Appendix A:

Prior Fiscal Year Air Quality Accomplishments

FY 2020 Accomplishments

Table A lists the Action Items from Fiscal Year (FY) 2020 CDOT *Air Quality Action Plan* and the status/accomplishments for each Action Item.

Table A: Prior Fiscal Year Air Quality Accomplishments (Revision #4; July 2020)

Action Items from FY 2019	Pollutant(s) Affected by Action[1, 2]	Status/Accomplishments FY 2020
CDOT *Sustainability Program and Action Plan*: Report describing action items CDOT will perform within CDOT and accomplishments (the status of past action items). Ongoing.	Criteria pollutants, MSAT, GHG	Action item table and accomplishments table are updated on an ongoing basis.
Alternative Fuel Corridor Designation: Collaborate with Colorado Energy Office (CEO) and equivalent agencies of eight states (AZ, CO, ID, MT, NM, NV, UT, & WY) (*Regional Electric Vehicle Plan for the West [REV West*]) to identify key interstate corridors and establish voluntary minimum standards for electric vehicle (EV) charging station development across the Intermountain West region. Ongoing.	Criteria pollutants, MSAT, GHG	Completed and published Voluntary Minimum Standards and signed updated *REV West Memorandum of Understanding* (MOU) in December 2019 recommitting member states to continued collaboration. New focus areas include electrification of national parks and other recreational destinations across Intermountain region. Submitted nominations and received approval for designation of US 160 and US 285 as Federal Highway Administration (FHWA) Alternative Fuel Corridors. Received Transportation Commission approval for Office of Innovative Mobility (OIM) budget that includes $1.5 million for infrastructure to continue build-out of rural electric vehicle supply equipment (EVSE) corridors. Will continue into FY 2021.
Alternative Fuel Transit Bus Replacement Program: Coordinate with Colorado Department of Public Health and Environment (CDPHE), Regional Air Quality Council (RAQC), CEO, through Division of Transit & Rail's (DTR's) capital award processes to implement $30 million in Volkswagen (VW) Settlement funds to replace aging transit fleets across	Criteria pollutants, MSAT, GHG	Completed Cycle #2 of Settlement Program grants as part of annual CDOT DTR Consolidated Call for Capital Projects (CCCP), awarding $2.9 million in grants to three transit agencies for the purchase of six new battery-electric buses and five charging systems. Will continue into FY 2021. Secured additional funding for planning for transit electrification in FY 2020.

Table A: Prior Fiscal Year Air Quality Accomplishments (Revision #4; July 2020)

Action Items from FY 2019	Pollutant(s) Affected by Action[1, 2]	Status/Accomplishments FY 2020
Colorado with zero-emissions vehicles (ZEVs). Program anticipated to operate between 3 to 5 years or once State's $68.7 million Trust fund allocation is exhausted.		
Bicycle and Pedestrian Directives: Continue to Implement the updated 2016 Policy Directive 1602.0 *Elevating Bicycle and Pedestrian Opportunities in Colorado* and Procedural Directive 1602.1 by continuing to work on including bike and pedestrian considerations in planning, construction, and operations to facilitate a modal shift to active transportation. Ongoing.	Criteria pollutants, MSAT, GHG	Planning: Addressed bicycle and pedestrian needs in *Statewide Safety Transportation Plan*, *2045 Statewide Transportation Plan*, Regional Transportation Plans, and Policy Directive 14. Trainings: Held eight Facility Design Classes with engineers and planners. Held traffic calming workshops in five rural communities. Held almost 50 Bicycle Friendly Driver classes for CDOT employees. Publications: Published revised *Statewide Bicycle Manual*. Outreach: Provided support for statewide events promoting bicycling and walking (i.e. Bike to Work Day, Walk a Child to School Day, Bicycle to School Day). Conducted pilot project to identify possible lending policies requiring developers to include bicycle and pedestrian accommodation in building projects. Administration: Administered Safe Routes to School Program, which encourages kids K-8 to bike or walk to school.
CDOT Performance Plan: Under strategic policy initiative (SPI) Reducing GHG Emissions, report the GHG produced per capita from the transportation sector as the lag measure for next year and provide quarterly updates for the lead measures and strategies support the SPI goal to the Governor's Office.	GHG	GHG per capita measures are currently meeting CDOT's goal of less than 4.7 tons per capita by the end of FY 2020. As a result, target adjustments are not being made. Lead measures include modal expansion projects, EV adoption, and multimodal commuting.

