Attachment E

Federal Highway Administration
Planning and Environmental Linkages Questionnaire

April 2020

I-25 Central PEL

Federal Highway Administration Planning and Environmental Linkages Questionnaire

April 2020

This questionnaire is intended to act as a summary of the Planning process and ease the transition from the planning study to a NEPA analysis. Often, there is no overlap in personnel between the planning and NEPA phases of a project, and much (or all) of the history of decisions, etc. is not passed along. Different planning processes take projects through analysis at different levels of detail. Without knowing how far, or in how much detail a planning study went, NEPA project teams often re-do work that has already been done.

Planning teams need to be cautious during the alternative screen process; alternative screening should focus on purpose and need/corridor vision, fatal flaw analysis and possibly mode selection. This may help minimize problems during discussions with resource agencies. Alternatives that have fatal flaws or do not meet the purpose and need/corridor vision cannot be considered viable alternatives, even if they reduce impacts to a particular resource. This questionnaire is consistent with 23 CFR 450 (Planning regulations) and other FHWA policy on Planning and Environmental Linkage process.

Instructions: These questions should be used as a guide throughout the planning process. The questionnaire should be filled out as the study progresses. It is a beneficial tool to keep leadership and program managers up to date on a study's progress. When a PEL study (i.e. corridor study) is started, this questionnaire will be given to the project team. Some of the basic questions to consider are: "What did you do?", "What didn't you do?" and "Why?". When the team submits the study to FHWA for review, the completed questionnaire will be included with the submittal. FHWA will use this questionnaire to assist in determining if an effective PEL process has been applied before NEPA processes are authorized to begin. The questionnaire should be included in the planning document as an executive summary, chapter, or appendix.

1. Background

a. What is the name of the PEL document and other identifying project information (e.g. sub-account or STIP numbers)?

I-25 Central Planning and Environmental Linkages (PEL) Study
CDOT Project No: NHPP 0252-461 CODE: 21840

b. Who is the lead agency for the study? (FHWA, FTA, CDOT, Local Agency)

CDOT is the lead agency for the study

c. Provide a brief chronology of the planning activities (PEL study) including the year(s) the studies were conducted.

- I-25 Central PEL, Existing Conditions Assessment – April 2019
- I-25 Central Planning and Environmental Linkages Study Report – March 2020

d. Provide a description of the existing transportation corridor, including project limits, modes, number of lanes, shoulder, access control and surrounding environment (urban vs. rural, residential vs. commercial, etc.)

Interstate 25 (I-25) in the study area, for approximately 4.5 miles between Santa Fe Drive/US 85 and 20th Street, has a prevailing cross-section of four through lanes in each direction with both an inside and outside shoulder with nine grade-separated interchanges. Some sections also contain one or more auxiliary lanes. The I-25 corridor parallels the South Platte River and Greenway Trail on the west side; crosses many local roadways, bike routes, and rail and bus transit corridors; and is adjacent to downtown Denver, residential and commercial neighborhoods, and areas of ongoing or potential redevelopment.

The I-25 Central PEL Study includes nine interchanges:

- 20th Street
- Speer Boulevard
- 23rd Avenue
- 17th Avenue
- Colfax Avenue, Auraria Parkway, and Walnut Street
- 8th Avenue Interchange
- US 6/6th Avenue
- Alameda Avenue
- Santa Fe Drive//US 85

e. Who was the sponsor of the PEL study? (CDOT, Local Agency, Other)

Colorado Department of Transportation (CDOT), Region 1

f. Who was included on the study team (Name and title of agency representatives, consultants, etc.)?

Project Management Team*

CDOT

Steve Sherman,
Resident Engineer, Region 1 Central Program
CDOT Project Manager

Jay Hendrickson,
Program Engineer, Region 1 Central Program

Jessica Myklebust,
Regional Environmental Manager, Region 1

Danny Herrmann,
Planning, Region 1

JoAnn Mattson,
Planning, Region 1

Bruce Naylor,
Engineering, Region 1 Central Program

Tamara Rollison,
Communications Manager, Region 1

Paul Scherner,
Traffic Operations, Region 1

Chris Enright,
Engineering, Region 1 Central Program

Nick Farber,
Director, High-Performance Transportation Enterprise (HPTE)

FHWA

Chris Horn,
Senior Area Engineer, Colorado Division

Denver

Karen Good,
Transportation Project Manager, Denver Department of Transportation and Infrastructure

Steve Markovetz,
Principal Mobility Engineer, Denver Department of Transportation and Infrastructure

**Members of the Project Management Team were also involved in the Technical Advisory Committee, Executive Oversight Committee, and Stakeholder Focus Group*

Technical Advisory Committee

CDOT

Jason Wallis (formerly with CDOT),
Senior Manager, Freight

FHWA

Tricia Sergeson,
Transportation Specialist, Colorado Division

Denver

Steve Nalley (formerly with Denver),
Neighborhood Planning Manager

Gordon Robertson,
Director of Park Planning & Design

Jeff Romine (formerly with Denver),
Chief Economist

Denver Regional Council of Governments

Steve Cook,
Transportation Modeling and Operations Manager

Regional Transportation District

Lee Cryer,
Planning Project Manager

Colorado Motor Carriers Association

Tracy Sakaguchi,
Director of State Issues & Special Events Coordinator

Executive Oversight Committee	
CDOT Paul Jesaitis, Transportation Director, Region 1 Angie Drumm, Deputy Director, Transportation Systems Management & Operations Richard Zamora, Deputy Director for Program Delivery, Region 1 **FHWA** Vershun Tolliver, Assistant Division Administrator Shaun Cutting, Program Delivery Team Leader	**Denver** Eulois Cleckley, Executive Director, Department of Transportation and Infrastructure Lesley Thomas, City Engineer/Deputy Director, Department of Transportation and Infrastructure **Denver Regional Council of Governments** Ron Papsdorf, Director of Transportation Planning and Operations

Consultant Team		
Atkins Carrie Wallis Kirk Webb Jamie Archambeau Stephen Harris Devin Louie **HDR** Jason Longsdorf Chau Nguyen Chris Primus Chris Proud Ian Chase Wendy Wallach	**HG Consult Inc** Jerry Mugg **CDR Associates** Jonathan Bartsch Jeffrey Range Emily Zmak **Two Hundred** Marjorie Alexander Kendall Peterson **Livable Cities** Meredith Wenskoski	**Pinyon** Michelle Marin Amy Kennedy **CORVUS** Mary Powell **Survey and Mapping** Ron Ilk Kevin Williams **All Traffic Data** Eric Boivin

g. List the recent, current or near future planning studies or projects in the vicinity? What is the relationship of this project to those studies/projects?

Attachment A, *Existing Conditions Assessment Report* of the PEL Study Report includes a full list of the studies completed by CDOT, City and County of Denver (Denver) or other entities that were reviewed to determine if their recommendations would influence this PEL process. Most of those had little to no information that changed the process or considerations.

However, some of the more recent studies did provide usable data that was incorporated into our existing conditions data collection processes. Other plans made recommendations for infrastructure or operational improvements in the corridor that have not yet been done.

