

The Colorado Department of Transportation
Congestion Mitigation and Air Quality Program
2006 Annual Report



Presented to the Transportation Commission
December 19, 2007

Introduction

The purpose of the Congestion Mitigation and Air Quality Improvement (CMAQ) Program is to reduce vehicle related pollution that plays a major role in the deterioration of air quality in urban areas. The Federal Clean Air Act sets National Ambient Air Quality Standards (NAAQS) for pollutants. Transportation sources are significant for three of the NAAQS pollutants that include carbon monoxide (CO), ozone, and particulate matter – 10 microns or less (PM-10).

Congress established the CMAQ program in ISTEA, expanded it under TEA-21, and continued it under SAFETEA-LU to provide extra funding to help reduce CO, ozone, and PM-10 in areas designated as non-attainment and maintenance under the Clean Air Act. In Colorado, the non-attainment / maintenance areas are the Denver, Fort Collins, and Colorado Springs urban areas, as well as, five rural areas: Aspen / Pitkin County, Canon City, Pagosa Springs, Steamboat Springs / Routt County, and Telluride / Mountain Village. The Transportation Commission has delegated project selection to the local level.

CMAQ Projects are typically strategies that reduce pollutants emitted by motor vehicles. The funds primarily support new facilities, equipment, and services that reduce transportation related emissions. The following pollutants are the focus of the emission reduction in the CMAQ program:

- **CO / Carbon Monoxide** – caused by incomplete fuel combustion in motor vehicles and is an issue in winter
- **NOx / Nitrogen Oxides** – contributes to ozone formation in summer and brown cloud in winter
- **VOC / Volatile Organic Compounds** – caused by fuel leakage; contributes to ozone formation in summer
- **PM-10 / Particulate Matter (10 microns or more)** – road dust; contributes to visibility problems in winter (brown cloud)

Following is summary of CMAQ project categories and activities (a complete list of 2006 projects and project descriptions can be found in Appendix A):

- **Construction** – HOV Lanes, Turning Lanes, Passing Lanes and Park-n-Ride Facilities
- **ITS / Signals** – Intelligent Transportation Systems, Traffic Signal Coordination
- **TDM, Shared Ride, and Other** – Travel Demand Management, Carpools, Marketing, Equipment Replacement, Ozone Outreach (RAQC)
- **Transit** – New, Expanded, or Express Transit Service
- **PM-10** – Paving (unpaved roads), Sweeping, Deicing

In 2000, the Colorado Transportation Commission expressed concern about the effectiveness of the CMAQ program in improving air quality and adopted a resolution (TC-807 (Appendix F)) to increase accountability for the CMAQ funds. The resolution determined an allocation of CMAQ funds and requires fund recipients to report annually to CDOT and the Commission on the effectiveness of CMAQ fund expenditures. The Colorado Department of Transportation together with the Metropolitan Planning Organizations, continue to work to improve the CMAQ benefit reporting system. For the 2006 Report, a methodology (Appendix D) was created to better account for future year benefits.

The CMAQ Reporter was unavailable during the time that the 2006 Annual Report was being generated, as it was being integrated into CDOT's larger financial and reporting systems. All the individual reporting organizations were requested to provide the project specific emissions numbers, from which the benefits were calculated using formulae from the CMAQ Reporter.

Funding

In Federal Fiscal Year 2006 (October 1, 2005 – September 30, 2006), \$18.1 million was available (obligated) for the CMAQ program statewide. According to resolution TC-807, the funds are shared between the MPOs based on a formula of 50 percent vehicle miles traveled (VMT) and 50 percent population, with an off-the-top \$1 million split among the five rural areas.

As shown in Figure 1, 69 percent or \$12.6 million was allocated to Denver Regional Council of Governments (DRCOG), 23 percent or \$4.2 million and 4 percent or \$0.6 million were allocated to Pikes Peak Area Council of Governments (PPACG) and North Front Range (NFR) MPO respectively. The remaining 0.7 million was divided among the Rural areas, Aspen/Pitkin County, Canon City, Pagosa Springs, Steamboat Springs/Routt County, and Telluride/Mountain Village.

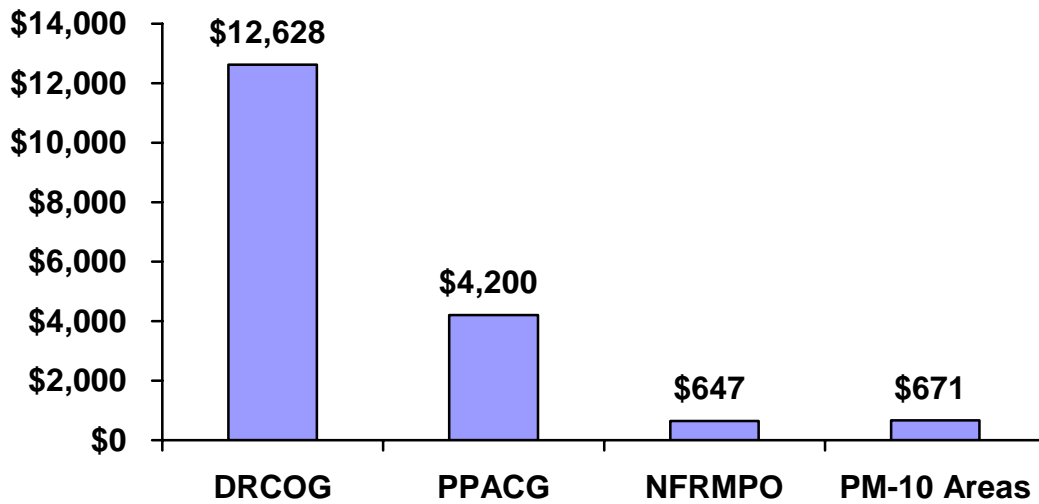


Figure 1 – FY 2006 Obligated Funds by Maintenance Area (in thousands)

Table 1 on the following page provides detailed information about all Fiscal Year 2006 CMAQ projects and includes funds budgeted, obligated, and expended during Federal Fiscal Year 2006 as well as all funds budgeted, obligated and spent over the life of the project (FY 2003 – FY 2006). Differences in funds budgeted, obligated, and expended are due to a variety of reasons including; the roll forward of unspent funds from one fiscal year into the next, and the budgeting of funds for some projects in FY 2005 and obligation occurred in FY 2006.

