

DRAFT

CO and Ozone Conformity Determination

for the
North Front Range Metropolitan Planning Area
2045 Regional Transportation Plan
and for the
FY2020-2023 Transportation Improvement Program
and for the
Northern Subarea of the Upper Front Range Transportation Planning Region
2040 Regional Transportation Plan
and for the
Northern Subarea of the Upper Front Range Transportation Planning Region
portion of the
Colorado FY2019-2022 Statewide Transportation Improvement Program

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LIST OF ACRONYMS

APCD – Air Pollution Control Division	MTRK – Medium-heavy Truck
AQCC – Air Quality Control Commission	MVEB – Motor Vehicle Emissions Budget
BRT – Bus Rapid Transit	NAAQS – National Ambient Air Quality Standards
BY – Base Year	NFRMPO – North Front Range Metropolitan Planning Organization
CAA – Clean Air Act	NFRT&AQPC – North Front Range Transportation and Air Quality Planning Council
CDOT – Colorado Department of Transportation	NOx – Nitrogen Oxides
CDPHE – Colorado Department of Public Health and Environment	OBO – Other-Based Other
CFR – Code of Federal Regulation	PIP – Public Involvement Plan
CO – Carbon Monoxide	PPM – Parts per Million
COLT – City of Loveland Transit	RAQC – Regional Air Quality Council
CSU – Colorado State University	RMSE – Root Mean Square Error
DRCOG – Denver Regional Council of Governments	RSC – Regionally Significant Corridor
EE – External-External	RTC – Regional Transit Corridor
EI – External-Internal	RTDM – Regional Travel Demand Model
EPA – Environmental Protection Agency	RTP – Regional Transportation Plan
FHWA – Federal Highway Administration	RVP – Reid Vapor Pressure
FTA – Federal Transit Administration	SDO – Colorado State Demography Office
GET – Greeley Evans Transit	SIP – State Implementation Plan
HBO – Home-Based Other	STIP – Statewide Transportation Improvement Program
HBS – Home-Based Shopping	TAC – Technical Advisory Committee
HBS_c – Home-Based School	TAZ – Traffic Analysis Zone
HBU – Home-Based University	TCM – Transportation Control Measures
HBW – Home-Based Work	TIP – Transportation Improvement Program
HTRK – Heavy Truck	TMA – Transportation Management Area
ICG – Air Quality Interagency Consultation Group	TPR – Transportation Planning Region
IE – Internal-External	UFR – Upper Front Range Transportation Planning Region
I/M – Inspection and Maintenance Program	UNC – University of Northern Colorado
LBO – Lodging-based Other	VMT – Vehicle Miles Traveled
LUAM – Land Use Allocation Model	VOC – Volatile Organic Compounds
MOA – Memorandum of Agreement	WBO – Work-Based Other
MOVES2014b – EPA’s Motor Vehicle Emission Simulator model	YOE – Year of Expenditure
MPO – Metropolitan Planning Organization	

CHAPTER 1: INTRODUCTION

Purpose

This report demonstrates the transportation programs and plans in the Northern Subarea of the Denver-North Front Range Nonattainment area and Fort Collins Maintenance area meet the federally prescribed air quality conformity requirements. Specifically, the programs and plans meet the requirements for the 2008 8-Hour Ozone National Ambient Air Quality Standard (NAAQS), the 2015 8-Hour Ozone NAAQS, and the 1971 Carbon Monoxide (CO) NAAQS.

This demonstration is based on the regionally significant projects in the 2045 Regional Transportation Plan (RTP), with which the FY2020-2023 Transportation Improvement Program (TIP) projects are consistent, along with the regionally significant projects in the 2040 RTP for the Upper Front Range (UFR) and the FY2019-2022 Statewide TIP (STIP). Since the previously approved conformity determination in June 2019, the North Front Range Metropolitan Planning Organization's (NFRMPO) regional travel demand model has been updated to incorporate the latest planning assumptions.

Background

The NFRMPO is the lead planning agency for Carbon Monoxide within the North Front Range and is responsible for conducting conformity determinations for all NAAQS pollutants for which the region is not in attainment.

The NFRMPO conducts air quality conformity determinations on the RTP and TIP to determine conformance with the applicable Colorado State Implementation Plans (SIP) and in compliance with the Clean Air Act (CAA),¹ the Transportation Conformity Regulation,² the Statewide and Metropolitan Planning Regulation,³ and other applicable federal and state requirements. The conformity determination ensures that transportation plans, programs, and projects do not:

- Create new violations of the NAAQS;
- Increase the frequency or severity of NAAQS violations; or
- Delay timely attainment of the NAAQS or achievement of any interim milestone.

Nonattainment Areas and Emissions Budgets

There are three nonattainment areas partially or wholly within the NFRMPO region. These include the Fort Collins Maintenance area for the 1971 CO NAAQS, the Greeley Maintenance area for the 1971 CO NAAQS, and the Denver-North Front Range Nonattainment Area for the 2008 Ozone NAAQS and 2015 Ozone NAAQS.

¹42 U.S.C. Chapter 85, Clean Air Act, Requirements and History, <https://www.govinfo.gov/content/pkg/USCODE-2017-title42/html/USCODE-2017-title42-chap85.htm>.

²40 CFR 93 Subpart A, Conformity to State or Federal Implementation Plans of Transportation Plans, Programs, and Projects Developed, Funded or Approved Under Title 23 U.S.C. or the Federal Transit Laws, https://www.ecfr.gov/cgi-bin/text-idx?tpl=/ecfrbrowse/Title40/40cfr93_main_02.tpl.

³ 23 CFR 450, Planning Assistance and Standards, https://www.ecfr.gov/cgi-bin/text-idx?tpl=/ecfrbrowse/Title23/23cfr450_main_02.tpl.

Carbon Monoxide Maintenance Areas

Portions of the cities of Fort Collins and Greeley and their immediate vicinities are designated as maintenance areas for CO, shown in **Figure 1**.

The Fort Collins area was designated by the U.S. Environmental Protection Agency (EPA) as nonattainment for CO in 1979. The last violation of the CO standard in Fort Collins was in 1991. The EPA redesignated Fort Collins as an attainment/maintenance area in 2003 with the approval of the first 10-year maintenance plan.⁴ The second 10-year maintenance plan was approved by the EPA in 2013 and demonstrates continued attainment through September 22, 2023.⁵

The second 10-year maintenance plan for the Fort Collins Maintenance Area meets the requirements and provisions of EPA's limited maintenance plan option. To qualify for this option, the maintenance plan demonstrated CO levels at or below 85 percent of the 8-hour standard of 9 parts per million (ppm) for eight consecutive quarters. Transportation plans and improvement programs in carbon monoxide limited maintenance plan areas are presumed to automatically satisfy the emissions budget test requirement, and no regional emissions analysis is required.

The Greeley area was designated by the EPA as nonattainment for CO in 1977. The last violation of the CO standard in Greeley was in 1988. The EPA redesignated Greeley as an attainment/maintenance area in 1999 with the approval of the first 10-year maintenance plan.⁶ The second 10-year maintenance plan was approved by the EPA in 2013 and demonstrated continued attainment through May 10, 2019.⁷ While the Greeley CO Maintenance area has not yet been redesignated as an attainment area, conformity requirements no longer apply due to the expiration of the second 10-year maintenance plan.

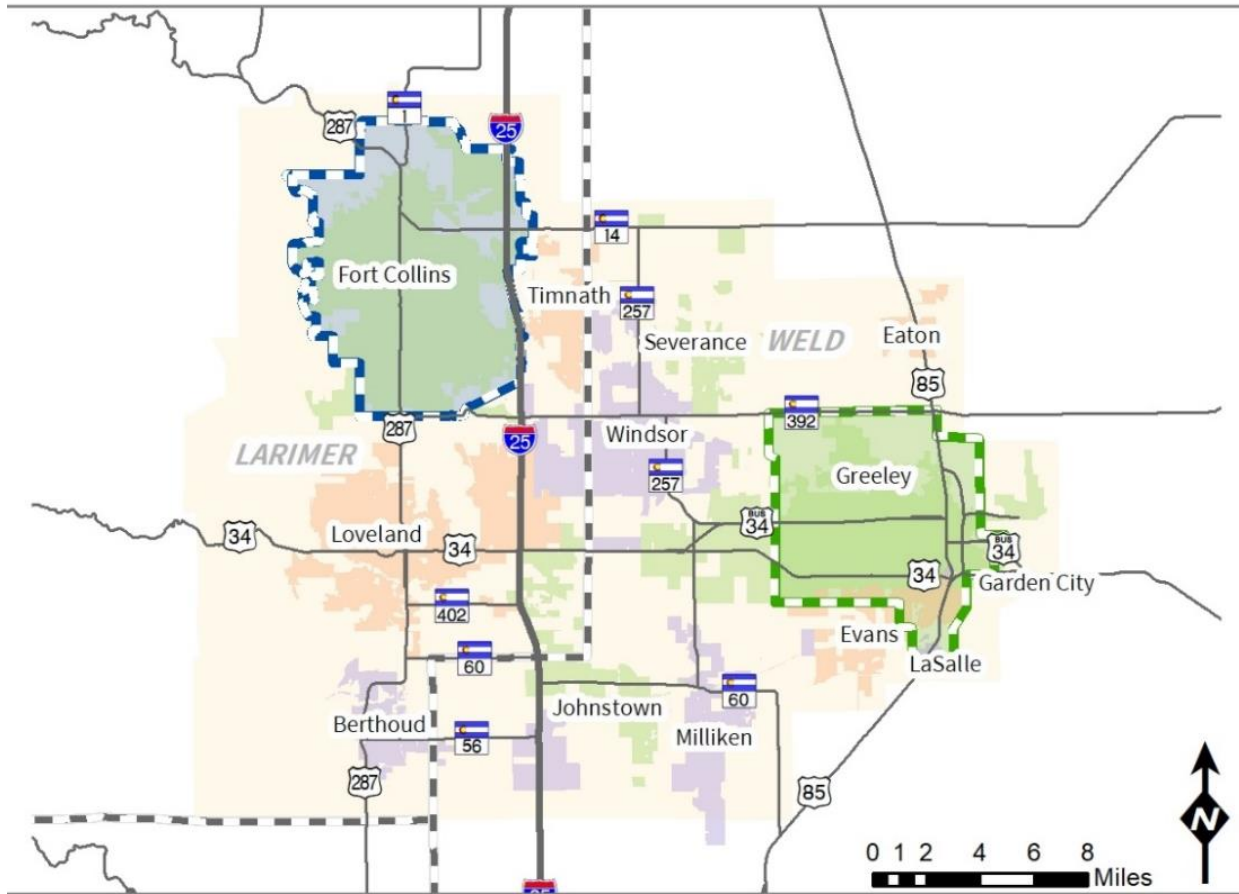
⁴ 68 FR 43316, <https://federalregister.gov/a/03-18303>, 2003

⁵ 78 FR 56164, <https://federalregister.gov/a/2013-21987>, 2013

⁶ 64 FR 11775, <https://federalregister.gov/a/99-5661>, 1999

⁷ 78 FR 46816, <https://federalregister.gov/a/2013-18439>, 2013

Figure 1: Fort Collins and Greeley CO Maintenance Area Boundaries



Legend

-  Fort Collins Maintenance Area
-  Greeley Maintenance Area
-  NFRMPO Planning Area
-  County Boundaries

