



Alternatives Development and Screening Methodology Report

Kimball Junction Environmental Impact Statement

Lead agency:
Utah Department of Transportation

April 17, 2023

The environmental review, consultation, and other actions required by applicable federal environmental laws for this project are being or have been carried out by the Utah Department of Transportation pursuant to 23 United States Code Section 327 and a Memorandum of Understanding dated May 26, 2022, and executed by the Federal Highway Administration and UDOT.

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Abbreviations

Area Plan	<i>Kimball Junction and SR-224 Area Plan</i>
BRT	bus rapid transit
EIS	Environmental Impact Statement
FHWA	Federal Highway Administration
GIS	geographic information systems
I-80	Interstate 80
LOS	level of service
MOU	Memorandum of Agreement
NEPA	National Environmental Policy Act
SR	state route
UDOT	Utah Department of Transportation
USC	United States Code
WOTUS	waters of the United States

1.0 Introduction

1.1 Report Purpose and Background Information

This report describes the alternatives development and screening process that will be used for the Kimball Junction Environmental Impact Statement (EIS). The Utah Department of Transportation (UDOT) is preparing the EIS to evaluate proposed transportation improvements at the Interstate 80 (I-80) and State Route 224 (SR-224) interchange at Kimball Junction in Summit County, Utah (Figure 1). A summary of the purpose of the project is provided in Section 3.1.2, *Purpose of the Project*.

The Federal Highway Administration (FHWA) has assigned its responsibilities under the National Environmental Policy Act (NEPA) and other federal environmental laws to UDOT for highway projects in Utah, pursuant to 23 United States Code (USC) Section 327, in a May 26, 2022, Memorandum of Understanding (NEPA Assignment MOU). In accordance with the NEPA Assignment MOU, UDOT is carrying out the environmental review process for the Kimball Junction EIS in lieu of FHWA and serves as the lead agency in the NEPA process. The NEPA Assignment MOU does not change the roles and responsibilities of any other federal agency whose review or approval is required for the project.

1.2 Kimball Junction and SR-224 Area Plan

In partnership with Summit County, UDOT published the *Kimball Junction and SR-224 Area Plan* (Area Plan) in 2021. The Area Plan was developed using UDOT's Solutions Development process, which is a local planning process that seeks to capture the unique context of an area or corridor and develop a set of solutions to meet its transportation needs. The Area Plan identified and evaluated future transportation improvements at the interchange of I-80 and SR-224 and through the two at-grade intersections on SR-224 (Ute Boulevard and Olympic Parkway) in Summit County, Utah. It also evaluated multimodal improvements to address congestion, mobility, safety, access, and travel time reliability at the Kimball Junction interchange and on SR-224 in the Kimball Junction area.

Input from study partners and the public helped establish transportation problems in the study area as well as opportunities to solve those. Additional public input contributed to the development of criteria aimed at balancing transportation and environmental goals and opportunities.

The Area Plan process informed the draft purpose and need statement for the Kimball Junction EIS and the preliminary identification of project alternatives. Specifically, the Area Plan analyzed potential solutions (30) and narrowed the options to three alternatives, including intersection and pedestrian improvements and larger, more complex transportation solutions that will be carried forward in the EIS process.

The 2021 Area Plan is available on the Kimball Junction EIS website (<https://kimballjunctioneis.udot.utah.gov/resources>).

Figure 1. Kimball Junction EIS Needs Assessment Evaluation Area



Legend

 Kimball Junction EIS Needs Assessment Evaluation Area



1.3 Alternatives Development and Screening Process Overview

The Area Plan alternatives evaluation process consisted of developing screening criteria based on addressing the problems and opportunities and study goals, developing a full range of alternatives, and documenting the elimination of alternatives. During the Area Plan process, the following two-level alternatives development and screening process was conducted:

- **Level 1 Screening.** Level 1 screening determined whether each alternative had a “fatal flaw” or whether it did not meet the problems and opportunities of the study. The alternatives that had a fatal flaw or did not meet the problems and opportunities were dismissed from further consideration.
- **Level 2 Screening.** Level 2 screening of the remaining alternatives included more-quantitative measures as well as a comparative evaluation of technical screening criteria, as shown in Table 1, *Level 2 Screening Criteria and Measurements*, on page 8.

What is a fatal flaw analysis?

A fatal flaw analysis determines whether an alternative has one or more defects that prevent it from being successfully implemented. A key aspect of a fatal flaw analysis is the establishment of clear goals and objectives—or, in the case of the Area Plan, problems and opportunities—for the project.

