Appendix C
US 34 Alternatives Report

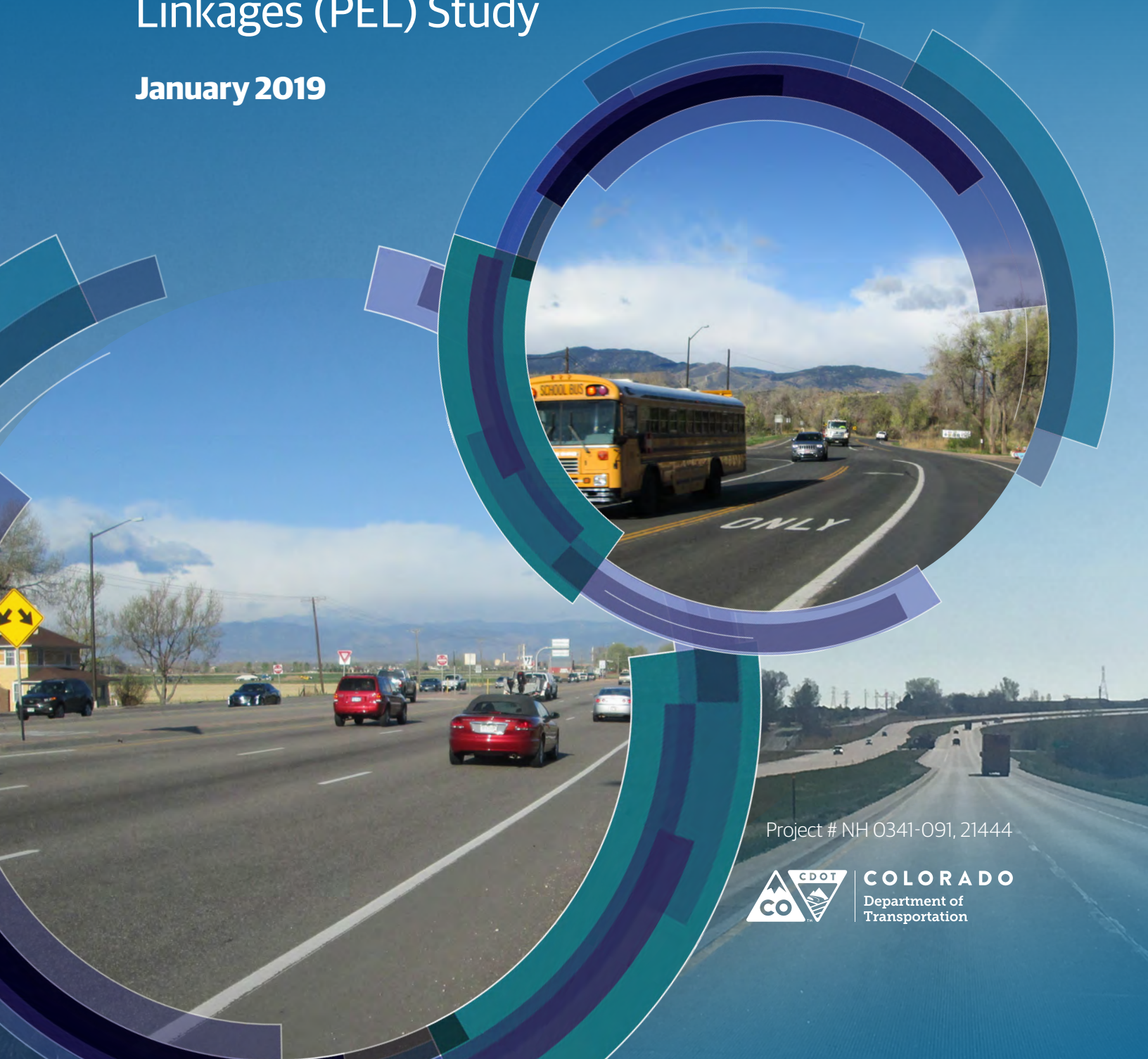
FINAL ALTERNATIVES REPORT

RS&H | TSIOUVARAS SIMMONS HOLDERNESS

in association with ch2m

US 34 Planning and Environmental Linkages (PEL) Study

January 2019



Project # NH 0341-091, 21444

COLORADO Department of Transportation

US 34

Planning and Environmental Linkage (PEL)

Final Alternatives Report

January 2019

Developed by

RS&H | TSIOUVARAS SIMMONS HOLDERNESS

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List of Acronyms and Abbreviations

ACP	Access Control Plan
Ave.	Avenue
CDOT	Colorado Department of Transportation
DDI	Diverging diamond interchange
EA	Environmental Assessment
EIS	Environmental Impact Study
FHWA	Federal Highway Administration
I-25	Interstate Highway 25
LCR	Larimer County Road
MP	Milepost
NFRMPO	North Front Range Metropolitan Planning Organization
NEPA	National Environmental Policy Act
Pkwy.	Parkway
PEL	Planning and Environmental Linkages
ROD	Record of Decision
ROW	right-of-way
RR	railroad
SDI	Standard Diamond Interchange
SH XX	State Highway XX
SPUI	Single Point Urban Interchange
TAC	Technical Advisory Committees
US	United States
US XX	United States Highway XX
WCR	Weld County Road

1.0 Introduction

The Colorado Department of Colorado (CDOT), in conjunction with the Federal Highway Administration and the local agencies, initiated the US 34 Planning and Environmental Linkages (PEL) study in response to growing traffic congestion and vehicle crashes on the corridor and to provide a corridor vision to guide the future.

The Study Area along US Highway 34 (US 34) is between Larimer Country Road (LCR) 29 and Weld County Road (WCR) 53 within Larimer County; Weld County, the Cities of Evans, Greeley, and Loveland; and the Towns of Johnstown, Kersey, Garden City, and Windsor. Recommendations are provided for the Project Area from LCR 27 to WCR 49.

The purpose of this *Alternative Development and Evaluation Report* is to document the approach used to develop, analyze, screen, and package alternatives within the Project Area. This report serves as an Appendix C to the PEL study.

2.0 Project Area

US 34 is a critical east-west transportation corridor for northern Colorado providing national, regional, and local access and connectivity. Nationally, it is a thoroughfare for tourists traveling to the destinations of Estes Park and Rocky Mountain National Park. Regionally, US 34 connects Greeley, Loveland, Ft. Collins, and the Denver metropolitan area. Within the adjacent cities, US 34 provides access to daily services.

The population of northern Colorado is growing quickly, generating increased traffic volumes, accidents, congestion, delays, and other issues along US 34. In response to the growing issues along the corridor, CDOT initiated this study to catalog existing roadway characteristics, multimodal facilities, and traffic safety conditions; identify infrastructure deficiencies; develop and screen a reasonable range of alternatives; and determine important existing environmental resources along US 34 within the Study Area.

A *Corridor Existing Conditions Report* was prepared that included information from completed studies, the roadway's physical features, the existing traffic conditions, and the environmental and cultural resources. This report can be found in Appendix B of the PEL. These characteristics and resources identified the needs, constraints, and opportunities that guided the development of the corridor Purpose and Need, goals, evaluation criteria, and concepts.

Local agency staff contributed valuable insight into the corridor context through initial stakeholder interviews and monthly Technical Advisory Committee (TAC) meetings. Local elected officials were engaged through US 34 Coalition meetings. Additionally, three series of public open houses were held during the PEL. Each series had a meeting on both the west and the east side of the corridor for a total of six meetings; these allowed the public an opportunity to provide firsthand information about the corridor and input to alternatives. The stakeholder interviews, TAC, Coalition and public meetings are documented in PEL Appendix D.

The US 34 corridor was divided into six segments because of the size of the Project Area, varying physical and operational corridor characteristics, and the context of adjacent communities. Below are the segments with a summary of their lengths and characteristics:

1. **Foothills** - Larimer County Road (LCR) 27 to Morning Drive – 3.2 miles. This segment is a 2-lane rural roadway that is transitioning from mountainous to urban and includes the Big Thompson River crossing.

2. **Loveland Urban** - Morning Drive to North Garfield Avenue (Ave.) – 3.1 miles. US 34 (Eisenhower Blvd.) is a 4-lane urban roadway with paved median with numerous intersections and private property access points and includes sidewalks and a shoulder/bike lane along most of its length.

3. **Loveland 6-Lane** - North Garfield Ave. to Rocky Mountain Ave. – 4.0 miles. Implementation of a 2006 Environmental Assessment (EA) recommending the 4-lane roadway be upgraded to 6 lanes is ongoing, with about half of this segment currently upgraded to 6 lanes.

4. **Johnstown – Greeley** - Centerra/Thompson Parkway (Pkwy) to east of SH 257 – 6.1 miles. This segment is a 4-lane expressway with ½ to 1-mile intersection spacing with typical speed limits of 65 mph. There are 2 at- grade railroad (RR) crossings and several governing jurisdictions. Access in this segment is governed by the existing Access Control Plan (ACP), approved in 2003.

5. **Greeley Expressway** - East of SH 257 to 11th Ave. – 9.3 miles. This segment is a 4-lane expressway with ½ to 1-mile intersection spacing with a typical speed limit of 65 mph, lowering to 45 mph at the east end. This segment is mostly within Greeley, and access is governed by the existing Access Control Plan (ACP), approved in 2003.

6. **East End** - 1st Ave. to Weld County Road 49 – 3.8 miles. This segment is rural with 4 lanes and has been mostly reconstructed since 2010. The 2003 Access Control Plan described in the previous segments has limited public intersections with ½ to 1 mile spacing and a 65mph speed limit. The segment includes the South Platte River crossing.

The I-25 Interchange Project (1.0 miles on US 34) and the US 34/US 85 Project (1.2 miles on US 34) are separate studies that will complement and accommodate the improvements proposed in the US 34 PEL Study. These two separate areas are not included in the US 34 project segments, and the US 34 PEL Study does not include additional recommendations within these areas. These are described further below:

- The I-25 interchange area, the 1.0-mile segment on US 34 between and including Rocky Mountain Ave. and Centerra/Thompson Pkwy. This area is included in the I-25 Environmental Impact Study (EIS) and Record of Decision (ROD) which identified an interchange complex encompassing I-25 and both Rocky Mountain Ave. and Centerra /Thompson Pkwy. Initial phases of improvements in this segment are included in an ongoing design/build construction project that begins in late 2018.

- The US 34/US 85 interchange area, a 1.2 mile segment at the east end of the Greeley Expressway segment, is a preliminary design project. The project will include alternatives at 11th Ave.

Figure 1 illustrates the corridor limits.

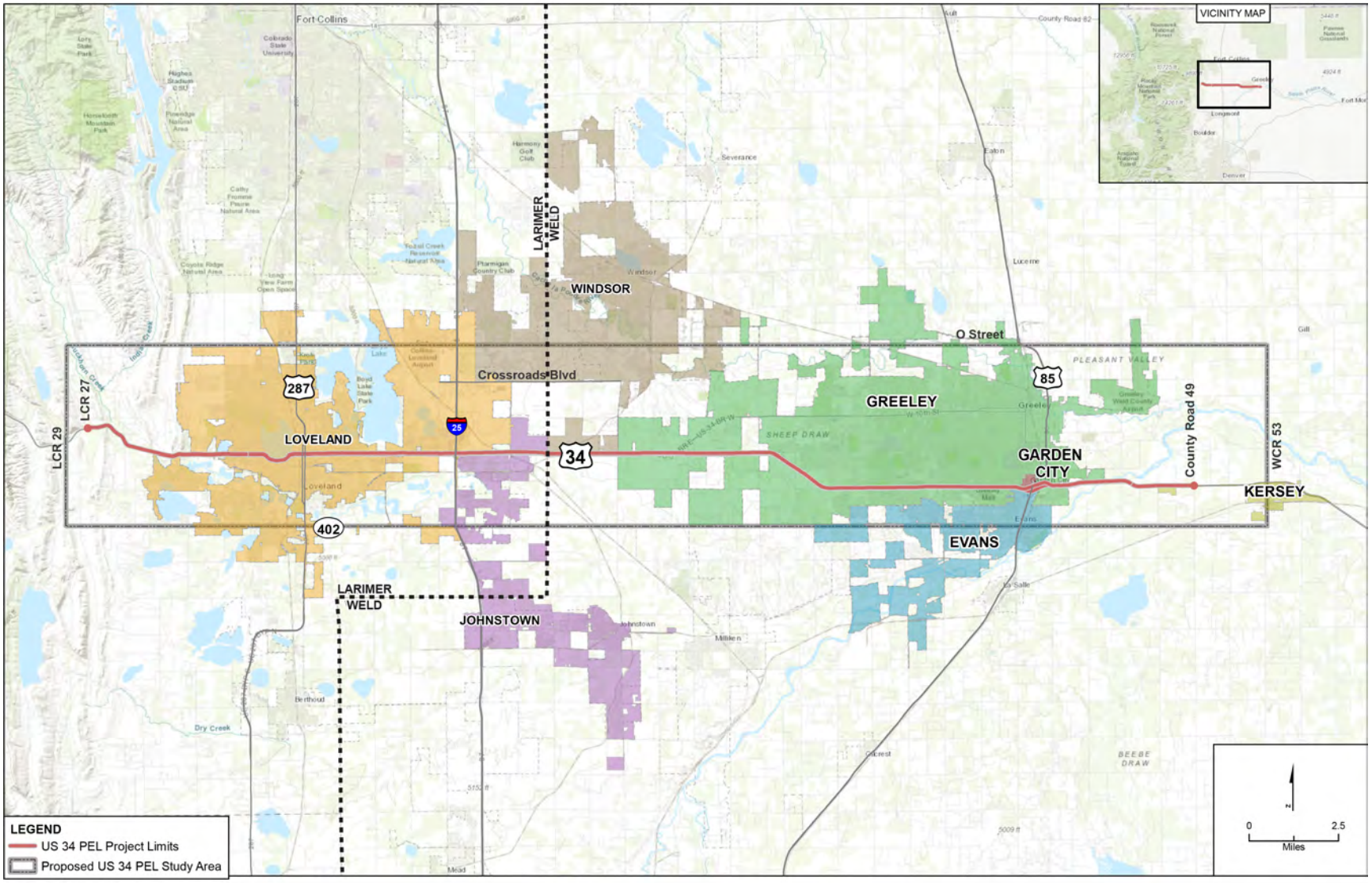

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*Figure 1 - **Project Area***

3.0 Purpose and Need

CDOT initiated this PEL Study to identify and assess potential transportation solutions along the US 34 corridor in Larimer and Weld Counties. The Purpose and Need statement was developed in coordination with stakeholders, including the state and local jurisdictions that encompass the Study Area and those represented in the US 34 Coalition. The Purpose and Need statement was reviewed by the general public at public meetings, and is shown below:

Transportation improvements within the US 34 corridor are needed for three reasons:

1. Increase safety. Increases in development and travel demand have resulted in safety concerns at intersections and other locations along the US 34 corridor.
2. Accommodate increased travel and tourism demands to maintain the economic vitality of the region. Northern Colorado communities are among the fastest growing in the nation. Growth has spurred economic benefits and provides funding to improve transportation infrastructure and amenities that make these communities desirable.
3. Increase reliability of east-west regional travel, while balancing local access, mobility, and freight needs. Traffic congestion and accidents can reduce the reliability of US 34 to serve its function as a Principal Arterial, while dampening the benefits of job growth and recreation opportunities the region provides to new and long-time residents.

Project goals were developed by the project management team (PMT) and refined and approved by the technical advisory committee (TAC). The goals supplement the Purpose and Need and help to define the elements that would comprise successful alternatives for the US 34 corridor. **Successful alternatives for the US 34 PEL Study will:**

- Be compatible with the natural and human environment
- Support community land use and aesthetics goals
- Be fiscally responsible and implementable
- Reduce risk and increase reliability
- Accommodate emerging technology

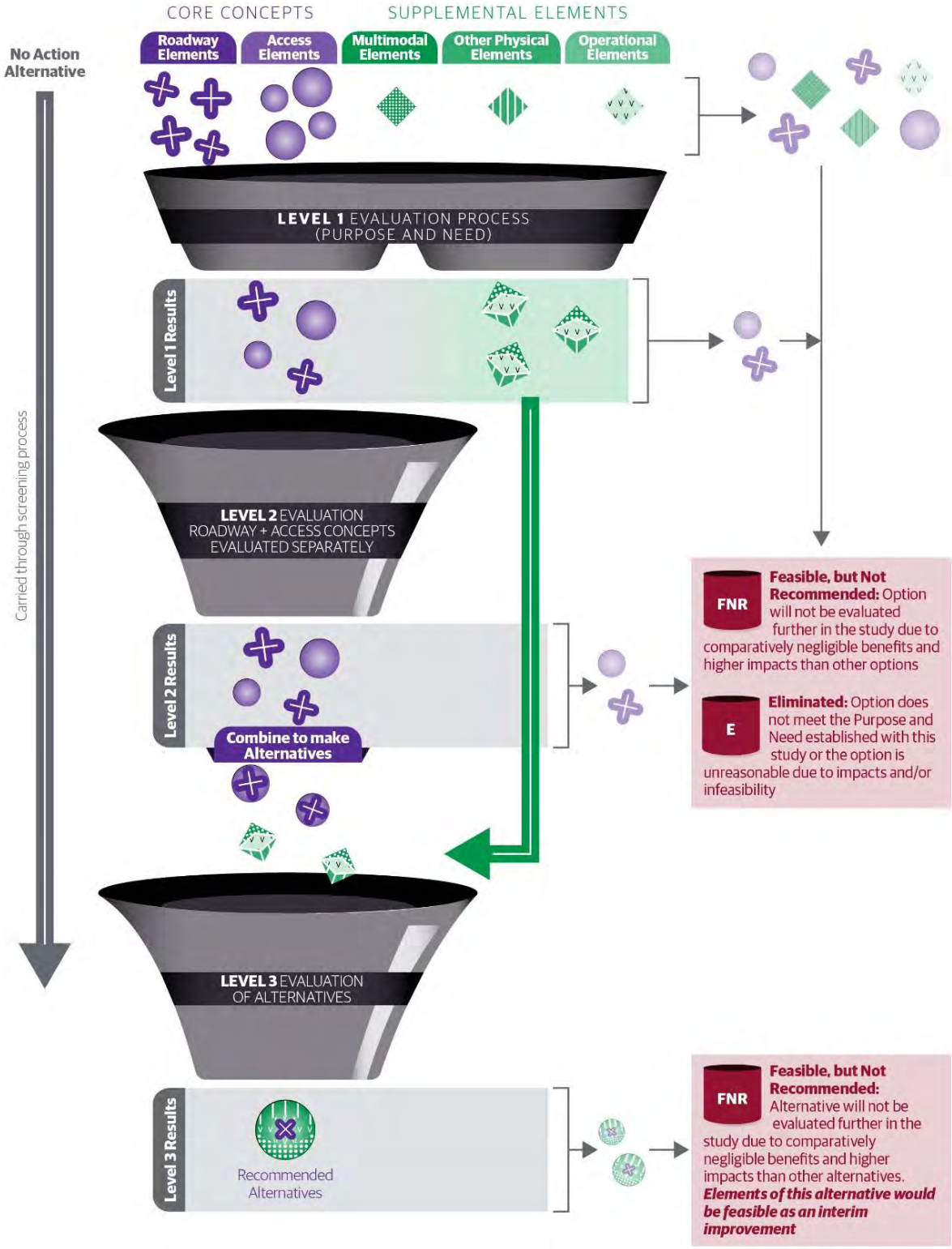
The project goals were used, in conjunction with the Purpose and Need, during each level of alternatives evaluation process.

4.0 Evaluation Process

This section summarizes the alternatives development and evaluation process used to identify a reasonable range of alternative improvements for the US 34 corridor to address the transportation problems identified in the project Purpose and Need. This process included developing evaluation criteria based on the project Purpose and Need and project goals, developing a full range of reasonable alternatives, and documenting the elimination and recommendation of alternatives to limit the need for consideration during future NEPA processes.

Figure 2 below shows a summary flowchart for the three-level evaluation process, and how some alternatives were carried forward compared to those included as supplemental elements (supplemental elements are defined in Section 6).

*Figure 2 - **Evaluation Process Flowchart***



5.0 No Action Alternative

Under the No Action Alternative, only improvements that are already planned and included in the fiscally constrained *2040 Regional Transportation Plan* (NFRMPO, 2015b) and routine maintenance would be completed. The No Action Alternative does not meet the Purpose and Need. It is carried forward as a baseline for comparison to the concepts and alternatives evaluated during the PEL Study.

6.0 Level 1 Concepts and Evaluation

A wide range of potential solutions were developed that could be implemented to address the project Purpose and Need. The Level 1 concepts focused on addressing the Purpose and Need and the issues identified in the evaluation of existing conditions and were developed based on input received from agency stakeholders and public open houses.

6.1 Level 1 Concept Descriptions

Concepts were developed for each of the six corridor segments and were categorized by roadway elements, access, multimodal elements, other physical elements, and operational elements. These categories addressed distinct improvement types or specific issues. **The categories were defined as follows:**

- ***Roadway Elements*** - Roadway concepts impacted a long section of the highway and were focused on vehicles.
- ***Access*** – Concepts that were localized at specific access points or intersections.
- ***Multimodal Elements*** – Concepts that addressed the needs of multimodal users regionally and locally.
- ***Other Physical Elements*** – Concepts that were not suitable in other categories.
- ***Operation Elements*** – Concepts that improve the operations of the roadway.

Table 1 Level 1 Concepts table below provides a summary and description of the Level 1 concepts for the corridor

Table 1 - Level 1 Concepts

Roadway Elements	• Add lanes – This concept would add one or more lanes in each direction. • Add/expand auxiliary lanes - This concept would add or expand existing auxiliary lanes at access locations. • Add frontage roads – This concept would add frontage roads to a segment of the corridor. • Design Criteria (Lane width, horizontal and vertical curves, freight movement) – This concept would encourage correction of geometric design deficiencies and enhance freight movement
Access	• Median improvements (Add/Remove/Improve) – This concept would establish, remove or otherwise improve the US 34 median. • Consolidate access– This concept would consolidate access points. • Intersection Improvements - specific locations within each segment – This concept would provide improvements to at grade intersections and/or construct an interchange. • Parking – This concept would address existing parking needs.
Multimodal	• Bicycle and pedestrian regional connections along US 34 – This concept would provide or improve existing regional bicycle and pedestrian connections along US 34. • Bicycle and pedestrian mobility improvements/enhancements – This concept would provide, improve, or enhance existing local bicycle and pedestrian facilities. • Transit service on US 34 – This concept would provide transit facilities on US 34.
Other Physical Elements	• Drainage improvements – This concept would address existing • Wildlife Crossings – This concept would provide crossings for wildlife. • Localized safety improvements – This concept would address locations with known or emergent safety needs. • Railroad crossing improvements - This concept would address existing at grade railroad crossings. Utilities – This concept would address known utility issues.
Operational Elements	• Existing technologies – These concepts would utilize existing technologies to maximize the functionality of the roadway infrastructure • Emerging technology - These concepts would utilize emerging technologies to maximize the functionality of the roadway infrastructure • Incident management – This concept would provide systems for incident management • Accessible to Maintenance Access – This concept would provide constructed improvements that are accessible to Maintenance personnel

6.2 Level 1 Evaluation Process

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

Concepts that received all "yes" answers to the criteria were carried forward as core concepts because they had the potential to address the Purpose and Need as a standalone alternative. Some concepts were able to address one or several needs, but not all four. These were carried forward for further consideration as a supplemental element. Concepts that could not meet the Purpose and Need were eliminated from the US 34 PEL study. Concepts that had negligible benefits or higher impacts than other concepts, were not recommended for further evaluation in the US 34 PEL study.

6.3 Level 1 Evaluation Results

Up to 27 concepts and a No Action Alternative were considered for each corridor segment during Level 1 Evaluation. The concepts that were not recommended for further evaluation and/or eliminated by segment were:

Foothills:

- *Roadway Elements*
    - **Add Frontage Roads** – Adding frontage roads would only meet one element of the Purpose and Need (increases travel reliability) and results in higher impacts that other concepts. Frontage roads are not necessary to accommodate the access needs within the segment; thus, they are not recommended for further evaluation.
- *Access*
    - **Consolidate Access** – An ACP is being developed for this segment. Once the ACP is adopted the individual interchange/intersection improvements at public streets identified in the ACP will be implemented with public projects and are considered supplemental to those projects. Consolidation of access to private properties will occur with development regardless of what happens on the highway.
- *Other Physical Elements*
    - **Railroads** – There are no railroads within this segment.
    - **Utilities** – Does not meet Purpose and Need as a standalone improvement. Modifications to existing utilities would be address in conjunction with other projects.

Loveland Urban:

- *Roadway Elements*
  - **Add Frontage Roads** – Adding frontage roads would only meet one element of the Purpose and Need (increases travel reliability) and results in higher impacts that other concepts. Frontage roads are not necessary to accommodate the access needs within the segment; thus, they are not recommended for further evaluation.
- *Access*
  - **Consolidate Access** – An ACP is being developed for this segment. Once the ACP is adopted the individual interchange/intersection improvements at public streets identified in the ACP will be implemented with public projects and are considered supplemental to those projects. Consolidation of access to private properties will occur with development regardless of what happens on the highway.
- *Other Physical Elements*
  - **Wildlife crossing** – This segment falls within an urban area with limited need identified for wildlife crossings.
  - **Railroads** – There are no railroads within this segment.
  - **Utilities** – Does not meet Purpose and Need as a standalone improvement. Modifications to existing utilities would be address in conjunction with other projects.

Loveland 6-Lane:

- *Roadway Elements*
  - **Add Frontage Roads** – Adding frontage roads would only meet one element of the Purpose and Need (increases travel reliability) and results in higher impacts that other concepts. Frontage roads are not necessary to accommodate the access needs within the segment; thus, they are not recommended for further evaluation.
- *Access*
  - **Consolidate Access** – An ACP is being developed for this segment. Once the ACP is adopted the individual interchange/intersection improvements at public streets identified in the ACP will be implemented with public projects and are considered supplemental to those projects. Consolidation of access to private properties will occur with development regardless of what happens on the highway.
  - **Parking** – No specific locations for parking improvements were identified in this segment.
- *Other Physical Elements*
  - **Wildlife crossing** – This segment falls within an urban area with limited need identified for wildlife crossings.
  - **Railroads** – No at-grade railroad crossings exist in this segment. Impacts to the grade-separated railroad crossing in this segment will be evaluated with future roadway projects.
  - **Utilities** – Does not meet Purpose and Need as a standalone improvement. Modifications to existing utilities would be address in conjunction with other projects.

Johnstown – Greeley:

- *Roadway Elements*
    - **Add Frontage Roads** – Adding frontage roads would only meet one element of the Purpose and Need (increases travel reliability) and results in higher impacts that other concepts. Frontage roads are not necessary to accommodate the access needs within the segment; thus, they are not recommended for further evaluation.
- *Access*
    - **Consolidate Access** – This segment has an adopted ACP. The individual interchange/intersection improvements at public streets identified in the ACP will be implemented with public projects and are considered supplemental to those projects. Consolidation of access to private properties will occur with development regardless of what happens on the highway.
    - **Parking** – No specific locations for parking improvements were identified in this segment.
- *Other Physical Elements*
    - **Drainage** – No specific areas with drainage problems were identified in this segment.
    - **Wildlife crossing** – Wildlife related crashes were not identified as an issue in this segment during scoping: therefore, the expected need for crossings is minimal.
    - **Utilities** – Does not meet Purpose and Need as a standalone improvement. Modifications to existing utilities would be address in conjunction with other projects.

Greeley Expressway:

- *Roadway Elements*
    - **Add Frontage Roads** – Adding frontage roads would only meet one element of the Purpose and Need (increases travel reliability) and results in higher impacts that other concepts. Frontage roads are not necessary to accommodate the access needs within the segment; thus, they are not recommended for further evaluation.
- *Access*
    - **Consolidate Access** – This segment has an adopted ACP. The individual interchange/intersection improvements at public streets identified in the ACP will be implemented with public projects and are considered supplemental to those projects. Consolidation of access to private properties will occur with development regardless of what happens on the highway.
    - **Parking** – No specific locations for parking improvements were identified in this segment.
- *Other Physical Elements*
    - **Drainage** – No specific areas with drainage problems were identified in this segment.
    - **Wildlife crossing** – Wildlife related crashes were not identified as an issue in this segment during scoping: therefore, the expected need for crossings is minimal.
    - **Railroads** – There are no railroads within this segment.
    - **Utilities** – Does not meet Purpose and Need as a standalone improvement. Modifications to existing utilities would be address in conjunction with other projects.

East End:

- *Roadway Elements*
    - **Add/expand auxiliary lanes** – Existing intersections in this segment have appropriate auxiliary lanes. Additional auxiliary lanes would most likely be implemented with development of adjacent parcels, as governed by the ACP.
    - **Add Frontage Roads** – Adding frontage roads would only meet one element of the Purpose and Need (increases travel reliability) and results in higher impacts that other concepts. Frontage roads are not necessary to accommodate the access needs within the segment; thus, they are not recommended for further evaluation.
- *Access*
    - **Consolidate Access** – This segment has an adopted ACP. The individual interchange/intersection improvements at public streets identified in the ACP will be implemented with public projects and are considered supplemental to those projects. Consolidation of access to private properties will occur with development regardless of what happens on the highway.
    - **Parking** – No specific locations for parking improvements were identified in this segment.
- *Multimodal Elements*
    - **Transit service on US 34** – There are no planned existing or proposed transit services in this segment.
- *Other Physical Elements*
    - **Drainage** – Drainage improvements will be evaluated in conjunction with other projects. No specific locations identified.
    - **Railroads** – No railroads within this segment
    - **Utilities** – Does not meet Purpose and Need as a standalone improvement. Modifications to existing utilities would be address in conjunction with other projects.

All other concepts were carried forward for further evaluation. Concepts that were carried forward included various roadway elements (such as adding lanes, adding and/or expanding auxiliary lanes, addressing areas that do not meet design criteria) and access elements (such as intersection and median improvements) as well as a number of supplemental elements, including wildlife crossings, parking, multimodal improvements, localized safety improvements, and existing/emerging technologies.

Table 2 - The full Level 1 Evaluation Tables are shown in Table 2 below**:**

Table 2 – Level I Evaluation Tables

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Foothills Segment
Level 1 Evaluation Table

NOTE: At Level 1, each segment is being evaluated individually. Subsequent levels of evaluation will include a review of the dependencies and continuity of elements, and combinations of elements, between the six segments.

Level 1 result classifications are defined as:

Carried Forward as Core Concept = has the potential to address the project's purpose and need by itself (i.e., standalone).

Carried Forward as Supplemental Element = has the potential to enhance the Core Concept(s).

Not Recommended for Further Evaluation = will not be evaluated further in the study due to comparatively negligible benefits, and/or higher impacts than other concepts/elements.

Eliminated = does not meet the Purpose and Need established within this study.

Concepts for Foothills: Larimer County Road 27 (LCR 27) to Morning Drive	INCREASES SAFETY?	ACCOMMODATES TRAVEL DEMAND?	INCREASES TRAVEL RELIABILITY?	SUPPORTS LOCAL ACCESS AND MOBILITY?	RESULT of LEVEL 1 EVALUATION	COMMENTS
No Action	N	N	N	N	Carried Forward as Core Concept	Although the No Action does not meet the purpose and need, it is advanced as a baseline condition for comparison.
Roadway Elements						
Add lanes	Y	Y	Y	Y	Carried Forward as Core Concept	
Add / expand auxiliary lanes	Y	Y	Y	Y	Carried Forward as Core Concept	
Add frontage roads	N	N	Y	N	Not Recommended for Further Evaluation	Segment does not require frontage roads.
Design Criteria (lane width, horizontal & vertical, curves, freight movement)	Y	Y	Y	Y	Carried Forward as Core Concept	
Access						
Median Improvements	Y	N	N	N	Carried Forward as Supplemental Element	Medians would be built in conjunction with other projects.
Consolidate access	Y	N	Y	Y	Not Recommended for Further Evaluation	An ACP is being developed for this segment. Once the ACP is adopted the individual interchange/intersection improvements at public streets identified in the ACP will be implemented with public projects and are considered supplemental to those projects. Consolidation of access to private properties will occur with local development regardless of what happens on US 34.
LCR 27 intersection improvements	Y	Y	Y	Y	Carried Forward as Core Concept	
Glade Road intersection improvements	Y	Y	Y	Y	Carried Forward as Core Concept	
Morning Drive intersection improvements	Y	Y	Y	Y	Carried Forward as Core Concept	
Parking	Y	N	N	N	Carried Forward as Supplement Element	Primary parking concerns in the Foothills segment are at the Big Thompson Elementary school.
Multimodal Elements						
Bicycle and pedestrian regional connections along US 34	Y	N	Y	Y	Carried Forward as Supplemental Element	Popular bike route. Planned for bike lanes. Planned Regional Bikeway.
Bicycle and pedestrian mobility improvements/enhancements	Y	N	Y	Y	Carried Forward as Supplemental Element	
Transit service on US 34	Y	N	Y	Y	Carried Forward as Supplemental Element	
Other Physical Elements						
Drainage improvements	Y	N	N	N	Carried Forward as Supplement Element	Sheet flow at the west end during rain events should be addressed.
Wildlife crossings	Y	N	N	N	Carried Forward as Supplement Element	
Localized safety improvements	Y	N	N	N	Carried Forward as Supplement Element	
Railroad crossing improvements	N	N	N	N	Not Recommended for Further Evaluation.	No railroads located within this segment.
Utilities	N	N	N	N	Not Recommended for Further Evaluation.	Modifications to existing utilities would be built in conjunction with other projects.
Operational Elements						
Existing technologies	Y	N	Y	Y	Carried Forward as Supplemental Element	
Emerging technologies	Y	N	Y	Y	Carried Forward as Supplemental Element	
Incident management	Y	Y	Y	N	Carried Forward as Supplemental Element	
Accessible to maintenance personal	Y	N	N	N	Carried Forward as Supplemental Element	

Notes: The typical section is 2-12' lanes with variable width substandard shoulders. Future development along the roadway will be limited by the mountainous terrain and a parallel floodplain. There is a significant amount of bicycle usage, especially during the summer.

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Loveland Urban Segment
Level 1 Evaluation Table

NOTE: At Level 1, each segment is being evaluated individually. Subsequent levels of evaluation will include a review of the dependencies and continuity of elements, and combinations of elements, between the six segments.
Level 1 result classifications are defined as:

Carried Forward as Core Concept = has the potential to address the project's purpose and need by itself (i.e., standalone).
Carried Forward as Supplemental Element = has the potential to enhance the Core Concept(s).
Not Recommended for Further Evaluation = will not be evaluated further in the study due to comparatively negligible benefits, and/or higher impacts than other concepts/elements.
Eliminated = does not meet the Purpose and Need established within this study.

Concepts for Loveland Urban: Morning Drive to N Garfield Ave	INCREASES SAFETY?	ACCOMMODATES TRAVEL DEMAND?	INCREASES TRAVEL RELIABILITY?	SUPPORTS LOCAL ACCESS AND MOBILITY?	RESULT of LEVEL 1 EVALUATION	COMMENTS
No Action	N	N	N	N	Carried Forward as Core Concept	Although the No Action does not meet the purpose and need, it is advanced as a baseline condition for comparison.
Roadway Elements						
Add lanes	Y	Y	Y	Y	Carried Forward as Core Concept	
Add / expand auxiliary lanes	Y	Y	Y	Y	Carried Forward as Core Concept	
Add frontage roads	N	N	Y	N	Not Recommended for Further Evaluation	Segment does not require frontage roads
Design Criteria (lane width, horizontal & vertical, curves, freight movement)	Y	Y	Y	Y	Carried Forward as Core Concept	
Access						
Median Improvements	Y	N	Y	Y	Carried Forward as Supplemental Element	Medians would be built in conjunction with other projects.
Consolidate access	Y	N	Y	Y	Not Recommended for Further Evaluation	An ACP is being developed for this segment. Once the ACP is adopted the individual interchange/intersection improvements at public streets identified in the ACP will be implemented with public projects and are considered supplemental to those projects. Consolidation of access to private properties will occur with local development regardless of what happens on US 34.
Wilson Ave intersection improvements	Y	Y	Y	Y	Carried Forward as Core Concept	
Taft Ave intersection improvements	Y	Y	Y	Y	Carried Forward as Core Concept	
Parking	Y	N	N	N	Carried Forward as Supplemental Element	Parking concerns at Lake Loveland would be addressed in conjunction with other projects.
Multimodal Elements						
Bicycle and pedestrian regional connections along US 34	Y	N	Y	Y	Carried Forward as Supplemental Element	Planned bike lanes. Planned Regional Bike Route.
Bicycle and pedestrian mobility improvements/enhancements	Y	N	Y	Y	Carried Forward as Supplemental Element	
Transit service on US 34	Y	N	Y	Y	Carried Forward as Supplemental Element	Important to fill in gaps
Other Physical Elements						
Drainage improvements	Y	N	N	N	Carried Forward as Supplemental Element	Evaluate storm sewer drainage throughout Loveland
Wildlife crossings	N	N	N	N	Not Recommended for Further Evaluation	This segment falls within an urban area, with limited need for wildlife crossing identified
Localized safety improvements	Y	N	N	N	Carried Forward as Supplemental Element	
Railroad crossing improvements	N	N	N	N	Not Recommended for Further Evaluation	No railroads located within this segment
Utilities	N	N	N	N	Not Recommended for Further Evaluation.	Modifications to existing utilities would be built in conjunction with other projects.
Operational Elements						
Existing Technologies	Y	N	Y	Y	Carried Forward as Supplemental Element	
Emerging Technologies	Y	N	Y	Y	Carried Forward as Supplemental Element	
Incident management	Y	N	N	Y	Carried Forward as Supplemental Element	
Accessible to maintenance personal	Y	N	N	N	Carried Forward as Supplemental Element	

Notes: From Morning Drive to Taft Avenue the typical section is 4 lanes with a painted median, variable shoulder widths, and sidewalks. An area of the shoulder is striped as a bike lane. Between Taft Avenue and North Garfield Avenue the median is raised with variable shoulder widths and sidewalks.

Table 2

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Loveland 6-Lane Segment
Level 1 Evaluation Table

NOTE: At Level 1, each segment is being evaluated individually. Subsequent levels of evaluation will include a review of the dependencies and continuity of elements, and combinations of elements, between the six segments.

Level 1 result classifications are defined as:

Carried Forward as Core Concept = has the potential to address the project's purpose and need by itself (i.e., standalone).

Carried Forward as Supplemental Element = has the potential to enhance the Core Concept(s).

Not Recommended for Further Evaluation = will not be evaluated further in the study due to comparatively negligible benefits, and/or higher impacts than other concepts/elements.

Eliminated = does not meet the Purpose and Need established within this study.

Concepts for Loveland 6-Lane: N Garfield Ave to Rocky Mountain Ave	INCREASES SAFETY?	ACCOMMODATES TRAVEL DEMAND?	INCREASES TRAVEL RELIABILITY?	SUPPORTS LOCAL ACCESS AND MOBILITY?	RESULT of LEVEL 1 EVALUATION	COMMENTS
No Action	N	N	N	N	Carried Forward as Core Concept	Although the No Action does not meet the purpose and need, it is advanced as a baseline condition for comparison.
Roadway Elements						
Add lanes	Y	Y	Y	Y	Carried Forward as Core Concept	
Add / expand auxiliary lanes	Y	Y	Y	Y	Carried Forward as Core Concept	
Add frontage roads	N	N	Y	N	Not Recommended for Further Evaluation	Segment does not require frontage roads
Design Criteria (lane width, horizontal & vertical, curves, freight movement)	Y	Y	Y	Y	Carried Forward as Core Concept	
Access						
Median Improvements	Y	N	Y	Y	Carried Forward as Supplemental Element	Medians would be built in conjunction with other projects.
Consolidate access	Y	N	Y	Y	Not Recommended for Further Evaluation	An ACP is being developed for this segment. Once the ACP is adopted the individual interchange/intersection improvements at public streets identified in the ACP will be implemented with public projects and are considered supplemental to those projects. Consolidation of access to private properties will occur with local development regardless of what happens on US 34.
Cleveland Avenue / Lincoln Avenue (US 287) intersection improvements	Y	Y	Y	Y	Carried Forward as Core Concept	
Parking	N	N	N	N	Not Recommended for Further Evaluation	Parking impacts to businesses will be evaluated in conjunction with other projects. No specific locations identified.
Multimodal Elements						
Bicycle and pedestrian regional connections along US 34	Y	N	Y	Y	Carried Forward as Supplemental Element	Planned Regional Bikeway 8: BNSF Fort Collins/Berthoud . Planned bike lanes.
Bicycle and pedestrian mobility improvements/enhancements	Y	N	Y	Y	Carried Forward as Supplemental Element	Minimize US 34 as a barrier.
Transit service on US 34	Y	N	Y	Y	Carried Forward as Supplemental Element	Important to complete missing gaps.
Other Physical Elements						
Drainage improvements	Y	N	N	N	Carried Forward as Supplemental Element	Evaluate storm sewer drainage throughout Loveland
Wildlife crossings	N	N	N	N	Not Recommended for Further Evaluation	This segment falls within an urban area, with limited need for wildlife crossing identified
Localized safety improvements	Y	N	N	N	Carried Forward as Supplemental Element	
Railroad crossing improvements	N	N	N	N	Not Recommended for Further Evaluation	The RR crosses under US 34 in this segment. Impacts to the RR will be evaluated with roadway alternatives.
Utilities	N	N	N	N	Not Recommended for Further Evaluation.	Modifications to existing utilities would be built in conjunction with other projects.
Operational Elements						
Existing Technologies	Y	Y	Y	N	Carried Forward as Supplemental Element	
Emerging Technologies	Y	Y	Y	N	Carried Forward as Supplemental Element	
Incident management	N	N	Y	Y	Carried Forward as Supplemental Element	
Accessible to maintenance personal	Y	N	N	N	Carried Forward as Supplemental Element	

Notes: From North Garfield Avenue to Monroe Avenue the typical section is 4 lanes with a raised median, variable shoulder widths and sidewalks. The typical section from Monroe Avenue to Denver Avenue is 6-10' lanes with a raised median, 1 foot shoulders and sidewalks. Between Denver Avenue and Rocky Mountain Avenue the typical section is 4 lanes with a depressed median, 3' inside shoulders and variable outside shoulders. Sidewalks are detached at various locations. The City of Loveland is reconstructing this segment to a 6 lane typical section.

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Johnstown-Greeley Segment

Level 1 Evaluation Table

NOTE: At Level 1, each segment is being evaluated individually. Subsequent levels of evaluation will include a review of the dependencies and continuity of elements, and combinations of elements, between the six segments.

Level 1 result classifications are defined as:

Carried Forward as Core Concept = has the potential to address the project's purpose and need by itself (i.e., standalone).

Carried Forward as Supplemental Element = has the potential to enhance the Core Concept(s).

Not Recommended for Further Evaluation = will not be evaluated further in the study due to comparatively negligible benefits, and/or higher impacts than other concepts/elements.

Eliminated = does not meet the Purpose and Need established within this study.

Concepts for Johnstown-Greeley: Centerra/Thompson Pkwy to East of Hwy 257	INCREASES SAFETY?	ACCOMMODATES TRAVEL DEMAND?	INCREASES TRAVEL RELIABILITY?	SUPPORTS LOCAL ACCESS AND MOBILITY?	RESULT of LEVEL 1 EVALUATION	COMMENTS
No Action	N	N	N	N	Carried Forward as Core Concept	Although the No Action does not meet the purpose and need, it is advanced as a baseline condition for comparison.
Roadway Elements						
Add lanes	Y	Y	Y	Y	Carried Forward as Core Concept	
Add / expand auxiliary lanes	Y	Y	Y	Y	Carried Forward as Core Concept	
Add frontage roads	N	N	Y	N	Not Recommended for Further Evaluation	Segment does not require frontage roads
Design Criteria (lane width, horizontal & vertical, curves, freight movement)	Y	Y	Y	Y	Carried Forward as Core Concept	
Access						
Median Improvements	Y	N	Y	Y	Carried Forward as Supplemental Element	Medians would be built in conjunction with other projects.
Consolidate access	Y	N	Y	Y	Not Recommended for Further Evaluation	This segment has an adopted ACP. The individual interchange/intersection improvements at public streets identified in the ACP will be implemented with public projects and are considered supplemental to those projects. Consolidation of access to private properties will occur with local development regardless of what happens on US 34..
Larimer Parkway (LCR 3E) intersection improvements	Y	Y	Y	Y	Carried Forward as Core Concept	
LCR 3 intersection improvements	Y	Y	Y	Y	Carried Forward as Core Concept	
WCR 13 intersection improvements	Y	Y	Y	Y	Carried Forward as Core Concept	
WCR 15 intersection improvements	Y	Y	Y	Y	Carried Forward as Core Concept	
WCR 17 intersection improvements	Y	Y	Y	Y	Carried Forward as Core Concept	
US 34 Business intersection improvements	Y	Y	Y	Y	Carried Forward as Core Concept	
WCR 19/US 257 intersection improvements	Y	Y	Y	Y	Carried Forward as Core Concept	
Parking	N	N	N	N	Not Recommended for Further Evaluation	Parking impacts to businesses will be evaluated in conjunction with other projects. No specific locations identified.
Multimodal Elements						
Bicycle and pedestrian regional connections along US 34	Y	N	N	Y	Carried Forward as Supplemental Element	Planned Regional Bikeways 4 and 9 cross US 34
Bicycle and pedestrian mobility improvements/enhancements	Y	N	N	Y	Carried Forward as Supplemental Element	The west end of the project has the potential for sidewalk connections and pedestrian crossings.
Transit service on US 34	Y	N	Y	Y	Carried Forward as Supplemental Element	This was attempted in the past US 34 Express. Ridership was low, talk with NFRMPO about lessons learned.
Other Physical Elements						
Drainage improvements	N	N	N	N	Not recommended for Further Evaluation.	Drainage improvements will be evaluated in conjunction with other projects. No specific locations identified.
Wildlife crossings	Y	N	N	N	Not recommended for Further Evaluation.	Wildlife related crashes not identified as an issue in this segment, therefore the need for crossings is minimal
Localized safety improvements	Y	N	N	N	Carried Forward as Supplemental Element	
Railroad crossing improvements	Y	N	Y	N	Carried Forward as Supplemental Element	Grade Separated rail would be very helpful in this segment.
Utilities	N	N	N	N	Not Recommended for Further Evaluation.	Modifications to existing utilities would be built in conjunction with other projects.
Operational Elements						
Existing Technologies	Y	Y	Y	Y	Carried Forward as Supplemental Element	
Emerging Technologies	Y	Y	Y	Y	Carried Forward as Supplemental Element	
Incident management	Y	N	Y	Y	Carried Forward as Supplemental Element	
Accessible to maintenance personal	N	N	N	N	Carried Forward as Supplemental Element	

Notes: The typical section is 4 lanes with a depressed median, 3' inside shoulders and variable width outside shoulders.

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Greeley Expressway Segment
Level 1 Evaluation Table

NOTE: At Level 1, each segment is being evaluated individually. Subsequent levels of evaluation will include a review of the dependencies and continuity of elements, and combinations of elements, between the six segments.
Level 1 result classifications are defined as:
Carried Forward as Core Concept = has the potential to address the project's purpose and need by itself (i.e., standalone).
Carried Forward as Supplemental Element = has the potential to enhance the Core Concept(s).
Not Recommended for Further Evaluation = will not be evaluated further in the study due to comparatively negligible benefits, and/or higher impacts than other concepts/elements.
Eliminated = does not meet the Purpose and Need established within this study.