Table A: Prior Fiscal Year Air Quality Accomplishments (Revision #4; July 2020)

Action Items from FY 2019	Pollutant(s) Affected by Action[1, 2]	Status/Accomplishments FY 2020
Congestion Mitigation and Air Quality (CMAQ) Alt Fuels Colorado (AFC) Program: Collaborate with CEO and RAQC on program to support development of sustainable statewide alternative fuels market by incentivizing purchase of alternative fuel vehicles and fueling station equipment. Program was extended in FY 2018 and will end in FY 2020 to allow for spend-down of original $15 million allocation. Vehicle purchase program impacted by lack of Buy America waivers being approved by FHWA. Current focus has shifted from compressed natural gas (CNG) to EV fast-charging corridors. Ongoing.	Criteria pollutants, MSAT, GHG	Ongoing implementation of the program, including collaboration with the CEO and grant awardee ChargePoint on the environmental clearance process for 33 EV charging stations across the state. Continued collaboration with CEO, RAQC, and CDPHE on statewide EV strategy, program development, and implementation. Will continue into FY 2021 to allow for the spend-down of funds as part of the Colorado Energy Office's DC Fast Charging Corridors grant program. Construction of these 34 sites has been delayed due to supply chain issues, environmental clearances, and most recently the COVID-19 pandemic.
CMAQ Advanced Fleets Technology (AFT) Project: Coordinate with CEO and RAQC on Charge Ahead Colorado Program to support purchase of electric and hybrid EVs and charging infrastructure statewide. Program, under AFT I & II contracts, was extended in FY 2018 and will end in FY 2022. Both programs are impacted by lack of Buy America waivers being approved by FHWA. Ongoing.	Criteria pollutants, MSAT, GHG	Ongoing implementation, including scoring of applications and contract amendments to add new funds and extend program end date to 2025. Lack of Buy America waivers is still impacting the program, though program has been adapted to account for that.
CMAQ Local Agency Air Quality Projects: Collaborate with RAQC on awarding air quality improvement grants to local government entities located within federally-identified Denver/Front Range ozone non-attainment area. Ongoing.	Criteria pollutants, MSAT, GHG	Completed implementation, including final reimbursements and transfer of remaining unspent funds to other RAQC alternative fuel and electrification contracts. Will close out by June 30, 2020.

Table A: Prior Fiscal Year Air Quality Accomplishments (Revision #4; July 2020)

Action Items from FY 2019	Pollutant(s) Affected by Action[1, 2]	Status/Accomplishments FY 2020
Develop Colorado Transportation Standard for Risk and Resilience Analysis: Staff initiated a project to develop statewide standards for risk assessments in January 2019. Resulting standards will be Colorado-specific and will be available to any Colorado state agency. The project will result in a written standard document that CDOT staff will be able to use to complete future Risk and Resiliency analyses in a consistent manner. Results from risk and resiliency analysis will allow CDOT to pro-actively manage identified risks to increase system resiliency and minimize road closures and disruptions that usually lead to additional vehicle miles traveled (VMT).	Criteria pollutants, MSAT, GHG	Finalized *CDOT Risk and Resiliency Standard Manual*. Will be released for CDOT staff use and public information in late Summer 2020.
Division of Maintenance and Operations (DMO) Data Analytics Intelligence System (DAISy) Development: Develop further applications to enhance real-time operations and maintenance of Colorado roadways through leveraging big data within the system. This will constitute Phases I and II and is dependent on executive review, approval and resources dedication.	Criteria pollutants, MSATs, GHG	Phase I and II were not approved. Therefore, applications were not developed in FY 2020. This project has been discontinued.
DMO Motorist Safety Patrol Program: Program to help motorists with traffic incidents and vehicle problems will continue to operate in Denver metro area, I-70 Mountain Corridor, I-25 Corridor in Region 4, and I-25 Corridor in Region 2. This program seeks to reduce non-recurring traffic incidents	Criteria pollutants, MSATs, GHG	Program continues to provide operational support in designated areas. Metro Program provides support 7-days a week; completed over 44,000 responses and cleared incidents on roadways on average within 11 minutes. I-70 Mountain Corridor Program provides support during peak weekend periods, holidays, and during severe storms;

Table A: Prior Fiscal Year Air Quality Accomplishments (Revision #4; July 2020)