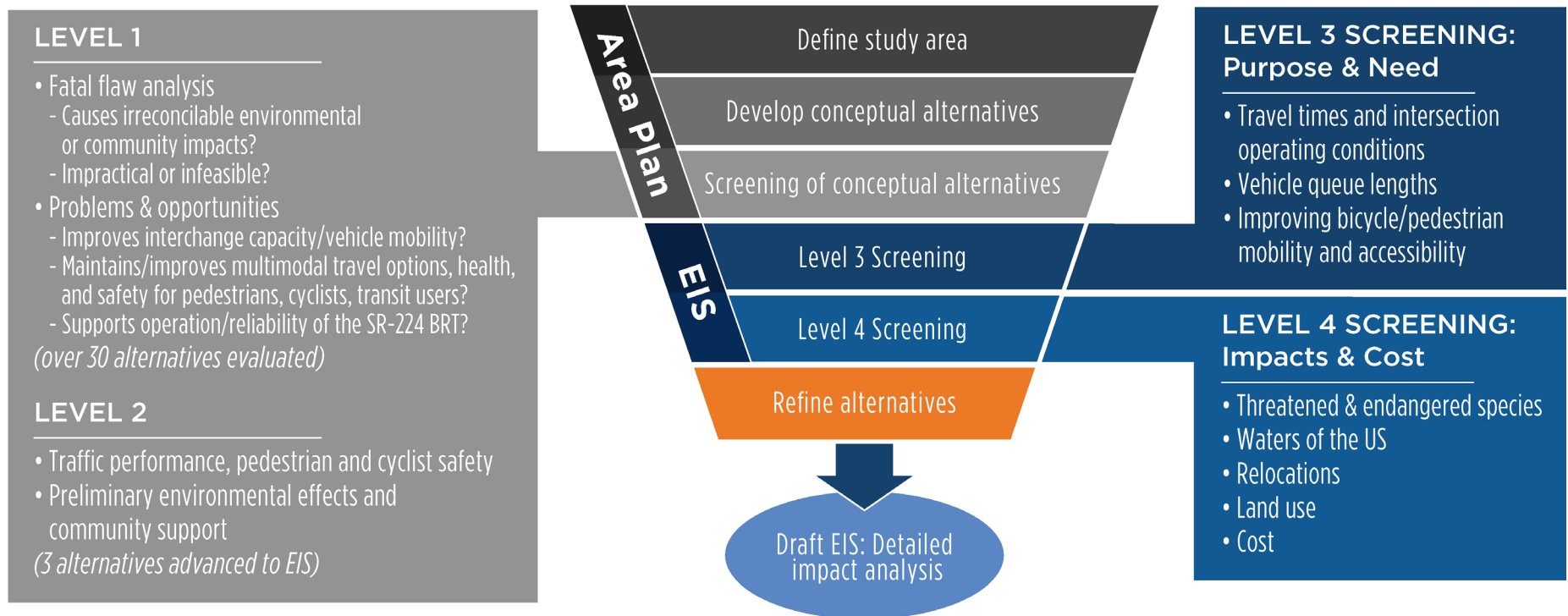
Building on results of the 2021 Area Plan, the alternatives development and screening process for the Kimball Junction EIS will consist of the following three phases:

- **Level 3 Screening.** Apply screening criteria to eliminate alternatives that do not meet the purpose of and need for the project. Refine the alternative options that pass this screening for further evaluation.
- **Level 4 Screening.** Apply screening criteria to eliminate alternatives that meet the purpose of and need for the project but would be unreasonable for other reasons—for example, an alternative that would have unreasonable impacts to the natural and human environment, would not meet regulatory requirements, or duplicates the benefits of a less costly alternative with similar impacts to the natural and human environment.
- **Preliminary Engineering.** Conduct additional preliminary engineering for alternatives that pass Level 4 screening. The alternatives will be refined to avoid and minimize impacts to the natural and human environment and will be designed to a higher level of detail to assist the impact analyses in the EIS.

The alternatives development and screening process described in this report will provide critical information about how well an alternative satisfies the project’s purpose and whether it is reasonable under NEPA, practicable under the Clean Water Act, and prudent and feasible under Section 4(f) of the Department of Transportation Act of 1966. (For more information regarding regulations considered in this screening process, see Section 5.0, *Reasons Why Alternatives Might Be Eliminated*.) A separate memorandum will detail the results of the screening process; that information will be summarized in the EIS.

The alternatives development and screening process is designed to be dynamic. If a new alternative is developed later in the process, it will be subject to the same screening process as all of the other alternatives, as described in this report. Finally, because NEPA requires evaluation of the No-Action Alternative, this alternative is not subject to the screening process and will be fully evaluated in the EIS.

