

Planning and Environmental Linkages Study

CO 52 from CO 119 to CO 79

CDOT SA#21656

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Prepared for

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ACRONYMS AND ABBREVIATIONS

ACP	Access Control Plan
ATMS	Active Traffic Management Systems
BNSF	Burlington Northern Santa Fe Railway
CDOT	Colorado Department of Transportation
CIP	Capital Improvement Program
CMCA	Colorado Motor Carriers Association
CO	State Highway
Coalition	State Highway 52 Coalition
CFR	Code of Federal Regulations
CPW	Colorado Parks and Wildlife
CR	county road
DHV	design hourly volume
DRCOG	Denver Regional Council of Governments
EJ	Environmental Justice
FHWA	Federal Highway Administration
GHG	greenhouse gas
GIS	Geographic Information Systems
HazMat	hazardous materials
HOA	homeowners' association
HOV	High-occupancy vehicle
I-25	Interstate 25
ID	identification
IGA	intergovernmental agreement
ITS	intelligent transportation system
LOS	Level of Service
LTS	Level of Traffic Stress
MP	mile post
MPOs	Metropolitan Planning Organizations
NEPA	National Environmental Policy Act
PEL	Planning and Environmental Linkages
PI	Public Involvement
PMT	Project Management Team
ROW	right-of-way
STIP	State Transportation Improvement Program
STSP	Colorado Strategic Transportation Safety Plan
T&E	Threatened and Endangered Species
TIP	Transportation Improvement Plan
TRP	Transportation Regional Plan
TT	Technical Team
TWTL	Two-way Left-turn Lane
US 287	U.S. Highway 287
USACE	U.S. Army Corps of Engineers
USDOT	U.S. Department of Transportation
USFWS	U.S. Fish and Wildlife Service
VOH	Virtual Open House
WAH	Work at Home
WCR	Weld County Road
WOTUS	Waters of the U.S.

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LETTERS OF SUPPORT

Local agencies engaged during the Planning and Environmental Linkages (PEL) Study for the State Highway (CO) 52 Corridor between CO 119 and CO 79 expressed their support through either letter or resolution (**Appendix A**).

The Federal Highway Administration (FHWA) and Colorado Department of Transportation (CDOT) agree that this study complies with the FHWA PEL process. The project team has submitted answers to the FHWA PEL Questionnaire to demonstrate compliance with this process. The process allows for PEL recommended projects to move forward for implementation under the National Environmental Policy Act (NEPA) documentation. Other resource agencies with jurisdiction along the corridor were provided an opportunity for feedback and comment throughout the process and have duly expressed their willingness to provide feedback and comment on future NEPA processes associated with specific corridor projects.

Recommended projects may be implemented in the future along the corridor as funding becomes available. CDOT will work cooperatively with local agencies during future project implementation to follow the NEPA process and to identify funding across multiple resources. Based on the results of the PEL, it is likely that several projects can move forward under NEPA Categorical Exclusions.

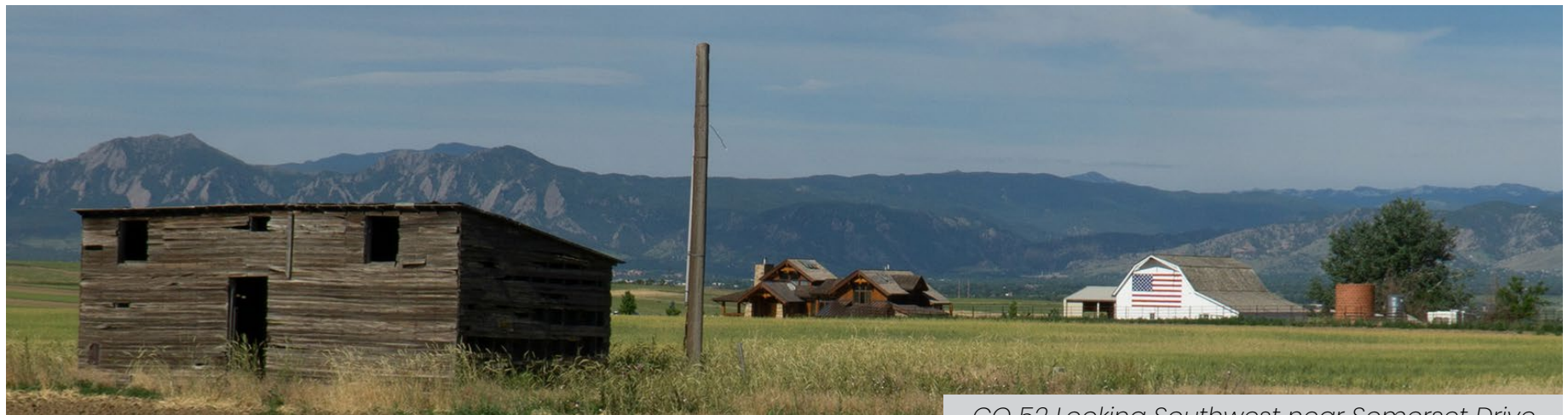
1.0 // INTRODUCTION

The Colorado Department of Transportation (CDOT) prepared a Planning and Environmental Linkages Study (PEL) and Access Control Plan (ACP) for the Colorado State Highway (CO) 52 corridor. CO 52 is a critical transportation corridor in northeastern Colorado providing east-west connectivity for the region. The PEL provides an understanding of the transportation problems in the corridor, a collaboratively developed vision for the future, and potential projects to implement that vision. CDOT and PEL partners initiated this study to explore a range of improvements for the corridor. The study will support CDOT, the local agencies, stakeholders, and the public to determine improvements that should be made and estimate a corridor preservation footprint for future projects. The project limits extend approximately 42 miles (milepost [MP] 0.00 to MP 41.94) along CO 52, from CO 119 in Boulder County to CO 79 east of Hudson in Weld County (Figure 1-1).

An increase in development along CO 52 helped local agencies and CDOT recognize the need to develop an ACP in addition to the PEL. An ACP evaluates access locations in accordance with the State Highway Access Code along a highway corridor to accommodate the anticipated increase in population and/or change in land uses. The CO 52 ACP designates future access types and locations to improve safety and mobility for the traveling public. Although the PEL

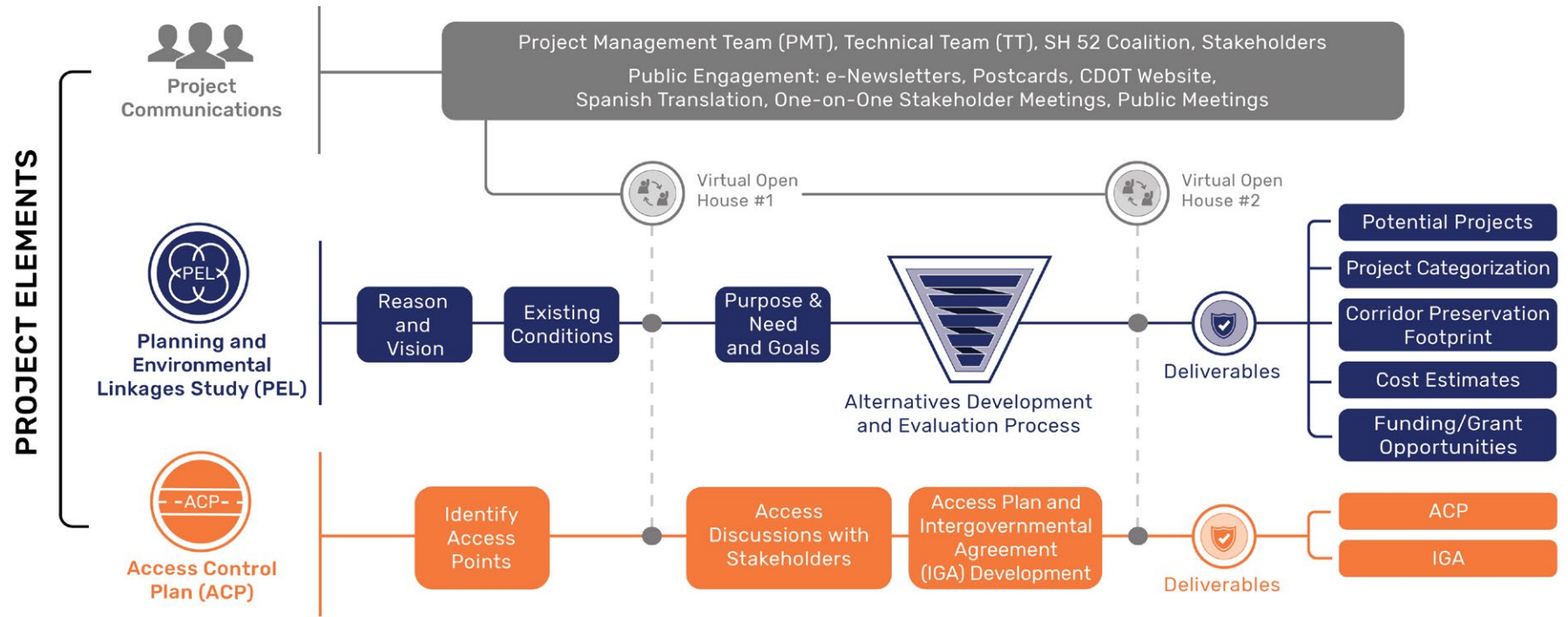
and ACP share common corridor information and were developed along the same timeline, the ACP is a separate document which requires adoption by local agencies, via Intergovernmental Agreement (IGA), while the PEL illustrates local agency coordination through letters of support (Appendix A). Figure 1-2 illustrates both the parallel processes used to develop the PEL and ACP and also the overall delivery process for this study.

Figure 1-1 | Regional Context Map



CO 52 Looking Southwest near Somerset Drive

Figure 1-2 | CO 52 PEL & ACP Project Delivery



Click on the components of the PEL and ACP above to move directly to the appropriate section.



Ducks at Banner Lakes State Wildlife Area

1.1 PLANNING AND ENVIRONMENTAL LINKAGES STUDY (PEL)

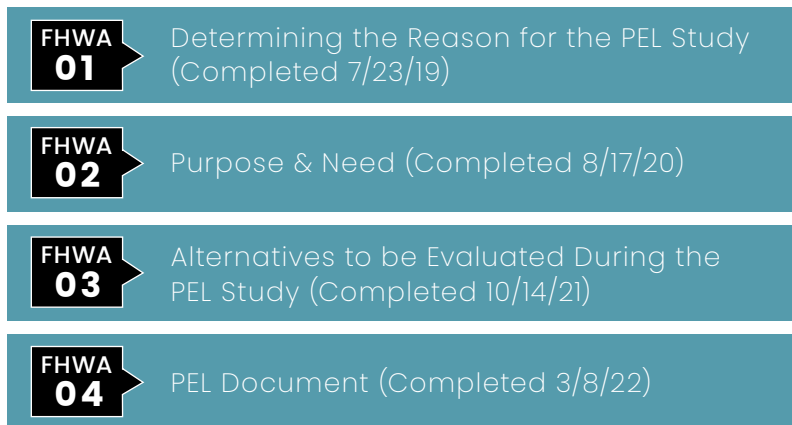


PELs are a Federal Highway Administration (FHWA) initiative that were created to support transportation decision-makers when considering environmental, community, and economic goals early in the planning process. Utilizing a PEL streamlines National Environmental Policy Act (NEPA) processes for future transportation projects (FHWA, 2015). Early in the PEL process, stakeholders and other project proponents identify a corridor vision, purpose, and needs leading to development of recommended transportation alternatives that reflect the needs and goals.

CDOT signed a Partnering Agreement with FHWA and several other federal and state agencies to encourage the use of a PEL approach to expedite transportation project implementation under NEPA, while adhering to agency procedures for project reviews and comments (CDOT, 2009).

FHWA Coordination

There are four required check-in meetings with FHWA at the following milestones of the PEL process:



For more information on these check-in points, please see **Appendix C** and **Appendix D**.

1.2 ACCESS CONTROL PLAN (ACP)



An ACP is a long-range planning document that designates preferred access locations along a highway corridor in accordance with the State Highway Access Code to improve safety and mobility for the traveling public. ACPs for state highways are binding agreements adopted by CDOT and the local authorities through an intergovernmental agreement (IGA). Each of the signatories of the IGA agree to abide by the ACP. ACPs are living documents that can be amended through the amendment process specified in the IGA, which allows for a change to be requested and voted on by all signatories to the IGA.

Developing an ACP provides CDOT and the local authorities an opportunity to develop a single transportation plan for a section of highway that considers multiple access points as a network rather than as individual access points. Corridor-specific considerations such as other local planning documents, intersection spacing, traffic movements, circulation, land use, topography and alternative access opportunities may be considered in developing the plan. ACPs do not define capacity improvements, off-network improvements, or funding sources for access improvements. However, in combination with a PEL, these elements can be considered in conjunction with the ACP.

ACP implementation is a coordinated effort between CDOT, the local agency, and the property owner. This typically occurs when there is a land use change to the property or there is a change that increases traffic volumes by more than 20%. Existing access changes are only triggered by events such a development, redevelopment, or a major highway project. When this occurs, CDOT reviews the access to determine if the future change shown in the ACP should be implemented. At this point, there would be discussions with local jurisdictions and the property owner prior to implementing any change in access.



The PEL and ACP are separate but related processes. For the CO 52 corridor, these processes are coordinated so they can share information and decisions about access for future conditions. The shared components between the PEL and ACP include elements like public and stakeholder engagement, traffic operations, and partnership opportunities. **Figure 1-3** below depicts the components and outcomes of the PEL and ACP.

The ACP and ACP Report can be found in **Appendix B**. The ACP Report discusses:

- Summary of relevant existing conditions data
- Summary of traffic modeling and analysis
- Methods used to collect public input
- Access data collection and recommendations

The CO 52 ACP IGA was formalized between CDOT and the agencies along the corridor in the Fall of 2021. Successful implementation of the ACP requires continued coordination and cooperation between these agencies.

Figure 1-3 | CO 52 PEL & ACP Relationship



1.3 PROJECT LIMITS AND LOGICAL TERMINI

CO 52 is located in northeastern Colorado. The highway is a critical east-west regional connection for corridor users and commuters traveling to and from Boulder County to communities east in Weld County. It is one of the few east-west routes that provides a critical connection between CO 119, I-25, US 85 and I-76. The project limits extend from CO 119 in Boulder County to CO 79 east of Hudson in Weld County, approximately 42 miles in length (from MP 0.00 to MP 41.94) (Figure 1-4).

FHWA 01 On July 23, 2019, CDOT and FHWA held a pre-scoping meeting to confirm that a PEL is the appropriate study method, and that the project logical termini should be CO 119 on the west and CO 79 on the east (Figure 1-4). Meeting participants determined that these limits met FHWA guidance on criteria to frame selection of transportation improvements (23 CFR 771.111[f]). The selected corridor connects logical termini to address environmental matters on a broad scope, provides independent utility, and would not require additional study context. The Logical Termini memorandum can be found in **Appendix F**.

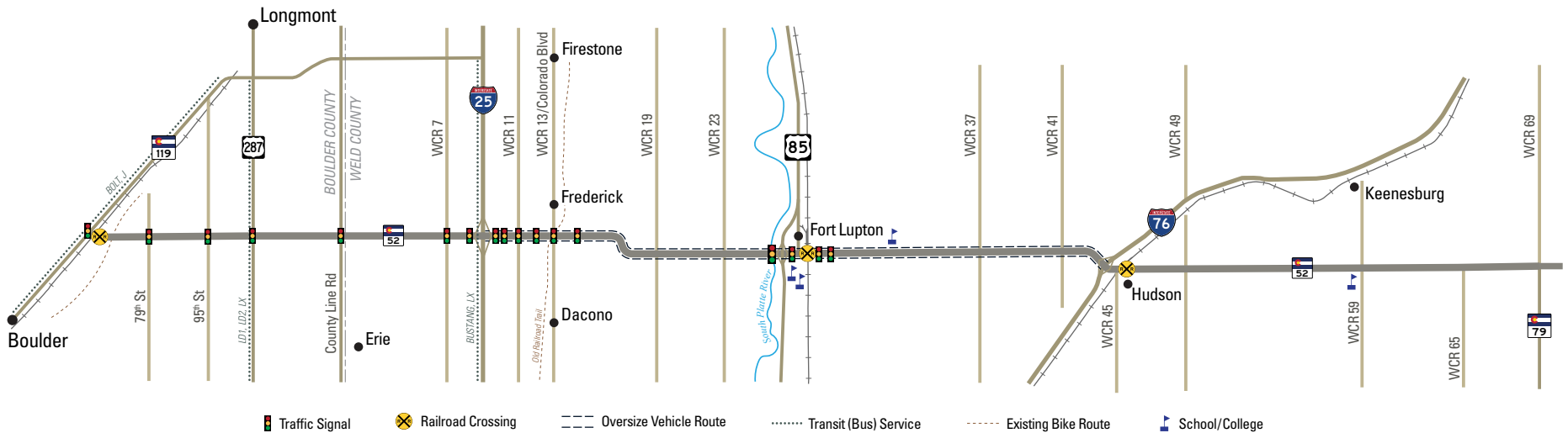
FHWA Coordination Point #1 provides an opportunity for FHWA to give input on the reason for the study and also to help define the logical termini and independent utility.

Defining logical termini and independent utility mean that a project would be functional even in the absence of other projects in the area. This lays the appropriate groundwork for future NEPA analyses.

According to NEPA and *Transportation Decisionmaking: The Development of Logical Project Termini* (FHWA, 1993), logical termini and independent utility can be defined as:

- Rational end points for a transportation improvement
- Rational geographic extent for a review of the environmental impacts by resource

Figure 1-4 | Corridor Map



1.3.1 Corridor Segments

In order to better analyze the 42-mile-long corridor, the study team divided the corridor into meaningful segments. Segment divisions considered political boundaries, community characteristics, and land use similarities (Figure 1-5). Other than Segment 2, which includes the communities of Erie, Frederick, and Dacono, the other segments only include one community along the corridor allowing community and county desires to be accommodated in the context of the overall corridor vision.



Entrance to the Wildlife Sanctuary at WCR 53

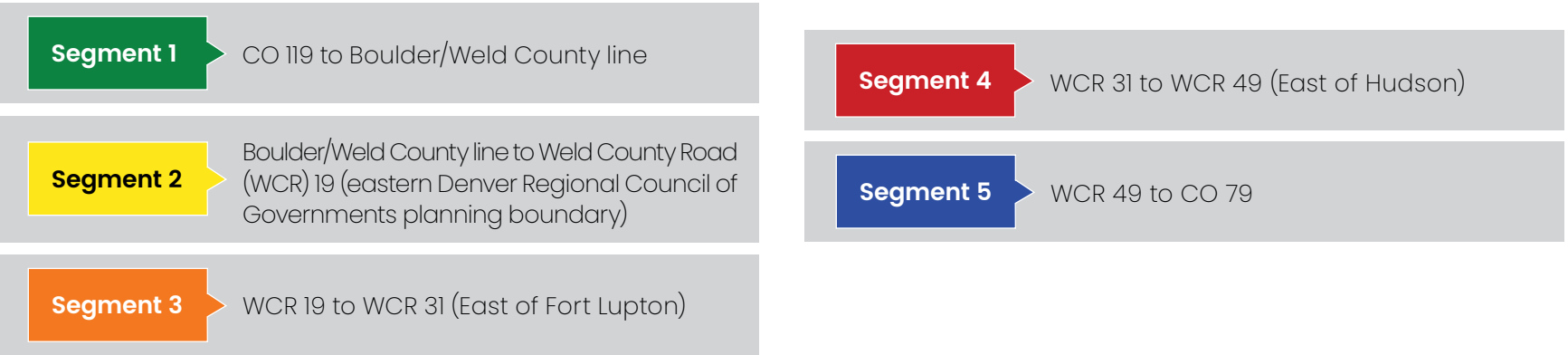


Figure 1-5 | CO 52 Segments



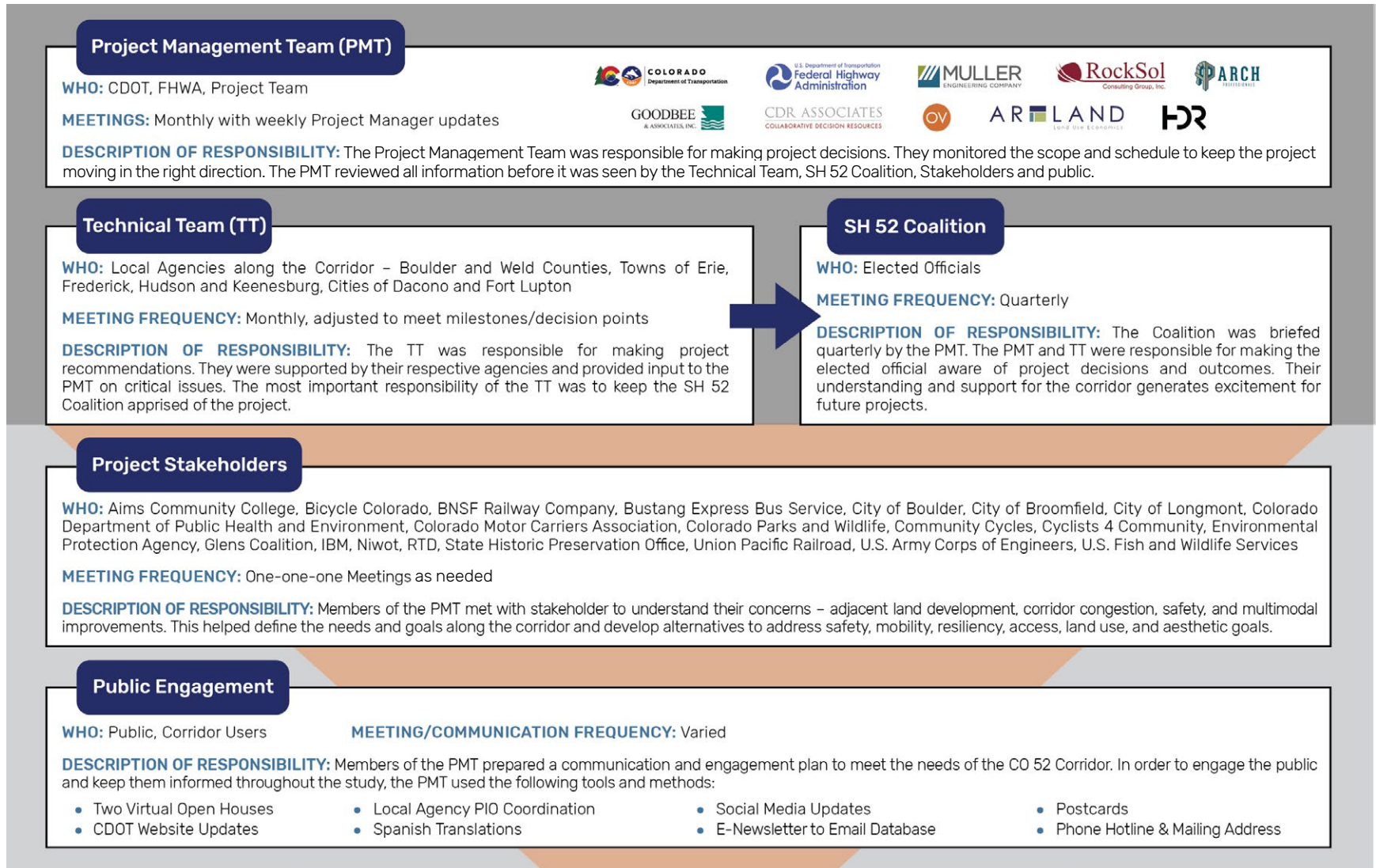
1.4 CO 52 PEL AND ACP PROJECT COMMUNICATIONS

FHWA and CDOT were committed to involving federal, state, and local agencies and the public throughout the CO 52 PEL and ACP processes. The goal of the Project Management Team (PMT) was to reach consensus amongst stakeholders through the development of the reason and vision; building towards the acceptance of the

evaluation criteria and recommended alternatives on CO 52. Local Agency involvement was emphasized throughout the PEL and ACP processes and feedback was solicited from the public at key decision points to foster support for corridor recommendations.

The communications structure showing the roles and responsibilities of the project participants is shown in **Figure 1-6** below.

Figure 1-6 | Project Communications



1.4.1 State Highway (SH) 52 Coalition

In 2018, local agencies recognized that increased growth and development along the corridor were contributing to congestion and safety issues. Realizing there was a need for coordination in addressing these concerns, these agencies formed the SH 52 Coalition.