Concepts for Greeley Expressway: East of Hwy 257 to West of 11th Ave	INCREASES SAFETY?	ACCOMMODATES TRAVEL DEMAND?	INCREASES TRAVEL RELIABILITY?	SUPPORTS LOCAL ACCESS AND MOBILITY?	RESULT of LEVEL 1 EVALUATION	COMMENTS
No Action	N	N	N	N	Carried Forward as Core Concept	Although the No Action does not meet the purpose and need, it is advanced as a baseline condition for comparison.
Roadway Elements						
Add lanes	Y	Y	Y	Y	Carried Forward as Core Concept	
Add / expand auxiliary lanes	Y	Y	Y	Y	Carried Forward as Core Concept	
Add frontage roads	N	N	Y	N	Not recommended for Further Evaluation.	Segment does not require frontage roads
Design Criteria (lane width, horizontal & vertical, curves, freight movement)	Y	Y	Y	Y	Carried Forward as Core Concept	
Access						
Median Improvements	Y	N	Y	Y	Carried Forward as Supplemental Element	Medians would be built in conjunction with other projects.
Consolidate access	Y	N	Y	Y	Not recommended for Further Evaluation.	This segment has an adopted ACP. The individual interchange/intersection improvements at public streets identified in the ACP will be implemented with public projects and are considered supplemental to those projects. Consolidation of access to private properties will occur with local development regardless of what happens on US 34.
Promontory Parkway	Y	Y	Y	Y	Carried Forward as Core Concept	
95th Ave intersection improvements	Y	Y	Y	Y	Carried Forward as Core Concept	
83rd Ave intersection improvements	Y	Y	Y	Y	Carried Forward as Core Concept	There is a temporary signal that needs to be upgraded at this location.
71st Ave/65th Ave intersection improvements	Y	Y	Y	Y	Carried Forward as Core Concept	
47th Ave intersection improvements	Y	Y	Y	Y	Carried Forward as Core Concept	
35th Ave intersection improvements	Y	Y	Y	Y	Carried Forward as Core Concept	
23rd Ave intersection improvements	Y	Y	Y	Y	Carried Forward as Core Concept	
17th Ave intersection improvements	Y	Y	Y	Y	Carried Forward as Core Concept	
Parking	N	N	N	N	Not recommended for Further Evaluation.	Parking impacts to businesses will be evaluated in conjunction with other projects. No specific locations identified.
Multimodal Elements						
Bicycle and pedestrian regional connections along US 34	Y	N	Y	Y	Carried Forward as Supplemental Element	Proposed Bypass Trail parallels US 34/Existing Bypass Trail at 61st. Planned Regional Bikeway.
Bicycle and pedestrian mobility improvements/enhancements	Y	N	Y	Y	Carried Forward as Supplemental Element	Proposed Sheep Draw Trail would cross near 95th Ave. Important to complete missing gaps. Several planned pedestrian and trail oriented intersection improvements in eastern portion.
Transit service on US 34	Y	N	Y	Y	Carried Forward as Supplemental Element	This was attempted in the past as part of the US 34 Express. Ridership was low talk to NFRMPO for lessons learned.
Other Physical Elements						
Drainage improvements	N	N	N	N	Not recommended for Further Evaluation.	Drainage improvements will be evaluated in conjunction with other projects. No specific locations identified.
Wildlife crossings	N	N	N	N	Not recommended for Further Evaluation.	Wildlife related crashes not identified as an issue in this segment, therefore the need for crossings is minimal
Localized safety improvements	Y	N	N	N	Carried Forward as Supplemental Element	
Railroad crossing improvements	N	N	N	N	Not recommended for Further Evaluation.	No railroads located within this segment
Utilities	N	N	N	N	Not recommended for Further Evaluation.	Modifications to existing utilities would be built in conjunction with other projects.
Operational Elements						
Existing Technologies	Y	N	Y	Y	Carried Forward as Supplemental Element	
Emerging Technologies	Y	N	Y	Y	Carried Forward as Supplemental Element	
Incident management	Y	N	Y	Y	Carried Forward as Supplemental Element	
Accessible to maintenance personal	Y	N	N	N	Carried Forward as Supplemental Element	

Notes: The typical section is 4 lanes with a depressed median, 1'-4' inside shoulders and variable width outside shoulders.

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East End Segment
Level 1 Evaluation Table

NOTE: At Level 1, each segment is being evaluated individually. Subsequent levels of evaluation will include a review of the dependencies and continuity of elements, and combinations of elements, between the six segments.
Level 1 result classifications are defined as:

Carried Forward as Core Concept = has the potential to address the project's purpose and need by itself (i.e., standalone).
Carried Forward as Supplemental Element = has the potential to enhance the Core Concept(s).
Not Recommended for Further Evaluation = will not be evaluated further in the study due to comparatively negligible benefits, and/or higher impacts than other concepts/elements.
Eliminated = does not meet the Purpose and Need established within this study.

Concepts for East End: 1st Ave to Weld County Road 49 (WCR 49)	INCREASES SAFETY?	ACCOMMODATES TRAVEL DEMAND?	INCREASES TRAVEL RELIABILITY?	SUPPORTS LOCAL ACCESS AND MOBILITY?	RESULT of LEVEL 1 EVALUATION	COMMENTS
No Action	N	Y	N	Y	Carried Forward as Core Concept	Although the No Action does not meet the purpose and need, it is advanced as a baseline condition for comparison.
Roadway Elements						
Add lanes	Y	Y	Y	Y	Carried Forward as Core Concept	
Add / expand auxiliary lanes	Y	Y	Y	Y	Not recommended for Further Evaluation.	
Add frontage roads	N	N	Y	N	Not recommended for Further Evaluation.	Segment does not require frontage roads
Design Criteria (lane width, horizontal & vertical, curves, freight movement)	Y	Y	Y	Y	Carried Forward as Core Concept	
Access						
Median Improvements	Y	N	N	Y	Carried Forward as Supplemental Element	Medians would be built in conjunction with other projects.
Consolidate access	Y	N	Y	Y	Not recommended for Further Evaluation.	This segment has an adopted ACP. The individual interchange/intersection improvements at public streets identified in the ACP will be implemented with public projects and are considered supplemental to those projects. Consolidation of access to private properties will occur with local development regardless of what happens on US 34.
27th Street (frontage road) intersection improvements	Y	Y	Y	Y	Carried Forward as Core Concept	Future projects would need to comply with the ACP
WCR 45 intersection improvements	Y	Y	Y	Y	Carried Forward as Core Concept	Future projects would need to comply with the ACP
US 34 Business intersection improvements	Y	Y	Y	Y	Carried Forward as Core Concept	
WCR 45.5 intersection improvements	Y	Y	Y	Y	Carried Forward as Core Concept	Future projects would need to comply with the ACP
WCR 47 intersection improvements	Y	Y	Y	Y	Carried Forward as Core Concept	Future projects would need to comply with the ACP
WCR 47.5 intersection improvements	Y	Y	Y	Y	Carried Forward as Core Concept	Future projects would need to comply with the ACP
WCR 49 intersection improvements	Y	Y	Y	Y	Carried Forward as Core Concept	Future projects would need to comply with the ACP
Parking	N	N	N	N	Not recommended for Further Evaluation.	Parking impacts to businesses will be evaluated in conjunction with other projects. No specific locations identified.
Multimodal Elements						
Bicycle and pedestrian regional connections along US 34	Y	N	Y	Y	Carried Forward as Supplemental Element	South Platte/American Discovery Trail crosses under US 34. Improvements would need to consider the proposed regional trail that follows the South Platte River. US 34 is shown as a Regional Bikeway in the NOCO Non Motorized Plan.
Bicycle and pedestrian mobility improvements/enhancements	Y	N	N	Y	Carried Forward as Supplemental Element	Currently there are no proposed sidewalks or trails in this area to connect to.
Transit service on US 34	N	N	N	N	Not recommended for Further Evaluation.	This area does not have existing or proposed transit services.
Other Physical Elements						
Drainage improvements	N	N	N	N	Not recommended for Further Evaluation.	Drainage improvements will be evaluated in conjunction with other projects. No specific locations identified.
Wildlife crossings	Y	N	N	N	Carried Forward as Supplemental Element	
Localized safety improvements	Y	N	N	N	Carried Forward as Supplemental Element	
Railroad crossing improvements	N	N	N	N	Not Recommended for Further Evaluation.	There is not an active railway in this segment.
Utilities	N	N	N	N	Not Recommended for Further Evaluation.	Modifications to existing utilities would be built in conjunction with other projects.
Operational Elements						
Existing Technologies	Y	N	Y	Y	Carried Forward as Supplemental Element	Existing signalized intersections have corridor surveillance, additional locations would not improve corridor surveillance
Emerging Technologies	Y	N	Y	Y	Carried Forward as Supplemental Element	Rural setting of Segment is not conducive to maximizing benefit from this supplemental element.
Incident management	Y	N	Y	Y	Carried Forward as Supplemental Element	
Accessible to maintenance personal	Y	N	N	N	Carried Forward as Supplemental Element	

Notes: The typical section is 4 lanes with a painted median and 10' shoulders.

7.0 Level 2 Concepts and Evaluation

For Level 2 Evaluation, the Core Concepts were further refined into either segment wide improvements and/or concepts at specific locations (i.e. at "Accesses"). Conceptual designs were developed for each concept and an approximate footprint determined if that concept was outside of existing right-of-way. The PEL team used these concept layouts and a Level 2 rubric to evaluate, compare, and quantify (if applicable) each concept. The results are shown in the evaluation matrices in this section.

This section summarizes how Level 2 Concepts were developed and evaluated for each segment.

7.1 Level 2 Concept Development

Roadway improvements (improvements along a stretch of US 34) and access improvements (improvements at intersection locations) identified as core concepts within the Level 1 evaluation were further developed and refined to meet the needs of the roadway segment or a specific access location within the segment. Design details were added to concepts, as appropriate, to understand traffic operations and potential environmental effects.

The roadway improvements and the core concepts access improvements were evaluated separately in Level 2. Concepts considered throughout the corridor are described below:

- **Added Lanes** – 2 additional lanes (one each way) throughout the length of each segment
- **Localized design deficiencies** - identified in the Existing Conditions Report (Appendix B to the PEL Report) and discussed in the Purpose and Need.
- **Intersections – improvements were considered to meet the Purpose and Need—specifically traffic demand and safety.** Attachment 01 provides Intersection Crash Analysis data.

At the intersections listed in each segment's concept descriptions, at least one of the below options were considered as a concept:

- **Restricted access** – Reduce full movement to "3/4" (lefts in, right turns only, no left-outs) or right-turn-only.
- **Signalization** – locations where signal warrants are anticipated to be met in before or in the Year 2040 planning horizon and at locations previously identified in the ACP.
- **New/improved auxiliary lanes** – locations where auxiliary lanes would improve safety and/ or traffic flow.
- **Non-Traditional solutions:**
    - **Channelized T** – at T intersections, provides a dedicated auxiliary lane for left turning vehicles
    - **Indirect Lefts** – either signalized or unsignalized
- **Roundabout intersection** – an alternative to signalization which may be a reasonable solution at selected locations.
- **Grade separated interchange** – Locations at identified high accident intersections and/or locations with high conflicting traffic and travel delay, mostly locations previously identified in the ACP.

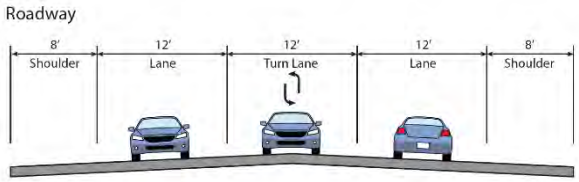
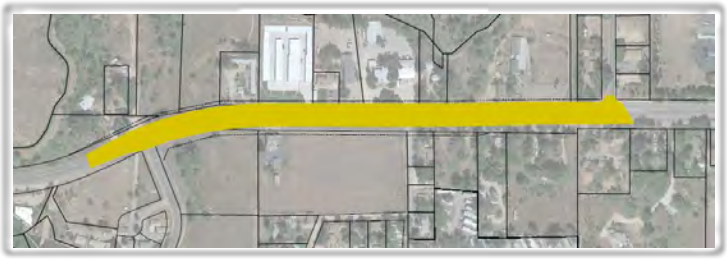
7.1.1 Concept Development - Foothills, Loveland Urban, and Loveland 6-Lanes Segments

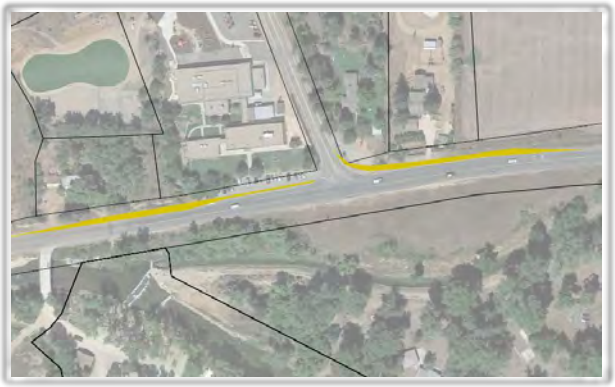
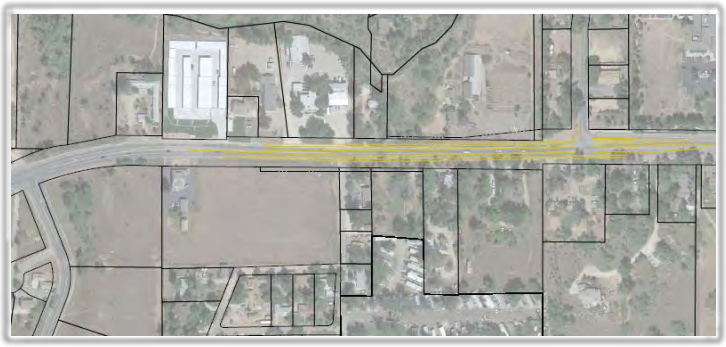
The Foothills, Loveland Urban, and Loveland 6-Lane segments, on the west side of I-25, had fewer reasonable concepts considered than other segments, since much of that segment is urbanized and unlikely to change and portions are constrained by the Big Thompson River. The 2006 EA also previously defined and cleared improvements in the Loveland 6-Lane segment.

The concepts by segment are organized in the table below, with graphics or verbal descriptions of what was considered at each location. In this area, an Access Control Plan (ACP) is being developed concurrent with this PEL (to be completed after the PEL). The concepts developed for this segment adhere to best-practice Access Control Plan principles, so should be consistent with the future ACP.

Table 3 - Level 2 Concepts – Foothills Segment, illustrates the Roadway and Access category concept descriptions developed for the Foothills segment.

Table 3- Level 2 Concepts – Foothills Segment

Roadway or Access	Concept
Roadway - Add/improve shoulders, Glade Road to Morning Drive	
Roadway - Add/improve auxiliary lanes, right or left turn lanes, and shoulders, LCR 27, and Rossum to Morning Drive	
Roadway - Add lanes to improve capacity (5-lanes Rossum to Morning Drive)	

Roadway or Access	Concept
Access – LCR 27 Added Left turn lane	
Access – Glade Road	Traffic signal added when warranted. No conceptual design necessary.
Access – Rossum to Morning Drive / Cascade. Provide two-way left turn lanes. Provide a more defined transition from 5 lanes on the east to 3 lanes on the west	
Access – Roundabout at Rossum Drive	
Access – Improve Channelized T at Morning Drive (Existing condition is a Channelized T defined by striping; it would be improved with median islands)	

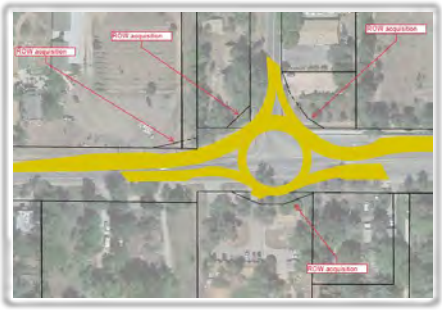
Roadway or Access	Concept
Access – Roundabout at Morning Drive	
Access – Raised Median, Rossum to Morning Drive	

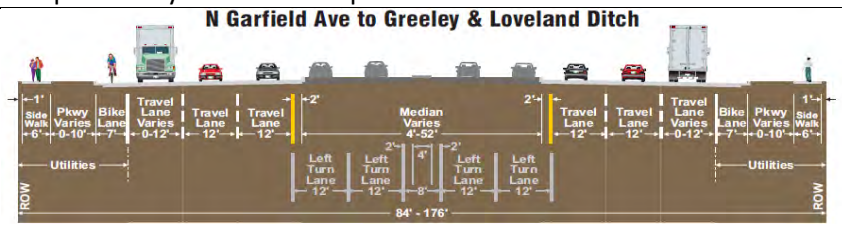
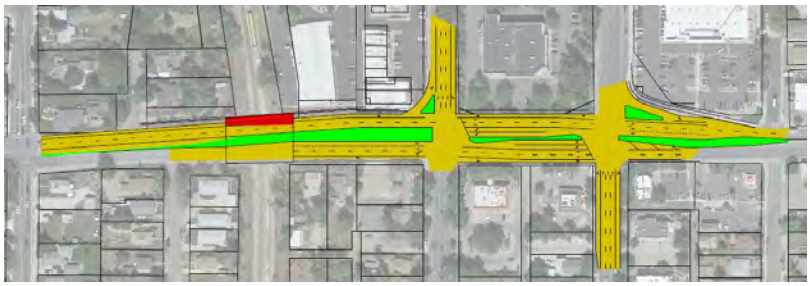
Table 4 - Level 2 Concepts – Loveland Urban Segment, illustrates the Roadway and Access category concept descriptions developed for the Loveland Urban segment.

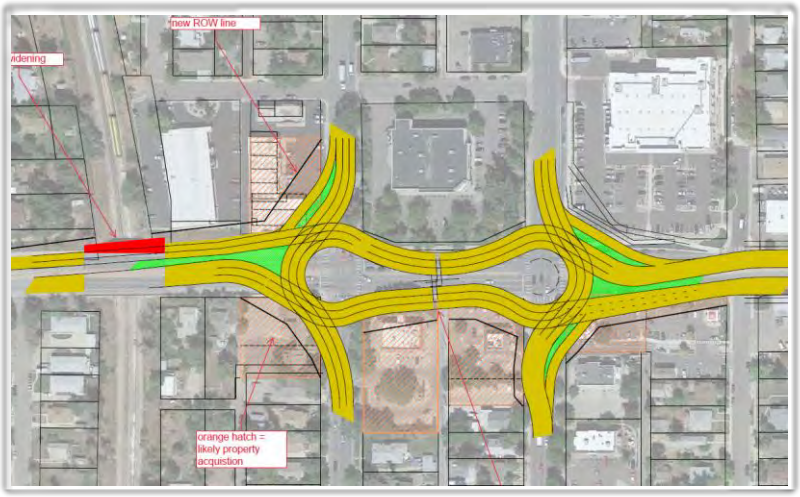
Table 4 - Level 2 Concepts - Loveland Urban Segment

Roadway or Access	Concept
Roadway - Add / expand auxiliary lanes at major intersections	Intersection with existing needs are addressed in the Access category. Future Auxiliary lane needs would be evaluated when properties redevelop and/or access points are added or revised consistent with the State Highway Access Code. No further concept refinement was completed beyond the description.
Roadway - Add additional lanes on entire segment, results in 6-lane arterial	No further concept refinement was completed beyond the description.
Access – Wilson Ave. – Double-left turns all directions (shared thru-rights)	Traffic analysis concept that would be a restriping project on existing pavement. (Re-allocate pavement used for separate right turn lanes and add a 2nd left turn lane)
Access – Taft Ave. – Double-left turns all directions (shared thru-rights)	Traffic analysis concept that would be a restriping project on existing pavement. (Re-allocate pavement used for separate right turn lanes and add a 2nd left turn lane)

Table 5 - Level 2 Concepts – Loveland 6-Lane provides concept descriptions for Loveland 6-Lane segment. Because the 2007 EA identified proposed improvements for most of this corridor, few reasonable concepts were identified to meet the Purpose and Need. At the request of the City of Loveland, the Study team conducted additional analysis at the Cleveland/Lincoln (US 287) intersection area.

Table 5 - Level 2 Concepts: Loveland 6-Lane

Roadway or Access	Concept
Roadway - Add / expand auxiliary lanes at major intersections	Intersection with existing needs are addressed in the Access category. Future Auxiliary lane needs would be evaluated when properties redevelop and/or access points are added or revised consistent with the State Highway Access Code. No further concept refinement was completed beyond the description.
Roadway - Add additional through lanes, 6-lane arterial from Lincoln to Monroe	 From 2007 US 34 Environmental Assessment - US 287 to Larimer County Road No. 3
Roadway – Add additional through lanes, 8-lane arterial, I-25 to Boise	***No further concept refinement was completed beyond the description***.
Access – Cleveland / Lincoln double left turn lanes. Design updated from 2007 EA and 1997 East-West corridor study.	
Access – Cleveland / Lincoln 2-lane Hourglass Roundabout (from 1997 East-West study)	

Roadway or Access	Concept
Access – Indirect left turn lanes. Have left turns from US 34 make a right and go one block out-of-direction. Signals would be added at 15th and 13th.	
Access – 3-lane roundabouts Updated design to consider 2040 traffic volumes, current ROW availability, Advance lane assignment, and other modern roundabout design elements.	

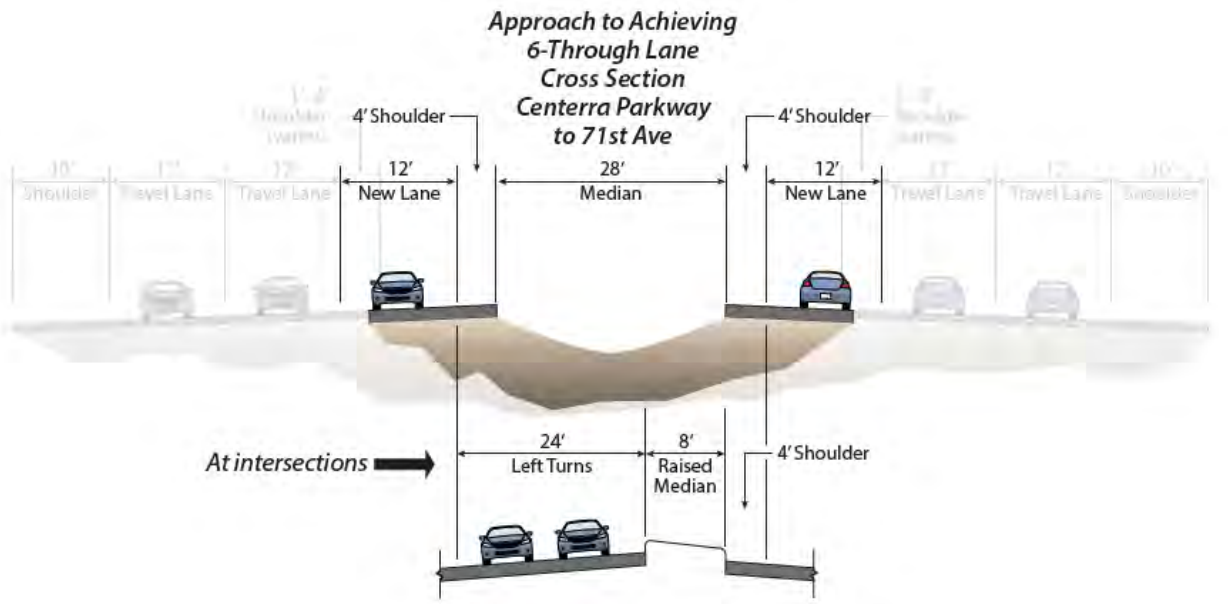
7.1.2 Level 2 Concept Development - Johnstown – Greeley and Greeley Expressway Segments

There are multiple options available for the Johnstown-Greeley and Greeley Expressway segments. The concept of widening / adding lanes in these segments was evaluated by looking at the cross section widening opportunities. The original construction of these segments of US 34 provided a generous median and right-of-way throughout most of these two segments, so the ability to widen in these segments should be relatively straightforward. The conceptual approach to achieving a 6-lane cross section is described and shown below;

- **Larimer Pkwy to 71st Ave. (Johnstown-Greeley and part of the Greeley Expressway)** - Existing 52 ft. median, widen additional lanes into median, results in a remainder 28 ft. median
- **71st Ave. to 23rd Ave. (Greeley Expressway**) - Existing 28 ft. median, widen for additional lanes to the outside (existing shoulder becomes a lane, widening primarily provides new shoulder)
- **23rd Ave. to 17th / 11th (Greeley Expressway)** - Existing median is variable, overall ROW is narrower, 6 lane cross section could fit with median narrowing, reduced shoulder & turn lane widths at some locations.

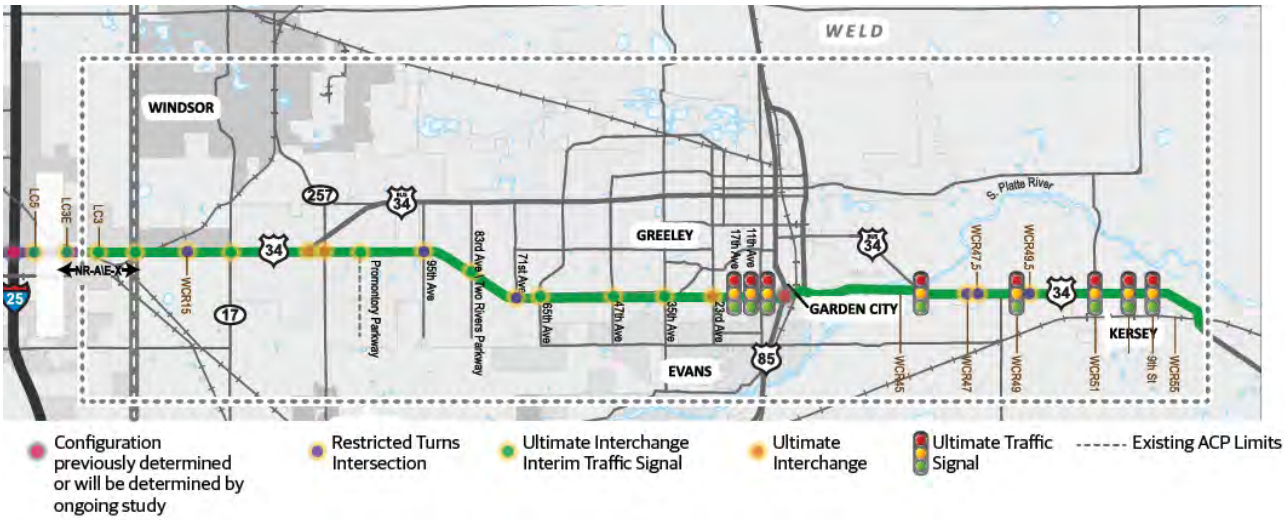
Figure 3 below shows the attributes of the cross sections described above.

*Figure 3 - **Level 2 Roadway Concepts: Widening to 6 Lanes in Johnstown - Greeley and Greeley Expressway Segments***



In the Johnstown-Greeley, Greeley Expressway, and East End segments, the US 34 Access Control Plan (ACP) from 2003 was the guiding document to determine possible signalized, interchange, and limited turn locations. A summary graphic of the 2003 ACP is shown in **Figure 4** below:

Figure 4 - 2003 US 34 Access Control Plan



This ACP has been in place for several years, and local jurisdictions have honored the ACP during ongoing private land development projects and public roadway projects. CDOT and the jurisdictions have been able to partner to secure additional right-of-way at many of the locations identified as ultimate interchanges. This provided some initial guidance to the project team in developing interchange concepts and provided more focus on the possible range of concepts. While it is possible for the PEL process to deviate from the ACP, this ACP was developed using well-established access management and design principles, so changes to the plan were not deemed necessary.

The concept development for the interchanges was done with a very high-level and conceptual engineering approach due to the lack of detailed mapping. In general, the interchanges were conceptually designed on a "flat earth" assumption for vertical elements.

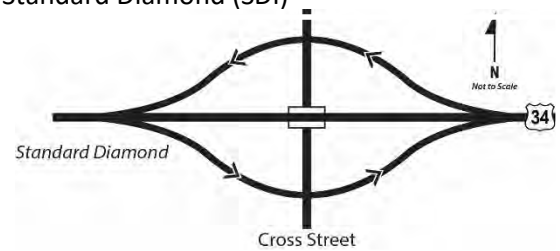
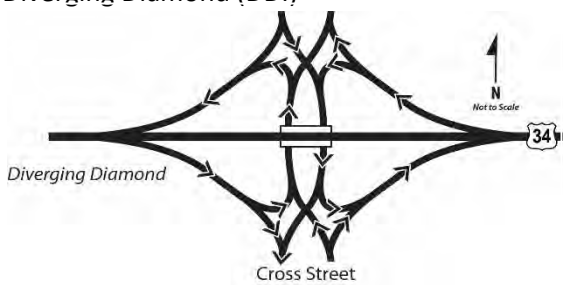
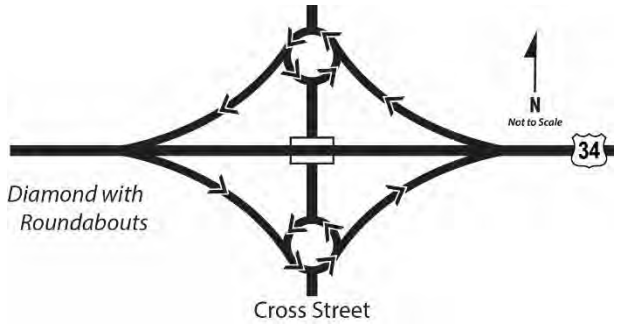
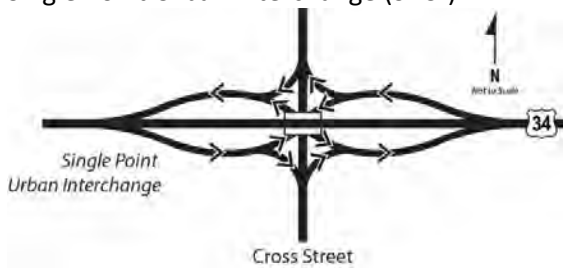
Interchange Considerations

Level 2 Access Concepts included grade separated interchanges at several locations. At proposed interchanges, a reasonably conservative interchange footprint was designed to estimate the environment impacts and the approximate ROW required at locations where ROW was not already preserved. A conceptual cost range for interchange, intersection, or roadway segment improvements could be determined by developing a conceptual design.

At all locations where an interchange was a potential long-term concept, the Standard Diamond Interchange (SDI) was the initial concept developed. A SDI is the most common interchange type, usually meets traffic needs, results in a reasonably conservative footprint, is consistent with the ACP and previous Right-of-Way (ROW) preservation, and generally is cost-efficient when ROW is available. An SDI has flexibility with both profiles (over-under) and traffic control type for different traffic demands (standard signals, diverging diamond, roundabouts).

At locations where the SDI footprint would likely impact developed properties, a Single Point Urban Interchange (SPUI) was shown as the base concept. The primary benefit of the SPUI is to be able to fit more constrained ROW footprints, although there is less operational flexibility of the traffic control type, and generally higher costs for bridge structures and walls. Finally, there are several locations in this corridor where a unique or custom interchange design will likely be required to fit constraints. The interchange concept approach is summarized in **Table 6** below:

Table 6 - Interchange Type Development Approach

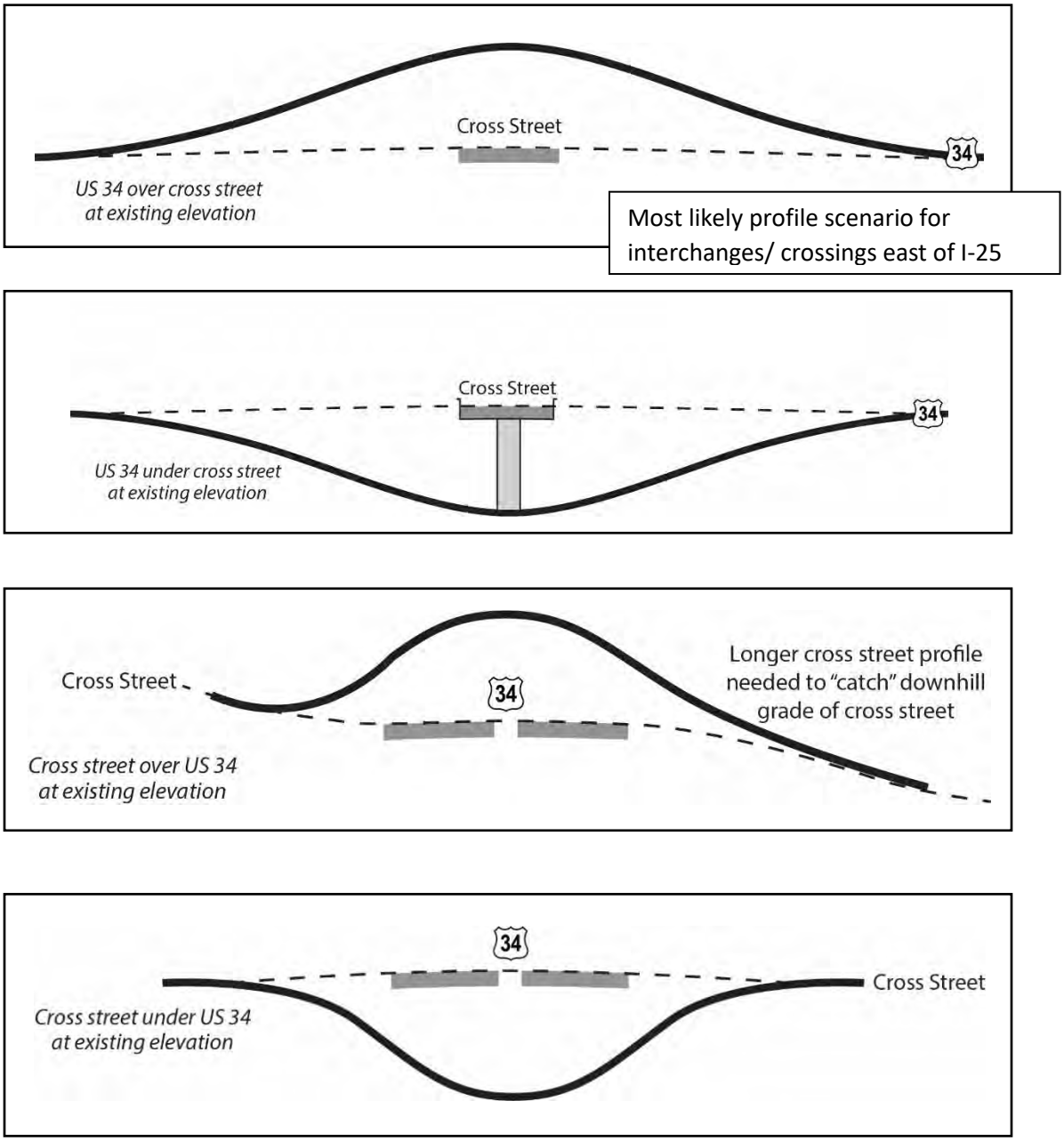
Interchange Type	Benefits	Issues
Standard Diamond (SDI)  	• Driver familiarity, easy for directional signing • Typically cost effective • Operationally efficient with several traffic control options	• Likely need ROW acquisition to optimize design and cost effectiveness
Diverging Diamond (DDI)  	• Easy for directional signing • Typically cost effective • Well suited to locations with high left turns • Usually smaller ROW footprint than SDI	• Some public resistance to new ideas / configurations
Diamond with Roundabout intersections  	• Very good safety history • Easy for directional signing • Typically cost effective • Good driver familiarity in Colorado • Usually smaller ROW footprint than SDI	• If traffic volume is high enough to warrant 3-lanes, some concerns related to additional signing, lane assignment, driver confusion
Single Point Urban Interchange (SPUI)  	• Ability to fit a narrow ROW area, limits impacts to adjacent properties • Good traffic capacity • Easy for directional signing	• High cost with bridge structure and usually retaining walls • Less flexible for traffic operations due to large intersection, long red clearance times, etc.
Other Unique interchange types	• Adapted to site specific constraints	• Driver familiarity • Additional costs for unique features

Another consideration at the PEL level of conceptual design was the most reasonable profile concept for US 34 and for the cross street at the likely interchange locations. It appears that the most likely design for interchanges along US 34 east of I-25 will have US 34 elevated over the cross street. More detailed design work may reveal other profile concepts to be feasible or cost effective, but constraints exist at most locations that indicate that elevating US 34 over cross streets would be the most-likely scenario, for reasons listed below;

- At railroad crossings, it is usually more feasible and cost effective to go over the railroad due to railroad owner preferences and less construction complexity.
- Both railroads have canals or irrigation ditches nearby, and in addition the distance to convey drainage of the lowered area to a natural channel makes lowering mainline US 34 difficult throughout this corridor.
- In developed areas, raising or lowering the cross streets may impact adjacent development access onto cross streets and/or require retaining walls in some cases.
- At most locations in this corridor there has been a ROW dedication or preservation that is best suited to the cross streets and ramps staying mostly at-grade, with US 34 mainline making the vertical change (over or under).
- Existing cross street profiles are not flat, at some locations they fall away from US 34 at a rate where a cross street profile change at US 34 would result in the new cross street profile "chasing" the existing profile for quite a distance. This occurs at both 47th and 83rd.

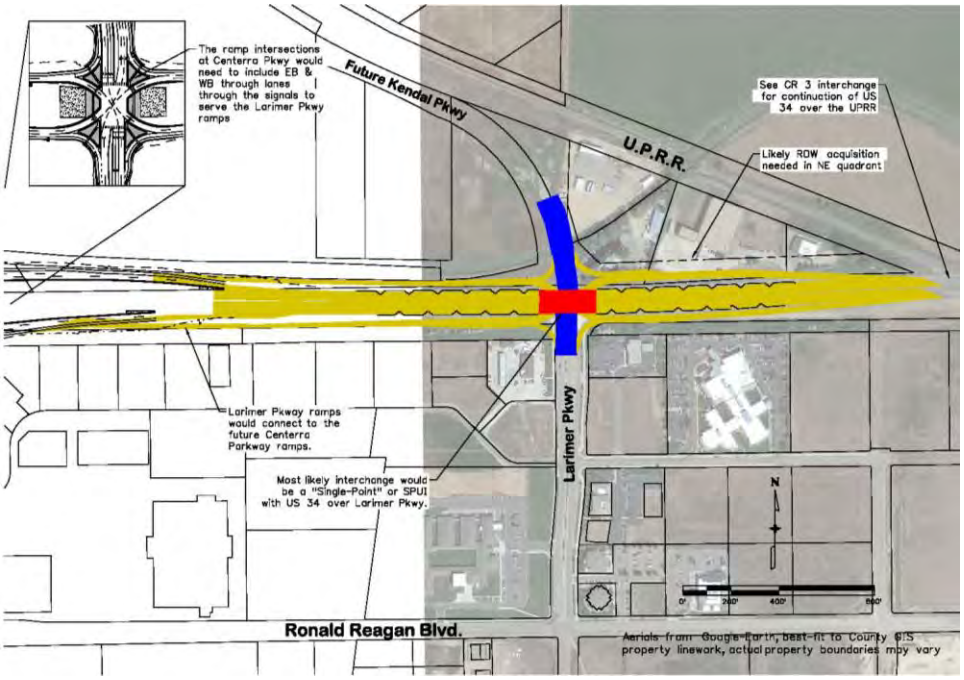
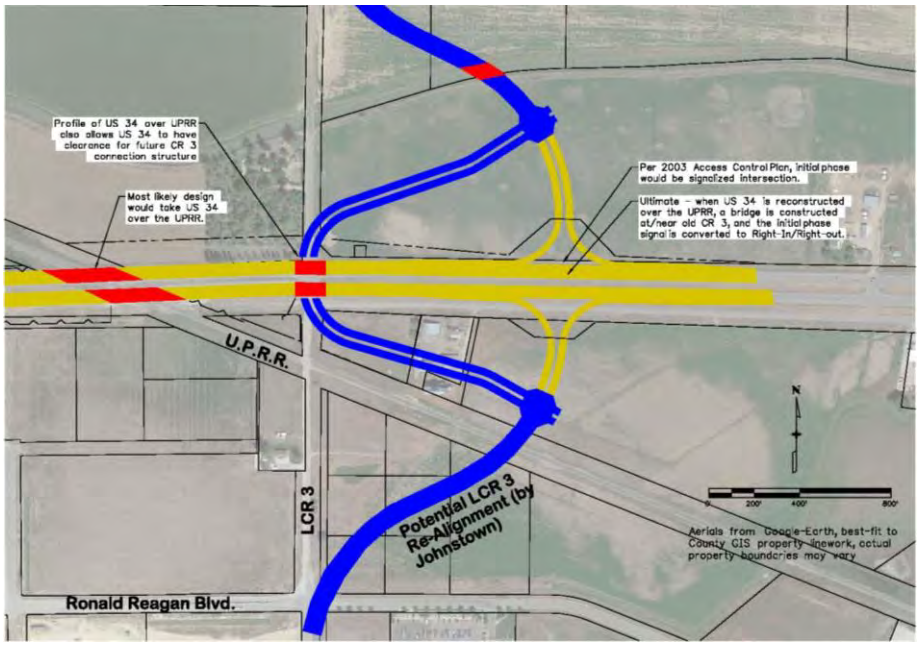
Figure 5 below summarizes the US 34 or cross street profiles that were evaluated at a conceptual level for this PEL concepts analysis.

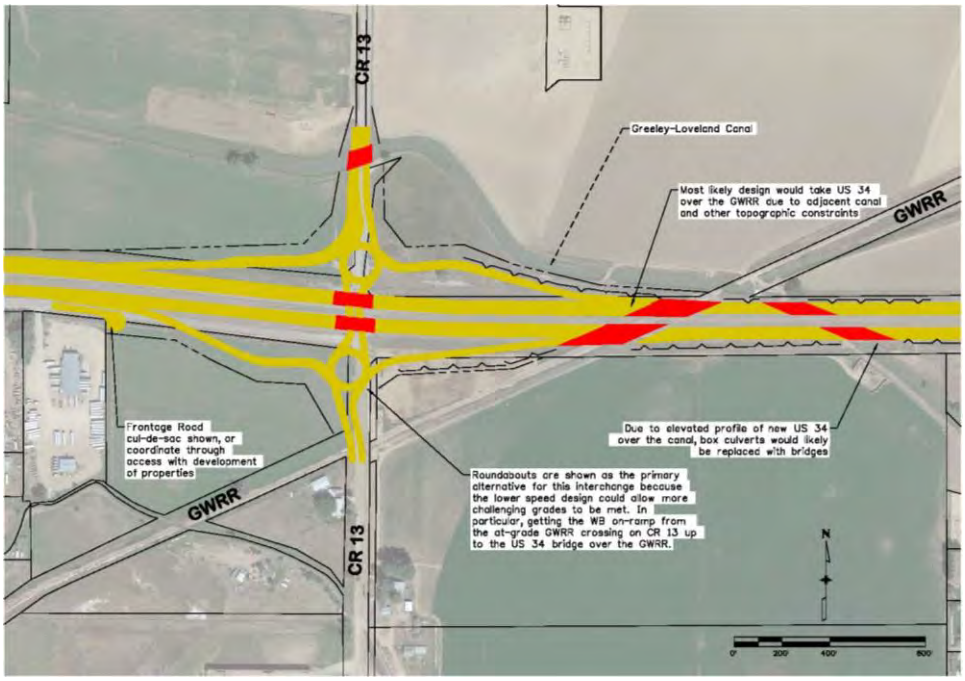
Figure 5 - Interchange and Cross Street Profile Concepts



Tables 7 and 8, Level 2 Concepts Johnstown – Greeley and Level 2 Concepts Greeley Expressway provide conceptual design graphics at the intersection and interchange locations where the GIS mapping and property information was used as a basis for a design concept. Additional information learned at each location during the PEL process is included to assist future project teams when a higher level of study and design is undertaken.