Table 1: Fiscal Year 2006 and CMAQ Project Total Funds Budgeted, Obligated and Spent

Organization	Program Name	Fiscal Year 2006 Funds (Single Year)			Total Project Funds (Multi Year Projects)*		
		Program Budget	Total Obligated Funds**	Total Spent	Program Budget	Obligated Funds*	Total Spent
Aspen/Pitkin County							
Aspen	FY 06 Pitkin County CMAQ (Vanpool)	\$194,175	\$160,757	\$0	\$194,175	\$160,757	\$0
Denver Regional Council of Governments							
DRCOG	RideArrangers (TDM Carpool)	\$1,926,968	\$1,926,968	\$1,705,688	\$5,320,968	\$2,173,968	\$4,537,070
DRCOG	Traffic Signal Improvements	\$2,524,712	\$5,380,245	\$3,678,998	\$7,632,272	\$10,487,805	\$7,229,900
RTD	Bus Route 153 (Transit Expansion)***	\$2,086,000	\$2,086,000		\$1,068,000	\$1,068,000	\$1,068,000
DRCOG	TDM Program Monitorship	\$831,536	\$831,536	\$831,536	\$5,261,217	\$5,261,217	\$2,729,556
Boulder	Arapahoe-Pearl Bike Ln 30th St	\$299,136	\$120,046	\$20,703	\$299,136	\$120,046	\$20,703
Greenwood Village	Orchard Rd Station Ped. Overpass***	\$600,000	\$600,000			\$600,000	
Greenwood Village	Dry Creek Ped Bridge**	\$600,000	\$600,000			\$600,000	
Douglas County	Lincoln Ave Station Ped. Overpass***	\$600,000	\$600,000			\$600,000	
DRCOG	RAQC-Big Clean Trucks	\$206,250	\$165,000	\$165,768	\$206,250	\$165,000	\$165,768
DRCOG	RAQC Hang Tag	\$248,362	\$198,690	\$247,089	\$248,362	\$198,690	\$247,089
Wheatridge	Wheatridge De-icing Equipment	\$145,000	\$120,045	\$104,239	\$145,000	\$120,045	\$104,239
North Front Range							
NFR MPO	Fort Collins TDM Outreach	\$16,173	\$16,173	\$3,283	\$289,164	\$289,164	\$276,274
Fort Collins	Mason Street Bike/Ped Underpass	\$295,000	\$237,117	\$277,417	\$295,000	\$237,117	\$277,417
Fort Collins	Harmony/Shields Intsec. Impvt	\$868,000	\$40,189	\$812,717	\$868,000	\$40,189	\$812,717
NFR MPO	ATMS/Traveler Info	\$318,000	\$255,604	\$303,737	\$318,000	\$255,604	\$303,737
Fort Collins	City of Ft Collins-Hi Emitter	\$39,645	\$39,645	\$4,809	\$39,645	\$39,645	\$4,809
NFR MPO	Natural Gas Compressor	\$73,000	\$58,676	\$69,373	\$73,000	\$58,676	\$69,373
Pikes Peak Area Council of Governments							
PPACG	City-wide Congestion Mgmt	\$1,768,000	\$1,768,000	\$0	\$6,671,000	\$8,439,000	\$4,365,771
PPACG	Downtown Circulator	\$445,000	\$445,000	\$445,152	\$1,342,000	\$1,708,000	\$1,708,152
PPACG	Inter-City Commuter Bus Service (FREX)	\$1,079,000	\$1,079,000	\$1,079,000	\$2,325,000	\$3,174,000	\$3,804,000
PPACG	Ridefinders (TDM Carpool)	\$320,446	\$308,446	\$250,431	\$594,446	\$582,446	\$318,107
PPACG	Woodmen Rd/Bl. Forest Rd P&R***	\$600,000	\$600,000	\$0	\$0	\$600,000	\$0
Southwest Region							
Pagosa Spgs	Pagosa Springs FY06 Street Sweeper	\$160,000	\$128,606	\$155,340	\$160,000	\$128,606	\$155,340

Pagosa Spgs	FY06 Pagosa Mag/Chlor/Sander	\$40,000	\$32,151	\$39,475	\$40,000	\$32,151	\$39,475
Northwest Region							
Steamboat Springs	Steamboat Springs (Paving)	\$112,295	\$112,295	\$0	\$388,556	\$388,556	\$0
Gunnison Valley							
Telluride	Mtn Village Combo Unit	\$0	\$76,360	\$92,233	\$0	\$76,360	\$92,233
Telluride	Tell FY06 Street Sweeper	\$145,000	\$116,549	\$140,777	\$145,000	\$116,549	\$140,777
Telluride	FY06 Mtn Village Mag Chloride	\$25,000	\$20,697	\$12,800	\$25,000	\$20,697	\$12,800
Telluride	FY06 Tell/Mtn Vlg Mag Chloride	\$30,000	\$24,114	\$0	\$30,000	\$24,114	\$0
Total Colorado CMAQ Funds		\$16,596,698	\$18,147,909	\$10,440,565	\$33,979,191	\$37,766,402	\$28,483,307

* Total project funds may or may not differ from FY06 funds because of funding in previous years (FY 2003 – FY 2006).

** For the purposes of this report, funds are budgeted in State Fiscal Year 2006 (July 1, 2005 – June 30, 2006) and obligated according to the Federal Fiscal Year 2006 (October 1, 2005 – September 31, 2006).

***Funds flexed to FTA, assumed budgeted.

Note: Multi-year projects receive funding for multiple years.

Projects

CMAQ funds were used to implement projects in the non-attainment/maintenance areas shown in Table 2.

Table 2: CMAQ Eligible Areas				
Non-attainment/Maintenance area	CO	NOx	VOC	PM-10
Aspen/Pitkin county	-	-	-	X
Canon City	-	-	-	X
Colorado Springs (PPACG)	X	-	-	-
Denver(DRCOG)	X	X	X	X
Fort Collins (NFR)	X	-	-	-
Pagosa Springs	-	-	-	X
Steamboat Springs/Routt County	-	-	-	X
Telluride/Mountain Village	-	-	-	X

Figure 2 shows the statewide funds obligated by project type. 39 percent of the available funds were allocated towards Intelligent Transportation System (ITS) and signal improvement projects. 29 percent of the funds were spent towards promoting alternative modes of transportation. Public transportation projects received 24 percent of the obligated funds, while PM-10 and other projects which included promoting cleaner fuels received 4 percent each.

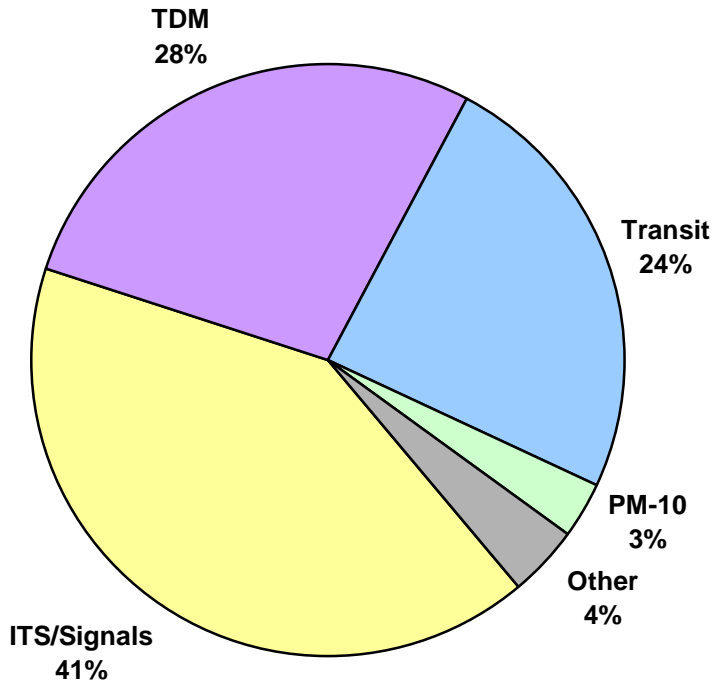


Figure 2 – FY 2006 Statewide Obligated Funds by Improvement Type

The following sections detail how each area (MPO & TPR) distributed the available CMAQ funds according to obligations during fiscal year 2006. Figure 3 illustrates how the Metropolitan Planning Organizations (MPOs) obligated their 2006 CMAQ funds.

