



Planning and Environmental Linkages (PEL) Alternatives Evaluation Guidance

INTRODUCTION

The Planning and Environmental Linkage (PEL) process is flexible and following this full alternatives evaluation process is not required. If the PEL study does include a more robust alternatives evaluation, these guidelines describe the basic steps for a traditional PEL study process and provides examples from completed PEL studies.

This document references the following CDOT PEL studies, as examples covering varying transportation areas (freeways, interchanges, highways) with different scopes and goals:

- US 34 PEL Study (January 2019) <https://www.codot.gov/library/studies/us-34-planning-and-environmental-linkages-pel-study>
- WestConnect PEL Study (May 2018) <https://www.codot.gov/library/studies/westconnect-coalition-pel-study>
- US 24 PEL Study (March 2018) <https://www.codot.gov/projects/archived-project-sites/us-24-pel-study>
- US 85 PEL Study (April 2017) <https://www.codot.gov/projects/us85pel>
- SH 7 PEL Study (February 2014) <https://www.codot.gov/library/studies/study-archives/sh7pel>
- I-70/Kipling Interchange PEL Study (July 2013) <https://www.codot.gov/library/studies/study-archives/i70kiplingpel>

PEL Alternatives Development and Evaluation Process

The intent of the alternatives development and evaluation process is to identify and screen a broad range of reasonable improvement alternatives for the area/corridor being studied. The application of the evaluation process is flexible and the process utilized should recognize the diverse elements of the specific study's transportation system and surrounding environment.

The alternatives development and evaluation process includes developing screening criteria based on the project Purpose and Need and goals, developing a range of reasonable alternatives, and narrowing options and alternatives through a multi-tiered screening process. A PEL study is not required to screen alternatives down to a single Recommended Alternative.

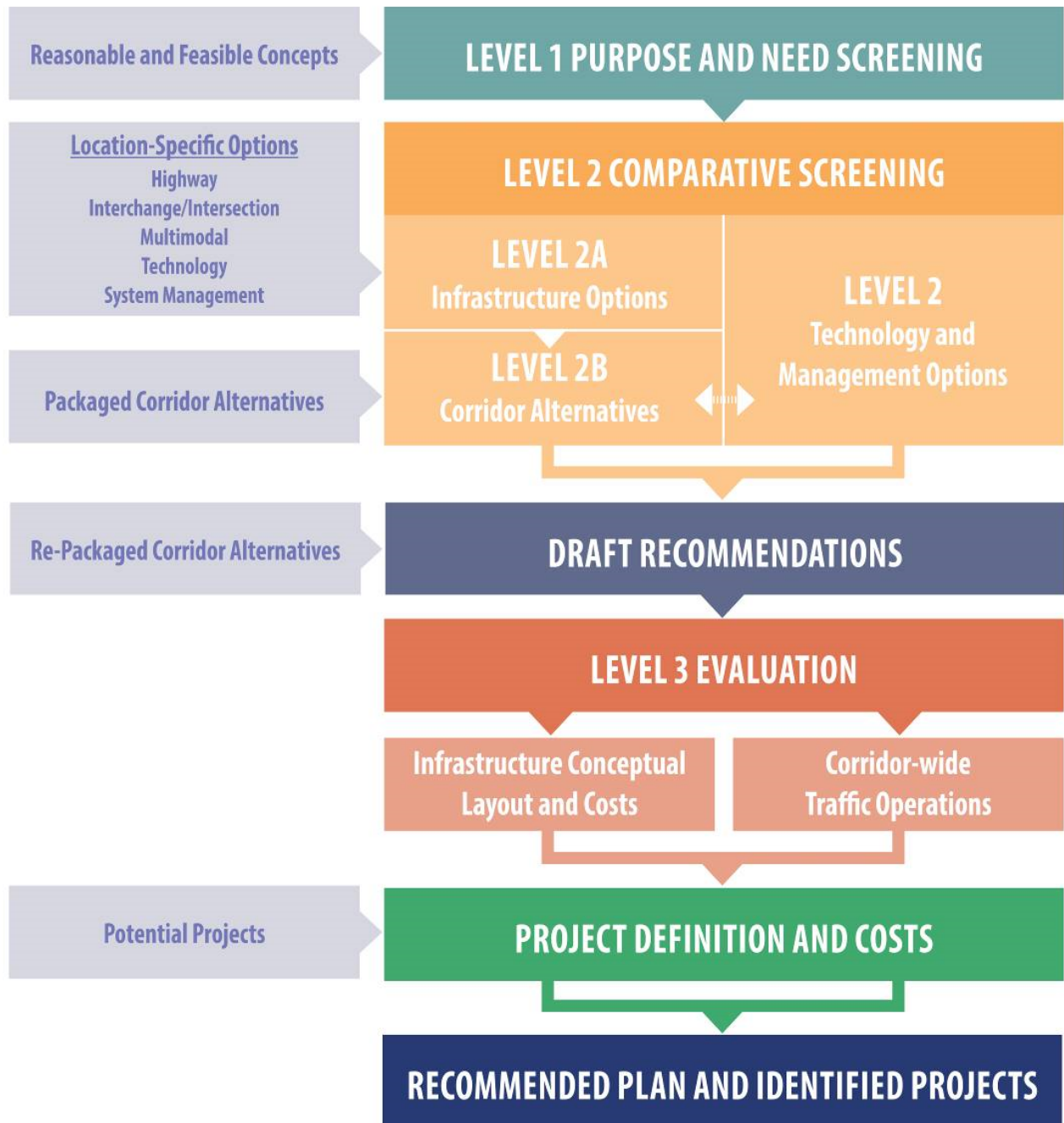
Most PEL studies conclude with several Recommended Alternatives.

