Appendix C

RTP Amendment #1

Image Credit: Denver Post

Appendix C: RTP Amendment #1

A. 2040 RTP Amendment: Resolutions

NFRMPO
NORTH FRONT RANGE METROPOLITAN PLANNING ORGANIZATION

REVISED

RESOLUTION NO. 2017-01
OF THE NORTH FRONT RANGE TRANSPORTATION & AIR QUALITY PLANNING COUNCIL ADOPTING CONFORMITY REDETERMINATIONS FOR THE NORTH FRONT RANGE METROPOLITAN PLANNING AREA 2040 FISCALLY CONSTRAINED REGIONAL TRANSPORTATION PLAN AMENDMENT AND THE FY2018-2021 TRANSPORTATION IMPROVEMENT PROGRAM (TIP) AND FOR THE NORTHERN SUBAREA OF THE UPPER FRONT RANGE TRANSPORTATION PLANNING REGION 2040 REGIONAL TRANSPORTATION PLAN, THE FY2016-2019 TIP, THE 2040 UPPER FRONT RANGE TRANSPORTATION PLANNING REGION RTP, AND COLORADO FY2017-2020 STATEWIDE TRANSPORTATION IMPROVEMENT PROGRAM

WHEREAS, 49 CFR PART 613 §450.324 requires development through continuing, cooperative, and comprehensive ("3C") multimodal transportation planning process of a fiscally constrained Regional Transportation Plan (RTP) and Transportation Improvement Program (TIP) for Metropolitan Planning Organizations (MPOs); and

WHEREAS, the Planning Council as the MPO is the agency responsible for developing and amending the RTP and TIP; and

WHEREAS, portions of the cities of Fort Collins and Greeley are currently designated as maintenance areas for carbon monoxide (CO) for which the Planning Council performs conformity determinations; and

WHEREAS, the Planning Council through a Memorandum of Agreement (MOA) (2008) has agreed to perform ozone conformity determinations for the Northern Subarea of the Denver-North Front Range 8-hour ozone nonattainment area which includes portions of Larimer and Weld counties outside the MPO contained in the Upper Front Range Transportation Planning Region (UFRTPR); and

WHEREAS, Section 93.110(a) of the conformity rule requires conformity determinations based on the most recent planning assumptions in force at the time of conformity analysis; and

WHEREAS, the planning assumptions for the Northern Subarea were updated prior to conformity analysis, updating from forecast year 2035 to 2040; and

WHEREAS, the air quality conformity redeterminations conducted on the MPO's fiscally constrained 2040 RTP Amendment, the FY2016-2019 TIP, FY2018-2021 TIP, and the Colorado FY2017-2020 Statewide TIP (STIP) using the 2040 planning assumptions were within the federally approved emissions budgets; and

WHEREAS, the Planning Council received no public comment opposing the finding of conformity during the public comment period or during the public hearing;

NOW, THEREFORE, BE IT RESOLVED BY North Front Range Transportation & Air Quality Planning Council, the fiscally constrained 2040 RTP Amendment, the FY2016-2019 TIP, FY2018-2021 TIP, the 2040 Upper Front Range, and the Colorado FY2017-2020 STIP conform to the State Implementation Plan (SIP) demonstrating positive air quality conformity redeterminations.

Passed and adopted at the regular meeting of the North Front Range Transportation & Air Quality Planning Council held the 2nd day of March, 2017.

Kevin Ross, Chair

ATTEST:

Terri Blackmore, Executive Director

NFRMPO
NORTH FRONT RANGE METROPOLITAN PLANNING ORGANIZATION

RESOLUTION NO. 2017-02
OF THE NORTH FRONT RANGE TRANSPORTATION
& AIR QUALITY PLANNING COUNCIL
ADOPTING THE 2040 REGIONAL TRANSPORTATION PLAN (RTP) AMENDMENT

WHEREAS, 49 CFR PART 613.100 and 23 CFR 450.322 require the development through the continuing, cooperative, and comprehensive ("3C") multimodal transportation planning process of a fiscally constrained Regional Transportation Plan (RTP) for Metropolitan Planning Organizations (MPOs); and

WHEREAS, pursuant to the aforementioned legislation, the North Front Range Transportation & Air Quality Planning Council (Planning Council) was designated by the Governor of the State of Colorado as the MPO agency responsible for carrying out the transportation planning process, and for developing and amending the RTP; and

WHEREAS, the Cities of Fort Collins and Greeley are currently designated as Maintenance Areas for Carbon Monoxide (CO) and the North Front Range also is within the Denver-North Front Range (Northern Subarea) 8-Hour Ozone Nonattainment Area, and the Planning Council was designated by the Governor of the State of Colorado as the lead Air Quality Planning Agency for Carbon Monoxide; and

WHEREAS, the Planning Council is responsible for determining conformity of all of its transportation plans and programs with the Clean Air Act, as amended, 1990, and the State Implementation Plan (SIP) for air quality. The RTP shall be reviewed and updated at least every four years in air quality Nonattainment and Maintenance Areas; and

WHEREAS, the transportation programming process shall address no less than a 20-year planning horizon as of the effective date. The effective date being established by the date of the conformity determination issued by the Federal Highway Administration (FHWA) and the Federal Transit Administration (FTA); and

WHEREAS, the Planning Council approves the 2040 RTP Amendment and submits copies for informational purposes to the Governor;

NOW, THEREFORE, BE IT RESOLVED BY North Front Range Transportation & Air Quality Planning Council, finds that the 2040 Regional Transportation Plan (RTP) Amendment, per Resolution No. 2017-02, is in conformance with the requirements of 49 CFR 613.100 and 23 CFR 450.322.

Passed and adopted at the regular meeting of the North Front Range Transportation & Air Quality Planning Council held the 2nd day of February, 2017.

Kevin Ross, Chair

ATTEST:

Terri Blackmore, Executive Director

B. Colorado Air Quality Control Commission Conformity Concurrence

COLORADO
Air Quality Control Commission
Department of Public Health & Environment

Dedicated to protecting and improving the health and environment of the people of Colorado

Ms. Terri Blackmore, Executive Director
North Front Range Metropolitan Planning Organization
419 Canyon Avenue, Suite 300
Fort Collins, CO 80521

December 15, 2016

The Colorado Air Quality Control Commission (AQCC) has reviewed your agency's conformity determinations for its Regional Transportation Plan and FY2018-2021 Transportation Improvement Program (TIP). The AQCC agrees that the North Front Range Metropolitan Planning Organization's (NFRMPO) 2040 Fiscally Constrained Regional Transportation Plan Amendment, FY 2018-2021 TIP, the Upper Front Range's (UFR) 2040 Regional Transportation Plan, and the NFRMPO portion of the Colorado FY 2017-2020 Statewide Transportation Improvement Program (STIP), as of December 15, 2016, conform to the State Implementation Plan (SIP) and emissions budgets for ozone precursors and carbon monoxide.

The North Front Range Metropolitan Planning Organization's and the Air Pollution Control Division's analyses indicate that emissions budgets for these pollutants will not be exceeded in any of the project or plan horizon years. Therefore, the AQCC concurs with this conformity determination.

Should you have any questions regarding the AQCC's action, please contact Paul Lee at the APCD, at 303-692-3127 or at paul.lee@state.co.us.

Sincerely,

John Clouse, Chair
Air Quality Control Commission

Cc: Tim Russ, U.S. EPA, Region 8
Bill Haas, FHWA
Steve Cook, DRCOG
Rose Waldman, CDOT
Paul Lee, APCD

C. US Department of Transportation Conformity Finding

U.S. Department of Transportation
Federal Highway Administration

Colorado Division

12300 W. Dakota Ave., Ste. 180
Lakewood, Colorado 80228
720-963-3000

March 3, 2017

Terri Blackmore
Executive Director, NFRMPO
419 Canyon Avenue, Suite 300
Fort Collins, CO 80521

Subject: Conformity Determination for the NFRMPO 2040 RTP Amendment and Amended 2016-2019 TIP

Dear Ms. Blackmore:

In accordance with the Clean Air Act of 1990, as amended, and 23 CFR 450, the U.S. Department of Transportation (USDOT) is required to make air quality conformity determinations of Regional Transportation Plans (RTP) and Transportation Improvement Programs (TIP) in non-attainment and maintenance areas. Consistent with the Federal Highway Administration (FHWA)/ Federal Transit Administration (FTA) Region 8 Memorandum of Agreement for Transportation Planning Oversight (MOA), the FHWA Colorado Division office signs the letter on behalf of FTA Region 8.

The North Front Range Metropolitan Planning Organization (NFRMPO) adopted an air quality conformity determination for the Fort Collins and Greeley urbanized areas for the 2040 RTP Amendment, as well as for the northern subarea of the Upper Front Range Transportation Planning Region (Upper Front Range TPR) 2040 RTP and the portion of the 2017-2020 State Transportation Improvement Program within the Upper Front Range region on February 2, 2017. On March 2, 2017, NFRMPO adopted a conformity determination for the Amended 2016-2019 TIP. The NFRMPO adopted both conformity determinations in its capacity as the Metropolitan Planning Organization.

Based on our evaluation of the NFRMPO 2040 RTP Amendment and Amended 2016-2019 TIP conformity determinations, in coordination with the EPA, the Denver Regional Council of Governments , the NFRMPO, the Colorado Air Quality Control Commission, the Regional Air Quality Council, and the Colorado Department of Transportation , we have determined that Fort Collins and Greeley urbanized areas have met the requirements of 40 CFR 51 and 93, 23 CFR 450, and 49 CFR 613 along with FHWA/FTA policies and guidance. Furthermore, the NFRMPO conformity determination is consistent with the 2008 DRCOG/NFRMPO 8-Hour Ozone MOA.

A conformity determination for the NFRMPO 2040 RTP Amendment and Amended 2016-2019 TIP is hereby made. We are also making a conformity determination for the northern subarea of the Upper Front Range TPR 2040 RTP and the Upper Front Range portion of the 2017-2020 State Transportation Improvement Program. This conformity determination does not restart the clock for conformity for either the NFRMPO Amended 2040 RTP or the Amended 2016-2019 TIP. Our action is consistent with the FHWA/FTA Transportation Planning MOA.

Sincerely,

John M. Cater, P.E.
Division Administrator

cc: Doug Rex, DRCOG
Barbara Kirkmeyer, Upper Front Range TPR
Paul Lee, APCD
Marissa Gaughan, CDOT
Tim Kirby, CDOT
Larry Squires, FTA
Ranae Tunison, FTA
Tim Russ, EPA

D. 2040 RTP Amendment: I-25 Expansion

COLORADO
Department of Transportation
Region 4

10601 W. 10th Street
Greeley, CO 80634
(970) 350.2103 (Fax) 350.2181

September 8, 2016

Ms. Terri Blackmore
Executive Director, North Front Range MPO
419 Canyon Avenue, Suite 300
Fort Collins, CO 80521

Dear Ms. Blackmore,

RE: 2040 Regional Transportation Plan Amendment Request

On behalf of the Colorado Department of Transportation (CDOT), please accept the 2040 Regional Transportation Plan Amendment Request to expand the scope of I-25. Through regional efforts, significant new financial resources were secured to construct immediate improvements to this critical corridor.

Within the next four years, one new express lane in each direction, replacement/rehabilitation of four key pairs of bridges, ITS, transit and safety components, and replacement of portions of the existing facility will be constructed within the North Front Range. CDOT will employ a Design-Build contractor to expedite opening the new lanes to the public.

Future work planned for the I-25 corridor includes reconstructing interchanges, extension of express lanes, and additional safety work. The attached schedule identifies adequate resources to complete future interstate components, which are included in the preferred alternatives identified in the North I-25 Final Environmental Impact Statement and Record of Decision, as re-evaluated.

We look forward to a timely amendment approval to the 2040 Regional Transportation Plan in order to proceed with this essential work.

Sincerely,

Johnny Olson, P.E.
Region 4 Transportation Director

JWO:KS:mbc
Attachment
pc: Corey Stewart / Heather Paddock / Scott Rees
J. Eussen / K. Schneiders
File

2040 Regional Transportation Plan

2040 RTP Amendment Request Form 2016

NFRMPO NORTH FRONT RANGE METROPOLITAN PLANNING ORGANIZATION

Due to NFRMPO Staff no later than 5:00 p.m. Friday, September 16, 2016

Requesting Agency Information

Project Sponsor Agency: Colorado Department of Transportation	**Agency Contact:** Johnny Olson	**Telephone:** 970/ 350-2101
Mailing Address: 10601 West 10th Street	**Email Address:** j.olson@state.co.us	
City: Greeley	**State:** CO	**ZIP Code:** 80631

Additional Financial Sponsors (if applicable):

Berthoud, Evans, Fort Collins, Johnstown, Larimer County, Loveland, Timnath, Weld County, Windsor, McWhinney Development

Project Description

Project Name: North I-25: SH56 to SH14	**Jurisdiction(s):** Berthoud, Fort Collins, Johnstown, Larimer County, Loveland, Timnath, Weld County, Windsor
Project Location (attach map of project location as well): North I-25 and associated areas	**Project Type** Mobility, Bridge, Safety, Operations, Transit, Non-Motorized vehicles
Project Limits (to and from): SH56 (MP 250) - SH14 (MP 270)	**Project Length (miles):** 20 miles

Is this part of an ongoing project? If so, please describe.

Yes. The North I-25 Final Environmental Impact Statement (FEIS) studied from Denver Union Station to SH14 in Fort Collins. This amendment continues implementing the outcomes of the FEIS.

Project Description:

Includes construction of 2 Express Lanes (one each direction), reconstruction of failing pavement, repairs or replacement of appropriate mainline I-25 structures, interchange improvements, park & ride replacement / enhancement, accommodate regional trail connections ITS technology throughout the corridor and other related safety / operational improvements. The first project will begin construction in early 2018 with opening in late 2020.

Project Phase(s), if applicable (Construction, Design, ROW, etc.): Design / ROW / Utilities / Construction	**Fiscal Year(s) of Construction:** First project 2018-2020

Reason for Amendment request:

New transportation funding sources have emerged since the passage of the FAST Act in December 2015. Through cooperative efforts, all $237 million needed to complete the first construction project was identified for immediate programming. Other reasonably anticipated revenues will be accumulated to fully fund the corridor improvements.

2040 RTP Goals, Objectives, Performance Measures, and Targets

Indicate which MPO Performance Measure(s) the project supports. If the project does not support one of the Goals listed

MPO Goal	Performance Measure(s)	Project Impact
Goal 1: Foster a transportation system that supports economic development and improves residents' quality of life	-Conforms to Air Quality Conformity -Investment in Infrastructure	The project's primary objective is to construct one express lane in each direction from SH56 to SH14. The project will complement the I25: SH392 to SH14 in currently listed the 2040 NFR fiscally constrained plan by expanding the project scope and length. The project will improve mobility and provide a sustainable alternative to congestion along North I-25. High Occupancy Vehicles (HOV) and public transit vehicles (buses, express bus) would use the express lanes free of charge while Single Occupant Vehicles (SOV) would pay a toll to use these lanes. The mixture of SOV tolled and HOV/Transit non-tolled vehicles using the lanes would be managed through variable pricing for SOVs to maintain free flow conditions within the express lanes, even during peak travel hours. The rehabilitation and replacement of key bridges in the corridor are sound investments that will allow the final alignment of I-25 to be constructed in the near future. All of these improvements reduce vehicle idling by keeping traffic moving along the corridor.
Goal 2: Provide a transportation system that moves people and goods safely, efficently, and reliably	Reliable travel times	Installation of express lanes, with associated operational and safety improvements throughout the project segments encourages transit, carpooling, and vanpooling as viable transportation options by providing reliable travel times and uncongested travel flow.
Goal 3: Provide a multi-modal system that improves accessibility and transportation system continuity	-Support transportation services for all including the most vulnerable and transit dependent populations. -Implement RTE, Regional Bike Plan and North I-25 EIS	Provides travelers with transportation choices – carpooling, vanpooling, public transit, or paying to use express lanes while driving alone. Project enables a critical connection of the Cache La Poudre Regional trail to be constructed by local agencies, which is part of the Governor's 16 in 16 focus, as well as improving Bustang Regional transit service reliability by relocating the US34 Park & Ride to Kendall Parkway and constructing bus-only slip ramps to reduce travel time. Bustang provides critical connections between Northern Colorado and the Denver Metro area by connecting to bus and rail service in Denver Union Station. Via DUS, users can connect to national travel on Amtrak or national / international travel options at Denver International Airport. All of these activities are components of the I25 FEIS Preferred Alternative

Goal 4: Optimize operations of transportation facilities	-Use TDM techniques to reduce congestion and optimize the system. -Implement ITS -Reduce project delivery time frame	Carpooling / vanpooling services will be enhanced through more reliable travel times due to free use of the express lane. The installation of state of the industry ITS components will aid the express lanes tolling and operations, as well as increased traveler information (travel time, ramp metering, etc). By utilizing Design / Build methodology, the project will be constructed quickly while taking advantage of contractor creativity.