Action Items from FY 2019	Pollutant(s) Affected by Action[1, 2]	Status/Accomplishments FY 2020
that are a major cause of traffic congestion. Ongoing.		completed over 3,000 responses and cleared incidents on average within 15 minutes. Safety Patrol Program continues to support safe and reliable travel on roadways and will continue through FY 2021.
DTR: In partnership with Division of Transportation Development and Rural Transit Assistance Program (RTAP) partners, will provide Colorado transit agencies assistance in planning and implementing electric fleet vehicle conversions, including operational planning, power delivery planning, ZEV procurement and implementation support.	Criteria pollutants, MSAT, GHG	Continued development of consultant support contract concept. On hold, awaiting completion of prerequisite contracts and clarification of funding eligibility. Will continue into FY 2021.
DTR, Bustang, Outrider, Snowstang, and Special Services: Increase regional and interregional bus ridership and expand rural regional bus routes on Bustang and Bustang Outrider - CDOT's contracted bus services which are intended to get more single-occupancy vehicles off congested routes, and provide improved regional and interregional mobility options. Bustang is an interregional bus service on I-25 from Colorado Springs to Fort Collins and on I-70 from Denver to Grand Junction. Outrider is a regional bus service that provides connections throughout rural regions of Colorado to their urban hubs, with connections to other local and interregional modes.	Criteria pollutants, MSAT, GHG	Ridership for regular Bustang service was 189,279, a decrease of 48,856 or 20.5%, compared to FY 2019. Outrider served 20,280 passengers in FY 2020 (1,968 were on Lamar to Colorado Springs service), a decrease of 4,338 or 17.6%. Reduction due to service suspension under Governor's "Stay-at-Home" executive order. Including regular Bustang and Outrider service ridership, plus the new and special services, a total of 216,425 rides were provided in FY 2020 (equivalent of taking 160,314 vehicles off the road). Snowstang started in December of 2019; ridership of 2,964. Special Services: Continuation of RamsRoute for Colorado State University students; ridership of 1,862. Bustang to Broncos special service; ridership of 817. New seasonal weekend Bustang service to Estes Park in summer of 2019; ridership of 1,223 (cancelled in 2020 due to COVID-19).

Table A: Prior Fiscal Year Air Quality Accomplishments (Revision #4; July 2020)

Action Items from FY 2019	Pollutant(s) Affected by Action[1, 2]	Status/Accomplishments FY 2020
Federal Funding to Reduce GHG Emissions: National Highway Freight Program (NHFP) considers congestion mitigation an eligible category for use of these federal funds as well as general environmental impacts. Although GHG reduction is not a specific project selection criterion for NHFP because of difficulty in quantifying benefits, congestion mitigation projects are funded using NHFP funds for freight related projects. Ongoing.	Criteria pollutants, MSAT, GHG	Many NHFP projects approved by Transportation Commission in November 2019 should improve congestion. Projects include chain-up stations on I-25 at Larkspur, on US 285 at North Kenosha Pass, and on on SH 9 at Hoosier Pass; I-70 Eastbound at Vail Pass Auxiliary Lanes; continuation of passing lanes on US 40/US 287; and improvement of the US 160/SH 17 intersection.
High Priority Bike Corridors: Bike corridors established in FY 2019, pending FY 2020 management approval of High Demand Bicycle Corridors.	Criteria pollutants, MSATs, GHG	Management adopted High Demand Bicycle Corridors.
High-Performance Transportation Enterprise (HPTE): Continue to find innovative financing solutions for increasing roadway capacity through managed and express lanes in Colorado. Ongoing.	Criteria pollutants, MSAT, GHG	As a result of projected budget shortfalls due to corona virus disease (COVID-19), HPTE worked with CDOT Regions 1 and 4 as well as Executive Management to identify initial financing solutions to fill funding gaps and accelerate delivery of critical projects along the I-25 North corridor through use of federal financing tools including Grant Anticipation Revenue Vehicle (GARVEE) bonds and toll revenue backed Transportation Infrastructure Finance and Innovation (TIFIA) loans. Additional analysis and work to implement a preferred solution will continue into FY2021.
HPTE Express Lanes Master Plan: Collaborate with CDOT and stakeholders to identify and prioritize which future corridors have the potential to benefit from Express Lanes including if high-occupancy vehicle (HOV)	Criteria pollutants, MSAT, GHG	HPTE completed *Express Lanes Master Plan* and is now working with CDOT Region 1 and 4, Environmental and Planning, CDOT Executive Management, and other external stakeholders to prioritize and implement Plan projects. Will