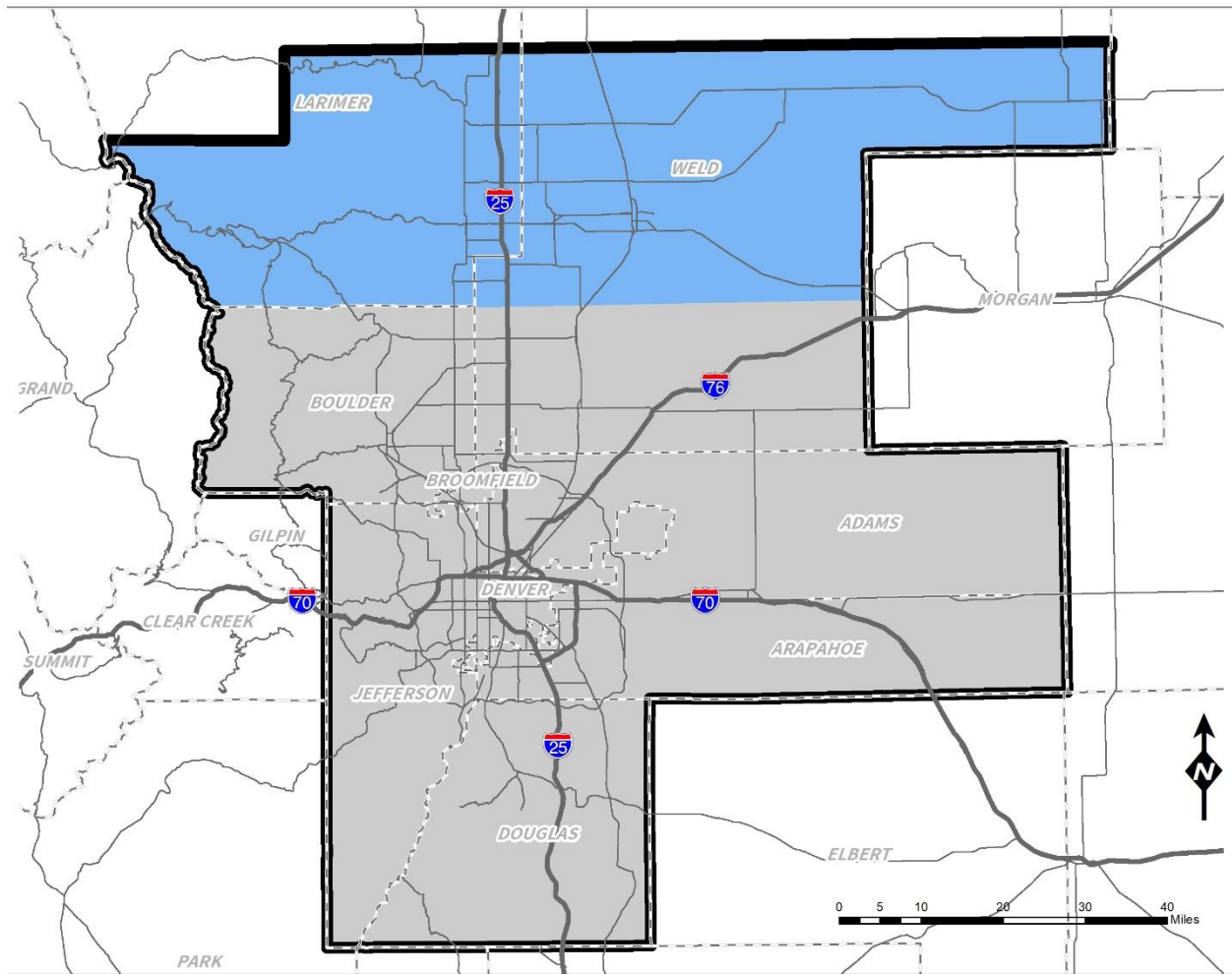
April 2019
Sources: CDOT, NFRMPO



Ozone Nonattainment Area

The Denver-North Front Range Nonattainment Area for the 2008 Ozone NAAQS covers the counties of Adams, Arapahoe, Boulder, Broomfield, Denver, Douglas, Jefferson, and portions of Larimer and Weld counties with the highest concentration of emissions. **Figure 2** shows the entire 8-Hour Ozone Nonattainment Area and its two subareas, Northern and Southern. The boundary between the two subareas is the Boulder/Larimer County line, extended at the same latitude eastward through southern Weld County to the Morgan County line. The NFRMPO conducts conformity determinations for the Northern Subarea.

Figure 2: Denver-North Front Range 8-hour Ozone Nonattainment Area and Subareas



Legend

-  Northern Subarea
-  Southern Subarea
-  Ozone Nonattainment Area
-  County Boundaries

April 2019
Sources: CDOT, NFRMPO



The nine county Denver-North Front Range area was originally designated as a nonattainment area for ozone under the 1997 8-hour ozone NAAQS of 0.080 ppm established by the EPA. A SIP was developed to demonstrate how the region would attain the 1997 8-hour ozone standard by 2010. For the purposes of Transportation Conformity, Motor Vehicle Emission Budgets (MVEBs) were established as part of the SIP for the two ozone precursors: Nitrogen Oxides (NOx) and Volatile Organic Compounds (VOC). EPA found the NOx and VOC MVEBs adequate for transportation conformity purposes⁸ and approved the budgets with the final rule to approve the *Denver Metro Area & North Front Range Ozone Action Plan* which included revisions to the SIP for the 1997 8-Hour Ozone NAAQS.⁹

On March 27, 2008,¹⁰ the EPA lowered the NAAQS for ground-level ozone to 0.075 ppm. The same nine county Denver-North Front Range Nonattainment area under the 1997 standard was designated as Marginal Nonattainment by the EPA under the 2008 standard on April 30, 2012.¹¹ As a Marginal Nonattainment area, the deadline to attain the 2008 ozone NAAQS was by the end of the 2014 ozone season and a new SIP was not required. The Denver-North Front Range Nonattainment area failed to attain the NAAQS based on the three-year average of ozone data from 2012 to 2014. Because of this, on May 4, 2016, EPA reclassified the area from Marginal to Moderate, extending the attainment year to 2017.¹² Per federal requirements, the State of Colorado developed a new SIP to demonstrate how the area will comply with the federal CAA for the 2008 ozone NAAQS. The *Moderate Area Ozone SIP*, submitted to the EPA on May 31, 2017, set MVEBs for each subarea of the Denver-North Front Range nonattainment area. On March 16, 2018, the EPA found the MVEBs in the Moderate Area Ozone SIP adequate for conformity determinations¹³ and on August 2, 2018, the EPA approved the majority of the SIP.¹⁴

Most recently, the EPA lowered the ozone NAAQS to 0.070 ppm on December 28, 2015.¹⁵ The nine county Denver-North Front Range area was designated as a Marginal Nonattainment area by the EPA on August 3, 2018.¹⁶ A SIP has yet to be developed for the 2015 ozone NAAQS. Until new MVEBs are approved and become effective, the Denver-North Front Range Nonattainment area demonstrates conformity to the 2015 ozone NAAQS by meeting the approved Moderate SIP MVEB tests for the 2008 ozone NAAQS ([40 CFR 93.109\(c\)\(2\)\(i\)](#)). The previous conformity determination completed in June 2019 met EPA's requirement to complete a new conformity determination within one year of the effective date of the Marginal Nonattainment designation for the 2015 Ozone NAAQS.¹⁷

Planning Organizations and Memorandum of Agreements (MOAs)

The NFRMPO is the MPO for the Fort Collins Transportation Management Area (TMA), which includes Berthoud, Fort Collins, Loveland, and portions of Johnstown, Timnath, and Windsor. The NFRMPO has 15 local government members, including 13 municipalities and portions of Larimer and Weld counties.

⁸ 75 FR 9893, <https://federalregister.gov/a/2010-4551>, 2010

⁹ 76 FR 47443, <https://federalregister.gov/a/2011-19807>, 2011

¹⁰ 73 FR 16436, <https://federalregister.gov/a/E8-5645>, 2008

¹¹ 77 FR 30098, <https://federalregister.gov/a/2012-11618>, 2012

¹² 81 FR 26697, <https://federalregister.gov/a/2016-09729>, 2016

¹³ 83 FR 11751, <https://federalregister.gov/a/2018-05406>, 2018

¹⁴ 83 FR 31068, <https://federalregister.gov/a/2018-13599>, 2018

¹⁵ 80 FR 65291, <https://federalregister.gov/a/2015-26594>, 2015

¹⁶ 83 FR 25776, <https://federalregister.gov/a/2018-11838>, 2018

¹⁷ Transportation Conformity Guidance for 2015 Ozone NAAQS Nonattainment Areas. (EPA-420-B-18-023)- June 2018

The UFR covers the remainder of the Northern Subarea of the 8-Hour Ozone Nonattainment Area. Located in north-central Colorado, the UFR is comprised of portions of Larimer and Weld counties and Morgan County, and excludes the portion of southwestern Weld County included in the Denver Regional Council of Governments (DRCOG) metropolitan planning area. **Figure 3** illustrates the Northern Subarea boundaries for the NFRMPO and the UFR.

The Regional Air Quality Council (RAQC) is the lead air quality planning agency for the entire Denver-North Front Range 8-Hour Ozone Nonattainment Area.¹⁸ DRCOG is the MPO for the Denver TMA and is responsible for conformity determinations for the Southern Subarea.

An MOA was signed in 2008 by the Air Pollution Control Division (APCD) of the Colorado Department of Public Health and Environment (CDPHE), Colorado Department of Transportation (CDOT), RAQC, UFR, NFRMPO, and DRCOG per federal transportation regulations,¹⁹ and is included in **Appendix A**. The MOA allows the option to establish subarea emissions budgets for VOC and NO_x based on the subareas defined in **Figure 2**. The MOA stipulates DRCOG will conduct conformity determinations for the Southern Subarea of the 8-Hour Ozone Nonattainment Area, while the NFRMPO will conduct conformity determinations for the Northern Subarea. It states the course of action to be pursued if one (or both) Subareas fail a conformity test or exceed emissions budgets.

In 2015, an MOA was signed by the NFRMPO, CDPHE, RAQC, and DRCOG, replacing an MOA signed in 1998 by the NFRMPO and CDPHE and a similar MOA between DRCOG and CDPHE. The MOA, included in **Appendix B**, identifies the specific roles and responsibilities in conformity evaluations and findings for each agency, including allowing for routine conformity determinations to be performed and approved through the APCD, rather than through a public hearing with the State of Colorado's Air Quality Control Commission (AQCC).