Table 7 – Level 2 Concepts – Johnstown – Greeley Segment

Roadway or Access	Concept
Access – Interchange at Larimer Pkwy	
Access – Interchange at LCR 3	

Roadway or Access	Concept
Access – Interchange at WCR 13	
Access – ¾ Access at WCR 15	

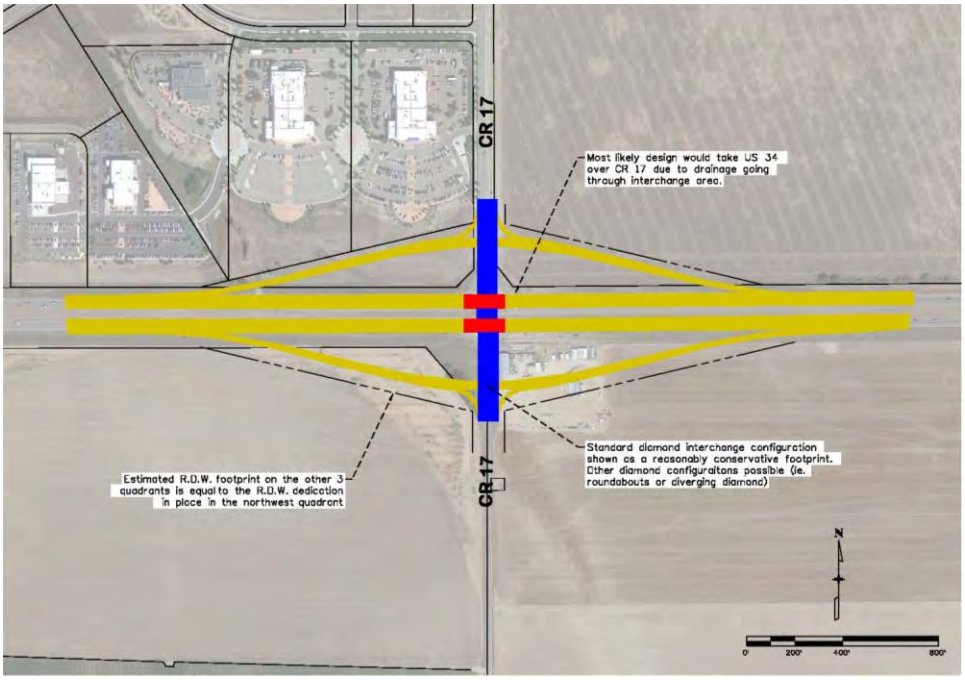
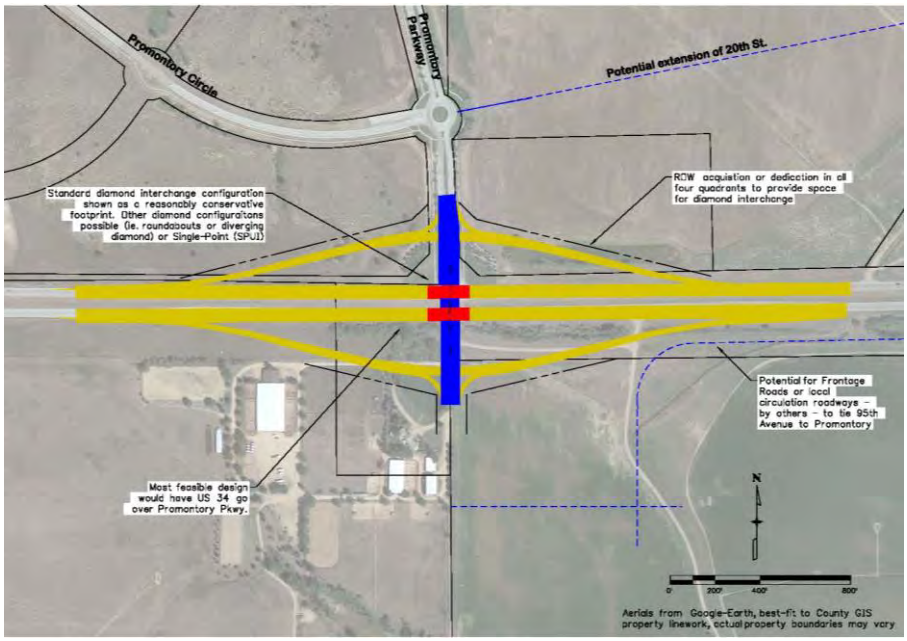
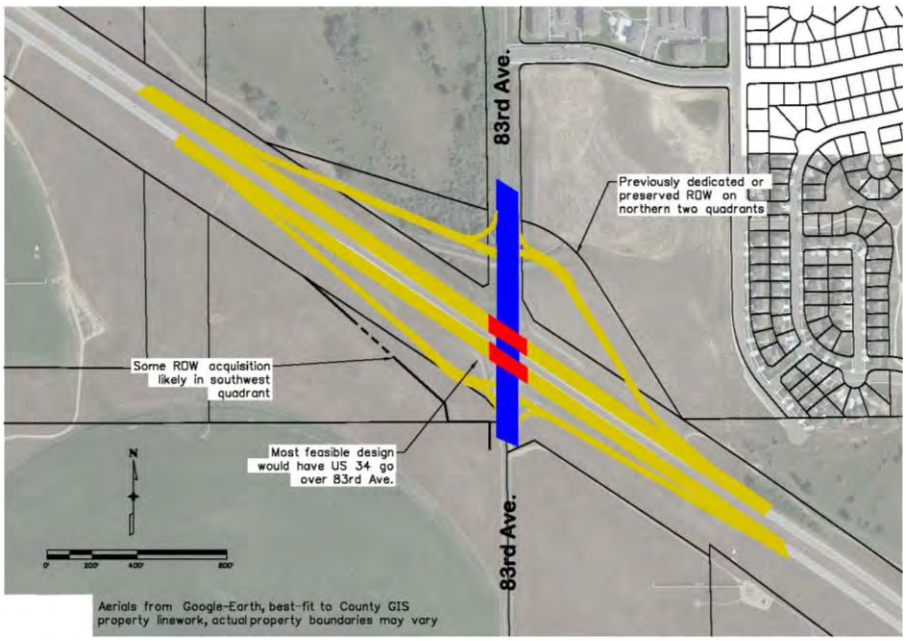
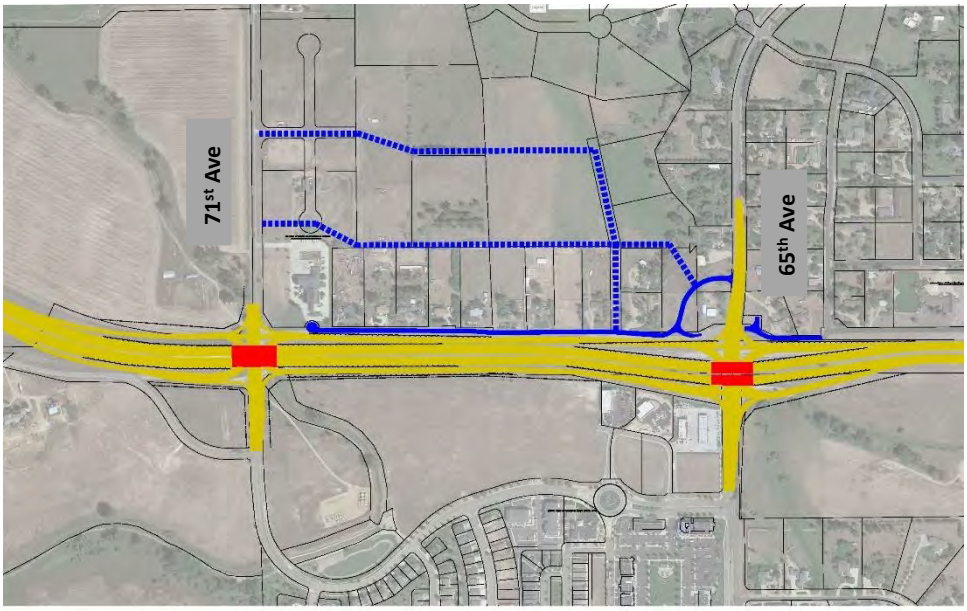
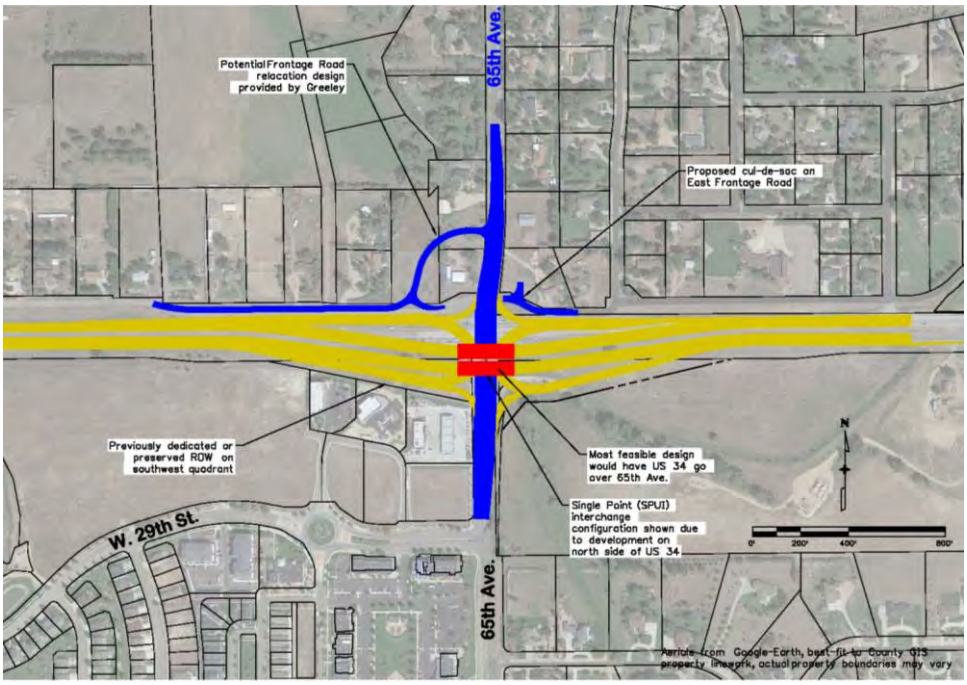
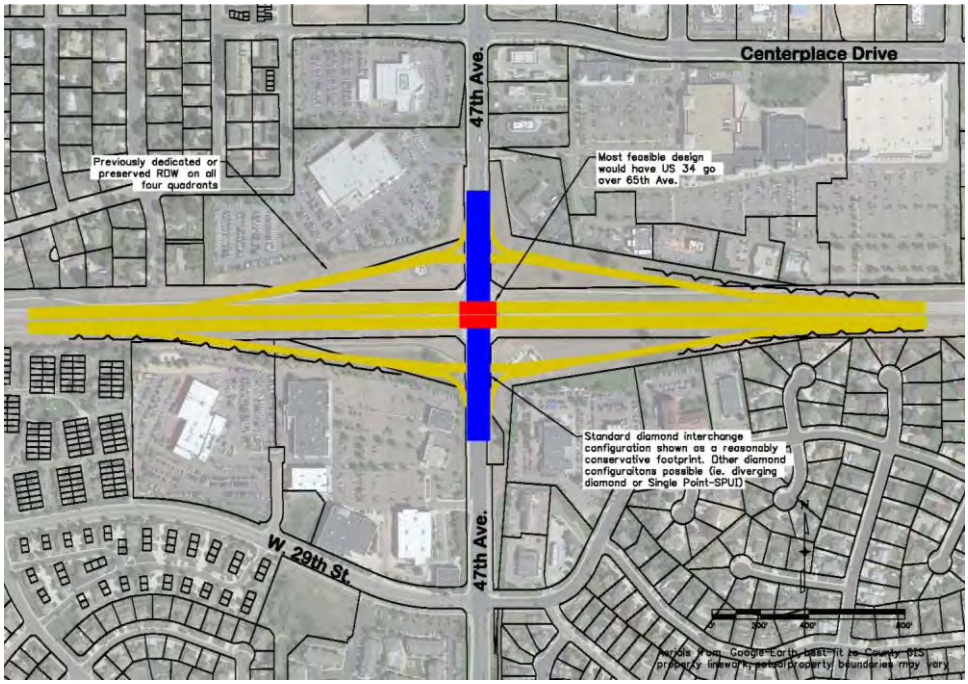
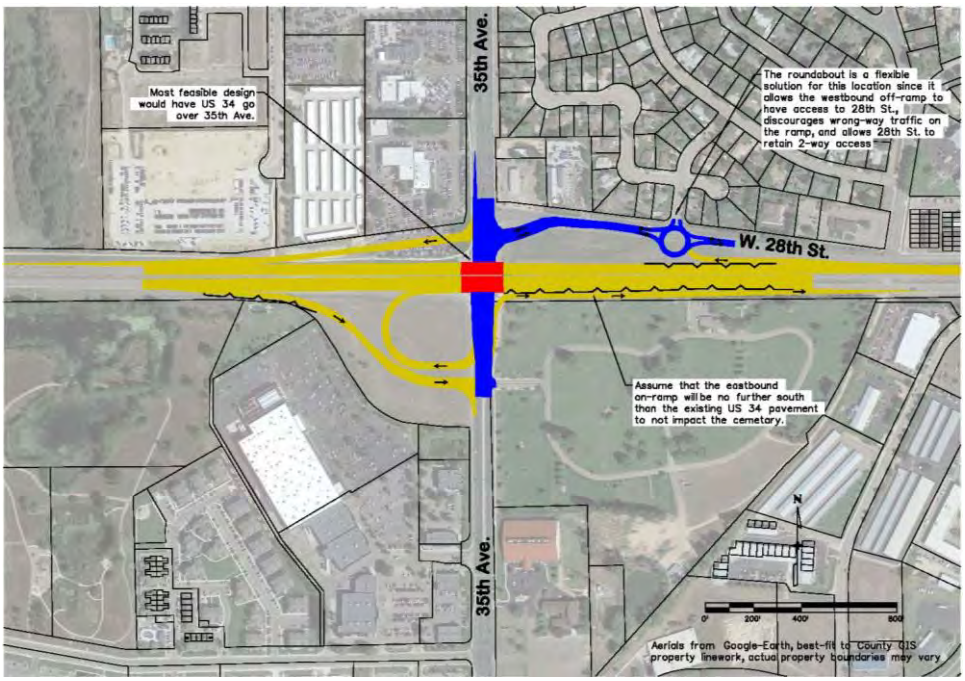
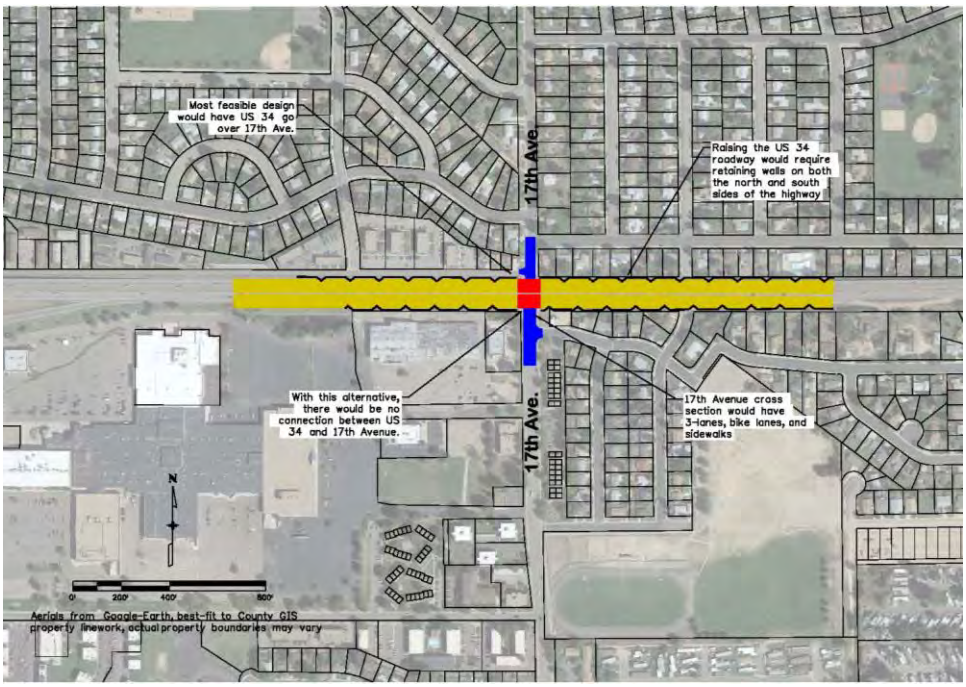
Roadway or Access	Concept
Access - Interchange at WCR 17	

Table 8 – Level 2 Concepts – Greeley Expressway Segment

Roadway or Access	Concept
Access – Interchange at Promontory Pkwy	
Access – Interchange at 83rd Ave.	

Roadway or Access	Concept
Access – Interchange at 71st Ave.	
Access – Interchange at 65th Ave.	

Roadway or Access	Concept
Access – Interchange at 47th Ave.	
Access – Interchange at 35th Ave.	

Roadway or Access	Concept
Access – Channelized -T at 17th Ave.	
Access – Interchange at 17th Ave.	

Legend for Tables 7 and 8

= Proposed US 34 Improvements

= Local Roadways

= Bridge Structures

= Raised Median Areas

- - - - - - - - - - - = Potential Future Right-of-Way Line

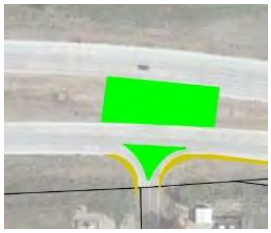
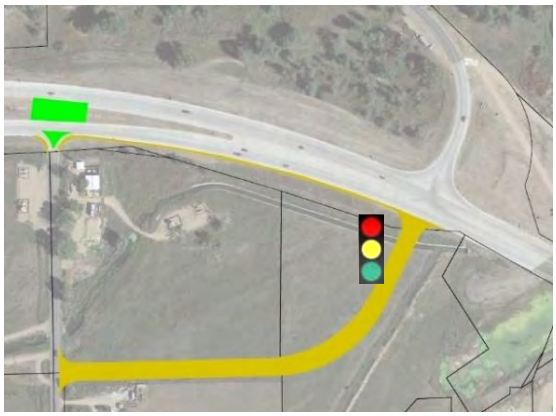
———————— = Retaining Walls

7.1.3 Concept Development - East End Segment

The East End segment Access category concepts utilized the US 34 Access Control Plan (ACP) from 2003 as the guiding document to determine possible signalized, and limited turn locations.

Table 9 - Level 2 Concepts – East End Segment, illustrates the Roadway and Access category concept descriptions developed for the East End segment.

Table 9 - Level 2 Concepts – East End Segment

Roadway or Access	Concept
Roadway - Add additional through lanes, results in 6-lane expressway	Not developed beyond the description.
Access – 27th / 28th Street (Frontage Road), ¾ Access	Concept would fit within existing pavement and ROW boundaries. Likely to be driven by redevelopment Adjacent to US 34.
Access – WCR 45 reduce to right-in/right-out	Concept would fit within existing pavement and ROW boundaries. Consistent with ACP. 
Access – Re-align WCR 45 to east, line up with US 34 Business, signalize	Re-alignment of WCR 45 would likely occur with redevelopment, consistent with the ACP. 

Roadway or Access	Concept
Access – WCR 45.5 Intersection, reduce to ¾ access	Concept would fit within existing pavement and ROW boundaries. Consistent with ACP. Likely occurring with redevelopment of adjacent parcels
Access – WCR 47 Intersection, reduce to ¾ access	Concept would fit within existing pavement and ROW boundaries. Consistent with ACP. Likely occurring with redevelopment of adjacent parcels
Access – WCR 47.5 Intersection, reduce to ¾ access	Concept would fit within existing pavement and ROW boundaries. Consistent with ACP. Likely occurring with redevelopment of adjacent parcels

7.2 Level 2 Evaluation Process

The purpose of the Level 2 evaluation was to compare how well concepts perform to meet the project Purpose and Need while balancing environmental effects. The Level 2 evaluation criteria expanded on measures from the Level 1 evaluation and provided additional criteria based on project goals.

The roadway and access concepts developed for Level 2 were compared to determine how well each concept met the following evaluation criteria.

- **Safety**
  - Reduce crashes
  - Reduce crash severity
  - Enhance pedestrian/bike safety
  - Improve roadway geometry
- **Travel Demand**
  - Reduce congestion
  - Serve demand
- **Reliability**
  - Improve travel reliability
  - Provide emergency access for adjacent communities
  - Quality of traffic operations
- **Mobility**
  - Provide local and regional route connectivity
  - Enhance nonmotorized opportunities
  - Provide additional travel choices
  - Improve bicycle connectivity
  - Ability to not preclude transit/rail options

- **Freight**
    - Accommodate truck requirements
- **Environmental**
    - Identify environmental effects
- **Community Land Use and Transportation Priorities**
    - Included in community land use and transportation plans

Improvements that were identified as supplemental elements in the Level 1 evaluation, including existing and emerging technology were not evaluated in Level 2 but were retained to be included in alternatives packaging and evaluation in Level 3.

7.2.1 Level 2 Evaluation Criteria

Specific performance measures were qualitatively compared, with some performance measures based on quantitative measures, either with actual data (i.e. many of the traffic measures) or comparable based on readily apparent information (i.e. safety comparisons, land area comparisons). The performance measures were guided and informed by the technical work by the project team.

To guide the evaluation of the concepts in a consistent manner, the project team developed a rubric. The rubric was the guidance of what the project team considered in each category while completing the evaluation matrix. The use of color coding for each performance measure (green=positive, yellow = neutral or no change, red=negative) provides a quick visual indication as to how concepts compare for each performance measure.

The criteria, performance measures and rating definitions used to evaluate the Level 2 Concepts are described in **Table 10** - Level 2 Evaluation Criteria, Performance Measures, and Rating Definitions, below:

Table 10 – Level 2 Evaluation Criteria, Performance Measures, and Rating Definitions

US 34 PEL
Level 2 Evaluation Criteria, Performance Measures, and Rating Definitions

Category	Criteria	Performance Measure (Measurement)	Ratings	
			Access Elements	Roadway Elements
Safety	• Reduce crashes • Reduce crash severity • Enhance pedestrian/bike safety • Improve roadway geometry	Vehicle/vehicle conflict points (change)	**Decrease** = The number of vehicle/vehicle conflict points would decrease and/or exposure to conflict points would be reduced as a result of this concept	
			Neutral = the number of conflict points and/or exposure to conflict points is balanced or would not change from existing conditions	
			Increase = The number of vehicle/vehicle conflict points and/or exposure to conflict points would increase as a result of this concept	
		Vehicle/pedestrian-bicycle conflict points (change)	**Decrease** = The number of vehicle/pedestrian-bike conflict points would decrease and/or exposure to conflict points would be reduced as a result of this concept	
			Neutral = the number of conflict points and/or exposure to conflict points is balanced or would not change from existing conditions	
			Increase = The number of vehicle/pedestrian-bike conflict points and/or exposure to conflict points would increase as a result of this concept	
		Projected total number of crashes (change)	**Decrease** = The projected number of crashes and/or exposure to crashes would decrease (over existing conditions) with this concept	
			Neutral = the number of projected crashes and/or exposure to crashes would not change substantially from existing conditions	
			Increase = The projected number of crashes and/or exposure to crashes would increase (over existing conditions) with this concept	
		Projected number of injury and/or fatal crashes (change)	**Decrease** = The projected number of crashes and/or exposure to crashes would decrease (over existing conditions) with this concept	
			No Change = the number of projected crashes and/or exposure to crashes would not change substantially from existing conditions	
			Increase = The projected number of crashes and/or exposure to crashes would increase (over existing conditions) with this concept	

Category	Criteria	Performance Measure (Measurement)	Ratings	
			Access Elements	Roadway Elements
Travel Demand	• Reduce congestion • Serve demand	Change in Vehicle Miles Traveled (qualitative)	**Decrease** = There would be a decrease in qualitative out of direction travel over existing conditions.	
			No Change = there would be minimal change in qualitative out of direction travel over existing conditions	
			Increase = There would be in increase in qualitative out of direction travel over existing conditions	
		Level of Service (LOS) (change)	**Improves** = Access LOS improves by one or more letter grade when compared to no action	**Improves** = HCM LOS for the Multilane Highway or Urban Streets segment improves by a letter grade or more when compared to no action
			No Change = Access LOS grade remains the same as no action	**No Change** =HCM LOS for the Multilane Highway or Urban Streets segment does not change when compared to no action
			Worsens = Access LOS worsens by one or more letter grade when compared to no action	**Worsens** = HCM LOS for the Multilane Highway or Urban Streets segment worsens by a letter grade or more when compared to no action
		Vehicle Hours of Delay (VHD) (hours)	**Not Applicable for Access Alternatives**	**Improves** = VHD for the segment improves compared to no action
				No Change = VHD for the segment is not significantly statistically different than for the no action
				Worsens = VHD for the segment worsens compared to no action

Category	Criteria	Performance Measure (Measurement)	Ratings	
			Access Elements	Roadway Elements
Reliability	• Improve travel reliability • Provide emergency access for adjacent communities • Quality of Traffic Operations	Travel Time Index (ratio)	**Not Applicable for Access Alternatives**	**Improves** = US 34 travel time index for the segment improves by 5% or more
				No Change = US 34 travel time changes by less than 5%
				Worsens = US 34 travel time index worsens by 5% or more
		Travel Time by location/segment (% change/minutes)	**Improves** = US 34 travel time improves by 5% or more.	**Improves** = Travel time for the US 34 segment improves compared to the no action
			No Change = US 34 travel time changes by less than 5%	**No Change** =Travel time for the US 34 segment worsens compared to the no action
			Worsens = US 34 travel time worsens by 5% or more	**Worsens** =Travel time for the US 34 segment worsens compared to the no action

Category	Criteria	Performance Measure (Measurement)	Ratings	
			Access Elements	Roadway Elements
Mobility	• Provide Local and Regional Route Connectivity • Enhance Non-Motorized Opportunities • Provide additional travel choices • Improve bicycle connectivity • Ability to not preclude transit/rail options	Access to transit facilities (qualitative)	**Improves** = This concept would improve access to transit facilities in the US 34 corridor for motorized and non-motorized users	
			No Change = This concept would not change accessibility of transit facilities in the US 34 corridor compared to existing conditions	
			Worsens = This concept would reduce accessibility of transit facilities in the US 34 corridor for motorized and non-motorized users	
		Reduce barriers for N/S pedestrian and bicycle travel (qualitative)	**Yes** = This concept would reduce barriers to north/south travel for pedestrians and bicyclists	
			No Change = This concept would not change barriers to north/south travel for pedestrians and bicyclists	
			No = This concept would create additional barriers to north/south travel for pedestrians and bicyclists	
		Improve continuity for E/W bicycle and pedestrian travel (qualitative)	**Yes** = This concept would improve continuity of east/west travel for pedestrians and bicyclists	
			No Change = This concept would not change east/west travel for pedestrians and bicyclists over existing conditions	
			No = This concept would disrupt continuity of east/west travel for pedestrians and bicyclists	

Category	Criteria	Performance Measure (Measurement)	Ratings	
			Access Elements	Roadway Elements
Freight	• Accommodate truck requirements	Minimize turning restrictions and/or out-of-direction travel (Y/N)	**Yes** = This concept would minimize out-of-direction travel and/or access restrictions for freight vehicles	
			No change = Out of direction travel and/or access restrictions for freight do not change	
			No = This concept would increase out-of-direction travel and/or impose new access restrictions for freight vehicles	
		Geometry accommodates truck turning movements (Y/N)	**Yes** = The geometry of this concept can accommodate truck turning requirements. Geometry will prevent trucks from impeding other lanes and sidewalks	
			No change = The geometry of this concept does not change how turning requirements of freight vehicles are accommodated.	
			No = The geometry of this concept will not accommodate the turning requirements of freight vehicles. Geometry will cause trucks to impede other lanes and sidewalks	
Environmental	• Identification of environmental effects	Relative environmental effects (Good, Fair, Poor)	**Good** = This concept would result in limited adverse environmental effects and/or would have beneficial environmental effects	
			Fair = This concept would have some adverse environmental effects that could be mitigated	
			Poor = This concept would have environmental effects that could be substantial or require extensive mitigation	

Category	Criteria	Performance Measure (Measurement)	Ratings	
			Access Elements	Roadway Elements
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)	**Good** = There is sufficient ROW to accommodate this concept	
			Fair = This concept could require acquisition of adjacent undeveloped properties	
			Poor = Concept would require acquisition of ROW from one or more developed properties	
		Consistent with local plans (qualitative)	**Yes** = This concept appears to be consistent with adopted local and regional plans	
			Mixed = This concept appears to be consistent with some adopted local/regional plans, while in conflict with others	
			No = This concept appears to be inconsistent with adopted local and regional plans	
		Consistent with ACP (qualitative)	**Yes** = This concept is consistent with the ACP for this location	
			No = This concept is inconsistent with the ACP for this location	
		Support economic development (qualitative)	**Yes** = This concept would not preclude economic development at this location	**Yes**= This concept would not preclude economic development in this segment
			Neutral = This concept could result in business relocation but does not preclude economic development at this location	**Neutral**= This concept could result in business relocation but does not preclude economic development at this segment
			No = This concept could preclude economic development opportunities in this segment (for roadway concepts)/at this location (for access concepts)	**No**= this concept could preclude economic development opportunities in this segment

Category	Criteria	Performance Measure (Measurement)	Ratings	
			Access Elements	Roadway Elements
Assessment		Result	**Carry forward =** Applies only to the No Action	
			Recommended = Option will be evaluated further as part of the corridor alternative with further definition and conceptual design.	
			Feasible, but not recommend = Option will not be evaluated further in the study due to comparatively negligible benefits and higher impacts than other options.	
			Eliminated = Option does not meet the Purpose and Need established with this study or the option is unreasonable due to impacts and/or infeasibility.	

7.2.2 Level 2 Evaluation Results

The defined Level 2 Evaluation results had three potential outcomes, as shown in the matrices:

- **Recommended** – Concepts were carried forward into Level 3 Evaluation
- **Feasible but not recommended** – These concepts were not carried forward into the Level 3 Evaluation. In the future, these concepts may be reconsidered based on the known needs at the time funding is available to pursue a project.
- **Eliminated** – Concepts were not carried forward into Level 3 Evaluation

Below is a summary of the Concepts assessed to be Feasible but not recommended:

Foothills:

- *Roadway*
  - Add Lanes – This concept is not recommended because traffic does not warrant the additional capacity and the additional travel lanes would result in poor ROW and environmental impacts.
- *Access*
  - Morning Drive – Roundabout – Due to the proximity of the signal at Cascade Ave. this concept is not recommended.

Loveland Urban:

- *Roadway Elements*
  - Add Lanes to 6 through entire segment – The ROW required for this alternative would be extensive compared to other concepts, and the additional capacity provides relatively little benefit to safety or travel demand for the additional impacts. Therefore, this concept has been eliminated from further consideration.

Loveland 6 Lane:

No concepts were considered to be Feasible but not recommended.

Johnstown-Greeley:

- *Access*
  - LCR 3E Indirect Lefts – This concept is not recommended because it is inconsistent with local plans, including the adopted ACP for LCR 3E.
  - LCR 3 Indirect Lefts - This concept is not recommended because it is inconsistent with local plans, including the adopted ACP for LCR 3.
  - WCR 15 Indirect Lefts – This concept is not recommended because it is inconsistent with local plans, including the adopted ACP for WCR 15.

Greeley Expressway

- *Access*
  - 95th Avenue Indirect Lefts – This concept is not recommended because it is inconsistent with local plans, including the adopted ACP for 95th Avenue.

East End

- *Roadway Elements*
  - Add Lanes to 6 through entire segment – This concept is not recommended because future traffic volumes do not necessitate additional capacity in this roadway segment.

Below is a summary of the Concepts Eliminated:

Loveland 6 Lane:

- *Roadway Elements*
    - Add Lanes to yield 8 lanes from I-25 to Boise Ave.– Although this concept would improve reliability and meet travel demand, it is inconsistent with local plans, therefore it has been eliminated from further consideration.
- *Access*
    - Cleveland Ave./Lincoln Ave. Hourglass Roundabout – This concept would not improve the LOS at this intersection unlike other concepts proposed for this location, therefore it has been eliminated from further consideration.

The remaining concepts were carried forward into alternatives packaging and Level 3 evaluation with the No Action Alternative.

The more comprehensive summary of the Level 2 work completed by the project team is contained in the **Level 2 Evaluation Table** shown in **Table 11** below:

Table 11 – Level 2 Evaluation Table

Table 11

COLORADO
Department of Transportation

Foothills Segment

Level 2 Evaluation Table - Roadway Elements

Concepts for **Foothills**: Larimer County Road 27 (LCR 27) to Morning Drive

Refer to Level 2 Rubric for explanation of performance measure terms and Figures 1 - 2 for graphics of all items that where recommended.

Criteria	Performance Measure (measurement)	No Action	Minimal Modifications (Improve Shoulders)	Add / Expand Auxiliary Lanes at Major Intersections	Add Additional Lanes 4 Lanes Rossum to Morning Drive
Number of Lanes		2	2	2 to 4	5
Roadway Classification		Rural principal arterial - other	Rural principal arterial - other	Rural principal arterial - other	Rural principal arterial - other
Safety					
· Reduce crashes · Reduce crash severity · Enhance pedestrian/bike safety · Improve roadway geometry	Vehicle/vehicle conflict points (change)	Neutral	Decrease	Decrease	Neutral Less congestion, but more conflicts
	Vehicle/pedestrian-bicycle conflict points (change)	Neutral	Decreases More space between vehicles/pedestrians-bikes	Neutral More lanes = more conflict points & exposure, yet no pedestrian-bike crossing exist	Neutral More lanes = more conflict points & exposure, yet no pedestrian-bike crossing exist
	Projected total number of crashes (change)	Neutral	Decrease Potential Reduction	Decrease Potential Reduction	Neutral Less congestion, but more conflicts
	Projected number of injury and/or fatal crashes (change)	Neutral	Decrease Potential Reduction	Decrease Potential Reduction	Neutral Less congestion, but more conflicts
Travel Demand					
• Reduce congestion • Serve demand	Change in Vehicle Miles Traveled (qualitative)	No Change	No Change	No Change	No Change
	Level of Service (LOS) (change)	No Change (LOS A)	No Change	No Change	No Change
	Vehicle Hours of Delay (VHD) (hours)	No Change	No Change	No Change	No Change
Reliability					
• Improve travel reliability • Provide emergency access for adjacent communities • Quality of traffic operations	Travel Time index (ratio)	No Change	No Change	No Change	No Change
	Travel Time by location/segment (% change/minutes)	No Change	No Change	No Change	No Change
Mobility					
• Provide local and regional route connectivity • Enhance non-motorized opportunities • Provide additional travel choices • Improve bicycle connectivity • Ability to not preclude transit/rail options	Access to transit facilities (qualitative)	No Change	Improves Shoulder space = improves E/W connectivity. Transit on east side	No Change	Improves If shoulders added improved E/W connectivity. Transit on east side
	Reduce barriers for N/S pedestrian and bicycle travel (qualitative)	No Change	No Change no existing N/S controlled bike-pedestrian crossings	No More lanes = greater N/S barriers	No More lanes = greater N/S barriers
	Improve continuity for E/W bicycle and pedestrian travel (qualitative)	No Change	Yes Shoulder space = improves E/W connectivity	No Increase in vehicular right-in movements	Yes If shoulders added improved E/W connectivity
Freight					
• Accommodate truck requirements	Minimize turning restrictions and/or out-of-direction travel (Y/N)	No Change	No Change	Yes	Yes
	Geometry accommodates truck turning movements (Y/N)	No Change	Yes	Yes	Yes
Environmental					
• Identification of environmental effects	Relative environmental effects [Good (limited); Fair, (some effects that can be mitigated); Poor (substantial/difficult to mitigate)]	Fair/poor Increase in noise	Fair Potential impacts from ROW acquisition. Portions of US 34 are potentially historic, changes to the alignment could be considered an adverse impact.	Fair Potential impacts from ROW acquisition. Portions of US 34 are potentially historic, changes to the alignment could be considered an adverse impact.	Poor Potential impacts from ROW acquisition including improvements in a floodplain and park lands. Portions of US 34 are potentially historic, changes to the alignment could be considered an adverse impact.
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)	Not Applicable	Good, varies	Fair Less ROW than GP lanes	Poor
	Consistent with local plans (qualitative)	No	Yes - see LCUASS Yes - see NFRMPO Non-Motorized Plan corridor #11	Yes - see LCUASS	Yes - see Loveland Street Plan Yes - see NFRMPO Non-Motorized Plan Corridor #11
	Consistent with ACP (qualitative)	No	Yes	Yes	Yes
	Support economic development (qualitative)	No	Yes	Yes	Yes
Assessment					
Result		**Carry forward**	**Recommended**	**Recommended**	**Feasible but not Recommended** This option is not recommended because traffic does not warrant the additional capacity, and the additional travel lanes would result in poor ROW and environmental impacts.
Comments		Consideration for planned Multimodal improvements in this segment include: RNMC #11 along US 34, RNMC #12 crossing at LCR 29, RNMC #3 that follows Big Thompson River, and Loveland's proposed side path along Big Barnes Ditch. Connection to Devil's Backbone and Blue Sky Trail.		Related to intersection improvements	

Notes:

Some design options will transition into adjacent segments.

Table 11

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Foothills Segment

Level 2 Evaluation Table - Access

Concepts for **Foothills**: Larimer County Road 27 (LCR 27) to Morning Drive

Refer to Level 2 Rubric for explanation of performance measure terms and Figures 1 - 2 for graphics of all items that where recommended.

Criteria	Performance Measure (measurement)	No Action	LCR 27 Intersection Improvements	Glade Road Intersection Improvements	Rossum to Cascade Improvements				
			EB Left Turn lane	Traffic Signal	2-Way Left Turn Lane	Roundabout at Rossum	Florida T at Morning Dr	Roundabout at Morning Dr	Raised Median
Safety									
· Reduce crashes · Reduce crash severity · Enhance pedestrian/bike safety · Improve roadway geometry	Vehicle/vehicle conflict points (change)	Neutral	Decrease	Decrease	Decrease	Decrease	Decrease	Decrease	Decrease
	Vehicle/pedestrian-bicycle conflict points (change)	Neutral	Neutral	Decrease Controlled vehicle/bike/pedestrian movements	Decrease Greater space between vehicles/bicycles	Increase Roundabout = more vehicle / bike-pedestrian conflict/exposure	Increase Traffic E/W always moving and greater crossing distance	Increase Roundabout = more vehicle / bike-pedestrian conflict/exposure	Decrease N/S pedestrian-bike movement discouraged, possibility for pedestrian refuge
	Projected total number of crashes (change)	Neutral	Decrease	Neutral	Decrease	Decrease	Decrease	Decrease	Decrease
	Projected number of injury and/or fatal crashes (change)	Neutral	Decrease	Neutral	Decrease	Decrease	Decrease	Decrease	Decrease
Travel Demand									
• Reduce congestion • Serve demand	Change in Vehicle Miles Traveled (qualitative)	No change	No Change	No Change	No change	No Change	No Change	No Change	Increases
	Level of Service (LOS) (change)	No change	No Change	LOS improves from F/F to B/B	No change	LOS improves from F/F to B/B	LOS improves from F/F to A/A	LOS improves from F/F to B/C	Improves LOS at Morning Dr
	Vehicle Hours of Delay (VHD) (hours)	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable
Reliability									
• Improve travel reliability • Provide emergency access for adjacent communities • Quality of traffic operations	Travel Time index (ratio)	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable
	Travel Time by location/segment (% change/minutes)	No change	No Change	Worsens by 5%	No change	Worsens by 9%	No change (worsen by ~1%)	Worsens by 11%	No change
Mobility									
• Provide local and regional route connectivity • Enhance non-motorized opportunities • Provide additional travel choices • Improve bicycle connectivity • Ability to not preclude transit/rail options	Access to transit facilities (qualitative)	No change	No change	Improves (controlled pedestrian-bike crossing)	Improves (shoulder improves E/W travel to transit)	Worsens Roundabout = difficult pedestrian-bike movement	Worsens N/S pedestrian-bike movement restricted by E/W movement	Worsens Roundabout = difficult pedestrian-bike movement	No change
	Reduce barriers for N/S pedestrian and bicycle travel (qualitative)	No change	No change	Yes (controlled pedestrian-bike crossing)	Yes (median act as refuge)	No Roundabout = difficult pedestrian-bike movement	No N/S pedestrian-bike movement restricted by E/W movement	No Roundabout = difficult pedestrian-bike movement	Yes Median act as refuge
	Improve continuity for E/W bicycle and pedestrian travel (qualitative)	No change	No change	Yes Controlled pedestrian-bike crossing	Yes Shoulder improves E/W travel	No Roundabout = difficult pedestrian-bike movement	Yes Continual E/W bike-pedestrian on south side	No Roundabout = difficult pedestrian-bike movement	Yes Less left-in turns
Freight									
• Accommodate truck requirements	Minimize turning restrictions and/or out-of-direction travel (Y/N)	No change	Yes	Yes	Yes	No	No	No	No
	Geometry accommodates truck turning movements (Y/N)	No change	Yes	Yes	Yes	Yes	No	Yes	No
Environmental									
• Identification of environmental effects	Relative environmental effects [Good (limited); Fair, (some effects that can be mitigated); Poor (substantial/difficult to mitigate)]	Fair/poor Increase in noise	Fair Potential impacts from ROW acquisition and possibly within the floodplain.	Fair Potential improvements within the floodplain, potential park impact to the south.	Fair Potential noise and impacts from ROW acquisitions to widening	Fair Potential impacts from ROW acquisition. US 34 is potentially historic in this area, changes to the alignment could be considered an adverse impact.	Fair Potential impacts from ROW acquisition. Skyrock road is potentially historic, changes to the alignment could be considered an adverse impact.	Fair Potential impacts from ROW acquisition. Assuming any impacts to sidewalks would replaced. Skyrock road is potentially historic, changes to the alignment could be considered an adverse impact.	Good
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)	Not Applicable	Fair	Good	Fair	Fair	Fair	Fair	Good
	Consistent with local plans (qualitative)	No	Yes	Yes	Yes See NFRMPO Non-Motorized Plan corridor #11	Yes	Yes	Yes	Yes
	Consistent with ACP (qualitative)	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	Support economic development (qualitative)	No	Yes	Yes	Neutral	Yes	Yes	Neutral	Neutral
Assessment									
Result		**Carry forward**	**Recommended**	**Recommended**	**Recommended**	**Recommended**	**Recommended**	**Feasible but not recommended** Option is not recommended because of the potential conflicts caused by its proximity to Cascade Avenue	**Recommended**
Comments		Consideration for planned Multimodal improvements in this segment include: RNMC #11 along US 34, RNMC #12 crossing at LCR 29, RNMC #3 that follows Big Thompson River, and Loveland's proposed side path along Big Barnes Ditch. Connection to Devil's Backbone and Blue Sky Trail		no specific alternatives discussed. What are the needs? signal warrant?	Option can be mixed and match to accommodate need	Option is recommended because it supports business access by providing a safe place for vehicle to U-turn in the area. Option can be mixed and match to accommodate need.	Option can be mixed and match to accommodate need	Due to the close proximity of the signal at Cascade Avenue, this option is not recommended.	Option can be mixed and match to accommodate need

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Loveland Urban Segment

Level 2 Evaluation Table - Roadway Elements

Concepts for **Loveland Urban**: Morning Drive to N Garfield Ave
Refer to Level 2 Rubric for explanation of performance measure terms and Figure 3 for graphics of all items that where recommended.

Criteria	Performance Measure (measurement)	No Action	Add / Expand Auxiliary Lanes at Major Intersections	Add Additional Lanes 6 Lane Arterial
Number of lanes		5	5	6
Roadway Classification		Urban principal arterial - other	Urban principal arterial - other	Urban principal arterial - other
Safety				
· Reduce crashes · Reduce crash severity · Enhance pedestrian/bike safety · Improve roadway geometry	Vehicle/vehicle conflict points (change)	Neutral	Decreases	Neutral Less congestion, yet> conflict points
	Vehicle/pedestrian-bicycle conflict points (change)	Neutral	Increase More lanes = more conflicts/exposure	Increase More lanes = more conflicts/exposure
	Projected total number of crashes (change)	Increases	Neutral	Neutral Less congestion, yet> conflict points
	Projected number of injury and/or fatal crashes (change)	Increases	Neutral	Neutral Less congestion, yet> conflict points
Travel Demand				
• Reduce congestion • Serve demand	Change in Vehicle Miles Traveled (qualitative)	No Change	No Change	No Change
	Level of Service (LOS) (change)	No Change	Improves from LOS F to C in Eastbound PM	Improves from LOS F to C in Eastbound PM
	Vehicle Hours of Delay (VHD) (hours)	No Change	No Change (improves 2%)	Improves 20%
Reliability				
• Improve travel reliability • Provide emergency access for adjacent communities • Quality of traffic operations	Travel Time index (ratio)	No Change	No change (improves 3%)	Improves 6%
	Travel Time by location/segment (% change/minutes)	No Change	No Change (improves 3%)	Improves 7%
Mobility				
• Provide local and regional route connectivity • Enhance non-motorized opportunities • Provide additional travel choices • Improve bicycle connectivity • Ability to not preclude transit/rail options	Access to transit facilities (qualitative)	No Change	Worsens More lanes = greater crossing distance/conflicts/exposure	Worsens More lanes = greater crossing distance/conflicts/exposure
	Reduce barriers for N/S pedestrian and bicycle travel (qualitative)	No Change	No More lanes = greater crossing distance/conflicts/exposure	No More lanes = greater crossing distance/conflicts/exposure
	Improve continuity for E/W bicycle and pedestrian travel (qualitative)	No Change	No Increase in vehicular right-in movements	Yes If shoulders added = better E/W continuity
Freight				
• Accommodate truck requirements	Minimize turning restrictions and/or out-of-direction travel (Y/N)	No Change	Yes	Yes
	Geometry accommodates truck turning movements (Y/N)	No Change	Yes	Yes
Environmental				
• Identification of environmental effects	Relative environmental effects [Good (limited); Fair, (some effects that can be mitigated); Poor (substantial/difficult to mitigate)]	Fair - increase in noise	Poor Increase in noise and potential ROW acquisition. Taft is considered potentially historic, changes to alignment could be considered adverse impact.	Poor Increase in noise and potential ROW acquisition. Taft is considered potentially historic, changes to alignment could be considered adverse impact.
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)	Not Applicable	Poor	Poor
	Consistent with local plans (qualitative)	No	Yes	Mixed No-Loveland Street Plan Yes - see NFRMPO Non-Motorized Plan corridor #11, and Loveland's bike Lanes
	Consistent with ACP (qualitative)	No	Yes	Yes
	Support economic development (qualitative)	No	Neutral	Neutral
Assessment				
Result		**Carry forward**	**Recommended**	**Feasible, but not recommend** The ROW required for this alternative would be extensive compared to other options, and the additional capacity provides relatively little benefit to safety or travel demand for the additional impacts. Therefore this alternative has been eliminated from further consideration.
Comments		Consideration for planned Multimodal improvements in this segment include: City of Loveland Bicycle Plan improvements on Wilson and Taft Intersection as well as new bike lanes from where existing bike lanes end (Namaqua Dr) to where existing bike lanes start again (east of Garfield). NFRMPO proposes a non-motorize corridor along US 34 as a side path.	ROW acquisition process/need/requirements could be limiting in some locations.	ROW acquisition is a limiting factor

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Loveland Urban Segment
Level 2 Evaluation Table - Access

Concepts for **Loveland Urban**: Morning Drive to N Garfield Ave
Refer to Level 2 Rubric for explanation of performance measure terms and Figure 3 for graphics of all items that where recommended.

Criteria	Performance Measure (measurement)	No Action	Wilson Ave Intersection Improvements	Taft Ave Intersection Improvements
			Double Left Turn Lanes All Directions w/ Shared Right/Thru Lanes	Double Left Turn Lanes SB & WB
Safety				
· Reduce crashes · Reduce crash severity · Enhance pedestrian/bike safety · Improve roadway geometry	Vehicle/vehicle conflict points (change)	Neutral	Decreases	Decreases
	Vehicle/pedestrian-bicycle conflict points (change)	Neutral	Increases More lanes = more crossing distance/conflicts/exposure	Increases More lanes = more crossing distance/conflicts/exposure
	Projected total number of crashes (change)	Neutral	Decreases	Decreases
	Projected number of injury and/or fatal crashes (change)	Neutral	Decreases	Decreases
Travel Demand				
• Reduce congestion • Serve demand	Change in Vehicle Miles Traveled (qualitative)	No change	No Change	No Change
	Level of Service (LOS) (change)	No change	No Change Access LOS grade remains the same as no action (LOS D)	No Change Access LOS grade remains the same as no action (LOS D)
	Vehicle Hours of Delay (VHD) (hours)	Not Applicable	Not Applicable	Not Applicable
Reliability				
• Improve travel reliability • Provide emergency access for adjacent communities • Quality of traffic operations	Travel Time index (ratio)	Not Applicable	Not Applicable	Not Applicable
	Travel Time by location/segment (% change/minutes)	No change	Improves by 5%	Improves by 17%
Mobility				
• Provide local and regional route connectivity • Enhance non-motorized opportunities • Provide additional travel choices • Improve bicycle connectivity • Ability to not preclude transit/rail options	Access to transit facilities (qualitative)	N/C	Worsens More lanes = more crossing distance/conflicts/exposure	Worsens More lanes = more crossing distance/conflicts/exposure
	Reduce barriers for N/S pedestrian and bicycle travel (qualitative)	N/C	No More lanes = more crossing distance/conflicts/exposure	No More lanes = more crossing distance/conflicts/exposure
	Improve continuity for E/W bicycle and pedestrian travel (qualitative)	N/C	No More lanes = more crossing distance/conflicts/exposure	No More lanes = more crossing distance/conflicts/exposure
Freight				
• Accommodate truck requirements	Minimize turning restrictions and/or out-of-direction travel (Y/N)	No change	Yes	Yes
	Geometry accommodates truck turning movements (Y/N)	No change	Yes	Yes
Environmental				
• Identification of environmental effects	Relative environmental effects [Good (limited); Fair, (some effects that can be mitigated); Poor (substantial/difficult to mitigate)]	Fair - increase in noise	Poor Increase in noise and potential ROW acquisition	Poor Increase in noise and potential ROW acquisition. Taft is considered potentially historic, changes to alignment could be considered adverse impact.
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)	Not Applicable	Poor	Poor
	Consistent with local plans (qualitative)	No	Yes If bike-pedestrian improvements (Loveland Bike-Pedestrian Plan)	Yes If bike-pedestrian improvements (Loveland Bike-Pedestrian Plan)
	Consistent with ACP (qualitative)	No	Yes	Yes
	Support economic development (qualitative)	No	Neutral	Neutral
Assessment				
Result		**Carry forward**	**Recommended**	**Recommended**
Comments		Consideration for planned Multimodal improvements in this segment include: City of Loveland Bicycle Plan improvements on Wilson and Taft Intersection as well as new bike lanes from where existing bike lanes end (Namaqua Dr) to where existing bike lanes start again (east of Garfield). NFRMPO proposes a non-motorize corridor along US 34 as a side path.	Loveland Bicycle and Pedestrian Plan calls for improvements in this intersection. ROW acquisition process/need/requirements could be limiting in some locations.	Loveland Bicycle and Pedestrian Plan calls for improvements in this intersection. ROW acquisition process/need/requirements could be limiting in some locations.

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Loveland 6-Lane Segment

Level 2 Evaluation Table - Roadway Elements

Concepts for **Loveland 6-Lane**: N Garfield Ave to Rocky Mountain Ave

Refer to Level 2 Rubric for explanation of performance measure terms and Figures 4 - 5 for graphics of all items that where recommended.