Metropolitan Area Projects

In 2006, DRCOG obligated 43 percent of its available CMAQ funds on Intelligent Transportation System (ITS) and signal improvement projects, 34 percent on Transportation Demand Management (including shared ride projects), 17 percent on public transportation projects, and 5 percent on cleaner fuel initiatives like informing prospective automotive buyers about flex fuel. The remaining funds were used on PM-10 projects such as purchasing deicers.

In 2006, PPACG distributed 42 percent of its available CMAQ funds for Intelligent Transportation System and signal projects, 51 percent toward transit, and the remainder on Transportation Demand Management projects.

In 2006, the NFR MPO used 46 percent of its available funds toward ITS/signals while 39 percent went toward Transportation Demand Management. The remaining 15 percent was used to fund programs such as purchasing a natural gas compressor for Fort Collins' buses.

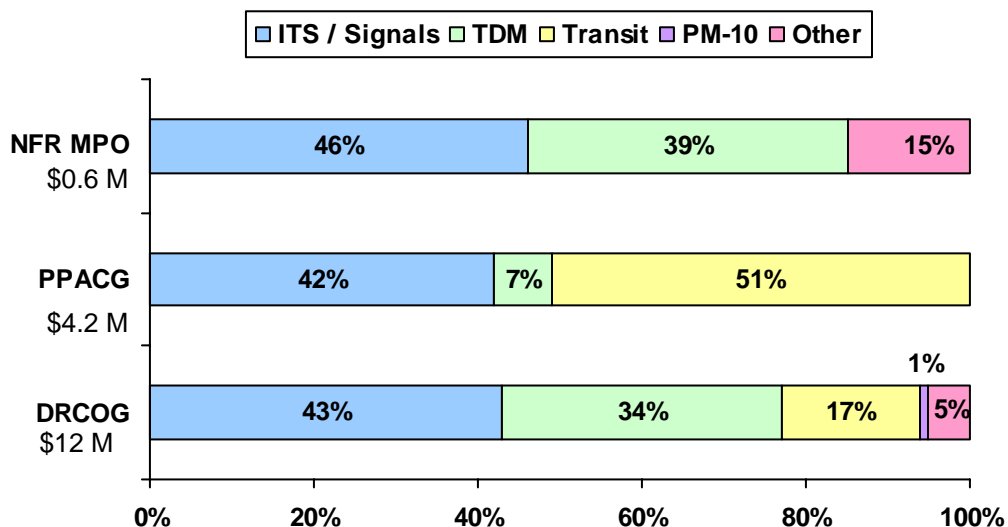


Figure 3 – FY 2006 MPO Funds Obligated by Project Type

Non-Urban Area Projects

CMAQ eligible non-urban areas can spend money on various PM-10 reduction projects. These include deicing (purchase of a truck, tank, and liquid), sweeping, and paving. In 2006, rural areas used CMAQ funds to pave soft surface roads, purchase deicer, and purchase a flush truck to wash away sand from paved streets. Sweeping efforts with equipment purchased in previous years are ongoing and are accumulating additional emission reductions.

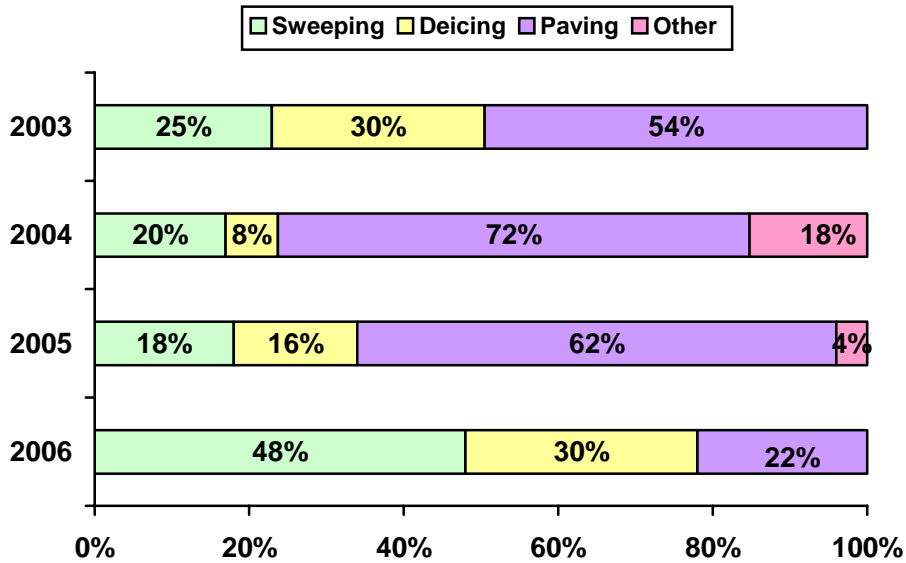


Figure 4 – CMAQ Funds Obligated By Project Type for PM-10 Areas

Success Stories

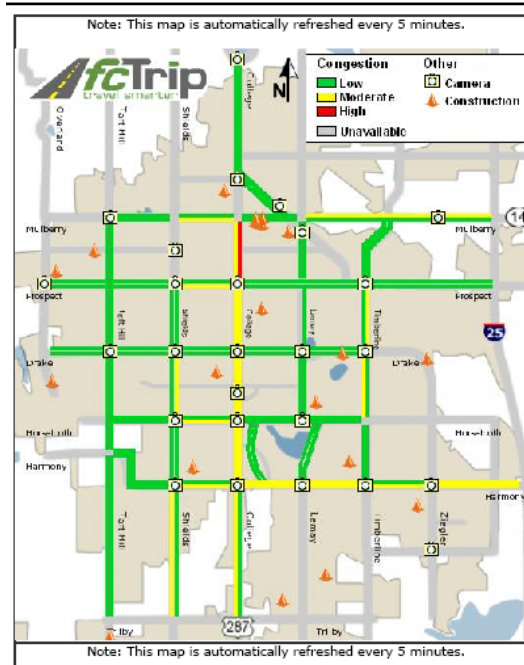
This section highlights two CMAQ funded projects which saw considerable success in reducing emissions.

DRCOG

- Transit ridership in Southeast Corridor (I-25 & I-225) increased by about 20,000 rider trips per day. An important part of this great success was the outreach and education efforts conducted by RTD to educate employers, students, and residents, but also by Southeast Business Partnership, Downtown Denver Partnership, and Transportation Solutions.
- The RideArrangers program achieved great results through all of its programs in 2006. Partnerships and cooperative marketing efforts from the individual TDM Service Providers (TMOs, TMAs, local governments, RTD) was a key part of these results.

NFRMPO

- The City of Fort Collins Traveler Information System brought a real-time interactive website to the public which reports traffic conditions in and around Fort Collins. The web page has links to the real-time video cameras currently installed as part of the ATMS project, the web page will also have links available to SmarTrips, Transfort, bikeway information, work area traffic control information, and potentially weather related information and COTRIPS connections.