Table A: Prior Fiscal Year Air Quality Accomplishments (Revision #4; July 2020)

Action Items from FY 2019	Pollutant(s) Affected by Action[1, 2]	Status/Accomplishments FY 2020
travel should be a component.		continue into FY2021.
I25 Gap Project: Will seek additional local sources of fill and backfill material that meets project specifications. This will lower haul truck VMT over project life. Currently using two on-site sources. The other major source is 11 miles away. Project began in August 2018 and is expected to last through 2022.	Criteria pollutants, MSAT, GHG	Two local sources of fill and backfill material that meet project specifications were found and used in FY 2020. These sources will continue to be used in FY 2021. For information about additional action items undertaken in FY 2020, but not originally listed in the FY 2020 Appendix B, see FY 2021 Appendix B.
Integrating Resiliency into CDOT Business Processes: Project will develop at least five case studies in order to provide proofs of concepts for how CDOT can integrate resiliency into core functions (e.g., long range planning, asset management, operations and maintenance, scoping and engineering, environmental planning documents). Each case study will be designed to drive ideas of resilience into day-to-day operations and find ways to use data, as seen in the information developed through the I-70 pilot. Throughout case study development, the project team will review CDOT's funding and criteria manuals to ensure the project outcome includes recommendations for incorporating resilience into these areas. Project is anticipated to lead to greater consideration of resilience in day to day CDOT activities, which is hoped to lead to a decrease in road closures, resulting in decreased VMT.	Criteria pollutants, MSATs, GHG	CDOT kickoff of Integrating Resiliency Project at CDOT was in March 2020. From then, five case studies will be completed over course of 18 months. First case study, which began in FY 2020, looks at how to comply with new FHWA requirements to assess alternatives for projects that involve assets that have been damaged more than once due to physical hazards, and how to mitigate that risk in a cost efficient manner.
Intelligent Transportation System	Criteria	Connected Vehicle (CV) program

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Action Items from FY 2019	Pollutant(s) Affected by Action[1, 2]	Status/Accomplishments FY 2020
(ITS), Panasonic Project: Phase 2 will begin in Fall of 2019 and will focus on operational status of the infrastructure and data flows. Phase 3, 4, and 5 will be discussed in future updates. See Appendix A for information on Phase 1.	pollutants, MSAT, GHG	completed deployment of roadside units on the I-70 Mountain Corridor, enabling collection of vehicle telemetry data from equipped vehicles traversing the corridor. In FY 2020, CDOT evaluated and documented various operation and maintenance aspects of the units, and began design and development of an open-source backend CV architecture. CV program plan was restructured and approved by the Transportation Commission in November 2019, featuring a new roadmap and revised milestones (previously known as "phases").
National Performance Measures: Update pollutant/precursor benefit reduction targets for CMAQ funded projects as required under the Fixing America's Surface Transportation (FAST) Act for year 2022, the end of the first four year performance period.	CO, NO_x, VOC, PM_{10}	CDOT is currently below its targets for pollutant/precursor benefit through CMAQ funded projects. As a result, CDOT will not adjust its its targets for CMAQ pollutant/precursor mitigation for mid-period performance report. Current targets for calendar year 2022: • 105 kg/day VOC • 152 kg/day PM_{10} • 1,426 kg/day CO • 105 kg/day NO_X
OIM: Continue to partner with private industry to pilot several transportation infrastructure technology projects to test technologies intended to enhance safety and mobility within transportation system that cost less and produce identifiable results.	Criteria pollutants, MSAT, GHG	OIM secured new funding in FY 2020 for transportation demand management projects and tools to encourage transit use, through integrated data and web-based tools.
OIM: Implement Governor's Executive Order *Supporting a Transition to Zero Emission Vehicles*, including developing and implementing CDOT's Clean Transportation Plan, increasing	Criteria pollutants, MSAT, GHG	In Summer 2019, Colorado adopted ZEV standard requiring auto manufacturers to sell a certain percentage of ZEVs in Colorado starting in model year 2023. In addition, OIM secured new funding

Table A: Prior Fiscal Year Air Quality Accomplishments (Revision #4; July 2020)