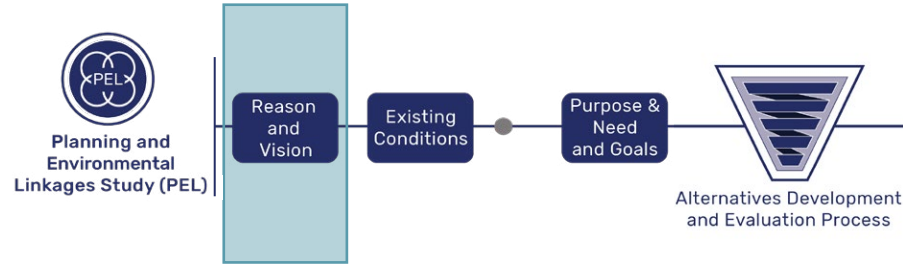
The SH 52 Coalition is made up of representatives from Boulder and Weld Counties, as well as the Towns of Erie, Frederick, Hudson, Keenesburg, and the Cities of Dacono and Fort Lupton.

Through their work on the SH 52 Coalition, these local agencies were instrumental in identifying the need for a cohesive plan along CO 52 and a corridor preservation footprint to better communicate with developers. They were integral to the development of the PEL and ACP by providing input and feedback throughout the process.



CO 52 East of 79th Street Looking West

1.5 REASON AND VISION



The PMT worked with local agencies and other stakeholders early in the PEL process to identify the reason for the PEL and overall vision for the corridor. Development of a corridor vision unified the PMT, local agencies, and stakeholders. The reason for the PEL and vision for the CO 52 corridor are shown in **Figure 1-7**.

For more information regarding the development of Reason and Vision, please see **Appendix F**.

Figure 1-7 | Reason and Vision

REASON

Why is this PEL being conducted?

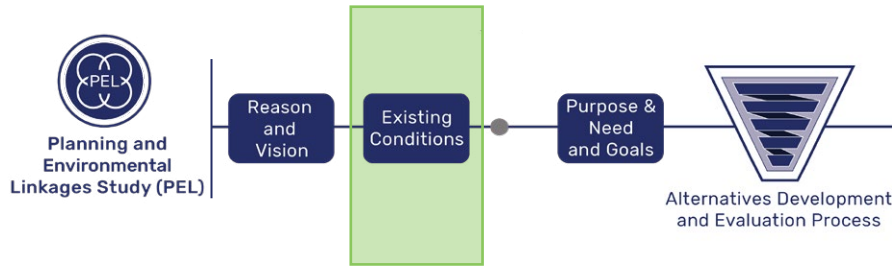
The reason for conducting this PEL is to complete a high level study of CO 52 to better understand transportation issues and environmental resources along the corridor. It will support CDOT, the local agencies, stakeholders, and the public to determine improvements that should be made and estimate ROW preservation for future projects. This study will prioritize a list of short and long term projects that will benefit CO 52 in both Boulder and Weld Counties.

VISION

What is the vision for the CO 52 corridor?

The vision for CO 52 is to improve safety and travel time reliability along the corridor for all modes and accommodate future growth plans of the local communities.

2.0 // EXISTING CONDITIONS OVERVIEW



The PEL process includes a review of the existing corridor conditions which has been included as Appendix E: Existing Conditions Report to this PEL document. There were four main sections developed to provide vital context on the current conditions of the corridor:

1. Introduction - Description of the Study Area and Stakeholders
2. Planning Context - Review of local agency existing planning efforts and land use data
3. Transportation Context - Describes the existing roadway characteristics and conditions
4. Environmental Overview - Review of resources in the corridor and identified future design and project implications



Pedestrians along CO 52 and Aggregate Blvd

2.1 PLANNING CONTEXT

The project team reviewed over 20 existing plans prepared by both Boulder and Weld Counties and local agencies across the length of the corridor. This was a critical step to better understand what was important to each community and what future plans they had for the corridor. This also helped the project team determine how potential CO 52 improvements may be compatible with or may contradict these existing plans.

Additionally, local agencies were interviewed to talk about their development plans especially related to near term growth. The review of current land use indicated that agricultural land is predominant throughout the corridor. Boulder County has a significant amount of Public Lands/Open Spaces outside of incorporated cities. Future land use data indicated that residential and commercial development is primarily concentrated within and near incorporated towns/cities around major interchanges. Some low-density residential development is typically allowable in the agricultural areas.



2.2 TRANSPORTATION CONTEXT

Roadway characteristics, traffic operations, travel demand modeling, socioeconomic projections, safety, transit, railroad crossings, freight, and structures of the corridor were evaluated in a review of the existing conditions of CO 52. A detailed mapbook can be found in **Appendix E** ([Appendix A Roadway Characteristics Map](#)) detailing 42-miles of corridor characteristics.

A brief description of the general roadway attributes is described below and shown in **Figure 2-1 Existing Lanes**.

Project Limits - CO 119 to CO 79

Length of Study Corridor - 42 miles

Modes - Includes vehicular, bicycle, pedestrian, and freight rail facilities

Speed - The posted speed limit is generally 55 miles per hour (mph) west of WCR 19 and 65 mph east of WCR 19. The speed limit drops to 35 mph through Fort Lupton and 30 mph through Hudson.

Number of Lanes - Generally, travel lanes throughout the study area are 12-ft wide. CO 52 is primarily two through lanes with a double yellow centerline or a yellow dash line for passing areas. The corridor widens to 4 lanes for roughly 3/4-mile through the I-25 interchange as well as at major intersections west of I-25 and through the WCR 13 intersection east of I-25.

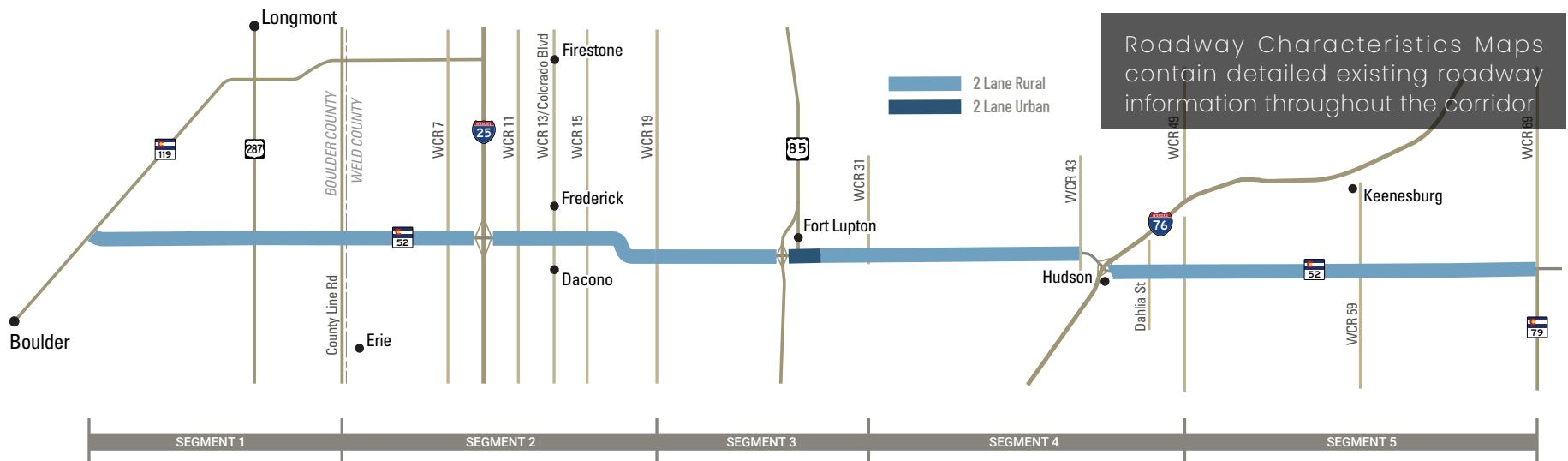
Intersections - At many intersections, CO 52 includes auxiliary lanes for right- and left-turn movements. Specific intersection locations are described in Section 4.9 Intersection Improvements.

Shoulders - Widths vary between 0 feet and 8 feet along the corridor. Shoulders greater than 4 feet are common through the western extents, but drop to 2 feet near WCR 31 and there is little to no shoulder east of Hudson.

Access Control - CO 52 is not currently a limited access highway with many uncontrolled accesses throughout the corridor. An IGA and ACP Report (Appendix B) has been developed in parallel with this PEL study.

Surrounding Environment - Includes a mix of suburban development and open space in Boulder County (western limits) and a mix of suburban development and agricultural uses in Weld County (eastern limits).

Figure 2-1 | Existing Lanes



2.2.1 Bike and Pedestrian Infrastructure

Bicycle and pedestrian facilities and operations were analyzed by dividing the corridor into three areas: CO 119 to County Line Road within Boulder County, County Line Road to WCR 37 within Weld County, and WCR 37 to CO 79 within Weld County. Bicycle analysis involved a desktop review and a Bicycle Level of Traffic Stress analysis. Pedestrian analysis included a desktop review of plans, online resources, and available GIS data from local and regional agencies. Stakeholder input was collected to gain an understanding of local priorities for bicycle and pedestrian mobility and needs.

2.3 ENVIRONMENTAL CONTEXT

Environmental resources considered in this study included:

Floodplains and floodways	Paleontological resources
Wetlands and Waters of the U.S.	Threatened and Endangered species
Water quality	Parks, trails, open spaces
Vegetation and noxious weeds	Wildlife and waterfowl refuges
Species of special concern	Environmental justice
Migratory birds and eagles	Utilities
Traffic noise	Visual resources
Hazardous materials	Prime and unique farmland
Historic resources	Air quality

These resources were assessed through desktop reviews of available data within the context of the regulatory framework. From this, NEPA scoping recommendations and project design and schedule implications were discussed for each resource. Even though the corridor contains diverse environmental resources, it is anticipated that identified projects can be cleared with Categorical Exclusions. In addition to the NEPA clearance process, other permitting processes were identified.



Separated Multiuse Path crossing under CO 52, west of 79th Street

2.4 SUMMARY OF EXISTING CONDITIONS DATA

The Existing Conditions Report documented the roadway characteristics for the entire corridor. Data collected plus conversations with the local agencies, highlighted the roadway context changes moving from west to east. **Table 2.1** below documents the detailed existing conditions, specific to each of the five corridor segments. This analysis supported the identification of improvements needed to serve address mobility, safety, and multimodal concerns along the developing CO 52 corridor.



CO 52 & CO 119 Looking West

Table 2.2 | Summary of Existing Conditions

	ROADWAY/GEOMETRICS	TRAFFIC/SAFETY	ENVIRONMENTAL/PLANNING
<p>Segment 1: CO 119 to Boulder/Weld County Line</p>	<ul style="list-style-type: none"> 2% of Eastbound shoulders are less than 4 feet wide 6% of westbound shoulders are less than 4 feet wide Limited right-of-way (ROW) is available for additional through lanes 	<ul style="list-style-type: none"> Westbound bottleneck congestion at CO 119 Eastbound bottleneck congestion at US 287 Westbound bottleneck congestion at County Line Road Unreliable travel time between CO 119 and US 287 Community desire for bicycle facilities High crash location (LOSS IV) at US 287 Some local agency support for transit 	<ul style="list-style-type: none"> Water features & floodplains Bald eagle nest site Irrigation ditches Oil & gas wells Sanitary sewer Superfund historic landfill Parks, trails, open space (Section 6(f)) Historic officially eligible/supporting segments/ listed resources 24 & 30-inch waterlines High pressure gas line
<p>Segment 2: Boulder/Weld County Line to WCR 19 (East of Dacono)</p>	<ul style="list-style-type: none"> Reverse horizontal curves & superelevation (MP 14-16) Structure within clear zone (MP 16.4) Existing pavement in poor condition (MP 11.3-16.4) 	<ul style="list-style-type: none"> Bottleneck congestion at/near I-25 interchange Unreliable travel time through segment (especially westbound) Severe crash pattern at intersections in Dacono (fatal at Colorado, Cherry, Forest) (LOSS IV) Crash pattern through reverse curves, including fatal head-on crash 45-85% growth by 2045 Community desire for bicycle facilities 	<ul style="list-style-type: none"> Historic officially eligible/supporting segments/listed resources Mule deer crossing area Oil & gas wells Irrigation ditches Parks, trails, open space (Section 6(f))

Table continued on next page

	ROADWAY/GEOMETRICS	TRAFFIC/SAFETY	ENVIRONMENTAL/PLANNING
Segment 3: East of Dacono (WCR 19) to east of Fort Lupton (WCR 31)	<ul style="list-style-type: none"> Offset intersection (Grand Ave, MP 20.05) Potential vertical curve sight distance issue (MP 21.5) Existing pavement in poor conditions (MP 20.5 - 22) 19% of westbound shoulders are less than 4 feet wide 25% of eastbound shoulders are less than 4 feet wide 	<ul style="list-style-type: none"> Bottleneck/congestion at US 85 through Fort Lupton High intersection density through Fort Lupton requires significant speed reduction Significant increase in non-intersection crashes through Fort Lupton High crash location (LOSS IV) at WCR 19 and WCR 37 intersections 60-85% growth by 2045 	<ul style="list-style-type: none"> Water features and floodplains Irrigation ditches Oil and gas wells 48-inch storm sewer Parks, trails, open space (Section 6(f)) The Fort Lupton Transportation Plan (2018) considered a bypass to lessen truck traffic through City
Segment 4: East of Fort Lupton to east of Hudson (WCR 49)	<ul style="list-style-type: none"> Multiple intersection improvements identified Pedestrian crossings in Hudson 83% of eastbound & westbound shoulders are less than 4 feet wide Potential vertical sight distance issue (MP 28.7) 	<ul style="list-style-type: none"> High speed limit increases risk at unsignalized side streets without auxiliary lanes Severe crash location at WCR 37 & WCR 41 intersection Higher proportion of truck traffic High severity non-intersection crashes west of Hudson 35-75% growth by 2045 	<ul style="list-style-type: none"> Historic eligible elements/supporting segments/listed resources Mule deer crossing area Oil & gas wells Irrigation ditches Parks, trails, open space (Section 6(f))
Segment 5: East of Hudson (WCR 49) to CO 79	<ul style="list-style-type: none"> 100% of eastbound & westbound shoulders are less than 4 feet wide Vertical sight distance issues at 3 locations (MP 32.3, MP 33.9, MP 34.8) Evaluate ROW & access needs for future development at northwest corner of CO 52 & WCR 59 	<ul style="list-style-type: none"> High speed limit increases risk at unsignalized side streets without auxiliary lanes Crashes at WCR 59 intersection under public scrutiny due to proximity to school Higher proportion of truck traffic 	<ul style="list-style-type: none"> Water features and floodplains Mule deer crossing areas Oil and gas wells Clandestine Drug Laboratory Facility registry system

3.0 // PURPOSE & NEED AND GOALS

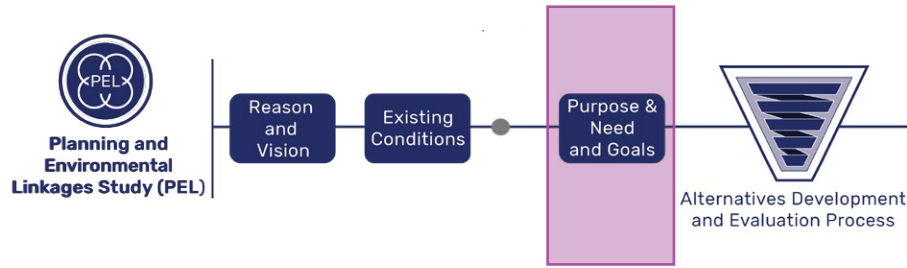


Figure 3-1 | Purpose & Need Development

3.1 PURPOSE & NEED

FHWA 02 The second milestone in the FHWA PEL process is to identify the Purpose & Need for future transportation corridor improvements. The Purpose & Need provides justification for the project and drives the development of evaluation criteria for alternatives. The reason and vision, in conjunction with the Existing Conditions Report, were the catalyst for the development of the Purpose & Need for the corridor (Figure 3-1).

The Purpose & Need was informed by existing transportation conditions identified throughout the corridor as detailed in the Existing Conditions Report. Once the data in the corridor was collected, the project team developed a draft Purpose & Need statement and solicited feedback from the Technical Team before soliciting support from the SH 52 Coalition. The Purpose & Need memo is included in **Appendix C**.

Transportation improvements are needed to:

Increase Safety	Increased highway access from continued development, high percentages of truck traffic, poor pedestrian and bicycle facilities, and geometric issues have resulted in safety concerns along the corridor.
Accommodate Increased Travel and Freight Demand	Traffic congestion from additional commuter and freight traffic has decreased travel time reliability. Increased corridor use requires roadway improvements to accommodate the movement of people, goods, and services.
Support Multimodal Connections	Stakeholder input and prior planning efforts identified the need to improve north-south pedestrian mobility and support enhanced parallel connectivity.

PURPOSE AND NEED

What are the greatest transportation needs of the corridor?

The purpose of the recommended transportation improvements is to increase safety, accommodate increased travel and freight demand, and support multimodal connections.

3.2 GOALS

Goals were developed collaboratively with the PMT and local agencies using valuable input from the SH 52 Coalition, Technical Team, and Stakeholder One-on-One Meetings (**Figure 3-2**). Goals carry less emphasis in a PEL, but they serve as differentiators during the alternatives evaluation process when other performance measures are similar. They also help define context sensitivity.



CO 52 West of WCR 55 looking West

Figure 3-2 | Goals Development

GOALS

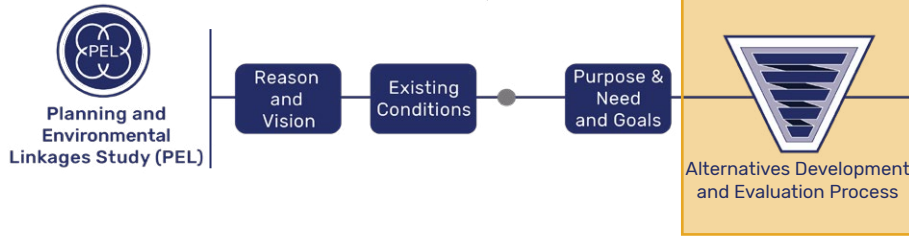
What additional items need to be addressed?

The project goals should consider the natural and built environment, support local and regional planning efforts, identify estimated ROW needs, and accommodate future technology.

The recommended improvements should:

Consider the natural and built environment	Improvements should minimize impacts to documented environmental resource constraints to the greatest extent possible. Environmental resource constraints documented in the Existing Conditions Report included wetlands, stream channels, floodplains, potential habitat for threatened and endangered species and general wildlife, underground and above ground utilities, historic resources, and hazardous materials. Improvements should consider the built environment through a context-sensitive approach to land uses and character along the corridor that should consider both function and aesthetic of the surrounding land uses and character.
Support local and regional planning efforts	Improvements should consider planning efforts by recognizing spatial recommendations for future and proposed local agency plans, such as multimodal connections, adjacent multiuse paths, and streetscape plans.
Identify estimated ROW needs	Recommended project alternatives will be used to define the estimated ROW needs to support future growth along the corridor. Although a separate and concurrent process, the ACP will show the estimated Corridor Preservation Footprint developed during the PEL process to support local agencies in land use decision making.
Accommodate future technology	Improvements should consider that increases in development and traffic volumes will result in changes in implementation and advancement of technology along the corridor. Transportation technology is anticipated to change within the next 20 to 30 years and improvements should consider the potential for technological advancement.

4.0 // ALTERNATIVES DEVELOPMENT AND EVALUATION



Development, evaluation, and refinement of alternatives focused on identifying alternatives that meet Purpose & Need for the corridor and that match corridor context.

4.1 EXCLUSION AREAS

There are four areas that have been excluded from this study. They either have current studies underway, existing NEPA documents, or are under construction. For these areas, recommendations and alternatives will be limited to the table shown in **Figure 4-1**. Although these areas have been excluded, it's important to note that the traffic modeling and assessment of access points have been analyzed for the entire study length. This approach allowed for a comprehensive assessment of the existing and future corridor conditions.

FHWA 03 The following section describes the methods used to develop and evaluate alternatives along the CO 52 PEL corridor. The alternatives produced and evaluated include a wide range of potential improvements encompassing roadways, intersections, access points, bicycle and pedestrian facilities, and transit.

Figure 4-1 | Exclusion Areas



Vicinity	CO 52 PEL/ACP Excluded Areas	Previous Documents	CO 52 PEL Recommendations
	CO 119 to just West of 71 st Street	<ul style="list-style-type: none"> CO 119 Multimodal Study APEX/Consortium completing traffic study SH 119 Bikeway & Mobility projects 	PMT to make Segment 1 recommendations based on traffic. Alternative between CO 119 and just west of 71 st Street will be left for new design teams.
	Southbound frontage road to Northbound frontage road	<ul style="list-style-type: none"> I-25 North EIS Recommendations: Frederick/Dacono Express Bus Station Widen CO 52 (6-lanes) over I-25 Pedestrian Bridge Crossing 	Make corridor recommendation up to frontage roads. Check they tie into I-25 recommendations.
	Western on/off ramp to Eastern on/off ramp	<ul style="list-style-type: none"> US 85 PEL Recommendations: Pedestrian Improvements to complete sidewalk network under US 85 	PMT to make corridor recommendations for CO 52. Recommended improvements are not expected to impact operations on US 85.
	WCR 43 to Dahlia St	<i>Under Construction</i>	Segment 4 recommendations up to construction limits.

4.2 STATE AND REGIONAL GUIDANCE

After the finalization of the Existing Conditions Report, additional regional guidance was reviewed and incorporated into the alternatives process where applicable. A summary of how this study relates to recent state and regional guidance regarding reduction of Greenhouse Gas (GHG) emissions and transportation safety is provided below.

4.2.1 Colorado Roadmap to GHG Pollution Reduction

Recent legislation and state agency policy has set the path toward reducing greenhouse gas emissions through transportation measures. These include Colorado House Bill 19-1261, the *Greenhouse Gas Pollution Reduction Roadmap* (Roadmap) (Colorado Energy Office, 2021), and Colorado Senate Bill 21-260 Sustainability Of The Transportation System. The *Pollution Reduction Planning for Transportation: Briefing Update* (CDOT, 2021) highlights CDOT initiatives being considered to implement the recent greenhouse gas emissions legislation.

In 2019 Colorado legislature passed Colorado House Bill 19-1261, the [Climate Action Plan to Reduce Pollution](#), which set ambitious greenhouse gas emissions reduction targets to combat climate change. This bill enabled Colorado to establish itself as a global leader on climate policy.

The Roadmap describes actions Colorado has taken to address climate change, analyzes the current trajectory for greenhouse gas emissions, and presents a suite of actions the state can pursue in the near term to make progress toward the Colorado House Bill 19-1261 goals. The goals for achieving GHG emissions reduction targets include increasing the number of electric vehicles and reducing the growth in vehicles miles traveled. To reduce vehicle miles traveled, the Roadmap suggests changing the way development decisions are made regarding land use, housing, and infrastructure, which can enhance accessibility, cut pollution, and reduce the need to drive.

The sum of emissions reductions from all of the strategies, once fully developed, is designed to meet the 2030 transportation sector reduction targets set in the Roadmap and to align with the 2050 goals adopted in Colorado House Bill 19-1261.

In June 2021, Governor Polis signed Colorado Senate Bill 21-260, *Sustainability Of The Transportation System*, into law. The bill includes an extensive transportation fee and spending measure, with more than \$5 billion to be spent over the next decade. The bill emphasizes electric vehicle adoption and expansion of mass transit (Durango Herald, 2021).

In response to the new legislative language in Colorado Senate Bill 21-260 and months of stakeholder discussions, CDOT proposed formal standards and rules for pollution reduction planning to the Colorado Transportation Commission. This would amend the current state planning rules in order to reduce pollution and greenhouse gas emissions levels for transportation.

These GHG emission strategies will be more applicable as long-term planning projects are implemented along the corridor. Transportation infrastructure planning, funding, engineering, and construction can take several years, and it is imperative that the implementation process is consistent with Colorado House Bill 19-1261, the Roadmap, and Colorado Senate Bill 21-260. The PEL recommendations for improvements are generally provided at a high level, without much detail on the design of the improvements.

Projects that result from the recommendations set forth in the CO 52 PEL Report will be subject to applicable federal and state air quality and GHG emissions environmental regulations and processes, including those established in Colorado House Bill 19-1261, *Greenhouse Gas Pollution Reduction Roadmap*, and Colorado Senate Bill 21-260, as applicable. The recommendations of this PEL do not preclude mitigation of greenhouse gas impacts.

A full review of these initiatives can be found in **Appendix F**.

Colorado Senate Bill 21-260 also discusses consideration and incorporation of protections for Disproportionately Impacted Communities. Future projects will need to consider environmental justice analyses for individual projects during subsequent preliminary engineering and environmental processes. Environmental justice analysis is typically a subset of the social and economic resources analyses completed during NEPA. In regards to this PEL, socio-economic analyses were completed during existing conditions. More information about the socio-economic analyses completed for this PEL can be found in the Existing Conditions Report (**Appendix E**).

4.2.2 Transportation Safety & Vision Zero

Transportation safety policy in Colorado focuses on Vision Zero; a strategy to eliminate all traffic fatalities and severe injuries, while increasing safe, healthy, equitable mobility for all. Recent safety policy initiatives include the CDOT’s *Whole System, Whole Safety strategy* (CDOT, 2019–2020) and the state’s *2020–2023 Colorado Strategic Transportation Safety Plan (STSP)* (CDOT, 2020).