Criteria	Performance Measure (measurement)	No Action	Add / Expand Auxiliary Lanes at Major Intersections	Add Additional Lanes 6 Lane Arterial from Lincoln to Monroe Ave	Add Additional Lanes 8 Lane Arterial West of I-25 to Boise
Number of lanes		4 - N. Garfield Ave. to Monroe Ave. 6 - Monroe Ave. to Rocky Mountain Ave.	6	6	8
Roadway classification		Urban principal arterial - other	Urban principal arterial - other	Urban principal arterial - other	Urban principal arterial - other
Safety					
· Reduce crashes · Reduce crash severity · Enhance pedestrian/bike safety · Improve roadway geometry	Vehicle/vehicle conflict points (change)	Neutral	Decrease	Neutral Less congestion, yet more conflict points	Neutral Less congestion, yet more conflict points
	Vehicle/pedestrian-bicycle conflict points (change)	Neutral	Increase More lanes = more conflicts/exposure	Increase More lanes = more conflicts/exposure	Increase More lanes = more conflicts/exposure
	Projected total number of crashes (change)	Increase More congestion - more crashes	Neutral Less congestion, yet more conflict points	Neutral Less congestion, yet more conflict points	Neutral Less congestion, yet more conflict points
	Projected number of injury and/or fatal crashes (change)	Increase More congestion - more crashes	Neutral Less congestion, yet more conflict points	Neutral Less congestion, yet more conflict points	Neutral Less congestion, yet more conflict points
Travel Demand					
• Reduce congestion • Serve demand	Change in Vehicle Miles Traveled (qualitative)	No Change	No Change	No Change	No Change
	Level of Service (LOS) (change)	No change (LOS F/F)	No Change	No Change	Improves from F/F to C/D
	Vehicle Hours of Delay (VHD) (hours)	No Change	No Change (improves 3%)	No Change (1% improvement)	Improves 67%
Reliability					
• Improve travel reliability • Provide emergency access for adjacent communities • Quality of traffic operations	Travel Time index (ratio)	No Change	No change (worsens 4%)	No Change (4% improvement)	Improves 64%
	Travel Time by location segment (% change/minutes)	No Change	No change (worsens 4%)	Improves 5%	Improves 64%
Mobility					
• Provide local and regional route connectivity • Enhance non-motorized opportunities • Provide additional travel choices • Improve bicycle connectivity • Ability to not preclude transit/rail options	Access to transit facilities (qualitative)	No Change	Worsens More lanes = greater crossing distance/conflicts/exposure. Important transit nodes in this segment	Worsens More lanes = greater crossing distance/conflicts/exposure. Important transit nodes in this segment	Worsens More lanes = greater crossing distance/conflicts/exposure. Important transit nodes in this segment
	Reduce barriers for N/S pedestrian and bicycle travel (qualitative)	No Change	No More lanes = greater crossing distance/conflicts/exposure	No More lanes = greater crossing distance/conflicts/exposure	No More lanes = greater crossing distance/conflicts/exposure
	Improve continuity for E/W bicycle and pedestrian travel (qualitative)	No Change	No Increase in vehicular right-in movements	Yes If shoulders added = better E/W continuity	Yes If shoulders added = better E/W continuity
Freight					
• Accommodate truck requirements	Minimize turning restrictions and/or out-of-direction travel (Y/N)	No Change	Yes	Yes	Yes
	Geometry accommodates truck turning movements (Y/N)	No Change	Yes	Yes	Yes
Environmental					
• Identification of environmental effects	Relative environmental effects [Good (limited); Fair, (some effects that can be mitigated); Poor (substantial/difficult to mitigate)]	Fair - increase in noise	Poor Noise impacts, ROW acquisition, potential impact to potentially historic properties, and 287 is considered potentially historic. Shifting the roadway alignment may be a adverse impact.	Poor Noise impacts, ROW acquisition, potential impact to potentially historic properties, and 287 is considered potentially historic. Shifting the roadway alignment may be a adverse impact.	Poor Noise impacts, ROW acquisition, potential impact to potentially historic properties, and 287 is considered potentially historic. Shifting the roadway alignment may be a adverse impact.
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)	Not Applicable	Poor in 287 to Monroe segment	Poor in 287 to Monroe segment	Poor
	Consistent with local plans (qualitative)	No	Yes	Yes Yes - See NFRMPO RNMC#11 and Loveland proposed bike lanes along US 34	No
	Consistent with ACP (qualitative)	No	Yes	Yes	Yes
	Support economic development (qualitative)	No	Neutral	Neutral	Neutral
Assessment					
		Carry forward	**Recommended**	**Recommended**	**Eliminated** Although this alternative would improve reliability and meet travel demand, it is inconsistent with local plans, therefore it has been eliminated from further consideration.
Comments		Consideration for planned multimodal improvements in this segment include: NFRMPO Bicycle and Non-Motorized Plans: RNMC #8 BNSF Fort Collins/Berthoud which is recognized on Loveland Bicycle and Pedestrian plan as a medium priority commuter trail. Consideration for access points is important. Future planned bike lanes on US 34 from Garfield to Madison and Future Planned Enhanced bike lanes from Madison to east of I-25. Additionally, a future planned recreational trail north of US 34 from Denver Ave to Boyd Lake Ave.(Loveland Bicycle and Pedestrian Plan)			Loveland's Bicycle and Pedestrian plans calls for Future Planned Enhanced bike lanes from Madison to east of I-25. Which also aligns with NFRMPO Bicycle and Non-Motorized Plans corridor #11.

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Loveland 6-Lane Segment
Level 2 Evaluation Table - Access

Concepts for **Loveland 6-Lane**: N Garfield Ave to Rocky Mountain Ave

Refer to Level 2 Rubric for explanation of performance measure terms and Figures 4 - 5 for graphics of all items that where recommended.

Criteria	Performance Measure (measurement)	No Action	Cleveland Avenue / Lincoln Avenue (US 287) Intersection Improvements			
			Double Left Turn Lanes	Hourglass Roundabout	Indirect Left Turn Lanes	3-Lane Roundabout
Safety						
· Reduce crashes · Reduce crash severity · Enhance pedestrian/bike safety · Improve roadway geometry	Vehicle/vehicle conflict points (change)	Neutral	Neutral	Decrease	Decrease	Decrease
	Vehicle/pedestrian-bicycle conflict points (change)	Neutral	Increase (more lanes = more crossing distance/conflicts/exposure)	Increase (roundabout = more vehicle / bike-pedestrian conflict/exposure)	Neutral (conflict/exposure is just shifted)	Increase (roundabout & lanes = more vehicle / bike-pedestrian conflict/exposure)
	Projected total number of crashes (change)	Not Applicable	Decrease	Decrease	Decrease	Unknown
	Projected number of injury and/or fatal crashes (change)	Not Applicable	Decrease	Decrease	Decrease	Unknown
Travel Demand						
• Reduce congestion • Serve demand	Change in Vehicle Miles Traveled (qualitative)	No change	No Change	No Change	Increase	No Change
	Level of Service (LOS) (change)	No change	Cleveland: Improves from LOS C/F to LOS C/D Lincoln: Improves from LOS C/D to LOS B/D	No Change Access LOS worsens from LOS F / F to LOS F / F	Cleveland: Improves from LOS C/F to LOS B/B Lincoln: Improves from LOS C/D to LOS B/C	Improves Access LOS improves from LOS F /F to LOS E / D
	Vehicle Hours of Delay (VHD) (hours)	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable
Reliability						
• Improve travel reliability • Provide emergency access for adjacent communities • Quality of traffic operations	Travel Time index (ratio)	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable
	Travel Time by location/segment (% change/minutes)	No change	Improves by 34%	Improves by 47%	Improves 42%	Improves by 55%
Mobility						
• Provide local and regional route connectivity • Enhance non-motorized opportunities • Provide additional travel choices • Improve bicycle connectivity • Ability to not preclude transit/rail options	Access to transit facilities (qualitative)	No change	Worsens (more lanes = more crossing distance/conflicts/exposure)	Worsens (roundabout = more vehicle / bike-pedestrian conflict/exposure)	No Change (Left-in changed to right-in, no transit access improvement)	Worsens (roundabout & lanes = more vehicle / bike-pedestrian conflict/exposure)
	Reduce barriers for N/S pedestrian and bicycle travel (qualitative)	No change	No (more lanes = more crossing distance/conflicts/exposure)	No (roundabout = more vehicle / bike-pedestrian conflict/exposure)	No change	No (roundabout & lanes = more vehicle / bike-pedestrian conflict/exposure)
	Improve continuity for E/W bicycle and pedestrian travel (qualitative)	No change	No (more lanes = more crossing distance/conflicts/exposure)	No (roundabout = more vehicle / bike-pedestrian conflict/exposure)	No Change (E/W continuity break shifted location)	No (roundabout & lanes = more vehicle / bike-pedestrian conflict/exposure)
Freight						
• Accommodate truck requirements	Minimize turning restrictions and/or out-of-direction travel (Y/N)	No change	Yes	Yes	No	Yes
	Geometry accommodates truck turning movements (Y/N)	No change	Yes	Yes	No	Yes
Environmental						
• Identification of environmental effects	Relative environmental effects [Good (limited); Fair, (some effects that can be mitigated); Poor (substantial/difficult to mitigate)]	Fair Increase in noise	Fair Potential ROW acquisition	Poor Noise impacts, ROW acquisition, potential impact to potentially historic properties, and 287 is considered potentially historic. Shifting the roadway alignment may be an adverse impact.	Fair Potential noise and socioeconomic impacts	Poor Noise impacts, ROW acquisition, potential impact to potentially historic properties, and 287 is considered potentially historic. Shifting the roadway alignment may be a adverse impact.
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)	Good	Fair	Fair	Good	Poor
	Consistent with local plans (qualitative)	No	Yes	Yes	Mixed	Mixed
	Consistent with ACP (qualitative)	No	Yes	Yes	Yes	Yes
	Support economic development (qualitative)	No	Yes	Neutral	Yes	Neutral
Assessment						
Result		**Carry forward**	**Recommended**	**Eliminated** This concept would not improve LOS at this intersection unlike other options proposed for this location, therefore it has been eliminated from further consideration.	**Recommended**	**Recommended**
Comments		Refer to text below for additional information on the No Action alternative.		Concept would not improve LOS at this intersection, unlike other concepts proposed at this location.		

Consideration for planned multimodal improvements in this segment include: NFRMP Bicycle and Non-Motorized Plans: RNMC #8 BNSF Fort Collins/Berthoud which is recognized on Loveland Bicycle and Pedestrian plan as a medium priority commuter trail. Consideration for access points is important. Future planned bike lanes on US 34 from Garfield to Madison and Future Planned Enhanced bike lanes from Madison to east of I-25. Additionally, a future planned recreational trail north of US 34 from Denver Ave to Boyd Lake Ave.(Loveland Bicycle and Pedestrian Plan).

Table 11

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Department of Transportation

Johnstown-Greeley Segment
Level 2 Evaluation Table - Roadway Elements

Concepts for **Johnstown-Greeley**: Centerra/Thompson Pkwy to East of Hwy 257
Refer to Level 2 Rubric for explanation of performance measure terms and Figures 6 - 9 for graphics of all items that where recommended.

Criteria	Performance Measure (measurement)	No Action	Add / Expand Auxiliary Lanes at Major Intersections	Add additional lanes 6 Lane Urban Principal Arterial Expressway
Number of lanes		4	4	6
Roadway classification		Urban principal arterial expressway	Urban principal arterial expressway	Urban principal arterial expressway
Safety				
· Reduce crashes · Reduce crash severity · Enhance pedestrian/bike safety · Improve roadway geometry	Vehicle/vehicle conflict points (change)	Neutral	Decreases	Neutral Less congestion, yet more conflicts
	Vehicle/pedestrian-bicycle conflict points (change)	Neutral	Increase More lanes = more conflicts/exposure	Increase More lanes = more conflicts/exposure
	Projected total number of crashes (change)	Increase	Neutral Aux. lanes do less for congestion	Decrease Less congestion, addresses high conflict crash types
	Projected number of injury and/or fatal crashes (change)	Increase	No Change Aux. lanes do less for congestion	Decrease Less congestion, addresses high conflict crash types
Travel Demand				
• Reduce congestion • Serve demand	Change in Vehicle Miles Traveled (qualitative)	No Change	No Change	No Change
	Level of Service (LOS) (change)	No Change	No Change	Improves from F/F to B/C
	Vehicle Hours of Delay (VHD) (hours)	No Change	No Change	Improves - Saves approximately 9500 vehicle hours of delay per year in the peak hour
Reliability				
• Improve travel reliability • Provide emergency access for adjacent communities • Quality of traffic operations	Travel Time index (ratio)	No Change	No Change	Improves 61%
	Travel Time by location/segment (% change/minutes)	No Change	No Change	Improves 66%
Mobility				
• Provide local and regional route connectivity • Enhance non-motorized opportunities • Provide additional travel choices • Improve bicycle connectivity • Ability to not preclude transit/rail options	Access to transit facilities (qualitative)	No Change Current transit facilities in segment: Park-n-Ride east of I-25 and bus stop on shops	Improves Vehicular access to park-n-ride. No change for bikes-pedestrians	Improves Vehicular access to park-n-ride. No change for bikes-pedestrians
	Reduce barriers for N/S pedestrian and bicycle travel (qualitative)	No Change	No More lanes = greater crossing distance/conflicts/exposure	No More lanes = greater crossing distance/conflicts/exposure
	Improve continuity for E/W bicycle and pedestrian travel (qualitative)	No Change	No Increase in vehicular right-in movements	Yes If shoulders added = better E/W continuity
Freight				
• Accommodate truck requirements	Minimize turning restrictions and/or out-of-direction travel (Y/N)	No Change	Yes	Yes
	Geometry accommodates truck turning movements (Y/N)	No Change	Yes	Yes
Environmental				
• Identification of environmental effects	Relative environmental effects [Good (limited); Fair, (some effects that can be mitigated); Poor (substantial/difficult to mitigate)]	Fair Increase in noise	Fair ROW acquisition, potential for noise impacts, and impacts to potentially historic resources (ditch and other)	Fair ROW acquisition, potential for noise impacts, and impacts to potentially historic resources (ditch and other)
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)	Not applicable	Good	Good
	Consistent with local plans (qualitative)	No	Yes	Mixed Yes No - Concept could preclude RNMC#11 along US 34 dependent on ROW
	Consistent with ACP (qualitative)	No	Yes	Yes
	Support economic development (qualitative)	No	Yes	Yes
Assessment				
Result		**Carry forward**	**Recommended**	**Recommended**
Comments		Consideration for planned multimodal improvements in this segment include: NFRMPO Bicycle and Non-Motorized Plans: RNMC #11 US 34 Segments B and C. Segment B (I-25 to WCR 13) bike lanes to LCR 3 (also recognized on the Loveland Bicycle and Pedestrian Plan). Segment C is seen as a shared used trail from WCR 13 to CO 257 (north or south side considerations). RNMC #4-B: Great Western is seen as a corridor that parallels the Great Western Railroad. Significant infrastructure (protected crossing signal, overpass/underpass of us 34 needed). RNMC 9, segments B-C: Johnstown Timnath is seen as shoulder improvements conducive for bikes lanes and recognizes significance infrastructure (protected crossing signal, overpass/underpass of US 34). Johnstown also has a neighborhood trail planned between WCR 13 and WCR 15 heading southeast along the Loveland Greeley ditch, as well as one traveling N/S along WCR 17. Windsor has bike lanes planned along WCR 15 going north. Greeley has bike lanes/Site path planned along WCR 17, 131st Ave. and along Hwy 257. Johnstown also has transit service planned along WCR 17 as well as on Hwy 257. NFRMPO RTE also highlights Transit corridors along US 34 as well as a corridor from the existing Park-n-Ride on Hwy 257 going north to Windsor. GET Strategic plans mentions proposed regional service from Greeley to Loveland along US 34 and to Windsor along WCR 17		

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Johnstown-Greeley Segment
Level 2 Evaluation Table - Access

Concepts for **Johnstown-Greeley**: Centerra/Thompson Pkwy to East of Hwy 257
Refer to Level 2 Rubric for explanation of performance measure terms and Figures 6 - 9 for graphics of all items that where recommended.

Criteria	Performance Measure (measurement)	No Action	Larimer Parkway (LCR 3E) Intersection Improvements			
			6 Lane plus Signal	Interchange	6 Lane with Interchange	Indirect Left Turn Lanes
Safety						
· Reduce crashes · Reduce crash severity · Enhance pedestrian/bike safety · Improve roadway geometry	Vehicle/vehicle conflict points (change)	Neutral	Increase	Decrease	Decrease	Decrease
	Vehicle/pedestrian-bicycle conflict points (change)	Neutral	Increase More lanes, more conflict points	Neutral Grade Separated crossing, yet more exposure	Neutral More lanes and more exposure, yet grade separated crossing	Decrease No increase in lanes and controlled movements
	Projected total number of crashes (change)	Neutral	Decrease	Decrease	Decrease	Decrease
	Projected number of injury and/or fatal crashes (change)	Neutral	Decrease	Decrease	Decrease	Decrease
Travel Demand						
• Reduce congestion • Serve demand	Change in Vehicle Miles Traveled (qualitative)	No Change	No Change	No Change	No Change	Increase
	Level of Service (LOS) (change)	No Change	Improves from LOS E/F to LOS D/C	Improves from LOS E/F to LOS C/D	Improves from LOS E/F to LOS C/C	Improves
	Vehicle Hours of Delay (VHD) (hours)	Not applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable
Reliability						
• Improve travel reliability	Travel Time index (ratio)	Not applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable
• Provide emergency access for adjacent communities	Travel Time by location/segment (% change/minutes)	No Change	Improves 19%	Improves 41%	Improves 42%	Improves through travel time
Mobility						
• Provide local and regional route connectivity • Enhance non-motorized opportunities • Provide additional travel choices • Improve bicycle connectivity • Ability to not preclude transit/rail options	Access to transit facilities (qualitative)	No Change Current transit facilities in segment: Park-n-Ride east of I-25 and bus stop by shops	No Change Current signal allows for control vehicle, bike and ped movement in intersection	Improves Interchange improves vehicular access to park-n-ride and grade separated crossing	Improves Interchange improves vehicular access to park-n-ride and grade separated crossing	No Change Current signal allows for control vehicle, bike and ped movement in intersection
	Reduce barriers for N/S pedestrian and bicycle travel (qualitative)	No Change	No More lanes = more crossing distance for pedestrian-bike crossing	No more crossing distance and crossing points	No more lanes, more crossing distance and crossing points	No Change Current signal allows for control vehicle, bike and ped movement in intersection
	Improve continuity for E/W bicycle and pedestrian travel (qualitative)	No Change	Yes possible shoulder improvements	Yes grade separated controlled pedestrian-bike crossing	Yes grade separated controlled pedestrian-bike crossing and possible shoulder improvements	No Change Current signal allows for control vehicle, bike and ped movement in intersection
Freight						
• Accommodate truck requirements	Minimize turning restrictions and/or out-of-direction travel (Y/N)	No Change	Yes	Yes	Yes	No
	Geometry accommodates truck turning movements (Y/N)	No Change	Yes	Yes	Yes	Yes
Environmental						
• Identification of environmental effects	Relative environmental effects [Good (limited); Fair, (some effects that can be mitigated); Poor (substantial/difficult to mitigate)]	Fair Increase in noise	Fair May require ROW configuration could impact potentially historic canal and property in NE quadrant.	Poor ROW acquisition, potential for noise impacts, and impacts to potentially historic resources (ditch and other)	Poor ROW acquisition, potential for noise impacts, and impacts to potentially historic resources (ditch and other)	Good
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)	Good	Fair	Poor	Poor	Good
	Consistent with local plans (qualitative)	No	Yes	Yes	Yes	No
	Consistent with ACP (qualitative)	No	Yes	Yes	Yes	No
	Support economic development (qualitative)	No	Neutral	Neutral	Neutral	No
Assessment						
Result		**Carry forward**	**Recommended**	**Recommended**	**Recommended**	**Feasible, but not recommended** This option is not recommended because it is inconsistent with local plans including the adopted ACP for LCR 3E. If the ACP is revised this design option would work as an interim project.
Comments		Refer to text below for additional information on the No Action alternative.	2040 traffic demand exceeds capacity for this alternative	2040 traffic demand exceeds capacity for this alternative, assuming 4 lanes on US 34		Assume no impact to the railroad crossing. RR is potentially historic. 2040 traffic demand exceeds capacity for this alternative, assuming 4 lanes on US 34

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Johnstown-Greeley Segment
Level 2 Evaluation Table - Access

Concepts for **Johnstown-Greeley**: Centerra/Thompson Pkwy to East of Hwy 257
Refer to Level 2 Rubric for explanation of performance measure terms and Figures 6 - 9 for graphics of all items that where recommended.

Criteria	Performance Measure (measurement)	No Action	Larimer Parkway (LCR 3E) Intersection Improvements			
			6 Lane plus Signal	Interchange	6 Lane with Interchange	Indirect Left Turn Lanes
Extended No Action Comments		Consideration for planned multimodal improvements in this segment include: NFRMPO Bicycle and Non-Motorized Plans: RNMC #11 US 34 Segments B and C. Segment B (I-25 to WCR 13) bike lanes to LCR 3 (also recognized on the Loveland Bicycle and Pedestrian Plan). Segment C is seen as a shared used trail from WCR 13 to CO 257 (north or south side considerations). RNMC #4-B: Great Western is seen as a corridor that parallels the Great Western Railroad. Significant infrastructure (protected crossing signal, overpass/underpass of us 34 needed). RNMC 9, segments B-C: Johnstown Timnath is seen as shoulder improvements conducive for bikes lanes and recognizes significance infrastructure (protected crossing signal, overpass/underpass of US 34). Johnstown also has a neighborhood trail planned between WCR 13 and WCR 15 heading southeast along the Loveland Greeley ditch, as well as one traveling N/S along WCR 17. Windsor has bike lanes planned along WCR 15 going north. Greeley has bike lanes/Site path planned along WCR 17, 131st Ave. and along Hwy 257. Johnstown also has transit service planned along WCR 17 as well as on Hwy 257. NFRMPO RTE also highlights Transit corridors along US 34 as well as a corridor from the existing Park-n-Ride on Hwy 257 going north to Windsor. GET Strategic plans mentions proposed regional service from Greeley to Loveland along US 34 and to Windsor along WCR 17				

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Johnstown-Greeley Segment
Level 2 Evaluation Table - Access

Concepts for **Johnstown-Greeley**: Centerra/Thompson Pkwy to East of Hwy 257
Refer to Level 2 Rubric for explanation of performance measure terms and Figures 6 - 9 for graphics of all items that where recomm

Criteria	Performance Measure (measurement)	LCR 3 Intersection Improvements			
		6 Lane plus Signal	Interchange	6 Lane with Interchange	Indirect Left Turn Lanes
Safety					
· Reduce crashes · Reduce crash severity · Enhance pedestrian/bike safety · Improve roadway geometry	Vehicle/vehicle conflict points (change)	Increase	Decrease		Decrease
	Vehicle/pedestrian-bicycle conflict points (change)	Increase More lanes, more conflict points	Neutral Grade Separated crossing, yet more exposure	Neutral More lanes and more exposure, yet grade separated crossing	Decrease No increase in lanes and controlled movements
	Projected total number of crashes (change)	Decrease	Decrease		Decrease
	Projected number of injury and/or fatal crashes (change)	Decrease	Decrease	Decrease	Decrease
Travel Demand					
• Reduce congestion • Serve demand	Change in Vehicle Miles Traveled (qualitative)	No Change	No Change	No Change	Increase
	Level of Service (LOS) (change)	No Change (LOS F/F)	Improves from LOS F/F to D/D	Improves from LOS F/F to C/C	Improves
	Vehicle Hours of Delay (VHD) (hours)	Not Applicable	Not Applicable	Not Applicable	Not Applicable
Reliability					
• Improve travel reliability	Travel Time index (ratio)	Not Applicable	Not Applicable	Not Applicable	Not Applicable
• Provide emergency access for adjacent communities	Travel Time by location/segment (% change/minutes)	Improves 31%	Improves 81%	Improves 81%	No Change
Mobility					
• Provide local and regional route connectivity • Enhance non-motorized opportunities • Provide additional travel choices • Improve bicycle connectivity • Ability to not preclude transit/rail options	Access to transit facilities (qualitative)	No Change Current signal allows for control vehicle, bike and ped movement in intersection	Improves Interchange improves vehicular access to park-n-ride and grade separated crossing	Improves Interchange improves vehicular access to park-n-ride and grade separated crossing	No Change Current signal allows for control vehicle, bike and ped movement in intersection
	Reduce barriers for N/S pedestrian and bicycle travel (qualitative)	No More lanes = more crossing distance for pedestrian-bike crossing	No more crossing distance and crossing points	No more lanes, more crossing distance and crossing points	No Change Current signal allows for control vehicle, bike and ped movement in intersection
	Improve continuity for E/W bicycle and pedestrian travel (qualitative)	Yes possible shoulder improvements	Yes grade separated controlled pedestrian-bike crossing	Yes grade separated controlled pedestrian-bike crossing and possible shoulder improvements	No Change Current signal allows for control vehicle, bike and ped movement in intersection
Freight					
• Accommodate truck requirements	Minimize turning restrictions and/or out-of-direction travel (Y/N)	Yes	Yes	Yes	No
	Geometry accommodates truck turning movements (Y/N)	Yes	Yes	Yes	Yes
Environmental					
• Identification of environmental effects	Relative environmental effects [Good (limited); Fair, (some effects that can be mitigated); Poor (substantial/difficult to mitigate)]	Fair ROW acquisition and impact to potentially historic railroad.	Poor Impacts from ROW acquisition, impacts to potentially historic property, railroad, canal, roadway. LCR 3 is potentially historic and changing the roadway alignment could be considered an adverse impact.	Poor Impacts from ROW acquisition, impacts to potentially historic property, railroad, canal, roadway. LCR 3 is potentially historic and changing the roadway alignment could be considered an adverse impact.	Good
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)	Fair	Poor	Poor	Good
	Consistent with local plans (qualitative)	No	No	No	No
	Consistent with ACP (qualitative)	Yes	Yes	Yes	No
	Support economic development (qualitative)	Neutral	Neutral	Neutral	No
Assessment					
Result		**Recommended**	**Recommended**	**Recommended**	**Feasible, but not recommended** This option is not recommended because it is inconsistent with local plans including the adopted ACP for LCR 3. If the ACP is revised this design option would work as an interim project.
Comments			2040 traffic demand exceeds capacity for this alternative, assuming 4 lanes on US 34		2040 traffic demand exceeds capacity for this alternative, assuming 4 lanes on US 34

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Johnstown-Greeley Segment
Level 2 Evaluation Table - Access

Concepts for **Johnstown-Greeley**: Centerra/Thompson Pkwy to East of Hwy 257
Refer to Level 2 Rubric for explanation of performance measure terms and Figures 6 - 9 for graphics of all items that where recomm

Criteria	Performance Measure (measurement)	WCR 13 Intersection Improvements			
		6 Lane plus Signal	Interchange	Interchange and realignment of WCR 13	6 Lane with Interchange
Safety					
· Reduce crashes · Reduce crash severity · Enhance pedestrian/bike safety · Improve roadway geometry	Vehicle/vehicle conflict points (change)	Increase	Decrease	Decrease	Decrease
	Vehicle/pedestrian-bicycle conflict points (change)	Increase More lanes, more conflict points	Neutral Grade Separated crossing, yet more exposure	Neutral More lanes and greater distance, yet grade separeted crossing	Neutral More lanes and more exposure, yet grade separated crossing
	Projected total number of crashes (change)	Decrease	Decrease	Decrease	Decrease
	Projected number of injury and/or fatal crashes (change)	Decrease	Decrease	Decrease	Decrease
Travel Demand					
• Reduce congestion • Serve demand	Change in Vehicle Miles Traveled (qualitative)	No Change	No Change	No Change	No Change
	Level of Service (LOS) (change)	Improves from LOS D/C to LOS C/C	No Change	No Change	Improves from LOS D/C to LOS C/C
	Vehicle Hours of Delay (VHD) (hours)	Not Applicable	Not Applicable	Not Applicable	Not Applicable
Reliability					
• Improve travel reliability	Travel Time index (ratio)	Not Applicable	Not Applicable	Not Applicable	Not Applicable
• Provide emergency access for adjacent communities	Travel Time by location/segment (% change/minutes)	No Change (improves 1%)	Improves 19%	Improves 19%	Improves 21%
Mobility					
• Provide local and regional route connectivity • Enhance non-motorized opportunities • Provide additional travel choices • Improve bicycle connectivity • Ability to not preclude transit/rail options	Access to transit facilities (qualitative)	No Change Current signal allows for control vehicle, bike and ped movement in intersection	Improves Interchange improves vehicular access to park-n-ride and grade separated crossing	Improves Interchange improves vehicular access to park-n-ride and grade separated crossing	Improves Interchange improves vehicular access to park-n-ride and grade separated crossing
	Reduce barriers for N/S pedestrian and bicycle travel (qualitative)	No Change Current signal allows for control vehicle, bike and ped movement in intersection	No more crossing distance and crossing points	No more crossing distance and crossing points	No more lanes, more crossing distance and crossing points
	Improve continuity for E/W bicycle and pedestrian travel (qualitative)	Yes possible shoulder improvements	Yes grade separated controlled pedestrian-bike crossing	Yes grade separated controlled pedestrian-bike crossing	Yes grade separated controlled pedestrian-bike crossing and possible shoulder improvements
Freight					
• Accommodate truck requirements	Minimize turning restrictions and/or out-of-direction travel (Y/N)	Yes	Yes	Yes	Yes
	Geometry accommodates truck turning movements (Y/N)	Yes	Yes	Yes	Yes
Environmental					
• Identification of environmental effects	Relative environmental effects [Good (limited); Fair, (some effects that can be mitigated); Poor (substantial/difficult to mitigate)]	Good	Poor Impacts from ROW acquisitions, impact to potentially historic canal and railroad, possible wetland impacts.	Poor Impacts from ROW acquisitions, impact to potentially historic canal and railroad, possible wetland impacts.	Poor Impacts from ROW acquisitions, impact to potentially historic canal and railroad, possible wetland impacts.
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)	Fair	Poor	Poor	Poor
	Consistent with local plans (qualitative)	Mixed Yes No - could preclude RNMC #9 and #4 US crossings and Johnstown Neigh Trail	Mixed Yes No - could preclude RNMC #9 and #4 US crossings and Johnstown Neigh Trail	Mixed - local plans keep CR 13 on alignment	Mixed Yes No - could preclude RNMC #9 and #4 US crossings and Johnstown Neigh Trail
	Consistent with ACP (qualitative)	Yes	Yes	Yes	Yes
	Support economic development (qualitative)	Yes	Yes	Neutral	Yes
Assessment					
Result		**Recommended**	**Recommended**	**Recommended**	**Recommended**
Comments		Careful consideration to NFRMPO Regional Bicycle Plan. WCR 13 is an important regional Bicycle and Pedestrian node.	Careful consideration to NFRMPO Regional Bicycle Plan. WCR 13 is an important regional Bicycle and Pedestrian node.	Careful consideration to NFRMPO Regional Bicycle Plan. WCR 13 is an important regional Bicycle and Pedestrian node.	Careful consideration to NFRMPO Regional Bicycle Plan. WCR 13 is an important regional Bicycle and Pedestrian node.

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Johnstown-Greeley Segment
Level 2 Evaluation Table - Access

Concepts for **Johnstown-Greeley**: Centerra/Thompson Pkwy to East of Hwy 257
Refer to Level 2 Rubric for explanation of performance measure terms and Figures 6 - 9 for graphics of all items that where recomm

Criteria	Performance Measure (measurement)	WCR 15 Intersection Improvements		WCR 17 Intersection Improvements		
		3/4 Movement	Indirect Lefts	6 Lane plus Signal	Interchange	6 Lane with Interchange
Safety						
· Reduce crashes · Reduce crash severity · Enhance pedestrian/bike safety · Improve roadway geometry	Vehicle/vehicle conflict points (change)	Decrease	Decrease	Increase	Decrease	Decrease
	Vehicle/pedestrian-bicycle conflict points (change)	Decrease Left-out conflict point removed	Neutral Conflict shift location	Increase More lanes = more crossing distance/conflicts/exposure	Increase Interchange = more crossing distance/conflicts/exposure	Increase Interchange = more crossing distance/conflicts/exposure
	Projected total number of crashes (change)	Decrease	Decrease	Decrease	Decrease	Decrease
	Projected number of injury and/or fatal crashes (change)	Decrease	Decrease	Decrease	Decrease	Decrease
Travel Demand						
• Reduce congestion • Serve demand	Change in Vehicle Miles Traveled (qualitative)	Increase	Increase	No Change	No Change	No Change
	Level of Service (LOS) (change)	No Change (LOS F/F)	Improves	Improves from LOS F/F to LOS C/F	Improves from LOS F/F to LOS C/D	Improves from LOS F/F to LOS B/C
	Vehicle Hours of Delay (VHD) (hours)	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable
Reliability						
• Improve travel reliability	Travel Time index (ratio)	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable
• Provide emergency access for adjacent communities	Travel Time by location/segment (% change/minutes)	No Change	No Change	Improves 61%	Improves 69%	Improves 70%
Mobility						
• Provide local and regional route connectivity • Enhance non-motorized opportunities • Provide additional travel choices • Improve bicycle connectivity • Ability to not preclude transit/rail options	Access to transit facilities (qualitative)	Worsens Left-out towards park-n-ride removed	No Change	Worsens Signal exists, more lanes	Improves Interchange improves access to park-n-ride and crossing for bikes-pedestrians	Improves Interchange improves access to park-n-ride and crossing for bikes-pedestrians
	Reduce barriers for N/S pedestrian and bicycle travel (qualitative)	No N/S pedestrian-bike movement restricted	No Change	No More lanes = more crossing distance/conflicts/exposure	No Interchange = more crossing distance/conflicts/exposure	No Interchange = more crossing distance/conflicts/exposure
	Improve continuity for E/W bicycle and pedestrian travel (qualitative)	No Change	No Change	No Change E/W lanes do not increase	No Interchange = more crossing distance/conflicts/exposure	No Interchange = more crossing distance/conflicts/exposure
Freight						
• Accommodate truck requirements	Minimize turning restrictions and/or out-of-direction travel (Y/N)	No	No	Yes	Yes	Yes
	Geometry accommodates truck turning movements (Y/N)	Yes	Yes	Yes	Yes	Yes
Environmental						
• Identification of environmental effects	Relative environmental effects [Good (limited); Fair, (some effects that can be mitigated); Poor (substantial/difficult to mitigate)]	Fair Unknown if potential to impact potentially historical marker on northwest side of 34 or impact alignment of WCR 15.	Fair Unknown if potential to impact potentially historical marker on northwest side of 34 or impact alignment of WCR 15.	Good	Poor ROW from State Land board Mineral lease area (not sure of impacts), ROW acquisitions, and impacts to unnamed tributary, potential impact to shared use path	Poor ROW from State Land board Mineral lease area (not sure of impacts), ROW acquisitions, and impacts to unnamed tributary, potential impact to shared use path
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)	Good	Good	Fair	Fair	Fair
	Consistent with local plans (qualitative)	Yes	No	Yes	Yes	Yes
	Consistent with ACP (qualitative)	Yes	No	Yes	Yes	Yes
	Support economic development (qualitative)	Yes	No	Neutral	Neutral	Neutral
Assessment						
Result		**Recommended**	**Feasible, but not recommended** This option is not recommended because it is inconsistent with local plans including the adopted ACP for WCR 15. If the ACP is revised this design option would work as an interim project.	**Recommended**	**Recommended**	**Recommended**
Comments			Not consistent with the ACP or local plans.			

Table 11

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Johnstown-Greeley Segment
Level 2 Evaluation Table - Access

Concepts for **Johnstown-Greeley**: Centerra/Thompson Pkwy to East of Hwy 257
Refer to Level 2 Rubric for explanation of performance measure terms and Figures 6 - 9 for graphics of all items that where recomm

Criteria	Performance Measure (measurement)	WCR 19/SH 257 Intersection Improvements 6-Lane Crossection, No Changes to WCR 19, Signalize SH 257 Ramps	US 34 Business Intersection Improvements Widen WB US 34 Business on Ramp (2 Lane)
Safety			
· Reduce crashes · Reduce crash severity · Enhance pedestrian/bike safety · Improve roadway geometry	Vehicle/vehicle conflict points (change)	Decrease	Neutral Less congestion yet more conflicts
	Vehicle/pedestrian-bicycle conflict points (change)	Increase Interchange = more crossing distance/conflicts/exposure	Increase More lanes = more crossing distance/conflicts/exposure
	Projected total number of crashes (change)	Decrease	Neutral
	Projected number of injury and/or fatal crashes (change)	Decrease	No Change
Travel Demand			
• Reduce congestion • Serve demand	Change in Vehicle Miles Traveled (qualitative)	No Change	No Change
	Level of Service (LOS) (change)	No Change	No Change (LOS D)
	Vehicle Hours of Delay (VHD) (hours)	Not Applicable	Not Applicable
Reliability			
• Improve travel reliability	Travel Time index (ratio)	Not Applicable	Not Applicable
• Provide emergency access for adjacent communities	Travel Time by location/segment (% change/minutes)	No Change	No Change (improves 2%)
Mobility			
• Provide local and regional route connectivity • Enhance non-motorized opportunities • Provide additional travel choices • Improve bicycle connectivity • Ability to not preclude transit/rail options	Access to transit facilities (qualitative)	Improves Interchange improves access to park-n-ride and crossing for bikes-pedestrians	No Change
	Reduce barriers for N/S pedestrian and bicycle travel (qualitative)	No Interchange = more crossing distance/conflicts/exposure	No Change
	Improve continuity for E/W bicycle and pedestrian travel (qualitative)	No Interchange = more crossing distance/conflicts/exposure	No Change
Freight			
• Accommodate truck requirements	Minimize turning restrictions and/or out-of-direction travel (Y/N)	Yes	Yes
	Geometry accommodates truck turning movements (Y/N)	Yes	Yes
Environmental			
• Identification of environmental effects	Relative environmental effects [Good (limited); Fair, (some effects that can be mitigated); Poor (substantial/difficult to mitigate)]	Good	Fair Potential ROW acquisition
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)	Good	Good
	Consistent with local plans (qualitative)	Yes	Yes
	Consistent with ACP (qualitative)	Yes	Yes
	Support economic development (qualitative)	Yes	Yes
Assessment			
Result		**Recommended**	**Recommended**
Comments			

Table 11

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Greeley Expressway Segment
Level 2 Evaluation Table - Roadway Elements

Concepts for Greeley Expressway: East of Hwy 257 to West of 11th Ave
Refer to Level 2 Rubric for explanation of performance measure terms and Figures 10 - 13 for graphics of all items that where recommended.

Criteria	Performance Measure (measurement)	No Action	Add / Expand Auxiliary Lanes at Major Intersections	Add Additional Lanes 6 Lane Urban Principal Arterial Expressway
Number of lanes		4	4	6
Roadway classification		Urban principal arterial expressway	Urban principal arterial expressway	Urban principal arterial expressway
Safety				
· Reduce crashes · Reduce crash severity · Enhance pedestrian/bike safety · Improve roadway geometry	Vehicle/vehicle conflict points (change)	Neutral	Decreases	Neutral Less congestion, yet more conflicts
	Vehicle/pedestrian-bicycle conflict points (change)	Neutral	Increase More lanes = more conflicts/exposure	Increase More lanes = more conflicts/exposure
	Projected total number of crashes (change)	Increases	Neutral Aux. lanes do less for congestion	Decrease Less congest, addresses high conflict crash type
	Projected number of injury and/or fatal crashes (change)	Increases	No Change Aux. lanes do less for congestion	Decrease Less congest, addresses high conflict crash type
Travel Demand				
• Reduce congestion • Serve demand	Change in Vehicle Miles Traveled (qualitative)	No Change	No Change	No Change
	Level of Service (LOS) (change)	No Change LOS F/F	No Change	Improves from F/F to B/B
	Vehicle Hours of Delay (VHD) (hours)	No Change	No Change	Saves 2800 vehicle hours of delay per year in the peak hour
Reliability				
• Improve travel reliability • Provide emergency access for adjacent communities • Quality of traffic operations	Travel Time index (ratio)	No Change	No Change	Improves 39%
	Travel Time by location/segment (% change/minutes)	No Change	No Change	Improves 49%
Mobility				
• Provide local and regional route connectivity • Enhance non-motorized opportunities • Provide additional travel choices • Improve bicycle connectivity • Ability to not preclude transit/rail options	Access to transit facilities (qualitative)	No Change	Worsens More lanes = greater crossing distance/conflicts/exposure	Worsens More lanes = greater crossing distance/conflicts/exposure
	Reduce barriers for N/S pedestrian and bicycle travel (qualitative)	No Change	No More lanes = greater crossing distance/conflicts/exposure	No More lanes = greater crossing distance/conflicts/exposure
	Improve continuity for E/W bicycle and pedestrian travel (qualitative)	No Change	No Increase in vehicular right-in movements	Yes If shoulder = better E/W continuity
Freight				
• Accommodate truck requirements	Minimize turning restrictions and/or out-of-direction travel (Y/N)	No Change	Yes	Yes
	Geometry accommodates truck turning movements (Y/N)	No Change	Yes	Yes
Environmental				
• Identification of environmental effects	Relative environmental effects [Good (limited); Fair, (some effects that can be mitigated); Poor (substantial/difficult to mitigate)]	Fair Increase in noise	Fair ROW acquisition, impacts to potentially historic ditch, and increase in noise	Poor ROW acquisition, impacts to potentially historic ditch, noise due to elevated main lane.
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)	Not applicable	Good Less impact than general purpose lanes	Fair Varies, wider roadway template
	Consistent with local plans (qualitative)	No	Yes	Yes
	Consistent with ACP (qualitative)	No	Yes	Yes
	Support economic development (qualitative)	No	Neutral	Neutral
Assessment				
Result		**Carry forward**	**Recommended**	**Recommended**
Comments		Consideration for planned multimodal improvements in this segment include: RNMC #11 along US 34, N/S bike lanes and bike routes from Greeley. Intersection improvements (47th, 35th, 23rd, and 11th), as well as grade separated crossings (Reservoir Rd and 17th Ave)		

Table 11

COLORADO
Department of Transportation

Greeley Expressway Segment
Level 2 Evaluation Table - Access

Concepts for Greeley Expressway: East of Hwy 257 to West of 11th Ave
Refer to Level 2 Rubric for explanation of performance measure terms and Figures 10 - 13 for graphics of all items that where recommended.