- The Transfort Natural Gas compressor project enhanced the use of alternative fuels for Transfort Busses. The purpose of this project is to supply a backup natural gas compressor for the alternative fuels site at Transfort. This refurbished compressor could also be used as to provide additional Compressed Natural Gas (CNG) for peak filling periods (25% of total compression). The backup compressor is a critical component for this station. The total output of this compressor is 312 gallons per day. During the next 3 years Transfort anticipates purchasing up to eight full-size natural gas buses that would have no other place to fuel in the event of a failure of the main compressor. Each of these buses travel about 250 miles per day and the inability to fuel them would cause a considerable disruption in the fixed route service.

Benefits

The following charts provide estimated benefit information by MPO and TPR for 2003, 2004, 2005 and 2006 CMAQ projects. These are single-year benefits, measuring only the benefits estimated during the year in which the funds were obligated.

Emission reductions in 1000 kg/year realized from 2003 to 2006*

Non-attainment/Maintenance area	CO				Nox				VOC				PM-10			
	2003	2004	2005	2006	2003	2004	2005	2006	2003	2004	2005	2006	2003	2004	2005	2006
Aspen/Pitkin county	-	-	-	3.23	-	-	-	-	-	-	-	-	3	-	2	0.01
Canon City	-	-	-	-	-	-	-	-	-	-	-	-	10	26	16	-
Colorado Springs (PPACG)	3,630	581	1,310	933	-	-	-	19.6	-	-	-	17.3	-	-	-	0.52
Denver(DRCOG)	3,540	1,590	3,980	2,760	34	47	145	81.3	170	44	232	67.9	736	1	26	2.20
Fort Collins (NFR)	178	1,120	111	88	-	-	-	5.26	-	-	-	4.63	-	-	-	0.14
Pagosa Springs	-	-	-	-	-	-	-	-	-	-	-	-	86	65	12	60.1
Steamboat Springs/Routt County	-	-	-	-	-	-	-	-	-	-	-	-	284	0	14	0.04
Telluride/Mountain Village	-	-	-	-	-	-	-	-	-	-	-	-	1	639	48	68
Total	7,360	3,290	5,400	3,780	34	47	145	106	170	44	232	90	1,120	731	118	131.01

Source: 2003, 2004, 2005 and 2006 CMAQ reports from project sponsors

*Note: Numbers shown in Blue indicate the pollutant for which an area is in non-attainment

*Note: The annual results should not be directly compared as year to year variations occur for many reasons (differing projects, emission rates, VMT calculation methodologies, etc.) For example, DRCOG's 2006 emission reductions decreased from 2005 primarily due to differing projects (Denver Union Station, Smart Sign, and Clean Yellow Fleet were 2005 only projects that saw significant CO reduction).

Tables 4 - 7 provide more detailed information by region, regarding funds obligated and benefits estimated from the various air quality improvement efforts of the 2006 CMAQ projects. Table 8 shows emission reduction statewide by project type.

**TABLE 4: Cost Benefit Analysis of 2006 DRCOG CMAQ Projects
(Funds Obligated and Benefits Realized in FY 2006)**

Project Description	AVMTR (mi)	CO (KG)	NOx (KG)	VOC (KG)	PM10 (KG)	Funds Obligated
Intelligent Traffic Signals (ITS) Programs						
Traffic Signal Improvements	-	1,840,000	-	-	-	\$5,380,245
Total ITS Benefits	-	1,840,000	-	-	-	\$5,380,245
TDM, Shared Ride and Other Projects						
TDM Program Monitorship	18,500,000	344,000	30,200	25,300	815	\$831,536
Arapahoe-Pearl Bike Ln 30th St*	0	0	0	0	0	\$120,046
I-25 Orchard Rd Station Ped. Overpass	8,940	166	14.6	12.2	0.39	\$600,000
Dry Creek Ped Bridge	7,900	147	12.9	10.8	0.35	\$600,000
I-25 Lincoln Ave Station Ped. Overpass	61,800	1,150	101.0	84	2.70	\$600,000
DRCOG RideArrangers	28,900,000	537,000	47,200	39,500	1,273	\$1,926,968
RAQC Big Clean Trucks	-	720	95	-	-	\$165,000
RAQC Hang Tag	-	-	-	-	-	\$198,690
Total TDM Benefits	47,500,000	883,000	77,700	64,900	2,090	\$5,042,240
Transit Projects						
Bus Route 153 (Transit Expansion)	2,210,000	41,000	3,610	3,020	97.3	\$2,086,000
Total Transit Benefits	2,210,000	41,000	3,610	3,020	97.3	\$2,086,000
PM-10 Reduction Projects						
Wheat Ridge De-icing Equipment	9,200	-	-	-	10.4	\$120,045
Total PM-10 Benefits	9,200	-	-	-	10.4	\$120,045
Total DRCOG Benefits	49,700,000	2,760,000	81,300	67,900	2,200	\$12,628,530

Source: Colorado Department of Transportation & Denver Regional Council of Governments

*Under construction

TABLE 5: Cost Benefit Analysis of 2006 PPACG CMAQ Projects (Funds Obligated and Benefits Realized in FY 2006)

Project Description	AVMTR (mi)	CO (KG)	NOx (KG)	VOC (KG)	PM10 (KG)	Funds Obligated
Intelligent Traffic Signals (ITS) Programs						
City-wide Congestion Mgmt*	-	687,000	-	-	-	\$1,768,000
Total ITS Benefits	-	687,000	-	-	-	\$1,768,000
TDM, Shared Ride and Other Projects						
Ridefinders (TDM Carpool)	5,510,000	116,000	9,230	8,120	242	\$308,446
Total TDM Benefits	5,510,000	116,000	9,230	8,120	242	\$308,446
Transit Projects						
Downtown Circulator	93,400	1,960	156	138	4.11	\$445,000
Intercity Commuter Bus Service (FREX)	6,100,000	128,000	10,200	9,000	269	\$1,079,000
Woodmen Rd/Bl. Forest Rd P&R*	-	-	-	-	-	\$600,000
Total Transit Benefits	6,193,400	129,960	10,356	9,138	273.11	\$2,124,000
PM-10 Reduction Projects						
Total PM-10 Benefits	-	-	-	-	-	\$0
Total PPACG Benefits	11,703,400	932,960	19,586	17,258	515.11	\$4,200,446

Source: Colorado Department of Transportation & Pikes Peak Area Council of Governments

* Under construction

TABLE 6: Cost Benefit Analysis of 2006 North Front Range MPO CMAQ Projects (Funds Obligated and Benefits Realized in FY 2006)

Project Description	AVMTR (mi)	CO (KG)	NOx (KG)	VOC (KG)	PM10 (KG)	Funds Obligated
Intelligent Traffic Signals (ITS) Programs						
Harmony/Shields Intsec. Impvt*	-	-	-	-	-	\$40,189
ATMS/Traveler Info-Ft. Collins	-	391	-	-	-	\$255,604
Total ITS Benefits	-	391	-	-	-	\$295,793
TDM, Shared Ride and Other Projects						
Fort Collins TDM Outreach	3,140,000	65,900	5,260	4,630	138.1	\$16,173
Mason Street Bike/Ped Underpass*	-	-	-	-	-	\$237,117
City of Ft Collins-Hi Emitter	-	252	-	-	-	\$39,645
Natural Gas Compressor/ Transfort Natural Gas	-	22,000	-	-	-	\$58,676
Total TDM Benefits	3,140,000	88,152	5,260	4,630	138.0	\$351,611
Transit Projects						
Total Transit Benefits	-	-	-	-	-	\$0
PM-10 Reduction Projects						
Total PM-10 Benefits	-	-	-	-	-	\$0
Total North Front Range MPO Benefits	3,140,000	88,543	5,260	4,630	138.0	\$647,404