Whole System, Whole Safety is a CDOT strategy launched in 2019 that includes both current and planned safety efforts to help reduce traffic injuries and deaths. This initiative takes a systematic, statewide approach to safety combining the benefits of CDOT’s programs that address driving behaviors, the built environment, and the organization’s operations. The goal is to improve the safety of Colorado’s transportation network by reducing the rate and severity of crashes and improving the safety of all transportation modes. This program supports the overall strategy for Vision Zero (Vision Zero Network).

The *2020–2023 CSTSP* established a collaborative and shared vision and mission for transportation safety in Colorado. The STSP identifies unique, yet achievable, strategies and goals to minimize fatalities and

serious injuries statewide. It relies on the premise that every agency and jurisdiction has a role in enhancing transportation safety to the benefit of our citizens and travelers for any transportation mode and facility in Colorado through policy, planning, funding design and construction, operations, and maintenance.

Recent state legislation related to safety includes Colorado Senate Bill 21-260, *Sustainability of the Transportation System*. This legislation establishes the Freight Mobility and Safety Branch in the Division of Transportation Development, which is designed to plan, design, and implement programs and projects that enhance freight mobility and safety within the state.

The PEL incorporates safety as a part of the Purpose & Need for the project and as part of the evaluation criteria for the alternatives evaluation process. The consideration and prioritization of safety-oriented performance metrics aligns future improvements with the vision and mission set forth in the STSP, particularly the “Prioritize Safety in Transportation Planning, Facility Design, and Project Selection” strategy.

A full review of these initiatives and how they are applicable to the CO 52 PEL can be found in **Appendix F**.



UP Railroad Crossing in Fort Lupton

4.3 SUPPLEMENTING THE EXISTING CONDITIONS REPORT

Additional corridor evaluations were conducted to further understand the corridor conditions along CO 52. Memos were created to document each of these additional evaluations. A brief summary of these memos is provided below and the complete memos can be found in **Appendix F**.

4.3.1 East County Line Road/ Weld County Road 1 Corridor Study

The final East County Line Road/ Weld County Road 1 Corridor Master Plan was released in March of 2021. Some of the recommendations shown in the Corridor Master Plan differ from those shown in this PEL. These changes are due to differences in study goals and operational analysis. The Corridor Master Plan notes that the intersection with CO 52 should coordinate with the recommendations provided in this PEL. During a future phase of project development, further analysis should be undertaken to determine the final intersection configuration.



4.3.2 Traffic Forecasting and Screenline/Parallel Routes Analysis

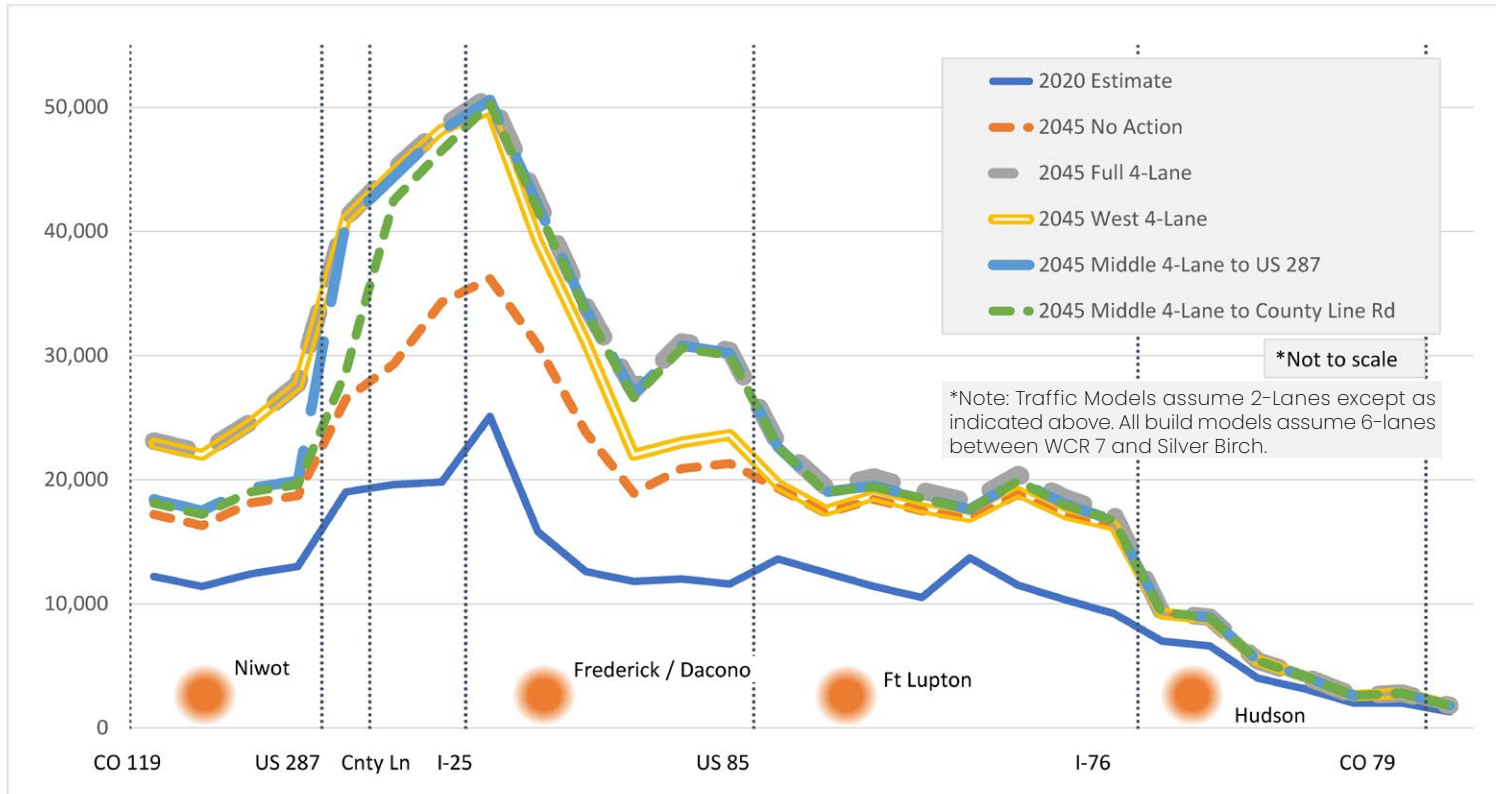
The Traffic Forecasting and Screenline/Parallel Routes Analysis simulated traffic volumes under existing conditions for year 2020, the 2045 No Action alternative, and four 2045 action alternatives using the CDOT travel demand model. Existing and forecasted daily traffic volumes along CO 52, and along parallel roadways at select locations, were summarized.

In 2021, traffic along CO 52 from US 287 to the Dacono/Frederick area was approaching, and in some cases exceeding capacity. Under the No Action alternative, traffic volumes are expected to increase by 40% to 90% in this area by 2045. Under the 4-Lane Action alternative,

volumes along CO 52 west of Dacono/Frederick are approximately 35% to 55% greater than volumes (Figure 4-2) under the No Action scenario. Despite the increase in traffic along CO 52 under the 4-lane action alternatives, the major highways that parallel the highway, CO 119 and CO 7, experience minimal impact to daily volumes. The greatest impact from the 4-lane scenarios is that parallel roadways immediately near CO 52 experience daily volumes 5%-25% lower as compared to the No Action.

East of the Dacono/Frederick area, under the No Action scenario, volumes along CO 52 generally increase 30% to 80% by 2045. Under the 4-lane scenario, volumes between Dacono/Frederick and Fort Lupton increase nearly 50% while volumes east of Ft Lupton increase by less than 10%.

Figure 4-2 | CO 52 Corridor – Daily Two-Way Volume Forecasts



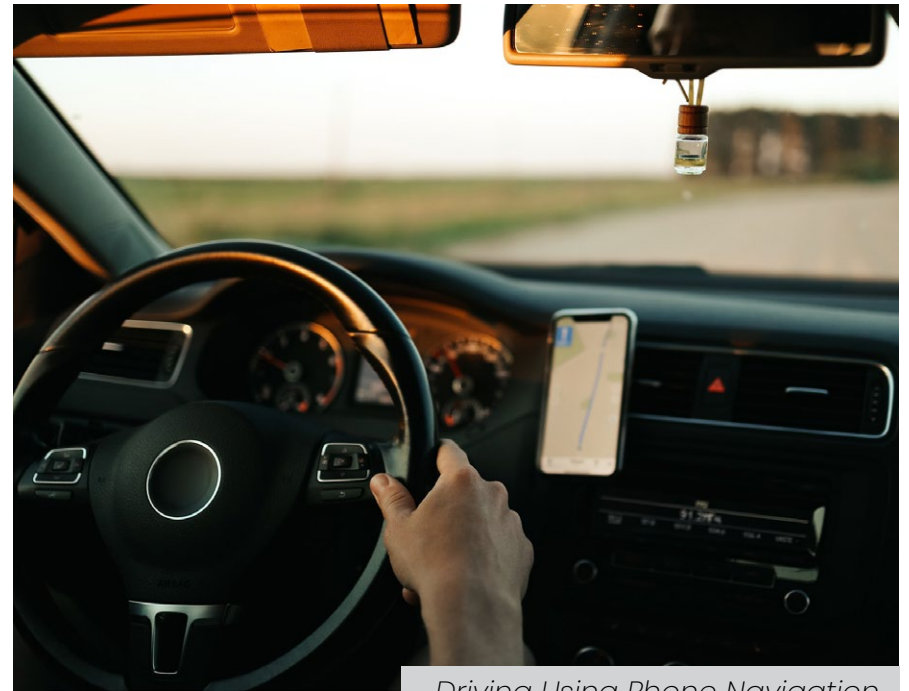
Source: CDOT StateFocus Model Version 1.4, 2020; model operation and volumes post-processing by HDR

4.3.3 Origin-Destination Trip Pattern Analysis

The project team performed an Origin-Destination Trip Pattern Analysis for the PEL. This analysis included a review of travel patterns using the CDOT travel demand model including select link and subarea model runs that consider where trips enter and exit the CO 52 corridor as well the origins and destinations of trips along the corridor (**Figure 4-3**).

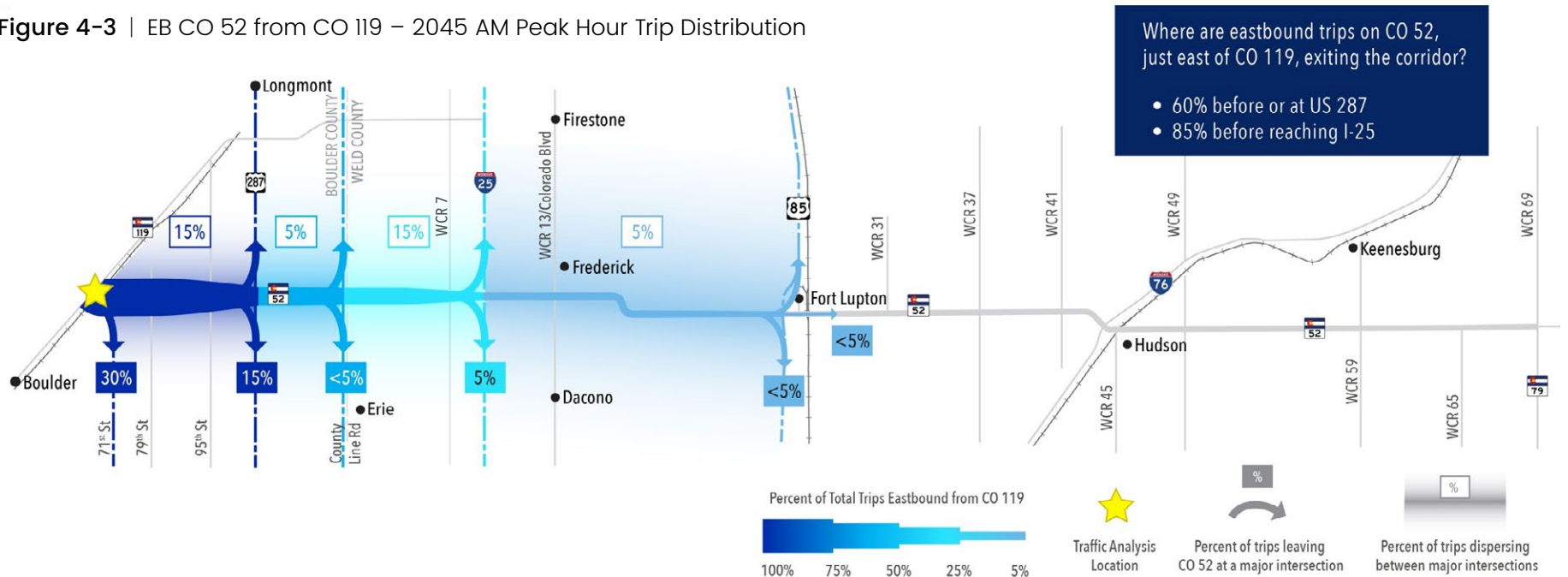
The 2015 model was used as the base year and the 2045 model was used as the horizon year. Two locations along CO 52 were selected for the select link analysis: 1) west of WCR 7 and 2) west of WCR 19. The key findings were that most CO 52 trips are relatively short, and most trips originate and terminate near CO 52. I-25 is a major connection for trips originating along CO 52 near I-25, from both the east and west. In 2045, trip lengths are expected to decline west of I-25, while trip lengths increase east of Dacono/Frederick. PM peak hour trip patterns were found to be similar in 2015 and 2045. Generally, most trips along CO 52 exit the corridor at or before the next major roadway crossing including US 287, I-25, US 85, and I-76.

For additional figures and information regarding the Origin-Destination Trip Pattern Analysis, please see **Appendix F**.



Driving Using Phone Navigation

Figure 4-3 | EB CO 52 from CO 119 – 2045 AM Peak Hour Trip Distribution



4.3.4 COVID-19 Adjustments

Traffic data was collected along the corridor, cross-streets and frontage roads for the purpose of analyzing traffic conditions, calibrating traffic models, and supporting other design needs. Traffic was scheduled to be collected in June of 2020, but was postponed until the Fall of 2020 due to the COVID-19 pandemic and the impact on traffic volumes. At the time data was collected, many of the pandemic restrictions had been lifted, yet there were indications that traffic had not returned to normal levels. Recent pre-COVID traffic data was used to adjust the collected data to better reflect pre-COVID traffic volumes. The resulting comparison and adjustment factors are summarized in **Table 4.1**.



Lane Drop along CO 52 East of intersection at US 287

The observed difference between the 2019 equivalent volumes and the 2020 traffic counts steadily increases between I-25 and CO 119, more-so west of US 287. The difference between I-25 and US 85 was less consistent but generally low (less than 10%), going back up between Fort Lupton and Hudson.

The differences observed at specific locations were generalized and applied across a wider area to balance and smooth out discrepancies in order to develop a reasonable approximation of 2020 conditions without the effects of the COVID-19 pandemic.

Table 4.1 | COVID-19 Adjustment Factor Development

Location	2020 Counts ¹	Avg, 2019 Equivalent ²	% Diff	Factor	Applied Factor
SH 119 and 79th St	7,290	11,230	-43%	1.54	1.40
79th St and 95th St	7,980	11,520	-36%	1.44	
95th St and US 287	8,880	11,750	-28%	1.32	1.25
US 287 and County Line	16,450	18,830	-13%	1.14	
Aggregate and SB I-25 Ramp	18,840	20,650	-9%	1.10	1.10
I-25 Frontage and York-Silver Birch	20,700	22,910	-10%	1.11	
Colorado Blvd and Frederick St	16,460	16,300	1%	0.99	
Frederick St and WCR 19	11,260	12,480	-10%	1.11	
WCR 19 and US 85	12,530	12,120	3%	0.97	1.10
US 85 and Denver St	12,710	15,280	-18%	1.20	
Denver St and WCR 31	6,520	N/A	-	-	
WCR 37 and Loves Access - I76 Frontage	6,610	8,990	-31%	1.36	1.30
EB I76 and Beech St	6,180	8,230	-28%	1.33	
Beech St and WCR 51	3,730	5,090	-31%	1.36	
WCR 51 and WCR 59	3,980	3,520	12%	0.88	1.0
WCR 59 and WCR 69-SH 79	3,490	2,430	36%	0.70	

¹ 2020 counts adjusted with average seasonal adjustment factors.

² Average 2019 AWDT Equivalent factors based on annual and seasonal adjustment factors.

4.3.5 Telework Analysis

During the COVID-19 pandemic, travel patterns shifted as much of the general population adjusted to new work-from-home conditions. The shift in traffic volumes resulted in less total traffic on the roadway network, especially during traditional peak hours. The project team prepared a separate analysis to look at how an increase in telework (even after stay-at-home orders were lifted) may impact the level of traffic along the CO 52 project corridor.

The project team researched the CDOT StateFocus travel demand model's telework assumptions, as well as other Metropolitan Planning Organizations and regional models, to identify trends in telecommuting before and after the pandemic. Based on findings in this research, the project team performed a sensitivity model run with Work at Home (WAH) trips accounting for 20% of all work trips, up from 6%, in the year 2045 to better reflect changes to travel patterns post-COVID.

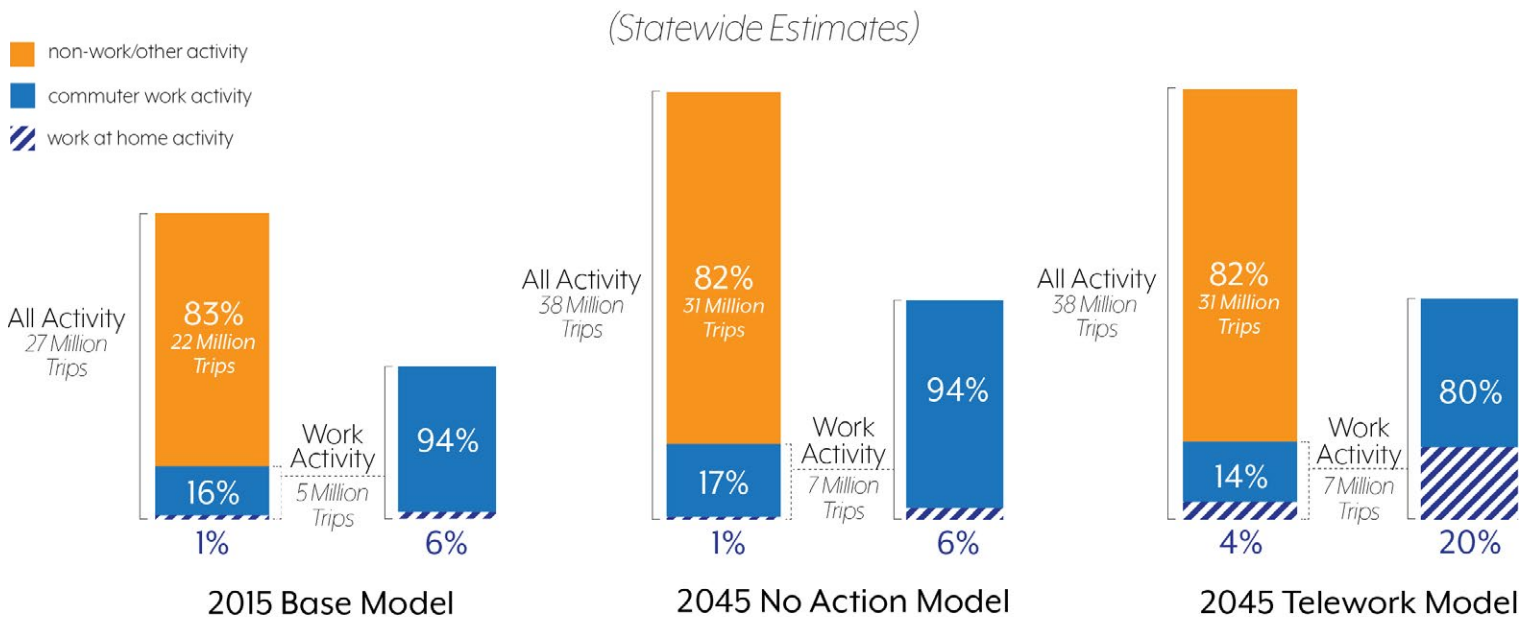
This analysis found that daily volumes along CO 52 declined between 1% and 2.5% west of Ft Lupton while to the east volume declines were somewhat greater. For more information on this analysis, please see the full Telework Analysis Memo in **Appendix F**.

Figure 4-4 shows the distribution of Commuter vs. Non-work/other trip activity statewide. Within that activity, it shows that in the 2045 Telework Model, 20% of all Work Activity trips are estimated to be WAH, and 4% of all statewide activity is estimated to be WAH activity (compared to the 2015 Base Model and 2045 No Action Model, which has WAH as 6% of the Work Activity, and 1% of all activity).



Working from Home

Figure 4-4 | Base Models vs. Telework Model Trip Estimations



As the data shows, WAH trips account for a relatively small percentage of all activity in the region and overall forecasted trip totals decline only marginally when WAH trip totals are adjusted.

4.3.6 Freight Analysis

The CO 52 corridor serves as an important freight corridor for the state. Weld County is one of Colorado’s leading producers of beef cattle, grain, sugar beets, and dairy products. It also prides itself on being the number one producer of oil and gas in the state, producing 86% of all crude oil and 44% of all natural gas production (Weld County, Department of Oil, Gas and Energy, 2020). Gas and agricultural production require a substantial amount of heavy and oversized vehicles for moving product and accessing wells. The Upper Front Range 2045 Regional Transportation Plan identifies CO 52 as a freight corridor for Colorado, making an analysis of freight movement crucial for this PEL.

Truck percentages fluctuate along the CO 52 corridor, ranging from 3% to 20%. Accommodation of heavy trucks is vital, particularly in the rural eastern segments of CO 52 which exhibit high proportions of trucks.

- Segment 1 - Between 3% and 5% trucks
- Segments 2 and 3 - Between 6% and 10% trucks
- Segments 4 and 5 - Between 6% and 20% trucks

During the Level 2 evaluation, alternatives were qualitatively evaluated for their potential to accommodate freight movement including oversized vehicles and trucks carrying hazardous materials. The performance measures evaluated the following elements:

Turning Radii	Roadway Grade
Shoulder Width (safety)	Intersection Control
Vertical Clearance	Rail Crossings
Passing Opportunities	Visibility

For more information on this analysis, including a breakdown of the percent of truck trips of the total vehicle volume along CO 52, please see the Freight Analysis Memo in **Appendix F**.

4.3.7 Transit Analysis

An analysis was performed to explore the viability of transit options. Daily ridership forecasts from the travel demand model in year 2045 indicate fewer than 200 riders per day for a transit route along CO 52. A lack of dense employment/population centers along the corridor is likely the greatest factor in the low ridership forecasts.

Table 4.2 shows ridership forecasts for CO 52 and other regional routes in the area for comparison. Through this analysis, the project team discovered that this corridor is not suitable for transit at this time. For more information on this analysis, please see the full Transit Analysis Memo in **Appendix F**.

Table 4.2 | Daily Transit Ridership – Two-Way Total

			DAILY RIDERSHIP BY ALTERNATIVE			
Provider	Route ID	Description	2045 Base	2045 Transit #1	2045 Transit #2	2045 Transit #3
N/A	CO 52	Local or Regional per Scenario	NA	171	71	141
RTD	119 BRT	BRT – Boulder to Longmont	2632	2836	2789	2800
Transfort	FLEX	Regional – Boulder to Ft Collins	1908	1915	1891	1853
RTD	Long Jump (A+C)	Local – Boulder to Erie/Lafayette	2264	2169	2239	2143
RTD	LSX/LNX	Regional – Longmont to Denver	1351	1199	1169	1231
Bustang	Northline	Regional – Ft Collins to Denver	283	1006	846	831

Source: CDOT StateFocus Model

4.4 EVALUATION CRITERIA AND PERFORMANCE MEASURES

Evaluation criteria, consistent with the Purpose & Need and Goals, were developed prior to beginning the alternatives evaluation process. These criteria and performance measures were developed by the project team and reviewed with the Technical Team, for final approval

by FHWA. The Level 1 performance measures assess the ability of each alternative to meet Purpose & Need at a high level. The Level 2 performance measures incorporate additional measurement criteria and evaluate how well alternatives meet project goals.

The final evaluation criteria as approved by all entities are shown in **Table 4.3**.

