CO 119 DIAGONAL HIGHWAY MOBILITY IMPROVEMENTS

RAISE GRANT

April 14, 2022

Boulder County

COLORADO Department of Transportation

RTD

LONGMONT COLORADO

CITY OF BOULDER

Commuting Solutions

SAFELY CONNECTING COMMUNITIES

with Equitable, Sustainable, and Reliable Transit & Mobility

TABLE OF CONTENTS

TABLE OF CONTENTS

FIGURES

TABLES

SUPPORTING DOCUMENTATION

Project Supporting Website

https://www.codot.gov/projects/co119-mobility-design/raise-grant

Northwest Area Mobility Study

https://commutingsolutions.org/regional-planning/northwest-area-mobility-study/

2020 Boulder County Transportation Master Plan

https://assets.bouldercounty.org/wp-content/uploads/2020/02/transportation-master-plan-tmp-update-technical-document-final.pdf

Southwest Longmont Operations Study

https://www.longmontcolorado.gov/departments/departments-n-z/transportation/capital-projects-road-bridge-construction/sw-longmont-operations-study

SH 119 Bus Rapid Transit Planning and Environmental Linkage Study

https://commutingsolutions.org/wp-content/uploads/SH-119-Multi-Modal-PEL-Study-Report-Part-I-reduced.pdf

SH 119 Bicycle and Pedestrian Connectivity Study

https://www.codot.gov/projects/co119-mobility-design

DRCOG 2020 Regional Multimodal Freight Plan

https://drcog.org/sites/default/files/regional_multimodal_freight_plan.pdf

Traffic Alternatives Analysis Study

https://www.codot.gov/projects/co119-mobility-design/raise-grant

First & Final Mile Study

https://www.codot.gov/projects/co119-mobility-design/raise-grant

Sources

Project Description

1 https://www.codot.gov/projects/co119-mobility-design/raise-grant, Boulder County - CO 119 Bikeway TIP Regional Application

2 https://assets.bouldercounty.org/wp-content/uploads/2020/02/transportation-master-plan-tmp-update-technical-document-final.pdf

3 CDOT Statewide Travel Demand Model, 2022

4 https://www.codot.gov/projects/co119-mobility-design/raise-grant, Traffic Alternatives Analysis Study

Project Location

5 https://www.transportation.gov/RAISEgrants/urbanized-areas

6 https://www.bouldercounty.org/transportation/plans-and-projects/transportation-master-plan/

7 https://datahub.transportation.gov/stories/s/RAISE-Peristent-Poverty-Tool/tsyd-k6ij/

8 https://www.census.gov/programs-surveys/acs, 2020

9 https://www.transportation.gov/RAISEgrants/raise-app-hdc

10 https://usdot.maps.arcgis.com/apps/dashboards/d6f90dfcc8b44525b04c7ce748a3674a

11 https://oedit.colorado.gov/colorado-opportunity-zone-program

12 https://www.huduser.gov/portal/maps/CN/home.html

13 https://www.dol.gov/agencies/eta/wotc/resources

14 https://www.hudexchange.info/programs/promise-zones/

Safety

15 https://www.transportation.gov/NRSS

16 https://safety.fhwa.dot.gov/provencountermeasures/

Environmental Sustainability

17 https://www.longmontcolorado.gov/home/showpublisheddocument/33209/637436468213200000

18 https://www.longmontcolorado.gov/home/showdocument?id=33737#:~:text=The%20term%20%E2%80%9Croadmap%E2%80%9D%20describes%20a,emission%20reduction%20goal%20by%202050.

19 https://bouldercolorado.gov/boulder-measures/community-greenhouse-gas-emissions#:~:text=In%202020%2C%20Boulder%20achieved%20a,against%20the%20original%202005%20baseline.

20 https://www.bouldercounty.org/climate-action-2/

21 https://leg.colorado.gov/bills/hb19-1261

22 https://assets.bouldercounty.org/wp-content/uploads/2019/07/climate-emergency-proclamation-july-2019.pdf

23 https://data.cdc.gov/, 2019

24 https://data.cdc.gov/, 2011

25 https://ipac.ecosphere.fws.gov/

Quality of life

26 https://onthemap.ces.census.gov/

27 https://ejscreen.epa.gov/mapper/

28 https://www3.epa.gov/airquality/greenbook/anayo_co.html

Improves Mobility and Community Connectivity

29 https://cohealthviz.dphe.state.co.us/t/EnvironmentalEpidemiologyPublic/views/EJActDICommunities-Public/HB21-1266DICommunities?%3AshowAppBanner=false&%3Adisplay_count=n&%3AshowVizHome=n&%3Aorigin=viz_share_link&%3AisGuestRedirectFromVizportal=y&%3Aembed=y

30 https://metrovision.drcog.org/

31 https://www.irs.gov/newsroom/irs-issues-standard-mileage-rates-for-2022

32 https://www.rtd-denver.com/fares-passes/fares

33 http://www.ridetransfort.com/flex

34 https://www.vtpi.org/tca/tca0501.pdf

35 https://www.codot.gov/projects/co119-mobility-design/raise-grant, First and Final Mile Study Appendix B

36 https://commutingsolutions.org/wp-content/uploads/2022/01/082321_CO-119-FINAL-REPORT.pdf

37 https://www.transit.dot.gov/funding/grants/enhanced-mobility-seniors-individuals-disabilities-section-5310

38 https://acrobat.adobe.com/link/review?uri=urn%3Aaaid%3Ascds%3AUS%3A4c8fcb03-2ba7-3832-b407-ab9fb167bd59, page 65

39 https://acrobat.adobe.com/link/review?uri=urn%3Aaaid%3Ascds%3AUS%3A4c8fcb03-2ba7-3832-b407-ab9fb167bd59, page 67

40 https://acrobat.adobe.com/link/review?uri=urn%3Aaaid%3Ascds%3AUS%3A4c8fcb03-2ba7-3832-b407-ab9fb167bd59, page 73

41 https://acrobat.adobe.com/link/review?uri=urn%3Aaaid%3Ascds%3AUS%3A4c8fcb03-2ba7-3832-b407-ab9fb167bd59, page 80

Economic Competitiveness

42 https://drcog.org/sites/default/files/regional_multimodal_freight_plan.pdf

43 https://www.rtd-denver.com/sites/default/files/files/2020-06/SH-119-Multi-Modal-PEL-Study-Report%20Sept-24-2019-FINAL-2020.pdf

Partnership and Collaboration

44 https://www.codot.gov/business/civilrights/smallbusiness/dbe/pgm-admin/dbe-program-manual

45 https://www.codot.gov/projects/co119-mobility-design/raise-grant, Stakeholder and Public Engagement Plan

Innovative Technology

46 https://www.nema.org/standards/view/Cyber-and-Physical-Security-for-Intelligent-Transportation-Systems-ITS, Section 3.1

47 https://sites.google.com/state.co.us/cotriporgfreight/clean-truck-strategy

48 https://kingcounty.gov/depts/transportation/metro/programs-projects/innovation-technology/zero-emission-fleet/battery-bus.aspx

49 https://www.colorado.com/articles/colorado-weather#:~:text=With%20300%20days%20of%20annual,planning%20your%20next%20Colorado%20adventure.

50 https://www.solarpowerworldonline.com/2020/12/texas-solar-project-supporting-nestle-approaches-commercial-operation/

51 https://azdot.gov/adot-news/adot%E2%80%99s-use-rubberized-asphalt-gives-new-life-recycled-tires

ACRONYMS AND ABBREVIATIONS

AADT - Annual Average Daily Traffic
ADA - Americans with Disabilities Act
AI - Artificial Intelligence
AIMS - Asset Investment Management System
BCA - Benefit Cost Analysis
BCR - Benefit Cost Ratio
BRT - Bus Rapid Transit
CAD/AVL - Computer-Aided Dispatch/Automatic Vehicle Location
CatEx - Categorical Exclusion
CCTV - closed-circuit television
CDC - Centers for Disease Control and Prevention
CDOT - Colorado Department of Transportation
CDPHE - Colorado Department of Public Health & Environment
CDPS - Colorado Department of Public Safety
CIP - Capital Improvement Plan
CLOMR - Conditional Letter of Map Revision
CM/GC - Construction Manager/General Contractor
CO - Colorado Highway
CO 119 - Colorado Highway 119
CPW - Colorado Parks and Wildlife
CRF - Crash Reduction Factors
CTIO - Colorado Transit Investment Office
CWCB - Colorado Water Conservation Board
DMS - Dynamic Message Signs
DRCOG - Denver Regional Council of Governments
DTR - Division of Transit and Rail
EA - Environmental Assessment
EIS - Environmental Impact Statement
EJSCREEN - Environmental Justice Screening & Mapping Tool
EPA - Environmental Protection Agency
ESA - Environmental Site Assessment
FDP - Floodplain Development Plan
FHWA - Federal Highway Administration
GHG - Greenhouse Gas
IPaC - Information for Planning and Consultation
I-25 - US Interstate 25
I-70 - US Interstate 70
ITS - Intelligent Transportation Systems
LCCA - Life-Cycle Cost Analysis
LOMR - Letter of Map Revision
LOS - Level of Service
LTS - Levels of Traffic Stress
MCC - Mayors and Commissioners Coalition
MS4 - Municipal Separate Storm Sewer Systems
NAMS - Northwest Area Mobility Study
NATA - North Area Transit Alliance
NHS - National Highway System
NHSS - National Highway Safety Strategy
NEPA - National Environmental Policy Act
NWI - National Wetlands Inventory
O&M - Operations and Maintenance
OTIS - Online Transportation Info System
PDO - Property Damage Only
PEL - Planning and Environmental Linkage
RECs - Recognized Environmental Concern
ROW - Right of Way
RPP - Regional Priority Program
RTD - Regional Transportation District
RTP - Regional Transportation Plan
RWIS - Road Weather Information Systems
SBDC - Small Business Development Center
SEP-14 - FHWA's Special Experimental Project No. 14 approval
SH 119 - State Highway (used interchangeably with CO)
SHPO - State Historic Preservation Offices
SOVs - Single Occupancy Vehicles
SUE - Subsurface Utility Engineering
SWQCP - Storm Water Quality Control Plans
TIP - Transportation Improvement Program
TMO - Transportation Management Organization
TSP - Transit Signal Priority
US - United States
USACE - US Army Corps of Engineers
USDOT - US Department of Transportation
USFWS - US Fish and Wildlife Services
US 287 - US Highway 287
US 36 - US Highway 36
ZEV - Zero Emission Vehicle

Project Overview

Colorado Highway 119 (CO 119) between Longmont and Boulder is the second most traveled corridor in Boulder County (the Applicant) [1]. Serving residents, employees, and visitors from across northern Colorado and the Denver-metropolitan area, travelers face highly unreliable travel times and this section of CO 119 is a high crash corridor that produces more severe crashes per mile than any other road in unincorporated Boulder County.

Figure 1 CO 119 Diagonal Proposed Project Elements

A vital regional transportation corridor serving the economic health of Boulder County, the **CO 119 Diagonal Highway Mobility Improvements Project** (the Diagonal) is the primary connection between Boulder County's two largest municipalities, the cities of Boulder and Longmont, which together make up close to two-thirds of the total population of Boulder County. Daily travel volumes demonstrate the importance of this corridor: it has the second highest travel volumes in Boulder County, behind only US Highway 36 (US 36), connecting Boulder and Denver. For all these reasons and more, Boulder County is the applicant submitting this RAISE grant. In addition, the Colorado Department of Transportation (CDOT) and the Regional Transportation District (RTD) (the Project Sponsors) recognize the need for the project, are funding sponsors, and will ultimately deliver the construction when funding is secured.

The Diagonal project will provide critical intersection improvements and implement Bus Rapid Transit (BRT), connecting the counties of Larimer, Weld, and Boulder (Rural Communities). The planned improvements promote safe, efficient, and equitable mobility options for people and goods traveling by car, truck, transit, bicycle, and on foot, essential to the improved prosperity and sustainability of the region. See **Figure 1** for an overview of the project.

The Diagonal provides an essential link between Boulder and Longmont and is a critical regional corridor that serves all travel modes between the two cities and activity centers along the corridor. **Figure 2** shows relative morning peak (6-10 am) traffic volumes from Larimer and Weld counties that use the Diagonal and end their trip in central Boulder [2]. Intra-county trips account for 28% of total trips on the Diagonal during the morning peak. The corridor also carries approximately 250 daily bicycle trips and 2,200 transit trips [3]. These numbers are expected to grow more than 50% over the next 20 years [1].

Project History

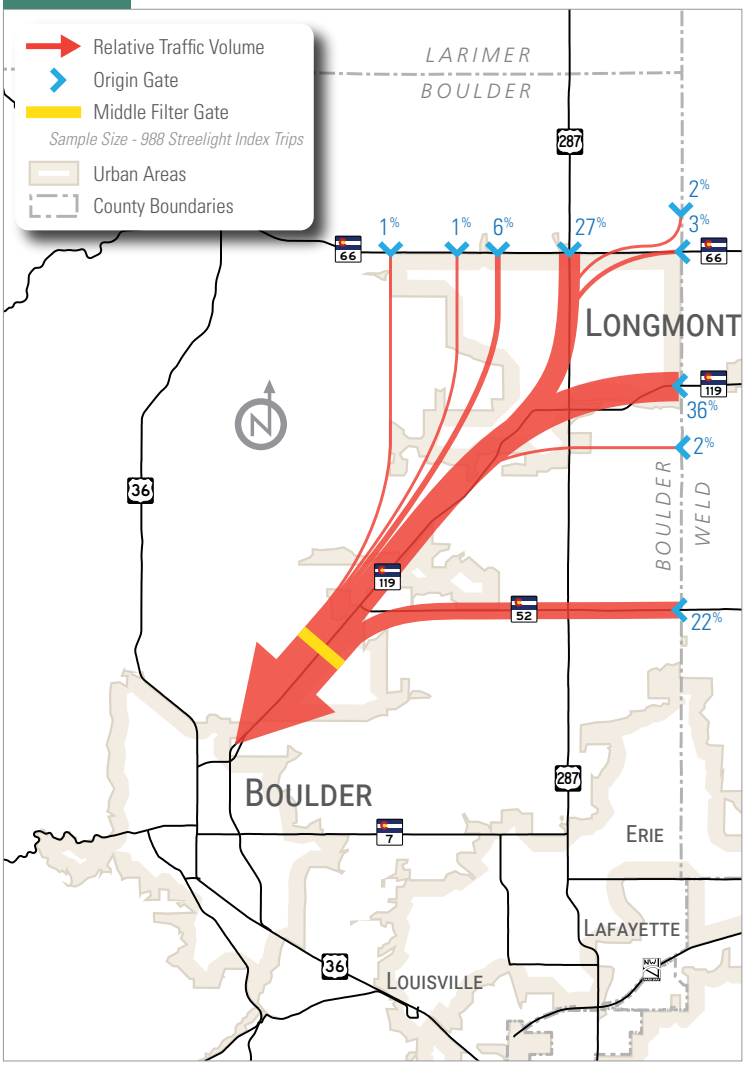
Significant traffic growth and congestion have led to safety concerns and the need for a better design approach to the Diagonal. This project results from several past studies that helped to identify, clarify, and inform next steps. The 2014 **Northwest Area Mobility Study (NAMS)** qualified the Diagonal as a priority BRT corridor, as did the **2020 Boulder County Transportation Master Plan**. The 2018 **Southwest Longmont Operations Study** independently identified the Hover Street intersection as one of the top intersection/project/improvement priorities in Longmont. The 2019 **SH 119 BRT Planning and Environmental Linkage (PEL) Study** narrowed in on critical improvement components. The **PEL**

identified the CO 52 intersection as the most critical in terms of congestion and safety, the Hover Street intersection as its second most critical, and the need for a separated bikeway corridor. CDOT's 2019 **SH 119 Bicycle and Pedestrian Connectivity Study** recommended a bikeway in the median spanning the entire Diagonal to connect bicyclists to downtown Boulder, Longmont, and BRT stations. The Diagonal is prominently featured in the Denver Regional Council of Governments (DRCOG) 2020 **Regional Multimodal Freight Plan** as critical facilities needing improvements to ensure optimal and safe regional freight movement. Links to the studies are listed in the ***Table of Contents***.

