The Colorado Department of Transportation
Congestion Mitigation & Air Quality Program
2007-2008 Report

Presented to the Transportation Commission
February 2010

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Acknowledgements

The Colorado Department of Transportation (CDOT) would like to express thanks to our planning partners and the Congestion Mitigation and Air Quality (CMAQ) project sponsors who worked diligently to provide the extensive project information and air quality data presented in this report. CDOT would also like to acknowledge the Federal Highway Administration in providing overall direction for the CMAQ program and for the use of their CMAQ Evaluation and Assessment Phase I & II Reports. Many of FHWA's findings and much of the information contained in the CMAQ Phase I & II reports are reflected throughout this 2007-2008 CMAQ program report for the State of Colorado. Lastly, CDOT would like to express thanks to CDOT Regional and Statewide planning staff who assisted in the collection, reporting and analysis of 2007-2008 CMAQ data.

I. Introduction

Purpose of this Report

Despite substantial progress in improving air quality nationally since the 1970s, millions of Americans, including Coloradans, still live in areas that do not meet EPA's National Ambient Air Quality Standards for one or more pollutants. Colorado, therefore, relies on the Congestion Mitigation and Air Quality Program (CMAQ) as a flexible funding source to support a wide range of projects that improve the State's air quality, reduce traffic congestion, and support a multi-modal transportation system.

The analysis of annual transportation emissions reductions in this report provides a possible framework that may help Colorado's Metropolitan Planning Organizations (MPOs), Transportation Planning Regions (TPRs), municipalities, and organizations with an interest in reducing traffic congestion and improving air quality strengthen their own analysis when considering projects for CMAQ funding. This report can also be used by the State as a resource to ensure effective implementation of the CMAQ program.

Context for the CMAQ Program in Colorado

Congress established the CMAQ program in the early 1990s under the Intermodal Surface Transportation Efficiency Act (ISTEA), expanded it under the Transportation Equity Act for the 21st Century (TEA-21), and continued it under the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU). The primary focus of the CMAQ program has been on air quality improvement, reflecting the requirements placed on the transportation sector by the Clean Air Act Amendments of 1990 to help meet national air quality goals. The CMAQ program provides flexible funding for States to use in nonattainment areas and maintenance areas to help them address air quality concerns from transportation sources. Over time, the CMAQ program has become a key mechanism for supporting investments that help areas to meet air quality goals, encourage alternatives to driving alone, and improve traffic flow.

Federal CMAQ money is allocated to CDOT to fund transportation related activities or projects that contribute to a reduction in emissions for the following pollutants:

- **CO / Carbon Monoxide** (Caused by incomplete fuel combustion in motor vehicles);
- **NOx / Nitrogen Oxides** (Contributes to ozone formation in summer and brown cloud in winter);
- **VOC / Volatile Organic Compounds** (Caused by fuel leakage and contributes to ozone formation); and
- **PM-10 / Particulate Matter** (The PM-10 standard includes particles with a diameter of 10 micrometers or less (0.04 inches or one-seventh the width of a human hair). PM-10 equates to road dust and contributes to visibility problems in winter and brown cloud).

The Federal Highway Administration (FHWA) has traditionally grouped the types of projects eligible for CMAQ funding into the following categories:

- **Traffic flow improvements** (e.g., traffic signalization, freeway management, high-occupancy vehicle lanes);
- **Shared ride programs** (e.g., regional ridesharing, vanpool programs, park-and-ride lots);
- **Travel Demand Management (TDM)** (e.g., regional marketing, employee trip reduction programs);
- **Bicycle/pedestrian facilities and programs** (e.g. bike lanes and paths, encouragement and education programs such as Bike to Work);
- **Transit** (e.g., new bus services, new rail services/equipment, service upgrades/amenities, bus replacements, alternative fuel buses); and
- **Other projects** (e.g., diesel engine retrofits, freight/intermodal projects, dust mitigation projects, and other qualifying projects, including experimental pilot projects which are allowed under the law as demonstrations to determine their benefits and costs).

In 2000, the Colorado Transportation Commission adopted Resolution TC-807 **(Appendix B),** determining the method of allocating CMAQ funds in Colorado and requiring fund recipients to report to CDOT and the Commission on the effectiveness of their CMAQ projects. Resolution TC-807 applies to projects selected though Fiscal Year 2009. Note that a new CMAQ Resolution will apply to projects receiving CMAQ allocation in FY10 and beyond. The Commission has delegated project selection to the local level.

In accordance with TC-807, recipients of 2007 and 2008 CMAQ funds include:

- **Denver Regional Council of Governments (DRCOG);**
- **Pikes Peak Area Council of Governments (PPACG);**
- **North Front Range Metropolitan Planning Organization (NFRMPO);** and
- **Five rural PM-10 areas** (Aspen / Pitkin County, Cañon City, Pagosa Springs, Steamboat Springs / Routt County, and Telluride / Mountain Village).

Required Emissions Report

The Federal CMAQ statute includes emissions reduction as a requirement for CMAQ-invested projects or programs. Project sponsors must estimate the expected emissions reductions for projects funded by the CMAQ program, with particular attention to the pollutants of concern (CO, NOx, VOCs, and PM-10) in the non-attainment/maintenance area. FHWA requires emissions to be reported in a consistent fashion across projects to allow accurate comparison during the project selection and prioritization process. While FHWA does not specify that States use a particular emissions reduction methodology, FHWA stipulates that States make sure determinations of air quality benefits are credible and based on a reproducible and logical analytical procedure. The emissions reductions data must be entered by the State in FHWA's national CMAQ database on an annual basis.

CDOT uses a computerized financial and reporting system developed by the company SAP to meet the federal emissions reporting requirement and to assist staff in collecting and organizing data for CMAQ projects. SAP is used in conjunction with FHWA's Financial Management Information System (FMIS) in the collection and organization of CMAQ projects for reporting. MPO and CDOT Regional Planning Staff directly input project emissions numbers into SAP annually. SAP takes these emissions numbers and calculates the VOC, NOx, CO, and PM-10 emissions reductions using a series of emission reduction formulas. *Please note that actual project benefits are not provided in this report, only anticipated or forecasted benefits.* See **Appendix C** to view the respective emissions reductions formulas for each type of CMAQ project.

FHWA guidance only requires a calculation of benefits in the first year of project implementation. This raises the question of how to evaluate projects that will improve air quality over multiple years. In the State of Colorado, the DOT and MPOs address this challenge by calculating life-cycle benefits for projects in addition to the first year benefits reported to FHWA. Please see **Appendix D** for CDOT's lifetime benefits calculation methodology.

In accordance with TC-807 **(Appendix B),** the State and the CMAQ fund recipients are required to go beyond the federal reporting requirements and produce an annual report containing statewide CMAQ project/benefit information and present the report to the Colorado Transportation Commission. This report serves as the annual report for FY2007-2008.[1]

Report Organization

This report is organized into the following major sections:

- **Project Categories and Funding Distribution (Section 2)** discusses the project improvement types and the distribution of funds for the 2007 and 2008 CMAQ projects in both the MPO and rural areas of Colorado.
- **Benefits of Projects on Air Quality and Congestion (Section 3)** reports the estimated emissions benefits for 2007 and 2008 CMAQ projects. This section also assesses project cost-effectiveness at reducing emissions.
- **Long-term Project Benefits (Section 4)** presents the estimated lifetime benefits of CMAQ projects.
- **Sample Projects (Section 5)** takes an in depth look at several CMAQ projects funded around the State that are reflective of typical projects funded by the CMAQ program in Colorado.
- **Conclusion (Section 6)** examines the big picture results of the CMAQ program.

[1] This CMAQ Report differs from previous reports because it encompasses a span of two years, instead of one. The decision to produce a joint 2007- 2008 report was made in order to allow CDOT staff more time to work with its planning partners to develop a more comprehensive understanding of how to report consistent and meaningful CMAQ benefits.

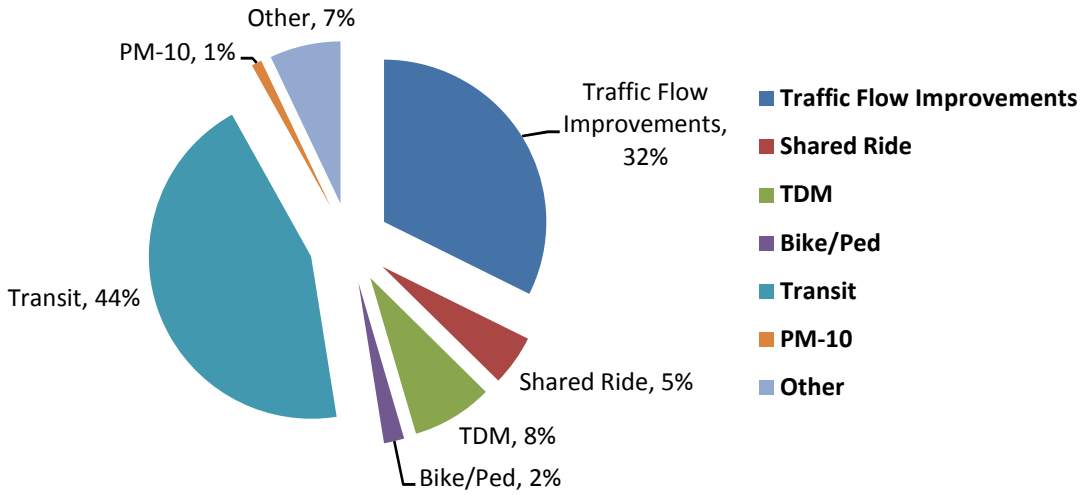
II. Project Categories and Funding Distribution

Statewide Synopsis of FY2007-2008 CMAQ Projects

In FY2007 and 2008, there was a grand total of $52,654,114 in federal funds obligated to Colorado CMAQ projects requiring a benefits report. According to Resolution TC-807 **(Appendix B)**, CMAQ funds are shared among DRCOG, PPACG and NFRMPO based on a formula of 50 percent vehicle miles traveled (VMT) and 50 percent population, with a $1 million off the top allocation split among the five rural PM-10 areas.

Figure 1 below displays a categorical breakdown of the $52,654,114 total CMAQ funds obligated in FY2007-2008 by improvement or project type. The improvement types below are the categories that FHWA has traditionally used to group CMAQ projects in its database.

Figure 1: FY2007-2008 Total Federal CMAQ Funds Obligated by Improvement Type



Source: FHWA FY2007 FMIS Report, extracted 02/26/2008; FHWA FY2008 FMIS Report, extracted 03/18/2009; CDOT FY2007 SAP Financial Report, extracted 03/24/2008; CDOT FY2008 SAP Financial Report, extracted 04/16/09; CDOT SAP CMAQ Project Sponsor report of FY2007- FY2008 project benefit data, extracted 08/11/09.

Please note again that the project types above reflect the categories FHWA applies to CMAQ projects. In Colorado, the State has left it up to the MPO/ project sponsor to categorize each project awarded CMAQ funding. While each project category is defined below, there often can be a fair amount of overlap between project categories. For instance, the Denver Regional Council of Governments (DRCOG) RideArrangers program[2] has carpool components (indicative of a Shared Ride program), as well as outreach and marketing components (indicative of a Travel Demand Management program). Similar projects may also be categorized differently in different planning

[2] For more on the RideArrangers program, please see Section V. Sample Projects, Sample Project 6: DRCOG RideArrangers Program on page 21.

areas. It is also important to note that no one type of CMAQ project is meant to stand on its own. All of the project categories must work together in order for the CMAQ program to work effectively and achieve lasting air quality and congestion benefits.

Traffic flow improvements are designed specifically to meet the dual goals of the CMAQ program: to decrease congestion and to reduce air pollution. Signal timing, intersection improvements and intelligent transportation system (ITS) projects fall under the traffic flow improvements project type. In general, these types of projects will reduce idling and increase traffic speeds along a given roadway so that the roadway can function at a more optimal level, especially during peak periods. High-Occupancy Vehicle (HOV) lanes also fall under this category. HOV lanes offer congestion benefits primarily by encouraging more passengers to travel in fewer vehicles, and can provide more person throughput on a fixed amount of transportation infrastructure. As shown in Figure 1, thirty-two percent of the CMAQ Funds obligated in 2007 and 2008 went to Traffic Flow Improvement projects.

Shared ride programs encompass a range of projects that focus on changing individual travel behaviors to reduce air pollutant emissions from light-duty vehicles. These programs offer services that encourage single-occupant vehicle travelers to share rides with other travelers, generally in carpools or vanpools, thereby increasing the average number of occupants per vehicle trip and reducing total vehicle miles traveled or VMT. Furthermore, regional ridesharing programs, vanpool programs and the construction of park and ride lots are all examples of shared ride projects. As shown in Figure 1, five percent of the CMAQ funds obligated in 2007 and 2008 went to Shared Ride projects.

Travel Demand Management (TDM) programs primarily use social marketing to reduce the number of vehicle trips by commuters during peak hours. TDM strategies are often linked to employer-based strategies and include encouragement of alternative work schedules, telework programs, and guaranteed ride home incentives. Regional marketing efforts to support transit, ridesharing and other alternative travel options are examples of TDM programs. Commuters frequently are the focus of TDM actions because of their regular, predictable driving patters, the possibilities of employer partnerships, and expanded opportunities for ridesharing programs. As shown in Figure 1, eight percent of the CMAQ funds obligated in 2007 and 2008 went to Travel Demand Management projects.

Bicycle/Pedestrian projects and programs include a wide range of investments and strategies to facilitate and encourage non-motorized travel. Some examples of these projects include bicycle paths and lanes, sidewalks, bicycle racks or lockers, pedestrian urban design enhancements, bike/ped marketing materials, and bike sharing projects. Bike and pedestrian projects often serve multiple goals, including improving mobility and safety. Non-motorized forms of transportation achieved through bike/ped projects require no fossil fuels, and are often considered in the context of goals such as sustainability, reducing energy consumption, and reducing greenhouse gas emissions. As shown in Figure 1, two percent of the CMAQ funds obligated in 2007 and 2008 went to projects in the Bicycle/Pedestrian category.

Transit projects funded under the CMAQ program typically fall into three broad categories of transit service-related projects or programs: 1) provision of new or expanded bus service; 2) provision of

new or expanded rail services; and 3) service upgrades and rider amenities on existing transit services. Note that routine maintenance and rehabilitation of existing transit facilities are not eligible projects for CMAQ funding. Only transit facilities that are likely to increase ridership and reduce emissions are eligible for funding. Transit improvement projects improve both air quality and congestion levels by reducing the number of trips by single-occupancy vehicles and total vehicle miles traveled (VMT). As shown in Figure 1, forty-four percent of the CMAQ funds obligated in 2007 and 2008 went to Transit projects.

PM-10**,** meaning particulate matter with a diameter of 10 micrometers or less, equates to road dust or fugitive dust that is suspended into the air by tires on roadways. Vehicular movement on paved and unpaved roads is a major contributor to fugitive dust emissions. Typical PM-10 mitigation projects include paving shoulders, curbs and gutters, roads, and access points. Street sweeping is another activity that removes particulate matter from the air. Regular street sweeping on paved roads removes sand and/or other de-icing materials, and other deposition of dirt on roads. CMAQ projects that fund the use of liquid deicer on roads, instead of sand, are also a type of PM-10 project. As shown in Figure 1, one percent of the CMAQ funds obligated in 2007 and 2008 went to PM-10 projects.