How does the project support the MPO Goal(s)? (Please attach all relevant data)

Project Funding

Type (Federal, State, Local, Local Over Match, Other)	Source	Amount	Fiscal Year to be Programmed
See attached			

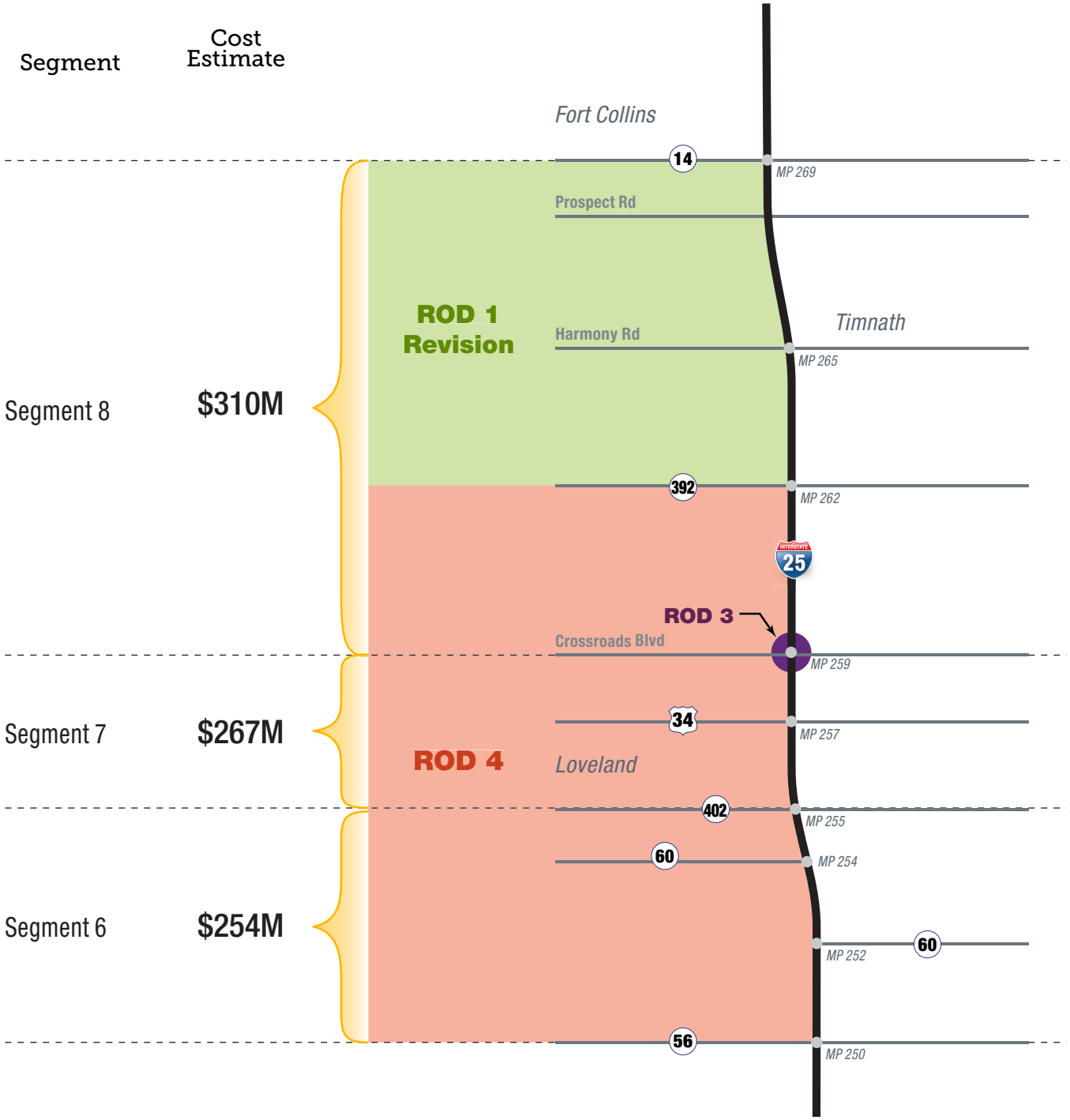
Total Project Cost	**$ -**

Supporting documentation attached or linked (optional): ***i.e. Studies, Master Plans, Comprehensive Plans***	https://www.codot.gov/projects/north-i-25-eis https://www.codot.gov/projects/NorthI-25/additional-information/tiger https://www.codot.gov/projects/NorthI-25/i-25-managed-lanes-traffic-operations-analysis

Submit completed form to Becky Karasko at bkarasko@nfrmpo.org no later than 5:00 p.m. on Friday,

COLORADO
Department of Transportation

North Front Range MPO
North I-25 - Regional Transportation Plan Amendment



North I-25 Plan Amendment to NFR MPO: SH56 to SH14
Cost Estimates by Segment

NFR Plan Amendment	Est	Revenues								
Element	Costs (millions)	2017	2018	2019	2020	2021	2022-2025	2026-2030	2031-2035	2036-2040
Segment 8 - SH 392 to SH 14 (ROD1)	***2015$***									
One express lane in each direction (approx 7 miles)										
Prospect Interchange										
SH 14 Interchange										
GWRR Bridges										
Pourde River bridges										
Kechter Bridge										
Subtotal Seg 8	$ 310	$ -	$ 40	$ 25	$ 25	$ 29	$ 19	$ 142	$ -	$ 30
Segment 7 SH 402 to SH 392 (ROD4)										
One express lane in each direction (approx 7 miles)										
Big Thompson Bridges, GWRR, LCR 20 & Frontage Rd										
Interim US 34 Interchange (Par-Clo)										
UPRR Kendall Parkwy Bridges										
Subtotal Seg 7	$ 267	$ 10	$ 25	$ 40	$ 40	$ 16	$ 5	$ 101	$ 29	$ -
Segment 6 SH 402 to SH 56 (ROD 4)										
One express lane in each direction (approx 5 miles)										
SH 60 interchange										
LCR 16 bridges										
SH 402 Interchange										
Subtotal Seg 6	$ 254	$ -	$ -	$ -	$ -	$ -	$ 60	$ 13	$ 91	$ 90
Corridor Total (Millions)	**$ 830**	**$ 10**	**$ 65**	**$ 65**	**$ 65**	**$ 45**	**$ 84**	**$ 256**	**$ 120**	**$ 120**

Open in 2020 SH402 to SH14: 1 express lane / each direction, replace/rehab 4 pairs of bridges, ITS, safety, Kendall Pkwy Park & Ride
Open in 2025 SH56 to SH14: 1 express lane / each direction: SH56 to SH402, SH402 Interchange Reconstruction
Open in 2030 SH56 to SH14: SH14, Prospect, US34 Interchange Reconstruction+ mainline reconstruction
Open in 2035 SH56 to SH14: SH60 Interchange Reconstruction + mainline reconstruction
Open in 2040 SH56 to SH14: LCR16 bridges replacement + mainline reconstruction

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9/9/2016

North I-25 Plan Amendment to NFR MPO: SH56 to SH14
Fund Sources

Fund Source (millions)	*FY17*	*FY18*	*FY19*	*FY20*	*FY21*	*FY22 - 25*	*FY26-30*	*FY31-35*	*FY36-40*	*Total*
RPP- NFR					$ 2	$ 8	$ 10	$ 10	$ 10	$ 42
RPP I25 Design					$ 1	$ 5	$ 6	$ 6	$ 6	$ 23
FASTER Safety					$ -	$ 11	$ 14	$ 14	$ 14	$ 52
Tolling Revenue					$ -	$ -	$ 5	$ 25	$ 25	$ 55
Surface Treatment					$ 10	$ 40	$ 50	$ 50	$ 50	$ 200
TC Contingency	$ 5	$ 23	$ 60	$ 22	$ -	$ -	$ -	$ -	$ -	$ 110
Loan				$ 18	$ 32	$ -	$ -	$ -	$ -	$ 50
Strategic Transit*	$ -	$ 5			$ -	$ -	$ 41	$ -	$ -	$ 46
RoadX	$ -	$ 2			$ -	$ -	$ -	$ -	$ -	$ 2
FASTLANE State Allocation	$ -	$ 15		$ 15	$ -	$ 15	$ 15	$ 15	$ 15	$ 90
Local	$ 5	$ 5	$ 5	$ 10	$ -	$ -	$ -	$ -	$ -	$ 25
TIGER Award	$ -	$ 15			$ -	$ -	$ -	$ -	$ -	$ 15
Strategic Funds*					$ -	$ -	$ 64	$ -	$ -	$ 64
Flexible Funds - RTP*					$ -	$ -	$ 22	$ -	$ -	$ 22
Loveland $ (I25 / US34)*					$ -	$ -	$ 15	$ -	$ -	$ 15
STP-Metro / CMAQ*					$ -	$ 5	$ 15	$ -	$ -	$ 20
	$ 10	$ 65	$ 65	$ 65	$ 45	$ 84	$ 256	$ 120	$ 120	$ 830
	$ 10			TIP	$ 240					

*Funds previously identified in 2040 Plan for ROD1 ($137 M)

COLORADO
Department of Transportation

9/9/2016

Travel Time Savings

The table below provides an overview of the travel times and the time savings by direction of travel.

Table 2: Travel Times and Savings During Peak and Shoulder Periods (2020-2040)

		2020		2025		2030		2035		2040	
		NB	SB	NB	SB	NB	SB	NB	SB	NB	SB
Scenario	**Lane Type**	**Travel Time for Corridor (Minutes)**									
Baseline	GP Lane	18.7	16.3	20.4	17.7	22.2	17.2	22.7	17.6	23.3	18.9
Build	GP Lane	17.0	15.8	18.6	17.2	17.4	16.4	17.8	16.8	21.6	17.0
	Managed Lane	13.9	13.7	15.2	14.9	14.1	13.9	14.5	14.2	15.2	14.1
Travel Time Savings	**GP Lane**	**1.6**	**0.5**	**1.8**	**0.5**	**4.8**	**0.8**	**4.9**	**0.8**	**1.7**	**1.9**
	Managed Lane	**4.8**	**2.6**	**5.2**	**2.8**	**8.0**	**3.3**	**8.2**	**3.4**	**8.1**	**4.8**

Travel Time Savings – Value of Time

The travel time savings were converted from hours to dollars. This is performed by assuming that travel time is valued as a percentage of the average wage rate, with different percentages assigned to different trip purposes. This analysis used the DOT's Recommended Hourly Value of Travel Time Savings as shown below in Table 4, and assumes the mix of personal and business travel to be consistent with the DOT's national distribution for local travel by surface modes.

Table 3: Hourly Values of Travel Time Savings, All-Commercial Drivers

Category of Travel	Hourly Value of Travel Time Savings ($2016)
Personal	$ 13.28
Business	$25.64
All Purpose*	$13.85
Commercial Truck Driver	$27.47

In April 2016, a Benefit Cost Analysis was performed as part of the TIGER grant application. The project that was analyzed was the addition of express lane SH 14 to SH 402. This RTP amendment (SH 392 to SH 56) overlaps the BCA project limits between SH 392 and SH 402. The project will deliver a variety of benefits, including reductions in travel times and vehicle accidents. Below is a summary of the key benefits that support the goals of the MPO that will be delivered by the project.

Table 1: Key Benefits Delivered by Long Term Outcomes (2021 – 2040)

	7% Discount ($2016)	3% Discount ($2016)
Economic Competitiveness Benefits		
Travel Time Savings	$ 124.9	$ 211.6
Mode Shift Vehicle Operating Savings	$ 28.0	$ 47.7
Bus Travel Time Savings	$ 5.5	$ 9.4
Bus Operating Savings	$ 0.9	$ 1.5
Inventory Savings	$ 0.0	$ 0.1
Freight Operating Savings	$ 37.2	$ 61.3
Bike Mode Shift Vehicle Operating Savings	$ 1.2	$ 2.1
Safety Benefits		
Mode Shift Safety Savings	$ 28.7	$ 49.6
Bike Mode Shift Safety Savings	$ 1.3	$ 2.2
State of Good Repair Benefits		
Maintenance Savings	$ 0.5	$ 0.4
Residual Value	$ 14.7	$ 36.6
Environmental Sustainability Benefits		
Idling Emissions Reductions	$ 0.2	$ 0.4
Idling CO2 Savings	$ 1.1	$ 1.1
Mode Shift Emissions Savings	$ 4.3	$ 6.9
Mode Shift CO2 Savings	$ 4.1	$ 4.1
Freight Idling Emissions Savings	$ 0.5	$ 0.9
Freight Idling CO2 Savings	$ 0.2	$ 0.2
Bike Mode Shift Emissions Savings	$ 0.2	$ 0.3
Bike Mode Shift CO2 Savings	$ 0.2	$ 0.2
Total Benefits	**$ 253.8**	**$ 436.6**
Total Cost	$ 206.5	$ 239.4
Benefit-Costs Ratio	**1.23**	**1.82**

BENEFIT COST ANALYSIS

COLORADO DEPARTMENT OF TRANSPORTATION'S (CDOT'S) TIGER PROPOSAL, *LEVERAGING ECONOMIC, ENVIRONMENTAL AND SOCIAL BENEFITS THROUGH I-25 NORTHERN COLORADO EXPANSION*

Prepared for

Colorado Department of Transportation

April 18th 2016

AECOM

4225 Executive Square, Suite 1400
La Jolla, CA 92037
858.812.9292 Fax: 858.812.9293

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SECTION 1 INTRODUCTION

A benefit-cost assessment (BCA) was conducted for the North I-25 Widening Project (I-25 Project) for submission to the U.S. Department of Transportation (DOT) to support the discretionary grant application of the Colorado Department of Transportation for the 2016 TIGER program. This analysis was conducted in accordance with the DOT's 2016 supplement to its *2014 Benefit-Cost Analysis Guidance for Tiger Grant Applicants* for a 23 year assessment period beginning with capital outlays in 2018 through to 2020 and operations from 2021 to 2040.

The I-25 Project is to take place along a 14 mile corridor (assessment corridor) of Interstate 25 (I-25) which runs north to south in Weld and Larimer Counties in northern Colorado. I-25's local, regional and national importance is multifaceted. It is the only major highway connecting Denver and the Fort Collins/Region, represents both a designated nuclear route and a major evacuation route. I-25 comprises the majority of the CanAm Highway, one of the major north-south freight corridors in the central United States which allows for the movement of goods to and from Canada and Mexico into the United States.

Currently, I-25 experiences significant congestion during several weekday periods between Fort Collins and Loveland. During the morning peak and shoulder periods, the majority of northbound traffic in the assessment corridor experiences levels of service (LOS) ratings of E or F; during the evening peak and shoulder periods, both directions of travel experience LOS ratings of D, E or F throughout the entirety of the assessment corridor. This congestion leads to significant delays for transit users and the drivers of private and commercial vehicles. Without the I-25 Project, forecast growth in vehicles will further exacerbate the already congested and unsatisfactory traffic conditions in the assessment corridor.

To address the congestion problems prevalent throughout the assessment corridor, the I-25 Project proposes a number of works which would aim to improve efficiency, safety and resiliency across multiple modes of travel. These works include:

- The rehabilitation or reconstruction of the existing two general purpose lanes and introduction of a separated managed lane in each direction along the entirety of the assessment corridor;
- The widening or replacement of four sets of bridges to accommodate the addition of managed lanes and the raising of specific bridges to improve their resiliency in the face of future flood events;
- The development of a Park and Ride facility and bus slips near the US34/I-25 which will generate significant time savings for transit users;
- The construction of the Kendall Parkway Underpass (in conjunction with the replacement of the Union Pacific Railroad Bridge) at Centerra which will alleviate congestion on US34 and facilitate more efficient multimodal access to the Park and Ride facility; and
- The construction of the an approximately one mile segment connecting the Fort Collins and Poudre Bike Trails, thus linking up over 40 miles of trail that allow for bikers to seamlessly ride from Fort Collins to Greeley. This trail segment's construction is enabled by the reconstruction and raising of the deck height of the Cache Le Poudres bridges.

The realization of I-25 Project will deliver a variety of benefits, most notably reductions in travel times through the corridor during weekdays, reductions in vehicle accidents and improvements in freight efficiency.

Notable impacts that the I-25 Project will deliver benefits for long term outcomes criteria include the following summarized in Table 1.

Table 1: Key Benefits Delivered by Long Term Outcomes (2021 – 2040)

	7% Discount ($2016)	3% Discount ($2016)
Economic Competitiveness Benefits		
Travel Time Savings	$ 124.9	$ 211.6
Mode Shift Vehicle Operating Savings	$ 28.0	$ 47.7
Bus Travel Time Savings	$ 5.5	$ 9.4
Bus Operating Savings	$ 0.9	$ 1.5
Inventory Savings	$ 0.0	$ 0.1
Freight Operating Savings	$ 37.2	$ 61.3
Bike Mode Shift Vehicle Operating Savings	$ 1.2	$ 2.1
Safety Benefits		
Mode Shift Safety Savings	$ 28.7	$ 49.6
Bike Mode Shift Safety Savings	$ 1.3	$ 2.2
State of Good Repair Benefits		
Maintenance Savings	$ 0.5	$ 0.4
Residual Value	$ 14.7	$ 36.6
Environmental Sustainability Benefits		
Idling Emissions Reductions	$ 0.2	$ 0.4
Idling CO2 Savings	$ 1.1	$ 1.1
Mode Shift Emissions Savings	$ 4.3	$ 6.9
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Freight Idling Emissions Savings	$ 0.5	$ 0.9
Freight Idling CO2 Savings	$ 0.2	$ 0.2
Bike Mode Shift Emissions Savings	$ 0.2	$ 0.3
Bike Mode Shift CO2 Savings	$ 0.2	$ 0.2
Total Benefits	**$ 253.8**	**$ 436.6**
Total Cost	$ 206.5	$ 239.4
Benefit-Costs Ratio	**1.23**	**1.82**

Source: AECOM

SECTION 2 BENEFITS ANALYSIS ASSUMPTIONS

The BCA evaluates the benefits and costs of implementing the I-25 Project against the no action scenario in which the I-25 Project does not occur. The analysis utilizes information from a number of sources from

both government agencies and consultants engaged by the applicant, as well a number of assumptions which are compliant with DOT guidance.

2.1 ANALYTICAL ASSUMPTIONS

2.1.1 Assumptions – General

2.1.1.1 Discount Rates

Consistent with the DOT's guidance for TIGER grants, and with OMB Circular A-4[1], real discount rates of 3 and 7 percent have been used for this analysis. Project investments are expressed in constant 2016 dollars. In instances where assumptions, cost estimates or benefit valuations are expressed in dollar values for other years, the Chained Price Index information from the White House Office of Management and Budget's Gross Domestic Product and Deflators[2] have been used to bring these to 2016 dollar figures.

2.1.1.2 Evaluation Period

The evaluation period in this assessment is 23 years, extending from 2018 through to the end of 2040. This evaluation period begins in the year in which capital expenditures for the I-25 Project are to begin, plus twenty years of operations of the managed lanes and other associated works of the I-25. This analysis assumes that construction of the I-25 Project will begin in 2018 will continue through to 2020. Operations of the managed lanes along the assessment corridor will begin in the first quarter of 2021. All benefits and costs are assumed to occur at the end of the year, with benefits beginning to be accrued in 2021, the same year that operation is scheduled to commence.

2.1.1.3 Key Benefit-Cost Evaluation Measures

This benefit-cost analysis converts potential gains (benefits) and losses (costs) resulting from the implementation of the I-25 Project into monetary units and compares them. The following two common benefit-costs evaluation measures are included in this analysis.