The entire BRT improvements identified in NAMS total over $300M. The Diagonal grant application scope is valued at $124M, with $99M in secured funding and $25M requested in RAISE grant funding.

The project team identified an additional $20.6M of potential funding sources specifically targeted to complete the implementation of the bikeway mentioned above. Preliminary design for the Diagonal is in progress and final design and construction phases are ready to be initiated as soon as funding is secured. CDOT's Project Delivery Selection Matrix will be used to determine the most appropriate delivery method (see ***Innovative Project Delivery***).

Figure 2 Critical Connectivity



The project schedule is in ***Project Readiness: Environmental Risk*** and the budget is in ***Grant Funds, Sources, and Uses of All Project Funding***.

In 2021, the **Traffic Alternatives Analysis Study** expanded on the 2014 **NAMS** and 2019 **PEL** studies and identified the projected congestion patterns along the Diagonal; critical intersection improvements needed at CO 52, Airport Road, and Hover Street; need for a split intersection at CO 52; and benefits of queue bypass lanes for transit travel time reliability. A **First & Final Mile Study** was conducted in 2021 to recommend bicycle and pedestrian connections, wayfinding, transportation demand management, shared parking, and microtransit solutions in and around the Diagonal that can fill the gaps between home to transit and transit to destination. Links to the studies are listed in the ***Table of Contents***.

Previously Completed Components

As of this grant submittal, design is nearing a 30% level and the following components of the project are complete.

Gathering and Analysis	Survey, preliminary Subsurface Utility Engineering (SUE); environmental data; Traffic Study
Design	Preliminary design; BRT station area planning; phased scenario development

Other project stakeholder investments that compliment the Diagonal corridor improvements

28th Street Bus Access/Transit lane between Iris Street and Canyon Boulevard design; Coffman Street dedicated BRT lanes design

Transportation Challenges and Solutions

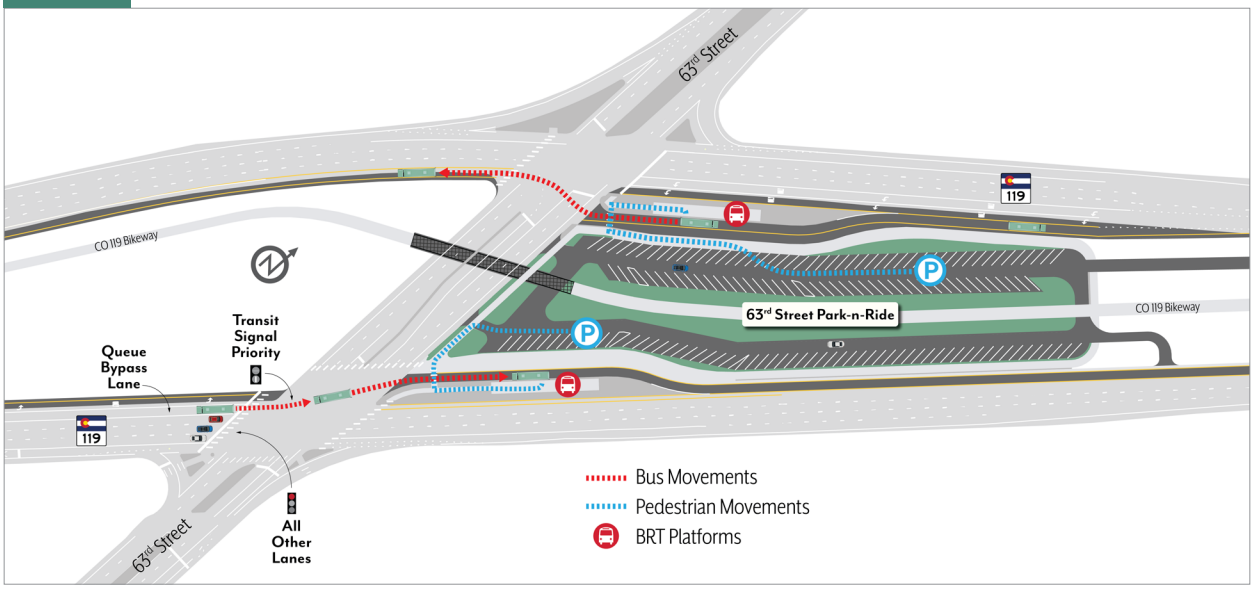
If this project is not funded, the increase in traffic will result in the following transportation challenges:

1. Increased delay by 150% for Single Occupancy Vehicles (SOVs) and 72% for transit riders by 2045 [4]
2. Harmful greenhouse gas (GHG) emissions and other pollutants, including 1,924 metric tons of CO2 and 7.98 metric tons of NOx, as outlined in ***Appendix A: Benefit Cost Analysis***
3. Less reliable and accessible travel options for the community outside the use of private automobiles

The implementation of an inside BRT system (**Figure 3**) to connect two Rural Communities on a 10-mile stretch of divided highway with signalized intersections is a unique solution to the challenges described. **This innovative design provides:**

- Park-n-Rides built in the median of a divided highway
- A BRT system on a high speed divided highway where queue bypass lanes are used to access the platforms in the median, have ample time to speed up in their own bus lane, and safely maneuver back to the high-speed general-purpose lanes
- A multimodal BRT implementation that safely accommodates and integrates all modes of transport
- Transit Signal Priority (TSP) implementation
- Innovative design using a series of queue bypass lanes at signalized intersections in its current configuration, yet allowing easy retrofitting for a future toll/managed lanes facility
- A BRT system designed to provide transit customers with rubber-tired light rail experience with high quality stations, passenger amenities, and high frequency transit service. The CO 119 BRT system will complement future passenger rail service planned to connect from Longmont, Boulder, and downtown Denver
- A bikeway specifically designed to serve commuter cyclists and e-bikes

Figure 3 Innovative Queue Bypass Lanes and Example Station Configuration



A key corridor connecting people to jobs, the Diagonal has long been known for its congested conditions; precarious, hairpin-like turn movements at the skewed intersections; and poor access to existing transit, as well as deficient pedestrian and bicycle connectivity. Total traffic volume will increase 25% (from 45,000 Annual Average Daily Traffic [AADT] to 56,000 AADT) by 2040 [4].

The planned improvements are anticipated to eliminate 637 crashes, have a net present value of $36.4M, and an economic benefit of $51.7M in crash reductions over the 20-year life cycle of the project.

Broader Context of Other Infrastructure Investments

The Diagonal enjoys broad collaboration and partnership among many stakeholders (***Project History; Partnership and Collaboration; Appendix C: Letters of Support***) and the collective goal is to deliver a corridor that provides mobility, safety, bicycle, pedestrian, and BRT services for Northern Colorado.

Collectively, the Diagonal project components create a more reliable and equitable regional transportation system by incorporating safe, efficient vehicular travel choices, with enhanced transit and bicycling infrastructure.

Figured 4 shows regional partners are transforming this corridor with many improvements already completed or planned.

CO 119 Diagonal

Bikeway in the median spanning the entire Diagonal

Boulder

28th St & Iris Ave improvements; 28th St & Canyon Blvd improvements; Iris Ave - 28th St to Foothills Pkwy Business Access and Transit Lanes; 28th St - Canyon Blvd to Iris Ave Business Access and Transit Lanes; Streetside BRT stops

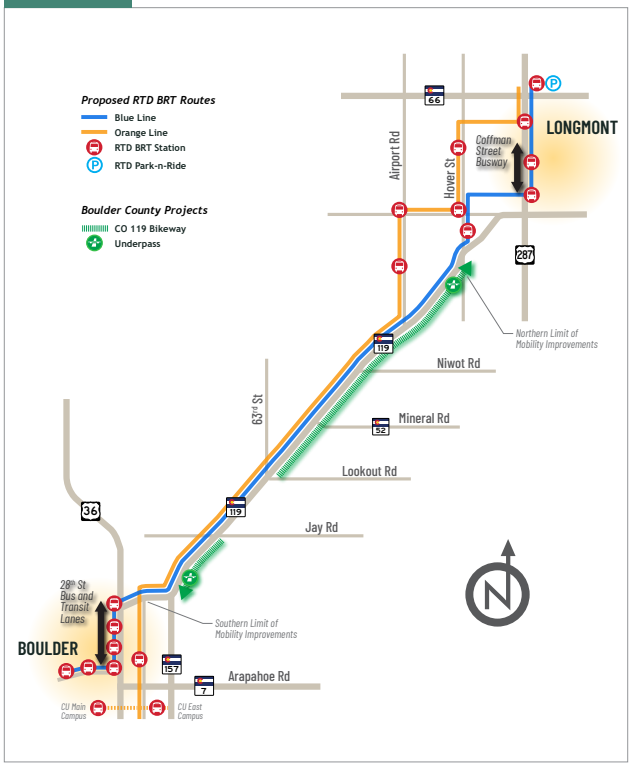
Longmont

Coffman St dedicated BRT lanes; 1st & Main Mobility Hub; Boston Ave Extension crossing at the BNSF Railway; Business Access and Transit Lanes between Nelson Rd & South Pratt Pkwy; Hover St & Nelson Rd active mode improvements; Streetside BRT stops

RTD

Main St & Park Ridge Ave Park-n-Ride facility

Figure 4 Projects Outside the CO 119 Diagonal Scope



Statement of Work

The major components of the Diagonal that will be considered for RAISE funds include:

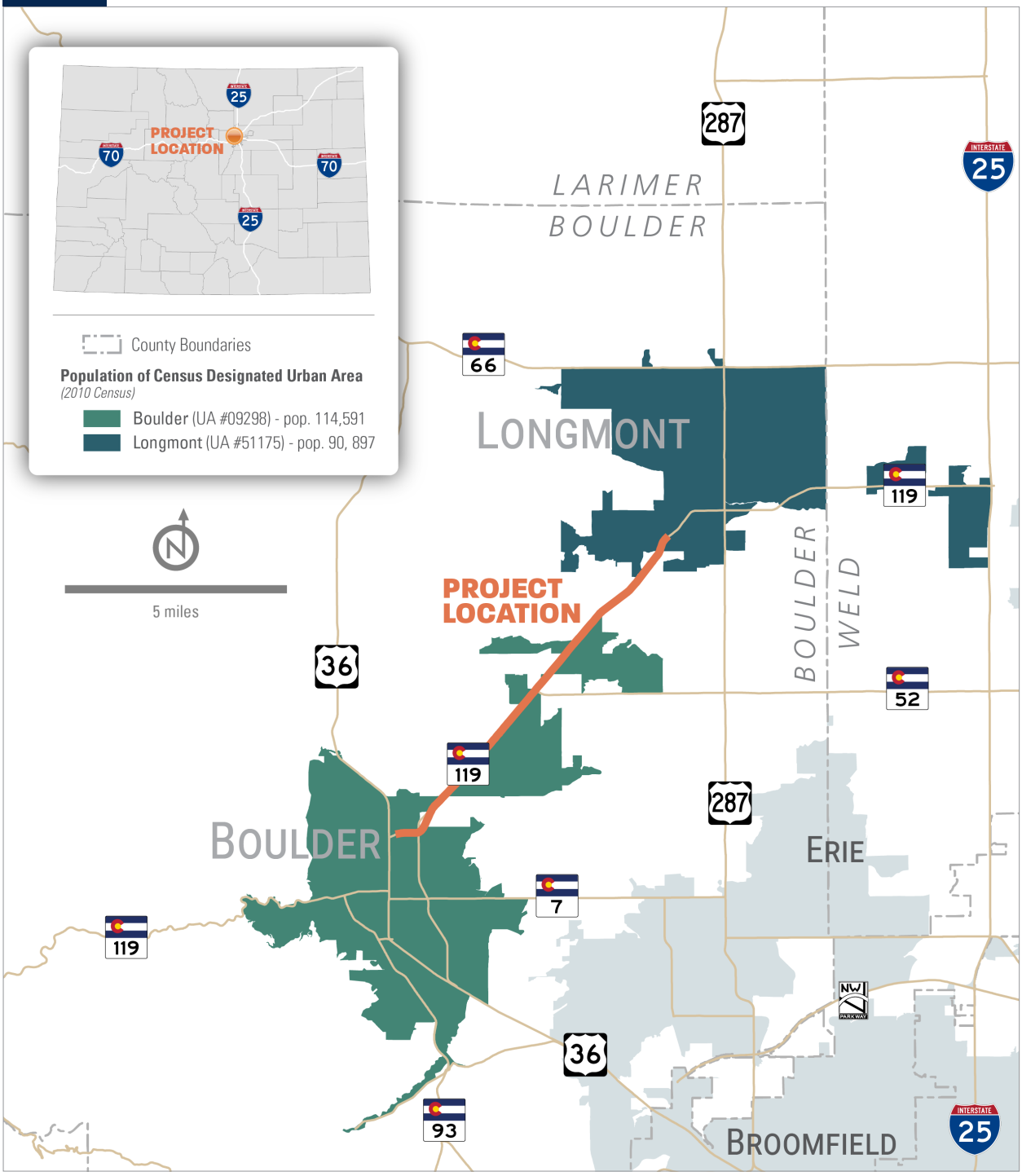
- **Park-n-Ride** facilities at 63rd Street and Niwot Road
- **BRT stations** at 63rd Street, CO 52, and Niwot Road
- Innovative design of inside **BRT lanes**
- **Queue bypass lanes** and **TSP** at all signalized intersections needed
- **Signalized intersection improvements** at (Jay Road, 63rd Street, CO 52, Niwot Road, Airport Road, and Hover Street)
- Upgrading **traffic signal poles** at all intersections
- Modification to a **split intersection configuration** at CO 52 to increase intersection operations/reduce congestion of the largest bottleneck in the Diagonal and accommodate BRT and separated bikeway needs
- **Reconfiguring lanes** at the Airport Road intersection to achieve vehicular, transit, bicycle and pedestrian operational and safety benefits
- **Tunnel for through traffic** at Hover Street with a grade-separated bicycle/pedestrian facility to run parallel to the vehicle tunnel. Intelligent Transportation Systems (ITS) technologies including variable messaging and more will also be used within the tunnel (see ***Innovative Technologies***)
- Improving **pedestrian safety** and **access** with **signing, striping**, and **lighting** at all crossings
- Construction of **four bikeway under/overpasses** and one segment of the bikeway (between Jay Road and 63rd Street)
- Implementation of **safety recommendations** throughout the Diagonal

PROJECT LOCATION

The Diagonal is located between CO 157/Foothills Parkway on the south end and Hover Street on the north end, and serves as a major regional corridor that directly connects the cities of Boulder and Longmont and the counties of Boulder, Weld, and Larimer. The project is located in the northwest quadrant of the Denver-metro area.