Other projects in Colorado are typically diesel emissions reduction projects. Diesel emissions reduction strategies are designed to reduce emissions from diesel engines and include the use of retrofit technologies and idle reduction technologies. The term "retrofit" is broadly defined by the EPA to include any technology, device, fuel or system that, when applied to an existing diesel vehicle or engine, achieves emissions reductions beyond that required by EPA regulations at the time of a vehicle or engine's certification. Diesel retrofit projects can include retrofitting vehicles/equipment with new or improved emissions control equipment, upgrading engines, replacing older engines with newer/cleaner engines, and using cleaner fuels. Buses in a transit system's fleet can be replaced with newer buses using alternative, cleaner-burning fuels. Freight/intermodal projects and experimental pilot projects are also examples of CMAQ projects that may fall under the Other category. As shown in Figure 1, seven percent of the CMAQ funds obligated in 2007 and 2008 went to Other projects.

Recipients of CMAQ Funds in Colorado

As stated previously, CMAQ funds are used to implement projects in three urban areas and five rural PM-10 areas around the State. The Denver Metropolitan Area (DRCOG), the Colorado Springs area (PPACG), and the Fort Collins area (NFRMPO), constitute the urban areas that receive CMAQ funds. Aspen/ Pitkin County, Steamboat Springs/ Routt County, Cañon City, Pagosa Springs, and Telluride/ Mountain Village constitute the five rural PM-10 areas that receive CMAQ funds.

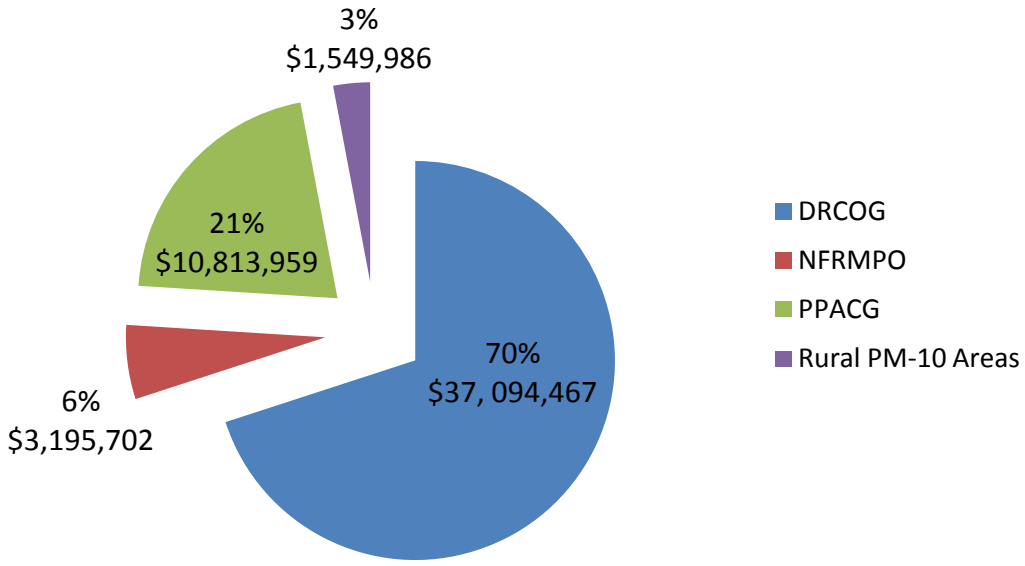
In 2007 and 2008, the Denver Metropolitan Area, and the North Front Range Area had an ozone[3] non-attainment designation. PPACG in 2007 and 2008 had an attainment/maintenance designation for Carbon Monoxide (CO). An attainment/maintenance designation means that an area was once in non-attainment for a pollutant, but has since met the EPA's air quality standards and must

[3] NOx and VOC are an ozone precursor.

continue to do so over a "maintenance" period of 20 years. DRCOG and NFRMPO had attainment/maintenance designations for CO in 2007 and 2008 as well. The five rural PM-10 areas each had attainment/maintenance designations for PM-10 in 2007 and 2008.

Figure 2 below displays the breakdown of the $52,654,114 total federal CMAQ funds obligated to the FY2007-2008 projects contained in this report by area.

Figure 2: FY 2007-2008 Total Federal CMAQ Funds Obligated by Area



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According to Figure 2, 70% of the FY2007-2008 CMAQ funds went to DRCOG, 21% to PPACG, 6% to NFRMPO, and 3% to the rural PM-10 areas.

For the complete list and description of all CMAQ projects funded in FY2007-2008, please refer to **Appendix A.**

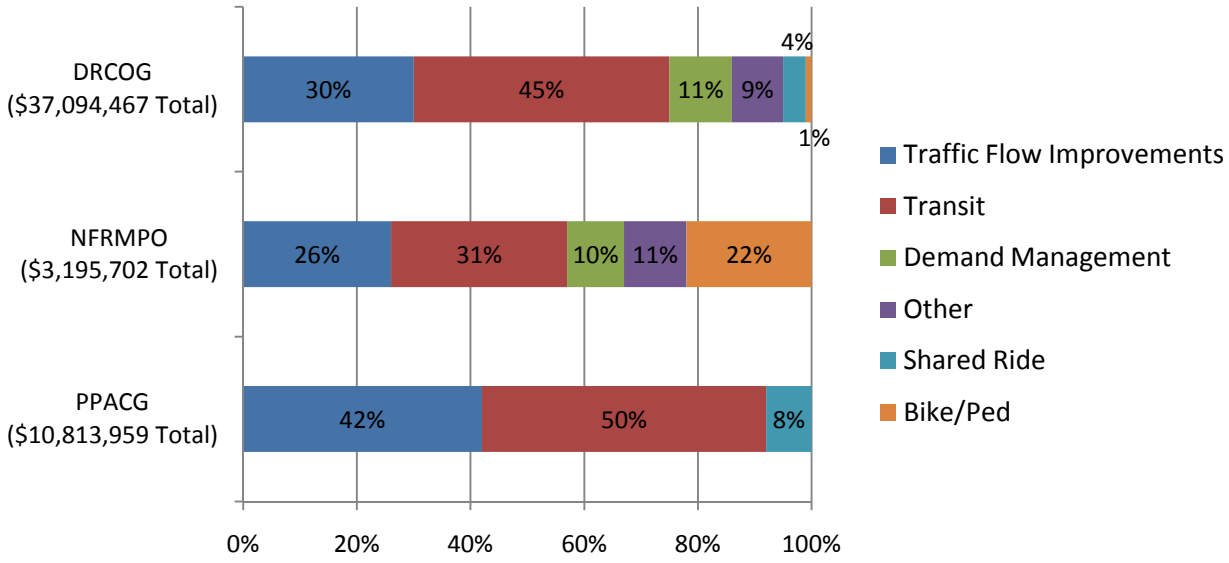
CMAQ Projects in Colorado's Metropolitan Areas

The CMAQ program provides funds that are targeted to areas of the country with the most severe air quality problems, which tend to be the largest metropolitan areas experiencing some of the worst traffic congestion. In Colorado, CMAQ funded projects in the eligible metropolitan areas can often be small in scale – e.g., a bike path, a park-and-ride lot, a new transit shuttle service, or a traffic signalization improvement. Yet, these projects have important benefits at a corridor or local level, where the benefits of a single project can make a difference. CMAQ funds are also often used

to leverage other state and local funding sources, and to support regional efforts such as regional ridesharing programs, incident management programs, and traveler information systems.

Figure 3 below shows the federal CMAQ funds obligated to the eligible metropolitan areas in Colorado by project type.

Figure 3: FY 2007-2008 MPO CMAQ Projects Obligated by Improvement Type



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In each of the metropolitan areas, most of the federal CMAQ funds obligated went to Transit, followed by Traffic Flow Improvements. In the Transit category, MPOs used CMAQ funds on projects such as FasTracks[4] in Denver, a Woodland Park Express Park-and-Ride in Colorado Springs, and an alternate fueled bus in Fort Collins. Transit project obligations ranged from $80,000, for initiatives such as Station Area Master Plans, to $7,500,000, for larger programs like FasTracks. Traffic Flow Improvements received the second highest percentage of funds obligated in the MPO areas. Examples of Traffic Flow Improvement projects in the metropolitan areas included Intelligent Transportation System (ITS) equipment on US 36 between Denver and Boulder and on the Interquest Corridor in Colorado Springs. Another project involved the synchronization of traffic signals in Fort Collins. Traffic Flow Improvement project obligations ranged from $15,693 for the

[4] The FasTracks Program is a multi-billion dollar comprehensive transit expansion plan to build 122 miles of new commuter rail and light rail, 18 miles of bus rapid transit, 21,000 new parking spaces at light rail and bus stations, and enhance bus service for easy, convenient bus/rail connections across an eight-county district. (Source: <http://www.rtd-fastracks.com/main_26> 12/21/2009)

upgrade of signal system software, to $1,898,094 for the purchase and installation of ITS equipment along major corridors such as the Interquest Corridor in Colorado Springs.

Travel Demand Management (TDM) and Other projects received around 9% to 11% of the CMAQ funds obligated to DRCOG and NFRMPO. TDM activities in these areas ranged from Eco-Pass distribution (a pass for unlimited RTD transit use), employee incentives, and a free bike sharing program for use in the City of Fort Collins. TDM project obligations ranged from $15,000, typical for many outreach/education activities, to $2,307,617, for the DRCOG RideArrangers program, a regional service that provides businesses and employees with transportation options like vanpools, carpools and telework. Other projects in FY2007-2008 mostly consisted of diesel emissions reduction projects and ranged from $356,078 to $1,291,058 in federal obligations.

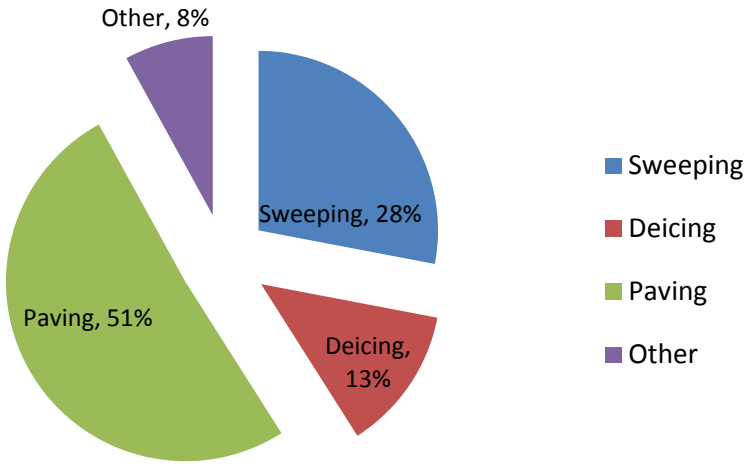
Shared Ride and Bicycle/Pedestrian improvement types, as categorized, received the least statewide in federal obligations in FY2007-2008 in the metropolitan areas, with the exception of North Front Range, which had 22% of its total CMAQ obligations going to bike/ped projects. This is somewhat misleading, however, because shared ride and bike/ped projects are captured under other categories. For example, the DRCOG shared ride program, RideArrangers, is accounted for under the TDM category. Shared Ride projects included activities such as new park-and-ride facilities and the RideFinders (currently called MetroRides) vanpool program in Colorado Springs. Shared ride activities ranged from $80,000 to $1,548,681 in federal obligations. In the bike/ped category, individual projects included construction of a 10-foot multi-use path in Denver, and a bike/ped grade separated structure along the Burlington Northern Santa Fe (BNSF) Railroad tracks in Fort Collins. Three bike/ped projects received a federal obligation in FY2007-2008, with obligations ranging from $103,488 to $545,000.

CMAQ Projects in Colorado's Rural PM-10 Areas:

There are five rural areas in Colorado that receive CMAQ funds to mitigate against transportation related particulate matter a diameter of 10 micrometers or less (roughly about one-seventh the width of a human hair). These areas again are Aspen / Pitkin County, Cañon City, Pagosa Springs, Steamboat Springs / Routt County, and Telluride / Mountain Village. In FY2007-2008, a total of $1,549,986 in federal dollars was obligated for projects in the rural PM-10 areas.

CMAQ funding for PM-10 or dust mitigation projects is usually provided for paving, sweeping and deicing. **Figure 4** below displays the federal CMAQ funds obligated to the rural PM-10 areas in Colorado by project type.

Figure 4: FY 2007-2008 Rural PM-10 CMAQ Projects by Improvement Type



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In FY2007-2008, the majority or 51% of the $1,549,986 total funds obligated to the rural PM-10 areas went to paving projects, such as the installation of pavement in conjunction with curb and gutter in Cañon City. Sweeping projects, such as the purchase of a street sweeper in Telluride/ Mountain Village, accounted for 28% of the rural PM-10 project funding, followed by deicing projects, such as the purchase of a magnesium chloride truck also in Telluride/ Mountain Village, with 13% of the funding. Aspen/ Pitkin County purchased a flush truck[5] in FY2007-2008, which accounted for the 8% funding in the Other category.

[5] A Flush truck is a water tank truck equipped with a hydraulic pump that is used to force water into storm drains to "flush" them of sand and choking debris.

III. Benefits of Projects on Air Quality and Congestion

General Observations on the Data Collected

This section describes the reported first year impacts of the CMAQ projects that received federal obligations in FY2007-2008 on transportation emissions and congestion levels. The data reported in this section are based on the materials reported by the MPOs and sponsors of CMAQ-funded projects. These benefit estimates of project efforts reflect project-specific factors and local conditions, such as park-and-ride lot utilization rates, vehicle trip lengths, and transit ridership levels on new services. Please see **Appendix C** for the CMAQ Reporter Benefit Formulas.

While the benefits data reported in this section are the project sponsor's best estimates of *expected* emissions and vehicle miles traveled (VMT) reductions during the project's first year, the data have some limitations that should be noted up front. Specifically, the reported benefits are *forecasts* of effects expected to occur in the first year the projects are implemented and are not typically validated by before-and-after studies or other post-project evaluations. For some types of projects, such as bicycle/ pedestrian projects and transit service amenities, it is difficult to predict effects, given limited scientific studies, analysis tools, and established approaches for estimating travel and emissions impacts. As a result, there will always be some degree of uncertainty in the benefits reported.

This being said, the analysis of the CMAQ projects does suggest that emissions reductions have been achieved and congestion minimized across the wide range of projects funded in FY2007-2008 by the CMAQ program. **Table 1** on the following page provides detailed benefit information about FY2007-2008 CMAQ projects. Benefits for the pollutants Carbon Monoxide (CO), Nitrogen Oxide (NOx), Volatile Organic Compounds (VOC), and Particulate Matter with a diameter of 10 micrometers or less (PM-10) are displayed by project category and are broken down across the eligible CMAQ metropolitan areas and rural PM-10 areas. **Table 1** can be used as a gauge to assess cost effectiveness at reducing emissions in each project category.

To view the pollutant concentrations for CO, NOx, VOC, and PM-10 in the non-attainment/ maintenance areas, see **Appendix F**.

