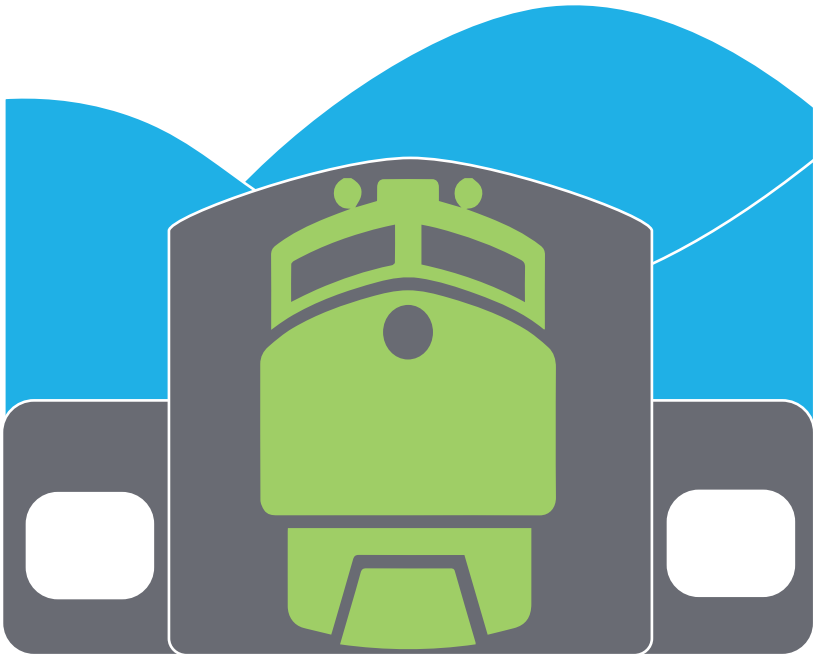
Freight Northern Colorado

Adopted August 1, 2019



North Front Range
Metropolitan
Planning
Organization

North Front Range Metropolitan Planning Organization

2019 Freight Northern Colorado (FNC) Plan

Prepared by:
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Adopted:
August 1, 2019

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North Front Range Metropolitan Planning Organization

RESOLUTION NO. 2019-19
OF THE NORTH FRONT RANGE TRANSPORTATION & AIR QUALITY PLANNING COUNCIL
ADOPTING THE 2019 FREIGHT NORTHERN COLORADO (FNC) PLAN

WHEREAS, the North Front Range Transportation & Air Quality Planning Council (NFRMPO) is designated as the Metropolitan Planning Organization (MPO) in cooperation with local elected officials and is authorized and required to carry out the continuing, cooperative, and comprehensive ("3C") transportation planning process that results in plans and programs that consider all transportation modes and supports community development, economic development, and social goals; and

WHEREAS, 23 CFR 450.316 requires major freight distribution routes and the enhancement of the freight system be considered as part of the planning process for all metropolitan areas; and

WHEREAS, FNC is the first regional freight plan for the NFRMPO region; and

WHEREAS, FNC will constitute the freight element of the 2045 Regional Transportation Plan (RTP);

NOW, THEREFORE, BE IT RESOLVED THAT the North Front Range Transportation & Air Quality Planning Council adopts the FNC to guide future regional freight transportation planning efforts for improvement of the overall freight system within the NFRMPO region.

Passed and adopted at the regular meeting of the North Front Range Transportation & Air Quality Planning Council held this 1st day of August, 2019.

Kristie Melendez, Chair

ATTEST:

Suzette Mallette, Executive Director

Acknowledgements

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Acronym List

A

AADT – Annual Average Daily Traffic
AADTT – Annual Average Daily Truck Traffic
AAR – Association of American Railroads
AASHTO – American Association of State Highway Transportation Officials
ATCT – Air Traffic Control Tower
ATRI – American Transportation Research Institute

B

BEA – US Bureau of Economic Analysis
BNSF – BNSF Railway
BUILD – Better Utilizing Investments to Leverage Development *(formerly TIGER)*

C

CBO – Congressional Budget Office
CDOT – Colorado Department of Transportation
CDPHE – Colorado Department of Public Health and Environment
CFC – Colorado Freight Corridor
CFP – Colorado Freight Plan
CMAQ – Congestion Mitigation and Air Quality
CMP – Congestion Management Process
CO – Carbon Monoxide
CO_2 – Carbon Dioxide
COGCC – Colorado Oil and Gas Conservation Commission
CR – County Road
CRFC – Critical Rural Freight Corridor
CTC – Colorado Transportation Commission
CUFC – Critical Urban Freight Corridor
CVLZ – Commercial Vehicle Load Zone
CVP – Commercial Vehicle Pilot

D

DDA – Downtown Development Authority
DEN – Denver International Airport
DOLA – Department of Labor Analysis
DOR – Department of Revenue
DOT –Department of Transportation
DSRC – Dedicated Short-Range Communication

E

EDC - Every Day Counts
EPA – Environmental Protection Agency

F

FAA – Federal Aviation Administration
FAC – Freight Advisory Council
FAF – Freight Analysis Framework
FAST Act– Fixing America's Surface Transportation Act (December 2015)

FASTLANE – Fostering Advancements in Shipping and Transportation for Long-Term Achievement of National Efficiencies
FHWA – Federal Highway Administration
FMCSA – Federal Motor Carrier Safety Administration
FNC – Freight Northern Colorado
FNL – Northern Colorado Regional Airport
FRA – Federal Railroad Administration
FRATIS – Freight Advanced Traveler Information Systems
FY – Fiscal Year

G

GOPMT – Goals, Objectives, Performance Measures, and Targets
GWRR – Great Western Railway of Colorado
GXY – Greeley-Weld County Airport

H

I

I2V – Infrastructure to Vehicle
INFRA – Infrastructure for Rebuilding America Grant Program *(formerly FASTLANE)*
ITE – Institute of Transportation Engineers
ITS – Intelligent Transportation Systems

J

JIT – Just-in-Time Production

K

L

LCR – Larimer County Road
LTL – Less-than-Truckload

M

MAP-21 – Moving Ahead for Progress in the 21st Century (July 2012)
MCF – Thousands of Cubic Feet
MCSAP – Motor Carrier Safety Assistance Program
MOVES2014b –Motor Vehicle Emissions Simulator 2014
MOW – Maintenance of Way
MP – Mile post
MPO – Metropolitan Planning Organization

N

NAPSR – National Association for Pipeline Safety Representatives
NATSO – National Association of Truck Stop Operators
NBI – National Bridge Inventory
NCHRP - National Cooperative Highway Research Program
NCFRP - National Cooperative Freight Research Program
NDB – Non-Directional Radio Beacon
NFN – National Freight Network
NFR – North Front Range
NFRMPO – North Front Range Metropolitan Planning Organization
NFRT&AQPC – North Front Range Transportation and Air Quality Planning Council
NHFN – National Highway Freight Network
NHFP – National Highway Freight Program
NHS – National Highway System
NO_x – Nitrogen Oxide
NPIAS – National Plan of Integrated Airport System NPIAS – National Plan of Integrated Airport Systems
NPMRDS – National Performance Measurement Research Dataset

O

OEDIT – Colorado Office of Economic Development and International Trade
OLI – Operation Lifesaver, Inc.
OPS – Office of Pipeline Safety

P

P3 – Public Private Partnership
PAB – Private Activity Bonds
PD – Policy Directive
PEL – Planning and Environmental Linkages
PFN – Primary Freight Network
PHFS – Primary Highway Freight System
PHMSA – Pipeline and Hazardous Materials Safety Administration
PM – Performance Measure
PTC – Positive Train Control

Q

R

RAQC – Regional Air Quality Council
RESCUME - Response, Emergency Staging and Communications, Uniform Management and Evacuation
ROW – Right-of-Way
RRIF – Railroad Rehabilitation and Improvement Financing
RSC – Regionally Significant Corridors
RTE – Regional Transit Element
RTP – Regional Transportation Plan
RWIS – Road and Weather Information Service

S

SAFETEA-LU – Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (August 2005)
SH – State Highway
SFPRP – 2018 Colorado Freight and Passenger Rail Plan
SOV – Single Occupant Vehicle
STBG – Surface Transportation Block Group
SWC&FRPRC – Southwest Chief and Front Range Passenger Rail Commission

T

TAC – Technical Advisory Committee
TEU – Twenty-Foot Equivalent
TIFIA – Transportation Infrastructure Finance and Innovation Act
TIGER – Transportation Investment Generating Economic Recovery
TIM – Traffic Incident Management
TIMP – Traffic Incident Management Plan
TPM – Transportation Performance Management
TPA – Truck Parking Assessment
TPR – Transportation Planning Region
TRB - Transportation Research Board
TTI – Travel Time Index
TTR – Travel Time Reliability
TTTR – Truck Travel Time Reliability
TSM&O – Transportation Systems Management and Operations

U

UPRR – Union Pacific Railroad
USDOT – US Department of Transportation
UZA – Urbanized Area

V

V2I – Vehicle to Infrastructure
V2V – Vehicle to Vehicle
VMS – Variable Message Sign
VMT – Vehicle Miles Traveled
VOC – Volatile Organic Compound

W

WCR – Weld County Road
WYDOT – Wyoming Department of Transportation

X

Y

Z

Chapter 1

Introduction

Chapter 1: Introduction

Background

Freight transportation is a key driver of economic success in the North Front Range. With large population, housing, and business growth on the horizon, an increased focus on freight concerns is needed. The North Front Range Metropolitan Planning Organization (NFRMPO) is working to integrate freight considerations into the transportation planning process.

Freight, rail, truck, and passenger vehicles are operating in an increasingly congested region. Industry in agriculture, education, medicine, resource extraction, and tourism coexist with an aging population and heavy pedestrian and bicycle traffic. Understandably, concerns about regional freight transportation are becoming more complex.

Historically, freight issues in Colorado have not received priority in the planning process. The current federal transportation bill, the Fixing America's Surface Transportation (FAST) Act signed into law in December 2015, carried forward the national freight policy created in Moving Ahead for Progress in the 21st Century (MAP-21) and encourages states to create freight plans and freight advisory councils.

Northern Colorado is located at the crossroads of the Great Plains and the foothills of the Rocky Mountains. NFRMPO staff oversees freight system planning in the Fort Collins Urbanized Area (UZA) and the Greeley UZA, shown in **Figure 1-1**. The NFRMPO area covers approximately 675 square miles and 15 local governments.

***Freight**—the goods transported by air, rail, truck, pipeline or water.*

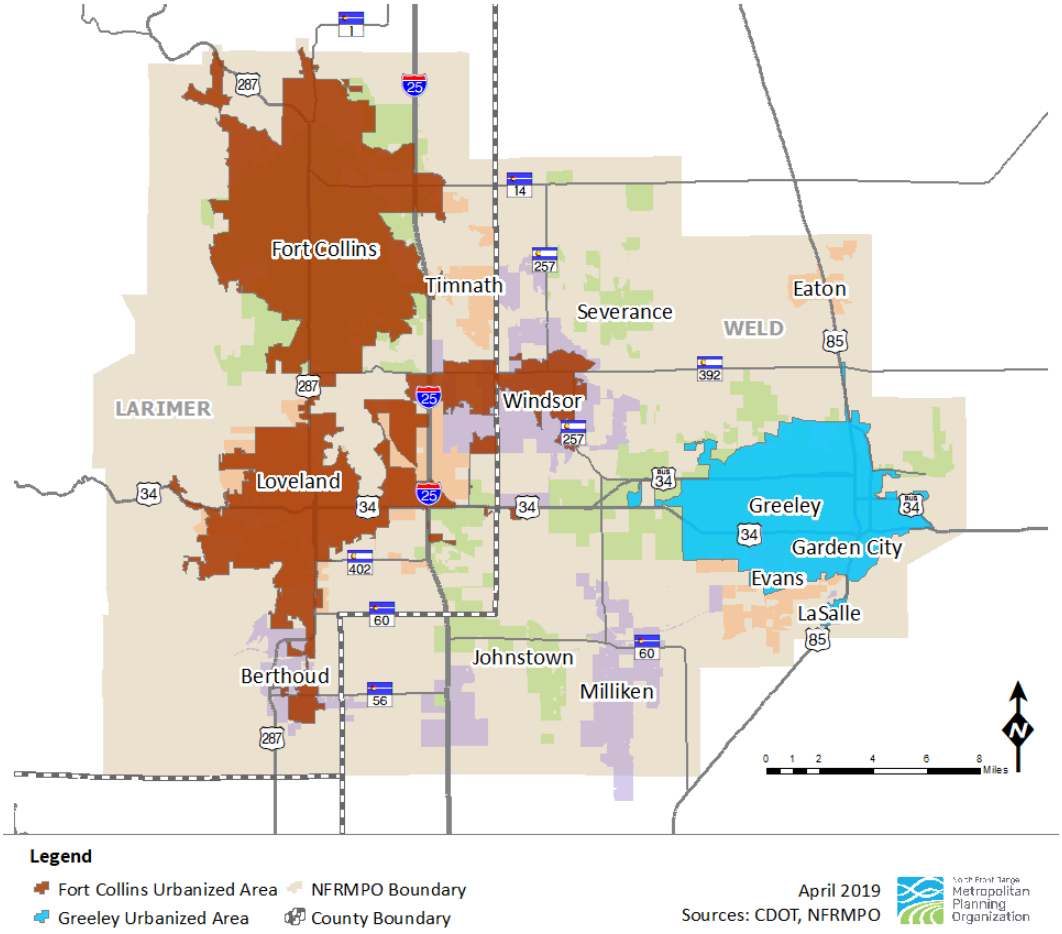
Transporting freight is a key component of the Northern Colorado regional economy. The region is located at the crossroads of agricultural and technology industry sectors. The region is home to two US 500 Manufacturing Companies: Pilgrim's Pride Corporation in Greeley (104) and Woodward Governor in Fort Collins (363),[1] which is also the region's only Fortune 1000 Company.[2] These companies, and several other major institutions anchor logistics operations in the region. Across the US, goods move move in two key ways:

- From production center to export center, as is the case of agricultural products from the region.
- From ports along the coast to distribution centers throughout the country, as is the case with containers arriving from Asia, through the Ports of Los Angeles and Long Beach, the only two

[1] Industry Week, 2018.
[2] Metro Denver Economic Development Corporation, 2018.

U.S. ports ranked in the world's top 20 container ports as measured in Twenty-Foot Equivalent Units (TEUs).[3]

Figure 1-1: NFRMPO Planning Area



The Federal Highway Administration (FHWA) estimates by 2045 the nation's transportation system will handle cargo valued at $1,461 per ton, when adjusted for inflation, compared with $1,044 per ton in 2012.[4] Volumes, in tons, will increase by nearly 41 percent over 2015 levels by 2040 from 17.9B to 25.3B, respectively. These huge increases in freight movement will place even greater demands on the nation's already strained transportation system. It is critical for transportation planning agencies throughout the country to integrate freight considerations into their long-range planning processes. It is clear a variety of strategies are needed to address the challenges surrounding the projected growth of freight transportation.

[3] Bureau of Transportation Statistics: America's Container Ports: Linking Markets at Home and Abroad, 2011.
[4] USDOT Freight Facts and Figures 2017, 2018.

Purpose/Role

The purpose of Freight Northern Colorado (FNC) is to provide a guide for the improvement of the overall freight system within the NFRMPO region. FNC serves as the freight component of the 2045 Regional Transportation Plan (RTP), providing a holistic view of freight and industry in the region. While not required by the FAST Act, having a regional freight plan positions the region to have a list of potential projects and a foundation for the pursuit of funds for projects that improve freight movement.

FNC is organized into five chapters:

1. Introduction
2. Existing Conditions
3. Plans, Studies, and Programs
4. Emerging Trends and Opportunities
5. Implementation

The overarching goal of FNC is to enhance the safety, mobility, and air quality of regional freight movements by creating a comprehensive freight system review within Northern Colorado. This document provides an overview of the current freight system, analyzes the system's performance, and summarizes major trends emerging regionally, nationally, and internationally in freight. This document also identifies future programs, policies, and projects for a sustainable freight system in Northern Colorado.

Vision

A safe, efficient, coordinated, and reliable system for the movement of goods in Northern Colorado.

Outreach

FNC draws from the extensive community and stakeholder engagement of recent and ongoing local, regional, and state freight planning efforts. This includes local agency transportation plans and studies, the Truck Traffic in the Northeastern Quadrant of the NFRMPO Region: Sub-Regional Study, feedback from a freight industry survey conducted for the Colorado Freight Plan, and the Colorado Freight Advisory Council (FAC), among others. NFRMPO staff also engaged with freight industry stakeholders at workshops related to truck mobility and parking hosted by the Colorado Department of Transportation (CDOT).

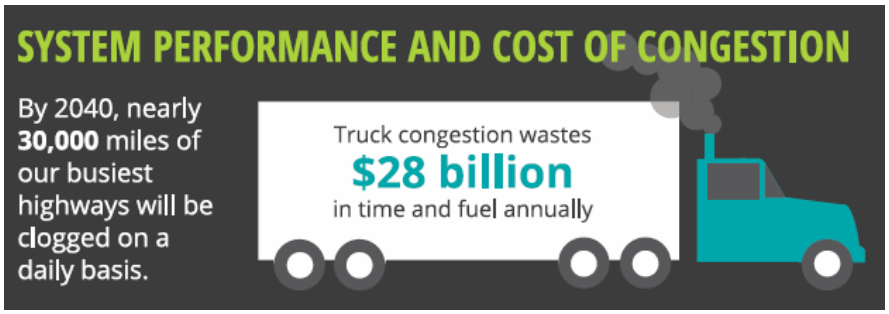
Benefits of Freight

Freight transportation is what brings Northern Colorado's goods to market and supports the basic needs of all Northern Colorado industries and households. According to the U.S. Bureau of Economic Analysis (BEA), one-third of Colorado's gross state product is generated by freight and freight-reliant

industries. Similarly, nearly one in five Colorado workers are employed in freight-reliant industries dependent on moving goods, products, and packages as a daily core business function.[5] Infrastructure designed and maintained to facilitate safe and efficient freight transportation is crucial to the quality of life and economic competitiveness of the North Front Range.

National Freight Movement

Freight is vital to the US, not only to the transportation industry, but to all sectors of industry and the economy. In 2015, an average of 49.3M tons of freight, worth $52.5B, was moved along the US transportation system every day.[6] Following the recession in 2008 and 2009, freight volumes decreased by 2.4 and 11.1 percent, respectively, compared to pre-recession levels.[7] by 2013 freight movement had rebounded to surpass pre-recession levels by 6.3 percent for freight tonnage and 6.2 percent for freight value.[8] The Federal Railroad Administration (FRA) estimates the average American requires the national freight system to move 40 tons of freight annually.[9]



Source: *USDOT Beyond Traffic 2045, 2017.*

Source: *USDOT Beyond Traffic 2045, 2017.*

The top 25 US trading partners in 2014 are shown in **Figure 1-2**. This list also includes the amount of trade between the US and these 25 partners in 2000, 2010, 2013, and 2014. For the State of Colorado, the top five trading partners include:

- Canada
- Mexico
- China
- Japan
- Republic of Korea[10]

[5] CDOT, Colorado Freight Plan, 2019.
[6] USDOT Freight Facts and Figures 2017, 2018.
[7] USDOT Freight Facts and Figures 2010, 2011.
[8] USDOT Freight Facts and Figures 2015, 2016.
[9] USDOT The Federal Railroad Administration's Ideas for the Next Phase of Rail Policy and Investment Programs, 2014.
[10] Metro Denver Economic Development Corporation.

Figure 1-2: Top 25 US Trading Partners of the U.S. in Merchandise Trade (in billions of 2009 U.S. Dollars)

Partner	2000	rank	2010	rank	2015	rank	2016	rank
China	135	4	429	2	574	1	575	1
Canada	466	1	497	1	553	2	541	2
Mexico	284	2	371	3	510	3	522	3
Japan	244	3	171	4	186	4	194	4
Germany	101	5	123	5	167	5	163	5
South Korea	78	7	83	7	110	6	111	6
United Kingdom	98	6	93	6	109	7	109	7
France	58	9	62	8	75	8	77	8
India	17	25	46	12	63	10	67	9
Taiwan	75	8	58	9	64	9	65	10
Italy	42	12	40	16	58	11	62	11
Switzerland	23	23	38	20	51	15	59	12
Netherlands	36	13	51	11	55	13	56	13
Brazil	33	14	56	10	57	12	56	14
Ireland	28	17	39	18	46	16	55	15
Vietnam	1	70	17	30	43	19	52	16
Belgium	27	18	39	17	51	14	49	17
Malaysia	42	11	38	19	44	18	48	18
Singapore	42	10	44	13	45	17	44	19
Hong Kong	30	15	29	25	42	20	42	20
Thailand	27	19	30	23	38	22	40	21
Israel	24	21	30	22	36	23	35	22
Saudi Arabia	24	22	40	15	40	21	35	23
Australia	22	24	29	26	34	24	32	24
Colombia	12	30	26	27	29	25	27	25
Top 25 total[1]	**2,010**		**2,510**		**3,084**		**3,115**	
U.S. total trade	**2,298**		**3,010**		**3,595**		**3,620**	
Top 25 as % of total	**87.4**		**83.4**		**85.8**		**86.0**	

[1] Top 25 trading partners change each year. Totals represent the top 25 trading partners for each year, not necessarily the top 25 trading partners listed here for 2016.

NOTE: Numbers may not add to totals due to rounding.

SOURCE: United States International Trade Commission, Interactive Traffic and Trade DataWeb, https://dataweb.usitc.gov/ as of May 2017. **Implicit Price Deflators**, Import Goods and Export Goods: U.S. Department of Commerce, Bureau of Economic Analysis, Table 1.1.9. Implicit Price Deflators for Gross Domestic Product, available at www.bea.gov as of April 2017.

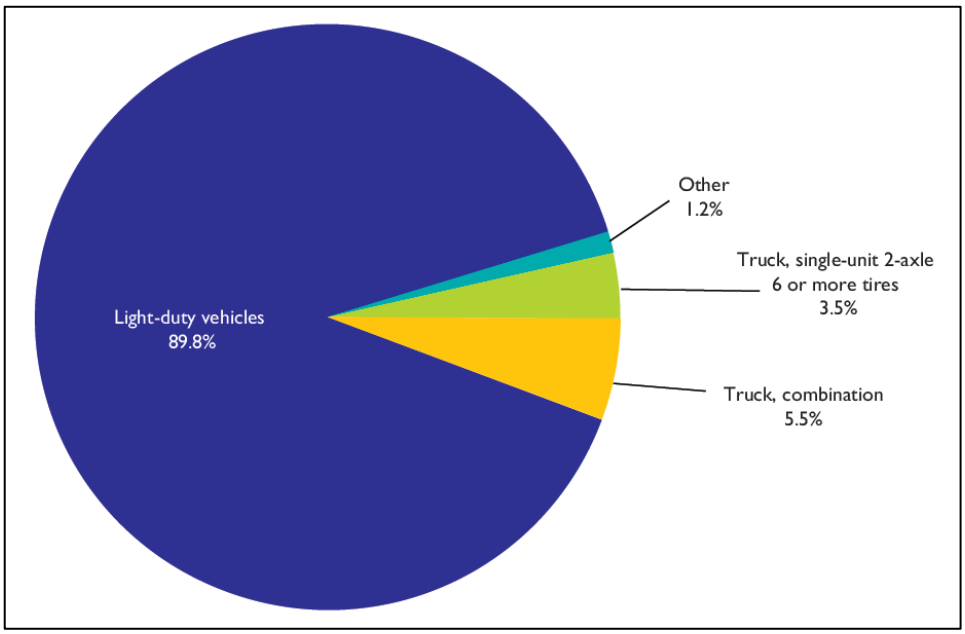
Source: *USDOT Freight Facts and Figures 2017, 2018*

A majority of freight moved within the US is moved by truck. In the US long-haul freight truck traffic is concentrated on major routes connecting population centers, ports, border crossings, and other major activity hubs. US freight truck traffic is projected to increase by the year 2045, when long-haul truck travel is forecast to be 488M miles per day.[11]

***Long-Haul Trucks**—trucks traveling more than 500 miles between their origin and destination.*

While truck traffic nationally has increased, doubling over the last two decades, truck traffic remains a small portion of total highway traffic, nine percent of highway traffic vehicle miles travelled in 2015.[12] This trend is illustrated in **Figure 1-3**.

Figure 1-3: Share of Highway Vehicle-Miles Traveled by Vehicle Type - 2017



***Source:** USDOT Freight Facts and Figures 2017, 2018.*

The FAST Act repealed both the Primary Freight Network (PFN) and National Freight Network (NFN) designated in MAP-21, and directed the FHWA Administrator to establish a National Highway Freight Network (NHFN) to strategically direct federal resources and policies toward improved performance of highway portions of the US freight transportation system.[13] The FAST Act also established the National Highway Freight Program was established to dedicate funding for improved freight movement on the NHFN. The National Highway Freight Program (NHFP) is discussed further in **Chapter 5**.

[11] USDOT Freight Facts and Figures 2017, 2018.
[12] USDOT Freight Facts and Figures 2017, 2018.
[13] FHWA Office of Freight Management and Operations National Highway Freight Network, 2018.

The NHFN includes the following roadway categories/systems:

- **Primary Highway Freight System (PHFS):** A network of highways identified as the most critical portions of the US freight transportation system, determined by measurable and objective national data. The network is made up of 41,518 centerlines miles, including 37,436 centerline miles of Interstate and 4,082 centerline miles of non-Interstate roads.
- **Other Interstate portions not on the PHFS:** The remaining portions of Interstate roadways not included in the PHFS and provide important continuity and access to freight transportation facilities. These portions amount to an estimated 9,511 centerline miles of Interstate nationwide and fluctuate with additions and deletions to the Interstate Highway System.
- **Critical Rural Freight Corridors (CRFCs):** Public roads not located in an urbanized area, which provide access and connection to the PHFS and the Interstate with other important ports, public transportation facilities, or other intermodal freight facilities. For the State of Colorado, the maximum limit for CRFCs is 160.69 miles.
- **Critical Urban Freight Corridors (CUFCs):** Public roads located in urbanized areas, which provide access and connection to the PHFS and the Interstate with other ports, public transportation facilities, or other intermodal transportation facilities. For the State of Colorado, the maximum limit for CUFCs is 80.35 miles.[14]

The State of Colorado has a total of 976.12 miles of NHFN Interstate, which includes 803.46 miles of Primary Highway Freight System (PHFS) and 172.67 miles of Non-PHFS Interstate. The Colorado portion of the PHFS is 1.94 percent of the National PHFS.[15] I-25 is currently the only portion of the NHFN in the NFRMPO region.[16]

[14]FHWA Office of Freight Management and Operations National Highway Freight Network, 2018.
[15]FHWA Office of Freight Management and Operations Table of National Highway Freight Network Mileages by State, 2017.
[16]FHWA Office of Freight Management and Operations National Highway Freight Network Map and Tables for Colorado, 2017.

Approximately 50 percent of the weight and 37 percent of the value of goods were moved less than 100 miles between their origin and destination in 2007, with only seven percent of the weight and 17 percent of the value moving than 1,000 miles or more, **Figure 1-4**.[17]

Figure 1-4: Total Freight Moved by Distance - 2017

	Value			Weight			Ton-miles	
Distance band (miles)	Millions of dollars	Percent	Cumulative percent	Millions of tons	Percent	Cumulative percent	Percent	Cumulative percent
Below 100	7,105	37	37	8,998	50	50	5	5
100 - 249	2,855	15	52	2,900	17	67	10	16
250 - 499	3,225	17	69	3,011	17	84	21	36
500 - 749	1,550	8	77	1,144	5	89	14	49
750 - 999	1,135	6	83	566	3	92	9	59
1,000 - 1,499	1,411	7	90	780	4	97	18	77
1,500 - 2,000	744	4	94	326	2	99	11	88
Over 2,000	1,121	6	100	253	1	100	12	100

NOTE: Weight percents do not add to 100 due to rounding.

SOURCE: U.S. Department of Transportation, Bureau of Transportation Statistics and Federal Highway Administration, Freight Analysis Framework, Version 4.3.1, 2017.

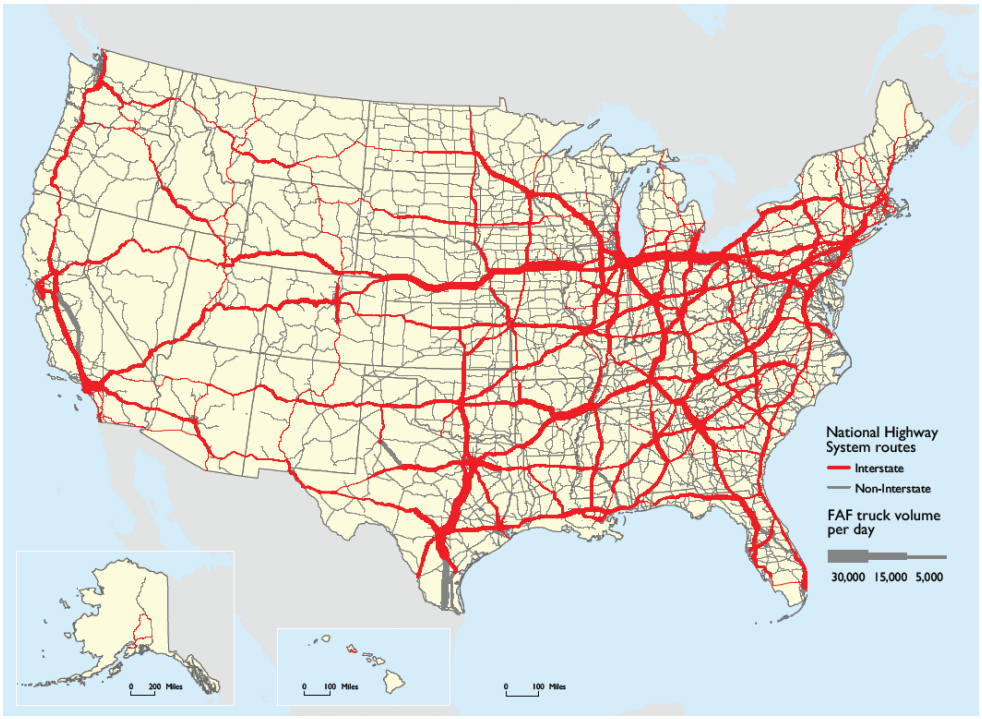
Source: *USDOT Freight Facts and Figures 2017, 2018.*

Figure 1-5 through **Figure 1-10** show spatial patterns nationwide for daily truck volume, trucks as a percentage of all traffic, and peak-period congestion on the National Highway System (NHS) in 2012 and in 2045. These maps illustrate the large amount of anticipated stress on the NHS across the nation. Colorado's Front Range and the corridors that serve it will see immense traffic growth, with major congestion concentrated in the urbanized areas.

Figure 1-5 illustrate the disparity in NHS facilities between the eastern and western United States. While this difference is driven by the location of population centers, less system redundancy in the West is predicted to put immense strains on long-haul routes along and near Colorado's Front Range, as shown in **Figure 1-6**.

[17] USDOT Freight Facts and Figures 2017, 2018.