The screening process will document the elimination of alternatives to limit the need for consideration during future National Environmental Policy Act (NEPA) process(es) and identify transportation projects that will be more fully evaluated during future project development and NEPA documentation. **The PEL alternatives evaluation process is flexible - all levels of screening do not need to be completed for the study to be valuable at informing NEPA.**



Planning and Environmental Linkages (PEL) Alternatives Evaluation Guidance

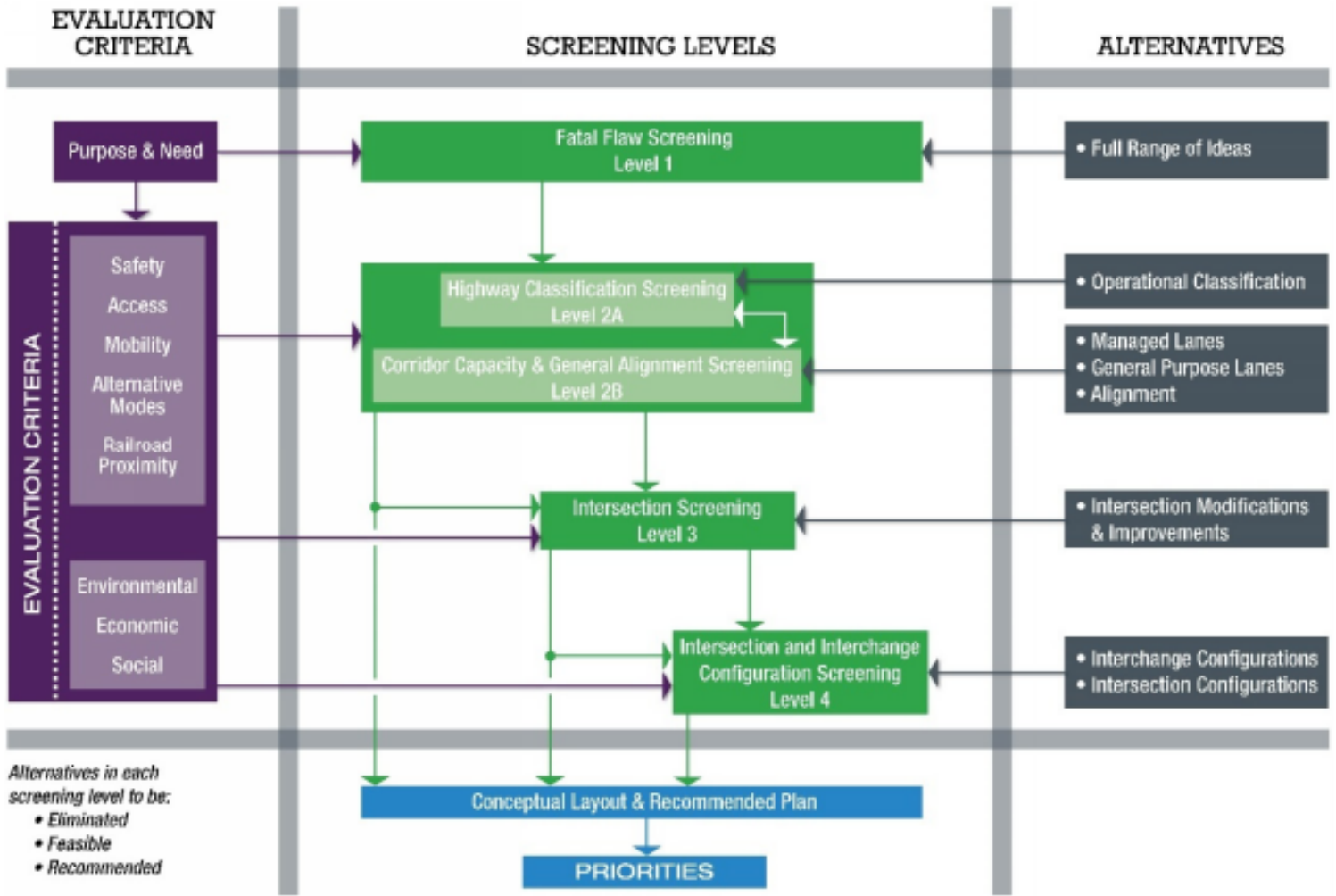
EXAMPLE: Multi-Tiered Alternatives Screening Process (WestConnect PEL Study)





Planning and Environmental Linkages (PEL) Alternatives Evaluation Guidance

EXAMPLE: Alternatives Development and Screening Process (US 85 PEL Study)





Planning and Environmental Linkages (PEL) Alternatives Evaluation Guidance

PURPOSE AND NEED AND GOALS

The project Purpose and Need statement should be developed in coordination with agency stakeholders with review by the general public. The goal in drafting the purpose statement is to define as specifically as possible the fundamental reasons why the project is being proposed, expressed as a desired transportation outcome.

The Purpose and Need should focus on transportation-related needs, emphasizing the needs related to the transportation system and/or infrastructure. For example, many transportation projects are proposed, at least in part, because it is believed they will help promote economic growth, but the potential for economic development benefit should not be defined as a project purpose. Instead, the purpose could be defined as providing the transportation infrastructure needed to support an economic development plan.

The development of the project Purpose and Need should follow FHWA guidelines on transportation decision-making

(https://www.environment.fhwa.dot.gov/nepa/trans_decisionmaking.aspx).