Figure 2. Overview of the Kimball Junction EIS Alternatives Development and Screening Process



2.0 Alternatives Development and Screening Process for the Area Plan

2.1 Initial Development Completed in the Area Plan

The Area Plan’s alternatives development and screening process first defined the problems, opportunities, and goals of the desired study. Then, the universe of alternatives was developed during an alternatives development workshop with the study partners. The universe of alternatives was then evaluated using a two-level screening process to ensure that only the most promising alternatives were carried forward for detailed analysis in a subsequent phase of study.

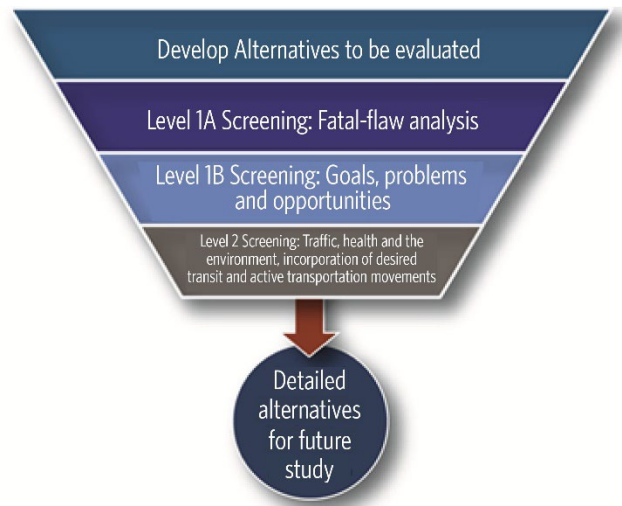
- **Level 1 screening** determined whether each alternative had a “fatal flaw” or whether it did not meet the problems and opportunities of the study. The alternatives that had a fatal flaw or did not meet the problems and opportunities were dismissed from further consideration.
- **Level 2 screening** of the remaining alternatives included more-quantitative measures as well as a comparative evaluation of technical screening criteria as described in Table 1, *Level 2 Screening Criteria and Measurements*, on page 8.

2.2 Screening Criteria Developed for the Area Plan

The study team developed screening criteria to evaluate alternatives for meeting the goals of the Area Plan. The team developed screening criteria in the following areas: capacity, accessibility, mobility, safety and comfort, community health and environment, multimodal connections, consistency with adopted plans, public acceptance, and innovative operational and maintenance techniques.

Specific performance measures were developed for some of the screening criteria so that the study team could more easily compare the alternatives against the study area’s problems and opportunities. These performance measures were either qualitative or quantitative assessments depending on the criteria and the availability of data at that stage of project development.

Figure 3. Overview of the Kimball Junction Area Plan’s Alternatives Development and Screening Process



2.3 Level 1 Screening

During Level 1 screening, the study team evaluated alternatives using mostly qualitative and fatal-flaw assessments. The Level 1 screening criteria addressed the problem and opportunity elements described in Section 3, *Problems and Opportunities Framework*, of the Area Plan and avoided fatal flaws while working within the Framework.

2.3.1 Fatal-flaw Screening Questions

The following yes-or-no questions were used in the first step of Level 1 screening:

- Does the alternative cause irreconcilable environmental impacts?
- Does the alternative cause irreconcilable community impacts?
- Is the alternative impractical and infeasible?

Any alternative with a “yes” answer to a screening question was dismissed from continued study.

2.3.2 Problems, Opportunities, and Goals Screening Questions

Alternatives that were not eliminated during the fatal flaw screening were then screened against the study goals and problems and opportunities. The study goals and problems and opportunities were the basis for the remaining Level 1 yes-or-no screening questions. Any alternative with a “no” answer to any one of the following screening questions was dismissed from continued study:

- Does the alternative improve interchange area capacity and vehicle mobility to/from I-80 and to/from SR-224 through the Kimball Junction area?
 - Criteria used to answer this question included:
 - Can the alternative meet future traffic demand?
 - Does the alternative reduce peak-period congestion?
 - Does the alternative provide safe, efficient, and well-coordinated access?
 - Does the alternative provide adequate mobility?

What issues were considered irreconcilable during the Area Plan process?

- New traffic issues resulting from an alternative
- Total closure of the I-80 interchange during construction
- Traffic issues not being fixed by an alternative
- Alternatives that didn’t meet roadway design standards

What fatal flaws labeled an alternative as being impractical and/or infeasible?