Figure 1-5: Average Daily Long-Haul Truck Traffic on the National Highway System (NHS) - 2012



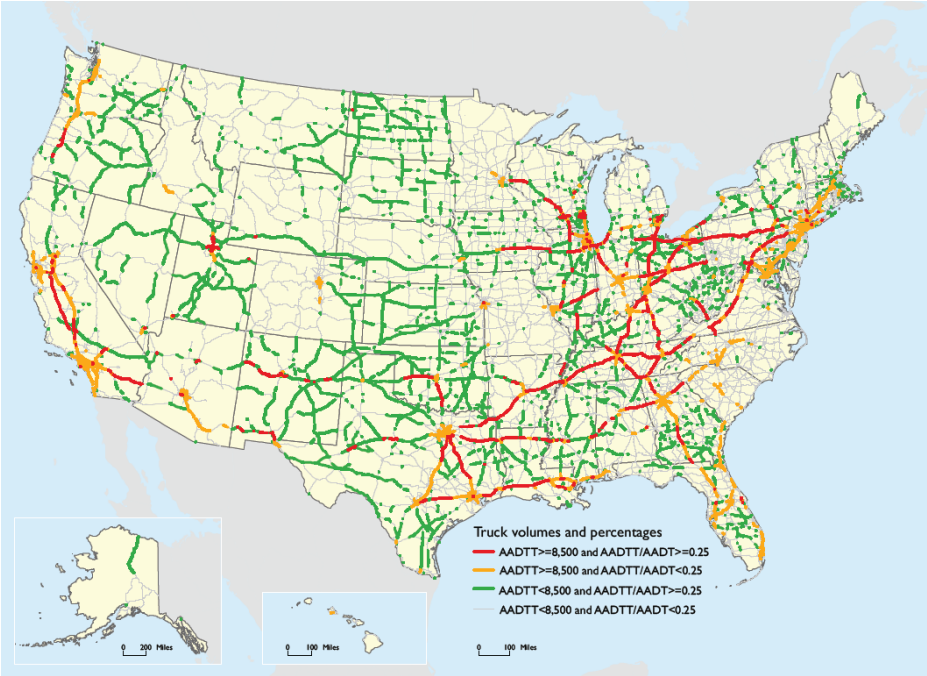
Source: *USDOT Freight Facts and Figures 2017, 2018.*

Figure 1-6: Projected Average Daily Long-Haul Truck Traffic on the NHS - 2045

Source: *USDOT Freight Facts and Figures 2017, 2018.*

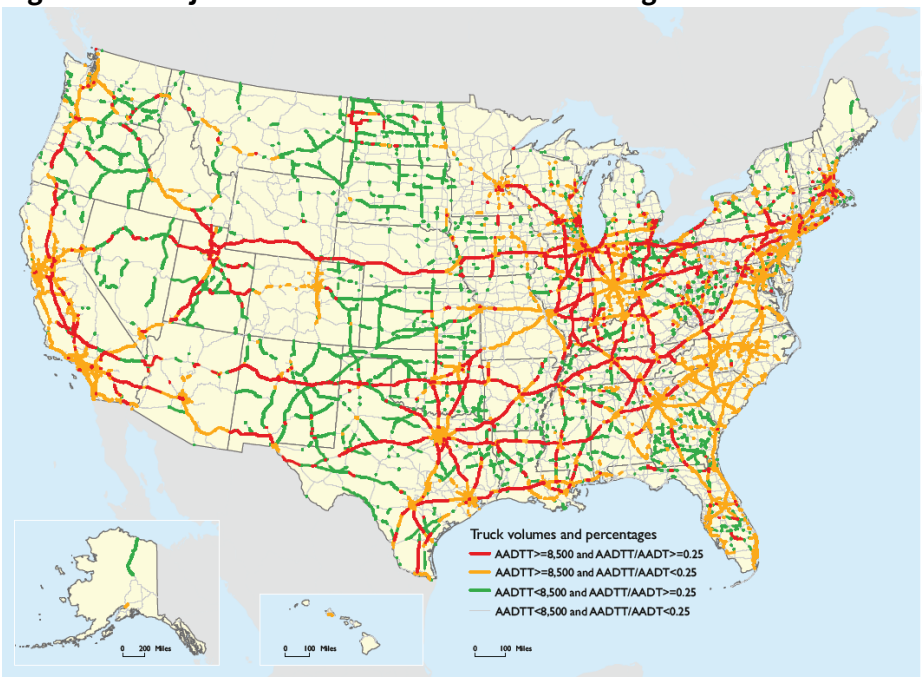
Similarly, **Figures 1-7** and **1-8** show the anticipated growth in the truck volumes and percent of trucks. Major growth along the I-80 corridor from Des Moines, Iowa to Salt Lake City, Utah could have implications for industries up and down Colorado's Front Range.

Figure 1-7: Truck Volumes and Percentages on the NHS – 2012



Source: *USDOT Freight Facts and Figures 2017, 2018.*

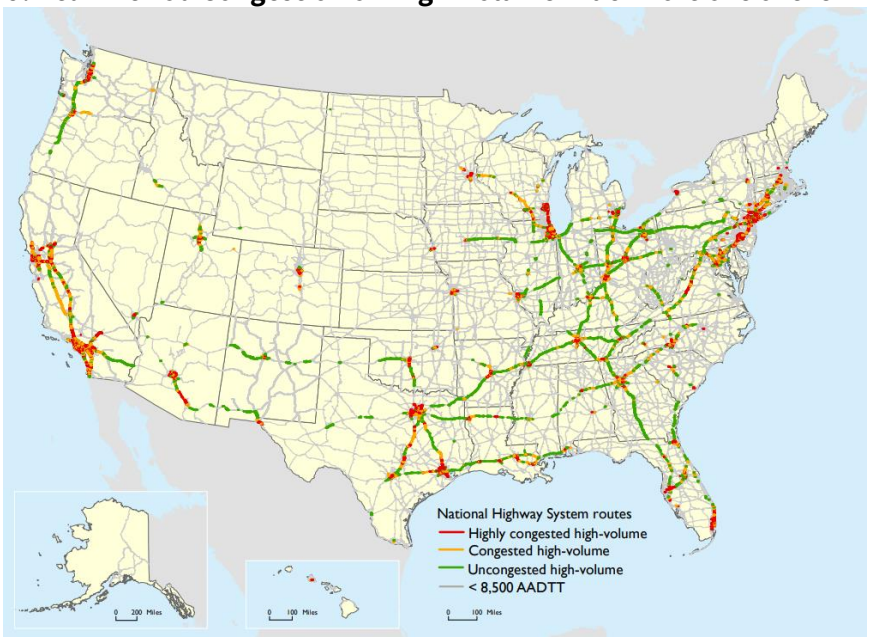
Figure 1-8: Projected Truck Volumes and Percentages on the NHS – 2045



Source: *USDOT Freight Facts and Figures 2017, 2018.*

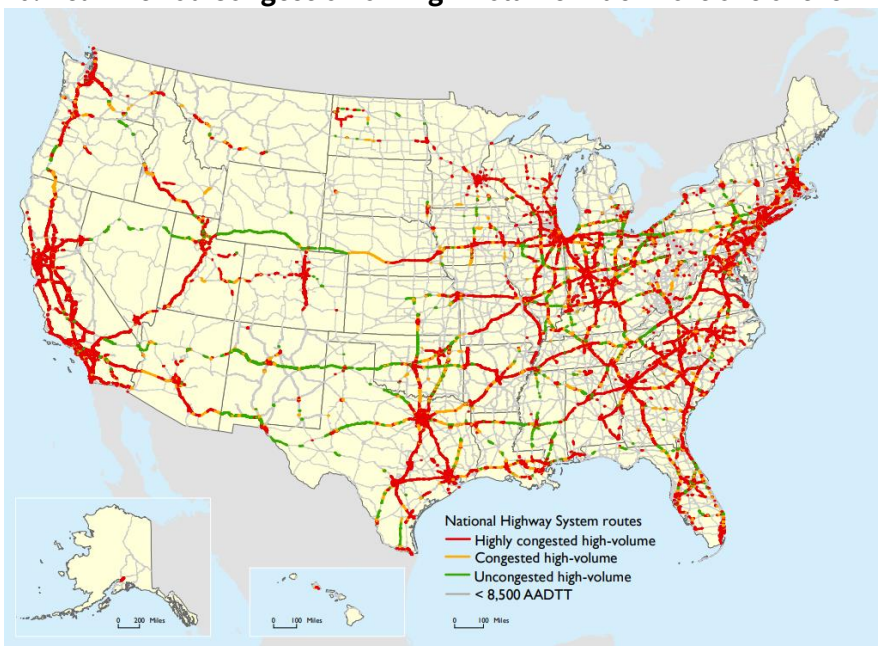
As shown in **Figures 1-9** and **1-10**, Colorado's Front Range is and will remain a national hot spot for peak-period congestion for high-volume truck routes. While the highest congestion is mostly contained in the Denver metropolitan area, it will expand north and south along the I-25 corridor, potentially decreasing freight mobility between Colorado and major NHS facilities.

Figure 1-9: Peak-Period Congestion on High-Volume Truck Portions of the NHS - 2012



Source: *USDOT Freight Facts and Figures 2017, 2018.*

Figure 1-10: Peak-Period Congestion on High-Volume Truck Portions of the NHS – 2045

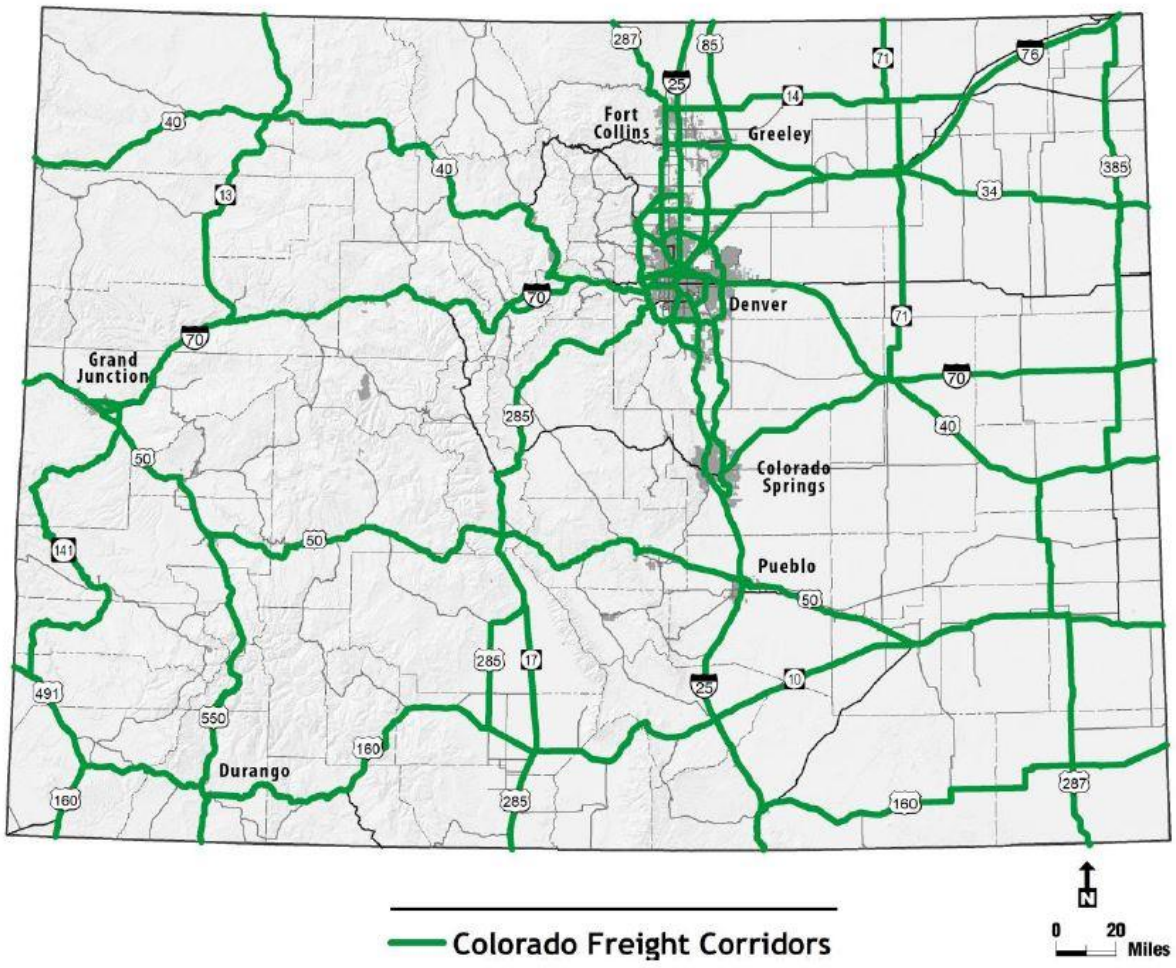


Source: *USDOT Freight Facts and Figures 2017, 2018.*

Colorado Freight Movement

As part of the 2015 State Highway Freight Plan CDOT identified Colorado Freight Corridors (CFCs) within the State, with input from the freight industry and other key stakeholders, as the primary network for regional and inter-regional truck travel. The CFC network was reaffirmed in the CFP. The CFCs include 4,156 centerline miles and include corridors considered critical for the interregional, intrastate, interstate, national, and international movement of freight and make up approximately 87 percent of the State's on-system NHS roadways.[18] Within the NFRMPO region, I-25, US34, US85, US287, and SH14 are part of the CFC network. The CFC Network is shown in **Figure 1-11**.

Figure 1-11: Colorado Freight Corridors (CFCs)



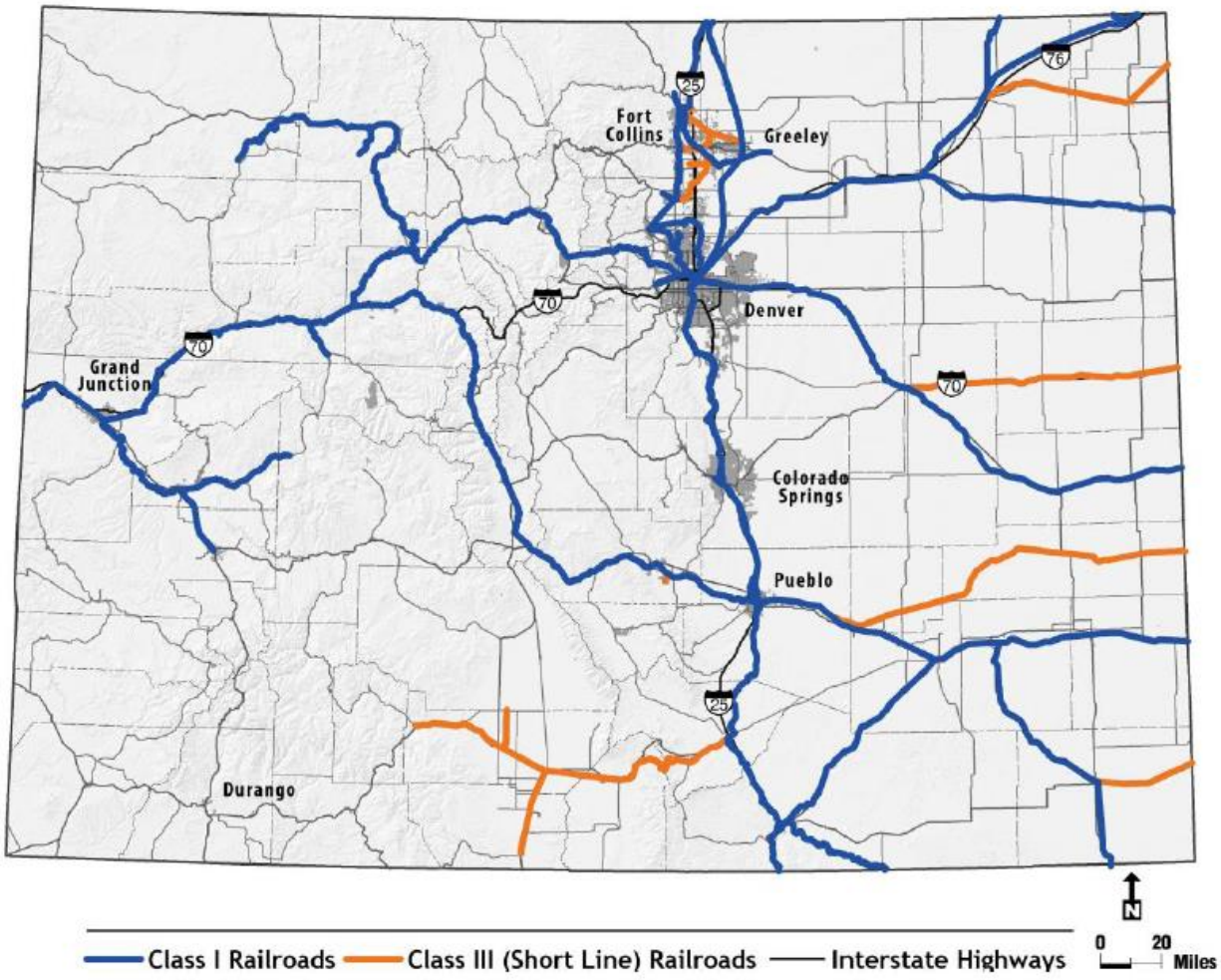
Source: *CDOT, Colorado Freight Plan, 2019.*

Figure 1-12 shows the network of Class I and Class III (shortline) Railroads across the State. The rail network is denser in the NFRMPO region than in the rest of Colorado due to the region's rich

[18]CDOT State Highway Freight Plan, 2015.

agricultural history. Statewide, this network provides critical links for regional economies that depend on farming, ranching, extraction, energy, and mining.

Figure 1-12: Colorado Freight Rail System



Source: *CDOT, Colorado Freight Plan, 2019.*

Commodity Flow

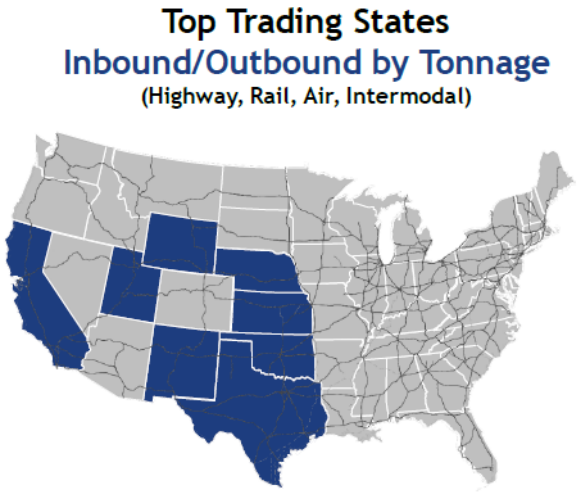
In 2010 Colorado's top trading partners included the Business Economic Areas (BEAs) included Los Angeles, CA; Salt Lake City, UT; Edmonton, Alberta Canada; Wichita, KS; and Grand Island, NE. For exports, the top BEAs included Casper, WY; Albuquerque, NM; Dallas, TX; Salt Lake City, UT; and Wichita, KS.[19]

Business Economic Areas (BEAs) —regional markets surrounding metropolitan statistical areas (core urban areas with populations of 50,000 or more) or micropolitan statistical areas (with urban core populations over 10,000 but less than 50,000)

[19] CDOT Statewide Highway Freight Plan, 2015.

In 2015, at the statewide level, Colorado's top trading partners by tonnage and value included neighboring states plus California and Texas. **Figure 1-13** breaks down inbound and outbound totals from FHWA's 2015 Freight Analysis Framework (FAF).

Figure 1-13: Colorado' Top Trading Partners by Tonnage and Value – 2015



Inbound (Kilotons)	
WY	35.1
NE	18.2
TX	3.0
CA	2.6
UT	2.5

Outbound (Kilotons)	
WY	35.5
NE	24.3
NM	13.6
OK	8.3
KS	7.7

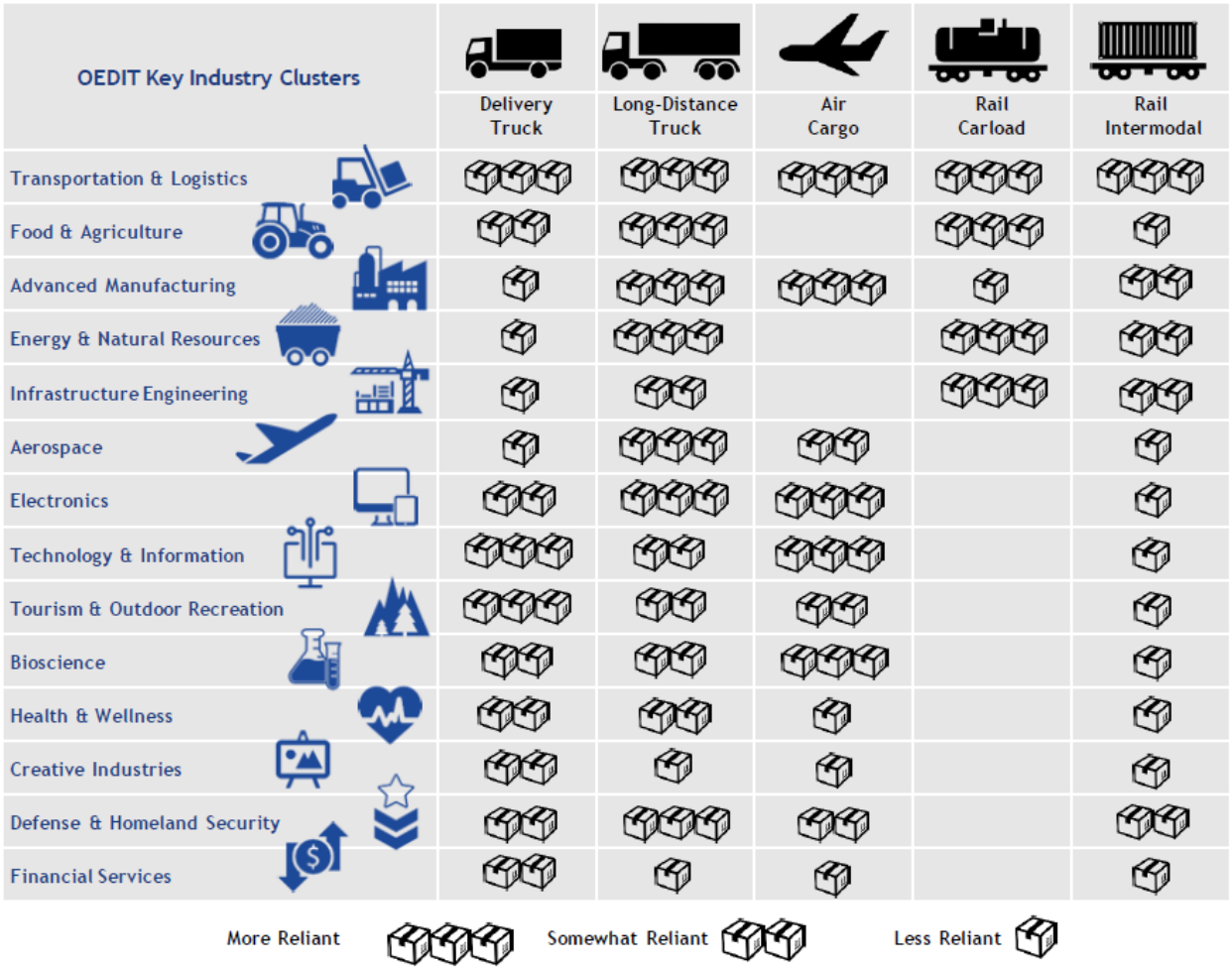
Inbound (Billions of Dollars)	
CA	$ 17.7
TX	$ 14.3
WY	$ 6.9
UT	$ 6.2
NE	$ 5.9

Outbound (Billions of Dollars)	
WY	$ 12.5
NE	$ 9.2
CA	$ 7.4
UT	$ 7.3
TX	$ 7.2

Source: *CDOT, Colorado Freight Plan, 2019.*

Each commodity type places its own unique demands on the national freight system. **Figure 1-14** shows how reliant the various industry clusters in Colorado are on the various modes of freight transportation. Colorado's industry clusters are identified by the Colorado Office of Economic Development and International Trade (OEDIT).

Figure 1-14: Reliance of Industry Clusters on Various Freight Modes



Source: *CDOT, Colorado Freight Plan, 2019.*

Chapter 2

Plans, Studies, and Programs

Chapter 2: Plans, Studies, and Programs

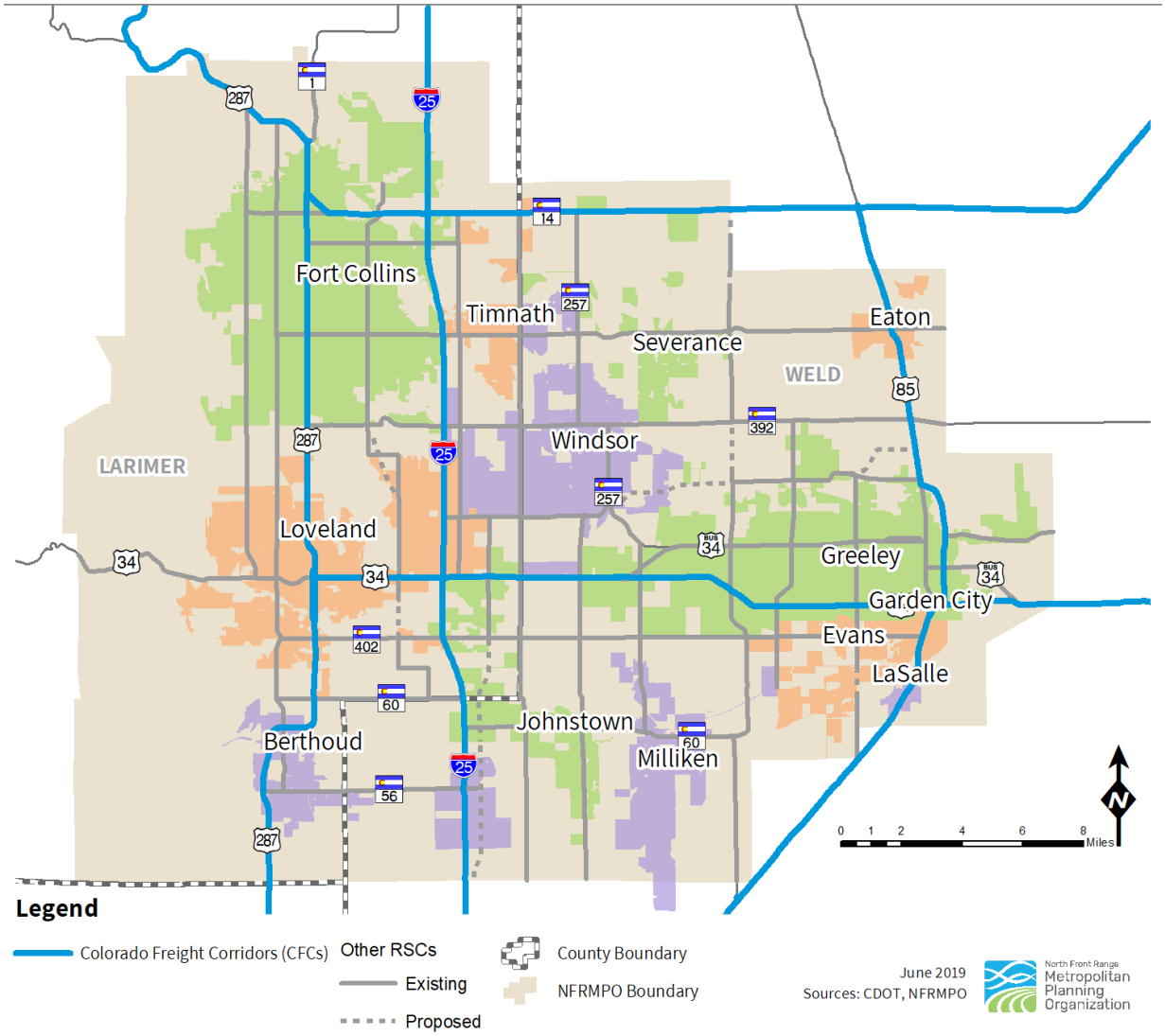
Planning partners at all levels have adopted transportation master plans, comprehensive plans, freight-focused studies, or instituted programs to balance community quality of life and the needs of the freight industry. This section highlights the major conclusions, concerns, and areas of focus from recent and ongoing planning efforts impacting the NFRMPO region. These plans, studies, and programs represent best practices, strategies, and/or opportunities for collaboration for an improved freight system.

Local and Regional Efforts

2045 Regional Transportation Plan (RTP)

Within the NFRMPO region, the Regionally Significant Corridors (RSCs) identified for the 2045 RTP comprise the primary network for truck freight transportation. Several RSCs have been identified by local agencies as suitable for local truck traffic rather than regional truck traffic. The CFCs are designated as the primary network for regional and inter-regional truck travel in the region. The CFCs within the NFRMPO include: I-25; US287, US85; SH14; and portions of US34, as shown in **Figure 2-1**.

Figure 2-1: Colorado Freight Corridors (CFCs) and Other Regionally Significant Corridors (RSCs) in the NFRMPO Region



Most of these CFCs also serve as the designated hazardous and nuclear materials routes. I-25 is both a hazardous and nuclear materials route. East of I-25, US34, US85, and SH14 are all hazardous materials routes. There are no such routes in the region west of I-25.

While the CFCs serve many of the region's major commercial and industrial corridors, communities such as Johnstown, Milliken, Severance, and Windsor are not served. As traffic increases across the region, particular attention should be paid to routes like SH60, SH257, and SH392, and how they can best meet these communities' needs.

Railroad classifications are based on their annual operating revenues:

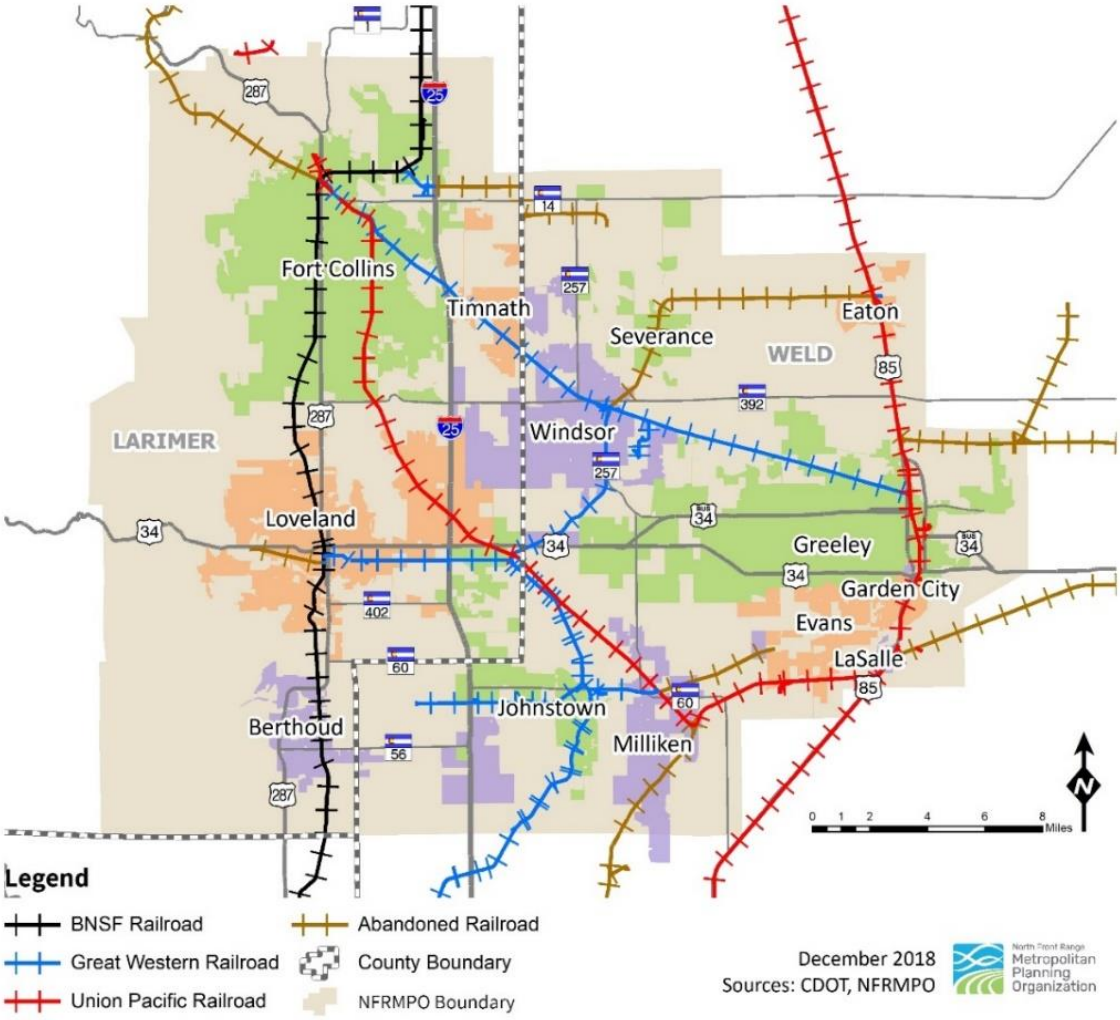
***Class I** - $447,621,226 or more*

***Class II** - Less than $447,621,226 but in excess of $35,809,698*

***Class III (Shortline)** - $35,809,698 or less*

There are also 2,662 miles of railroad track within the State of Colorado, with 172 miles within the NFRMPO region. Railroads in the region are owned by one of three companies. The Class I Railroads are owned BNSF or Union Pacific Railroad (UPRR), with 33.8 miles and 57 miles in operation, respectively. Great Western Railroad (GWR) is a Class III or shortline railroad that owns the remaining 81.4 miles in operation. There are an additional 48 miles of abandoned railroad in the region. Although these facilities are privately owned and maintained, the NFRMPO focuses some planning efforts on locations where these facilities interface with publicly owned and maintained transportation facilities, especially the RSCs. The 2045 RTP also highlights the needs and constraints on these rail lines and includes some visioning for potential passenger rail service. **Figure 2-2** shows the railroads in the region by owner and operating status.