Those recommendations were considered during our alternatives development and screening. Those studies included:

CDOT Studies

- I-25 Valley Highway Environmental Impact Statement (EIS) (2006) and Record of Decision (ROD) 1 (2007).
- Draft Structure Selection Report, 23rd Avenue Over I-25 and Speer Boulevard Over I-25 (2013)
- 23rd Avenue over I-25 Structure Pre-Scoping Report (2014)
- Speer Boulevard over I-25 Structure Pre-Scoping Report (2014)
- Corridor Operations and Bottleneck Reduction Assistance (COBRA) Technical Reports
- I-25 Northbound On-Ramp at Cedar Avenue (2016)
- US 6 and Southbound I-25 Merge Area (2016)
- I-25 and Mulberry (2017) (*Mulberry St. is the location of the NB I-25 on ramp for the 8th Avenue interchange)*
- Express Lanes Master Plan (anticipated 2020)

Denver Studies

- Baker Neighborhood Plan (2003)
- Jefferson Park Neighborhood Plan (2005)
- Denver Strategic Transportation Plan—Moving People (2008)
- Denver South Platte Corridor Study (2013)
- Transit Oriented Denver—Transit Oriented Development Strategic Plan (2014)
- Denver Moves: Enhanced Bikeways (2016)
- Denver's Mobility Action Plan (2017)
- Denver Downtown Area Plan Amendment, Central Platte Valley—Auraria District (2018)

Other Studies

- Denver Area Regional Bus Facility Study (2015)
- Auraria Higher Education Master Plan (2017)
- Denver Regional Council of Governments 2040 Regional Transportation Plan (2019)

2. Methodology used

a. Did the Study follow the FHWA PEL Process? If the Study was conducted by another US DOT Agency, provide a crosswalk table to demonstrate how the FHWA Process was utilized.

The study followed the FHWA PEL Process.

b. How did the Study meet each of the PEL Coordination Points identified in 23 USC 168?

FHWA and CDOT officials met prior to kicking off the process to determine that a PEL Study was the appropriate planning process for this project.

The study team utilized the Executive Oversight Committee as the body which convened senior officials from FHWA, CDOT, and Denver to review, comment on and endorse the Purpose and Need statement as well as the alternatives development and screening process. Meeting minutes documented those discussions and endorsements (See 2E for exact dates).

All three agencies were provided copies of the draft PEL Report in January/February 2020 to review and comment on. Revisions were made based on those comments and incorporated into the Final PEL Report.

c. What NEPA terminology/language was used and how did you define them? (Provide examples or list)

- Purpose and Need Statement
  Defined the project intent and the problems to be addressed
- Goals and Objectives
  Broad criteria that provided the evaluation framework
- No-Action Alternative
  Alternative that would leave the transportation system as it currently is without any improvements
- Screening Criteria
  Evaluation measures derived to assess an alternative's ability to address the Purpose and Need of the project
- Carried Forward

  Alternative has the potential to address one or more project needs and will be evaluated further as part of corridor alternative with additional definition and conceptual design
- Recommended

  Alternatives selected for further analysis and to advance to a future NEPA study based on the last level of screening
- Not Recommended

  Alternatives concepts that were removed from consideration for further evaluation and not recommended for implementation on I-25 due to comparatively negligible benefits, and/or higher impacts than other options.
- Eliminated

  Alternatives concepts that do not meet the Purpose and Need established within this study

  Eliminated as a Standalone Alternative
  Alternative concepts were eliminated, but specific elements were carried forward for incorporation into other alternative concepts
- Mitigation Strategies
  Describes the anticipated commitments to address community and environmental resources impacted by the Recommended Alternatives

d. How do you see these terms being used in NEPA documents?

These terms will be used in NEPA documents as defined in the PEL Study Report, with the exception of the Recommended Alternatives. Instead, the NEPA process will result in a single Preferred Alternative.

e. What were the key steps and coordination points in the PEL decision-making process? Who were the decision-makers and who else participated in those key steps? For example, for the corridor vision, the decision was made by CDOT and the local agency, with buy-in from FHWA, the Corps, and USFWS.

As the study's decision-making group, the Executive Oversight Committee (EOC) met four times at the key steps in the process listed below. The EOC was made up of policy-level representatives of Denver, CDOT, Denver Regional Council of Governments (DRCOG), and FHWA. These agencies provided concurrence on these milestones and deliverables:

- EOC Meeting #1 (May 2018): Purpose & Need, goals and objectives, and existing conditions
- EOC Meeting #2 (Nov 2018): Level 1 Evaluation Results
- EOC Meeting #3 (April 2019): Level 2 Evaluation Results
- EOC Meeting #4 (November 2019) Recommended Alternatives

f. How should the PEL information below be presented in NEPA?

The PEL information presented below should be presented in NEPA in a similar fashion as it was used in the PEL Study Report. Additional detail will be available as the design and data collection for individual projects progresses.

3. Agency coordination

a. Provide a synopsis of coordination with federal, tribal, state and local environmental, regulatory and resource agencies. Describe their level of participation and how you coordinated with them.

Coordination with agencies occurred primarily at meetings.

FHWA was involved to assure that the PEL process followed relevant federal guidelines and methodologies in all of the following meetings:

- EOC meetings
- Project Management Team (PMT) meetings
- Technical Advisory Committee (TAC) meetings
- Specific issue meetings

CDOT staff directed the project and provided staff with specific resource expertise to support technical analyses and provide input at the following meetings:

- EOC meetings
- PMT meetings

- TAC meetings
- Specific issue meetings (various departments)

Denver's Department of Transportation and Infrastructure staff coordinated input from several different departments on all aspects of the study, including endorsement of each milestone at the EOC. Denver staff participated in the following meetings:

- EOC meetings
- PMT meetings
- TAC meetings
- Specific issue meetings (various departments)

DRCOG staff provided input on traffic forecasting as wells as other aspects of the study, including endorsement of each milestone at the EOC. DRCOG staff participated in the following meetings:

- EOC meetings
- TAC meetings
- Specific issues (Traffic Task Force) meetings

RTD staff provided input on transit forecasting and alternatives development. RTD staff participated in the following meetings

- TAC meetings
- Specific issue meetings (Transit)

More information and specific dates of meetings can be found in Attachment D, *Agency Coordination and Public Coordination Summary* of the PEL Study Report.

b. What transportation agencies (e.g. for adjacent jurisdictions) did you coordinate with or were involved during the PEL study? This includes all federal agencies if the study is being led by a local agency or transit-oriented study seeking to utilize the FHWA PEL Process.

- FHWA
- CDOT
- Denver
- RTD
- DRCOG
- High Performance Transportation Enterprise (HPTE)

c. What steps will need to be taken with each agency during NEPA scoping?

CDOT. Will be the lead agency for individual projects developed within the corridor.

FHWA. Will assist CDOT in determining the class of NEPA action that will be developed for the corridor and/or individual projects. FHWA will be the lead agency when there is an FHWA action related to an individual project.

Denver. Will assist CDOT as a technical and/or financial partner on projects that will impact Denver owned infrastructure. May lead efforts to reconstruct surrounding vehicular or trail assets owned by Denver.

RTD. Will assist CDOT as a technical and/or financial partner on projects that will impact RTD owned infrastructure.

DRCOG. May facilitate financing of certain projects if they are awarded regional Transportation Improvement Program (TIP) funding.

HPTE. Will assist CDOT as a technical and/or financial partner on projects that will impact Express Lane facilities.

4. Public coordination

a. Provide a synopsis and table of your coordination efforts with the public and stakeholders.

General Public

The general public was engaged through the following activities:

Activity	Timing and Results
Project website with online comment form and link to survey	Ongoing throughout PEL study
Online survey hosted on SurveyMonkey	Ongoing throughout PEL study: 1,425 responses
Email blasts to project distribution list	4 times: 434 addresses at study conclusion
Presentations at community and stakeholder organizations	13 held
Project videos posted on website and CDOT's YouTube account	Two posted
Public Open House	June 6, 2019: 55 total registered attendees Information Tables provided information on these topics: Alternatives and Evaluation, Bike and Pedestrian, Environmental Resources, Land Use and Community, Traffic and Safety, Transit. 16 comment cards were submitted with feedback regarding the following topics: additional lanes, alternative modes of transportation, congestion pricing and transportation demand management, managed lanes, bridges, environment, cross connectivity, future orientation, and safety.