From FHWA guidance on transportation decisionmaking:

Purpose and Need

Elements of Purpose and Need

The purpose and need of a project is essential in establishing a basis for the development of the range of reasonable alternatives required in an EIS and assists with the identification and eventual selection of a preferred alternative.

The following items may be listed and described in the purpose and need statement for a proposed action. These are by no means all-inclusive or applicable in every situation. They are intended as a guide.

- **Project Status** — Briefly describe the action's history, including measures taken to date, other agencies and governmental units involved, action spending, schedules, etc.
- **Capacity** — Discuss the capacity of the present facility and its ability to meet present and projected traffic demands. Discuss what capacity and levels of service for existing and proposed facilities are needed.
- **System Linkage** — Discuss if the proposed action is a "connecting link" and how it fits into the transportation system.
- **Transportation Demand** — Discuss the action's relationship to any statewide plan or adopted urban transportation plan. In addition, explain any related traffic forecasts that are substantially different from those estimates of the 23 U.S.C. 134 (Section 134) planning process.
- **Legislation** — Explain if there is a Federal, state, or local governmental mandate for the action.
- **Social Demands or Economic Development** — Describe how the action will foster new employment and benefit schools, land use plans, recreation facilities, etc. In addition, describe projected economic development/land use changes that indicate the need to improve or add to the highway capacity.
- **Modal Interrelationships** — Explain how the proposed action will interface with and serve to complement airports, rail and port facilities, mass transit services, etc.
- **Safety** — Explain if the proposed action is necessary to correct an existing or potential safety hazard. In addition, explain if the existing accident rate is excessively high and why, and how the proposed action will improve safety.
- **Roadway Deficiencies** — Explain if and how the proposed action is necessary to correct existing roadway deficiencies (e.g., substandard geometrics, load limits on structures, inadequate cross-section, high maintenance costs, etc.) In addition, explain how the proposed action will correct these deficiencies.



Planning and Environmental Linkages (PEL) Alternatives Evaluation Guidance

The specific needs are based on the analysis and findings documented for the area existing and forecasted conditions. **Thorough documentation of the development of the project Purpose and Need and goals is a critical element of the PEL process so the decisions can be used in future NEPA process(es).**

Evaluation criteria should be established for the different levels of screening based on the project Purpose and Need and goals, prior to the development of alternatives.

EXAMPLE: Purpose and Need and Goals (US 24 PEL Study)

PROJECT PURPOSE AND NEED

PURPOSE OF THE PROJECT

The purpose of transportation improvements recommended by this study is to improve regional and local mobility, improve existing and future corridor and intersection operations, and enhance safety for all users along the existing US 24 highway from Powers Boulevard (SH 21) to Ramah Road.

NEED FOR THE PROJECT

Transportation improvements are needed to address:

- ✦ **Regional and Local Mobility:** Drivers along the US 24 corridor experience substantial delays and queues during peak travel periods today and congestion along the corridor is expected to worsen by 2040 with longer delays, slower speeds, and unreliable travel times, as well as new areas of congestion.
- ✦ **Traffic Operational Issues:** Traffic operations along the US 24 corridor are inadequate with frequent interruptions in traffic flow due to intersection operations and traffic maneuvers.
- ✦ **Safety Concerns:** There are safety concerns with vehicular crashes along US 24 related to traffic congestion, intersection conflicts, and lack of recovery area.

PROJECT GOALS

Additional goals of the transportation improvements for the US 24 study corridor are to:

- ✦ Support local and regional plans
- ✦ Avoid and minimize environmental impacts
- ✦ Balance mobility and access for existing and future land and economic development
- ✦ Accommodate growth in freight transport
- ✦ Complement local community surroundings
- ✦ Accommodate multimodal connections
- ✦ Preserve the existing transportation system

EXAMPLE: Purpose and Need and Goals (US 85 PEL Study)

<https://drive.google.com/file/d/0B6BtAVe2Hf-wZEjXRIVEb3RnQUU/view>

EXAMPLE: Purpose and Need and Goals (WestConnect PEL Study)

https://drive.google.com/file/d/1gskECp_eva-8zlgNFL_HqEcaJa3WUPgO/view



Planning and Environmental Linkages (PEL) Alternatives Evaluation Guidance

ALTERNATIVES DEVELOPMENT

Initial concepts/alternatives for improvements should be developed from reasonable options focused on addressing the project Purpose and Need and issues identified in the evaluation of existing and future conditions. These initial alternatives should be coordinated with input from the agency stakeholders, public input, and the technical input of the project team. The No Action alternative must be carried forward through the entire screening analysis as a baseline for comparison, even if it does not address the project Purpose and Need.

A PEL study may determine whether corridor managed lane strategies are appropriate when considering capacity improvement alternatives. The CDOT Managed Lanes Guidelines (<https://www.codot.gov/library/traffic/traffic-manuals-and-guidelines/traffic-guidelines-info/managed-lane-guidelines.pdf/view>) may be referenced for guidance on the planning process and documentation for managed lane strategies.

The alternatives development sets the stage for subsequent levels where alternative refinement and evaluation will occur with increasing amount of detail. At each level, the alternatives will be refined to match the overall goal of each level of analysis and alternatives may be removed from further analysis. This approach provides an efficient way to evaluate contextually appropriate alternatives at increasing levels of detail.

For long corridor with varying issues and surrounding environments, initial concepts/alternatives may be categorized for the first levels of screening, prior to compiling corridor-wide recommendations. Example categories include:

- highway
- intersections/interchanges
- multimodal elements
- corridor management
- technology

Alternatives are developed to respond to the project Purpose and Need and specific issues identified in the evaluation of existing and future conditions. They should consist of elements that CDOT and/or the partnering agencies have control over and not expand outside transportation.