Figure 2-2: Regional Railroad Lines by Owner in the NFRMPO Region



As a part of the 2045 RTP, and to comply with the requirements established in MAP-21 and reaffirmed in the FAST Act, the NFRMPO developed Goals, Objectives, Performance Measures, and Targets (GOPMT), approved in October 2018, for inclusion in the 2045 RTP. The GOPMT guide investment decisions for the regional transportation system.

Goals and Objectives

Goals are the first step to supporting the vision statement. Goals address the key desired outcomes for the region. Objectives are needed to support and accomplish the established goals. The NFRMPO Goals and Objectives are shown in **Table 2-1**, all of which apply directly or indirectly to the movement of freight.

Table 2-1: 2045 RTP Goals and Objectives

	Goal Area 1	Goal Area 2	Goal Area 3	Goal Area 4
	Economic Development Quality of Life	Mobility	Multi-Modal	Operations
MPO GOAL	Foster a transportation system that supports economic development and improves residents' quality of life	Provide a transportation system that moves people and goods safely, efficiently, and reliably	Provide a multi-modal system that improves accessibility and transportation system continuity	Optimize operations of transportation facilities
OBJECTIVES	▸ Conform to air quality requirement ▸ Maintain transportation infrastructure and facilities ▸ Increase investment in infrastructure	▸ Reduce number of severe traffic crashes ▸ Reduce congestion ▸ Improve travel time reliability	▸ Support transportation services for all including the most vulnerable and transit-dependent populations ▸ Increase mode share of non-single occupancy vehicles (SOV) modes ▸ Develop infrastructure that supports alternate modes and connectivity	▸ Optimize the transportation system ▸ Enhance transit service in the NFR region ▸ Reduce project delivery time frame

Freight-Related Performance Measures and Targets

The USDOT sets federal roadway performance measures for which states and MPOs must set targets. MPOs can choose to set their own targets or support targets set by their state. For the 2045 RTP, the NFRMPO opted to support the State's targets. In addition, the NFRMPO has also established its own performance measures and targets based on regional priorities. The following sections identify the NFRMPO's approved performance measures related to freight transportation, as well as performance measures from the Colorado Freight Plan (CFP).

While performance measures from the CFP are analyzed at the state level, they each relate to NFRMPO-specific goals and objectives. The following sections highlight the many ways the NFRMPO and its planning partners are assessing the status of freight transportation in the North Front Range and across the State. Several of these performance measures (PMs) are analyzed in **Chapter 3**, highlighting opportunities for the NFRMPO to achieve its own targets and contribute to the State's target achievement. More on the complete NFRMPO's GOPMT can be found in the 2045 RTP.

Safety

The safety PMs included in the 2045 RTP were established at the federal level and address vehicular crashes on the roadway system. **Chapter 3** discusses how the highway and rail freight networks are performing with regards to safety, as well as the processes in place for ensuring pipelines are also moving materials safely. For the 2045 RTP, the NFRMPO chose to support statewide safety targets.

Table 2-2: 2045 RTP and CFP Safety Performance Measures and Targets

	Performance Measure	Statewide Target
2045 RTP	Number of fatalities	644
	Fatality rate per 100 million vehicle miles traveled	1.2
	Number of serious injuries	2,909
	Serious injury rate per 100 million vehicle miles traveled	5.575
	Number of non-motorized fatalities and serious injuries	514

	Performance Measure	Statewide Target
CFP	Commercial vehicle involved incident rate per 1M truck VMT	0.86
	Number of highway-rail incidents	16
	Available public truck parking spaces per 100,000 truck VMT	20.4

Bridge and Pavement Condition

The bridge and pavement condition PMs included in the 2045 RTP were also established at the federal level. **Chapter 3** identifies the extent to which trucks have a disproportionately high impact on roadway condition, with an analysis of bridge and pavement conditions across the region. For the 2045 RTP, the NFRMPO chose to support the statewide bridge and pavement condition targets.

Table 2-3: 2045 RTP and CFP Bridge and Pavement Condition Performance Measure and Targets		
	Performance Measure	**Statewide Target**
2045 RTP	Percent of pavement on Interstate System in Good condition	47%
	Percent of pavement on Interstate System in Poor condition	1%
	Percent of pavement on non-Interstate System in good condition	51%
	Percent of pavement on non-Interstate System in poor condition	2%
	Percentage of NHS bridges in good condition	44%
	Percentage of NHS bridges in poor condition	4%

	Performance Measure	**Statewide Target**
CFP	Percent of bridge crossings over Interstates, U.S. Routes and State Highways with a vertical clearance less than the statutory maximum vehicle height of 14 feet-6 inches	1%
	Percent of bridge crossings over Interstates, U.S. Routes and State Highways with a vertical clearance less than the minimum design requirement of 16 feet-6 inches	18%
	Percent of CDOT-owned bridges posted for load	0%
	Percent of CDOT-owned bridges with a load restriction	1%
	High/Moderate Drivability Life for Colorado Freight Corridors	80%
	Percent of State Highway total bridge deck area not structurally deficient for Colorado Freight Corridors	90%

Mobility

These PMs focus on recurring and non-recurring congestion on the road system. The NFRMPO has created its own regionally-specific mobility PM in addition to supporting several statewide targets. With the exception of Travel Time Index (TTI), the congestion and system reliability PMs were set at the federal level. Of all the NFRMPO's PMs, Truck Travel Time Reliability (TTTR) is most directly related to freight transportation. For the 2045 RTP, the NFRMPO chose to support statewide safety targets for the federally-required PMs.

Table 2-4: 2045 RTP and CFP Mobility Performance Measures and Targets		
2045 RTP	**Performance Measure**	**Regional Target**
	Travel Time Index (TTI) on Regionally Significant Corridors (RSCs)	90% ≤ 1.5
	Performance Measure	**Statewide Target**
	Percent of person-miles traveled on Interstate that are reliable	81%
	Percent of person-miles traveled on non-Interstate NHS that are reliable	64%
	Truck Travel Time Reliability (TTTR)	1.5

CFP	**Performance Measure**	**Statewide Target**
	Truck Travel Time Reliability (TTR)	1.5
	Annual peak period person hours of truck delay	904,486
	Peak period incident clearance times on key corridors	I-25 = 18 minutes

Economic Vitality

The NFRMPO has created its own regionally specific PM related to economic vitality. While "Miles of fiber for connected roadways" is related to safety and mobility, it does not directly measure either. Rather it more directly measures the advancement of communication technologies on the region's major corridors, an increasingly important factor in how the freight industry makes decisions.

Table 2-5: 2045 RTP and CFP Economic Vitality Performance Measures and Targets		
2045 RTP	**Performance Measure**	**Regional Target**
	Miles of fiber for connected roadways	250 miles

CFP	**Performance Measure**	**Statewide Target**
	Annual cost of congestion to commercial motor vehicles, 2016 dollars	$160,000,000

Air Quality

The North Front Range Transportation and Air Quality Planning Council (NFRT&AQPC) is the designated lead air quality planning organization for Carbon Monoxide (CO), while the Regional Air Quality Council (RAQC) is the designated lead air quality planning organization for ozone. The NFRMPO must address motor vehicle emissions, which constitute a major source of CO and ozone precursors – volatile organic compounds (VOCs) and nitrogen oxides (NOx). The North Front Range area currently contains two designated Maintenance Areas for CO (Fort Collins and Greeley) and is part of the Denver-North Front Range 8-hour Ozone Nonattainment Area.

Freight can have significant impacts on air quality. The amount and efficiency of freight movement in the region factors into the region's CO and ozone conformity determinations. The air quality PMs included in the 2045 RTP were established at the federal level and the NFRMPO chose to support the statewide targets.

Table 2-6: 2045 RTP and CFP Air Quality Performance Measures and Targets		
2045 RTP	**Performance Measure**	**Statewide Target**
	Total emissions reduction	105.000 kg/day VOC reduction 1,426.000 kg/day CO reduction 105.000 kg/day NOx reduction
CFP	**Performance Measure**	**Statewide Target**
	Emission (pounds of CO2) resulting from excess truck delay	904,486

Regional freight movement can have significant impacts on the environment, specifically regarding emissions of CO and ozone precursors. Rail can move freight with lower environmental impacts than trucks; however, rail is slower and limited to their right-of-way. **Table 2-7** compares estimated past emissions rates and future projections for truck and rail derived from the U.S. Environmental Protection Agency's (EPA) Motor Vehicle Emission Simulator (MOVES2014a) model for selected pollutants. The MOVES2014a model is the same model previously used to determine air quality conformity for North Front Range's two CO Maintenance Areas and the Denver-North Front Range 8-hour Ozone Nonattainment Area.

Table 2-7: Comparison of Truck and Rail Emission Rates						
Type	**Rail (adjusted for circuity)**			**Truck (adjusted for empty miles)**		
	2015	2030	2040	2015	2030	2040
NOx grams / ton-revenue mile	0.3178	0.1044	0.0475	0.5828	0.1765	0.1437
PM grams / ton-revenue mile	0.0084	0.0020	0.0007	0.0232	0.0034	0.0019
VOC grams / ton-revenue mile	0.0148	0.0039	0.0018	0.0611	0.0273	0.0243
CO2 grams / ton-revenue mile	25.033	20.023	17.253	92.197	80.458	79.232
Source: *EPA MOVES2014a, AAR, WSP Analysis, 2015*						

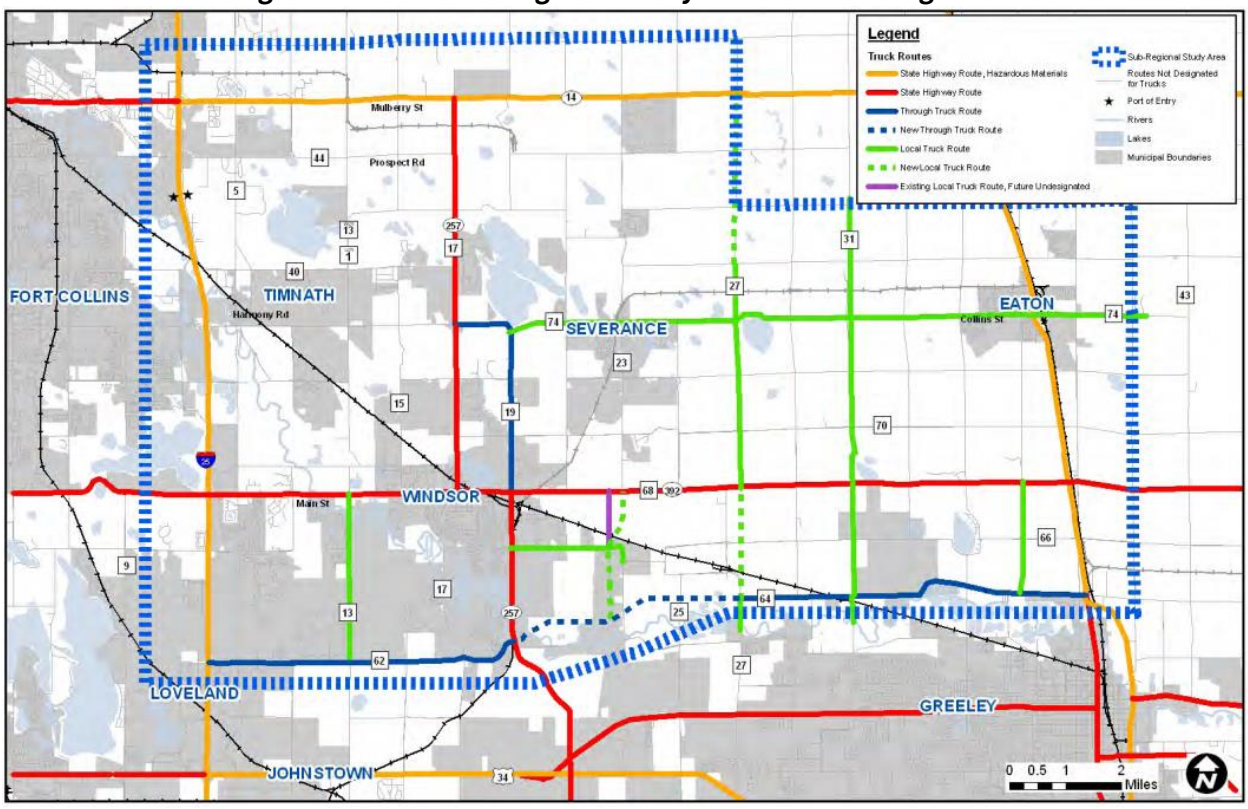
Table 2-7 assumes rail fuel efficiency improvements of one percent per year based on new emissions standards for locomotives introduced in 2008.[20] For these four pollutants, rail was a 72.7 percent more fuel-efficient mode of freight transportation than truck in 2015. By 2040, rail is expected to be 78.2 percent more efficient than truck.

[20]AASHTO Freight Rail Study Support Services, 2018.

Truck Traffic in the Northeastern Quadrant of the NFRMPO Region: Sub-Regional Study

The Sub-Regional study was carried out to address community concerns of how changing freight-oriented land use and truck traffic patterns could bring undesirable effects to neighborhoods and local streets such as: increased road maintenance costs, noise and air pollution, congestion and delay, and compromised bicycle and pedestrian safety. The Study identified "Through Truck Route" and "Local Truck Route" designations and proposed connections, shown in **Figure 2-3**, as well as an informal commitment on the part of officials from Severance, Timnath, Windsor, and Weld County to pursue physical improvements and additions of directional signs to WCR19 north of SH392, so that it and a portion of WCR74 can eventually serve as an alternative truck route to SH257.

Figure 2-3: 2010 Sub-Regional Study Truck Route Designation



Source: *NFRMPO, Truck Traffic in the Northeastern Quadrant of the NFRMPO Region, 2010.*

CDOT Region 4 Smart Mobility Regional Plan

The CDOT Region 4 Smart Mobility Regional Plan, scheduled for completion in 2019 or 2020, identifies potential areas where Smart Mobility implementation could apply in Region 4, which the NFRMPO region is in. The Plan contains general and location-specific applications and strategies to address regional needs through technology. Regional priorities identified in the Plan are shown in **Table 2-8**.

Table 2-8: Urban and Rural Smart Mobility Solutions for CDOT Region 4	
Rural	**Urban**
▸ Fiber infrastructure for communication purposes ▸ Road Weather Information System (RWIS) improvements ▸ Smart Work Zones – and working with Waze and other third-party mapping providers to share information ▸ Lane Departure Warning ▸ Curve Warning ▸ Stop Sign Gap Assist ▸ General Congestion Management tools along I-25	▸ Ramp Metering ▸ Dynamic Route Assignment (Alternatives to I-25) ▸ Adaptive/Coordinated Signal Control ▸ Pedestrian Detection/Protection ▸ Road Weather Information System (RWIS) improvements ▸ Response, Emergency Staging and Communications, Uniform Management and Evacuation (RESCUME) ▸ Positive Train Control ▸ Transit Signal Priority and Automatic Vehicle Location ▸ Smart Work Zones
Source: *CDOT, Draft CDOT Region 4 Smart Mobility Regional Plan, 2018.*	

The Plan prioritizes the I-25 and US34 corridors due to their existing fiber. US34 Business, US85, US85 Business, US287, SH1, SH14, SH56 SH60, and SH402 are also prioritized as corridors for near-term fiber installation. At the rail switch yard near downtown Fort Collins, the Plan calls for solutions from the Freight Advanced Traveler Information Systems (FRATIS) bundle of applications to improve freight-specific dynamic travel planning and performance and optimize drayage.

Drayage – *Transporting of rail or ocean freight by truck to an intermediate or a final destination; typically, a charge for pickup/delivery of goods moving short distances (Source: CDOT).*

Themes from the local plans

While not all local agencies in Northern Colorado have dedicated freight plans or even transportation plans, each agency has concerns and visions for how their community is served by and interacts with truck and rail freight. Some of the more prominent local issues are highlighted in the following list. These issues give context to how Northern Colorado freight should be considered when projects are planned and designed along related corridors.

Berthoud

The Town of Berthoud does not discuss specific freight issues in its local plans. In 2018, Love's Travel Stop opened in Berthoud at the southwest corner of the I-25 and SH56 interchange. The Travel Stop brought much needed truck parking to North I-25. Love's boasts 82 truck parking spaces as well as showers for drivers.

Eaton

In the 2013 Eaton Transportation Plan, the Town expressed concerns about the large turn radius for trucks entering or leaving US85, as well as concerns about truck parking shortages in Town creating congestion on local streets. The Plan also discussed the possibility of a transload facility near the UPRR. The transload facility has since been built and is operational just south of E Collins Street (WCR74).

Evans

In the City of Evans Transportation Plan, the community acknowledges the UPRR's impact on traffic delays and how it creates a barrier for east-west travel. The Plan identifies the need for railroad crossing gates where UPRR crosses 39th Street. Concerns were raised during CDOT's US85 Traffic Incident Management Plan (TIMP) process regarding truck speeds on US85 through Evans.

Fort Collins

In the Fort Collins City Plan, the City identifies several freight-related principles and policies. Principle T-8: Manage the transportation system to ensure reliable traffic and transit flow through travel demand management and transportation system optimization. The policies associated with Principle T-8 include:

- **Ease of Access and Bypass Traffic -** Encourage through-truck/freight traffic to bypass the city using designated truck routes on state and federal highways.
- **Freight Mobility** - Maintain a truck routing plan with designated truck routes to provide commercial access and minimize truck travel through residential neighborhoods.

In the Implementation and Monitoring Chapter of City Plan, the City also identifies a strategy to continue to explore opportunities to work with the FRA and other stakeholders to create a healthy community that mitigates the impacts of freight noise as much as possible.

Garden City

Garden City does not have any community adopted plans; however, City residents, staff, and officials are active in planning efforts related to changes near the US34 and US85 interchange (also known as Spaghetti Junction). The community values continued access to 8th Avenue, Garden City's Main Street from this interchange which is frequently used by commercial vehicle drivers.

Greeley

In Greeley's 2035 Comprehensive Transportation Plan, the City identified proposed truck routes, hazardous materials routes, and routes with a maximum weight of 50,000 lbs. Aside from O Street and 8th Street, these routes are all State and US Highways. The Plan also identified effort between the City and the Downtown Development Authority (DDA) to investigate the possibility of a quiet zone for train horns in the downtown area. Subsequent studies have identified eight potential quiet crossings along

UPRR and four along GWR. The City is in the process of implementing roughly $12M in improvements to theses crossings to establish the quiet zones.

Johnstown

In Johnstown's 2008 Transportation Master Plan, one of the community's implementation strategies was to "Enter into discussion and agreements with new and existing industries to redirect their truck traffic away from the Downtown Center to appropriate routes that generate the least amount of visual, environmental and traffic impact on the community." The Plan calls for construction of a truck route east of downtown to redirect truck traffic away from Parish Ave, which will be reconstructed according to the Downtown Johnstown Improvement Master Plan to create a more pedestrian-friendly environment. The community also raised concerns with heavy truck traffic traveling east and west on SH60.

Larimer County

In the 2017 Larimer County Transportation Master Plan, the County identified the CFCs as its priority freight network. The Plan also identifies LCR5 and LCR19 as heavily used trucks routes. Owl Canyon Road (LCR70), is also undergoing major construction that is expected to make the route more attractive to commercial motor vehicles traveling between I-25 and US287, potentially removing some truck traffic from SH14 in Fort Collins. The Plan also states the County needs to identify additional heavily trafficked freight corridors for geometric and safety improvements to facilitate and accommodate economic development across the region.

LaSalle

LaSalle residents, businesses, and emergency responders have raised concerns about trains stopping for extended periods of time near the town core. The Town of LaSalle, Weld County, and UPRR partnered in 2018 to apply for and obtain a $750,000 grant from DOLA to alleviate congestion on main street by designing and constructing a connector road which will extend county road 39 between county roads 50.5 and 52, giving people east of the railroad tracks a secondary option through town when trains are stopped indefinitely.

Loveland

One recommendation from the 2035 Loveland Transportation Plan is to develop a program to work with local railroads to maintain at-grade crossings through a Railroad Crossings Strategic Plan. The Plan also identifies Intelligent Transportation Systems (ITS) improvements for commercial vehicle operations and inter-modal freight as a future area for enhancement and expansion.

Milliken

The Milliken Transportation Plan identifies truck traffic through downtown as a major community concern. The Plan calls for initiating discussions with CDOT for the implementation of short-term

solutions to reduce truck traffic on Broad Street (SH60) through downtown Milliken, while long-term solutions are explored. Initial short-term solution identified in the Plan include:

- Reducing speed limits to 20 or 25 mph
- Narrowing the cross-section and converting to diagonal parking
- Implementing pedestrian signage with flashing signs at appropriate intersections
- Constructing roundabouts at entry points to downtown.

The community would also like to explore the idea of a long-term "facility swap" with CDOT, allowing the Town to take ownership and maintenance responsibilities for Broad Street in exchange for a new facility. Potential alternatives identified in the Plan include designating Two Rivers Parkway as a state highway and truck route and/or creating a bypass route for SH60 northeast of downtown.

Severance

The Severance Transportation Plan identifies a Preferred Future Commercial Truck Route network. This network consists of SH14, SH257, SH392, WCR19, WCR27, and a small section of WCR74. The Town intends to maintain roads closer to the Town Core for local vehicle travel and alternative transportation modes. The public expressed concerns related to heavy truck traffic in several locations, some of which is related to oil and gas.

Timnath

The Timnath Transportation Plan also identifies a Preferred Commercial Truck Route network. This network designates I-25, SH14, and SH257 as through truck routes. Harmony Road / WCR74 is designated as a local truck route from I-25 to SH257. The Town has raised concerns about trucks using this corridor for regional trips as it develops into a mixed-use commercial and residential area. During the development of this plan, truck traffic was a top public concern, especially along LCR40.

Weld County

The 2035 Weld County Transportation Plan acknowledges the county has significant oil and gas activity resulting in rural truck traffic on nearly every road. The Plan highlights the 2010 Resolution passed by the Board of County Commissioners designating all county roads as "local pick-up and delivery" truck routes for oil and gas production purposes. The Plan also acknowledges hazardous or conflict areas where travel modes interact, such as roadways and railroads, and the need to eliminate deficient design characteristics to mitigate conflicts.

Windsor

Windsor's 2016 Comprehensive Plan illustrates the community's concerns about the congestion and safety impacts of increasing rail and truck traffic through downtown, suggesting the exploration of options for building a SH257 bypass and rerouting the railroad. The Plan states future industrial development will need to adequately address these concerns to receive the community's support. Planned enhancements to WCR70 and Hollister Lake Road (WCR19) were identified as potential

opportunities to reroute some truck traffic away from downtown. Windsor, CDOT, and other planning partners are working on the CO257 and CO392 Network Feasibility Study to assess the feasibility of rerouting SH257, and other roadway improvements that could impact truck freight patterns.

Statewide Efforts

Colorado Freight Plan

The Colorado Freight Plan (CFP) will be the State's guide for improvements and investments on the freight system and its supports. With an anticipated adoption by the Colorado Transportation Commission (CTC) in 2019, the CFP will be the first comprehensive multimodal freight planning effort to integrate highway, rail, air, intermodal, and pipeline policies and strategies across Colorado. The CFP will fulfill federal planning requirements outlined in the FAST Act and help public agency and private industry partners understand and improve the State's complex freight systems. The CFP's vision and goals are highlighted in **Figure 2-4.**

Figure 2-4: CFP Vision and Goals

Source: *CDOT, Colorado Freight Plan, 2019.*

Analysis, strategies, and other components of the CFP are reaffirmed and referenced within FNC.

Development of the CFP has included interviews, surveys, committee and working group outreach, and other engagement efforts. The feedback received highlights specific issues and needs related to freight transportation. **Table 2-9** shows the top freight issues and needs as expressed by economic development organizations, businesses, freight shippers and carriers, and regional and local planning partners statewide and within the NFRMPO region. Stakeholders within the NFRMPO region listed transportation system congestion as their highest concern, while transportation system condition was of paramount concern statewide.

Table 2-9: Top Freight Issues According to Public and Private Freight Stakeholders - 2018					
Level of Concern	**Statewide**		**Level of Concern**	**NFRMPO Region**	
Highest		Transportation System Condition	**Highest**		Transportation System Congestion
		Regional Transportation Connectivity			Transportation System Condition
		Transportation System Congestion			Transportation System Safety
		Transportation System Safety			Regional Transportation Connectivity
		Transportation System Reliability			Transportation as a Barrier to Exports / Manufacturing / Sales Growth
		Transportation as a Barrier to Exports / Manufacturing / Sales Growth			Export or International Marketing Assistance
		Cost of Transportation for Products or Inputs			Cost of Transportation for Products or Inputs
		Access to Interstates, Rail Yards, Airports, Intermodal Centers			Access to Interstates, Rail Yards, Airports, Intermodal Centers
Lowest		Export or International Marketing Assistance	**Lowest**		Transportation System Reliability
Source: *CDOT, Colorado Freight Plan, 2019.*					

2018 Colorado Freight and Passenger Rail Plan (SFPRP)

Adopted in 2018, the SFPRP provides a framework for future action by CDOT and public and private partners and is a resource for rail planning partners to understand current issues and future needs, connecting trends and issues to opportunities, and providing priority strategies and implementation pathways for future action. MPOs are identified in the SFPRP as partners in the action plans for each priority objective. The opportunities for the NFRMPO to partner include:

- **Advance Front Range Passenger Rail**
  - Integrate findings of relevant studies to build consensus on potential future Front Range passenger rail alignments
  - Document future capacity considerations and constraints on potential passenger rail corridors
  - Develop and maintain a priority list of mobility, connectivity, and accessibility improvements needed to improve existing passenger rail service and/or support future service
- **Strengthen Rail Coordination**
  - Coordinate with partners to identify and fund safety, security, and crossing needs
  - Support and participate in joint efforts to improve safety and security
- **Integrate Planning Processes**
  - Consider guidelines or directives that integrate freight and passenger rail issues and needs into CDOT planning processes
  - Develop a program for freight-focused workshops or summits to connect local and regional planning partners with industry
  - Establish a process to share information with local planning partners and the public on outcomes of freight and passenger rail studies
  - Craft information, policies, or guidelines to better align local decision-making and statewide rail priorities
- **Enhance Economic Connections**
  - Develop ongoing coordination processes and communication channels with economic organizations and planning partners
  - Quantify regional trade relationships and commodity flows and apply findings to customize transportation plans
- **Address Freight Rail Needs and Issues**
  - Develop an inventory of shortline rail service constraints
  - Continue coordination with Class I railroads to identify planned or needed improvements

Colorado Downtown Streets: A Tool for Communities, Planners, and Engineers

This toolkit was designed to help communities transform their downtown streets into safe, accessible, and vibrant places. The guide acknowledges that many of the State's truck routes and freight corridors also serve as community main streets. In the NFRMPO region, this includes: US287 and SH14 through Old Town Fort Collins; US287 through downtown Loveland; and US85 through LaSalle and Eaton. *Colorado Downtown Streets* encourages communities and transportation agencies to consider the design vehicle when determining lane width and turning radii.

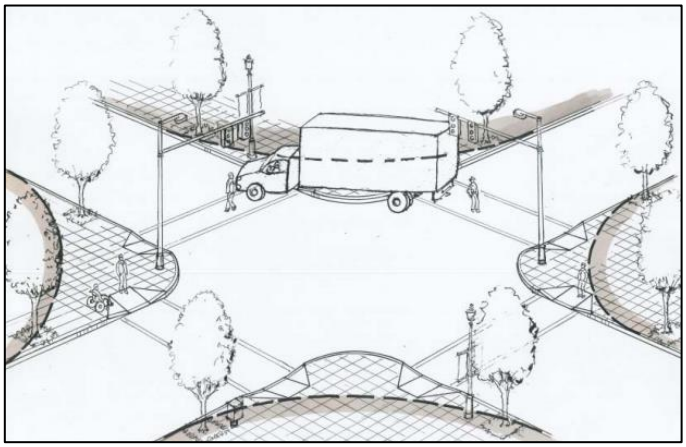
Lane Width

If the design vehicle is a truck or bus, CDOT recommends a lane width of 11 feet.[21] The Institute of Transportation Engineers (ITE) states 11-foot lane width is appropriate under most conditions and lane width should be adjusted to accommodate the design vehicle. When attempting to enhance roadway capacity, lane width should only be considered after other means, such as access management or signal synchronization, have been thoroughly explored.[22]

Design Vehicle: *The vehicle that must regularly be accommodated on a roadway without encroachment into other travel lanes (ITE, 2009).*

Turn Radius

If the design vehicle is a truck or bus, CDOT recommends a minimum turning radius of 25 feet. If there are bike lanes or on-street parking to accommodate the "effective" turning radius, the turn radius may be reduced to 10-15 feet.[23] ITE recommends turning radii, "be designed to accommodate the largest vehicle type that frequently turning the corner. This principle assumes that occasional large vehicle can encroach into the opposing travel lane."[24]



Smaller turning radii shorten the distance pedestrians must cross at intersections, while still allowing slower speed turns by large trucks with occasional encroachment into the opposing traffic lane. ***Source:*** *ITE, 2006.*

Colorado Freight Advisory Council (FAC)

The FAC is an advisory group whose membership represents a cross-section of freight industry stakeholders. The FAC advises CDOT and other organizations on the freight-specific needs of the transportation system in Colorado. The FAC meets quarterly and engages in other statewide planning processes to:

- Advise CDOT on freight-related issues, priorities, projects, and funding needs.
- Educate the public, decision-makers and other stakeholders on the importance of freight, its connection to the economy, and its reliance on the transportation system.
- Serve as a forum to discuss opportunities and strategies to influence freight-related transportation decisions.
- Seek opportunities for leveraging partnerships to improve freight movement.

[21]CDOT, CDPHE, & DOLA Colorado Downtown Streets, 2016.
[22]Institute of Transportation Engineers (ITE) Context Sensitive Solutions in Designing Major Urban Thoroughfares for Walkable Communities, 2006.
[23]CDOT, CDPHE, & DOLA Colorado Downtown Streets, 2016.
[24]Institute of Transportation Engineers (ITE) Context Sensitive Solutions in Designing Major Urban Thoroughfares for Walkable Communities, 2006.

- Collaborate with other agencies and organizations on data and information sharing to promote informed decision making.
- Identify short- and long-term initiatives that will benefit mobility for the freight industry and promote a healthy transportation system.
- Advise CDOT and other public organizations during transportation planning efforts.

NFRMPO staff regularly attend FAC meetings and communicate with CDOT's staff liaison(s) to the group.

Other Plans and Studies

The following plans and studies paved the way for the CFP and ongoing freight planning efforts, helping to build and refine the collective vision for safe efficient freight transport throughout Colorado to 2045. Some of these important efforts include:

- 2015 Colorado State Highway Freight Plan: Identifies highway freight trends, needs and issues in Colorado, determines ways to improve network efficiency, measures the system's performance, addresses innovative technologies and operational strategies, inventories facilities with freight mobility challenges and methods employed to address those issues.[25]
- 2012 Colorado State Freight and Passenger Rail Plan Update: Provides a framework for future freight and passenger rail planning in Colorado, improve the overall effectiveness of the system, and create a vision for targeted improvements.
- 2010 Rocky Mountain Rail Authority High Speed Rail Feasibility Study: Outlines the feasibility of future high-speed rail development.
- 2009 CDOT Rail Relocation Implementation Study: In partnership with BNSF, UPRR, and other partners, studies the needs for relocation of rail through-freight away from communities along the Front Range.
- 2009 Colorado Freight Roadmap: Serves as a roadmap to guide development of the transportation system and navigate emerging trends affecting future freight movement.
- 2008 Freight Destinations Pilot Study: Lays out a framework for future data collection activities related to freight movement within Colorado.
- 2007 Truck Parking Issues at State Facilities in Colorado: Identifies the deficiencies in truck parking, opportunities to expand available parking, and recommended policies.
- 2005 Freight Data Assessment: Recommends surveys and analyses related to freight flow, economic significance, and origins and destinations of freight traffic. Lead to the 2008 Origin and Destination Pilot Study.
- 2005 CDOT Public Benefits and Costs Study: Examines moving freight through traffic further east of the front range.
- 2002 Eastern Colorado Mobility Study: Focuses on freight improvements from I-25 east across the state.

[25]CDOT State Highway Freight Plan, 2015.

- 2002 High Speed Rail Application: Submitted by CDOT to FRA for approval, but no action was taken.
- 1999 Statewide Rail Needs Study: Revisits similar topics as the 1980's State Rail Plans.
- 1979 Colorado State Rail Plan – Rail Bypass Feasibility Study: Examines coal train traffic from Wyoming to Texas via Colorado.