Criteria	Performance Measure (measurement)	No Action	Promontory Parkway				
			6-Lane plus Signal	SPUI Interchange	Interchange	6-Lane with SPUI Interchange	6-Lane Interchange
Safety							
· Reduce crashes · Reduce crash severity · Enhance pedestrian/bike safety · Improve roadway geometry	Vehicle/vehicle conflict points (change)	Neutral	Increase	Decrease	Decrease	Decrease	Decrease
	Vehicle/pedestrian-bicycle conflict points (change)	Neutral	Increase More lanes = more crossing distance/conflicts/exposure	Increase Interchange = more crossing distance/conflicts/exposure	Increase Interchange = more crossing distance/conflicts/exposure	Increase Interchange = more crossing distance/conflicts/exposure	Increase Interchange = more crossing distance/conflicts/exposure
	Projected total number of crashes (change)	Neutral	Decrease	Decrease	Decrease	Decrease	Decrease
	Projected number of injury and/or fatal crashes (change)	Neutral	Decrease	Decrease	Decrease	Decrease	Decrease
Travel Demand							
• Reduce congestion • Serve demand	Change in Vehicle Miles Traveled (qualitative)	No Change	No Change	No Change	No Change	No Change	No Change
	Level of Service (LOS) (change)	No Change	Improves from LOS B/C to LOS A/C	Worsens from LOS B/C to C/C	Worsens from LOS B/C to C/C	Improves from LOS B/C to B/B	Improves from LOS B/C to B/B
	Vehicle Hours of Delay (VHD) (hours)	No Change	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable
Reliability							
• Improve travel reliability • Provide emergency access for adjacent communities	Travel Time index (ratio)	No Change	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable
	Travel Time by location/segment (% change/minutes)	No Change	Improves 16%	Improves 31%	Improves 31%	Improves 32%	Improves 32%
Mobility							
• Provide local and regional route connectivity • Enhance non-motorized opportunities • Provide additional travel choices • Improve bicycle connectivity • Ability to not preclude transit/rail options	Access to transit facilities (qualitative)	No Change	Improves Signal improves access to park-n-ride and crossing for bikes-pedestrians	Improves Interchange improves access to park-n-ride and crossing for bikes-pedestrians	Improves Interchange improves access to park-n-ride and crossing for bikes-pedestrians	Improves Interchange improves access to park-n-ride and crossing for bikes-pedestrians	Improves Interchange improves access to park-n-ride and crossing for bikes-pedestrians
	Reduce barriers for N/S pedestrian and bicycle travel (qualitative)	No Change	No More lanes = more crossing distance/conflicts/exposure	No Interchange = more crossing distance/conflicts/exposure	No Interchange = more crossing distance/conflicts/exposure	No Interchange = more crossing distance/conflicts/exposure	No Interchange = more crossing distance/conflicts/exposure
	Improve continuity for E/W bicycle and pedestrian travel (qualitative)	No Change	No Change E/W lanes do not increase	No Interchange = more crossing distance/conflicts/exposure	No Interchange = more crossing distance/conflicts/exposure	No Interchange = more crossing distance/conflicts/exposure	No Interchange = more crossing distance/conflicts/exposure
Freight							
• Accommodate truck requirements	Minimize turning restrictions and/or out-of-direction travel (Y/N)	No Change	Yes	Yes	Yes	Yes	Yes
	Geometry accommodates truck turning movements (Y/N)	No Change	Yes	Yes	Yes	Yes	Yes
Environmental							
• Identification of environmental effects	Relative environmental effects [Good (limited); Fair, (some effects that can be mitigated); Poor (substantial/difficult to mitigate)]	Fair Increase in noise	Good	Poor ROW acquisition, impacts to potentially historic property, wetlands and ponds. Potential impacts to proposed trail, timing dependent.	Poor ROW acquisition, impacts to potentially historic property, wetlands and ponds. Potential impacts to proposed trail, timing dependent.	Poor ROW acquisition, impacts to potentially historic property, wetlands and ponds. Potential impacts to proposed trail, timing dependent.	Poor ROW acquisition, impacts to potentially historic property, wetlands and ponds. Potential impacts to proposed trail, timing dependent.
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)	Good	Good	Fair	Poor	Fair	Poor
	Consistent with local plans (qualitative)	No	Yes	Yes	Yes	Yes	Yes
	Consistent with ACP (qualitative)	No	Yes	Yes	Yes	Yes	Yes
	Support economic development (qualitative)	No	Yes	Yes		Yes	
Assessment							
Result		**Carry forward**	**Recommended**	**Recommended**	**Recommended**	**Recommended**	**Recommended**
Comments		Consideration for planned multimodal improvements in this segment include: RNMC #11 along US 34, N/S bike lanes and routes from Greeley. Intersection improvements (47th, 35th, 23rd, and 11th), as well as grade separated crossings (Reservoir Rd and 17th Av)					

Table 11

COLORADO
Department of Transportation

Greeley Expressway Segment
Level 2 Evaluation Table - Access

Concepts for Greeley Expressway: East of Hwy 257 to West of 11th Ave
Refer to Level 2 Rubric for explanation of performance measure terms and Figures 10 - 13 for graphics of all items that wl

Criteria	Performance Measure (measurement)	95th Ave Intersection Improvements		83rd Ave Intersection Improvements			
		3/4 Movement	Indirect Left Turn Lanes	6-Lane plus Signal	Interchange	6-Lanes with Interchange	Indirect Left Turn Lanes
Safety							
· Reduce crashes · Reduce crash severity · Enhance pedestrian/bike safety · Improve roadway geometry	Vehicle/vehicle conflict points (change)	Decrease	Decrease	Increase	Decrease	Decrease	Decrease
	Vehicle/pedestrian-bicycle conflict points (change)	Decrease Left-out conflict removed	Neutral	Neutral More lanes, yet controlled movement	Neutral More lanes, yet controlled movement	Neutral More lanes, yet controlled movement	Neutral Conflict points location shifts
	Projected total number of crashes (change)	Decrease	Decrease	Increase	Decrease	Decrease	Decrease
	Projected number of injury and/or fatal crashes (change)	Decrease	Decrease	Increase	Decrease	Decrease	Decrease
Travel Demand							
• Reduce congestion • Serve demand	Change in Vehicle Miles Traveled (qualitative)	Increase	Increase	No Change	No Change	No Change	Increase
	Level of Service (LOS) (change)	No Change (LOS F/F)	Improves	No Change (LOS F/F)	Improves from F/F to C/D	Improves from F/F to B/C	Improves
	Vehicle Hours of Delay (VHD) (hours)	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable
Reliability							
• Improve travel reliability • Provide emergency access for adjacent communities	Travel Time index (ratio)	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable
	Travel Time by location/segment (% change/minutes)	No Change	No Change	Improves by 21%	Improves 65%	Improves 65%	Improves
Mobility							
• Provide local and regional route connectivity • Enhance non-motorized opportunities • Provide additional travel choices • Improve bicycle connectivity • Ability to not preclude transit/rail options	Access to transit facilities (qualitative)	No Change	No Change	Improves Signal = controlled bike-pedestrian movement	Improves Interchange = controlled bike-pedestrian movement	Improves Interchange = controlled bike-pedestrian movement	No Change
	Reduce barriers for N/S pedestrian and bicycle travel (qualitative)	No N/S movement restricted	No Change	Yes Signal = controlled bike-pedestrian movement	Yes Interchange = controlled bike-pedestrian movement	Yes Interchange = controlled bike-pedestrian movement	No Change
	Improve continuity for E/W bicycle and pedestrian travel (qualitative)	No Change	No Change	Yes Signal = controlled bike-pedestrian movement	Yes Interchange = controlled bike-pedestrian movement	Yes Interchange = controlled bike-pedestrian movement	No Change
Freight							
• Accommodate truck requirements	Minimize turning restrictions and/or out-of-direction travel (Y/N)	No	No	Yes	Yes	Yes	No
	Geometry accommodates truck turning movements (Y/N)	Yes	Yes	Yes	Yes	Yes	Yes
Environmental							
• Identification of environmental effects	Relative environmental effects [Good (limited); Fair, (some effects that can be mitigated); Poor (substantial/difficult to mitigate)]	Fair to Poor Widen to the median, potential impacts to floodplain, trails, park, wetlands	Fair to Poor Widen to the median, potential impacts to floodplain, trails, park, wetlands	Good	Fair ROW acquisition, impacts to potentially historic ditch, noise due to elevated main lane.	Fair ROW acquisition, impacts to potentially historic ditch, noise due to elevated main lane.	Good - If at 71st. If also at 65th then that will need to be assessed.
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)	Good	Good	Good	Fair	Fair	Good
	Consistent with local plans (qualitative)	Yes	No	Yes	Yes	Yes	No
	Consistent with ACP (qualitative)	Yes	No	Yes	Yes	Yes	No
	Support economic development (qualitative)	Yes	No	Yes	Yes	Yes	No
Assessment							
Result		**Recommended**	**Feasible, but not recommended** This option is not recommended because it is inconsistent with local plans including the adopted ACP for 95th Ave. If the ACP is revised this design option would work as an interim project.	**Recommended**	**Recommended**	**Recommended**	**Recommended**
Comments							

Table 11

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Greeley Expressway Segment
Level 2 Evaluation Table - Access

Concepts for Greeley Expressway: East of Hwy 257 to West of 11th Ave
Refer to Level 2 Rubric for explanation of performance measure terms and Figures 10 - 13 for graphics of all items that wl

Criteria	Performance Measure (measurement)	71st Ave/65th Ave Intersection Improvements			
		71st: 3/4 Movement 65th: 6-Lane plus Signal	71st: 3/4 Movement 65th: SPUI	71st: SPUI 65th: Overpass	Split Interchange
Safety					
· Reduce crashes · Reduce crash severity · Enhance pedestrian/bike safety · Improve roadway geometry	Vehicle/vehicle conflict points (change)	Increase	Decrease	Decrease	Decrease
	Vehicle/pedestrian-bicycle conflict points (change)	Increase More lanes = more crossing distance/conflicts/exposure	Increase Interchange = more crossing distance/conflicts/exposure	Increase Interchange = more crossing distance/conflicts/exposure	Increase More lanes = more crossing distance/conflicts/exposure
	Projected total number of crashes (change)	Increase	Decrease	Decrease	Decrease
	Projected number of injury and/or fatal crashes (change)	Increase	Decrease	Decrease	Decrease
Travel Demand					
• Reduce congestion • Serve demand	Change in Vehicle Miles Traveled (qualitative)	No Change	No Change	Increases	Increases
	Level of Service (LOS) (change)	No Change LOS F/F at 71st LOS F/F at 65th	No Change (LOS F/F) at 71st Improves from LOS F/F to C/C at 65th	Improves from LOS F/F to C/C at 71st Improves from LOS F/F to C/C at 65th	Improves from LOS F/F to C/C at 71st Improves from LOS F/F to C/C at 65th
	Vehicle Hours of Delay (VHD) (hours)	Not Applicable	Not Applicable	Not Applicable	Not Applicable
Reliability					
• Improve travel reliability	Travel Time index (ratio)	Not Applicable	Not Applicable	Not Applicable	Not Applicable
• Provide emergency access for adjacent communities	Travel Time by location/segment (% change/minutes)	Improves 54%	Improves 70%	Improves 70%	Improves 70%
Mobility					
• Provide local and regional route connectivity • Enhance non-motorized opportunities • Provide additional travel choices • Improve bicycle connectivity • Ability to not preclude transit/rail options	Access to transit facilities (qualitative)	Decrease More lanes = more crossing distance/conflicts/exposure	Decrease More lanes/interchange = more crossing distance/conflicts/exposure	Decrease interchange = more crossing distance/conflicts/exposure	Decrease interchange = more crossing distance/conflicts/exposure
	Reduce barriers for N/S pedestrian and bicycle travel (qualitative)	No More lanes = more crossing distance/conflicts/exposure	No Interchange = more crossing distance/conflicts/exposure	No Interchange = more crossing distance/conflicts/exposure	No Interchange = more crossing distance/conflicts/exposure
	Improve continuity for E/W bicycle and pedestrian travel (qualitative)	No Change	No Interchange = more crossing distance/conflicts/exposure	No Interchange = more crossing distance/conflicts/exposure	No Interchange = more crossing distance/conflicts/exposure
Freight					
• Accommodate truck requirements	Minimize turning restrictions and/or out-of-direction travel (Y/N)	No	No	Yes	Yes
	Geometry accommodates truck turning movements (Y/N)	Yes	Yes	Yes	Yes
Environmental					
• Identification of environmental effects	Relative environmental effects [Good (limited); Fair, (some effects that can be mitigated); Poor (substantial/difficult to mitigate)]	Fair Minimal ROW acquisition, potential impacts to two historic ditches, and potential visual and noise impacts	Fair Minimal ROW acquisition, potential impacts to two potentially historic ditches, and potential visual and noise impacts	Fair Minimal ROW acquisition, impacts to two potentially historic ditches, noise and visual impacts due to elevating 34. The local access road would be required that potentially would require ROW, and potential impact to stream and wetland.	Fair Minimal ROW acquisition, impacts to two potentially historic ditches, noise and visual impacts due to elevating 34. The local access road would be required that potentially would require ROW, and potential impact to stream and wetland.
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)	Good	Fair	Fair	Fair
	Consistent with local plans (qualitative)	Yes	Yes	No	No
	Consistent with ACP (qualitative)	Yes	Yes	No	No
	Support economic development (qualitative)	Yes	Yes	No	
Assessment					
Result		**Recommended**	**Recommended**	**Recommended**	**Recommended**
Comments		this does not include the U turn option, this is the 3/4 per the ACP	this does not include the U turn option, this is the 3/4 per the ACP	May support adjacent development goals/would require change to ACP	

Table 11

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Department of Transportation

Greeley Expressway Segment
Level 2 Evaluation Table - Access

Concepts for Greeley Expressway: East of Hwy 257 to West of 11th Ave
Refer to Level 2 Rubric for explanation of performance measure terms and Figures 10 - 13 for graphics of all items that wl

Criteria	Performance Measure (measurement)	47th Ave Intersection Improvements		35th Ave Intersection Improvements		23rd Ave Intersection Improvements
		6-Lane plus Signal	Interchange	6-Lane plus Signal	Interchange	Minor Changes
Safety						
· Reduce crashes · Reduce crash severity · Enhance pedestrian/bike safety · Improve roadway geometry	Vehicle/vehicle conflict points (change)	Increase	Decrease	Increase	Decrease	Decrease
	Vehicle/pedestrian-bicycle conflict points (change)	Increase More lanes = more crossing distance/conflicts/exposure	Increase Interchange = more crossing distance/conflicts/exposure	Increase More lanes = more crossing distance/conflicts/exposure	Increase Interchange = more crossing distance/conflicts/exposure	Increase Double left NB = more conflict points
	Projected total number of crashes (change)	Increase	Decrease	Increase	Decrease	Decrease
	Projected number of injury and/or fatal crashes (change)	Increase	Decrease	Increase	Decrease	Decrease
Travel Demand						
• Reduce congestion • Serve demand	Change in Vehicle Miles Traveled (qualitative)	No Change	No Change	No Change	No Change	No Change
	Level of Service (LOS) (change)	Improves from LOS E/F to E/E	Improves from E/F to C/C	No Change (LOS D/F)	Improves from D/F to C/C	No Change
	Vehicle Hours of Delay (VHD) (hours)	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable
Reliability						
• Improve travel reliability • Provide emergency access for adjacent communities	Travel Time index (ratio)	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable
	Travel Time by location/segment (% change/minutes)	No change (improves 3%)	Improves 30%	Improves 38%	Improves 61%	No Change
Mobility						
• Provide local and regional route connectivity • Enhance non-motorized opportunities • Provide additional travel choices • Improve bicycle connectivity • Ability to not preclude transit/rail options	Access to transit facilities (qualitative)	Decrease More lanes = more crossing distance/conflicts/exposure	Decrease Interchange= more crossing distance/conflicts/exposure	Decrease More lanes = more crossing distance/conflicts/exposure	Decrease Interchange= more crossing distance/conflicts/exposure	Decrease More conflict points. area important transit node
	Reduce barriers for N/S pedestrian and bicycle travel (qualitative)	No More lanes = more crossing distance/conflicts/exposure	No Interchange = more crossing distance/conflicts/exposure	No More lanes = more crossing distance/conflicts/exposure	No Interchange = more crossing distance/conflicts/exposure	No Double NB more conflict points
	Improve continuity for E/W bicycle and pedestrian travel (qualitative)	No Change No change in E/W lanes	No Interchange = more crossing distance/conflicts/exposure	No Change No change in E/W lanes	No Interchange = more crossing distance/conflicts/exposure	No Change No change in E/W lanes
Freight						
• Accommodate truck requirements	Minimize turning restrictions and/or out-of-direction travel (Y/N)	Yes	Yes	Yes	Yes	Yes
	Geometry accommodates truck turning movements (Y/N)	Yes	Yes	Yes	Yes	Yes
Environmental						
• Identification of environmental effects	Relative environmental effects [Good (limited); Fair, (some effects that can be mitigated); Poor (substantial/difficult to mitigate)]	Fair Potential to impact to two potentially historic canals.	Fair Potential impacts to trail, minimal ROW acquisition, potential impacts to two potentially historic ditches, potential to increase noise and visual impacts due to elevating US 34.	Good	Poor ROW acquisition from park, noise receptors, visual impact, trail relocation, and impacts to potentially historic ditch.	Good
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)	Good	Good	Good	Good	Good
	Consistent with local plans (qualitative)	Yes	Yes	Yes	Yes	Yes
	Consistent with ACP (qualitative)	Yes	Yes	Yes	Yes	Yes
	Support economic development (qualitative)	Yes	Yes	Yes	Yes	Yes
Assessment						
Result		**Recommended**	**Recommended**	**Recommended**	**Recommended**	**Recommended**
Comments						

Table 11

COLORADO
Department of Transportation

Greeley Expressway Segment
Level 2 Evaluation Table - Access

Concepts for Greeley Expressway: East of Hwy 257 to West of 11th Ave
Refer to Level 2 Rubric for explanation of performance measure terms and Figures 10 - 13 for graphics of all items that wl

Criteria	Performance Measure (measurement)	17th Ave Intersection Improvements	
		3rd EB, Channelized T	Overpass
Safety			
· Reduce crashes · Reduce crash severity · Enhance pedestrian/bike safety · Improve roadway geometry	Vehicle/vehicle conflict points (change)	Decrease	Decrease
	Vehicle/pedestrian-bicycle conflict points (change)	Decrease No west N/S pedestrian-bike movement	Decrease Eliminates any left-turn and right-turn conflict points
	Projected total number of crashes (change)	Decrease	Decrease
	Projected number of injury and/or fatal crashes (change)	Decrease	Decrease
Travel Demand			
• Reduce congestion • Serve demand	Change in Vehicle Miles Traveled (qualitative)	No Change	Increases
	Level of Service (LOS) (change)	Improves from LOS F/F to D/E	Improves from LOS F/F to B/B
	Vehicle Hours of Delay (VHD) (hours)	Not Applicable	Not Applicable
Reliability			
• Improve travel reliability	Travel Time index (ratio)	Not Applicable	Not Applicable
• Provide emergency access for adjacent communities	Travel Time by location/segment (% change/minutes)	Improves 30%	Improves 44%
Mobility			
• Provide local and regional route connectivity • Enhance non-motorized opportunities • Provide additional travel choices • Improve bicycle connectivity • Ability to not preclude transit/rail options	Access to transit facilities (qualitative)	Decrease Always moving E/W traffic	Improves Greater N/S connectivity improves access to important transit node south of US34
	Reduce barriers for N/S pedestrian and bicycle travel (qualitative)	No Always moving E/W traffic	Yes Grade separated crossing reduces N/S barriers
	Improve continuity for E/W bicycle and pedestrian travel (qualitative)	No Right turn lane decreases E/W continuity	No Overpass limits access to E/W connectivity at this location
Freight			
• Accommodate truck requirements	Minimize turning restrictions and/or out-of-direction travel (Y/N)	Yes	Yes
	Geometry accommodates truck turning movements (Y/N)	Yes	Yes
Environmental			
• Identification of environmental effects	Relative environmental effects [Good (limited); Fair, (some effects that can be mitigated); Poor (substantial/difficult to mitigate)]	Good	Fair Potential impacts to trail, minimal ROW acquisition, potential to increase noise and visual impacts due to elevating US 34.
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)	Good	Good
	Consistent with local plans (qualitative)	Mixed - consistent with ACP but concept does not include grade separated concept from Greeley Bicycle Master Plan	Yes Follows Greeley's Bicycle Master Plan grade separated crossing
	Consistent with ACP (qualitative)	Yes	Yes
	Support economic development (qualitative)	Yes	Yes
Assessment			
Result		**Recommended**	**Recommended**
Comments		Grade separated crossing from Greeley Bicycle and Pedestrian Plan not included in concept	Grade separated crossing from Greeley Bicycle and Pedestrian Plan included in concept. Overpass concept should consider existing Grade separated crossing to the east on 15th Ave Ct, and incorporate that in concept to be maintained

COLORADO
Department of Transportation

East End Segment

Level 2 Evaluation Table - Roadway Elements

Concepts for **East End**: 1st Ave to Weld County Road 49 (WCR 49)

Refer to Level 2 Rubric for explanation of performance measure terms and Figure 14 for graphics of all items that where recommended.

Criteria	Performance Measure (measurement)	No Action	Add Lanes 6 Lane Rural Principal Arterial - Expressway
Number of Lanes		4	6
Roadway Classification		Rural principal arterial - expressway	Rural principal arterial - expressway
Safety			
· Reduce crashes · Reduce crash severity · Enhance pedestrian/bike safety · Improve roadway geometry	Vehicle/vehicle conflict points (change)	Neutral	Neutral Less congestion more conflicts
	Vehicle/pedestrian-bicycle conflict points (change)	Neutral	Increase More lanes = more conflicts
	Projected total number of crashes (change)	Increase	Neutral Less congestion more conflicts
	Projected number of injury and/or fatal crashes (change)	Increase	Neutral Less congestion more conflicts
Travel Demand			
• Reduce congestion • Serve demand	Change in Vehicle Miles Traveled (qualitative)	No Change	No Change
	Level of Service (LOS) (change)	No Change (LOS A/A)	No Change
	Vehicle Hours of Delay (VHD) (hours)	No Change	Improves by 9%
Reliability			
• Improve travel reliability • Provide emergency access for adjacent communities	Travel Time index (ratio)	No Change	No Change
	Travel Time by location/segment (% change/minutes)	No Change	No Change
Mobility			
• Provide local and regional route connectivity • Enhance non-motorized opportunities • Provide additional travel choices • Improve bicycle connectivity • Ability to not preclude transit/rail options	Access to transit facilities (qualitative)	No Change	Worsens More lanes = greater crossing distance/conflict/exposure
	Reduce barriers for N/S pedestrian and bicycle travel (qualitative)	No Change	No More lanes = greater crossing distance/conflict/exposure
	Improve continuity for E/W bicycle and pedestrian travel (qualitative)	No Change	No Greater right-in movements
Freight			
• Accommodate truck requirements	Minimize turning restrictions and/or out-of-direction travel (Y/N)	No Change	Yes
	Geometry accommodates truck turning movements (Y/N)	No Change	Yes
Environmental			
• Identification of environmental effects	Relative environmental effects [Good (limited); Fair, (some effects that can be mitigated); Poor (substantial/difficult to mitigate)]	Fair Increase in noise	Poor ROW acquisition, impacts to Waters of the US (S. Platte River), within a floodplain, potential impacts to potentially historic properties, trails, and noise receptors.
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)	Not applicable	Fair
	Consistent with local plans (qualitative)	No	Yes If multimodal improvements are considered in the concept
	Consistent with ACP (qualitative)	No	Yes
	Support economic development (qualitative)	No	Yes
Assessment			
Result		**Carry forward**	**Feasible, but not recommended** This option is not recommended because future traffic volumes do not necessitate additional capacity in this roadway segment.
Comments		Multimodal considerations in this segment include: RNMC #11 along US and the crossing of RNMC#1 with US 34	Future traffic volumes do not necessitate a 6-lane cross section in this segment.

COLORADO Department of Transportation

East End Segment

Level 2 Evaluation Table - Access

Concepts for **East End**: 1st Ave to Weld County Road 49 (WCR 49)

Refer to Level 2 Rubric for explanation of performance measure terms and Figure 14 for graphics of all items that where recommended.

Criteria	Performance Measure (measurement)	No Action	27th/28th Street (Frontage Road) Intersection Improvements	WCR 45 Intersection Improvements		US 34 Business	WCR 45.5 Intersection Improvements	WCR 47 Intersection Improvements	WCR 47.5 Intersection Improvements
			3/4 Movement	Realign Intersection	Right-in / Right-out	Signalization	3/4 Movement	3/4 Movement	3/4 Movement
Safety									
· Reduce crashes · Reduce crash severity · Enhance pedestrian/bike safety · Improve roadway geometry	Vehicle/vehicle conflict points (change)	Neutral	Decreases	Neutral	Decreases	Decreases	Decreases	Decreases	Decreases
	Vehicle/pedestrian-bicycle conflict points (change)	Neutral	Neutral	Neutral	Decreases Left-out/left-in movement removed	Decreases Controlled movements	Neutral	Decreases Left-out movement removed	Decreases Left-out movement removed
	Projected total number of crashes (change)	Neutral	Decreases	Decreases	Decreases	Decreases	Neutral	Decreases	Decreases
	Projected number of injury and/or fatal crashes (change)	Neutral	Decreases	Decreases	Decreases	Decreases	Neutral	Decreases	Decreases
Travel Demand									
• Reduce congestion • Serve demand	Change in Vehicle Miles Traveled (qualitative)	No change	Increases	No change	Increases	No Change	Increases	Increases	Increases
	Level of Service (LOS) (change)	No change	Improves	No change	No change	Improves	Improves	Improves	Improves
	Vehicle Hours of Delay (VHD) (hours)	Not applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable
Reliability									
• Improve travel reliability • Provide emergency access for adjacent communities • Quality of traffic operations	Travel Time index (ratio)	Not applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable
	Travel Time by location/segment (% change/minutes)	No change	No change	No change	No change	Worsens	No change	No change	No change
Mobility									
• Provide local and regional route connectivity • Enhance non-motorized opportunities • Provide additional travel choices • Improve bicycle connectivity • Ability to not preclude transit/rail options	Access to transit facilities (qualitative)	No Change	No Change	No Change	No Change	No Change	No Change	Worsens Left-out vehicular movement towards transit facilities restricted	Worsens Left-out vehicular movement towards transit facilities restricted
	Reduce barriers for N/S pedestrian and bicycle travel (qualitative)	No Change	No Change	No Change	No N/S movement restricted	Yes Controlled movements	No Change	No N/S movement restricted	No N/S movement restricted
	Improve continuity for E/W bicycle and pedestrian travel (qualitative)	No Change	No Change	No Change	Yes Less conflict points for e/w continuity	Yes Controlled movements	No Change	No Change	No Change
Freight									
• Accommodate truck requirements	Minimize turning restrictions and/or out-of-direction travel (Y/N)	No Change	No	Yes	No	Yes	No	No	No
	Geometry accommodates truck turning movements (Y/N)	No Change	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Environmental									
• Identification of environmental effects	Relative environmental effects [Good (limited); Fair, (some effects that can be mitigated); Poor (substantial/difficult to mitigate)]	Fair Increase in noise	Fair Increase in noise	Fair If within ROW, potentially historic property adjacent	Fair If within ROW, potentially historic property adjacent	Fair Within floodplain	Fair Increase in noise	Good	Good
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)	Not applicable	Good	Fair	Good	Good	Good	Good	Good
	Consistent with local plans (qualitative)	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	Consistent with ACP (qualitative)	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	Support economic development (qualitative)	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Assessment									
Result		**Carry forward**	**Recommended**	**Recommended**	**Recommended**	**Recommended**	**Recommended**	**Recommended**	**Recommended**
Comments							Consideration for RNMC#1 intersection with US 34 west of WCR 45 along the river		

8.0 Level 3 Alternatives and Evaluation

8.1 Level 3 Alternative Description

For the Level 3 evaluation, the roadway and access elements advancing from the Level 2 evaluation were combined with the supplemental elements (including existing and emerging technologies) that advanced out of the Level 1 evaluation to create alternative packages that could be further evaluated. **Table 12,** below, lists the alternatives, and the concepts used to compile the alternatives that design options that were evaluated in Level 3. At some access locations, more than one concept that advanced out of Level 2 was included in the alternative packages. These are listed as design options within each alternative.

Table 12 - Alternatives Evaluated in Level 3

Foothills Segment	
Concepts Included	***Alternative 1: 2-Lane Cross Section with Added or Expanded Auxiliary Lanes at Intersections and Modifications to Shoulders***
Roadway	Add/expand auxiliary lanes at major intersections to maximize the capacity of the 2-lane cross section while adding standard shoulders
Access	**Eastbound left-turn lane at LCR 27** **New traffic signal at Glade Road** **Intersection Rossum to Cascade** **Improvements:** • Option 1: 2-Way Left-turn Lane • Option 2: Roundabout at Rossum • Option 3: Channelized T at Morning Drive • Option 4: Raised Median
Supplemental Elements	Median improvements, Consolidate access, Bicycle and pedestrian regional connections along US 34, Transit service on US 34, Wildlife crossings, Localized safety improvements, Existing technologies, Emerging technologies, Incident management, Maintenance access, Parking, Drainage improvements
Loveland Urban Segment	
Concepts Included	***Alternative 1: 4-Lane Cross Section with Added or Expanded Auxiliary Lanes at Major Intersections***
Roadway	Add/expand auxiliary lanes at major intersections to maximize the capacity of the 4-lane cross section
Access	**Wilson Avenue Improvements:** • Double left-turn lanes all directions with right through-lanes **Taft Avenue Improvements:** • Double left-turn lanes southbound and westbound
Supplemental Elements	Median improvements, Consolidate access, Bicycle and pedestrian regional connections along US 34, Transit service on US 34, Localized safety improvements, Existing technologies, Emerging technologies, Incident management, Maintenance access, Parking, Drainage improvements

Loveland 6-Lane Segment	
Concepts Included	***Alternative 1: 6-Lane Cross Sections with Added or Expanded Auxiliary Lanes at Major Intersections***
Roadway	Add additional lanes from Lincoln to Monroe to create a 6-lane cross section
Access	**Cleveland Avenue/Lincoln Avenue (US 287) Improvements:** • Option 1: Double Left-turn Lanes • Option 2: Indirect Left-turn Lanes • Option 3: 3-Lane Roundabout
Supplemental Elements	Median improvements, Consolidate access, Bicycle and pedestrian regional connections along US 34, Transit service on US 34, Localized safety improvements, Existing technologies, Emerging technologies, Incident management, Drainage improvements

Johnstown-Greeley Segment		
Concepts Included	***Alternative 1: 4-Lane Cross Section with Interchanges***	***Alternative 2: 6-Lane Cross Section with Interchanges***
Roadway	Existing 4-lane cross section with interchanges	Add lanes to create a 6-lane cross section with interchanges
Access	**Interchange at Larimer Pkwy (LCR 3E)** **Interchange at LCR 3** **WCR 13:** • Option 1: Interchange at WCR 13 • Option 2: Interchange and realignment of WCR 13 **¾ Movement at WCR 15** **Interchange at WCR 17** **No improvements are proposed for WCR 19 and SH 257** **Widen the west-bound on-ramp to US 34 Business (2-Lane)**	**Interchange at Larimer Parkway (LCR 3E)** **Interchange at LCR 3** **WCR 13:** • Option 1: Interchange at WCR 13 • Option 2: Interchange and realignment of WCR 13 **¾ Movement at WCR 15** **Interchange at WCR 17** **New signals at SH 257 Ramps with no changes to WCR 19** **Widen the west-bound on-ramp to US 34 Business (2-Lane)**
Supplemental Elements	Consolidate access, Bicycle and pedestrian regional connections along US 34, Transit service on US 34, Localized safety improvements, Railroad, Existing technologies, Emerging technologies, Incident management, Maintenance access	Median improvements, Consolidate access, Bicycle and pedestrian regional connections along US 34, Transit service on US 34, Localized safety improvements, Railroad, Existing technologies, Emerging technologies, Incident management, Maintenance access

Greeley Expressway Segment		
Concepts Included	***Alternative 1: 4-Lane Cross Section with Interchanges***	***Alternative 2: 6-Lane Cross Section with Interchanges***
Roadway	Existing 4-lane cross section with interchanges	Add lanes to create a 6-lane cross section with interchanges
Access	**Promontory Parkway:** • Option 1: SPUI • Option 2: Interchange **¾ Movement at 95th Avenue** **Interchange at 83rd Avenue** **71st Avenue/65th Avenue**: • Option 1: 3/4 Movement at 71st Avenue with a SPUI at 65th Avenue • Option 2: SPUI at 71st Avenue with an overpass at 65th Avenue • Option 3: Split diamond **Interchange at 47th Avenue** **Interchange at 35th Avenue** **Minor Changes at 23rd Avenue** **17th Avenue:** • Option 1: Add a third eastbound lane and a channelized T at 17th Avenue • Option 2: Overpass over 17th Avenue	**Promontory Parkway:** • Option 1: SPUI • Option 2: Interchange **¾ Movement at 95th Avenue** **Interchange at 83rd Avenue** **71st Avenue/65th Avenue:** • Option 1: 3/4 Movement at 71st Avenue with a SPUI at 65th Avenue • Option 2: SPUI at 71st Avenue with an overpass at 65th Avenue • Option 3: Split diamond **Interchange at 47th Avenue** **Interchange at 35th Avenue** **Minor Changes at 23rd Avenue** **17th Avenue:** • Option 1: Add a third eastbound lane and a channelized T at 17th Avenue • Option 2: Overpass over 17th Avenue
Supplemental Elements	Consolidate access, Bicycle and pedestrian regional connections along US 34, Transit service on US 34, Localized safety improvements, Existing technologies, Emerging technologies, Maintenance access, Incident management	Median improvements, Consolidate access, Bicycle and pedestrian regional connections along US 34, Transit service on US 34, Localized safety improvements, Existing technologies, Emerging technologies, Incident management, Maintenance access

East End Segment	
Concepts Included	***Alternative 1: 4-Lane Cross Section with Intersections***
Roadway	Existing 4-lane cross section with intersections
Access	**3/4 Movement at 27th/28th Street** (frontage road) **WCR 45 Improvements**: • Option 1: Realign Intersection • Option 2: Right-in/Right out **Signalization at US 34 Business** **3/4 Movement at WCR 45.5** **3/4 Movement at WCR 47** **3/4 Movement at WCR 47.5**
Supplemental Elements	Median improvements, Consolidate access, Bicycle and pedestrian regional connections along US 34, Wildlife crossings, Localized safety improvements, Existing technologies, Emerging technologies, Incident management

SPUI= single-point urban interchange

The Supplemental Elements that were carried forward from Level 1 should be accommodated as the recommended alternatives are implemented. The Supplemental Elements that are included in the alternatives (by segment) are shown in **Table 13**.

Table 13 - Level 3 Supplemental Elements

Supplemental Element	**Segment 1** Foothills	**Segment 2** Loveland Urban	**Segment 3** Loveland 6-Lane	**Segment 4** Johnstown-Greeley	**Segment 5** Greeley Expressway	**Segment 6** East End
Median Improvements	✓	✓	✓	✓	✓	✓
Bicycle and Pedestrian Connections	✓	✓	✓	✓	✓	✓
Transit Service along US 34	✓	✓	✓	✓	✓	
Localized Safety Improvements	✓	✓	✓	✓	✓	✓
Railroad Improvements				✓		
Existing technology enhancements *	✓	✓	✓	✓	✓	✓
Emerging Technology Enhancements *	✓	✓	✓	✓	✓	✓
Incident Management	✓	✓	✓	✓	✓	✓
Maintenance Access	✓	✓	✓	✓	✓	✓
Parking Improvements	✓	✓				
Drainage Improvements	✓	✓	✓			
Wildlife Crossing	✓					✓

* The Technology Elements of the corridor are addressed in Attachment **02** of this report.

8.2 Level 3 Evaluation Criteria

The purpose of the Level 3 evaluation was to evaluate the segment-wide alternatives against the project Purpose and Need while balancing environmental effects. The Level 3 evaluation criteria expanded on the Level 2 evaluation and provided additional criteria based on the project goals.

In addition to the Level 2 evaluation criteria, the following criteria were added:

- Travel Demand
    - Improve operations to adjacent and parallel routes

Improvements that were identified as supplemental elements in the Level 1 evaluation were included in the alternatives packaging and evaluation in Level 3.

8.2.1 Level 3 Evaluation Criteria

A discussion on the development of rubrics for evaluating the concepts and alternatives was presented in Section 7.2.1. For the Level 3 evaluation Performance Measures were added and the rating definitions were added or modified to reflect a segment-wide evaluation.

The criteria, performance measures and rating definitions used to evaluate the Level 3 Alternatives are described in Table 14 – Level 3 Evaluation Criteria, Performance Measures, and Rating Definitions, below:

Table 14 – Level 3, Evaluation Criteria, Performance Measures, and Rating Definitions

US 34 PEL
Level 3 Evaluation Criteria, Performance Measures, and Rating Definitions

Category	Criteria	Performance Measure (Measurement)	Recommended Segment-wide Alternative Rating Definitions
Safety	• Reduce crashes • Reduce crash severity • Enhance pedestrian/bike safety • Improve roadway geometry	Vehicle/vehicle conflict points (change)	**Decrease** = The number of vehicle/vehicle conflict points would decrease and/or exposure to conflict points would be reduced under this alternative
			Neutral = The number of conflict points and/or exposure to conflict points is balanced or would not change from existing conditions under this alternative
			Increase = The number of vehicle/vehicle conflict points and/or exposure to conflict points would increase under this alternative
		Vehicle/pedestrian-bicycle conflict points (change)	**Decrease** = The number of vehicle/pedestrian-bike conflict points would decrease and/or exposure to conflict points would be reduced under this alternative
			Neutral = the number of conflict points and/or exposure to conflict points is balanced or would not change from existing conditions under this alternative
			Increase = The number of vehicle/pedestrian-bike conflict points and/or exposure to conflict points would increase under this alternative
		Projected total number of crashes (change)	**Decrease** = The projected number of crashes and/or exposure to crashes would decrease (over existing conditions) under this alternative
			Neutral = The number of projected crashes and/or exposure to crashes would not change substantially from existing conditions under this alternative
			Increase = The projected number of crashes and/or exposure to crashes would increase (over existing conditions) under this alternative
		Projected number of injury and/or fatal crashes (change)	**Decrease** = The projected number of crashes and/or exposure to crashes would decrease (over existing conditions) under this alternative
			No Change = The number of projected crashes and/or exposure to crashes would not change substantially from existing conditions under this alternative
			Increase = The projected number of crashes and/or exposure to crashes would increase (over existing conditions) under this alternative

Category	Criteria	Performance Measure (Measurement)	Recommended Segment-wide Alternative Rating Definitions
Travel Demand	• Reduce congestion • Serve demand • Improve operations to adjacent and parallel routes	Change in Vehicle Miles Traveled (qualitative)	**Decrease** = There would be a decrease in qualitative out of direction travel over existing conditions under this alternative
			No Change = There would be minimal change in qualitative out of direction travel over existing conditions under this alternative
			Increase = There would be in increase in qualitative out of direction travel over existing conditions under this alternative
		Overall level of Service (LOS) (change)	**Improves** = Overall LOS ratings at intersections and roadway segments improves by one or more letter grade when compared to no action under this alternative
			No Change = Overall LOS ratings at intersections and roadway segments remains the same as no action under this alternative
			Worsens = Overall LOS ratings at intersections and roadway segments worsen by one or more letter grade when compared to no action under this alternative
		Vehicle Hours of Delay (VHD; hours)	**Improves** = VHD improves compared to no action under this alternative
			No Change = VHD is not significantly statistically different than for the no action under this alternative
			Worsens = VHD worsens compared to no action under this alternative
		Effect on parallel roads (ADT)	**Improves** = Reduces average daily traffic volume on parallel roads
			Neutral = Average daily traffic volume is unaffected on parallel roads
			Worsens = Increases average daily traffic volume on parallel roads
Reliability	• Improve travel reliability • Provide emergency access for adjacent communities • Quality of Traffic Operations	Travel Time Index (ratio)	**Improves** = US 34 travel time index improves by 5% or more under this alternative
			No Change = US 34 travel time index changes by less than 5% under this alternative
			Worsens = US 34 travel time index worsens by 5% or more under this alternative
		Travel Time by segment (% change of minutes)	**Improves** = US 34 travel time improves by 5% or more within the segment improves overall compared to the no action under this alternative
			No Change = US 34 travel time changes by less than 5% within the segment and worsens overall compared to the no action under this alternative
			Worsens = US 34 travel time worsens by 5% or more within the segment worsens overall compared to the no action under this alternative

Category	Criteria	Performance Measure (Measurement)	Recommended Segment-wide Alternative Rating Definitions
Mobility	• Provide Local and Regional Route Connectivity • Accommodate future transit service • Enhance Non-Motorized Opportunities • Improve bicycle connectivity • Accommodate bicycle and pedestrian travel	Access to transit facilities (qualitative)	**Improves** = This alternative would improve access to transit facilities in the US 34 corridor for motorized and non-motorized users
			No Change = This alternative would not change accessibility of transit facilities in the US 34 corridor compared to existing conditions
			Worsens = This alternative would reduce accessibility of transit facilities in the US 34 corridor for motorized and non-motorized users
		Accommodate future transit service and facilities (qualitative)	**Good** = This alternative accommodates planned service and facilities in the US 34 corridor
			Fair = This alternative has minor impacts to planned transit service in the US 34 corridor
			Poor = This alternative has substantial impacts to planned transit service in the US 34 corridor
		Reduce barriers for N/S pedestrian and bicycle travel (qualitative)	**Yes** = This alternative would reduce barriers to north/south travel for pedestrians and bicyclists
			No Change = This alternative would not change barriers to north/south travel for pedestrians and bicyclists
			No = This alternative would create additional barriers to north/south travel for pedestrians and bicyclists
		Improve continuity for E/W bicycle and pedestrian travel (qualitative)	**Yes** = This alternative would improve continuity of east/west travel for pedestrians and bicyclists
			No Change = This alternative would not change east/west travel for pedestrians and bicyclists over existing conditions
			No = This alternative would disrupt continuity of east/west travel for pedestrians and bicyclists
		Accommodate planned regional non-motorized corridors (qualitative)	**Good** = this alternative has no impacts to the implementation of the planned regional non-motorized corridors along and across US 34.
			Fair = This alternative has minor adverse impact to the planned regional non-motorized corridors along and across US 34.
			Poor = This alternative has substantial impacts to the planned regional non-motorized corridors along and across US 34.

Category	Criteria	Performance Measure (Measurement)	Recommended Segment-wide Alternative Rating Definitions
Freight	• Accommodate truck requirements	Minimize turning restrictions and/or out-of-direction travel (Y/N)	**Yes** = This alternative would minimize out-of-direction travel and/or access restrictions for freight vehicles
			No change = Out of direction travel and/or access restrictions for freight do not change
			No = This alternative would increase out-of-direction travel and/or impose new access restrictions for freight vehicles
		Geometry accommodates truck turning movements (Y/N)	**Yes** = The geometry of this alternative can accommodate truck turning requirements. Geometry will prevent trucks from impeding other lanes and sidewalks
			No change = The geometry of this alternative does not change how turning requirements of freight vehicles are accommodated.
			No = The geometry of this alternative will not accommodate the turning requirements of freight vehicles. Geometry will cause trucks to impede other lanes and sidewalks
Environmental	• Relative rating of environmental effects • Identification of environmental effects	Relative environmental effects (Good, Fair, Poor)	**Good** = This alternative would result in limited adverse environmental effects and/or would have beneficial environmental effects to the resources listed.
			Fair = This alternative would have some adverse environmental effects that could be mitigated to the resources listed.
			Poor = This alternative would have environmental effects that could be substantial or require extensive mitigation to the resources listed.

Category	Criteria	Performance Measure (Measurement)	Recommended Segment-wide Alternative Rating Definitions
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)	**Good** = There is sufficient ROW to accommodate this alternative, include number of parcels
			Fair = This alternative would require acquisition of adjacent undeveloped properties, include number of parcels
			Poor = This alternative would require acquisition of ROW from one or more developed properties, include number of parcels
		Consistent with local plans (qualitative)	**Yes** = This alternative appears to be consistent with adopted local and regional plans
			Mixed = This alternative appears to be consistent with some adopted local/regional plans, while in conflict with others
			No = This alternative appears to be inconsistent with adopted local and regional plans
		Consistent with ACP (qualitative)	**Yes** = This alternative is consistent with the ACP for this location
			No = This alternative is inconsistent with the ACP for this location
		Support economic development (qualitative)	**Yes** = This alternative would not preclude economic development in this segment
			Neutral = This alternative could result in business relocation but would not preclude economic development in this segment
			No = This alternative could preclude economic development opportunities in this segment
Cost	• Segment Conceptual Cost	Cost or Range of Cost (2017 U.S. Dollars)	**No Rating** = Cost or range of cost which include planning design, and construction costs (excludes right-of-way costs)
Assessment		Result	**Carry forward =** Applies only to the No Action
			Recommended = This is the recommended alternative for this segment
			Feasible, but not recommend = This alternative will not be evaluated further in the study due to comparatively negligible benefits and higher impacts than other alternatives. Elements of this alternative would be feasible as an interim improvement and will be discussed further in the "Implementation Plan".
			Eliminated = This alternative does not meet the Purpose and Need established with this study or the alternative is unreasonable due to impacts and/or infeasibility.

A summary of conceptual cost can be found in Attachment 03 of this report. Specific conceptual cost data can be found in Attachment 04 of this report.

8.2.2 Level 3 Evaluation Results

The defined Level 3 Evaluation results had three potential outcomes, as shown in the matrices;

- **Recommended** – Alternative is recommended as the ultimate configuration in this segment
- **Feasible but not recommended** – This alternative is not recommended as the ultimate configuration in this segment, but this alternative might be implemented – either in whole or in part- as a phasing step toward the Recommended Alternative
- **Eliminated** – Alternatives were not carried forward

Below is a summary of the Alternatives assessed to be either Feasible but not recommended or Eliminated:

Foothills, Loveland Urban, Loveland 6 Lane, and East End:

No alternative was considered to be either Feasible but not recommended or was Eliminated.

Johnstown-Greeley and Greeley Expressway:

The Level 3 evaluation resulted in one alternative in the Johnstown-Greeley segment and one alternative in the Greeley Expressway segment not being recommended. In both segments, Alternative 1, 4-Lane Cross Section with Interchanges, was not recommended for further consideration because the 6-lane cross section would achieve the following:

- Eliminate a transition that reduces traffic conflicts, providing consistency with the 6-lane highway section near I-25, and better connect with the I-25 Interchange Project and US 34/US 85 Project (separate projects)
- Better accommodate incident management
- Provide flexibility and be more resilient to accommodate unforeseen growth
- Not require additional ROW over the 4-lane cross section
- Have a relatively similar cost to the 4-lane cross section
- Provide more flexibility to accommodate express lanes, bus rapid transit options, and/or future emerging technologies

The matrix in each segment will vary based on the number of alternatives and the other unique characteristics within each segment. Similar to the Level 2 results, the most comprehensive summary of the Level 3 work completed by the project team is contained in the Level 3 Evaluation matrices, which are shown in **Table 15** below:

Table 15 – Level 3 Evaluation Table - Alternatives

Table 15

COLORADO
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Foothills Segment
Level 3 Evaluation Table - Alternatives

Concepts for **Foothills**: Larimer County Road 27 (LCR 27) to Morning Drive

Criteria	Performance Measure (measurement)	No Action	Alternative 1 2-lane roadway cross section with added or expanded auxiliary lanes at intersections and modifications to shoulders Figure 1
Safety			
· Reduce crashes · Reduce crash severity · Enhance pedestrian/bike safety · Improve roadway geometry	Vehicle/vehicle conflict points (change)	Neutral	Decrease- aux lanes improves safety
	Vehicle/pedestrian-bicycle conflict points (change)	Neutral	Increase (auxiliary lanes at intersections increase exposure and conflict points)
	Projected total number of crashes (change)	Neutral	Decrease- aux lanes improves safety
	Projected number of injury and/or fatal crashes (change)	Neutral	Decrease- aux lanes improves safety
Travel Demand			
• Reduce congestion • Serve demand • Improve operations to adjacent and parallel routes	Change in vehicle miles traveled (qualitative)	No Change	No Change
	Overall level of service (LOS) (change)	No Change (LOS A)	No Change
	Vehicle hours of delay (VHD) (hours)	No Change	No Change
	Effect on parallel roads (ADT)	Neutral	Neutral
Reliability			
• Improve travel reliability • Provide emergency access for adjacent communities • Quality of traffic operations	Travel time index (ratio)	No Change	No Change
	Travel time by segment (% change of minutes)	No change	No Change
Mobility			
• Provide Local and Regional Route Connectivity • Accommodate future transit service • Enhance Non-Motorized Opportunities • Improve bicycle connectivity • Accommodate bicycle and pedestrian travel	Access to transit facilities (qualitative)	No change	Worsens (improvements make access to transit on east for bikes/peds difficult)
	Accommodate future transit service and facilitates (qualitative)	N/A (No planned transit service or facilities in segment)	N/A (No planned transit service or facilities in segment)
	Reduce barriers for N/S pedestrian and bicycle travel (qualitative)	No change	No (Increased lanes at intersections and intersection options that are difficult for bikes and peds to travel)
	Improve continuity for E/W bicycle and pedestrian travel (qualitative)	No change	No (Increased right-in movements and intersection options that are difficult for bikes/peds to travel)
	Accommodate planned regional non-motorized corridors (qualitative)	Fair (no improvements accommodate the RNMC # 3 which parallels US 34, yet does not implement segments of the RNMC #3)	Good (accommodates RNMC #3 along the Big Thompson River. Further consideration should be given to the potential crossings of this planned corridor with US 34
Freight			
• Accommodate truck requirements	Minimize turning restrictions and/or out-of-direction travel (Y/N)	No change	Yes
	Geometry accommodates truck turning movements (Y/N)	No change	Yes
Environmental			
• Relative rating of environmental effects • Identification of environmental effects	Relative environmental effects (Good, Fair, Poor)	Fair Increase in noise	Fair - 1 100-year floodplain encroachment - 1 cultural resource site (US 34 mainline, 5LR.13318.2) - 6 stream and/or water body crossings - 1 potential noise analysis area in residential area at Butte Rd.
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)		Fair - minimal footprint
	Consistent with local plans (qualitative)	No	Yes
	Consistent with ACP (qualitative)	No	Yes
	Support economic development (qualitative)	No	Yes
Cost			
• Segment Conceptual Cost	Cost or Range of Cost (U.S. Dollars)		$5 M
Assessment			
Result		**Carry forward**	**Recommended**
Comments			

Disclaimer: The most reasonable design options were included in each alternative for Level 3 segment evaluation. A future NEPA team may reevaluate design options at individual locations.

Table 15

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Loveland Urban Segment
Level 3 Evaluation Table - Alternatives

Concepts for **Loveland Urban: Morning Drive to N Garfield Ave**

Criteria	Performance Measure (measurement)	No Action	Alternative 1 4-lane roadway cross section with intersections Figure 2
Safety			
· Reduce crashes · Reduce crash severity · Enhance pedestrian/bike safety · Improve roadway geometry	Vehicle/vehicle conflict points (change)	Neutral	Neutral
	Vehicle/pedestrian-bicycle conflict points (change)	Neutral	Increase (more aux lanes = more crossing distance/conflicts and exposure
	Projected total number of crashes (change)	Neutral	Neutral (less congestion, more traffic)
	Projected number of injury and/or fatal crashes (change)	Neutral	Neutral (less congestion, more traffic)
Travel Demand			
• Reduce congestion • Serve demand • Improve operations to adjacent and parallel routes	Change in vehicle miles traveled (qualitative)	No change	No change
	Overall level of service (LOS) (change)	No change	Improves from B/F to B/C
	Vehicle hours of delay (VHD) (hours)	No change	No change
	Effect on parallel roads (ADT)	Neutral	Neutral
Reliability			
• Improve travel reliability • Provide emergency access for adjacent communities • Quality of traffic operations	Travel time index (ratio)	No change	No change
	Travel time by segment (% change of minutes)	No change	No change
Mobility			
• Provide Local and Regional Route Connectivity • Accommodate future transit service • Enhance Non-Motorized Opportunities • Improve bicycle connectivity • Accommodate bicycle and pedestrian travel	Access to transit facilities (qualitative)	N/C	Worsens (more aux lanes = more crossing distance/conflicts/exposure to get to transit located to the east)
	Accommodate future transit service and facilitates (qualitative)	N/A	N/A (No planned transit service or facilities in segment)
	Reduce barriers for N/S pedestrian and bicycle travel (qualitative)	N/C	No (more aux lanes and more left-turn movements)
	Improve continuity for E/W bicycle and pedestrian travel (qualitative)	N/C	No (increase vehicular right-in and left-in movements)
	Accommodate planned regional non-motorized corridors (qualitative)	N/A	N/A (No Regional Non-Motorized Corridors (RNMC) adjacent or across US 34 in this segment. Yet consideration should be given to Segment of 3-A of RNMC #3 that parallels US 34 to the south)
Freight			
• Accommodate truck requirements	Minimize turning restrictions and/or out-of-direction travel (Y/N)	No change	Good
	Geometry accommodates truck turning movements (Y/N)	No change	Good
Environmental			
• Relative rating of environmental effects • Identification of environmental effects	Relative environmental effects (Good, Fair, Poor)	Fair - increase in noise	Fair - 2 potential cultural resource sites (Big Barnes Ditch, State of Liberty Sculpture) - 1 trail crossing under US 34 - 3 stream and/or water body crossings - 2 potential noise analysis areas in area near Wilson Ave. and Taft Ave. (residential area with 1 church)
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)	Not Applicable	Poor - developed urban area, ROW impacts
	Consistent with local plans (qualitative)	No	Mixed Yes = Land Use No = Does not implement City of Loveland Bicycle and Pedestrian Plan (, future bike lanes from Namaqua to Garfield)
	Consistent with ACP (qualitative)	No	Yes
	Support economic development (qualitative)	No	Yes
Cost			
• Segment Conceptual Cost	Cost or Range of Cost (U.S. Dollars)		Undefined
Assessment			
Result		**Carry forward**	**Recommended**
Comments			

Disclaimer: The most reasonable design options were included in each alternative for Level 3 segment evaluation. A future NEPA team may reevaluate design options at individual locations.