The initial alternatives developed for the PEL study are expected to be high-level concepts without design details. Corridor alternatives may consist of simple alignments with a general cross-section. Intersection/interchanges may be general concepts (e.g. diamond interchange, roundabout, continuous flow intersection) utilizing simple illustrations or examples from other locations.



Planning and Environmental Linkages (PEL) Alternatives Evaluation Guidance

Project alternatives should be developed with a brief description of the key project components. Identifying the Purpose and Need elements addressed by each alternative helps to explain the reason for considering the alternative by clearly demonstrating the connection of the alternative to the project Purpose and Need. The following table can be used to document the alternatives to be considered by the study.

Project Alternatives

Fill in table with alternatives developed. Numbers assigned to alternatives are not required, but it will help keep references in reports brief, without needing to use full titles.

Alt #	Title	Description	Purpose and Need Elements Addressed
N/A	No Action Alternative		
1	<i>Alt 1 Title</i>		
2	<i>Alt 2 Title</i>		
3	<i>Alt 3 Title</i>		
4	<i>Alt 4 Title</i>		
5	<i>Alt 5 Title</i>		
6	<i>Alt 6 Title</i>		
7	<i>Alt 7 Title</i>		
8	<i>Alt 8 Title</i>		
9	<i>Alt 9 Title</i>		
10	<i>Alt 10 Title</i>		



Planning and Environmental Linkages (PEL) Alternatives Evaluation Guidance

EVALUATION OF TECHNOLOGY OPTIONS

PEL studies may evaluate and recommend operational strategies based on existing and reasonably anticipated technologies at the time of the study, either as stand-alone alternatives or supplemental options, to identify project recommendations that will optimize safety and operational benefits.

Due to the difference in type and magnitude of benefits and impacts, technology elements may be evaluated separately from the alternatives consisting of infrastructure options. The type and placement of new technology elements should properly integrate with existing Intelligent Transportation System (ITS) infrastructure. Technology options will supplement the safety and operational performance of corridor infrastructure improvements, but alone may be insufficient to meet project Purpose and Need. These options may be combined with corridor infrastructure improvements to identify project recommendations that will optimize safety and operational benefits.

The evaluation of the technology elements should focus on the criteria developed for the overall alternatives evaluation. The technology options remaining after this screening may be combined with the infrastructure improvements and further considered for the final recommendations, including specific locations for technology applications within the project area.

Examples of technology elements:

- Enhanced Signal Detection
- Adaptive Signal Control
- Transit Signal Priority
- Enhanced Communications Infrastructure
- Queue Warning System
- Ramp metering
- Dynamic Lane Use
- Variable Message Signs
- Variable Speed Limits
- Road Weather Information System
- Enhanced Lane Markings
- Wildlife Detection and Alert Systems

Due to the variance of applicability over future years, the technology concepts evaluated for the PEL study should consider potential time horizons. As new technologies arise,



Planning and Environmental Linkages (PEL) Alternatives Evaluation Guidance

recommendations and prioritized projects may move forward in the future as modified with the proven new transportation technologies.

Potential Time Horizons

- 5 years, 10 years, and 25 years
- 5%, 10%, or 25% Connected and Automated Vehicle (CAV) adoption
- Other milestones identified in applicable regional plans

EXAMPLE: Evaluation for Technology Options (WestConnect PEL Study)

CONCEPT	EVALUATION CRITERIA					
	SAFETY	TRAFFIC OPERATIONS	MULTIMODAL OPERATIONS AND CONNECTIVITY	COMMUNITY	ENVIRONMENTAL RESOURCES	IMPLEMENTABILITY
Ramp Metering	<ul style="list-style-type: none"> ■ Potential for reduced freeway rear-end and sideswipe crashes 	<ul style="list-style-type: none"> ■ Delayed onset of congestion on freeway ■ Limited ramp capacity may result in queues extending into cross-street/ramp intersection 	<ul style="list-style-type: none"> ■ Minimal multimodal benefits 	<ul style="list-style-type: none"> ■ Consistent with corridor context ■ Queues may impact arterial road operations within communities ■ Minimal to no property impacts 	<ul style="list-style-type: none"> ■ Potential air quality benefits 	<ul style="list-style-type: none"> ■ Relatively low to moderate cost for ramp capacity improvements
Wildlife Detection and Alert Systems	<ul style="list-style-type: none"> ■ Limited potential for reduced crashes with wild animals with existing technology 	<ul style="list-style-type: none"> ■ Limited operational benefits with high traffic volumes, speed and multi-lane roadways where driver responsiveness is reduced 	<ul style="list-style-type: none"> ■ Minimal multimodal benefits 	<ul style="list-style-type: none"> ■ Most applicable beyond local communities ■ Consistent with corridor context ■ Minimal to no property impacts 	<ul style="list-style-type: none"> ■ Potential wildlife benefits 	<ul style="list-style-type: none"> ■ Relatively moderate cost for animal detection and warning beacon interconnect system
Enhanced Communication Infrastructure	<ul style="list-style-type: none"> ■ Potential for reduced crashes by providing support for multiple information systems 	<ul style="list-style-type: none"> ■ Operational benefits with connectivity to numerous technologies and devices 	<ul style="list-style-type: none"> ■ Potential for multimodal operational enhancements 	<ul style="list-style-type: none"> ■ Consistent with corridor context ■ Minimal to moderate property impacts 	<ul style="list-style-type: none"> ■ Potential air quality benefits 	<ul style="list-style-type: none"> ■ Relatively moderate cost for significant fiber enhancements
Improved Traveler Information Signs	<ul style="list-style-type: none"> ■ Potential for reduced congestion- and weather-related crashes 	<ul style="list-style-type: none"> ■ Reduced congestion if vehicles take suggested alternate routes, predictable travel time 	<ul style="list-style-type: none"> ■ Potential for multimodal operational enhancements 	<ul style="list-style-type: none"> ■ Consistent with corridor context ■ Minimal to no property impacts 	<ul style="list-style-type: none"> ■ Potential air quality benefits 	<ul style="list-style-type: none"> ■ Relatively low to moderate cost for communication and power to signs
Enhanced Lane Markings	<ul style="list-style-type: none"> ■ Potential for reduced crashes 	<ul style="list-style-type: none"> ■ Operational benefits related to highway geometrics, lighting, and adverse weather 	<ul style="list-style-type: none"> ■ Enhances transit operations ■ Minimal pedestrian/bicyclist benefits 	<ul style="list-style-type: none"> ■ Consistent with corridor context ■ Minimal to no property impacts 	<ul style="list-style-type: none"> ■ Potential air quality benefits 	<ul style="list-style-type: none"> ■ Relatively low to moderate cost for materials and maintenance
Road/Weather Information Systems	<ul style="list-style-type: none"> ■ Potential for reduced weather-related crashes 	<ul style="list-style-type: none"> ■ Reduced congestion during inclement weather 	<ul style="list-style-type: none"> ■ Enhances transit operations ■ Minimal pedestrian/bicyclist benefits 	<ul style="list-style-type: none"> ■ Consistent with corridor context ■ Minimal to no property impacts 	<ul style="list-style-type: none"> ■ Potential air quality benefits 	<ul style="list-style-type: none"> ■ Relatively moderate to high cost for system equipment, communication, maintenance, and monitoring