National Freight Plans and Programs

Current Legislation

Performance Management Regulations

Title 23 of United States Code (23 U.S.C 150), passed by Congress into law in 2017, requires FHWA to establish performance measures for which states and MPOs must set targets. These requirements are being implemented under the Transportation Performance Management (TPM) program. States are required to submit performance reports to FHWA and must identify and describe the ways they are addressing congestion at freight bottlenecks. This requirement improves the ability of local agencies to identify and assess bottlenecks. Public agencies have access to the federally sponsored National Performance Management Research Data Set (NPMRDS) containing archived speed and travel time information for the NHS. Freight-related performance-based planning efforts are identified earlier in **Chapter 2** and freight system performance is analyzed in **Chapter 3**.

Fixing America's Surface Transportation (FAST) Act

The FAST Act is the first long-term transportation funding bill since Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU) in 2005. The FAST Act maintains many of the performance-based planning provisions created in MAP-21 and created a new funding source for freight projects called the Fostering Advancements in Shipping and Transportation for the Long-term Achievement of National Efficiencies (FASTLANE) program, now Infrastructure for Rebuilding America (INFRA). The FAST Act authorized the program at $4.5B for FY2016 through FY2020 to be awarded by the Secretary of Transportation. INFRA grants are highly competitive, with each Call typically attracting over 200 applicants.

The FAST Act also included a new funding source for states to apply to freight projects, the National Highway Freight Program, which is focused on improving the efficient movement of freight on the NHFN.[26] This program includes an estimated $1.2B in funding to states through a funding formula and are eligible to be used on construction, operational improvements, freight planning, and performance measurement activities, with up to 10 percent eligible for public or private freight rail, water, and/or intermodal facility projects. [27] The FAST Act also established a National Multimodal Freight Policy that includes national goals to guide decision-making. These goals are highlighted in **Table 2-10**.

[26]USDOT Fixing America's Surface Transportation Act (FAST Act): A Summary of Highway Provisions, 2016.
[27]USDOT Fixing America's Surface Transportation Act (FAST Act): A Summary of Highway Provisions, 2016.

National Freight Strategic Plan

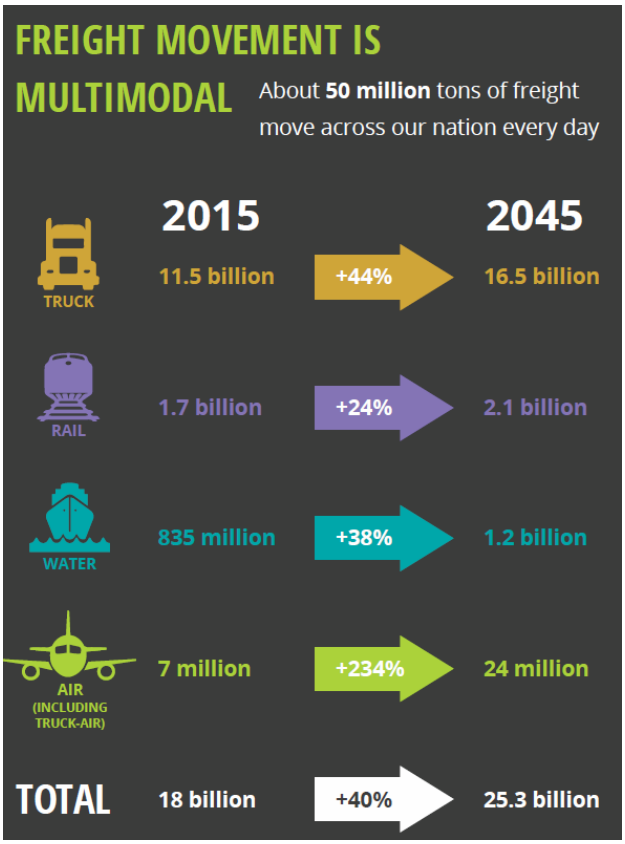
In October 2015, the USDOT released the draft National Freight Strategic Plan for public comment. The draft Plan was written to fulfill USDOT's MAP-21 requirements and National Freight Policy. The draft Plan contains a variety of strategies to address infrastructure bottlenecks, institutional bottlenecks, and financial bottlenecks that could impede the implementation and success of the MAP-21 National Freight Policy Goals. The draft Plan was not updated following the passage of the FAST Act in December 2015 and to-date has not been adopted.

Table 2-10: National Multimodal Freight Policy Goals
(1) to identify infrastructure improvements, policies, and operational innovations that— (A) strengthen the contribution of the National Multimodal Freight Network to the economic competitiveness of the United States; (B) reduce congestion and eliminate bottlenecks on the National Multimodal Freight Network; and (C) increase productivity, particularly for domestic industries and businesses that create high-value jobs
(2) to improve the safety, security, efficiency, and resiliency of multimodal freight transportation
(3) to achieve and maintain a state of good repair on the National Multimodal Freight Network
(4) to use innovation and advanced technology to improve the safety, efficiency, and reliability of the National Multimodal Freight Network
(5) to improve the economic efficiency and productivity of the National Multimodal Freight Network
(6) to improve the reliability of freight transportation
(7) to improve the short- and long-distance movement of goods that— (A) travel across rural areas between population centers; (B) travel between rural areas and population centers; and (C) travel from the Nation's ports, airports, and gateways to the National Multimodal Freight Network
(8) to improve the flexibility of States to support multi-State corridor planning and the creation of multi-State organizations to increase the ability of States to address multimodal freight connectivity
(9) to reduce the adverse environmental impacts of freight movement on the National Multimodal Freight Network; and
(10) to pursue the goals described in this subsection in a manner that is not burdensome to State and local governments.
Source: *http://uscode.house.gov/view.xhtml?path=/prelim@title49/subtitle9/chapter701&edition=prelim*

Beyond Traffic 2045

In January 2017, the USDOT released Beyond Traffic 2045. While not specifically a freight plan, the federal document surveys current and future trends related to freight as well as the transportation system as a whole. The report highlights a variety of factors impacting not only the freight industry and how freight moves. These factors include:

- The increase in international trade;
- Shifting global manufacturing center and changing trade routes;
- Just-in-time shipping driving down the cost of logistics to firms;
- Greater online shopping is increasing the demand for home deliveries;
- The automation of global ports;
- The increase in intermodal freight (freight shipped in containers via ships, trains and trucks);
- The increase in domestic energy production that is straining transportation infrastructure, specifically roadways, in oil and gas producing regions.[28]



National Coalition on Truck Parking

As “a call for action for a national dialogue on trucking needs and strategies for immediate, near-term and long-term solutions," the USDOT formed the National Truck Parking Coalition in 2015. Core stakeholders of the Coalition include: Federal Highway Administration (FHWA), the Federal Motor Carrier Safety Administration (FMCSA), American Association of State Highway and Transportation Officials (AASHTO), the American Trucking Associations, the National Association of Truck Stop Operators, the Owner-Operator Independent Driver Association, and the Commercial Vehicle Safety Alliance.

In ATRI’s 2018 Top Industry Issues report, hours-of-service rules was the number two issue facing the trucking industry according to commercial drivers, which is closely related to parking availability.[29] The National Truck Parking Coalition has identified the following focus as areas concern and opportunity:

[28]USDOT Beyond Traffic 2045, 2017.
[29]ATRI Driver Shortage Once Again Ranked As Trucking Industry’s Top Concern , 2018.

- Parking Capacity (Land Use/Siting)
- Technology/Data
- Funding & Finance (including Regulatory/Policy issues)
- Community Education / Coordination with Regional and Local Governments
- Safety/Security
- Creative Models and Solutions

The National Coalition on Truck Parking generated ideas for improvement in each of these focus areas in their 2015-2016 Activity Report. These ideas can address many of the findings identified in the FHWA's Jason's Law Truck Parking Survey Results and Comparative Analysis, evaluation of the capability of each State and its public and private stakeholders to provide adequate parking. These reports can be used in tandem to identify issues facing both Colorado and other states and identify best practices and other potential solutions. Solutions can be reach collaboratively in Northern Colorado through interagency collaboration between the State, the NFRMPO and its member communities, and the Colorado Freight Advisory Council.

Chapter 3

Existing Conditions

Chapter 3: Existing Conditions

A variety of modes are used to transport freight in the NFRMPO region. Freight is not a transportation mode; rather freight is the goods transported by rail, truck, air, pipeline, or water. Goods are predominantly transported by truck and rail in the NFRMPO region.

Regional Commodity Flow

Table 3-1 breaks down the amount of cargo traveling to, from, and within the NFRMPO region. While the NFRMPO region exports more cargo by weight than it imports, the region's imports are roughly 2.5 times as valuable as the exports.

Table 3-1: Commodity Flow Direction for Larimer and Weld Counties - 2015		
Direction	**Tons**	**Value**
Inbound	13,397,884	$13,386,573,127
Internal	8,044,634	$1,959,264,585
Outbound	22,411,404	$8,874,149,002
Total	**43,853,922**	**$24,219,986,714**

Table 3-2 illustrates the region's overwhelming reliance on truck as the dominant mode of freight delivery. Both in terms of tons and value, truck freight is anticipated to maintain over 99 percent of the mode share in Larimer and Weld counties through 2045. Trucks are an attractive option for shippers for a diverse range of goods. The flexibility offered by trucks is one attribute that sets it apart from other modes. Rail appeals to a more specific type of good. Rail typically transports agricultural and mined commodities far more efficiently than any other mode. In **Table 3-2**, "Other" is comprised of the small amount of goods that arrive via the region's two airports categorized in the National Plan of Integrated Airport Systems (NPIAS): Northern Colorado Regional Airport (FNL) and Greeley-Weld County Airport (GXY).

Table 3-2: Freight Mode Splits by Tonnage and Value for Larimer and Weld Counties - 2015		
Mode	**Tons**	**Value**
Truck	43,739,995	$24,117,105,461
Rail	111,670	$92,428,033
Other	2,256	$10,453,220
Total	43,853,922	$24,219,986,714

Of all commodities flowing into Larimer and Weld counties, 51 percent by tonnage and 33 percent by value originates from within the State of Colorado. **Table 3-3** shows the top five trading partners from outside Colorado for inbound commodities as of 2015. The top five trading partners by tonnage

account for 22 percent of all inbound tonnage, while the top five trading partners by value account for just eight percent of all inbound value. Higher value, lightweight products come to the region from far and wide, while lower value, heavier products come from neighboring states.

Table 3-3: Top Trading Partners for Imports from Outside Colorado - 2015				
Rank	By Tonnage		By Value	
	Trading Partner	Tons	Trading Partner	Value
1	Wyoming Portion of Casper BEA	1,789,741	California Portion of Los Angeles BEA	$803,327,979
2	Nebraska Portion of North Platte BEA	316,830	Kansas Portion of Wichita BEA	$339,736,863
3	Kansas Portion of Wichita BEA	296,753	Houston, TX BEA	$311,318,893
4	Grand Island, NE BEA	294,713	Grand Island, NE BEA	$301,009,078
5	California Portion of Los Angeles BEA	233,035	Texas Portion of Dallas BEA	$285,760,199

Conversely, of all commodities flowing out of Larimer and Weld counties, 79 percent by tonnage and 44 percent by value remain in Colorado. **Table 3-4** shows the top five trading partners from outside Colorado for outbound commodities as of 2015. The top five trading partners by tonnage account for roughly nine percent of all outbound tonnage, while the top five trading partners by value account for 13 percent of all inbound value.

Table 3-4: Top Trading Partners for Exports Outside Colorado - 2015				
Rank	By Tonnage		By Value	
	Trading Partner	Tons	Trading Partner	Value
1	Wyoming Portion of Casper BEA	841,444	California Portion of Los Angeles BEA	$441,714,244
2	San Francisco, CA BEA	403,847	San Francisco, CA BEA	$257,266,844
3	California Portion of Los Angeles BEA	377,834	Utah Portion of Salt Lake City BEA	$189,884,901
4	Utah Portion of Salt Lake City BEA	199,575	Texas Portion of Dallas BEA	$171,902,878
5	Grand Island, NE BEA	131,023	Nevada Portion of Las Vegas BEA	$128,855,434

Table 3-5 highlights the top commodities Larimer and Weld counties trade with these trading partners and many others, regardless of direction.

Table 3-5: Top Commodities Traded To or From Larimer and Weld Counties - 2015				
Rank	By Tonnage		By Value	
	Commodity	Tons	Commodity	Value
1	Gravel or Sand	17,367,234	Warehouse & Distribution Center	$2,388,012,045
2	Broken Stone or Riprap	4,092,145	Livestock	$1,964,418,451
3	Misc. Waste or Scrap	2,843,642	Meat, Fresh or Chilled	$1,104,763,833
4	Warehouse & Distribution Center	2,039,515	Drugs	$954,024,098
5	Grain	2,002,105	Meat, Fresh Frozen	$837,224,660
6	Dairy Farm Products	1,911,173	Misc. Plastic Products	$761,792,581
7	Ready-mix Concrete, Wet	1,740,520	Misc. Waste or Scrap	$681,373,754
8	Misc. Field Crops	1,535,089	Dairy Farm Products	$653,621,240
9	Petroleum Refining Products	1,184,015	Meat Products	$635,078,070
10	Concrete Products	1,028,014	Petroleum Refining Products	$633,948,957

Truck Freight

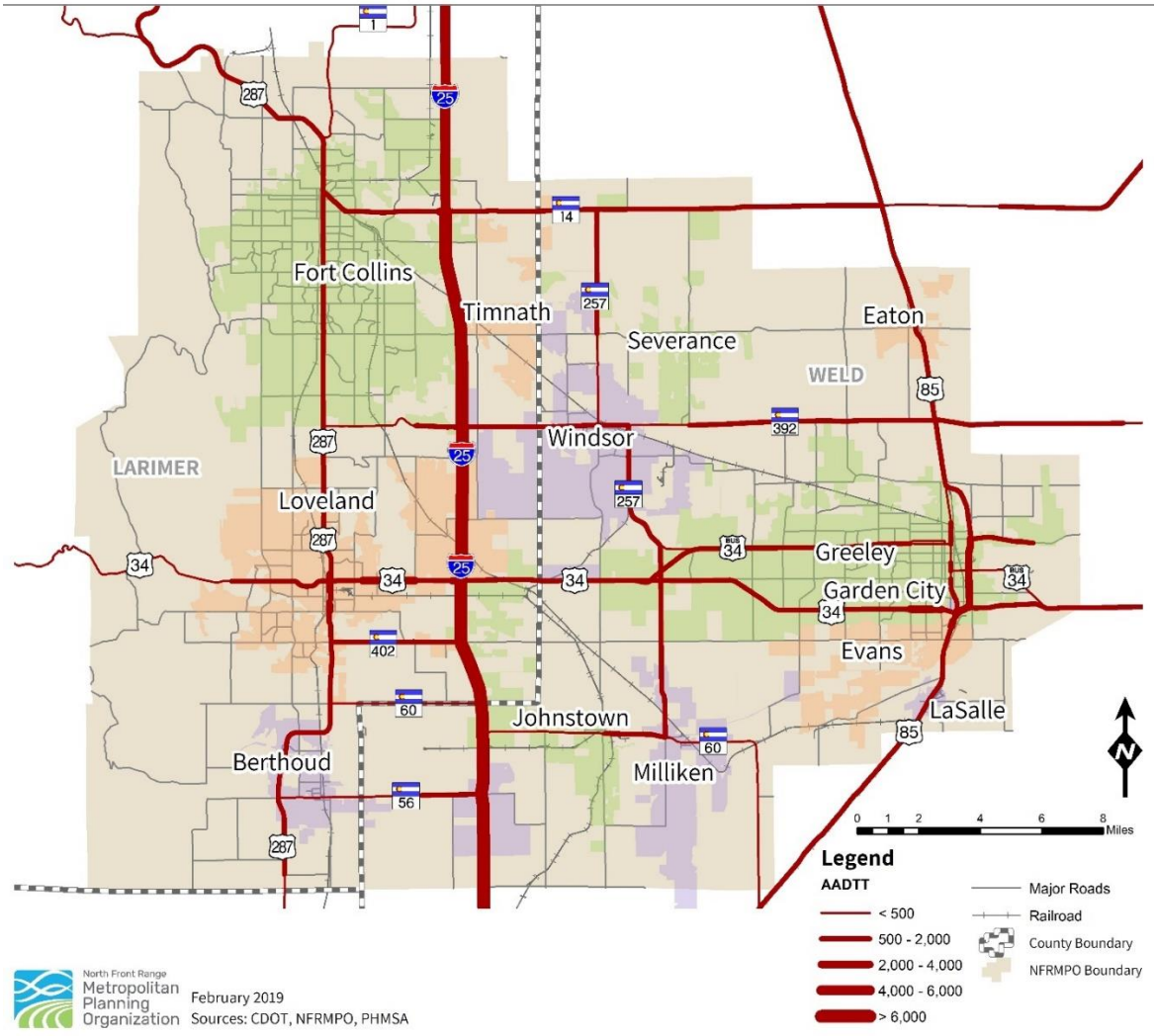
Trucks are the most used mode of transportation for a majority of the goods moving into, through, and out of the region. The regional roadway network allows trucks to access the region from many directions, saving time and money for both the truck operators and consumers. There are over 23,000 highway lane miles (State Highways, US Highways, and Interstate Highways) within the State of Colorado[30], with 683 highway lane miles within the NFRMPO region.

As of April 2017, there were over 13,180 trucking companies located within Colorado, a majority being small, locally owned businesses.[31] A wide variety of national, regional, and local trucking companies operate within the region. Truck shipments are the economic lifeblood for the NFRMPO region, carrying products during the supply chain's critical first and last miles. Everything used on a daily basis has travelled on a truck at some point during its journey to residents. In the US, 30 percent of all ton miles are related to agriculture, 58 percent is carried by truck. Weld County is the eighth largest agriculture producing county in the nation. Both Larimer County and Weld County farmers also produce each of the nation's top six agricultural commodities: cattle, wheat, corn, hay, eggs, and milk.[32] Regional commodities flows are explored later in this Chapter.

[30] CDOT CDOT and Transportation Facts, 2019.
[31] Colorado Motor Carriers Association (CMCA) Colorado Truck Facts, 2019.
[32] Colorado Farm Bureau, 2018.

A large amount of freight is moved by truck through the region. Total tonnage moved through the region is expected to increase by 51 percent by 2045. Long-haul freight truck traffic is concentrated on major routes connecting metropolitan areas, ports, border crossings, and major hubs.[33] **Figure 3-1** shows 2017 truck freight volumes on the State Highways in the region. The most heavily used truck routes in the region are I-25, US34, US85, US287, and SH14. The Fort Collins Port of Entry, located south of Prospect Road on I-25, recorded a total of 1,116,537 trucks in 2017, an increase of nearly 14 percent from 2014.[34]

Figure 3-1: Annual Average Daily Truck Traffic (AADTT) on State Highways – 2017

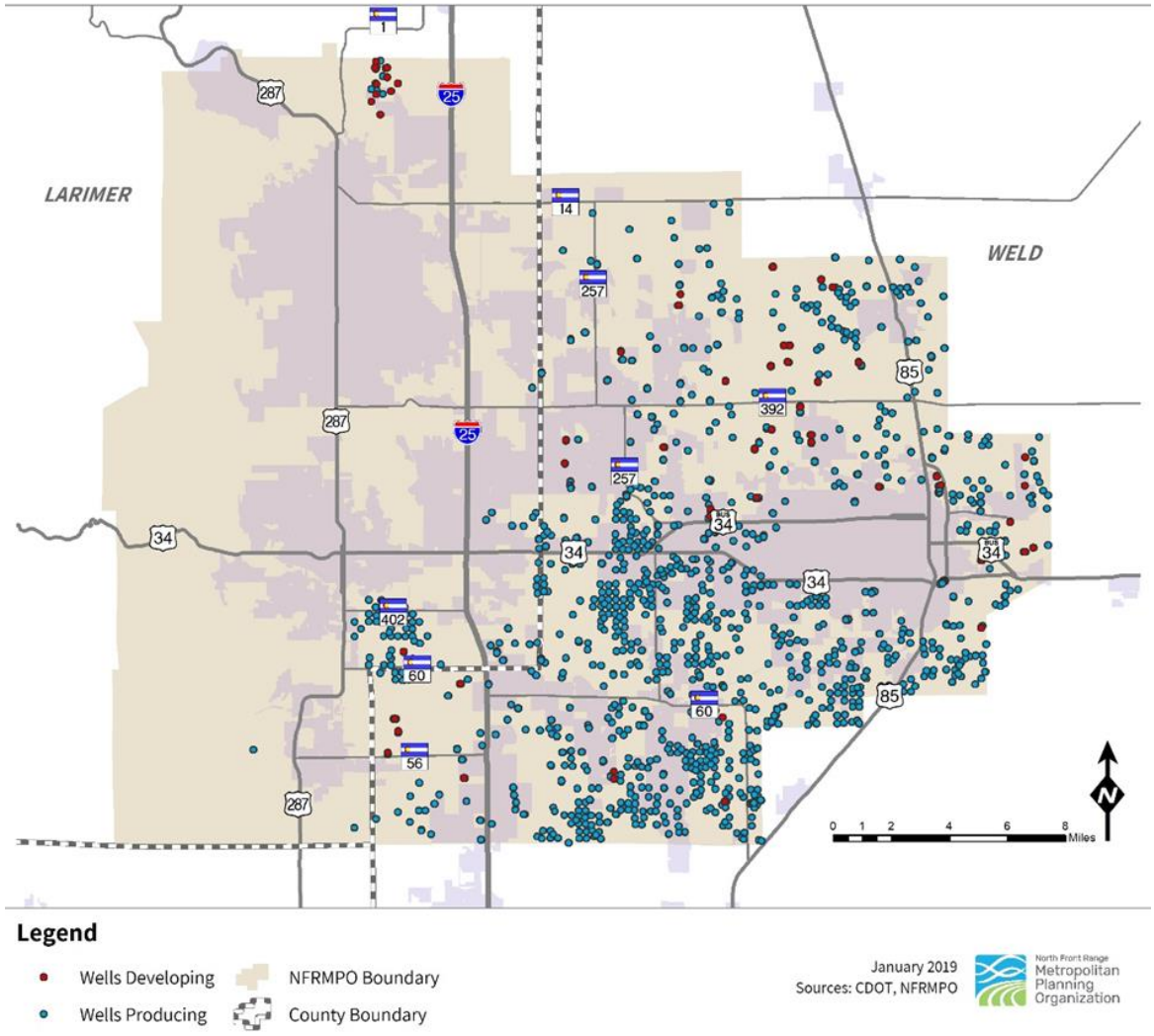


[33] USDOT Freight Facts and Figures 2017, 2018.

[34] Colorado State Patrol, 2018.

Although the NHS and other highways typically carry a higher percentage of truck freight traffic than other public roadways, it is important to consider the roads connecting the highway system to key manufacturing and distribution centers, intermodal facilities, and truck parking and service locations. These roadways, often locally-owned, may have differing standards for pavement condition, turn radius, access ramps, and signage than state-owned facilities, while still carrying a heavy volume of truck traffic. As the first-and-last-mile connections to the NHS as well as the remaining Colorado Freight Corridors and NFRMPO Regionally Significant Corridors (RSCs), these roads representing important links for regional economy. Substantial oil and gas well activity in the rural Weld County portions of the region, as well as a few concentrated locations in rural Larimer County, contributes to truck freight traffic on roads which otherwise see mainly local traffic. This activity can warrant special truck access and safety considerations. **Figure 3-2** shows the dispersion of the active (developing and producing) oil and gas wells in the NFRMPO region as of 2018.

Figure 3-2: Active Oil and Gas Wells in the NFRMPO Region - 2018



Performance

A performance-based approach to planning is important in maximizing safety and efficiency on the roadway system. Measuring performance allows agencies to pinpoint constraints and opportunities. State and federal funding opportunities are becoming increasingly competitive and data driven. The following sections summarize both high-level and location-specific truck freight performance that relates back to the 2045 RTP GOPMT discussed in **Chapter 2**.

Safety

To evaluate the safety of truck travel on the roadway network, the percentage of overall crashes involving trucks was compared against the percentage of truck traffic on the region's top 10 truck routes. **Table 3-6** compares Annual Average Daily Truck Traffic (AADTT), Annual Average Daily Traffic (AADT), and the percent truck crashes along the heaviest-traveled corridors in 2015. This comparison can be used to evaluate safety on routes with high truck traffic**.** Crash data for the 2011-2015 time period includes total number of crashes, truck crashes, and percent truck crashes to evaluate safety on routes with high truck traffic. As shown in **Table 3-6**, there is a correlation between the percent truck traffic and the percent truck crashes; however, some corridors have much higher truck crash percentages than can be explained by the percent truck traffic. The corridors with the highest truck crash rate per 100M VMT include US85 Business, US85, and SH14.

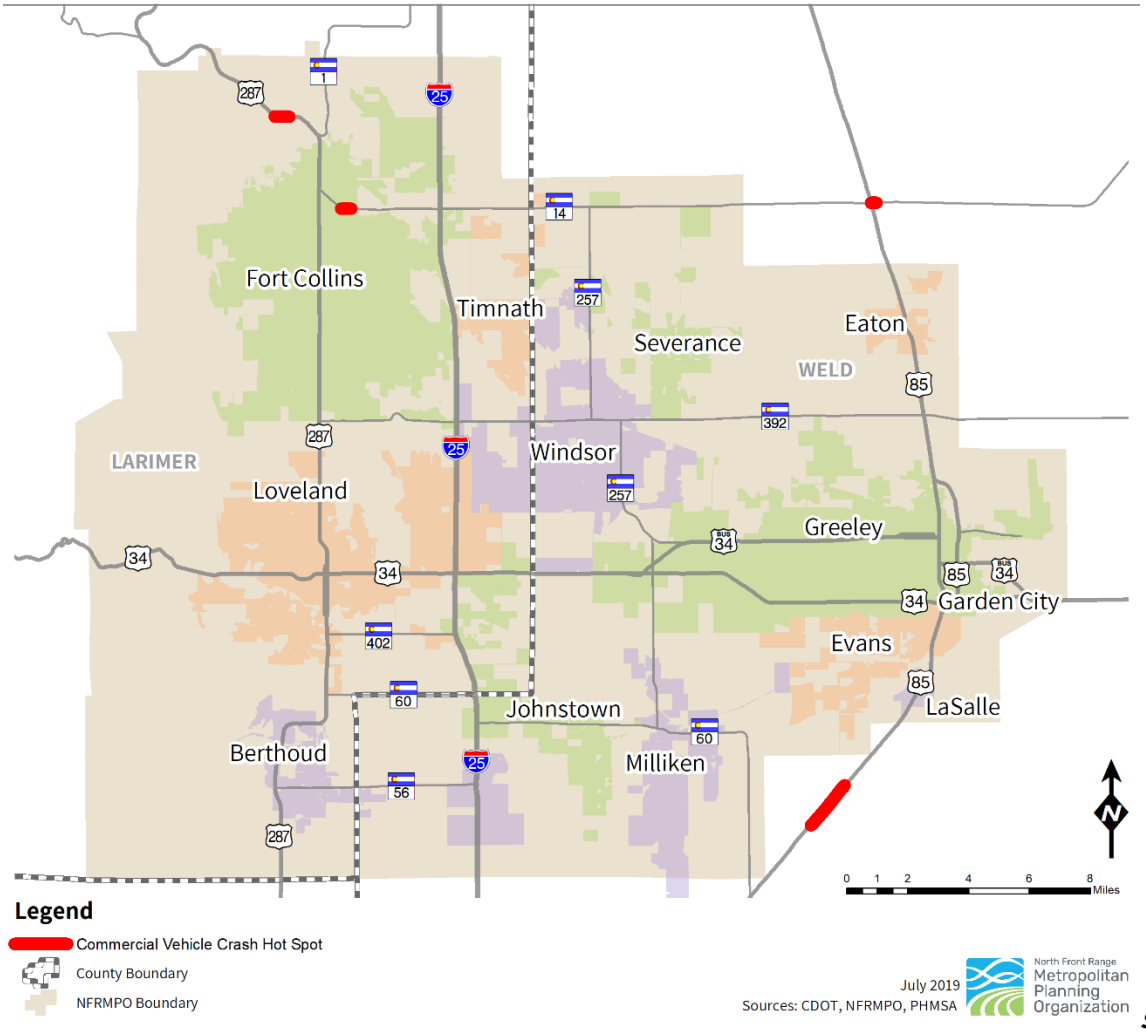
Table 3-6: Truck Traffic (2015) Compared with Crash Data (2011 – 2015)

Roadway		2015			2011 - 2015			
	Centerline Miles	AADTT (Truck)	AADT (All Traffic)	Percent Truck Traffic	Total Crashes	Truck Crashes	Percent Truck Crashes	Truck Crashes per 100M VMT
I-25	27.1	5,292	63,267	8.4%	3,737	385	10.3%	12
US287	32.5	397	21,714	1.8%	4,513	116	2.6%	9
US34	34.4	646	25,449	2.5%	2,647	123	4.6%	8
US34 Bus.	15.5	147	15,561	0.9%	1,786	51	2.9%	12
US85	16.3	1,010	15,247	6.6%	844	135	16.0%	30
US85 Bus.	4.4	148	10,008	1.5%	363	37	10.2%	46
SH14	14.2	753	13,478	5.6%	905	91	10.1%	26
SH56	7.0	113	7,082	1.6%	135	6	4.4%	7
SH60	19.8	162	6,394	2.5%	410	39	9.5%	17
SH257	18.6	332	7,822	4.2%	450	35	7.8%	13
SH392	21.3	290	9,940	2.9%	860	73	8.5%	19

Source: *CDOT and NFRMPO, 2017*

For the CFP, CDOT conducted a commercial vehicle crash hot spot analysis using crash data from 2008 to 2014. The analysis identified locations on the CFCs where the three-year rolling average truck crash rate was higher than the general crash rate for five consecutive years. The analysis identified 35 locations statewide, two of which are located in the NFRMPO region. They are SH14 from Lemay Avenue to Riverside Avenue in Fort Collins, and US287 between North Shields Street and North Taft Hill Road in unincorporated Larimer County. These locations and two other hotspots on US85 near the NFRMPO region are shown in **Figure 3-3**.

Figure 3-3: Commercial Vehicle Crash Hot Spots - 2008-2014



Source: *CDOT, 2019*

Mobility

Congested roadways cost the trucking industry more than just time. Nationwide in 2016, congestion accounted for approximately 13 percent of the industry's fuel consumption, an additional $15.74B in fuel spending, and 67.3M metric tons of excess carbon dioxide (CO2) emissions. The American Transportation Research Institute (ATRI) estimates 89 percent of the trucking industry's congestion

costs generate from just 12 percent of interstate highway miles.[35] Pinpointing congestion in the NFRMPO region and addressing its root causes can pay major dividends.

Recurring Congestion

Recurring congestion in the US is a large and growing problem. Congestion on the National Highway System (NHS) cost the trucking industry $74.5B in 2016, a 0.5 percent increase from 2015.[36] Trucks bear 17 percent of all highway congestion costs while accounting for just seven percent of traffic.[37] This report also analyzed the overall costs of congestion in 370 Urban Areas for the year 2014, including Fort Collins and Greeley. **Table 3-7** summarizes these costs.

