging and anticipated road closures during construction.
- **Estimated Construction Costs** – This screening measure evaluates the relative level of anticipated construction costs for implementing each alternative.
- **Estimated Life-Cycle Costs** – This screening measure evaluates the anticipated costs of operating and maintaining each alternative over its expected life cycle.

### 4.4. Public and Stakeholder Input Screening Criteria

The project team is evaluating each alternative based on public and stakeholder input received on the alternatives. This input is being provided through numerous sources and includes a broad cross section of interested stakeholders and the general public. Input received from public and stakeholder activities, such as stakeholder interviews and presentations, Advisory Group meetings, public information meetings, statistically valid community surveys, community focus group sessions, and social media outreach

is incorporated into the screening process for the alternatives using public comment tools on the website, at meetings, and through social media channels to document public and stakeholder feedback on the project.

- **Public and Stakeholder Input** - screening measure indicates positive, neutral, or negative reactions from stakeholders and the public on each alternative and is captured via the project team’s public and stakeholder outreach activities.

#### 4.5. Screening Rating System

The initial range of alternatives are rated qualitatively using a Harvey balls/ideograms rating system (**Figure 4-1**). Where applicable, quantifiable data on the criteria is included in the environmental consequences and impact analysis for the EA for the No-Build and any proposed actions being carried forward from the initial screening of alternatives as Reasonable Alternatives (Tier 2 screening).

Each symbol relates to the extent of achieving a Purpose and Need goal or the level of potential impacts. Criteria for Tier 1 screening are classified as impact related or achievement related. Achievement related criteria evaluate items related to project Purpose and Need goals and impact related criteria evaluate items related to environmental or cost impacts of an alternative.

Alternatives have been compared against the No-Build Alternative and each other for each criterion. Differences or similarities in ratings indicate differences or similarities between the alternatives at achieving the criteria.

**Figure 4-1: Harvey Balls/Ideograms Rating System**



- **High Impact/No or Low Achievement** – This rating denotes that achievement-based criteria and goals are not met (or very negligible), or there are high environmental or engineering/cost impacts.



- **Substantial Impact/Slight Achievement** – This rating indicates some success at addressing achievement-based criteria and goals, or there are substantial environmental and engineering/cost criteria related impacts.
- **Moderate Impact/Moderate Achievement** – This rating indicates a mid-level of success at addressing achievement-based criteria and goals, or there are some environmental and engineering/cost criteria related impacts.
- **Slight Impact/Substantial Achievement** – This rating indicates increasing success at addressing achievement-based criteria and goals, or lower levels of environmental or engineering/cost related impacts. Achievement based criteria might be met under this rating, however an alternative could be rated as substantial achievement if another alternative exceeds it at addressing the criteria.
- **No or Low Impact/High Achievement** – This rating indicates the highest level of success at meeting achievement-based criteria and goals. Achievement-based criteria are fully met under this rating. This rating can also indicate that there are approximately zero or very low impacts for environmental and engineering/cost criteria.

## 5.0 Screening of Initial Alternatives

In November 2023 the Purpose and Need Statement for the project was shared with Agencies and Native Tribes identified as Participating Agencies as part of the EA. They were asked to review, comment and provide concurrence if desired. Participating Agencies providing a response, included:

- U.S. Environmental Protection Agency (USEPA)
- Kansas Department of Health and Environment (KDHE)
- Kansas Water Office
- City of Lenexa
- Osage Nation of Oklahoma
- Mid America Regional Council

The Initial Alternatives Screening of all alternatives is based upon the Purpose and Need and the screening criteria established as a result. Please see **Appendix B** for the full Initial Alternatives Screening Matrix.

## 5.1. Purpose and Need Screening

The Purpose and Need Screening considered all Initial Alternatives for the project. Each alternative was evaluated across several criteria under each component of the Purpose and Need.

**Enhance Safety Performance** – Adding new lanes of travel capacity through either traditional widening or adding express toll lanes (ETL) have the most potential to improve the safety of the corridor as it will address crashes caused by stop and go traffic and includes improvements to roadway, ramp, and interchange geometrics along the corridor.