The Diagonal connects the Rural Communities to urban areas in Boulder and Longmont. The Diagonal is located within both the Longmont and Boulder Census Designated Urban Areas [5]. **Figure 5** shows the project location, surrounding points of connectivity, and populations of the two Census Designated Urban Areas the Diagonal spans.

Figure 5 Project Location



Connections to Existing Infrastructure

The entire Diagonal spans two designated rural areas and sits near US Interstate 25 (I-25), US Interstate 70 (I-70), and US 36.

Travel forecast models in the PEL show that between 2015 and 2045, there will be large increases in the proportion of trips that cross into and out of Boulder County. The majority of Boulder County residents and employees will continue to live and work in different communities, with an increasing proportion commuting from outside the county [6]. For example, the Diagonal connects Boulder County to Weld County, one of the fastest growing counties in the state, where many people are moving for more affordable housing options and, consequently, commuting to Boulder County for jobs and education opportunities. Currently, there are 31,000 trips per day coming to/from Larimer County to Boulder County and those trips are forecasted to increase to 43,000 trips/day in 2040. Also, 69,000 trips per day come to/from Weld County to Boulder County, which is forecasted to more than double to 143,000 trips/day in 2040 [2].

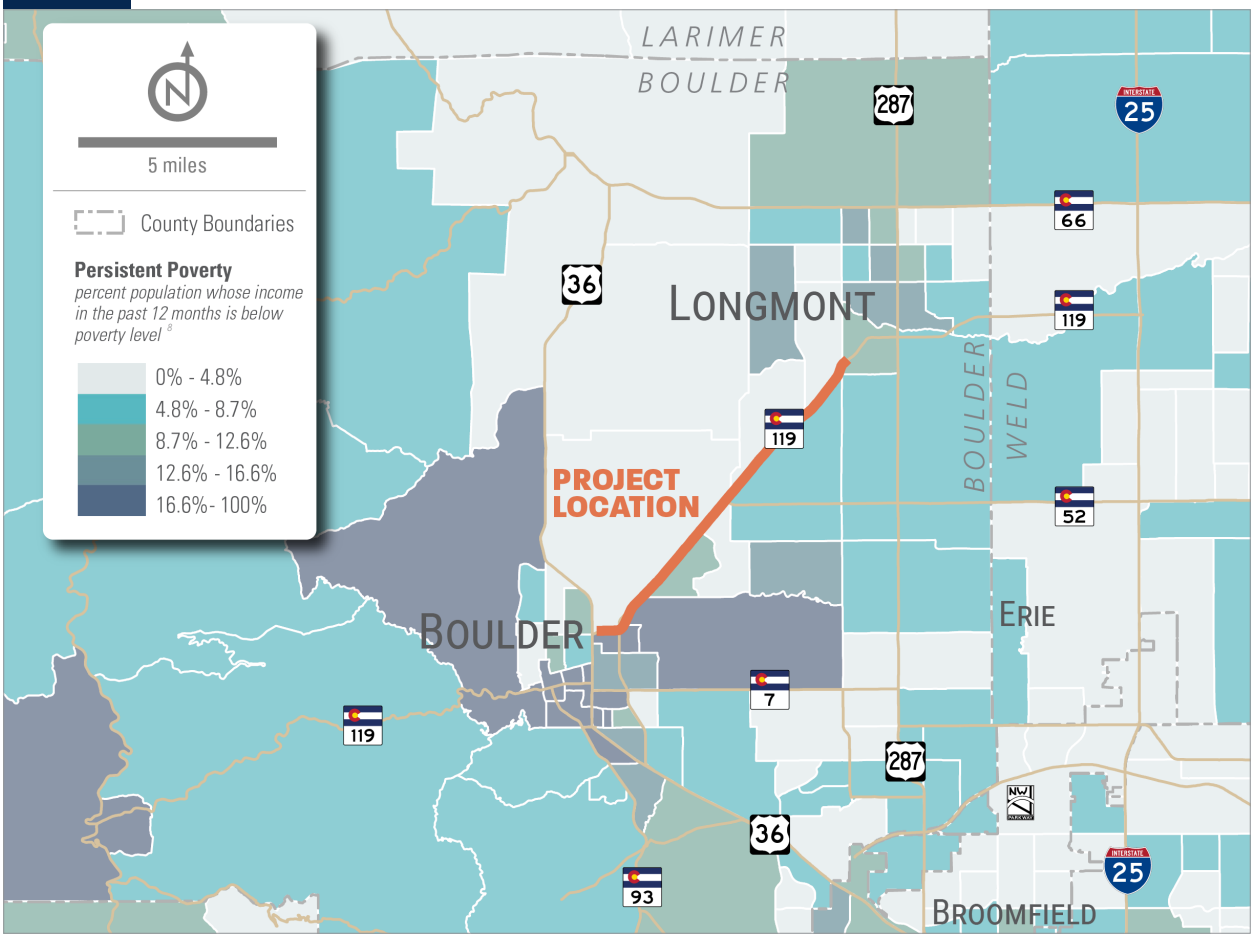
The Diagonal BRT service is planned to extend east from Longmont to connect with I-25 and CDOT's new mobility hub linking the Diagonal corridor with CDOT's Bustang, an inter-regional bus service on I-25.

Area of Persistent Poverty

The Diagonal is a critical travel way for commuter and freight between the Rural Communities and urban centers within northern Colorado. As a four-lane limited access highway, CO 119 is the preferred route for regional commuters accessing employment, educational, retail, medical, and social service opportunities in the region.

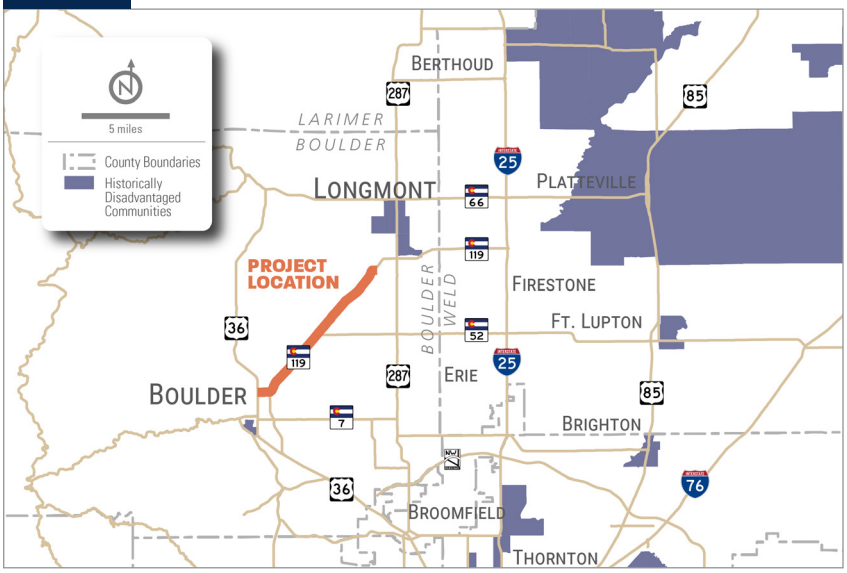
The Diagonal is directly adjacent to census tract 127.07, a defined area of persistent poverty. Each neighboring county's Census Tracts was analyzed with the RAISE Persistent Poverty Project Status Tool to determine the number of areas of persistent poverty present in contributing areas. Research showed that 13% of Boulder County's Census Tracts, 14% of Weld County's Census Tracts, and 23% of Larimer County's Census Tracts meet the definition of an area of persistent poverty [7]. The Areas of Persistent Poverty closest to the Diagonal are depicted in **Figure 6**.

Figure 6 CO 119 Diagonal Areas of Persistent Poverty



Historically Disadvantaged Communities

Figure 7 CO 119 Diagonal Historically Disadvantaged Communities



The Diagonal improvements are located near the historically disadvantaged communities of Census Tracts 134.01, 123, 135.03, 133.08, 133.07, 133.06, and 135.05 in Boulder County [9]. Although not directly adjacent to the Diagonal, residents and employees from these areas will benefit from the safety improvements, congestion relief, and system efficiencies of this project and future connected projects associated with the PEL. The multiple BRT routes and safer bike route options on the Diagonal will connect these communities. Historically disadvantaged communities are shown in **Figure 7**.

By providing cost-effective and reliable transportation modes, the project will provide potential workers more job opportunities and promote expansion of private economic development. Not only will these benefits enhance overall productivity and improve overall wellbeing, the project will also help address justice concerns, as explained in ***Environmental Sustainability***. Along the Diagonal and adjacent areas, approximately 20% of the population is considered low income [10], meaning the household income is less than or equal to twice the federal poverty level. Transportation, economic, and environmental stressors can be alleviated from the identified areas of persistent poverty and/or low-income communities by providing greater corridor access, supporting economic development, and decreasing environmental risks (e.g., improved air quality through emissions reductions) with the additional Diagonal improvements and mobility hub addressed above, (addressed in ***Environmental Sustainability*** and ***Improves Mobility and Community Connectivity***).

Federally Designated Community Development Zones

The Diagonal is located within two Opportunity Zones in Boulder and will help serve an additional two zones in Longmont [11], shown in **Figure 8**. In addition, the Diagonal is within census tract 127.07, a choice neighborhood. It also serves the choice neighborhoods in tracts 122.01, 122.04, 122.02, 123.00, 124.01, 126.07, and 125.07 [12]. All choice neighborhood locations are in line with the areas of persistent poverty, shown in **Figure 6**.

The Diagonal is not located within Empowerment [13] or Promise Zones [14].

Figure 8 CO 119 Diagonal Opportunity Zones

GRANT FUNDS, SOURCES, & USES OF ALL PROJECT FUNDING

The Applicant and the Project Sponsors are requesting $25M in RAISE Grant funding from the United States Department of Transportation (USDOT). Of the $124M needed for the project, 80% (or $99M) has already been acquired. Although construction on the BRT, CO 52 intersection, and BRT/queue bypass lanes at CO 52 will begin first, the project is not confined to specific phases. In addition, there are no limitations on non-federal funds. **The RAISE grant would provide the remaining funding piece necessary to implement this critical infrastructure project.**

Table 1 Project Funding Uses

Category	Amount*
Design	$9M
Pre-Construction Indirects/Overhead	$1.1M
Construction	$90.4M
Construction Indirects/Overhead	$12.2M
Construction Engineering/Management	$11.3M
Total	**$124M**

*Amounts are subject to change based on construction cost. A 5% inflation rate to construction midpoint and a 20% contingency are included in the cost estimates to reflect recent industry trends.

Table 2 Project Funding Sources

Funding Source	Amount	% of Total Cost	Funding Category
CDOT Years 1 - 4***	$33.0M	27%	Non-Federal
CDOT Years 5 - 10***	$5.0M	4%	Non-Federal
CDOT Years 5 - 10***	$19.8M	16%	Federal
CDOT RPP (FY 2023)***	$8.5M	7%	Non-Federal
RTD (Diagonal Corridor)***	$11.1M	9%	Non-Federal
63rd Queue Bypass 2022-2025 TIP – Boulder County**	$5.0M	4%	Federal
63rd Queue Bypass 2022-2025 TIP – CDOT Match**	$5.0M	4%	Federal
CO 52 Queue Bypass TIP Federal Portion**	$3.1M	2.5%	Federal
CO 52 Queue Bypass TIP RPP Portion***	$0.5M	0.5%	Federal
CO 52 Queue Bypass TIP RTD Portion**	$4.9M	4%	Federal
Longmont CIP (2023/2024)**	$2.0M	1%	Non-Federal
Boulder County (Bikeway Design Funding)**	$1.1M	1%	Non-Federal
Subtotal	**$99M**	**80%**	
RAISE Grant	$25M	20%	RAISE (Federal)
Total	**$124M**	**100%**	

See ***Appendix B: Funding Commitments*
See ***Appendix C: Letters of Support

CIP - Capital Improvement Plan
RPP - Regional Priority Program
TIP - Transportation Improvement Project

Table 3 Project Budget by Major Component

Major Project Component	% of Total Cost	RAISE Funds	Federal Funds	State Funds	Local Funds	Total Funding
Jay Road - Intersection Improvements	0.1%			$0.1M		**$0.1M**
Jay Road - Queue Bypass Lanes	7%		$8.6M			**$8.6M**
Jay Road - Bikeway Underpass	2%			$2.6M	$0.2M	**$2.8M**
Bikeway Segment Between Jay Road and 63rd Street	4%			$4.4M	$0.3M	**$4.7M**
63rd Street - Intersection Improvements	0.1%			$0.1M		**$0.1M**
63rd Street - Queue Bypass Lanes	9%		$11.3M			**$11.3M**
63rd Street - BRT Platform	1%				$1.5M	**$1.5M**
63rd Street - Park-n-Ride	3%				$3.3M	**$3.3M**
63rd Street - Bikeway Underpass	3%			$3.9M	$0.2M	**$4.1M**
CO 52 - Intersection Improvements	23%	$10.0M	$0.8M	$17.7M		**$28.5M**
CO 52 - Queue Bypass Lanes	6%		$7.7M			**$7.7M**
CO 52 - BRT Platform	1%				$1.5M	**$1.5M**
CO 52 - Bikeway Underpass	3%			$2.9M	$0.2M	**$3.1M**
Niwot - Intersection Improvements	0.1%			$0.1M		**$0.1M**
Niwot - Queue Bypass Lanes	6%		$7.6M			**$7.6M**
Niwot - BRT Platform	1%				$1.5M	**$1.5M**
Niwot - Park-n-Ride	3%				$3.3M	**$3.3M**
Niwot - Bikeway Underpass	3%			$3.9M	$0.2M	**$4.1M**
Airport Road - Intersection Improvements	1%			$1.0M		**$1.0M**
Airport Road - Queue Bypass Lanes (southbound only)	0.7%			$0.6M		**$0.6M**
Hover Street - Intersection Improvements	23%	$15.0M	$2.3M	$9.2M	$2.0M	**$28.5M**
Total	**100%**	**$25M**	**$38.3M**	**$46.5M**	**$14.2M**	**$124M**

Safety

Existing Safety Conditions

The five-year crash history between 2015 and 2019 along the Diagonal (**Figure 9**) was examined to assess the safety performance of the roadway and to identify crash patterns relevant to the proposed improvements. Of the 1,010 crashes reported, 518 crashes occurred in signalized intersections along the Diagonal; 492 crashes could not be tied to a signalized intersection.