Table 1: Cost Benefit Analysis of FY2007-2008 CMAQ Projects*

(Funds Obligated and Emissions Benefits Estimated in kg/year)

Project Category	CO(kg)	VOC(kg)	NOx(kg)	PM-10 (kg)	Annual VMT Reduction (mi)	Funds Obligated
DRCOG						
Traffic Flow Improvements	4,053,057	-	-	-	-	$11,191,461
Shared Ride	305,362	22,566	26,292	828	20,702,566	$1,548,681
Bike/ Ped	1,166	86	101	86	79,040	$103,488
TDM	1,647,354	130,294	156,881	44,734	110,249,182	$3,953,410
Transit	3,128,342	231,198	269,787	8,833	208,577,715	$16,658,537
PM-10	-	-	-	1,191	-	$344,000
Other	1,618,084	174,945	75,398	55,985	13,986,430	$3,294,890
DRCOG TOTAL	10,753,365	553,139	509,625	111,657	353,594,933	$37,094,467
NFRMPO						
Traffic Flow Improvements	1,150,198	-	-	-	-	$824,882
Bike/ Ped	29,302	2,042	2,248	70	1,729,728	$718,859
TDM	1,772,032	123,635	136,146	4,179	104,349,333	$319,883
Transit	26,614	1,717	1,892	58	1,507,911	$976,000
Other	1,472	-	-	-	-	$356,078
NFRMPO TOTAL	2,979,618	127,394	140,286	4,307	107,536,972	$3,195,702
PPACG						
Traffic Flow Improvements	1,531,862	-	-	-	-	$4,597,881
Shared Ride	901,734	65,705	71,482	2,053	49,497,300	$855,409
Transit	121,021	10,716	2,023	322	8,002,544	$5,360,669
PPACG TOTAL	2,580,267	76,422	83,158	2,375	57,499,844	$10,813,959
Rural PM-10 Areas						
Rural PM-10 Projects	-	-	-	495,873	-	$1,549,986
STATEWIDE TOTAL	**16,313,250**	**756,955**	**738,949**	**614,212**	**518,681,749**	**$52,654,114**

Source: FHWA FY2007 FMIS Report, extracted 02/26/2008; FHWA FY2008 FMIS Report, extracted 03/18/2009; CDOT FY2007 SAP Financial Report, extracted 03/24/2008; CDOT FY2008 SAP Financial Report, extracted 04/16/09; CDOT SAP CMAQ Project Sponsor Report of FY2007-FY2008 project benefit data, extracted 08/11/09.

*Please note that project categories contain a degree of overlap. Similar projects may be categorized differently in different MPOs.

As indicated in **Table 1,** the $52,654,114 in total CMAQ funds obligated to first year CMAQ projects in FY2007-2008 resulted in an anticipated 16,313,250kg/year decrease in CO emissions, a 756,955kg/year decrease in VOC emissions, a 738,949kg/year decrease in NOx emissions, and a 614,212kg/year decrease in PM-10 emissions statewide. In addition, the 2007 and 2008 CMAQ projects contributed to a forecasted annual vehicle miles travel reduction of 518,681,749 miles.

Many CMAQ projects, due to their small scale and localized nature, only yield small reductions in motor vehicle pollution. However, when the total project reductions are combined, the effect of the many small projects funded by the CMAQ program can be significant. The achievement of regional air quality goals in Colorado is even more profound when combining the effects of the projects over multiple years. For instance, many traffic flow improvement projects funded in 2007-2008 were relatively small in scope (e.g., an individual intersection improvement). Yet, such targeted investments when looked at cumulatively can yield significant improvements in roadway level of service and intersection performance in specific locations. On highly traveled corridors, even small changes in travel speeds can result in substantial travel timesavings when multiplied over thousands of vehicles.

Projects that reduce vehicle miles traveled (VMT) also have significant impacts on congestion, mainly through providing enhanced mobility and multimodal choices. Bike/Ped projects, shared ride programs, travel demand management programs, and transit improvements each reduce VMT, especially during peak periods, and, therefore, reduce traffic congestion and improve air quality. Over the long-term and in combination with other projects, projects such as bicycle paths and transit shuttles may improve mobility considerably by providing destination connectivity, supporting transit-oriented development, improving the pedestrian environment and enhancing commuter choices.

Air Quality Benefits in the Rural PM-10 Areas

Rural PM-10 projects in Colorado contributed to a 495,873kg total decrease in PM-10. To better understand what these PM-10 emissions reductions mean in terms of improving the air quality in the five rural PM-10 areas, please refer to **Table 2**, which converts the PM-10 emissions reductions estimated in Table 1 to percentages by taking the annual reductions estimated and comparing the reductions to the total area emissions inventory.[6]

[6] The percent reduction of annual emissions for each of the non-attainment and attainment/maintenance areas across the state were calculated against total emissions inventories for each geographic area taken from the Colorado Dept. of Public Health and the Environment (CDPHE) published county emissions inventories (http://apcd.state.co.us/county_inventory.aspx). County emissions inventories for 2008 have not yet been compiled by APCD. Actual 2008 emissions reductions calculated from CMAQ programs and projects were compared to 2007 total emissions inventories to provide an estimate of percent emissions reduction in 2008. Because the percent emissions reduction per area is quite small, professional judgment of the surrogate 2007 inventories for 2008 inventories is considered reasonable for estimation purposes. These percentages will be updated using 2008 inventories as soon as data becomes available.

Table 2: PM-10 Percent Reduction

(Annual Reductions compared to Total Area Annual Emissions Inventory)

Rural PM-10 Area	PM-10 Annual Reductions		
	FY 2006	**FY 2007**	**FY 2008***
Aspen/Pitkin County	Less than 1%	-	12.2%
Steamboat Springs/ Routt County	Less than 1%	-	6.5%
Telluride/ Mountain Village	7.9%	-	17.5%
Pagosa Springs	3.7%	Less than 1%	-
Cañon City	-	1.5%	-

**** 2008 total emissions inventories are not yet available from APCD. Estimates of percent 2008 emissions reductions based on 2007 emissions inventory data.***

PM-10 areas each receive $200,000/yr for projects. According to Table 2**,** all the rural PM-10 areas have anticipated PM-10 reductions well over one percent between FY2006-2008, which is highly significant and meaningful from an air quality standpoint.

Additional Considerations on CMAQ Program Benefits

Cost-effectiveness of reducing air pollutant emissions and VMT are typically considered as important measures of CMAQ success. While infrastructure projects can be formulaic in identifying benefits, TDM projects are more difficult. As an example, if someone changes his or her driving habits and chooses to bicycle commute two days a week, what is the actual benefit over that person's lifetime? Less-quantifiable benefits of CMAQ programs should also be considered when identifying or evaluating projects.

Some of the indirect or less-quantifiable benefits of CMAQ projects include:

- Enhancing mobility and access;
- Creating more reliable travel times and transit services;
- Improving physical activity and well-being;
- Reducing greenhouse gas emissions;
- Improving safety;
- Enhancing streetscapes;
- Creating better connections between transportation and land use; and
- Fostering a more comprehensive multimodal system.

Most of these benefits are difficult, if not impossible, to quantify in a standard metric, and thus are not usually considered in a cost-effectiveness framework. However, these benefits may be very important to achieving regional transportation goals. States and MPOs should consider these benefits in the evaluation of potential CMAQ projects and in post-assessments of CMAQ projects.

The emissions reductions in this report also suggest that projects' influence have a regional extent. Pollutants, such as ozone, are not specific to any single Colorado city, county or MPO limits. Since non-attainment/maintenance areas are often smaller than entire counties, the impacts to local air quality may be greater than described in this report. Strong partnerships between the State, the MPOs, counties, cities, and air quality organizations are critical in leveraging funds to maximize impact across geographic boundaries.

IV. Long-term Project Benefits

Some CMAQ projects experience benefits that are expected to occur mainly in the short-term, such as operationally focused programs. Other projects may have longer lasting impacts, notably infrastructure projects, like park-and-ride lots, transit rail, and bicycle and pedestrian facilities. It can be reasonably expected that these projects will last for more than 10 years, and continue to generate benefits over many years.

The total benefit of a project over its lifetime can be estimated by multiplying the benefits provided in the first year by the anticipated lifespan of the project. The lifetime benefits of each project were added together to get an area's total emission reduction, attributable to the 2007 and 2008 CMAQ projects. The total lifetime emission reductions are displayed in **Table 3.** See **Appendix D** for the future benefits calculation methodology.

Table 3: Total Lifetime Emission Reductions Attributable to 2007 & 2008 CMAQ Projects

Non-attainment or Maintenance Area	CO (kg)	NOx (kg)	VOC (kg)	PM-10 (kg)
MPOs				
Denver (DRCOG)	137,337,863	9,431,581	9,009,063	718,320
Fort Collins (NFR)	7,726,292	326,061	296,055	10,042
Colorado Springs (PPACG)	13,121,784	185,190	169,285	5,325
Rural PM-10 Areas				
Aspen/Pitkin County	-	-	-	300,381
Steamboat Springs/Routt County	-	-	-	525,595
Telluride/Mountain Village	-	-	-	716,210
Pagosa Springs	-	-	-	1,428
Cañon City	-	-	-	173,731
STATEWIDE TOTAL	**158,185,939**	**9,942,832**	**9,474,403**	**2,451,032**

Source: CDOT SAP CMAQ Project Sponsor Report of FY2007-FY2008 project benefit data, extracted 08/11/09.

Some projects may even yield more benefits than those captured in the table above as certain projects can become more effective over time. For instance, transit stations may not attract a large number of riders in their first year, but may gradually build up ridership over time as behavior patterns shift and congestion worsens. Estimating a stream of benefits over time, therefore, can be extremely useful for purposes of project prioritization and selection.

V. Sample Projects

This report includes eight summaries of CMAQ-funded projects to demonstrate the range and variety of CMAQ projects in Colorado. The summaries highlight projects that the MPOs, rural PM-10 areas, and CDOT staff felt were successful in areas such as providing air quality benefits, strengthening interagency cooperation, increasing economic vitality, improving quality of life, and leveraging funds to maximize impact across geographic boundaries.

Sample Project 1: Transportation Solutions, Designed to Ride Project

In June 2007, Transportation Solutions unveiled a CMAQ pilot program called "Designed to Ride," which was intended to increase transit ridership by addressing defined barriers in choosing transit within the Cherry Creek area of Denver.

With the distinctive character of Cherry Creek in mind, they engaged a local artist to create vibrant artwork to update and enliven 50 area bus stops. Colorful die-cut bus stop signs were added for extra visibility and stop identification. Each stop featured easy-to–read schedules, route maps and specific departure times. The art and information were enclosed in bright, four-foot tubes that were easy to see, durable and easy to update as schedules changed.

The program received widespread media coverage. Local residents, employees, and those traveling to and through the area quickly took note. Post installation follow-up surveys revealed:

- Transit mode share for work trips increased from 1% to 5%
- Transit mode share for all trips increased from 3% to 4%
- Bus stop counts show 7% increase in ridership

Source: CDOT, Division of Transportation Development, 12/8/2009

Sample Project 2: GO Boulder, GO Smart Individualized Marketing Campaign

The City of Boulder's GO Boulder office targeted 4000 individual households in north Boulder and offered specific travel information to help them shift from driving alone to walking, biking or using the bus. Nearly 700 households responded. GO Boulder then provided information in hard copy and on-line formats, depending on the request.

Participants that received customized travel information increased their bicycle mode share for all trips by 26%, and their bus mode share for all trips increased by 66%. SOV travel was reduced by 14%. Participants reported reduced working at home and carpooling in favor of bicycling and walking.

Approximately 10% of participants increased their transit use from a few times a week to riding it daily. Recipients of customized travel information also reported increased knowledge of, and being more comfortable with, taking transit from their neighborhoods to work and non-work destinations. The majority of participants also agreed that they feel more comfortable bicycling in the city since receiving customized bicycle information.

The development of the GO Smart marketing materials enabled the city to update transit and bicycle maps that are now available to all Boulder citizens.

Source: CDOT, Division of Transportation Development, 12/8/2009

Sample Project 3: Downtown Denver Partnership, Get Downtown Unconventionally

The Downtown Denver Partnership (DDP) developed an on-line program that registered 1,150 employees who worked in Downtown Denver during the Democratic National Convention. In exchange for incentive items, participants were required to use transit, bike, walk or carpool instead of driving alone at least 15 times during the month of August.

In addition to the incentive, the DDP provided daily information and outreach regarding travel delays, schedules, road closures, encouragement, etc. At the end of the month, participants saved more than 400,000 miles and 30,000 trips that otherwise would have been taken in single occupancy vehicles.

Source: CDOT, Division of Transportation Development, 12/8/2009

Sample Project 4: Transfort, Fort Collins Diesel Retrofit Project

In July of 2008 the City of Fort Collins was able to replace three 35' Diesel Buses with three 35' Compressed Natural Gas (CNG) buses. Since July of 2008, the three CNG buses have logged over 116,000 miles and have directly reduced 2,074,392 grams of Nitrogen Oxide (NOx) and 23,049 grams of Volatile Organic Compounds (VOCs) by utilizing CNG versus Diesel fuel. During that same timeframe, the three CNG buses have provided over 328,600 trips reducing 1,860,000 Vehicle Miles Traveled.

Source: City of Fort Collins and North Front Range MPO, 10/16/2009

Sample Project 5: PM-10 Mitigation in Cañon City

The City of Cañon City has received CMAQ funding annually for dust mitigation since 2000. With that money, Cañon City has paved approximately 3.37 miles of roadway and purchased two street sweepers. All but one of Cañon City's paving projects has been incorporated with a Public Improvement District formed by the property owners for the installation of curb and gutter in conjunction with the paving. The City has contributed about $360,000 in cash match in addition to in-house design and construction management. The adjacent property owners have contributed $395,220 to the projects. Cañon City has a total of 118 miles of roadway with 18 miles still being gravel. Cañon City relies on the CMAQ program to fund these projects and to increase its fleet of street sweepers, which come with a price tag of $150,000 each. The funding has not only brought the City into compliance but has kept Cañon City there as traffic volume has increased on many of the City streets.

Source: City of Cañon City, 10/16/2009

Sample Project 6: DRCOG RideArrangers Program

RideArrangers offered a regional commute option program designed as a resource for employers, schools, commuters, local governments and other Transportation Demand Management (TDM) service providers. A division of the Denver Regional Council of Governments (DRCOG), RideArrangers is part of a complete TDM strategy for the Denver Metro Region and provides centralized services that can be utilized directly by the region's employers and governments or as a resource for local TDM service providers.

By providing the following TDM marketing strategies, RideArrangers worked to reduced traffic congestion and improve air quality in the region:

- Carpool matching.
- Schoolpool matching.
- Vanpool services.
- Telework services and expertise.
- Guaranteed Ride Home.
- Employer outreach and business services such as consultation and development of employee commute plans, surveys and commute pattern analysis, tax benefit information, assistance in implementing company commute programs, transit information and ongoing support.
- Tools for employers and TDM service providers such as survey instruments, business database information, maps and data on commute habits.
- Facilitation of region-wide efforts such as Bike to Work Day.
- Transit Oriented Development.
- Forum for regional coordination of services among TDM professionals.
- Program evaluation, data collection and reports on program impact.
- Tools and materials.