Planning and Environmental Linkages (PEL) Alternatives Evaluation Guidance

EVALUATION OF SYSTEM MANAGEMENT OPTIONS

PEL studies should evaluate and recommend system management strategies based on existing and potential future area planning and agency programs, either as stand-alone alternatives or supplemental options to identify project recommendations that will optimize safety and operational benefits.

System management strategies focus on programs, plans, and minor infrastructure improvements. Examples of system management elements:

- Travel Demand Management (TDM) strategies
- Multimodal programs
- Freight management strategies
- Enhanced maintenance and operations programs
- Access management plan
- Incident management plan
- Event traffic management program
- Wildlife crossing infrastructure
- Snow fence

EXAMPLE: Evaluation for System Management Options (US 24 PEL Study)

SYSTEM MANAGEMENT ALTERNATIVE	RECOMMENDATION	SEGMENT				
		POWERS TO CONSTITUTION	CONSTITUTION TO FALCON	FALCON TO PEYTON	PEYTON TO CALHAN	CALHAN TO RAMAH
Falcon to Colorado Springs Transit Service	Carry Forward	■	■			
Peterson AFB to Colorado Springs Transit Service	Not Recommended	■	■			
Specialized Transportation Service Expansion	Carry Forward	■	■	■	■	■
Carpool Park-n-Ride	Carry Forward		(planned by others)		■	
Flextime Incentives	Carry Forward	■	■			
Veteran Transportation Information Services	Carry Forward	■	■	■	■	■
Vanpool	Carry Forward	■	■			
Stationless Bike Sharing System	Carry Forward	■	■			
Incident Management Plan	Carry Forward	■	■	■	■	■
Freight Management Strategies	Carry Forward (as part of highway alternatives)	■	■	■	■	■
Access Control Plan	Carry Forward	(exists)	(exists)	■	■	■
Enhanced Intersection Signage	Carry Forward				■	■



Planning and Environmental Linkages (PEL) Alternatives Evaluation Guidance

LEVEL I (PURPOSE AND NEED) SCREENING

The purpose of the Level I screening is to eliminate fatally flawed alternatives, alternatives that are considered unreasonable, or alternatives that do not meet the project Purpose and Need. Level I screening is supported by available data and initial broad data compiled for the study. During the Level I screening, alternatives are evaluated qualitatively using readily-available data and the professional judgment of the project engineering and planning staff. The screening may be completed with little to no additional data collection, in order to rule out unreasonable alternatives to avoid spending resources collecting unneeded data.

The PEL alternatives evaluation process is flexible - all levels of screening do not need to be completed for the study to be valuable at informing NEPA. The intent of a PEL study may be to identify alternatives that meet the project Purpose and Need. The study may conclude at the end of Level I screening by identifying reasonable alternatives meeting the Purpose and Need that may be considered in future NEPA processes.

Project Level I Evaluation Criteria

Level I screening criteria should be developed to screen concepts using the primary elements of the project Purpose and Need, using yes-or-no questions to determine if an alternative meets the Purpose and Need. An alternative/concept that has a “No” answer to any of the questions is considered to not fully meet the project Purpose and Need.

EXAMPLE: Level I Evaluation Criteria (SH 7 PEL Study)

In Level 1 evaluation, these elements were evaluated solely on their ability to effectively provide improvements for the transportation problems described in the purpose and need statement. The following questions were used to screen the elements:

- ▶ **Safety:** Does the element improve existing and future conditions that contribute to higher than expected crash rates?
- ▶ **Traffic Operations:** Can the element improve existing and future traffic operations?
- ▶ **Access:** Does the element improve existing access deficiencies and accommodate future access needs?
- ▶ **Alternative Travel Modes:** Does the element include infrastructure for alternative travel modes that is consistent with existing and future needs of the communities?