- Insufficient merge/weave distance between Ute Blvd. and the I-80 interchange
- “Extremely high” construction costs defined on a scale ranging from extremely low to low to relatively low to relatively high to high to extremely high
- Construction would severely impact function of the I-80 mainline and/or the I-80 interchange

- Does the alternative maintain or improve multimodal travel options, health, and safety for pedestrians, cyclists, and transit users in the Kimball Junction area?
 - Criteria used to answer this question included:
 - Does the alternative maintain or improve the continuity of bicycle and pedestrian facilities compared to the existing facilities?
 - Does the alternative provide safe crossing opportunities?
 - Does the alternative safely and comfortably accommodate all levels and abilities of pedestrians and cyclists?
 - Does the alternative improve non-motorized level of service compared to the existing level of service?
- Does the alternative support operation and reliability of the *Valley to Mountain (SR-224) Transit Project Alternatives Analysis* preferred alternative (side-running bus rapid transit [BRT]) on both sides of SR-224?
 - Criteria used to answer this question included:
 - Does the alternative provide a competitive and reliable travel time for the BRT?
 - Does the alternative provide enhanced access to transit stops?

Alternatives carried forward from Level 1 screening were reviewed and refined to add more definition to the proposed improvements, to better understand their operational benefits and costs, and to provide information so that the study team could further assess the alternatives in Level 2 screening.

2.4 Level 2 Screening

2.4.1 Purposes of Level 2 Screening

Level 2 screening performed additional and more-detailed analysis to determine whether each alternative would meet the Problems and Opportunities Statement, compared how well the alternatives would perform, and preliminarily identified the alternatives' impacts. The Level 2 screening either added additional measures or expanded measures for each of the criteria from Level 1 screening and provided a method for comparing alternatives. Alternatives advanced for study after Level 2 screening will be further developed during the EIS process.

2.4.2 Level 2 Screening Matrix

The Level 2 screening process further refined the reasonable alternatives by assessing the alternatives against study goals and problems and opportunities in a primarily quantitative way, though some qualitative criteria were used. Table 1 lists the screening criteria and measurements that were used in Level 2 screening.

What is level of service (LOS)?

Level of service is a measure of the operating conditions on a road or at an intersection. Level of service is represented by a letter “grade” ranging from A (free-flowing traffic and little delay) to F (extremely congested, stop-and-go traffic and excessive delay).

Table 1. Level 2 Screening Criteria and Measurements

Goal	Screening Criteria	Measurements
Move people and goods more efficiently through the Kimball Junction area.	Prevent off-ramp vehicle queues from I-80 to S.R. 224 from affecting operations and safety of the I-80 mainline.	Measure peak-hour ^a vehicle queue lengths at the westbound and eastbound off-ramps.
	Accommodate current and projected travel demand on S.R. 224 in the Kimball Junction area while minimizing the roadway footprint. Reduce person-delay of private (single-occupant or high-occupancy) vehicles navigating through the Kimball Junction area.	Quantitatively assess the alternative’s ability to reduce travel times for travel time pairs ^b on S.R. 224 south of Kimball Junction to and from eastbound and westbound I-80.
	Improve the overall capacity of the Kimball Junction area by improving vehicle and transit networks.	Improve vehicle or person throughput at intersections during future (2050) peak hours. Measure overall intersection level of service (LOS) ^c as well as percent served.
Improve mobility and comfort for all users to and around the Kimball Junction area through a connected network.	Maintain existing, and consider additional, grade-separated active transportation connections across I-80 and S.R. 224.	Measure directness of safe and comfortable routes for people bicycling and walking to major destinations in the Kimball Junction area.
	Enhance regional transit connectivity to the Kimball Junction Transit Center and future BRT facilities.	Measure changes in transit travel times for all routes that serve the Kimball Junction area.
	Improve existing access deficiencies and accommodate future access needs.	Qualitatively assess whether the alternative includes or supports future congestion-management strategies such as Transportation Demand Management.
	Improve vehicle mobility to and from the Kimball Junction area.	Quantitatively assess vehicle delay for movements into and out of Kimball Junction land uses via S.R. 224 and I-80.

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Table 1. Level 2 Screening Criteria and Measurements

Goal	Screening Criteria	Measurements
<p>Provide a balanced transportation system that contributes to improved local and regional air quality, environmental sustainability, and community health.</p>	<p>Promote comfortable active transportation opportunities that connect existing and emerging land uses.</p>	<p>Qualitatively assess the alternative’s ability to accommodate safe travel by pedestrians and cyclists.</p>
	<p>Create a place where there are viable travel alternatives to using a car in order to improve mobility and contribute to improved local and regional air quality, environmental sustainability, and community health.</p> <p>Minimize environmental, right-of-way, and utility impacts.</p> <p>Minimize impacts to public health while improving health-related activities and access and equity to public health facilities.</p>	<p>Qualitatively assess the ability of local residents and visitors to access community facilities both across and along S.R. 224.</p> <p>Alternative avoids impacts to existing neighborhoods, has minimal effect on community cohesion, and enhances the character of the area. Assess high-level measures of expected impacts to environmental resources including:</p> <ul style="list-style-type: none"> ▪ Acres of floodplains ▪ Acres of conservation easements and open space ▪ Acres of wetlands ▪ Acres of biological resources ▪ Acres of right-of-way impacts ▪ Number of historic properties ▪ Number of utility impacts <p>Qualitatively assess vehicle-miles traveled reduction for improvement in air quality.</p> <p>Qualitatively assess increased physical activity achieved during everyday trips.</p> <p>Qualitatively assess improved access to health-related resources along S.R. 224.</p> <p>Qualitatively assess improved multimodal connectivity to Kimball Junction–area destinations.</p> <p>Measure distance traveled for accessibility to transit and active transportation facilities—what is available within ¼ mile—and assess physical barriers.</p> <p>Qualitatively assess transportation equity.</p>
	<p>Improve safety on S.R. 224 in the Kimball Junction area for all users.</p>	<p>Quantitatively assess the alternative’s ability to reduce conflict points (vehicle-to-vehicle, vehicle-to-cyclist/pedestrian) and crash rates (where <i>Highway Safety Manual</i> methodologies apply).</p>