RideArrangers makes all services available to all regional jurisdictions, employers, schools, individuals and TDM agency partners. Centralizing the services allows for greater cost-effectiveness, more efficient customer service and better use of limited resources.

Overall, RideArrangers' programs reduced 90.6 million VMT in the combined years 2007 and 2008, with a cost-effectiveness of 8 cents/mile in 2007 and 4 cents/mile in 2008.

Source: Denver Regional Council of Governments, 01/20/2010

Sample Project 7: Real-Time Traveler Information Project, I-70 from DIA to C-470

The purpose of this Project was to expand the real-time travel time application to the I-70 corridor, and complete the section from DIA to C-470. Currently, real-time travel time is provided on the I-70 corridor from C-470 to Vail. Freeways serve the highest volumes of traffic and carry a significant portion of the longer intraregional and interregional trips. Freeways are affected by many of the critical transportation problems including; normal congestion, weather events, incidents, venues and activity centers, major construction, and daily construction. Implementation of real-time travel time on the freeway system will provide system managers with timely information on current conditions and better tools for controlling flow and managing construction, incidents, and events. Dissemination of travel times to the traveling public will allow travelers to make more informed decisions regarding their travel choices.

The direct benefits from actively managing the freeway system are reduced delay, increased throughput, more reliable travel times, smoother flow, fewer crashes (both primary and secondary), and quicker response time for emergency service providers. Secondary benefits include more consistent expectations regarding travel and reduced air pollutant emissions. The RITSSP identifies the freeways as the priority system that should be implemented prior to arterial applications due to the characteristics of the freeway system and the significant benefits derived from managing the freeways.

CDOT has invested considerable resources to ensure that the real-time travel time application is accurate and provides timely information. This includes determining optimum placement of devices for data/information collection and dissemination and software development to process the data in a very complex algorithm. Multiple detection devices, i.e., automated traffic recorders (ATRs), Travel Time Indicators (TTI) and RTMS/Wavetronix radar are used to collect information such as; volume, speed, speed between fixed points, occupancy, etc. The data is then processed using a customized algorithm that was developed based on specific corridor conditions. Travel times are currently disseminated using the overhead variable message signs (VMS) on the roadway, the COTRIP.org web site and the 511 Traveler Information Hotline. The project installed the following devices at the following locations:

- 12 CCTV at I-225, Peoria, Havana, east of I-270, between Quebec and Colorado, Vasquez, Federal, I-70/I-76, Kipling, Ward, Denver West and east of Rooney Road).
- 5 TTI at Youngfield, SH 58, Wadsworth, Vasquez, between Quebec and I-270 and I-225/I70.
- 8 Wavetronix between C-470 and US-6, Denver West and Youngfield, SH 58 and Ward, Kipling and Wadsworth, I-25 and Brighton Blvd, Colorado and Quebec, I-270 and Havana and I-225 and Chambers.

Using 2008 average daily traffic and conservatively estimating that travelers will save about three minutes of total trip time on the corridor segment during peak periods results in the following benefits: 16,450 hours that travelers will collectively save on a weekly basis translating into about $250,000 dollars of weekly savings, an annual fuel reduction of 168,000 gallons and an annual reduction of 412,000 pounds of carbon dioxide.

Source: CDOT ITS Branch, 01/27/2010

Sample Project 8: HOP Automated Transit Information System, Boulder Special Transit

The development of an Automated Transit Information System (ATIS) for Boulder's HOP route will serve a variety of users and entities. The HOP ATIS project will utilize GPS and AVL technology to provide automated stop announcements that will be both verbally annunciated and visually displayed to best accommodate blind or hard of hearing passengers. Automatic Passenger Counters (APC) will also be installed in order to better inform transportation planners of service demand. APC data will inform route planning and frequency need. Finally, security cameras will be installed to improve on-board safety and driver training.

The HOP transit service utilizes a fleet of 10 vehicles. Six of these vehicles have recently been replaced and will be the focus of the ATIS project. The remaining four vehicles are scheduled to be replaced within the next two years and ATIS technology will be included in the procurement scopes of these new vehicles. Special Transit staff approached this ATIS project by breaking it into three separate elements: 1. Automated Stop Announcements; 2. Automatic Passenger Counters and; 3. Security Cameras. The buses have already been implemented with automatic vehicle identification, automatic passenger counting and security cameras. Boulder Special Transit has worked with CDOT to identify highway intersection locations on the bus routes where buses could benefit by taking advantage of queue jumps. Boulder Special Transit and CDOT are installing necessary equipment at these intersections to allow the queue jumps.

Boulder Special Transit believes this ATIS application will allow buses to adhere to schedules, provide real-time communications between buses and dispatch, gather better data regarding rider ship and to make decisions concerning routing, which will result in increased ridership as commuters gain a higher level of confidence with schedule adherence and delivery of transit services.

Source: Boulder Special Transit, 01/27/2010

VI. Conclusion

While the CMAQ program is federally funded, no national standard or set of regulations exists for how the CMAQ program should be structured and operated at the state or MPO level. It is intentionally left to the states, MPOs, municipalities, and organizations with an interest in reducing traffic congestion and improving air quality to develop and operate a CMAQ program that best responds their unique local and regional needs.

The information presented in this report is intended to contribute to further discussions about the effectiveness of the CMAQ program in Colorado, both as it currently stands and with an eye to the future. This report is also intended to bring to life the diverse projects funded by the CMAQ program and illustrate how the projects reflect regional air quality goals and transportation priorities. While the quality of the benefits anticipated is only as good as the assumptions built into the benefit formulas, this report suggests that the CMAQ program has a relatively large impact on air quality, congestion, and transportation planning processes in Colorado.

Appendix A – CMAQ Project Descriptions

2007 Projects

DRCOG

State ID	Project Name	Project Description	Project Category	Funds Obligated	1st Year CO Benefit (kg/ year)	1st Year VOC Benefit (kg/ year)	1st Year NOx Benefit (kg/ year)	1st Year PM-10 Benefit (kg/ year)	Lifetime Benefit Years	Lifetime CO Benefit (kg/ year)	Lifetime VOC Benefit (kg/ year)	Lifetime NOx Benefit (kg/ year)	Lifetime PM-10 Benefit (kg/ year)	Annual VMT Reduction
13805	**R6 FY02 Signal System**	INSTALL FIBER; PURCHASE AND INSTALL SIGNAL SYSTEM	Traffic Flow Improvements	$187,862	133,826	-	-	-	7	936,782	-	-	-	-
14855	**SANTA FE: I.M.P.**	INSTALL INTERCONNECT CONDUIT	Traffic Flow Improvements	$6,234	644,318	-	-	-	7	4,510,226	-	-	-	-
14857	**FY 05 DRCOG MISC EQUIPMENT**	PURCHASE TRAFFIC SIGNAL EQUIPMENT FOR LOCAL GOVT TRAFFIC SIGNAL	Traffic Flow Improvements	$367,248	31,137	-	-	-	7	217,959	-	-	-	-
16162	**DRCOG Congestion Evaluation**	DRCOG CONGESTION EVALUATION TOOL (TRANSIT TOLL AND DIA SURVEY)	Traffic Flow Improvements	$37,147	0	-	-	-	7	-	-	-	-	-
15237	**FY06 DRCOG Program**	SIGNAL SYSTEM CAPITAL IMPROVEMENT ENGINEERING, SIGNAL COORDINATION	Traffic Flow Improvements	$1,055,000	629,098	-	-	-	7	4,403,686	-	-	-	-
15673	**Denver Signal System**	INSTALL ELECTRICAL CONDUIT, PULL BOXES, FIBER OPTIC CABLE	Traffic Flow Improvements	$1,045,000	135,786	-	-	-	-	-	-	-	-	-
15815	**FY07 ITS DRCOG**	I.T.S. EQUIPMENT INSTALLATION ON C470,I-25,US36,I70	Traffic Flow Improvements	$998,430	68,182	-	-	-	7	477,274	-	-	-	-
15474	**RTD- Transit**	COORDINATE TRANSPORTATION DEMAND MANAGEMENT SERVICES	Demand Management	$56,978	1,510	117	135	4	7	10,570	819	945	28	92,958
16087	**2007 CMAQ US 36 TMO**	TDM EMPLOYEE MOBILITY SERVICES	Demand Management	$37,500	11,288	876	1,008	28	7	79,016	6,132	7,056	196	695,068
16088	**2007 CMAQ TRANSPORTATION**	TDM FOCUS ON CHERRY CREEK AREA	Demand Management	$55,000	3,495	271	312	9	7	24,465	1,897	2,184	63	215,029
16090	**2007 CMAQ SOUTHEAST**	TDM MARKETING, OUTREACH, DATABASE	Demand Management	$100,000	12,187	946	1,088	30	7	85,309	6,622	7,616	210	750,437

State ID	Project Name	Project Description	Project Category	Funds Obligated	1st Year CO Benefit (kg/ year)	1st Year VOC Benefit (kg/ year)	1st Year NOx Benefit (kg/ year)	1st Year PM-10 Benefit (kg/ year)	Lifetime Benefit Years	Lifetime CO Benefit (kg/ year)	Lifetime VOC Benefit (kg/ year)	Lifetime NOx Benefit (kg/ year)	Lifetime PM-10 Benefit (kg/ year)	Annual VMT Reduction
16023	**Boulder East Community**	COORDINATE TDM SERVICES: CARPOOLS, VAN POOLS	Demand Management	$63,037	41,379	3,219	3,682	107	2	82,759	6,437	7,365	213	2,548,302
16053	**2007 CMAQ DRCOG Telework**	DEVELOP TELEWORK PROGRAMS TO MOVE PEOPLE OUT OF CARS	Demand Management	$130,889	184,396	14,342	16,409	475	2	368,791	28,685	32,818	949	11,355,803
16054	**2007 CMAQ DRCOG RIDE**	COORDINATE TRANSPORTATION DEMAND MANAGEMENT CARPOOLS AND VANPOOL	Demand Management	$2,307,617	412,051	31,969	36,790	1,015	5	2,060,255	159,845	183,950	5,075	25,372,595
16086	**2007 CMAQ Downtown Denver**	TDM ACTIVITIES PROMOTING DRIVE LESS DENVER	Demand Management	$80,150	5,098	396	455	13	2	10,195	793	907	26	313,924
15238	**05-07 Ozone Reduction**	REDUCING OZONE-FORMING EMISSIONS FROM HIGH-EMITTING MOBILE SOURCES	Other	$629,600	227,112	17,665	20,210	585	7	1,589,781	123,654	141,473	4,092	13,986,430
16098	**2007 CMAQ RAQC DIESEL**	DIESEL IDLING AND EMMISSIONS REDUCTION	Other	$1,291,058	1,163,200	122,400	24,400	54,000	7	8,142,400	856,800	170,800	378,000	-
16099	**2007 CMAQ RAQC**	OZONE REDUCTION - "LET'S TAKE CARE OF SUMMER AIR"	Other	$374,232	189,372	33,480	1,988	0	7	1,325,604	234,360	13,916	0	-
15940	**Purch Mag Chl Trucks**	PURCHASE OF TWO MAG CHLORIDE TANKER TRUCKS	PM10 Project	$344,000	-	-	-	1,191	5	-	-	-	5,955	-
16224	**S. Boulder Intermodal**	CONSTRUCTION OF A TRANSIT STOP INTERMODAL CENTER	Transit	$452,167	48,546	3,776	4,320	125	20	970,914	75,518	86,400	2,499	2,989,636
90007	**Pearl Street: 30th Boulder Village Transit Center**	This project will construct a multi-modal transit station on an 11-acre site located in the northeast quadrant of 30th St. and Pearl Parkway in Boulder, as a replacement for the South Boulder Intermodal Center.	Transit	$3,747,304	2,616	203	233	7	20	52,317	4,069	4,656	135	161,093
90008	**Pearl Street: 30th Boulder Village Transit Center**	This project will construct a multi-modal transit station on an 11-acre site located in the northeast quadrant of 30th St. and Pearl Parkway in Boulder, as a replacement for the South Boulder Intermodal Center.	Transit	$1,262,696	2,616	203	233	7	20	52,317	4,069	4,656	135	161,093
90009	**Southeast Corridor: Colo. Blvd. Station Area Action Plan (STAMP)**	Project will develop a station area master plan for the Colorado Boulevard station on the Southeast Corridor.	Transit	$75,000	3,639	203	324	9	20	72,772	4,069	6,476	187	224,080

State ID	Project Name	Project Description	Project Category	Funds Obligated	1st Year CO Benefit (kg/ year)	1st Year VOC Benefit (kg/ year)	1st Year NOx Benefit (kg/ year)	1st Year PM-10 Benefit (kg/ year)	Lifetime Benefit Years	Lifetime CO Benefit (kg/ year)	Lifetime VOC Benefit (kg/ year)	Lifetime NOx Benefit (kg/ year)	Lifetime PM-10 Benefit (kg/ year)	Annual VMT Reduction
90010	**West Corridor: Wadsworth Blvd. Station Area Master Plan**	Project will develop an Action Plan for the city's station area master plan at the 13th and Wadsworth West Corridor station.	Transit	$75,000	5,792	451	515	15	20	115,846	9,010	10,309	298	356,711
90011	**Central Corridor: 10th/Osage Station Area Master Plan**	Project will develop station area master plans for the 10th Avenue and Osage Street stations on the Central Corridor.	Transit	$100,000	1,265	98	113	3	20	25,296	1,967	2,251	65	77,891
90012	**East Corridor: 40th St/40th Ave Station Area Master Plan**	Project will develop a station area master plan for the 40th/40th station on the East Corridor.	Transit	$75,000	7,104	553	632	18	20	142,079	11,051	12,643	366	437,491
90013	**Gold Line: 38th/Inca Station Area Master Plan**	Project will develop a station area master plan for the 38th/Inca station on the Gold Line.	Transit	$75,000	1,365	106	121	4	20	27,295	2,123	2,429	70	84,046
90014	**I-225 Corridor: Nine Mile Station Area Master Plan**	Project will develop a station area master plan for the Nine Mile station on the I-225 Corridor.	Transit	$80,000	3,005	234	267	8	20	60,099	4,674	5,348	155	185,056
90015	**East Corridor: Peoria St/Smith Rd Station Area Master Plan**	Project will develop a station area master plan for the Peoria/Smith station on the East Corridor.	Transit	$150,000	15,065	1,172	1,341	39	20	301,302	23,435	26,812	776	927,768
90016	**West Corridor: Sheridan & Decatur Station Area Master Plan**	This pool will fund intelligent transportation systems projects which implement the adopted Regional Intelligent Transportation Systems Strategic Plan.	Transit	$187,000	5,240	408	466	13	20	104,806	8,152	9,326	270	322,719
90026	**South Thornton Call-n-Ride**	Project is a new call-n-Ride service in the southern part of the City of Thornton. The service boundaries will be just north of 104th Avenue, Riverdale Road to the east, Coronado Parkway to the south, and Pecos Street to the west.	Transit	$130,000	Benefits Reported in 2008									