Planning and Environmental Linkages (PEL) Alternatives Evaluation Guidance

EXAMPLE: Level I Evaluation Criteria (US 34 PEL Study)

The Level 1 evaluation criteria were developed using the need categories of safety, travel demand, travel reliability, and local access and mobility. Concepts were evaluated by answering “yes” or “no” to the following questions to demonstrate each concept’s ability to meet the project Purpose and Need:

- Does the concept increase safety?
- Does the concept accommodate future travel demand?
- Does the concept increase travel reliability?
- Does the concept support local access and mobility?

Project Level I Screening Matrix

During the Level I screening, alternatives are usually evaluated qualitatively, primarily using available data and the professional judgment of the project engineering and planning staff. An alternative/concept that has a “No” answer to any of the questions is considered to not fully meet the project Purpose and Need. If a concept should be evaluated quantitatively and with more criteria in order to make an informed decision for recommendation, it can be carried forward to Level 2 screening for further evaluation. In order to identify the best solution possible, concepts can also be retained as elements to consider with alternatives that are carried forward to Level 2 screening. For example, a pedestrian/bicyclist grade separation may not fully meet the Purpose and Need as an independent alternative for a highway corridor, but it could be retained as an element to include in Level 2 alternatives to enhance multimodal safety and operational improvements along the corridor.

The following table can be used to create the Level I Screening Matrix for a PEL study.

EXAMPLE: Level I Screening Matrix (US 24 PEL Study)

<https://www.codot.gov/projects/archived-project-sites/us-24-pel-study/assets/us-24-final-alternatives-report-10-15-2017>

EXAMPLE: Level I Screening Matrix with retained elements (WestConnect PEL Study):

<https://www.codot.gov/library/studies/westconnect-coalition-pel-study/assets/final-alternatives-report>



Planning and Environmental Linkages (PEL) Alternatives Evaluation Guidance

Level I Screening Matrix

Fill in matrix by answering “Yes” or “No” to the questions developed as the Level I Evaluation Criteria for each Alternative. A brief explanation for a “No” answer may be provided with the answer and/or in the Notes.

Evaluation Criteria	Alternatives										
	N/A	1	2	3	4	5	6	7	8	9	10
	No Action	Alt 1 Title	Alt 2 Title	Alt 3 Title	Alt 4 Title	Alt 5 Title	Alt 6 Title	Alt 7 Title	Alt 8 Title	Alt 9 Title	Alt 10 Title
Question 1	Yes or No	Yes or No	Yes or No	Yes or No	Yes or No	Yes or No	Yes or No	Yes or No	Yes or No	Yes or No	Yes or No
Question 2	Yes or No	Yes or No	Yes or No	Yes or No	Yes or No	Yes or No	Yes or No	Yes or No	Yes or No	Yes or No	Yes or No
Question 3	Yes or No	Yes or No	Yes or No	Yes or No	Yes or No	Yes or No	Yes or No	Yes or No	Yes or No	Yes or No	Yes or No
Question 4	Yes or No	Yes or No	Yes or No	Yes or No	Yes or No	Yes or No	Yes or No	Yes or No	Yes or No	Yes or No	Yes or No
Question 5	Yes or No	Yes or No	Yes or No	Yes or No	Yes or No	Yes or No	Yes or No	Yes or No	Yes or No	Yes or No	Yes or No
RESULTS	Retained										
Notes											

Possible results:

- **Eliminated** = Does not meet Purpose and Need, has a fatal flaw, and/or is considered unreasonable (with notes provided on reasons)
- **Retained or Carried Forward** = Carried forward for further evaluation in Level 2 screening
- **Retained as an Element or Eliminated as a Stand-Alone** = Does not fully meet Purpose and Need, but will be evaluated as a packaged element of larger-scale alternative



Planning and Environmental Linkages (PEL) Alternatives Evaluation Guidance

LEVEL 2 (COMPARATIVE) SCREENING

The purpose of the Level 2 screening is to establish a means for comparing how well alternatives perform in meeting the project Purpose and Need in a cost-effective and least environmentally harmful manner. Concepts/alternatives carried forward from the Level 1 screening may be combined and/or refined to provide more information for further assessment in the Level 2 screening. More information can be added, as appropriate, to understand the projected study area traffic flows and potential safety components and community and environmental benefits and impacts, but the level of design should remain at a conceptual level. In order to compare the impacts of alternatives, cross-sections and/or conceptual alignments may be developed with right-of-way width assumptions for each alternative based on appropriate standards for the roadway classification and multimodal elements.

The Level 2 screening expands measures for each evaluation criterion from Level 1 screening and provides additional screening criteria based on the project goals. A “category” refers to the main elements of the project Purpose and Need, plus Goals (e.g., Safety, Traffic Operations, Multimodal Connectivity, Community, Environmental Resources). Performance measures are developed to compare each alternative against the evaluation criteria. These measures can be a mix of qualitative and quantitative assessments and should be chosen based on the availability of data and the high-level conceptual level of design and analysis at this stage of development. For example, specific environmental resource impacts are not known/collected at this stage of a project, so acres of wetland impact would not be used as a performance measure. At the PEL study stage, extensive traffic modeling is not required and usually not preferred when other methods are available. For example, evaluation criteria and performance measures for travel demand and reliability for a corridor can utilize the available regional travel demand model to compare alternatives. Project cost should only be considered as an evaluation criterion with a high-level assessment of general magnitude of cost (i.e., low, moderate, high, very high). Magnitude of costs are for information only and alternatives should not be screened out based solely on project cost.

The following table can be used to document the Level 2 screening criteria for the evaluation.