Table 4.3 | PEL Evaluation Criteria and Performance Measures

			PERFORMANCE MEASURE EVALUATION	
	Category	Criteria	Level 1	Level 2
NEEDS	Increase Safety	<ul style="list-style-type: none"> Crash frequency Crash severity Ped/bike safety Roadway geometry Presence of truck freight 	Potential to improve safety (Y/N)	<ul style="list-style-type: none"> Reduce frequency and severity of crashes Reduce vehicle/pedestrian conflict points (number) Reduce Level of Traffic Stress Implement geometric features that accommodate truck freight
	Accommodate Increased Travel and Freight Demand	<ul style="list-style-type: none"> Congestion Corridor capacity Travel times Travel reliability Quality of traffic operations 	Potential to accommodate projected travel demand (Y/N)	<ul style="list-style-type: none"> Decrease Travel Time Index (ratio) Decrease travel time by minutes Reduce Delay Accommodates Freight Destinations (Improves/Neutral/Limits)
	Support Multimodal Connections	<ul style="list-style-type: none"> Local and regional route connectivity Non-motorized opportunities Bicycle connectivity Pedestrian crossings 	Potential to increase multimodal mobility (Y/N)	<ul style="list-style-type: none"> Reduce barriers for N/S pedestrian and bicycle travel (qualitative) Improve continuity for E/W bicycle and pedestrian travel (qualitative) Reduce uncontrolled vehicle/pedestrian conflict points (number) Increase shoulder width to accommodate bicycle traffic (Y/N)
GOALS	Consider the Natural and Build Environment	<ul style="list-style-type: none"> Environmental resource constraints Contextual function and aesthetics of surrounding land uses 	Not evaluated in Level 1	<ul style="list-style-type: none"> Identification of critical resources impacted based on footprints. No quantitative impacts will be done Qualitative measurement of context sensitive approach of land use and character along the corridor
	Support Local and Regional Planning Efforts	<ul style="list-style-type: none"> Included in community land use plans for multimodal connections, multiuse paths, and streetscapes 	Not evaluated in Level 1	<ul style="list-style-type: none"> Relative improvement/spatial alignment with goals of local agency plans [Good (closely aligned), Fair (some variations between alternatives), Poor (significant variations)]
	Identify Estimated ROW Needs	<ul style="list-style-type: none"> Opportunity to preserve ROW 	Not evaluated in Level 1	<ul style="list-style-type: none"> Complexity of acquisition (based on presence of structures, land use type) Relative expected ROW cost
	Accommodate Future Technology	<ul style="list-style-type: none"> Inclusion of technology along the corridor that will counteract increases in development and traffic volumes 	Not evaluated in Level 1	<ul style="list-style-type: none"> Accommodate present and future implementation of emerging existing and future technology

4.5 ALTERNATIVES DEVELOPMENT AND EVALUATION PROCESS

Alternatives were produced through a multi-level iterative process. The process began with a large number of alternatives that led to a smaller number of more detailed alternatives, following a focused evaluation effort. Agency coordination and public involvement played a major role in the alternative development process.

4.5.1 No Action Alternative

The No Action Alternative anticipates future conditions of the CO 52 corridor without completing any transportation improvements developed in this PEL. The No Action Alternative does include required safety and maintenance improvements to maintain an operational transportation system, as well as those fiscally constrained projects that have committed funding sources that will be built regardless of the improvements recommended in this PEL. Funding sources for those fiscally constrained projects include the State Transportation Improvement Program (STIP), regional Transportation Improvement Programs (TIP) funded by Metropolitan Planning Organizations (MPOs), and local agency Capital Improvement Programs (CIPs). The No Action Alternative does not meet the Purpose & Need of this PEL but is used as a baseline for comparison to the operational and safety benefits that would result from recommended transportation improvements of this PEL.

Table 4.4 provides information on 2045 fiscally constrained projects that have been included in the No Action Alternative.

Table 4.4 | 2045 Fiscally Constrained Projects Considered in No Action Alternative Model (STIP/TIP)

Facility	Project Name	Project Description	Source
CO 52	CO 52 & US 287 Intersection	Intersection improvements	CDOT (STIP)
CO 52	CO 52 & I-76 Interchange	Interchange improvements	CDOT (STIP)
CO 52	CO 52 & WCR 41 Intersection	Intersection improvements	CDOT (Upper Front Range, TPR)
I-25	MP 214-269	Congestion, safety, travel time and freight reliability improvements	CDOT (TIP)
N 71st St	Lookout Rd to CO 52	Realignment and widening of intersection	Boulder (CIP)
WCR 7	CO 52 to Erie Pkwy	Realignment and widening to 4 lanes	Erie Transportation Plan (CIP)



At WCR 5 looking West along CO 52

4.5.2 Alternatives Development

To develop a range of alternatives for consideration, the study team utilized data from the existing conditions report as well as input collected from stakeholders (**Table 4.5**).



Team Collaborating

The corridor is primarily rural with the exception of more urban areas near I-25 and Fort Lupton. In addition to the I-25 and Fort Lupton areas, urban sections are also being considered between WCR 7/ Aggregate Blvd and Silver Birch and through Hudson due to the more urban feel in these locations. Rural roadway sections are also being considered in these areas, consistent with existing conditions.

The rural roadway character alternatives include adding or widening a shoulder to increase safety as well as adding general purpose lanes, auxiliary lanes, and median treatments where traffic projections and access warrant.

The team held several meetings that focused on individual segments to develop alternatives that had potential to meet project needs and goals while still addressing stakeholder concerns. **Figure 4-5** summarizes the alternatives considered along the corridor.

Table 4.5 | Stakeholder Meeting Highlights

Agency	Summary of Input
Boulder County (Segment 1)	<ul style="list-style-type: none"> Relationship building Intersections to accommodate transit, queue jump, and bypass lanes Keep the rural feel Fiscally responsible building Policy against widening roads between intersections Improve safety Desire for separate bike trail (west end)
Weld County (Segment 2-5)	<ul style="list-style-type: none"> Corridor Preservation Footprint Work with community partners Identify future bottleneck locations Interest in widening corridor to 4 lanes
Erie (Segment 2)	<ul style="list-style-type: none"> Improve traffic flow and safety North/South turn lane improvements Congestion at WCR 7 Commercial and Residential Development at WCR 3, WCR 5 & WCR 7 Multimodal Improvements Identify ROW needs
Frederick (Segment 2)	<ul style="list-style-type: none"> Safety improvements for I-25 Frontage Road intersection Improve North-South pedestrian connectivity Consider adequate turn lanes to improve congestion Improve roadway safety
Dacono (Segment 2)	<ul style="list-style-type: none"> Safety concerns at WCR 17 Improve pedestrian safety at Colorado (WCR 13) Improve pedestrian safety at Glenn Creighton Interest in improving connections for vulnerable populations
Fort Lupton (Segment 3)	<ul style="list-style-type: none"> Potential to close Grand Ave intersection Extension of lower “in-town” speed limits Corridor Preservation Footprint Intersection improvements at WCR 19 Pedestrian crossings desired near the river (overpass or underpass)
Hudson (Segment 4)	<ul style="list-style-type: none"> Improve bike/ped movements across CO 52 Improve railroad crossings Maintain town character Discourage truck use along CO 52 Corridor Preservation Footprint
Keenesburg (Segment 5)	<ul style="list-style-type: none"> Roadway improvements for freight Widen shoulders Corridor Preservation Footprint Commercial development planned at CO 52 / WCR 59 Wild animal sanctuary traffic on WCR 53

Figure 4-5 | Range of Alternatives Considered

No Action	2 Lane Urban
2 Lanes Rural	2 Lanes with 2 HOV Managed Lanes
2 Lanes with Peak Period Shoulder Lane	4 Lane Urban
2 Lanes with Alternating Passing Lane	6 Lane Urban
2 Lanes with Reversible Lane	

Rural vs Urban Treatment – For purposes of this study, the designation of “rural” with a typical section indicates full shoulder width, lack of curb and gutter, and open channel ditches running parallel to the roadway to handle storm runoff. The “urban” designation means that the typical section will have curb and gutter and potentially other urban features such as storm sewer and bike lanes.

Based on adjacent land use, environmental concerns, traffic and safety concerns, truck percentages, and geometric evaluation, not all alternatives were considered throughout the entire corridor. Please see the full Level 1 matrix in **Appendix G** for where each alternative was applied geographically.

4.5.3 Key Geometric Features

For study purposes, it is assumed that travel and auxiliary lanes are 12’ wide, shoulders are 10’ wide, and medians are 16’ wide to accommodate turning between intersections and widening out as needed at intersections. Other elements were evaluated as items that could stand alone and would not need to be part of a larger improvement project. Bicycle and pedestrian improvements and facility implementations were evaluated as a part of select alternatives as well as stand-alone elements. Accommodations for bicycles and pedestrians included bikes on shoulders, sidewalks and bike lanes, as well as a separate

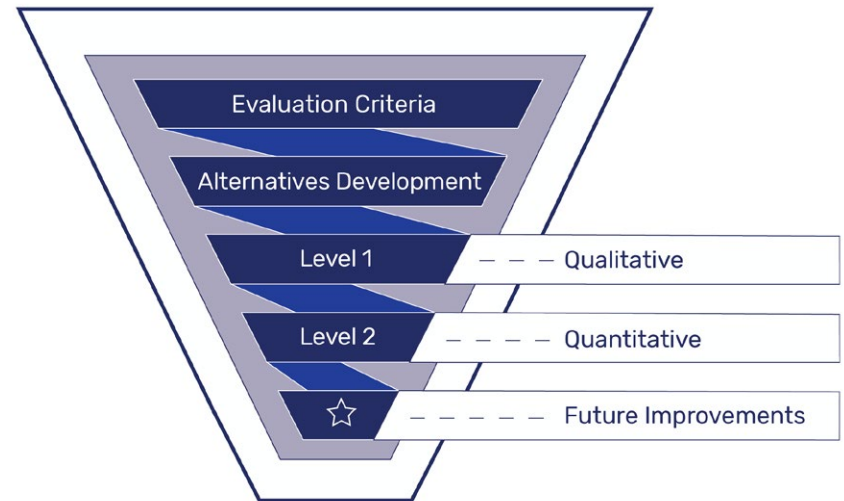
multiuse path. Access control is considered during the evaluation of alternatives, median treatment, and auxiliary lane locations.

4.5.4 Evaluation Process

A two-level evaluation process was created to evaluate alternatives developed for the PEL. Evaluation criteria were identified for each level and were used to assess alternatives relative to the Purpose & Need. During the first level of evaluation, the alternatives were analyzed to determine if they met Purpose & Need and if they did, they were advanced to the next level of evaluation. Goals of the project were also considered in this process during the second level of evaluation.

Figure 4-6 summarizes the alternatives development and evaluation process for the CO 52 PEL.

Figure 4-6 | Alternatives Development and Evaluation Process



The categories, criteria, and performance measures for both the Level 1 and Level 2 are shown in **Table 4.2**. Additionally, terminology used to evaluate Alternatives in Level 1 and Level 2 was established in a memo dated January 29, 2021. This memo is located in **Appendix F**.

4.6 LEVEL 1 EVALUATION

The goal of the Level 1 Evaluation was to assess a full range of alternatives based on Existing Conditions (**Appendix E**) to determine whether alternatives would meet Purpose & Need. The needs defined for the corridor were to improve safety, accommodate increased travel and freight demand, and support multimodal connections. Each alternative was evaluated according to the established evaluation criteria.

Does this alternative have the potential to improve safety by way of crash frequency, crash severity, ped/bike safety, roadway geometry, truck/oversize vehicle safety, and freight safety?

Does this alternative have the potential to accommodate projected travel and freight demand by way of congestion, corridor capacity travel times, travel reliability, and quality of traffic operations?

Does this alternative have the potential to increase and not preclude multimodal mobility by way of local and regional route connectivity, non-motorized opportunities, bicycle connectivity, and pedestrian crossings?

Level 1 evaluation was limited to a simple yes or no to the questions above for alternatives to advance to Level 2. The Project Management and Technical Teams had the opportunity to review and discuss inputs to this table as well as the alternatives progressing to the next level. The full Level 1 Evaluation Matrix can be found in **Appendix G**.

4.6.1 Result of Level 1

Multiple alternatives were evaluated within each segment and the following language was used to document the findings:

Carried Forward: meets Purpose & Need, considered reasonable and feasible, and may be considered for further evaluation in this study or subsequent NEPA and project development.

Retained as Element: does not fully meet Purpose & Need, but will be evaluated as packaged element of a larger-scale alternative.

Eliminated: does not meet Purpose & Need, has a fatal flaw, and/or is considered unreasonable. A project alternative that is Eliminated is removed from further consideration in the PEL.

The project team conducted the evaluation and several alternatives were considered to not meet the needs of the Study and therefore not carried to Level 2 for further evaluation. Eliminated alternatives are shown in **Table 4.6** below.

Table 4.6 | Level 1 Eliminated Alternatives

Segment	Alternative	Reason
1	2 Lane with Alternating Passing Lanes	Configuration does not accommodate access or traffic needs along the segment
1	2 Lane with Reversible Lane	Configuration does not accommodate access or traffic needs along the segment
2	2 Lane with 2 HOV Managed Lane	Demand for HOV/Managed lane insufficient
3	2 Lane Rural	Minimal benefit over No Action
		Precluding passing reduces operational performance; limited safety benefit over No Action
3	2 Lane with Peak Period Shoulder Lane	Precluding passing reduces operational performance; limited safety benefit over No Action
3	Fort Lupton Bypass	Evaluation was completed based on coordination with the Fort Lupton which identified concerns with economic vitality for the City.
4	2 Lane Rural	Minimal benefit over No Action
		Precluding passing reduces operational performance; limited safety benefit over No Action
4	2 Lane with Peak Period Shoulder Lane	Precluding passing reduces operational performance; limited safety benefit over No Action
4	2 Lane plus Reversible Lane	Configuration does not accommodate access or traffic needs along the segment

4.7 LEVEL 2 EVALUATION

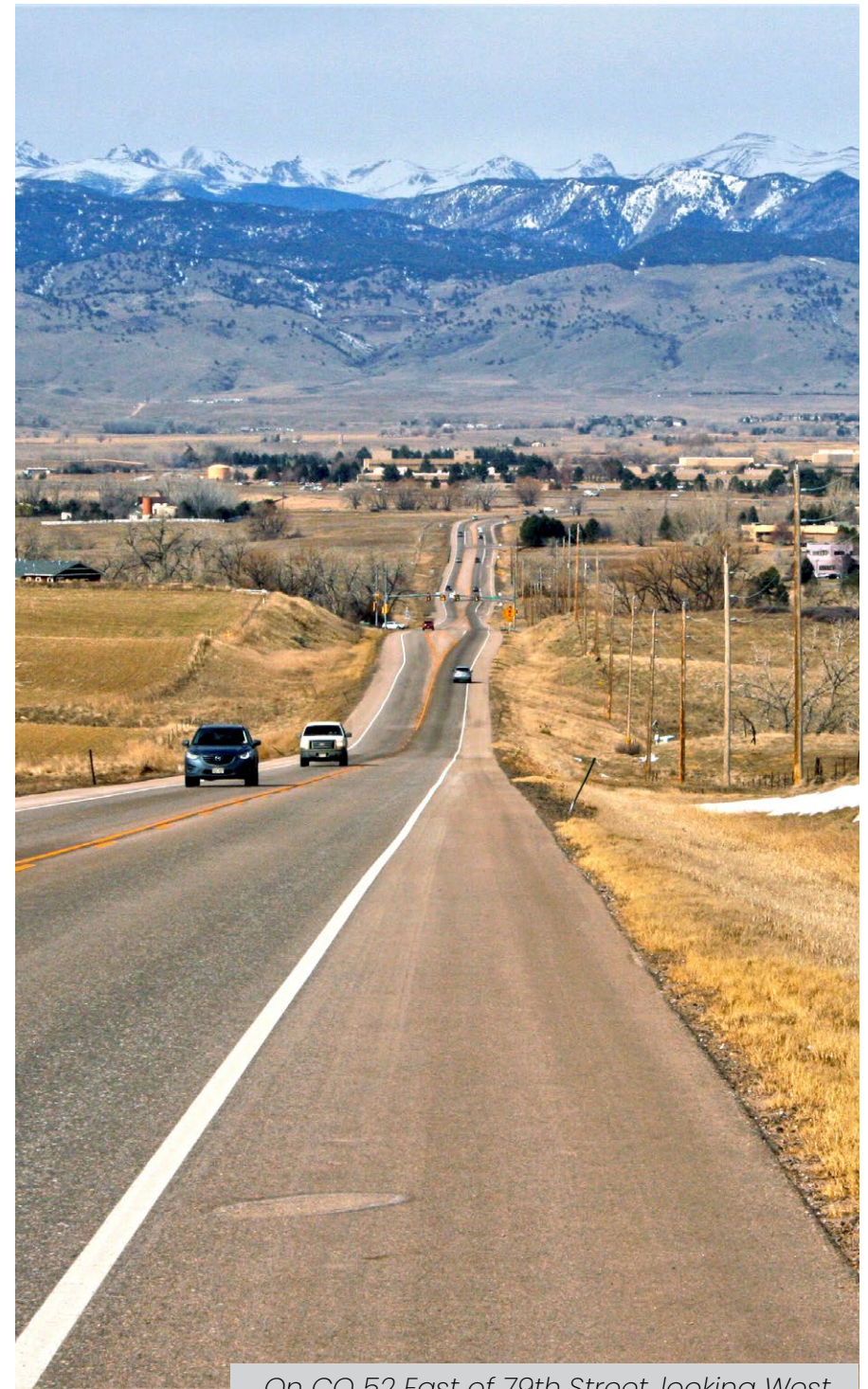
After assessing the full range of alternatives in Level 1 and narrowing the options to only the alternatives that meet project needs, the team moved to Level 2. During the Level 2 analysis, alternatives were evaluated based on more detailed criteria related to project needs as well as how well they met the project goals. Each Alternative was evaluated according to the established evaluation criteria shown in **Table 4.3**.

4.7.1 Corridor Overview – Segment Typical Sections

The Level 2 analysis carried forward nine alternatives to be considered by segment. The table below (**Table 4.7**) lists the alternatives considered by segment. Recommended typical sections from the Level 2 analysis are shown in **Figures 4-7 through 4-11** on the following pages. The full Level 2 Evaluation Matrix can be viewed in **Appendix G**.

Table 4.7 | Level 2 Alternatives Considered

Segment	Alternative
All	No Build
1, 2, 4, 5	2 Lane Rural
1	2 Lane with Peak Period Shoulder Lane
1	2 Lane with 2 HOV Managed Lanes
1, 2, 4	4 Lane Rural
2, 3	4 Lane Urban
2	6 Lane Urban
3, 4	2 Lane with Alternating Passing Lane
3, 4	2 Lane Urban



On CO 52 East of 79th Street, looking West

Figure 4-7 | 2 Lane Rural Typical Section

Increase Shoulder Width to 12' for 2 lane with Peak Period Shoulder Lane



Figure 4-8 | 4 Lane Rural Typical Section (Similar Footprint for 2 Lane with 2 HOV Managed Lanes)

174' Corridor Preservation Footprint



Figure 4-9 | 2 Lane Urban Typical Section (with Two-way Left-turn Lane)

73' Corridor Preservation Footprint



Figure 4-10 | 4 Lane Urban Typical Section (with Two-way Left-turn Lane)

94' Corridor Preservation Footprint



Figure 4-11 | 6 Lane Urban Typical Section

145' Corridor Preservation Footprint



4.7.2 Typical Section Options

The project team recognizes that there are many features of the main typical sections described above that may need to be altered as the identified improvements move into project design.

Median Treatments – For purposes of developing alternatives, a 16-foot wide median was assumed that could be configured either as a two-way left-turn lane or left-turn lanes with a raised or striped median. There are also locations along the corridor where a wide median was unnecessary for traffic operations and median improvements could be limited to major intersections – these areas are noted in the Level 2 Evaluation Matrix. In the area of the reverse curves (MP 15.5 – MP 15.57), additional median treatments including rumble strips, cable rail, and a depressed median were considered.

Shoulder Width – Based on roadway classification and traffic volumes, the study team selected a 10-foot shoulder width and applied it consistently throughout the corridor except when curb and gutter is introduced in the more urban areas. However, where on-street bicycles are prevalent, a 12-foot shoulder may be considered. In Segment 5, the DHV drops below the threshold requiring a 10-foot shoulder so an 8-foot shoulder would also be acceptable. However, due to the oversize/overweight designation of the roadway, local agencies indicated a strong preference for maintaining a 10-foot shoulder.

Rumble Strips – Rumble strips along edge lines and centerline may be considered. For purposes of this study, rumble strips were evaluated at a high level against a wider (12-foot) shoulder in Segment 1 where on-street cycling is expected. Centerline rumble strips were also evaluated through the reverse curves at the east end of Segment 2 as a crash mitigation measure.

Two examples of level medians are shown in the Dacono/Frederick and Hudson visualizations (**Figures 4-12 & 4-13**). In the existing condition, there is a striped median and in the proposed condition, a raised median is introduced. The raised median establishes a more urban feel for the area, and also accommodates implementation of access control measures. In the existing condition, this access is a full movement access, but in the proposed condition the access on the left side of the photo has been converted to a right-in right-out movement and the access on the right side of the photo has been converted to a right-in, right-out and left-in movement. Implementing access control measures in the corridor improves traffic operations and safety.

Figure 4-12 | Dacono/Frederick Before and After Visualizations



Figure 4-13 | Hudson Before and After Visualizations



The existing condition through Hudson (**Figure 4-13**) has a rural feel with gravel shoulders and open, grassy ditches along the roadway. In the proposed condition, the roadway has been widened to add a continuous two-way left-turn lane and bike lanes. The shoulder has been replaced with curb and gutter and attached sidewalks have been added. Through areas in the corridor with a high density of access points, traffic operations can be improved through the introduction of a continuous two-way left-turn lane. The addition of this lane provides turning vehicles with a dedicated space for turning rather than impeding through traffic by turning out of the travel lane.

4.7.3 Additional Elements

Multimodal

Multiuse Path – A separate multiuse path was considered through much of the corridor and identified to be carried forward through most of the western portion from CO 119 through Fort Lupton. The multiuse path is assumed to be 10-foot wide and would generally be located on the north side of CO 52 based on review of existing planning documents. In rural areas, the path would be located just beyond the backslope of the roadside ditch and located behind the curb and gutter in urban areas.

In keeping with the rural nature of the corridor, a multiuse path in Segment 1 would likely be offset from the highway as shown in the visualization to the right (**Figure 4-14**). For more urban areas in the corridor, the multiuse path may need to be attached directly to the back of curb or detached, by offsetting from the curb with a tree-lawn in order to fit within the available ROW.

Enhanced Bike/Pedestrian Crossings – The study team identified several locations for enhanced bicycle and pedestrian crossings. Possible treatments include: bike lanes through major intersections, bicycle detection, pedestrian accessibility improvements, railroad crossing treatments, and connections to other trail systems along the corridor. Additional transitions at intersections and to/from multiuse paths should be considered.

Figure 4-14 | Boulder County Before and After Visualizations



Transportation Demand Management Considerations

As part of the alternatives analysis, a Travel Demand Management (TDM) Program was considered for CO 52. The intention of a TDM program is to reduce vehicular traffic by implementing strategies tailored for the corridor, such as carpooling, transit enhancements and incentives, parking management, guaranteed ride home, or promoting work-from-home, to name a few. The rural nature of the corridor and relative lack of development density along the corridor do not favor TDM program strategies and are unlikely to result in a meaningful or measurable reduction in vehicle traffic. It should be noted that interchange areas, which would be subject to the CDOT Interchange Approval Process with its associated TDM analysis, are part of the Exclusion Areas discussed in Section 4.1.

Multimodal Connections

The Bicycle and Pedestrian Connectivity Memo (**Appendix F**) summarizes the PEL process as it relates to multimodal connections, documents the multimodal evaluation criteria, and provides recommendations for bicycle and pedestrian improvements, both regional (corridor-wide) and local (location specific).

Technology

With increasing traffic volumes and congestion, the traditional capacity expansion solution to congestion management has proven that it cannot be the only solution. Effectively utilizing technology in conjunction with roadway capacity expansion and intersection improvements provides an opportunity to improve system wide safety, reliability, and efficiency beyond capacity expansions alone.

Transportation Technology (Active Traffic Management) - Active Traffic Management System, which uses dynamic message signs over each lane of traffic to close lanes that are obstructed due to crashes and then direct vehicles to adjacent lanes to move traffic more efficiently past the crash, has shown to reduce delays and secondary traffic crashes.

Traffic Signal Optimization - Techniques such as corridor wide signal timing and commercial vehicle signal priority would have the benefit of improving the flow of traffic and improving safety along the corridor.

Travel Demand Management - Adaptive traffic signals can improve the flow of traffic along the corridor by dynamically adjusting signal timing, coordination, and progression of vehicles based on the actual traffic demand along the corridor.

Wildlife Crossings

During stakeholder one-on-one meetings, a potential need for a wildlife crossing near Banner Lakes was identified. A review of crash data in the corridor indicates that a wildlife crossing at this location or at any other location within the corridor is not supported. For this reason, this element was eliminated during the Level 2 evaluation.

Transit Accommodations

As discussed in Section 4.3, the viability of transit options along the CO 52 corridor was considered, but this corridor is not suitable for transit at this time. Improvements should not preclude transit, but no separate accommodations have been identified at this time.