2.1.1.3.1 Net Present Value (NPV)

NPV compares the net benefits (benefits less costs) after being discounted to present values using the real discount rate assumption. The NPV provides a perspective on the overall dollar magnitude of cash flows over time in $2016.

2.1.1.3.2 Benefit Costs Ratio (BCR)

The BCR expresses the relation of discounted benefits to discounted costs as a measure of the extent to which the project benefits either exceed or fall short of their associated costs.

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[1] White House Office of Management and Budget. *Circular A-4: Guidelines for Discount Rates for Benefit-Cost Analysis of Federal Programs*. September 17, 2003. Accessed from https://www.whitehouse.gov/omb/circulars_a004_a-4/

[2] White House Office of Management and Budget. *Historical Tables, Table 10.1 – Gross Domestic Product and Deflators Used in the Historical Tables 1940-2021*. Accessed from https://www.whitehouse.gov/omb/budget/Historicals

2.1.2 Assumptions – Travel Demand and Travel Time

2.1.2.1 Travel Demand Assumptions

In July 2014, Muller Engineering Company, Inc. (Muller) produced a technical memorandum for the Colorado Department of Transportation (CDOT) entitled *I-25 Managed Lanes Traffic Operations Analysis – Final* (I-25 Managed Lanes Study). This memorandum complemented a study entitled *Traffic and Revenue Assessment of Tolled Express Lanes Scenarios* (T&R Study), produced in the same month by CDM-Smith. Estimations on the total number of trips within the corridor as well as revenue generated by the managed lanes under the build scenario were updated by CDM-Smith in their 2016 draft technical memorandum *Traffic and Revenue Update of Tolled Express Lanes: Scenario 3c*. Together, these documents modeled the Average Weekday Daily Traffic (AWDT) for the assessment corridor, estimating the volume of traffic within the assessment corridor between 5am and 7pm each weekday, as well as the travel times, average speeds in general purpose and managed lanes, and revenue generated by the use of the managed lanes.

The benefit evaluation within this analysis assesses only the daily AWDT as described above as it is only during this fourteen hour period on weekdays that congestion currently occurs within the assessment corridor. Travel time savings and associated benefits are assessed for only two periods during the weekdays, 6:45am – 8:30am and 3pm – 7pm. These two periods represent the times of the day when congestion along the corridor is most pronounced, as well as the only time for which travel time savings between the two scenarios have been modelled. While thousands of vehicles utilize this corridor outside of these time periods throughout the week and over the weekend, congestion levels and travel time savings have not been modelled for this times and thus are not assessed within this analysis.

2.1.2.2 Traffic Volumes in Assessment Corridor

Volumes under the baseline and build scenarios for both northbound and southbound traffic within the assessment corridor have been derived from Muller's and CDM-Smith's AWDT data for the years 2015, 2025 and 2035, with volume estimates for 2020, 2030 and 2040 inter-and extrapolated from this data. The overall reduction in vehicle volumes between the two scenarios is assumed to be reflective of mode shift from single passenger vehicles to carpooling (high occupancy vehicles or HOV 3+) and to public transit.

Traffic volumes for a representative segment of the assessment corridor under both scenarios, are shown in Table 2.

Table 2: Traffic Volumes in Assessment Corridor (2020-2040)

Scenario	2020	2025	2030	2035	2040
Baseline	77,801	82,161	86,765	91,627	96,761
Build	73,225	76,369	79,648	83,068	86,635
Decrease in Traffic Volumes	4,577	5,792	7,117	8,559	10,127

Source: CDM – Smith (2016), Muller (2014), AECOM

2.1.2.3 Travel Demand Sources and Forecast Years

The travel demand data used in this analysis was extracted from aforementioned studies conducted in 2014 and 2016 by Muller and CDM-Smith, respectively. These studies in turn utilized the travel demand models

(COMPASS) from the Denver Regional Council of Governments (DRCOG) and North Front Range Metropolitan Planning Organization (NFRMPO) as the basis for developing their traffic and revenue travel demand model.

Scenarios used for the analysis were the no-action (baseline) and Scenario 3c (build scenario) from the T&R Study. Both scenarios forecast average weekday trips within the corridor and travel times within the assessment corridor for 2015, 2025 and 2035. The build scenario forecasts travel times for both the assessment corridor's managed and general purpose lanes.

2.1.2.4 Bicycle Commuter Data

Projected ridership for bike commuters utilizing the Poudre River trail connection enabling them to commute to/from Fort Collins from Windsor and Greely was developed by Atkins[3]. Their analysis utilized a variety of US Census Bureau data[4] coupled with Colorado Department of Health demographic information to estimate bike commuters. Atkin's forecasts estimate a current range of bicycle commuters between the cities of between 35-150. For the BCA analysis, an assumption of 90 round trips per day was used, split evenly between those commuting to Fort Collins from Windsor and from Greeley.

The bicycle commuting analysis assumes annual growth in commuters of 2.2% in line with the assumed growth rate of the North Front Range travel demand model. This assumption sees the number of bicycle commuters using the Poudre River Trail rise to approximately 160 by the end of the assessment period.

Given the section of the trail completing the Poudre River Trail does not exist in the baseline study, all bicycle commuters using this trail in the build scenario are considered to be part of the mode shift from single passenger vehicles to other forms of transportation. Accordingly, the impacts and benefits delivered from this mode shift to bicycle has been assessed along other forms of mode shift (to carpooling and Bustang).

2.1.2.5 Travel Time Savings

Travel time savings estimations were derived from Muller's 2014 study. Travel times were estimated for both north- and southbound traffic for the entire length of the assessment corridor. Travel time savings for 2020 and 2030 were interpolated from the 2015 and 2025 estimates; 2040 travel time savings were extrapolated from 2035 data. Table 3 provides an overview of the travel times and the time savings across the assessment period by direction of travel.

Table 3: Travel Times and Savings During Peak and Shoulder Periods (2020-2040)

		2020		**2025**		**2030**		**2035**		**2040**	
		NB	SB	NB	SB	NB	SB	NB	SB	NB	SB
Scenario	**Lane Type**	**Travel Time for Corridor (Minutes)**									
Baseline	GP Lane	18.7	16.3	20.4	17.7	22.2	17.2	22.7	17.6	23.3	18.9
Build	GP Lane	17.0	15.8	18.6	17.2	17.4	16.4	17.8	16.8	21.6	17.0

[3] Atkins. *Poudre River Trail Connection: Projected Commuter Bicycling Rate*. April 2014

[4] United State Census Bureau. *Longitudinal Employer-Household Dynamics (LEHD) Origin-Destination Employment Statistics (LODES).* 2014 database.
United State Census Bureau. *American Community Survey*. 2013

	Managed Lane	13.9	13.7	15.2	14.9	14.1	13.9	14.5	14.2	15.2	14.1
Travel Time Savings	**GP Lane**	**1.6**	**0.5**	**1.8**	**0.5**	**4.8**	**0.8**	**4.9**	**0.8**	**1.7**	**1.9**
	Managed Lane	**4.8**	**2.6**	**5.2**	**2.8**	**8.0**	**3.3**	**8.2**	**3.4**	**8.1**	**4.8**

Source: Muller (2014), AECOM

2.1.2.6 Annualization Factor

This analysis considers various benefits and costs resulting from changes to the commuter bus service Bustang, which provides express bus services between the three locations in the assessment corridor (Fort Collins, Harmony Road and US34/I25 Interchange) and downtown Denver. As Bustang does not operate on weekends or holidays, an annualization factor of 260 days of weekday operations per annum has been assumed. This same annualization factor was used by CDM-Smith and Atkins when developing forecasts of traffic volumes and tolling revenue, respectively, within the assessment corridor

2.1.2.7 Value of Time

Travel time savings are converted from hours to dollars. This is performed by assuming that travel time is valued as a percentage of the average wage rate, with different percentages assigned to different trip purposes. This analysis has used the DOT's Recommended Hourly Value of Travel Time Savings[5], as shown below in Table 4, and assumes the mix of personal and business travel to be consistent with the DOT's national distribution for local travel by surface modes.

Table 4: Hourly Values of Travel Time Savings, All-Commercial Drivers

Category of Travel	**Hourly Value of Travel Time Savings** ($2016)
Personal	$ 13.28
Business	$25.64
All Purpose*	$13.85

[5] United States Department of Transportation. *Revised Departmental Guidance on Valuation of Travel Time in Economic Analysis*. 2014. Accessed from https://www.transportation.gov/sites/dot.gov/files/docs/BCA%20Resource%20Guide%202016.pdf

Commercial Truck Driver	$27.47

*Distribution for local travel by surface modes: 95.4% personal, 4.6% business.
Source: US Department of Transportation (2014)

As per the DOT's guidance, a real growth rate of 1.2% per annum has been assumed for the value of time figures and is applied to all years in the analysis after 2016.

2.1.2.8 Vehicle Miles Travelled

Vehicle miles travelled (VMT) are used in a variety of benefits and costs categories including: safety, emissions, and operations and maintenance. In both the baseline and build scenarios, the total VMT for the assessment corridor is forecast to decrease over time, though at differing magnitudes. Personal vehicle VMT was estimated by assessing the number of forecast trips within the corridor, point of origin, and direction of travel, and applying these to the distance travelled within the corridor. Commercial truck VMT was estimated using the number of annual truck trips through the corridor, with the number of trucks as a percentage of traffic volumes derived from CDOT's recent historical road share information.

Bustang VMT was estimated by using CDOT's data on point of boarding/alighting and ridership. A further assumption is that passengers using Bustang only travel to and from the Denver Union Station and that there is no intraregional travel on Bustang within the assessment corridor. For Bustang ridership attributed to mode shift or inducement, the additional distance between the Denver Union Station and the southern point of the assessment corridor – a round trip distance of 77.8 miles – has been included in VMT avoided on a per passenger basis. The rationale for this assumption is that passengers choosing to use transit will thus avoid travelling the distance to and from Denver in a personal vehicle.

2.1.2.9 Vehicle Hours Travelled

Vehicle hours travelled (VHT) is used in a variety of benefits and costs categories including: safety, emissions, and operations and maintenance. Vehicle hours used in this analysis comprise the estimates of travel times avoided for personal vehicles and commercial trucks under the baseline and build scenarios.

2.1.2.10 Average Vehicle Occupancy

Average vehicle occupancy allows for the estimation of total travel time savings. This analysis assumes an average vehicle occupancy of 1.67 for the build scenario, as taken from the DOT's 2009 National Household Travel Survey data.

2.1.3 Assumptions – Vehicle Operation

2.1.3.1 Vehicle Operating Costs

The I-25 Project is not expected to induce increased traffic volumes; rather, the I-25 Project will increase the corridor's capacity to accommodate a higher volume of traffic associated with regional population and employment growth and an expected increase in freight volumes on Colorado's highways of approximately 75 percent over the next 25 years.[6] The I-25 Project assumes a greater efficiency of travel as opposed to a driver of greater traffic volumes. Concurrently, the build scenario assumes that significant mode shift to

[6] Colorado Department of Transportation. *State Highway Freight Plan.* 2015. Accessed from http://colorado transportationmatters.com/wp-content/uploads/2013/04/Colorado-State-Highway-Freight-Plan.pdf

carpooling or use of transit will occur with the advent of managed lanes. This in turn leads to a large quantum of vehicle miles travelled that would otherwise occur if the build scenario was not implemented. Accordingly, operating costs and savings are calculated on both operating hours and on VMT avoided.

Vehicle operating costs comprise both fuel and non-fuel costs for commercial vehicles, including buses.

2.1.3.1.1 Personal Vehicles

Operating costs for personal vehicle are derived from the American Automobile Association's (AAA) 2015 estimation of on road operating costs per VMT. These include three variable costs (gas, maintenance, and tires) and half of the car's depreciating value. An overview of the assumptions for the per-mile operating costs for personal vehicles is shown in Table 5.

Table 5: Average Personal Automobile Operating Costs per VMT

Operating Cost Component	$/VMT
Gas, maintenance, and tires	$ 0.17
Depreciation	$ 0.12
Total	**$ 0.29**

Source: Department of Energy (2015)

VMT avoided was calculated by annualizing the number of trips avoided due to the implementation of the I-25 Project and multiplying this by half the length of the corridor (as point of origin in the traffic volumes is not known) to determine VMT avoided. This value was then applied to the average operating cost per mile to determine the benefit in operating savings.

2.1.3.1.2 Commercial Trucks

The operating costs for commercial trucks comprise vehicle and driver based costs and are expressed on an hourly basis. This analysis has used the American Transportation Research Institute's 2015 Average Margin Costs per Hour as the benchmark for hourly truck operating costs[7]. ATRI's hourly driver based costs have been adjusted nominally to match the DOT's suggested guidance for the value of time of a commercial truck drive. This analysis uses the more conservative assumption, shown in Table 6, along with all other components comprising the hourly operating costs for commercial trucks.

Table 6: Average Truck Operating Costs per Vehicle Hour Traveled

Vehicle Based	**$2016**
Fuel-Oil Costs	$ 23.98
Truck/Trailer Lease or Purchase Payments	$ 8.84
Repair and Maintenance	$ 6.50
Truck Insurance Premiums	$ 2.98
Driver Based	
Driver Pay (Adjusted per TIGER BCA Guidance)	$ 27.47
Driver Benefits	$ 5.30
Total	$ 75.85

[7] American Transportation Research Institute. An Analysis of the Operational Costs of Trucking. 2015. Accessed from http://atri-online.org/wp-content/uploads/2015/09/ATRI-Operational-Costs-of-Trucking-2015-FINAL-09-2015.pdf

Source: ATRI (2015)

2.1.3.2 Vehicle Operating Costs – Bustang

For Bustang's express services between the Northern I25 Corridor and Denver, a figure of $159 per operating hour of each bus, as provided by CDOT, has been used in this analysis. This analysis has assumed that that operating cost will remain constant throughout the assessment period.

2.1.4 Assumptions – Infrastructure Operations and Maintenance

2.1.4.1 Operations and Maintenance Costs – General Purpose and Managed Lanes

The baseline figure for operations and maintenance (O&M) cost of the general purpose and managed lanes is $14,200 per lane mile per annum, representative CDOT's average per lane O&M expenditure over the past three years.

For the build scenario, under which general purpose lanes will be rehabilitated and new managed lanes introduced, an operations and maintenance cost comparable to current CDOT maintenance costs for newly rehabilitated highways of $7,200 per lane mile per annum has been assumed for the first 10 years of operation. For the remaining 10 years of the assessment period, the annual O&M cost will rise to current baseline scenario assumption of $14,200 (in $2016) per lane mile.

An overview of the O&M cost for general purpose and managed lanes is shown in Table 7.

Table 7: Operations and Maintenance Costs – General Purpose and Managed Lanes

	Baseline (2021-2040)	**Build (2021-2030)**	**Build (2031-2040)***
O&M Costs - General Purpose and Managed Lanes	**$/Lane Mile**		
	$ 14,200	$ 7,300	$ 14,200

*A section of the general purpose lane will be rehabilitated asphalt pavement in 2020 will be replaced in 2030. Accordingly, the O&M cost for this section from 2031-2040 will be $7,300 per lane mile per annum.
Source: Colorado Department of Transportation

2.1.4.2 Operations and Maintenance Costs – Bridges

The build scenario proposes that certain bridges in the assessment corridor be widened and rehabilitated while others are proposed to be replaced. In the absence of maintenance schedules for both the bridges proposed for widening and rehabilitation and those proposed for replacement, this analysis assumes that operations and maintenance costs of these structures will be equal to 0.5% of the capital cost per annum.

Baseline O&M costs for bridges are largely comprised of scheduled maintenance and repairs. Other maintenance costs are associated with unscheduled maintenance as well as inspections and repairs following flood events. Current O&M costs for structures within the assessment corridor are not available. To allow for equal consideration of O&M costs for the baseline scenario, this analysis assumes that O&M costs of these structures will be equal to an annual 0.5% of the capital cost associated with the widening and replacement of these structures in the build scenario. Under this rationale, there is no different in O&M costs for bridges between the baseline and build scenario.

2.1.4.3 Operations and Maintenance Costs – Bus Related Infrastructure

As the bus slips are within the interstate corridor, their annual maintenance cost has been included within the annual O&M costs for general purpose and managed lanes described in 2.1.4.1. Maintenance costs for the Park and Ride facility will comprise utilities and cleaning, and for the parking lot: snow removal, striping, and ad hoc resurfacing. These annual O&M costs are assumed to be equal to 3% of the facility's capital cost (excluding right of way) or approximately $82,200 per annum.

2.1.5 Assumptions - Safety

The analysis assumes that there will be neither an increase nor decrease in the incidence of accidents due to any structural changes to the highway network. Rather, changes in the number of accidents would be determined largely by any changes in VMT. This approach captures the change in the occurrence of accidents as related to the difference in VMT between the baseline and build scenarios. It does not, however, account for increased safety expected from road improvements such the segregation of the general purpose lanes from the managed lanes.

While it is not captured in this analysis, a reduction in VHT could also lead to a decrease in the incident of accidents. As most accidents on interstate corridors comprise rear end and sideswipe collisions during congestion, lower average levels of congestion and a higher average rate of travel, as indicated by a decreased travel time through the corridor, would likely result in an reduction in the incidence of accidents.

The rate of occurrence of accidents for automobiles is benchmarked to the Bureau of Transportation Statistic's Motor Vehicle Safety Data for 2016, while the rate of occurrence for buses was benchmarked to Federal Highway Administration's data from 2013[89]. The rate of occurrence for each per one hundred million vehicle miles is shown below in Table 8.

Table 8: Auto and Bus Accidents by Type per 100,000,000 VMT

	Rate per 100M VMT	
	Car	**Bus**
Fatalities	1.1008	0.5
Injured persons	80.0628	67.59857143
Crashes	190.3076	62.08428571

Source: Department of Transportation (2013)

[8] Bureau of Transportation Statistics. *Table 2-17: Motor Safety Data.* Updated March 2015. Accessed from http:// www.rita.dot.gov/bts/sites/rita.dot.gov.bts/files/publications/national_transportation_statistics/html/table_02_17.html

[9] Federal Highway Administration. *Transit Incidents, Fatalities and Injuries.* Modified 2014. Accessed from https://www.fhwa.dot.gov/policy/2013cpr/chap4.cfm

In order to convert the abovementioned accident rates into the appropriate Abbreviated Injury Scale (AIS) category for calculating benefits and costs, national statistics from the National Highway Traffic and Safety Administration were used. Each of the AIS categories represents a level of severity of injury ranging from AIS – 0 (No Injury) to AIS – 6 (Not-Survivable). Table 9 below provides an overview of each category as a proportion of all possible non-fatal accident injuries.