State ID	Project Name	Project Description	Project Category	Funds Obligated	1st Year CO Benefit (kg/ year)	1st Year VOC Benefit (kg/ year)	1st Year NOx Benefit (kg/ year)	1st Year PM-10 Benefit (kg/ year)	Lifetime Benefit Years	Lifetime CO Benefit (kg/ year)	Lifetime VOC Benefit (kg/ year)	Lifetime NOx Benefit (kg/ year)	Lifetime PM-10 Benefit (kg/ year)	Annual VMT Reduction
90017	**Gold Line: Pecos and Federal Station Area Master Plan**	Project will develop station area master plans for the Pecos and Federal stations on the Gold Line.	Transit	$158,000	5,871	457	522	15	20	117,425	9,133	10,449	302	361,576
90018	**West Corridor: Federal Center Station Area Master Plan**	Project will create action plans to develop design criteria, phasing strategies, traffic studies, and other related plans and studies necessary to assist with implementation of the Federal Center Station Area Master Plan.	Transit	$75,000	5,305	413	472	14	20	106,105	8,253	9,442	273	326,718
90019	**Gold Line: Sheridan, Olde Town, and Arvada Ridge STAMP**	Project will develop station area master plans for the Sheridan, Olde Town, and Arvada Ridge stations on the Gold Line.	Transit	$200,000	10,621	826	945	27	20	212,426	16,523	18,903	547	654,103
90020	**US-36/SH 119: Denver to Longmont Corridor Station Planning**	Conduct development oriented transit (DOT) design for 11 commuter rail and BRT stations in corridor (71st/Lowell, 88th/Sheridan, 104th/Church Ranch, 116th/US-36, Flatiron/96th, McCaslin/US-36, Table Mesa, Downtown Louisville, 30th/Pearl, IBM/SH-119, and Hover/SH-119).	Transit	$75,000	7,845	610	698	20	20	156,895	12,203	13,962	404	483,112

NFRMPO

State ID	Project Name	Project Description	Project Category	Funds Obligated	1st Year CO Benefit (kg/ year)	1st Year VOC Benefit (kg/ year)	1st Year NOx Benefit (kg/ year)	1st Year PM-10 Benefit (kg/ year)	Lifetime Benefit Years	Lifetime CO Benefit (kg/ year)	Lifetime VOC Benefit (kg/ year)	Lifetime NOx Benefit (kg/ year)	Lifetime PM-10 Benefit (kg/ year)	Annual VMT Reduction
16094	**2007 CMAQ City of Fort Collins**	TDM - FC BIKES, TRANSFORT TEST RIDE, TRANSFORT FIXED ROUTE	Demand Management	$249,883	51,360	3,777	4,099	116	1	51,360	3,777	4,099	116	2,774,865
15605	**ATMS/Traveler Info**	UPGRADES TO THE SIGNAL SYSTEM AND COMPUTER	Other	$356,078	1,472	-	-	-	3	4,416	-	-	-	-

PPACG

State ID	Project Name	Project Description	Project Category	Funds Obligated	1st Year CO Benefit (kg/ year)	1st Year VOC Benefit (kg/ year)	1st Year NOx Benefit (kg/ year)	1st Year PM-10 Benefit (kg/ year)	Lifetime Benefit Years	Lifetime CO Benefit (kg/ year)	Lifetime VOC Benefit (kg/ year)	Lifetime NOx Benefit (kg/ year)	Lifetime PM-10 Benefit (kg/ year)	Annual VMT Reduction
14637	**Traffic Signalization**	IMPROVE TRAFFIC SIGNALIZATION, I-25 THRU COLORADO SPRINGS, US 24 AND ACADEMY BLVD	Traffic Flow Improvements	$201,005	804,472	-	-	-	7	5,631,304	-	-	-	
15836	**Nevada Ave. Corridor**	PURCHASE AND INSTALLATION OF ITS EQUIPMENT INCLUDING CAMERAS, NEVADA AVENUE FROM NORTH I-25 TO LAKE AVENUE	Traffic Flow Improvements	$1,359,203	1,472	-	-	-	7	10,304	-	-	-	
16091	**COLORADO SPRINGS METRO RIDES**	COORDINATE METRO RIDES IN COLO SPGS,EG VANPOOL, CARPOOL, ETC	Shared Ride	$300,814	746,148	54,866	59,542	1,685	2	1,492,296	109,732	119,084	3,370	40,312,720
90004	**Woodmen/Black Forest P-n-R**	Constuct 255 space park-and-ride facility	Transit	$678,800	Benefits reported in 2008									
90005	**Dntwn CoSprings Circulator**	Operate a demonstration public transportation service	Transit	$322,000	7,325	539	585	17	10	1,492,296	109,732	119,084	3,370	395,751
90006	**FREX Bus Service**	Operation of the FREX bus route between Fountain and Denver during 2007.	Transit	$1,400,000	123,637	9,084	9,886	267	10	1,236,370	90,840	98,860	2,670	6,679,450

PM-10 Areas

State ID	Project Name	Project Description	Project Category	Funds Obligated	1st Year CO Benefit (kg/ year)	1st Year VOC Benefit (kg/ year)	1st Year NOx Benefit (kg/ year)	1st Year PM-10 Benefit (kg/ year)	Lifetime Benefit Years	Lifetime CO Benefit (kg/ year)	Lifetime VOC Benefit (kg/ year)	Lifetime NOx Benefit (kg/ year)	Lifetime PM-10 Benefit (kg/ year)	Annual VMT Reduction
15695	**Cañon City CMAQ 5**	INSTALLATION OF PAVEMENT IN CONJUNCTION WITH CURB & GUTTER	PM10	$321,514	-	-	-	43,433	4	-	-	-	173,731	-
14070	**Pagosa Springs CMAQ**	CMAQ PROJECT TO PAVE STREETS WITHIN NON-ATTAINMENT BOUNDARY	PM10	$3,943	-	-	-	476	3	-	-	-	1,428	-

2008 Projects

DRCOG

State ID	Project Name	Project Description	Project Category	Funds Obligated	1st Year CO Benefit (kg/ year)	1st Year VOC Benefit (kg/ year)	1st Year NOx Benefit (kg/ year)	1st Year PM-10 Benefit (kg/ year)	Lifetime Benefit Years	Lifetime CO Benefit (kg/ year)	Lifetime VOC Benefit (kg/ year)	Lifetime NOx Benefit (kg/ year)	Lifetime PM-10 Benefit (kg/ year)	Annual VMT Reduction
15198	**FY05 CCD DRCOG Partnership**	TRAFFIC FLOW IMPROVMENTS ON HIGH PRIORITY ARTERIALS THAT SERVE I-25	Traffic Flow Improvements	$300,000	7,419	-	-	-	5	37,095	-	-	-	-
15233	**DENVER SIGNAL SYSTEM - PH 10b**	INSTALL FIBER OPTIC SIGNAL INTERCONNECT	Traffic Flow Improvements	$1,045,000	135,829	-	-	-	5	679,145	-	-	-	-
15387	**FY06 CCD DRCOG Partnership**	TRAFFIC FLOW IMPROVMENTS ON HIGH PRIORITY ARTERIALS THAT SERVE I-25	Traffic Flow Improvements	$170,000	7,419	-	-	-	5	37,095	-	-	-	-
15674	**FY07 DRCOG MISC EQUIP**	PURCHASE TRAFFIC SIGNAL EQUIPMENT FOR LOCAL GOV'T TRAFFIC SIGNALS	Traffic Flow Improvements	$932,200	39,546	-	-	-	3	118,638	-	-	-	-
15816	**FY07 ITS CCD DRCOG Ptnrship**	LAYING FIBER IN DENVER METRO AREA	Traffic Flow Improvements	$250,000	133,556	-	-	-	5	667,780	-	-	-	-
16070	**DENVER TSSIP DESIGN**	DESIGN FUTURE TSSIP PROJECTS	Traffic Flow Improvements	$20,239	43,201	-	-	-	3	129,603	-	-	-	-
16395	**DENVER SIGNALS PH 12-MONACO**	INSTALL INTERCONNECT,COMMUNICATION DEVICES, & EQUIPMENT	Traffic Flow Improvements	$840,000	221,195	-	-	-	5	1,105,975	-	-	-	-
16396	**THORNTON - WASHINGTON ST**	INSTALL INTERCONNECT AND COMMUNICATION EQUIPMENT	Traffic Flow Improvements	$245,000	96,857	-	-	-	5	484,285	-	-	-	-
16437	**GREENWOOD VILLAGE SIGNAL SYSTEM**	PURCHASE & UPGRADE SIGNAL SYSTEM SOFTWARE	Traffic Flow Improvements	$15,693	84,105	-	-	-	3	252,315	-	-	-	-
16449	**AURORA SIGNAL SYSTEM**	INSTALL TRAFFIC SIGNAL EQUIPMENT & COMMUNICATION MEDIA	Traffic Flow Improvements	$450,000	127,273	-	-	-	3	381,819	-	-	-	-
16450	**LAKEWOOD SIGNAL SYSTEM**	PURCHASE SYSTEM COMMUNICATION WITH RADIOS	Traffic Flow Improvements	$310,000	82,159	-	-	-	3	246,477	-	-	-	-
16536	**CBD SIGNAL TIMING PROJECT**	RETIME TRAFFIC SIGNALS WITH IN THE CBD	Traffic Flow Improvements	$300,000	336,707	-	-	-	3	1,010,121	-	-	-	-

State ID	Project Name	Project Description	Project Category	Funds Obligated	1st Year CO Benefit (kg/ year)	1st Year VOC Benefit (kg/ year)	1st Year NOx Benefit (kg/ year)	1st Year PM-10 Benefit (kg/ year)	Lifetime Benefit Years	Lifetime CO Benefit (kg/ year)	Lifetime VOC Benefit (kg/ year)	Lifetime NOx Benefit (kg/ year)	Lifetime PM-10 Benefit (kg/ year)	Annual VMT Reduction
16564	**US 36 ITS EQUIPMENT (FED TO BOULDER)**	ITS EQUIPMENT (CCTVS, WIRELESS, TTT)	Traffic Flow Improvements	$325,207	131,000	-	-	-	5	655,000	-	-	-	-
16567	**I-70 (C470 TO DIA) ITS EQUIPMENT INSTALL**	ITS EQUIPMENT (CCTVS, TTT, AND ATRS)	Traffic Flow Improvements	$168,030	187,000	-	-	-	5	935,000	-	-	-	-
16580	**BOULDER COUNTY - FY08 ITS PP -**	INSTALL AVL AND APC ON BUSES	Traffic Flow Improvements	$103,000	-	-	-	-	-	-	-	-	-	-
16581	**CITY OF AURORA - FY08 ITS PP**	INTERCONNECT TRAFFIC SIGNAL WITH FIBER OPTICS	Traffic Flow Improvements	$66,171	4,000	-	-	-	5	20,000	-	-	-	-
16582	**CITY OF BOULDER TRANSIT - FY08 ITS PP**	EQUIP BUSES WITH AVL AND APC	Traffic Flow Improvements	$75,000	1,200	-	-	-	5	6,000	-	-	-	-
16583	**CITY OF BOULDER - FY08 ITS PP**	INSTALL CCTV TO PROVIDE TRAVELER INFORMATION	Traffic Flow Improvements	$83,000	1,200	-	-	-	8	9,600	-	-	-	-
16587	**CITY OF DENVER - FY08 DRCOG ITS PP -**	INSTALL ITS EQUIPMENT TO PROVIDE TRAVELER INFORMATION	Traffic Flow Improvements	$269,000	-	-	-	-	-	-	-	-	-	-
16703	**2008 CMAQ BOULDER CNTY ETHANOL FUEL**	ETHANOL FUEL IMPLEMENTATION PROJECT	Traffic Flow Improvements	$130,000	-	-	-	-	-	-	-	-	-	-
16786	**REGION CENTER TO CENTER**	EQUIPMENT AND SOFTWARE PURCHASE FOR C2C	Traffic Flow Improvements	$200,000	483,239	-	-	-	5	2,416,195	-	-	-	-
16788	**FY08 & FY09 DRCOG PROGRAM**	ENGINEERING SERVICES	Traffic Flow Improvements	$1,197,000	423,591	-	-	-	3	1,270,773	-	-	-	-
16095	**2007 CMAQ Indiv MKTG City of Boulder**	NON-CONSTRUCTION, PROMOTING ALTERNATIVE MODES THROUGH TDM	Demand Management	$120,000	693	51	60	51	1	693	51	60	51	47,000
16468	**2007 CMAQ TDM DENVER IDLING GETS YOU**	MARKETING CAMPAIGN PROMOTING TURNING OFF CAR ENGINES	Demand Management	$100,000	73,735	5,460	6,360	5,460	1	73,735	5,460	6,360	5,460	5,000,000
16472	**2008 CMAQ TDM TRANSPORTATION SOLUTIONS**	INCENTIVE-BASED PROGRAM. WEB-BASED TRACKING SYSTEM. TARGET COMPANY EMPLOYEES.	Demand Management	$20,000	2,433	180	210	180	1	2,433	180	210	180	165,000

State ID	Project Name	Project Description	Project Category	Funds Obligated	1st Year CO Benefit (kg/ year)	1st Year VOC Benefit (kg/ year)	1st Year NOx Benefit (kg/ year)	1st Year PM-10 Benefit (kg/ year)	Lifetime Benefit Years	Lifetime CO Benefit (kg/ year)	Lifetime VOC Benefit (kg/ year)	Lifetime NOx Benefit (kg/ year)	Lifetime PM-10 Benefit (kg/ year)	Annual VMT Reduction
16475	**2008 CMAQ TDM SOUTH I-25 URB COR. TMA**	INDIVIDUAL RIDERSHIP INCENTIVES, ECO-PASS INCENTIVES AND SHELTER IMPROVEMENTS. TRANSIT RIDERSHIP INCENTIVE PROGRAM	Demand Management	$75,000	84,058	6,224	7,250	6,224	1	84,058	6,224	7,250	6,224	5,700,000
16476	**2008 CMAQ TDM GOLDEN TDM PLAN**	DEVELOP A CENTRAL GOLDEN AND CAMPUS TDM PROGRAM	Demand Management	$25,000	85,533	6,334	7,378	6,334	1	85,533	6,334	7,378	6,334	5,800,000
16477	**2008 CMAQ TDM GO BOULDER ECO PASS**	TDM PROGRAM ENCOURAGING EMPLOYEES WITH ECO PASSES TO PICK THEM UP	Demand Management	$45,000	10,486	776	904	776	1	10,486	776	904	776	711,062
16478	**2008 CMAQ TDM FITZSIMONS TMA OUTREACH**	TDM PROGRAM TO DEVELOP WEB SITE AND OUTREACH TO EMPLOYEES AT FITZSIMONS CAMPUS	Demand Management	$50,000	221,205	16,380	19,080	16,380	1	221,205	16,380	19,080	16,380	15,000,000
16479	**2008 CMAQ TDM DOWNTOWN DENVER PARTNERSHIP**	ACCESS DOWNTOWN DENVER WEB SITE, INCENTIVES, ETC. TDM PROGRAM	Demand Management	$150,920	6,988	517	603	517	1	6,988	517	603	517	473,867
16481	**2008 CMAQ TDM BOULDER VALLEY SD GO/BUS**	TDM PROGRAM WITHBOULDER AND BOULDER VALLEY SCHOOLS. MIDDLE SCHOOL GO BY BUS/SCHOOL POOL OUTREACH	Demand Management	$15,000	51,615	3,822	4,452	3,822	1	51,615	3,822	4,452	3,822	3,500,000
16482	**2008 CMAQ TDM BOULDER EAST EMP. SHOWCASE**	EMPLOYER SHOWCASE OUTREACH, ASSISTANCE AND MARKETING	Demand Management	$70,000	16,222	1,201	1,399	1,201	1	16,222	1,201	1,399	1,201	1,100,000
16483	**2008 CMAQ TDM BOULDER COUNTY TRANSIT ED**	COUNTY WIDE TRANSIT EDUCATION AND PASS SUPPORT: TDM PROGRAM FOR 2008	Demand Management	$25,000	10,485	776	904	776	1	10,485	776	904	776	711,000
16484	**2008 CMAQ TDM 36 COMMUTING SOLUTIONS P/P**	PAY FOR PERFORMANCE PROGRAM: TDM PROGRAM FOR 2008	Demand Management	$25,000	2,673	198	231	198	1	2,673	198	231	198	181,264
16631	**2008 CMAQ DRCOG RIDEARRANGERS MATCHED**	DRCOG RIDEARRANGERS MATCHED	Demand Management	$401,319	450,109	33,263	38,755	1,221	2	900,218	66,526	77,510	2,442	30,515,873