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Table 1. Level 2 Screening Criteria and Measurements

Goal	Screening Criteria	Measurements
Maintain consistency with adopted plans for the Kimball Junction area.	Ensure that the alternative is consistent with planned land uses.	Alternative is consistent with adopted local and regional land use and transportation plans. Alternative is compatible with other planned projects on S.R. 224 in the Kimball Junction area as identified in adopted planning studies for the area.
	Ensure that the alternative fits the character and scale of the community and is complementary to the landscape.	Assess community support for the alternative based on a public survey and meetings. Qualitatively assess the suitability of the alternative within the scale of the community and the alternative's ability to enhance the study area's natural setting and character.
Develop solutions that complement the evolving context and scale of the community.	Ensure that the alternative is practical and implementable.	Measure the alternative's practicality and implementability with conceptual-level costs. Consider the alternative's constructability given available technology.
	Accommodate snow storage after plowing and other maintenance activities.	Qualitatively assess the alternative's ability to accommodate snow storage and other maintenance activities to ensure travelers' safety and mobility.
Consider innovative operational technologies and accommodate maintenance needs.	Include innovative operational technologies.	Qualitatively assess whether the alternative includes or supports future congestion-management strategies such as Transportation Systems Management, Intelligent Transportation Systems, or Transportation Network Companies.

- ^a Peak hours are the hours of the day with the greatest amounts of traffic. For this project, the AM (morning) peak hour is from 8 AM to 9 AM, and the PM (afternoon) peak hour is from 4 PM to 5 PM.
- ^b A travel time pair (also referred to as an origin-destination pair) is a selected beginning and ending point for a trip on the transportation network.
- ^c Level of service (LOS) is a measure of the operating conditions on a road or at an intersection. Level of service is represented by a letter "grade" ranging from A (free-flowing traffic and little delay) to F (extremely congested, stop-and-go traffic and excessive delay).

3.0 Alternatives Development and Screening Process for Determining Alternatives to be Studied in Detail in the EIS

3.1 Level 3 Screening

3.1.1 Purposes of Level 3 Screening

During the Level 3 screening phase, each of the initial alternatives will be evaluated using criteria to determine whether the alternative meets the purpose of the project. Alternatives that UDOT concludes would not meet the purpose of the project will not be carried forward for further analysis. If an alternative fails to meet the project purpose, it will be considered unreasonable for NEPA purposes, not practicable for Clean Water Act Section 404(b)(1) purposes and not prudent or feasible for Section 4(f) purposes. The basis for such a determination will be documented in the screening results memorandum. (For more information, see Section 5.0, *Reasons Why Alternatives Might Be Eliminated*.)

3.1.2 Purpose of the Project

The project purpose is to address transportation-related safety and mobility for all users of the Kimball Junction area by:

- Improving operations and travel times on SR-224 from the I-80 interchange through Olympic Parkway;
- Improving safety by reducing vehicle queues on I-80 off-ramps;
- Improving pedestrian and bicyclist mobility and accessibility throughout the evaluation area; and
- Maintaining or improving transit travel times through the evaluation area.

3.1.3 Level 3 Screening Matrix

UDOT developed Level 3 screening criteria based on the need to improve operations, vehicle travel times, safety, and pedestrian and bicyclist mobility and accessibility on the I-80 interchange and SR-224 through Olympic Parkway. The criteria are also based on the need to maintain or improve transit travel times through the evaluation area. The initial alternatives will be screened against criteria pertaining to travel time, intersection level of service (LOS), percent served, length of vehicle queues, level of traffic stress, and walking and transit travel times (Table 2). To accommodate Level 3 screening, UDOT will develop the initial alternatives in enough detail to allow UDOT to use the Summit-Wasatch travel demand model to forecast the future traffic volumes and associated congestion for the evaluation area. (For more information about the travel demand model, see Section 6.1, *Travel Demand and Microsimulation Models*.)