**Improve Traffic Operations** – The additional capacity alternatives have the highest potential rating for improving traffic operations as they would add additional lanes to reduce congestion and delay within the corridor.

**Improve Infrastructure Condition** – Adding additional capacity through traditional widening and express toll lanes both have the highest rating to improve the infrastructure condition. Traditional widening and express toll lanes would impact long-term travel reliability and life-cycle costs through additional capacity in the corridor to accommodate larger traffic volumes.

**Provide Flexible Transportation Choices** – The Multimodal Alternative offers improved access to transit, bicycle, and pedestrian connections in the study area, which provides additional traveler flexibility and mode choice. Additionally, both additional capacity alternatives offer lane management strategies that are flexible and adaptable to changing corridor conditions.

**Support Local and Regional Growth** – The alternatives that add new lanes of capacity in addition to the existing capacity management were evaluated to best align with the various city and the region’s anticipated growth strategies. These alternatives are incorporated into the planned and committed transportation improvements within state, regional and local planning documents to help accommodate future growth plans. The other alternatives were evaluated to moderately align with future growth strategies as they provide improved multimodal connections and enhanced traveler information technologies and demand management strategies that are included in local and regional goals and area plans.

## 5.2. Initial Alternatives Dismissed from Further Considerations

Through the Purpose and Need Screening several alternatives did not meet the Purpose and Need of the project. The Improvement of Alternate Routes, Existing Capacity Management and Multimodal alternatives as stand-alone alternatives do not satisfy the Purpose and Need for the project. Components of those alternatives may ultimately be incorporated as part of the Preferred Alternative, if appropriate and coordinated with city, county, region, and transit agency plans and commitments.

**Improvement of Alternate Routes** – This Initial Alternative was eliminated from consideration as a stand-alone alternative due to its low achievement at improving safety performance and infrastructure condition, connectivity to bicycle and pedestrian facilities, and reliability for transit riders. In addition, it did not have a high rating in being compatible with local planning.

**Existing Capacity Management** – This Initial Alternative was eliminated from consideration as a stand-alone alternative due to its low achievement at reducing congestion and improving infrastructure condition issues along the K-10 corridor. This alternative also performs poorly when compared to other Initial Alternatives at providing flexible choices.

**Multimodal** – This Initial Alternative was eliminated from consideration as a stand-alone alternative due to its low achievement at reducing congestion and improving traffic operations along the K-10 corridor. The alternative has moderate, even substantial achievement at reaching the project’s goals of providing flexible choices and some aspects of supporting local and regional growth. A full consideration of transit specific alternatives considered and their viability can be found in **Appendix A**. Although this alternative is eliminated from consideration as a stand-alone solution due to the above reasons, individual elements may be incorporated into the Preferred Alternative.

### 5.3. Initial Alternatives Retained for Further Development

The two “Add Capacity” alternatives, as well as the No-Build Alternative to continue to serve as a baseline, were retained from the Initial Alternatives Screening for further development and screening as Reasonable Alternatives. These alternatives have been shown to satisfy the Purpose and Need of the project. No alternative was shown to score well across all screening criteria.

**No-Build Alternative** – As previously described, the No-Build Alternative makes no capacity improvements to the K-10 corridor other than those directly related to on-going maintenance and/or rehabilitation of the facility or those already committed or programmed by local, state, or regional funding programs. This alternative fails to meet several components of the Purpose and Need for the project. This alternative, however, is retained throughout the NEPA process and its potential impacts are utilized as a basis of comparison to the Build Alternatives.

**Traditional Widening Alternative** – This alternative was carried forward for analysis as a Reasonable Alternative due to its ability to meet all elements of the Purpose and Need criteria, most at a high level. This alternative is anticipated to enhance safety and reduce congestion along the K-10 corridor while promoting sustainability and accommodating local and regional growth. The Traditional Widening Alternative is expected to manage congestion and offer long-term corridor travel reliability while maintaining a smaller footprint and lower construction costs than the ETL Alternative. Impacts to the Natural and Human Environment as well as Engineering and Cost

related criteria will be quantified for this alternative as part of the Reasonable Alternatives Analysis.