Table 3-7: Congestion Cost Measures for the Fort Collins and Greeley Urban Areas - 2015

Urban Area	Total Annual Hours of Delay	Annual Hours of Delay Per Auto Commuter	Total Annual Congestion Cost (Million $)	Annual Congestion Cost per Auto Commuter ($)
Fort Collins	5,606	19	122	425
Greeley	1,596	13	36	285

Source: *Texas A & M Transportation Institute and INRIX 2015 Urban Mobility Scorecard, 2015.*

ATRI estimates the congestion cost per mile for both Larimer and Weld counties is between $55,000 and $155,000 per mile of NHS. In the NFRMPO region, the highest per mile congestion costs can be attributed to SH14, US34, US85, and I-25.[38]

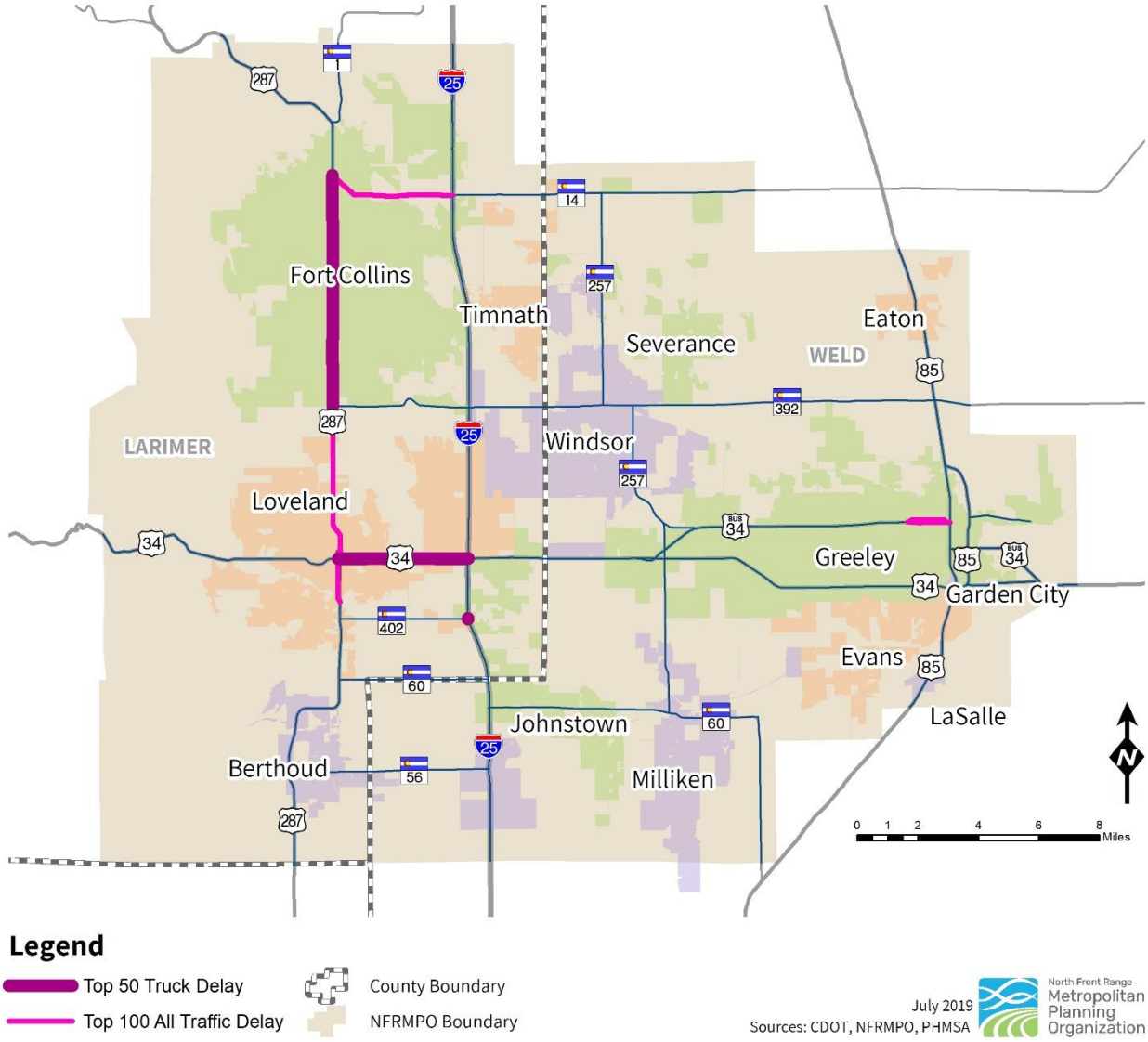
The Texas A&M Transportation Institute identified the top 100 congested road segments across the state. Several segments were identified in the NFRMPO region and were assessed for truck delay as well. **Table 3-8** lists the segments ranked in the top 100 highway segments statewide for truck delay.

[35]ATRI Fixing The 12% Case Study: Atlanta, Georgia Fuel Consumption And Emissions Impacts, 2019.
[36]ATRI Cost of Congestion to the Trucking Industry, 2018.
[37]Texas A & M Transportation Institute and INRIX 2015 Urban Mobility Scorecard, 2015.
[38] ATRI Cost of Congestion to the Trucking Industry, 2018.

Table 3-8: Top Segments for Truck Delay within the NFRMPO region			
Road Name	**Limits**	**2016 Truck Delay State Rank**	**Annual Truck Delay (Person Hours)**
E Eisenhower Blvd (US34)	N Cleveland Ave (US287) to I-25	29	16,267
S College Ave (US287)	Carpenter Rd (SH392) to Riverside Ave (SH14)	41	23,177
10th St (US34 BUS)	23rd Ave to 8th Ave (BUS85)	57	3,805
9th St (US34 BUS)	23rd Ave to 8th Ave (BUS85)	70	2,908
E Mulberry St (SH14)	US287 to I-25	71	9,164
Cleveland Ave (US287)	S Lincoln Ave (US287) to N Lincoln Ave (US287)	74	3,789
CanAm Hwy (US85)	US34 to 8th Ave (US85 BUS)	90	8,121
E Mulberry St (SH14)	I-25 to Co Rd 17 (SH257)	98	7,728

Figure 3-4 shows segments within the NFRMPO region ranked in the top 50 statewide for truck delay and/or the top 100 for all traffic delay in 2016. The list of all segments ranked in the state's top 650 most congested segments can be found in **Appendix A.**

Figure 3-4: Top Highway Segments for Truck Delay and All Traffic Delay - 2016



Non-Recurring Congestion

Non-recurring congestion is an unexpected traffic delay caused by temporary disruptions such as crashes, disabled vehicles, work zones, adverse weather events, or planned special events. As opposed to recurring congestion, non-recurring congestion is much harder to predict.

Although a given road may not have significant delays during peak hours, it could be prone to crashes or other incidents due to inadequate geometric design. These incidents may cause added delay. This delay can be measured in terms of the roadway's reliability. Travel time reliability compares a roadway's worst traffic delay days with an average day. More than just the average travel time, reliability assesses the consistency or dependability of travel times day-to-day and/or across different

times of day, an important factor in delivery routing when drivers must meet a specific delivery window.

A roadway's susceptibility to non-recurring congestion is dependent on the resilience and redundancy of the system. Resilience refers to the system's ability to quickly rebound form unexpected shocks like crashes, weather events, or natural disasters. Redundancy refers to the components of the system that can absorb traffic when a particular roadway fails. Resiliency and redundancy are critical to on-time delivery of goods both for the sake of the trucking industry as well as the communities and businesses who rely on them. Reconstructing the I-25 bridge over the Poudre River in Fort Collins will build resiliency into a corridor that was closed over a 40-mile section for 26 hours during the Fall 2013 floods.

The NFRMPO measures performance of the highway freight system specifically through Truck Travel Time Reliability (TTTR). The TTTR is a measure of the consistency or dependability in travel times from day to day and/or across different times of day on the Interstate System. It is reported during five time periods to acknowledge the need to plan for on-time arrivals during all hours of the day. The time period for reporting are shown in **Table 3-9**.

Table 3-9: Time Periods for TTTR Index Reporting

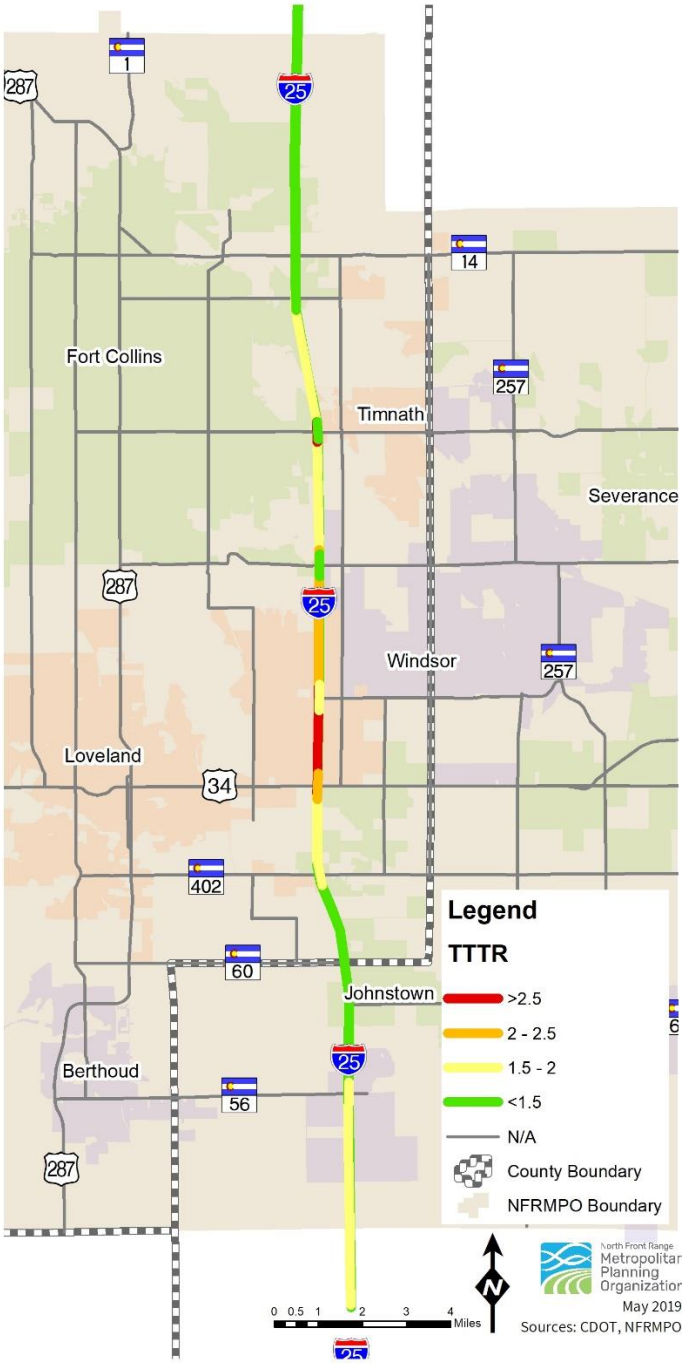
Monday-Friday			Saturday and Sunday	All Days
Morning Peak (6am -10am)	Midday (10am – 4pm)	Afternoon Peak (4pm – 8pm)	Weekend Day 6am – 8pm	Overnight (8pm – 6am)

Source: *FHWA, 2018*

The TTTR Index is generated by dividing the 95th percentile time by the normal time (50th percentile) for each segment. Each segment's largest ratio among the five periods is multiplied by its length, then the sum of all length-weighted segments is divided by the total length of Interstate. The NFRMPO is supporting the statewide target of a TTTR Index at or below 1.5 for the Interstate portions of the National Highway System (NHS).[39] In the NFRMPO region, nearly 39 percent of I-25 was unreliable for trucks (had a TTTR above 1.5) in 2018. The average TTTR for the I-25 corridor was 1.48, slightly below the statewide target. For comparison, Travel Time Reliability (TTR) was below 1.5 for all segments on the North I-25 corridor in the NFRMPO region, meaning the corridor was 100 percent reliable when accounting for all vehicles. This difference illustrates the disproportionate impacts of slight disruptions to traffic conditions on trucks compared with other vehicles. TTTR for I-25 in 2018 is shown in **Figure 3-5**.

[39] FHWA Transportation Performance Management Freight Fact Sheet, 2018.

Figure 3-5: Truck Travel Time Reliability (TTTR) for I-25 in the NFRMPO Region – 2018



Source: *INRIX, 2019.*

In 2018, CDOT adopted Policy Directive (PD) 1905.0 "Building Resilience into Transportation Infrastructure and Operations" and instituted a resilience program to implement that vision. CDOT's I-70 Risk and Resilience Pilot study is developing a map of criticality by assessing threats to the system. CDOT is working to expand the study to other corridors. North I-25 may benefit from a similar study.

Pavement Condition

Good pavement condition helps ensure efficient freight movement by truck; however, trucks have a disproportionately high impact on pavement condition compared with light-duty and passenger vehicles. Several studies estimate the average pavement cost of truck movement is anywhere between $0.011 and $0.26 per mile in 2008 dollars.[40] Among trucks, pavement damage can more than triple when total vehicle weight is increased from 60,000 to 80,000 lbs. The impacts are more dramatic on urban highways than on rural highways. **Table 3-10** shows pavement damage by vehicle weight.

Table 3-10: A Comparison of Pavement Damage on Urban and Rural Highways by Truck Weight - 2015

Truck Weight	Pavement Damage (2015 $)	
	Urban Highways	Rural Highways
60,000 lbs.	$0.142 / mi	$0.045 / mi
80,000 lbs.	$0.553 / mi	$0.172 / mi

Source: *FHWA, WSP, 2015.*

MPOs must measure pavement performance by supporting State four-year targets or adopt their own four-year targets for pavement condition on the Interstate and Non-Interstate NHS. In 2018, NFRMPO Planning Council voted to support the statewide four-year Performance Measures and Targets shown in **Table 3-11**. **Table 3-11** also includes a summary of 2018 pavement condition on the NHS in the NFRMPO region.

Table 3-11: CDOT's Statewide Pavement Condition Performance Measures and Targets - 2018

Pavement Condition Performance Measure	Four-Year Statewide Pavement Condition Target	2018 NFRMPO Pavement Condition
Percent of pavement on the Interstate System in good condition	47 percent	52.57 percent
Percent of pavement on the Interstate System in poor condition	1 percent	1.1 percent
Percent of pavement on the non-Interstate NHS in good condition	51 percent	41.68 percent
Percent of pavement on the non-Interstate NHS in poor condition	2 percent	0 percent

Source: *CDOT, 2018*

[40] AASHTO Freight Rail Study Support Services, 2018.

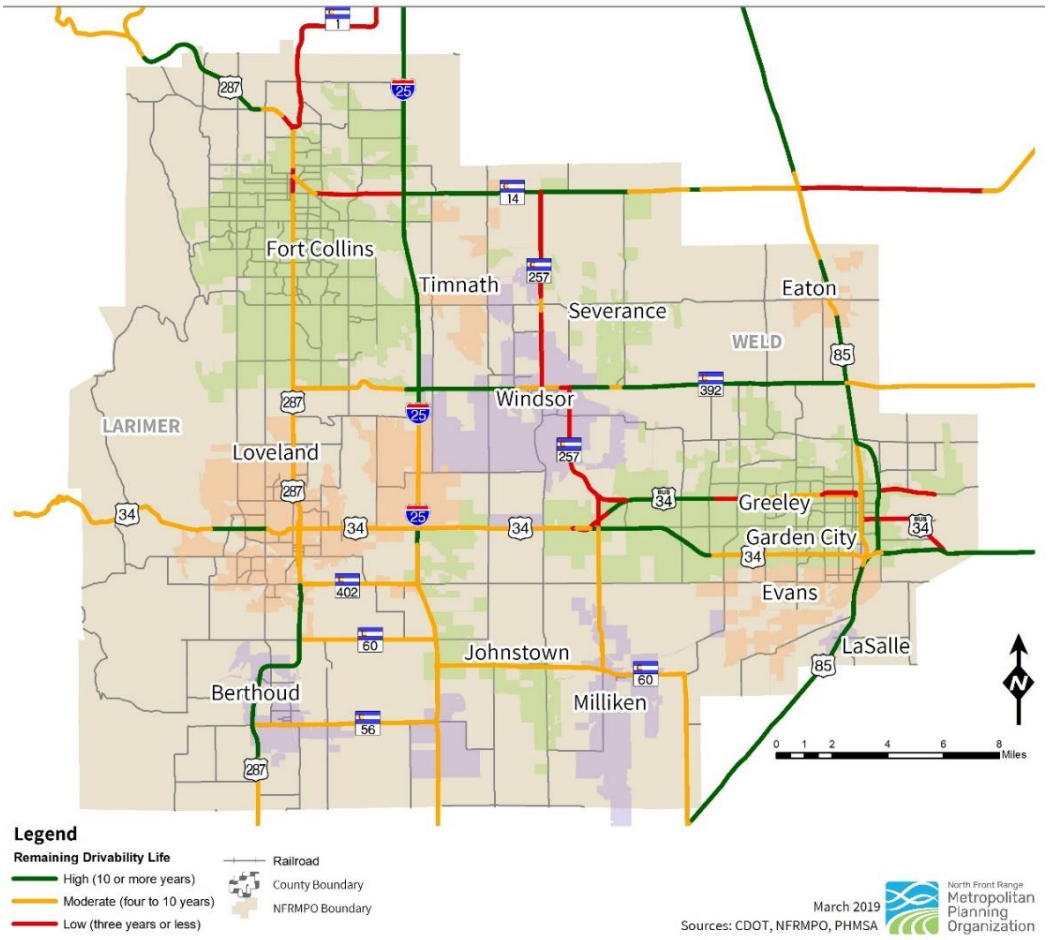
In 2018, only 1.2 miles of pavement on the NHS was in poor condition, 280.76 miles were in fair condition, and 221.82 were in good condition in the NFRMPO region.[41]

CDOT uses an indicator called "Remaining Drivability Life" to monitor pavement condition. This is a measure of how long a roadway is expected to have acceptable driving conditions based on a variety of factors related to pavement. Remaining Drivability Life for is measured on the following scale:

- **High Drivability Life:** 10 or more years remaining of acceptable driving conditions
- **Moderate Drivability Life:** Between four and 10 years remaining of acceptable driving conditions
- **Low Drivability Life:** Three years or less remaining of acceptable driving conditions

Within the NFRMPO region, 34 percent of centerline miles on the State highways have a high drivability life, 52.2 percent have a moderate drivability life, and 13.8 have a low drivability life. **Figure 3-6** shows the Remaining Drivability Life on the State Highways in the North Front Range.

Figure 3-6: Remaining Highway Drivability Life - 2018

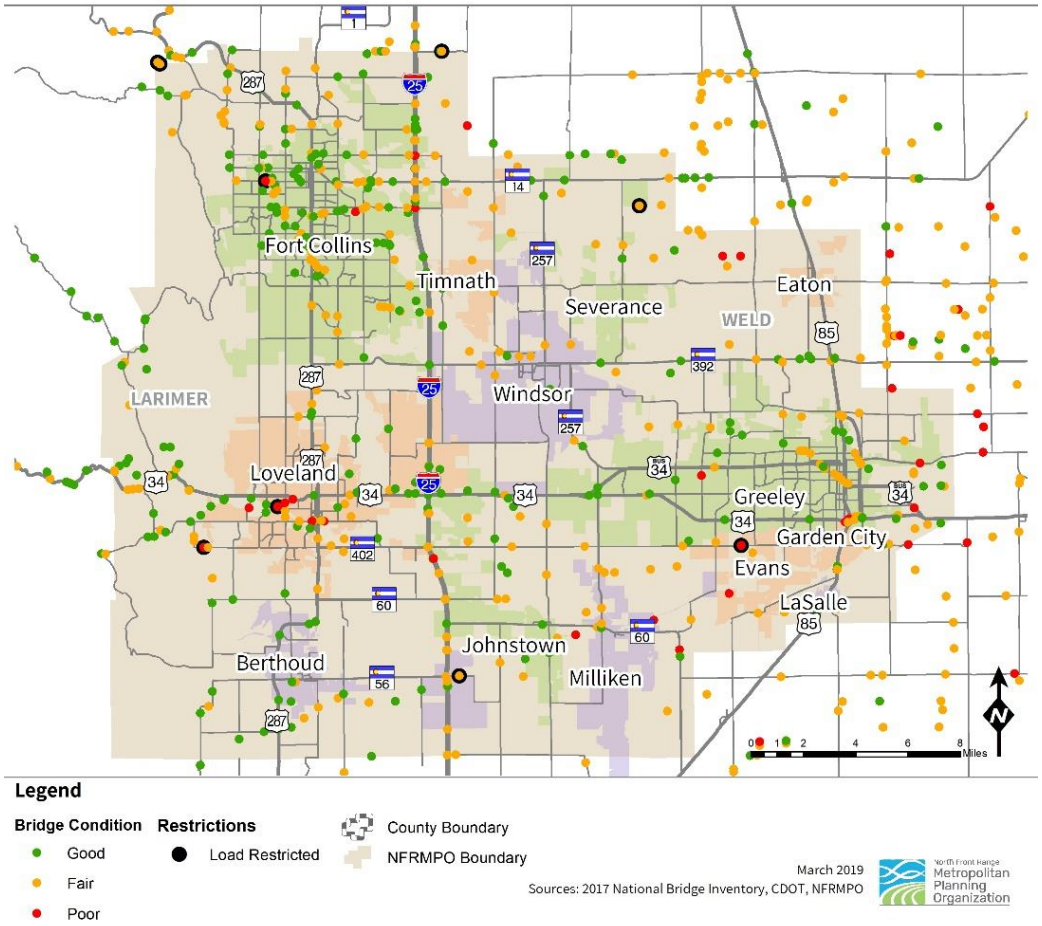


[41] CDOT, 2018.

Bridge Condition

In addition to truck-involved crashes, bridge height and weight restrictions are also critical to safety and system performance. Bridges on major roadways or railroads that do not accommodate truck or rail traffic can add costs to the freight industry and the region. The FHWA's National Bridge Inventory (NBI) captures bridge condition through a variety of measures. In accordance with the Pavement and Bridge Condition Performance Measures final rule, bridge condition is determined by a structure's lowest rating for deck, superstructure, substructure, or culvert condition. Bridge condition is rated as Good, Fair, or Poor. Structures in Poor condition are also considered structurally deficient. Some bridges were not designed to accommodate minimum legal weight limits or vertical clearances. These limits vary by facility type but are more commonly found on local facilities. Truck drivers must be aware of these restrictions along their route. Load-restricted bridges are bridges that have posted weight restrictions because they are unable to safely carry the legal weight limit. Height-restricted bridges are bridges that have posted height restrictions because they are unable to meet minimum vertical clearance requirements. All bridges in the North Front Range meet minimum vertical clearance requirements. Bridge condition and restrictions are shown in **Figure 3-7**.

Figure 3-7: Bridges Condition and Restrictions - 2017



Truck Parking

Adequate and ample truck parking infrastructure is crucial to an efficient freight system. Parking capacity constraints impact truck drivers by encouraging illegal and dangerous parking practices and lost time. In 2012, CDOT published the Colorado Truck Parking Guide to provide truck drivers with parking information for normal and emergency conditions as well as to identify chain-up stations for times when chain restrictions are in effect. The document provides general guidance as well as corridor-specific exit, parking, and rest area information for Colorado's Interstates, including North I-25. The 2007 Truck Parking Issue Final Report also identified issues, opportunities, approaches, and policies for addressing truck parking needs in the State. FHWA's Jason's Law Truck Parking Survey Results and Comparative Analysis found Colorado ranks 14th in truck parking space per 100 miles of NHS, but 27th in truck parking spaces per 100,000 daily truck vehicle miles travelled (VMT). When looking solely at publicly-maintained truck parking spaces, Colorado ranks 38th per 100,000 daily truck VMT. The National Coalition on Truck Parking's 2015-2016 Activity Report proposes public parking be made available at Park-n-Ride lots overnight, truck chain-up areas during summer months, and ports of entry or weigh stations for temporary use.

In 2019, CDOT completed a Truck Parking Assessment (TPA), which includes an inventory of the truck parking spaces and amenities on major freight corridors, identifies gaps, and high-level possible solutions in the State. Of the truck drivers surveyed for the TPA, 80 percent disagreed with the statement "In general, it is easy to find truck parking in Colorado compared to other surrounding states." Truck drivers dedicate an average of 56 minutes per day to securing a parking spot. In revenue drive time, this equates to $4,600 in lost wages per driver per year. I-25 North of Denver was ranked second most difficult corridor to find safe and legal parking in the state.[42] Drivers were asked how parking issues could be improved on the worst corridors. Their responses included:

- More parking facilities were needed. Specifically, new public rest areas and private truck stops should be opened, and closed public rest areas should be reopened.
- Shippers and receivers should permit parking.
- Hazmat routes should be eliminated. Truck parking spaces should accommodate current vehicle configurations.
- Local ordinances prohibiting truck parking reduce parking supply. Industrial locations should permit truck parking.
- Iowa, Indiana, Texas, Kansas, Missouri, Nebraska, New Mexico, Texas, and Wyoming were cited as examples of states with exemplary truck parking facilities.[43]

The Assessment included an analysis of truck parking utilization within a 30-minute drive of major corridors. In Northern Colorado, only I-25 was analyzed. From the Denver metropolitan area to the Wyoming Border, I-25 truck parking utilization is high, meaning 85 percent or more of available spaces are utilized during peak periods. This is the longest continuous stretch of high utilization along

[42]CDOT Truck Parking Assessment, 2019.
[43]CDOT Truck Parking Assessment, 2019.

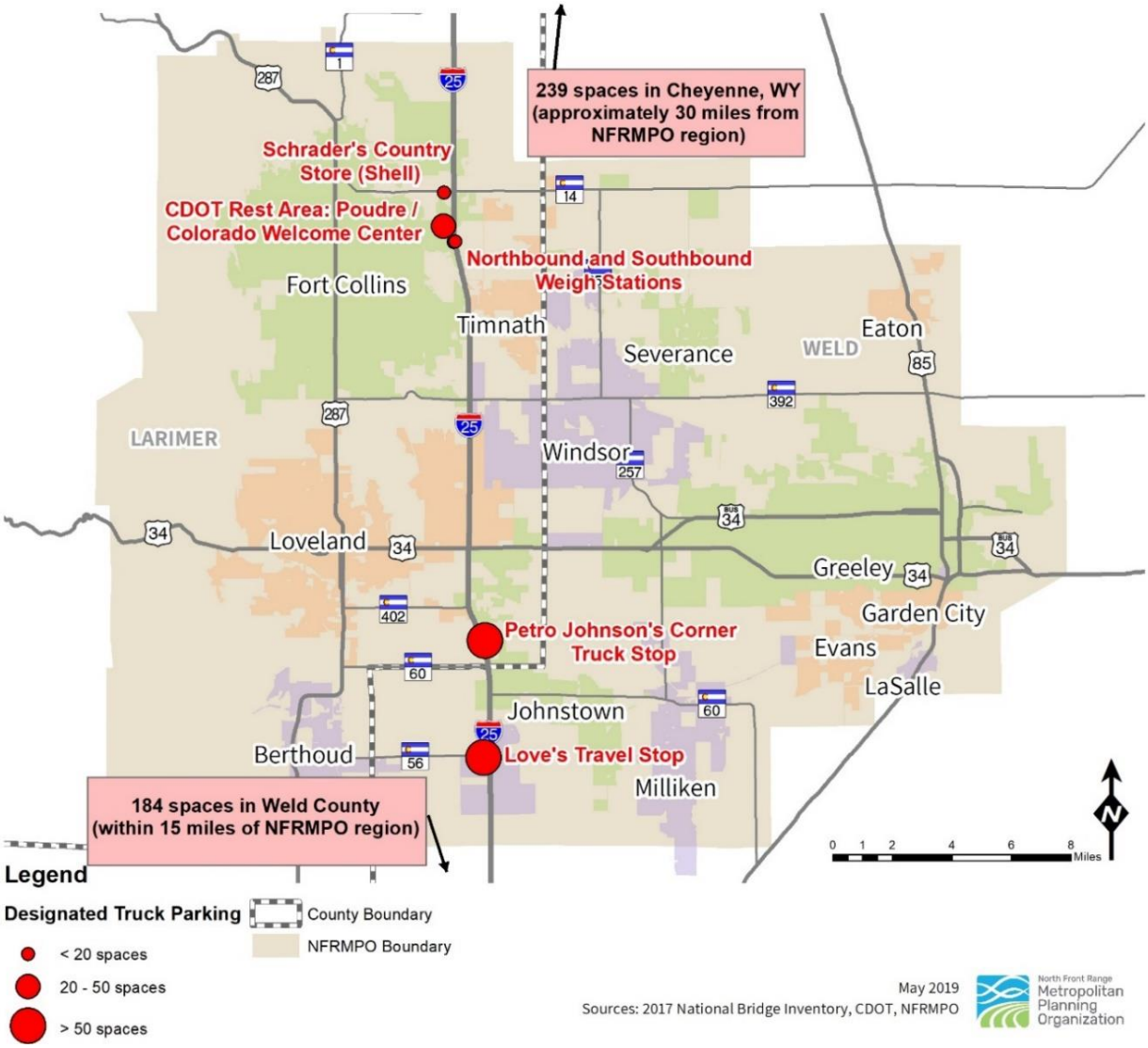
Colorado's Front Range. **Figure 3-8** shows the truck parking inventory and priority projects identified in the 2019 Assessment. To prevent a substantial truck parking shortfall along North I-25 in the future, CDOT has recommended the following solutions:

- Construct additional safety rest areas with truck parking
- Construct public truck parking facilities adjacent to truck stops and travel plazas
- Open existing facilities such as weigh stations and park-and-ride facilities to accommodate truck parking
- Promote the availability of publicly or privately provided truck parking on the NHS using intelligent transportation systems (ITS) or other means[44]

CDOT's 2018 *Statewide Rest Area Study - Phase I Report, Inventory and Assessment* found that on average, services are available every five miles along North I-25. Without rest areas, private services would provide for all travel needs within a one-hour drive time throughout this length of interstate, consistent with AASHTO guidance on rest area spacing. In inclement weather, however, an increased number of travelers seeking these services can put disproportionate strain on truck drivers facing their hours-of-service limits and/or vying for limited space with a large trailer. The NFRMPO region and southern Wyoming are prone to high wind events, snow storms, and a combination of the two. Accordingly, it is important to identify and communicate emergency truck parking locations where drivers can wait out the elements safely. Publicly-owned facilities such as fairgrounds are often well-suited for these events, while other opportunities may rely on the development of private partnerships within the freight industry to identify privately-owned underutilized space.

[44]CDOT Truck Parking Assessment, 2019.

Figure 3-8: North I-25 Truck Parking Inventory



Rail Freight

Rail freight in the region is primarily moved on the BNSF Railway and Union Pacific Railroad (UPRR) lines, with each carrying between two and 17 trains per day. There are 14 railroads operating within the State of Colorado, with three of those operating within the NFRMPO region. Railroads are classified according to the annual gross operating revenue from the railroad operations. A Class I Railroad is a railroad that had an operating revenue of at least $447.6M in 2016 dollars. A Class II Railroad, also known as a regional railroad, has an operating revenue between $35.8M and $447.6M. A Class III Railroad, also known as a shortline railroad, has annual operating revenue of less than $35.8M and typically services a small number of towns or businesses or performs short haul trips between larger railroad lines. Both BNSF Railway and UPRR are classified as Class I Railroads and the Great Western Railway is considered a Class III or shortline railroad. These railroads are described in more detail in the following section and shown in **Figure 2-2** in **Chapter 2**.

- **Union Pacific Railroad (UPRR):** UPRR is a Class I Railroad, which has several rail lines in the NFRMPO region. The north-south line runs from the Denver metro region through the North Front Range to Wyoming, generally following the US85 Corridor. The majority of the east-west line of the UPRR runs between LaSalle and Milliken with a switching yard in LaSalle, and from Milliken into Fort Collins. There are an average of 17 trains per day on the UPRR.
- **BNSF Railway:** BNSF is a Class I Railroad, which travels the length of the NFRMPO region north-south, passing through Fort Collins, Loveland, and Berthoud, parallel to US287, with a switch yard in Fort Collins. An average of six trains operate per day on the BNSF line.
- **Great Western Railway of Colorado (GWR):** GWR is a regional/shortline railroad. GWR operates a total of 80 miles of track and interchanges with both BNSF and UPRR. The company operates freight service between Loveland and Johnstown, with spur lines to Milliken and Longmont. Another line connects north from Kelim (east of Loveland) to Windsor, and from there to Greeley and Fort Collins. GWR also owns a branch line from Johnstown to Welty (just west of Johnstown). GWR serves a diverse customer base including the Great Western Industrial Park. GWR is managed by OmniTRAX.

Rail facilities and operations differ from those of highways because railroads are privately owned, operated, and maintained and receive little public funding. Colorado relies on rail to ship several commodities far more efficiently than possible by truck or pipeline. **Table 3-12** and **Table 3-13** show the top five commodities originating and terminating within the State in 2015. Coal was the largest commodity shipped to and from Colorado, making up over half of all rail tonnage in the State and nearly a third of all carloads. These tables provide a cross-section of the rail cargo passing through the region each day. One train can carry as much freight as several hundred trucks. It would have taken approximately 7.7M additional truck trips to handle the 138.7M tons of freight that originated in, terminated in, or moved through Colorado by rail in 2017.[45]

Table 3-12 Colorado Originated Rail Freight - 2015		
Commodity	**Percent of Total Tonnage**	**Carloads**
Coal	51%	83,100
Farm Products	8%	15,100
Glass and Stone	8%	14,500
Intermodal	6%	90,700
Nonmetallic Minerals	5%	9,800
Other	22%	53,400
Source: *Association of American Railroads, Rail Fast Facts, 2017.*		

[45] Association of American Railroads, Rail Fast Facts, 2017.