4.7.4 Design Refinements and Advanced Study Areas

The more detailed analysis completed during Level 2 allowed the team to make some design refinements to the alternatives put forth in Level 1, mostly related to the location. For example, the team added a 6-lane alternative between WCR 7 and Silver Birch/York St to better manage the expected traffic volumes and thereby creating a sub-segment within Segment 2. Similarly, the analysis indicated that a four-lane section wasn't required in Segment 3 east of Denver Avenue so a 2-lane section was introduced in this area.

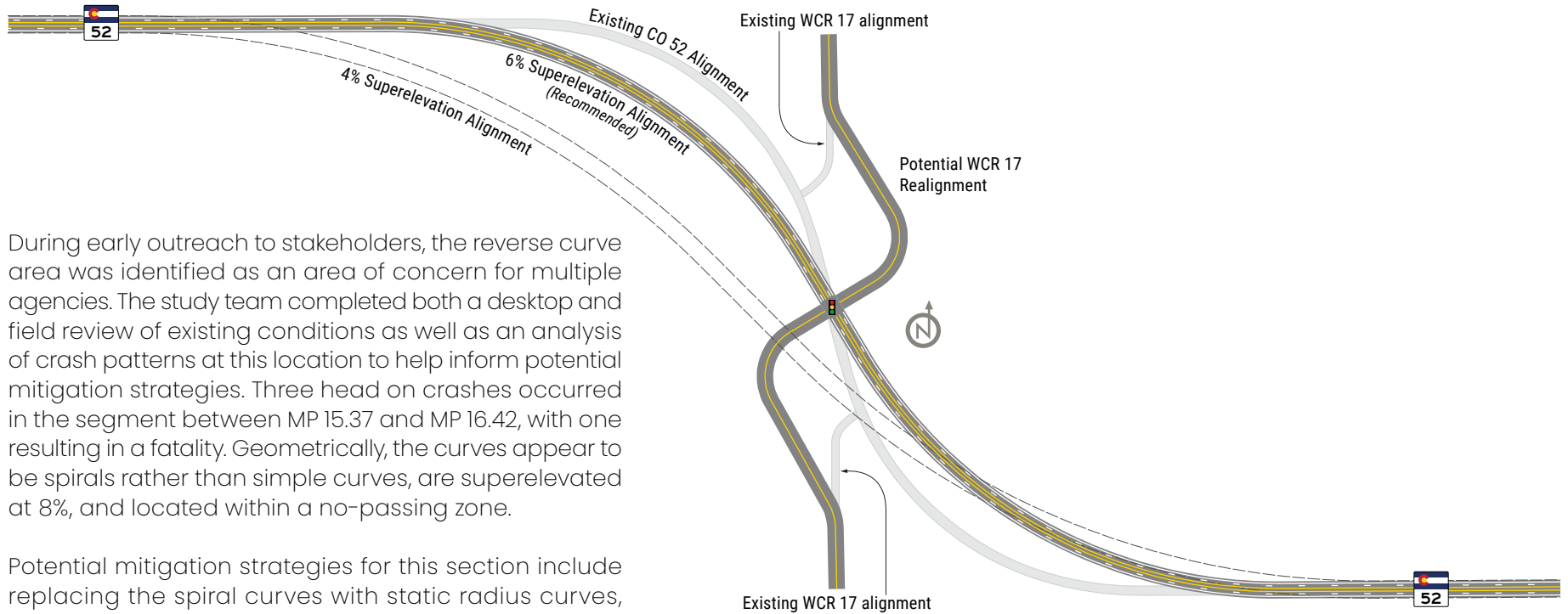
As part of the study, a few key locations were identified for a more in-depth study. These included the US 287 and CO 52 intersection in Segment 1, the Reverse Curves between WCR 15 and WCR 19 in Segment 2, and the WCR 59 and CO 52 intersection in Segment 5. Additional information about the Reverse Curves and WCR 59 are shown on the following pages.



Pedestrian Railroad Crossing in Fort Lupton

Reverse Curves (MP 15.5 to MP 15.57)

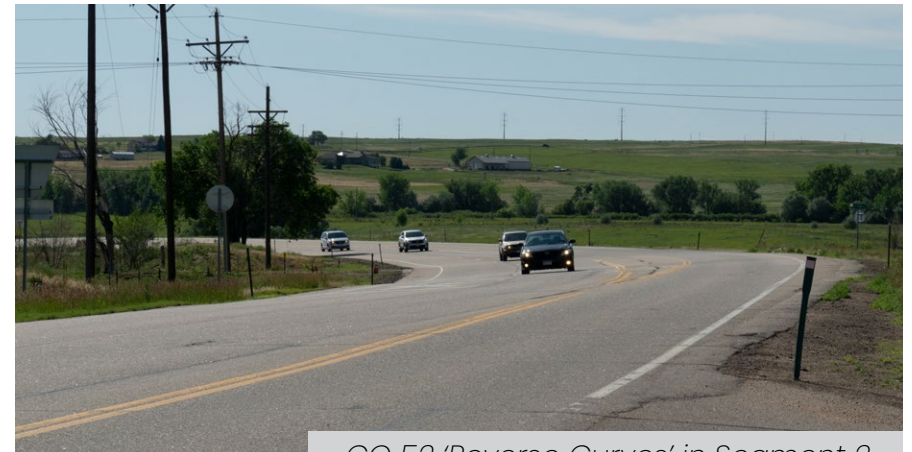
Figure 4-15 | Reverse Curves and Potential Weld County Road 17 Realignment



During early outreach to stakeholders, the reverse curve area was identified as an area of concern for multiple agencies. The study team completed both a desktop and field review of existing conditions as well as an analysis of crash patterns at this location to help inform potential mitigation strategies. Three head on crashes occurred in the segment between MP 15.37 and MP 16.42, with one resulting in a fatality. Geometrically, the curves appear to be spirals rather than simple curves, are superelevated at 8%, and located within a no-passing zone.

Potential mitigation strategies for this section include replacing the spiral curves with static radius curves, installing centerline rumble strips, and introducing curves with larger radii to flatten the superelevation. In addition to evaluating replacing the spiral curves with simple curves generally following the existing alignment, the study team evaluated two options for flattening the superelevation – a 6% and a 4% option. Although the traffic projections do not indicate a signal will be warranted at the intersection of CO 52 and WCR 12 within the forecasted period, the team recognizes that a realignment would be a major investment and therefore chose to evaluate options that did not preclude future signal installation.

The 8% superelevation alignment was not recommended following the Level 2 evaluation, the 4% alternative was carried forward, and the 6% alternative was recommended. In order to preserve the most flexibility possible, the ROW preservation line was set to accommodate all three alternatives.

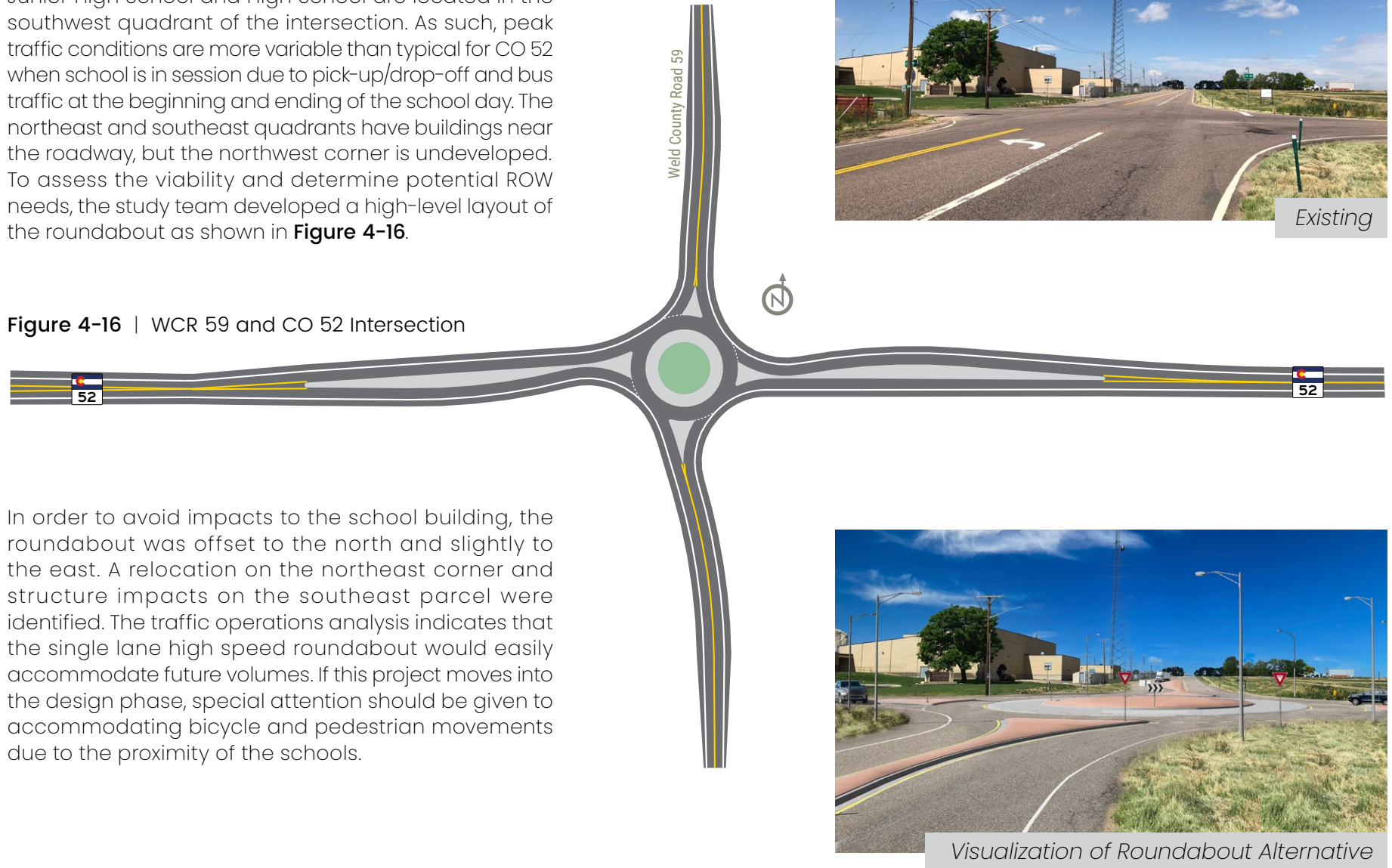


CO 52 'Reverse Curves' in Segment 2

WCR 59 and CO 52 Potential Alternative

The CO 52 Safety Assessment Report (Appendix E. Existing Conditions Report) indicated that this location is unlikely to qualify for a signal and recommended that the viability of a high-speed roundabout be studied. The Weld Central Junior High School and High School are located in the southwest quadrant of the intersection. As such, peak traffic conditions are more variable than typical for CO 52 when school is in session due to pick-up/drop-off and bus traffic at the beginning and ending of the school day. The northeast and southeast quadrants have buildings near the roadway, but the northwest corner is undeveloped. To assess the viability and determine potential ROW needs, the study team developed a high-level layout of the roundabout as shown in **Figure 4-16**.

Figure 4-16 | WCR 59 and CO 52 Intersection



In order to avoid impacts to the school building, the roundabout was offset to the north and slightly to the east. A relocation on the northeast corner and structure impacts on the southeast parcel were identified. The traffic operations analysis indicates that the single lane high speed roundabout would easily accommodate future volumes. If this project moves into the design phase, special attention should be given to accommodating bicycle and pedestrian movements due to the proximity of the schools.

4.7.5 Traffic Operations

Additional travel lanes on CO 52 will allow more traffic onto the CO 52 corridor and intersection improvements allow traffic to flow along the CO 52 corridor. The Traffic Technical Memorandum (**Appendix F**) provides a detailed review of the methodology used to evaluate the complex relationship between traffic growth, roadway improvements, and operations.

The detailed operations analysis performed for the Level 2 evaluation used TransModeler software for both intersection and corridor operations along CO 52. The operations analysis focused on intersection operations, segment operations (travel time and Travel Time Index (TTI)) and travel time reliability. While multimodal operations are a key consideration for the PEL, the Level 2 traffic operations analysis did not specifically address transit, pedestrian, or bicycle traffic in terms of the stated performance measures.

Wait times at traffic signals are responsible for most of the delay experienced along CO 52. As such, improvements at intersection locations drive the operational benefits for the alternatives. The Level 2 evaluation considered the impacts of additional turn lanes, acceleration and deceleration lanes, widening to provide additional through lanes near signalized intersections, as well as signal timing optimization and progression throughout the corridor. The resulting change in intersection delay allows traffic to move more freely and improves the overall travel time along the CO 52 corridor. At stop-controlled locations, wait times for traffic turning onto CO 52 from side-streets may go up significantly as traffic volumes increase.

Congestion increases travel times, especially during the morning and evening peak periods. Queues approaching signalized intersections and other disruptions cause speeds to drop and delays to increase. This relationship between intersection and roadway segment operations was analyzed for various combinations of modeled traffic volumes and roadway alternatives. The analysis compared the resulting segment travel times for No Action and Build scenarios, and also looked at the relationship between the average peak hour travel time and the free-flow, or low traffic, travel times. Travel times provide a sense of how much time one could expect to spend on CO 52, while the TTI provides a general sense of how much congestion one might expect on a daily basis.



Old Highway 52 Intersection just west of WCR 5 intersection

The average travel times and peak hour TTI represent the balance between the bad traffic conditions experienced by some drivers and those that happen to hit the signals at the right time and experience very little delay. Broadly speaking, reliability describes how a roadway network handles traffic under non-ideal conditions. On an average day, reliability can also be described using the relationship between

the vehicles experiencing heavy congestion (95th percentile travel times) and vehicles during free-flow conditions (also referred to as the Planning Time Index). Increases in traffic volume along a segment may cause travel times to increase somewhat even with the recommended improvements, but still improve reliability.

Figure 4-17 | Fort Lupton Before and After Visualizations



Existing



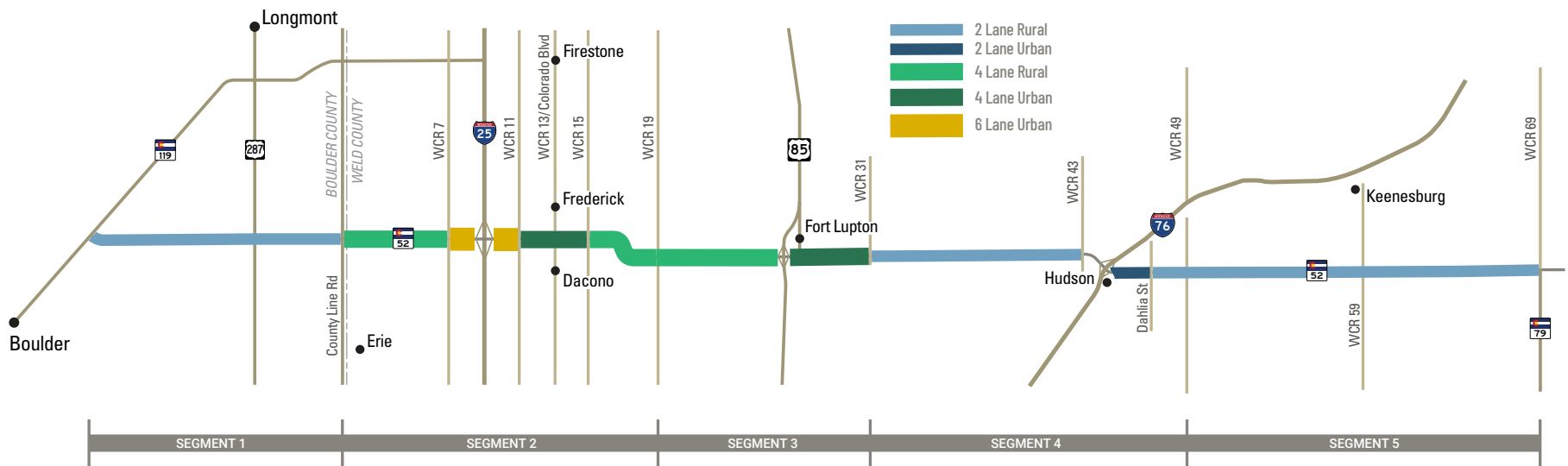
Visualization of 4 Lane Urban Alternative

To handle the increase in travel demand, additional lanes are recommended in parts of the corridor (Figure 4-17). The additional lanes are necessary to maintain efficient and safe operations. Adding additional lanes in constrained area, like Fort Lupton, will be challenging and will require extensive modifications to existing access points and parking areas.

4.8 CORRIDOR RECOMMENDATIONS

The following map (Figure 4-18) shows the recommended corridor alternatives. In addition to the recommended alternatives, additional alternatives were Carried Forward (Table 4.8). These are alternatives that are considered reasonable and feasible and would be expected to perform well if implemented but were not the strongest-performing alternative.

Figure 4-18 | Recommended Corridor Alternatives Map



Alternatives that will not be evaluated further in the study due to comparatively negligible benefits and higher impacts than other alternatives are shown as Not Recommended. While these alternatives are still eligible to be studied during subsequent phases of the NEPA process, it is unlikely that any of these alternatives will rise to the level of Preferred Alternative. In addition to the No Build Alternative, which was shown as Not Recommended in all segments, Table 4.8 shows the additional alternatives in this category based on the evaluation.

The 2 Lane with 2 HOV Managed Lanes alternative in Segment 1 was eliminated based on the analysis completed during Level 2. This alternative was eliminated because it would decrease reliability, introduce safety concerns, require significant investment in ITS infrastructure and was lacking local support.

Table 4.8 | Alternatives Carried Forward

Segment	Recommended Alternative	Alternatives Carried Forward	Alternatives Not Recommended
1	2 Lane Rural	2 Lanes with Peak Period Shoulder Lane	4 Lane Rural
2A	4 Lane Urban	4 Lane Urban	2 Lane Rural
2B	4 Lane Rural	4 Lane Rural	2 Lane Rural
		4 Lane Urban	
2C	4 Lane Urban	4 Lane Urban	
2D	4 Lane Rural		2 Lane Rural
3A	4 Lane Rural		2 Lane with Alternating Passing Lane
			4 Lane Rural (with depressed median)
3B	4 Lane Urban	2 Lane Urban	
4A	2 Lane Rural	4 Lane Rural	2 Lane with Alternating Passing Lane
4B (Hudson)	2 Lane Urban	2 Lane Rural	4 Lane Rural
			4 Lane Urban
4B (east of Hudson)	2 Lane Rural		2 Lane Urban
			4 Lane Rural
			4 Lane Urban
5	2 Lane Rural	2 Lane Rural (8-foot Shoulders)	2 Lane with TWLTL

4.9 INTERSECTION IMPROVEMENTS

Intersections along the CO 52 corridor were analyzed based on the 2045 traffic volumes. Although detailed design was not completed for each location, improvements to address safety and maintain mobility for all users are included in Intersection Improvement Maps below (**Figures 4-19 through 4-25**) and in the Project Categorization Table (**Appendix H**).

Intersection improvements are based on the 2045 peak hour traffic volumes forecasted for each alternative. Additional turn lanes at unsignalized locations, including vehicle storage and speed change distances, were outlined per the CDOT Access Code unless warranted by other factors such as crash experience. For signalized intersections, including locations where signals are likely warranted in the future, lane geometry was developed to meet critical traffic demands and maintain an acceptable level of service. In some cases, additional through lanes were used at intersections to improve traffic flow during the peak periods. Dual turn lanes and right-turn lanes were also evaluated on a case-by-case basis. Widening along the side-street approaches was also considered to improve operations, reduce queuing, or to allow for better signal timing along CO 52. The implementation of the changes in lane geometry also involved signal timing and corridor progression optimization, where appropriate.

Conventional intersection improvements and optimization should handle future traffic conditions at most intersections along the CO 52 study corridor with two exceptions: US 287 and WCR 59. At the US 287 intersection, the projected traffic growth is expected to exceed the limits of what a conventional intersection can accommodate. A partial continuous-flow intersection is one example of a non-traditional configuration that could significantly improve traffic flow through the intersection without adding capacity to either US 287 or CO 52. WCR 59 required special consideration due to the school located in the southwest corner and safety concerns at the high-speed unsignalized intersection. Though signal warrants may be met at some point in the future, the high-speed roundabout provides a potentially safer and more efficient option.

Appendix F details multimodal considerations throughout the corridor, including at intersections.

Figure 4-19 | Segment I: Preferred Intersection Improvements

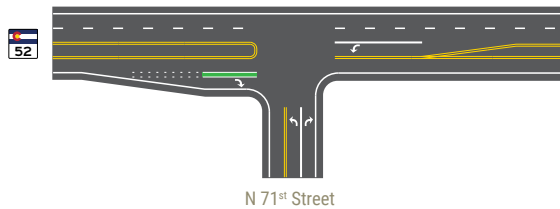


1 N 71st Street:

Existing project to realign 71st to right-angle and add northbound right-turn lane. Signalize intersection when warrants are met.

Pedestrian/Bicycle Improvements:

- Include bike lanes through the intersection located left of right-turn lanes for on-shoulder alternative.



2 N 79th Street:

Currently signalized. No required capacity improvements; however, consider adding right-turn lanes as conditions warrant.

Pedestrian/Bicycle Improvement:

- Provide bicycle crossing improvements east-west and north-south.
- Evaluate bicycle detection for on-shoulder alternative and potential signal for multiuse path alternative.
- Improve crossing for left-turning bicyclists
- Include bike lanes through the intersection located left of right-turn lanes for on-shoulder alternative



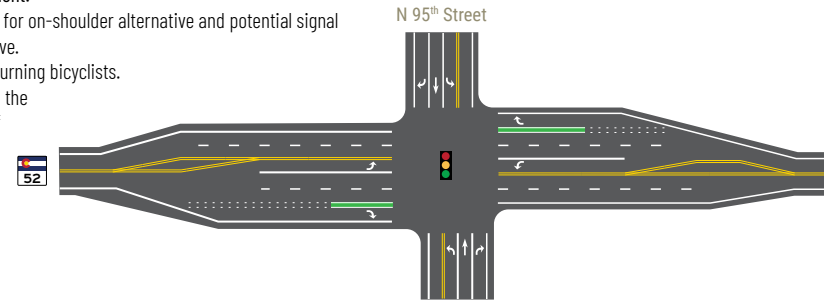
3 N 95th Street:

Assuming 2-Lane Cross Section:

- Add second through lane in each direction on CO 52 (secondary through lanes terminate).

Pedestrian/Bicycle Improvement:

- Evaluate bicycle detection for on-shoulder alternative and potential signal for multiuse path alternative.
- Improve crossing for left-turning bicyclists.
- Include bike lanes through the intersection located left of right-turn lanes for on-shoulder alternative.



4 US Highway 287:

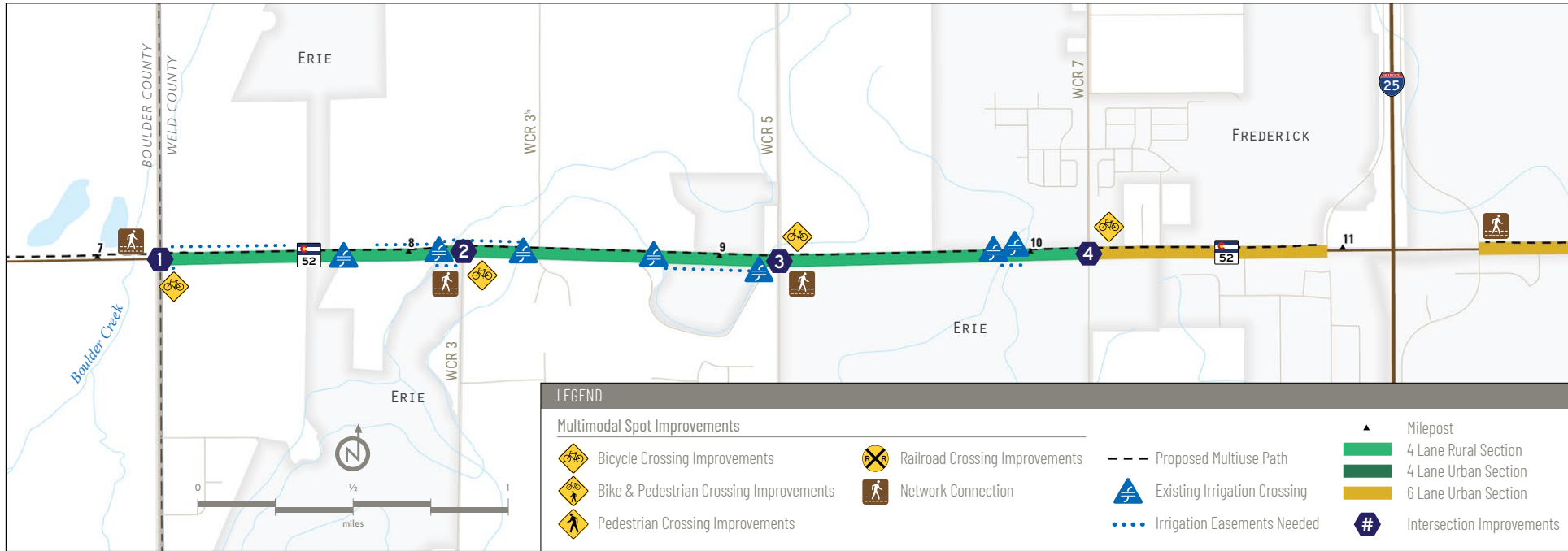
Base Condition (Traditional Intersection Improvements): Dual left-turns on all approaches, two-through lanes, channelized right-turn lanes. (CO 52 secondary through lanes terminate in 2-Lane alternatives). Significant queuing, in particular due to heavy southbound left-turn movements (550 - 800 vph), result in bottleneck/gridlock conditions.