Table 9: Abbreviate Injury Scale Categories and Percentage of Occurrence

Category	% of occurrence
AIS 1 – Minor	88.46%
AIS 2 – Moderate	8.28%
AIS 3 – Serious	2.39%
AIS 4 – Severe	0.69%
AIS 5 – Critical	0.18%

Source: NHTSA (2011)

AIS categories can be given a monetized value representative of a fraction of Monetized values for fatalities, and all ranges of injuries categorized on the AIS Scale, are addressed within the DOT's guidance for "Treatment of the Economic Value of a Statistical Life (VSL)", and assigned a value representative of a fraction of VSL, as shown in Table 10.

Table 10: Value of Injury and Recommended Monetary Value

Category	Fraction of VSL	Recommended Monetary Value ($2016M)
AIS 1 – Minor	.003	$0.029
AIS 2 – Moderate	.0047	$0.451
AIS 3 – Serious	.105	$1.008
AIS 4 – Severe	.266	$2.554
AIS 5 – Critical	.593	$5.693

Source: Department of Transportation (2015)

2.1.6 Assumptions – Emissions

A reduction in VMT along the assessment corridor will create environmental and sustainability impacts relating to automobile, commercial truck and bus travel. Five types of emissions are identified, measured and monetized: volatile organic compounds (VOC), particulate matter (PM2.5 and PM10), carbon monoxide (CO), carbon dioxide (CO_2) and nitrogen oxide (NOx).

2.1.6.1 Emissions Quantification

Emission rates differ between vehicle types and depending on fuel efficiency, average speed and driving conditions. This analysis uses emissions factors from the Environmental Protection Agency (EPA) and

Federal Transit Administration (FTA), which provides emissions factors for automobiles, commercial trucks and buses[10][11].

This analysis uses two different approaches to quantify emissions generated under the build scenario utilizing both VMT and VHT. Mode shift from personal vehicles to HOV3+ (carpooling) or express bus services will generate a decrease in VMT. More efficient travel times by commercial trucks and personal vehicles due to the advent of managed lanes will generate a reduction in VHT. Accordingly, emissions reduction as a result of the build scenario has been estimated using both VMT and VHT.

Emission factors for automobiles and buses utilize the EPA guidance which assumes that emissions will decrease on a per VMT basis over time due to better fuel efficiency and engineering design. An overview of the assumed emission factors for automobiles for this analysis is shown in Table 11 and for buses in Table 12.

Table 11: Emission Factors (g/VMT) for Automobiles

	CO	NOX	PM2.5	PM10	VOC	CO2*
2015	16.77	0.91	0.01	0.16	0.6	532
2025	11.46	0.28	0.01	0.1	0.27	434
2035	10.26	0.2	0.01	0.05	0.21	397

*CO2 in metric tons

Source: Department of Transportation (2013)

Table 12: Emission Factors (g/VMT) for Buses

	CO	NOX	PM2.5	PM10**	VOC	CO2*
2015	5.83	8.67	0.48	0.297	0.73	2655
2025	3.26	2.08	0.09	0.297	0.24	2283
2035	2.89	1.14	0.03	0.297	0.16	2177

*CO2 in metric tons

** Assumes no change

Source: Department of Transportation (2013)

Commercial truck emissions have been estimated not on a VMT basis, but rather on forecast reductions in VHT, which produces more conservative estimations given it is based on emissions rates while idling. An even split between Classes 8a and 8b heavy-duty diesel trucks has been assumed for this analysis. An overview of emissions rates for commercial trucks is shown in Table 13.

Table 13: Emission Factors (g/VHT) for Heavy Duty Diesel Vehicles by Class

Pollutant	Truck Class 8a (g/hour of operation)	Truck Class 8b (g/hour of operation)	Weighted Average Emissions (g/hour of operation)

[10] Environmental Protection Agency. *Average In-Use Emissions from Heavy Duty Trucks.* 2008. Accessed from *https://www3.epa.gov/otaq/consumer/420f08025.pdf*

[11] United States Department of Transportation. *New and Small Starts Evaluation and Rating Process: Final Policy Guidance.* 2013.

VOC	3.518	4.218	3.868
THC	3.565	4.27	3.9175
CO	26.548	34.473	30.5105
Nox	35.758	42.345	39.0515
PM2.5	1.07	1.114	1.092
PM10	1.163	1.211	1.187

Source: Environmental Protection Agency (2008)

2.1.6.2 Emissions Valuation Approach

Values for each emission type, with the exception of CO_2, were sourced from the National Highway Traffic and Safety Administration's (NHTSA) CAFE standards for MY2017-MY2025 [12]and escalated to $2016[13]. An overview of the economic values used for each emission type is shown in Table 14.

Table 14: Economic Values Used for Benefits Non-CO_2 Emissions Reduced

Value of Emissions Reduced	2016$	Unit
Carbon Monoxide	$0	$/short ton
Volatile Organic Compounds	$1,873	$/short ton
Nitrogen Oxides	$7,381	$/short ton
Particulate Matter	$337,668	$/short ton

Source: NHTSA (2012)

Valuation of the cost of CO_2 emissions follow DOT guidelines which states that monetization within a benefit costs analysis should follow the OMB guidance on the social cost of carbon which recommends the use of a 3 percent discount rate[14]. Per ton costs of carbon emissions were converted to $2016 using the OMB's GDP and Deflator tables. Table 15 shows the assumed social cost of carbon in five year increments across the assessment period.

Table 15: Economic Values Used for Benefits of Carbon Dioxide Emissions Reduced

	2020	2025	2030	2035	2040
Social Cost of Carbon	$ 47.00	$ 52.00	$ 56.00	$ 62.00	$ 67.00
Adjusted	$ 47.74	$ 52.82	$ 56.89	$ 62.98	$ 68.06

Source: OMB (2013)

2.1.7 Assumptions – Freight

2.1.7.1 Freight Value

The value of freight, on a per ton and per truck basis, is required for estimating inventory savings resulting from reduced travel time by commercial truck drivers. Freight values were determined using data from the

[12] As recommended in the 2016 TIGER BCA Guidance

[13] National Highway Traffic and Safety Administration. *Corporate Average Fuel Economy for MY2017-2025 Passenger Cars and Light Trucks*. 2012 (page 922). Accessed from http://www.nhtsa.gov/staticfiles/rulemaking/pdf/cafe/FRIA_2017-2025.pdf

[14] White House Office of Management and Budget. *Technical Support Document: Technical Update of the Social Cost of Carbon for Regulatory Impact Analysis Under Executive Order 12866: Annual SCC Values: 2010-2050*. 2013. Accessed from http://www.whitehouse.gov/sites/default/files/omb/assets/inforeg/technical-update-social-cost-of-carbon-for-regulator-impact-analysis.pdf

Federal Highway Administration's Freight Analysis Framework (FAF) to identify the type and volume of freight whose movement occurs within the assessment corridor. The following flows of freight were identified which utilize the I-25:

- Domestic Northbound and Southbound Flows (Origin or Destination inside Colorado);
- Domestic Northbound and Southbound Passing Flows(both Origin or Destination outside Colorado);
- Export Northbound Flows (to Canada via Montana);
- Import Southbound Flows (from Canada via Montana);
- Export Southbound Flows (to Mexico via Texas); and
- Import Northbound Flows (from Mexico via Texas).

For each of these flows, origin-destination (OD) pairs were identified and the total tonnage and value of the freight extracted from FAF data. This information was utilized to determine an average value per ton of freight for each of the aforementioned flows which utilize the assessment corridor.

The determination of the average tons of freight carried per truck began with the identification of the maximum weight allowed for road freight on the I-25: 80,000 pounds (40 tons). This analysis assumes that the commercial truck, chassis and container weigh 16 tons and conservatively assume that trucks will on average carry only half their cargo capacity by weight to account for empty trips. The remaining 24,000 pounds, or 12 tons, is assumed to be the average weight of freight for every commercial truck utilizing the assessment corridor.

An overview of this analysis' assumptions on the average value per ton of freight, and per truck, is shown in Table 16.

Table 16: Value of Truck Freight

Value per Ton ($2016)	1,916
Value per Truck ($2016)	22,987

Source: FHWA (2016), AECOM

2.1.7.2 Freight Inventory

The inventory cost associated with the annual truckloads and annual hours of delay is based on the commercial discount – the opportunity cost associated with holding assets in inventory rather than using them for another purpose. An avoidance of delays with the delivery of freight contributes to a savings in freight inventory costs. This analysis uses a commercial discount rate of 4.0%. Assuming 8,760 hours in a year (365 days * 24 hours), this yields an hourly discount rate of 0.00046%. Multiplying this hourly discount rate by value of freight shipped and by the hours of delay avoided yields an annual value of inventory savings.

2.1.8 Assumptions – Other Categories

2.1.8.1 Tolling Revenues

Tolling revenues for this analysis were provided by Atkins, as derived from CMD–Smith's 2016 update to their 2014 T&R Study. These represent the total tolling revenue from all north- and southbound tolling points within the corridor. High occupancy vehicles with three or more passengers (HOV3+), buses, van pools, and motorcycles are not assessed a toll for using the managed lanes in the corridor.

Tolling revenue for the corridor from the commencement of operation is 2021 until the conclusion of the assessment period in 2040 is estimated at $117.4 million undiscounted dollars.

Consistent with DOT guidance, revenue in this analysis is treated neither as a benefit nor as an offset to costs, but rather as a transfer.

2.1.8.2 Residual Value

The major categories of infrastructure components which comprise the I-25 Project have different assumed asset lives. For instance, a bridge which has been reconstructed will have an assumed life of 75 years while a rehabilitated asphalt pavement general purpose lane will have an assumed useful life of 10 years and will need to be replaced or rehabilitated in 2031. Those assets with useful lives longer than the 20 years following commencement of operations will thus have a residual value which can be discounted back to a net present value and included in the project benefits. Table 17 below provides and overview of the useful lives of asset categories within the I-25 Project.

Table 17: Assumed Useful Life of Assets – Assessment Corridor

Asset Type	Construction Type	Assumed Useful Life	Residual Value Applicable
General Purpose and Managed Lanes	New - Asphalt	20	✓
	New - Concrete	30	✓
	Concrete Pavement Reconstruction	30	✓
	Asphalt Pavement Rehabilitation	10	
Bridges	Widen	25	✓
	Reconstruction	75	✓
Bus Infrastructure	Bus Slip New Concrete	30	✓
	Park and Ride Facility	20	✓
Bike Trail	Bike Trail	20	✓

Source: Atkins, AECOM

SECTION 3 OUTCOMES

3.1 ECONOMIC OUTCOMES

3.1.1 Travel Time Savings

Travel time savings estimations were derived from Muller's 2014 report. Travel times were estimated for both north- and southbound traffic for the entire length of the assessment corridor. Travel time savings for 2020 and 2030 were interpolated from the 2015 and 2025 estimates; 2040 travel time savings were extrapolated from 2035 data. Table 18 provides an overview of the travel times and the time savings across the assessment period by direction of travel. The difference in forecast travel time between the two scenarios form the basis from which all travel time and operating savings are determined.

Table 18: Travel Times and Savings During Peak and Shoulder Periods (2020-2040)

		2020		2025		2030		2035		2040	
		NB	SB	NB	SB	NB	SB	NB	SB	NB	SB
Scenario	**Lane Type**	**Travel Time for Corridor (Minutes)**									
Baseline	GP Lane	18.7	16.3	20.4	17.7	22.2	17.2	22.7	17.6	23.3	18.9
Build	GP Lane	17.0	15.8	18.6	17.2	17.4	16.4	17.8	16.8	21.6	17.0
	Managed Lane	13.9	13.7	15.2	14.9	14.1	13.9	14.5	14.2	15.2	14.1
Travel Time Savings	GP Lane	1.6	0.5	1.8	0.5	4.8	0.8	4.9	0.8	1.7	1.9
	Managed Lane	4.8	2.6	5.2	2.8	8.0	3.3	8.2	3.4	8.1	4.8

Source: Muller (2014), AECOM

3.1.1.1 Travel Time Savings – Personal Vehicles and Passengers

Travel time savings for personal were calculated by applying total traffic volumes (less commercial trucks) to the reduction in travel time for both general purpose and managed lanes for during peak and shoulder periods in the build scenario. Time savings per vehicle were then applied to the benchmarked average vehicle occupancy assumption to determine the total travel time reduction. This total travel time reduction was then used to determine the travel time savings, emissions reductions and vehicle operating savings. An overview of the personal vehicle and passenger travel time reduction resulting from the implementation of the I-25 Project is shown in Table 19.

Table 19: Travel Times and Savings – Personal Vehicles (2021-2040)

	2021	2025	2030	2035	2040	Total
Annual Reduction in Travel Time - General Purpose Lanes	74,145	99,497	143,449	189,717	222,581	2,967,232
Annual Reduction in Travel Time - Managed Lanes	334,613	473,957	485,035	444,722	393,561	8,890,746
Annual Reduction in Travel Time Including Passengers - Managed Lanes	123,823	166,160	239,560	316,828	371,710	4,955,277
Annual Reduction in Travel Time Including Passengers - General Purpose Lanes	558,804	791,508	810,008	742,685	657,247	14,847,546

Source: Muller, AECOM

3.1.1.2 Travel Time Savings – Commercial Trucks

Travel time reduction of commercial trucks were calculated by applying the assumed percentage of trucks in the total traffic volumes (10.725%) to the reduction in travel times for general purpose lanes during the peak and shoulder periods in the build scenario. These travel time reductions were then used to determine freight inventory savings, freight operating savings and freight emissions savings. Reduced travel times equate to more efficient movement of road freight as indicated by a reduction in commercial truck operating hours. Over the assessment period, the build scenario will generate a reduction of more than 1 million operating hours for commercial trucks. An overview of the total commercial truck travel time reductions resulting from the implementation of the I-25 Project is shown in Table 20.

Table 20: Travel Times Savings – Commercial Trucks (2021-2040)

	2021	2025	2030	2035	2040	Total
Commercial Truck Operating Hours	42,188	58,916	55,603	51,141	45,452	1,041,597

Source: Muller, AECOM

3.1.1.3 Travel Time Savings – Bustang Express Bus

The reduction in the average travel time per trip for the Bustang express bus comprises the travel time reduction that is achieved by using managed lanes. These total time reductions were then applied to the number of bus services per annum to determine passenger travel time savings, emissions savings, operating savings, and safety savings. The level of these savings differ representative of where in the assessment corridor the passengers board and alight the bus.

The advent of the Park and Ride facility, bus slips and Kendall Parkway Underpass near the US34/I-25 interchange will bring additional time savings benefit to bus commuters outside of the travel time savings associated with the introduction of managed lanes. Currently, Bustang service must exit the I-25 and travel along US34 to access the existing temporary Loveland-Greeley Park and Ride (also known as the Centerra Park and Ride). It has been estimated by CDOT that the advent of the bus slips along the I-25 corridor and the adjacent Park and Ride will deliver 15 minutes of time savings each way. This analysis applies that additional time savings only to those passengers assumed to board/alight Bustang services north of the US34/I-25 interchange.

Travel time savings for buses were applied only to those Bustang services operating in the AM and PM peak and shoulder periods for which travel time savings were captured. Of the 14 daily services which will be operating at the time of the commencement of managed lanes, 10 of them fall within the AM and PM peak and shoulder periods.

An overview of the travel time reduction for Bustang expresses bus is shown in Table 21.

Table 21: Travel Times Savings – Bustang Express Bus (2021-2040)

	2021	2025	2030	2035	2040	Total
Total Operating Hours Avoided	33,869	41,456	46,156	50,906	56,114	925,827

Source: CDOT, Muller, AECOM

To avoid double counting in the evaluation, the travel time savings of those passengers mode shifting from personal vehicle to transit under the build scenario were not included added to the overall travel time savings as these savings are already captures in the overall mode shift savings. The travel time saving for Bustang passengers identified in Table 22 represents only the savings of current transit passengers and includes the additional 15 minutes time savings for those boarding/alighting Bustang services north of the US34/I-25 interchange. In this sense, the estimation of travel time savings by Bustang Passengers should be considered conservative.

3.2 SAFETY OUTCOMES

Safety outcomes comprise reduction in the incidence of accidents, injuries and fatalities within the assessment corridor associated with the implementation of the I-25 Project. The baseline and build scenarios both forecast increased traffic volumes over time; however, the build scenario is forecast to allow for more efficient travel through the corridor and to see substantial mode shift from single passenger vehicles to either carpooling in HOV+ or to public transit. Together, these impacts of the build scenario generate VMT avoidance which, as discussed in Section 2.1.5, is the primary driver in the generation of safety benefits.

Table 23 shows the annual and total reduction of accidents, injuries and fatalities associated with VMT avoidance in the build scenario, as well as the annual accidents avoided by MAIS type.

Table 23: Reduction in Accidents, Injuries and Fatalities (2021-2040)

	2021	2025	2030	2035	2040	Total
Reduced Fatalities	0.10	0.12	0.14	0.18	0.18	2.87
Reduced Injuries	7.0	8.2	9.7	12.5	12.5	200.5
Reduced Crashes	17.5	20.6	24.4	31.3	31.4	503.2
Annual Accidents Avoided by MAIS type						
	2021	**2025**	**2030**	**2035**	**2040**	**Total**
Fatalities	0.1	0.1	0.1	0.2	0.2	2.9
MAIS 5	0.1	0.1	0.1	0.1	0.1	2.2
MAIS 4	0.0	0.0	0.0	0.1	0.1	0.9
MAIS 3	0.3	0.3	0.4	0.5	0.5	8.1
MAIS 2	0.8	0.9	1.1	1.4	1.4	22.7
MAIS 1	5.8	6.8	8.1	10.4	10.4	166.7
Property Damage Only	17.5	20.6	24.4	31.3	31.4	503.2

Source: AECOM, DOT

3.3 ENVIRONMENTAL OUTCOMES

3.3.1 Emissions Reduction

The reduction in emissions between the baseline and build scenarios was estimated for personal vehicles, commercial trucks and Bustang express bus. Reduction in emissions was calculated through the evaluation of the decrease in vehicle hours across all vehicle types in the build scenario. A summary of the emissions reduction associated with a reduction in vehicle operating hours is shown in Table 24.