Project Level 2 Evaluation Criteria

Fill in criteria based on project Purpose and Need and Goals.

Category	Criteria	Performance Measure
<i>Category</i>	<i>Evaluation Criteria</i>	<i>Performance Measure</i>
<i>Category</i>	<i>Evaluation Criteria</i>	<i>Performance Measure</i>
<i>Category</i>	<i>Evaluation Criteria</i>	<i>Performance Measure</i>
<i>Category</i>	<i>Evaluation Criteria</i>	<i>Performance Measure</i>



Planning and Environmental Linkages (PEL) Alternatives Evaluation Guidance

EXAMPLE: Level 2 Evaluation Criteria and Performance Measures (US 34 PEL Study)

Category	Criteria	Performance Measure (Measurement)
Safety	• Reduce crashes	Vehicle/vehicle conflict points (change)
	• Reduce crash severity	Vehicle/pedestrian-bicycle conflict points (change)
	• Enhance pedestrian/bike safety	Projected total number of crashes (change)
	• Improve roadway geometry	Projected number of injury and/or fatal crashes (change)
Travel Demand	• Reduce congestion	Change in Vehicle Miles Traveled (VMT) (qualitative)
	• Serve demand	Level of Service (LOS) (change)
		Vehicle Hours of Delay (VHD) (hours)
Reliability	• Improve travel reliability	TTI (ratio)
	• Provide emergency access for adjacent communities	Travel Time by location/segment (percent change/minutes)
	• Quality of traffic operations	
Mobility	• Provide local and regional route connectivity	Access to transit facilities (qualitative)
	• Enhance non-motorized opportunities	Reduce barriers for north/south pedestrian and bicycle travel (qualitative)
	• Provide additional travel choices	Improve continuity for east/west bicycle and pedestrian travel (qualitative)
	• Improve bicycle connectivity	
	• Ability to not preclude transit/rail options	
Freight	• Accommodate truck requirements	Minimize turning restrictions and/or out-of-direction travel (yes/no)
		Geometry accommodates truck turning movements (yes/no)
Environmental	• Identification of environmental effects	Relative environmental effects (Good, Fair, Poor)
Community, Land Use, and Transportation Priorities	• Included in community land use and transportation plans	Sufficient ROW to accommodate planned transportation projects, including ACP items (Good, Fair, Poor)
		Consistent with local plans (qualitative)
		Consistent with ACP (qualitative)
		Support economic development (qualitative)



Planning and Environmental Linkages (PEL) Alternatives Evaluation Guidance

EXAMPLE: Level 2 Evaluation Criteria and Performance Measures (WestConnect PEL Study)

CATEGORY	CRITERIA	PERFORMANCE MEASURE
Safety	Ability to address identified unsafe physical or operational conditions	Qualitative assessment of expected change in frequency and severity of crashes at locations identified in Safety Assessment Report
	Potential multimodal conflict points	Vehicular, pedestrian, and bicyclist conflict points at intersections Qualitative assessment of pedestrian and bicyclist perception of comfort and safety
Traffic Operations	Roadway capacity related to 2040 travel demand	Volume-to-capacity (V/C) ratio for the highway options for 2040 daily traffic volumes
	Intersection delay during 2040 peak hours	Overall intersection Level of Service (LOS) for 2040 AM and PM peak hours
Multimodal Operations and Connectivity	Enhanced regional biking and walking options	New infrastructure and/or wayfinding provided for pedestrians and bicyclists
	Enhanced transit options	Additional routes, frequency, and/or stop enhancements
Community	Design and operational context related to local community surroundings	Qualitative assessment of consistency of infrastructure and operations with existing and future local surroundings
	Impacts on existing properties	Number of properties that may be impacted based on conceptual layout Acres of properties that may be impacted based on conceptual layout
	Support of local and regional planning efforts	Noted consistencies and inconsistencies with recommendations within documented plans as identified in Corridor Conditions Report
Environmental Resources	Impacts on environmental resources within the built and natural environment	Qualitative and quantitative assessment of notable benefits and/or impacts to environmental resources based on existing conditions identified in Environmental Scan Report
Implementability	Construction costs	Assessment of conceptual-level probable construction costs (low, moderate, high, very high)
	Ease and cost of maintenance	Assessment of ease and accessibility for maintenance and conceptual-level probable maintenance costs (low, moderate, high, very high)



Planning and Environmental Linkages (PEL) Alternatives Evaluation Guidance

Project Level 2 Screening Matrix

In Level 2 screening, the alternatives are evaluated to identify fatal flaws related to infeasibility or unacceptable community or environmental impacts and to compare how well each concept meets the project Purpose and Need and goals. The results of the Level 2 screening identifies the alternatives that are most practical or feasible to carry forward as study recommendations.

The following table can be used to create the Level 2 Screening Matrix for a PEL study.

EXAMPLE: Level 2 Screening Matrix (WestConnect PEL Study)

<https://www.codot.gov/library/studies/westconnect-coalition-pel-study/assets/final-alternatives-report>

EXAMPLE: Level 2 Screening Matrix (I-70/Kipling Interchange PEL Study)

<https://www.codot.gov/library/studies/study-archives/i70kiplingpel/final-reports/revised-final-i-70-kipling-alternatives-development-and-analysis-report-june-2013/view>



Planning and Environmental Linkages (PEL) Alternatives Evaluation Guidance

Level 2 Screening Matrix

Fill in matrix with qualitative and/or quantitative results for Evaluation Criteria and Performance Measure for each Alternative. A brief explanation for the overall Result should be provided in the Notes.