Action Items from FY 2019	Pollutant(s) Affected by Action[1, 2]	Status/Accomplishments FY 2020
fleet electrification across the Department, and support for public charging infrastructure.		for charging infrastructure, education and outreach in its FY 2020 budget. OIM is continuing to work with CDOT's fleet managers, CEO, and Colorado Department of Personnel and Administration to increase fleet electrification within CDOT through procurement of additional battery electric vehicles and deployment of new charging infrastructure to support them. CEO released updated *Colorado EV Plan* in April 2020, and *Clean Transportation Plan* is being developed. Colorado's *Volkswagen Settlement Beneficiary Mitigation Plan* (BMP) was updated to focus all remaining funds on electric and zero-emission transportation projects in accordance with Executive Order directives.
OIM: Reduce per capita VMT through innovative programs to increase shared ridership, including implementation of Senate Bill (SB) 19-239, new mobility apps and technologies that encourage transit and shared usage - such as mobility hubs across the State. The SB 19-239 study is called 2019 Emerging Mobility Impact Study.	Criteria pollutants, MSAT, GHG	Completed SB 19-239 Emerging Mobility Impact Study in late 2019. Further action regarding fees is pending action by the state legislature; however, CDOT is pursuing additional research tasks related to findings from the study.
Research Study - *Integrating Mobility Energy Productivity Metric into the CDOT Statewide Model*: CDOT research branch will begin procurement process, finalize a scope of work, and select a vendor to perform research. Goal is to determine feasibility of integrating National Renewable Energy Laboratory (NREL) mobility metric to CDOT's statewide Travel Demand Model.	Criteria pollutants, MSAT, GHG	This project is still not underway; it is in procurement phase. It will continue into FY2021.

Table A: Prior Fiscal Year Air Quality Accomplishments (Revision #4; July 2020)

Action Items from FY 2019	Pollutant(s) Affected by Action[1, 2]	Status/Accomplishments FY 2020
Metric assesses impacts of transportation technologies. Research will begin in Fall 2019. Will continue into FY 2020.		
Simple Steps/Better Air: Continue public outreach and education program to raise awareness of ground ozone pollution and create behavior change. Will focus on behavior change.	Criteria pollutants, MSAT, GHG	Ongoing implementation, including completion of contract amendment to add additional funds and extend project end date to 2023. Will continue into FY 2021.
Smart 25 Demonstration Project: Construction items were separated into three projects. First was completed in January 2019. Second awarded in December 2018 and will be in construction from January 2019 until May 2020. Final construction project will be constructed in Fall 2019 (once cleared for construction). Project construction will continue to install devices and infrastructure until Spring 2020, at which time CDOT will conduct pilot project to increase efficiency on I-25. Demonstration will run for 6 month trial period, anticipated to run from May to October 2020. Then system will be shut down and data analyzed. Hot spot analysis will be conducted in Fall/Winter 2020 before any permanent implementation of the project could begin.	Criteria pollutants, MSAT, GHG	Smart 25 was separated into three projects in 2019. First project was completed in January 2019. Second (ITS/Electrical) Project is 60% complete with construction. Project construction will continue until September 2020. For more information about upcoming actions, see Appendix B.
Statewide Bicycle Plan: Develop revised Statewide bicycle plan as part of the *2045 Statewide Transportation Plan*. Revision will use High Demand Corridor information and data from	Criteria pollutants, MSAT, GHG	Provided bicycle-specific data to the *2045 Statewide Transportation Plan* and included bicycling and walking components into the plan.

Table A: Prior Fiscal Year Air Quality Accomplishments (Revision #4; July 2020)

Action Items from FY 2019	Pollutant(s) Affected by Action[1, 2]	Status/Accomplishments FY 2020
Strava, Inc. to make planning recommendations for improvements to enhance bicycle use for transportation and recreation.		
2045 Statewide Plan: Process based on data-driven needs assessment and public/ stakeholder outreach. Formal planning process started in May 2019 with county meetings, which will be followed by meetings with rural transportation planning regions (TPRs) and some of the five metropolitan planning organizations (MPOs). Each TPR will meet three times to, among other things, update priority corridors, discuss how to integrate modes and various CDOT plans for the priority corridors, and develop a 10-year project pipeline. Pipeline includes four years of State Transportation Improvement Program (STIP), plus six years beyond that. By including all modes of travel, people may be moved more efficiently and effectively.	Criteria pollutants, MSATs, GHG	Planned meetings occurred, including with all five MPOs. *2045 Statewide Plan* anticipated to be adopted by the Transportation Commission in August 2020. Plan includes by reference ten TPR plans and five MPO plans, as well as modal and topic plans. Plan addresses efforts to improve air quality through providing more opportunities for active, non-motorized transportation; encouraging purchase of more light-duty electric trucks, electric transit buses and school buses; and includes a 10-year Vision to invest $192 million in transit.
Traffic Incident Management (TIM) Training Track: TIM website supplements information that participants in TIM training sessions acquire at training track. Refresher materials provided for those who have already taken TIM course. Ongoing.	Criteria pollutants, MSATs, GHG	All action items completed in FY 2020. Website development continues to continue provide additional training supplementation and information accessibility for TIM programs statewide. TIM Training Track used for 35 training events with over 850 personnel trained. Effort to develop increased training options for individual agency as well as multi-agency training opportunities at the TIM Training Track. Continued coordination in FY