Table 15

Loveland 6-Lane Segment
Level 3 Evaluation Table - Alternatives

Concepts for **Loveland 6-Lane**: N Garfield Ave to Rocky Mountain Ave

Criteria	Performance Measure (measurement)	No Action	Alternative 1 6-lane roadway cross section with intersections Figure 3
Safety			
· Reduce crashes	Vehicle/vehicle conflict points (change)	Neutral	Neutral
· Reduce crash severity	Vehicle/pedestrian-bicycle conflict points (change)	Neutral	Increase (Aux lanes increase exposure and conflict points)
· Enhance pedestrian/bike safety	Projected total number of crashes (change)	Not Applicable	Neutral (less congestion, more traffic)
· Improve roadway geometry	Projected number of injury and/or fatal crashes (change)	Not Applicable	Neutral (less congestion, more traffic)
Travel Demand			
• Reduce congestion • Serve demand • Improve operations to adjacent and parallel routes	Change in vehicle miles traveled (qualitative)	No change	No change
	Overall level of service (LOS) (change)	No change	No change
	Vehicle hours of delay (VHD) (hours)	No change	Improves by 5%
	Effect on parallel roads (ADT)	Neutral	Neutral
Reliability			
• Improve travel reliability • Provide emergency access for adjacent communities • Quality of traffic operations	Travel time index (ratio)	No change	Improves by 9%
	Travel time by segment (% change of minutes)	No change	Improves by 9%
Mobility			
• Provide Local and Regional Route Connectivity • Accommodate future transit service • Enhance Non-Motorized Opportunities • Improve bicycle connectivity • Accommodate bicycle and pedestrian travel	Access to transit facilities (qualitative)	No change	Worsens (more lanes = more crossing distance. Options make it more difficult for bikes/peds to travel. Areas is important access node)
	Accommodate future transit service and facilitates (qualitative)	N/A	Fair (Improvements do not preclude future transit service, yet does not implement transit service in alternative NFRMPO Regional Transit Corridors #5, #8, #9)
	Reduce barriers for N/S pedestrian and bicycle travel (qualitative)	No change	No (Add aux lanes at intersection, increases the crossing distance and options make it harder for bikes and peds to navigate)
	Improve continuity for E/W bicycle and pedestrian travel (qualitative)	No change	No (Intersection options make it harder for bike-ped travel)
	Accommodate planned regional non-motorized corridors (qualitative)	Poor	Poor (Alternative does not implement RNMC #11 segment 11-A, (planned enhance bike lanes from RNMC #7 (east of Boise Ave.) to I-25
Freight			
• Accommodate truck requirements	Minimize turning restrictions and/or out-of-direction travel (Y/N)	No change	Yes
	Geometry accommodates truck turning movements (Y/N)	No change	Yes
Environmental			
• Relative rating of environmental effects • Identification of environmental effects	Relative environmental effects (Good, Fair, Poor)	Fair Increase in noise	Fair Option 1 and 3: - 1 cultural resources site (Columbine Cabin Court, 5LR.9881) - 4 stream and/or water body crossings - 1 noise analysis area in residential area between Monroe Ave. and Lincoln Ave. (includes 2 churches, residences, hotel, music school) caused by new additional lane Option 2: - Same as Option 1 plus potential noise impacts caused by introduction of new traffic patterns for indirect lefts
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)	Good	Poor - Cleveland/Lincoln to Monroe
	Consistent with local plans (qualitative)	No	Mixed Yes = Land Use No = Alternative does not include Loveland's Bicycle and Pedestrian Plan future planned bike lanes on US 34 from Garfield to Madison and Future Planned Enhanced bike lanes from Madison to east of I-25.
	Consistent with ACP (qualitative)	No	Yes
	Support economic development (qualitative)	No	Neutral
Cost			
• Segment Conceptual Cost	Cost or Range of Cost (U.S. Dollars)		Loveland's budget numbers
Assessment			
Result		**Carry forward**	**Recommended**
Comments			

Disclaimer: The most reasonable design options were included in each alternative for Level 3 segment evaluation. A future NEPA team may reevaluate design options at individual locations.

Table 15

COLORADO Department of Transportation

Johnstown-Greeley Segment
Level 3 Evaluation Table - Alternatives

Concepts for **Johnstown-Greeley**: Centerra/Thompson Pkwy to East of Hwy 257

Criteria	Performance Measure (measurement)	No Action	Alternative 1 4-lane roadway cross section with interchanges Figure 4	Alternative 2 6-lane roadway cross section with interchanges Figure 5
Safety				
· Reduce crashes	Vehicle/vehicle conflict points (change)	Neutral	Decrease	Decrease
· Reduce crash severity	Vehicle/pedestrian-bicycle conflict points (change)	Neutral	Neutral (Controlled movements, yet more locations)	Neutral (Controlled movements, yet increased exposure distance and locations)
· Enhance pedestrian/bike safety	Projected total number of crashes (change)	Neutral	Decrease	Decrease
· Improve roadway geometry	Projected number of injury and/or fatal crashes (change)	Neutral	Decrease	Decrease
Travel Demand				
• Reduce congestion • Serve demand • Improve operations to adjacent and parallel routes	Change in vehicle miles traveled (qualitative)	No Change	No Change	No change
	Overall level of service (LOS) (change)	No Change	Improves from LOS F/F to C/D	Improves from LOS F/F to B/C
	Vehicle hours of delay (VHD) (hours)	No Change	Improves	Improves
	Effect on parallel roads (ADT)	Neutral	Neutral	Improves
Reliability				
• Improve travel reliability • Provide emergency access for adjacent communities • Quality of traffic operations	Travel time index (ratio)	No Change	Improves by 60%	Improves by 61%
	Travel time by segment (% change of minutes)	No Change	Improves by 64%	Improves by 65%
Mobility				
• Provide Local and Regional Route Connectivity • Accommodate future transit service • Enhance Non-Motorized Opportunities • Improve bicycle connectivity • Accommodate bicycle and pedestrian travel	Access to transit facilities (qualitative)	No Change Current transit facilities in segment: Park-n-Ride east of I-25 and bus stop on shops	Improves (access to facilities on the west is improved)	Improves (controlled movement facilitate access to facilities on the West)
	Accommodate future transit service and facilitates (qualitative)	Fair (no improvements to better accommodate future transit)	Fair (accommodates future regional transit service along US 34, yet might have some impacts on planned Village Center on US 34 and WCR 13, located as to support the servicing by future regional transit system)	Fair (accommodates future regional transit service along US 34, yet might have some impacts on planned Village Center on US 34 and WCR 13, located as to support the servicing by future regional transit system)
	Reduce barriers for N/S pedestrian and bicycle travel (qualitative)	No Change	No (interchanges would increase crossing distance/N/S barriers)	No (increased crossing distance and exposure by interchanges and number of lanes)
	Improve continuity for E/W bicycle and pedestrian travel (qualitative)	No Change	No (increased crossing distance and crossing points because of interchanges)	No (increased crossing distance and crossing points because of interchanges)
	Accommodate planned regional non-motorized corridors (qualitative)	Fair (no improves do not preclude, yet do not implement RNMC #11 along US 34 and grade separated crossing of RNMC #4 and #9)	Fair (Interchanges at LCR 3E and LCR 3 could have minor impacts on RNMC 11 segment 11-B (bike lanes from I-25 to LCR 3)	Fair (Interchanges at LCR 3E and LCR 3 could have minor impacts on RNMC 11 segment 11-B (bike lanes from I-25 to LCR 3)
Freight				
• Accommodate truck requirements	Minimize turning restrictions and/or out-of-direction travel (Y/N)	No Change	Yes	Yes
	Geometry accommodates truck turning movements (Y/N)	No Change	Yes	Yes
Environmental				
• Relative rating of environmental effects • Identification of environmental effects	Relative environmental effects (Good, Fair, Poor)	Fair Increase in noise	Poor - 7 streams and/or water body crossings - 2 noise analysis areas (hospital at LCR 3E, residential area south of US 34 at WCR 15) LCR 3 and 3E: Option 2: - 1 cultural resource site (Loveland and Greeley Canal, 5LR.503.2) Option 3: - 5 cultural resource sites (railroad, 5LR.1815.3 and 5LR.1815.12; Lauver Farm, 5LR.11297; Loveland and Greeley Canal, 5LR.503.2; Zeller Farm, 5LR11299) WCR 13: Option 1: - 3 cultural resource sites (Feeder Ditch Oklahoma; Great Western Railroad, 5WL.841; Loveland and Greeley Canal, 5WL.898) Option 2: - Same cultural resource impacts as Option 1 plus one additional crossing of Loveland and Greeley Canal (5WL.898) - 1 potential wetland area - 1 oil/gas well potentially impacted	Poor Same as Alternative 1 plus 2 cultural resource sites (railroad; Zeller Farm, 5LR.11299) may have additional impacts from widening US 34
• Included in community land use and transportation plans	Sufficient ROW to accommodate planned transportation projects, including ACP items (Good, Fair, Poor)	Good	Fair	Fair
	Consistent with local plans (qualitative)	No	No (alternative could impact proposed village center in Johnstown Comprehensive Plan)	Mixed Yes No (Alternative could impact proposed village center in Johnstown Comprehensive Plan)
	Consistent with ACP (qualitative)	No	Yes	Yes
	Support economic development (qualitative)	No	Yes	Yes
Cost				
• Segment Conceptual Cost (2017 $)	Cost or Range of Cost (U.S. Dollars)		$280 M - $300 M	$310 M - $320 M
Assessment				
Result		**Carry forward**	**Feasible, but not recommended**	**Recommended**
Comments			Although not recommended for inclusion in the long-term Recommended Alternative, these improvements are lower-cost and would support a phased approach to achieving the Recommended Alternative (see Section 6.0).	This option was selected because it better accommodates incident management, provides flexibility to accommodate unforeseen growth and is more resilient. This option eliminates a transition that reduces traffic conflicts, providing consistency with the 6-lane highway section near I-25, and better connect with the I 25 Interchange Project and US 34/US 85 Project (separate studies). This option also does not impact ROW, provides more flexibility for a relatively similar costs, and better accommodates express lanes, BRT options, an/or future emerging technologies.

Disclaimer: The most reasonable design options were included in each alternative for Level 3 segment evaluation. A future NEPA team may reevaluate design options at individual locations.

Table 15

COLORADO
Department of Transportation

Greeley Expressway Segment
Level 3 Evaluation Table - Alternatives

Concepts for **Greeley Expressway**: East of Hwy 257 to West of 11th Ave

Criteria	Performance Measure (measurement)	No Action	Alternative 1 4-lane roadway cross section with interchanges Figure 6	Alternative 2 6-lane roadway cross section with interchanges Figure 7
Safety				
· Reduce crashes · Reduce crash severity · Enhance pedestrian/bike safety · Improve roadway geometry	Vehicle/vehicle conflict points (change)	Neutral	Decrease	Decrease
	Vehicle/pedestrian-bicycle conflict points (change)	Neutral	Increase (interchanges add conflict points and exposure)	Increase (interchanges + additional lanes add conflict points and exposure)
	Projected total number of crashes (change)	Neutral	Decrease	Decrease
	Projected number of injury and/or fatal crashes (change)	Neutral	Decrease	Decrease
Travel Demand				
• Reduce congestion • Serve demand • Improve operations to adjacent and parallel routes	Change in vehicle miles traveled (qualitative)	No Change	No Change	No Change
	Overall level of service (LOS) (change)	No Change	Improves F/F to C/C	Improves from LOS F/F to B/B
	Vehicle hours of delay (VHD) (hours)	No Change	Improves	Improves
	Effect on parallel roads (ADT)	Neutral	Neutral	Improves
Reliability				
• Improve travel reliability • Provide emergency access for adjacent communities • Quality of traffic operations	Travel time index (ratio)	No Change	Improves by 39%	Improves by 39%
	Travel time by segment (% change of minutes)	No Change	Improves by 49%	Improves by 49%
Mobility				
• Provide Local and Regional Route Connectivity • Accommodate future transit service • Enhance Non-Motorized Opportunities • Improve bicycle connectivity • Accommodate bicycle and pedestrian travel	Access to transit facilities (qualitative)	No Change	Worsens (interchanges increase crossing distance. Channelized T reduces the number of N/S crossing points at in important transit node (Greeley Mall Transit Center) while prioritizing E/W traffic that is always moving)	Worsens (additional lanes and interchanges increase crossing distance. Channelized T reduces the number of N/S crossing points at in important transit node (Greeley Mall Transit Center) while prioritizing E/W traffic that is always moving)
	Accommodate future transit service and facilitates (qualitative)	Fair (alternative does not preclude transit service and facilities, yet does not provide flexibility for future transit service)	Fair (alternative does not preclude transit service and facilities, yet interchanges might make it more difficult for transit stops and bike/ped crossings)	Fair (alternative does not preclude transit service and facilities. Additional lanes provide flexibility for better transit travel time, yet interchanges make it more difficult for stops that are close together and for bike-ped crossings)
	Reduce barriers for N/S pedestrian and bicycle travel (qualitative)	No Change	No (interchanges increase crossing distance. 3/4 movements restrict N/S movement. Channelized T reduce the number of N/S crossing points at in important transit node (Greeley Mall Transit Center) while prioritizing E/W traffic that is always moving)	No (6 lanes increase and interchanges N/S crossing distance. 3/4 movements restrict N/S movement. Channelized T reduce the number of N/S crossing points at in important transit node (Greeley Mall Transit Center) while prioritizing E/W traffic that is always moving)
	Improve continuity for E/W bicycle and pedestrian travel (qualitative)	No Change	No (interchanges increase E/W barriers and distance to be crossed by bikes/peds)	No (interchanges increase E/W barriers and distance to be crossed by bikes/peds and aux lanes increase right-in turn movements)
	Accommodate planned regional non-motorized corridors (qualitative)	Poor (no accommodation of proposed RNMCs)	Good (accommodates future and existing segments of RNMC #11 and intersection of RNMC #10)	Fair (additional lanes could have minor impacts on accommodating future segments of RNMC 11 (side path/bike lanes or bike route) east of 35th due to space)
Freight				
• Accommodate truck requirements	Minimize turning restrictions and/or out-of-direction travel (Y/N)	No Change	Good	Good
	Geometry accommodates truck turning movements (Y/N)	No Change	Good	Good
Environmental				
• Relative rating of environmental effects • Identification of environmental effects	Relative environmental effects (Good, Fair, Poor)	Fair Increase in noise	Poor - 1 100-year floodplain encroachment - 16 stream and/or water body crossings - 1 hazardous materials site - 7 noise analysis areas (residential areas NE of 83rd and US 34, between 71st and 47th on both sides of US 34, between 23rd and 35th on both sides of US 34, and between 23rd and 11th on both sides of US 34) - 4 water wells potentially impacted at 83rd - 2 trail crossings - 1 park/recreational site - 1 potential wetland area - 1 cultural resource site (Greeley Canal, 5WL.898) at 3 different locations because of new interchanges	Poor Same as Alternative 1 plus - 1 cultural resource site (Loveland and Greeley Canal, 5WL.898) may have additional impacts from widening of US 34
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)	Good	Fair	Fair
	Consistent with local plans (qualitative)	No (Limits N/S bike/ped movements at 95th and 71st where bicycle facilities are planned. Also grade separated crossing at 17th Ave is not included	Mixed Yes No (Limits N/S bike/ped movements at 95th and 71st where bicycle facilities are planned. Also grade separated crossing at 17th Ave is not included"	Mixed Yes No (Limits N/S bike/ped movements at 95th and 71st where bicycle facilities are planned. Also grade separated crossing at 17th Ave is not included"
	Consistent with ACP (qualitative)	No	Yes	Yes
	Support economic development (qualitative)	No	Neutral	Neutral
Cost				
• Segment Conceptual Cost (2017 $)	Cost or Range of Cost (U.S. Dollars)		$175 M - $185 M	$210 M - $220M
Assessment				
Result		**Carry forward**	**Feasible but not recommended**	**Recommended**
Comments			Although not recommended for inclusion in the long-term Recommended Alternative, these improvements are lower-cost and would support a phased approach to achieving the Recommended Alternative (see Section 6.0).	This option was selected because it better accommodates incident management, provides flexibility to accommodate unforeseen growth and is more resilient. This option eliminates a transition that reduces traffic conflicts, providing consistency with the 6-lane highway section near I-25, and better connect with the I 25 Interchange Project and US 34/US 85 Project (separate studies). This option also does not impact ROW, provides more flexibility for a relatively similar costs, and better accommodates express lanes, BRT options, an/or future emerging technologies.

Disclaimer: The most reasonable design options were included in each alternative for Level 3 segment evaluation. A future NEPA team may reevaluate design options at individual locations.

Table 15

COLORADO
Department of Transportation

East End Segment
Level 3 Evaluation Table - Alternatives

Concepts for **East End**: 1st Ave to Weld County Road 49 (WCR 49)

Criteria	Performance Measure (measurement)	No Action	Alternative 1 4-lane roadway cross section with intersections Figure 8
Safety			
· Reduce crashes	Vehicle/vehicle conflict points (change)	Neutral	Decreases - Access mgmt reduces conflicts
· Reduce crash severity	Vehicle/pedestrian-bicycle conflict points (change)	Neutral	Decreases (limits turn movements)
· Enhance pedestrian/bike safety	Projected total number of crashes (change)	Neutral	Decreases - Access mgmt reduces conflicts
· Improve roadway geometry	Projected number of injury and/or fatal crashes (change)	Neutral	Decreases - Access mgmt reduces conflicts
Travel Demand			
• Reduce congestion • Serve demand • Improve operations to adjacent and parallel routes	Change in vehicle miles traveled (qualitative)	No change	Increase
	Overall level of service (LOS) (change)	No change	No change
	Vehicle hours of delay (VHD) (hours)	No change	No change
	Effect on parallel roads (ADT)	Neutral	Neutral
Reliability			
• Improve travel reliability • Provide emergency access for adjacent communities • Quality of traffic operations	Travel time index (ratio)	No change	No change
	Travel time by segment (% change of minutes)	No change	No change
Mobility			
• Provide Local and Regional Route Connectivity • Accommodate future transit service • Enhance Non-Motorized Opportunities • Improve bicycle connectivity • Accommodate bicycle and pedestrian travel	Access to transit facilities (qualitative)	No Change	No change (no transit facilities in this segment)
	Accommodate future transit service and facilitates (qualitative)	No Change	N/A (alternative does not impact proposed transit service or facilities. Yet, 3/4 movements limit access to proposed NFRMPO Regional Transit Corridor and I-25 EIS proposed transit center that would be located towards the west)
	Reduce barriers for N/S pedestrian and bicycle travel (qualitative)	No Change	No (3/4 movements restrict N/S movement)
	Improve continuity for E/W bicycle and pedestrian travel (qualitative)		Yes (limits/controls movements)
	Accommodate planned regional non-motorized corridors (qualitative)		Good (accommodates RNMC #1 further consideration should be give to the potential crossing of RNMC #11 with RNMC #1)
Freight			
• Accommodate truck requirements	Minimize turning restrictions and/or out-of-direction travel (Y/N)	No Change	No
	Geometry accommodates truck turning movements (Y/N)	No Change	Yes- truck accommodation included with new construction
Environmental			
• Relative rating of environmental effects • Identification of environmental effects	Relative environmental effects (Good, Fair, Poor)	Fair Increase in noise	Fair - 1 100-year floodplain encroachment - 1 potential wetland area (at floodplain) 6 streams and/or water body crossings
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)	Not applicable	Fair - small corner acquisitions, CR 45 likely would be done via developer dedication
	Consistent with local plans (qualitative)	No	Mixed Yes No(alternative does not preclude, yet does not implement local planned multimodal improvements (side path south of US 34))
	Consistent with ACP (qualitative)	No	Yes
	Support economic development (qualitative)	No	Yes
Cost			
• Segment Conceptual Cost	Cost or Range of Cost (U.S. Dollars)		$3 M
Assessment			
Result		**Carry forward**	**Recommended**
Comments			

Disclaimer: The most reasonable design options were included in each alternative for Level 3 segment evaluation. A future NEPA team may reevaluate design options at individual locations.

9.0 Recommended Alternatives

Comparison of the alternatives against the Level 3 criteria resulted in the identification of a Recommended Alternative with potential design options for each segment. The Recommended Alternative meets the project Purpose and Need and project goals while minimizing environmental and community impacts and setting a vision for the future of US 34.

The following improvements, listed by segment below and illustrated on **Figures 6** through **11**, comprise the Recommended Alternative for the US 34 corridor. These figures also show potential locations of supplemental elements to the Recommended Alternative including potential wildlife crossings, drainage improvements, parking improvements, transit elements, and a park and ride. Although future NEPA studies may re-evaluate design options at individual locations, the most reasonable design options were included in each alternative for Level 3 segment evaluation. A detailed discussion describing how the multimodal facilities included in the supplemental elements would be incorporated into the Recommended Alternative is included in **PEL Section 2.3.1**.

- **Foothills Segment**
  - Alternative 1: 2-Lane Cross Section with Added or Expanded Auxiliary Lanes at Intersections and Modifications to Shoulders
- **Loveland Urban Segment**
  - Alternative 1: 4-Lane Cross Section with Intersections
- **Loveland 6-Lane Segment**
  - Alternative 1: 6-Lane Cross Sections with Intersections
- **Johnstown-Greeley Segment**
  - Alternative 2: 6-Lane Cross Section with Interchanges
- **Greeley Expressway Segment**
  - Alternative 2: 6-Lane Cross Section with Interchanges
- **East End Segment**
  - Alternative 1: 4-Lane Cross Section with Intersections

9.1 Consistency of Segments Adjacent to I-25

The I-25 Interchange Project study area, between and including Rocky Mountain Boulevard and Centerra/Thompson Parkways, was excluded from the US 34 PEL because its ultimate improvements are defined in the I-25 EIS/Record of Decision (ROD) (CDOT, 2011). The improvements include a multi-level directional interchange between US 34 and I-25, with single-point interchanges at both Rocky Mountain Boulevard and Centerra/Thompson Parkways on either side of I-25. An interim phase of these improvements will be constructed in 2018, with the addition of a third lane in each direction of US 34 within ½ to ¾ mile on either side of I-25.

On the west side of I-25 in the Loveland 6-Lane segment, the Recommended Alternative is to complete the construction of six lanes on US 34, which is consistent with both the interim 2018 6-laning project and the ultimate I-25 interchange improvements shown in the I-25 ROD (CDOT, 2011). On the east side of I-25 in the Johnstown-Greeley Expressway segment, the Recommended Alternative is to implement a series of interchanges, which were shown in the access control plan (CDOT, 2003b) and is consistent with the I-25 interchange improvements as shown in the I-25 ROD.

9.2 Consistency of Segments Adjacent to US 34 / US 85 Interchange

The US 34/US 85 project area (which includes 11th Avenue), located between the Greeley Expressway and East End segments, is a complex interchange that is currently under study for preliminary design. It is anticipated that recommendations for long-term improvements and phased implementation of that alternative will be determined in late 2018.

A constraint for the Recommended Alternative in the Greeley Expressway segment is that the generous ROW available east of 23rd Avenue begins to narrow moving eastward on US 34, through 17th Avenue, and on to 11th Avenue. Within the current highway ROW, there is marginal space for six lanes with turning lanes at the 11th Avenue intersection. The Recommended Alternative would accommodate this minimum footprint. There are minimal ROW constraints east of the interchange moving into the East End segment, but there is no identified need to widen US 34 to the east, therefore it is not anticipated that there would be compatibility issues on the east side of the interchange with the Recommended Alternative.

Alternatives Report Attachments

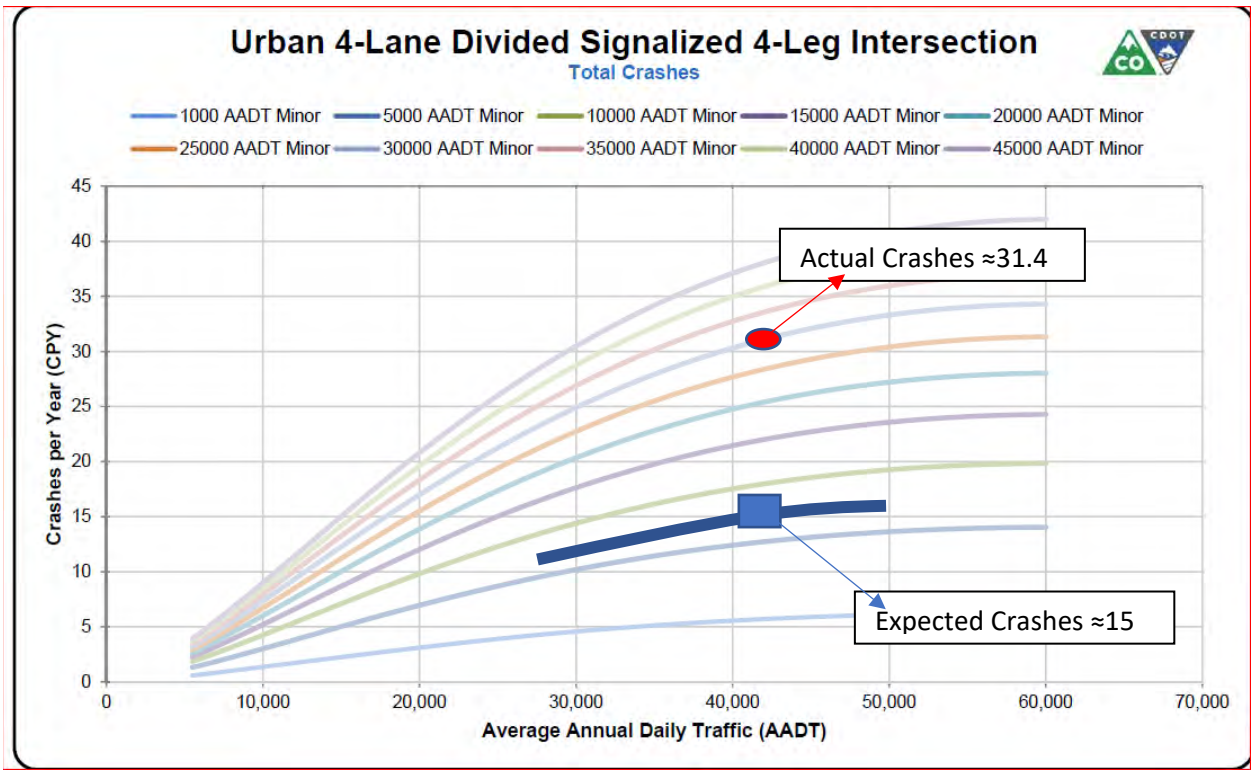
- Attachment 01 - Intersection Crash Analysis
- Attachment 02 - Technology Memorandum
- Attachment 03 - Intersection and Interchanges Cost Summary
- Attachment 04 - Intersection and Interchanges Cost Details

US 34 PEL

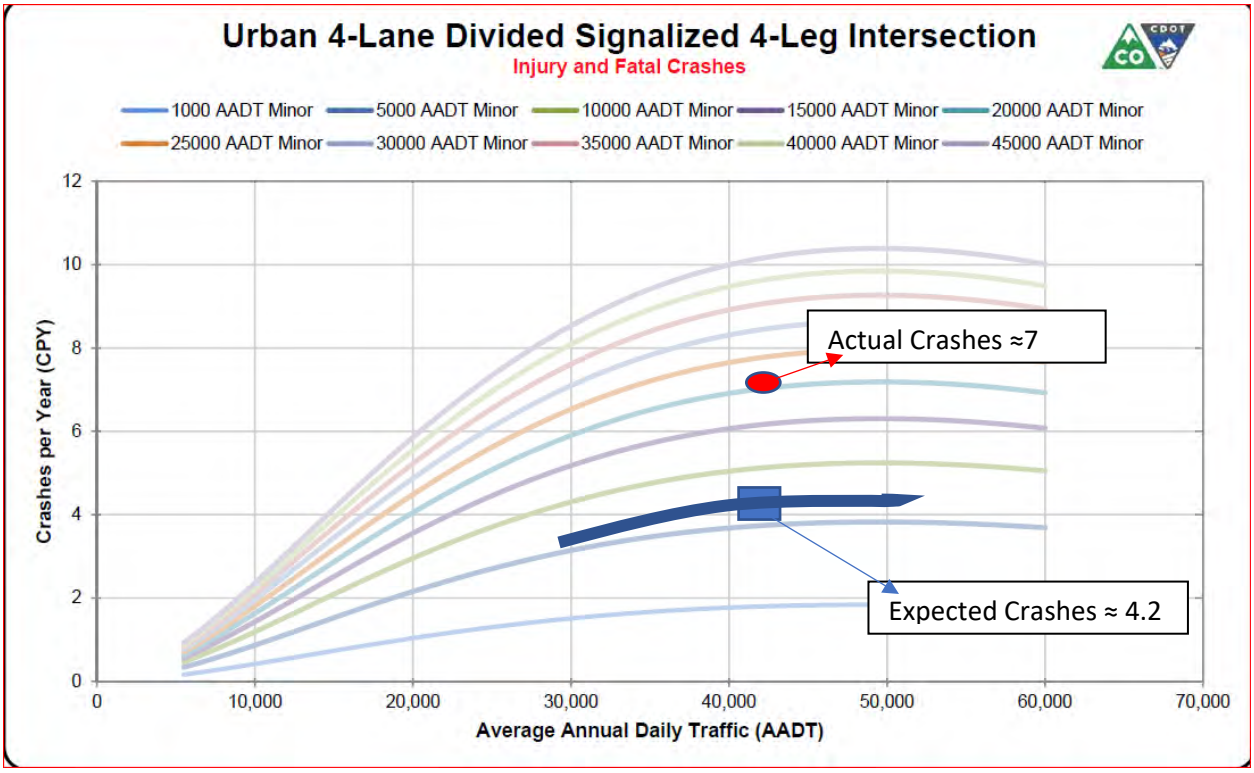
Alternatives Report Attachment 01

Intersection Crash Analysis

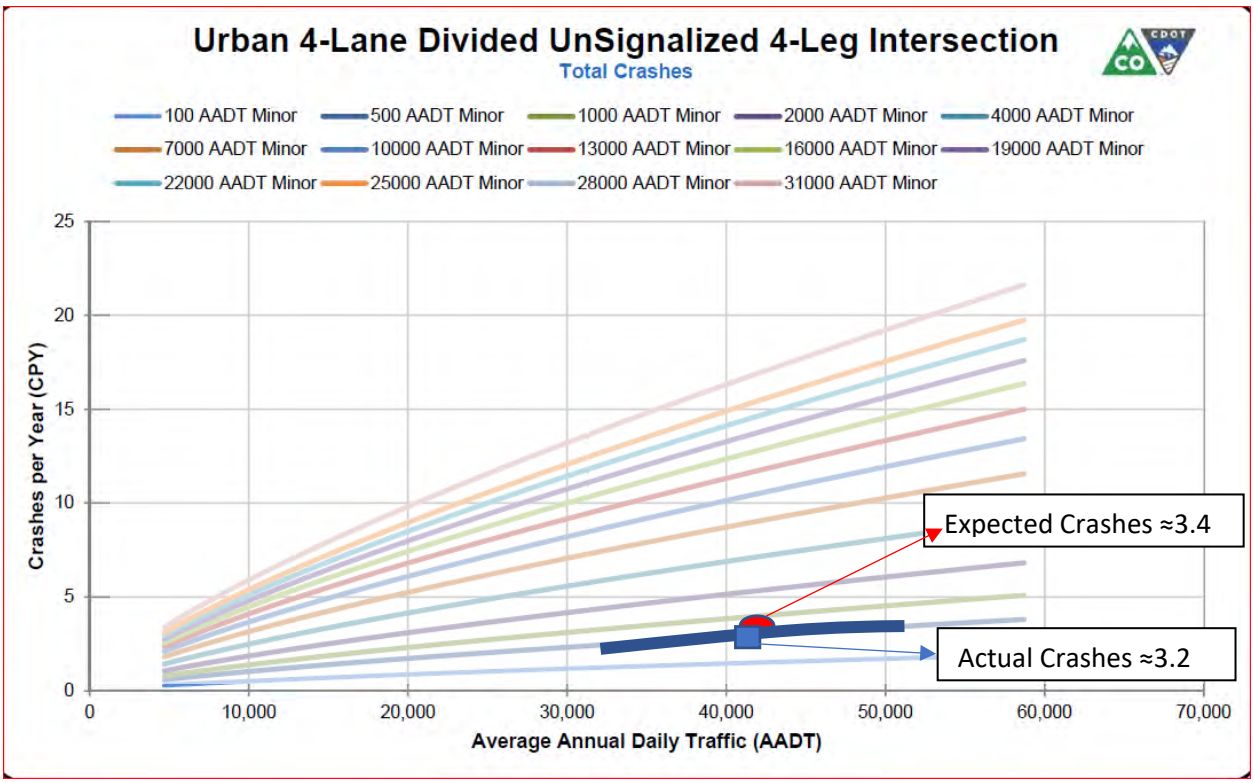
County RD 17 - TOTAL CRASHES (5 year data, January 2011 thru December 2015)



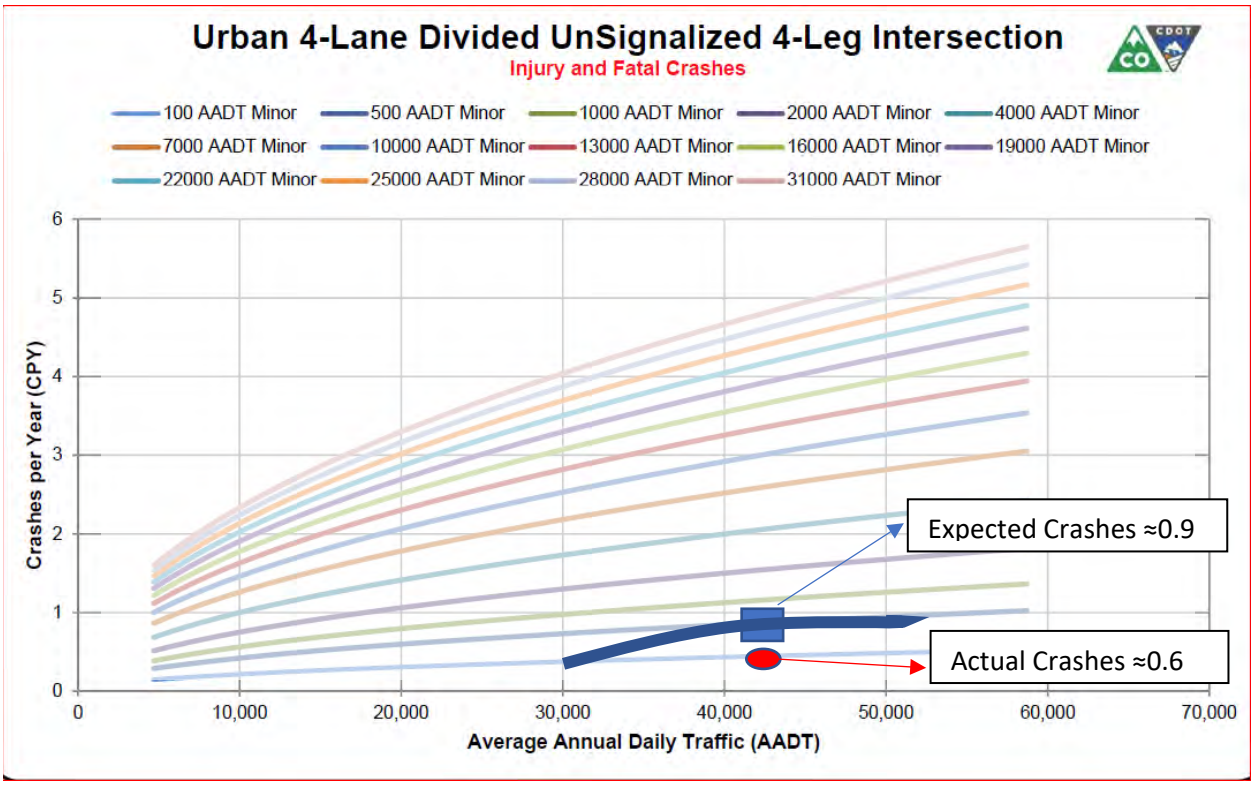
County RD 17- INJURY AND FATAL CRASHES (5 year data, January 2011 thru December 2015)



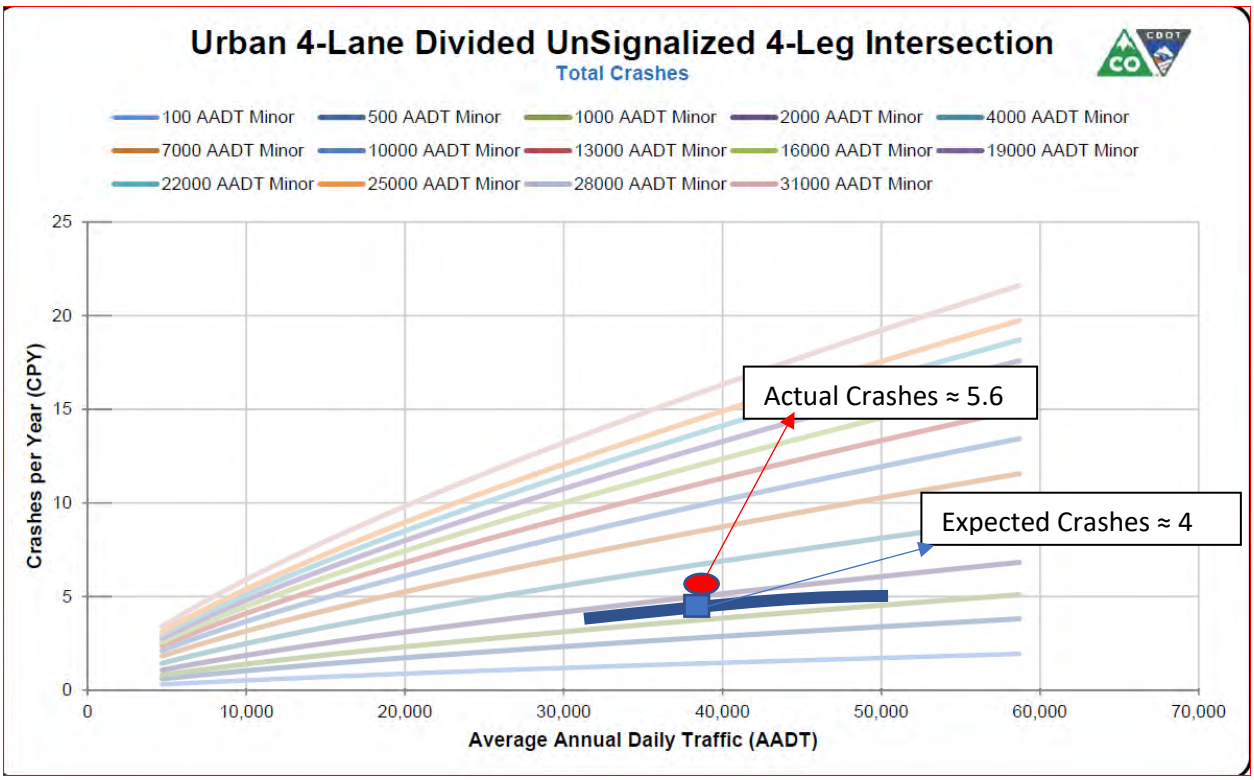
County RD 15- TOTAL CRASHES (5 year data, January 2011 thru December 2015)



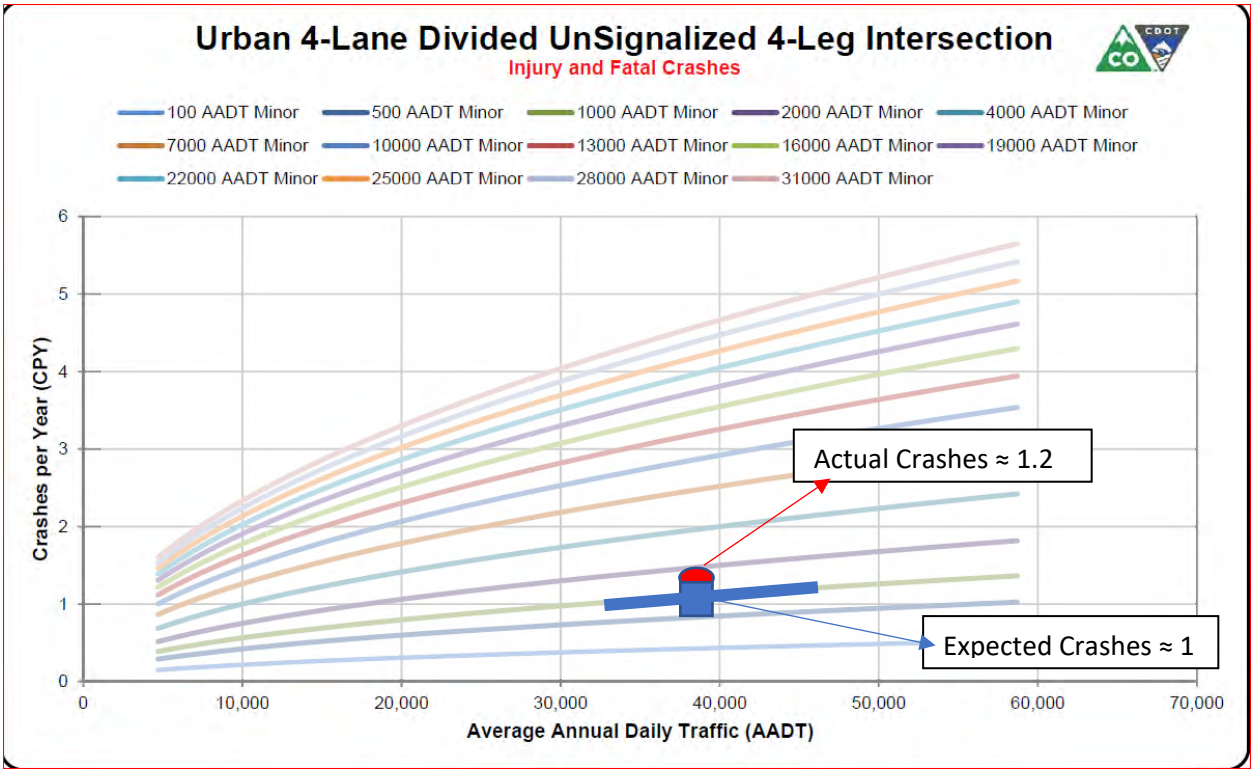
County RD 15 - INJURY AND FATAL CRASHES (5 year data, January 2011 thru December 2015)



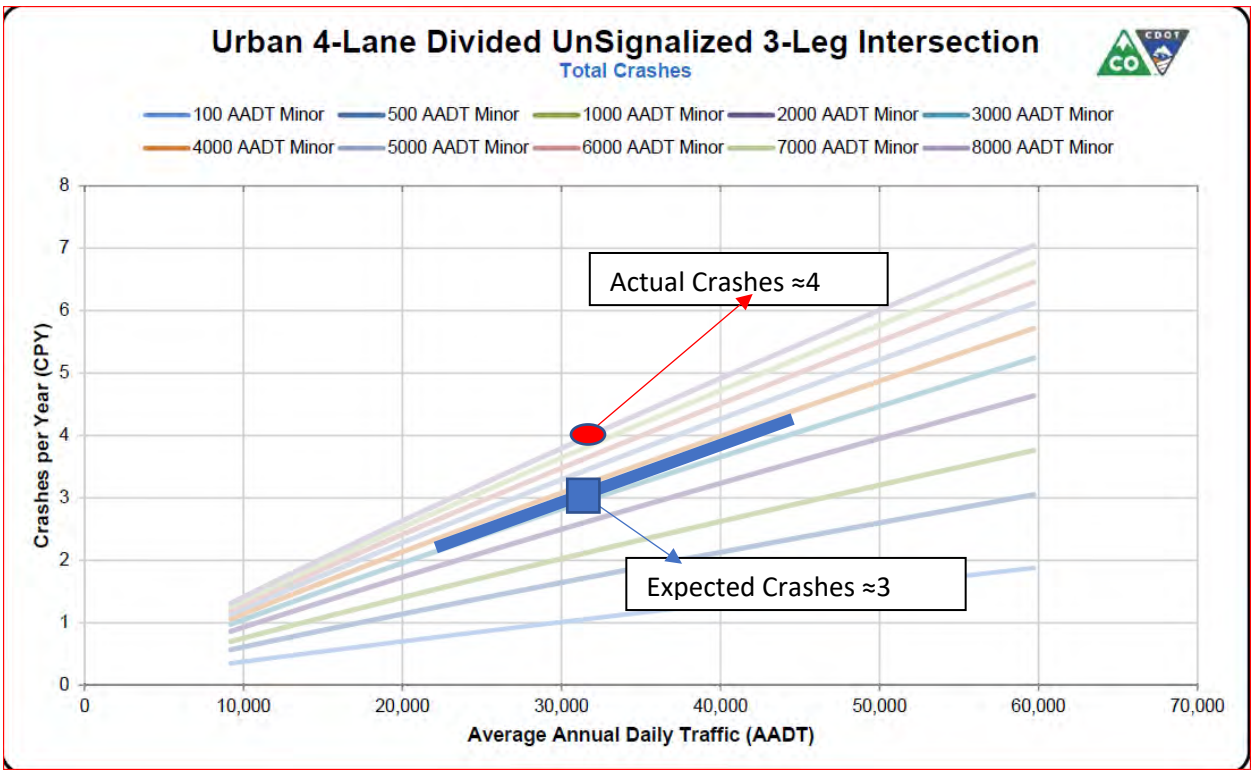
CR 13 - TOTAL CRASHES (5 year data, January 2011 thru December 2015)



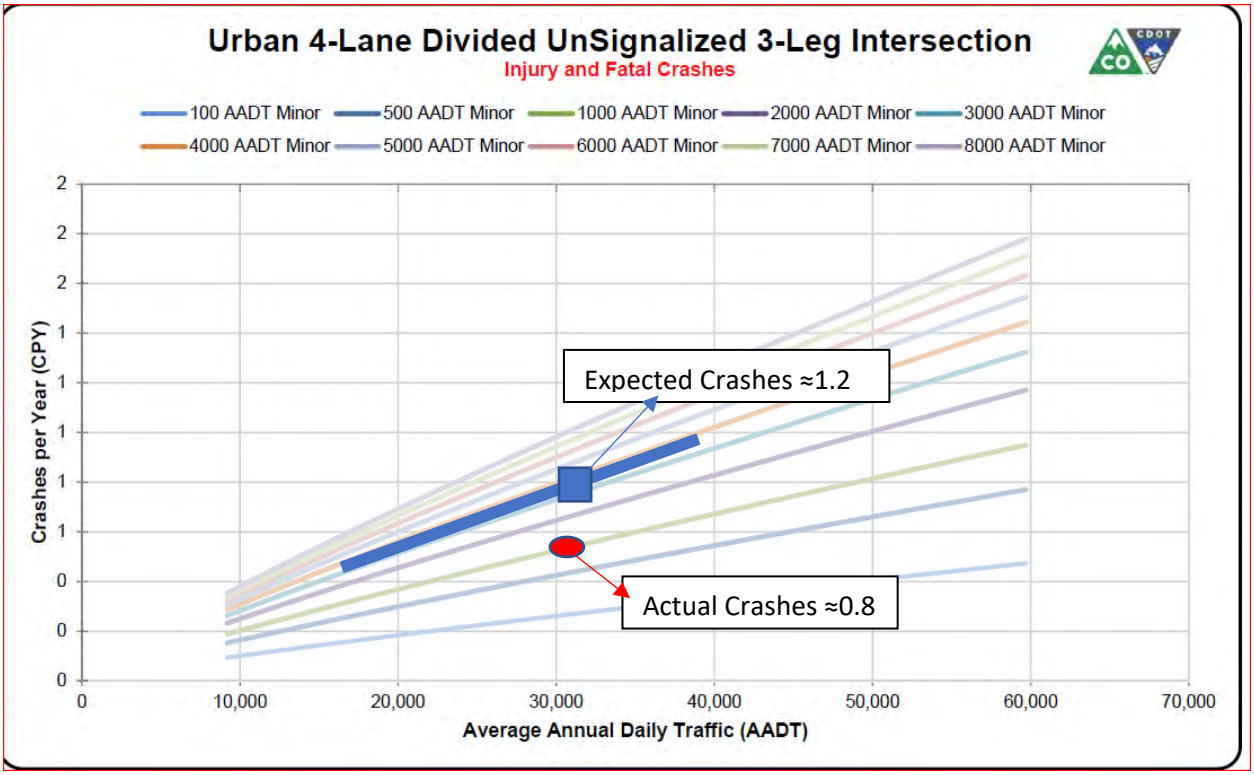
WCR 13 - INJURY AND FATAL CRASHES (5 year data, January 2011 thru December 2015)