What is percent served?

Percent served represents the percentage of vehicles that can make it through a congested intersection during the peak hour. It is useful for comparing intersections where demand exceeds capacity.

Table 2. Level 3 Screening Criteria – Purpose and Need

Criterion	Measure	Data Used
Improving operations and travel times on SR-224 from the I-80 interchange through Olympic Parkway	Does the alternative provide reliable through-traffic travel time on SR-224 during the AM and PM peak hour?	Travel time (look at average speeds on SR-224 to equate to arterial LOS)
	Meet a level of service of LOS D for as many intersections as possible.	Intersection LOS (overall LOS and turning LOS)
	Is the percent served improved during the peak hour?	Percent served ^a
Improving safety by eliminating vehicle queues on I-80 off-ramps	Are the off-ramp vehicle queue lengths eliminated on I-80 mainline through lanes? (yes/no)	Length of vehicle queue (feet)
Improving pedestrian and bicyclist mobility and accessibility throughout the evaluation area	Does the level of traffic stress improve in the vicinity of SR-224? ^b	Level of traffic stress ^b
	Do the walk times improve for key origin-destination pairs? ^c	Walk times
Maintaining or improving transit travel times through the evaluation area	Does the alternative maintain or improve the SR-224 BRT transit travel times through the evaluation area? (yes/no)	Travel times

- ^a Percent served is the percent of traffic demand that can move through the transportation network during the analysis period as measured by a traffic analysis model.
- ^b Level of traffic stress (LTS) is a 1-to-4 rating for the amount of traffic stress imposed on bicyclists or pedestrians on a transportation facility. LTS 1 represents the least stress, and LTS 4 represents the most stress.
- ^c An origin-destination pair (also referred to as a travel time pair) is a selected beginning and ending point for a trip on the transportation network.

3.2 Level 4 Screening

3.2.1 Purposes of Level 4 Screening

Level 4 screening identifies alternatives that are practicable and reasonable and eliminates alternatives that are not practicable and reasonable. During Level 4 screening, UDOT will collectively evaluate the alternatives that passed Level 3 screening against criteria that focus on the alternatives’ impacts to the natural and built environment, estimated project costs, logistical considerations, and technological feasibility.

The criteria listed below in Table 3 were selected based on applicable federal regulations—such as Section 4(f) of the U.S. Department of Transportation Act of 1966 and Section 404 of the Clean Water Act—and comments received during agency and public outreach. Waters of the United States (WOTUS) and Section 4(f) properties were given special consideration during screening because federal laws require UDOT to consider and analyze alternatives that avoid or minimize impacts to these resources. See Section 5.0, *Reasons Why Alternatives Might Be Eliminated*, for more information regarding Section 4(f) and Section 404 of the Clean Water Act.

3.2.2 Level 4 Screening Matrix

Table 3 lists the Level 4 screening criteria.

Table 3. Level 4 Screening Criteria – Impacts and Costs

Criterion	Measure
Threatened and Endangered Species	<ul style="list-style-type: none"> • Acres and types of habitat
Waters of the United States	<ul style="list-style-type: none"> • Acres and types of aquatic resources • Linear feet of creeks affected
Section 4(f) resources	<ul style="list-style-type: none"> • Number and type of Section 4(f) uses
Relocations	<ul style="list-style-type: none"> • Number of potential residential or business relocations
Land use	<ul style="list-style-type: none"> • Compatibility with current land use plans (yes/no)
Cost	<ul style="list-style-type: none"> • Estimated project cost

The overall process for Level 4 screening will be as follows:

- UDOT will develop basic alignments and footprints, including rights-of-way, for the alternatives carried forward from Level 3 screening. During this step, UDOT will adjust the alternative design to try to minimize impacts to natural resources and the built environment. Alternatives that pass Level 4 screening will be further refined during preliminary engineering.
- Project engineers will review the alternatives to make sure they continue to meet basic requirements for roadway design and safety.
- Project engineers will evaluate the alternatives for costs, logistical considerations, and technological feasibility and will determine whether any of the alternatives would have substantially greater impacts or costs without having substantially greater benefits.
- The team will convert the alternatives’ footprints to geographic information systems (GIS) format, and a GIS analysis will be performed to determine the amount of resource impacts for each alternative.
- The alternatives’ effects on the resources listed above in Table 3 will be compared to determine the reasonable alternatives that will be advanced for detailed analysis in the Draft EIS.