Table 3-13 Colorado Terminated Rail Freight - 2015		
Commodity	**Percent of Total Tonnage**	**Carloads**
Coal	52%	133,400
Nonmetallic Minerals	13%	34,900
Glass and Stone	6%	18,000
Intermodal	6%	124,000
Lumber, Wood Products	5%	15,000
Other	18%	86,100
Source: *Association of American Railroads, Rail Fast Facts, 2017.*		

Performance

Safety

Passenger vehicles and freight vehicles interact on the roadway system and at the 316 at-grade railroad crossings in the region. Mitigating conflicts at these locations will be increasingly important as traffic volumes and distracted driving incidents continue to grow. **Figure 3-9** shows these crossings, as well as grade-separated crossings where conflicts between travel modes have been eliminated. **Table 3-14** lists the number of crashes at the at-grade rail crossings between 2008-2018. In this 10-year period, 24 incidents between trains and passenger vehicles occurred at regional at-grade railroad crossings, with eight injuries and three fatalities. Trucks can be particularly susceptible at rail crossings due to stalling or failing to clear a crossing on congested roads. The prevalence of oil and gas development in the North Front Range creates significantly higher truck traffic in rural parts of the region compared with much of the State.

Figure 3-9: At-Grade and Grade-Separated Railroad Crossings of the Transportation Network, Rivers, and Streams

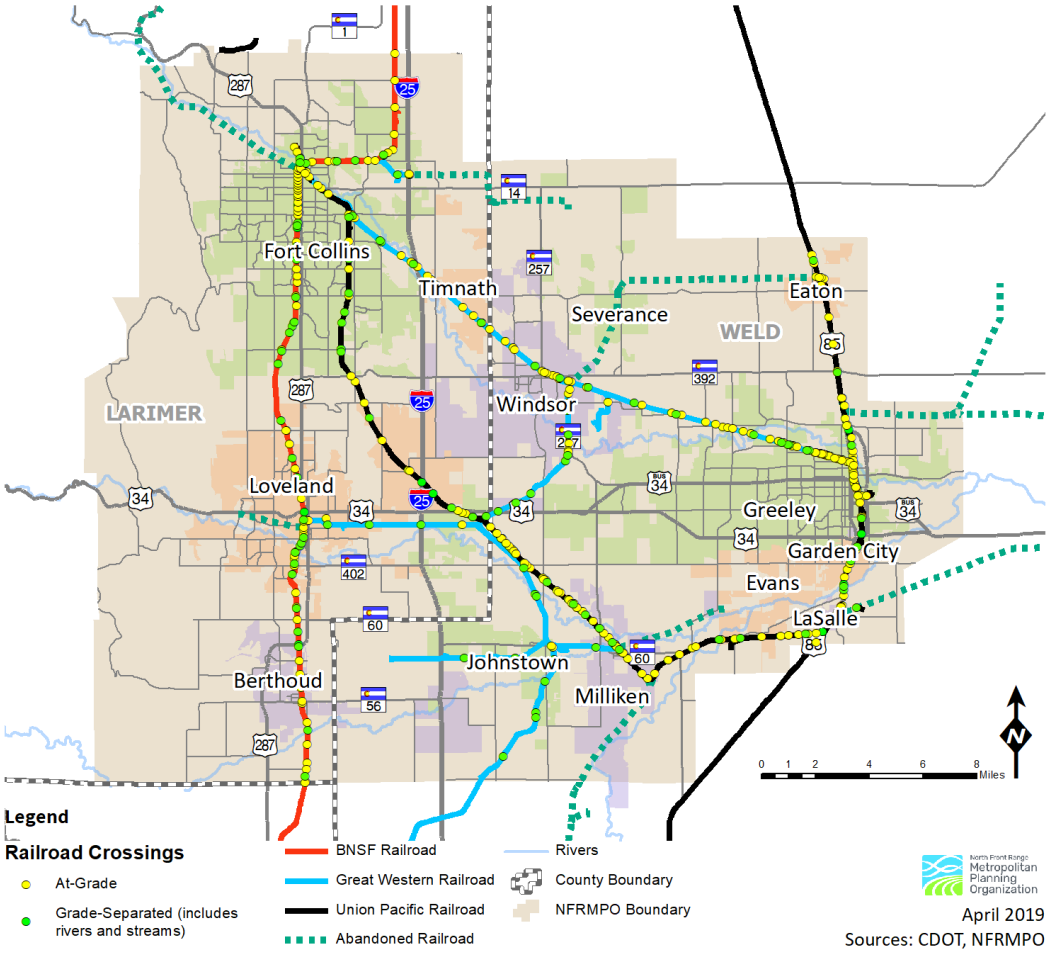


Table 3-14: Railroad Crossing Crashes 2008-2018							
Crossing ID	**City/Town**	**Roadway Name**	**Railroad**	**Crossing Protection**	**Number of Crashes**	**Number of Fatalities**	**Number of Injuries**
804855W	Eaton	5th Street	UPRR	Cross Bucks	4	2	1
804852B	Eaton	WCR72	UPRR	Cross Bucks, Stop Signs	3	--	1
804856D	Eaton	WCR76	UPRR	Stop Signs	2	--	3
245033R	Loveland	Roosevelt Avenue	BNSF	Gates, Standard Flashing Light Signal	2	--	--
244647X	Fort Collins	Summit View	GWR	Gates, Standard Flashing Light Signal, Audible, Cross Bucks	1	--	--
921967R	Loveland	Boise Avenue	GWR	Highway Traffic Signals, Wigwags, Bells	1	--	--
804355Y	LaSalle	WCR48	UPRR	Cross Bucks, Stop Signs	1	--	--
244632H	Fort Collins	Plus Street	BNSF	Cross Bucks	1	1	--
245106Y	Windsor	WCR23	GWR	Cross Bucks	1	--	1
245032J	Loveland	Private Road	BNSF	Stop Signs	1	--	--
804501C	Fort Collins	LCR32	UPRR	Gates	1	--	--
804514D	Fort Collins	US287	UPRR	Highway Traffic Signals, Wigwags, Bells	1	--	--
804363R	Evans	31st Street	UPRR	Gates	1	--	--
804491Y	Milliken	WCR17	UPRR	Cross Bucks	1	--	1
244622C	Fort Collins	Horsetooth Road	BNSF	Gates, Cantilever Flashing Light Signal	1	--	1
804854P	Eaton	Collins Ave	UPRR	Gates, Standard Flashing Light Signal, Audible, Cross Bucks	1	--	--
804848L	Eaton	WCR70	UPRR	Cross Bucks, Stop Signs	1	--	--

As part of the *US85 Planning and Environmental Linkages (PEL) Study*, Weld County, CDOT, and UPRR have agreed to close 11 of the 57 at-grade railroad crossings along the 63-mile stretch of US85. Two of these crossings are in the NFRMPO region: Weld County Road 72 (WCR72) in Eaton and WCR64 / O Street in Greeley.

Planning and Environmental Linkages (PEL) Study *- a voluntary approach to transportation decision-making that considers environmental, community, and economic goals early in the planning stage and carries them through project development, design, and construction. (Source: CDOT)*

By the year 2020, all Class I railroads are required by federal statute to operate with a Positive Train Control (PTC) system. PTC refers to technologies designed to prevent incidents caused by human error including train-to-train collisions; derailments caused by excessive speed; unauthorized incursions by trains onto sections of track where maintenance activities are taking place; and the movement of a train through a track switch left in the wrong position.[46] The PTC system consists of an onboard locomotive system, a wayside system, and a back office server all connected via a wireless data communication system.

BNSF Railway, GWR, and UPRR provide multiple programs to ensure track safety. BNSF Railway and UPRR staff inspect their routes multiple times per week for internal defects, track strength, undue stress on wheels, or preventable equipment failures.

Educating people about safety near railroad tracks is an important undertaking for the railroads. UPRR and BNSF Railway provide safety grants, which can be used by communities to provide education about safety near railroads. Grants can be used for youth education activities, school or community safety days, community safety blitzes, and at-grade crossing educational enforcement activities. In addition to programs for the public, the railroads maintain a firm commitment to safety behind the scenes. The railroads provide safety and technical training for all employees. Employees are trained in the field, on the job, and at centralized training centers.

Operation Lifesaver Inc. (OLI) is a rail safety education non-profit organization established in 1972. The organization offers free rail safety education programs using a network of authorized volunteer speakers and trained speakers. OLI focuses on what it calls the three E's: education, enforcement, and engineering. By partnering with federal, state, and local government agencies, highway safety organizations, and the freight railroads, OLI reaches a wide population as rail transport increases, becomes more efficient, and uses quieter trains.

Some jurisdictions within the region are working to ensure safety while creating Quiet Zones at some at-grade crossings in their downtowns. The FRA allows Quiet Zones, which are areas where trains

[46]American Association of Railroads (AAR) Positive Train Control, 2018.

proceed without sounding a warning horn unless it is an emergency, at crossings with gates, flashing lights, constant warning time devices, and power out indicators. In 2016, the Town of Windsor established a Quiet Zone throughout the downtown area after installing safety equipment at 13 at-grade crossings with federal TIGER grant funds. The City of Fort Collins is currently pursuing an exemption from the Quiet Zone rules for the downtown area due to the lack of space at intersections for crossing gates.

Needs and Constraints

The CFP identifies major needs and capacity constraints on freight rail. While needs and constraints are identified at the state level, some are applicable to the NFRMPO region given existing conditions, while others will apply down the road as growth and development continue transforming the region. **Table 3-15** lays out these needs and constraints.

Table 3-15: Colorado Rail Needs and Capacity Constraints

Needs	Capacity Constraints
Improvements and Planning for Rail-Served Industrial Developments Targeted Freight Intermodal Connectivity Improvements Addressing Rail Service Constraints Preservation of Freight Corridors and Assets Safety and Security	Vertical clearance Weight limit Track capacity Terminal and yard capacity Rail line operating speed Traffic control and signaling systems Land use development and encroachment

Source: CDOT Colorado Freight Plan, 2019.

The NFRMPO region is geographically situated between two rail freight choke points or congested areas according to AASHTO's 2003 Freight Rail Bottom Line Report, with little change to infrastructure in the past 16 years. The choke points are in the Denver Metropolitan Area and southeastern Wyoming. The report suggests congestion in these areas is the result of:

- Outdated communication and signaling systems including signaling restrictions
- Switching inefficiency including conflicts for mixed-speed operation on single or dual tracks
- Inadequate sidings to accommodate train lengths
- Inadequate capacity of yards and port terminals[47]

As these constraints are addressed in the most congested areas just outside the region, it is important to consider them within the region as well as rail freight traffic increases.

[47]TRB NCFRP Report 7: Identifying and Using Low-Cost and Quickly Implementable Ways to Address Freight-System Mobility Constraints, 2010

The performance of a freight rail system is a function of both physical and operational constraints, both of which can lead to freight rail bottlenecks or chokepoints. Physical constraints that can reduce throughput capacity include antiquated bridges, low-ceiling tunnels, missing connections, outdated signal systems, inadequate siding along single-track lines, inadequate bridges, and inadequate terminal capacity. Operational constraints include railroads interchanging traffic among themselves, sharing right-of-way with passenger rail, and crossing roadway traffic at-grade.[48]

Siding *- An auxiliary track for meeting or passing trains.*

Potential low-cost improvements to the rail system to address some of these challenges are outline in **Table AC-2** in **Appendix C.** Many of these improvements rely solely on private investments but building public-private partnerships early can be the catalyst for identifying public funding opportunities and building overall support from stakeholders and the general public.

Air Freight

Lightweight, high value products are the most common types of air cargo. In 2016, air cargo accounted for less than one percent of trade tonnage but was 35 percent of trade value worldwide.[49] Common air cargo commodities include computing equipment, electronics, flowers, machinery, medical equipment, pharmaceuticals, and various vegetables. Less than one percent of goods by tonnage and value is currently transported by airplane, a trend expected to remain unchanged through 2045. In Larimer and Weld counties in 2015, nearly $4.5M in cargo was transported by airplane.

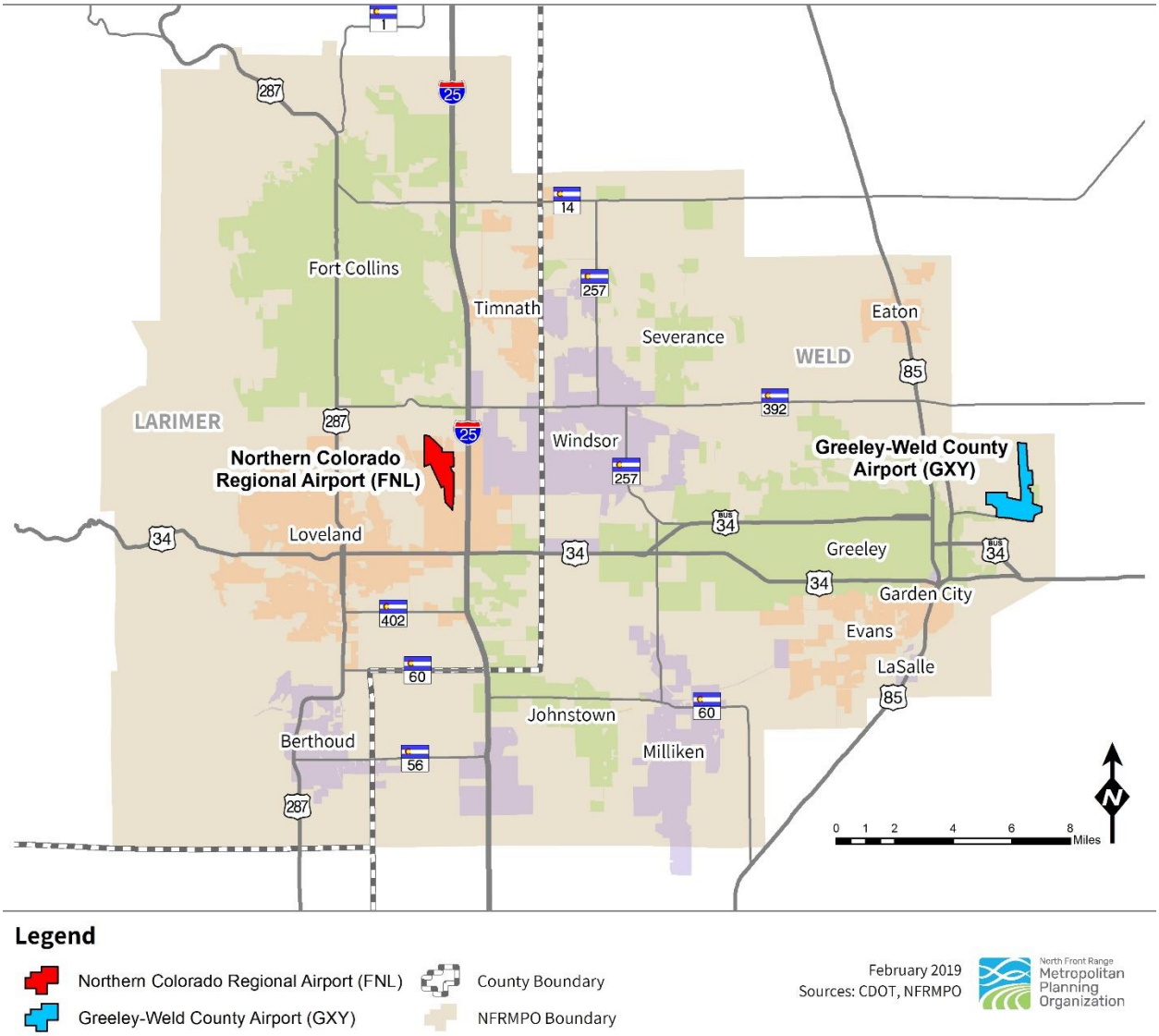
The two airports in the NFRMPO region categorized in NPIAS are Northern Colorado Regional Airport (FNL), a Commercial Service Nonprimary Airport in Loveland, and Greeley-Weld County Airport (GXY), a General Aviation Airport in Greeley. Neither airport regularly accommodates air cargo, nor do they have dedicated air cargo infrastructure. Air cargo is generally handled at the same airports with scheduled commercial passenger service. Denver International Airport (DEN), just 48 miles southeast of the NFRMPO region, ranked 21st among qualifying U.S. airports in landed weight in 2017 at nearly 700,000 tons.[50] Population growth and increased production of high-value, time-sensitive commodities in Northern Colorado could spur niche demand for air cargo services in the future, especially with the addition of commercial passenger service.

The 2011 Colorado Aviation System Plan provides a glimpse into the performance of theses airports and how well they are contributing to meeting the State's needs and economic goals.

[48] AASHTO Freight-Rail Bottom Line Report, 2003.
[49] The Boeing Company World Air Cargo Forecast 2016-2017, 2016.
[50] FAA CY 2017 All-Cargo Data, 2018.

The future of air cargo services at FNL and GXY is uncertain and will depend on various economic trends. Northern Colorado's proximity to DEN will remain a limiting factor, but there are still trends to pay attention to. The growth of e-commerce and online shopping coupled with customer expectations of quick delivery could increase the demand for air cargo in Northern Colorado. Likewise, modernizing air traffic control systems are increasing reliability, safety, and capacity at airports while reducing delay and fuel use. At the same time, the adoption of connected and autonomous vehicles can also lower costs and delivery times.[51] **Figure 3-10** shows the location of FNL and GXY.

Figure 3-10: NPIAS Airports in the NFRMPO Region



[51]CDOT, Colorado Freight Plan, 2019.

Northern Colorado Regional Airport (FNL)

In 2007, FNL (known at the time as the Fort Collins-Loveland Municipal Airport) updated its Airport Master Plan under the direction of the cities of Fort Collins and Loveland. The Plan assesses the direct improvements necessary to accommodate the region's future aviation needs. The Plan lays out development opportunities on the airport property and future runway extensions, other facility improvements, and more. In 2020, FNL expects its new Virtual Air Traffic Control Tower (ATCT) will be operational and Federal Aviation Administration (FAA) certified. By optimizing runway operations, the Virtual ATCT will expand FNL's capacity to accommodate commercial services and other future opportunities. The Virtual ATCT will also allow the airport to remotely manage runway operations at other airports around the state, improving safety, efficiency, and providing economic benefits. FNL is currently working on an update to its 2007 Master Plan.

Greeley-Weld County Airport (GXY)

In 2014, the Greeley-Weld County Airport Authority updated its Airport Master Plan. The Plan lays out the extent and development schedule for future improvements and expansions of parking, roads, hangars, and other buildings for aeronautical and non-aeronautical uses at GXY. Future plans at the adjacent Colorado Air National Guard Recruiting Center may also impact development at GXY and the surrounding area.

Pipeline Freight

Although the NFRMPO is not involved in the long-range planning of pipelines in Northern Colorado, pipelines can be an efficient and safe alternative to transporting mined materials via railroad or roadway. Nationwide, 74 percent of crude oil is carried by pipeline. Colorado's 56,000-mile pipelines network is long enough to go around the world more than twice. Currently, there is no formally adopted statewide pipeline plan. The suitability of pipeline transportation for various commodities depends on nearby development and the availability and affordability of large easements.

Access to subsurface natural resources is why Weld County produces more oil and gas than any other Colorado county. The region is part of the Niobrara Shale, a shale rock formation spanning part of several states, including Northeastern Colorado. It contains oil and natural gas at depths of approximately 7,000 feet or greater. Companies drill wells vertically and horizontally to access the oil and gas, and use a complex hydraulic fracturing system, commonly known as fracking, to extract the resource. Companies are preparing for long-term drilling of the formation.

***MCF**—thousands of cubic feet*

***Fracking** – a technique in which a liquid is injected under high pressure into a well to create tiny fissures in the rock deep beneath the earth which then allow gas and oil to flow into the well. (Source: Merriam-Webster)*

Since 2014, oil production increased in Larimer County, but decreased slightly in Weld County, while natural gas production increased in both. The State's overall

production decreased for both oil and natural gas. Across the region, pipelines are used to transport commodities associated with the oil and gas industry, including:

- Gasoline
- Natural gas
- Water
- Other fuel oils

Pipelines and pipeline facilities within the region transport petroleum, natural gas, and other hazardous materials. The oil and natural gas industry is an integral component of the regional economy. The Wattenberg Gas Field, which covers a large portion of Weld County and to a smaller extent portions of Larimer County, is an onshore natural gas field stretching from North I-25 to the east. The Wattenberg Gas Field covers 2,000 square miles between Denver and Greeley with over 20,000 wells[52] and is located beneath 13 of the 15 communities within the NFRMPO area, including:

- City of Evans
- City of Greeley
- City of Loveland
- Town of Berthoud
- Town of Eaton
- Town of Garden City
- Town of Johnstown
- Town of LaSalle
- Town of Milliken
- Town of Severance
- Town of Windsor
- Larimer County
- Weld County

Substantial economic growth in Weld County has been the result of the oil and gas industry. 943 drilling permits were approved in Weld County between April 2018 and April 2019, accounting for 67 percent of all permits approved statewide over the same period. Seven drilling permits were approved in Larimer County during this time. As shown in **Table 3-16**, Weld County produced nearly 80 percent of the State's oil and one third of its natural gas across 2017 and 2018.

Table 3-16 Colorado Oil and Gas Production - 2017 and 2018

Area	2017		2018	
	Barrels of Oil	MCF of Natural Gas	Barrels of Oil	MCF of Natural Gas
Larimer County	678,005	2,521,657	4,022,417	11,455,710
Weld County	119,303,851	679,601,291	157,754,576	807,298,942
State of Colorado	131,400,792	2,166,366,751	177,467,352	2,281,830,827

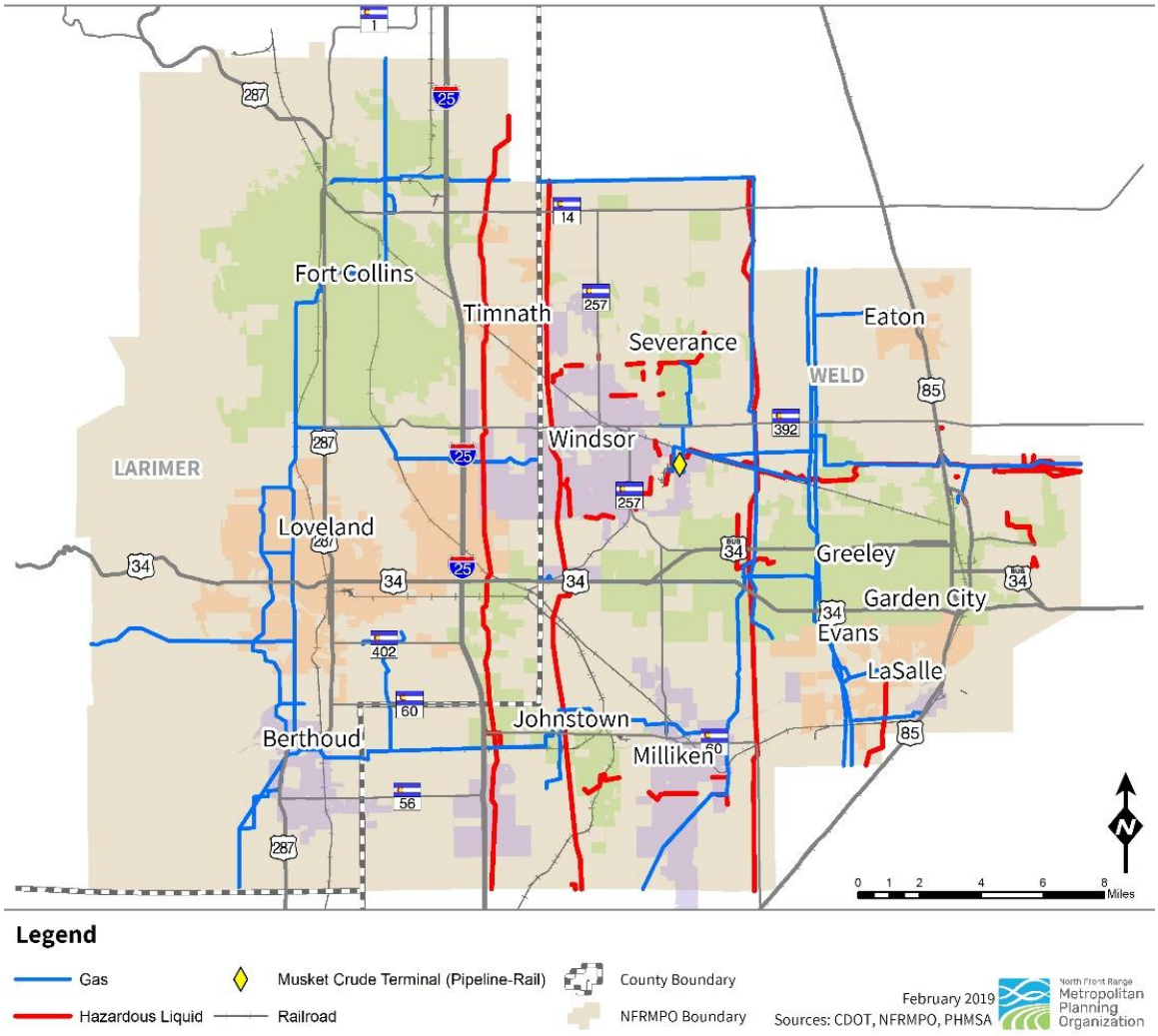
Source: *Colorado Oil and Gas Conservation Commission (COGCC)*

Figure 3-11 shows active pipeline in the NFRMPO region carrying gas other hazardous liquids. The map also shows the site of the Musket Crude Terminal, one of Colorado's four pipeline to rail terminals

[52] Petroleum Listing Service

transferring petroleum products between pipeline and rail tank cars. The site is in the Great Western Industrial Park in Windsor. All four terminals that transfer petroleum products between pipelines and trucks in Colorado are in Commerce City.

Figure 3-11: Active Pipelines



Safety

Pipelines are considered the safest and most efficient way to move oil and gas products. The Pipeline and Hazardous Materials Safety Administration (PHMSA) has overall regulatory responsibility for hazardous liquid and gas pipelines under its jurisdiction in the US. Since 2002, the PHMSA has recorded one hazardous liquid pipeline accident and two gas pipeline incidents.

Nationally, the Office of Pipeline Safety (OPS) has five regional offices. The Western Region Office located in Lakewood, Colorado serves as the regional office for Northern Colorado. The PHMSA and the National Association for Pipeline Safety Representatives (NAPSR) developed performance metrics in six areas:

- Damage Prevention Program
- Inspection Activity
- Inspector Qualification
- Leak Management
- Enforcement
- Incident Investigation[53]

On January 3, 2012, President Obama signed into law the Pipeline Safety, Regulatory Certainty, and Job Creation Act of 2011. The Act reauthorizes federal pipeline safety programs through FY 2015 and provides “for enhanced safety and environmental protection in pipeline transportation.” Pipeline safety programs were reauthorized in 2016 when President Obama signed "Protecting Our Infrastructure of Pipelines and Enhancing Safety Act of 2016," set to expire on September 30, 2019, the end of Federal Fiscal Year (FY) 2019. Another reauthorization is anticipated for FY2020.[54]

[53]USDOT Pipeline & Hazardous Materials Safety Administration Colorado State Program Metrics, 2015.
[54] Congressional Research Service DOT’s Federal Pipeline Safety Program: Background and Key Issues for Congress, 2019.

Chapter 4

Emerging Trends and Opportunities

Chapter 4: Emerging Trends and Opportunities

This Chapter focuses on the trends altering the supply chain at various stages. One important trend for Northern Colorado public and private partners to pay attention to, is a shift in trading partners. **Table 4-1** shows the anticipated shift in the amount of goods shipped to, from, and within Larimer and Weld counties, based on 2015 Transearch data. In 2045, there will be 22.6M additional tons of freight traveling to, from, or within the region. Moving an additional 52 percent safely and efficiently will require a holistic approach to improving to the overall transportation system.

Table 4-1: Commodity Flow Projections by Direction for Larimer and Weld Counties, by Tonnage – 2015, 2025, and 2045 (in Millions of Tons)

Direction	2015	2025	2045	30-Year Change (2015 to 2045)
Inbound	13.40	17.27	22.25	66%
Internal	8.04	9.36	10.06	25%
Outbound	22.41	25.95	34.20	53%
Total	43.85	52.58	66.51	52%

Table 4-2 demonstrates the value of goods shipped to, from, or within the region in 2045 will be double what it was in 2015. The increased value of the freight industry will place pressures on land uses across the region. Maximizing the public benefits of this value will require public and private partners to preserve and expand freight-oriented facilities where there is adequate access to the region's major corridors for each freight mode.

Table 4-2: Commodity Flow Projections by Direction for Larimer and Weld Counties, by Value – 2015, 2025, and 2045 (in Billions of US Dollars)

Direction	2015	2025	2045	30-Year Change (2015 to 2045)
Inbound	$13.39	$16.90	$24.83	85%
Internal	$1.96	$2.40	$3.34	70%
Outbound	$8.87	$11.85	$19.98	125%
Total	$24.22	$31.15	$48.15	99%

Transearch data also shows a shift in mode split for goods movement in Larimer and Weld counties. **Table 4-3** and **Table 4-4** shows the forecasted mode splits by tons and by value. By 2045, additional strain on the freight system will be borne by capacity-constrained modes such as rail and other modes such as air; however, these increases are small in the overall growth of freight traffic in the region when compared to truck freight. The region will need to push the flexibility and versatility of truck freight technology and infrastructure to accommodate this projected growth.

Table 4-3: Freight Mode Split Projections for Larimer and Weld Counties, by Tonnage - 2015, 2025, and 2045 (in Millions of Tons)				
Mode	**2015**	**2025**	**2045**	**30-Year Change (2015 to 2045)**
Truck	43.74	52.42	66.26	51%
Rail	0.11	0.16	0.23	110%
Other	0.002	0.004	0.010	327%
Total	43.85	52.58	66.51	52%

Table 4-4: Freight Mode Split Projections for Larimer and Weld Counties, by Value - 2015, 2025, and 2045 (in Billions of US Dollars)				
Mode	**2015**	**2025**	**2045**	**30-Year Change (2015 to 2045)**
Truck	24.12	31.00	47.89	99%
Rail	0.09	0.13	0.21	132%
Other	0.010	0.019	0.045	331%
Total	24.22	31.15	48.15	99%

Where freight is going to and coming from will play a large role on where the freight system will see the most additional stress in 2045. **Table 4-5** and **Table 4-6** show the projected top five trading partners for Larimer and Weld Counties in 2045. Many of these top trading partners are consistent with 2015 conditions. For imports, the San Francisco BEA is the only new partner in the rankings, replacing the Grand Island, NE BEA. This alludes to a slight shift upward in the share of goods traveling into the region from the south. As a share of overall imports an additional 8 percent by tonnage and 6 percent by value will travel beyond the State of Colorado compared to 2015.

Table 4-5: Top Trading Partner Projections for Larimer and Weld Counties for Imports from Outside Colorado - 2045				
Rank	**By Tonnage**		**By Value**	
	Trading Partner	**Millions of Tons**	**Trading Partner**	**Billions of US Dollars**
1	Wyoming Portion of Casper BEA	4.26	California Portion of Los Angeles BEA	$2.02
2	Kansas Portion of Wichita BEA	0.50	Houston, TX BEA	$0.61
3	California Portion of Los Angeles BEA	0.48	Kansas Portion of Wichita BEA	$0.60
4	Grand Island, NE BEA	0.46	Texas Portion of Dallas BEA	$0.60
5	Nebraska Portion of North Platte BEA	0.46	San Francisco, CA BEA	$0.53

For exports (**Table 4-6**), Jalisco, MX (ranked 20th by value in 2015) is the only new partner in the rankings, replacing the Nevada Portion of the Las Vegas BEA. This represents an increase in the distance goods will be traveling out of the region among top trading partners, compared with 2015. The share of overall exports leaving the State of Colorado in 2045 is expected to remain relatively constant.

Table 4-6: Top Trading Partner Projections for Larimer and Weld Counties for Exports Outside Colorado - 2045

Rank	By Tonnage		By Value	
	Trading Partner	Millions of Tons	Trading Partner	Billions of US Dollars
1	San Francisco, CA BEA	0.77	California Portion of Los Angeles BEA	$0.83
2	California Portion of Los Angeles BEA	0.75	Utah Portion of Salt Lake City BEA	$0.49
3	Wyoming Portion of Casper BEA	0.73	San Francisco, CA BEA	$0.46
4	Utah Portion of Salt Lake City BEA	0.48	Texas Portion of Dallas BEA	$0.38
5	Grand Island, NE BEA	0.23	Jalisco, Mexico	$0.33

The types of goods moved by truck, rail, and air are predicted to change as well. **Table 4-7** shows the forecasted shift in the top commodities moving to and from the region.