State ID	Project Name	Project Description	Project Category	Funds Obligated	1st Year CO Benefit (kg/ year)	1st Year VOC Benefit (kg/ year)	1st Year NOx Benefit (kg/ year)	1st Year PM-10 Benefit (kg/ year)	Lifetime Benefit Years	Lifetime CO Benefit (kg/ year)	Lifetime VOC Benefit (kg/ year)	Lifetime NOx Benefit (kg/ year)	Lifetime PM-10 Benefit (kg/ year)	Annual VMT Reduction
16502	**KIPLING/RIDGE RD-58TH AVE/MULTI-USE PATH**	10' MULTI-USE PATH ON WEST SIDE OF KIPLING: RIDGE RD TO 58TH	Pedestrian/ Bicycle	$103,488	1,166	86	101	86	24	27,984	2,064	2,424	2,064	79,040
16630	**2008 CMAQ DRCOG RIDEARRANGERS UNMATCHED**	DRCOG RIDEARRANGERS UNMATCHED	Shared Ride	$1,548,681	305,362	22,566	26,292	828	5	1,526,810	112,830	131,460	4,140	20,702,566
16782	**2008 CMAQ RACQ DIESEL IDLING**	2008 CMAQ RAQC DIESEL IDLING	Other	$1,000,000	38,400	1,400	28,800	1,400	1	38,400	1,400	28,800	1,400	-
15892	**30th St. Transit Village Ph I**	IMPROVEMENTS TO THE TRANSIT VILLAGE	Transit	$248,370	2,927,735	216,355	252,083	7,940	33	96,615,255	7,139,715	8,318,739	262,020	198,490,500
90021	**I-225 Corridor: 4th Ave STAMP**	I-225 Corridor: 4th Ave STAMP	Transit	$80,000	736	2	63	55	33	24,288	66	2,079	1,815	49,921
90025	**I-225 Corridor: Illiff STAMP**	I-225 Corridor: Illiff STAMP	Transit	$80,000	4,708	13	406	349	1	4,708	13	406	349	319,254
90026	**South Thornton Call-n-Ride**	South Thornton Call-n-Ride	Transit	$130,000	3,397	251	292	9	1	3,397	251	292	9	230,289
90027	**FasTracks CMAQ Projects**	FasTracks CMAQ Projects	Transit	$7,500,000	3,767	278	324	10	33	124,311	9,174	10,692	330	255,396
90028	**West Corridor: 11th Ave to Knox Ct Multi-use Trail**	West Corridor: 11th Ave to Knox Ct Multi-use Trail	Transit	$923,000	3	-	-	-	24	72	-	-	-	194
90029	**Arvada Call 'n Ride Transit Service**	Arvada Call 'n Ride Transit Service	Transit	$142,000	5,580	412	480	15	1	5,580	412	480	15	378,337
90030	**95th/96th S. Transit Service: Longmont to Flatiron Crossing**	95th/96th S. Transit Service: Longmont to Flatiron Crossing	Transit	$638,000	16,236	1,200	1,398	44	12	194,832	14,400	16,776	528	1,100,731

NFRMPO

State ID	Project Name	Project Description	Project Category	Funds Obligated	1st Year CO Benefit (kg/ year)	1st Year VOC Benefit (kg/ year)	1st Year NOx Benefit (kg/ year)	1st Year PM-10 Benefit (kg/ year)	Lifetime Benefit Years	Lifetime CO Benefit (kg/ year)	Lifetime VOC Benefit (kg/ year)	Lifetime NOx Benefit (kg/ year)	Lifetime PM-10 Benefit (kg/ year)	Annual VMT Reduction
16503	**Comprehensive Signal Timings**	Synchronize/Interconnect traffic signals in Fort Collins	Traffic Flow Improvements	$200,000	1,147,835	-	-	-	3	3,443,505	-	-	-	-

State ID	Project Name	Project Description	Project Category	Funds Obligated	1st Year CO Benefit (kg/ year)	1st Year VOC Benefit (kg/ year)	1st Year NOx Benefit (kg/ year)	1st Year PM-10 Benefit (kg/ year)	Lifetime Benefit Years	Lifetime CO Benefit (kg/ year)	Lifetime VOC Benefit (kg/ year)	Lifetime NOx Benefit (kg/ year)	Lifetime PM-10 Benefit (kg/ year)	Annual VMT Reduction
16603	**Ft. Collins Various Intersections**	INTERSECTION IMPROVEMENTS	Traffic Flow Improvements	$144,882	2,286	-	-	-	5	11,430	-	-	-	-
90022	**ITS Transit Information**	ITS Transit Information	Traffic Flow Improvements	$480,000	77	-	-	-	5	385	-	-	-	-
16469	**2008 CMAQ TDM FC - BIKE LIBRARY**	FREE BICYCLES LOCATED AROUND CITY FOR PUBLIC USE TDM PROGRAM	Demand Management	$25,000	856	60	66	2	4	3,424	240	264	8	50,544
16470	**2008 CMAQ TDM FORT COLLINS - BIKES**	MARKETING AND OUTREACH (BIKE TO WORK DAY, ETC.) PROMOTING BIKING AS TRANSPORTATION	Demand Management	$45,000	1,719,816	119,798	131,981	4,061	2	3,439,632	239,596	263,962	8,122	101,523,924
16526	**Mason/Corridor Troutman Crossing**	BIKE/PED GRADE SEPARATED STRUCTURE AT BNSF RAILROAD	Pedestrian/ Bicycle	$173,859	14,651	1,021	1,124	35	24	351,624	24,504	26,976	840	864,864
16584	**Mason Trail Extension To Spring Creek**	PED/BIKE TRAIL AND BRIDGE	Pedestrian/ Bicycle	$545,000	14,651	1,021	1,124	35	24	351,624	24,504	26,976	840	864,864
90023	**Test Ride Transfort**	Test Ride Transfort	Transit	$136,000	24,656	1,717	1,892	58	2	49,312	3,434	3,784	116	1,455,485
90024	**Alternate Fueled Bus**	Alternate Fueled Bus	Transit	$840,000	1,958	-	-	-	10	19,580	-	-	-	52,426

PPACG

State ID	Project Name	Project Description	Project Category	Funds Obligated	1st Year CO Benefit (kg/ year)	1st Year VOC Benefit (kg/ year)	1st Year NOx Benefit (kg/ year)	1st Year PM-10 Benefit (kg/ year)	Lifetime Benefit Years	Lifetime CO Benefit (kg/ year)	Lifetime VOC Benefit (kg/ year)	Lifetime NOx Benefit (kg/ year)	Lifetime PM-10 Benefit (kg/ year)	Annual VMT Reduction
15837	**Interquest Corridor Phase I & II**	PURCHASE AND INSTALL ITS EQUIPMENT FOR PHASE I & II	Traffic Flow Improvements	$1,898,094	17,270	-	-	-	5	86,350	-	-	-	-
15838	**Austin Bluffs Project ITS Phase I & II**	PURCHASE AND INSTALL ITS EQUIPMENT FOR PHASE I & II	Traffic Flow Improvements	$1,139,579	708,648	-	-	-	5	3,543,240	-	-	-	-
16079	**FALCON PARK & RIDE**	NEW PARK & RIDE	Shared Ride	$173,445	30,831	2,148	2,366	73	10	308,310	21,480	23,660	730	1,820,000
16647	**2008 CMAQ RIDEFINDERS UNMATCHED**	CMAQ RIDEFINDERS PROGRAM	Shared Ride	$301,150	78,578	5,474	6,030	186	5	392,890	27,370	30,150	930	4,638,654
16648	**2008 CMAQ RIDEFINDERS MATCHED**	CMAQ RIDEFINDERS PROGRAM	Shared Ride	$80,000	46,177	3,217	3,544	109	5	230,885	16,085	17,720	545	2,725,926

State ID	Project Name	Project Description	Project Category	Funds Obligated	1st Year CO Benefit (kg/ year)	1st Year VOC Benefit (kg/ year)	1st Year NOx Benefit (kg/ year)	1st Year PM-10 Benefit (kg/ year)	Lifetime Benefit Years	Lifetime CO Benefit (kg/ year)	Lifetime VOC Benefit (kg/ year)	Lifetime NOx Benefit (kg/ year)	Lifetime PM-10 Benefit (kg/ year)	Annual VMT Reduction
15783	**Woodmen & Black Forest P-n-R**	CONSTRUCT A 255 PARKING SPACE PARK-N-RIDE FACILITY	Transit	$659,105	7,608	530	584	18	10	76,080	5,300	5,840	180	449,098
15905	**Pikes Peak Lib Dist Bkmobile**	PURCHASE NEW BOOKMOBILE;RETROFIT EXISTING BOOKMOBILE	Transit	$227,223	3,610	251	277	9	5	18,050	1,255	1,385	45	213,127
90004	**Woodland Park Express: Woodmen Rd/Black Forest Rd P-n-R**	Woodland Park Express: Woodmen Rd/Black Forest Rd P-n-R	Transit	$2,073,541	4,491	313	345	11	5	22,455	1,565	1,725	55	265,118

PM-10 Areas

State ID	Project Name	Project Description	Project Category	Funds Obligated	1st Year CO Benefit (kg/ year)	1st Year VOC Benefit (kg/ year)	1st Year NOx Benefit (kg/ year)	1st Year PM-10 Benefit (kg/ year)	Lifetime Benefit Years	Lifetime CO Benefit (kg/ year)	Lifetime VOC Benefit (kg/ year)	Lifetime NOx Benefit (kg/ year)	Lifetime PM-10 Benefit (kg/ year)	Annual VMT Reduction
16289	**Routt County FY 2007 CMAQ - Paving**	PAVING AN EXISTING GRAVEL COUNTY ROAD.	PM10	$469,533	-	-	-	50,095	1	-	-	-	50,095	-
16291	**Aspen FY 2007 CMAQ Flush Truck**	FY 07 CITY OF ASPEN CMAQ (FLUSH TRUCK)	PM10	$116,035	-	-	-	100,127	3	-	-	-	300,381	-
16815	**FY 08 Steamboat CMAQ Street Sweeper**	PURCHASE A STREET SWEEPER	PM10	$151,915	-	-	-	158,500	3	-	-	-	475,500	-
15286	**FY05 MagChlrde-Tellurd/Mtn Vlg**	MAG CHLORIDE	PM10	$241	-	-	-	19,807	5	-	-	-	99,035	-
16387	**CMAQ FY07 TELLURIDE MTN. VILLAGE SWEEPER**	PURCHASE OF A STREET SWEEPER FROM CMAQ FUNDS	PM10	$155,645	-	-	-	32,433	5	-	-	-	162,165	-
16571	**CMAQ TELLURIDE TRUCK**	CMAQ FUNDED MAG. TRUCK FOR TELLURIDE	PM10	$206,975	-	-	-	32,433	5	-	-	-	162,165	-
16598	**08 TELLURIDE STREET SWEEPER**	PM-10 MITIGATION	PM10	$124,185	-	-	-	58,569	5	-	-	-	292,845	-

Source: FHWA FY2007 FMIS Report, extracted 02/26/2008; FHWA FY2008 FMIS Report, extracted 03/18/2009; CDOT FY2007 SAP Financial Report, extracted 03/24/2008; CDOT FY2008 SAP Financial Report, extracted 04/16/09; CDOT SAP CMAQ Project Sponsor report of FY2007- FY2008 project benefit data, extracted 08/11/09.

Appendix B – CMAQ Resolution TC-807

Transportation Commission of Colorado
January 20, 2000

Resolution Number TC-807

WHEREAS, the Congestion Mitigation and Air Quality (CMAQ) improvement program was developed under the Intermodal Surface Transportation Efficiency Act (ISTEA) and has been continued with the Transportation Equity Act for the 21st Century (TEA-21); and

WHEREAS, the purpose of the CMAQ program is to provide a flexible funding source for spending on transportation projects and programs that help to meet the Clean Air Act requirements and that help to reduce transportation-related emissions for state and local governments; and

WHEREAS, funding is available for both non-attainment areas (areas not in compliance with the National Ambient Air Quality Standards) and maintenance areas (areas that were formerly in non-compliance and are now in compliance); and

WHEREAS, current resource allocation forecasts indicate that Colorado can expect to receive $145,875,000 in CMAQ funds between Fiscal Year (FY) 2001–2006; and

WHEREAS, federal regulations state how the money can be spent; and

WHEREAS, CMAQ money is allocated to the state of Colorado to be distributed within the state among the eligible areas as determined by the State in consultation with non-attainment areas, local governments, MPOs and the state; and

WHEREAS, in the past, CMAQ money has been allocated to the carbon monoxide non-attainment area MPOs based on 50 percent Vehicle-Miles Traveled (VMT) and 50 percent population; and

WHEREAS, based upon TEA-21 provisions that allow CMAQ money to be used in PM-10 non-attainment areas, last year the Commission allocated a total of $2 million over 3 years (FY 1998-2000) to the five rural PM-10 non-attainment areas; and

WHEREAS, CDOT's budget is now required by the Joint Budget Committee of the General Assembly to include performance measures describing the results of CDOT's various programs and projects; and

WHEREAS, CMAQ funds have not yet been allocated beyond FY 2000.

NOW THEREFORE BE IT RESOLVED, the Commission has determined that for the remainder of TEA-21 (FY 2001 – 2003):

A total of $1,000,000 per year of CMAQ funds be allocated among the five rural PM-10 non-attainment areas;

the remaining balance of CMAQ funds will be allocated to the three non-attainment MPOs based on the 50% VMT and 50% population as follows:

DRCOG – 76.31%
PPACG - 18.13%
NFRT&ACPC – 5.56%

project selection for CMAQ funds will be at the local level: in the non-attainment MPOs, projects, including eligible CDOT and transit agency projects, will be selected by the MPOs cooperatively with CDOT and the public transit agencies; and, in the rural non-attainment areas, projects will be selected by local governments cooperatively with their respective CDOT Regions.

CMAQ fund recipients will report annually in writing to the Commission on the effectiveness of the CMAQ fund expenditures.