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Action Items from FY 2019	Pollutant(s) Affected by Action[1, 2]	Status/Accomplishments FY 2020
		2021 for TIM Training Track curriculum development and implementation in conjunction with CSP.
Transportation Air Quality Research: Participate in multi-state Near-Road Air Quality Transportation Pooled Fund. Overall report for all task orders will be finalized. Publication on near-road ambient modeling vs. measurements will be submitted.	Criteria pollutants, MSAT, GHG	*Analysis of Modeled and Measured Near-Road PM2.5 Concentrations in Indianapolis and Providence During 2015 and 2016* report was published in October 2019. Report summarizing project was published in December 2019. Near-road pooled fund contract ended on 12/31/19.
WheelRight: In late summer 2019, CDOT will install sensors in the Wooly Mammoth Park and Ride, which will measure car tire tread depths and tire pressures and alert drivers if their tire pressure is low. This will lead to some drivers inflating their tires, which improves the miles per gallon achieved by the vehicle.	Criteria pollutants, MSATs, GHG	CDOT decided to move in a different direction and will not be deploying WheelRight tire management solution.

Notes for Tables A

1. Potential pollutants include:
   - 1.A. Transportation Criteria Pollutants: carbon monoxide (CO), particulate matter of 10 micrometers in diameter or smaller (PM_{10}), particulate matter of 2.5 micrometers in diameter or smaller ($PM_{2.5}$), nitrogen oxides (NO_x), and volatile organic compounds (VOC) (VOCs are not a criteria pollutant, but are a precursor to criteria pollutant ozone, which is not directly emitted by any source)
   - 1.B. Transportation Mobile Source Air Toxics (benzene, acetaldehyde, formaldehyde, acrolein, 1,3-butadiene, diesel particulate matter plus diesel exhaust organic gases, naphthalene, polycyclic organic matter, and ethylbenzene)
   - 1.C. Transportation Greenhouse Gases (GHG): Carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O)

2. Determining which pollutants will be affected by each action:
   - 2.A. Tailpipes of hydrocarbon fuel powered vehicles emit all three categories of pollutants: criteria pollutants, MSATs, and GHGs. Therefore, emissions of all three categories will be reduced if a strategy reduces VMT, increases system efficiency, increases the use of alternative fuel vehicles, or increases vehicle fuel efficiency. Most strategies will fall into this category.
   - 2.B. Even if a strategy targets a specific pollutant, the strategy will most likely reduce tailpipe emissions. For example, Simple Steps/Better Air is a program that encourages VMT reduction specifically to help address the Denver Front Range ozone issue.

However, strategies that reduce ozone precursors also generally reduce emissions of other pollutants.

2.C. Some strategies target specific pollutants. For example, concrete production creates CO_2. Therefore, the strategy to add more fly ash to a concrete mixture reduces CO_2, but no other pollutants.

Appendix B:

Fiscal Year 2021 Action Items

FY 2021 Action Items

The goal of CDOT's *Air Quality Action Plan* is to reduce air pollution from Colorado's transportation sector. Table B lists CDOT's FY 2021 Action Items. The following are included for each Action Item: strategy category(s), pollutant(s) affected by each action, and the champion (contact). Strategy categories include System Efficiency, Reducing vehicle miles traveled (VMT) Growth, Promoting Alternative (Alt) Fuel Vehicles, Increasing Vehicle Fuel Efficiency, and Collecting or Deflecting Emissions. The categories are described in more detail in Section 2.2 of this Plan.