Conformity Determination Process

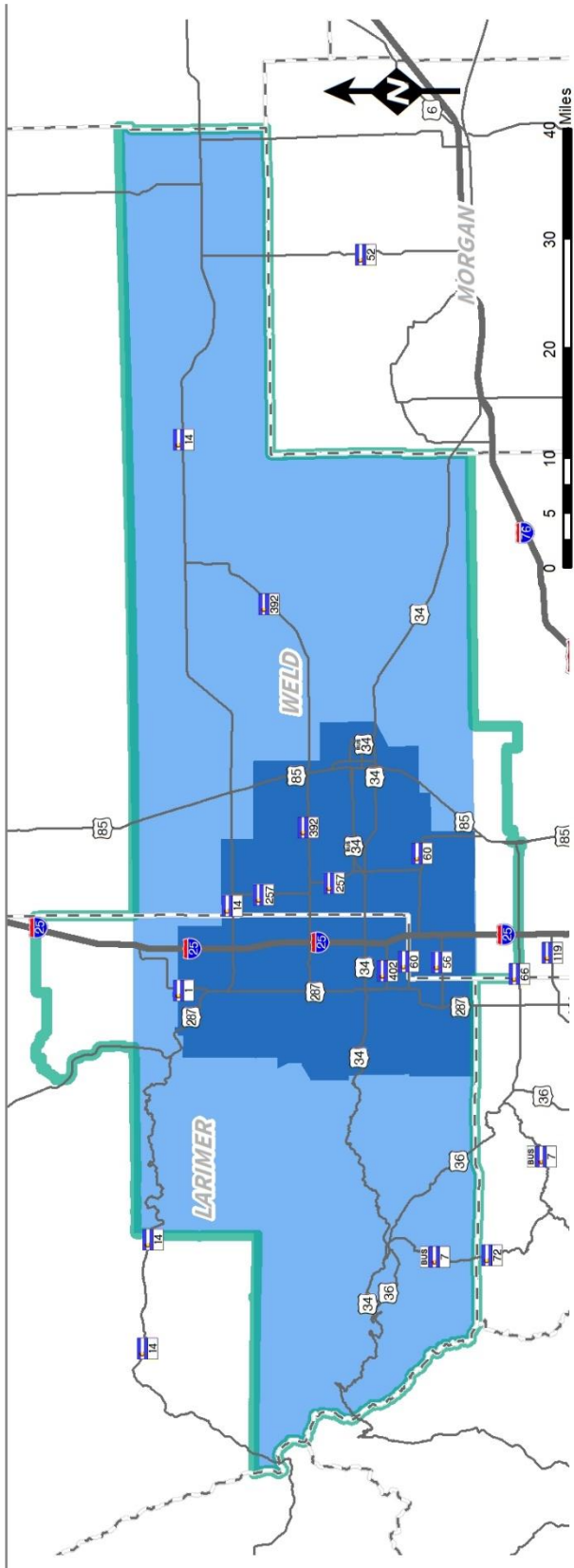
The NFRMPO and DRCOG worked cooperatively with the Air Quality Interagency Consultation Group (ICG) which includes membership from the Federal Highway Administration (FHWA), Federal Transit Administration (FTA), EPA, CDOT, and APCD to review the conformity documentation and planning assumptions for this report. Furthermore, members of the NFRMPO's Technical Advisory Committee (TAC), or their representatives, served as the review team for the North Front Range Socio-economic Data and NFRMPO 2015 Base Year (BY) Regional Travel Demand Model (RTDM) assumptions, pursuant to the AQCC's Regulation Number 10.²⁰

¹⁸ Executive Order B 2013 007, https://www.colorado.gov/governor/sites/default/files/executive_orders/b_2013-007.pdf, 2013

¹⁹ 23 CFR 450.314(c), https://www.ecfr.gov/cgi-bin/text-idx?SID=cb8fc2bb654e58e1c70363164784595b&mc=true&node=se23.1.450_1314&rqn=div8, 2017

²⁰ 5 CCR 1001-12, <https://www.sos.state.co.us/CCR/GenerateRulePdf.do?ruleVersionId=4498&fileName=5%20CCR%201001-12>, 2012

Figure 3: Northern Subarea



Legend

-  NFRMPO Modeling Area
-  NFRMPO Planning Area
-  County Boundaries
-  Northern Subarea
-  County Boundaries

April 2019

Sources: CDOT, NFRMPO



Public Participation

The 2019 Public Involvement Plan (PIP) guides the NFRMPO's public participation activities for all plans and programs. The NFRMPO invited public participation throughout the development of the 2045 RTP, the FY2020-2023 TIP, and the associated conformity determinations.

A public hearing notice was published on July 31, 2019, with the documents made available to the public on August 5, 2019. The documents are available on the NFRMPO website at <http://nfrmpo.org/air-quality> and at the NFRMPO Office as a print copy. The public comment period ends at 5:00 p.m. on September 3, 2019.

The North Front Range Air Quality and Transportation Planning Council (NFRT&AQPC) will hold a public hearing regarding this conformity determination prior to their monthly meeting on September 5, 2019 at the Severance Town Hall at 3 S. Timber Ridge Parkway; Severance, Colorado 80546. All public comments submitted during the public comment period will be presented and the public is encouraged to attend. Minutes of the NFRMPO Planning Council's public hearing will be available at the NFRMPO office and website: nfrmpo.org.

In addition, a public meeting on this conformity determination will be held at the AQCC meeting on September 19, 2019. The public is encouraged to attend and can find out more information about the meeting location and time at <https://www.colorado.gov/pacific/cdphe/aqcc>.

The 2045 RTP and FY2020-2023 TIP were also made available for a 30-day public comment period from August 1, 2019 through August 31, 2019. Public comments will be taken at the September 5, 2019 NFRT&AQPC meeting. It is anticipated the 2045 RTP and the FY2020-2023TIP will be adopted at this meeting.

CHAPTER 2: IMPLEMENTATION OF CONTROL MEASURES

For this conformity determination no new transportation control measures (TCMs) are identified for timely completion or implementation as part of the applicable state implementation plans. The Moderate Area Ozone SIP adopted by the AQCC in 2016 and approved by the EPA on August 2, 2018 did not include any TCMs, nor are there commitments to TCMs in the Fort Collins Carbon Monoxide Maintenance Plan.

CHAPTER 3: EMISSIONS TESTS

Background

The transportation plan and program must pass a series of emissions tests to demonstrate conformity. The plan and program must not exceed the MVEBs in the applicable SIP or SIP submittal. Satisfying these tests involves demonstrating relevant emissions in future years are less than or equal to the emissions budget established in the approved SIP.

CO Emissions Test

As stated in **Chapter 1**, a conformity determination is no longer required for the Greeley CO Maintenance area. In addition, the second 10-year maintenance plan for the Fort Collins CO Maintenance Area meets the requirements and provisions of EPA's limited maintenance plan option. Transportation plans and improvement programs in carbon monoxide limited maintenance plan areas are presumed to automatically satisfy the emissions budget test requirement, and no regional emissions analysis is required.

8-Hour Ozone Emissions Tests

The 8-Hour Ozone emissions test is required for the Northern Subarea of the Denver-North Front Range Nonattainment area. The emissions test is for the two ozone precursors, NO_x and VOC. The EPA found the MVEBs for NO_x and VOCs contained in the *Moderate Area Ozone SIP* adequate for transportation conformity purposes on March 16, 2018 and approved these MVEBs on August 2, 2018. As a result, the NFRMPO is required to use these budgets for subsequent transportation conformity determinations.

Budgets Analysis Years

In accordance with EPA regulations,²¹ the ICG agreed on the following staging years for determining 8-hour ozone conformity:

- **2020** – the first horizon year (no more than 10 years from the 2015 base year of the travel demand model)
- **2030** – an intermediate modeling year
- **2040** – an intermediate modeling year
- **2045** – the last year (horizon) of the 2045 RTP

Technical Process

The technical process used to estimate future pollutant emission levels is based on the latest planning assumptions in effect at the time of this conformity determination. Assumptions behind the analysis were derived from estimates of current and future population, employment, travel, and congestion. The MOA stipulates the emissions estimates for the

²¹ 40 CFR 93.118, <http://www.ecfr.gov/cgi-bin/retrieveECFR?gp=1&SID=4c2888da2e1fb443b24ff76fcd7cfc84&ty=HTML&h=L&mc=true&r=PART&n=pt40.20.93>.

Northern Subarea portion of the 8-Hour Ozone Nonattainment Area are to be performed by the APCD.

The NFRMPO 2010 BY Land Use Allocation Model (LUAM) and the 2015 BY RTDM, developed for input to the emissions model, covers the Northern Subarea of the 8-Hour Ozone Nonattainment Area. **Appendix C** and **Appendix D** describe the modeling structure for the RTDM in more detail.

Demographic Assumptions

Table 1 presents the demographic assumptions for the Northern Subarea developed using the 2010 LUAM. The 2020 estimated population for the Northern Subarea is 569,393. The population forecast for the Northern Subarea in 2045 is 913,574, an increase of 60 percent. Employment is forecast to be approximately 445,307 in 2045 compared to the year 2020 estimate of 316,316, an increase of 53 percent. Growth in population and employment will be the principal factors for the increased demand on the region’s transportation facilities and services.

Table 1: Population and Employment Forecasts – Northern Subarea				
Statistic	2020	2030	2040	2045
Population	569,393	700,578	841,870	913,574
Employment	316,316	379,272	445,307	482,771

Transportation Assumptions

To complete the emissions tests, the applicable staging years (2020, 2030, and 2040, and 2045) and transportation networks were defined for the NFRMPO boundary and the UFR area within the Northern Subarea. The RTDM includes all capacity improvements (widening) and regionally significant projects for the Northern Subarea for the respective staging years. **Appendix E** contains the list and map of regionally significant transportation improvement projects coded in the RTDM on regionally significant corridors (RSCs) and regional transit corridors (RTC).

Air Quality Modeling Assumptions

APCD estimated air pollution emissions shown in this report using the most recent EPA Motor Vehicle Emissions Simulation (MOVES2014b) model.

Emission Test Results – Northern Subarea

The results of the Northern Subarea emissions tests by year are reported in **Table 2**. APCD generated the emissions estimates using the transportation inputs from the 2015 RTDM and the MOVES2014b emissions model. APCD performed the 8-hour ozone conformity analysis

for the years 2020, 2030, 2040, and 2045, which meet the EPA staging year requirements.²²

Table 2: 8-Hour Ozone Conformity for Denver-North Front Range Northern Subarea (Emission Tons per Day)						
	2008 SIP Budgets	2020	2030	2040	2045	Pass/Fail
Volatile Organic Compounds (VOC)	8	8	6	5	4	PASS
Oxides of Nitrogen (NOx)	12	10	6	4	5	PASS

Summary of 8-hour Ozone Conformity Findings

Based on the quantitative conformity analysis, NFRMPO staff has determined the NFRMPO 2045 RTP, the FY2020-2023 TIP, the UFR 2040 RTP, and the northern subarea of the FY2019-2022 STIP demonstrate conformity for the 2008 and 2015 8-Hour Ozone NAAQS using the 8-hour ozone emissions budgets for the Northern Subarea. **Appendix C** includes more information on the transportation and demographic assumptions used in the 8-hour ozone emissions analysis.