Table 24: Emissions Avoided Due to Reduction in Vehicle Operating Hours (2021-2040)

	2021	2025	2030	2035	2040	Total
CO (short tons)	29.96	46.77	44.23	44.31	42.03	853.05
NOX (short tons)	3.71	5.44	4.97	4.79	4.41	95.59
PM2.5 (short tons)	0.06	0.09	0.09	0.08	0.08	1.69
PM10 (short tons)	0.10	0.19	0.15	0.15	0.11	2.89
SO2 (short tons)	0.12	0.36	0.16	0.16	0.13	3.84
VOC (short tons)	99.92	295.54	241.51	241.51	221.00	4,666.92
CO2 (metric tons)	1,290.21	1,780.04	1,800.93	1,791.41	1,707.18	34,319.27

Source: AECOM, DOT

The travel demand modelling shows substantial mode shift from single passenger vehicle to either carpooling (HOV3+) , to Bustang express bus and to bicycle resulting in an avoidance of more than 260 million vehicle miles travelled as compared to the baseline scenario across the duration of the assessment period. A summary of emissions avoided as per a reduction in VMT due to this mode shift is shown in Table 25.

Table 25: Emissions Avoided Due to Vehicle Miles Travelled Avoided (2021-2040)

	2021	2025	2030	2035	2040	Total
CO (short tons)	167.5	134.5	159.6	182.9	183.7	3,385.4
NOX (short tons)	9.1	3.3	3.9	3.6	3.6	98.6
PM2.5 (short tons)	0.1	0.1	0.1	0.2	0.2	2.9
PM10 (short tons)	1.6	1.2	1.4	0.9	0.9	25.9
VOC (short tons)	6.0	3.2	3.8	3.7	3.8	85.1
CO2 (metric tons)	4,821.4	4,621.6	5,484.2	6,421.9	6,449.3	113,145.8

Source: AECOM, DOT

SECTION 4 COSTS ANALYSIS

The costs assessed in this analysis comprise capital costs and those associated with the operation and maintenance of the general purpose and managed lanes, bridges and other structures within the assessment corridor. Capital costs are those associated with the construction of the widening of I-25 to accommodate managed lanes (including the widening and replacement of four bridges within the assessment corridor, as well as other general civil works) which will be incurred prior to the widened corridor's operation. The capital costs also include the construction of an approximately one mile segment of bike trail which crosses beneath the Cache Le Poudre River bridges and which completes the trail network connecting Fort Collins with Windsor and Greeley. This total initial capital outlay is estimated at approximately $235.7 million in 2016 dollars.

Operation and maintenance costs in the analysis represent those incurred on an annual basis for the inspection, upkeep and scheduled repair of general purpose and managed lanes as well as structures within the assessment corridor.

Additional costs include asset renewal – specifically the replacement of a section of general purpose lane in the year 2031 at the conclusion of this section's useful life.

4.1 INITIAL CAPITAL COSTS FOR I-25 PROJECT

Construction associated with the I-25 Project comprises several components which can be grouped into five categories: general purpose lanes, managed lanes, structures, bus related infrastructure and bike trail. Each of these categories and their various components are described below. Overviews of the estimated cost of each component are shown in Table 26 through Table 29 in which the capital cost of component is broken down into: construction capital, right of way and utilities, and professional costs.

4.1.1 General Purpose Lanes

Two different approaches will be used for the construction of the general purpose lanes in the I-25 Project. 29.4 of the 56 miles of general purpose lanes will be subjected to asphalt pavement rehabilitation, while the remaining 26.6 miles will undergo concrete pavement reconstruction. Capital costs associated with construction works for the general purpose lanes are estimated to total $83.8 million. The asphalt pavement section of the general purpose lanes will require an additional capital outlay in 2031 at the end of its useful life.

Table 26: I-25 Project Capital Costs: General Lanes

Constituent Cost Component	General Purpose Lanes	
	GP Lanes (Existing – Concrete Pave. Reconstruction)	GP Lanes (Existing – Asphalt Pave. Rehab)
Construction Capital	$ 50,521,900	$ 9,824,000
R/W (and Utilities)	$ 4,748,400	$ -
Professional (Design, PM, CM)	$ 15,702,200	$ 3,053,300
TOTAL	$ 70,972,500	$ 12,877,300

Source: AECOM, Atkins

4.1.2 Managed Lanes

The I-25 Project will see the introduction of managed lanes running the entirety of the 14 mile corridor. As with the general purpose lanes, two different approaches will be used in their construction. 14.7 miles of the managed lanes will be constructed in asphalt while 13.3 will be constructed in concrete. Capital costs associated with construction works for the managed lanes are estimated to total $91.6 million.

Table 27: I-25 Project Capital Costs: Managed Lanes

Constituent Cost Component	Managed Lanes	
	Express Lanes (New - Asphalt)	Express Lanes (New - Concrete)
Construction Capital	$ 36,888,600	$ 30,837,100
R/W (and Utilities)	$ 416,500	$ 2,374,200
Professional (Design, PM, CM)	$ 11,465,000	$ 9,584,200
TOTAL	**$ 48,770,100**	**$ 42,795,500**

Source: AECOM, Atkins

4.1.3 Bridges

Four bridges are proposed for widening or replacement within the assessment corridor. The construction works proposed for bridges within the assessment corridor comprise:

- Widening of the separated bridges over the Big Thompson River to accommodate managed lanes in either direction;
- Reconstruction of the separated bridges known as the Union Pacific Rail Road (UPRR) Bridges, including additional works to build the Kendall Parkway Underpass beneath the UPRR's southern approach;
- Reconstruction of the separated Cache Le Poudre River bridges, including the raising of their elevation by four feet for resiliency purposes; and
- The widening of the separated Great Western Rail Road (GWRR) to accommodate managed lanes in either direction.

Capital costs associated with construction works for the widening or reconstruction of structures within the assessment corridor, including the Kendall Parkway Underpass, are estimated at approximately $49.7 million.

Table 28: I-25 Project Capital Costs: Bridges and Structures

	Structures				
Constituent Cost Component	Big Thompson River Bridges (Widen)	UPRR Bridges (Full Reconstruction)	Kendall Parkway (Additional to UPRR)	Poudre River Bridges (Full Reconstruction)	GWRR Bridges (Widen)
Construction Capital	$ 2,599,000	$ 7,370,400	$ 4,806,800	$ 15,887,400	$6,095,200
R/W (and Utilities)	$ 40,400	$ 947,400	$ -	$ 435,200	$ 97,300
Professional (Design, PM, CM)	$ 807,800	$ 2,290,700	$ 1,494,000	$ 4,937,800	$1,894,400
TOTAL	**$ 3,447,200**	**$ 10,608,500**	**$ 6,300,800**	**$ 21,260,400**	**$8,086,900**

Source: AECOM, Atkins

4.1.3.1 Bus Related Infrastructure

The bus slip ramps are proposed to be built adjacent to the Kendall Parkway underpass near the US34/I-25 intersection to allow for more efficient pick up and drop off capabilities for the Bustang express bus. Capital costs associated with their construction are estimated to be $4.2 million. The new Park and Ride facility is proposed for location adjacent to the western side of the I-25 immediately south of the Kendall Parkway Underpass. Its capital costs is estimated to be $5.0 million.

Table 29: I-25 Project Capital Costs: Bus Related Infrastructure

Constituent Cost Component	Bus Related Infrastructure	
	Bus Slip Ramps (New - Concrete)	**Park and Ride**
Construction Capital	$ 2,376,700	$ 2,741,100
R/W (and Utilities)	$ 1,132,300	$ 1,477,500
Professional (Design, PM, CM)	$ 738,700	$ 805,300
TOTAL	**$ 4,247,700**	**$ 5,023,900**

Source: AECOM, Atkins

4.1.4 Schedule of Construction Expenditures

Construction is scheduled to commence at the beginning of 2018 and to complete at the end of 2020 with the managed lanes beginning operation at the start of 2021. Capital costs are assumed to be expended at a constant rate of approximately $19.1 million per quarter from the project's onset through to its conclusion. An additional $12.9 million (present value) will be expended in 2031 when those sections of general purpose lane with rehabilitated asphalt pavement will need to be replaced.

4.2 ANNUAL OPERATING AND MAINTENANCE COSTS

Operation and maintenance costs are applied to the highway corridor, comprising general purpose and managed lanes, on a per lane mile basis. As discussed in Section 2.1.4.1, the annual O&M cost for the highway corridor is $7,300/lane mile for the first ten year of operation, and $14,200/lane mile thereafter to the end of their useful life.

Baseline O&M costs for bridges are largely comprised of scheduled maintenance and are based on actual annual costs incurred. Other maintenance costs are associated with unscheduled maintenance associated with inspections and repairs following flood events. Current O&M costs for bridges within the assessment corridor are not available. In the absence of maintenance schedules for both the bridges proposed for widening and rehabilitation and those proposed for replacement, this analysis assumes that operations and maintenance costs of these structures will be equal to 0.5% of the capital cost per annum. To allow for equal consideration of O&M costs for the baseline scenario, this analysis assumes that operations and maintenance costs of these structures will be equal to an annual 0.5% of the capital cost associated with the widening and replacement of these structures in the build scenario. Under this rationale, the only material difference in O&M costs for bridges between the baseline and build scenario is the additional of the Kendall Parkway Underpass and its associated O&M costs.

For the Park and Ride facility near the US34/I-25 interchange, a conservative annual O&M cost equal to 3% of its non-right of way capital costs has been assumed for operations, snow clearance, striping and resurfacing.

The annual cost of O&M of all components of the assessment is summarized in Table 30. Additional costs to replace components of the general purpose lanes at the end of their useful lives are indicated for 2031.

Table 30: Annual Operations and Maintenance Costs – Assessment Corridor (2021-2040)

	2021	2025	2030	2031*	2035	2040	Total
Annual Operations and Maintenance Cost ($M)	1.0	1.0	1.0	14.3	1.4	1.4	36.8
Annual O&M Cost discounted at 7% ($2016)	0.7	0.5	0.4	5.2	0.4	0.3	13.8
Annual O&M Cost discounted at 3% ($2016)	0.9	0.8	0.7	9.2	0.8	0.7	23.7

*Indicates year in which rehabilitated asphalt pavement general purpose lanes have reached the end of their useful life and need to be replaced.
Source: Colorado Department of Transportation, Atkins, AECOM

4.3 DISCOUNTED CAPITAL AND OPERATIONS AND MAINTENANCE COSTS

The total costs associated with the construction, operations and maintenance of the I-25 Project have are shown in $2016 in Table 31 using both a 7% and 3% discount rate.

Table 31: I-25 Project Capital and Operations and Maintenance Costs - Discounted

	Discount Rate	
	7% ($2016M)	3% ($2016M)
I-25 Project Capital Costs	$192.7	$215.7
I-25 Project O&M Costs	$13.8	$23.7
Total Costs	**$206.5**	**$239.4**

Source: Atkins, AECOM

4.3.1 Residual Value

Those components with a useful life beyond 20 years will have a residual value at the end of the assessment period. Specifically, highway components of the I-25 Project have a capital cost of $175.4 million (including $3.8 million attributable to right of way) and a residual value of $10.3 million at a 7% discount rate and $22 million at a 3% discount rate, both excluding right of way. Bridges and structures have a capital cost of $49.7 million (including $0.8 million attributable to right of way) and a residual value of $7.3 million at a 7% discount rate and $15.6 million at a 3% discount rate, both excluding right of way. Bus related infrastructure has a capital cost of $9.3 million (including $1.3 million attributable to right of way) and a residual value of $0.4 million at a 7% discount rate and $0.9 million at a 3% discount rate, both excluding right of way.

The total residual value of all elements of the I-25 Widening project are $15.1 million at a 7% discount rate and $37.7 million at a 3% discount rate, both excluding right of way.

An overview of the residual value of component types of the I-25 Project at the conclusion of the assessment period is shown in Table 32.

Table 32: Residual Life of I-25 Project Components – Assessment Corridor

	Capital Cost	Useful Life	Useful Life Remaining	Residual Value	Discounted Residual Value	
Highway	$2016M	Years	%	$2016M	7% ($2016)	3% ($2016)
Express Lanes (New – Asphalt)	**48.8**	20	5%	**2.2**	0.6	1.2
Express Lanes (New – Concrete)	**42.8**	30	37%	**14.1**	3.6	7.8
GP Lanes (Existing – Concrete Pave. Reconstruction)	**71.0**	30	37%	**23.4**	6.1	13.0
GP Lanes (Existing - Asphalt Pave. Rehab)	**12.9**	10	0%	**-**	0.0	0.0
Bus Related Infrastructure						
Bus Slip Ramps (New - Concrete)	**4.2**	30	37%	**1.4**	0.4	0.8
Park and Ride Facility	**5.0**	20	5%	**0.2**	.06	.1
Structures						
Big Thompson River Bridges (Widen)	**3.4**	25	24%	**0.7**	0.2	0.4
UPRR Bridges (Full Reconstruction)	**10.6**	75	75%	**7.1**	1.8	3.9
Kendall Parkway (Additional to UPRR)	**6.3**	75	75%	**4.2**	1.1	2.3
Poudre River Bridges (Full Reconstruction)	**21.3**	75	75%	**14.3**	3.7	7.9
GWRR Bridges (Widen)	**8.1**	25	24%	**1.7**	0.5	1.0
Bike Trail						
Bike trail	**1.3**	20	5%	**.06**	.01	.03
Total Cost	**235.7**		**Total Residual Value***	**$70.8**	**$18.3**	**$39.2**

*Excludes Right of Way
Source: Atkins, AECOM

SECTION 5 BENEFITS COST ANALYSIS RESULTS

Over the 20 year assessment period, the I-25 Project generates $254.3 million in benefits at a 7% discount rate, and $438.7 million in benefits at a discounted rate of 3%.

At a 7% discount rate, the I-25 Project has **a BCR of 1.23:1;** at a 3% discount rate, the Project has a BCR of 1.83:1.

A more granular overview of the project benefit generated under both discount rate assumptions is shown in Table 33, as broken into benefits generated by managed and general lanes, by transit, by freight and by mode shift to bicycle.

Table 33: I-25 Project Benefits by Mode Type - Discounted

Managed and General Purpose Lanes		
	7% Discount ($2016)	3% Discount ($2016)
Travel Time Savings	$ 124.9	$ 211.6
Idling Emissions Reductions	$ 0.2	$ 0.4
Idling CO2 Savings	$ 1.1	$ 1.1
Mode Shift Emissions Savings	$ 4.3	$ 6.9
Mode Shift CO2 Savings	$ 4.1	$ 4.1
Mode Shift Vehicle Operating Savings	$ 28.0	$ 47.7
Mode Shift Safety Savings	$ 28.7	$ 49.6
Maintenance Savings	$ 0.5	$ 0.4
Residual Value	$ 15.1	$ 37.7
Transit Benefits		
	7% Discount ($2016)	3% Discount ($2016)
Bus Travel Time Savings	$ 5.5	$ 9.4
Bus Operating Savings	$ 0.9	$ 1.5
Freight Benefits		
	7% Discount ($2016)	3% Discount ($2016)
Inventory Savings	$ 0.0	$ 0.1
Freight Operating Savings	$ 37.2	$ 61.3
Freight Idling Emissions Savings	$ 0.5	$ 0.9
Freight Idling CO2 Savings	$ 0.2	$ 0.2
Bike Path Benefits		
	7% Discount ($2016)	3% Discount ($2016)
Bike Mode Shift Emissions Savings	$ 0.2	$ 0.3
Bike Mode Shift CO2 Savings	$ 0.2	$ 0.2
Bike Mode Shift Vehicle Operating Savings	$ 1.2	$ 2.1
Bike Mode Shift Safety Savings	$ 1.3	$ 2.2
Total Benefits	***$ 254.2***	***$ 437.7***

Source: AECOM

The largest components of the benefits generated by the I-25 Project are concentrated in travel time savings and in freight operating savings. Both of these benefits are driven by the decrease in VHT reflective of greater efficiency in travel for all vehicle types through the assessment corridor in the build scenario. The third largest contributors to the benefits are those related to safety and specifically the reduction in accidents associated with VMT avoided due to mode shift to carpooling and to transit. This VMT avoidance is also the major driver for vehicle operations and maintenance savings, the fourth largest contributor to the benefits generated by the Project.

5.1 BENEFITS BY LONG TERM OUTCOMES

5.1.1 Economic Competitiveness

Economic Competitiveness Benefits Summary		
	7% Discount ($2016)	3% Discount ($2016)
Travel Time Savings	$ 124.9	$ 211.6
Mode Shift Vehicle Operating Savings	$ 29.2	$ 49.8
Bus Travel Time Savings	$ 5.5	$ 9.4
Bus Operating Savings	$ 0.9	$ 1.5
Inventory Savings	$ 0.0	$ 0.1
Freight Operating Savings	$ 37.2	$ 61.3
Bike Mode Shift Vehicle Operating Savings	$ 1.2	$ 2.1

5.1.1.1 Personal Vehicle and Passenger Travel Time Savings

Travel time savings were calculated using the reduction in VHT between the build and baseline scenario and applying this quantum to the Value of Time assumptions identified in Section 2.1.2.5 Total travel time savings for personal vehicle drivers and their passengers total $124.9 million at a 7% discount and $211.6 million at a 3% discount. An overview of the travel time savings for personal vehicles and passengers is shown in Table 34.

Table 34: Travel Time Savings: Personal Vehicle and Passengers (2021-2040)

	2021	2025	2030	2035	2040	Total
Travel Time Savings ($M)	10.0	14.8	17.2	18.4	19.0	**328.6**
Travel time Savings @ 7 percent ($2016M)	7.2	8.0	6.7	5.1	3.7	**124.9**
Travel time Savings @ 3 percent ($2016M)	8.7	11.3	11.4	10.5	9.3	**211.6**

Source: Muller, AECOM

5.1.1.2 Travel Time Savings – Bustang Passengers

Travel time savings for passengers of Bustang Express Buses were calculated using the reduction in VHT between the build and baseline scenario and applying this quantum to the Value of Time assumptions identified in Section 2.1.2.5. Total travel time savings for passengers using the Bustang Express Bus total $5.5 million at a 7% discount and $9.4 million at a 3% discount. An overview of the travel time savings for personal vehicles and passengers is shown in Table 35.