Estimate Impacts to the Natural and Built Environment. Using GIS software, UDOT will estimate how each alternative that passed Level 3 screening might affect resources such as WOTUS (wetlands and other jurisdictional waters), threatened and endangered species, compatibility with existing and planned land uses, and the number of potential residential and business relocations. The number of impacts will be determined by overlaying the estimated right-of-way for each alternative on the GIS datasets for these resources. UDOT will use the same approach to identify the expected number of impacts to homes and businesses (relocations or property acquisitions).

Compare Impacts and Costs to Benefits. UDOT will use the screening results to determine whether any of the alternatives would have substantially greater impacts or costs without having substantially greater benefits. Alternatives that have the same or similar benefits as other alternatives but have substantially greater impacts or costs will be eliminated and considered unreasonable for NEPA purposes.

Evaluate Alternatives for Consistency with Permitting Requirements and Agency Approvals.

UDOT will evaluate the alternatives independently for their consistency with applicable permitting requirements. If the impact assessment indicates that an individual Clean Water Act Section 404 permit could be required for one or more alternatives, UDOT will consider whether an alternative is likely to be practicable for Section 404(b)(1) purposes. If UDOT determines that the alternative is likely to be practicable and could have fewer adverse impacts to the aquatic environment than other alternatives, it will be retained for detailed analysis in the Draft EIS.

If the impact assessment found that a Section 4(f) use with greater-than-*de minimis* impact could be required for one or more alternatives, UDOT will consider whether an alternative is prudent and feasible for Section 4(f) purposes. If an alternative is found by UDOT to be prudent and feasible and to have fewer adverse impacts to Section 4(f) resources than other alternatives, it will be retained for detailed analysis in the EIS.

For more information, see Section 5.0, *Reasons Why Alternatives Might Be Eliminated*.

3.3 Preliminary Engineering

The alternative(s) that pass Level 4 screening will be further developed through preliminary engineering to support detailed analysis in the EIS. The preliminary engineering phase will include design work to provide details such as horizontal and vertical alignments; right-of-way needs; interchange design; parking lot, trail, and bicycle lane configurations; access design; and potential drainage designs. All alternative(s) will be designed to a similar level of detail.

Once the preliminary engineering phase is complete, the expected effects of the alternative(s) will be characterized and compared to the No-Action Alternative in the EIS.

4.0 Agency and Public Involvement

UDOT requested input on the range of alternatives during the agency and public scoping period and is now providing this *Alternatives Development and Screening Methodology Report* to the public, agencies, and tribal representatives for review and comment.

Following the screening process, UDOT will prepare an alternatives screening results technical memorandum that will document the input UDOT received from agencies and the public and how UDOT considered the input during the screening process. The alternatives screening report and supporting information will be posted on the project website and will also be summarized in the EIS.

5.0 Reasons Why Alternatives Might Be Eliminated

5.1 NEPA Regulations and Council on Environmental Quality Guidance

According to NEPA regulations and guidance issued by the Council on Environmental Quality, an alternative may be determined to be not reasonable and eliminated from further consideration if:

1. The alternative does not satisfy the purpose of the project (evaluated in Level 3 screening).
2. The alternative meets the purpose of the project but is unreasonable based on a combination of other factors, such as costs, logistical or technical issues, environmental impacts, or inability to meet permitting or other regulatory requirements (evaluated in Level 4 screening).
3. The alternative substantially duplicates another alternative; that is, it is otherwise reasonable but offers little or no advantage for satisfying the project's purpose, and it has impacts and/or costs that are similar to or greater than those of other, similar alternatives (evaluated in Level 4 screening).

5.2 Clean Water Act Requirements

Because the project area of analysis might support federally regulated wetlands or other jurisdictional WOTUS, UDOT will also consider compliance with the permitting requirement under Section 404 of the Clean Water Act during the alternatives development phase and the identification of alternatives for review in the EIS. If it appears that an individual Section 404 permit could be required, UDOT would consider the U.S. Army Corps of Engineers Clean Water Act Section 404(b)(1) Guidelines for Dredged or Fill Material (40 Code of Federal Regulations Part 230) and Executive Order 11990, *Protection of Wetlands*, during the alternative development phase.

The Section 404(b)(1) Guidelines state that “no discharge of dredged or fill material [to Section 404–regulated waters] shall be permitted if there is a practicable alternative to the proposed discharge which would have less adverse impact on the aquatic ecosystem, so long as the alternative does not have other significant adverse environmental consequences” [Section 230.10(a)]. This section of the guidelines further states that:

1. For the purpose of this requirement, practicable alternatives include but are not limited to:
 - a. Activities which do not involve a discharge of dredged or fill material into the waters of the United States or ocean waters;
 - b. Discharges of dredged or fill material at other locations in waters of the United States or ocean waters;
2. An alternative is practicable if it is available and capable of being done after taking into consideration cost, existing technology, and logistics in light of overall project purposes. If it is otherwise a practicable alternative, an area not presently owned by the applicant which could reasonably be obtained, utilized, expanded, or managed in order to fulfill the basic purpose of the proposed activity may be considered.
3. Where the activity associated with a discharge which is proposed for a special aquatic site (as defined in Subpart E of the guidelines) does not require access or proximity to or siting within the special aquatic site in question to fulfill its basic purpose (i.e., is not water dependent), practicable alternatives that do not involve special aquatic sites are presumed to be available, unless clearly demonstrated otherwise. In addition, where a discharge is proposed for a special aquatic site, all practicable alternatives to the proposed discharge which do not involve a discharge into a special aquatic site are presumed to have less adverse impact on the aquatic ecosystem, unless clearly demonstrated otherwise.