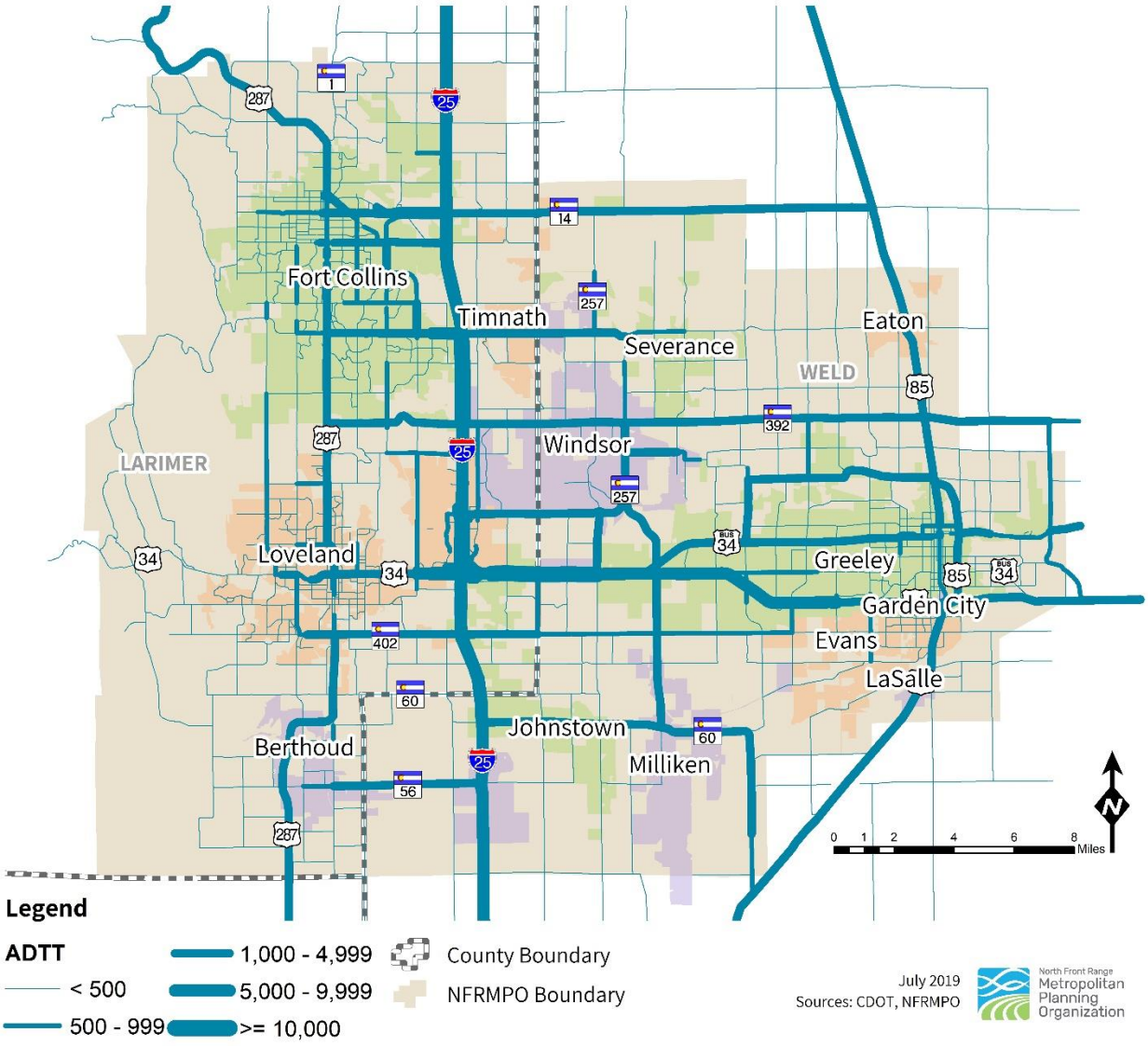
Table 4-7: Top Commodities Traded To or From Larimer and Weld Counties - 2015

Rank	By Tonnage		By Value (Billions of US Dollars)	
	Trading Partner	Millions of Tons	Trading Partner	Billions of US Dollars
1	Gravel or Sand	22.44	Warehouse & Distribution Center	$4.36
2	Misc. Waste or Scrap	5.53	Drugs	$3.75
3	Broken Stone or Riprap	5.20	Livestock	$2.81
4	Ready-mix Concrete, Wet	4.36	Rail Intermodal Drayage to Ramp	$2.33
5	Warehouse & Distribution Center	3.72	Meat, Fresh or Chilled	$2.18

These high growth projections for trade will mean significant stress on an already strained freight transportation system. The NFRMPO's Regional Travel Demand Model (RTDM) projects the growth in truck traffic based on development patterns, planned transportation projects, and various assumptions about socioeconomic growth and change. **Figure 4-1** shows the projected Annual Average Daily Truck Traffic (AADTT) in 2045 for all modeled roads in the NFRMPO region. The CFC's (I-25, US85, US287, SH14, and most of US34) as well as US34 Business and SH392 are projected to carry

roughly 44% of all truck VMT in the region in 2045, consistent with current truck traffic distribution. **Figure 4-1** also illustrates the importance of connectors to the CFC and RSC networks such as Mountain Vista Dr in Fort Collins, Eastman Park Dr in Windsor, and WCR27 east of Greeley. Overall projected growth equates to 733,919 additional truck VMT on the region's roadways in 2045 compared with 2015, representing a 64% increase over 30 years.

Figure 4-1: Annual Average Daily Truck Traffic (AADTT) on Modeled Roadways - 2045



Source: *NFRMPO Regional Travel Demand Model, 2019.*

For the CFP, stakeholders were asked about changes they anticipate will shape goods movement within the next 20 years. 26 organizations and agencies located within the NFRMPO region responded to the survey. Northern Colorado respondents viewed growth in the state population and demographic composition as the largest risk or disruptors to the state's economy and movement of goods and

people. Other risks and disruptions are displayed in **Table 4-8** ranked based on potential impact and likelihood.

Table 4-8: Future Risks and Disruption to Goods Movement in Colorado – CFC Survey Responses from the NFRMPO Region - 2018	
Impact and Likelihood	**Within the next 20 years, what major risks and disruptors do you think could impact Colorado's economy and the overall demand for moving goods and people?**
Highest	Growth in Colorado's population and demographic composition
	Shifts in energy sources and prices
	Changes in Colorado's industry clusters and economic diversification
	Adjustments in commodity prices and demand
	Attention to environmental impacts
	Increased trade protectionism and impacts on trade flows
	Rising global security concerns
Lowest	New global and domestic shipping routes
Source: *CDOT, Colorado Freight Plan, 2019.*	

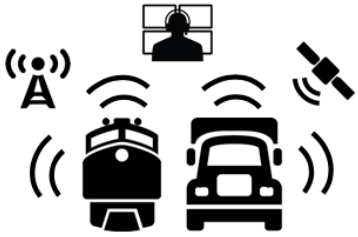
The same respondents also viewed highway and rail infrastructure conditions and maintenance as the largest change or trend impacting the type of infrastructure and services that Colorado businesses will demand. These survey question response results are summarized in **Table 4-9**.

Table 4-9: Future Changes and Trends Impacting Infrastructure and Services in Colorado – CFC Survey Responses from the NFRMPO Region - 2018	
Impact and Likelihood	**Within the next 20 years, what major changes or trends do you think will impact the type of infrastructure and services that Colorado businesses will demand?**
Highest	Highway and rail infrastructure condition and maintenance
	Continued capacity and congestion constraints
	Changing business dynamics (e-commerce, on-demand delivery, etc.)
	Increased demand for interstate/intercity passenger rail
	Changes to federal, state, or local regulations
	Adoption of connected and autonomous vehicle technologies
	Increase in air cargo movements/airport related development
Lowest	Development of alternative freight transport (drones, robotics, etc.)
	Insourcing, 3-D printing, or other local production means
Source: *CDOT, Colorado Freight Plan, 2019.*	

To address this growth and change, freight industry stakeholders across the NFRMPO region will need to explore and prepare for various new opportunities and emerging trends. For the public and private sector alike, this involves calculating risk. Decision makers are likely to prioritize actions based on their perception of when and how a new technology, regulation, or consumer preference will disrupt the industry.

Each of the three areas of opportunity highlighted in **Table 4-10** consist of various practices already well established in other regions, technologies and trends just beginning to creep into the transportation system, and considerations and concepts further on the horizon. Many of these practices are consistent with the congestion management strategies and opportunities identified in the NFRMPO's 2019 Congestion Management Process (CMP). Applied in tandem, FNC and the 2019 CMP can ensure improvements in passenger and freight mobility happen together. The rest of Chapter 4 expands on the areas of opportunity introduced in **Table 4-10.**

Table 4-10: Areas of Opportunity and Emerging Trends for Freight Transportation

Freight-Intensive Land Uses and Rights-of-Way (ROW)	Vehicle Automation and Enhanced Communication	Shifts in the Global Economy
		
Practices by local, regional, and state agencies improving freight movement by dedicating space in the built environment for freight-related uses	Advancements in how freight vehicles operate and communicate with the surrounding environment	Changes in the way goods are produced and distributed due to shifting consumer preferences and technological advancements

Freight-Intensive Land Uses and Rights-of-Way (ROW)

In a rapidly growing region like Northern Colorado, nodes of freight activity are under constant pressure from encroaching residential and non-industrial commercial activities. Establishing and preserving freight nodes, as well as surrounding them with appropriate infrastructure, can ensure a freight-friendly local and regional environment while also ensuring safety for nearby residents and visitors. Examples of freight-intensive land uses which could be implemented in the NFRMPO region include:

Freight-Oriented Development

Strategically locating industrial land uses near one another and away from non-compatible land uses such as residential areas, schools, and areas of high pedestrian activity can improve freight efficiency

and ensure continuous operations. One strategy to ensure the preservation of space for important manufacturing and freight activity centers is through the creation of Planned Manufacturing Districts (PMDs). The City of Chicago has used PMDs for decades to preserve and protect historically important manufacturing centers from redevelopment or encroachment from non-compatible land uses. By designating areas as PMDs, cities can strengthen existing manufacturing centers and encourage investment in freight-friendly infrastructure near the priority freight network. In rapidly growing and densifying areas, tools like PMDs can create stable, predictable industrial environments, maintain ease of freight delivery, and protect from conversion into residential and commercial uses.[55] Areas where all activities related to transport, logistics, and distribution are intentionally clustered are also often referred to as "Freight Villages."[56]

> **Examples:** The Great Western Industrial Park in Windsor is a 3,000-acre master-planned development hub for energy, manufacturing, and technology industries. The Park has direct connections to BNSF and UPRR facilities and is near major highway corridors including I-25, US34, US85, US287, and SH257.

Truck Staging and Commercial Vehicle Load Zones (CVLZs)

"The Final 50 Feet" in a truck freight delivery refers to the end of the journey when the truck stops and unloading of the cargo begins in a commercial district. This often occurs at a curb, parking spot, or alley, but can involve long periods when trucks must stage somewhere else and wait their turn or continue driving when space isn't available. This part of the journey can be particularly difficult in urban settings where land use and limited space do not accommodate the needs of truck deliveries. Many communities have Commercial Vehicle Load Zones (CVLZs) to accommodate the Final 50 Feet; however, these spaces are becoming increasingly overtaxed as e-commerce expands. E-commerce sales grew 16 percent between 2016 and 2017, adding more trucks vying for limited CVLZ spaces, which are often occupied up to 90 percent of the work day.[57] Communities can reduce truck dwell times in the following ways:

- Requiring private loading docks/bays or truck staging areas with new commercial developments where space allows.
- Designating CVLZs with dwell time limits in the central business district and enforcing them.
- Implementing common carrier locker systems in the central business district. This is a system of metal locker storage shared by businesses accessed by freight carriers and merchants. The locker system reduces dwell times and failed first deliveries by allowing drivers to deliver packages to an empty locker.

[55]VREF Center for Excellence for Sustainable Urban Freight Systems Innovative Ways to Gain Insight Into the Needs of Freight Activity, 2018.
[56]New York Metropolitan Transportation Council (NYMTC) Freight Village: What It Is, What It Does, Feasibility in the NYMTC Region, 2007.
[57] University of Washington, The Final 50 Feet Urban Goods Delivery System, 2018.

Examples: The Anheuser-Bush Brewery in Fort Collins implemented a truck staging area allowing trucks to wait in line for loading to relieve congestion caused by staging on nearby corridors.

Truck staging at the Anheuser-Busch Brewery in Fort Collins. ***Source****: NFRMPO Staff, 2018.*

Soft-surface truck parking/staging along Mountain Vista Drive near the Anheuser-Busch Brewery in Fort Collins. ***Source:*** *NFRMPO Staff, 2018.*

Aerial view of informal truck staging along US85 at the JBS plant in Greeley. ***Source:*** *Google, Inc., 2019.*

Shared-Use Corridors

Most commuter and intercity rail services in the US operate on existing freight railroad tracks. It is up to freight railroads to agree shared operation is viable. Although passenger trains often require more advanced infrastructure than freight trains, shared-use agreements can sometimes be an effective means of increasing capacity, increasing train speed, improving reliability, ensuring on-time performance, optimizing maintenance costs, and improving ROW conditions.[58] According to the Federal Railroad Administration (FRA) shared-use corridors can take three forms:

- **Shared Tracks** – Freight and passenger trains use the same tracks
- **Shared Right-of-Way (ROW)** – Freight and passenger trains use separate but adjacent tracks with less than 25 feet between track centers
- **Shared Corridor** – Freight and passenger trains use separate, but adjacent tracks with 25 - 200 feet between track centers[59]

Viability of shared-use corridors requires in-depth analysis of safety, operations, maintenance, and other costs.

Examples: The Southwest Chief & Front Range Passenger Rail Commission (SWC&FRPRC) exists to bring local, regional, and state agencies together with the private rail industry and neighboring states to ensure track repairs and upgrades required for the continuation of

[58]Texas A&M Transportation Institute, Public Use of Rail Right-of-Way in Urban Areas, 2014 .
[59] Ibid.

existing Southwest Chief Amtrak Rail service in Colorado are completed and to facilitate the future possibilities of Front Range passenger rail.

Railbanking

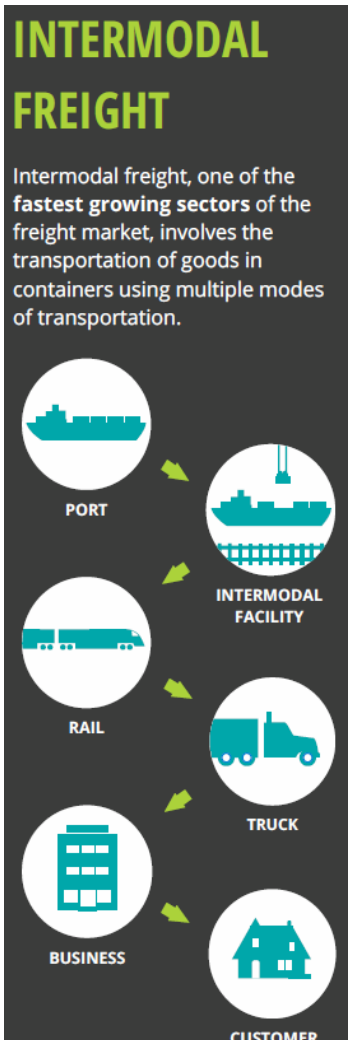
As established in a 1983 amendment to the National Trails System Act, railroads have the option to preserve corridors for alternative use instead of complete abandonment. The railroad can form an agreement with any person or agency, public or private, to use the rail line as a trail or linear park until the railroad might need the corridor again for future rail service.[60]

Examples: In 2004 the Great Western rail line from Eaton to Windsor was railbanked by Omnitrax and the old rails and ties were removed. In 2006, the Towns of Eaton, Severance, and Windsor formed the Great Western Trail Authority to accept the railbanked land, making way for the Great Western Trail. The 10.5-mile multi-use trail will ultimately connect all three Towns.[61] The Great Western Trail is part of the NFRMPO's Regional Non-Motorized Corridor #4.

[60]Rails-to-Trails Conservancy, Railbanking, 2019.
[61]Great Western Trail Authority, The Story Behind the Great Western Trail, 2014.

Intermodal and Transload Facilities

Intermodal transportation refers to the movement of freight containers from one mode to another without any handling of the freight itself. This can include shipments between rail and truck, rail and ship, or truck and ship. Intermodal transportation can reduce cargo handling, damage, losses, and overall shipping time. Producers in Colorado have expressed an increased demand for intermodal transportation options in the face of growing highway congestion and truck driver shortages. Demand for intermodal freight will outgrow the capacity of existing intermodal facilities in the Denver Metropolitan Area, presenting opportunities for intermodal infrastructure in Northern Colorado. Operational costs continue to climb and driver shortage is ranked as the top issue facing the North American trucking industry in 2017 and 2018. In 12 of the last 14 years, the issue has ranked in the top three.[62] For select industries in Northern Colorado, introduction of an intermodal facility in the future may help ease the pressures on freight transportation if these issues persist and grow.



Source: *USDOT Beyond Traffic 2045, 2017*

Transload facilities are similar to intermodal facilities, except the products are moved to a different conveyance or container, rather than the full containers being transferred from rail to a different mode of transportation, meaning more handling is required at the facility.

> **Examples:** There are only two intermodal facilities currently operating in Colorado, both of which are in the Denver metropolitan area. A transload facility operates in the NFRMPO region just south of WCR74 / E Collins Street in the Town of Eaton.

Shifts in the Global Economy

The way in which goods are produced and consumer preferences are constantly changing. The amount of information available for decision-making across supply chains continues to grow, presenting both opportunities and challenges to freight transportation. Examples include:

Just-in-time (JIT) production

Just-in-time (JIT) production, also known as Lean Production, is an inventory management strategy aligning productions needs with shipping schedules, so goods and raw materials are produced, processed, and delivered on-demand when the buyer needs them. This reduces inventory costs but also introduces risk. While buyers are able to reduce warehousing needs with JIT production, they

[62] ATRI, 2018 Top Industry Issues Report, 2019.

become increasingly susceptible to disruptions in the supply chain. Growth in 3D Printing, also known as additive manufacturing, enables JIT production, has shortened supply chains, and lessened dependence on warehousing, especially for high-value, urgent products like electronics, automobiles, and medicine.[63]

> **Examples:** 65 percent of manufacturers are already using or will invest in 3D printing over the next two years.[64] Companies in Northern Colorado such as Hewlett Packard and OtterBox are applying 3D printing in various ways.

Digital Freight Matching

Matching shipper demand for transportation with carrier truck capacity through digital or mobile-based platforms, usually in the form of apps is known as digital freight matching. This can serve both long-haul trucking and last-mile deliveries.[65] Digital freight matching may increase the prevalence of on-demand warehousing, a model in which companies purchase warehousing services when they are needed rather than relying on more traditional warehousing and distribution models. It may also impact less-than-truckload (LTL) shipping by making the booking process more efficient. Together, these models enable quick delivery to wider pools of customers, potentially altering truck travel patterns.

Less-Than-Truckload (LTL) Shipping: *Multiple shippers sharing space on a single truck, paying only for their portion of the overall load.*

> **Examples:** Uber, Amazon, and several other companies have released apps automating the delivery and check-in process, matching truck drivers with cargo shippers, or allowing companies to launch their own delivery services.

Enhanced Communication and Vehicle Automation

Technological advances available to vehicle operators are arriving in the form of in-vehicle and infrastructure solutions. Technology is allowing for real-time information sharing about the surrounding transportation system which improves the safety and efficiency of goods movement. These trends are at the heart of CDOT's RoadX program ensuring the State of Colorado is investing in and prepared for a more connected and automated transportation system.

Connected Vehicles and Drivers

A more connected freight fleet consists of technology-enabled communication between vehicles, infrastructure, smartphones, and other devices. Short-range radio signals allow the infrastructure, vehicles and/or their drivers or operators to be aware of their surroundings and convey information to make decisions in the interest of safety and efficiency. For freight, applications of connectivity are bringing increased fuel efficiency, improved routing, reduced idling, signal priority, collision avoidance, and better information on parking, weather, and more.

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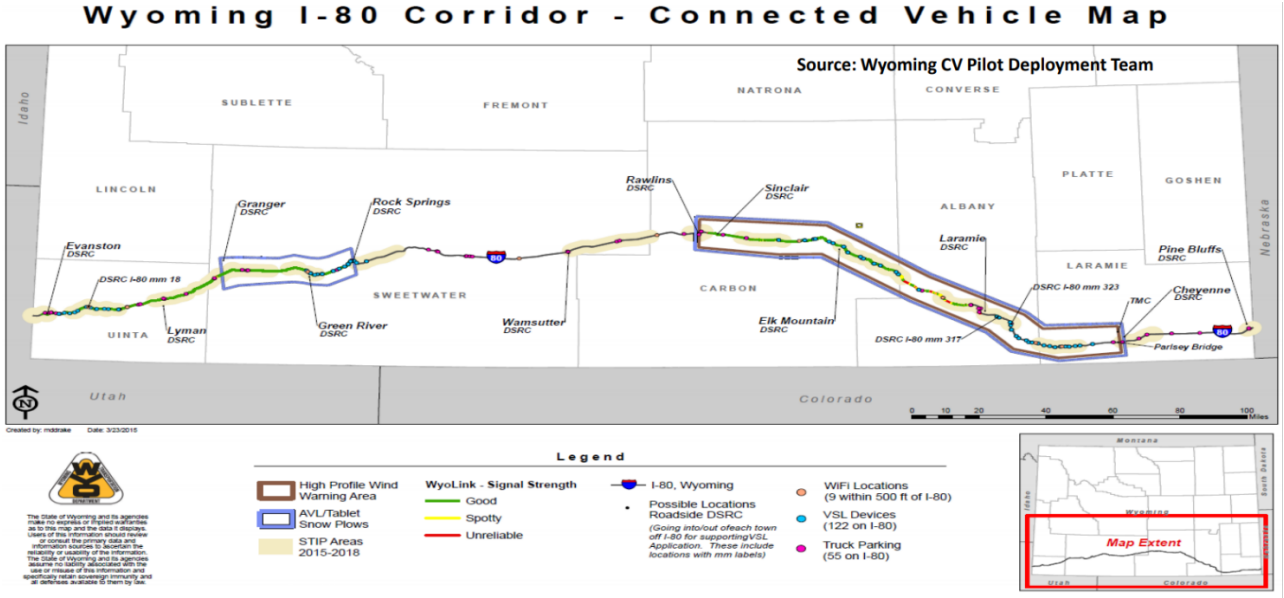
[63]USDOT Beyond Traffic 2045, 2017.
[64] Stratasys Direct Manufacturing. The Impact of 3D Printing on the Supply Chain, 2018.
[65]Supply Chain 24/7 Digital Freight Matching Services & Technologies, 2017.

Examples: In 2015, the Wyoming Department of Transportation (WYDOT) began a Connected Vehicle Pilot (CVP) program, deploying dedicated short-range communication (DSRC) technology for vehicle-to-vehicle (V2V), vehicle-to-infrastructure (V2I), and infrastructure-to-vehicle (I2V) communications. Through the CVP, WYDOT has installed 75 roadside units along I-80 and equipped 400 fleet vehicles with DSRC onboard units. Fleets participating in the CVP can receive communication directly regarding forward collision warnings, weather alerts, speed restrictions, road conditions, incidents, parking, closures, work zones, and distress notifications. This information is also transmitted to WYDOT's 511 traveler information app.[66]



Source: *WYDOT, 2019.*

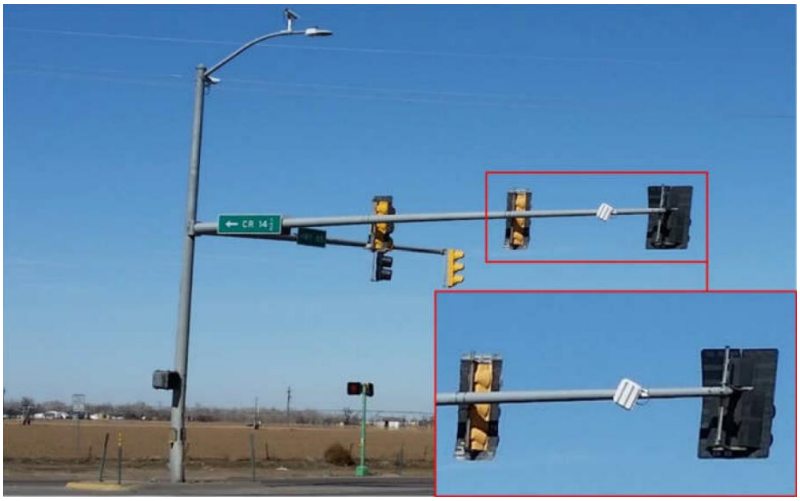
Commercial Vehicle Signal Priority (CVSP) is an intelligent mobility concept allowing commercial vehicle detection by ITS infrastructure in advance of an intersection by extending the green phase of a signal for commercial vehicles. CDOT Region 4 is studying CVSP to address:

- **Safety** – minimizing commercial vehicle red light violations
- **Efficiency** – reducing the number of commercial vehicles stopping at signalized intersections
- **Mobility / Reliability** – reducing delay and enhancing traffic flow

Deployment of CVSP is an early application of connected vehicle technology. CVSP devices have been deployed on US85 at three locations outside the NFRMPO region. The detection devices are secured to the traffic signal mast arms and can detect and track commercial vehicles up to 900 feet ahead of the signal. A card is installed in the signal controller cabinet to complete the system. Other pilot CVSP projects will be deployed within the NFRMPO region along SH257 and

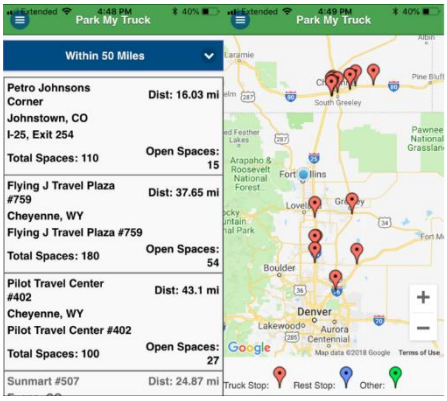
[66] WYDOT Wyoming Connected Vehicle Pilot, 2017.

just east of the region along US34. CDOT plans to perform further research on the effectiveness of CVSP.[67]



Commercial Vehicle Signal Priority (CVSP) detection device on the signal mast arm at US85 and WCR14.5

Smart Truck Parking Systems involve varying degrees of detection, information, and reservation systems. These systems allow truck drivers to receive advance roadside or in-vehicle information about available space at nearby parking facilities. This information helps reduce truck operation time and fuel consumption, wear and tear on roadways, and excess pollution. In Colorado, solutions are being implemented through CDOT's RoadX Program, using on-site detection paired with cloud-based software to report available spaces to drivers. This can be done using dynamic truck parking signs as well as traditional variable message signs (VMS).



Left: Example of a Dynamic Truck Parking Sign (Source: Michigan DOT), Right: Screenshot of the Park My Truck app interface

[67]CDOT Region 4, Commercial Vehicle Signal Priority Early Deployment: Proof of Concept Report. July 2018.

Smartphone apps and online resources are in-vehicle technologies that can provide truck drivers with real-time information on where to find truck parking. Park My Truck, the free smartphone app created by the National Association of Truck Stop Operators (NATSO) allows any parking provider to share their parking availability with professional driver at no charge.

Automated and Autonomous Vehicles

Vehicle automation has the potential to improve safety and efficiency on Colorado's roadways. Autonomous trucks are being tested on Colorado's roadways; however, full implementation and utilization of the technology remains a long-term effort but is important to supporting the State's growing economy.[68] In October 2016, Anheuser-Busch and Otto (acquired by Uber) partnered to send a driverless beer truck from Fort Collins to Colorado Springs via I-25. While this trip was a milestone achievement for a commercial motor vehicle, widespread autonomous trucks will rely on advancements in the automotive and trucking industries as well as more advanced connected vehicle infrastructure, as outlined in CDOT's Smart Mobility Plan.

[68]CDOT, Colorado Freight Plan, 2019.

Chapter 5

Implementation

Chapter 5: Implementation

It is advantageous for agencies within the region to support and stay involved with the State's ongoing CFP implementation efforts by understanding how their local goals and shared regional vision align with the State's key strategies, performance measures, and investment actions. These are laid out in CFP "Chapter 6 – Moving Forward." The leading stakeholder for each action associated with the Plan's individual goals is either CDOT or the FAC. These actions are listed in **Appendix B**. It is important for the NFRMPO and its member agencies to coordinate with the appropriate stakeholders to maintain consistency with these actions as they relate to local and regional priorities.

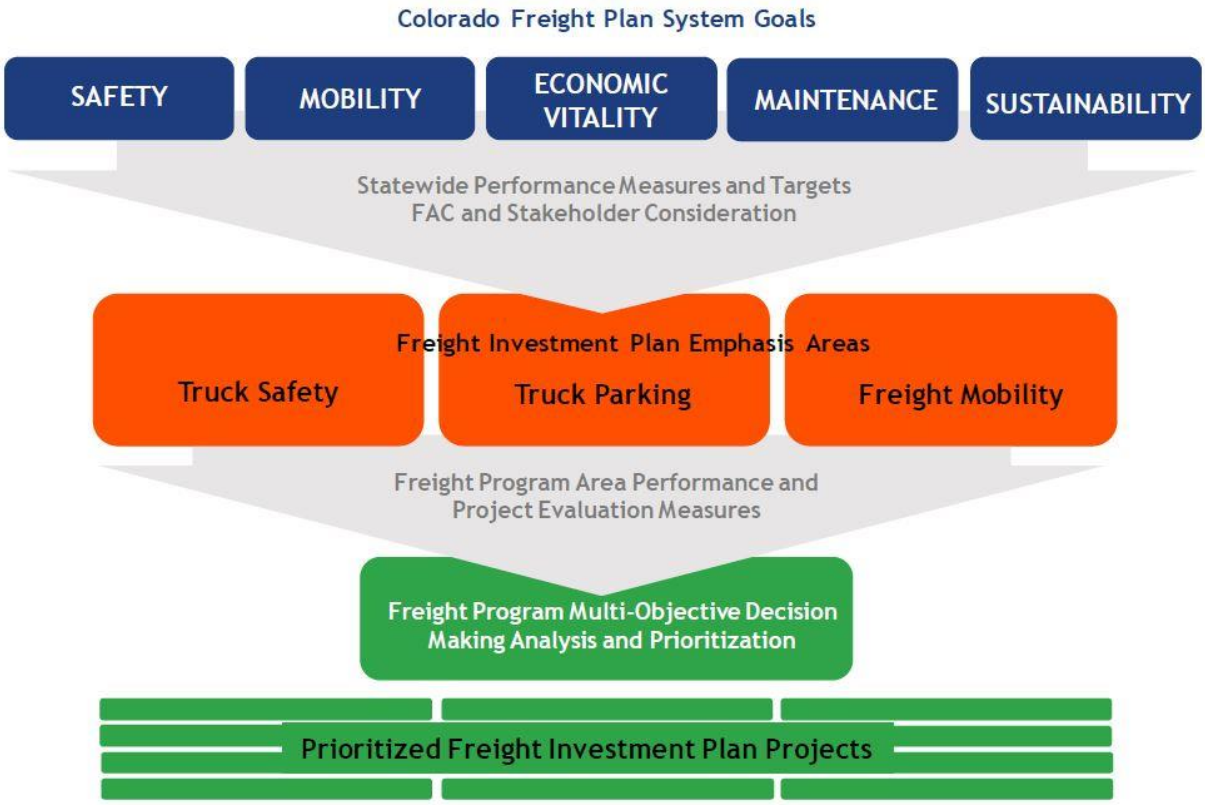
Prioritization

Most major opportunities to improve freight transportation in the NFRMPO region exist on the Colorado Freight Corridors (CFCs). The CFP identifies three emphasis areas to guide project-level prioritization:

- Truck Safety
- Truck Parking
- Freight Mobility

These emphasis areas are based on the CFP's goals for the State's freight system as well as feedback from the FAC and other stakeholders and are consistent with the needs in the North Front Range. **Figure 5-1** illustrates how these emphasis areas relate to the State's goals and how they are used to shape investment priorities.

Figure 5-1: CFP Goals and Emphasis Areas



The CFP also identifies key highway segments with freight mobility, reliability, and safety issues. In cooperation with local planning partners, CDOT plans to track and monitor these project areas, highlighted in **Table 5-1** for the NFRMPO region.