Table B: Current Fiscal Year Air Quality Action Items (Revision #4; July 2020)

Action Item for FY 2021	Strategy Category					Pollutant(s) Affected by Action[1, 2]	Champion/Contact
	System Efficiency	Reduce VMT	Alt. Fuel	Fuel Efficiency	Absorption/ Barrier		
Alternative Fuel Corridor Designation: Collaborate with Colorado Energy Office (CEO) and equivalent agencies of eight states (AZ, CO, ID, MT, NM, NV, UT, & WY) (*Regional Electric Vehicle Plan for the West* [REV West]) to coordinate electric vehicle policies and infrastructure investments on key interstate and state highway corridors across the Intermountain West region. Ongoing.			X			Criteria pollutants, MSAT, GHG	Michael King Asst. Director of Electrification & Energy Michael.King@state.co.us (303) 757-9997
Alternative Fuel Transit Bus Replacement Program: Coordinate with Colorado Department of Public Health and Environment (CDPHE), Regional Air Quality Council (RAQC), CEO, through Division of Transit & Rail's (DTR's) capital award processes to implement $30 million in Volkswagen (VW)			X			Criteria pollutants, MSAT, GHG	Michael King Asst. Director of Electrification & Energy Michael.King@state.co.us (303) 757-9997

Table B: Current Fiscal Year Air Quality Action Items (Revision #4; July 2020)

Action Item for FY 2021	Strategy Category					Pollutant(s) Affected by Action[1, 2]	Champion/Contact
	System Efficiency	Reduce VMT	Alt. Fuel	Fuel Efficiency	Absorption/ Barrier		
Settlement funds to replace aging transit fleets across Colorado with zero-emissions vehicles (ZEVs). Program anticipated to operate between 3 to 5 years or once State's $68.7 million Trust fund allocation is exhausted.							
Bicycle and Pedestrian Directives: Continue to Implement the updated 2016 Policy Directive 1602.0 *Elevating Bicycle and Pedestrian Opportunities in Colorado* and Procedural Directive 1602.1 by continuing to work on including bike and pedestrian considerations in planning, construction, and operations to facilitate a modal shift to active transportation. Ongoing.		X				Criteria pollutants, MSAT, GHG	Betsy Jacobsen Bicycle/ Pedestrian/ Byways Section Manager Betsy.Jacobsen@state.co.us 303-757-9982
CDOT *Clean Transportation Plan*: Develop goals, targets, and strategies to support the adoption of ZEVs and expansion of clean transportation modes statewide in alignment with Executive Order B 2019-002 and House Bill (HB) 19-1261.			X			Criteria pollutants, MSAT, GHG	Michael King Asst. Director of Electrification & Energy Michael.King@state.co.us (303) 757-9997
CDOT Emerging Mobility Consumer Survey: Survey will be created and sent out. It will act as compendium to Senate Bill 19-239 *Emerging Mobility Impacts Study* effort. Purpose will be to better understand consumer behavior in using shared rides in taxis and Transportation Network Companies trips, in carpools, and in vanpools. Data will help CDOT	X	X				Criteria pollutants, MSAT, GHG	Lisa Streisfeld Asst. Director of Mobility Services Lisa.Streisfeld@state.co.us (303) 757-9876

Table B: Current Fiscal Year Air Quality Action Items (Revision #4; July 2020)

Action Item for FY 2021	Strategy Category					Pollutant(s) Affected by Action[1, 2]	Champion/Contact
	System Efficiency	Reduce VMT	Alt. Fuel	Fuel Efficiency	Absorption/ Barrier		
staff refine models to forecast changes in VMT and emissions related to potential legislative action on adding fees to emerging mobility providers such as Transportation Network Companies.							
CDOT *Performance Plan*: Report the GHG produced and vehicle miles traveled (VMT) traveled per capita from the transportation sector as a lag measure under Strategic Policy Initiative (SPI) for Clean Transportation, helping reach the goals set by HB 19-1261. GHG per capita is calculated using an internally developed, MOVES based model that was approved by the CDPHE. Will report quarterly in FY2021 Performance Plan Evaluations. Lead measures affecting VMT and GHG reduction goals will be reported monthly in the Governor's "Bold Four" dashboard.	X	X	X			GHG	Darius Pakbaz DTD Performance Data Manager Darius.Pakbaz@state.co.us 303-757-9133
CDOT Statewide Guide for Implementing Micro-Mobility: Document will be completed and will assist local governments, Metropolitan Planning Organizations, technological centers and university campuses in adopting micro-mobility technology to diversify mode share, reduce VMT, reduce single occupancy vehicles (SOVs), and reduce emissions.	X	X				Criteria pollutants, MSAT, GHG	Lisa Streisfeld Asst. Director of Mobility Services Lisa.Streisfeld@state.co.us (303) 757-9876