Source: Colorado Department of Transportation & North Front Range MPO

* Under construction

TABLE 7: CMAQ Projects in PM-10 Non-Attainment/Maintenance Areas (Funds Obligated and Benefits Realized in FY 2006)

Rural PM-10 Programs	Project Description	PM10 (KG)	Funds Obligated
Telluride	Tell FY06 Street Sweeper	0.03	\$116,549
Telluride	FY06 Mtn Village Mag Chloride	639	\$20,697
Telluride	FY06 Tell/Mtn Vlg Mag Chloride	745	\$24,114
Telluride	Mtn Village Combo Unit	66,300	\$76,360
Steamboat Springs	Steamboat Springs Paving	39	\$112,295
Pagosa Springs	Pagosa Springs FY06 Street Sweeper	0.03	\$128,606
Pagosa Springs	FY06 Pagosa Mag/Chlor/Sander	60,100	\$32,151
Aspen	FY 06 Pitkin County CMAQ	154	\$160,757
Total PM-10 Area Project Benefits		128,000	\$671,529

Source: Colorado Department of Transportation

	CO	NOX	VOC	PM-10
ITS	2,527,391			
Transit	170,960	13,966	12,158	370
TDM and Other	1,087,152	92,190	77,650	2470
PM 10				137,200

2006 Results with Future Benefits

As mentioned previous annual reports, CMAQ efforts that involve capital projects have benefits that extend well past the first year of operation. Examples of such projects include: paving soft surface roads, purchasing transit vehicles, traffic signal coordination, and constructing a transit station. To effectively capture the future benefits, a methodology was developed that takes into account various factors when calculating future benefits. These factors include project completion year, project lifespan, and project future effectiveness (how long the project provides air quality benefits). Appendix D describes the future benefit calculation methodology in more detail.

The following table shows FY 2006 and future emission reductions. Benefits are reported when the funds are obligated.

2006 Future Emission Reductions (Emission Reductions in FY 2006 & Future)

Non-attainment/Maintenance area	CO	Nox	VOC	PM-10
Aspen/Pitkin county	12.9	1.01	.91	0.03
Canon City	0	0	0	0
Colorado Springs (PPACG)	3950	40.6	35.8	1.07
Denver(DRCOG)	10,700	135	113	3.63
Fort Collins (NFR)	375	21	19	0.55
Pagosa Springs	0	0	0	300
Steamboat Springs/Routt County	0	0	0	0.39
Telluride/Mountain Village	0	0	0	333
2006 Total	15,000	198	168	639

Source: 2006 CMAQ reports from project sponsors

Note: Emission reduction expressed in 1000 kilograms per year

The table below shows statewide 2006 and future emission reductions by project type. Emission reduction expressed in 1000 kilograms per year.

2006 & Future Emission Reduction by Project Type in Kilograms				
	CO	NOX	VOC	PM-10
ITS	12,622			
Transit	171	14	12	.4
TDM and Other	2,217	183	155	5
PM 10				632

Conclusion

In Federal Fiscal Year 2006 there were 30 projects under the Congestion Mitigation and Air Quality Improvement Program, with a trend in funding more ITS type projects. Some projects were and will continue to be more effective than others in improving Colorado's air quality, but overall the MPOs and Non-Urban TPRs selected projects that significantly reduced emissions of concern for their area.

As with any comprehensive and efficient transportation system, multiple strategies are necessary. The aim of the CMAQ program is to address Colorado's air quality issues and reduce pollution. In order to effectively achieve results, it is helpful to target multiple strategies and project types that fit specific circumstances and needs of an area. Although some efforts provide greater benefit than others, a balance of project types may be necessary to create the CMAQ program for a specific area.

Appendix A – 2006 CMAQ Project Descriptions

DRCOG Projects

Projects	2006 Benefits	2006 Funding
<p>Arapahoe-Pearl Bike Ln 30th St #14985</p> <p>This project will widen 30th Street to build on-street bike lanes, provide an enhanced sidewalk on both sides of the street, provide pedestrian crossing treatments at several locations and add more than ten bike racks in the project area. Disturbed areas will be re-landscaped</p>	<p>No calculated benefits at this time. Project is still in design stage</p>	<p>Obligated \$120,046 Budgeted \$299,136 Expended \$20,703</p>
<p>Wheatridge De-icing Equipment #15218</p> <p>This project will purchase one liquid spreader unit and two combination sand/liquid spreader units, permitting Wheat Ridge to decrease its application of sand.</p>	<p>9,200 miles 10.4 kg PM-10</p> <p><i>Future benefits (2006 – 2011)</i> 52 kg PM-10</p>	<p>Obligated \$120,045 Budgeted \$145,000 Expended \$104,239</p>
<p>Big Clean Trucks-Acquisition #15478</p> <p>Funding will supplement the incremental costs associated with purchasing 10 alternative fuel (compressed natural gas) light-heavy duty (Federal Highway Administration Classification 6) vehicles.</p>	<p>720 kg CO 94.5 kg NOx</p> <p><i>Future benefits (2006 – 2011)</i> 3600 kg CO 472.5 kg NOx</p>	<p>Obligated \$165,000 Budgeted \$206,250 Expended \$165,768</p>
<p>E85 Hang Tag #15479</p> <p>The E85 Hangtag Program will attempt to increase E85 fuel (85% ethanol, 15% unleaded gasoline) consumption by educating new vehicle purchasers about flex-fuel vehicles and E85 fuel.</p>	<p>Benefits to be calculated in FY 2007 report.</p>	<p>Obligated \$198,690 Budgeted \$248,362 Expended \$247,089</p>
<p>RideArrangers TMA/TDM-RideArrangers #15469</p> <p>A full service commuting resource (Carpool, Vanpool, Schoolpool, Telework, Guaranteed Ride Home, Bike to Work Day) that serves the growing and diverse needs of Denver metro area commuters while contributing to better air quality and improved traffic flow.</p>	<p>28,900,000 miles 1,273 kg PM-10 537,000 kg CO 47,200 kg NOx 39,500 kg VOC</p> <p><i>Future Benefits (2006 – 2009)</i> 2,490 kg PM-10 1,050,000 kg CO 92,400 kg NOX 77,400 kg VOC</p>	<p>Obligated \$1,926,968 Budgeted \$1,926,968 Expended \$1,705,688</p>
<p>Regional Traffic Signal Improvements #15232, #15235, #15236, #15223, #15237</p> <p>Capital improvements to signal systems in the region through a program defined in Update to Traffic Signal System Improvement Program adopted by DRCOG July 2003.</p>	<p>1,840,000 kg CO</p> <p><i>Future Benefits (2006 – 2011)</i> 9,180,000 kg CO</p>	<p>Obligated \$4,795,000 Budgeted \$3,645,000 Expended \$3,346,934</p>