CDOT will continue developing performance measures as part of its on-going resource allocation and budget requirements, including measures related to the CMAQ program, seeking input from external stakeholders.

If performance measurement of the CMAQ program indicate concerns regarding the effectiveness of the use of CMAQ funds, the Commission reserves the option for reviewing and altering the allocation formula.

FURTHER, for the period 2004 through 2020, the above formula can be used for planning purposes but is not a budget allocation.

Appendix C – CMAQ Reporter Formulas

Paving

PM10 Emissions Reduction (kg) = AVMT * (EFi - EFi*(1-RF))

Variable	Default	Units	Description
AVMT	-	miles	Total annual vehicles miles of travel affected by the project for the year
EFi	0.606	kg/VMT	Emissions Factor before Paving
RF	0.9818	unitless	Percent Reduction in Emissions entered as a decimal (This value should not be changed)
WF	0.5443	unitless	Weight factor (This value should not be changed)

Broom Sweeping (ADT > 5000)

PM10 Emissions Reduction (kg) = AVMT * (EFi - EFf)

Where:

Ei = Initial Emissions Factor = k*(SLi/2)^0.65*WF

Ef = Final Emissions Factor = k*(SLf/2)^0.65*WF

SLf = Final Silt Loading Factor = ((SLi-0.5)*(1-RF/100))+0.5

Variable	Default	Units	Description
AVMT	-	miles	Total annual vehicles miles of travel affected by the project for the year
k	0.073	kg/VMT	Particle size range base emission factor (This value should not be changed)
SLi	-	kg/m2	Initial Silt Loading Factor entered by the administrator
RF	0.32	unitless	Percent Reduction in Emissions entered as a decimal (This value should not be changed)
WF	0.5443	unitless	Weight factor (This value should not be changed)

Broom Sweeping (ADT < 5000)

PM10 Emissions Reduction (kg) = AVMT * (EFi - EFf)

Where:

Ei = Initial Emissions Factor = k*(SLi/2)^0.65*WF

Ef = Final Emissions Factor = k*(SLf/2)^0.65*WF

SLf = Final Silt Loading Factor = ((SLi-3.0)*(1-RF/100))+3.0

Variable	Default	Units	Description
AVMT	-	miles	Total annual vehicles miles of travel affected by the project for the year
k	0.073	kg/VMT	Particle size range base emission factor (This value should not be changed)
SLi	-	kg/m2	Initial Silt Loading Factor entered by the administrator

RF	0.32	unitless	Percent Reduction in Emissions entered as a decimal (This value should not be changed)
WF	0.5443	unitless	Weight factor (This value should not be changed)

Deicing (ADT > 5000)

PM10 Emissions Reduction (kg) = AVMT * (EFi - EFf)

Where:

Ei = Initial Emissions Factor = k*(SLi/2^)0.65*WF

Ef = Final Emissions Factor = k*(SLf/2)^0.65*WF

SLf = Final Silt Loading Factor = ((SLi-0.5)*(1-RF/100))+0.5

Variable	Default	Units	Description
AVMT	-	miles	Total annual vehicles miles of travel affected by the project for the year
k	0.073	kg/VMT	Particle size range base emission factor (This value should not be changed)
SLi	-	kg/m2	Initial Silt Loading Factor entered by the administrator
RF	0.2	unitless	Percent Reduction in Emissions entered as a decimal (This value can vary between .20 and .90)
WF	0.5443	unitless	Weight factor (This value should not be changed)

Deicing (ADT < 5000)

PM10 Emissions Reduction (kg) = AVMT * (EFi - EFf)

Where:

Ei = Initial Emissions Factor = k*(SLi/2)^0.65*WF

Ef = Final Emissions Factor = k*(SLf/2)^0.65*WF

SLf = Final Silt Loading Factor = ((SLi-3.0)*(1-RF/100))+3.0

Variable	Default	Units	Description
AVMT	-	miles	Total annual vehicles miles of travel affected by the project for the year
k	0.073	kg/VMT	Particle size range base emission factor (This value should not be changed)
SLi	-	kg/m2	Initial Silt Loading Factor entered by the administrator
RF	0.2	unitless	Percent Reduction in Emissions entered as a decimal (This value can vary between .20 and .90)
WF	0.5443	unitless	Weight factor (This value should not be changed)

Vacuum Sweeping

PM10 Emissions Reduction (kg) = AVMT * (EFi - EFf)

Where:

Ei = Initial Emissions Factor = k*(SLi/2)^0.65*WF

Ef = Final Emissions Factor = k*(SLf/2)^0.65*WF

SLf = Final Silt Loading Factor = SLi*(1-RF/100)

Variable	Default	Units	Description
AVMT	-	miles	Total annual vehicles miles of travel affected by the project for the year
k	0.073	kg/VMT	Particle size range base emission factor (This value should not be changed)
SLi	-	kg/m2	Initial Silt Loading Factor entered by the administrator
RF	0.34	unitless	Percent Reduction in Emissions entered as a decimal (This value should not be changed)
WF	0.5443	unitless	Weight factor (This value should not be changed)

Reduced Sanding or Sweeping

PM10 Emissions Reduction (kg) = EF * 907 * APN * RF * 240

Where:

907 is the conversion factor from tons to kilograms

240 is the number of days in the PM10 season. Multiplying by this factor will provide a yearly reduction.

Variable	Default	Units	Description
EF	102.1	tons/day	Uncontrolled emissions factor for the region
APN	-	unitless	Agency's percent of the reported sanding network for all reporting agency's. If you don't know this value, ask RAQC
RF	-	unitless	Percent of PM10 emissions reduced from the baseline level (1989). If this value is not known, it can be calculated by the following equation:

RF = (1-(0.36*(1-(SRC* % Swept)) + (0.64(1-% Sand Reduction)^0.8*(1-(SRC*% Swept))))

where:

0.36 is dust faction of emissions and 0.64 is sand plus residual sand fraction of emissions

SRC = Sweeping equipment emissions reduction credit; currently recommended as 0.37 for Mechanical and Combination equipment or 0.61 or Vacuum and Regenerative Air equipment.

% Swept = % of Network Swept in 4 days, [as reported in section E of the annual Street Sand Use Report].

% Sand Reduction = ((Baseline Rate - Material Application Rate)/Baseline Rate) * 100

Baseline Rate (lbs/lane mile) = (Sand applied in tons * 2000)/Miles driven in 1989 for each entity. If Baseline is not known, contact the RAQC or APCD.

Material Application Rate (lbs./lane mile) = (Material applied, as corrected total in tons * 2000) / Miles Driven

Material Applied, as corrected in tons (Solids Only) = Sand/Salt and Ice Slicer shall be recorded as actual tons applied. Realite shall be multiplied by a factor of 1.1. All the above totals of solid material in tons shall be summed for the corrected total. Can be found in Section B of annual Street Sand Use Report

Miles Driven if do not know, can be found Section D of Annual Street Sand Use Report

The power of 0.8 is the EPA factor used to calculate emissions reduction credit from the reduction of applied sand.

240 are the number of days in the PM10 season, multiplying by this factor will provide a yearly reduction.

Carpool Matching
AVMTR = (N + Nt-1 + 0.75 * Nt-2) * P * (1/AVO) * ((S-1)/S) * (F/W) * Nt * Nd * D

Variable	Default	Units	Description
N		people	The average number of carpool commuters at any given time during the year.
Nt-1		applications	Number of carpool matching applications processed in the previous year (i.e. 2001 if N = 2002)
Nt-2		applications	Number of carpool matching applications processed in the year prior to the previous year (i.e. 2000). The final portion of the equation is then multiplied by 0.75 to account for months 24 - 33 of carpool operation.
P	0.16	unitless	Ongoing placement rate. The proportion (expressed as a decimal) of matching applicants placed in carpools.
AVO	1.08	people	Average vehicle occupancy for work trips.
S	2.74	people	Average carpool size (including the driver).
F		days	Average number of days per week that carpool is used instead of driving alone.
W	5	days	Number of workdays in a week.
D	19.5	miles	Average one-way trip distance.
Nd	240	days	Number of benefit days per year.
Nt	2	trips	Number of one-ways trips per day.

Vanpool Matching
AVMTR = N * (1/AVO) * ((S-1)/S) * (F/W) * Nt * Nd * D

Variable	Default	Units	Description
N	-	people	The average number of vanpool commuters at any given time during the year.
AVO	1.08	people	Average vehicle occupancy for work trips.
S	-	people	Average vanpool size (including the driver).
F	-	days	Average number of days per week that vanpool is used instead of driving alone.
W	5	days	Number of workdays in a week.
Nt	2	trips	Number of one-ways trips per day.
Nd	240	days	Number of benefit days per year.
D	19.5	miles	Average one-way trip distance.

School Pool

AVMTR = N * P * ((S-1)/S) * D * W * Nw * ((P2 * Nt) + (1 - P2) * Nf)

Variable	Default	Units	Description
N	-	people	Number of families in the database
P	0.2424	unitless	The proportion (expressed as a decimal) of families in the database that form carpools
S	2.13	people	Average carpool size (including the driver).
D	-	miles	Average one-way trip distance.
W	4.81	days	Number of carpool days in a week.
Nw	-	weeks	Number of weeks in a school year
P2	0.49	unitless	The proportion (expressed as a decimal) of two-way trip carpools. The remainder of carpools is assumed to be four-way trip carpools
Nt	2	trips	Number of one-ways trips per day for the two-way trip carpool
Nf	4	trips	Number of one-ways trips per day for the four-way trip carpool

New or Expanded Transit Service

AVMTR = (((Rf - Ri) * (1 - GR) * D * Nt * PSOV) - (EF * DBVMT)) * Nd

Variable	Default	Units	Description
Rf	-	people	Average daily ridership after project
Ri	-	people	Average daily ridership before project
GR	-	unitless	Yearly population growth rate (expressed as a decimal) for the surrounding community. For example, .2 = 20% growth, -.3 = 30% loss
D	19.5	miles	Average one-way trip distance.
Nt	2	trips	Number of one-ways trips per day.
PSOV	-	unitless	Proportion of users (expressed as a decimal) that formerly commuted by single occupant vehicle
EF	-	unitless	Emission factor of transit vehicle (i.e., bus) relative to automobiles. For example, 3 = transit emits three times as much

			as automobiles.
DBVMT	1	miles	Average daily transit vehicle (i.e., bus) miles traveled, including route mileage and mileage to and from garage
Nd	290	days	Number of benefit days per year.

Bicycle/Pedestrian

AVMTR = PSOV * Nd * D

Variable	Default	Units	Description
PSOV	-	unitless	Proportion of users (expressed as a decimal) that formerly commuted by single occupant vehicle
Nd	252	days	Number of benefit days per year.
D		miles	Total number of miles traveled on new facility per day (for all users)

New Transit Station

AVMTR = N * Cs / Cl * PSOV * Nd * D

Variable	Default	Units	Description
N	-	people	Number of new trips traveling through the station
Cs		dollars	Cost of station
Cl	-	dollars	Total cost of transit lines feeding into station
PSOV	-	unitless	Proportion of users (expressed as a decimal) that formerly commuted by single occupant vehicle
Nd	290	days	Number of benefit days per year.
D	19.5	miles	Average one-way trip distance.

HOV Lanes

AVMTR = N * (PSOV - (1/S)) * Nd * D

Variable	Default	Units	Description
N	-	vehicles	Average total number of vehicles traveling on HOV facility per day
PSOV	-	unitless	Proportion of users (expressed as a decimal) that formerly commuted by single occupant vehicle
S	2.74	people	Average carpool size (including the driver).
Nd	290	days	Number of benefit days per year.
D	19.5	miles	Average one-way trip distance.

Telework / Telecommute

AVMTR = N * P * D * Nt * W * Nw

Variable	Default	Units	Description
N	-	people	Total number of employees that work at companies with a

			telework program
P	0.0536	unitless	Percentage (expressed as a decimal) of employees that telework
D	19.5	miles	Average one-way trip distance.
Nt	2	trips	Number of one-ways trips per day.
W	1.62	days	Average days per week that employees telework instead of commuting
Nw	50	weeks	Number of work weeks per year

Bike Share

AVMTR = PSOV * Nd * D

Variable	Default	Units	Description
PSOV	-	unitless	Proportion of users (expressed as a decimal) that formerly commuted by single occupant vehicle
Nd	252	days	Number of benefit days per year.
D		miles	Average daily number of miles traveled on shared bicycles

Bike to Work Day

AVMTR = N * R * D * Nt * Nd

Variable	Default	Units	Description
N	-	people	The average number of bike to work participants
R	0.59	unitless	Percentage (expressed as a decimal) of participants who already regularly bike to work
D	19.5	miles	Average one-way trip distance.
Nt	2	trips	Number of one-ways trips per day.
Nd	4.21	days	Number of benefit days per year. Equal to the number of days that participants biked to work during the initial event plus any months following the event.

Marketing

AVMTR = N * P * (R / E) * PSOV * Nt * Nd * D

Variable	Default	Units	Description
N	-	items	Number of items (e.g., pamphlets, flyers, etc.) distributed by the project
P	0.6	unitless	Proportion (expressed as a decimal) of items that are seen by the target audience. Default value is from Coloradoan.
R	0.27	unitless	Percent (expressed as a decimal) recall of multiple ads. Default value is from Riger Knowledge Base Media.
E	3	items	Minimum number of exposures needed to incite action in the target audience. Default value is from Riger Knowledge Base Media.

PSOV	-	unitless	Proportion of users (expressed as a decimal) that formerly commuted by single occupant vehicle
Nt	2	trips	Number of one-ways trips per day.
Nd	240	days	Number of benefit days per year.
D	19.5	miles	Average one-way trip distance.

Inspection and Maintenance (I/M)

AVMTR = ADT * P * (J1 - J2) * D * Nd

Variable	Default	Units	Description
ADT	-	trips	Average number of trips per day
P	-	unitless	Proportion of vehicles (expressed as a decimal) subject to I/M
J1	-	unitless	Before I/M emission speed factor
J2	-	unitless	After I/M emission speed factor
D	-	miles	Average one-way trip distance.
Nd	252	days	Number of benefit days per year.

ITS and Traffic Controls

This formula allows for direct entry of CO emission reduction. The project sponsor provides calculations.

Variable		Units	Description
VHT		hours	Total number of vehicle hours eliminated by the project during the year.
CO		kg	Total kilograms of carbon monoxide eliminated by the project during the year.