Stakeholders

At the start of the project, approximately 20 interviews were conducted with key stakeholders to understand their respective interests, goals, issues, and desired outcomes for the study. Interview summaries are included in Attachment D, *Agency Coordination and Public Participation* of the PEL Study Report.

Many of the interviewees became part of the Stakeholder Focus Group (SFG) that met four times throughout the study at study milestones. The SFG included the following organizations

- Athmar Park Neighborhood Association, Ken Knob lock
- Auraria Campus, Carl Meese, Barb Weiske
- Dazbog Coffee, Max Mattison
- Baker Neighborhood Association, Tim Lopez, Keven Sniokaitis
- Citizen/Subject Matter Expert, Kathleen Osher
- Denver Aquarium, Chad Ashley
- Denver Broncos, Mac Freeman, Austin Zilis
- Denver Children's Museum, John Handwork
- Denver Housing Authority, Stella Madrid, Chris Spelke
- Denver Inter-Neighborhood Cooperation, Ean Tofoya, Geneva Hooten
- Downtown Denver Partnership, Andrew Iltis, Adam Perkins
- Elitch Gardens, Rhys Duggan
- Greenway Foundation, Jeff Shoemaker
- Highland United Neighbors Inc., Tim Boers, Melissa Traynham
- La Alma/Lincoln Park Neighborhood Association, Dave Keough, Christine Sprague
- Lower Downtown Neighborhood Association, Andy Davis, Jack Tone
- Metropolitan Football Stadium District, Matt Sugar
- Pepsi Center, David Foster, Michelle Berger
- Jefferson Park United Neighbors, Jeff Archambeau, Michael Guiietz
- Joshua Station, Amy Jackson
- Mile High Ministries, Jeff Johnsen, Dylan Skeadas
- Santa Fe Drive Redevelopment Corporation, Andrea Barela
- Sportsfan Shops, Derek Freeman
- Sun Valley Community Coalition, Jeanne Granville
- Union Station Advocates, Jim Graebner
- Valverde Neighborhood Association, Maureen McCanna, Yara Vaneau
- Walk Denver, Jill Locantore
- West Corridor Transportation Management Association, Mike Hughes

SFG Meeting	Purpose of Meeting	Participation
SFG #1 Introduction to Study July 12, 2018	The group was provided a project overview, including the group's role in the process, discussed the project goals and objectives, and shared concerns and ideas for the study. The group provided feedback that the roads crossing the corridor were as important to consider as the I-25 mainline	20 stakeholder organizations/ groups were represented.
SFG Meeting #2: Alternative Creation and Level 1 Evaluation Results December 13, 2018	The group was provided an overview of the study schedule and progress to date; and an overview of the alternatives development and evaluation process, including the results of the Level 1 evaluation; and watched a video about PEL studies. Participants provided questions and concerns from their respective organizations, participated in electronic polling, and provided feedback on the Level 1 process and alternatives.	21 stakeholder organizations/ groups were represented.
SFG Meeting #3: Level 2 Evaluation Results April 18, 2019	The group was provided an overview of the public involvement activities conducted to date, a synopsis of how the group's input had been considered during the study process, an overview of the Level 2 evaluation process and results, and a preview of the Level 3 evaluation. Attendees participated in roundtable discussions regarding environmental resources, land use and community, transit, bike and pedestrian, traffic and safety, and alternatives evaluation.	22 stakeholder organizations/ groups were represented.
SFG Meeting #4: Level 4 Evaluation Results and Study Conclusion November 14, 2019	The group was provided an update on the study, including public involvement the Level 3 evaluation and results, process, results of the sensitivity analyses. Attendees participated in small groups to discuss and provide feedback on traffic and safety, potential community benefits and impacts, and engineering feasibility and potential implementation options.	22 stakeholder organizations/ groups were represented.

The materials, presentations, and meeting summaries for the SFG meetings can be found here: https://www.codot.gov/projects/i-25-santa-fe-20th-street-pel/public-involvement.

Attachment D, *Agency Coordination and Public Participation* of the PEL Study Report has more detail regarding the public and stakeholder coordination.

5. Corridor Vision/Purpose and Need

a. What was the scope of the PEL study and the reason for doing it?

The scope of this PEL study includes:

- Identification of corridor purpose and needs and goals and objectives for the corridor
- Development of efficient and cost-effective solutions and environmental stewardship
- Evaluation of potential improvement projects
- Development and prioritization of an implementation plan for potential projects

The reason for doing the study was to give FHWA, CDOT, and Denver a clear understanding of the transportation problems in the corridor, a collaboratively developed vision for the future, and potential projects to implement that vision. The study conclusions will aid the decision-making process around development of future projects and will provide initial background and input to the NEPA and design processes.

Previous studies that were most crucial to developing the scope of the PEL and the reasons for doing it are the following:

- I-25 Valley Highway Environmental Impact Statement (EIS) (2006) and Record of Decision (ROD) 1 (2007). ROD 1 completed improvements around Santa Fe Drive/US 85 and Alameda Avenue. Funding for remaining I-25 improvements identified in the EIS has yet to be identified.
- I-25 Valley Highway Logan to US 6 (US 6 Bridges Design Build Project) ROD 2 (2013). ROD 2 completed improvements around the I-25 and US 6 interchange. Funding for remaining I-25 improvements identified in EIS has yet to be identified.
- Draft Structure Selection Report, 23rd Avenue Over I-25 and Speer Boulevard Over I-25 (2013). The report recommended basic preservation measures and spot repairs for the 23rd Avenue and Speer Boulevard bridges with the understanding that the bridges would be fully replaced within 12 years.
- DRCOG 2040 Regional Transportation Plan (2019). The plan calls out the need for major improvements of freeway interchanges at I-25/Alameda Avenue/Santa Fe Drive/US Route 6.

b. What is the vision for the corridor?

The corridor-wide improvements and potential projects presented in the study provide a long-term vision for the corridor that uses a mix of managed lanes, mainline improvements, and interchange and ramp modifications to improve congestion, travel time reliability, safety, and operations on I-25.

c. What were the goals and objectives?

Goals and Objectives

The Goals and objectives further aided the definition and evaluation of the alternatives. The goals and objectives included the following:

Environment

- Are there impacts or benefits to the natural environment?
- Are there impacts or benefits to the social and built environment?

Future Flexibility and Technology

- Could the alternative accommodate future physical changes to the roadway (restriping, new lane assignments, new technology infrastructure, etc.)?

Planning Context

- How well does the alternative accommodate future land use changes?

d. What is the PEL Purpose and Need statement?

Project Purpose

The purpose of the recommended transportation improvements in the I-25 Central Corridor between approximately Santa Fe Drive and 20th Street is to reduce congestion and improve safety and travel-time reliability for the movement of people and goods. The improvements will also consider access to and from I-25 as well as connectivity across I-25 for bicycles, pedestrians, transit, and local traffic.

Project Needs

Transportation improvements are required to address the following needs identified in the study area. They are described in further detail in the PEL Study Report and the following table.