**Express Toll Lanes (ETL) Alternative** – The ETL Alternative was carried forward for analysis as a Reasonable Alternative due to its ability to meet the Purpose and Need criteria established for the project. This alternative is anticipated to enhance safety and reduce congestion along the K-10 corridor, while promoting sustainability, providing flexible choices, and supporting local and regional growth. The ETL Alternative is expected to manage congestion and offer long-term corridor travel reliability with a slightly larger overall footprint and, therefore, higher construction costs than the Traditional Widening Alternative. Impacts to the Natural and Human Environment as well as Engineering and Cost related criteria will be quantified for this alternative as part of the Reasonable Alternatives Analysis.

Based on the Tier 1 screening, both the Traditional Widening and ETL Alternatives merit additional analysis. However, the ETL alternative cannot advance as a viable alternative without the consent of the community, and approvals by the KTA Board, and State Finance Council as required by Kansas Statute KSA 68,20-120. If the necessary consent and approvals are not secured, the ETL Alternative will be dismissed.

## 6.0 Reasonable Alternatives

As described in Section 5.3, three alternatives were carried forward for additional detailed development and analysis as Reasonable Alternatives. These alternatives are the No-Build Alternative, Traditional Widening Alternative, and the ETL Alternative. The two Build Alternatives were carried forward for their ability to satisfy the Purpose and Need of the project. Figures depicting the configurations of the Traditional Widening and ETL Alternatives can be found in **Appendix D** and **Appendix E**, respectively. Although the No-Build Alternative does not satisfy the Purpose and Need screening criteria, it is considered a benchmark for comparison against the Build Alternatives.

## 7.0 Reasonable Alternatives Screening

The Reasonable Alternatives were screened against additional screening criteria in a similar fashion as the Initial Alternatives utilizing the Harvey Balls rating system. A detailed quantifiable analysis was done for select environmental and engineering criteria.

### Screening Criteria Categories:

- Project Purpose and Need
- Natural and Human Environment
- Engineering and Cost
- Public and Stakeholder Input

The Traditional Widening and ETL Alternatives were evaluated for engineering, traffic, safety, and environmental impact analysis. A full screening matrix for the Reasonable Alternatives Screening can be found in **Appendix C**. The following details the analysis and results.

### 7.1. Purpose and Need Screening

The ratings for the Purpose and Need Screening from the Initial Alternatives Screening were carried forward to be utilized as the Reasonable Alternatives Screening. This is a recognition that the ability of the alternatives to satisfy the Purpose and Need has remained unchanged.

### 7.2. Natural and Human Environment Screening

The Natural and Human Environment Screening of the Reasonable Alternatives was conducted using quantifiable data where appropriate. Generally, the Traditional Widening Alternative has a smaller right-of-way and impact footprint than the ETL therefore, fewer impacts are seen to environmental features or community facilities and resources. The No-Build Alternative generally has more favorable ratings since it is a “no action” strategy and does not cause physical impacts to the natural and manmade environment.

**Parks and Recreational Areas and Community Facilities** – There are anticipated to be minor impacts from each alternative to adjacent recreational trail connections and bike lanes as well as parks. Both alternatives would impact approximately 0.18 acres of parks, 3,643 feet of bike lanes, and 12,856 feet of recreational trails. It is anticipated that all impacts to parks and recreational trails would be able to be mitigated and replaced in-kind to restore access. There are properties containing two community facilities located within the construction limits of both alternatives that would be impacted, these include a church and school. Impacts are related to grading and construction activities and would not impact the functional use of either resource.

**Environmental Justice** – EJ areas include areas along the corridor at the Block Group level that meet state, regional, county, and city level thresholds for designated low-income or minority populations. The EJ analysis also includes low-income and minority populations that use K-10 to access jobs and other major activity centers from throughout the Kansas City region. For both alternatives, direct property impacts are anticipated to be minor, with the exception of potential relocations. Both alternatives are anticipated to displace four residential properties. All four properties are located within a low-income and minority Block Group.

**Noise** – The ETL Alternative has a wider right-of-way footprint than the Traditional Widening Alternative, shifting traffic closer to sensitive noise receptors such as residences, schools, churches, and other community facilities. A noise analysis was not completed for this Tier 2 Screening. Upon selection of the Preferred Alternative, KDOT will complete a noise study to evaluate if any areas of the corridor qualify for noise

abatement measures based on being reasonable and feasible. A general assessment of potential receptors was conducted and determined similar impacts from both alternatives.