²² 40 CFR 93.118, <http://www.ecfr.gov/cgi-bin/retrieveECFR?gp=1&SID=c9ad38a0577544cc1bd184aaa325cb6a&ty=HTML&h=L&mc=true&r=PART&n=pt40.20.93>, 2013

***Appendix A: Memorandum of Agreement – Transportation Conformity Evaluations
Conducted Under the 8-Hour Ozone Standard (2008)***

MEMORANDUM OF AGREEMENT

FOR

TRANSPORTATION CONFORMITY EVALUATIONS
CONDUCTED UNDER THE 8-HOUR OZONE STANDARD

BY AND BETWEEN

THE COLORADO DEPARTMENT OF PUBLIC HEALTH AND ENVIRONMENT,
THE DENVER REGIONAL AIR QUALITY COUNCIL,
THE COLORADO DEPARTMENT OF TRANSPORTATION,
THE UPPER FRONT RANGE TRANSPORTATION PLANNING REGION,
THE NORTH FRONT RANGE TRANSPORTATION AND AIR QUALITY
PLANNING COUNCIL (a.k.a. the North Front Range MPO),
AND THE DENVER REGIONAL COUNCIL OF GOVERNMENTS

March 14, 2008

Abbreviations Guide

APCD – Air Pollution Control Division
AQCC – Air Quality Control Commission, (“the Commission”)
CDPHE – Colorado Department of Public Health and Environment
CDOT - Colorado Department of Transportation
DRCOG – Denver Regional Council of Governments
MOA – Memorandum of Agreement
MPA – Metropolitan Planning Area
MPO – Metropolitan Planning Organization
NFR – North Front Range
NFRT& AQPC – North Front Range Transportation & Air Quality Planning Council (the NFR MPO)
NOx – Nitrogen Oxides
RAQC – (Denver) Regional Air Quality Council
SIP – State Implementation Plan
UFR – Upper Front Range
TIP – Transportation Improvement Program
TPR – Transportation Planning Region
USDOT – United States Department of Transportation
USEPA – United States Environmental Protection Agency
VOC – Volatile Organic Compounds

Terminology

Consulting parties – Those agency parties involved in data and document review for the purposes making or commenting on a Conformity Determination. Includes the Air Quality Control Commission, USDOT and USEPA, who are not signatory parties to this MOA.

Signatories/Signatory parties –The parties signatory to this document. This group of six agencies does not include USDOT or USEPA.

On-road motor vehicle – Refers to cars, trucks, buses, motorcycles, vans and other motorized vehicles that use public highways, streets and roadways; to be distinguished from motor vehicles that may be designed for off-road use, e.g., all-terrain vehicles, and from agricultural and construction equipment.

A. Background and Purpose

The U.S. Environmental Protection Agency (USEPA) has designated an area (See map, Attachment A) inclusive of the Denver Metro Area and portions of both the North Front Range Metropolitan Planning area and the Upper Front Range Transportation Planning Region as nonattainment under the 8-hour ozone standard. The nonattainment designation became effective November 20, 2007. The Upper Front Range TPR is not represented by a Metropolitan Planning Organization as it comprises a largely rural area. Furthermore, the TPR lacks the expertise and wherewithal to provide or purchase transportation and modeling forecasts as part of the Conformity Determination process for the 8-hour ozone area.

Federal Transportation Regulations at 23CFR 450.314 (b) state that where a metropolitan planning area does not include an entire nonattainment area or maintenance area, “there shall be written agreement among the State Department of Transportation, State air quality agency, affected local agencies, and the MPO describing the process for cooperative planning and analysis of all projects outside the MPA within the nonattainment or maintenance area. The agreement must also indicate how the total transportation-related emissions for the nonattainment or maintenance area, including areas outside the MPA, will be treated for the purposes of determining conformity in accordance with EPA’s transportation conformity rule (40 CFR Part 93). The agreement shall address policy mechanisms for resolving conflicts concerning transportation-related emissions...**(and)** (c): In nonattainment or maintenance areas, if the MPO is not the designated agency for air quality planning...there shall be a written agreement between the MPO and the designated air quality planning agency describing their respective roles and responsibilities for air quality related transportation planning. (d) If more than one MPO has been designated to serve an urbanized area, there shall be written agreement among the MPOs, the State(s), and the public transportation operator(s) describing how the metropolitan transportation planning processes will be coordinated to assure the development of consistent metropolitan transportation plans and TIPs across the MPA boundaries....”

Similarly, EPA regulations at 40 CFR 93.105(e) and 51.390 require states to create consultation procedures in the SIP whereby MPO representatives, state and local air quality planning agencies, state and local transportation agencies and other organizations must consult with each other and with U.S. Environmental Protection Agency (USEPA) and U.S. Department of Transportation (USDOT) regarding development of State Implementation Plans (SIPs), transportation plans, transportation improvement programs (TIPs), and Conformity Determinations.

This Memorandum of Agreement (MOA) is designed to allow for and to guide cooperative transportation planning in conformance with State air quality plans, and related review and analysis in the pursuit of transportation Conformity Determinations associated with the 8-hour ozone State Implementation Plan (SIP).

B. Conformity Determinations Prior to/In Lieu of the Establishment of On-Road Motor Vehicle Emission Budgets

The first Conformity Determination for the area of concern is due November 20, 2008, as required by the federal Conformity Rule at 40 CFR 93.102(d). Since adequate or

approved motor vehicle emission budgets will not be available until late 2009, one or more Conformity Determinations for the nonattainment or maintenance area of concern must follow the procedures at 40 CFR 93.109(e)(2)(iii).

The Denver Regional Council of Governments and the North Front Range MPO shall perform transportation emissions forecasting for the respective areas described in Section C.1 and C.2 for Conformity Determinations, regardless of whether emission budgets have been established, and regardless of whether overall nonattainment-or maintenance area emission budgets or sub-area emission budgets are used.

C. Motor Vehicle Emission Budgets for the 8-Hour Ozone Nonattainment (or Maintenance) Area and Sub-Areas

In the SIP development process, the Air Pollution Control Division (APCD), the North Front Range Metropolitan Planning Organization (NFRMPO), and the Regional Air Quality Council (RAQC) shall work together to propose overall area motor vehicle emission budgets for volatile organic compounds (VOC) and nitrogen oxides (NO_x) for the 8-hour ozone nonattainment or maintenance area. Said budgets must be adopted by the Commission and affirmed via USEPA adequacy determinations in order to become viable for use in Conformity Determinations.

Sub-area emission budgets for ozone precursors under the 8-hour ozone standard may also be proposed to the AQCC for the following two sub-areas:

1. The combined areas of the Denver Metro Region and the southern portion of the Upper Front Range Transportation Planning Region (TPR) as designated nonattainment by USEPA, i.e., the area south of the north line of Township 3 north of the 6th Principal Meridian; said line is the southern boundary of the North Front Range MPO extended to the east line of Weld County. For this sub-area, the budgets for NO_x and VOC shall be proposed during SIP development for the federal 8-hour ozone standard by the RAQC with input from the APCD, CDOT, DRCOG, and UFR to be considered for adoption by the Commission.
2. The combined areas of the North Front Range MPO area and the northern portion of the Upper Front Range TPR, as designated nonattainment by USEPA, i.e., the area north of the north line of Township 3 north of the 6th Principal Meridian; said line is the southern boundary of the North Front Range MPO extended to the east line of Weld County. For this sub-area, the budgets for NO_x and VOC shall be proposed determined during SIP development for under the federal 8-hour ozone standard by the NFR MPO in consultation with the APCD and the RAQC, with input from CDOT and UFR, to be considered for adoption by the Commission.

Sub-area budgets, agreed to by the signatories and approved by the Commission, may be used to measure the conformity of plans and programs for the respective areas, once determined adequate by the USEPA.

Sub-areas as described above and Conformity procedures described in this document shall remain the same when and if the 8-Hour Nonattainment Area is re-designated an "Attainment/Maintenance Area.

D. Granting of Authority, Responsibilities

The Upper Front Range TPR lacks the expertise and wherewithal to provide or purchase transportation and modeling forecasts as part of the Conformity Determination process for the 8-hour ozone area. By this agreement:

1. The DRCOG agrees to provide transportation forecasts and make Conformity Determinations for the area described in Section C.1 above. The area includes the DRCOG MPO area and other 8-hour ozone nonattainment areas within the DRCOG TPR, as well as a portion of the nonattainment area of the Upper Front Range TPR.
2. The North Front Range MPO agrees to provide transportation forecasts and make Conformity Determinations for an area described in Section C.2 above. The area includes North Front Range MPO 8-hour ozone nonattainment areas as well as portions of the Upper Front Range TPR nonattainment area.
3. The Upper Front Range TPR authorizes the DRCOG and the NFR MPO to prepare transportation forecasts and make Conformity Determinations for the relevant nonattainment areas of the Upper Front Range as described in Section C of this document.
4. The agreed-upon transportation forecasting authorities shall continue for the 8-Hour Ozone Area after it is re-designated "Attainment/Maintenance" status by USEPA.

E. Compensation to MPOs for Additional Responsibilities

It is anticipated that over the next one-to-four years, funding will be needed for enhanced transportation forecasting and to perform Conformity Determinations for the Upper Front Range areas of concern. The CDOT has the responsibility to fund required Conformity Determinations and associated transportation modeling efforts for areas outside of the MPOs.

As forecasting and modeling work for the UFR will extend beyond the MPO boundaries, the CDOT will provide necessary funding to DRCOG and NFR based upon a mutually agreeable course of action delineating tasks, schedule, and costs among the signatory agencies. The signatory agencies will look to the USEPA and USDOT to assure consistency with federal requirements regarding tasks. The CDOT will execute separate intergovernmental agreements with the NFRMPO and DRCOG detailing the specific work that will be done for the agreed-to compensation.

F. Conformity Review – Procedural

The agencies shall follow the interagency consultation process and procedures identified in Colorado Air Quality Control Commission Regulation No. 10 for sharing information and conducting review of transportation data, projections, and determining Transportation Conformity to the State Implementation Plan under the 8-hour ozone standard, and generally the process outlined in memoranda of agreement for Transportation Conformity evaluations by and between the CDPHE and the Denver Regional Council of Governments (1998) and with the North Front Range Transportation and Air Quality Planning Council (2003).

The DRCOG and NFR MPO shall provide forecasts for their respective areas as described in Section C. 1 and C.2. In cases where one Conformity finding is to be made for the overall 8-Hour Ozone Nonattainment (or Attainment/Maintenance) Area, and no sub-area emission budgets are to be used, the MPOs, in consultation with the other signatory parties and with USEPA and USDOT, shall sum the ozone precursor emissions from their respective areas for overall-Area totals of VOC and NO_x, to determine whether forecasted emissions meet the appropriate Conformity test(s). In such cases, the MPOs jointly shall produce one Conformity Determination document for the overall 8-Hour Ozone Nonattainment (or Attainment/Maintenance) Area.

The APCD will perform independent emission budget tests and other applicable analyses for the overall Nonattainment (or Attainment/Maintenance) region and, as well as for the sub-areas described in C.1 and C.2 if sub-area budgets are to be used, within 30 days of receiving the final submittal of transportation data, although such data will be submitted to the APCD as early in the process as possible. The APCD may also assist with enhanced emissions forecasting for the Upper Front Range area, or provide other in-kind assistance to emissions forecasting efforts.

Assuming the APCD agrees with a Conformity Determination, it will recommend that the Air Commission comment formally via letter to the relevant MPO and to CDOT regarding its concurrence.

In the event that future sub-area emissions exceed a Conformity test or emission budget, the sub-area MPO shall immediately and diligently pursue actions, e.g., transportation plan and/or TIP amendment, that would bring projected emissions under budget (or in line with the Conformity test being used) and thus to conform to the SIP (and/or not threaten to increase the severity of the 8-Hour Area's nonattainment status). Such endeavor would be pursued as part of standard interagency process. If the sub-area were to fail to meet a Conformity test/make a positive Conformity Determination, all parties to this MOA shall confer on an emergency basis to review emission budgets and to consider the merits of the following actions, which may be needed to achieve or to re-establish Conformity:

- Potential revisions to transportation plans and/or transportation programs
- Potential modeling (by both MPO's) of the entire nonattainment (or Attainment/Maintenance) Area for a Conformity Determination, if allowed by the SIP
- Potential appeal (via the SIP process) for emission budget revisions
- Potential additional SIP revisions.