Table 35: Travel Time Savings: Bustang Passengers (2021-2040)

	2021	2025	2030	2035	2040	Total
Travel time Savings ($M)	0.5	0.6	0.7	0.8	1.0	**14.8**
Travel time Savings @ 7 percent ($2016M)	0.3	0.3	0.3	0.2	0.2	**5.5**
Travel time Savings @ 3 percent ($2016M)	0.4	0.5	0.5	0.5	0.5	**9.4**

Source: CDOT Muller, AECOM

5.1.1.3 Travel Time Savings – Commercial Truck Drivers

The implementation of the I-25 Project will allow for the more efficient movement of freight due to lower levels of congestion and faster travel times through the assessment corridor. Travel time savings for commercial truck drivers has been captured in the overall freight operating savings which can be found in Section 5.1.2.2.

5.1.2 Reduction in Vehicle Operating Costs

5.1.2.1 Personal Vehicle Operating Savings

Personal vehicle operation savings were calculated on VMT avoided through the implementation of the I-25 Project as compared to the baseline scenario and applied to the benchmarked average operating costs per mile. The resulting benefit is $29.2M at a discount rate of 7% and $49.8 at a discount rate of 3%. An overview of VMT avoided and the discounted operating savings is shown in Table 36.

Table 36: Travel Times and Savings (2021-2040)

	2021	2025	2030	2035	2040	Total
Annual Car Trips Avoided (Million)	1.2	1.5	1.7	22.3	2.2	**35.6**
Annual VMT Avoided (Million)	9.1	10.6	12.6	161.6	16.2	**260.0**
Operating Savings ($M)	2.7	3.2	3.8	48.4	4.9	**77.9**
Operating savings 7% Discount ($2016M)	1.9	1.7	1.5	13.4	1.0	**29.2**
Operating savings 3% Discount ($2016M)	2.3	2.4	2.5	27.6	2.4	**49.8**

Source: Muller, AECOM

5.1.2.2 Freight Operating Savings

Freight operating savings were calculated using the annual operating hours avoided through the implementation of the I-25 Project as compared to the baseline scenario which were applied to commercial truck operating costs per hour. Freight operating benefits are $33.6 million at a discounted rate of 7% and $55.2 million at a discount rate of 3%. An overview of the reduction in commercial truck operating hours and associated operating savings is shown in Table 37.

Table 37: Commercial Truck Operating Savings (2021-2040)

	2021	2025	2030	2035	2040	Total
Commercial Truck Operating Hours	42,188	58,916	55,603	51,141	45,452	1,041,597
Operating Savings ($M)	3.2	4.6	4.5	4.2	3.8	**83.6**
Operating savings 7% Discount ($2016M)	2.3	2.5	1.7	1.2	0.8	**33.6**
Operating savings 3% Discount ($2016M)	2.8	3.5	2.9	2.4	1.9	**55.2**

Source: Muller, AECOM

5.1.2.3 Freight Inventory Savings

Freight inventory savings were calculated using the annual operating hours avoided through the implementation of the I-25 Project as compared to the baseline scenario which were applied to the per hour value of freight each truck is hauling and then multiplied by the hourly commercial discount rate, as derived from 4% per annum.

As shown in Table 38, the benefits from freight inventory savings total $0.04 million at a 7% discount rate and $0.07 million at a discount rate of 3%.

Table 38: Freight Inventory Savings (2021-2040)

	2021	2025	2030	2035	2040	Total
Inventory Savings ($M)	0.004	0.006	0.006	0.005	0.005	**0.11**
Inventory savings 7% Discount ($2016M)	0.003	0.003	0.002	0.001	0.001	**0.04**
Inventory savings 3% Discount ($2016M)	0.004	0.005	0.004	0.003	0.002	**0.07**

Source: Muller, AECOM

5.1.2.4 Bus Operating Savings

Bus operating savings were calculated using the annual operating hours avoided through the implementation of the I-25 Project as compared to the baseline scenario. This quantum of operating hours is then applied to the CDOT's hourly operating cost per bus. The benefit of bus operating savings is valued at $0.9 million at a discount rate of 7% and $1.5 million at a discount of 3%

An overview of the reduction of Bustang operating hours and associated operating savings is shown in Table 39.

Table 39: Bustang Express Bus Operating Savings (2021-2040)

	2021	2025	2030	2035	2040	Total
Total Operating Hours Avoided	665	692	715	731	746	14,252
Operating Savings ($M)	0.1	0.1	0.1	0.1	0.1	2.3
Operating savings 7% Discount ($2016M)	0.1	0.1	0.0	0.0	0.0	0.9
Operating savings 3% Discount ($2016M)	0.1	0.1	0.1	0.1	0.1	1.5

Source: AECOM, CDOT

5.1.3 Safety

Safety Benefits Summary		
	7% Discount ($2016)	3% Discount ($2016)
Mode Shift Safety Savings	$ 30.0	$ 51.8
Bike Mode Shift Safety Savings	$ 1.3	$ 2.2

Savings from accidents and fatalities avoided were calculated using the VMT avoidance generated by mode shift from single passenger vehicles to carpooling in HOV3+ , to transit, or to bicycle which was then applied to the DOT's benchmarked guidance on occurrence of accidents per VMT. The estimated number of accidents and fatalities were then broken down into NHTSA's MAIS categories, which were then monetized using the DOT's recommended monetary value as a fraction of VSL. Table 40 shows the annual savings generate under each MAIS category. The net present value of the safety benefit generated by the build scenario is $28.7M at a 7% discount rate, and $49.6M at a 3% discount rate.

Table 40: Savings from Accidents and Fatalities Avoided (2021-2040)

	2021	**2025**	**2030**	**2035**	**2040**	**Total**
Cost Savings from Fatalities Avoided ($2016M)	1.0	1.2	1.5	2.1	2.2	**32.2**
Cost Savings from MAIS 5 Accidents Avoided ($2016M)	0.4	0.5	0.7	0.9	1.0	**14.5**
Cost Savings from MAIS 4 Accidents Avoided ($2016M)	0.1	0.1	0.1	0.2	0.2	**2.8**
Cost Savings from MAIS 3 Accidents Avoided ($2016M)	0.3	0.4	0.5	0.6	0.7	**9.5**
Cost Savings from MAIS 2 Accidents Avoided ($2016M)	0.4	0.5	0.6	0.8	0.8	**12.0**
Cost Savings from Property Damage Only Accidents Avoided ($2016M)	0.2	0.2	0.3	0.4	0.4	**5.6**
Cost Savings from MAIS 1 Accidents Avoided ($2016M)	0.1	0.1	0.1	0.1	0.1	**1.9**
Total	2.4	3.0	3.7	5.1	5.4	**78.5**
Accidents and Fatalities Avoided Savings 7% Discount ($2016M)	1.7	1.6	1.4	1.4	1.1	**28.7**
Accidents and Fatalities Avoided Savings 3% Discount ($2016M)	2.1	2.3	2.5	2.9	2.7	**49.6**

Source: Muller, AECOM, DOT

5.1.4 Environmental Sustainability

Environmental Sustainability Benefits Summary		
	7% Discount ($2016)	3% Discount ($2016)
Idling Emissions Reductions	$ 0.2	$ 0.4
Idling CO2 Savings	$ 1.1	$ 1.1
Mode Shift Emissions Savings	$ 4.3	$ 6.9
Mode Shift CO2 Savings	$ 4.1	$ 4.1

Freight Idling Emissions Savings	$ 0.5	$ 0.9
Freight Idling CO2 Savings	$ 0.2	$ 0.2
Bike Mode Shift Emissions Savings	$ 0.2	$ 0.3
Bike Mode Shift CO2 Savings	$ 0.2	$ 0.2

Emissions reduction generated by the implementation of the I-25 Project were quantified through evaluation of reduced operating hours and of vehicle miles travelled avoidance. With the exception of CO_2 emissions, these were then monetized against the National Highway Traffic and Safety Administration's (NHTSA) CAFÉ standards for MY2017-MY2025 and escalated to $2016. CO_2 emissions were monetized following DOT guidelines which state that monetization within a benefit-costs analysis should follow the OMB guidance on the social cost of carbon which recommends the use of a 3% discount rate.

5.1.4.1 Emissions Savings from Reduced Operating Hours

The reduction in emissions for personal vehicles, commercial trucks and Bustang express bus was calculated through the evaluation of the decrease in vehicle hours across all vehicle types in the build scenario when compared to the baseline scenario. This reduction in emissions from decreased VHT across all vehicle types resulted in a benefit of $2.1 million at a 7% discount rate and $2.6 million at a 3% discount rate. A summary of the valuation of the emissions reduction generated by a decrease in operating hours across all vehicle types is shown in Table 41.

Table 41: Valuation of Emissions Benefit from Reduced VHT (2021-2040)

	2021	2025	2030	2035	2040	Total
	$M					
CO	-	-	-	-	-	-
NOX	0.03	0.04	0.04	0.04	0.03	0.7
PM2.5	0.02	0.03	0.03	0.03	0.03	0.6
PM10	0.02	0.03	0.03	0.03	0.03	0.6
VOC	0.00	0.00	0.00	0.00	0.00	0.1
CO2	0.06	0.09	0.10	0.11	0.12	2.0
Total Emissions Savings from VHT Reduction	0.1	0.2	0.2	0.2	0.2	4.0
Total Emissions Savings at 7% discount ($2016)	0.1	0.1	0.1	0.1	0.1	2.1
Total Emissions Savings at 3% discount ($2016)	0.1	0.2	0.1	0.1	0.1	2.6

Source: Muller, AECOM

5.1.4.2 Emissions Savings from VMT Avoided

The reduction in emissions associated with the avoidance of nearly 250 million vehicle miles travelled as a result of mode shift from single passenger vehicle to either carpooling (HOV3+) , to transit (Bustang express bus), or to bicycle resulted in a emissions avoidance benefit of $8.8 million at a 7% discount rate and $11.4 million at a 3% discount rate. A summary of the valuation of the emissions avoided as per a reduction in VMT due to mode shift is shown in Table 42.

Table 42: Valuation of Emissions Benefit from VMT Avoidance (2021-2040)

	2021	2025	2030	2035	2040	Total
	$M					
CO	-	-	-	-	-	-
NOX	0.07	0.02	0.03	0.03	0.03	0.73
PM2.5	0.03	0.04	0.05	0.06	0.06	0.97
PM10	0.54	0.40	0.47	0.30	0.30	8.74
VOC	0.01	0.01	0.01	0.01	0.01	0.16
CO2	0.23	0.24	0.31	0.40	0.45	6.67
Total Emissions Savings from VHT Reduction	0.88	0.71	0.87	0.80	0.84	17.27
Total Emissions Savings at 7% discount ($2016)	0.66	0.44	0.42	0.34	0.30	8.79
Total Emissions Savings at 3% discount ($2016)	0.76	0.54	0.57	0.46	0.41	11.44

Source: Atkins, AECOM

5.1.5 State of Good Repair

State of Good Repair Benefits Summary		
	7% Discount ($2016)	3% Discount ($2016)
Maintenance Savings	$ 15.6	$ 38.0
Residual Value	$ 15.1	$ 37.7

State of good repair benefit comprise benefits associated with residual value and maintenance savings associated with mode shift to carpooling, transit or bicycle. Together, these benefits are valued at $15.6 million at a 7% discount rate and $38.0 million at a 3% discount rate. A summary of the valuation of the state of good repair benefits due to residual value and mode shift is shown in Table 43.

Table 43: Valuation State of Good Repair Benefits (2021-2040)

	2021	**2025**	**2030**	**2035**	**2040**	**Total**
	$M					
Maintenance Savings	0.2	0.2	0.2	(0.2)	(0.2)	(0.0)
Residual Value					**76.6**	**76.6**
Total State of Good Repair Savings	0.2	0.2	0.2	(0.2)	76.4	**76.6**
Total State of Good Repair Savings at 7% discount ($2016)	0.1	0.1	0.1	(0.1)	15.1	15.6
Total State of Good Repair Savings at 3% discount ($2016)	0.2	0.1	0.1	(0.1)	37.6	38.0

Source: AECOM

E. 2040 RTP Amendment: Greeley-Evans Transportation Center

2040 Regional Transportation Plan

2040 RTP Amendment Request Form

2016

NFRMPO NORTH FRONT RANGE METROPOLITAN PLANNING ORGANIZATION

Due to NFRMPO Staff no later than 5:00 p.m. Friday, September 16, 2016

Requesting Agency Information		
Project Sponsor Agency: City of Greeley / GET	**Agency Contact:** Will Jones	**Telephone:** 970-350-9751
Mailing Address: 1200 A Street	**Email Address:** will.jones@greeleygov.com	
City: Greeley	**State:** CO	**ZIP Code:** 80631
Additional Financial Sponsors (if applicable): Colorado Department of Transportation		

Project Description	
Project Name: Greeley-Evans Transportation Center	**Jurisdiction(s):** City of Greeley
Project Location (attach map of project location as well): Greeley Evans Transit Office (map provided)	**Project Type (Mobility, Safety, Bridge, etc.):** Mobility
Project Limits (to and from): A Street South to RR Tracks and from GET office to 11th Avenue	**Project Length (miles):** N/A
Is this part of an ongoing project? If so, please describe. N/A	

Project Description:

The project will construct a regional transportation hub that will include the following amenities:

- Concrete bus pull-in's to facilitate current and future routes. Several lanes sized to accommodate larger over the road coaches.
- Shelters at respective pull-ins
- Building to include climate controlled indoor lobby to accommodate 30-40 seated customers, future customer service representative area, customer and separate driver restrooms and a small storage area.
- Electronic sign-age notating passenger information and departures
- Security camera system for both the park-n-ride lot and the transfer center and associated fiber connections
- Bike racks to facilitate inter-modal transportation from Poudre Trail as this regional trail very close to the proposed facility
- Way-Finding signs for the park-n-ride
- Lighting

This project will be extremely beneficial to the system and the region as it will not only facilitate current transit operations but also future expansion to include but not limited to regional routes.

Project Phase(s), if applicable (Construction, Design, ROW, etc.): N/A	**Fiscal Year(s) of Construction:** 2017

Reason for Amendment request:

There were previously not enough funds for construction; however, there are now enough funds (FASTER & local) to complete the project.

2040 RTP Goals, Objectives, Performance Measures, and Targets

Indicate which MPO Performance Measure(s) the project supports. If the project does not support one of the Goals listed below, please type "N/A" in both the Performance Measure(s) and Project Impact columns.

MPO Goal	Performance Measure(s)	Project Impact
Goal 1: Foster a transportation system that supports economic development and improves residents' quality of life	Air Quality	By improving non-motorized facilities it helps to entice new riders to utilize transit and hence potentially decrease the amount of people driving. Furthermore, this facility will facilitate future regional routes which will continue to help entice single occupant vehicles.
Goal 2: Provide a transportation system that moves people and goods safely, efficently, and reliably	Regionally significant congested corridors	This new facility will not immediately impact the performance measures associated with this goal but overall it will help facilitate the goal and long term facilitate regional routes that will help to reduce congestion on regionally significant corridors.
Goal 3: Provide a multi-modal system that improves accessibility and transportation system continuity	Non-motorized facilities per capita	As this is the construction of a new non-motorized facility it will have a direct impact on both the goal and performance measure.
Goal 4: Optimize operations of transportation facilities	Fixed Route ridership per capita within service area	The construction of this facility help to facilitate future regional routes which intern will increase ridership. This combined with the fact that the facility is much nicer than our current transfer center will only further entice people to utilize our transit system.

How does the project support the MPO Goal(s)? (Please attach all relevant data)

This project helps facilitates the above mentioned goals as well as the Regional Transit Element (RTE) of the Regional Transportation Plan (RTP). More specifically it will help to facilitate a regional route between Greeley, Windsor and Fort Collins.

Project Funding

Type (Federal, State, Local, Local Over Match, Other)	Source	Amount	Fiscal Year to be Programmed
State	CDOT FASTER	$ 2,815,000.00	FY17
Local	General Fund	$ 743,000.00	FY17
	Total Project Cost	$ 3,558,000.00 -	

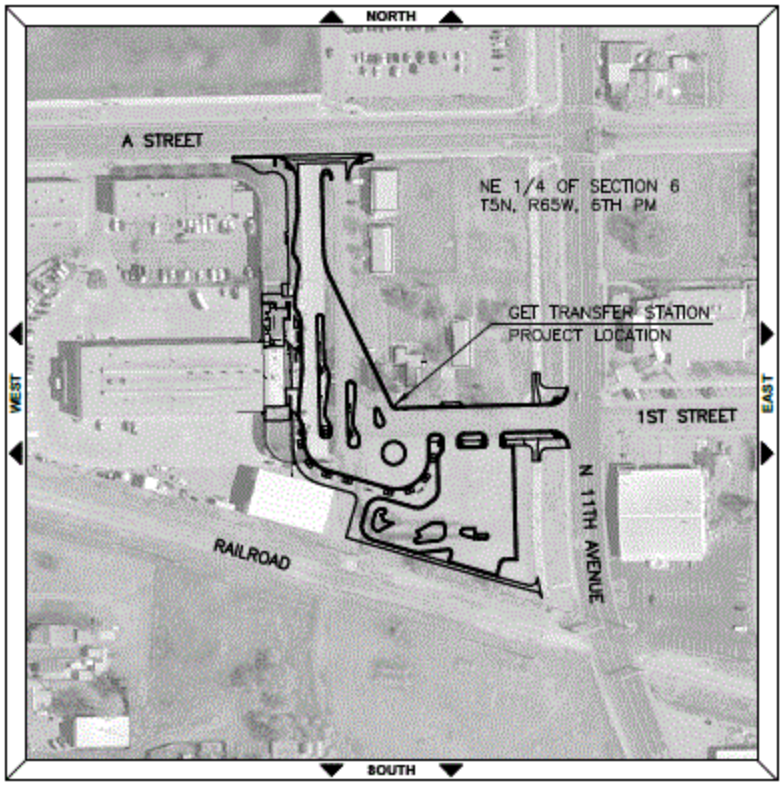
Supporting documentation attached or linked (optional): ***i.e. Studies, Master Plans, Comprehensive Plans***	

Submit completed form to Becky Karasko at bkarasko@nfrmpo.org no later than 5:00 p.m. on Friday, September 16, 2016.