**Natural Environment** – This category evaluates potential impacts to water resources such as wetlands, streams, and floodplains, as well as critical plant and animal habitat and designated Threatened and Endangered Species. There will be some impacts under both alternatives to habitat, streams, wetlands, and floodplains crossing the corridor, however, these impacts are not expected to be substantial and will be mitigated. These impacts are the same or less under the Traditional Widening Alternative than the ETL. There are anticipated to be no impacts to ponds within the corridor under either alternative.

Approximately 8.96 acres of wetlands are anticipated to be impacted as a result of the Traditional Widening Alternative and approximately 9.26 acres of wetlands as a result of the ETL Alternative. Additionally, the Traditional Widening Alternative will impact approximately 18,195 feet of streams, and 19.38 acres of floodway and 100-year floodplains; the ETL Alternative will have a slightly higher impact with over 18,850 feet of streams and 20.15 acres of Floodway and 100-year Floodplains anticipated to be impacted. The project team will obtain all necessary permits and use best management practices for construction and ongoing maintenance to provide for long-term corridor resiliency and environmental stewardship.

**Hazardous Materials** – Both the Traditional Widening and ETL Alternative are anticipated to have similar impacts to locations with identified hazardous materials. Both alternatives are shown to impact two previous underground storage tank (UST) locations. Both sites are considered closed according to the KDHE. Any impacts are expected to be minor in nature and remediation will be completed as necessary.

**Cultural and Historic Sites** – Impacts to cultural and historic sites are not known at this time, however both the Traditional Widening and ETL Alternative would have similar impacts due to similar footprints. Review of the Kansas Historic Resources Inventory does not show any listed properties along the K-10 Corridor. KDOT is currently working with the SHPO to determine if there are any potentially eligible sites that have not previously been identified. If any sites are identified the preferred alternative will be evaluated for impacts. If impacts or potential impacts are identified, coordination will be conducted with the SHPO.

**Air Quality, Emissions, and Energy Impacts** – Both build alternatives alleviate stop and go traffic congestion along the corridor to varying degrees, and therefore will have positive impacts on the region's air quality, as well as a reduction in greenhouse gas emissions.

**Indirect and Cumulative Impacts** – Both build alternatives are expected to have indirect and cumulative impacts from their construction and operation. The ETL Alternative, having a larger footprint, is expected to have slightly greater indirect and

cumulative impacts than the Traditional Widening Alternative. Additionally, the ETL Alternative will have impacts from the tolling component of the managed travel lane and its influence on Kansas City regional travelers accessing K-10.

### 7.3. Engineering and Cost Screening

The Traditional Widening and ETL Alternatives were evaluated against the Engineering and Cost Criteria. The No-Build Alternative was also carried forward as a benchmark for comparison.

Generally, the Traditional Widening Alternative has a smaller right-of-way footprint than the ETL Alternative, therefore fewer impacts are expected to engineering and cost factors such as right-of-way displacements.

**Roadway and Interchange Geometrics** – Both build alternatives would address current roadway, ramp, and interchange deficiencies.

**Right-of-Way Impacts and Residential or Business Displacements** – The smaller footprint of the Traditional Widening Alternative requires 0.05 acres less of additional right-of-way than the ETL Alternative. Both alternatives will require four residential property displacements and would impact the property of three additional residences. There would be no business displacements, however, multiple businesses would be indirectly impacted due to construction of either alternative. Two community facilities (a church and a school) will have property impacts due to construction requiring additional right-of-way.

**Ease of Phasing, Maintenance of Traffic, and Constructability** – The ETL Alternative requires fewer construction phases than the Traditional Widening Alternative, which has a positive impact on the traveling public. This is due to the need to construct larger portions of the corridor at once to create a viable toll lane system. The Traditional Widening can be phased in smaller pieces as congestion worsens along the corridor. Due to this the Traditional Widening was rated higher for its ability to be phased in a way that better meets the needs of the corridor.

**Construction Cost** – The Traditional Widening Alternative is expected to cost \$40 million (in 2023 dollars) less to build than the ETL Alternative because it requires a smaller footprint.