- These conditions could be mitigated through implementation of non-traditional intersection such as quadrant road or CFI.

Pedestrian/Bicycle Improvements:

- Evaluate bicycle detection for on-shoulder alternative and potential signal for multiuse path alternative.
- Include bike lanes through the intersection located left of right-turn lanes for on-shoulder alternative.

Figure 4-20 | Segment 2 West: Preferred Intersection Improvements

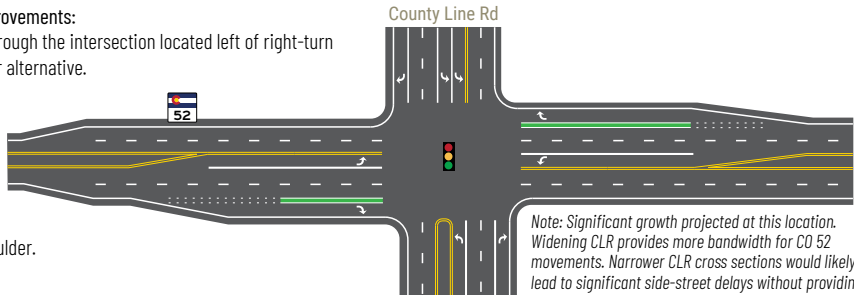


1 County Line Road:

- Currently signalized
- Assuming 4-Lane cross section (2-Lanes west of intersection):
- Add second through lane in each direction on CO 52 (secondary lanes to terminate on 2-Lane approaches)
 - Maintain separate left and right-turn lanes.
 - Add dual southbound left-turns, maintain single northbound left-turn lane, add right-turn lanes.
 - Add second through lane in each direction on CLR (secondary lanes terminate beyond intersection).

Pedestrian/Bicycle Improvements:

- Include bike lanes through the intersection located left of right-turn lanes for on-shoulder alternative.
- For multiuse path alternative, provide bicycle crossing improvements for eastbound bicyclists to transition from multiuse path to shoulder.

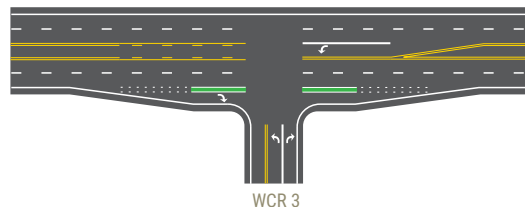


2 Weld County Road 3

- Expected to remain unsignalized.
- Add eastbound right-turn decel, and accel lane on eastbound CO 52 for northbound to eastbound right-turn movement.
 - Add westbound left-turn lane.
- Note: Lane recommendations per CDOT access code.

Pedestrian/Bicycle Improvement:

- Include bike lanes through the intersection located left of right-turn lanes for on-shoulder alternative.

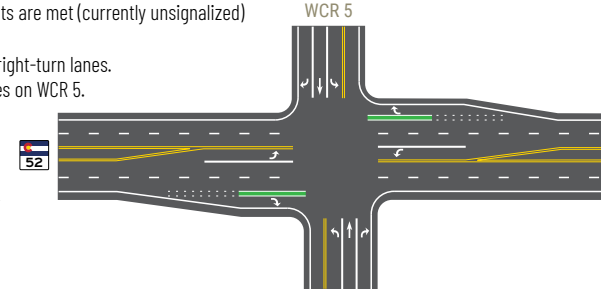


3 Weld County Road 5

- Signalize intersection when warrants are met (currently unsignalized)
- Assuming 4-Lane Cross Section:
- Add eastbound and westbound right-turn lanes.
 - Add left-turn and right-turn lanes on WCR 5.

Pedestrian/Bicycle Improvement:

- Include bike lanes through the intersection located left of right-turn lanes for on-shoulder alternative.



4 Weld County Road 7:

- Currently signalized.
- Assuming 4-Lane cross section to west, 6-Lane cross section to east:
- Add eastbound and westbound right-turn lanes.
 - Westbound right-turn lane-drop
 - Eastbound right-turn lane-add

Pedestrian/Bicycle Improvements:

- Evaluate bicycle detection for on-shoulder alternative and potential signal for multiuse path alternative.
- Improve bicycle connections to the north.
- Include bike lanes through the intersection located left of right-turn lanes for on-shoulder alternative.

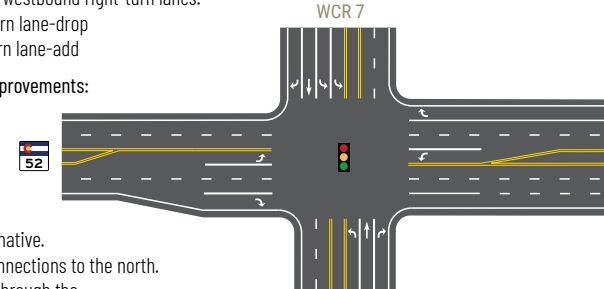
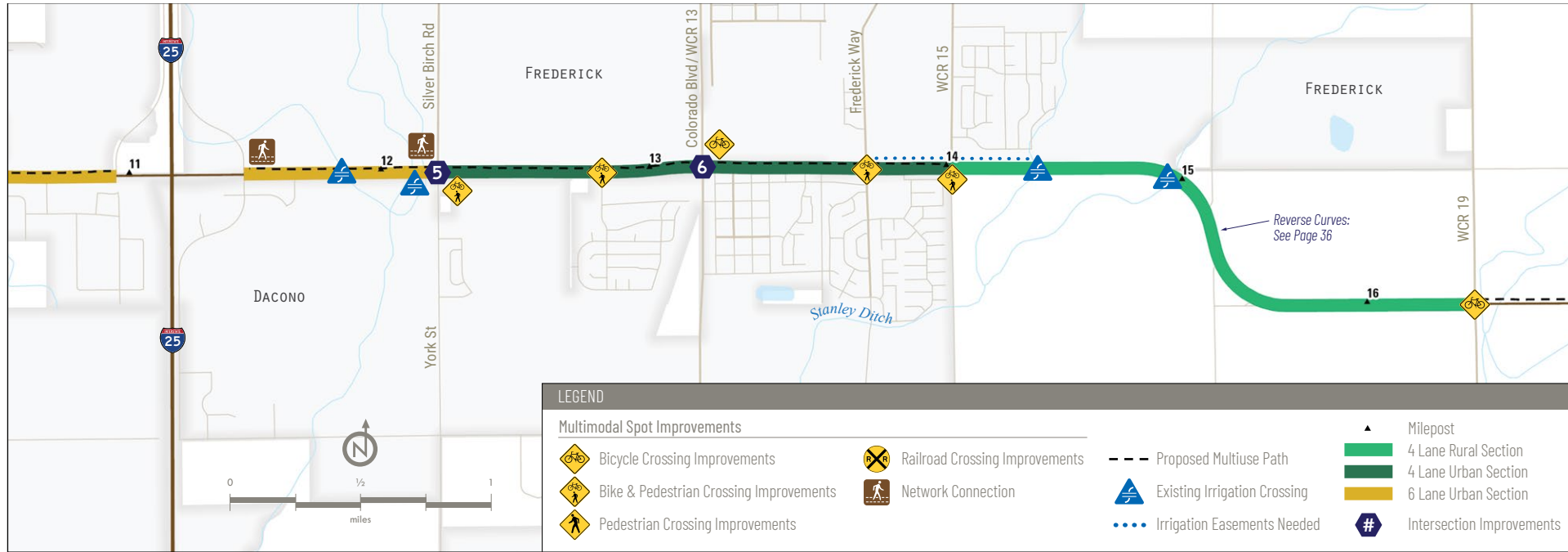
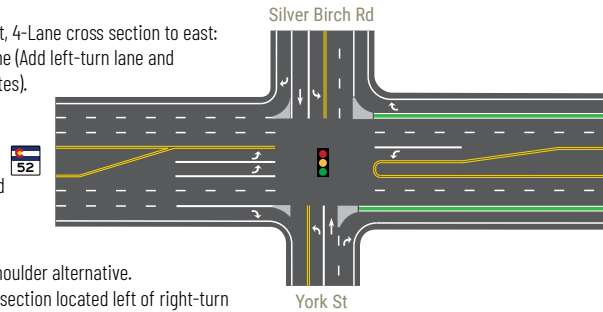


Figure 4-21 | Segment 2 East: Preferred Intersection Improvements



5 Silver Birch Road / York St:

- Currently signalized
Assuming 6-Lane cross section to west, 4-Lane cross section to east:
- Provide eastbound dual left-turn lane (Add left-turn lane and northbound receiving lane (terminates).
 - Add northbound right-turn lane.
 - Eastbound right-turn lane-drop.
 - Westbound right-turn lane-add.
 - Expand northbound and southbound storage to accommodate queues.

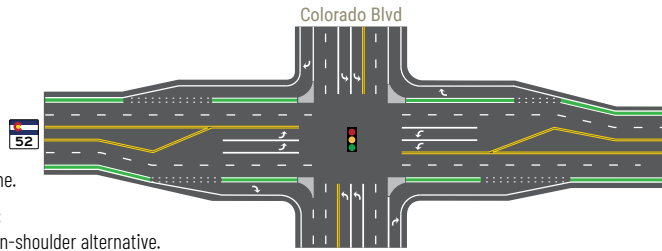


Pedestrian/Bicycle Improvement(s)

- Evaluate bicycle detection for on-shoulder alternative.
- Include bike lanes through the intersection located left of right-turn lanes for on-shoulder alternative or bring bikes to the intersection and have them cross with pedestrians.
- Install turn islands and provide pedestrian accessibility improvements at intersection.

6 Colorado Boulevard / WCR 13:

- Currently signalized
Assuming 4-Lane Cross Section:
- All approaches to have dual left-turn lanes, two thru lanes, and a channelized right-turn lane.

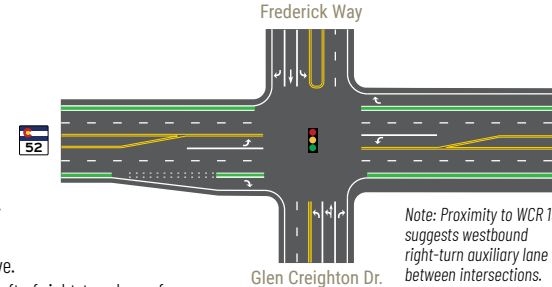


Pedestrian/Bicycle Improvements:

- Evaluate bicycle detection for on-shoulder alternative.
- Include bike lanes through the intersection located left of right-turn lanes for on-shoulder alternative or bring bikes to the intersection and have them cross with pedestrians.
- Consider tunnel or ped/bike bridge for Old Railroad Trail.

7 Glen Creighton Dr. / Frederick Way:

- Currently signalized
Assuming 4-Lane Cross Section:
- Add southbound left-turn lane.
 - Extend northbound storage and modify lane designations for one left-turn, shared left-turn/thru lane, and right-turn lane (maintains split phasing).
 - Maintain eastbound and westbound right-turn lanes.

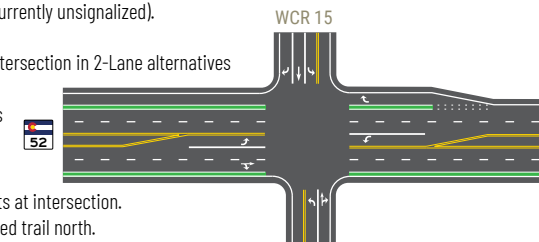


Pedestrian/Bicycle Improvement(s)

- Evaluate bicycle detection for on-shoulder alternative.
- Include bike lanes through the intersection located left of right-turn lanes for on-shoulder alternative or bring bikes to the intersection and have them cross with pedestrians.
- Future connection to proposed off-street paved trail to the north.
- Provide pedestrian accessibility improvements at intersection

8 Weld County Road 15:

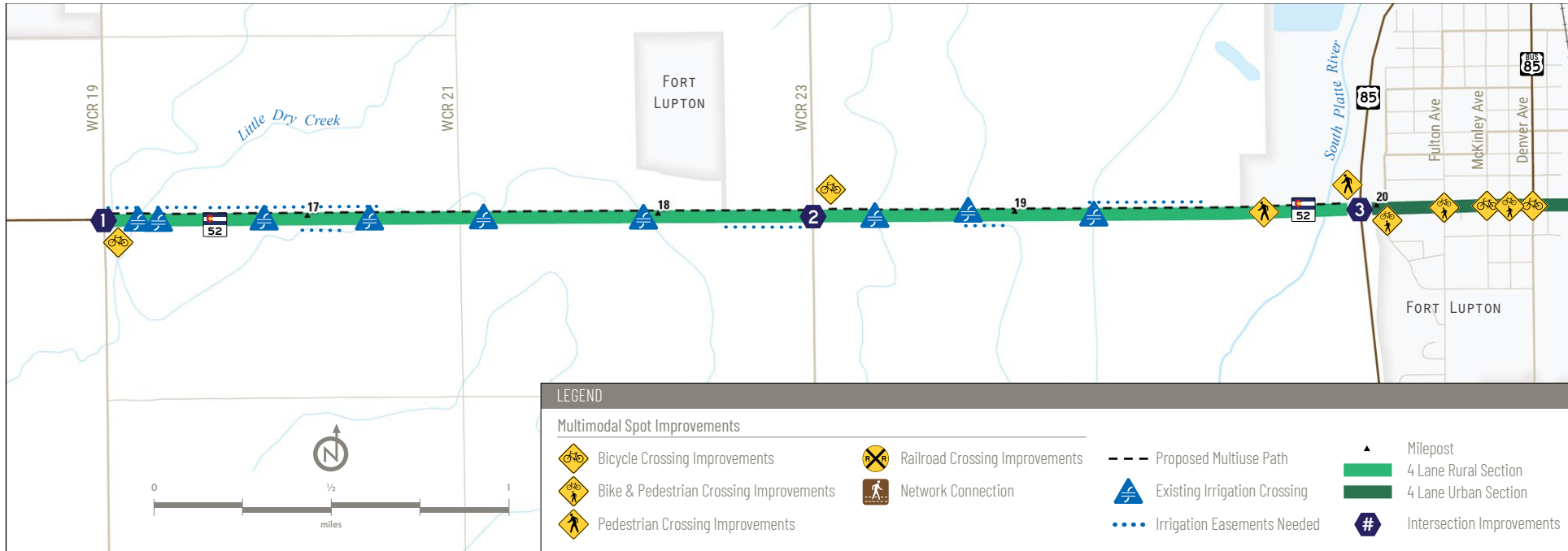
- Signalize intersection when warrants are met (currently unsignalized).
Assuming 4-Lane Cross Section:
- Secondary through lane terminates east of intersection in 2-Lane alternatives
 - Add northbound left-turn lane
 - Add southbound left-turn and right-turn lanes
 - Maintain westbound right-turn lane



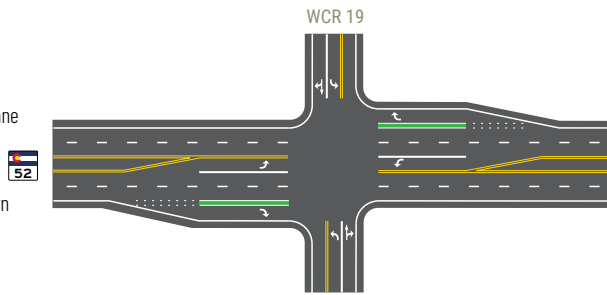
Pedestrian/Bicycle Improvements:

- Provide pedestrian accessibility improvements at intersection.
- Future connection to proposed off-street paved trail north.
- Install crossing visibility improvements.
- Include bike lanes through the intersection located left of -turn lanes for on-shoulder alternative
- Provide pedestrian accessibility improvements at intersection

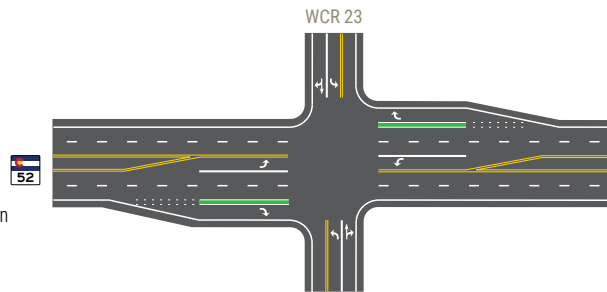
Figure 4-22 | Segment 3 West: Preferred Intersection Improvements



1 Weld County Road 19:
 Signalize intersection when warrants are met (currently unsignalized).
 Assuming 2-Lane Cross Section:
 - Add eastbound and westbound left-turn and right-turn lanes
 - Add northbound and southbound left-turn lane
 Note: High volume for 2-Lane facility. Consider adding auxiliary thru lane at intersection in 2-Lane alternative.
 Pedestrian/Bicycle Improvements:
 - Include bike lanes through the intersection located left of right-turn lanes for on-shoulder alternative.



2 Weld County Road 23:
 Signalize intersection when warrants are met (currently unsignalized).
 Assuming 2-Lane Cross Section:
 - Add eastbound and westbound left-turn and right-turn lanes
 - Add northbound and southbound left-turn lane
 Note: High volume for 2-Lane facility. Consider adding auxiliary thru lane at intersection in 2-Lane alternative.
 Pedestrian/Bicycle Improvement:
 - Include bike lanes through the intersection located left of right-turn lanes for on-shoulder alternative



3 US 85 Interchange:
 Currently Signalized
 Assuming 2-Lane Cross Section:
 - Widen bridge west of interchange to 4-Lanes to extend eastbound storage and westbound auxiliary lane.
 - Add westbound thru lane under bridge to allow for northbound dual-left-turn lanes.
 - Consider adding northbound right-turn lane on ramp.
 - Extend westbound left-turn lane storage through Grand Avenue intersection (Grand Avenue to RIR0).

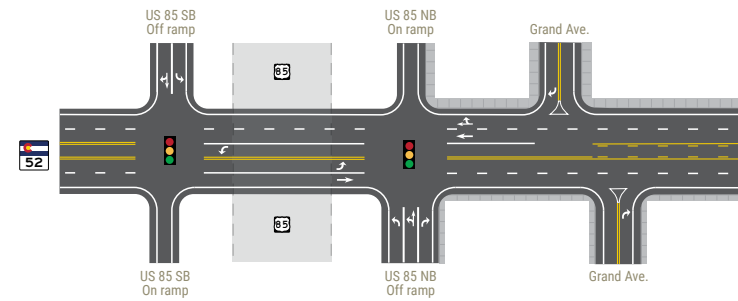
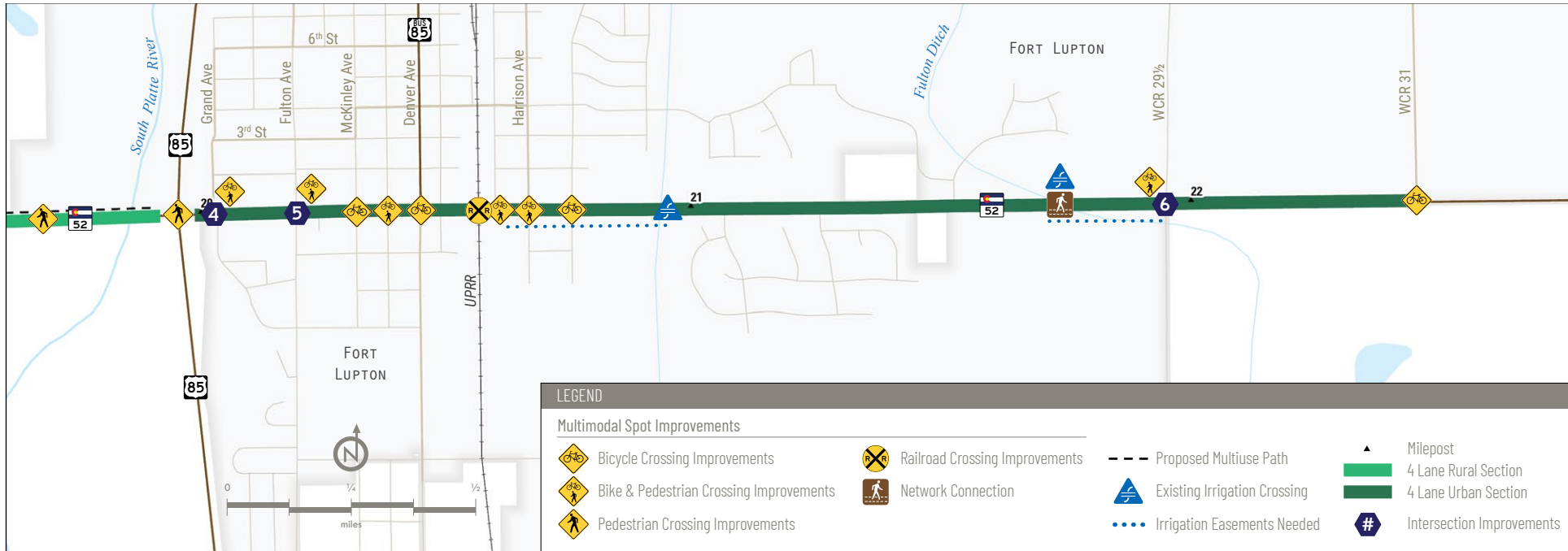
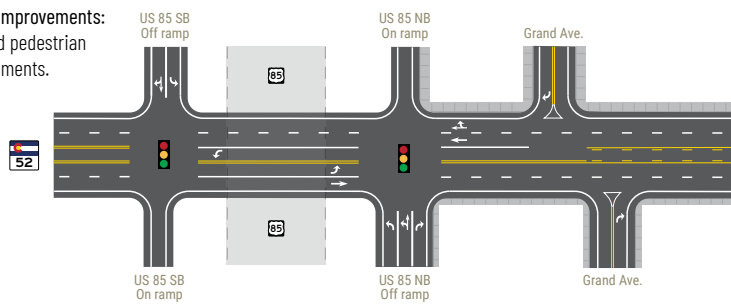


Figure 4-23 | Segment 3 East: Preferred Intersection Improvements



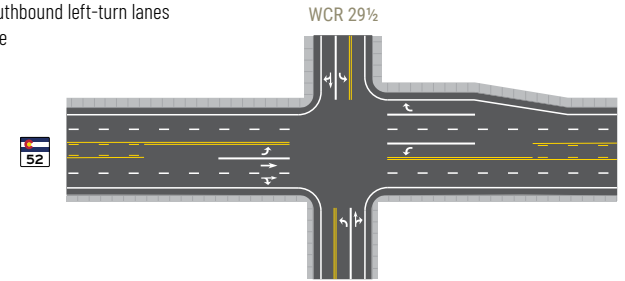
4 Grand Avenue:
 Currently unsignalized, offset intersection within 250-ft of US 85 ramps.
 - Restrict access to 3/4 movement (not recommended) or RIRO (recommended)
 - Accommodating left-turns from sidestreet would require signal to be combined with US 85 signal due to proximity (not recommended).
 Note: Assumed Right-in, Right-out in models due to excessive delay for side-street movements. Traffic rerouted to Fulton Avenue.

Pedestrian/Bicycle Improvements:
 - Multiuse path and pedestrian crossing improvements.



6 Weld County Road 29 1/2:
 Currently Unsignalized
 Assuming 2-Lane Cross Section:
 - Add eastbound and westbound right-turn lanes
 - Extend eastbound and westbound left-turn lanes
 - Add northbound and southbound left-turn lanes
 Note: Per CDOT Access Code

Pedestrian/Bicycle Improvements:
 - Multiuse path and pedestrian crossing improvements.



5 Fulton Avenue:
 Signalize intersections when warrants are met (currently unsignalized).
 Assuming 2-Lane or 4-Lane Cross Section:
 - Provide left-turn lanes from Fulton Street and a southbound right-turn lane to accommodate redirected traffic.
 Note: Location has the potential to meet signal warrants with or without traffic redirected from Grand Avenue.

Pedestrian/Bicycle Improvement:
 - Multiuse path and pedestrian crossing improvements.