GREELEY-EVANS TRANSIT TRANSFER STATION
FINAL DESIGN
WELD COUNTY, COLORADO

SCALE OF ORIGINAL DRAWINGS

ON PLAN 1" = 30'



VICINITY MAP

F. Amended List of NFRMPO Regional Travel Demand Model Projects

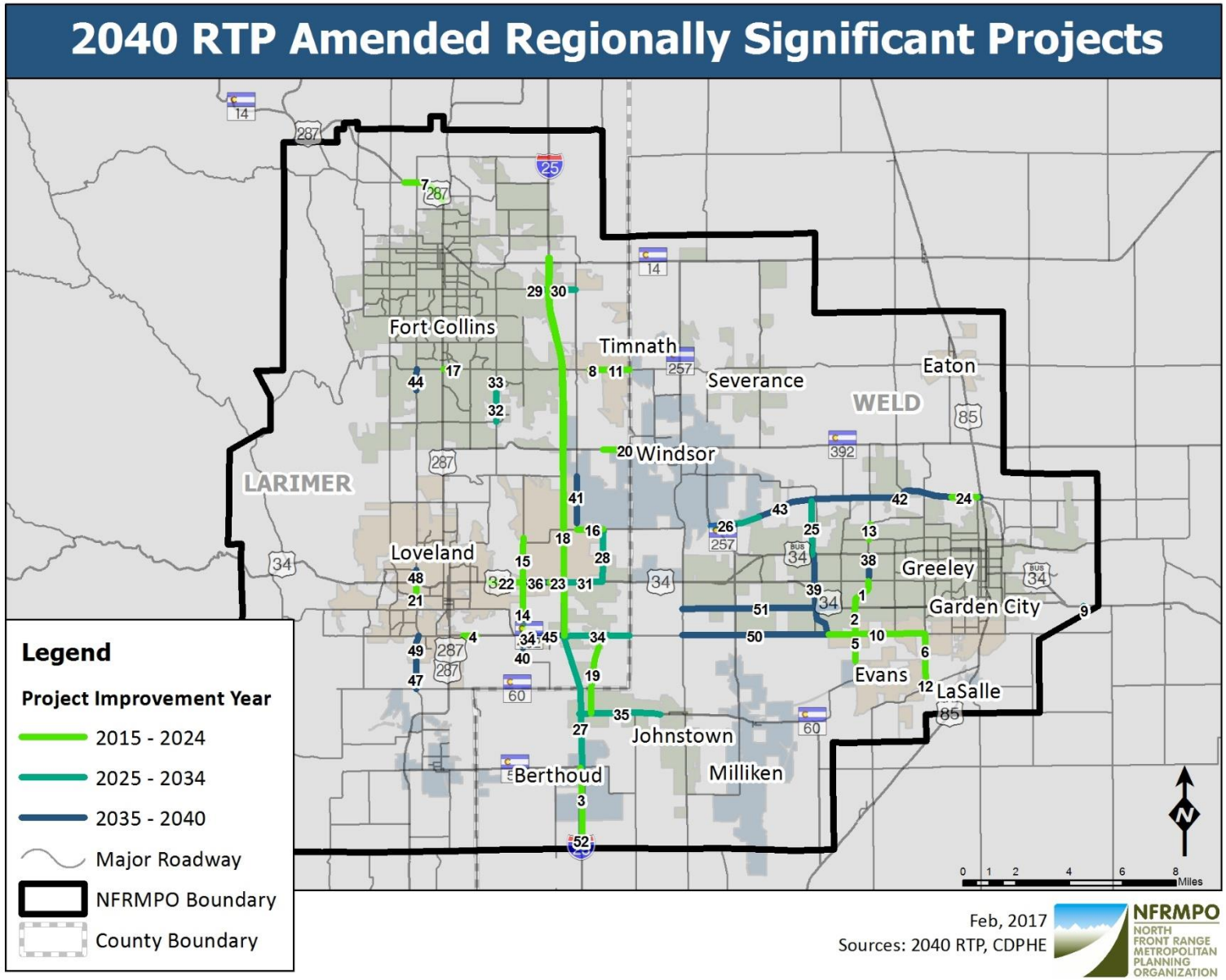


Table C-1 List of NFRMPO Regional Travel Demand Model Projects								
Map #	Street Name	From	To	Description of Improvement		Year of Improvement	Cost (thousands)	Funding Source
				Before	After			
2015-2024 Network								
1	**59th Avenue**	20th Street	US 34 Bypass	2	2 (Center turn lane)	2015	$1,500	Greeley – Capital Improvement Program
2	**65th Avenue**	US 34 Bypass	Weld CR 54	2	4	2015	$3,000	Greeley – Road Development Funds
3	**I-25 Southbound**	Approximately Mile Marker 247	Approximately Mile Marker 249	2	3	2015	$9,700	NFRMPO – STP-Metro Funds
4	**SH 402**	St. Louis Avenue	Boise Avenue	2	4	2015	$6,000	Loveland – Transportation Capital Improvement Plan Funds; CDOT
5	**65th Avenue**	37th Street	49th Street	2	4	2016	$1,000	Evans – Capital Projects Street Fund Future Development
6	**35th Avenue**	37th Street	49th Street	2	4	2016	$1,000	Evans – Capital Projects Street Fund Future Development
7	**US 287**	Shields Street	LaPorte Bypass	2	4	2016	$22,000	CDOT – FASTER Safety/RAMP
8	**Harmony Road**	RR tracks	Three Bell Parkway (Larimer CR 3)	2	4	2017	$3,325	Timnath – General Fund/Adjacent Development
9	**Weld County Parkway (Weld CR 49)**	US 34	I-76	0-4	4 (Center turn lane)	2017	$12,500	Weld County – General Fund
10	**37th Street**	35th Avenue	Two Rivers Parkway	2	4	2018	$1,500	Evans – Capital Projects Street Fund Future Development

Table C-1 List of NFRMPO Regional Travel Demand Model Projects								
Map #	Street Name	From	To	Description of Improvement		Year of Improvement	Cost (thousands)	Funding Source
				Before	After			
2015-2024 Network (cont.)								
11	**Harmony Road**	Three Bell Parkway (Larimer CR 3)	Lathem Parkway (Larimer CR 1)	2	4	2019	$3,500	Timnath – General Fund/Adjacent Development
12	**35th Avenue**	49th Street	Weld CR 35 & Weld CR 394	0	4	2020	$1,500	Evans – Capital Projects Street Fund Future Development
13	**59th Avenue**	4th Street	C Street	2	4	2020	$2,400	Greeley – Road Development Funds
14	**Boyd Lake Avenue**	Larimer CR 20C	US 34	2	4	2020	$1,988	Loveland – Transportation Capital Improvement Plan Funds
15	**Boyd Lake Avenue**	US 34	Canal	2	4	2020	$2,732	Loveland – Centerra Metro District
16	**Crossroads Boulevard**	Centerra Parkway	Larimer CR 3	2	4	2020	$2,365	Loveland – Transportation Capital Improvement Plan Funds
17	**Harmony Road**	College Avenue	Boardwalk Drive	4	6	2020	$9,349	Fort Collins – Street Oversizing Fund, Developer Contribution, Sales Tax
18	**I-25**	SH 402	SH 14	4	6	2020	$250,000	CDOT – Regional Priority Program, FASTER, Surface Treatment, TC Contingency, HPTE, Strategic Transit, RoadX, Strategic Funds; Federal – FAST Freight State Allocation, TIGER; Local Funds; Private Funds; Flexible Funds – RTP, Other STBG, CMAQ; Tolling Revenue
19	**Larimer CR 3**	Weld CR 50	Larimer CR 18	0	2	2020	$7,605	Johnstown - Johnstown/Adjacent Developers

Table C-1 List of NFRMPO Regional Travel Demand Model Projects								
Map #	Street Name	From	To	Description of Improvement		Year of Improvement	Cost (thousands)	Funding Source
				Before	After			
2015-2024 Network (cont.)								
20	**SH 392**	17th Street	Larimer CR 3	2	4	2020	$1,500	Windsor - Road Impact Fee and Adjacent Development
21	**Taft Avenue**	Arkins Branch	US 34	4	4 (Center turn lane and bike lanes)	2020	$10,509	Loveland – Transportation Capital Improvement Plan Funds
22	**US 34**	Denver Avenue	Boyd Lake Avenue	4	6	2020	$6,506	Loveland – Transportation Capital Improvement Plan Funds; CDOT; STBG
23	**US 34**	Rocky Mountain Avenue	I-25	4	6	2020	$2,066	Loveland - Centerra Metro District
24	**O Street**	11th Avenue	Weld CR-37	2	4	2021	$7,222	STBG; Greeley – Road Development Fund; Weld County – General Fund; Adjacent Developers
2025-2034 Network								
25	**83rd Avenue**	US 34 Business (10th Street)	US 34 Bypass	2	4	2025	$5,900	Greeley – Road Development Funds
26	**Crossroads Boulevard**	Great Western Drive	SH 257	0	2 (Center turn lane)	2025	$5,000	Windsor - Road Impact Fee and Adjacent Development
27	**I-25**	SH 56	SH 402	4	6	2025	$84,000	CDOT – Regional Priority Program, FASTER, Surface Treatment, TC Contingency, Strategic Transit, Strategic Funds; Federal – FAST Freight State Allocation; Local Funds; Flexible Funds – RTP, Other STBG, CMAQ; Tolling Revenue

Table C-1 List of NFRMPO Regional Travel Demand Model Projects								
Map #	Street Name	From	To	Description of Improvement		Year of Improvement	Cost (thousands)	Funding Source
				Before	After			
2025-2034 Network (Cont.)								
28	**Larimer CR 3**	US 34	Crossroads Boulevard	0	2	2025	$8,073	Loveland – Transportation Capital Improvement Plan Funds
29	**Prospect Road**	Summit View Drive	I-25	2	4	2025	$7,500	Fort Collins - Street Oversizing Fund, Developer Contribution, Sales Tax
30	**Prospect Road**	I-25	Growth Management Area Boundary	2	4	2025	$3,000	Fort Collins - Street Oversizing Fund, Developer Contribution, Sales Tax
31	**US 34**	Centerra Parkway	Kendall Parkway (Larimer CR 3E)	4	6	2025	$5,568	Loveland – Centerra Metro District
32	**Timberline Road**	Trilby Road	Kechter Drive	2	4	2025	$15,000	Fort Collins - Street Oversizing Fund
33	**Timberline Road**	Kechter Drive	Stetson Creek Drive	2	4	2025	$7,755	Fort Collins – Street Oversizing Fund, NFRMPO – STBG
34	**Larimer CR 18**	I-25 Frontage Road	Weld CR 13	2	4	2030	$13,890	Johnstown; Adjacent Developers
35	**SH 60**	I-25	Weld CR 15	2	4	2030	$17,363	Johnstown; CDOT
36	**US 34**	Boyd Lake Ave.	Rocky Mountain Ave.	2	2	2030	$4,291	Loveland – General Fund - CDOT
37	**US 34**	I-25	Centerra Parkway	4	6	2030	$2,543	Loveland – Transportation Capital Improvement Plan Funds; CDOT

Table C-1 List of NFRMPO Regional Travel Demand Model Projects								
Map #	Street Name	From	To	Description of Improvement		Year of Improvement	Cost (thousands)	Funding Source
				Before	After			
2035-2040 Network								
38	**59th Avenue**	US 34 Bypass	20th Street	2	4	2035	$3,500	Greeley – Road Development Funds
39	**83rd Avenue**	Weld CR 54	Weld CR 64	2	2 (Center turn lane)	2035	$7,000	Greeley - Road Development Funds
40	**Boyd Lake Avenue**	SH 402	Larimer CR 20E	2	4	2035	$6,300	Loveland – Transportation Capital Improvement Plan Funds
41	**N. Fairground Avenue (Larimer CR 5)**	Rodeo Road	71st Street (Larimer CR 30)	2	4	2035	$3,000	Loveland – Transportation Capital Improvement Plan Funds
42	**O Street**	SH 85	83rd Avenue	2	2 (Center turn lane)	2035	$4,700	Greeley – Road Development Funds
43	**O Street**	83rd Avenue	Weld CR 23	0	2 (Center turn lane)	2035	$7,400	Greeley – Road Development Funds
44	**Shields Street**	Fossil Creek Drive	Harmony Road	2	4	2035	$6,500	Fort Collins – Street Oversizing Fund
45	**SH 402**	Larimer CR 9	I-25	2	4	2035	$33,378	Loveland – Transportation Capital Improvement Plan Funds; CDOT
46	**SH 402**	US 287	St. Louis Avenue	2	4	2035	$3,000	Loveland – Transportation Capital Improvement Plan Funds; CDOT
47	**Taft Avenue/ Larimer CR 17**	SH 60/Larimer CR 14	28th Street Southwest/ Larimer CR 16	2	4	2035	$6,123	Loveland – Transportation Capital Improvement Plan Funds

Table C-1 List of NFRMPO Regional Travel Demand Model Projects								
Map #	Street Name	From	To	Description of Improvement		Year of Improvement	Cost (thousands)	Funding Source
				Before	After			
2035-2040 Network (Cont.)								
48	**Taft Avenue**	US 34	22nd Street	4	4 (Center turn lane and bike lanes)	2035	$6,123	Loveland – Transportation Capital Improvement Plan Funds
49	**Taft Avenue**	28th Street Southwest	14th Street Southwest	4	4 (Center turn lane and bike lanes)	2035	$3,920	Loveland – Transportation Capital Improvement Plan Funds
50	**Weld CR 54**	35th Avenue	Weld CR 17	2	2 (Center turn lane)	2035	$6,800	Greeley – Road Development Funds
51	**Weld CR 56**	US 34 Bypass	Weld CR 17	0	2	2035	$21,000	Greeley – Road Development Funds
52	**I-25**	Weld CR 38	SH 56	4	6	2040	$85,000	CDOT Strategic Projects, Strategic Transit, Local Funds, Flexible Funds – RTP, Other STP Metro, CMAQ, FASTER Safety

G. Environmental Mitigation

NFRMPO staff analyzed the potential impacts of transportation projects according to the environmental features detailed in ***Chapter 5***. The projects added during the *2040 RTP Amendment* Call for Projects have been added. A complete list of projects is included in ***Appendix C***, section F. Transportation projects included are from the Amended *2040 RTP* Regionally Significant Projects list. Project impacts are shown in **Table C-2**. Total columns show the number of projects in each category; for example, there are four intersection projects which impact at least one resource and 14 projects within Flood Zones. It is important to note projects may be counted in more than one category as they may impact more than one environmental resource. As a result, column totals may be more than the total number of planned projects.

Transportation projects affect each environmental resource differently, depending on the resource's location within the region. The most impacted resource is Energy Production due to the span of the Wattenberg Gas Field under much of Weld County. Wetlands may potentially be affected by 22 proposed projects. Only one Historical and Archeological Site may be impacted by these projects. Three transportation projects will be located atop the Laramie-Fox Hills aquifer (Water Resources), while 14 projects will be located within a 100-year flood zone according to the available FEMA data. Four projects will be built within potential Conservation Areas. As each project moves forward, the respective agencies/jurisdictions will need to study individual project impacts on each environmental resource.

Table C-2: Environmental Mitigation Analysis

Project Type (Total Number of Projects Planned)	Number of Projects Potentially Impacting Resources[1]					
	Historical and Archeological Sites	Flood Zones	Wetlands	Conservation Areas	Energy Production	Total Impacts
Total	1	13	18	4	25	61

Figures C-1 through C-4 map the transportation projects in relation to the region's environmental resources.

[1] Projects may be present in more than one column, reflecting the multiple resources the project may impact.