Need	Description of Need
Improve Safety 	**Crashes**—With three crashes per day, 20 percent of which result in an injury or fatality, the corridor is at or above the 80th percentile for similar facilities in Colorado (CDOT, 2017b). **Structural Conditions**—At least three bridges have substandard clearance and are functionally obsolete, with vertical clearance as low as 12 feet, 5 inches, resulting in frequent bridge strikes. **Roadway Design Standards**—Substandard mainline and ramp geometry and roadway configurations increase the likelihood of crashes: • Ramp alignments are substandard at numerous locations. • Mainline I-25 and ramps have consistently deficient lane/shoulder width and stopping sight distance.
Reduce Congestion 	**Highway Capacity**—As of October 2017, I-25 carried more than 250,000 vehicles per day (vpd) (Project Team, 2017a) (350,000 people at a vehicle occupancy rate of 1.4), which greatly exceeds the 150,000 vpd capacity of a typical eight-lane freeway (Transportation Research Board [TRB], 2016). **Congestion**—The corridor experiences more than eight hours of congested traffic conditions on a typical weekday (INRIX, 2017). Delays are spread across three hours in the morning peak period and five hours in the evening peak period. **Traffic Growth**—Local and regional growth is expected to increase trip-making demand and traffic volumes on I-25 by at least 10 percent by 2040 (DRCOG, 2017). Substantial additional development in the corridor may increase travel demand beyond these expectations.
Improve Travel Time Reliability 	**Crash-Related Reliability**—The 1,000 crashes per year and additional breakdown-type incidents seriously impact travel reliability in the corridor. Each incident is estimated to cause four minutes of delay for every one minute in place. Beyond the regularly expected congestion, a major event—such as a sports game—or incident—such as a large crash requiring a full or partial freeway closure—occurs once every three to four days. **Incident Management**—Substandard shoulder widths and lack of refuge areas provide few locations for disabled vehicles and hinder emergency response activities. This often results in closure of mainline lanes during emergency-response activities. **Special Events**—The corridor does not have adequate infrastructure to accommodate traffic associated with the number of high-volume special events that routinely impact operations (such as events at Empower Field at Mile High Stadium, Pepsi Center, Coors Field, etc.).

Additional Considerations

As part of the project's purpose and need, two additional considerations were identified. These included optimizing access and improving cross connectivity as described below.

Consideration	Description of Consideration
Optimize Access 	**I-25 Function**—As an Interstate, I-25's primary function is to serve regional travel while balancing and providing necessary access locally. The number and configuration of accesses in the I-25 Central corridor does not meet current design standards and results in I-25 not meeting its primary function as an interstate facility. **I-25 Weave Operations**—Multiple ramp locations do not meet minimum spacing criteria, creating short distances for vehicles to safely enter or exit. There are six deficient weave areas northbound and three southbound.
Improve Cross Connectivity 	**Network Fragmentation**—Barriers such as the South Platte River, I-25, and the railroads bisect the roadway network and result in vehicles making short trips on I-25. These short trips increase the merging and weaving on the freeway and contribute the congestion and safety issues. **Spacing of I-25 Crossings**—There are 15 crossings of I-25 along the corridor • 12 of the 15 crossings are roadway crossings for vehicles. • 9 of the 12 roadway crossings include I-25 ramps. • 10 of the 15 crossings include pedestrian and bicycle facilities (many are substandard). • Bicycle/pedestrian bridge at 16th Street.

e. What steps will need to be taken during the NEPA process to make this a project-level purpose and need statement?

A Purpose and Need statement will be developed for each project that CDOT advances through NEPA, design, and construction.

The first project identified includes the development of concept plans and a NEPA clearance for replacement of the bridges over I-25 at 23rd Avenue and Speer Boulevard. During the initial phase of that NEPA process, CDOT's project team will need to work with stakeholders to develop a specific purpose and need which will likely include needs related to the bridges being near the end of their useful life and unable to accommodate the mainline improvements recommended by the I-25 Central PEL.

6. Range of alternatives considered, screening criteria and screening process

a. What types of alternatives were looked at? (Provide a one or two sentence summary and reference document.)

This PEL used a three-level evaluation process. The following alternative concepts were considered in Level 1 and narrowed down and combined in subsequent analyses:

- No Action
- I-25 Reroute with Urban Boulevard
- Lane Reductions
- Shoulder Lane Use
- I-25 Geometric Refinements
- I-25 Geometric Improvements
- I-25 Realignment
- Lane Conversion
- Additional General-Purpose Lanes
- Added Managed Lane
- Dedicated Transit Lanes
- Collector/Distributor Roads
- Multi-Level Highway
- TDM, Operational, and ITS
- Congestion Pricing
- New Transit Facility

Attachment B, *Alternatives Evaluation Technical Report* of the PEL Study Report includes the Level 1, 2, and 3 criteria and measures of effectiveness, along with a summary evaluation matrix for each level of evaluation.

b. How did you select the screening criteria and screening process?

The screening process was developed by the PMT in accordance with guidance provided in CDOT's PEL Handbook, version 2 (2016).

c. How did the team develop Alternatives? Was each alternative screened consistently?

Level 1 screening criteria were developed based on concepts and considerations gained through a series of brainstorming discussions and interviews with key project stakeholders, study team members, and the Stakeholder Focus Group. The concepts fell into the categories of safety, congestion, travel time reliability, access, and connectivity across I-25. Criteria specific to each of these considerations were used to determine how well the concepts met the project's Purpose and Need.

For the Level 2 screening process, the general Level 1 concepts were combined into more specific concepts that were considered to meet the project's Goals and Objectives based on input gained through a series of workshops. The Goals and Objectives were divided into the categories of safety, constructability, congestion, travel time reliability, access, environment, crossings of I-25, and future flexibility and technology. Each concept was evaluated based on how well it addressed specific questions in each category.

For the Level 3 screening process, the concepts carried forward were packaged into corridor alternatives. Rather than focus on specific criteria, the evaluation focused on an alternative's benefits and tradeoffs between different improvements within an alternative relative to the other alternatives evaluated. Alternatives were evaluated based on results of a traffic operations analysis, safety analysis, crossings analysis, and impacts analysis.

d. For alternative(s) that were screened out, briefly summarize the reasons for eliminating the alternative(s). (During the initial screenings, this generally will focus on fatal flaws.)

In Level 1 screening, alternative concepts were "eliminated" or "eliminated as a standalone alternative" from the screening process if they did not address the Purpose and Need. The following alternatives were not carried into Level 2 Screening:

- **I-25 Reroute with Urban Boulevard.** This alternative concept was eliminated because it would not meet the Project Needs to improve safety, reduce traffic congestion and improve travel time reliability on I-25.
- **Lane Reductions.** This alternative concept was eliminated because it would not meet the Project Need to reduce traffic congestion on I-25.
- **Shoulder Lane Use.** This alternative concept was eliminated as a standalone alternative because of its inability to fully meet the Project Need to improve safety. Although eliminated as a standalone alternative, it could still be considered as an element of another alternative, if that alternative is able to meet the Project Need to improve safety.

In Level 2 screening, alternatives were "eliminated" and not carried into Level 3 if they did not meet more detailed measures of the Purpose and Need and/or the project's goals and objectives. The "Construct a Tunnel" Level 2 alternative concept was eliminated. The Construct a Tunnel Level 2 alternative concept was developed as a combination of the Multi-Level Highway and Add Express Lane concepts. It was removed because it had consistent negative ratings from the PMT members for the Level 2 screening criteria of safety, constructability, travel time reliability, and access.

e. Which alternatives were recommended? Which alternatives should be brought forward into NEPA and why?

The three alternatives analyzed in Level 3 are also those that are recommended and should be brought forward to NEPA because they would provide benefits to corridor operation and safety. The outcome of Level 3 was to make recommendations for improvements based on elements within each alternative, rather than recommending one single alternative. Features from all of the alternatives evaluated in Level 3 should be considered in subsequent NEPA processes, along with a No Action Alternative.

It should be noted that the alternatives evaluated in Level 3 reflect only a few of the potential improvement options for I-25 Central and were created only to allow for more detailed analysis. All concepts carried forward from the Level 2 evaluation are still recommended for further evaluation and potential implementation pending the results of additional, more detailed future studies.

Bring the Corridor to Standard Alternative

Much of the existing I-25 corridor has substandard geometric elements, including shoulder widths, roadway curvature, stopping sight distance, and ramp spacing. This alternative proposes to address the defined deficiencies identified in the *I-25 Central Existing Conditions Assessment Report* (Attachment A) by providing all necessary geometric

improvements to the highway to meet FHWA Controlling Criteria engineering standards for the Interstate Highway System.