A course of action employing one or more of the above-listed actions shall be determined by the parties to this agreement. Parties may appeal to the USDOT and USEPA for guidance in establishing Conformity.

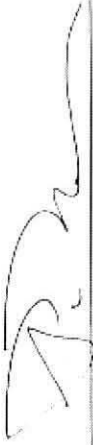
G. Dispute Resolution

Any protracted disagreements between consulting parties reviewing a Conformity Determination shall be elevated to the Commission, per the provisions in AQCC Regulation No. 10. Any continuing dispute that devolves or threatens to devolve into a situation of official non-conformance of transportation plans with the State Implementation Plan may be elevated to the Governor, just as a disputed Conformity Determination may be elevated to the Governor, as provided in AQCC Regulation No. 10 and at 40 CFR Section 93.105(d).


H. Termination of Agreement

This agreement shall be binding upon the signatory parties-until the 8-hour ozone area has achieved attainment status and maintains said status for a period of at least 20 years, unless the undersigned agencies revise or replace this MOA via unanimous, written agreement.


The undersigned hereby agree to the delegations, responsibilities and procedures described above.



Paul Tourangeau, Director, Air Pollution Control Division, CDPHE Date 3/14/08



Jennifer Finch, Director, Transportation Development Division, CDOT Date 3/14/08



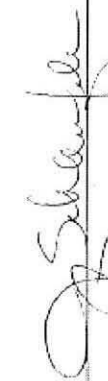
Kenneth H. Lloyd, Executive Director, Regional Air Quality Council Date 3/14/08



Robert D. Masden, Weld County Commissioner,
Chairman, Upper Front Range TPR Date 3/24/08

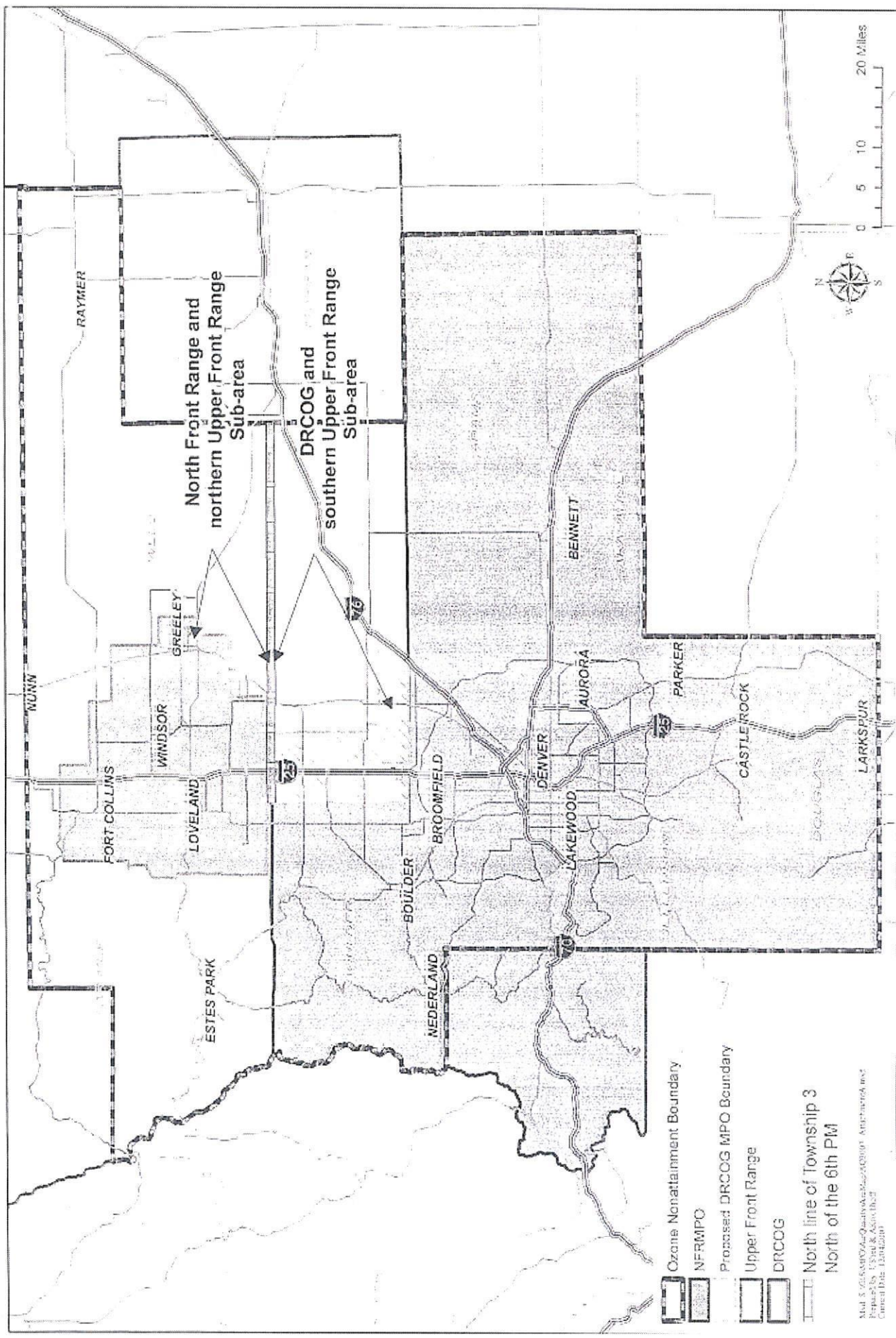


Cliff Davidson, Executive Director, North Front Range MPO Date 3/00/08



Jennifer Schaufele, Executive Director,
Denver Regional Council of Governments Date 3/14/08

**Attachment A:
8-Hour Ozone Nonattainment Area
and Sub-areas**



Map 5: Ozone Nonattainment Area and Sub-areas
 Prepared by: URS & Associates, Inc.
 Council Date: 12/04/2004

***Appendix B: Memorandum of Agreement – Transportation Conformity Evaluations
(2015)***

2015
MEMORANDUM OF AGREEMENT
FOR
TRANSPORTATION CONFORMITY EVALUATIONS

BY AND BETWEEN
THE COLORADO DEPARTMENT OF PUBLIC HEALTH AND ENVIRONMENT
AND
THE REGIONAL AIR QUALITY COUNCIL
AND
THE DENVER REGIONAL COUNCIL OF GOVERNMENTS
AND
THE NORTH FRONT RANGE TRANSPORTATION AND
AIR QUALITY PLANNING COUNCIL

PURPOSE

This Memorandum of Agreement (MOA) is established for the purpose of defining the specific roles and responsibilities of the Air Pollution Control Division (APCD) of the Colorado Department of Health and Environment (CDPHE), the Regional Air Quality Council (RAQC), the Denver Regional Council of Governments (DRCOG), and the North Front Range Transportation and Air Quality Planning Council (NFRMPO) for transportation conformity evaluations and modeling for the Denver and North Front Range regions. Hereafter, the above are referenced as “parties,” and DRCOG and NFRMPO are referenced to as the “MPO(s)” (Metropolitan Planning Organization(s)).

Section 176(c) of the Clean Air Act Amendments of 1990 calls for conformity evaluations to be made for transportation plans, programs, and projects, and for these conformity determinations to be developed through an interagency consultation process. Title 23, Part 450 of the Code of Federal Regulations calls for a continuing, cooperative and comprehensive transportation planning process, including provision of complete information, opportunity for early and continuing public involvement, and access to technical and policy information used in developing transportation documents. These federal mandates are best carried out with the explicit understanding of how the state air quality agency and the MPOs will coordinate efforts, especially with regard to transmitting and analyzing data, and identifying key assumptions used in planning documents.

This MOA augments interagency consultation requirements set forth in federal law and Colorado Air Quality Control Commission (AQCC) Regulation Number 10, Section III. The MOA is to be used in conjunction with these federal and state requirements for transportation conformity determinations required under the Clean Air Act. Specifically, this MOA identifies the roles and responsibilities of RAQC, DRCOG, NFRMPO and APCD in conducting conformity evaluations and sets forth a procedural framework to ensure appropriate consultation and coordination between RAQC, DRCOG, NFRMPO and APCD in carrying out these responsibilities. It also clarifies what key assumptions and data are expected in draft documents and materials used in the interagency consultation process.

This MOA supersedes the prior agreements between the parties dated November 19, 1998 (DRCOG and APCD) and November 24, 1998 (NFRMPO and APCD).

CONFORMITY EVALUATIONS RESPONSIBILITIES

Conformity evaluations are conducted in association with new conformity determinations. The evaluations require the modeling and calculation of pollutant emissions.

MPO RESPONSIBILITIES

As defined in Regulation 10, Section III, MPOs are responsible for the development, maintenance, accuracy, and operation of the regional travel demand models which provide input data to the official emissions model. MPOs will notify APCD and RAQC staff once a need for a new conformity determination is identified and a schedule for conformity modeling has been established. The estimated time period over which APCD modeling work would be required will be defined. Any changes in the schedule will be discussed with APCD staff as soon as such changes are known by the MPO. When requesting APCD to model emissions, MPO staff will forward all necessary travel model data, for each staging year that will be modeled. The NFRMPO is responsible for travel modeling in the Ozone Northern Subarea and DRCOG is responsible in the Ozone Southern Subarea, as defined in the March 14, 2008 Memorandum of Agreement.

APCD RESPONSIBILITIES

The APCD is responsible for the development, maintenance, accuracy, and operation of the official emissions model. After receiving travel model inputs to the emissions model, the APCD will inform the parties regarding an estimated schedule for completion of the emissions results. After the APCD performs emissions modeling, it will provide the parties with the emission model output results as soon as possible.

RAQC RESPONSIBILITIES

The RAQC shall review travel and emissions modeling inputs and outputs and provide comments to the parties. The RAQC will provide technical support and advice regarding model modifications.

MODEL MODIFICATIONS AND CORRECTIONS

Once travel and emission models have been established, modifications and updates to those models by the APCD or MPO may occur for some of the following reasons: updated models, updated input information, such as fleet mix or travel demand model changes, or other issues that are discovered.

If a modification or correction is required in the travel or emissions model, the following steps should be led by the agency making the identification:

- Identify all affected parties and potential work items
- Notify the affected parties and provide an initial explanation
- If needed, call a meeting to review and explain the issue to all parties
- Establish timeline and assigned duties for implementing the modification or correction
- Obtain concurrence and approval for the process for implementation from all parties
- Ensure that the APCD or MPO updates the model with the new information for use with the next applicable conformity cycle
- Share and/or discuss model results with all parties

Changes to the models will be documented and provided to the affected parties and, if needed, may be incorporated into the applicable conformity determination report.

INTERAGENCY CONSULTATION PROCESS (OR GROUP)

An Interagency Consultation Group (ICG) has been established for consultation purposes as identified in Regulation 10. The APCD, DRCOG, and NFRMPO staff will submit technical data for review and recommendation by the ICG that is comprised of representatives from Federal Highway Administration (FHWA), Colorado Department of Transportation (CDOT), Environmental Protection Agency (EPA), Regional Air Quality Council (RAQC), Air Pollution Control Division (APCD), Upper Front Range Transportation Planning Region (UFR), Denver Regional Council of Governments (DRCOG), and North Front Range MPO (NFRMPO).