Figure C-2: Historic and Archaeological Sites (2040 RTP Amendment #1)

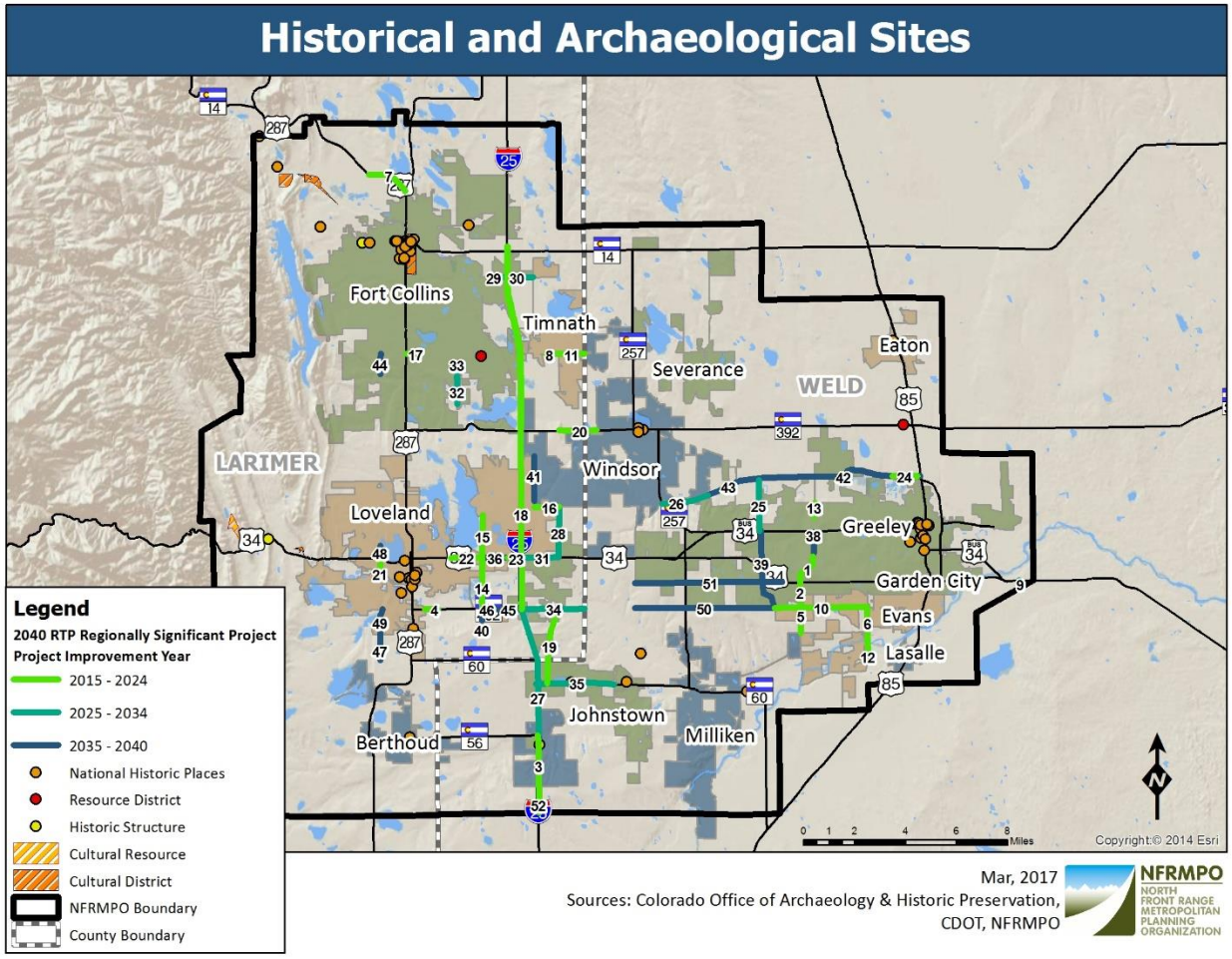


Figure C-3 Flood Plains (2040 RTP Amendment #1)

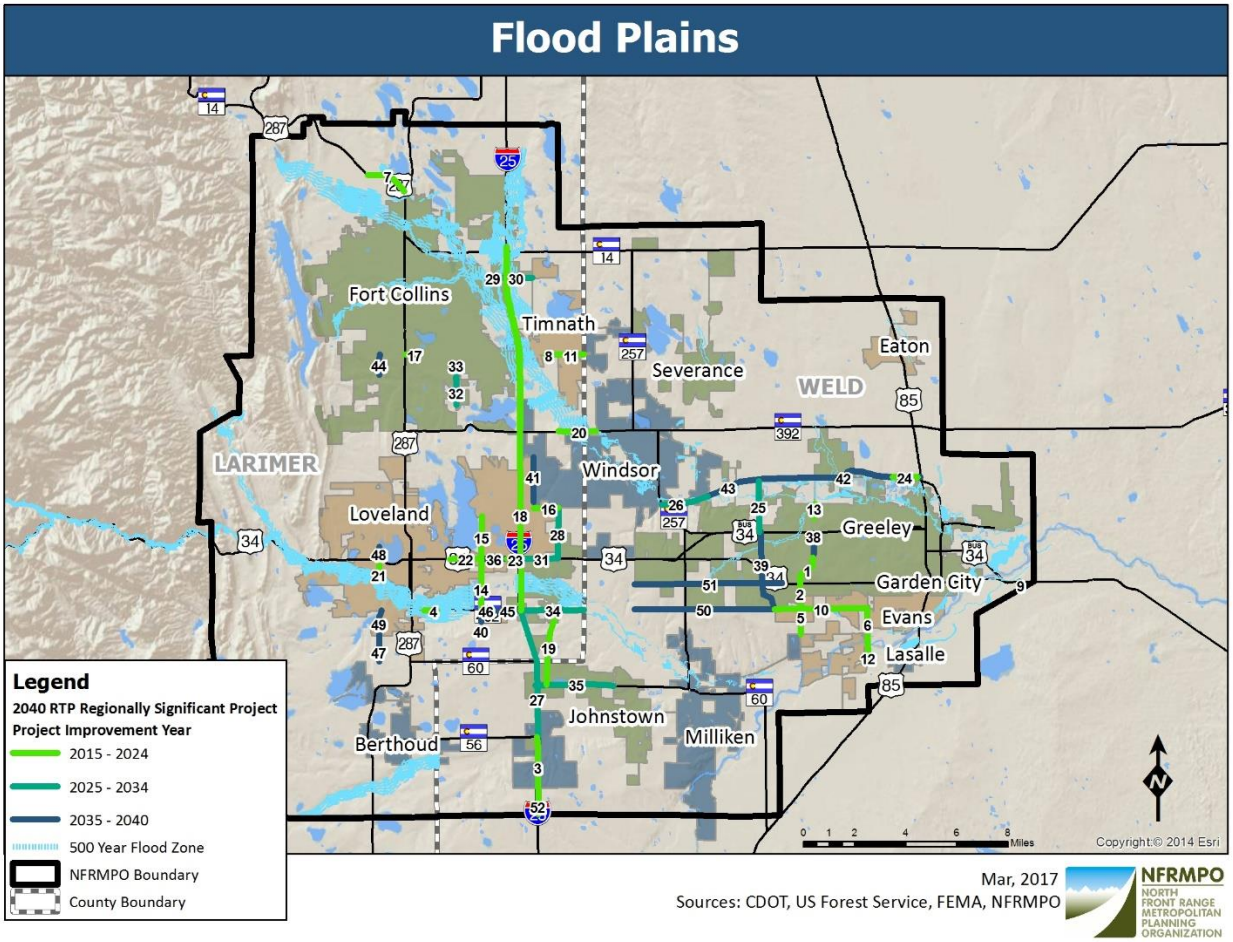


Figure C-4 Water Resources (2040 RTP Amendment #1)

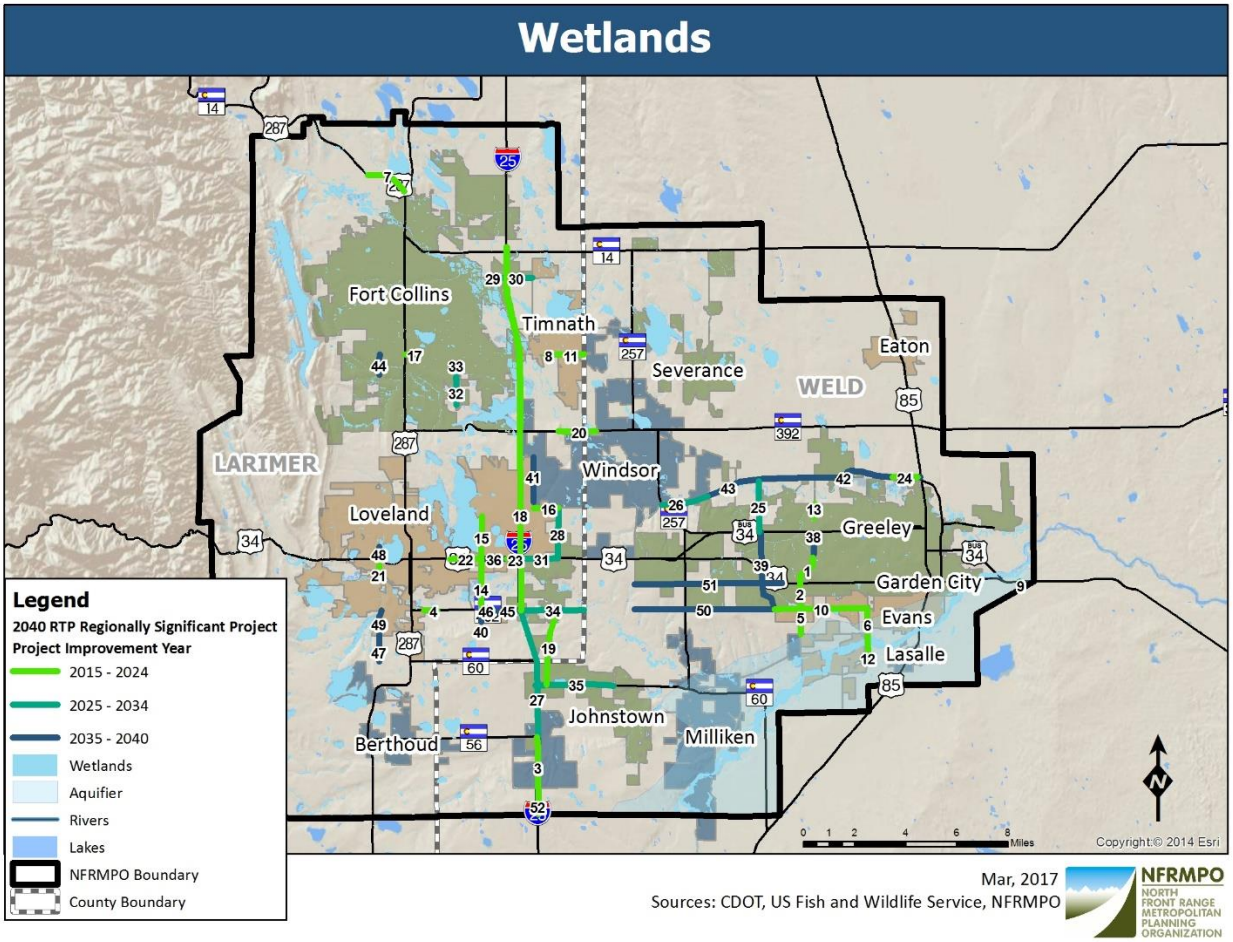


Figure C-5 Conservation Areas (2040 RTP Amendment #1)

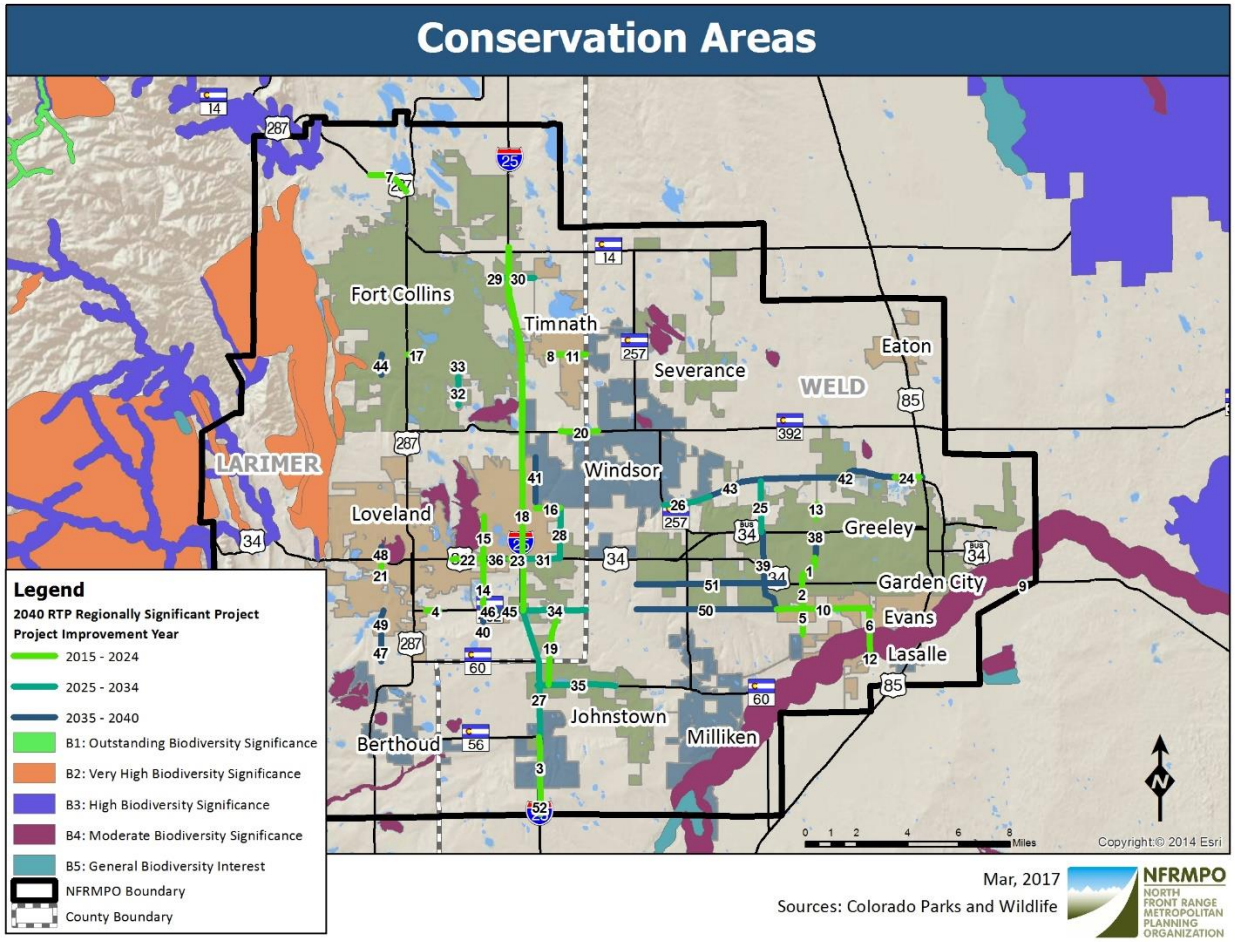
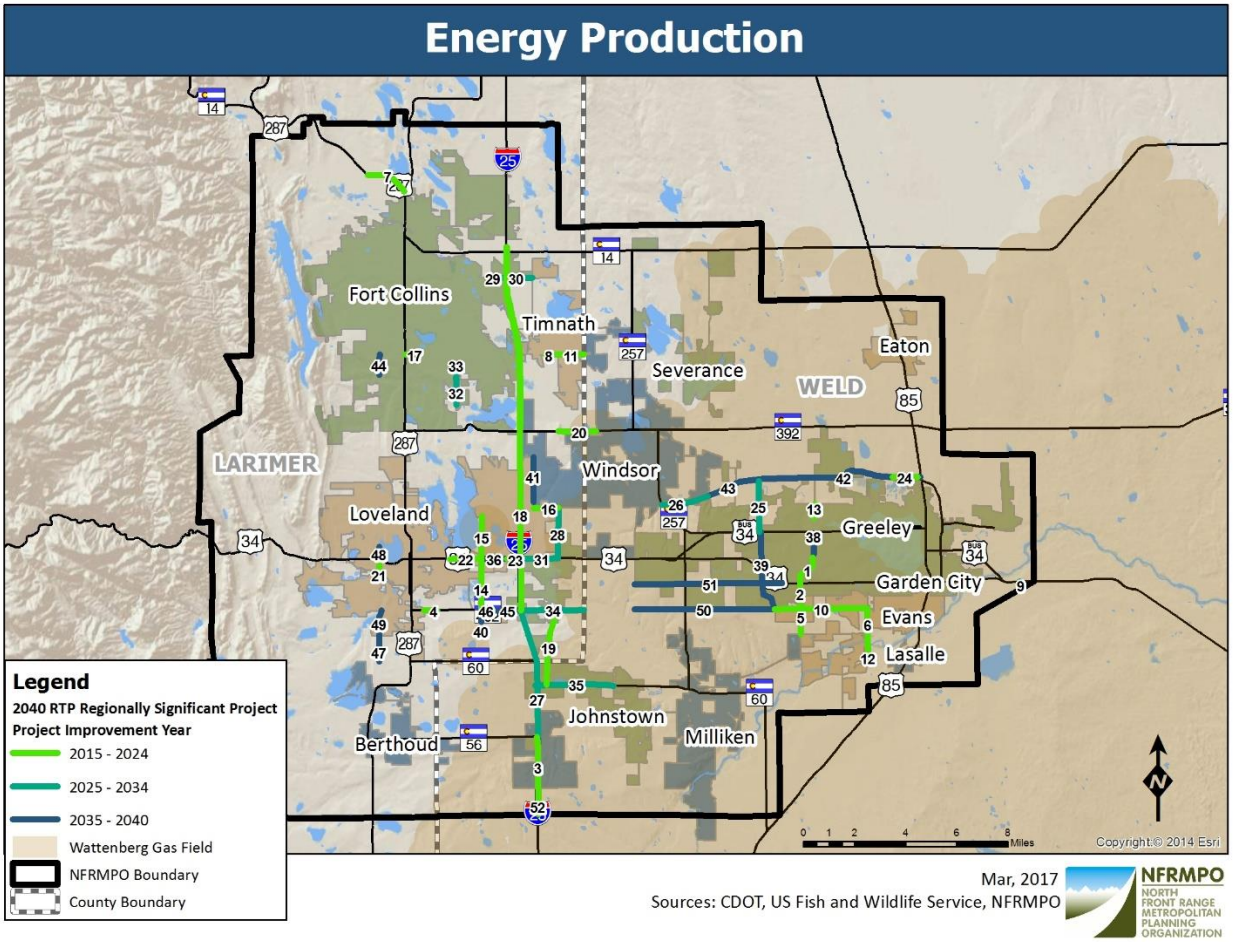


Figure C-6 Energy Production (2040 RTP Amendment #1)



H. Environmental Justice Analysis

As explained in ***Chapter 3,*** Executive Order 12898 requires federal agencies to address adverse human health and environmental impacts or effects of its programs on Environmental Justice (EJ) populations. An EJ analysis is required on all projects included in the 2040 RTP Amendment to determine these impacts. Projects within ¼-mile of or adjacent to an EJ population are considered to be EJ projects. If it does not, the project is considered Non-EJ. The benefits and burdens of each project must be examined on all EJ and Non-EJ projects, and an overall analysis on projects in the RTP determines if it meets EJ requirements. The analysis process follows the three guiding principles outlined in DOT Order 5610.2(a), as discussed in ***Chapter 3***.

Table C-3 includes all projects on Regionally Significant Corridors (RSCs) in the North Front Range Region that are modeled for air quality purposes. **Figure C-6** shows all of the EJ and Non-EJ projects. An overall EJ analysis of projects included in the 2040 RTP Amendment shows 71.2 percent of projects are being completed in EJ areas, while 33.8 percent of the overall funding is being spent in EJ areas. Non-EJ areas contain 28.8 percent of projects being completed and 66.2 percent of overall funding spent.

Table C-3: Amended 2040 RTP EJ Projects (FY2016 $ shown in thousands)

Totals	EJ Areas	Non-EJ Areas	Total
Total Number of Projects	37	15	**52**
	71.2%	28.8%	**100%**
Total Investment Amount	$270,221	$530,083	**$800,304**
	33.8%	66.2%	**100%**

Figure C-7: 2040 RTP Environmental Justice Analysis