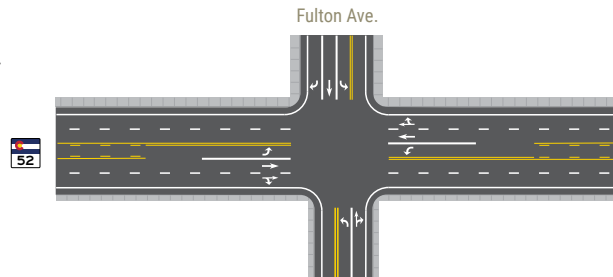
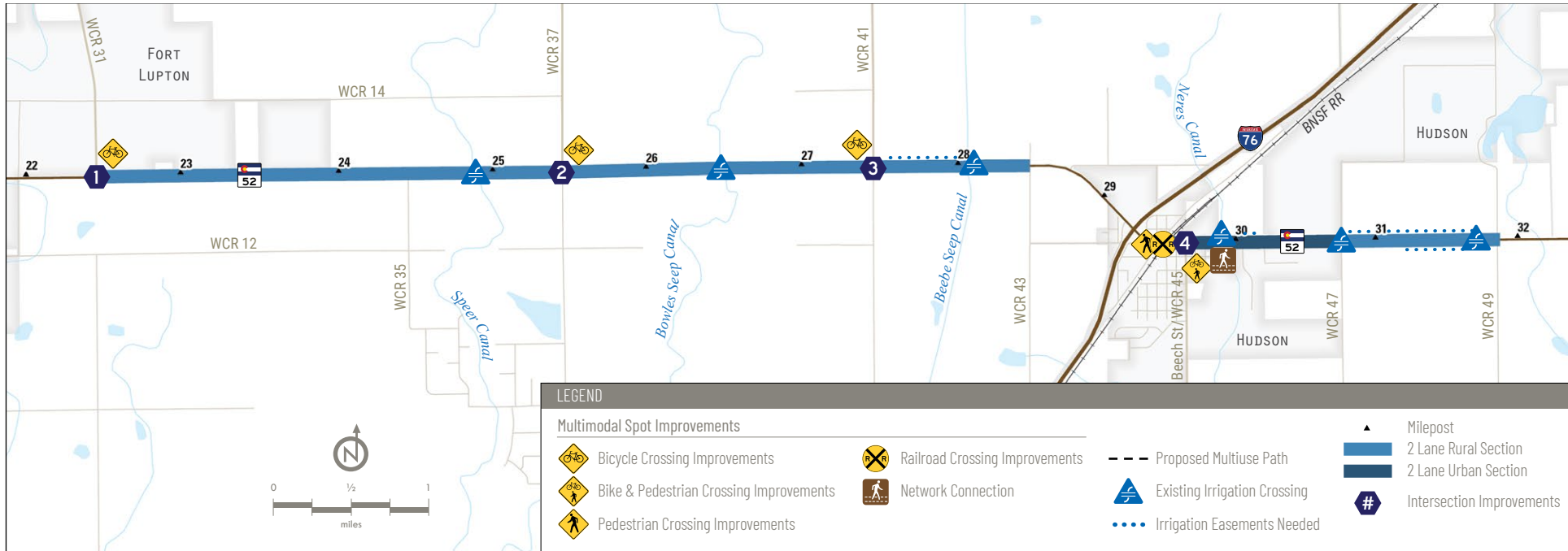
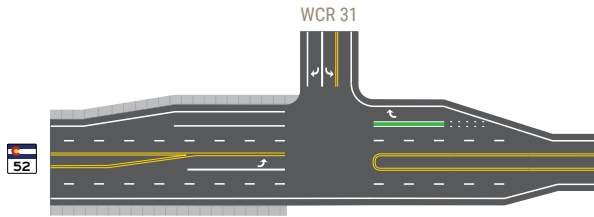


Figure 4-24 | Segment 4: Preferred Intersection Improvements

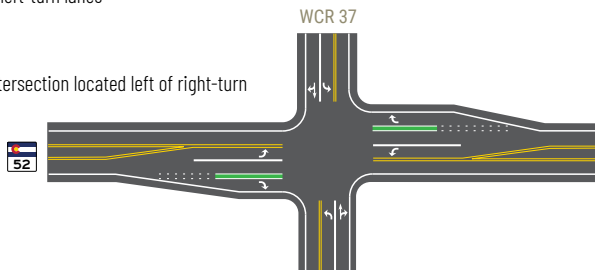


1 Weld County Road 31:
 Currently Unsignalized
 Assuming 2-Lane Cross Section:
 - Add southbound right-turn lane
 - Extend lanes to Access Code standards
Pedestrian/Bicycle Improvements:
 - Multiuse path begins to the west.
 Bicycles on shoulder to the east.
 - Provide bicycle crossing improvements for eastbound bicyclists to transition from multiuse path to shoulder.

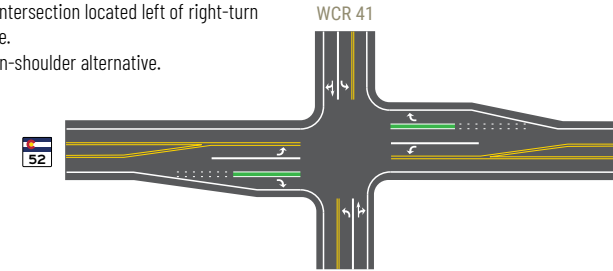


2 Weld County Road 37:
 Currently Unsignalized
 Assuming 2-Lane Cross Section:
 - Add eastbound and westbound left-turn and right-turn lanes
 - Add northbound and southbound left-turn lanes
 Note: Per CDDT Access Code.

Pedestrian/Bicycle Improvement:
 - Include bike lanes through the intersection located left of right-turn lanes for on-shoulder alternative

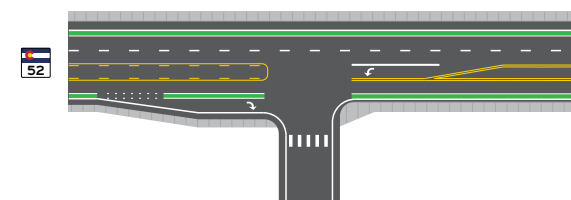


3 Weld County Road 41:
 Being Signalized
Pedestrian/Bicycle Improvement:
 - Include bike lanes through the intersection located left of right-turn lanes for on-shoulder alternative.
 - Evaluate bicycle detection for on-shoulder alternative.



4 Weld County Road 45 / Beech Street:
 Currently Unsignalized
 Assuming 2-Lane Cross Section:
 - Add eastbound right-turn
 - Add westbound left-turn
 Note: Per CDDT Access Code

Pedestrian/Bicycle Improvement:
 - Provide crossing improvements.

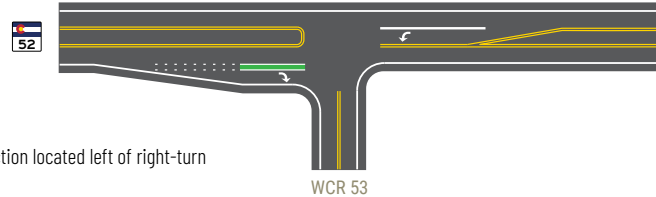


WCR 45 / Beech Street

Figure 4-25 | Segment 5: Preferred Intersection Improvements



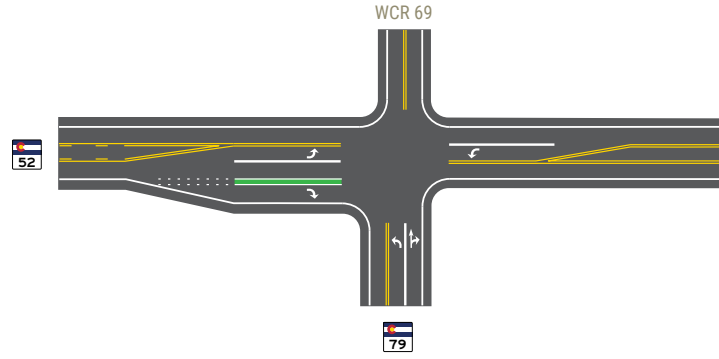
1 Weld County Road 53:
 Currently Unsignalized
 Assuming 2-Lane Cross Section:
 - Add eastbound right-turn
 - Add westbound left-turn
 Note: Per CDDOT Access Code
 Pedestrian/Bicycle Improvements:
 - Include bike lanes through the intersection located left of right-turn lanes for on-shoulder alternative



2 Weld County Road 59:
 Base Condition: Stop Controlled with eastbound shared left-turn/thru lane and right-turn lane, westbound left-turn lane, westbound accel lane for northbound left-turn movement.
 Signalization: Does not meet warrants (not recommended)
 Unsignalized: Consideration for northbound and southbound left-turn lane could negatively impact sight distance or create conflict with turning trucks.
 Roundabout: Single lane high-speed roundabout would allow for significant safety improvements while allowing consistent operation throughout the day.
 Visibility Improvements: Consider overhead span wire warning signal (mainline yellow, sidestreet red) or other intersection visibility improvements.
 Pedestrian/Bicycle Improvement:
 - Install bicycle crossing treatments for left-turns onto/off of CO 52

*See page 37 for WCR 59 Intersection Diagram

3 Weld County Road 69 / CO 79:
 Currently Unsignalized
 Assuming 2-Lane Cross Section:
 - Add lanes per access code pending evaluation of ROW impacts.
 Note: No operational deficiencies noted.
 Pedestrian/Bicycle Improvement:
 - Provide pedestrian accessibility improvements



4.10 CORRIDOR PRESERVATION FOOTPRINT

This PEL prepared a corridor preservation footprint which is shown in the ACP Report (**Appendix B**). This footprint is considered the collective footprint of all options that have been either carried forward or recommended. This common footprint of alternatives represents an estimate of the ROW that would be necessary to accommodate the aggregate of:

- Ultimate roadway improvements
- Intersection configurations
- Bicycle and pedestrian facilities along CO 52

This footprint is intended to inform decision-making at the state and local level in terms of preserving land and making land use decisions to not preclude future transportation improvements that have been identified in this PEL. The footprint width generally corresponds to the recommended typical section, but expands to account for improvements at the intersections. The ACP provides a detailed alternatives mapbook of the footprint, along with parcel information and future access conditions. A package of digital files has also been provided that allow communities, developers, and stakeholders to view the corridor preservation footprint interactively. File formats include:

- DGN – Computer aided design and drafting file
- KML – Google Earth® file
- Shapefile package – Geographic Information Systems package



Existing Guardrail along CO 52 , West of County Line Road

5.0 // PROJECT CATEGORIZATION

Understanding that project funding for improvements would not occur for the entire corridor at once, but more likely in relatively small amounts over a long period of time from a variety of funding sources, the study team developed a list of potential projects for the corridor. The list briefly characterizes each project for effectiveness, provides a range of estimated cost, and categorizes each project for funding eligibility. The intention of the list is to facilitate project implementation in the future. The list provides a searchable and sortable CO 52 project database, so that as funds from specific sources may become available, qualifying CO 52 projects can be identified. The complete list of potential projects is presented in **Appendix H**.

5.1 IDENTIFICATION OF POTENTIAL PROJECTS

The project team reviewed alternatives from Level 2 to identify potential projects. The Potential Projects List includes carried forward and recommended alternatives, intersection and multimodal improvements, as well as recommended projects from local agencies. Likely endpoints for projects were identified for project definition purposes.

5.2 PROCESS OF CATEGORIZATION

The list of potential projects describes each project with summary information regarding how well it would achieve the Purpose & Need, the ease of implementation, and general attributes of cost and funding eligibility.

5.2.1 Purpose & Need Measurements

Based on data analysis conducted during Level 2 evaluation each potential project was rated for its ability to meet the elements of Purpose & Need including its ability to:

Increase Safety

Accommodate Increased Travel and Freight Demand

Support Multimodal Connections

Safety scores of potential projects were assigned on a qualitative basis, with consideration for how a project might impact intersection and segment crash patterns due to elements like vehicle speeds, congestion, or intersection geometry. The introduction or removal of conflict points for potential impact to crash patterns was also considered. Projects that specifically address identified safety issues were assigned the highest score.

Traffic operations improvements were rated quantitatively based on the results of the detailed traffic analysis for potential intersection improvement projects and potential roadway segment projects. Intersection projects were rated based on the projected improvement of peak hour intersection level-of-service (LOS), which is based on the average delay of all vehicles through an intersection and results in a letter grade A through F. Roadway segment improvement projects were rated based on the estimated improvement in peak hour travel time.

From a multimodal perspective, the potential projects were evaluated based on the design elements of the type of multimodal facilities included. An increased score indicates that the project provides multimodal facilities with greater benefits to user safety and comfort.

Table 5.1 describes the specific definitions for the scores for each Purpose & Need element. The scores were given based on a scale of 1-5. Some numbers are given specific definitions.

Table 5.1 | Table of Purpose & Need Measurement Scores

Scores	Measure
Increase Safety (Qualitative Information)	
1	Not expected to improve safety
3	Expected to have a positive safety impact
5	Improves safety by addressing an identified safety issue
Improved Traffic Operations to Accommodate Increased Travel and Freight Demand (Quantitative Data)	
1	Would not improve intersection LOS or segment travel time
2	Moderate potential to improve peak hour intersection LOS 1 letter grade
3	Moderate potential to improve peak hour intersection LOS 2 letter grades; or improves segment travel time 5 to 15%
4	Moderate potential to improve intersection LOS 3 letter grades
5	High potential to improve intersection LOS 4 letter grades; or improves segment travel time >15%
Support Multimodal Connections (Qualitative Information)	
1	Does not provide multimodal infrastructure or safety improvements
2	Project provides minor improvements such as widening of existing shoulders that are already four feet or greater
3	Provides shoulders of at least 4-foot width where no multimodal facilities already exist
4	Provides on-street bicycle lanes or other dedicated improvements
5	Provides separated bicycle/pedestrian infrastructure, such as a multiuse path

5.2.2 Ease of Implementation

Ease of implementation summarizes potential issues that could be encountered as a project moves towards implementation. These issues typically require additional time that should be factored into the schedule for project implementation. These are comprised of the need for additional environmental analysis and documentation, the extent to which a project is in alignment with local plans and policies, and the need for acquisition of ROW. For each project, these concerns are briefly summarized to provide awareness as projects move into further development.

Environment

The Existing Conditions Report identified community and natural resources that required lengthy clearance requirements or costly investigation or mitigation requirements. These critical resources include historic resources, parks, recreation and open space, noise, critical wildlife habitat and additional environmental site-specific considerations identified by the team, such as and oil and gas wells. During alternatives development and evaluation of these critical resources were identified and categorized to inform the evaluation process and identify potential projects. In Level 2B evaluation, these critical resources were identified segment by segment to inform the evaluation process and identify projects which have the potential to impact resources which may pose project risks. Findings were used to narrow the range of potential projects.

After Level 2 evaluation, the same resources were identified at a project level to help categorize and identify potential projects. The project team identified the number and type of critical resources associated with each site-specific alternative for consideration of the overall ease of implementation.



Looking East at the Intersection of 95th St and CO 52

Local Planning

Local agencies determined the level of local support for each alternative when considering consistency with local plans (e.g., Transportation Master Plan, Comprehensive Plan, etc.). Based on the interviews and input received from the community representatives on the Technical Team, the potential projects were tagged with a potential amount of additional community engagement needed to refine the potential project: Substantial, Moderate, or None Anticipated.

Right-of-Way

Ease of implementation for ROW is subjective based on corridor knowledge, engineering judgment, and experience with similar projects. In addition to identifying likely structure acquisitions, the team also identified where corridor preservation lines lie close to structures, where underlying easements or realignments may complicate the process, and where a significant number of commercial access and parking modifications would be required for implementation.



Table 5.2 | Summary Table of Potential Projects

Project ID	Location	Improvement Type	Overall Purpose & Need Rating	Cost Estimate – Low	Cost Estimate – High
1	CO 119 to County Line Rd	2-lane Resurfacing Shoulder Widening	11	\$41,200,000	\$50,300,000
2	CO 119 to Monarch Pl	Multiuse Trail	9	\$2,200,000	\$2,700,000
3	71st Ave	Intersection Improvements	9	\$4,500,000	\$5,500,000
4	79th Ave	Intersection Improvements	7	\$9,000,000	\$10,900,000
5	Hover St/95th Ave	Intersection Improvements	8	\$8,300,000	\$10,100,000
6	US 287 – option 1	Intersection Improvements (Traditional Configuration)	7	\$11,800,000	\$14,400,000
7	US 287 – option 2	Intersection Improvements (Non-Traditional Configuration)	11	\$21,100,000	\$25,800,000

Segment 1

Table continued on next page

5.3 POTENTIAL PROJECTS

Table 5.2 provides a summary of the potential projects for the CO 52 corridor, in arbitrary order from west to east. It is important to note that the projects form a future vision for the corridor and may require many years to implement. Annual identification of funding resources will be necessary on a project-by-project basis. Some projects may be bundled or packaged together depending on funding opportunities. Further project definition and development is required including additional environmental analysis as well as preliminary and final design. A Project ID is assigned to each project for cross-references purposes only.

Appendix H provides the complete detailed table with ease of implementation information on each project.




**Segment
2**

Project ID	Location	Improvement Type	Overall Purpose & Need Rating	Cost Estimate - Low	Cost Estimate - High
8	County Line Rd	Intersection Improvements	9	\$23,100,000	\$28,300,000
9	WCR 3	Intersection Improvements	13	\$10,300,000	\$12,500,000
10	WCR 5	Intersection Improvements	10	\$8,900,000	\$10,800,000
11	County Line Rd to WCR 7	4-Lane Widening Shoulder Widening	10	\$30,400,000	\$37,100,000
12	WCR 7	Intersection Improvements	11	\$10,300,000	\$12,500,000
13	WCR 7 to I-25 SB FR	6-Lane Widening Shoulder Widening	10	\$24,900,000	\$30,500,000
14	I-25 NB FR to Silver Birch (York)	6-Lane Widening Shoulder Widening	8	\$28,100,000	\$34,300,000
15	Silver Birch Rd (York)	Intersection Improvements	8	\$14,300,000	\$17,500,000
16	Colorado Boulevard	Intersection Improvements	8	\$10,000,000	\$12,200,000
17	Glen Creighton/Frederick Way	Intersection Improvements	11	\$10,200,000	\$12,500,000
18	WCR 15	Intersection Improvements	9	\$5,700,000	\$6,900,000
19	Silver Birch (York) to WCR 15	4-Lane Widening Shoulder Widening	12	\$19,800,000	\$24,200,000
20	Reverse Curves - Option 1	Realignment (4% Superelevation)	6	\$26,000,000	\$31,700,000
21	Reverse Curves - Option 2	Realignment (6% Superelevation)	6	\$26,500,000	\$32,400,000
22	WCR 15 to WCR 19	2-Lane Resurfacing Shoulder Widening (Interim)	6	\$19,200,000	\$23,400,000

Table continued on next page

**Segment
3**



Project ID	Location	Improvement Type	Overall Purpose & Need Rating	Cost Estimate - Low	Cost Estimate - High
23	WCR 19 to US 85	4-Lane Widening Shoulder Widening	10	\$13,000,000	\$15,800,000
24	WCR 19 to US 85	2-Lane Resurfacing Shoulder Widening (Interim)	6	\$23,900,000	\$29,100,000
25	Through Fort Lupton	2-Lane Resurfacing Urban	9	\$5,300,000	\$6,500,000
26	Through Fort Lupton	4-Lane Widening Urban	13	\$5,700,000	\$7,000,000
27	Denver Ave to WCR 31	4-Lane Widening Urban	13	\$5,400,000	\$6,500,000
28	Denver Ave to WCR 31	2-Lane Resurfacing Shoulder Widening (Interim)	9	\$8,300,000	\$10,100,000
29	WCR 19	Culvert Replacement (In progress)	3	\$1,900,000	\$2,300,000
30	WCR 19	Intersection Improvements	14	\$14,700,000	\$17,900,000
31	WCR 23	Intersection Improvements	8	\$9,300,000	\$11,400,000
32	Pedestrian Underpass West of US 85	Multimodal Connections	7	\$3,500,000	\$4,300,000
33	US 85 Interchange	Intersection Improvements	15	\$5,900,000	\$7,300,000
34	Grand Ave	Intersection Improvements	15	\$2,300,000	\$2,800,000
35	Fulton Street	Intersection Improvements	12	\$3,200,000	\$3,900,000
36	Grand Ave to Denver Ave	Multimodal Ped Connections	11	\$2,100,000	\$2,500,000
37	WCR 29.5	Intersection Improvements	10	\$7,300,000	\$8,900,000
38	Structure D-17-1 (Bridge over South Platte)	Structure Replacement Structure Widening	3	\$16,300,000	\$19,900,000

Table continued on next page

Identification of Potential Projects



Segment 4

Segment 5

Project ID	Location	Improvement Type	Overall Purpose & Need Rating	Cost Estimate - Low	Cost Estimate - High
40	WCR 31 to WCR 43	4-Lane Widening (Future) Shoulder Widening	7	\$46,100,000	\$56,300,000
41	WCR 31 to WCR 43; Holly to WCR 49	2-Lane Resurfacing Shoulder Widening	7	\$71,900,000	\$87,800,000
42	Through Hudson	2-Lane Widening Urban	8	\$10,000,000	\$12,200,000
43	WCR 37	Intersection Improvements	10	\$7,400,000	\$9,000,000
44	WCR 41	Intersection Improvements (In Progress)	10	\$8,200,000	\$10,100,000
45	WCR 45	Intersection Improvements	8	\$1,300,000	\$1,600,000
46	Railroad Pedestrian Crossing	Multimodal Ped Connections	11	\$700,000	\$900,000
47	WCR 49 to CO 79	2-Lane Resurfacing Shoulder Widening	7	\$107,000,000	\$130,700,000
48	WCR 53	Intersection Improvements	8	\$7,300,000	\$8,900,000
49	WCR 59 - Option 2	Intersection Improvements (Roundabout)	11	\$10,000,000	\$12,000,000
50	CO 79	Intersection Improvements (Note: ROW and Irrigation Issues)	5	\$5,000,000	\$6,200,000
51	Bridge at MP 32.825	Structure Replacement	3	\$4,100,000	\$5,000,000

*Costs estimated in 2021

5.3.1 Potential Prioritization

Potential prioritization can be identified by those projects that rank highest for meeting overall Purpose & Need. It is important to note that project cost has no bearing on prioritization ranking. **Table 5.3** lists the top 15 projects that address overall Purpose & Need.

Table 5.3 | Highest Rated Overall Need Projects

Project ID	Segment	Location	Improvement	Operational Improvements Rating	Traveler Safety Rating	Multimodal Safety and Infrastructure Rating	Overall P&N Rating
33	3	US 85 Interchange	Intersection Improvements	5	5	5	15
34	3	Grand Ave	Intersection Improvements	5	5	5	15
30	3	WCR 19	Intersection Improvements	5	5	4	14
9	2	WCR 3	Intersection Improvements	4	5	4	13
26	3	WCR 19 to Grand; Denver to west of WCR 31	4-lane Urban	5	3	5	13
27	3	Denver to west of WCR 31	4-lane	5	3	5	13
19	2	Silver Birch (York) to WCR 15	4-lane	5	3	4	12
35	3	Fulton Street	Intersection Improvements	4	3	5	12
1	1	CO 119 to west of County Line Rd	2-lane resurfacing (10' shoulder widening with resurfacing)	3	3	5	11
7	1	US 287 - option 2	Intersection Improvements - Non-traditional	3	3	5	11
12	2	WCR 7	Intersection Improvements	4	3	4	11
17	2	Glen Creighton/Frederick Way	Intersection Improvements	4	3	4	11
36	3	Grand to Denver	Multimodal Ped connections	1	5	5	11
46	4	Railroad Pedestrian Crossing	Multimodal Ped connections	1	5	5	11
49	5	WCR 59 - option 2	Roundabout	3	5	3	11

The top ranked projects ratings for the three individual elements of Purpose & Need (Safety, Traffic Operations, and Multimodal) are presented in **Tables 5.4, 5.5 & 5.6** respectively. These projects each received the top score of 5, for the respective categories. The order within the top ranking is inconsequential; the projects are arbitrarily listed from west to east.