The ICG will meet as needed to review data pertaining to conformity determinations and advise in a timely fashion. In this way, the assumptions and procedures used in transportation and air quality modeling can be reviewed by staff before the final modeling is performed. Data to be submitted to the ICG for review as part of the regular transportation planning process should be sufficient for making decisions and may include transportation network and land use assumptions, descriptions of any calibrations or updates to the travel model, and updates or changes to the air quality model. If changes which could affect air emissions modeling or evaluations are made after the above data have been reviewed by the ICG, these differences will be disclosed to the ICG and to the other parties to this MOA prior to initiating the final air quality modeling.

Per Regulation 10 section III.H.2, the APCD, shall decide if the conformity determination needs to be reviewed by the AQCC (non-routine) or solely by APCD (routine).

AQCC CONFORMITY REVIEW

The MPO will follow the procedures identified in the AQCC Procedural Rules calling for a public meeting by the AQCC for purposes of commenting on the MPO's non-routine conformity determinations. The parties acknowledge the initial conformity determination document must be available to the Commission office at least 15 days prior to requesting that the AQCC schedule a public meeting, and the final conformity determination document must be available to the Commission office at least 30 days prior to the AQCC's public meeting at which the conformity determination is scheduled to be discussed. The initial document should contain all modeling results and the appropriate supporting materials, and the final documents should contain any updates, revisions or corrections. The Commission can entertain deviations from this schedule on a case-by-case basis.

The Division will provide the MPO with a copy of its written comments, if any, on the conformity determination at the same time it provides them to the AQCC. All AQCC comments on determinations of conformity shall be forwarded to the MPO by APCD. Any AQCC appeal of such conformity determination will follow the procedure outlined in Regulation 10. After review, the APCD will send the MPO a letter of concurrence of a positive conformity determination. If the AQCC does not concur on the conformity determination made by the MPO, this disagreement is forwarded to the Governor's Office unless the parties revise the conformity determination.

LIMITATIONS

1. Nothing in this MOA impairs or otherwise affects the authority of the heads of the signatory party over their organizations.
2. This MOA is intended to outline an agreement among the parties and does not create or confer any right or benefit on any person or party, private or public. Nothing in this MOA is intended to

- restrict the authority of any signatory to act as provided by law or regulation, or to restrict any agency from enforcing any laws within its authority and jurisdiction.
3. This MOA in no way restricts signatory parties from participating in similar activities with other public or private agencies, organizations, and individuals.
 4. Nothing in this MOA shall obligate any signatory party to obligate or transfer any funds, nor does it supplement existing statutory authorities of the signatory party agencies.
 5. This MOA, consisting of five (5) pages, represents the entire and integrated agreement between the parties and supersedes all prior negotiations, representations, and agreements concerning this MOA, whether written or oral.

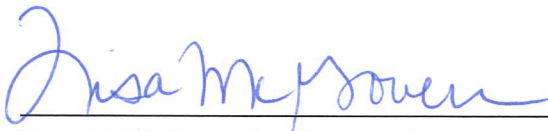
EXECUTION, MODIFICATION AND TERMINATION OF AGREEMENT

It is mutually agreed and understood by all signatory parties that:

1. Any party to this agreement may suspend it by a 60-day written notice to the other parties. If this occurs, the parties agree to consult further to determine whether the issues can be resolved and the agreement re-implemented in an amended form.
2. Changes to the scope of this MOA shall be made by the issuance of a multilaterally executed modification. These changes are to be mutually agreed upon between the parties to this MOA, shall be incorporated by written instrument, executed and signed by all parties to this MOA and are effective as of the date of the last signature obtained.
3. This MOA may be executed in counterparts. A copy with the original signature pages affixed will constitute the original MOA. The effective date shall be the date of the final signatory party agency's signature, and the MOA shall remain in effect until modified or dissolved.
4. This MOA may not serve as the basis for any challenges or appeals.
5. Colorado Open Records Act (CORA). Any information furnished by any parties under this Memorandum is subject to the Colorado Open Records Act (24-72-201 to 24-72-309, C.R.S.).
6. **RESPONSIBILITIES OF PARTIES.** The subject parties intend to handle their own activities and utilize their own resources, including the expenditure of their own funds, in pursuing these objectives. Each party intends to carry out its separate activities in a coordinated and mutually beneficial manner.
7. **NON-FUND OBLIGATING DOCUMENT.** Nothing in this MOA shall obligate the subject parties to obligate or transfer any funds. Specific work projects or activities that involve the transfer of funds, services, or property among the various agencies and offices of the parties will require execution of separate agreements and be contingent upon the availability of appropriated funds. This MOA does not provide such authority. Negotiation, execution, and administration of each such agreement must comply with all applicable statutes and regulations.
8. **ESTABLISHMENT OF RESPONSIBILITY.** This MOA is not intended to, and does not create, any right, benefit, or trust responsibility, substantive or procedural, enforceable at law or equity, by a party against any of the signatory parties, including but not limited to, their agencies, their officers, or any other person.
9. **AUTHORIZED REPRESENTATIVES.** By signature below, the signatory party certifies that the individuals listed in this document as representatives of the signatory party are authorized to act in their respective areas for matters related to this agreement.
10. **GOVERNMENTAL IMMUNITY:** The parties do not waive their governmental immunity by entering into this MOA and retain all immunities and defenses provided by law with respect to any action based on or occurring as a result of this MOA.

11. The parties agree that exclusive venue for any action related to performance of this agreement shall be in the City and County of Denver, Colorado.

The undersigned parties hereby agree to the responsibilities and procedures described above.

for


Larry Wolk, Executive Director &
Chief Medical Officer
Colorado Department of Public Health and Environment

5-28-15

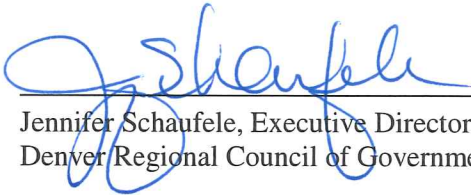
Date



Ken Lloyd, Executive Director
Regional Air Quality Council

March 31, 2015

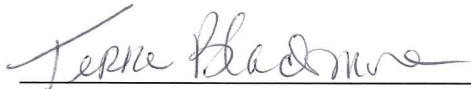
Date



Jennifer Schaufele, Executive Director
Denver Regional Council of Governments

March 25, 2015

Date



Terri Blackmore, Executive Director
North Front Range MPO

May 7, 2015

Date

Appendix C: NFRMPO 2015 Base Year Regional Travel Demand Model Description

Introduction

The NFRMPO 2015 Base Year (BY) Regional Travel Demand Model (RTDM) is a four-step travel model incorporating trip generation, trip distribution, mode choice, and trip assignment. The model was updated in 2019 to incorporate updated traffic counts, freight data, land use data, and various modeling improvements. The 2015 BY RTDM replaces the 2012 BY RTDM developed in 2014.

The 2015 BY RTDM was calibrated using data from the *NFRMPO Household Survey, 2010* and the *NFRMPO On-Board Transit Survey, 2009*. The household survey was used to develop the trip generation rates, trip length frequency distributions, and auto occupancy rates. The on-board survey was used in combination with the household survey to produce mode share targets. Detailed information on the modeling process, inputs, and procedures will be documented in the soon-to-be-released *North Front Range 2015 Base Year Regional Travel Model Documentation* which will be available at <https://nfrmpo.org/modeling/>.

Roadway volumes were validated using traffic count data collected between 2013 and 2017. Transit ridership was calibrated to match boarding counts on the transit systems in the region at the system level.

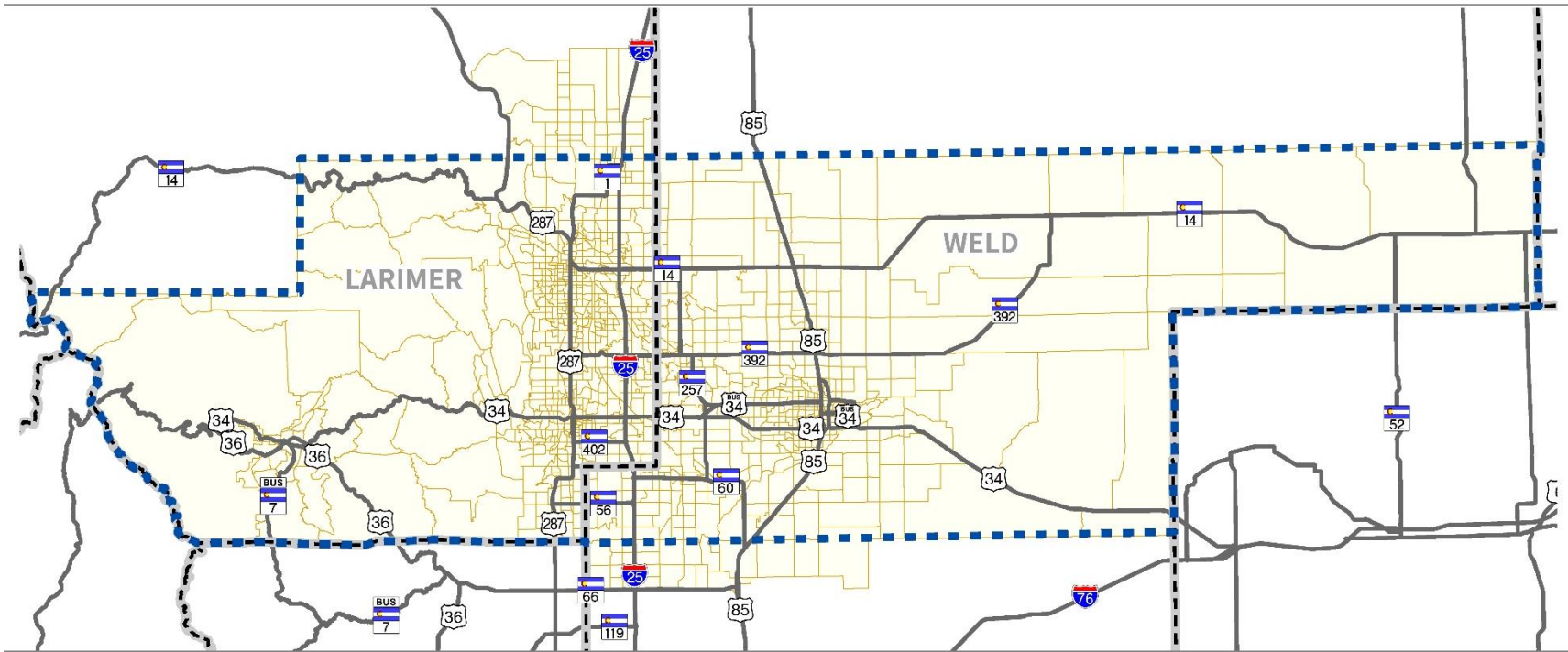
To facilitate modeling of the entire ozone nonattainment area, the model was expanded to cover additional portions of Larimer and Weld counties not within the NFRMPO boundary. The majority of this additional area is very sparsely populated. The expanded area includes the Estes Park area, which is heavily influenced by seasonal tourist activity. To best reflect the unique nature of the Estes Park area, an additional lodging-based trip purpose was included. In addition, the Estes Park area was modeled to represent summer conditions rather than school-season conditions due to the heavily seasonal nature of the area. The remainder of the modeling area remains reflective of an average weekday when school is in session.

The model incorporates a traffic analysis zone (TAZ) structure developed based on existing land use and roadway conditions, future land use, and staff comments from member governments. For the Northern Subarea, the TAZ structure includes 1,136 internal zones and 20 external stations. **Figure 4** depicts the complete TAZ structure, slightly larger than the 8-Hour Ozone Nonattainment Northern Subarea. The RTDM has a base year of 2015 and forecast years of 2020, 2030, 2040, and 2045.