The prevailing section of this alternative is four general-purpose lanes, not including acceleration and deceleration lanes, with full-width inside and outside shoulders in each direction. In addition to the transportation network changes in the No Action Alternative, improvements provided in this alternative include:

- Full-width inside and outside shoulders on the mainline
- Standard width travel lanes
- Sufficient stopping sight distance
- Increased space between interstate access locations
- Standard acceleration and deceleration lanes at all ramps
- Revision of the mainline alignment to reduce curves on I-25
- Reconstruction of bridge structures to address height clearance issues and accommodate the widening of I-25

Collector/Distributor Roads and Braided Ramps Alternative

This alternative includes all geometric improvements (e.g., shoulder width, mainline alignment, etc.) proposed in the Bring the Corridor to Standard Alternative and proposes new CD roads to be constructed along each side of I-25 from 20th Street to Santa Fe Drive/US 85 in conjunction with braided ramps to allow for management of access to/from I-25. A list of the general improvements provided in this alternative is provided below. All improvements included in the No Action Alternative

- All geometric improvements provided in the Bring the Corridor to Standard Alternative
- CD roads
    - Northbound
        - Santa Fe Drive/US 85 to US 6/6th Avenue
        - US 6/6th Avenue to Colfax Avenue/Auraria Parkway
        - 23rd Avenue to 20th Street
    - Southbound
        - 20th Street to 17th Avenue
        - Colfax Avenue/Auraria Parkway/Lower Colfax Avenue to US 6/6th Avenue
        - US 6/6th Avenue to Santa Fe Drive/US 85
- Braided Ramps
    - Northbound
        - Between the Santa Fe Drive/US 85 to US 6/6th Avenue CD road on-ramp to northbound I-25 and the northbound I-25 off-ramp to US 6/6th Avenue
        - Between the northbound I-25 off-ramp to the US 6/6th Avenue to Colfax Avenue/Auraria Parkway CD road and the US 6/6th Avenue on-ramp to northbound I-25

        - Between the Colfax Avenue on-ramp to northbound I-25 and the northbound I-25 off-ramp to the 23rd Avenue to 20th Street CD road
        - Between the Speer Boulevard on-ramp to northbound I-25 and the 23rd Avenue to 20th Street CD road
    - Southbound
        - Between the Speer Boulevard on-ramp to the southbound 20th Street to 17th Avenue CD road and the 20th Street to 17th Avenue CD road off-ramp to 23rd Avenue
        - Between the 23rd Avenue to 17th Avenue CD road on-ramp to southbound I-25 and the southbound I-25 off-ramp to the Colfax Avenue to US 6/6th Avenue CD road
        - Between the Colfax Avenue, Auraria Parkway, and Lower Colfax Avenue on-ramps to southbound I-25 and the Colfax Avenue to US 6/6th Avenue CD road
        - Between the US 6/6th Avenue on-ramp to southbound I-25 and the southbound I-25 off-ramp to the US 6/6th Avenue to Santa Fe Drive/US 85 CD road

Managed Lanes Alternative

This alternative proposes new managed lanes along I-25 consistent with the HPTE *Express Lanes Master Plan* (as of the time of the release of this PEL, the final Master Plan has not yet been released). The managed lanes are proposed to extend from approximately Santa Fe Drive/US 85 to the existing reversible managed lanes, north of 20th Street, running in both the northbound and southbound directions. In addition to adding managed lanes, this alternative would also include geometric improvements provided in the Bring the Corridor to Standard Alternative, and some of the CD roads and braided ramps proposed in the Collector/Distributor Roads and Braided Ramps Alternative. A list of the general improvements provided in this alternative is provided below. All improvements included in the No Action Alternative

- All geometric improvements provided in the Bring the Corridor to Standard Alternative
- One new managed lane in both the northbound and southbound directions from the existing managed lanes near 20th Street to approximately Santa Fe Drive/US 85.
- Direct connection ramps from the managed lanes to crossing roadway facilities at the following locations:
    - Northbound
        - Eastbound and westbound US 6/6th Avenue on-ramp to the northbound I-25 managed lane
        - Northbound I-25 managed lane off-ramp to Colfax Avenue and Auraria Parkway
    - Southbound
        - Auraria Parkway on-ramp to the southbound I-25 managed lane
        - Speer Boulevard on-/off-ramp to/from the managed lanes to the north. This ramp was modeled as a reversible ramp serving southbound I-25 managed lane off-ramp traffic to Speer Boulevard during the AM peak period and then serving Speer Boulevard on-ramp traffic to the northbound I-25 managed lane during the PM peak period.

- Northbound CD road from 23rd Avenue to 20th Street
- Southbound CD road from 20th Street to Speer Boulevard

None of the above alternatives is intended to be a standalone alternative ready for immediate implementation. Instead, they represent a sample range of improvements. Their evaluation and considerations should be used to further guide development of more refined alternatives in future planning studies.

For more information on the alternative development and evaluation process of this study, see Attachment B, *Alternatives Evaluation Technical Report* of the PEL Study Report.

f. Did the public, stakeholders, and agencies have an opportunity to comment during this process?

The public had the opportunity to comment on the process at the project website where there was a place to submit comments on the project via email to the project team. (https://www.codot.gov/projects/i-25-santa-fe-20th-street-pel). In addition, there was a survey conducted via the website from January to June 2019 to capture the priorities, needs, concerns, and uses of I-25 Central users and communities. More than 1,400 Coloradans from Denver and across the Front Range and mountain communities responded to the surveys. The public also was invited to comment at the June 6, 2019, Public Open House Meeting.

The stakeholders were provided the opportunity to comment at interviews conducted at the onset of the study, presentations held at community organization meetings, and at four Stakeholder Focus Group meetings described in the answer to Question 4A.

The agencies provided ongoing comments and input at Project Management Team, Executive Oversight Committee, Technical Advisory Committee, and issue-specific meetings, as listed in the answer to Question 3A.

g. Were there unresolved issues with the public, stakeholders, and/or agencies?

Stakeholders have requested additional evaluation of the impacts of the direct connection ramps between local roadways and potential managed lanes, specifically at Colfax Avenue. They also have requested additional information about how the alternatives will impact pedestrian and other multimodal connections across the ramp terminals, collector/distributor roads, and managed lanes.

7. Planning assumptions and analytical methods

a. What is the forecast year used in the PEL study?

2040

b. What method was used for forecasting traffic volumes?

The traffic analysis for the I-25 Central PEL was conducted using a combination of travel demand modeling and microsimulation traffic analysis. Travel demand modeling was done using DRCOG's regional travel demand model (TDM), also known as FOCUS. This model

was calibrated to the existing conditions of the I-25 Central PEL traffic analysis area. Using the outputs from the TDM, a microsimulation traffic model was constructed using TransModeler Version 5 software. The microsimulation traffic model then was calibrated to the existing year (2017) traffic conditions and used to model future (2040) conditions using the four alternatives developed through the alternatives evaluation process.

It should be noted that due to the extreme congestion forecasted in 2040, the microsimulation traffic model grid-locked and could not accurately capture conditions in 2040. To obtain meaningful results, the 2040 travel demand was reduced by 10 percent. This reduced travel demand was then used to model and evaluate all alternatives. Based on a linear travel demand growth pattern, this 2040 minus 10 percent travel demand corresponds to an approximate modeling year of 2030. This methodology was agreed to by both the project team, FHWA, and Denver. Additional information about this reduction and the reasoning behind it can be found in Attachment D, *Traffic and Safety Technical Report,* of the PEL study.

c. Are the planning assumptions and the corridor vision/purpose and need statement consistent with each other and with the long-range transportation plan?