Morning and evening weekday peak periods experienced the highest frequency of rear end crashes, with a directionality that matches the commuting patterns: southbound toward Boulder in the morning and northbound toward Longmont in the evening (**Figure 10**). This emphasizes the importance of improving traffic flow through the project area, especially at key bottleneck locations like the CO 52 and the Hover Street intersections.

Figure 9 Crash Type Distribution

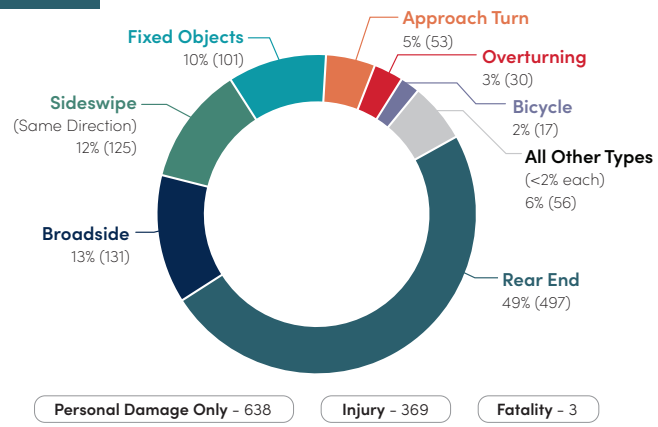
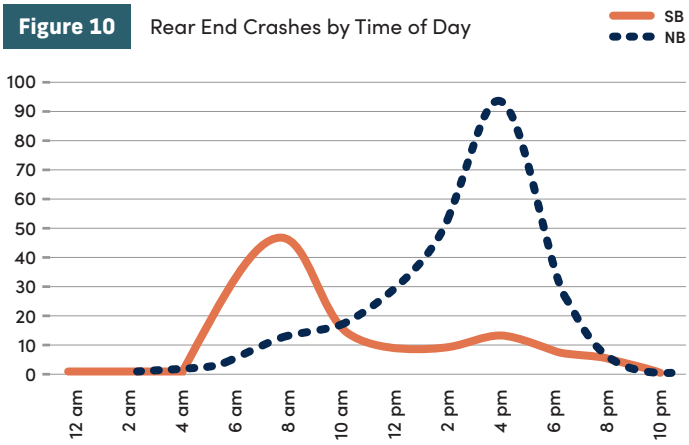


Figure 10 Rear End Crashes by Time of Day



Project Approach to Address Safety Conditions

The Diagonal project is a significant step toward reducing serious injuries and deaths in support of the safe systems approach outlined in the National Roadway Safety Strategy (NRSS) [15]. This project features elements that provide safety benefits corresponding to their five objectives:

SP **Safer People** SR **Safer Roads** SV **Safer Vehicles** SS **Safer Speeds** PC **Post-Crash Care**

A safe system approach supports underserved communities and disadvantaged persons for a more equitable transportation system. The safety components included in this project are complementary and best categorized as:

Transit Enhancements **Bikeway Connections** **Signalized Intersection Improvements**

Transit and Multimodal Connections SP SR SV

Transit enhancements provided by the BRT line and station amenities will directly incentivize additional ridership and reduce SOVs. Notable safety benefits follow.

- Higher profile transit facilities, platforms, bypass lanes, and associated wayfinding signage significantly improve drivers' awareness of activity proximate to the stations. SP SV
- Because drivers expect to see more pedestrian activity around consistently spaced transit stops, there is an inherent safety benefit to vulnerable users, including bicyclists. SP SR
- Well-lit BRT stops, equipped with security cameras and passenger information displays, enhance users' personal safety. SP

Bikeway Connections SP SR SS

The bikeway under/overpasses and associated bike path constructed at the Jay Road, 63rd Street, CO 52, and Niwot Road intersections are critical elements of the overall bikeway project that will provide a high-quality bikeway in the median of CO 119. These connections will provide cyclists with direct, safe, and convenient connections from downtown Longmont to downtown Boulder and to the University of Colorado main and east campuses. Notable safety benefits follow.

- The bikeway (**Figure 11**) will significantly reduce conflicts between cyclists and motor vehicles by physically separating the bikeway from the highway. It will address the primary reason people cite for not bike commuting: fear of interacting with much faster moving motor vehicle traffic. SS SP
- The bikeway will be 12-feet wide, paved, maintained year-round, and designed for all user types. SR The facility will allow Class 2 e-bikes, which will make biking the 9 miles between Longmont and Boulder more feasible.
- Improving safety on the Diagonal is critical to achieving CDOT's and Boulder County's safety and Vision Zero goals. Boulder County's Traffic Crash Analysis identified this corridor as having the highest number of serious injury and fatal crashes in unincorporated Boulder County, and the second highest number of bicycle and pedestrian injury and fatal crashes. The grade-separated bicycle crossings at the major crossroads will greatly reduce bicycle-pedestrian conflicts and save cyclists several minutes of commuting travel time. SR

Figure 11 Median Bikeway Photo Simulation

Signalized Intersection Improvements SR SS PC

Crashes that occur during these peak congestion periods may have a disproportionate effect on underserved, overburdened, or disadvantaged persons that work in Boulder but may have to travel longer distances due to rising housing costs. The cost of repairs, potential loss of transportation as a result of the crash, loss of income due to injury, or the loss of time due to the additional traffic congestion after a crash may all have a larger economic impact on lower-income groups.

The majority of safety issues along the Diagonal are directly influenced by weekday peak hour congestion at the six signalized intersections: Jay Road, 63rd Street, CO 52, Niwot Road, Airport Road (southbound), and Hover Street. Safety along the Diagonal will be significantly enhanced by the reconstruction efforts at the CO 52 and Hover Street intersections and through the implementation of Federal Highway Administration's (FHWA) Proven Safety Countermeasures [16] throughout the corridor.

Intersection Reconfiguration

CO 52 and Hover Street intersection improvements address many key infrastructure deficiencies that will foster a safer driving environment. SR

Congestion Mitigation

Adding a BRT system provides an opportunity to use CDOT's new Adaptive Signal Control System to reduce queues and alleviate recurring congestion. This will address the pattern of congestion-related crashes due to speed differentials SS and improve response times for emergency services. PC

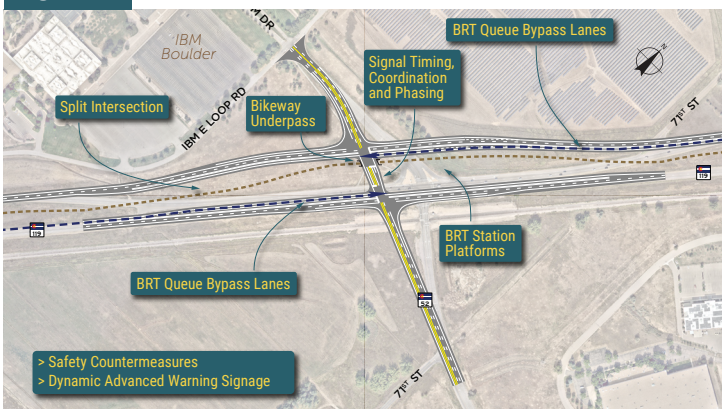
Driver Awareness

Upgrades to the signal equipment, including proven safety countermeasures (e.g., highly reflective backplates and adjustments to the clearance intervals) and additional features (e.g., dynamic signal warning systems) will improve signal visibility, reducing crashes. SR

Project's Ability to Foster a Safe Transportation System

CO 52 Intersection – Between 2015 and 2019, there were 69 crashes at the CO 52 intersection, with another 30 due to queued traffic approaching the intersection. More than one-third (38 of 99) of crashes involved injury, with 11 seriously injured people. Unlike the other intersections, which are configured as paired one-way couplets separated by a wide median, the CO 52 intersection (**Figure 12**) is a traditional four-leg signalized intersection without a median. The traditional configuration has less capacity than adjacent intersections, resulting in a bottleneck and an increase in observed crash patterns.

Figure 12 CO 52 Intersection Improvements



To address these safety issues, this project will completely reconstruct the CO 52 intersection, creating a 175-foot median separating northbound and southbound on the Diagonal.

The median area will be used for the BRT queue bypass lanes and station platforms. SP SV SR

Signal timing, coordination, and phasing adjustments should allow for significantly improved through-put and platoon management. SS PC

Splitting the intersection allows for additional green time to be allocated to the Diagonal without adding new through lanes to the intersection. SR SS PC

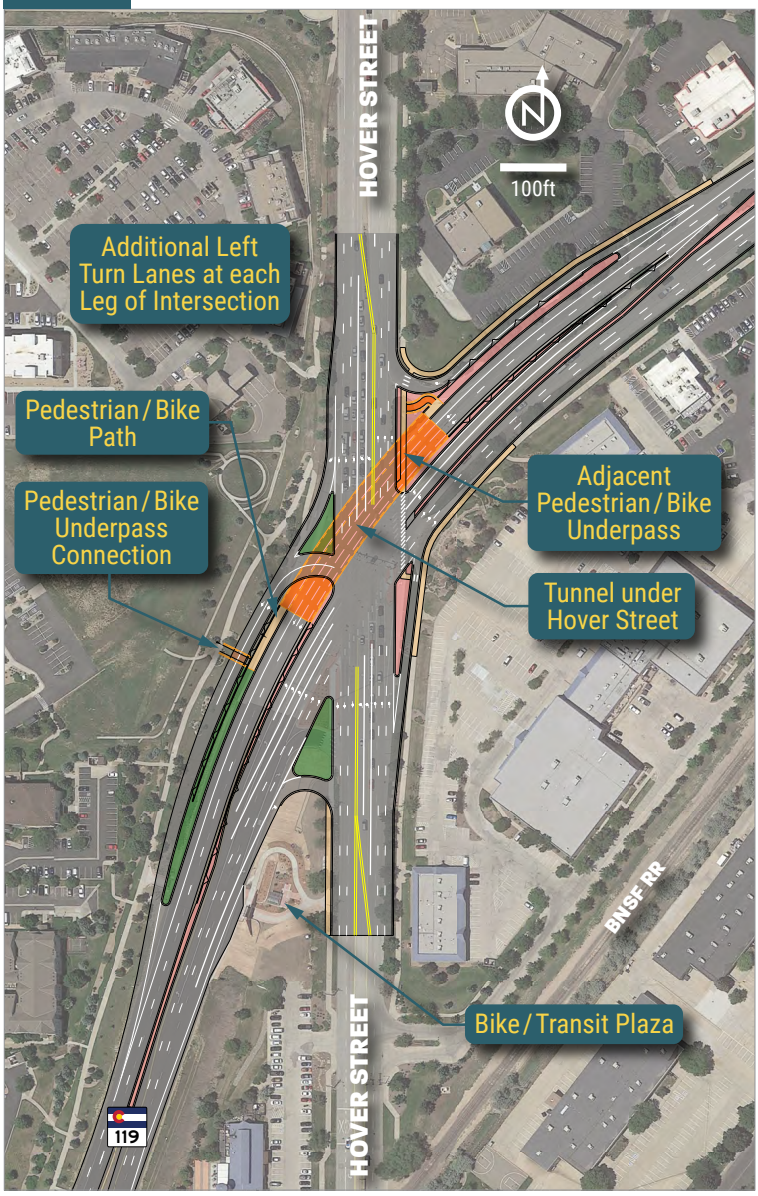
The bikeway underpass will significantly enhance the safety of cyclists and pedestrians using the regional bikeway. SP SR SS

Implementing proven safety countermeasures (e.g., reflective backplates and clearance interval adjustments) adds dynamic signal-ahead warning signs tied to the signal controller. SR

Hover Street Intersection - There were 121 crashes at this intersection between 2015 and 2019; 40 crashes resulted in injury, with 17 persons severely injured. Many geometric and operational issues contribute to the high frequency of crashes at this intersection, which is a significant bottleneck for weekday commuters traveling between Boulder and Longmont. Approximately one-half of all crashes are rear end crashes that are largely due to excessive queuing and stopping.

Due to the excessive skew of the intersection (**Figure 13**) and the high volume of turning traffic, the intersection is confusing and difficult to safely navigate for all travelers. For example, southbound to westbound right turns are free flow with only a suggested yield to pedestrians, resulting in an "on-ramp feel" for people accelerating to 65 mph on the Diagonal. As observed, many people who bicycle or walk will avoid the intersection throughout most of the day.

Figure 13 Hover Street Intersection Improvements



The project will address these safety issues by creating a grade separation for the westbound to southbound Diagonal traffic movement, upgrade and relocate the traffic signal equipment, and provide several multimodal improvements to include a pedestrian underpass.

An underpass for pedestrians, bicyclists, and other vulnerable multimodal transportation users will eliminate conflicts with intersection traffic. SP SR SS

Transit improvements through the intersection will further reduce congestion through mode-shift and enhanced safety at the bus stops. SP SV SR

Rear end crashes in the westbound direction will be mostly eliminated by the project because westbound grade separation will remove the stop and go condition. SR SS PC

Jay Road, 63rd Street, Niwot Road, Airport Road – There was a high frequency of crashes at the Jay Road (72 crashes), 63rd Street (102 crashes), Niwot Road (52 crashes), and Airport Road (32 crashes) intersections during the five-year study period, with at least 40 more crashes due to queued traffic approaching one of these locations. Peak hour congestion is a significant contributing factor as these four locations account for more than one-third of the rear end crashes along the corridor. There was also a fatal broadside crash at the Niwot Road intersection.