Demographic Development Estimation

Socio-economic data is the input activity-based information that provides the foundation for trip-making in the RTDM. Data is recorded for basic, retail, medical, and service employment types and for households by income groups and household sizes. Data for the Estes Park area also includes lodging information to better represent tourist/visitor trips. Employment data is used in the RTDM primarily as generators of trip attractions. Household data is used in the RTDM primarily as a generator of trip productions. The NFRMPO develops and maintains a Census Block-based land use allocation model (LUAM) which distributes total households and employment at the Block level, which then aggregates to the TAZ level. The LUAM uses the household and employment control totals for the region developed by the Colorado State Demography Office (SDO).

Figure 4: TAZ Structure



Legend

-  Northern Subarea
-  Traffic Analysis Zone (TAZ)
-  County Boundary
-  Highways

July 2019
Sources: CDOT, NFRMPO



Highway and Transit System

Roadway and transit networks contain basic input information for use in the model and represents real-world conditions to the greatest extent possible. The roadway network contains over 8,400 links defined according to facility type, area type, speeds, capacities, etc. The roadway network is used to distribute trips and route transit and automobile trips. The roadway network was prepared based on data from the NFRMPO and from scheduling/phasing of projects in the RTP and TIP. The NFRMPO also collaborated with local jurisdictions as necessary to verify construction and opening dates. The model contains base year, interim year, and forecast year transit route systems based on information provided by Transfort, City of Loveland Transit (COLT), Greeley Evans Transit (GET), and CDOT. Transit networks are categorized into local, express, and Bus Rapid Transit (BRT) service.

Trip Generation

The trip generation module estimates trip productions and attractions based on zonal attributes (e.g. population, households, income, employment, etc.). Productions and attractions are generated for each TAZ and balanced by trip purpose at the regional level. Cross-classified trip rates are applied in the model to represent trip-making characteristics that vary by household size and income. Generally, trip rates increase as household size and income increase. The model includes the following trip purposes:

- **Home-Based Work (HBW):** Commute trips between home and work.
- **Home-Based University (HBU):** Trips between home and university locations (e.g., CSU, UNC) for school related purposes by people not employed by the university.
- **Home-Based Shop (HBS):** Trips between home and retail locations for the purpose of shopping.
- **Home-Based School (HBSc):** Trips between home and K-12 school locations for students in these schools.
- **Home-Based Other (HBO):** All other trips with one end at home.
- **Work-Based Other (WBO):** Work-related trips without an end at home.
- **Other-Based Other (OBO):** Trips with neither an end at home nor a work-related purpose.
- **Lodging-Based Other (LBO):** Trips made by visitors, based at a lodging establishment (Estes Park area only, not included in the household travel survey).
- **Medium Truck (MTRK):** Medium-heavy truck trips (FHWA Vehicle classes 5-7).
- **Heavy Truck (HTRK):** Heavy truck trips (FHWA Vehicle classes 8-12).

Some TAZs have unique land uses and generate a significantly different number of trips in comparison to the model's estimation. For these locations, special generator values are applied in the model to define the number of trips produced and attracted to the locations. The main Colorado State University (CSU) campus in Fort Collins and the University of Northern Colorado (UNC) campus in Greeley are the two University special generators used in the NFRMPO model area. Additionally, Rocky Mountain National Park is treated as a special generator in the expanded model area.

The model represents two types of external travel. Through trips are represented by the EE trip purpose and were estimated using traffic count data and information from the Statewide Travel Model developed by CDOT. Trips with one end inside the modeling area and another outside of the modeling area are referred to as Internal-External/External-Internal (IE/EI) trips. These trips are included in the primary model trip purposes described previously. At external stations, the number of IE/EI trips by purpose is based on traffic count data and analysis of the *NFRMPO Household Travel Survey* data.

Trip Distribution

Trip distribution is the process used to apportion person trip productions and attractions from the trip generation model among all zone pairs by trip purpose. The resulting trip table matrix contains both intrazonal trips (trips that do not leave the zone) on the diagonal and interzonal trips in all other zone interchange cells. The NFRMPO model uses a destination choice model for most trip purposes and a standard gravity model for HBU and HBSc trip purposes. The trip distribution model is validated to average trip lengths and trip length frequency distributions observed in the *NFRMPO Household Travel Survey*.

Mode Analysis

The RTDM uses a nested logit model to determine travel modes. The first step in the mode analysis process is the split among primary modes: auto, transit, and non-motorized. The second step provides a choice between drive alone and shared ride 2 and shared ride 3+. The next model provides a choice between walk and drive access to transit, followed by a choice between walk or drive access and then local, express, and BRT. The drive access mode only considers express and BRT transit, as on-board data shows that drive access to local transit is minimal in the region. Lastly, the model provides a choice between walk and bike.

Traffic Assignment/Time-of-Day Analysis

The traffic assignment module loads vehicle trips onto the roadway network to estimate link-specific traffic volumes. This is done for three time periods which cover the entire day: the PM peak period, AM peak period, and off-peak. Each of these trip tables is assigned to the roadway network using a capacity constrained equilibrium assignment procedure. The resulting traffic volumes from the four assignments are summed to estimate a 24-hour volume for each link in the network.

As part of the RTDM's 2015 base year development using the household survey and traffic count data, additional time-of-day parameters were developed to represent the variation of travel patterns throughout the day. The time-of-day assignment process uses the vehicle trip table in production/attraction format for the three time periods and divides it into eight time periods: AM peak, one AM shoulder hour, midday peak period, PM peak, three PM shoulder hours, and an off-peak period representing the remainder of the day. The mid-day and off-peak periods may be further divided into hourly volumes using percentages identified in the model documentation.

Model Validation

Validation involves testing the RTDM's predictive capabilities. Validation tests include quantifying the model's ability to replicate observed conditions and performing sensitivity tests. The base year validation effort was conducted by comparing model results to observed traffic count data. The overall sum of model volumes is within two percent of the traffic counts on the same links. Model volume totals by facility type are within eight percent of the sum of traffic counts for arterials and freeways and within 23 percent for collectors. The overall percent root mean square error (percent RMSE) is within 40 percent.

Speed Feedback

A speed feedback loop is incorporated into the modeling process to ensure consistency of speeds. This corrects a fundamental problem with travel demand models when estimated speeds used in the trip distribution process are not the same as those which result from the traffic assignment/speed estimation process.

Air Quality Modeling

The Air Pollution Control Division (APCD) conducts the air pollutant emissions modeling using the Environmental Protection Agency (EPA) Motor Vehicle Emissions Simulator (MOVES) computer software, MOVES2014b. The NFRMPO, APCD, and other agencies work together in this effort, both to develop the modeling techniques, assumptions, and parameters, and reviewing the executed model runs. The RTDM outputs are one of the principal inputs to the air pollutant emissions model. The air pollutant emissions model estimates the amount of emissions of Volatile Organic Compounds (VOCs) and Nitrogen Oxides (NO_x) generated by motor vehicles. The results are then combined with numerous assumptions concerning meteorology and atmospheric chemical reactions to produce air pollutant concentration estimates. No dispersion modeling was conducted for this analysis; only emission estimates were calculated.

Inputs included the link vehicle miles traveled (VMT) and speeds from the transportation networks, vehicle fleet mix estimates from the Colorado Department of Transportation (CDOT) automatic traffic counters, maximum and minimum temperature, the ethanol content, and Reid Vapor Pressure (RVP) of the gasoline. The emissions model included adjustments for emission reduction credits from the State-only Inspection and Maintenance (I/M) program.²³ For the Northern Subarea the RVP was 8.5 psi and 10 percent by volume ethanol in all gasoline. The results reflect recent vehicle age distribution and mileage accumulation rates from the Mobile Sources program.

²³40 CFR 93.122(a)(3)(i)., <http://www.gpo.gov/fdsys/pkg/CFR-2012-title40-vol21/pdf/CFR-2012-title40-vol21-sec93-122.pdf>, 2012

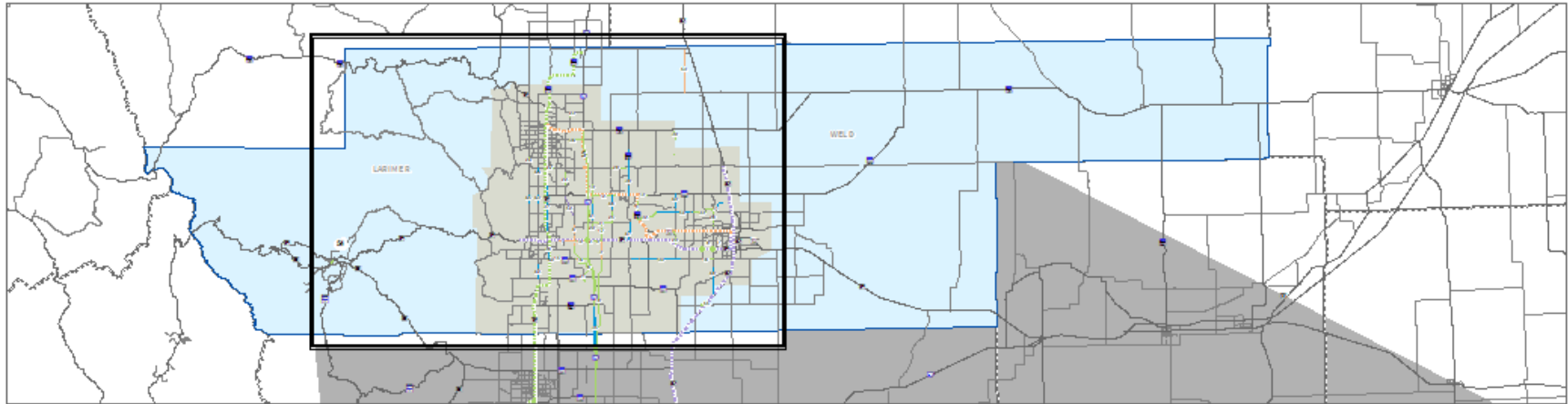
Appendix D: 8-Hour Ozone Northern Subarea Modeling Summary

Table 3: 8-Hour Ozone Northern Subarea Modeling Summary

	2020 (1 st Horizon Year)	2045 (Last Horizon Year)
Socioeconomic Data		
Population	569,393	913,574
Employment	316,316	482,771
VMT-Weighted Speed by Roadway Type		
Interstate	71.3	66.6
Expressway	48.7	41.8
Principal Arterial	35.5	32.0
Minor Arterial	38.9	33.6
Collector	33.1	28.6
Ramp	38.1	27.8
Frontage Road	41.6	36.8
Centroid Connector	29.2	28.6
<i>Average</i>	42.9	37.9
Daily VMT		
Interstate	2,123,429	3,248,143
Expressway	2,138,913	3,086,750
Principal Arterial	4,061,056	6,479,110
Minor Arterial	3,265,158	5,600,471
Collector	1,235,135	2,404,986
Ramp	116,531	169,726
Frontage Road	141,621	271,590
Centroid Connector	1,241,758	2,145,046
<i>Total</i>	14,323,601	23,405,823
Lane Miles by Roadway Type		
Interstate	274	333
Expressway	429	431
Principal Arterial	907	1,026
Minor Arterial	1,163	1,257
Collector	2,222	2,326
Ramp	21	22
Frontage Road	100	100
Centroid Connector	2,704	2,700
<i>Total</i>	7,821	8,196
<i>Source: NFRMPO 2015 Regional Travel Demand Model, 2010 Land Use Allocation Model</i>		