<p>TDM Program Monitorship #15476, #15468, #15471, #15477, #15475, #15473, #15466, #15467, #15472</p> <p>The Regional TDM Program funds projects that promote alternative transportation mode use, with the intent to reduce mobile source emissions.</p>	<p>18,500,000 miles 815 kg PM-10 344,000 kg CO 30,200 NOx 25,300 VOC</p> <p><i>Future Benefits (2006 – 2009)</i> 971 kg PM-10 409,000 kg CO 36,000 kg NOx 30,100 kg VOC</p>	<p>Obligated \$831,536 Budgeted \$831,536 Expended \$831,536</p>
<p>Dry Creek Rd Pedestrian Bridge at I-25</p> <p>This project will construct a pedestrian bridge over I-25 south of Dry Creek Road alignment to connect east side (ICG parking structure) to west side Dry Creek light rail station, which is being constructed by T-Rex project.</p>	<p>7900 miles 0.35 kg PM-10 147 kg CO 12.9 kg NOx 10.8 kg VOC</p> <p><i>Future Benefits (2006 – 2026)</i> 6.95 kg PM-10 2930 kg CO 258 kg NOx 216 kg VOC</p>	<p>Obligated \$600,000 Flexed To FTA</p>
<p>Interstate- 25: Lincoln Avenue Station Pedestrian Overpass</p> <p>This project will construct a pedestrian bridge over I-25, north of Lincoln Avenue, providing access to the Lincoln Avenue Station on the west side of I-25 from the Meridian business park development on the east.</p>	<p>61800 miles 2.70 kg PM-10 1,150 kg CO 101 kg NOx 84 kg VOC</p> <p><i>Future Benefits (2006 – 2026)</i> 54.4 kg PM-10 22,900 kg CO 2,020 kg NOx 1,690 kg VOC</p>	<p>Obligated \$600,000 Flexed To FTA</p>
<p>Interstate-25: Orchard Road Station Pedestrian Overpass</p> <p>This project will construct a pedestrian bridge over I-25, connecting the Denver Tech Center developments east of I-25 with the Orchard LRT Station on the west side of the interstate.</p>	<p>8940 miles 0.39 kg PM-10 166 kg CO 14.6 kg NOx 12.2 kg VOC</p> <p><i>Future Benefits (2006-2026)</i> 7.87 kg PM-10 3,320 kg CO 292 kg NOx 244 kg VOC</p>	<p>Obligated \$600,000 Flexed To FTA</p>
<p>Route 153: Montbello park-n-Ride to Parker park-n-Ride Transit Service</p> <p>Operating costs for new transit service on Route 153 (Chambers Crosstown) and for purchase of transit vehicles as needed.</p>	<p>2,210,000 miles 97.3 kg PM-10 41,000 kg CO 3,610 kg NOx 3,020 kg VOX</p>	<p>Obligated \$2,086,000 Flexed To FTA</p>

PPACG Projects

Projects	2006 Benefits	2006 Funding
<p>City-wide Congestion Management #14985</p> <p>ITS (variable message signs, incident detection cameras, traffic activated signals) on I-25, US 24 and SH 83 (year three of a three year project).</p>	<p>687,000 kg CO</p> <p><i>Future Benefits (2006 – 2011)</i> 3,440,000 kg CO</p>	<p>Obligated \$1,768,000 Budgeted: \$1,768,000</p>
<p>Downtown Colorado Springs Circulator</p> <p>A free circulator covering about 2 miles in downtown Colorado Springs (year two of a three year project).</p>	<p>93,400 miles 4.11 kg PM-10 1,960 kg CO 156 kg NOx 138 kg VOC</p>	<p>Obligated \$445,000 Budgeted \$445,000 Expended \$445,152</p>
<p>Inter-city Commuter Bus Service (FREX)</p> <p>Express bus service with stops at Fountain, Colorado Springs, Monument, Castle Rock and Denver aimed primarily at commuters (year three of a three year project).</p>	<p>6,100,000 miles 269 kg PM-10 128,000 kg CO 10,200 kg NOx 9,000 kg VOC</p>	<p>Obligated \$1,079,000 Budgeted \$1,079,000 Expended \$1,079,000</p>
<p>Ridefinders #15482</p> <p>An organization providing services for carpools, vanpools, school-pools, and bike to work day (year two of a three year project).</p>	<p>5,510,000 miles 242 kg PM-10 116,000 kg CO 9,230 kg NOx 8,120 kg VOC</p> <p><i>Future Benefits (2006 – 2009)</i> 794 kg PM-10 379,000 kg CO 30,200 kg NOx 26,700 kg VOC</p>	<p>Obligated \$308,446 Budgeted \$320,446 Expended \$250,431</p>
<p>Woodmen Rd./Black Forest Rd. Park-and-Ride Facility</p> <p>Construction of a 255-space park-and-ride facility (year one of a two year project).</p>	<p>Under construction</p>	<p>Obligated \$600,000 Flexed to FTA</p>

NFRMPO Projects

Projects	2006 Benefits	2006 Funding
<p>Harmony and Shields intersection improvement #15572</p> <p>Improvements to Harmony/Shields intersection to increase capacity and increase turning movements.</p>	<p>No calculated emissions at this time</p>	<p>Obligated \$40,189 Budgeted \$868,000 Expended \$812,717</p>
<p>Natural gas compressor # 15152</p> <p>This project enhanced the use of alternative fuels for Transfort Busses.</p>	<p>22,000 kg CO</p> <p><i>Future Benefits (2006 – 2011)</i> 110,000 kg CO</p>	<p>Obligated \$58,676 Budgeted \$73,000 Expended \$69,373</p>

<p>ATMS Traveler Information #15605</p> <p>This project brought a real-time interactive website to the public which reports traffic conditions in and around Fort Collins.</p>	<p>390 kg CO</p> <p><i>Future Benefits (2006 – 2011)</i> 1,960 kg CO</p>	<p>Obligated \$255,604 Budgeted \$318,000 Expended \$303,737</p>
<p>Mason street bike/ped underpass #15279</p> <p>This project will provide direct and safe crossing for pedestrians and cyclists between major employment centers and a large commercial center as well as existing transit service on US287, thereby encouraging walking, biking, and use of transit rather than reliance on the automobile.</p>	<p>Under construction</p>	<p>Obligated \$237,117 Budgeted \$295,000 Expended \$277,417</p>
<p>City of Fort Collins – TDM business outreach # 15480</p>	<p>3,140,000 miles 138 kg PM-10 65,900 kg CO 5,260 kg NOx 4,630 kg VOC</p> <p><i>Future benefits (2006 – 2011)</i> 551 kg PM-10 263,000 kg CO 21,000 kg NOx 18,500 kg VOC</p>	<p>Obligated \$16,173 Budgeted \$16,173 Expended \$3,282.62</p>
<p>City of Fort Collins – High emitter # 15484</p> <p>This project was developed to identify and repair a small number of high-emitting vehicles to test the remote sensing unit/s capability and also to test the public acceptance of a possible high emitter program.</p>	<p>252 kg CO</p>	<p>Obligated \$39,645 Budgeted \$39,645 Expended \$4,809.05</p>

Rural Area Projects

Projects	2006 Benefits	2006 Funding
<p>Telluride street sweeper #15572</p> <p>Purchase of street sweeper</p>	<p>0.03 kg PM-10</p> <p><i>Future Benefits (2006 – 2011)</i> 0.08 kg PM-10</p>	<p>Obligated \$116,549 Budgeted \$145,000 Expended \$140,777</p>
<p>Mountain village Mag Chloride #15432, #15440</p> <p>Purchase of Mag Chloride for deicing local streets</p>	<p>1,390 kg PM-10</p>	<p>Obligated \$44,811 Budgeted \$55,000 Expended \$12,800</p>
<p>Mountain Village combo unit #15213</p> <p>Purchase of a combo unit</p>	<p>66,300 kg PM-10</p> <p><i>Future Benefits (2006 – 2011)</i> 331,000 kg PM-10</p>	<p>Obligated \$76,360 Expended \$92,233</p>