The project includes widening for the BRT queue bypass lanes and general safety improvements to signing, striping, signal phasing, and coordination.

The BRT queue bypass lanes provide multimodal benefits, including expected increased ridership, that will ultimately have a positive impact on crash experience. SP SV SR

The bikeway under/overpasses will significantly enhance the safety of cyclists and pedestrians using the regional bikeway. SP SR SS

Signal timing, coordination, and phasing adjustments should allow for significantly improved through-put and platoon management. SS PC

Implementing proven safety countermeasures (e.g., reflective backplates and clearance interval adjustments) adds dynamic signal-ahead warning signs tied to the signal controller. SR

At Airport Road, the project will convert the 350-foot connection through the median to a one-way link toward the north and shift a small amount of traffic to adjacent locations with less conflicting traffic.

Removing southbound traffic through the median eliminates several critical conflict points for both vehicular and bikeway traffic. SR SS

Additional green time can be allocated to southbound Diagonal traffic to improve progression and reduce congestion along the highway. SS PC

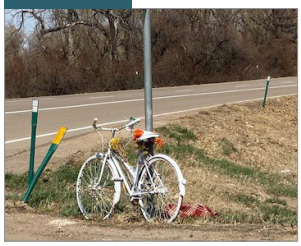
Bikeway Project Improvements - There were 17 bicycle crashes between 2015 and 2019. However, there was a fatal crash along the Diagonal near Airport Road in October 2021 that bears consideration when evaluating the safety impacts of the bikeway under/overpasses. Shifting the five-year study period to 10/16/2016 through 10/15/2021, 13 bicycle crashes were considered for mitigation: 11 injury crashes and 1 fatal crash. Multiple crashes involved riders using the shoulders of the Diagonal for long-distance travel, including the fatal collision. The under/overpasses and bikeway segments included in this project enhance the safety benefits of the bikeway project by providing an alternative to riding on the highway shoulder, thus providing a safer and more efficient path for cyclists of all levels to drastically reduce exposure for vulnerable users.

Monetized Safety Benefits

Using FHWA Crash Reduction Factors (CRF), the following benefits are expected over 20 years:

- Intersection operational improvements will eliminate 218 injury crashes and 1 fatal crash (570 total crashes), resulting in a monetized benefit of $30.9M
- Signing, striping and signal coordination improvements will eliminate another 14 injury crashes (47 total crashes), resulting in a monetized benefit of $1.7M
- Bikeway under/overpasses and associated path segments will eliminate 16 injury crashes and 4 fatal crashes (20 total crashes), resulting in a monetized benefit of $19.1M

Figure 14 Bike Memorial



The planned improvements are anticipated to eliminate 637 crashes, have a net present value of $36.4M, and an economic benefit of $51.7M in crash reductions over the 20-year life cycle of the project.

Environmental Sustainability

Greenhouse Gas Emissions and Air Quality

The Diagonal project has been identified as a Regionally Significant Project which means this corridor connects communities from one travel shed to another and significantly changes how people move through the corridor. These innovative improvements are the exact improvements that impact the human behavior decision on choice of travel. Providing a network of modes creates equitable opportunities and flexibility of travel, additionally reducing the reliance on SOVs.

The Diagonal project is directed by established Colorado and local emission reductions goals to increase energy efficiency, reduce dependence on oil, and reduce congestion-related GHG emissions by eliminating severe traffic bottlenecks and associated idle time with improved intersections and increased transit. As of 2019, 19% of Longmont's emissions come from transportation, with 77% of transportation emissions being generated by gasoline vehicles [17]. In 2021, Longmont released the **Equitable Carbon-Free Transportation Roadmap** (Roadmap) which outlines methods to address transportation needs while mitigating climate impacts. The Roadmap outlines five key goals: reducing overall GHG emissions by 69% by 2050, reducing transportation-related fuel consumption by 33% by 2050, increasing equitable access, prioritizing construction of missing links, and educating and providing funding to enhance overall safety [18]. The strategies for reducing vehicle emissions include shortening/reducing the number of trips, shifting modes, and reducing direct vehicle emissions through reduced- and zero-emission vehicles. In addition, CDOT's emission reduction rule adopted by the Transportation Commission in 2019 requires multimodal transportation investments achieve ambitious GHG reduction targets. As of 2020, 33% of the City of Boulder's emissions come from transportation [19]. Boulder City Council set a goal in October 2021 to reduce emissions 70% by 2030 from a 2018 baseline, become a net-zero city by 2035, and become a carbon-positive city by 2040 [19]. Boulder County's **Climate Action Plan** documents that approximately 30% of GHG emissions in the county are generated by the transportation sector. The **Climate Action Plan** outlines a plan to reduce GHG emissions by 45% by 2030 and by 90% by 2050 from a 2005 baseline. These ambitious goals and bold targets require substantial emission reductions from transportation [20]. Colorado's **Climate Action Plan to Reduce Pollution** (HB19-1261) also set goals of GHG emission reductions from a 2005 baseline as 26% by 2025, 50% by 2030, and 90% by 2050 [21]. In addition, Boulder County, the entire North Front Range, and the Denver metro area is currently being downgraded from Serious to Severe non-attainment area for ozone.

Through the overall reduction in fuel consumption and vehicle delay [4], improvements will also result in less air and water pollution, and reduce oil dependency. The more efficient movement of more people through the Diagonal will result in less energy expended. These benefits will be achieved through the planned improvements listed in **Table 4**.

Table 4 Planned Improvements to Promote Environmental Sustainability

Planned Improvement	Benefit of Improvement
BRT stations at 63rd Street, CO 52, and Niwot Road	The unique solution of inside BRT lanes and corresponding Park-n-Rides provide safe, comfortable stations that make BRT travel time-competitive, reliable, and affordable. These also reduce congestion along the Diagonal for movement of goods in a timely manner.
Tunnel for through traffic at Hover Street with a grade-separated bicycle/pedestrian facility to run parallel to the vehicle tunnel	Tunneling will eliminate the stops required for opposing left-turn movements and free up idling traffic for the major movement of this intersection. The separation will improve the safety, comfort, and travel time competitiveness of people bicycling and walking.
Split intersection at CO 52	Splitting the intersection has operational benefits which would reduce congestion and delay and allow for median bus station construction.
Queue bypass lanes at signalized intersections	Bypass lanes facilitate efficient BRT movements through intersections, allowing transit to be more time competitive, attract more riders, and further reduce the number of SOVs.
Partial bikeway segment and four bikeway under/overpasses	The overarching regional goal of a commuter bikeway spanning the Diagonal will significantly reduce GHG emissions.

Water Quality

To improve water quality, the Colorado Department of Public Health and Environment (CDPHE) standards for stormwater discharges associated with Municipal Separate Storm Sewer Systems (MS4) will be met. Water running off new pavement will be treated to the standards of the permit.

Environmental Justice

On July 23, 2019, Boulder County issued a proclamation declaring a climate emergency. The proclamation emphasizes the importance of a just transition effort when addressing climate change, considering frontline communities have borne much of the environmental consequences resulting from environmental degradation [22]. The project will align its goals with Boulder County's goals regarding environmental justice, particularly by engaging the community and fostering active participation in planning and decision-making. A preliminary screening of the Environmental Justice Screening and Mapping Tool (EJSCREEN)

from the Environmental Protection Agency (EPA), Information for Planning and Consultation (IPaC) from US Fish and Wildlife Service (USFWS), National Wetlands Inventory (NWI) from USFWS, and Environmental Public Health Tracking from Centers for Disease Control and Prevention (CDC) was conducted.

The Diagonal regional area is primarily commercial and employment with very little housing, shown in **Figure 15**. The 2019 CDC data [23] provides a broader overview of demographics and environmental health issues across Boulder County that may impact the users traveling the Diagonal. In Boulder County, 10.7% of residents live below the poverty line. One of every 10 residents identifies as Hispanic. In 2018, residents experienced 29 days of exposure to unhealthy levels of ozone and an annual ambient Particulate Matter (PM2.5) concentration of 8.5 µg/m3, which is less than the annual national standard of 12 µg/m3. In Boulder County, 2.3% of the population lives within 150 miles of a highway [24]. Information from the CDC tool, EJSCREEN, and others will be used throughout the project to provide valuable insight into environmental justice issues.

Threatened and Endangered Species

The IPaC query identified federally listed threatened and endangered species that have the potential to occur within or be impacted by the project [25]. Through the PEL process, two species, Preble's meadow jumping mouse and Ute ladies'-tresses orchid, were identified to have potentially suitable habitat. In follow-up coordination and a field visit with USFWS, it was determined that there is no suitable habitat for either species and additional survey is not required. Formal coordination with USFWS will occur as part of the National Environmental Policy Act (NEPA) documentation.

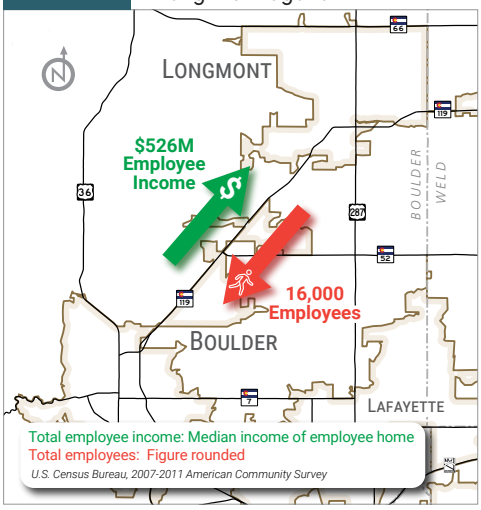
Promoting Efficiencies

The Applicant and Project Sponsors will work to incorporate innovative technologies into the project to improve safety and operation efficiency, and those are discussed in ***Innovative Technologies***.

Quality of Life

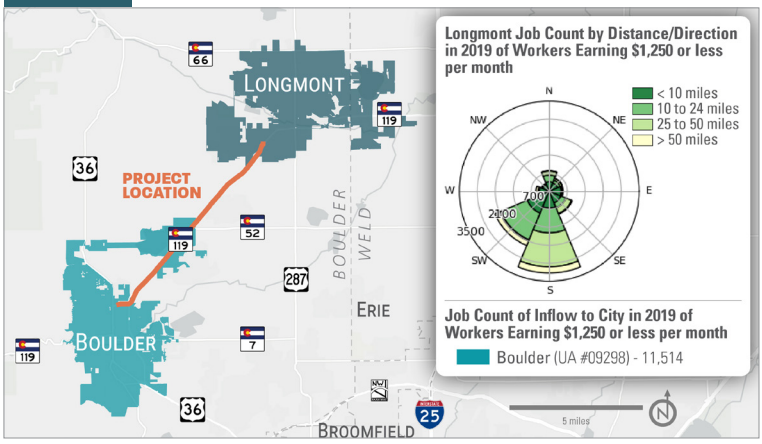
Every day, rural and disadvantaged communities north and east of Boulder rely on the Diagonal to access employment, healthcare, education, retail, social service, and other essential services. For the Rural Communities, the Diagonal is the primary roadway access to critical destinations in Boulder County and the surrounding area. It is estimated that over $526M in salaries [8] is returned through personal expenditures in the surrounding rural and vulnerable communities (**Figure 15**). Travel along the Diagonal creates a vital lifeline for the individuals and their families, as well as the communities supported by the expenditure of this income.

Figure 15 Employee & Money Flow Along the Diagonal



Many of the employees mentioned above have low to medium income jobs within the limits of Boulder, but due to rising housing costs live in other areas. Reliable transportation methods for these employees is critical. **Figure 16** shows the distance and direction that low income employees who live within Longmont and work elsewhere travel, as well as the inflow of employees. Over 2,100 of these Longmont residents are traveling towards the Diagonal, with over 1,050 traveling more than 10 to 25 miles in that direction. Consequently Boulder sees an inflow of 11,514 low income employees who work, but do not live in the area [26].

Figure 16 Job Count Data of Workers Earning $1,250 or Less per Month



The Diagonal improvements will increase transportation choices for individuals, expand access to essential services, and provide improved access for vulnerable populations with little or no access to a private vehicle. Information regarding the areas of persistent

poverty, historically disadvantaged communities, choice neighborhoods, and opportunity zones the Diagonal serves are in ***Project Location***. In this corridor, the vulnerable populations, economically disadvantaged people, and people of color (specifically Latinx populations), comprise over 25% of the workforce population just east of the Diagonal [27]. The improvements to multimodal access, resulting in faster and more reliable travel times for these communities, accomplishes one of the Diagonal's main goals of reducing transportation cost burdens for communities already burdened by housing costs, outlined in ***Improved Mobility and Community Connectivity***. The Diagonal is in line with the Longmont Equity Team's purpose of fostering social and racial equity through project identification, collaboration, and removal of barriers to allow for equity in the community. ***Partnership and Collaboration*** expands upon the diverse groups involved in planning this project.

The improvements to the Diagonal:

- Reduce barriers to opportunity by making multimodal investments that create connections via bikeways, walkable/rollable pathways, and BRT lines that connect the underserved and disadvantaged communities, outlined in ***Project Location***.
- Increase reliable movement along the Diagonal, creating a more appealing development environment and improving freight access to underserved communities, specifically those in areas of persistent poverty and choice neighborhoods.
- Reduce overall long-term congestion and move people more efficiently, reducing travel time by over 30% in SOVs and for those using transit options [4].
- Promote vibrant and growing economies for all travelers and surrounding communities by providing connections to jobs, businesses, and opportunities, outlined in ***Economic Competitiveness and Opportunity***.
- Enable businesses to better attract and retain employees by improving transportation choices.
- Maintain and enhance Boulder's unique characteristic of being a cycling mecca, an accessible transportation option for all income levels.
- Improve air quality by offering an array of travel mode options and lowering emissions through reduced congestion along the Diagonal, located in a Nonattainment Area for Ozone [28].

Improves Mobility and Community Connectivity

Affordable Transportation Choices

Advanced multimodal options offer more opportunities for travel and make it more cost accessible. After housing, transportation often accounts for the second largest share of household spending. Traveling via private vehicle is an expensive way to travel. In line with the Areas of Persistent Poverty shown in ***Project Location***, Boulder County has many housing burdened communities [29]. Providing mobility options will reduce travel expenses for residents in Boulder County, which may allow some of the housing cost-burdened residents to remain in Boulder County. Using the DRCOG region average of 25.5 miles per day per person [30] and the IRS mileage rate of $0.59 per mile [31], individual annual transportation costs for private vehicle travel come to $4,200- $5,200 per year. Currently, the only way to get between Longmont and Boulder without a vehicle is to take the RTD BOLT bus line. This bus line travels from downtown Boulder to downtown Longmont via the Diagonal ausing either a 3-hour or all day pass [32]. From Boulder, passengers can take the FLEX Express to Longmont, Loveland, and Fort Collins using a one-way pass [33]. The Victoria Transport Policy Institute has estimated the cost of bicycle commuting at $0.05-$0.15 per mile [34], roughly six times cheaper than motor vehicle travel. The Diagonal improvements will reduce transportation costs twofold. Firstly, by providing a safe bicycle and pedestrian option connecting Longmont and Boulder, the RTD line will be enhanced with another multimodal option. Secondly, the queue bypass lanes will increase efficiency in the bus routes. Reducing overall long-term congestion and moving people more efficiently will reduce travel time over 30% for SOVs and those using transit options between now and 2045 [4].