**Life-Cycle Costs** – The Traditional Widening Alternative is anticipated to have lower life-cycle costs than the ETL Alternative as the ETL requires additional life-cycle costs for toll related infrastructure including wider pavement to accommodate the buffer between ETL and general purpose lanes and additional infrastructure for direct connect ramps at I-435. This additional infrastructure would need to be maintained over the life of the facility and, therefore, contribute to increased lifecycle costs. All other life-cycle costs are expected to be the same for both facilities.

## 7.4. Public and Stakeholder Screening

Input received from public and stakeholder activities such as stakeholder interviews and presentations, Advisory Group meetings, public information meetings, community surveys, community focus groups, and social media outreach is incorporated into the screening process for the alternatives using public comment tools on the website, at meetings and through social media channels to document public and stakeholder feedback on the project. The Traditional Widening Alternative has received more positive feedback from the public and stakeholders than the ETL Alternative.

# 8.0. Recommended Preferred Alternative (Proposed Action)

## 8.1. Recommended Preferred Alternative (Proposed Action)

### Description

The Traditional Widening Alternative was selected as the Recommended Preferred Alternative, designated as the Proposed Action for the K-10 Capacity Improvements Project. The Traditional Widening Alternative was recommended by the K-10 Project team due to its ability to meet the Purpose and Need of the project, address congestion and traffic safety concerns within the corridor, results in fewer impacts to the natural and human environment over the other Build Alternative, and its ability to provide a lower cost solution. KDOT will work with local partners to accommodate multimodal, existing capacity management, improvement of alternate routes, and other complementary improvements to the preferred alternative. A map series showing the Traditional Widening Alternative can be found in **Appendix D**.

The Traditional Widening Alternative met the Purpose and Need of the project by:

- **Enhancing Safety Performance** – The implementation of the Traditional Widening Alternative will enhance safety performance through adding new lanes of travel capacity which will address crashes caused by stop and go traffic and include improvements to roadway, ramp, and interchange geometrics along the corridor.
- **Improving Traffic Operations** – The Traditional Widening Alternative and the ETL Alternatives had the highest ratings for improving traffic operations. The Traditional Widening Alternative would provide more capacity options for all vehicles. Additional lanes would also increase the overall corridor’s travel speed and increase the corridor’s throughput.
- **Improve Infrastructure Condition** – Adding additional capacity has the highest rating to improve the infrastructure condition through the replacement of pavement and bridges along the corridor. The addition of lanes through



traditional widening would impact long-term travel reliability and life-cycle costs through additional capacity in the corridor.

- **Provide Flexible Transportation Choices** – The Traditional Widening Alternative offers additional capacity through the addition of lanes for other modes of transportation, such as transit, by alleviating roadway congestion. In addition, as a result of construction, there will be improved access to transit, bicycle, and pedestrian connections in the study area.
- **Support Local and Regional Growth** – Both the Traditional Widening and ETL Alternatives were evaluated to best align with the various city and the region’s anticipated growth strategies. These alternatives are incorporated into the planned and committed transportation improvements within state, regional, and local planning documents to help accommodate future growth plans.

The Traditional Widening Alternative is shown to have fewer natural and human environment impacts than the ETL Alternative. This includes fewer displacements of floodplains, wetlands, and streams. This is due to the smaller footprint of the Traditional Widening Alternative than the ETL Alternative.

From an engineering and cost standpoint the Traditional Widening Alternative has an overall lower construction cost of \$1.16 billion, which is \$40 million lower than the ETL Alternative. The Traditional Widening Alternative has an overall lower life-cycle cost than the ETL Alternative due to the lack of tolling infrastructure. The Traditional Widening Alternative has fewer right-of-way impacts.

The No-Build Alternative, while not a Reasonable Alternative, was carried forward for evaluation as a point of comparison against the Build Alternatives. The No-Build Alternative does not meet the Purpose and Need for the project and was not selected as the Recommended Preferred Alternative due to the presence of a constructible, fundable, and viable Build Alternative that met the Purpose and Need for the project. The No-Build Alternative, however, will be carried through to the EA to serve as the basis of comparison.