Steamboat Springs Paving Project #15558	39.3 kg PM-10 <i>Future Benefits (2006 – 2026)</i> 393 kg PM-10	Obligated \$112,295 Budgeted \$112,295
Pagosa Springs street sweeper # 15431	0.03 kg PM-10 <i>Future Benefits (2006 – 2011)</i> 0.13 kg PM-10	Obligated \$128,606 Budgeted \$160,000 Expended \$155,340
Pagosa Springs Mag/Chloride/Sander # 15541	60,100 kg PM-10 <i>Future Benefits (2006 – 2011)</i> 300,000 kg PM-10	Obligated \$32,151 Budgeted \$40,000 Expended \$39,745
FY 06 Aspen/Pitkin County CMAQ Vanpool matching #15557	154 kg PM-10 <i>Future Benefits (2006 – 2010)</i> 614 kg PM-10	Obligated \$160,757 Budgeted \$194,175

Appendix B – Pollutant Levels

CO Concentrations in Non-attainment / Maintenance Areas

In Colorado, there are three CMAQ eligible non-attainment / maintenance areas for CO. They are Denver, Colorado Springs, and Fort Collins. All three areas have met both 1-hour and 8-hour Federal standards for CO emissions in years 2002 through 2006.

* Data Methodology may have changed from previous reporting years.

	2002		2003		2004		2005		2006	
	1hr	8hr	1hr	8hr	1hr	8hr	1hr	8hr	1hr	8hr
Standard	35	9	35	9	35	9	35	9	35	9
	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Colorado Springs	9.8	5.2	6.7	3.8	6.5	3.1	5.9	3.7	6.4	3.4
Denver	7.4	3.7	14.9	4.5	8.7	4.1	5.6	2.9	9.3	3.4
Fort Collins	5.5	2.9	8.1	2.3	5.3	3.1	8.1	3.2	6.4	3.4

PM-10 Concentration in Non-attainment / Maintenance Areas

The six PM-10 non-attainment / maintenance areas in Colorado have met both the 99th percentile and annual mean standards during the past five years. In the rural areas, paving has been the primary method of PM-10 reduction. Other projects have included purchasing sweepers and deicing trucks and equipment. In the Denver non-attainment / maintenance area, sweepers have been the primary method to reduce PM-10.

	2002		2003		2004		2005		2006	
	99th	M	99th	M	99th	M	99th	M	99th	M
Standard	150	50	150	50	150	50	150	50	150	50
	ug ₃ / m ³	ug ₃ / m ³	ug ₃ / m ³	ug ₃ / m ³	ug ₃ / m ³	ug ₃ / m ³	ug ₃ / m ³	ug ₃ / m ³	ug ₃ / m ³	ug ₃ / m ³
Aspen Pitkin County	90	34	50	21	44	18	127	21	59	22
Canon City	42	17	30	16	23	14	33	18	74	22
Denver	88	38	111	37	92	35	105	39	65	23
Pagosa Springs	61	24	70	27	52	23	82	24	59	21
Steamboat Spgs Routt County	79	25	89	26	73	23	86	22	67.5	23
Telluride Mountain Village	58	22	74	125	59	18	70	21	63	22

Ozone Concentrations in Non-attainment / Maintenance Areas

In 2006, the Denver Metro Area was participating in an Early Action Compact for the express purpose of deferring the effective date of a nonattainment designation if a violation of the 8-hour ozone National Ambient Air Quality Standards were to occur in the future. There are two standards for ozone, the 1- hour peak standard and the 8-hour peak standard. The Denver Metro area has not violated the 1 hour ozone standard since 1988, and the area was redesignated to attainment for the 1-hour ozone standard on September 11, 2001. While the Denver region, through 2006, had attained the 8- hour standard the Denver area, it was extremely close to violating the standard.

DRCOG is pursuing projects, such as the purchase of Denver Union Station, which will provide a central hub for transit lines and reduce Ozone levels. In addition, the Regional Air Quality Council (RAQC) has a number of projects targeting ozone emissions.

	2002		2003		2004		2005		2006	
	1hr	8hr	1hr	8hr	1hr	8hr	1hr	8hr	1hr	8hr
Standard	.12	.08	.12	.08	.12	.08	.12	.08	.12	.08
	ug / m ³	ug / m ³	ug / m ³	ug / m ³	ug / m ³	ug / m ³	ug / m ³	ug / m ³	ug / m ³	ug / m ³
Denver	.092	.073	.096	.085	.087	.078	.108	.091	.112	.097

Note: In areas where there are multiple air quality monitors, the maximum value is shown. These values were extracted from the EPA website (<http://www.epa.gov/air/data/>) July 2006.

Appendix C - Current Emission Budgets

The following table illustrates which areas across the state are in air quality non-attainment / maintenance for specific pollutants. The values in the table represent the transportation emission budget in tons per day. An emission budget is set so that transportation related emission will not cause an exceedance of Federal air quality standards. The Denver area has been designated non-attainment / maintenance for CO, Ozone, and PM-10. In the five rural areas PM-10 is the pollutant of primary concern. The Fort Collins and Colorado Springs areas have been designated non-attainment / maintenance for CO.

Non-attainment / Maintenance Area	CO	NOx > PM-10	NOx > Ozone	VOC	PM-10
Season	Winter	Winter	Summer	Summer	Winter
Units	Tons/day	Tons/day	Tons/day	Tons/day	Tons/day
Aspen/Pitkin County	-n/a-	-n/a-	-n/a-	-n/a-	8
Canon City	-n/a-	-n/a-	-n/a-	-n/a-	4
Colorado Springs (PPACG)	531	-n/a-	-n/a-	-n/a-	-n/a-
Denver (DRCOG)	800	101	134	119	51
Fort Collins (NFR)	99	-n/a-	-n/a-	-n/a-	-n/a-
Pagosa Springs	-n/a-	-n/a-	-n/a-	-n/a-	4
Steamboat Springs / Routt County	-n/a-	-n/a-	-n/a-	-n/a-	11
Telluride / Mountain Village	-n/a-	-n/a-	-n/a-	-n/a-	5

Appendix D – Future Benefits Calculation Methodology

Some CMAQ projects continue to provide emissions reduction benefits beyond the period that it was funded because the project changes the conditions that result in emissions. This paper describes the methods used to calculate these future emissions reduction benefits for the types of projects commonly funded by CMAQ.

There are many factors that go into calculating the emission reduction benefits from CMAQ funded projects. These factors and calculation methods are discussed in the CMAQ annual report. However, there are some project types that provide benefits after the period that they are funded. For example, once a dirt road is paved, that paved road continues to emit lower levels of PM₁₀ than the dirt road for many years in the future. The CMAQ program needs to account for these “future benefits” when calculating a cost/benefit ratio for projects.