Walkability and Accessibility for Motorized and Non-Motorized Travelers

One of the main goals of the Diagonal is to expand connectivity for travelers using all modes of transportation. With increased transit options, individuals in the surrounding communities have the ability to move around with or without a car, advancing both Longmont and Boulder to a future where people can have greater transportation options on where and when to live, work,

and play. The proposed improvements outlined in the ***Project Description*** will make the BOLT line even more efficient. Improvements to the Hover Street intersection will dramatically improve idle times at that intersection, making Diagonal through travel more efficient for drivers, while access to transit and the bicycle corridor will be greatly enhanced by the grade-separated facilities for active modes.

Figure 17 Colorado Bicyclist Uses the Bike Racks on an RTD Bus

The bike under/overpasses and segments of bikeway that are included in this project's scope will transform the Diagonal into a unique connectivity point for non-motorized travelers, as well. The future bikeway segments will open up a dynamic multi-city travel option spanning rural Northern Colorado for bicyclists like the one shown in **Figure 17**.

In a Levels of Traffic Stress (LTS) evaluation for 10 stations along the Diagonal where biking and walking were recommended, 63rd Street, Hover Street, Airport Road, Niwot Road, and CO 52, were identified as high-stress facilities for biking and walking [35]. The First & Final Mile gap can be a barrier that discourages potential riders from using transit [36].

In addition to the planned bikeway, First & Final Mile solutions will improve the small gaps that many transit hubs see today in getting residents from their homes to the door of their final destination.

The First & Final Mile study: The 2021 First & Final Mile study determined an approach for sign locations, content, and branding that created consistency within the Diagonal. The study identified strategies to address transportation demand management, such as station amenities, workplace commute ambassador programs, regional bike share, and shuttles. A shared parking location to supplement Park-n-Ride capacity was identified. Finally, a one-year pilot program for microtransit is now planned near the 63rd Street Park-n-Ride to address First & Final Mile travel restrictions. Additional information about the jobs, activities, and communities the Diagonal connects to can be found in ***Economic Competitiveness and Opportunity***.

Universal Design and Accessibility

The Diagonal's pathway access points and amenities are planned with Universal Design and accessibility in the forefront to eliminate barriers. The project will increase walkability and rollability for travelers who may be getting from one destination to another via wheelchair or scooter. The pathways and buses are Americans with Disabilities Act (ADA) compliant.

Boulder County is developing a **Mobility and Access for All Ages and Abilities Plan** (Plan) to build off of the **Boulder County Transportation Master Plan**. The Plan seeks to guide transportation policy and development to fit the needs of underserved communities and populations with special needs. This Plan will fulfill requirements under the Enhanced Mobility of Seniors and Individuals with Disabilities (Section 5310) Program. This living document will help Boulder County prioritize programs, services, and investments over the next five years [37].

The population density of adults over the age of 65 for the eastern portion of Boulder County is concentrated around central and western Longmont, northeast Boulder, and several spots directly along the Diagonal at Jay Road, CO 52, Niwot Road, and Hover Street [38]. The population density of youth (under the age of 18) with disabilities is concentrated around central Longmont, eastern Boulder, and along the Diagonal near Jay Road and Niwot Road [39]. Finally, the population density of veterans with disabilities is concentrated around the central Longmont area [40]. Areas were identified as reflective of coordinated and human service transit need [41] by highest proportion of populations of older adults, youth, people with disabilities, and people with low income. In and around the project area, areas with notable amount of need include the eastern, northern, and southern peripheries outside central Longmont and rural north Boulder. The unincorporated community of Hygiene to the north and the Fox Ride area to the south, as well as areas around Longmont and west of the 95th and Hover Street intersection, are areas in which transit need is unserved by fixed-route transit; however, future analysis will provide a more complete picture of transportation gaps and barriers.

Mobility in Freight

How this project improves freight and supply chain movement is described in ***Economic Competitiveness and Opportunity***.

Economic Competitiveness and Opportunity

System Operations and Global Economy Competitiveness

Cell phone traffic data patterns provided by INRIX revealed both the Hover Street and CO 52 intersections along the Diagonal as regional highway bottlenecks [42], which are locations defined by a 10% reduction in travel speeds compared to posted speed limits routinely occurring over a selected three-month period due to high truck volumes. The Diagonal design will improve supply chain reliability at this critical regional intersection that is currently experiencing significant delays that are projected to increase over time if unaddressed. Delays negatively impact regional freight efficiencies, schedule reliability, and workforce productivity. The Diagonal is critical to the reliable movement of goods and services in the region by current and projected truck freight movement.

To improve long-term efficiency, reliability, and costs of the movement of workers and goods, the project focuses on improving dependable, attractive, and competitive commuting options along a corridor continuing to grow in travel demand.

The Diagonal is part of the National Highway System (NHS) and designated as a CDOT State Freight Corridor, with connections to the local, regional, and national transportation network. To continue to help the US compete in a global economy by facilitating efficient and reliable freight movement, the project improves a critical transportation node along the Diagonal with direct connections to I-25 (a national freight corridor), United States Highway 287 (US 287; a Colorado freight corridor), and US 36 (a Colorado freight corridor). Markets well beyond the Diagonal can be reached via these freight corridor connections.

Improvements to Economic Strength

Improvements to the economic productivity of land, capital, and labor will be achieved with over 30% less delays [4]. Also, improved travel options such as enhanced transit, bike, and pedestrian options, and improved people-through-put capacity, will improve productivity. Likewise, the reduction of burdens of commuting and improvements to overall wellbeing will be achieved by having more bike and pedestrian options available and providing more personal free time and less stress due to less delay. These components create a better work-life balance for healthier, more productive workforces.

Transportation Cost Reduction

Information regarding transportation cost reduction can be found in ***Improves Mobility and Community Connectivity***.

Tourism Opportunity

The implementation of more transportation options increases the opportunity and accessibility for tourism in the area. With its close proximity to hiking, biking, skiing, skydiving, fishing, birdwatching, golfing, kayaking, paddle boarding, and snowshoeing, Boulder County is a desirable tourist destination. Once this project is complete, more people will have access to all of these activities without needing to stay in the higher-priced areas to enjoy them. In alignment with Boulder County's sustainable transportation priorities, Eldora Ski Resort offers free round-trip shuttle rides between Boulder and Eldora on Saturdays, Sundays, and certain other days, in addition to being on an RTD bus route. Local residents and employees needing to access the ski area for jobs from Boulder, Longmont, and surrounding counties will have more affordable and more reliable transit access to these activities that help promote healthy lifestyles and communities, as outlined in ***Improves Mobility and Community Connectivity***.

Economic Strength and Long-Term Job Creation

The Diagonal project improves reliable and timely access to employment centers and job opportunities through improved travel speeds and improved multimodal travel options, resulting in:

- $72M in estimated travel time savings for automobile, commercial truck, and transit users with this improvement between Longmont and Boulder over the 20-year life of the project.
- Reliable and efficient access to nearly 145,000 jobs [26] and opportunities, including those from major companies and institutions along the Diagonal, including Celestial Seasonings, IBM, Lockheed Martin, Medtronic, Northrop Grumman, Qualcomm, National Institute of Standards & Technology, Google Headquarters, Ball Aerospace, the University of Colorado Boulder, and Colorado State University.

The Diagonal is a critical travel point for commuter and freight travel between I-25, US 287, Longmont, Boulder, and US 36. The surrounding Rural Communities rely heavily on this corridor for economic opportunity – this includes rural locations east

of I-25 into Weld County and north of Hover Street into Larimer County. This corridor is key in connecting these employee-rich communities to well-paying jobs at larger national and global companies located in central Boulder County and the City of Boulder and will continue to promote the expansion of private economic development. The disadvantaged communities near each end of the Diagonal will benefit from the transportation and First & Final Mile micro transit options to access more job opportunities along the Diagonal. This project decreases transportation costs by facilitating safer and more efficient operational movements with a delay reduction of over 30% for SOVs and transit users [4]. In addition, current regional and local vehicle traffic improves from Level of Service (LOS) F to LOS C near the Hover Street intersection [43]. The Diagonal supports improved community access to employment, education, retail, healthcare, and social service opportunities resulting in better competition globally for the US market.

State of Good Repair

With the exception of Jay Road and Niwot Road intersections which were resurfaced 10 years ago with concrete, the current pavement along the Diagonal was constructed in the mid-1980s and will soon approach the end of its useful life. Despite routine preventive maintenance efforts, much of the roadway stress is due to the inadequate pavement thickness and lack of load transfer devices to carry the traffic/loads. The existing pavement does not have dowels that are now standard to aide in load transfer. Several of the concrete panels are showing moderate to severe distress levels due to the lack of dowels. These current deficiencies will be managed and corrected as stated below to maintain a high State of Good Repair.

If left in its current state of repair, the existing concrete pavement will continue to deteriorate and threaten:

Future transportation network safety, reliability, and efficiency of this busy regional corridor; the movement of freight through the corridor; and economic development and growth.

The Diagonal project will maintain the transportation infrastructure in a State of Good Repair by upgrading the current intersections and reconstructing them with concrete pavement and resurfacing the roadway and queue bypass lanes with asphalt. These improvements are designed for the movement of more people, by various modes, more efficiently, and for trucks moving goods between the interstate highways and population/employment centers along the corridor. The Applicant and Project Sponsors have discussed and determined clear maintenance responsibilities among the three entities and have a plan for implementing these maintenance responsibilities. The plan for CDOT's roadway maintenance is below.

The Diagonal design addresses the vulnerabilities for disadvantaged communities by providing quick, equitable, and reliable travel options. Keeping the assets in a State of Good repair will ensure these communities have a reliable system.

To optimize the asset's long-term cost structure and keep all of the roadway assets constructed on the project in a State of Good Repair, CDOT plans to:

- Modernize the Diagonal's core transit components (see ***Innovative Technologies***).
- Conduct a Life-Cycle Cost Analysis (LCCA) to determine the most cost-effective pavement structure to maximize the life-cycle of assets.
- Use CDOT's Online Transportation Information System (OTIS) to track the conditions of all the assets.
- Use CDOT's Risk-Based Asset Management Plan that chronicles CDOT's history of asset management to define a framework for implementing asset management strategies with a focus on increasing the life cycle of their assets.
- Use CDOT's Risk-Based Asset Management Plan to perform routine and preventive maintenance as a cost-effective means of extending the useful life of the pavement, structures, culverts, and other assets built.
- Use an Asset Investment Management System (AIMS) to develop budget scenarios that explore the relationship between funding and performance to establish an official approach for strategic preservation of assets. Investment decisions ensure the planned safety and mobility improvements will be maintained throughout the asset's life-cycle.
- Adhere to established performance targets for pavement, structures, and maintenance levels of service (which is a data driven budget tool that informs the CDOT AIMS process).

Partnership and Collaboration

Partnership Input and Collaboration

RTD and the Northwest Mayor & Commissioners Coalition (MCC) completed the 2014 **NAMS** to identify priority areas to fill the transit gap created by significant cost increases, and delays associated with building and operating the 41-mile Northwest Rail commuter rail line from Longmont to Denver. It was determined that the highest priority corridor was CO 119, including the BRT, commuter bikeway, and broader multimodal mobility and safety improvements outlined in the ***Project Description***.

The 2019 **RTD SH 119 BRT PEL Study** classified the intersections of CO 119 and Hover Street and CO 119 and CO 52 as the two highest priority areas for immediate improvement based on safety and congestion, both of which will be addressed with this project. The PEL recommended intersection improvements at CO 119 and Hover Street, consistent with the **Southwest Longmont Operational Study** in 2018 and **Boulder County Transportation Master Plan** in 2020.

Based on the recommendations made in the PEL, the Applicant and Project Sponsors are collaborating with numerous stakeholders to gain consensus, build momentum, and establish a plan of action for the CO 119 corridor. Tangible evidence for this partnership is found in the "CO 119 Coalition" that has been mobilized by Commuting Solutions (a Transportation Management Organization [TMO]) and has met quarterly for over two years. This coalition includes key partners at state, regional, and local levels with other supporting management and planning organizations and private sector representatives for major employers along the corridor. Local agencies along the corridor are working with vulnerable populations who live and/or travel along CO 119 to ensure their needs are incorporated into the planning process and the vision for the corridor. The outreach has resulted in a holistic approach to visioning and securing funding for the project. Other communities and agencies are contributing funds and/or resources to this project, although it is not located within their community limits, because they understand the regional context and benefits. The CO 119 agency partners and coalition members have generated over $99M to jump start the multimodal corridor improvements. **Tables 5 and 6** list the partners and their involvement and responsibilities. A corridor Project Management Team, Project Leadership Team, and Executive Oversight Committee meet regularly with stakeholders to discuss project progress, prioritize and pursue funding, and ensure that recommended elements of the PEL are being advanced. There are also specific working groups for funding pursuits and corridor communications and messaging, including public engagement. Letters of support from partners are included in ***Appendix C: Letters of Support***.

Table 5 Applicant & Project Sponsors

Partner	Involvement & Responsibility
Boulder County	**Applicant.** Boulder County is the county seat and includes the cities/towns of Boulder, Erie, Jamestown, Lafayette, Longmont, Louisville, Lyons, Nederland, Superior, and Ward.
CDOT	**Project Sponsor.** CDOT Region 4 staff will design and construct the full project, and manage the Diagonal roadway. CDOT staff from the Division of Transit and Rail (DTR) and the Colorado Transit Investment Office (CTIO) are involved in planning and execution.
RTD	**Project Sponsor.** Completed the SH 119 BRT PEL study. Responsible for the future BRT build out, maintenance, and operations along the Diagonal.
City of Boulder	City of Boulder is a **key local stakeholder** responsible for many of the improvements in the full BRT build out, as explained in the ***Project Description***.
City of Longmont Colorado	City of Longmont is a **key local stakeholder** responsible for many of the local improvements, as explained in the ***Project Description***.