Common PM 10 Formula

PM10 Emissions Reduction (kg) = (TPEF + (SLEF / 1000) * (1 - RF)) * AVMTR

Variable	Default	Units	Description
TPEF	-	kg/mile	Tailpipe PM10 emissions factor entered by administrator
SLEF	-	g/vmt	Uncontrolled emissions factor for the region
RF	-	unitless	Percent PM10 reduction by the Agency, entered as a decimal

Emission Reduction Formula

Emission Reduction CO, NOx, VOC, PM-10 = AVMTR * Emission Factor CO, NOx, VOC, PM-10

Reporter Emission Factors

Factors provided by Colorado Department of Public Health and Environment

Tailpipe Emission Factors

Emission Region	Year	CO	NOx	VOCs	PM10
		(g/mile)	(g/mile)	(g/mile)	(g/mile)
Denver Metro	2007	16.238	1.445	1.263	0.0418
All Other Areas	2007	18.509	1.477	1.361	0.0418
Denver Metro	2008	14.747	1.272	1.092	0.0392
All Other Areas	2008	16.938	1.303	1.184	0.0392

Silt Loading Factors

Emission Region	Silt Loading Factor (g/m2)
Aspen - Local Streets	10.7
Aspen - Main St. (SH 82 in town)	15.2
Aspen - SH 82 Outside City	7.15
Cañon City - Local Streets	9.714
Cañon City - US 50	29.98
Pagosa Springs - Local Streets	9.714
Pagosa Springs - US 160 Through Town	29.98
Pitkin County Roads	14.84
Steamboat Springs - Lincoln Ave.	29.98
Steamboat Springs - Local streets	9.714
Steamboat Springs - US 40 Outside City	4.96
Telluride - SH 145 Near Society Turn	32.47
Telluride and Mountain Village Local Streets	9.714

Appendix D – Future Benefits Calculation Methodology

The Effective Benefit Years factor has been developed to incorporate the project lifespan (i.e., how long the project provides benefits) and the future effectiveness into one value that eases calculating total future benefits. The equation for calculating total future benefits is shown below:

FB = FYB * EFP

Where:
FB = Future year benefits
FYB = First year benefits
EFP = Effective Benefit Years value from the table below

As an example, consider a carpool matching project with an annual CO savings of 1000 Kgs. The future benefits of this project will be:

FB = 1000 * 3 = 3000 Kgs CO

The following table identifies the Effective Benefit Year values for the types of projects commonly funded by CMAQ.

Type of Project	Effective Benefit Years
Paving	11
Broom Sweeping	5
Deicing – Equipment Purchase	5
Deicing – Salt/Mag Chloride Purchase	1
Carpool Matching	3
Vanpool Matching	5
Vanpool Vehicles	5
Schoolpool Matching	2
New or Expanded Transit Service Operations	1
Transit Vehicles	12
Bike/Ped Facility	24
New Transit Station	33
Telework/Telecommute	2
Bike to Work Day	2
Marketing	1
ITS / Signal Infrastructure	5
Traffic Signal Coordination	3

Appendix E - Federal Code

TITLE 23 -HIGHWAYS
CHAPTER 1 -FEDERAL-AID HIGHWAYS
§ 149. Congestion mitigation and air quality improvement program

(a) Establishment.— The Secretary shall establish and implement a congestion mitigation and air quality improvement program in accordance with this section.
(b) Eligible Projects.— Except as provided in subsection (c), a State may obligate funds apportioned to it under section 104 (b)(2) for the congestion mitigation and air quality improvement program only for a transportation project or program if the project or program is for an area in the State that is or was designated as a nonattainment area for ozone, carbon monoxide, or particulate matter under section 107(d) of the Clean Air Act (42 U.S.C. 7407 (d)) and classified pursuant to section 181(a), 186(a), 188(a), or 188(b) of the Clean Air Act (42 U.S.C. 7511 (a), 7512 (a), 7513 (a), or 7513 (b)) or is or was designated as a nonattainment area under such section 107 (d) after December 31, 1997, or is required to prepare, and file with the Administrator of the Environmental Protection Agency, maintenance plans under the Clean Air Act (42 U.S.C. 7401 et seq.) and—

(1)

(A)

(i) if the Secretary, after consultation with the Administrator determines, on the basis of information published by the Environmental Protection Agency pursuant to section 108(f)(1)(A) of the Clean Air Act (other than clause (xvi)) that the project or program is likely to contribute to—

(I) the attainment of a national ambient air quality standard; or

(II) the maintenance of a national ambient air quality standard in a maintenance area; and

(ii) a high level of effectiveness in reducing air pollution, in cases of projects or programs where sufficient information is available in the database established pursuant to subsection (h) to determine the relative effectiveness of such projects or programs; or,

(B) in any case in which such information is not available, if the Secretary, after such consultation, determines that the project or program is part of a program, method, or strategy described in such section 108 (f)(1)(A);

(2) if the project or program is included in a State implementation plan that has been approved pursuant to the Clean Air Act and the project will have air quality benefits;
(3) the Secretary, after consultation with the Administrator of the Environmental Protection Agency, determines that the project or program is likely to contribute to the attainment of a national ambient air quality standard, whether through reductions in vehicle miles traveled, fuel consumption, or through other factors;
(4) to establish or operate a traffic monitoring, management, and control facility or program, including advanced truck stop electrification systems, if the Secretary, after consultation with the Administrator of the Environmental Protection Agency, determines

that the facility or program is likely to contribute to the attainment of a national ambient air quality standard;

(5) if the program or project improves traffic flow, including projects to improve signalization, construct high occupancy vehicle lanes, improve intersections, improve transportation systems management and operations that mitigate congestion and improve air quality, and implement intelligent transportation system strategies and such other projects that are eligible for assistance under this section on the day before the date of enactment of this paragraph;

(6) if the project or program involves the purchase of integrated, interoperable emergency communications equipment; or

(7) if the project or program is for—

(A) the purchase of diesel retrofits that are—

(i) for motor vehicles(as defined in section 216 of the Clean Air Act(42U.S.C.7550));or

(ii) published in the list under subsection (f)(2) for non-road vehicles and non-road engines (as defined in section 216 of the Clean Air Act (42 U.S.C. 7550)) that are used in construction projects that are—

(I) located in nonattainment or maintenance areas for ozone, PM10, or PM2.5 (as defined under the Clean Air Act (42 U.S.C. 7401 et seq.)); and

(II) funded, in whole or in part, under this title; or

(B) the conduct of outreach activities that are designed to provide information and technical assistance to the owners and operators of diesel equipment and vehicles regarding the purchase and installation of diesel retrofits.

No funds may be provided under this section for a project which will result in the construction of new capacity available to single occupant vehicles unless the project consists of a high occupancy vehicle facility available to single occupant vehicles only at other than peak travel times. In areas of a State which are nonattainment for ozone or carbon monoxide, or both, and for PM–10 resulting from transportation activities, the State may obligate such funds for any project or program under paragraph (1) or (2) without regard to any limitation of the Department of Transportation relating to the type of ambient air quality standard such project or program addresses.

(c) States Receiving Minimum Apportionment.—

(1) States without a nonattainment area.— If a State does not have, and never has had, a nonattainment area designated under the Clean Air Act (42 U.S.C. 7401 et seq.), the State may use funds apportioned to the State under section 104 (b)(2) for any project in the State that—

(A) would otherwise be eligible under this section as if the project were carried out in a nonattainment or maintenance area; or

(B) is eligible under the surface transportation program under section 133.

(2) States with a nonattainment area.— If a State has a nonattainment area or maintenance area and receives funds under section 104 (b)(2)(D) above the amount of funds that the State would have received based on its nonattainment and maintenance area population under subparagraphs (B) and (C) of section 104 (b)(2), the State may use that

portion of the funds not based on its nonattainment and maintenance area population under subparagraphs (B) and (C) of section 104 (b)(2) for any project in the State that—

(A) would otherwise be eligible under this section as if the project were carried out in a nonattainment or maintenance area; or

(B) is eligible under the surface transportation program under section 133.

(d) Applicability of Planning Requirements.— Programming and expenditure of funds for projects under this section shall be consistent with the requirements of sections 134 and 135 of this title.

(e) Partnerships With Nongovernmental Entities.—

(1) In general.— Notwithstanding any other provision of this title and in accordance with this subsection, a metropolitan planning organization, State transportation department, or other project sponsor may enter into an agreement with any public, private, or nonprofit entity to cooperatively implement any project carried out under this section.

(2) Forms of participation by entities.— Participation by an entity under paragraph (1) may consist of—

(A) ownership or operation of any land, facility, vehicle, or other physical asset associated with the project;

(B) cost sharing of any project expense;

(C) carrying out of administration, construction management, project management, project operation, or any other management or operational duty associated with the project; and

(D) any other form of participation approved by the Secretary.

(3) Allocation to entities.— A State may allocate funds apportioned under section 104 (b)(2) to an entity described in paragraph (1).

(4) Alternative fuel projects.— In the case of a project that will provide for the use of alternative fuels by privately owned vehicles or vehicle fleets, activities eligible for funding under this subsection—

(A) may include the costs of vehicle refueling infrastructure, including infrastructure that would support the development, production, and use of emerging technologies that reduce emissions of air pollutants from motor vehicles, and other capital investments associated with the project;

(B) shall include only the incremental cost of an alternative fueled vehicle, as compared to a conventionally fueled vehicle, that would otherwise be borne by a private party; and

(C) shall apply other governmental financial purchase contributions in the calculation of net incremental cost.

(5) Prohibition on federal participation with respect to required activities.— A Federal participation payment under this subsection may not be made to an entity to fund an obligation imposed under the Clean Air Act (42 U.S.C. 7401 et seq.) or any other Federal law.

(f) Cost-Effective Emission Reduction Guidance.—

(1) Definitions.— In this subsection, the following definitions apply:

(A) Administrator.— The term “Administrator” means the Administrator of the Environmental Protection Agency.

(B) Diesel retrofit.— The term "diesel retrofit" means a replacement, repowering, rebuilding, after treatment, or other technology, as determined by the Administrator.

(2) Emission reduction guidance.— The Administrator, in consultation with the Secretary, shall publish a list of diesel retrofit technologies and supporting technical information for—

(A) diesel emission reduction technologies certified or verified by the Administrator, the California Air Resources Board, or any other entity recognized by the Administrator for the same purpose;

(B) diesel emission reduction technologies identified by the Administrator as having an application and approvable test plan for verification by the Administrator or the California Air Resources Board that is submitted not later than 18 months of the date of enactment of this subsection;

(C) available information regarding the emission reduction effectiveness and cost effectiveness of technologies identified in this paragraph, taking into consideration air quality and health effects.

(3) Priority.—

(A) In general.— States and metropolitan planning organizations shall give priority in distributing funds received for congestion mitigation and air quality projects and programs from apportionments derived from application of sections 104 (b)(2)(B) and 104 (b)(2)(C) to—

(i) diesel retrofits, particularly where necessary to facilitate contract compliance, and other cost-effective emission reduction activities, taking into consideration air quality and health effects; and

(ii) cost-effective congestion mitigation activities that provide air quality benefits.

(B) Savings.— This paragraph is not intended to disturb the existing authorities and roles of governmental agencies in making final project selections.

(4) No effect on authority or restrictions.— Nothing in this subsection modifies or otherwise affects any authority or restriction established under the Clean Air Act (42 U.S.C. 7401 et seq.) or any other law (other than provisions of this title relating to congestion mitigation and air quality).

(g) Interagency Consultation.— The Secretary shall encourage States and metropolitan planning organizations to consult with State and local air quality agencies in nonattainment and maintenance areas on the estimated emission reductions from proposed congestion mitigation and air quality improvement programs and projects.

(h) Evaluation and Assessment of Projects.—

(1) In general.— The Secretary, in consultation with the Administrator of the Environmental Protection Agency, shall evaluate and assess a representative sample of projects funded under the congestion mitigation and air quality program to—

(A) determine the direct and indirect impact of the projects on air quality and congestion levels; and

(B) ensure the effective implementation of the program.

(2) Database.— Using appropriate assessments of projects funded under the congestion mitigation and air quality program and results from other research, the Secretary shall maintain and disseminate a cumulative database describing the impacts of the projects.

(3) Consideration.— The Secretary, in consultation with the Administrator, shall consider the recommendations and findings of the report submitted to Congress under section 1110(e) of the Transportation Equity Act for the 21st Century (112 Stat. 144), including recommendations and findings that would improve the operation and evaluation of the congestion mitigation and air quality improvement program.

(Added Pub. L. 93–87, title I, § 142(a), Aug. 13, 1973, 87 Stat. 272; amended Pub. L. 102–240, title I, § 1008(a), Dec. 18, 1991, 105 Stat. 1932; Pub. L. 102–388, title III, § 380, Oct. 6, 1992, 106 Stat. 1562; Pub. L. 104–59, title III, § 319(a)(1), (b), Nov. 28, 1995, 109 Stat. 588, 589; Pub. L. 104–88, title IV, § 405(a)(2), (b), Dec. 29, 1995, 109 Stat. 956, 957; Pub. L. 105–178, title I, § 1110(a)–(d)(1), June 9, 1998, 112 Stat. 142, 143; Pub. L. 109–59, title I, § 1808(a)–(f), Aug. 10, 2005, 119 Stat. 1461–1463.)

Appendix F – Pollutant Levels

Carbon Monoxide (CO) Concentrations by Area

In Colorado, there are three CMAQ areas eligible for CMAQ funds based on Carbon Monoxide (CO): Colorado Springs, Denver and Fort Collins. All three areas have met both the 1-hour and 8-hour Federal standard for CO emissions since 2002.

CO	2007		2008	
Standard	1hr	8hr	1hr	8hr
	35	9	35	9
	ppm	ppm	ppm	ppm
Colorado Springs	4	2.1	3.5	2.3
Denver	5.9	2.8	7	3.1
Fort Collins	3.5	2.4	4.6	2.9

Data source: APCD Annual Data Report, 2007, 2008.

PM-10 Concentrations by Area

There are five rural PM-10 areas in Colorado: Aspen, Cañon City, Pagosa Springs, Steamboat Springs, and Telluride/Mountain Village. Denver is a metropolitan PM-10 area.

PM10	2007*	2008
Standard	24hr	24hr
	150	150
	ug/m3	ug/m3
Aspen	79	Not Reported
Cañon City	31	54
Denver	118	142
Pagosa Springs	102	149
Steamboat Springs	99	Not Reported
Telluride/ Mountain Village	77	82

*Revised standard promolgated.

Data sources: APCD Annual Data Report 2007, 2008, personal communication APCD 10/1/09, Revised PM10 Maintenance Plan for Telluride Attainment/Maintenance Area 2009, and Revised PM10 Maintenance Plan for Pagosa Springs Attainment/Maintenance Area, 2009

Ozone Concentrations by Area

A nine county Front Range area of the state, including all or portions of Douglas, Jefferson, Denver, Broomfield, Adams, Arapaho, Boulder, Larimer and Weld Counties was designated a marginal nonattainment area for ozone based on the 8-hour standard of 80 ppb in November 2007. In May 2008, the standard was revised to 75ppb, but later vacated to reassess the standard. A final (revised) 8-hour ozone standard is expected to be promulgated by August 31, 2010.[7] Compliance with conformity standards would be required by December 2013.

Ozone Nonattainment Area	2007		2008*	
Standard	1hr	8hr	8hr	8hr
	0.12	0.08	0.075	0.075
	ug/m3	ug/m3	ug/m3	ug/m3
DRCOG	0.108	0.090	0.080	0.080
NFR/UFR	0.106	0.085	0.073	0.073

*Revised standard promulgated.

Data source APCD Annual Data Report, 2007, 2008.

[7] According to the Environmental Protection Agency's (EPA) website (01/06/2010) the EPA has proposed to strengthen the national ambient air quality standards for ground-level ozone. The proposed revisions are based on scientific evidence about ozone and its effects on people and sensitive trees and plants. EPA will accept comments for 60 days following the proposal in the Federal Register.