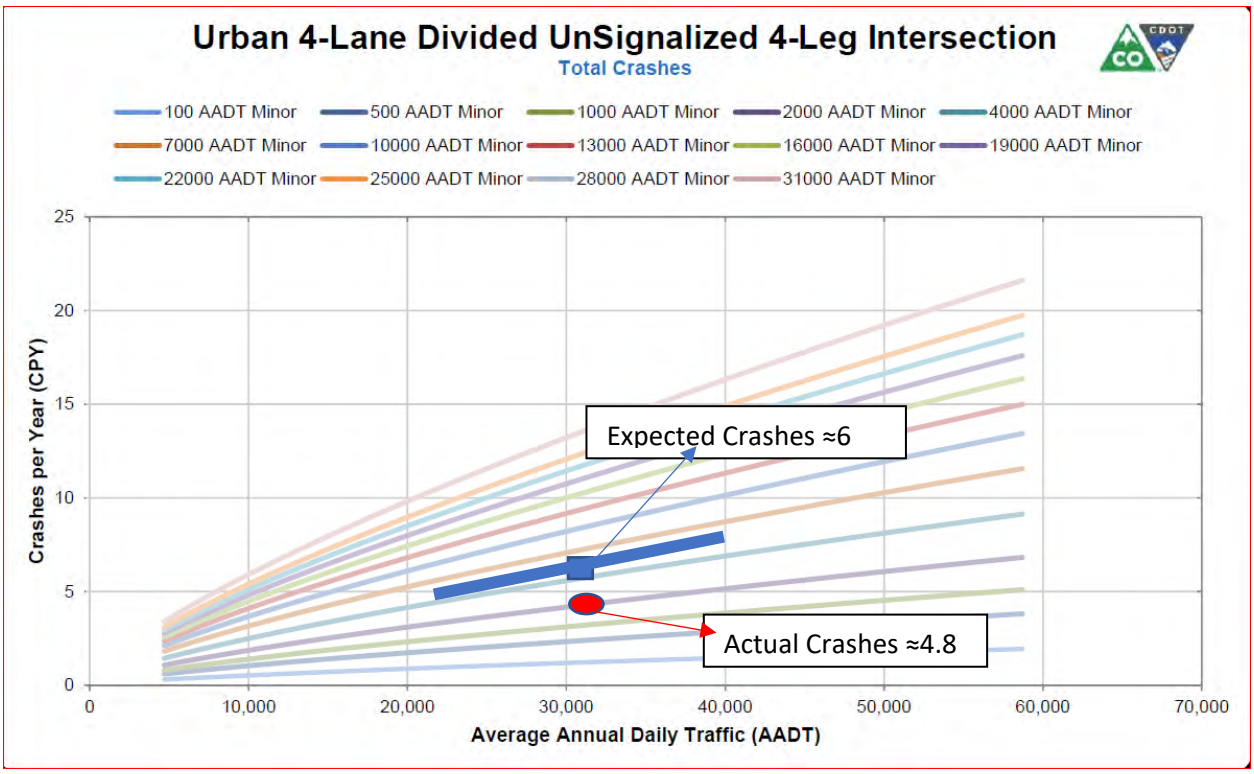
Promontory (#21)- TOTAL CRASHES (5 year data, January 2011 thru December 2015)



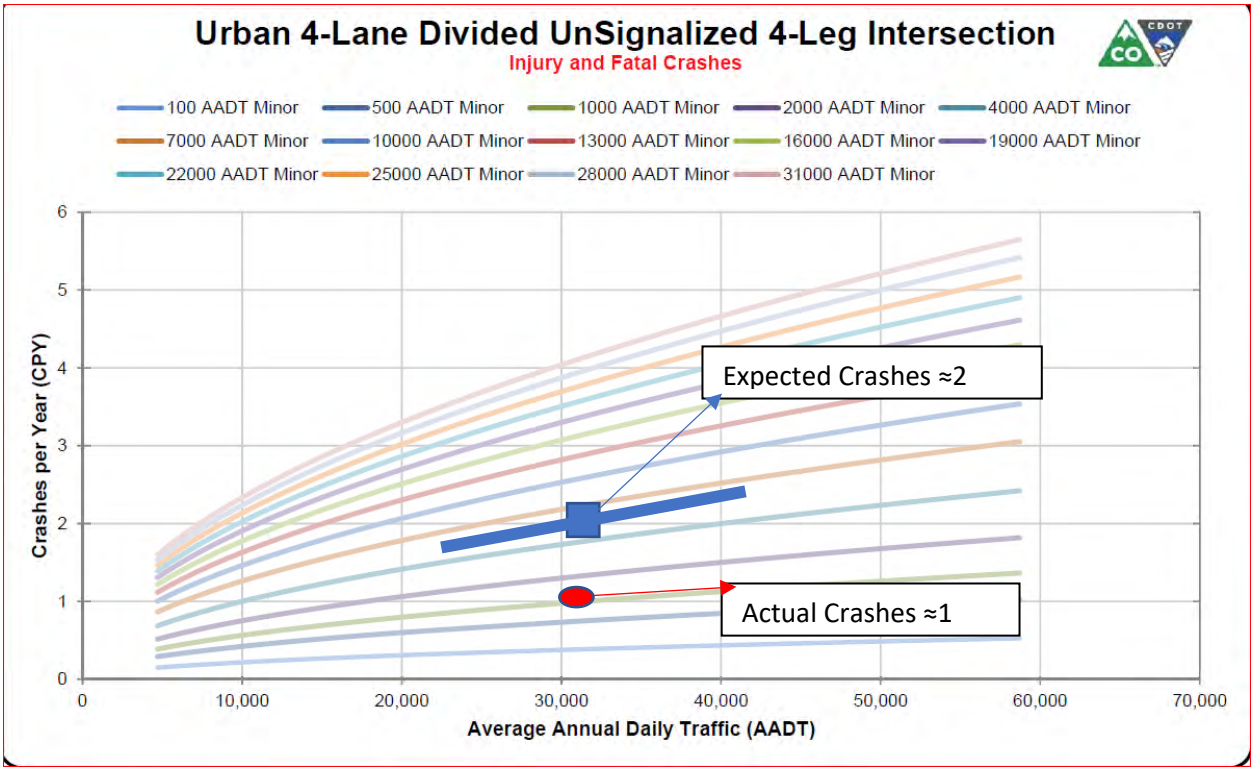
Promontory (#21) INJURY AND FATAL CRASHES (5 year data, January 2011 thru December 2015)



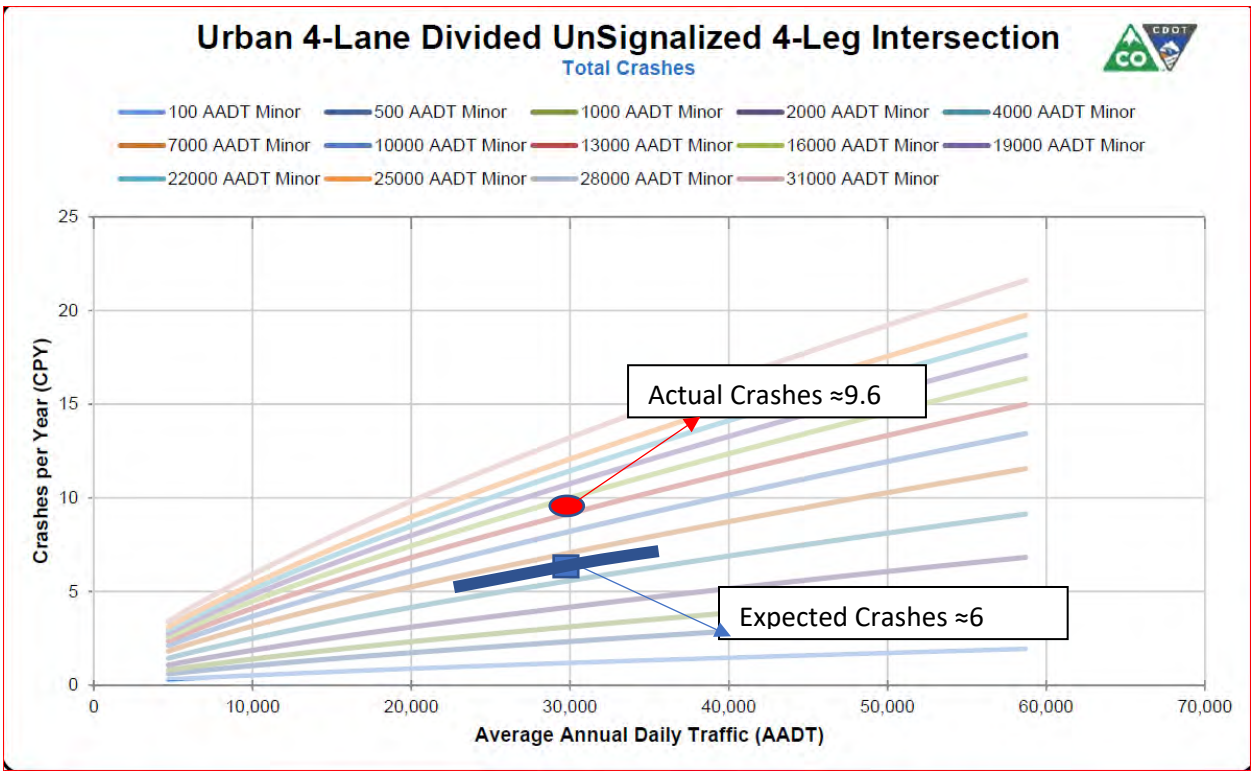
95TH AVE (#22)- TOTAL CRASHES (5 year data, January 2011 thru December 2015)



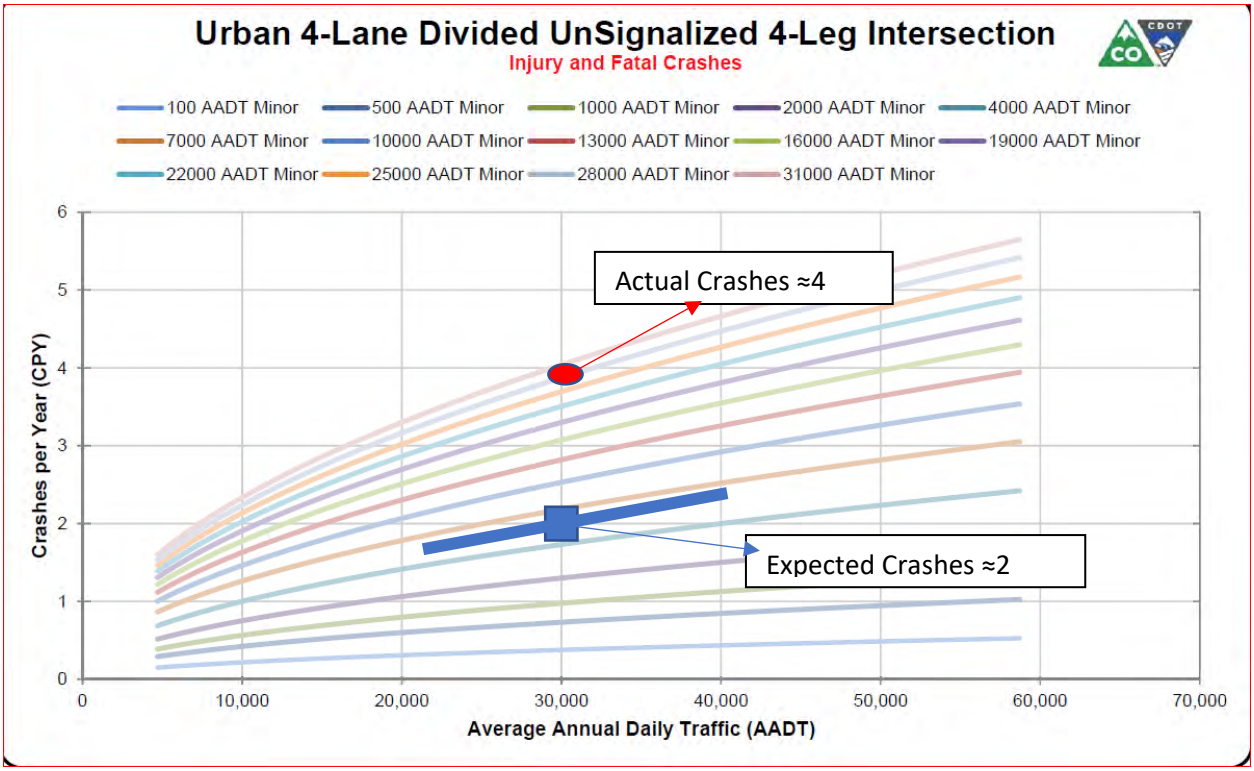
95TH AVE (#22)- INJURY AND FATAL CRASHES (5 year data, January 2011 thru December 2015)



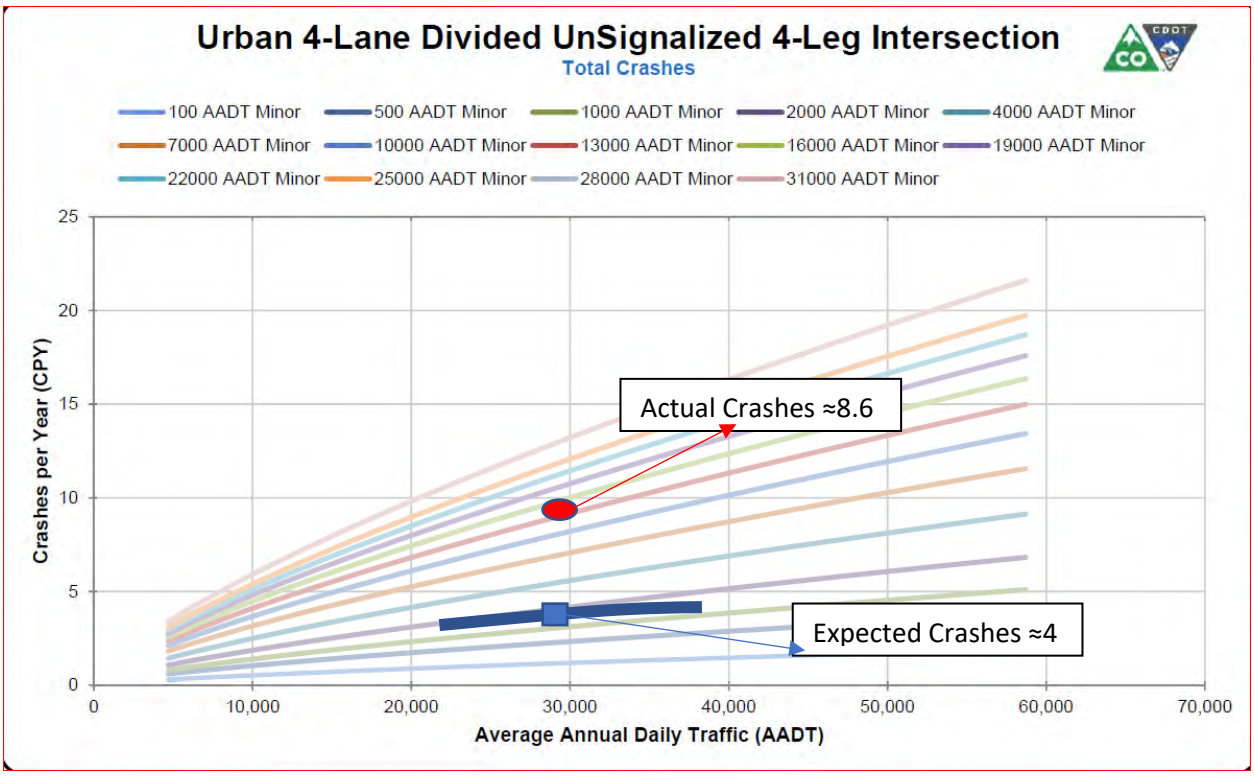
83RD AVE (#23)- TOTAL CRASHES (5 year data, January 2011 thru December 2015)



83RD AVE (#23)- INJURY AND FATAL CRASHES (5 year data, January 2011 thru December 2015)



71ST AVE (#24)- TOTAL CRASHES (5 year data, January 2011 thru December 2015)



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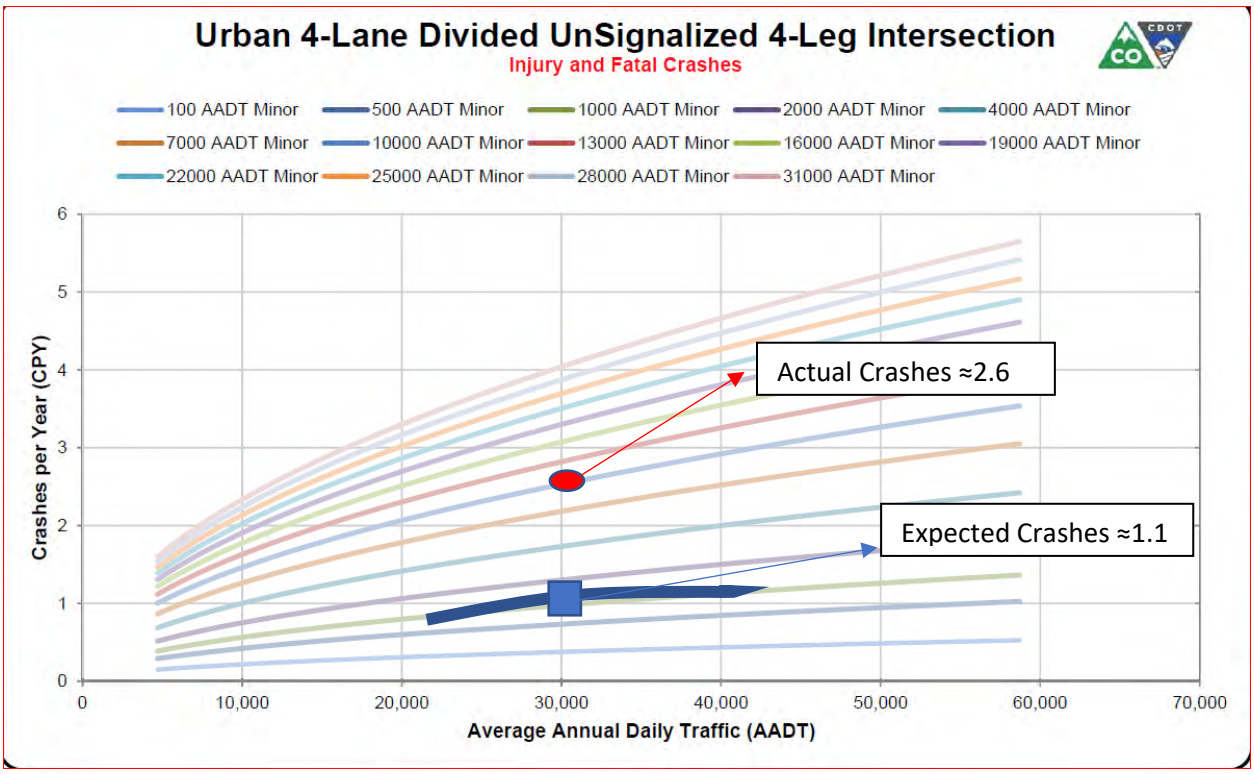

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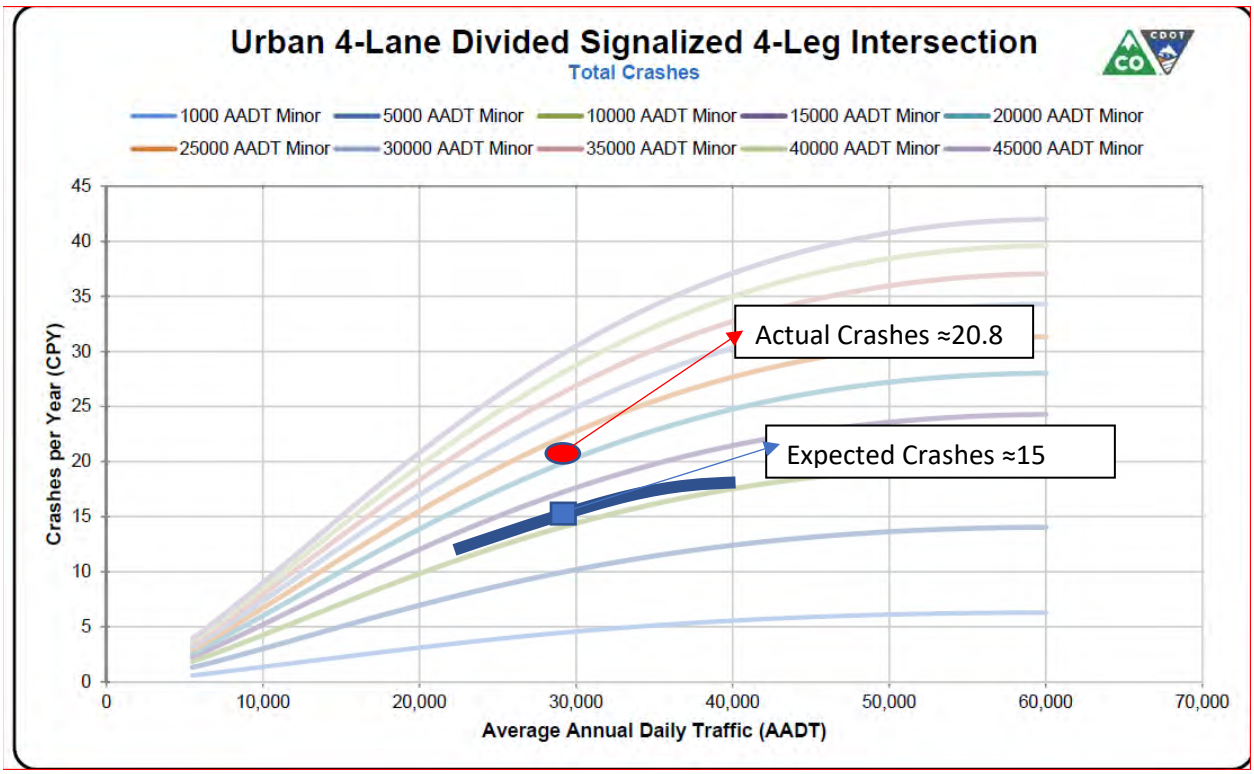

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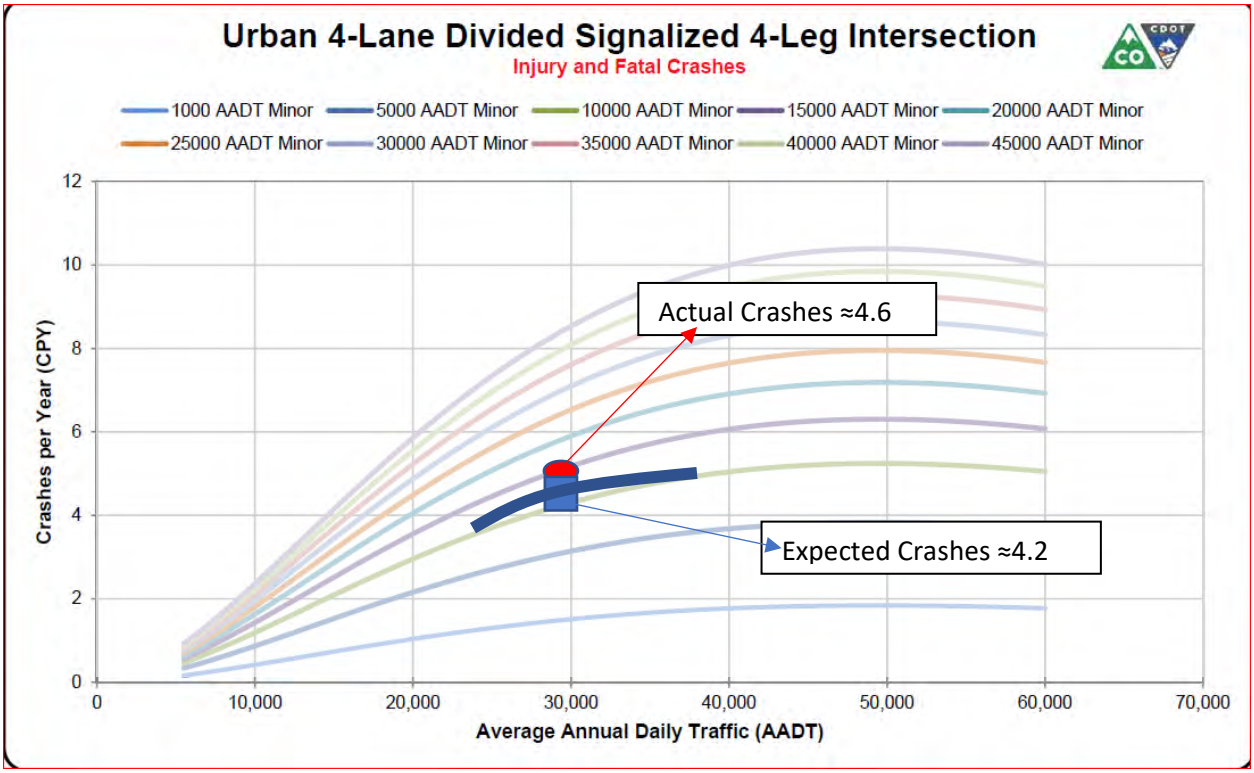

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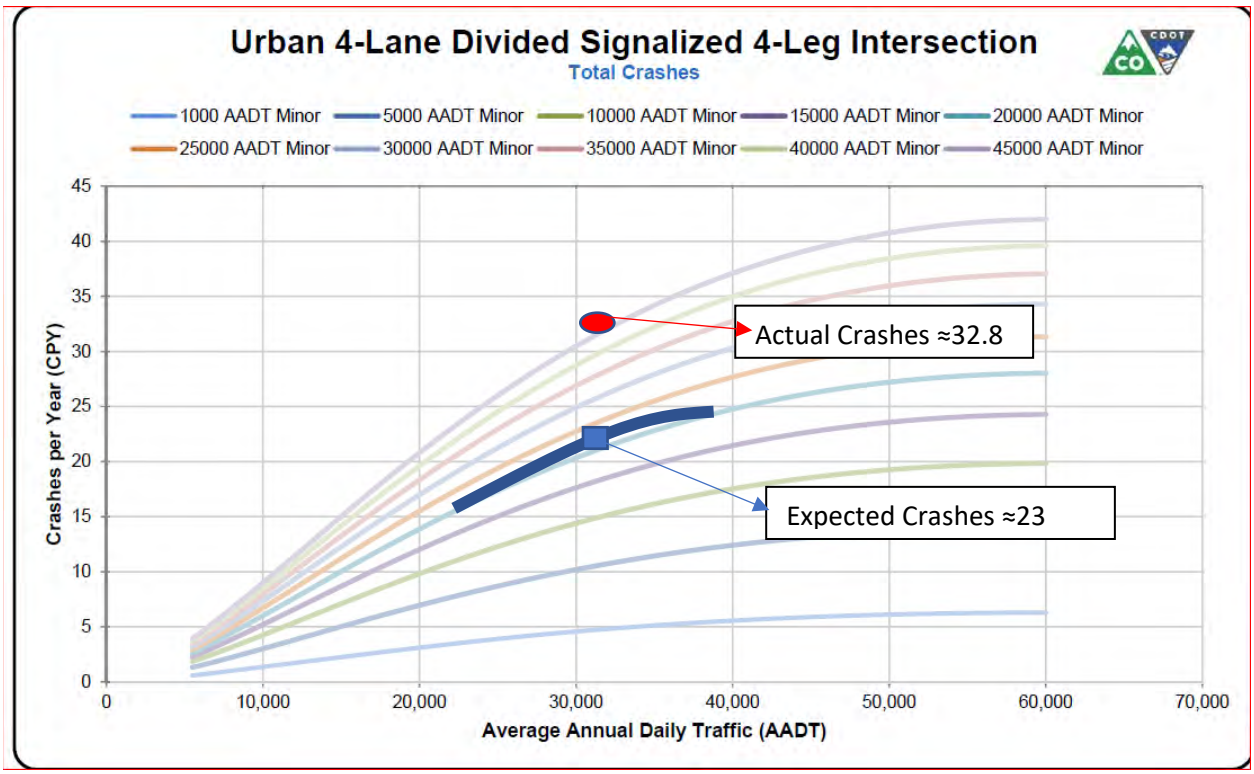

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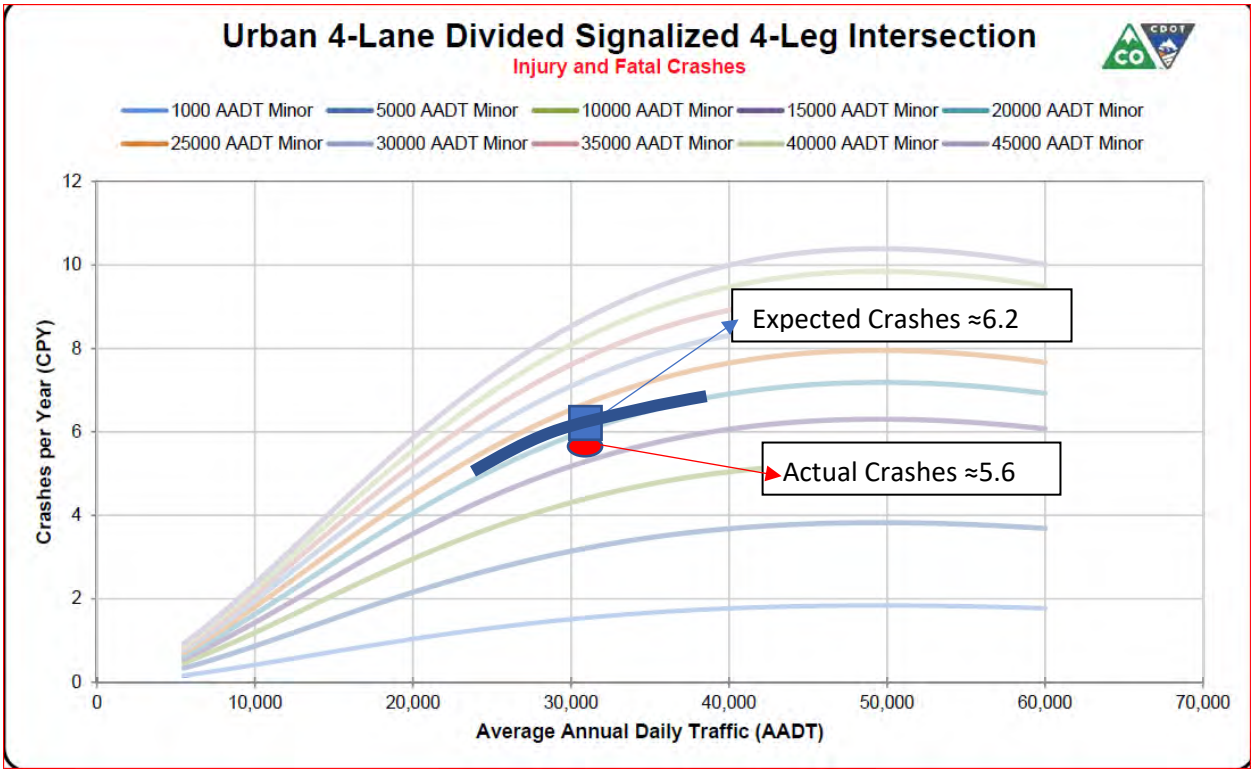

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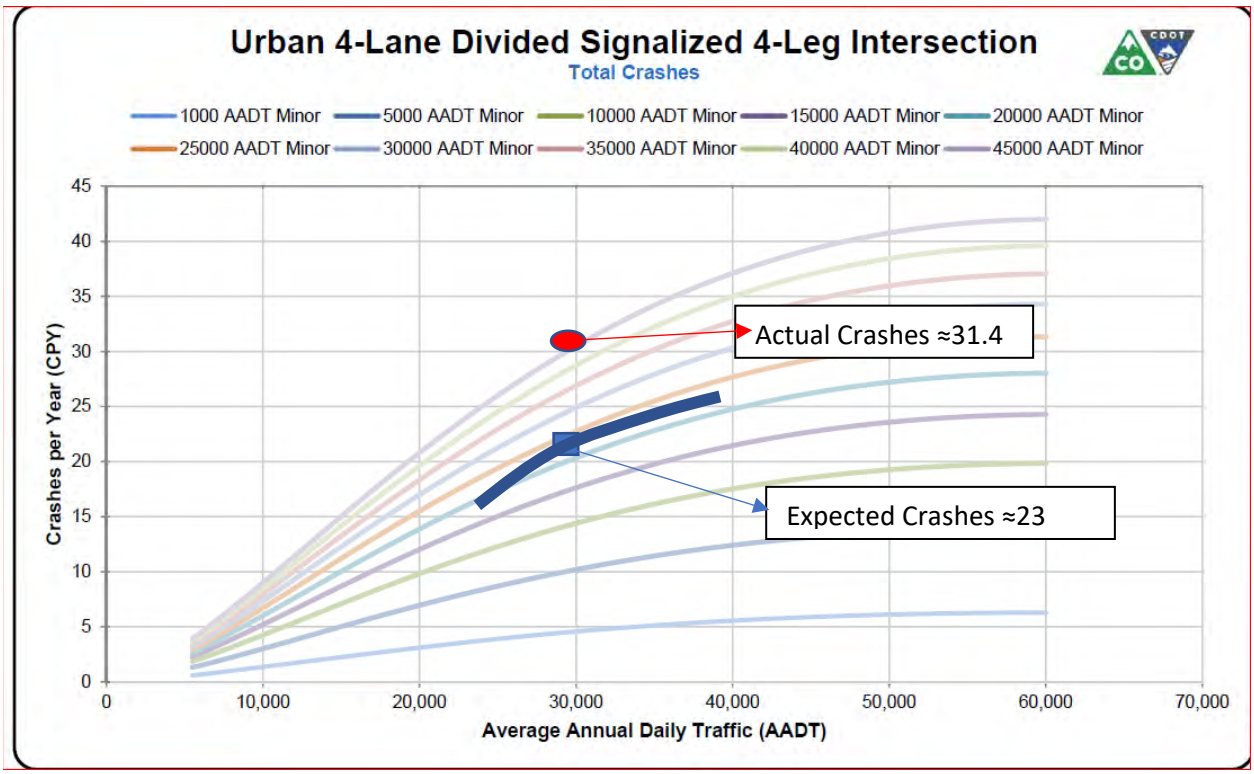

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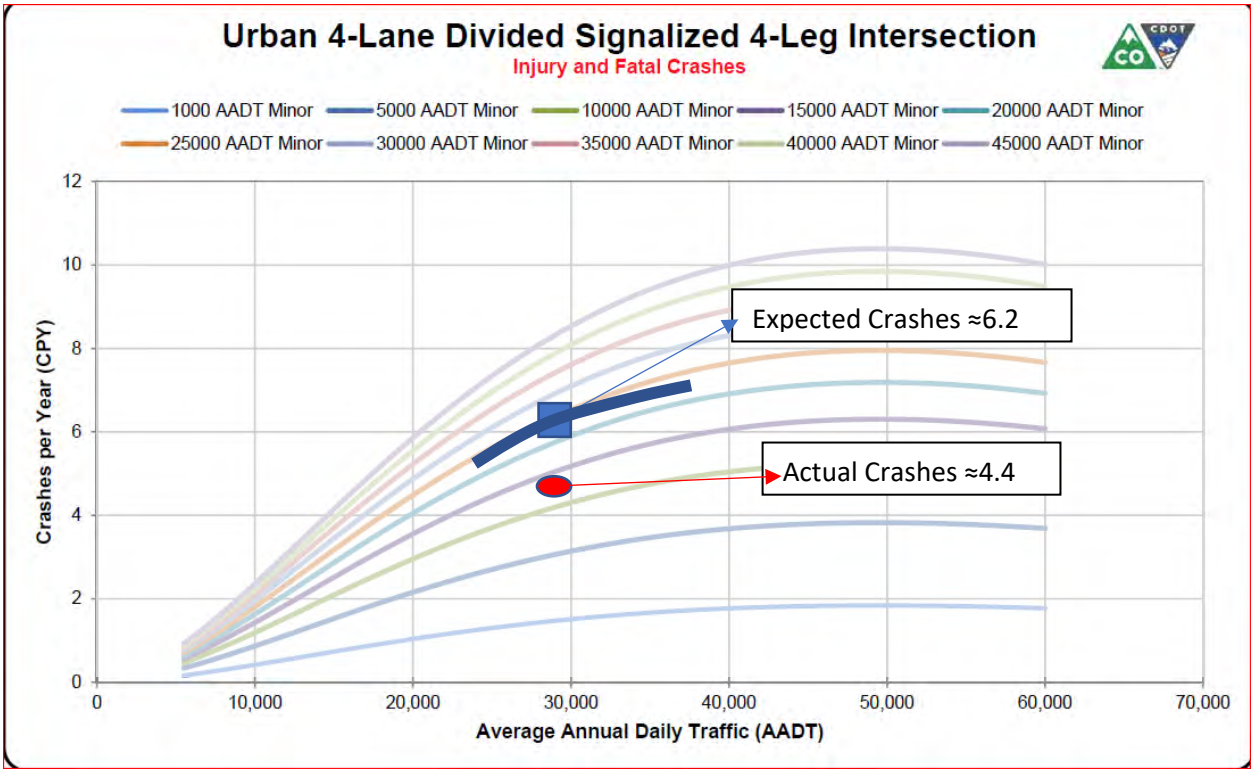

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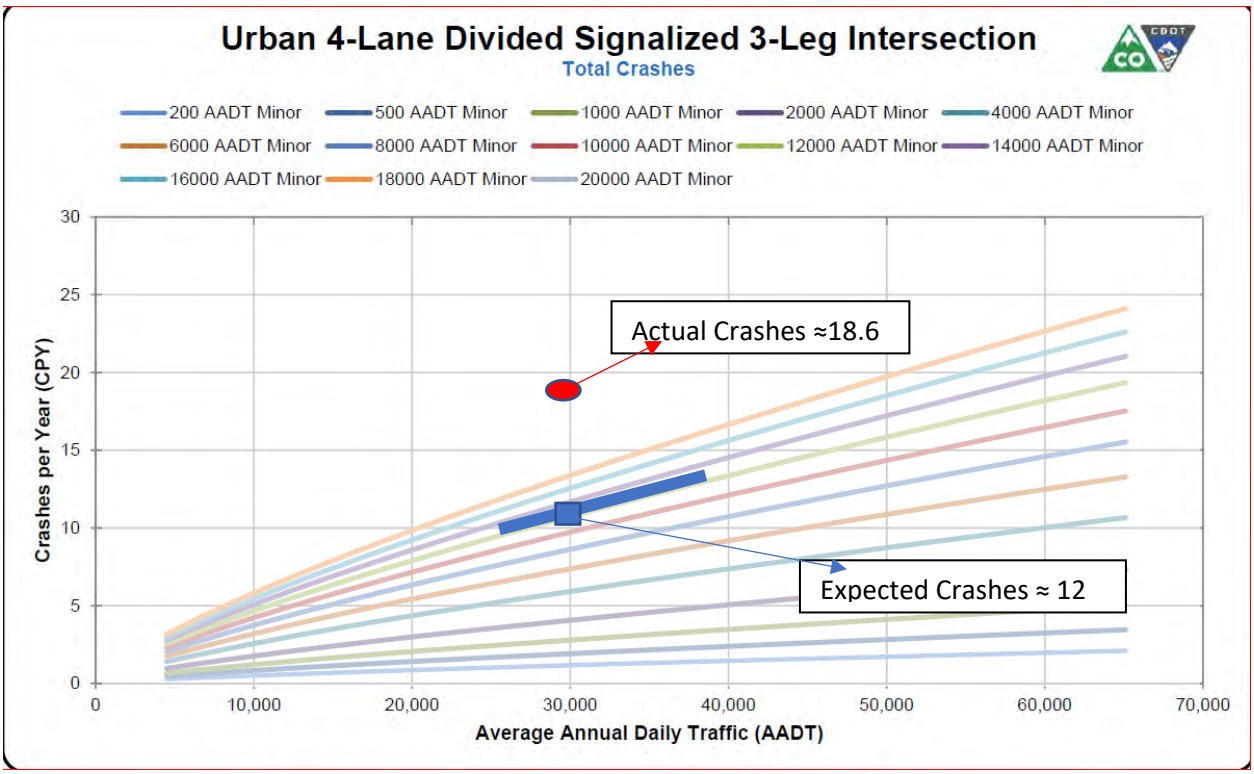

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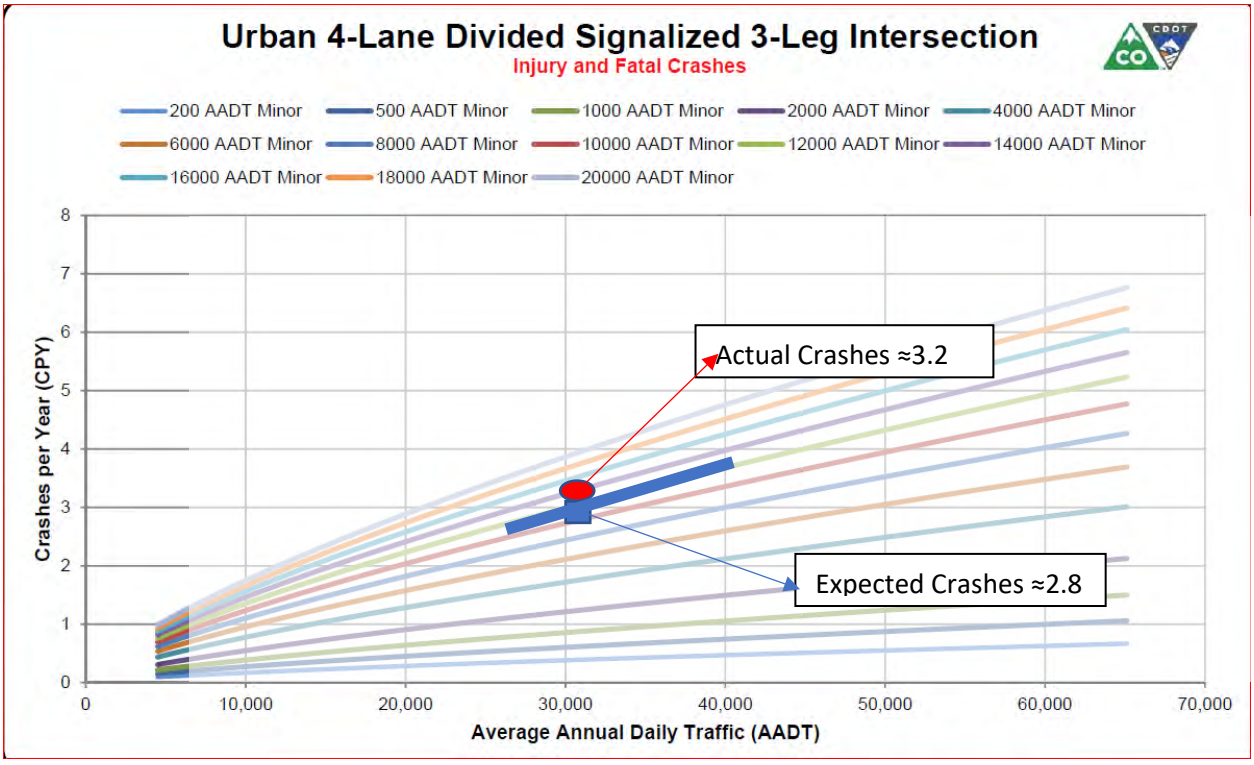

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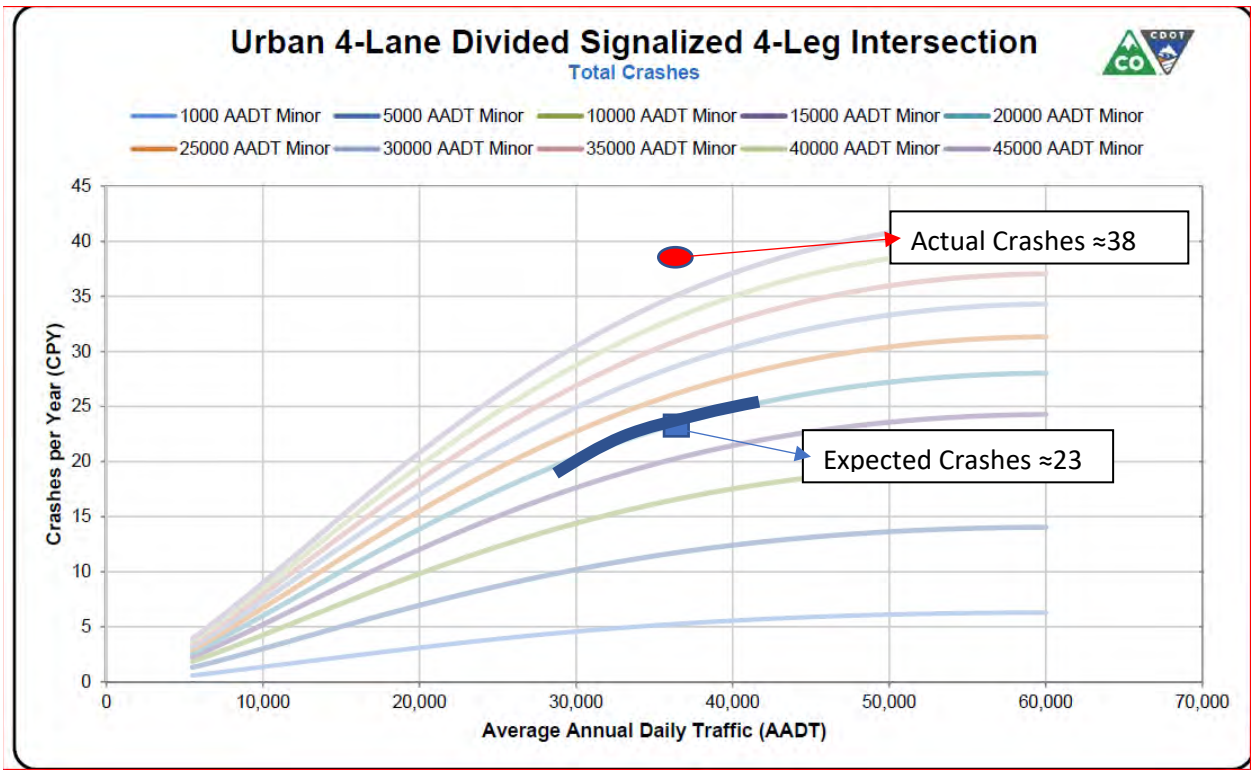

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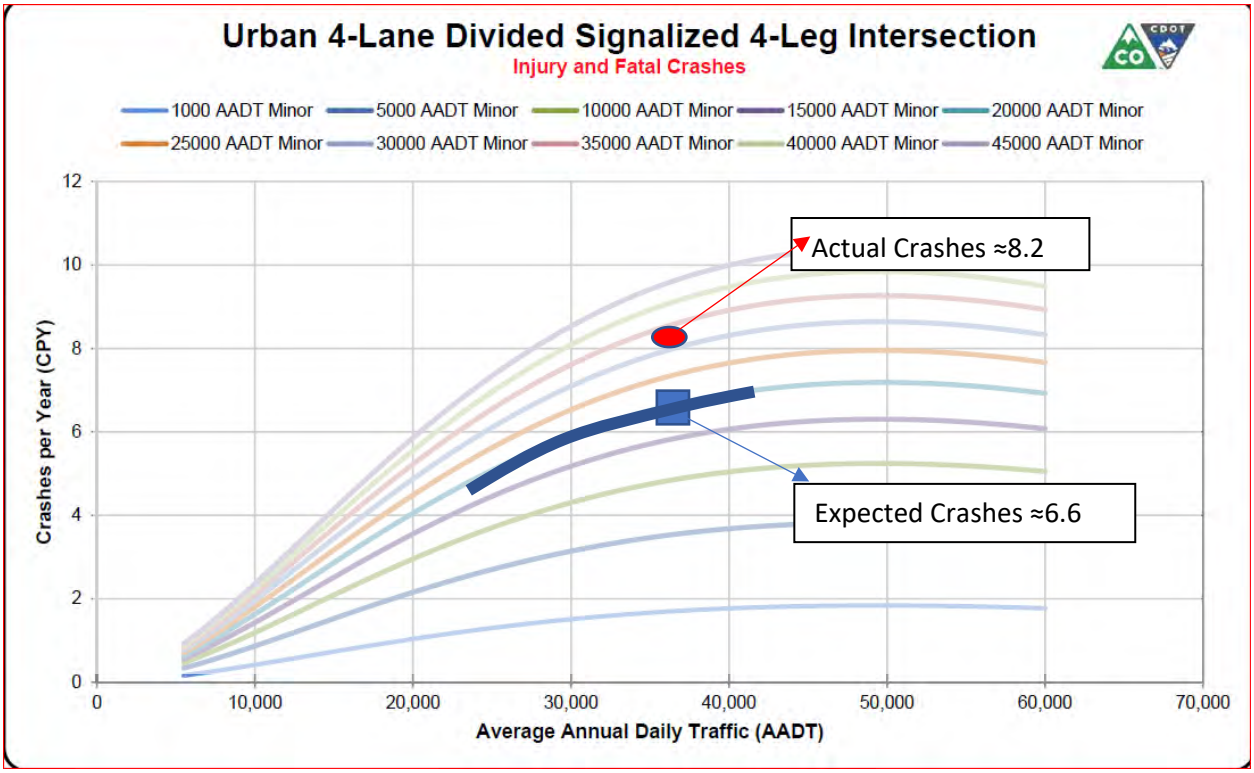

US 34 PEL

Alternatives Report Attachment 02

Technology Memorandum

F I N A L

Existing and Emerging Technology in Planning and Environmental Linkages (PEL) Studies: US 34

Prepared for

Colorado Department of Transportation

December 2018

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Introduction

This document describes the existing and emerging technology options considered for the US 34 Planning and Environmental Linkages (PEL) Study. The Level 1 evaluation determined that these technology options alone would be insufficient to meet the project Purpose and Need, but could supplement the core options; therefore, these options will be combined and packaged with core options in the Level 3 evaluation as a supplemental element to optimize safety, travel, and operational benefits. Recommendations for technology options were evaluated based on existing conditions and characteristics of the corridor and their applicability for each segment is summarized below.