Table 5-1: Currently Identified Freight-Related Highway System Infrastructure and Safety Needs by Corridor in the NFRMPO Region							
Corridor	Truck Parking Potential	Limited Shoulder Widths	Low Clearance Bridges	Congested Bottleneck Areas	Truck Safety Hotspots	High-Volume Truck Crash Locations	Economic Connectivity Needs
I-25: From US36/I-270 to SH14	X	X		X	X	X	X
I-25: From US36 to Wyoming border	X						X
US34: From Weld County line to US85		X		X		X	
US34: Between SH71 and US34		X		X			X
US34: Greeley to Wiggins		X		X		X	
US85: SH66 to US34		X		X	X		X
US85: US34 to Ault		X		X	X		
US287: From SH14 to Wyoming border							X
US287: Between C-470 and SH14		X		X			
SH14: Between US287 and US85		X		X		X	X

The NFRMPO, its member agencies, and other regional planning partners will work together to identify opportunities to address these needs and others such as the segments with the most truck delay identified in **Chapter 3**. The sections that follow outline strategies which can be employed to make the most of limited transportation funding.

Quick Wins

Largescale, corridor-level improvements are often cost prohibitive. Targeted spot improvements can alleviate bottlenecks hindering freight mobility and reliability. Identifying recurrent and non-recurrent bottlenecks and quantifying the extent of the issue is becoming easier, allowing agencies to pinpoint constraints throughout the system. **Tables AC-1** and **AC-2** in **Appendix C** identifies a menu of low-cost improvements, for both the highway and rail freight systems, agencies can consider once a specific constraint has been identified and it is determined a corridor-level project is infeasible.

Public Private Partnerships (P3s)

In transportation, public private partnerships (P3) are contractual agreements between a public agency and a private entity to bring innovation, efficiency, and capital to a project. P3s can help address complex problems facing state and local governments in the development and delivery of transportation improvements. The USDOT's Build America Bureau encourages consideration of P3s

and offers technical assistance opportunities for P3 projects. For the North I-25: Johnstown to Fort Collins project, McWhinney, a real estate investment, development, and management firm, provided $6M to the local match for the federal TIGER Grant funds awarded in 2016. Pursuing P3s are referenced in the 2019 TPA as an implementation strategy for expanding existing private parking facilities.

P3s are especially important in maintaining and improving the effectiveness of the region's rail facilities. Because the region's railroads are owned and operated privately, public agencies have a limited ability to impact the rail system. Rail improvements and expansion can bring significant safety and congestion improvements to the road network. Although P3s can be mutually beneficial, potential partners typically have differing perspectives on many aspects of a project or program. NCHRP Report 586 outlines guidelines for public-private dialogue as it relates to rail investment. **Figure 5-2** highlights public and private perspectives to various rail planning elements.

Figure 5-2: Public and Private Perspectives on Rail Planning Elements

Planning Element	Public Perspective	Private Perspective
Financial Performance	Public rail investment vs. highway cost avoidance and other public benefits	Return on private investment
Access to System	Broadest possible for all freight shippers	Selective access to maximize returns
Public Involvement	Broad education to support political agenda	Minimized; defensive to avoid taxation and liability proposals
Environment	System or corridor focus; net impact on all modes	Adherence to statutory or regulatory limits
Asset Tracking	Public contribution easily identified and tracked	Asset integration to promote efficiency
Capital Planning	Incorporated into formal long-term plans with broad public input	Revised annually to reflect funds availability and ranking with other projects system-wide
Passenger Travel	Impact on passenger rail operations and highway congestion for passenger travel	Impact of passenger rail on freight operations; potential for passenger-driven capacity expansion
Benefit-Cost Analysis	Architecture described by federal funding programs	Proprietary to each carrier, geared to investor expectations

Source: *TRB, NCHRP Report 586: Rail Freight Solutions to Roadway Congestion--Final Report and Guidebook, 2007.*

Funding

For the region to remain economically competitive, our public agencies will need to continue partnering with one another and with the private sector to expand their financial means by pursuing grant and financing opportunities. There are several federal funding programs which explicitly identify specific freight activities in their eligibility information as a priority of the program. **Table 5-2** and **Table 5-3** are not exhaustive lists of all available funding opportunities; rather, they are meant to highlight several major funding sources and serve as a resource for agencies pursuing projects to

improve freight transportation. In many cases, it is best to coordinate with CDOT Region 4 regarding these opportunities and others.

Table 5-2: Federal Funding Programs for Freight Projects		
Funding Program/Source	**Example Projects**	**Federal Share**
10 Percent of State Federal-Aid Apportionments for Certain Safety Projects	Safety rest areas, rumble strips and stripes, rail-highway crossing closure,	Up to 100 percent federal share for construction (also up to 100 percent for right-of-way)
Better Utilizing Investments to Leverage Development (BUILD) – ***formerly known as TIGER***	Freight rail, inland ports of entry, intermodal	Up to 80 percent in urban areas, possibly higher in rural areas
Congestion Mitigation and Air Quality Improvement Program (CMAQ)*	Intermodal equipment and facility projects, advanced truck stop electrification systems, traffic flow improvements	Generally, 80 percent
Infrastructure for Rebuilding America (INFRA) – ***formerly known as FASTLANE***	Highway freight projects on the National Highway Freight Network (NHFN), intermodal or rail projects, railway-highway grade crossing or grade separation projects	Up to 60 percent (up to 80 total Federal assistance for projects receiving an INFRA grant)
Motor Carrier Safety Assistance Program (MCSAP) Program	Available to states with a commercial vehicle safety plan (CVSP) to reduce the number and severity of crashes and hazardous material incidents involving CMVs.	Generally, 85 percent
National Highway Freight Program (NHFP)	ITS freight projects, climbing lanes, additional capacity to address highway bottlenecks, truck parking facilities	Generally, 80 percent
Pipeline and Hazardous Materials Safety Administration (PHMSA) Grant Program	Designed to improve damage prevention, develop new technologies, improve both hazmat and pipeline safety. • Hazardous Materials (Hazmat) Grants Program • Pipeline Safety Grant Programs	Varies
Railways-Highway Crossings (Section 130) Program	Improvements at at-grade railway-highway crossings	Up to 100 percent, administered by CDOT
Surface Transportation Block Grant Program (STBG)*	Truck parking facilities, railway-highway grade Crossings, advanced truck stop electrification systems	Generally, 80 percent
**CMAQ and STBG funds are sub-allocated to the NFRMPO by the Colorado Transportation Commission (CTC), and projects are selected for funding typically every two years.*		

Table 5-3: Federal Financing Programs for Freight Projects		
Financing Program	**Example Projects**	**Financial Assistance**
Private Activity Bonds (PAB)	Private highway and freight transfer facilities	Tax-exempt interest rates for private investors
Railroad Rehabilitation and Improvement Financing (RRIF)	Acquire, improve, or rehabilitate intermodal or rail equipment or facilities	Loan: Up to 100% of project costs
Transportation Infrastructure Finance and Innovation Act (TIFIA)	Some freight rail projects, intermodal freight transfer facilities, ITS freight projects	Line of credit: up to 33 percent of project costs Loan: up to 49 percent of project costs Combined: up to 49 percent of project costs Total federal assistance to project receiving TIFIA loan: up to 80 percent of project costs

New Revenue Generation

Transportation revenues can be derived from a variety of sources to address funding shortfalls. The Congressional Budget Office (CBO) estimates a $167M national shortfall in transportation funding over the next decade at current spending levels and revenue streams.[69] In Colorado, CDOT estimates there will be a $1B annual funding deficit for transportation over the next 10 years. The passage of Colorado Senate Bill 267 (SB267) is a recent step in addressing this shortfall.

Traditional mechanisms for generating revenue for transportation include state and federal gasoline and diesel fuel taxes and other excise taxes (such as on highway usage by trucks), user fees (such as vehicle registration fees or mileage-based user fees), tolls, and congestion-pricing programs.[70] The USDOT suggests new funding sources to address the shortfall could include federal vehicle registration fees, a dedicated national sales tax, carbon tax (a type of pollution tax), or income tax. These options do little to address challenges with rail and aviation given their reliance on a mixture of private and public funding streams. USDOT suggests policies encouraging increased private investment in infrastructure could expedite project delivery, generate near-term revenues, and create long-term government cost savings.[71]

In lieu of new revenue and/or private investment, it is possible federal transportation funding could be cut, match requirements and eligibility could be restructured, and States given increased cost-sharing responsibilities on capital projects.[72]

[69] USDOT Beyond Traffic 2045, 2017.
[70] Ibid.
[71] Ibid.
[72] Ibid.

Project Delivery

Typical goals for project delivery include minimizing project cost and delivery time, and maximizing project scope and life cycle performance of the project. CDOT has created a Project Delivery Selection Matrix to provide a formal approach for selecting project delivery methods for highway projects.

In 2009, the FHWA launched Every Day Counts (EDC) in partnership with AASHTO, which aims to accelerate deployment of proven, but underutilized innovations. FHWA works with national, state, and local partners to identify a collection of innovations every two years for accelerated deployment.

The FAST Act also includes flexibilities to accelerate the environmental review process for surface transportation projects.[73]

Monitoring System Performance

USDOT has recommended further federal requirements beyond those set in the FAST Act to ensure local, regional, and state governments use planning processes and collect data to assess how the goals of a project are being met.[74] Federal tools such as NPMRDS increase the region's ability to monitor changes in system performance associated with performance-based investment to further improve the project prioritization process. Freight stakeholders in the region should assess the programs, policies, and projects associated with system performance along specific corridors in tandem with the NFRMPO's Congestion Management Process (CMP).

It is in the region's favor for agencies to invest in performance monitoring methods such as travel time collectors, traffic counters, crash data, and third-party datasets on commercial vehicle travel patterns. These methods and others allow agencies to identify and analyze opportunities for improvement, assess performance of implemented projects, and better understand how freight moves throughout the North Front Range.

[73]FHWA FAST Act: Accelerating Project Delivery, 2016.
[74]USDOT Beyond Traffic 2045, 2017.

Recommendations

- Support CDOT's efforts to address truck parking on North I-25
- Track progress towards the freight-related statewide and regional targets identified in **Chapter 2.**
- Enhance the region's performance-based planning processes by expanding freight data collection and analysis efforts, especially on Regionally Significant Corridors (RSCs) lacking regular data collection
- Participate in the Colorado Freight Advisory Council (FAC) and other freight-industry organizations to increase public-private sector collaboration on freight-related issues and invite representatives to NFRMPO Technical Advisory Committee (TAC) meetings
- Assess opportunities to address regional freight needs through the NFRMPO's biennial Call for Projects
- Identify high-priority freight-benefitting projects for inclusion in CDOT's 10-Year Strategic Pipeline of Projects
- Coordinate freight planning efforts with neighboring Transportation Planning Regions (TPRs) and CDOT Region 4
- Support member agency efforts to minimize the negative impacts of truck and rail freight transportation through downtowns and other sensitive areas, and maximize freight safety and efficiency

Appendix A

Figure AA-1: Colorado Top 650 Most Congested Roads within the NFRMPO region

2016 Rank						Annual Travel Delay (Person Hours)			
Truck Delay	All Delay	County	Road Name	Limits	Segment Length	Per Mile	Annual Truck Delay per Mile (person-hours)	Truck Hours	Total Hours
11	23	Larimer	I 25	I 70 to I 270/US 36	3.32	175,571	12,290	40,828	583,248
29	38	Larimer	E Eisenhower Blvd (US 34)	N Cleveland Ave (US 287) to I 25	4.31	129,840	3,776	16,267	559,352
41	36	Larimer	S College Ave (US 287)	Carpenter Rd (SH 392) to Riverside Ave (SH 14)	7.63	135,879	3,036	23,177	1,037,166
57	47	Weld	10th St (BUS 34)	23rd Ave to 8th Ave (BUS 85)	1.40	110,327	2,716	3,805	154,568
70	57	Weld	9th St (BUS 34)	23rd Ave to 8th Ave (BUS 85)	1.32	92,893	2,196	2,908	122,990
71	82	Larimer	E Mulberry St (SH 14)	US 287 to I 25	4.23	61,997	2,167	9,164	262,185
74	79	Larimer	Cleveland Ave (US 287)	S Lincoln Ave (US 287) to N Lincoln Ave (US 287)	1.78	65,656	2,132	3,789	116,670
90	153	Weld	CanAm Hwy (US 85)	US 34 to 8th Ave (US 85 BUS)	4.60	22,037	1,765	8,121	101,369
98	158	Weld	E Mulberry St (SH 14)	I 25 to Co Rd 17 (SH 257)	4.92	21,199	1,569	7,728	104,384
105	136	Weld	CanAm Hwy (US 85)	Co Rd 44 to US 34	7.17	25,128	1,395	9,999	180,092
115	140	Larimer	N College Ave (US 287)	Riverside Ave (SH 14) to Poudre Canyon Hwy (SH 14)	9.59	24,215	1,233	11,820	232,150
117	110	Weld	Weld County Rd 68 (SH 392)	I 25 to Weld County Rd 17 (SH 257)	4.18	38,549	1,182	4,937	160,979
122	130	Weld	8th Ave (US 85 BUS)	10th St to US 85	2.14	28,098	1,075	2,296	60,017
123	131	Weld	28th St (US 34)	Co Rd 21 (SH 257) to CanAm Hwy (US 85)	9.39	27,801	1,061	9,960	261,020
124	99	Larimer	N Garfield Ave (US 287)	E Eisenhower Blvd (US 34) to Carpenter Rd (SH 392)	5.11	45,449	1,049	5,363	232,381
125	125	Larimer	S Lincoln Ave (US 287)	42nd St SE (SH 60) to E Eisenhower Blvd (US 34)	3.96	30,814	1,041	4,124	122,085
126	155	Weld	US Highway 34	CanAm Hwy (US 85) to Hwy 34 Business	3.31	21,984	1,035	3,428	72,834
129	104	Weld	US Highway 34	I 25 to Co Rd 21 (SH 257)	6.50	41,332	1,022	6,644	268,656
148	119	Weld	8th Ave (US 85 BUS)	US 85 to 18th St	1.69	32,461	836	1,412	54,859
149	112	Weld	W 10th St (BUS 34)	SH 257 Spur to 23rd Ave	7.03	38,007	807	5,675	267,269
154	144	Weld	E 18th St (BUS 34)	8th Ave (BUS 85) to US 34	4.33	23,669	767	3,317	102,369
157	232	Weld	Weld County Rd 68 (SH 392)	Co Rd 27 to US 85	6.27	8,152	756	4,741	51,098
161	215	Weld	CanAm Hwy (US 85)	8th Ave (BUS 85) to Weld County Rd 68 (SH 392)	1.95	9,541	706	1,374	18,567
179	209	Weld	State Highway 257	US 34 to Weld County Rd 68 (SH 392)	5.45	10,245	552	3,009	55,866
183	246	Weld	CanAm Hwy (US 85)	Weld County Rd 68 (SH 392) to SH 14	7.35	6,885	525	3,864	50,631
184	221	Weld	8th St (SH 263)	CanAm Hwy (US 85) to Fern Ave	2.05	8,999	524	1,076	18,485
185	222	Weld	I 25	SH 66 to SH 56	7.04	8,965	523	3,686	63,134
198	231	Larimer	I 25	US 34 to SH 392	4.99	8,310	466	2,326	41,492
208	174	Weld	Weld County Rd 68 (SH 257)	Weld County Rd 68 (SH 392) to Weld County Rd 17	0.95	14,858	432	411	14,145
211	196	Weld	State Highway 56	US 287 to I 25	6.68	11,977	413	2,759	80,053
215	250	Weld	State Highway 257	SH 60 to US 34	5.02	6,469	405	2,033	32,496
227	276	Weld	Weld County Rd 17 (SH 257)	Weld County Rd 68 (SH 257) to SH 14	7.01	5,171	379	2,655	36,238
236	304	Weld	Co Rd 82 (SH 14)	Co Rd 17 (SH 257) to CanAm Hwy (US 85)	9.27	3,557	341	3,163	32,969
238	254	Weld	I 25	SH 56 to SH 60	2.96	6,376	335	992	18,867
242	187	Weld	South 1st St (SH 60)	I 25 to Co Rd 21 (SH 257)	5.99	12,571	328	1,964	75,315
243	264	Weld	Weld County Rd 68 (SH 392)	SH 257 to Co Rd 27	3.70	5,897	328	1,213	21,820
247	260	Larimer	I 25	SH 60 to US 34	4.08	6,156	323	1,320	25,134
257	179	Larimer	East County Rd 32 (SH 392)	S College Ave (US 287) to I 25	4.66	14,132	289	1,345	65,797
259	197	Larimer	14th St SE (SH 402)	S Lincoln Ave (US 287) to I 25	4.30	11,962	283	1,214	51,378
264	206	Larimer	Big Thompson Canyon Rd (US 34)	E Elkhorn Ave (US 36) to N Cleveland Ave (US 287)	29.23	10,319	271	7,907	301,596
281	292	Larimer	I 25	SH 392 to Mulberry St (SH 14)	7.06	4,148	235	1,656	29,286
284	359	Weld	State Highway 392	US 85 to SH 14	26.10	1,641	230	6,000	42,826
285	214	Larimer	US Highway 287	Mountain Ave (SH 56) to 42nd St SE (SH 60)	4.24	9,553	228	964	40,464
295	258	Weld	W 10th St (BUS 34)	US 34 to SH 257 Spur	2.28	6,263	201	457	14,255
296	247	Larimer	State Highway 1	US 287 to I 25	9.99	6,778	199	1,987	67,697
311	296	Weld	State Highway 60	Co Rd 21 (SH 257) to CanAm Hwy (US 85)	8.32	3,920	187	1,557	32,627
317	352	Weld	US Highway 34	Hwy 34 Business to Co Rd 1 (SH 144)	28.85	1,795	169	4,885	51,769
374	265	Larimer	N 107th St (US 287)	Ute Hwy (SH 66) to Mountain Ave (SH 56)	7.06	5,805	96	681	40,981
608	612	Larimer	I 25	Mulberry St (SH 14) to Wellington (SH 1)	5.98	44	6	38	264

Source: *Texas A&M Transportation Institute, Colorado's Most Congested Roadways, 2018.*

Appendix B

Table AB-1: CFP Goals and Action Steps for Implementation			
Goal 1: Enhance Safety and Security for Commercial Corridors			
Action	**Stakeholder Priority**	**Timeline**	**Lead**
Commercial Vehicle Safety – Prioritize identified commercial vehicle safety hotspots and other locations with specific safety challenges for funding within NHFP project selection.	High	Short-term	CDOT
Truck Parking Needs - Utilize statewide truck parking assessment to prioritize network gaps and solutions for funding and implementation of public parking projects.	High	Short-term	CDOT
Truck Parking Information - Design and deploy a Colorado Truck Parking Information Management System	High	Mid-term	CDOT
Truck Parking - Support private sector partners in exploring innovative pilot programs or public-private initiatives to expand the availability of privately-owned truck parking facilities.	High	Mid-term	FAC
Risk and Redundancy – Evaluate potential natural hazard risk to key freight corridors and identify redundant routes and necessary improvements to ensure redundancy of the system.	High	Mid-term	CDOT
Rail Safety - Streamline delivery of the Railway-Highway Crossings (Section 130) Program, including project prioritization and risk assessments for future projects.	Medium	Ongoing	CDOT
Safety Data - Enhance internal data and analytical capabilities to identify and assess commercial vehicle safety hotspots and integrate needs into regional and state project selection processes.	Medium	Short-term	CDOT
Goal 2: Improve Mobility and Efficiency of Goods Movement			
Action	**Stakeholder Priority**	**Timeline**	**Lead**
Mobility Data - Enhance internal data and analytical methods to identify highway bottlenecks and congestion points that contribute to travel time or reliability issues and link to funding opportunities.	High	Short-term	CDOT
Incident Management - Continue to support and expand CDOT capabilities for commercial vehicle incident management, including the Heavy Tow program for commercial vehicles on Colorado Freight Corridors.	High	Short-term	CDOT
Management and Operations - Continue coordination with CDOT TSM&O and local and regional planning partners to identify potential ITS applications for commercial vehicles and identify opportunities for funding and implementation of projects.	High	Short-term	CDOT
Freight Coordination - Coordinate with local and regional planning partners to address identified local freight issues, including truck parking needs, restrictive freight policies, curb management practices, roadway design, and other mobility constraints.	High	Mid-term	CDOT
Freight Information - Develop a statewide freight information platform or portal to disseminate information on freight trip planning, truck routes, real-time travel information, truck parking, safety and capacity constraints, and other information.	Medium	Short-term	CDOT
Freight Technology - Support private-sector partner efforts to deploy innovative technologies or pilot test freight technologies, including truck platooning, connected commercial vehicles, and other safety and mobility technologies.	Medium	Mid-term	FAC

Goal 3: Maintain the System			
Action	**Stakeholder Priority**	**Timeline**	**Lead**
Bridge Constraints - Prioritize and target improvements to low vertical clearance and load restricted bridges and highway assets.	High	Short-term	CDOT
Freight Rail Condition - Develop and implement an assistance program (loan fund, grant program, or hybrid) to fund critical capacity needs and track upgrades for short-line railroads.	Medium	Long-term	CDOT
System Condition - Identify and implement maintenance and improvement projects on the Colorado Freight Corridors by integrating freight specific projects into current CDOT project development, selection, and funding processes.	Low	Short-term	CDOT
Goal 4: Improve Economic Vitality and Industry Competitiveness			
Action	**Stakeholder Priority**	**Timeline**	**Lead**
Education and Communications – Develop marketing strategy, enhance industry partnerships, and create materials to advance the Colorado Delivers communications initiative.	High	Short-term	CDOT
Economic Development - Develop a process with Engineering Regions and TPRs to identify potential projects that improve rural and urban economic competitiveness and advance projects into regional planning and project selection processes.	High	Short-term	CDOT
Economic Coordination - Develop ongoing coordination processes with state, regional, and local economic development agencies to identify and advance multimodal freight improvement needs – including highway, rail, or air cargo connectivity to existing and future industrial, free trade, or economic redevelopment areas.	Medium	Mid-term	CDOT
Freight Workforce - Support public agency partners in evaluating freight and logistics workforce needs developing programs to address specific needs.	Medium	Mid-term	FAC
Trade and Logistics - Support public agency or civic partner organizations in developing a statewide export, manufacturing, and trade and logistics strategy to support an increase in outbound freight shipments.	Medium	Long-term	FAC
Economic Benefits - Develop data and methods to support identification, evaluation, and prioritization of freight projects with economic development benefits or impacts.	Low	Mid-term	CDOT
Goal 5: Improve Sustainability and Reduce Environmental Impacts			
Action	**Stakeholder Priority**	**Timeline**	**Lead**
Supply Chain Efficiency - Coordinate with industry partners on opportunities to improve supply chain efficiencies, including load- matching resulting in reduced emissions and environmental impacts.	High	Mid-term	FAC
Truck Emissions - Implement highway mobility improvements to reduce truck delay resulting in excess emissions.	Medium	Short-term	CDOT
Fleet Efficiency - Identify and partner with FAC on Federal or state grant opportunities for industry to convert or update fleet vehicles (including rail yard locomotives and airport groundside support equipment) or fuel sources.	Low	Long-term	FAC
System Risk and Redundancy – Evaluate potential natural hazard risk to key freight corridors and identify redundant routes and necessary improvements to ensure redundancy of the system.	Low	Mid-term	CDOT

Appendix C

Table AC-1: Catalog of low-cost improvements for highway system constraints			
	Constraint	**Constraint Description**	**Improvements**
Physical Constraints	**Weaving**	Where traffic must merge across one or more lanes to access entry or exit ramps. Occurs at closely spaced interchanges/ short acceleration lanes	• Add auxiliary lane to connect an on-ramp and off-ramp • Extend/lengthen the existing turning lane • Add a dedicated turning lane at intersection • Extend/lengthen the existing lane • Redirect traffic i.e., replace exit ramp with entrance ramp from collector distributor to mainline lanes. • Restriping i.e., re-mark pavement lanes to add more narrow lanes
	Lane Drop	Where one or more traffic lanes are lost—typically at bridge crossings. Occurs on short ramps on interchanges	• Add auxiliary lane to connect an on-ramp and off-ramp • Extend/lengthen the ramp
	Inadequate Interchange/Ramp Capacity	Inability of freeway-to-freeway interchanges and ramps to handle high traffic volume merging and weaving. Occurs on short ramps, single-lane ramps, short deceleration lanes	• Extend/lengthen the ramp length
			• Extend/lengthen the acceleration and deceleration lanes
			• Add a dedicated turning lane at intersection
			• Ramp metering—install traffic signals at freeway on-ramps to control the rate of vehicles entering the freeway
			• Realign/improve interchange layout and add ramps
			• Widen lane width on ramp
			• Install new traffic signal
			• Add auxiliary lane to connect an on-ramp and off-ramp
			• Reduce speed limit on ramp
			• Install warning/advisory/navigational signs on ramps
			• Improve existing road signs to reduce confusion or to warn the traffic
			• Repaint pavement marking with fluorescent paint to separate traffic movement
			• Restriping i.e., re-mark pavement lanes to add more narrow lanes
	Steep Grade	Where steep uphill grade causes trucks to slow down causing delays to other traffic	• Add a passing lane on steep grades
	Steep Grade with Ramp Meter	Ramp metering on steep grades to regulate access to urban freeways	• Remove ramp meter, i.e., remove traffic signal on ramp with steep grades

		resulting in queues and delays caused by slow-moving trucks.	• Relocate ramp meter, i.e., relocate traffic signal on ramp to improve effectiveness
			• Alter ramp metering operation, i.e., reprogram traffic signal operation on ramp to provide exclusive lanes to bypass queue at ramp meter
			• Modify median bull noses to facilitate turning movements
Physical Constraints	**Inadequate Turning Radii**	Turning radius at edge intersections too tight to permit easy entry and exit by turning vehicles without encroaching on other lanes. Intersections – urban arterials; intermodal connectors	• Widen to improve turning radius
			• Add a dedicated turning lane at intersection
			• Modify median bull noses to facilitate turning movements
			• Widen and extend existing lane width
			• Widen to improve turning radius
			• Add a dedicated turning lane at intersection
			• Modify median bull noses to facilitate turning movements
			• Widen and extend existing lane width
	Inadequate Mainline Capacity	Traffic demand exceeds mainline capacity due to insufficient number of lanes to handle traffic volume. Urban Interstates/urban principal arterials.	• Install warning/advisory/navigational signs
			• Reduce speed limit on ramp
			• Provide alternative directions for alternative routes, e.g., use secondary roads
			• Improve existing road signs to reduce confusion or to warn the traffic
			• Repaint pavement marking with fluorescent paint to separate traffic movement
			• Restriping i.e., re-mark pavement lanes to add more narrow lanes
			• Use beacons, advisory signs, etc. to implement revisions in merging and diverging areas
			• Deploy technology to allow in-cab communication
	Inadequate Intersection Capacity	Traffic demand exceeds intersection capacity; may be caused by outdated traffic signals, poor signal timing, or no dedicated turn lanes	• Add a dedicated turning lane at intersection
			• Extend/lengthen the existing turning lane
			• Widen the lane width
			• Modify traffic signal phasing taking traffic volume in account
			• Install traffic signal at intersection
			• Upgrade existing traffic signal
			• Widen pavement shoulder
			• Extend existing turning lanes to accommodate traffic
			• Improve existing road signs to reduce confusion or to warn the traffic
			• Improve intersection layout to meet traffic demand and accommodate trucks
			• Add auxiliary lane to connect an on-ramp and off-ramp

	Insufficient Parking for Trucks	Inadequate parking facilities along highways and restrictions in central business districts	• Provide basic parking for trucks even if without amenities especially closer to urban areas
			• Widen and pave shoulders to allow trucks to park – especially close to urban areas
Operational Constraints	**Steep Grade with Ramp Meter**	Ramp metering on steep grades to regulate access to urban freeways resulting in queues and delays caused by slow-moving trucks	• Remove ramp meter, i.e., remove traffic signal on ramp with steep grades
			• Relocate ramp meter, i.e., relocate traffic signal on ramp to improve effectiveness
			• Alter ramp metering operation, i.e., reprogram traffic signal operation on ramp to provide exclusive lanes to bypass queue at ramp meter
	Poor Road Signage/Lack of Warning Signs	Poor road signage, i.e., graphics created to display information to highway users in order to warn or inform	• Improve existing road/navigational signs to reduce confusion or to warn the traffic
			• Provide warning/advisory and/or navigational signs
	Poor Traffic System Management	Lack of, or poor, traffic control system including a condition where signal timing does not meet traffic requirements	• Upgrade existing traffic signal to accommodate traffic demand
			• Install new traffic signal system
			• Modify signal phasing taking traffic volume into account
			• Synchronize closely placed traffic signals for traffic to receive right of way simultaneously during one or more intervals
	Lack of Traveler Information	Lack of or limited traveler information provided to trucks	• Improve existing or provide traveler information
			• Use variable message signs to provide traveler information
Regulatory Constraints	**Truck Restrictions in Central Business District**	Where regulatory controls restrict access to central business district during certain times of the day or restrict parking in certain sections	• Develop and implement loading comprehensive zone plan that considers truck delivery and pickup
			• Implement metered freight loading zones in designated areas
			• In high freight activity locations, add loading zone "hot spots"
			• Designate locations with on-street parking away from loading zones
			• Discourage peak-hour loading/unloading through increased parking violation fines during peak periods
			• Increase enforcement activities for automobiles parking in docking areas

Source: *TRB, NCFRP REPORT 7: Identifying and Using Low-Cost and Quickly Implementable Ways to Address Freight-System Mobility Constraints, 2010.*

Table AC-2: Catalog of low-cost improvements for rail system			
	Constraint	**Constraint Description**	**Improvements**
Operational Constraints	**Switching Conflicts/ Inefficient Switching**	Inefficient and inadequate switching and conflicts causing delays to trains	• Upgrade or reconfigure interlocking— Interlocking is an arrangement of signal apparatus that prevents conflicting movements through an arrangement of tracks such as junctions or crossings.
			• Implement remote switching
			• Coordination of Class I operations with short- line/regional railroad operations to optimize joint operations and expedite switching traffic at interchanges.
	Outdated Communication and Signal System	Old and outdated communication and signaling systems	• Centralized Traffic Control System—use of electrical circuits in tracks to monitor locations of trains, allowing remote control of train movements from a central dispatching office.
			• Signal improvements – deploy advanced technologies to improve signaling system
			• Implement on-board and wayside defect detection and other advanced sensors
			• Implement trunked digital communications systems
Physical Constraints	**Inadequate Siding Capacity**	Lack of, or inadequate, passing siding to allow efficient train movement	• Extend siding track to accommodate longer trains
			• Provide new siding track long enough to accommodate train lengths
			• Provide turnout to enable trains to be guided from one track to another at a railway junction
			• Realign tracks to ensure smooth ride and increased speed
			• Upgrade siding track to accommodate all trains using track
			• Provide connection tracks
			• Centralized Traffic Control System—use of electrical circuits in tracks to monitor locations of trains, allowing remote control of train movements from a central dispatching office.
	Inadequate Capacity of Yards and Port Terminals or Inefficient Yard Operations	Inadequate rail and port terminals as well as inefficiencies in terminal operations causing delays to trains and trucks	• Expand carload terminals to add capacity
			• Expand intermodal terminals to add more capacity
			• Maximize infrastructure and equipment utilization through cooperative competitor arrangements for port terminal operations
			• Coordinate operations with feeder services, e.g., shortline or regional railroads, to optimize joint operations
	Inadequate Track Capacity	Physical characteristics of tracks to handle train traffic and causing delays to trains due to slow	• Maximize infrastructure and equipment utilization through route sharing and directional flows – two competitive company's routes coordinated and operated directionally
			• Advanced electronic inspection techniques to speed up inspection activities

		speeds and resulting increased trip time	• Tie replacement to improve train speed
			• Track surfacing or putting the rails and track in a uniform plane (usually includes lining and gauging) is remedy to correct irregular track surface, with sags, low joints, bent rails, and short depressions and humps in the roadbed.
			• Improve crossing warning systems and make current passive crossings active
			• Provide turnout or switch – i.e., mechanical installation enabling trains to be guided from one track to another at a railway junction.
			• Realign tracks to ensure smooth ride and increased speed
			• Provide crossover – i.e., a pair of switches that connects two parallel rail tracks, allowing a train on one track to cross over to the other
			• Curve Superelevation – correct or provide superelevation in curves to enhance safe speed
			• Maintenance of way (MOW) – optimize scheduling of track work windows
			• MOW-seasonal "blitz" to coordinate multiple "out-of-face" projects with dedicated equipment and track forces
			• Relocate crew change points and re-schedule trains to improve safety, hours-of-service compliance, and customer service
Regulatory Constraints	**Limited Funding/ Fear of Regulation**	Lack of funding (public and private) to support and ensure efficient operation or expand capacity	• Remove capping of returns/provide incentives for investments
			• Investment tax credit
			• Encourage public-private partnerships
			• Provide access to public funding

Source: *TRB, NCFRP REPORT 7: Identifying and Using Low-Cost and Quickly Implementable Ways to Address Freight-System Mobility Constraints, 2010.*