Table 6 Partners

Partner	Involvement & Responsibility
Boulder County, CDOT, and RTD – Community Advisory Committee	The Community Advisory Committee membership was picked from 99 applications received. Criteria for membership includes diversity of race and age, an ability to consider other viewpoints, and a personal working knowledge of the challenges of all modes of commuting on CO 119. The committee's focus is to give in-depth feedback on public outreach and design of the Bikeway, BRT, and roadway elements in the corridor.
Boulder County – Latino Equity Committee	The Latino Equity Committee was developed by Boulder County and is made of nine members that are leaders in their communities. The focus of the committee is to find ways for more of the Hispanic community to comment on bikeway design via members speaking with their communities and members giving direct feedback to staff on outreach that is working and what not working for the Latino communities. All meetings have interpretation in English and Spanish.
Boulder County – Commuter Bikeway Advocacy organizations	Boulder County staff reached out to the bicycle advocacy organizations in the county to get feedback on the concept design and as the preliminary design is being developed. Staff completed direct outreach to the Center for People with Disabilities. All the comments and suggestions received were considered and many of them were incorporated into the design.
Northwest Mayors & Commissioners Coalition	Northwest MCC focuses on corridors identified in the NAMS to address the mobility needs of the region. MCC was founded in 1999 and includes the local governments of Boulder, Boulder County, Longmont, Erie, Superior, Lafayette, Louisville, the City & County of Broomfield, and Westminster. The MCC collaborates to advance regional transportation planning and advocacy efforts. This political collaboration resulted in the successful completion of the $500 million US 36 Express Lanes Project between Denver and Boulder in 2017 and the opening of the RTD B Line commuter rail service between Denver Union Station and Westminster in 2017.
Commuting Solutions	Commuting Solutions is a 501(c)3 nonprofit TMO for Boulder County, who convenes local governments, businesses, chambers of commerce, and other nonprofit organizations to advocate for the greater Boulder County region and to inspire commute behavior change.
Northwest Chamber Alliance	Local chambers of commerce who are engaged in the advocacy efforts of regional transportation projects are also participating in the project, including the Northwest Chamber Alliance who convenes seven chambers from the northwest metro region.
drcog Denver Regional Council of Governments	DRCOG serves as the state and regional transportation planning and services provider.
Weld County; Larimer County	Weld and Larimer are adjacent counties who support the Diagonal corridor project.
Smart Commute Metro North	Smart Commute Metro North is a TMO representing the Denver-metro north region in support of advancing the Diagonal.

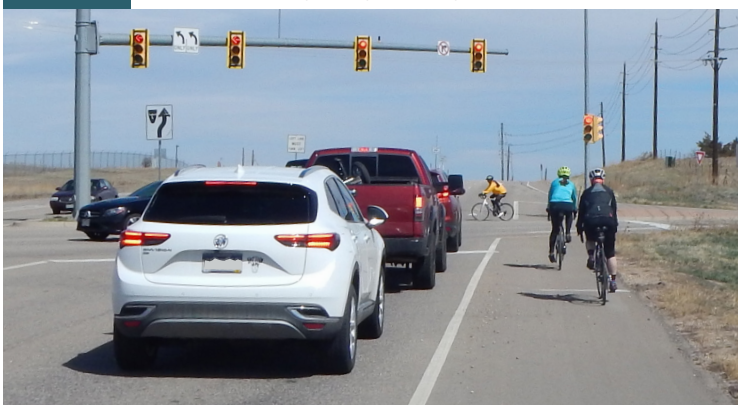
Workforce Development and DBEs

Because CDOT is delivering the project, a 3-year overall annual DBE goal of 11.89% for fiscal years 2022-2024 was adopted [44].

CDOT also maintains a DBE program, Connect2DOT, which is an innovative supportive services program partnership with the Colorado Small Business Development Center (SBDC) Network designed to help small businesses in the transportation industry become more competitive and successful in bidding and contracting with CDOT and other local transportation agencies. In addition to free, unlimited consulting and free or low cost business training, Connect2DOT provides online resources and events tailored to construction contractors and professional design, architecture, and engineering firms.

Public Involvement

Figure 18 Cyclists Traveling Along the Diagonal



Public input was used during preparation of the **SH 119 BRT PEL Study** and to develop the purpose and need statement, the alternatives development and screening, and the conceptual design. More than 475 comments and questions were received, most of which were gathered through the Diagonal website, and at public meetings. These comments will be reviewed as design progresses and applicable comments will undergo further consideration. Public engagement was included as part of the **Southwest Longmont Operational Study**. From March through October 2018, three stakeholder meetings and a public open house meeting were held, soliciting over 100 comments influencing the overall project design.

In 2021, additional public engagement focused on the commuter bikeway for cyclists like those pictured in **Figure 18**. A virtual public meeting was conducted with over 130 attendees with simultaneous Spanish interpretation, a survey was issued with over 1,100 respondents, and the bikeway was presented to 11 advocacy organizations, special events, and businesses.

The project team created a Stakeholder and Public Engagement Plan with a coordinated corridor approach [45].

Robust and continuous public engagement will continue throughout the remaining phases of the project to incorporate community preferences and accommodate stakeholders through project design and implementation. Moving forward, public engagement will remain a large part of the design process, with one public meeting immediately following the completion of preliminary design and another meeting immediately following the completion of final design.

Right of Way Minimization

Over 99% of the project is within existing right of way (ROW) owned by CDOT. ROW impacts will be minimized where feasible and discussions with impacted property owners will begin immediately. In the event the acquisitions take longer than expected, the Applicant and Project Sponsors will work with the contractor to phase work in a way that mitigates schedule impacts. ROW will be obtained in accordance with 49 CFR part 24, 23 CFR part 710 and the Federal Relocation Act.

Innovative Technologies

The Diagonal is undergoing a complete transformation by incorporating mobility improvements that serve different modes of travel and provide multiple mobility options for its users. The Diagonal is targeting the implementation of state-of-the-art Adaptive Signal Control System with updated detection systems, fiber optic communications, Computer-Aided Dispatch/ Automatic Vehicle Location (CAD/AVL)-based TSP, bus queue bypass lanes, queue bypass signals, bus stop and shelter enhancements, CCTV cameras, Dynamic Message Signs (DMS), and Road Weather Information Systems (RWIS) with the potential to enhance safety, efficiency, and mobility for all modes of travel. Together, CDOT, RTD, and Boulder County will approach this project with the goal of using 2 CFR 200.216 compliant innovative technologies to reach safe and equitable operational efficiencies.

Additional innovative technologies to enhance the safety and mobility of all transportation modes in the project area follow.

CDOT's state-of-the-art Adaptive Signal Control System will vastly improve the current operation of the traffic signals along the Diagonal corridor by automatically adjusting signal timing patterns, cycle lengths, offsets, and splits based on real-time traffic conditions. It will also seamlessly integrate with RTD's CAD/AVL-based TSP and queue bypass signals that would significantly improve transit travel time through the intersections.

Deploy Artificial Intelligence (AI) cameras with built-in edge computing at signalized intersections adjacent to RTD Park-n-Ride lots to monitor pedestrian and bicycle counts, occupancy, speed, direction, and predict the intent to cross. The cameras would be used to detect a pedestrian or bicyclist in the crosswalk and activate a blank out sign to inform motorists the crosswalk is still occupied. The cameras can also be used to collect near miss detections and to support touchless crosswalk applications in the future. The implementation of these AI cameras falls under conflict detection and mitigation technologies.

Migrate away from the industry standard Corbin #2 lock on all traffic signal controller cabinets on the project corridor in favor of higher-grade mechanical or electromechanical locks to conform with the National Electrical Manufacturers Association's TS8 Cyber and Physical Security for ITS Standard [46]. This cybersecurity element protects the deployment of safety-critical systems.

Other innovative technologies are being considered, but the details for implementation need to be further assessed. Consequently, these future considerations would enhance the opportunity to conserve energy, employ environmentally beneficial practices, recycle materials, and reduce emissions on the corridor.

Implementation of battery-electric buses – RTD has been at the forefront of battery-electric buses with its 1.2-mile 16th Street Free MallRide service, creating desire to invest in more long-range battery-electric buses. These types of electric buses can travel farther on a single charge to provide safe and efficient transit service on the corridor with the hope of attracting more transit patrons and keeping cars off the road. Slowly converting to a Zero Emission Vehicle (ZEV) bus fleet is aligned with the State of Colorado Clean Truck Strategy that looks to adopt ZEV trucks and buses that could reduce greenhouse gas emissions by at least 45% in Colorado by 2050 [47].

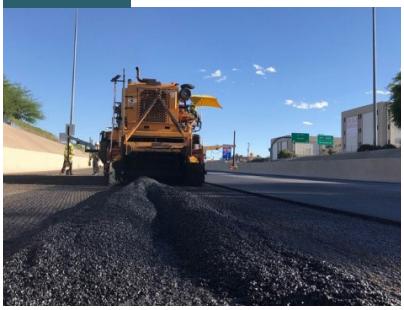
ROW Solar – Using the CDOT-owned ROW on the Diagonal to generate electricity to power the RTD stations would take advantage of Colorado's 300 days of annual sunshine and open ROW adjacent to the stations for roadside solar [49]. This would be an innovative concept to expand the corridor's use of alternate energy and reduce or eliminate the need for utility power. This undertaking would use high-efficiency solar panels in the vicinity of each RTD station on the corridor. Instead of using turf grass or gravel under and around the solar panels, this area would be planted with native xeriscape vegetation requiring little to no supplemental irrigation, promote a stronger local ecosystem, and support local pollinators.

Recycled Rubber Pavement – Adding recycled tires to the asphalt pavement mixture reduces road noise, increases road durability, and can extend the life of the pavement by 15-20%. The increased durability helps to reduce maintenance needs, such as filling cracks, and limits the exposure of CDOT employees working on the roadway to repair pavement. The reuse of discarded tires reduces the accumulation in landfills and prevents the buildup of water that can increase disease carrying mosquitoes. Special mix designs have been utilized in cold climates such as Alaska and California's Sierra Nevada mountain range. Depending on the mix design needed for this corridor, a 2-inch thick overlay of asphalt rubber hot mix can use approximately 2,000 tires per lane mile, thereby conserving natural resources and recycling used tires.

Figure 19 Battery-Electric Transit Bus [48]

Figure 20 Solar Panels [50]

Figure 21 Recycled Rubber Pavement [51]



Innovative Project Delivery

The Diagonal team is progressing the design of many elements of the corridor toward a 30% preliminary design and is currently planning for a Design-Bid-Build delivery. However, if the project is successful in receiving additional funds (including RAISE grant funding), there could be a distinct advantage in considering an alternative delivery.

This project presents several complex packaging, phasing, and traffic control considerations that will be evaluated as two major intersections are planned to be fully reconstructed with changing traffic configurations. Additionally, there are four planned bikeway under/overpasses to be constructed below/above cross streets and two Park-n-Rides which will directly interface with the proposed bikeway under/overpasses. Contractor input could be invaluable during the pre-construction phase to review these phasing, constructability, and other traffic control concerns will be experienced during construction.

To select the best delivery method, the team is committed to using CDOT's Project Delivery Selection Matrix. Through this structured approach, Design-Bid-Build, Design-Build, and Construction Manager/General Contractor (CM/GC) delivery methods will be evaluated based on the project's complexity and innovation, delivery schedule, project cost considerations, and the current level of design.

Due to this project requiring a Categorical Exclusion (CatEx) clearance, the environmental permitting process will be effectively optimized from the conception of the project without impact from the project delivery method. During the procurement and selection process, CDOT will ensure the efficiency of the development and project delivery.

Innovative Financing

The Diagonal will not incorporate private sector funding or revenue from the sale or lease of publicly owned or operated assets for transportation funding and finance. Instead, the stakeholders secured a combination of state, local, and federal funding sources.

CDOT identified three sources of state funding from Senate Bill 267 in the first four years, along with additional funds in years 5-10. These funds are a combination of transit and roadway funds. CDOT also allocated $9M in Regional Priority Program funding to the corridor.

RTD has committed up to $16M for the project in the 2023 mid-year budget, locally dedicated to the BRT Park-n-Rides, BRT stations, and the queue bypass lane construction at CO 52.

Boulder County and stakeholders have prioritized this corridor and pursued several different tranches of DRCOG (federal) funding through its TIP program. Funding has already been received for the queue bypass lanes at 63rd Street and CO 52.

The stakeholders continue to pursue funding for the project and are currently submitting additional requests for DRCOG funding for Jay Road, 63rd Street and other elements of the regional bikeway.

City of Longmont prioritized this corridor and secured $2M in funding from the Longmont CIP.

Approximately, 49% of the funding for this RAISE grant would be considered state or non-federal funding. The other 51% is coming from Federal sources as outlined in ***Grant Funds, Sources, and Uses of All Project Funding***.

All project partners are committed to this corridor and continue to pursue funding to complete the entire multimodal vision. Our letters of support demonstrate the commitment and funding dedication to the Diagonal project (See ***Appendix B: Funding Commitments*** and ***Appendix C: Letters of Support***).

Project Schedule

The current project schedule is illustrated in **Figure 22**. The Applicant and Project Sponsors are completing a preliminary design and are ready to initiate the final design and construction phases as soon as funding is secured. The current project schedule is based on using a SEP-14 Best Value Design-Bid-Build construction delivery method. If a different delivery method is chosen, the schedule will be adjusted to reflect those changes. The delivery method chosen will not negatively impact the overall completion date and can expedite the anticipated completion date. Construction impacts to the traveling public will be mitigated by constructing the bikeway over/under/overpasses with the railroad elements. The team will use the least impactful traffic closure option and perform work during non-peak traffic times whenever possible. Previously completed project components are described in the ***Project Description***.

Obligating funds in advance of the June 30, 2026 deadline

Project elements (e.g., design, ROW acquisition, and environmental clearance) will span several months, with all necessary preconstruction activities completed in advance of the deadline for obligation.

Expeditious spending of RAISE Grant funds and meeting the expended funds deadline (September 30, 2031)

Upon the obligation of funds, construction will quickly begin, and the grant funds will be spent expeditiously before construction starts. With construction expected to end in mid 2026, the Applicant and Project Sponsors expect to expend funds well ahead of the program deadline with generous calendar cushion remaining in case of unforeseen project delays. The project team has adequate experience receiving, obligating, and expending funds on time for grants received in the past.