If impacts to wetlands and other jurisdictional WOTUS would be large enough that an individual Section 404 permit will be required, UDOT will coordinate with the U.S. Army Corps of Engineers to ensure compliance of the Section 404(b)(1) Guidelines.

5.3 Section 4(f) Requirements

Pursuant to 23 USC Chapter 327 and the NEPA Assignment MOU, UDOT is responsible for compliance with Section 4(f) of the Department of Transportation Act of 1966, as amended (49 USC Chapter 303). Section 4(f) applies to certain publicly owned parks, recreation areas, wildlife and waterfowl refuges, and historic properties that are listed on or eligible for listing on the National Register of Historic Places.

Section 4(f) prohibits agencies within the U.S. Department of Transportation (USDOT) from approving the use of any Section 4(f) land for a transportation project, except as follows:

- First, the USDOT agency can approve the use of Section 4(f) land by making a determination that (1) there is no prudent and feasible alternative that would avoid the use of the Section 4(f) resource *and* (2) the project includes all possible planning to minimize harm to that property, and, if there is more than one alternative with a use of Section 4(f) property with greater-than-*de minimis* impacts, the alternative would have the least overall harm in light of Section 4(f)'s preservation purpose.
- Second, the USDOT agency can approve the use of Section 4(f) property by making a finding of *de minimis* impact for that property.

What is a *de minimis* impact?

For publicly owned public parks, recreation areas, and wildlife and waterfowl refuges, a *de minimis* impact is one that would not adversely affect the activities, features, or attributes of the property.

For historic sites, a finding of *de minimis* impact means FHWA has determined that the project would have “no adverse effect” on the historic property.

An alternative that would have more than a *de minimis* impact on Section 4(f) resources could be eliminated during Level 4 screening. To comply with the Section 4(f) regulations, UDOT will need to demonstrate that either (1) the alternative selected would have a use with more than *de minimis* impacts on the Section 4(f) property or (2) there is no feasible and prudent alternative that would avoid the use of the Section 4(f) property, and the alternative includes all possible planning to minimize harm to Section 4(f) resources. In light of Section 4(f)'s preservation mandate, if more than one alternative results in a use of Section 4(f) property with greater-than-*de minimis* impacts, UDOT may advance only the alternative that would have the least overall harm to protected resources.

6.0 Tools Used

6.1 Travel Demand and Microsimulation Models

A travel demand model is a computer model that predicts the number of transportation trips (travel demand) in an area at a given time. This prediction is based on projections of land use, socioeconomic patterns, and transportation system characteristics in the area.

UDOT will use the output from Summit County's Summit-Wasatch travel demand model version v1 – 2020-09-14 to determine whether an alternative meets the traffic-related purposes (operations, travel time, safety, mobility and accessibility) of the Kimball Junction EIS Project.

Microsimulation will also be used for the traffic modeling analysis because of its ability to analyze complex interchange configurations. Specifically, PTV Group's VISSIM software will be used to determine whether an alternative meets the measures of effectiveness for operational standards. Traffic densities, delay, vehicle queue lengths, speeds, and travel times will be analyzed on the roads, intersections, and freeway facilities for the action and no-action conditions.

What is a travel demand model?

A travel demand model is a computer model that predicts the number of transportation trips (travel demand) in an area at a given time. Predictions are based on the expected population, employment, household, and land use conditions in the area.

6.2 GIS Data

GIS-based data will be used during the screening phases to help UDOT understand the locations and extents of several resources. Some GIS data are managed by federal, state, or local governments and are readily available to UDOT. The data that will be checked regularly include data layers that show streets, parcels, land ownership, parks, and land use designations. UDOT will also use other data layers available from the State of Utah that provide information such as the locations of rivers, streams, and water bodies; jurisdictional boundaries (such as city and county boundaries); critical habitats; and geology.

UDOT is also developing GIS databases through reconnaissance-level field surveys in the Kimball Junction study area. The specific data layers that UDOT is creating and that will be used during Level 2 screening include wetland locations and types and cultural (prehistoric and historic) resources.