The planning assumptions collected from Denver and interviews with study area property owners identified in Attachment A *Existing Conditions Assessment Report* of the PEL Study Report indicate the potential for substantially more population and employment in the area immediately surrounding the corridor that what is accounted for in the DRCOG's 2040 Fiscally Constrained Regional Transportation Plan (2019). Despite that difference, the assumptions are still valid because it is typical for localized growth projections to exceed more conservative assumptions in regional long-range plans.

d. What were the future year policy and/or data assumptions used in the transportation planning process related to land use, economic development, transportation costs, and network expansion?

The data assumptions for the PEL study used DRCOG's 2040 Fiscally Constrained Regional Transportation Plan (2019) for the future year.

8. What pieces of the PEL can transfer directly to the NEPA phase of a project?

Assuming the next NEPA process is conducted in the next 5 years, the following elements can be directly transferred to the NEPA phase.

- Local land use, growth management, and development
- Built environmental and infrastructure conditions

Additional information from the PEL will serve as helpful information to inform project scoping and streamline additional data collection, refinement or analysis.

- Purpose and Need Statement
- Stakeholder identification
- Travel demands

- Regional development and growth
- Population and employment
- Natural environmental conditions
- Environmental resources and environmentally sensitive areas
- Potential environmental effects and mitigation needs

9. Resources (wetlands, cultural, etc.) reviewed. For each resource or group of resources reviewed, provide the following:

a. In the PEL study, at what level of detail was the resource reviewed and what was the method of review?

Most resources were studied either via desktop or resource-agency-specific website. Some records research was done for historic resources with the State Historic Preservation Officer (SHPO). See the table at the end of Question 8 for details on other resources.

b. Is this resource present in the area and what is the existing environmental condition for this resource?

All resources listed in the table at the end of Question 8 are present within the environmental study area defined around this corridor.

c. What are the issues that need to be considered during NEPA, including potential resource impacts and potential mitigation requirements (if known)?

The table at the end of question 8 includes general recommendations for assessing impacts during the NEPA phase for individual projects.

d. How will the planning data provided need to be supplemented during NEPA?

The PEL Study includes a discussion of which resources should be included during NEPA and which critical schedule considerations for resource assessments should be built into project schedules. Additionally, Attachment A *Existing Conditions Assessment Report* of the PEL Study Report provides a baseline of existing conditions for consideration during scoping for, and the onset of, the NEPA phase of individual projects. The table below provides a summary of how environmental resources will need to be supplemented for future NEPA processes.

Environmental Resources Needing Supplemental Analysis

Resource Present in the Corridor	Data Source Used	Supplemental Analysis for NEPA
Socioeconomic Conditions	DRCOG Traffic Analysis Zones (2015)	Update existing conditions and determine impacts and mitigation based on design for particular alternatives screened for each individual project.
Environmental Justice	2010 Census; 2012-2016 American Community Survey	Update existing conditions and determine impacts and mitigation based on design for particular alternatives screened for each individual project and the 2020 Census.
Right of Way	CDOT's OTIS Website (2017); Denver Assessor's records (2017)	Develop Right-of-Way Plans specific to each project.
Air Quality	Colorado Department of Public Health and Environment website (2017)	Develop NEPA documentation to show conformity with federal and state air quality standards.
Noise	Desktop review of Google Earth and City of Denver land use (2002) and trails and sidewalks (2017)	Complete traffic noise assessment and consider noise abatement strategies, as applicable, consistent with CDOT's Noise Analysis and Abatement Guidelines.
Historic Resources	Secondary data review; Colorado Office of Archaeology and Historic Preservation (2017)	Initiate and complete Section 106 process.
Archaeology	Colorado Office of Archaeology and Historic Preservation (2017)	Initiate and complete Section 106 process.
Geologic resources and Soils	Geologic Maps (accessed 2019)	Design for each project will consider geotechnical impacts to the project or environmental resources and propose mitigation, if necessary.
Hazardous Materials	Limited Reconnaissance Survey (2017)	Complete a Modified Environmental Site Assessment to CDOT standards.
Parks and Recreation/Section 6(f) Resources	Denver Open Data Catalog (2018); CDOT's OTIS Website (2017)	Determine impacts and mitigation based on design for particular alternatives screened for each individual project.
Section 4(f) Resources	Colorado Office of Archaeology and Historic Preservation (2017); Denver Open Data Catalog (2018); CDOT's OTIS Website (2017); Denver trail and sidewalk data (2017)	Determine which resources are eligible for protection under Section 4(f), determine if a *use* occurs, and prepare the appropriate analysis and documentation based on FHWA guidance.

Environmental Resources Needing Supplemental Analysis

Resource Present in the Corridor	Data Source Used	Supplemental Analysis for NEPA
Visual and Aesthetics	Denver Building Code, RMC, Section 10-61.5 (accessed 2018)	Complete a Visual Impact Assessment to FHWA and CDOT standards. Complete viewshed assessment appropriate to local standards.
Floodplains	FEMA Floodplain Data (2018)	Determine impacts and mitigation based on design for particular alternatives screened for each individual project.
Drainage and Water Quality	Denver Storm Drainage Master Plan (2014)	Determine impacts and mitigation based on design for particular alternatives screened for each individual project. Obtain the appropriate permits from federal, state and local agencies.
Wetlands and Waters of the U.S	USFWS National Wetland Inventory (2018); Aerial photo review (2018)	Complete project-specific site survey to delineate wetlands. Determine impacts and mitigation based on design for particular alternatives screened for each individual project. Obtain the appropriate permits from federal and state agencies, as applicable.
Vegetation and Noxious Weeds	CPW Riparian Mapping (2012); Google Earth Desktop Survey; Colorado National Heritage Program	Complete project-specific site survey to identify existing vegetation. Determine impacts and mitigation based on design for particular alternatives screened for each individual project. Complete necessary assessment for SB 40 certification, as applicable.
Wildlife and Fisheries	CPW Riparian Mapping (2012); CPW Species Activity Mapping (2011)	Complete project-specific site survey to identify existing wildlife and wildlife habitat. Determine impacts and mitigation based on design for particular alternatives screened for each individual project.
Threatened and Endangered Species	USFWS (2017)	Update review of USFWS lists of federal and state threatened and endangered species. Consult with USFWS under Section 7, as applicable
Cumulative Impacts	Data sources listed above for applicable resource categories.	Update the log for past, present, and reasonably foreseeable projects. Determine impacts and mitigation for each resource based on the design for particular alternatives screened for each individual project.

10. List resources that were not reviewed in the PEL study and why? Indicate whether or not they will need to be reviewed in NEPA and explain why.

Transportation Resources: Although transportation resources were not evaluated as a stand-alone resource, the existing transportation system was documented Attachment A *Existing Conditions Assessment Report* of the PEL Study Report. Transportation resources will be impacted by recommended alternatives and should be assessed in NEPA, and the existing transportation system, with applicable updates, should serve as the baseline for that assessment.

Utilities: Although utilities were not evaluated as a stand-alone resource, existing utilities are discussed in Attachment A *Existing Conditions Assessment Report* of the PEL Study Report. Surveys for existing utilities and identification of conflicts typically occur at a project-level scale where specific and detailed conflicts can be identified. Utility surveys and assessments should occur for each individual project during the NEPA phase.

Railroad Facilities: Although railroad facilities were not evaluated as a stand-alone resource, existing railroad facilities and conflicts with recommended alternatives are discussed in the PEL Study Report. An assessment of railroad facilities and documentation of coordination with railroad-related companies should occur during NEPA.

Farmlands: It has been assumed that no farmlands occur within or adjacent to this I-25 corridor. An assessment of farmlands is not anticipated during NEPA. If an assessment of land use during NEPA reveals farmland then that farmland resource will be assessed for that project, as appropriate.