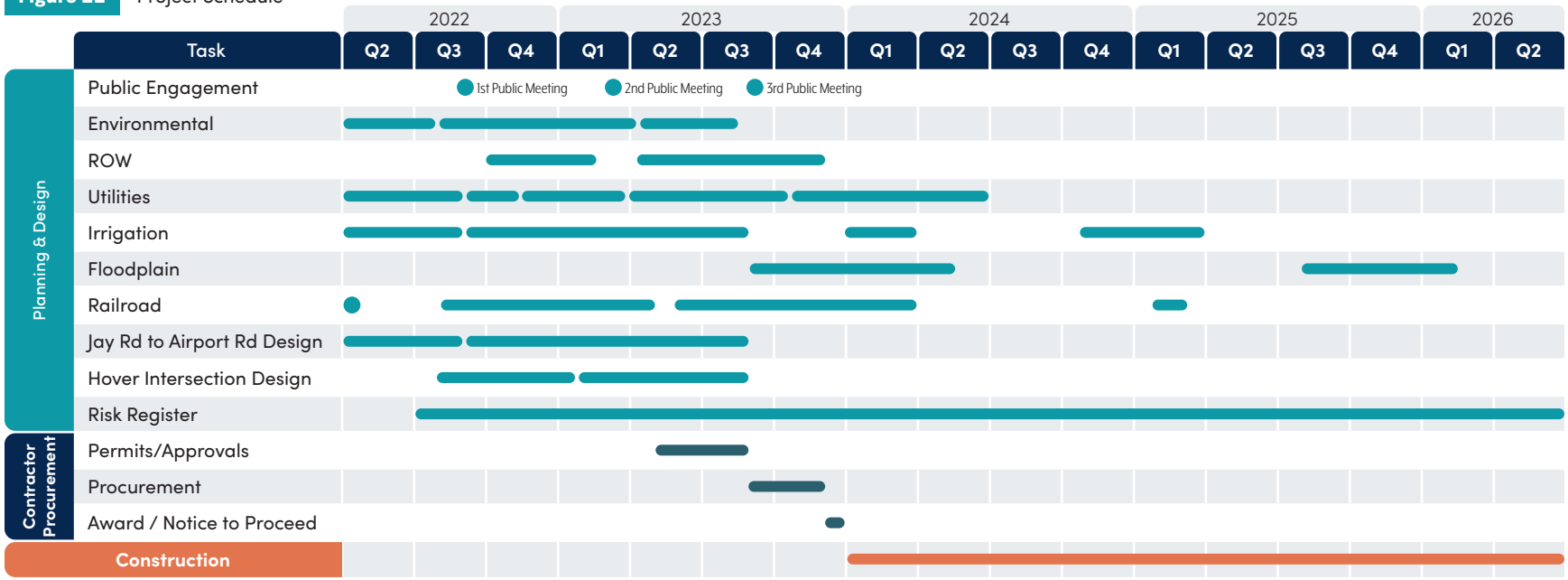
Property and ROW acquisition will be completed in a timely manner

Information on minimizing ROW can be found in ***Partnership and Collaboration***.

Project team has continued seeking meaningful community involvement

Information on public involvement can be found in ***Partnership and Collaboration***.

Figure 22 Project Schedule



See ***Appendix D: Project Schedule*** for more details on subtasks

Required Approvals

CDOT has identified the following list of required approvals for this project.

NEPA Status

For federally funded projects, the PEL study provides a foundation for NEPA scoping by informing the project purpose and need, defining the important issues to be addressed in the NEPA process, providing alternative recommendations and context for how the project could be advanced to preliminary design. In the PEL, several resources were identified as "no further reviews/analysis required" within the study area.

Using the previous environmental data and analysis collected for this corridor, it is anticipated these improvements will be cleared under NEPA using a CatEx. The project team will continue to avoid and minimize impacts to resources to ensure environmental impacts do not rise to the "significant" level.

Generally, the NEPA process requires the incorporation of environmental considerations during planning and decision-making through a systematic interdisciplinary approach which may include approvals from USFWS, Colorado Parks and Wildlife (CPW), and State Historic Preservation Offices (SHPO). Early coordination with USFWS, SHPO, and the US Army Corps of Engineers (USACE) has begun. The developed nature of the areas as well as existing land use and zoning may accelerate the review and approval process. Most of the project improvements are proposed within the existing CDOT ROW.

Discussions Regarding the Project's Compliance with NEPA

Previous planning efforts and early agency coordination have indicated that this project is anticipated to be cleared under a CatEx. These types of projects do not individually or cumulatively have a significant environmental impact and are excluded from the requirement to prepare an Environmental Assessment (EA) or an Environmental Impact Statement (EIS).

CatExs are actions that do not: induce significant impacts to planned growth or land use for the area; require the relocation of significant numbers of people; have a significant impact on any natural, cultural, recreational, historic, or other resource; involve significant air, noise, or water quality impacts; have significant impacts on travel patterns; or, otherwise, either individually or cumulatively, have any significant environmental impacts.

Summary of Resources Present in Study Area

Social and Community, Parks and Trails

There are no park or public recreational areas within or adjacent to the study area. There are existing bicycle routes/lanes along both the Diagonal and the Hover Street, Niwot Road, 63rd Street, and Jay Road intersections. Connectivity to these facilities is a priority for the proposed improvements. Information regarding the planned commuter bikeway can be found in the ***Project Description***.

Documentation

Section 4(f) Documentation

Hazardous Materials

Based on review of the nearby land uses and aerial mapping, there are likely documented facilities that contain hazardous materials adjacent to the study area.

Documentation

CDOT Form 881 and a Phase I Environmental Site Assessment (ESA) will be required for the Diagonal. A current database of known Recognized Environmental Concern (RECs) will need to be obtained within 180 days of CDOT's approval of Part B of the CatEx Form 128.

Air Quality

The project falls within the Longmont Carbon Monoxide maintenance area; Denver Metro PM10 maintenance area, and Denver-Boulder-Greeley-Fort Collins-Loveland Ozone (O3) nonattainment area. The Hover Street intersection is at LOS F and therefore elevated concentrations of carbon monoxide may be present. These improvements are likely to improve air quality at the intersection by reducing congestion. However, a reduction in congestion on roads that are to be improved will make them more attractive routes that can then result in an increase in vehicle miles traveled that could potentially result in impacts to air quality.

Documentation

The project must be included in a conforming TIP and the Regional Transportation Plan (RTP). It is anticipated that the intersection improvements will require "Hot Spot Modeling" due to the intersection reconfiguration.

Water Quality

The project is within the CDOT and Boulder County MS4 boundaries and will comply with permit requirements. The proposed improvements are anticipated to increase in impervious surface which will require additional permanent water quality measures. Modifying existing water quality ponds within the Diagonal median may be an option to capture additional flow.

Documentation

A Water Quality Report and Stormwater Management plans will be prepared to meet the MS4 water discharge standards.

Noise

Noise sensitive receptors have been identified within and adjacent to the study area. Once an alternative has been identified, a noise analysis will be performed which will include potential receptors within a 500-foot buffer from the study area.

Documentation

Traffic Noise Analysis to identify potential impacts and mitigation.

Environmental Justice

Based on the new 2020 Census data, the project will need to identify any Environmental Justice populations adjacent to the intersection. The improvements are anticipated to directly benefit Environmental Justice populations as well as the general population by providing enhanced transit access, contributing to improved transportation choices and greater overall mobility. An EJSCREEN was run for this project, and the results can be found in ***Environmental Sustainability.***

Documentation

Environmental Justice analysis as part of NEPA.

Utilities

There are numerous utilities along the Diagonal and at its intersections including water, wastewater, electric, telecommunications, and gas lines.

Documentation

Quality Level D and C subsurface utility information was gathered. Conflicts will be identified during preliminary design, informing the Quality Level B and A survey needs. The team will work collaboratively with utility providers to determine the best course of action (protect in place or relocation). Utility relocation agreements will be coordinated with providers as relocation plans are finalized. Seasonally dependent relocations will be phased with construction as appropriate.

Irrigation

There are multiple irrigation lines along the Diagonal and at its intersections.

Documentation

The project is currently gathering information on the existing infrastructure and beginning coordination with the ditch owners. After preliminary design, impacted irrigation facilities will be assessed and adjustments will be designed as necessary. Agreements with the ditch owners will be coordinated during this time as well. All agreements and design will be reviewed by the ditch owner's legal and design review representatives. Construction phasing will accommodate any irrigation adjustments during the irrigation off-seasons from November 15 to Apri 1.

Floodplain

The project is within the Left Hand Creek floodplain. Any improvements that cause a rise to the floodplain may require additional coordination through the Conditional Letter of Map Revision (CLOMR)/Letter of Map Revision (LOMR) process.

Documentation

A Floodplain Development Permit (FDP) application will submitted to CDOT and Boulder County at final design. There may be a rise in regulatory base flood elevations caused by this project, which would require a CLOMR to be submitted to and approved by the Colorado Water Conservation Board (CWCB) in order to obtain the FDP. The CLOMR review and approval process (including approval and receipt of the FDP) will be coordinated with construction phasing. After construction, a LOMR would be submitted to Boulder County and CDOT, followed by Mile High Flood District.

Resources Not Anticipated, Further Review Required

Land Use | Socioeconomics | Transportation Resources | Paleontological Resources | Archaeological Resources

Environmental Studies

The **SH 119 BRT PEL Study** is linked in the ***Table of Contents*** and discussed in ***Project History***.

ROW Acquisition

ROW minimization is discussed in ***Partnership and Collaboration***.

Public Engagement

Specifics regarding public involvement can be found in ***Partnership and Collaboration***.

State & Local Environmental & Planning Approvals

The following state and local permits will be required for the proposed project to address water quality:

Compliance with MS4 permit, Construction Dewatering Operations Permit if groundwater is discharged from excavation to any waters of the State, Erosion Control Permit for CDPHE, Stormwater Quality Permit (SWQCP) from Boulder County, FDP, Groundwater Discharge Permit, General Permit for Stormwater Discharges Associated with Construction Activities (the Stormwater Construction Permit) under the Colorado Department of Public Safety (CDPS) from CDPHE, Sewer Use and Drainage Permits from local municipalities, 1041 permit from Boulder County.

Federal Transportation Requirements

DRCOG included the project in their 2022-2025 TIP program as the 2020-081 CO 119 Corridor Safety/Mobility Operational Improvements (See ***Appendix B: Funding Committments***). Freight support information is included in ***Economic Competitiveness and Opportunity***.

Assessment of Project Risks & Mitigation Strategies

The project team has developed and actively maintains a risk register, keeps an ongoing action and decision log, and tracks progress on all required clearances for initiating the start of construction. CDOT will use proven project delivery techniques to document, assign, and retire risks throughout the course of the project. **Table 7** presents a summary of the major project risks and the associated mitigation strategies. In addition to the mitigation strategies outlined below, the project team will be facilitating meaningful engagement with the community through the public engagement plan to aide in reducing project risk. More information regarding public involvement can be found in ***Partnership and Collaboration***.

Table 7 Assessment of Project Risks & Mitigation Strategies

Risk	Description	Mitigation Strategy
Environmental Clearance	NEPA Clearance begins once a project is defined and a footprint is established (approximately 30% design).	Environmental and design team are actively working to avoid or mitigate impacts. A CatEx document is anticipated to clear this project, minimizing the clearance process to 6 to 9 months after 30% design is reached.
Right-of-Way Acquisition	Federal funds require the project complies with Uniform Act, which begins after environmental clearance work is complete. Increased acquisition costs are expected.	Most planned improvements are strategically designed within the existing ROW. If ROW or easements are needed for construction, impacts will be minimized where feasible and discussions with impacted property owners will begin as soon as possible.
Floodplain	Falls within the limits of three floodplains, requiring floodplain permitting.	Coordinate early with permitting agencies. Conversations suggest proceeding with no-rise permitting for two crossings if not all three, significantly reduces the permitting timeline. For conservative scheduling purposes, the pre-construction schedule factors in time to obtain a CLOMR in case conditions or scope changes.
Utility Impacts/ Relocations	Utility impacts and relocations required mostly at CO 52 and Hover Street intersections.	Planning for utility impacts and relocations will continue through the design phase. Eliminating impacts to service and relocations will be prioritized where possible.
Irrigation	There are identified irrigation impacts.	Developed a database of irrigation facilities, ownership, status of conflicts, etc. Coordination is underway, including field visits with owners, as is the process to establish agreements for design review and construction.
Railroad Crossings	Running adjacent to the BNSF Railway, there are at-grade railroad crossings at cross streets in the corridor.	CDOT entered into an agreement with BNSF for a crossing relocation at CO 52 and to review operational changes for the other crossings within the corridor. A diagnostic meeting will be scheduled with BNSF and Public Utilities Commission to review proposed improvements. A comprehensive pre-construction schedule will ensure timely approvals for construction.
Supply Chain	Impacted material supply, material price inflation, and equipment availability.	Conduct construction cost estimates with predicted inflation rates and proactively order material and equipment.
Construction	Constructability constraints, weather impacts, and more.	Monitor risks with a risk register.
Maintenance of Traffic	Anticipated traffic delays during construction.	Phase construction components that can reduce delay time.
Concrete Pavement Construction	Traffic volume increases the risk of completing work safely and reducing impacts to traffic flow. Concrete requires more time to remove, replace, and cure before traffic can return.	Use the least impactful traffic closure option and perform work during non-peak traffic times when possible. The split highway configuration offers opportunities to isolate work to southbound or northbound and traffic can move on the opposite side to reduce potential conflicts during construction.
Large Federal Grant	Large federal grants require strict program deadlines and reporting requirements.	Through agency competence and dedicated personnel among the Applicant and Project Sponsors, deadlines and requirements will be monitored to ensure successful compliance and completion.

Over the 20-year assessment period, the Diagonal generates $126.2M in benefits at a Capital Cost of $89.7M using a 7% discount rate. The resulting benefit cost ratio (BCR) is 1.41. A more detailed overview of the project benefits generated under the discount rate assumption is shown in **Table 8**. The full BCA technical memorandum is provided in ***Appendix A: Benefit Cost Analysis***.

The largest component of the benefits generated by this project is concentrated in travel time savings driven by reduced congestion. The next largest contributors are related to safety savings and fuel cost savings.

Table 8 Benefits & Cost by Type (Discounted)

Benefit	20 Year Analysis Period (2020-2040) Value Stated in 2020 $M Discounted at 7%
Economic	
Travel Time Savings - Auto	$59.8
Travel Time Savings - Commercial Truck	$2.0
Travel Time Savings - Transit	$10.2
Operating Cost Savings - Commercial Truck	$2.8
Operating Cost (additional)- Transit Bus Service	-$9.2
Fuel Cost Savings	$3.4
Environmental	
Reduced Emissions - Automobiles	$0.7
Reduced Emissions - Commercial Truck	$0.2
State of Good Repair	
Net Increase in Operations and Maintenance (O&M)	-$0.4
Residual	$5.0
Safety	
Reduced Crashes	$51.7
Total Benefits	**$126.2**
Costs	
Capital Costs	$89.7
Total Costs	**$89.7**
Benefit Cost Analysis	
Net Present Value ($M)	$36.4
Benefit Cost Ratio	1.41