The total benefit of a project over its lifetime can be estimated by multiplying the benefits provided in the first year by the lifespan of the project. However, since some projects are not as effective in subsequent years as they were in the first year, the future year’s benefits should be reduced. Alternatively, some projects are more effective in the future than in their first year. For example, transit stations might not attract a large number of riders in their first year but gradually build up ridership over time.

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:

$$FB = 1000 * 3 = 3000 \text{ Kgs CO}$$

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 - Commission Resolution

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&AQPC	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 indicates 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 G - Reporter Formulas

Phase II Formulas extracted on August 19, 2003

Paving

$$\text{PM10 Emissions Reduction (kg)} = \text{AVMT} * (\text{EFi} - \text{EFi} * (1 - \text{RF}))$$

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)

$$\text{PM10 Emissions Reduction (kg)} = \text{AVMT} * (\text{EFi} - \text{EFf})$$

Where:

$$\text{Ei} = \text{Initial Emissions Factor} = k * (\text{SLi} / 2)^{0.65} * \text{WF}$$

$$\text{Ef} = \text{Final Emissions Factor} = k * (\text{SLf} / 2)^{0.65} * \text{WF}$$

$$\text{SLf} = \text{Final Silt Loading Factor} = ((\text{SLi} - 0.5) * (1 - \text{RF} / 100)) + 0.5$$

Variable	Default	Units	Description
AVMT	-	miles	Total annual vehicles miles of travel affected by the project for the year
k	0.0073	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)

$$\text{PM10 Emissions Reduction (kg)} = \text{AVMT} * (\text{EFi} - \text{EFf})$$

Where:

$$\text{Ei} = \text{Initial Emissions Factor} = k * (\text{SLi} / 2)^{0.65} * \text{WF}$$

$$\text{Ef} = \text{Final Emissions Factor} = k * (\text{SLf} / 2)^{0.65} * \text{WF}$$

$$\text{SLf} = \text{Final Silt Loading Factor} = ((\text{SLi} - 3.0) * (1 - \text{RF} / 100)) + 3.0$$

Variable	Default	Units	Description
AVMT	-	miles	Total annual vehicles miles of travel affected by the project for the year
k	0.0073	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)

$$\text{PM}_{10} \text{ Emissions Reduction (kg)} = \text{AVMT} * (\text{Efi} - \text{Efi})$$

Where:

$$\text{Ei} = \text{Initial Emissions Factor} = k * (\text{SLi}/2)^{0.65} * \text{WF}$$

$$\text{Efi} = \text{Final Emissions Factor} = k * (\text{SLfi}/2)^{0.65} * \text{WF}$$

$$\text{SLfi} = \text{Final Silt Loading Factor} = ((\text{SLi} - 0.5) * (1 - \text{RF}/100)) + 0.5$$

Variable	Default	Units	Description
AVMT	-	miles	Total annual vehicles miles of travel affected by the project for the year
k	0.0073	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)

$$\text{PM}_{10} \text{ Emissions Reduction (kg)} = \text{AVMT} * (\text{Efi} - \text{Efi})$$

Where:

$$\text{Ei} = \text{Initial Emissions Factor} = k * (\text{SLi}/2)^{0.65} * \text{WF}$$

$$\text{Efi} = \text{Final Emissions Factor} = k * (\text{SLfi}/2)^{0.65} * \text{WF}$$

$$\text{SLfi} = \text{Final Silt Loading Factor} = ((\text{SLi} - 3.0) * (1 - \text{RF}/100)) + 3.0$$

Variable	Default	Units	Description
AVMT	-	miles	Total annual vehicles miles of travel affected by the project for the year
k	0.0073	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

$$\text{PM}_{10} \text{ Emissions Reduction (kg)} = \text{AVMT} * (\text{Efi} - \text{Efi})$$

Where:

$$\text{Ei} = \text{Initial Emissions Factor} = k * (\text{SLi}/2)^{0.65} * \text{WF}$$

$$\text{Efi} = \text{Final Emissions Factor} = k * (\text{SLfi}/2)^{0.65} * \text{WF}$$

$$\text{SLfi} = \text{Final Silt Loading Factor} = \text{SLi} * (1 - \text{RF}/100)$$

Variable	Default	Units	Description
AVMT	-	miles	Total annual vehicles miles of travel affected by the project for the year
k	0.0073	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

$$\text{PM10 Emissions Reduction (kg)} = \text{EF} * 907 * \text{APN} * \text{RF} * 240$$

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:

$$\text{RF} = (1 - (0.36 * (1 - (\text{SRC} * \% \text{ Swept}))) + (0.64 * (1 - \% \text{ Sand Reduction})^{0.8} * (1 - (\text{SRC} * \% \text{ Swept}))))$$

where:

0.36 is dust fraction 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].

$$\% \text{ Sand Reduction} = ((\text{Baseline Rate} - \text{Material Application Rate}) / \text{Baseline Rate}) * 100$$

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.

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

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

$$\text{AVMTR} = (N + \text{Nt-1} + 0.75 * \text{Nt-2}) * P * (1/\text{AVO}) * ((S-1)/S) * (F/W) * \text{Nt} * \text{Nd} * D$$

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

$$AVMTR = N * (1/AVO) * ((S-1)/S) * (FW) * Nt * Nd * D$$

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.

Bike Ped

$$\text{AVMTR} = \text{PSOV} * \text{Nd} * \text{D}$$

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

$$\text{AVMTR} = \text{N} * \text{Cs} / \text{CI} * \text{PSOV} * \text{Nd} * \text{D}$$

Variable	Default	Units	Description
N	-	people	Number of new trips traveling through the station
Cs		dollars	Cost of station
CI	-	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

$$\text{AVMTR} = \text{N} * (\text{PSOV} - (1/\text{S})) * \text{Nd} * \text{D}$$

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.
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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)

$$\text{AVMTR} = \text{ADT} * \text{P} * (\text{J1} - \text{J2}) * \text{D} * \text{Nd}$$

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	Default	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

$$\text{PM10 Emissions Reduction (kg)} = (\text{TPEF} + (\text{SLEF} / 1000) * (1 - \text{RF})) * \text{AVMTR}$$

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

Appendix H - Reporter Emission Factors

Tailpipe Emission Factors

Emission Region	Year	CO (kg/mile)	NO _x (kg/mile)	VOCs (kg/mile)	PM ₁₀ (kg/mile)
Denver Metro	2006	0.018556	0.001632	0.001366	0.000044
All Other Areas	2006	0.020998	0.001676	0.001475	0.000044

Silt Loading Factors

Emission Region	Silt Loading Factor	Silt Loading Factor
	2002 (g/m ²)	2003 (g/m ²)
Aspen - Local Streets	10.7	10.7
Aspen - Main St. (SH 82 in town)	15.2	15.2
Aspen - SH 82 Outside City	7.15	7.15
Canon City - Local Streets	9.714	9.714
Canon City - US 50	29.98	29.98
Pagosa Springs - Local Streets	9.714	9.714
Pagosa Springs - US 160 Through Town	29.98	29.98
Pitkin County Roads	14.84	14.84
Steamboat Springs - Lincoln Ave.	29.98	29.98
Steamboat Springs - Local streets	9.714	9.714
Steamboat Springs - US 40 Outside City	4.96	4.96
Telluride - SH 145 Near Society Turn	32.47	32.47
Telluride and Mountain Village Local Streets	9.714	9.714