Appendix E: Northern Subarea Regional Travel Demand Model Projects

Figure 5: Map of Northern Subarea Regional Travel Demand Model Projects



Legend

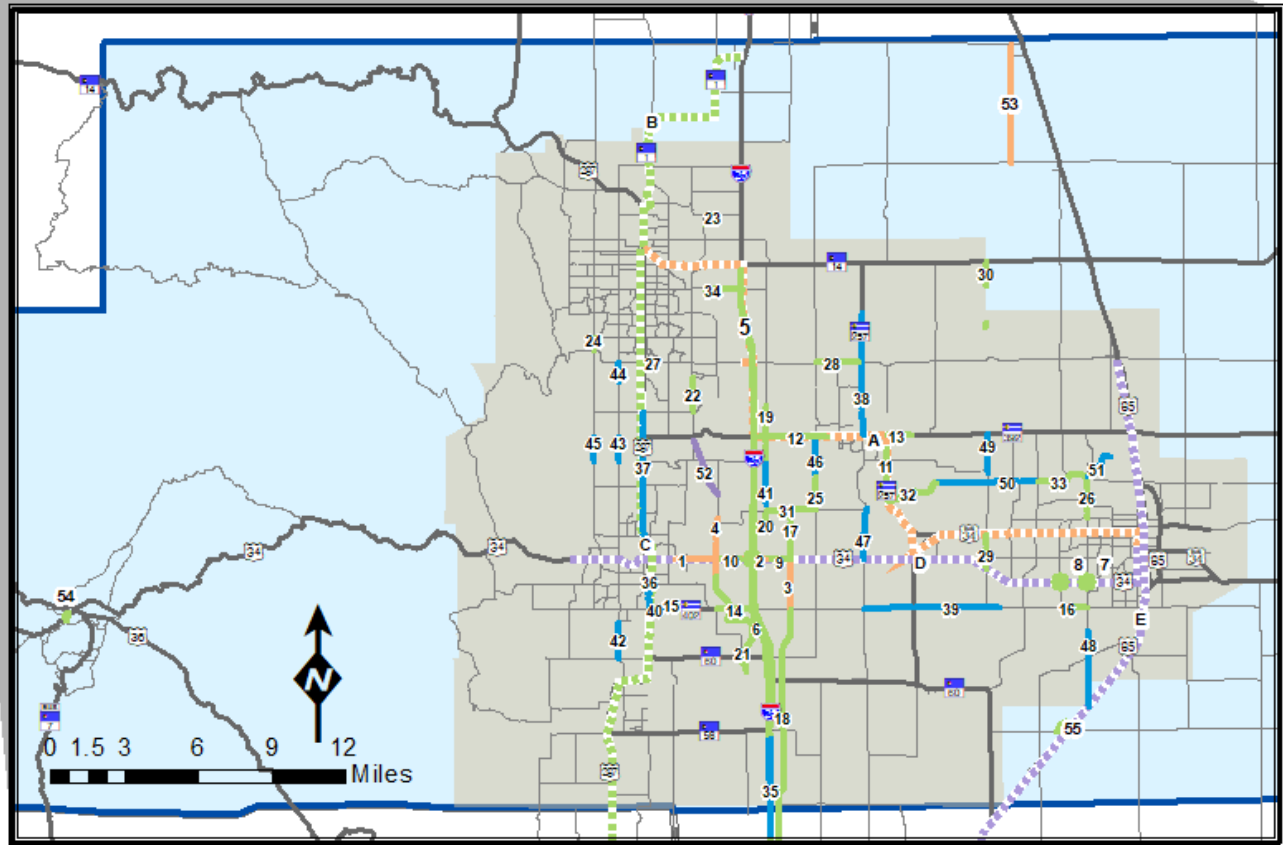
Roadway Projects by Staging Period

- 2020
- 2021-2030
- 2031-2040
- 2041-2045

Transit Projects by Staging Period

- - - 2020
- - - 2021-2030
- - - 2031-2040
- - - 2041-2045

- Highways
- Major Roads
- NFRMPO Boundary
- + Ozone Northern Subarea
- + County Boundary



August 2019
Sources: NFRMPO

Table 4: Fiscally Constrained Roadway Capacity Projects

Map ID	RSC	Facility	Project Limits	Improvement Type	Length (Mi)
2020 Projects					
1	2	US34	Boyd Lake Ave to Boise Ave	Widen from 4 lanes to 6 lanes	1.7
2	2	US34	Centerra Pkwy to Rocky Mountain Ave	Widen from 4 lanes to 6 lanes	1.0
3	14	LCR3	LCR18 to US34	Pave unpaved road	2.0
4	16	Boyd Lake Ave	LCR20C to 37 th St	Widen from 2 lanes to 4 lanes	2.3
53	N/A	WCR29	SH14 to WCR100	Pave unpaved road	8.8
2021-2030 Projects					
5	1	I-25	SH402 to SH14	Add tolled express lane in each direction, improve the US34 interchange, and other interchange reconstructions	14.0
6	1	I-25	SH56 to SH402	Add tolled express lane in each direction and interchange reconstructions	5.0
7	2	US34	US34 and 35 th Ave	New interchange	N/A
8	2	US34	US34 and 47 th Ave	New interchange	N/A
9	2	US34	LCR3E to Centerra Pkwy	Widen from 4 lanes to 6 lanes	1.0
10	2	US34	Rocky Mountain Ave to Boyd Lake Ave	Widen from 4 lanes to 6 lanes	1.0
11	11	SH257	Crossroads Blvd to Garden Dr	Widen from 2 lanes to 4 lanes	2.2
12	12	SH392	17 th St to Westgate Dr	Widen from 2 lanes to 4 lanes	2.8
13	12	SH392	WCR21 to WCR19	Widen from 2 lanes to 4 lanes	1.0
14	13	SH402	I-25 to LCR9	Widen from 2 lanes to 4 lanes	1.5
15	13	SH402	Boise Ave to St. Louis Ave	Widen from 2 lanes to 4 lanes	0.5
16	13	37 th St	35 th Ave to 47 th Ave	Widen from 2 lanes to 4 lanes	1.1
17	14	LCR3	Crossroads Blvd to US34	Pave unpaved road	2.0

Map ID	RSC	Facility	Project Limits	Improvement Type	Length (Mi)
2021-2030 Projects, Continued					
18	14	WCR9.5	WCR38 to SH402	New 2 lane road	8.1
19	15	LCR5	LCR30 to LCR34C	Widen from 2 lanes to 4 lanes	2.3
20	15	LCR5	0.5 mi south of Crossroads Blvd to Crossroads Blvd	Widen from 2 lanes to 4 lanes	0.5
21	16	Boyd Lake Ave	SH60 to LCR20C	New 2 lane road	4.4
22	16	Timberline Rd	Trilby Rd to Stetson Creek Dr	Widen from 2 lanes to 4 lanes	1.4
23	16	Timberline Rd	S of LCR50 to LCR9	Widen from 2 lanes to 4 lanes and realign	0.7
24	18	Taft Hill Rd	Harmony Rd to Horsetooth Rd	Widen from 2 lanes to 4 lanes	0.5
25	19	WCR13	Crossroads Blvd to Kaplan Dr	Widen from 2 lanes to 4 lanes	1.4
26	21	35 th Ave	4 th St to O St	Widen from 2 lanes to 4 lanes	1.7
27	22	Harmony Rd	Boardwalk Dr to College Ave	Widen from 4 lanes to 6 lanes	0.6
28	22	Harmony Rd	WCR15 to WCR13	Widen from 2 lanes to 4 lanes	1.9
29	25	83 rd Ave	US34 Bypass to US34 Business	Widen from 2 lanes to 4 lanes	1.4
30	25	WCR27	WCR80 to SH14 and WCR76 to WCR78	New 2 lane road	2.0
31	26	Crossroads Blvd	WCR13 to Centerra Pkwy	Widen from 2 lanes to 4 lanes	2.0
32	26	Crossroads Blvd	WCR23 to SH257	New 2 lane road	2.3
33	26	O St	35 th Ave to 59 th Ave	Widen from 2 lanes to 4 lanes	2.2
34	28	Prospect Rd	I-25 to Sharp Point Dr	Widen from 2 lanes to 4 lanes	1.6
54	N/A	US36 & Riverside Dr	Crags Dr to Park Ln	Convert two-way to one-way couplet	0.9
55	N/A	WCR44	US85 & WCR44	Grade-separated intersection	N/A

Map ID	RSC	Facility	Project Limits	Improvement Type	Length (Mi)
2031-2040 Projects					
35	1	I-25	WCR38 to SH56	Add tolled express lane in each direction and interchange reconstructions	3.0
36	6	US287	SH402 to 1 st St	Widen from 4 lanes to 6 lanes	1.4
37	6	US287	29 th St to Trilby Rd	Widen from 4 lanes to 6 lanes	5.1
38	11	SH257	SH392 to WCR78	Widen from 2 lanes to 4 lanes	5.0
39	13	37 th St	77 th Ave to WCR17	Widen from 2 lanes to 4 lanes	5.5
40	13	SH402	St. Louis Ave to US287	Widen from 2 lanes to 4 lanes	0.5
41	15	Fairgrounds Ave	Rodeo Dr to LCR30	Widen from 2 lanes to 4 lanes	1.7
42	17	LCR17	SH60 to 23 rd St SW	Widen from 2 lanes to 4 lanes	1.4
43	17	LCR17	LCR30 to LCR32	Widen from 2 lanes to 4 lanes	1.0
44	17	LCR17	Fossil Creek Dr to Harmony Rd	Widen from 2 lanes to 4 lanes	0.8
45	18	LCR19	LCR30 to LCR32	Widen from 2 lanes to 4 lanes	1.0
46	19	WCR13	Kaplan Dr to SH392	Widen from 2 lanes to 4 lanes	1.6
47	20	WCR17	US34 to Crossroads Blvd	Widen from 2 lanes to 4 lanes	2.1
48	21	35 th Ave	US85 to 49 th St	New 4 lane road	3.1
49	25	WCR27	WCR64.5 to SH392	New alignment of 2 lane road	1.6
50	26	O St	59 th Ave to WCR23	Widen from 2 lanes to 4 lanes	4.1
51	26	O St	35 th Ave to AA St	Widen from 2 lanes to 4 lanes and realign	1.5
2041-2045 Projects					
52	16	Boyd Lake Ave	North of UPRR Crossing to Timberline Rd	New 4 lane road	2.5

Table 8: Fiscally Constrained Transit Capacity Projects

Map ID	RTC	Agency	Corridor	Project Type	Length (Mi)
2020 Projects					
A	8	GET	Poudre Express	New Service	37
2021-2030 Projects					
B	2	Transfort	Fort Collins to Wellington (SH1)	New Service	13
C	9	Transfort	Fort Collins to Longmont/Boulder (US287)	Increased Frequency	45
2041-2045 Projects					
D	10	Unidentified	Loveland to Greeley (US34)	New Service	24
E	11	Unidentified	Eaton to Denver Region (US85)	New Service	69

***Appendix F: Resolution 2019-XX North Front Range Transportation & Air Quality
Planning Council (NFRT&AQPC) Adoption
(to be provided)***

***Appendix G: AQCC Conformity Concurrence
(to be provided)***

***Appendix H: U.S. Department of Transportation Conformity Finding
(to be provided)***