Category	Evaluation Criteria	Alternatives					
		N/A	1	2	3	4	5
		No Action	Alt 1 Title	Alt 2 Title	Alt 3 Title	Alt 4 Title	Alt 5 Title
Category	Evaluation Criteria						
Category	Evaluation Criteria						
Category	Evaluation Criteria						
Category	Evaluation Criteria						
Category	Evaluation Criteria						
RESULTS		Retained					
Notes							

Possible results:

Eliminated = Does not meet Purpose and Need established with this study or the alternative is unreasonable due to impacts and/or infeasibility

Carried Forward = Considered reasonable and feasible and may be considered for further evaluation in this study or subsequent NEPA and project development

Recommended = Considered reasonable and feasible and recommended for consideration as the Preferred Alternative during subsequent NEPA and project development

Not Recommended = Will not be evaluated further in this study due to comparatively negligible benefits and higher impacts than other alternatives, but may be studied further with subsequent NEPA and project development



Planning and Environmental Linkages (PEL) Alternatives Evaluation Guidance

LEVEL 3 (DETAILED) EVALUATION AND BEYOND

Most PEL studies do not include alternatives evaluation past the Level 2 screening. However, the alternatives carried forward from Level 2 screening may be further evaluated to provide more information on the benefits and impacts of the potential study recommendations, including more information for conceptual cost estimates and potential right-of-way impacts. If needed, the Level 3, Level 4, and further evaluations would expand measures for differentiating evaluation criteria from Level 2 screening and would provide additional detailed information to facilitate future project development.

Differentiating evaluation criteria are criteria that show a difference between alternatives/options. By the end of Level 2 screening, the alternatives carried forward will have similar results for many evaluation criteria. There may not be a need to continue to evaluate the alternatives against those non-differentiating criteria, unless the information provided would be helpful with future project development, such as right-of-way needs for cost estimates and potential environmental impacts for future environmental documentation scoping.

Level 3 and Level 4 evaluation may be completed for long and/or complicated corridors with an alternatives evaluation that separated modes or other elements. The further evaluation would consider the compilation of the elements into compiled corridor alternatives.

EXAMPLE: Level 3A Evaluation (SH 7 PEL Study)

<https://www.codot.gov/library/studies/study-archives/sh7pel/final-pel-study-report/appendix-c-evaluation-results/view>



Planning and Environmental Linkages (PEL) Alternatives Evaluation Guidance

SUMMARY OF RESULTS

A PEL study is not required to screen alternatives down to a single Recommended Alternative. **Most PEL studies conclude with several Recommended Alternatives.** Even so, all of the Recommended Alternatives from a PEL study are not required to be evaluated in NEPA. Results of the alternatives evaluation should be clear on the study recommendations that may move forward into future study. Next steps should be outlined for potential implementation of the Recommended Alternatives and/or separate project phases, including anticipated process requirements and conceptual costs.

If managed are considered with the alternatives evaluation, the PEL study documentation should include a memorandum outlining the decision on managed lanes with the completed CDOT Managed Lanes Decision Form. When managed lanes have been evaluated in a previous PEL study, additional evaluation is not required within the following NEPA study.

The following table can be used to document the next steps for the Recommended Alternatives or project phases.

Recommended Alternatives Next Steps

Recommended Alternative or Project Phase	Description	Next Steps		
		Potential Environmental Resources Affected	Expected Process or Requirements	Conceptual Cost Estimates



Planning and Environmental Linkages (PEL) Alternatives Evaluation Guidance

EXAMPLE: Recommended Alternative Next Steps (I-70/Kipling Interchange PEL Study)

Criteria	Separate Project Phase				
	Westbound Off Ramp	Westbound On and Off Ramps	All Ramps (bridge not replaced)	South Half of Interchange	Relocated South Frontage Road
Independent Utility	Yes Project provides operational and safety benefits independent of the completion other phases				
Purpose and Need Elements	<ul style="list-style-type: none"> • Reduces congestion • Optimizes operations • Improves safety • Accommodates multimodal connections 				
Potential Environmental Resources Affected	Potential impacts to Hazardous Materials & Wells	Potential impacts to Hazardous Materials & Wells	Potential impacts to Hazardous Materials, Wells, Wetlands, Noise	Potential impacts to Hazardous Materials, Wells, Wetlands, Noise	Potential impacts to Hazardous Materials, Wells, Noise
Potential Mitigation Requirements	Standard BMPs during construction Avoidance/relocation of wells	Standard BMPs during construction Avoidance/relocation of wells	Standard BMPs during construction Avoidance/relocation of wells Noise mitigation 404 permitting	Standard BMPs during construction Avoidance/relocation of wells Noise mitigation 404 permitting	Standard BMPs during construction Avoidance/relocation of wells Noise mitigation
ROW Impacts	Full = 0.5 acres Partial = 0.3 acres Total = 0.8 acres	Full = 0.5 acres Partial = 0.5 acres Total = 1.0 acres	Full = 6.8 acres Partial = 0.8 acres Total = 7.6 acres	Full = 6.3 acres Partial = 0.4 acres Total = 6.7 acres	Full = 6.3 acres Partial = 0.4 acres Total = 6.7 acres
Construction Duration	3 months	6 months	12 months	8 months	6 months
Conceptual Cost Estimate	Construction=\$5.4 M ROW = \$1.2 M Total = \$6.6 M	Construction=\$7.1 M ROW = \$1.4 M Total = \$8.5 M	Construction=\$15.1 M ROW = \$11.0 M Total = \$26.1 M	Construction=\$8.0 M ROW = \$8.8 M Total = \$16.8 M	Construction=\$4.7 M ROW = \$8.8 M Total = \$13.5 M