Existing Conditions

The project team inventoried technology options currently being used in all segments. These options and their location are listed in **Table 1**.

Existing CRC Level

Table 2 shows the Connected Road Classification System (CRCS) level for each segment. CRCS, created by Colorado Department of Transportation (CDOT), is a scale programmed for classifying the operational environment of a road relative to a deployment of connected vehicles/autonomous vehicles (AV/CV) based on the level of technology and infrastructure associated with them; this roadway classification is a draft classification system awaiting a National Cooperative Highway Research Program (NCHRP) evaluation. Additional information on CRCS levels is provided in **Appendix A**.

Table 1. Existing Technology by Segment

Option	Foothills	Loveland Urban	Loveland 6-Lane	I-25 by others	Johnstown-Greeley	Greeley Expressway	US 85 by others	East End
Advanced Signal Warning Flashers	--	--	--	--	--	65th Avenue to 8th Avenue	--	--
Adaptive Traffic Signals	--	--	--	--	--	--	--	--
Variable Speed Limits	--	--	--	--	--	--	--	--
Dynamic Lane Use	--	--	--	--	--	--	--	--
Queue Warnings	--	--	--	--	--	--	--	--
Ramp Metering	--	--	--	--	--	--	--	--
Wildlife Detection and Alert Systems	--	--	--	--	--	--	--	--
Enhanced Communications Infrastructure/Fiber Optic Lines	--	--	--	NW Frontage Road	Segment-wide – Centerra/Thompson Parkway to East of SH 257	East of SH 257 to W 27th Street	--	--
Improved Traveler Information Signs	--	--	--	--	--	--	--	--
Enhanced Lane Markings	--	--	--	--	--	--	--	--
Road/Weather Information Systems	--	--	Redwood Drive	--	--	35th Avenue	--	--
Transit Signal Priority	--	--	--	--	--	--	--	--
Autonomous Vehicle Lanes	--	--	--	--	--	--	--	--
Still Camera	--	--	--	Centerra Parkway	MP: Larimer Parkway, County Line Road (2)[a], WCR 17	--	--	MP: County Road 49 (2)[a]
Variable Message Board	--	--	MP: Denver Avenue (2)[a]	--	MP: 131st Avenue/ US 34 Business (4)[a]	--	--	--
Automatic Traffic Recorder	--	--	--	MP: NW Frontage Road	MP: WCR 15	--	--	--

[a] (#) indicates number of devices at one location; device locations were rounded to 0.5-mile.

MP = mile post

Table 2. Existing CRCS Level

Segment	CRC Level
Foothills	Level 2
Loveland Urban	Level 3
Loveland 6-Lane	Level 3
Johnstown-Greeley	Level 3
Greeley Expressway	Level 4
East End	Level 2

Note:

CRCS ranges from Level 1 to Level 6; Level 1 is the lowest level.
See **Appendix A** for more a detailed description of CRCS Levels.

Technology Options and Applicability (Level 1)

Advanced Signal Warning Flashers

This option was considered in the Level 1 Alternatives Evaluation because it may address safety concerns with traffic signals on high-speed corridors. The option consists of signs with flashing beacons that are activated when the signal is going to turn from green to yellow, and then stay flashing through the red signal phase. Advanced signal warning flashers alert motorists before they arrive at a roadway condition to reduce potential conflicts.

Flashers need to be placed strategically, where the greatest benefits will likely be captured such as intersections with high occurrences of rear-end crashes. If flashers are placed with too much frequency or have a low threshold to trigger the flashing phase, drivers may stop paying attention to them because they do not alert drivers to different conditions.

Applicability

This option will be applicable at the locations where semi-isolated signals exist along high-speed sections of US 34, particularly in the Johnstown-Greeley and Greeley Expressway segments. Example signal locations include westbound at Centerra Parkway/Thompson Parkway, WCR 17 in both directions of travel, and 65th Avenue in both directions of travel.

Adaptive Traffic Signals

This option was considered in the Level 1 Alternatives Evaluation because it may address congestion and operational performance. The option consists of traffic signal control technology in which traffic signal timing changes are based on actual traffic demand to accommodate variable traffic patterns and reduce traffic congestion. Ideally, a number of traffic signals would be connected to provide the most efficient signal timing among multiple traffic signals.

Oftentimes a traffic signal will be activated for a cross street because cars have started queuing. To minimize traffic delay, the adaptive traffic signals could communicate to coordinate cross traffic at the same time. This would reduce the likelihood of drivers to stop at multiple traffic signals for traffic on cross streets.

Applicability

Any signalized intersection in the study area could be a candidate for adaptive signal control. With traffic conditions on US 34 varying based on time of day, time of year, special events and weather conditions,

deployments are anticipated at traffic signals along the US 34 corridor. However, any federally funded intelligent transportation system (ITS) project requires that a Systems Engineering Analysis be conducted to determine infrastructure and/or optimization need before implementation.

Variable Speed Limits

This option was considered in the Level 1 Alternatives Evaluation because it may address safety and recurring congestion. The option consists of dynamically adjusted speed limits to maintain safe travel speeds based on traffic, weather, or other roadway conditions. The speed limits can be regulatory and enforceable, or they can be recommended speed advisories.

The main benefits that would result from the implementation of variable speed limits are improving safety by increasing uniform behavior of motorists and delaying onset of congestion.

Applicability

Variable speed limits may be applicable throughout all segments, but especially where congested traffic conditions, school zones, high pedestrian activity areas, and/or weather conditions result in slow speed. This option is less applicable in urban or low-speed areas (45 miles per hour or less) that are not access controlled, particularly in the Foothills and Loveland Urban segments. This type of speed harmonization will be more appropriate for expressways, particularly in adverse weather conditions and other variable conditions.

Dynamic Lane Use

This option was considered in the Level 1 Alternatives Evaluation because it facilitates congestion and incident management. Dynamic lanes are managed lanes that serve multiple uses and/or accommodations based on time of day, congestion levels, and/or unfavorable roadway conditions. Dynamic lanes allow for Active Transportation Demand Management (ATDM) enabling traffic management centers (TMC) to close, restrict, or open lanes to designated or all vehicles. Lanes are designated and communicated to drivers through Video Message Sign (VMS) or another form of digital signaling. Examples of dynamic lane uses include transit lane, high-occupancy vehicle (HOV) lane, peak period lane or shoulder, tolling lane, emergency vehicle lane, autonomous or connected vehicle lane, and climbing lane.

Applicability

Dynamic lanes are best suited for long regional corridors serving a high percentage of through-trips with increasing trips and congestion in the foreseeable future. Loveland 6-Lane, Johnstown-Greeley, and Greeley Expressway are best suited for dynamic lanes especially if there is unforeseen future growth and if regional transit is implemented on US 34.

Reversible Lane

This option was considered in the Level 1 Alternatives Evaluation because it may address recurring congestion and improve multimodal operational performance. This option involves dynamically closing or opening individual traffic lanes or allowable movements by use of advanced warning or lane use control signs to improve traffic operations and respond to traffic congestion or incidents. Changing lane assignments based on roadway conditions and peak period conditions maximizes the capacity of the existing roadway.

There are a number of ways this can be integrated into the roadway system: reversing lane direction, diverting traffic to another lane, changing a through-lane to a shared turn lane, and moving traffic to the shoulder or a peak period lane.

Applicability

Reversible lanes are beneficial along segments that are highly directional during peak periods. For example, HOV lanes on I-25 north of Denver are directional southbound in the a.m. period as people commute from suburbs to work; in the afternoon, the dominant direction is northbound, therefore the HOV lanes are reversed. Based on existing traffic data, US 34 is not highly directional and therefore not a good candidate for Reversible lanes.

Express Lanes

This option was considered in the Level 1 Alternatives Evaluation because it may address recurring traffic congestion. Express lanes are managed lanes that increase roadway capacity and help manage congestion on highways by adding lanes that provide choice to drivers. Motorists can choose to ride the bus, carpool, or pay a toll to use express lanes as an alternative to the no-cost general-purpose lanes that do not provide these options but likely are more congested. Express lane users can ride the bus, carpool with two or more passengers (where HOV is allowed) or ride a motorcycle to use the lanes at no cost. Drivers can also choose to pay a toll to use the lanes. Additionally, with other technology integrations, express lanes can also allow for other dynamic use such as those detailed in the Dynamic Lane Use section of this technical memorandum.

CDOT policy (1603.0) requires that managed lanes be strongly considered during the National Environmental Policy Act (NEPA) phase of planning and developing capacity improvements on state highway facilities that are or will likely become congested.

Applicability

Express lanes are best suited for long regional corridors serving a high percentage of through-trips with increasing trips and congestion in the foreseeable future. Loveland 6-Lane, Johnstown-Greeley, and Greeley Expressway are best suited for express lanes especially if there is unforeseen future growth and if regional transit is implemented on US 34.

Queue Warnings

This option was considered in the Level 1 Alternatives Evaluation because it may address corridor safety concerns. The option uses real-time information to alert motorists of downstream stopped traffic by use of warning signs and flashing lights, thereby reducing rear-end crashes. The queue warnings need to be located in the correct locations to alert drivers to upcoming queues without being activated all the time, so drivers will pay attention to the warnings and respond accordingly.

Applicability

Queue warnings would be applicable in combination with advanced signal warning flashers in high-speed locations such as the Johnstown-Greeley and Greeley Expressway segments. Like advanced signal warnings, this option will be applicable at the locations where semi-isolated signals exist along high-speed sections of US 34 and when transitioning between expressway sections.

Ramp Metering

This option was considered in the Level 1 Alternatives Evaluation because it may address recurring traffic congestion and improve traffic operations. This option uses traffic signals and traffic detection systems on interchange on-ramps to monitor expressway and ramp traffic and manage the flow of on-ramp traffic to minimize impact to expressway traffic speed. In areas where the roadway congestion occurs consistently, a ramp meter may be on all the time. In other cases, ramp metering may turn on when congestion reaches certain threshold, often during peak period times.

Managing the flow of traffic requires enough storage on the ramps entering the highway to not create gridlock on the local street system. Sometimes the queuing on the ramps can overflow on the cross street providing access to the highway and the meter releases vehicles more quickly to clear the queue from blocking cross street traffic. Consideration for ramp metering will be prioritized at expressway interchange locations with high entering ramp volumes, to limit turbulence to mainline flow.

Applicability

Any expressway on-ramps with enough storage on the ramps could be considered candidates for ramp metering.

Wildlife Detection and Alert Systems

This option was considered in the Level 1 Alternatives Evaluation because it may address safety concerns with reduced crashes resulting from collisions with wild animals. This option consists of wildlife detection systems, roadway markings, and signage with activated flashing warning beacons installed along the roadway at known wildlife movement locations. The wildlife detection and alert systems are most effective when the animals are naturally directed to the crossing, whether that is with fencing, foliage, or topography. The alert systems need to be sensitive enough to pick up a wide variety of species. However, if the alert system is too sensitive, the alert systems will be activated when there are no animals present and motorists will become desensitized from the alert constantly being active.

Applicability

Wildlife detection systems are not recommended for any locations within this study. The existing technology is currently not sufficiently reliable, although newer systems are currently being tested and may hold future promise. Additionally, current US 34 roadway fiber optic lines do not extend to wildlife concern areas located in the Foothills segment. Without the fiber optic lines, the roadway is unable to support the integration of the technology required by wildlife detections systems. Furthermore, the frequency of vehicle-wildlife collisions is below CDOT thresholds justifying their applications (25 crashes per 1 mile over a 5-year period). Potential wildlife crossing locations have been identified as a part of the PEL; however, these crossings are to be implemented by a future project team if vehicle-wildlife collisions meet CDOT's thresholds in the future.

Enhanced Communications Infrastructure/Fiber Optic Lines

This option was considered in the Level 1 Alternatives Evaluation because it may address safety concerns and recurring traffic congestion. This option consists of enhanced fiber optic communication infrastructure to support data transmission from vehicle detection systems, closed-circuit television cameras, and other technology devices and vehicle-to-roadway technology.

Fiber optic lines can transmit data near lightspeed to advanced/adaptive ITS devices, vehicles, traffic control centers, and mobile devices. This allows for nearly instantaneous communication necessary to activate measures needed in the event of accident, unsafe weather conditions, congestion, and other variable roadway conditions.

Installation of roadway fiber optics has the ability to support future advanced and adaptive ITS devices through telecommunication networks and integrated communication systems. The technology can improve the operation of the roadway and enhance the safety and mobility of users.

Additionally, the integration of a robust fiber optic system enables future connected roadways and connected vehicle environments. Currently, a connected roadway allows roadway technology devices to communicate information instantaneously with each other as well as the TMC. Connected vehicles in current conditions allow vehicles to communicate with one another to share information such as sudden stops or slippery roadways. In a fully connected roadway environment, vehicles are able to communicate or share information with each other as well the roadway infrastructure devices. These

connected-vehicle applications allow for real-time data exchange that communicate vehicle actions and enable CDOT to monitor and improve overall system performance. These applications also allow drivers to be aware of data from other vehicles so that potential countermeasures—such as alternate route selection or cautionary speeds—should be enacted by the driver. Vehicles in constant communication can be aware of one another, even if their sightlines are obstructed, and improve the likelihood that motorists will avoid incidents when they encounter hazards such as sudden braking, lane changes, and blind corners and intersections.

Applicability

This option is applicable in all areas, especially from the Loveland Urban to Greeley Expressway segments. This includes additions of ITS devices and fiber optics that will enable future use of connected roadways and vehicles. For areas with existing enhanced communications infrastructure/fiber optic lines, it would be beneficial to improve or expand communication infrastructure, especially during implementation of civil infrastructure projects—this will account for future growth and the necessary communications network while reducing cost.

Improved Traveler Information Signs

This option was considered in the Level 1 Alternatives Evaluation because it may address safety issues and recurring congestion. This option consists of electronic display signs used to notify motorists of upcoming roadway, incident, weather, and traffic-related conditions. Traveler information signs should be placed in locations with high visibility that will not distract drivers and will provide useful information about the road conditions ahead.

The signs can display informational text based on real-time conditions. The signs are side-mounted or mounted overhead of the roadway on a cantilever, sign bridge, or other structure. Traveler information signs can work well in combination or independently from other real-time warning and alert systems. The flexibility of traveler information signs can provide general information.

Applicability

Locations for implementation would be prioritized in the Loveland 6-Lane through Greeley Expressway segments that are high-volume and high-speed, where travel information would provide greater benefits. Improved traveler information signs would typically be located in advance of important junctions for purposes such as incident management and wayfinding. Important junctions would include SH 287, I-25, US 34 Business, and US 85.

Enhanced Lane Markings

This option was considered in the Level 1 Alternatives Evaluation because it may address safety concerns or geometric problems that disrupt operational performance. The option may consist of pavement markings, reflectors, or lights to enhance driver recognition of roadway geometry and lanes, and other new technology to support driverless vehicle recognition of geometry and lanes.

Applicability

Enhanced lane markings are applicable in all areas, especially the Johnstown-Greeley and Greeley Expressway segments, where speeds are higher, and visibility can be low.

Roadway Weather Information Systems

This option was considered in the Level 1 Alternatives Evaluation because it may address safety concerns and operational performance. The option consists of technologies and strategies for improved monitoring and prediction, information dissemination, and decision support during adverse weather conditions.

Applicability

Roadway weather information systems are applicable in all areas. The Foothills segment, based on observed and documented weather-related roadway conditions, would be most applicable to this technology option because of its proximity to mountainous terrain and the presence of the Big Thompson River floodplain.

Transit Signal Priority and Queue Jump

The transit signal priority (TSP) and queue jump option was considered in the Level 1 Alternatives Evaluation to improve transit mobility and transit user experience. Buses equipped with technology communicate with close-range traffic signals to modify the signal timing and reduce delay for the transit vehicle. The modification usually changes the length of the green or red phase based on the signal distance. To take it a step further, TSP can be supplemented with queue jumping, which incorporates an additional lane at intersections for transit vehicles to proceed forward before other queued vehicles traveling the same direction—this further reduces signal delay for transit vehicles.

The most direct benefits of TSP are the reduction in transit vehicle delay at intersections and the increased reliability of transit service. This can make transit a more attractive mode choice. Because the signals react to the buses, TSP may affect queuing on cross streets as well as affect the network of signals if the signals are connected and communicate with one another. Signal controller cabinets and bus technology may need to be updated. This technology is most effective at intersections that have far-side or no bus stops because it is much easier to anticipate transit running time than dwell time.

Applicability

TSP would be applied to the Loveland Urban and Loveland 6-Lane segments where COLT service currently operates. If transit operations are expanded or developed in other segments (such as the proposed regional service between Loveland and Greeley; and proposed intersecting services on WCR 17, SH 257, US 34 Business, and I-25), then TSP will be applicable to signalized intersections of those segments.

Autonomous Vehicle Lanes

This future technology option was considered in the Level 1 Alternatives Evaluation because it may address recurring congestion, safety concerns, and operational performance. The option consists of a dedicated lane for autonomous vehicles, vehicles that can sense the environment around them and navigate without human input. A dedicated lane for such vehicles could potentially be narrower than a general-purpose lane and provide greater capacity with reduced vehicle headways. Although there are still unknowns associated with autonomous vehicles, this option assumes vehicle technology will continue to evolve that would allow vehicles to travel in a specified lane to maximize the technological benefits of autonomous vehicles. To allow flexibility in the timing and implementation, the future autonomous vehicle lane could initially be used as a general-purpose or managed lane, then repurposed as the percentage of autonomous vehicles in the overall vehicle mix reaches an appropriate level.

Applicability

Implementation may be applicable in the Loveland 6-Lane, Johnstown-Greeley, and Greeley Expressway segments. This includes additions of ITS devices and fiber optics that will enable future use of connected roadways and vehicle. When automated vehicles are fully deployed on the roadway and account for a significant amount of the vehicles in operation, this option should be taken into consideration.

Evaluation of Technology/Summary Recommendations

The technology options recommended in this memorandum supplement alternatives to meet the Purpose and Need of the PEL study: increase safety; accommodate increased travel and tourism demands to maintain the economic vitality of the region; and increase reliability of east-west travel, while balancing local access, mobility and freight. Options were evaluated based on existing conditions and corridor characteristics.

Applicable technology options that would help meet the Purpose and Need are summarized in **Table 3.**

Table 3. Technology Options that Support the Purpose and Need

Option	How Option Addresses Purpose and Need	Benefits
Advanced Signal Warning Flashers	Increases safety	Flashers alert motorists before they arrive at a roadway condition to reduce potential intersection conflicts and rear-end crashes.
Variable Speed Limits	Increases safety and increase reliability of east-west travel	Variable speed limits improve safety and mobility by increasing uniform and cautionary behavior of motorists and delaying onset of congestion.
Queue Warnings	Increases safety	Warnings use real-time information alerts motorists of downstream stopped traffic by use of warning signs and flashing lights, thereby reducing rear-end crashes.
Enhanced Communications Infrastructure/Fiber Optic Lines	Increases safety	Fiber optic lines can transmit data at lightspeed to advanced/adaptive ITS devices, vehicles, traffic control centers, and mobile devices. This allows for nearly instantaneous communication to activate measures needed in the event of accident, unsafe weather conditions, congestion, and other variable roadway conditions.
Improved Traveler Information Signs	Increases safety	This option notifies motorists of upcoming roadway, incident, weather, and traffic-related conditions.
Enhanced Lane Markings	Increases safety	This option enhances driver recognition of roadway geometry and lanes to facilitate more safe operations and roadway behavior.
Road/Weather Information Systems	Increases safety	Early warning of current or upcoming weather conditions facilitates more safe operations and roadway behavior.
Autonomous Vehicle Lanes	Increases safety and increase reliability of east-west travel	This option leverages the use of autonomous vehicles, which remove human error when operating a vehicle. Implementing lanes dedicated to these vehicles as they become a part of the fleet mix will enhance the safety capabilities and benefits of these vehicles. Additionally, human error that causes congestion such as excessive breaking or inconsistent speeds will be eliminated by these vehicles, improving travel times and reliability.
Adaptive Traffic Signals	Increase reliability of east-west travel	This option connects traffic signals to provide the most efficient signal timing among multiple traffic signals, thus reducing the likelihood of drivers stopping at multiple traffic signals for traffic on cross streets and ultimately causing unnecessary queuing and congestion.
Express Lanes	Increase reliability of east-west travel and accommodate increased travel and tourism demands	This option increases roadway capacity and helps manage congestion on highways by adding lanes that provide choice to drivers. Drivers that would benefit more from using an express lane are allowed the opportunity to use the lane, which in turn lowers travel demand on adjacent general-purpose lanes.

Table 3. Technology Options that Support the Purpose and Need

Option	How Option Addresses Purpose and Need	Benefits
Dynamic Lanes	Increase reliability of east-west travel and accommodate increased travel and tourism demands	This option allows for ATDM, enabling TMCs to close, restrict, or open lanes to designated or all vehicles to accommodate congestion based on time of day and/or unfavorable roadway conditions.
Ramp Metering	Increase reliability of east-west travel	This option allows for ATDM, enabling TMCs to control the number of vehicles entering at any given time. This results in consistent traffic speeds and traffic flow to improve corridor reliability.
Enhanced Communications Infrastructure/Fiber Optic Lines	Increase reliability of east-west travel and accommodate increased travel and tourism demands	This option allows for nearly instantaneous communication to activate measures needed in the event of accident, unsafe weather conditions, congestion, and other variable roadway conditions. This result improves the operation of the roadway and enhances user mobility.
Improved Traveler Information Signs	Accommodate increased travel and tourism demands and increase safety	This option provides notifications to motorists of upcoming useful roadway conditions such as incidents, weather, and traffic. This improves the operation of the roadway and enhances user mobility and safety.
TSP and Queue Jump	Increase reliability of east-west travel	This option reduces transit vehicle delay at intersections to increase travel reliability for transit service.

Technology options applicable to the Study Area in this screening will be combined with packaged alternatives in Level 3 as supplemental elements. **Table 4** show recommended segment locations for applicable technology options

Table 4. Recommended Segment Locations for Applicable Technology Options

Results Option	Foothills	Loveland Urban	Loveland 6-lane	Johnstown -Greeley	Greeley Expressway	East End
Advanced Signal Warning Flashers			X	X	X	X
Adaptive Traffic Signals	X	X	X	X	X	X
Variable Speed Limits	X			X	X	X
Express Lanes			X	X	X	
Dynamic Lanes			X	X	X	
Queue Warnings			X	X	X	
Ramp Metering				X	X	
Enhanced Communications Infrastructure/Fiber Optic Lines	X	X	X	X	X	X
Improved Traveler Information Signs			X	X	X	X
Enhanced Lane Markings	X	X	X	X	X	X
Road/Weather Information Systems	X	X	X	X	X	X
Transit Signal Priority and Queue Jumping	X	X	X	X	X	X
Autonomous Vehicle Lanes			X	X	X	

Time Horizons

Time horizons for applicable technology are shown in **Table 5**. These horizons follow core concept time horizon implementation strategies using near-term, interim, and ultimate horizons to guide implementation phasing. These horizons for different types of projects are defined as follows:

- Near-term projects are projects that could be implemented quickly without lengthy planning or design. In terms of technology option, those deemed near-term are options that are usually low cost and improve the roadway without significant changes in operations.
- Interim projects are identified as those beyond the near-term improvements, which would serve as initial phases of the ultimate corridor recommendations. While on their own they do not solve all the problems in the corridor, they do provide localized safety and mobility improvements. In terms of technology options, those deemed interim are likely in existence and commonly practiced on today's roadways but may require lengthy planning or design because they are not currently deployed on US 34.
- Ultimate projects are projects that more fully address all problems within the corridor. In terms of technology options, those deemed ultimate are options that will take lengthy planning or design and policy implementation components.

Table 5. Time Horizons for Applicable Technology

Option	Time Horizon
Advanced Signal Warning Flashers	Near-Term
Adaptive Traffic Signals	Near-Term
Variable Speed Limits	Interim/Ultimate
Queue Warnings	Interim
Ramp Metering	Ultimate
Enhanced Communications Infrastructure/Fiber Optic Lines	Near-Term
Express Lanes	Ultimate
Improved Traveler Information Signs	Near-Term
Enhanced Lane Markings	Near-Term
Road/Weather Information Systems	Near-Term
Transit Signal Priority and Queue Jump	Interim
Autonomous Vehicle Lanes	Ultimate
Dynamic Lanes	Ultimate

Target CRCS Level

Table 2 shows each segment's CRCS level. Implementing the recommended technology options discussed previously will enhance the operational environment of US 34 relative to a deployment of connected vehicles/autonomous vehicles. The target classification level for US 34 is a connected road classification of 4, at which point the roadway will be able to:

- Adequately support autonomous vehicles
- Adapt to variable roadway conditions and congestion
- Better connect vehicles and people to the road

US 34 as CRCS 4 roadway would support the Purpose and Need by:

- Reducing risk and increasing reliability of east/west regional travel
- Increasing safety
- Alleviating congestion to accommodate increase travel and tourism demands

APPENDIX A

Colorado Connected Roadway Classification System

The Colorado Connected Roadway Classification System (CRCS), created by Colorado Department of Transportation (CDOT), is a scale programmed for classifying the operational environment of a road relative to a deployment of connected vehicles/autonomous vehicles (AV/CV) based on the level of technology and infrastructure associated with them; this roadway classification is a draft classification system awaiting a National Cooperative Highway Research Program (NCHRP) evaluation.

Colorado's CRCS levels are defined as follows:

Definition of Levels

- **Level 1**: Unpaved and/or non-striped roads designed to a minimum standard level of safety and mobility. Least prepared.
- **Level 2**: Paved roads designed to meet American Association of State Highway and Transportation Officials (AASHTO) standards and *Manual of Uniform Traffic Control Devices* signage requirements. No presence of intelligent transportation systems (ITS) infrastructure to collect and distribute vehicle data. Access to cellular data service may or may not be available.
- **Level 3**: Presence of ITS equipment operated by a Traffic Management Center (TMC) and/or one-way data sharing between vehicles, users, CDOT staff, and/or lane infrastructure.
- **Level 4**: Presence of adaptive ITS infrastructure in specific lanes or the entire roadway with TMC connection and override; and/or two-way data sharing between vehicles, users, CDOT staff, and/or lane infrastructure; and/or lanes designated only for Level 3 and Level 4 connected and autonomous vehicles.
- **Level 5**: Presence of lanes or entire roadway designed only for Level 4 connected and autonomous vehicles; potential for additional features such as inductive vehicle charging or enhanced data sharing; no roadway signage required because of the presence of integrated, two-way data sharing between vehicles and infrastructure.
- **Level 6**: All roadway elements designed exclusively for fully automated vehicles; no signage, signals, or striping required.

US 34 PEL

Alternatives Report Attachment 03

Concept Level

Intersection and Interchanges Cost Summary

Conceptual Project Costs

Order-of-Magnitude conceptual level costs using 2017 construction costs were completed for the distinct concepts in each of the segments. The approach was to estimate quantities and costs at each intersection or interchange location individually, then determine quantities and costs for the widening of US 34 between major intersections or interchanges.

The costs are based on very limited design information and rely on percentage add-ons for many of the items associated with construction projects. The costs are based the conceptual level engineering with very approximate quantities determined for:

- Pavement area (asphalt assumed)
- Bridge structure area
- Retaining walls
- Earthwork (flat-level-earth assumption)
- Traffic signals

The percentage add-ons are detailed further in the Attachments and are based on previous experience with the CDOT projects. These add-ons take the limited items listed above and essentially triple the cost to account for the following;

- Drainage, Signing, Striping, Construction Phasing and Traffic Control
- Other Unaccounted items/contingiencies
- Utility relocations
- Construction Engineering and the CDOT indirect costs
- Design Engineering and Permitting

In addition, right-of-way costs were not estimated for these concepts.

The goal of this cost estimating effort is to provide an order-of-magnitude cost that can be considered for budgeting purposes by the CDOT and local jurisdictions. It is also noted that with rapidly increasing construction costs (5% per year), a budget put together in 2019 for a project that might be constructed in 2021-2022 may likely require 20%-25% more money than identified in this PEL. **Table 1** is a summary of the conceptual costs determined for concepts in all of the segments.

Table 1
Conceptual Project Costs

Segment	Location	Conceptual 2017 Order-of-Magnitude Cost *(does not include ROW costs)*
Segment 1 - Foothills	LCR 27 turn lane improvements	$1 M
	Glade Road signalization	0.4 M
	Rossum to Morning Drive – Add median or add two-way left turn lanes	$3 M
Segment 3 - Loveland 6-Lane	Cleveland / Lincoln, add double left turn lanes within/approaching intersection (1 full property acquistion needed)	$5 M
	Cleveland / Lincoln, two 3-lane roundabouts (5 full property acquistions needed)	$10 M
	Cleveland/Lincoln, Indirect left turns (no property acquistions)	$1 M
Segment 4 - Johnstown-Greeley - Greeley Expressway	Widen to 6 lanes, Larimer Pkwy to US 34 Business, signals and accesses per the 2003 ACP. Railroad crossings stay at-grade	$54 M
	Interchange at Larimer Pkwy	$26 M
	Interchange at CR 3 combined with grade-separation of US 34 over the UPRR	$74 M
	Interchange at CR 13 combined with grade-separation of US 34 over the GWRR	$80 M
	Interchange at CR 17	$29 M
	Full-build of interchanges and 6-lanes in Segment 4 - Johnstown-Greeley - Greeley Expressway, Larimer Pkwy to US 34 Business Rt. (using ACP)	$230 M
Segment 5	Widen to 6 lanes, US 34 Business to 17th Ave., signals and accesses per the 2003 ACP.	$62 M
	Interchange at Promontory	$35 M
	Interchange at 83rd	$32 M
	71st – 65th Options • Interchange at 71st, overpass at 65th • Combined 71st – 65th Split Interchange • Interchange at 65th (ACP)	 $54 M $63 M $36 M
	Interchange at 47th	$35 M
	Interchange at 35th	$38 M
	Improvements at 23rd Interchange	$1 M
	17th Ave. Options • US 34 overpass of 17th (no ramps) • Channelized T - signalized	 $25 M $5 M
	Full-build of interchanges and 6-lanes in Segment 5, US 34 Business to 17th Ave. (using ACP)	$220 M
Segment 6	Convert full movement intersection to ¾ intersection (applies to multiple locations)	$0.3 M per location

US 34 PEL

Alternatives Report Attachment 04

Concept Level

Intersection and Interchanges Cost Details

TSIOUVARAS SIMMONS HOLDERNESS
CONSULTING ENGINEERS

LARIMER PKWY

Item No	Description	Unit	Street	Ramp	Unit Cost	Total
	Bridge deck	total cost	16,293	-	$ 150.00	$ 2,443,924
	Walls	SF	-	-	$ 50.00	$ -
	Pavement	SY	62,816	-	$ 75.00	$ 4,711,200
	Earthwork	CY	155,346	-	$ 10.00	$ 1,553,460
	Signals	Each	3		$ 250,000.00	$ 750,000
					TOTAL	***$ 9,458,584***

Bid items subtotal			
Allowance for Unlisted Items (Contingencies)	of A	25%	$2,364,646
Drainage	of A+B	10%	$1,182,323
Signing/Striping/Traffic Control	of A-C	3%	$390,167
Construction Phasing / Traffic Control	of A-D	15%	$2,009,358
Force Account	of A-E	5%	$770,254
Mobilization	of A-F	8%	$1,294,027
Total of Construction Bid Items	**A thru G**		**$17,469,358**
Engineering, Design, CE, CM			
Construction Engineering & Indirects	of H	22%	$3,860,728
Planning/Environmental/Preliminary Design	of H	5%	$873,468
Final Design & permitting	of H	8%	$1,397,549
Utility Allowance	of H	5%	$873,468
Total Conceptual Project Cost	H thru N		**$24,474,571**

TSIOUVARAS SIMMONS HOLDERNESS
CONSULTING ENGINEERS

UPRR overpass and CR 3

Item No	Description	Unit	Street	Ramp	Unit Cost	Total
	Bridge deck	total cost	62,545	-	$ 150.00	$ 9,381,692
	Walls	SF	40,283	-	$ 50.00	$ 2,014,150
	Pavement	SY	62,539	10,620	$ 75.00	$ 5,486,882
	Earthwork	CY	713,154	272,688	$ 10.00	$ 9,858,421
	Signals	Each	2		$ 250,000.00	$ 500,000
					TOTAL	***$ 27,241,144***

Bid items subtotal			
Allowance for Unlisted Items (Contingencies)	of A	25%	$6,810,286
Drainage	of A+B	10%	$3,405,143
Signing/Striping/Traffic Control	of A-C	3%	$1,123,697
Construction Phasing / Traffic Control	of A-D	15%	$5,787,041
Force Account	of A-E	5%	$2,218,366
Mobilization	of A-F	8%	$3,726,854
Total of Construction Bid Items	**A thru G**		**$50,312,530**
Engineering, Design, CE, CM			
Construction Engineering & Indirects	of H	22%	$11,119,069
Planning/Environmental/Preliminary Design	of H	5%	$2,515,627
Final Design & permitting	of H	8%	$4,025,002
Utility Allowance	of H	5%	$2,515,627
Total Conceptual Project Cost	H thru N		**$70,487,855**

TSIOUVARAS SIMMONS HOLDERNESS
CONSULTING ENGINEERS

CR 13 and GWRR overpass

Item No	Description	Unit	Street	Ramp	Unit Cost	Total
	Bridge deck	total cost	85,340	-	$ 150.00	$ 12,801,015
	Walls	SF	50,308	-	$ 50.00	$ 2,515,400
	Pavement	SY	72,520	21,471	$ 75.00	$ 7,049,323
	Earthwork	CY	639,031	106,050	$ 10.00	$ 7,450,812
	Signals	Each	-		$ 250,000.00	$ -
					TOTAL	***$ 29,816,549***

Bid items subtotal			
Allowance for Unlisted Items (Contingencies)	of A	25%	$7,454,137
Drainage	of A+B	10%	$3,727,069
Signing/Striping/Traffic Control	of A-C	3%	$1,229,933
Construction Phasing / Traffic Control	of A-D	15%	$6,334,153
Force Account	of A-E	5%	$2,428,092
Mobilization	of A-F	8%	$4,079,195
Total of Construction Bid Items	**A thru G**		**$55,069,128**
Engineering, Design, CE, CM			
Construction Engineering & Indirects	of H	22%	$12,170,277
Planning/Environmental/Preliminary Design	of H	5%	$2,753,456
Final Design & permitting	of H	8%	$4,405,530
Utility Allowance	of H	5%	$2,753,456
Total Conceptual Project Cost	H thru N		**$77,151,848**

TSIOUVARAS SIMMONS HOLDERNESS
CONSULTING ENGINEERS

CR 17

Item No	Description	Unit	Street	Ramp	Unit Cost	Total
	Bridge deck	total cost	16,293	-	$ 150.00	$ 2,443,924
	Walls	SF	-	-	$ 50.00	$ -
	Pavement	SY	48,958	21,405	$ 75.00	$ 5,277,232
	Earthwork	CY	180,423	21,892	$ 10.00	$ 2,023,150
	Signals	Each	4		$ 250,000.00	$ 1,000,000
					TOTAL	***$ 10,744,306***

Bid items subtotal			
Allowance for Unlisted Items (Contingencies)	of A	25%	$2,686,076
Drainage	of A+B	10%	$1,343,038
Signing/Striping/Traffic Control	of A-C	3%	$443,203
Construction Phasing / Traffic Control	of A-D	15%	$2,282,494
Force Account	of A-E	5%	$874,956
Mobilization	of A-F	8%	$1,469,926
Total of Construction Bid Items	**A thru G**		**$19,843,999**
Engineering, Design, CE, CM			
Construction Engineering & Indirects	of H	22%	$4,385,524
Planning/Environmental/Preliminary Design	of H	5%	$992,200
Final Design & permitting	of H	8%	$1,587,520
Utility Allowance	of H	5%	$992,200
Total Conceptual Project Cost	H thru N		**$27,801,442**

TSIOUVARAS SIMMONS HOLDERNESS
CONSULTING ENGINEERS

PROMONTORY PKWY

Item No	Description	Unit	Street	Ramp	Unit Cost	Total
	Bridge deck	total cost	28,651	-	$ 150.00	$ 4,297,642
	Walls	SF	-	-	$ 50.00	$ -
	Pavement	SY	50,351	25,437	$ 75.00	$ 5,684,093
	Earthwork	CY	153,910	30,904	$ 10.00	$ 1,848,143
	Signals	Each	4		$ 250,000.00	$ 1,000,000
					TOTAL	***$ 12,829,877***

Bid items subtotal			
Allowance for Unlisted Items (Contingencies)	of A	25%	$3,207,469
Drainage	of A+B	10%	$1,603,735
Signing/Striping/Traffic Control	of A-C	3%	$529,232
Construction Phasing / Traffic Control	of A-D	15%	$2,725,547
Force Account	of A-E	5%	$1,044,793
Mobilization	of A-F	8%	$1,755,252
Total of Construction Bid Items	**A thru G**		**$23,695,906**
Engineering, Design, CE, CM			
Construction Engineering & Indirects	of H	22%	$5,236,795
Planning/Environmental/Preliminary Design	of H	5%	$1,184,795
Final Design & permitting	of H	8%	$1,895,672
Utility Allowance	of H	5%	$1,184,795
Total Conceptual Project Cost	H thru N		**$33,197,964**

TSIOUVARAS SIMMONS HOLDERNESS
CONSULTING ENGINEERS

83RD AVE

Item No	Description	Unit	Street	Ramp	Unit Cost	Total
	Bridge deck	total cost	25,404	-	$ 150.00	$ 3,810,644
	Walls	SF	-	-	$ 50.00	$ -
	Pavement	SY	49,450	19,688	$ 75.00	$ 5,185,380
	Earthwork	CY	150,672	15,830	$ 10.00	$ 1,665,024
	Signals	Each	4		$ 250,000.00	$ 1,000,000
					TOTAL	***$ 11,661,048***

Bid items subtotal			
Allowance for Unlisted Items (Contingencies)	of A	25%	$2,915,262
Drainage	of A+B	10%	$1,457,631
Signing/Striping/Traffic Control	of A-C	3%	$481,018
Construction Phasing / Traffic Control	of A-D	15%	$2,477,244
Force Account	of A-E	5%	$949,610
Mobilization	of A-F	8%	$1,595,345
Total of Construction Bid Items	**A thru G**		**$21,537,159**
Engineering, Design, CE, CM			
Construction Engineering & Indirects	of H	22%	$4,759,712
Planning/Environmental/Preliminary Design	of H	5%	$1,076,858
Final Design & permitting	of H	8%	$1,722,973
Utility Allowance	of H	5%	$1,076,858
Total Conceptual Project Cost	H thru N		**$30,173,559**

TSIOUVARAS SIMMONS HOLDERNESS
CONSULTING ENGINEERS

65TH and 71st

Item No	Description	Unit	Street	Ramp	Unit Cost	Total
	Bridge deck	total cost	44,698	-	$ 150.00	$ 6,704,683
	Walls	SF	85,956	-	$ 50.00	$ 4,297,800
	Pavement	SY	72,991	17,243	$ 75.00	$ 6,767,503
	Earthwork	CY	401,883	30,904	$ 10.00	$ 4,327,873
	Signals	Each	4		$ 250,000.00	$ 1,000,000
					TOTAL	***$ 23,097,859***

Bid items subtotal			
Allowance for Unlisted Items (Contingencies)	of A	25%	$5,774,465
Drainage	of A+B	10%	$2,887,232
Signing/Striping/Traffic Control	of A-C	3%	$952,787
Construction Phasing / Traffic Control	of A-D	15%	$4,906,851
Force Account	of A-E	5%	$1,880,960
Mobilization	of A-F	8%	$3,160,012
Total of Construction Bid Items	**A thru G**		**$42,660,166**
Engineering, Design, CE, CM			
Construction Engineering & Indirects	of H	22%	$9,427,897
Planning/Environmental/Preliminary Design	of H	5%	$2,133,008
Final Design & permitting	of H	8%	$3,412,813
Utility Allowance	of H	5%	$2,133,008
Total Conceptual Project Cost	H thru N		**$59,766,892**

TSIOUVARAS SIMMONS HOLDERNESS
CONSULTING ENGINEERS

65TH AVE

Item No	Description	Unit	Street	Ramp	Unit Cost	Total
	Bridge deck	total cost	28,415	-	$ 150.00	$ 4,262,249
	Walls	SF	-	-	$ 50.00	$ -
	Pavement	SY	56,707	24,076	$ 75.00	$ 6,058,671
	Earthwork	CY	153,910	30,904	$ 10.00	$ 1,848,143
	Signals	Each	4		$ 250,000.00	$ 1,000,000
					TOTAL	***$ 13,169,063***

Bid items subtotal			
Allowance for Unlisted Items (Contingencies)	of A	25%	$3,292,266
Drainage	of A+B	10%	$1,646,133
Signing/Striping/Traffic Control	of A-C	3%	$543,224
Construction Phasing / Traffic Control	of A-D	15%	$2,797,603
Force Account	of A-E	5%	$1,072,414
Mobilization	of A-F	8%	$1,801,656
Total of Construction Bid Items	**A thru G**		**$24,322,359**
Engineering, Design, CE, CM			
Construction Engineering & Indirects	of H	22%	$5,375,241
Planning/Environmental/Preliminary Design	of H	5%	$1,216,118
Final Design & permitting	of H	8%	$1,945,789
Utility Allowance	of H	5%	$1,216,118
Total Conceptual Project Cost	H thru N		**$34,075,625**

TSIOUVARAS SIMMONS HOLDERNESS
CONSULTING ENGINEERS

47TH AVE

Item No	Description	Unit	Street	Ramp	Unit Cost	Total
	Bridge deck	total cost	16,293	-	$ 150.00	$ 2,443,924
	Walls	SF	26,997	-	$ 50.00	$ 1,349,850
	Pavement	SY	55,392	22,393	$ 75.00	$ 5,833,911
	Earthwork	CY	195,251	36,596	$ 10.00	$ 2,318,470
	Signals	Each	4		$ 250,000.00	$ 1,000,000
					TOTAL	***$ 12,946,155***

Bid items subtotal			
Allowance for Unlisted Items (Contingencies)	of A	25%	$3,236,539
Drainage	of A+B	10%	$1,618,269
Signing/Striping/Traffic Control	of A-C	3%	$534,029
Construction Phasing / Traffic Control	of A-D	15%	$2,750,249
Force Account	of A-E	5%	$1,054,262
Mobilization	of A-F	8%	$1,771,160
Total of Construction Bid Items	**A thru G**		**$23,910,663**
Engineering, Design, CE, CM			
Construction Engineering & Indirects	of H	22%	$5,284,257
Planning/Environmental/Preliminary Design	of H	5%	$1,195,533
Final Design & permitting	of H	8%	$1,912,853
Utility Allowance	of H	5%	$1,195,533
Total Conceptual Project Cost	H thru N		**$33,498,839**

TSIOUVARAS SIMMONS HOLDERNESS
CONSULTING ENGINEERS

35TH AVE

Item No	Description	Unit	Street	Ramp	Unit Cost	Total
	Bridge deck	total cost	25,404	-	$ 150.00	$ 3,810,644
	Walls	SF	26,880	-	$ 50.00	$ 1,344,000
	Pavement	SY	45,049	17,545	$ 75.00	$ 4,694,575
	Earthwork	CY	283,928	15,830	$ 10.00	$ 2,997,584
	Signals	Each	4		$ 250,000.00	$ 1,000,000
					TOTAL	***$ 13,846,803***

Bid items subtotal			
Allowance for Unlisted Items (Contingencies)	of A	25%	$3,461,701
Drainage	of A+B	10%	$1,730,850
Signing/Striping/Traffic Control	of A-C	3%	$571,181
Construction Phasing / Traffic Control	of A-D	15%	$2,941,580
Force Account	of A-E	5%	$1,127,606
Mobilization	of A-F	8%	$1,894,378
Total of Construction Bid Items	**A thru G**		**$25,574,099**
Engineering, Design, CE, CM			
Construction Engineering & Indirects	of H	22%	$5,651,876
Planning/Environmental/Preliminary Design	of H	5%	$1,278,705
Final Design & permitting	of H	8%	$2,045,928
Utility Allowance	of H	5%	$1,278,705
Total Conceptual Project Cost	H thru N		**$35,829,313**

COLORADO DEPARTMENT OF TRANSPORTATION

Johnstown-Greeley 6-Lane Widening and combined widening + Interchanges

		Larimer Pkwy	UPRR	CR 3	CR 13 + GWRR	CR 15	CR 17	34 business
Just widen to 6 lane		5100		4100	5300	5200	10400	5200
$1,500	**$54,000,000**	$7,700,000	$750,000	$6,200,000	$8,000,000	$7,800,000	$15,600,000	$7,800,000
approx $1,500 per ft. to widen to 6 lane								
Just Interchange	**$202,500,000**	$24,500,000	with CR 3	$70,500,000	$77,500,000	$0	$28,000,000	$2,000,000
	feet between interchanges	0	0	3300	2700	3600	8300	
Interchange + 6 Lane	$202,500,000	$24,500,000	with CR 3	$70,500,000	$77,500,000	$0	$28,000,000	$2,000,000
	$27,000,000			$5,000,000	$4,100,000	$5,400,000	$12,500,000	
	$229,500,000							

Greeley Expressway 6-Lane Widening and combined widening + Interchanges

		start at 257			**Promontory**		**95th**		**83rd**		**71st**		**65th**		**47th**		**35th**		**23rd**		**17th Ave.**
Just widen to 6 lane					10400		5500		6000		4500		5300		6900		5100		2100		2200
$1,500	**$72,000,000**				$15,600,000		$8,300,000		$9,000,000		$6,800,000		$8,000,000		$10,400,000		$7,700,000		$3,200,000		$3,300,000
approx $1,500 per ft. to widen to 6 lane																					
Just Interchange	**$171,500,000**				$33,000,000		$0		$30,000,000		$0	tied together	$34,000,000		$33,500,000		$36,000,000		$3,000,000		$2,000,000
											$32										
	feet between interchanges---->		2600			3700		4400		7762		1200		5000		3200		2400		1600	
Interchange + 6 Lane	interchanges	$171,500,000			$33,000,000		$0		$30,000,000		$0	tied together	$34,000,000		$33,500,000		$36,000,000		$3,000,000		$2,000,000
	widen between	$43,900,000	$3,900,000			$5,600,000		$6,600,000		$11,600,000		$1,800,000		$7,500,000		$4,800,000		$3,600,000		$2,400,000	
	Total	**$215,400,000**																			

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