Energy: An assessment of energy was not completed due to range of recommended alternatives being carried forward. Whether energy is assessed during NEPA will be determined during scoping for each project, based on the scale of the project and anticipated contribution to energy consultation.

11. Were cumulative impacts considered in the PEL study? If yes, provide the information or reference where the analysis can be found.

Cumulative impacts were collected for the existing conditions report but were not considered during the PEL Alternatives Analysis since a range of recommended alternatives are being carried forward. Cumulative impacts will be assessed during NEPA. Additionally, see response to Question 13 for discussion of “issues a future project team should be aware of.”

12. Describe any mitigation strategies discussed at the planning level that should be analyzed during NEPA.

The PEL Study Report did not describe mitigation strategies other than identifying critical schedule considerations and next steps. The discussion of critical schedule considerations and next steps will inform scoping and schedule-making activities at the onset of NEPA for individual projects.

13. What needs to be done during NEPA to make information from the PEL study available to the agencies and the public? Are there PEL study products which can be used or provided to agencies or the public during the NEPA scoping process?

This PEL study was intended to provide the framework for the long-term implementation of improvements along the corridor as funding is available, and to be used as a resource for future NEPA documentation.

Published documentation resulting from the PEL process will be posted on the I-25 Central PEL website and future NEPA documentation project websites. Applicable aspects of the I-25 Central PEL process such as Purpose and Need, alternatives screening, scoping for environmental resource impact assessments, and public and agency coordination will be properly documented and referenced for future NEPA processes.

14. Are there any other issues a future project team should be aware of?

a. Examples: Utility problems, access or ROW issues, encroachments into ROW, problematic land owners and/or groups, contact information for stakeholders, special or unique resources in the area, etc.

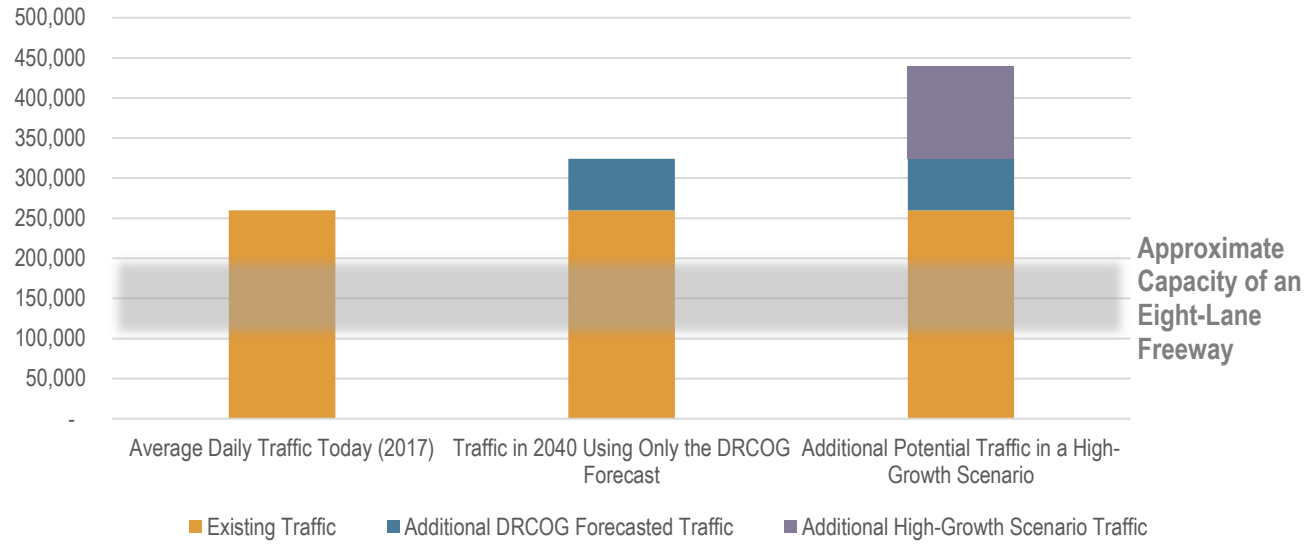
Through the process of completing the PEL study, stakeholders had questions regarding three considerations that were not captured within the study's evaluation process. They are related to planning assumptions that are different from those assumed under DRCOG's forecasts. To provide insight into potential future scenarios, the project team completed the three sensitivity analyses described below. All three are summarized described in "What other things were considered during the evaluation process?" in the PEL Study Report.

High-Growth Land Use Sensitivity Analysis

For the purposes of the alternatives evaluation, this study used the existing 2040 DRCOG regional population and employment forecasts to evaluate the future travel demand for I-25. However, along the I-25 Central corridor there is the potential that population and employment growth may exceed DRCOG's projections and result in a larger number of trips than originally forecasted. Based on a collaborative effort between the study team and Denver staff, a high-growth land use scenario was created, which estimated the potential additional trips, beyond what is already forecasted in the DRCOG models, that may occur if existing, large-scale development plans were to fully come to fruition by 2040.

The results of this analysis indicated that there is a potential for an additional 116,000 daily trips on I-25 if all the planned major developments along I-25 Central were to be fully constructed by 2040. These trips would be in addition to the approximately 20 percent regional travel demand growth already forecasted by DRCOG. The following figure depicts the potential increase in trips on I-25 given this high-growth land use scenario. Additional information about the methodology and results of this analysis can be found in Appendix D, *I-25 Central Land Use Sensitivity Analysis Technical Memorandum* of the *Traffic and Safety Technical Report* (Attachment C).

Potential Additional Trips on I-25 in a High-Growth Scenario



Source: Existing average daily traffic counts were obtained from in-field data collection efforts (Project Team 2017b). Forecasted DRCOG 2040 trips were obtained from the DRCOG regional TDM (DRCOG 2017).

I-25 currently struggles to serve the level of demand that exists today. Without improvements to I-25, the additional travel demand estimated in this land use sensitivity analysis is likely to far exceed the highway's capacity. This will result in more severe congestion over more hours of the day than what is already forecasted to occur in the regular No Action Alternative. Therefore, this level of growth will likely need to be accommodated in many ways and modes including those on and off of I-25. Accomplishing this will require a continued, coordinated effort between CDOT, Denver, and RTD.

It is also likely that this high-growth scenario may not be distributed evenly across all of the identified development areas. Based on coordination with Denver, it is likely that certain areas, such 41st and Fox, will develop sooner than other areas. Because of this, CDOT will continue to monitor and coordinate with Denver as these development areas come to fruition. In some instances, additional studies, such as a study of the Park Avenue and I-25 interchange, may be needed to examine more specific improvement strategies around these development areas.

Connected and Autonomous Vehicle Sensitivity Analysis

One of the biggest unknowns at the time of this PEL Study is the potential impact emerging technologies could have on transportation. Of these technologies, it is likely that the widespread adoption of CAVs could have the largest impact to I-25 Central. To understand the potential level of impact CAVs could have on I-25, a CAV sensitivity analysis was completed. A key goal of this sensitivity analysis was to understand if the widespread adoption of CAVs could provide enough benefit to I-25 to reduce the need for capacity improvements.

The results of this analysis showed that it would take a relatively high adoption rate—about 75 percent of all vehicles on I-25—to achieve a substantial (about 15 percent) improvement

in highway capacity. However, this analysis also showed that additional capacity increase can be obtained through converting a potential managed lane into an exclusive CAV-only lane. By doing this, an additional 30-percent capacity can be obtained within the managed lane as compared to when the managed lane serves both CAVs and non-CAVs. Additional information and discussion about the potential impacts of CAVs on I-25 Central can be found in Appendix C, *I-25 Central Vissim Connected and Automated Vehicle Sensitivity Analysis Technical Memorandum*, of the *Traffic and Safety Technical Report* (Attachment C).