Table 5.4 | Highest Rated Safety Projects

Project ID	Segment	Location	Improvement
9	2	WCR 3	Intersection Improvements
30	3	WCR 19	Intersection Improvements
33	3	US 85 Interchange	Intersection Improvements
34	3	Grand Ave	Intersection Improvements
36	3	Grand to Denver	Multimodal Ped connections
44	4	WCR 41	Being signalized
46	4	Railroad Pedestrian Crossing	Multimodal Ped connections
49	5	WCR 59 - option 2	Roundabout

Table 5.5 | Highest Rated Traffic Operations Projects

Project ID	Segment	Location	Improvement
10	2	WCR 5	Intersection Improvements
11	2	County Line Rd to WCR 7	4-lane
19	2	Silver Birch (York) to WCR 15	4-lane
23	3	WCR 19 to US 85	4-lane
26	3	WCR 19 to Grand; Denver to west of WCR 31	4-lane urban
27	3	Denver to west of WCR 31	4-lane urban
30	3	WCR 19	Intersection Improvements
33	3	US 85 Interchange	Intersection Improvements
34	3	Grand Ave	Intersection Improvements



Damaged Culvert at WCR 13

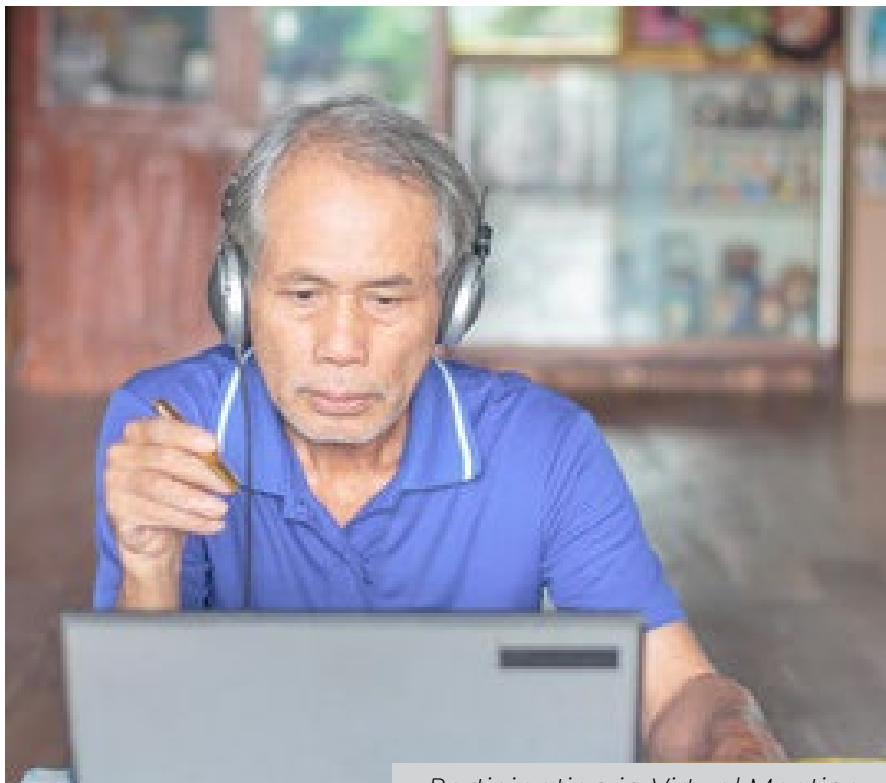
Table 5.6 | Highest Rated Multimodal Projects

Project ID	Segment	Location	Improvement
1	1	CO 119 to west of County Line Rd	2-lane resurfacing (10' shoulder widening with resurfacing)
3	1	71st	Intersection Improvements
4	1	79th Ave	Intersection Improvements
5	1	Hover/95th	Intersection Improvements
6	1	US 287 - option 1	Traditional Intersection Configuration
7	1	US 287 - option 2	Non-traditional Configuration
8	2	County Line Rd	Intersection Improvements
24	3	WCR 19 to Grand; Denver to west of WCR 31	2-lane urban (interim)
25	3	WCR 19 to Grand; Denver to west of WCR 31	4-lane urban
27	3	Denver to west of WCR 31	4-lane
28	3	Denver to west of WCR 31	2-lane w/shoulders (interim)
32	3	Pedestrian underpass near US 85	Multimodal Ped connections
3	3	US 85 Interchange	Intersection Improvements
34	3	Grand Ave	Intersection Improvements
35	3	Fulton Street	Intersection Improvements
36	3	Grand to Denver	Multimodal Ped connections
7	3	WCR 29.5	Intersection Improvements
4	4	Railroad Pedestrian Crossing	Multimodal Ped connections

6.0 // AGENCY AND PUBLIC COORDINATION

6.1 INTRODUCTION

The PEL agency and public coordination process was created to obtain input from and provide information to the Project Management Team, stakeholders, and the public. This included engaging a coalition of elected officials; creating a Technical Team of agency stakeholders; gathering public input; and ensuring community involvement, education, and outreach.



Participation in Virtual Meeting

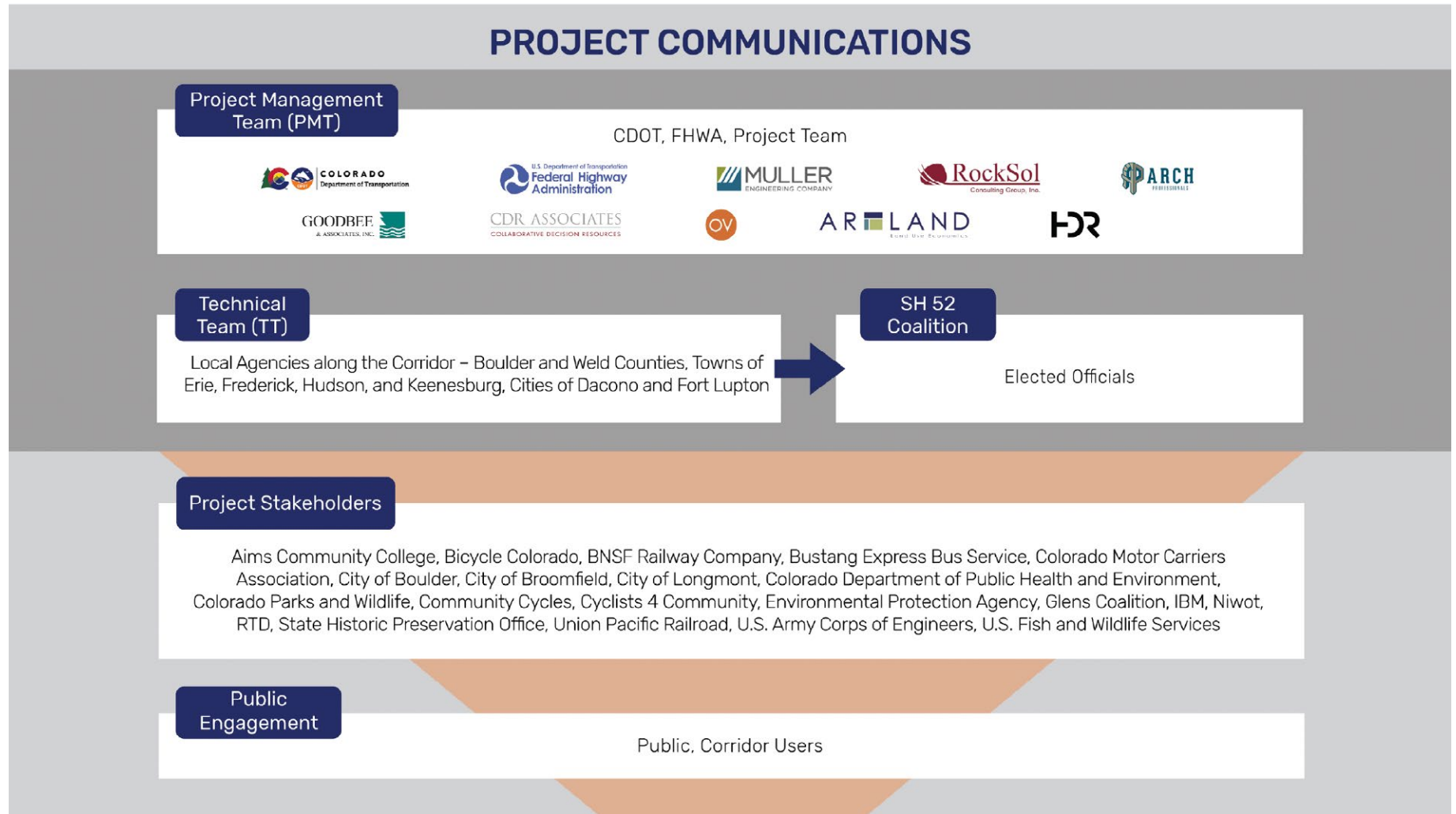
6.2 PROJECT AND AGENCY COORDINATION

The Agency and Public communication strategies were evaluated and updated throughout the PEL to improve outreach to and input from stakeholders and the public. The purpose of these outreach efforts were to accomplish the following:

- Increase public and stakeholder awareness of issues concerning the CO 52 corridor
- Develop a plan that balances and integrates competing needs
- Generate informed consent between the local agencies along the corridor (Boulder County, Weld County, Dacono, Erie, Fort Lupton, Frederick, Keenesburg, Hudson and CDOT)
- Listen to stakeholders and get support for potential corridor improvements
- Establish public confidence in CDOT and the PEL process
- Identify critical issues and problems as early as possible
- Determine the proper level and means of public involvement for the PEL

The comprehensive Agency Coordination and Public Engagement report includes meeting notes, communication packets, and meeting advertisements and is included in **Appendix I. Figure 6-1** shows the roles and responsibilities of the PMT and stakeholders engaged in the project.

Figure 6-1 | Project Communications Graphic



6.2.1 Project Management Team (PMT)

The PMT, composed of CDOT, FHWA, and the consultant team, we responsible for making project decisions. They frequently reviewed the scope, schedule, and budget to make sure the project was moving forward. The PMT met monthly on the third Thursday of the month to discuss topics such as public involvement, traffic, environmental, engineering, and planning, in order to develop strategies and make decisions on technical questions and communication strategies.

6.2.2 Technical Team (TT)

The TT, comprised of local agency representatives, provided the study and PMT with technical input. The TT identified relevant materials that could be helpful to the Study teams, supported development of the corridor vision, coordinated with and informed the State Highway 52 Coalition of project status and helped articulate problems and evaluate solutions for the corridor. The TT included representatives from:



The TT provided guidance in developing study deliverables including:

Purpose & Need Statement
Evaluation Criteria
Range of Alternatives
Alternatives Evaluation
Recommended Alternatives
Stakeholder Engagement Approach

The TT met fourteen times throughout the project on these dates:

May 28, 2020	April 22, 2021
July 23, 2020	June 24, 2021
August 20, 2020	July 22, 2021
October 29, 2020	August 31, 2021
December 3, 2020	September 16, 2021
January 28, 2021	October 18, 2021
February 22, 2021	November 11, 2021



6.2.3 State Highway 52 Coalition

The SH 52 Coalition assisted the PMT in resolving issues, making decisions on policy issues, and providing feedback on the status of study activities and decisions. In addition, they helped guide local involvement in the PEL. The team provided monthly updates to the SH 52 Coalition and presented to the SH 52 Coalition at project milestones. The Coalition was made up of elected officials of the local agencies along the CO 52 corridor and policy-level representatives of CDOT.

6.2.4 Resource Agency Coordination

Agency contacts below received a letter via email on July 31, 2020, detailing the scope of the project. At the completion of the Existing Conditions Report, they were sent a copy for review and comment. Each of the agencies were also sent a final version of this PEL document. Any further comments from the agencies will be addressed during NEPA.

- CDOT/CDPHE Liaison*
- CDPHE EPS Oil and Gas Liaison*
- CDPHE Hazardous Materials*
- CDPHE Solid Waste*
- CDPHE Water Quality Control Division*
- CDPHE Water Quality Control Division (Permits Section)*
- Colorado Parks & Wildlife*
- State Historic Preservation Officer*
- U.S. Army Corps of Engineers*
- U.S. Environmental Protection Agency*
- U.S. Fish and Wildlife Service*
- EPA NEPA Transportation Sector*

Comments from CPW were received in September 2020 and focused on potential locations for wildlife crossings and recommendations specific to Banner Lakes State Wildlife Area. These comments were incorporated into the Alternatives Development process. The letters sent and additional details can be found in **Appendix I**.



Banner Lakes State Wildlife Area

6.2.5 One-on-One Meetings

Stakeholder One-on-One Meetings

To fully understand the needs along the CO 52 corridor, it was critical for members of the PMT to meet individually with each of the local agencies. At the start of the project, interviews were conducted with these stakeholders to understand their respective interests, goals, issues, and desired outcomes for the study. This provided an opportunity to build trusted relationships and understand their perspectives as alternatives were developed and evaluated.

- Boulder County (June 8, 2020)
- Dacono (May 22, 2020)
- Erie (June 22, 2020)
- Fort Lupton (May 13, 2020)
- Frederick (June 5, 2020)
- Hudson (May 14, 2020)
- Keenesburg (June 23, 2020)
- Weld County (May 20, 2020)



Fort Lupton Recreation/Community Center

Additional One-on-One Meetings

In addition to meeting with the local agency stakeholders during the onset of the project, the PMT continued to meet with other organizations and groups throughout the PEL/ACP process to hear specific concerns, answer questions and provide project updates. These additional organizations and groups included:

- CDOT Rail (July 28, 2020)
- Colorado Motor Carriers Association (CMCA) (July 24, 2020)
- Colorado Parks and Wildlife (CPW) (August 26, 2020)
- IBM (August 5, 2020)
- Transit Organizations (May 12, 2021)
- Boulder County Cycling Meeting (July 20, 2021) with Bicycle Colorado, Boulder County, CDOT, CO 119 Bikeway, CO 119 Mobility, CO 52 PEL / ACP, Community Cycles, Cyclists 4 Community, RTD
- Glen's Coalition (July 8, 2021)
- Aims Community College (August 18, 2020)

6.3 PUBLIC INVOLVEMENT

Public involvement included individuals and corridor users. In addition to connecting with the general public, the PMT also connected with local schools, community groups, HOAs, etc. Two public open houses were held over the duration of the project in addition to ongoing coordination and communication.

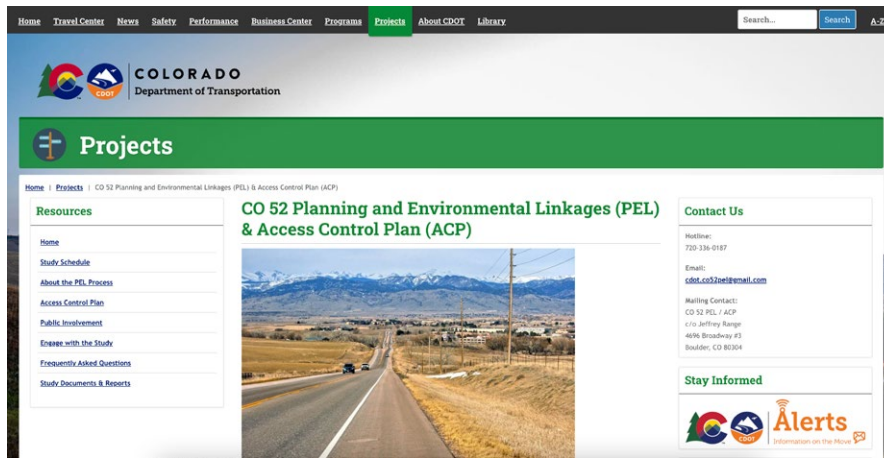
6.3.1 General Communications

Website

Throughout the PEL process, project-relevant content was produced and managed on the [project website](#) (Figure 6-2). The website was launched on May 20, 2020 and received 4,878 hits over the next 17 months. The website content fulfilled its purpose to:

- Explain and illustrate the PEL process and Purpose & Need
- Provide opportunities for stakeholder input through the website comment form, project email, project phone number, the interactive Social Pinpoint map and comment board, and the public meetings in August 2020 and August 2021
- Inform stakeholders on schedule, public involvement, and updated findings
- Provide answers to frequently asked questions
- Link to relevant documents, related projects and studies

Figure 6-2 | CDOT's Project Website



One-Pagers

The project team prepared and distributed the Project One-Pager, ACP One-Pager (Figure 6-3), and e-blasts to stakeholders and local residents who signed up to stay informed about the project. This information was also translated into Spanish and was made available on the project website.

Figure 6-3 | ACP One-Pager

Access Control Plan

About the Access Control Plan (ACP)
 An Access Control Plan designates preferred access locations in accordance with the State Access Code along a highway corridor that will improve safety and mobility for the traveling public.

- Safety Improvements:** The consolidation and location of accesses can eliminate and/or greatly reduce the number of conflict points on a roadway.
- Congestion Reduction:** Consolidating access locations causes side road traffic to concentrate at a single location to enter and exit the highway, reducing congestion and improving mobility.

Will an ACP impact my property or business?
 Property owners are affected if there are changes to the property which generate an increase in traffic volumes by more than 20%. CDOT will look at the access to determine if the change shown in the ACP can be made. Each situation is individually reviewed and discussed with the local municipality and property owner. This typically occurs when a land use change to the property occurs. Should a private property owner request a change to access, it must be supported by the appropriate local agency to be considered. Business property owners are treated the same as a private property owner.

When do ACPs change an existing access?
 Usually development or redevelopment of a property is the trigger for review of an existing access, which may trigger consideration of the ACP recommendation. A roadway project on the highway may also create the need to review existing accesses and associated ACP recommendations. Property owners will be involved should there be a proposed change to their access. At no time will a property be not accessible.

ACP Guiding Documents
 In 1981, the State of Colorado became the first state in the nation to implement an Access Code (State of Colorado State Highway Access Code). The Code governs the location of all accesses along all state highways and interstates.

ACP Approval Process
 Upon completion of the ACP, an Intergovernmental Agreement (IGA) will be signed by all of the local municipalities along the impacted corridor and CDOT. Each municipality will have a designated representative.

ACP Amendment Process
 Each of the signers of the IGA agree to abide by the ACP. Sometimes a change is necessary and the plan needs to be modified. An amendment process is part of the IGA which allows for a change to be requested and voted on by all local municipalities along the project corridor.

For more information, visit our website: <https://www.codot.gov/projects/co52-pel-acp>

Email Distribution List & E-Blasts

The email distribution list was developed throughout the PEL process. The study ended with 400 email addresses on the distribution list. Email blasts included:

Quarterly Newsletter #1: July 23, 2020

About the ACP

Public Meeting Information

Quarterly Newsletter #2: November 23, 2020

Existing Conditions Report

August Public Engagement Report

What's Next (Alternatives, Level 1)

Quarterly Newsletter #3: March 25, 2021

Project Status Update (Level 1, Level 2)

ACP FAQ

Website Update

Quarterly Newsletter #4: August 26, 2021

Project Status Update (Level 1, Level 2)

ACP FAQ

Website Update

Emails & Voicemail Comments

The study provided stakeholders multiple ways to provide comment and ask questions (beyond during presentations, meetings, and the survey), including via phone, email, and a website comment form. In total, x comments were received from stakeholders.



Signage at Harrison Ave in Fort Lupton

6.3.2 Open Houses

Open House #1 – August 2020

Due to COVID-19, the project team, along with CDOT, made the decision to host a virtual open house for the public in lieu of an in-person event. The open house was hosted on a website platform – separate from the general project website. The open house was live from August 24 through September 17, providing opportunity for as many stakeholders as possible to interact with the materials on their own schedule and time. The open house had various goals and success metrics.

Figure 6-4 | 2020 Postcard



The key goals were:

- Inform stakeholders of the project's goals and activities
- Receive input from stakeholders on their interests and concerns
- Establish relationships and lines of communication with stakeholders for on-going interaction

The two key success metrics were:

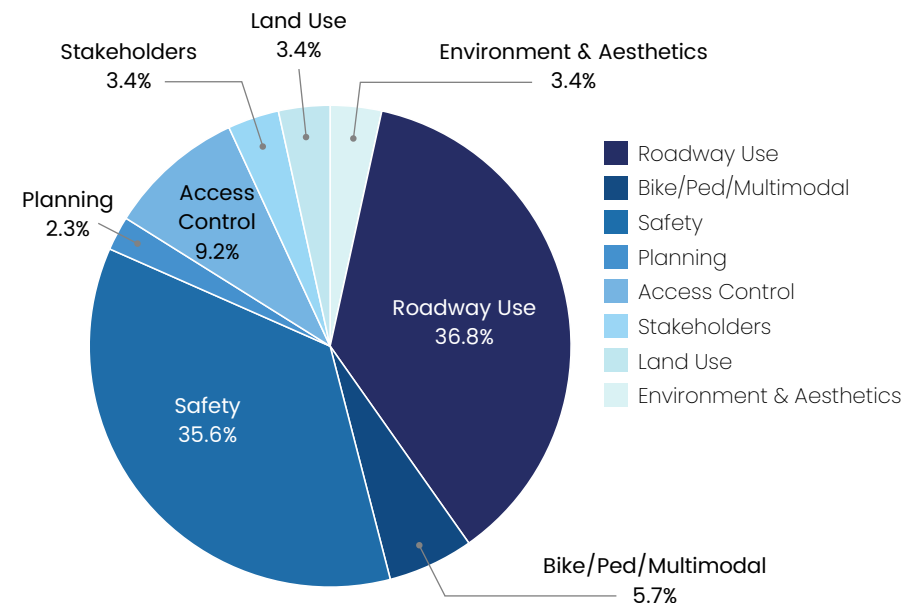
- Through inclusive access, receive high levels of participation
- Identify site-specific locations

With the goal to provide the same level of engagement as would have been expected during an in-person meeting, the website included a number of interactive opportunities for the public to provide input including:

- Two topic-specific surveys
- Social Pinpoint Interactive Map
- Social Pinpoint Interactive Comment Wall
- Opportunity to send the project team emails or call the project hotline

The open house was the first broad introduction of the project to the public and was translated into Spanish. Over 800 individuals viewed the site, and 126 new contacts were collected during the online public event. The project team identified eight major key themes that arose from public input during the event: Environment & Aesthetics; Roadway Use; Bike/Pedestrian/Multimodal; Safety; Planning; Access Control; Stakeholder Engagement; Land Use (Figure 6-5).

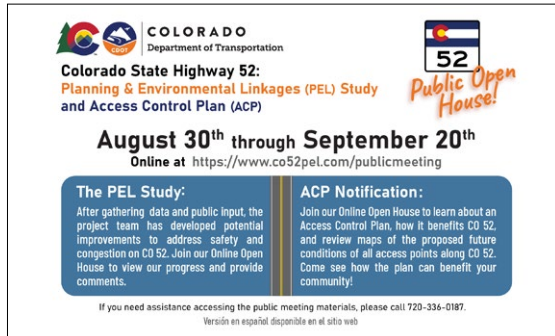
Figure 6-5 | Frequency of Key Themes



Open House #2 – August 2021

The second open house event focused on updating the public on progress made in both the PEL and ACP, as well as presenting the proposed alternatives evaluated to date. The event was held from August 30 – September 20. The content of the meeting focused on educating the public on existing conditions data that was evaluated since the last public meeting, as well as detailing the alternatives evaluated in each segment of the corridor. Half of this virtual meeting website was dedicated to describing the process, purpose and draft of the ACP. The website allowed for the public to review the ACP and provide comments on individual access recommendations. In preparations for this event, 3,200 postcards were mailed directly to adjacent property owners along the corridor.

Figure 6-6 | 2021 Postcard



The key goals were:

- Provide access to previous open house information and materials
- Inform stakeholders and the public about progress on the PEL & ACP
- Share the results of previous open house event and input received to date
- Provide property owners along the corridor with the updated access recommendations from the ACP
- Display results of the Alternatives Evaluation
- Collect additional public feedback and input per segment

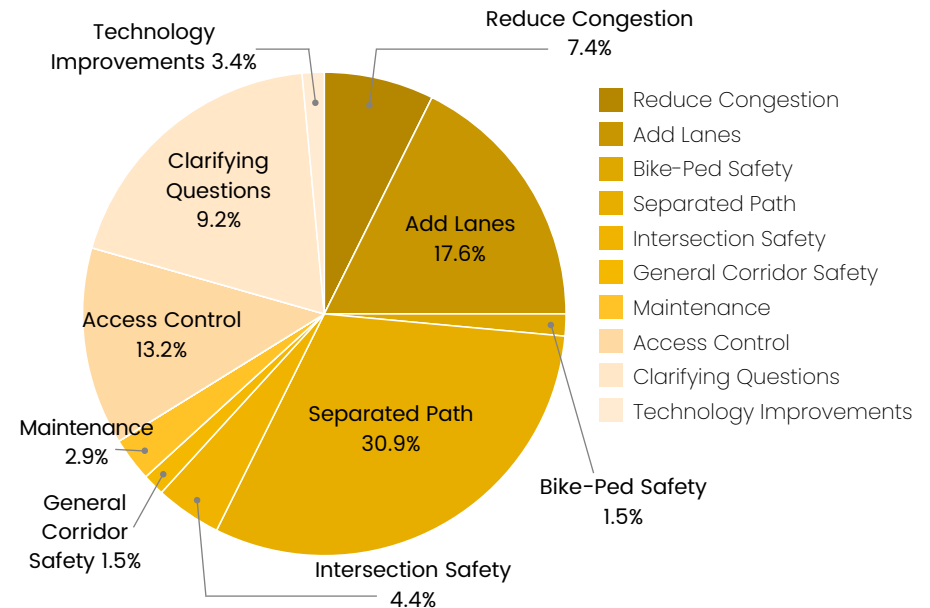
The two key success metrics were:

- Through inclusive access, receive high levels of participation
- Receive comments on segment specific alternatives

With the goal to provide the same level of engagement as would have been expected during an in-person meeting, the website included a number of interactive opportunities for the public to provide input including:

- A survey to better understand user interests
- Interactive ACP maps
- Interactive Bike and Pedestrian Infrastructure Map
- Ability to comment on segment-specific alternatives
- Opportunity to send the project team emails or call the project hotline

Figure 6-7 | Frequency of Key Themes



7.0 // LITERATURE CITED

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8.0 // APPENDIX