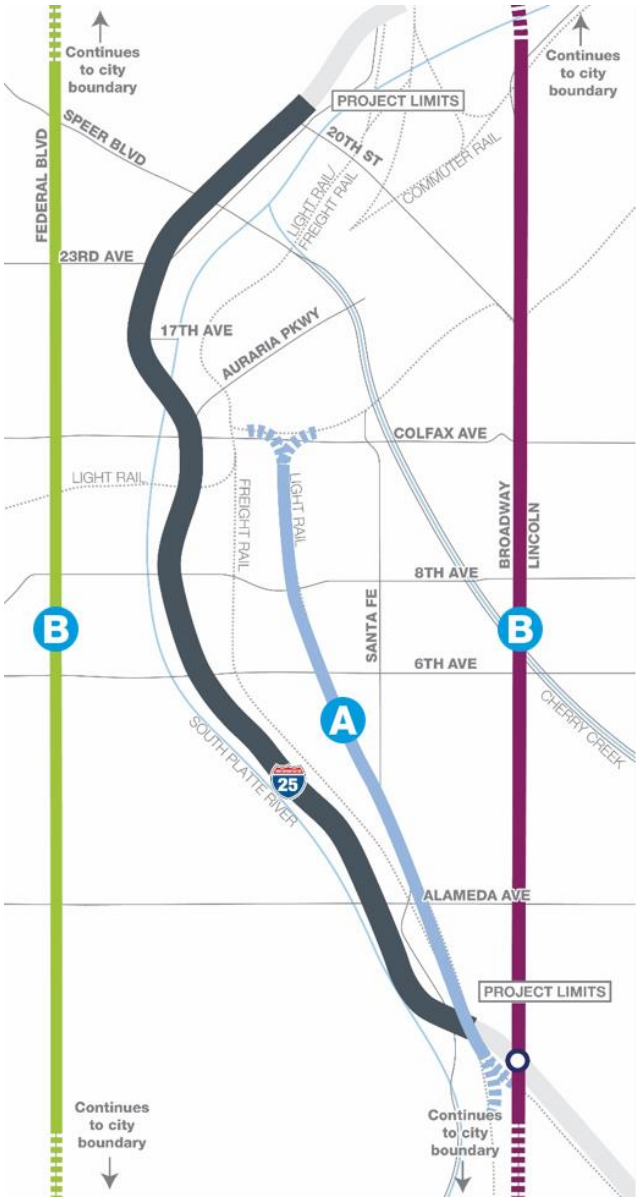
These results show that, depending on future adoption rates of CAV technology, meaningful benefits to traffic operations and safety could be achieved. Therefore, future studies and projects should examine/ consider the CAV adoption rates at the time of their evaluation and re-evaluate the need for additional capacity on I-25 at that time.

Additional Transit Ridership Sensitivity Analysis

As the population of the Denver metropolitan region and the land-use densities along the I-25 Central corridor continue to increase, there is a recognition that transit solutions will play a critical role within the transportation network. To this end, the I-25 Central project team, in partnership with RTD, completed a transit ridership sensitivity analysis that explored the potential benefits large-scale transit investments could have in supporting the PEL's Purpose and Need. The key question to be answered by this sensitivity analysis is whether major transit investments could provide enough congestion relief to reduce the need to add capacity to I-25 Central.

Based on this question, three key transit corridors were identified as having the highest potential to remove trips from I-25. These corridors included Federal Boulevard, Broadway/Lincoln Street, and the existing I-25 Central light rail corridor between the I-25 and Broadway Station and Colfax Avenue as shown in the following figure. These corridors already serve a high number of transit riders and, with capacity improvements, these passenger volumes could increase.

Transit Corridors Evaluated in the Transit Sensitivity Analysis



The results of this analysis showed that—with major transit investments on Broadway/Lincoln Street, Federal Boulevard, and along the existing RTD light rail tracks—there is a potential to remove approximately 15,000 daily trips from I-25 in 2040. These removed trips would be in addition to the trips already removed from the highway given the existing transit network. This reduction in trips shows that transit improvements could help reduce congestion and provide alternative travel options to I-25; however, providing only transit improvements likely would not provide enough benefit to reduce the need for additional capacity improvements on I-25. Additional information about the analysis methodology and findings of the transit ridership sensitivity analysis can be found in

Appendix B, *I-25 Central Order-of-Magnitude Transit Ridership Development Process Technical Memorandum,* of the *Traffic and Safety Technical Report* (Attachment C).

It is important to note that the transit ridership numbers estimated in this transit sensitive analysis were based on improvements to existing transit facilities. However, there are currently a variety of other transit improvements being considered including Colorado Front Range Rail and mobility hubs.

In addition to these regional-type facilities, Denver is taking an increasing local responsibility in implementing transit improvements through plans such as Denver's Mobility Action Plan, and organizational changes, such as the recent change from the Denver Department of Public Works to the Denver Department of Transportation and Infrastructure. These plans and organizational changes could result in greater travel mode-shift to transit and therefore a reduction in local vehicular travel demand.

Because these ideas, plans, and organizational changes are still in their early/conceptual phases, their impacts to travel are not well understood at this time. CDOT will continue to monitor the development of such ideas and strategies and examine ways in which these types of improvements could help address the needs of I 25.

Right-of-Way Analysis

Because the corridor is in a highly urbanized part of the region and runs parallel to the railroad and the South Platte River in many locations, the right-of-way is constrained.

To determine the impacts of each recommended alternative, ROW impacts were identified by overlaying the construction limits of each alternative over Denver's GIS parcel data. Construction limits for each alternative were created by taking a 25-foot offset from the edge of pavement for any at-grade element and taking a 50-foot offset from edge of pavement for any type of structure. The assumption was that any impact to a parcel would require a full acquisition unless it was visually obvious that the impact would only result in a partial take. The results indicate the following ROW requirements for each alternative.

- Bring the Corridor to Standard: 10-15 acres
- Braided Ramps and CD Roads: 35-45 acres
- Managed Lanes: 30-40 acres

This is a coarse methodology and future projects will undoubtedly attempt to minimize their ROW (and related environmental) impacts and costs. Subsequent NEPA processes will need to closely assess their alignment and design recommendations to limit ROW needs and provide for a detailed process to accurately determine the exact ROW needed.

15. Provide a table of identified projects and/or a proposed phasing plan for corridor build out.

The PEL study includes an Action Plan and a menu of individual projects with identified benefits, impacts, and costs that CDOT can use to select projects to move forward in the project development process. The Action Plan identifies Early Action projects that would improve operations and safety and are simpler to implement in the short term, even if they

may eventually be removed during construction of longer-term improvements. The tables of the Action Plan are included in the PEL study document.

Phasing considerations are presented in the PEL study document. CDOT is planning to immediately address the deficient bridge structures at 23rd Avenue and Speer Boulevard. Beyond that, two critical decisions not yet made will influence the sequencing of the improvement projects—if and how to implement Managed Lanes in the I-25 Central corridor; and if CDOT will purchase Burnham Yard from UPRR. Sequencing will depend on the outcome of these decision and priorities and available funding. Potential phasing options are outlined in the PEL study report.

16. Provide a list of what funding sources have been identified to fund projects from this PEL?

Planning-level estimates were developed for each alternative as well as individual projects and are presented in the PEL study document.

Funding from the Colorado Bridge Enterprise program has been identified for the bridge structures at 23rd Avenue and Speer Boulevard. During subsequent NEPA studies, CDOT intends to seek opportunities for funding partnerships with potential partners including HPTE, Denver, RTD, The Greenway Foundation, and the major districts and large property owners along the corridor.