Table B: Current Fiscal Year Air Quality Action Items (Revision #4; July 2020)

Action Item for FY 2021	Strategy Category					Pollutant(s) Affected by Action[1, 2]	Champion/Contact
	System Efficiency	Reduce VMT	Alt. Fuel	Fuel Efficiency	Absorption/ Barrier		
CDOT *Sustainability Program and Action Plan*: Report and interactive webpage describing action items CDOT will perform within CDOT and accomplishments (status of past action items). Ongoing.		X	X	X		Criteria pollutants, MSAT, GHG	Sarah Mitchell EPB Sustainability Coordinator Sarah.Mitchell@state.co.us (303) 757-9764
Congestion Mitigation and Air Quality (CMAQ) Administration: Administer CMAQ Program including program tracking and monitoring, administration of CMAQ non-infrastructure grants, annual allocations, development of program structure and special programs, and program reporting.		X	X	X		Criteria pollutants, MSAT, GHG	Marissa Gaughan Statewide and Regional Planning Manager Marissa.Gaughan@state.co.us 303.512.4235
CMAQ Alt Fuels Colorado (AFC) Program: Collaborate with CEO and RAQC on program to support development of sustainable statewide alternative fuels market by incentivizing purchase of alternative fuel vehicles and fueling station equipment. Program was extended in FY 2020 and will end in FY 2023 to allow for spend-down of original $15 million allocation. Vehicle purchase program impacted by lack of Buy America waivers being approved by the Federal Highway Administration (FHWA). Current focus has shifted from compressed natural gas (CNG) to electric vehicle (EV) fast-charging			X			Criteria pollutants, MSAT, GHG	Michael King Asst. Director of Electrification & Energy Michael.King@state.co.us (303) 757-9997

Table B: Current Fiscal Year Air Quality Action Items (Revision #4; July 2020)

Action Item for FY 2021	Strategy Category					Pollutant(s) Affected by Action[1, 2]	Champion/Contact
	System Efficiency	Reduce VMT	Alt. Fuel	Fuel Efficiency	Absorption/ Barrier		
corridors. Ongoing.							
CMAQ Advanced Fleets Technology (AFT) Project: Coordinate with CEO and RAQC on Charge Ahead Colorado Program to support purchase of electric and hybrid EVs and charging infrastructure statewide. AFT I contract ending in FY 2020 and AFT II contract was extended in FY 2020 and will end in FY 2025. Both programs are impacted by lack of Buy America waivers being approved by FHWA. Ongoing.			X			Criteria pollutants, MSAT, GHG	Michael King Asst. Director of Electrification & Energy Michael.King@state.co.us (303) 757-9997
CMAQ Program Selection and Reporting Processes: Evaluate CMAQ project selection and reporting processes and identify options for improvement to project selection, administration, and delivery of CDOT-administered projects, benefits estimation, program tracking and monitoring, and reporting. Ongoing.		X	X	X		Criteria pollutants, MSAT, GHG	Marissa Gaughan Statewide and Regional Planning Manager Marissa.Gaughan@state.co.us 303.512.4235
CMAQ Transportation Demand Management (TDM). Continue administering TDM grant program with various providers who work with businesses and agencies to reduce VMT through teleworking, transit, carpooling, biking and walking. Ongoing		X				Criteria pollutants MSAT, GHG	Betsy Jacobsen Bicycle/Pedestrian/ Byways Section Manager Betsy.jacobsen@state.co.us 303-757-9982
Connected Vehicle (CV) Program: CDOT is expanding the footprint of the CV program over 400+ miles of the state through 2023	X					Criteria pollutants, MSAT, GHG	Ashley Nylen Asst. Director of Mobility Technology Ashley.Nylen@state.co.us

Table B: Current Fiscal Year Air Quality Action Items (Revision #4; July 2020)

Action Item for FY 2021	Strategy Category					Pollutant(s) Affected by Action[1, 2]	Champion/Contact
	System Efficiency	Reduce VMT	Alt. Fuel	Fuel Efficiency	Absorption/ Barrier		
and building a robust backend digital architecture supporting CV use cases and is well integrated in CDOT's broader Intelligent Transportation Systems (ITS) architecture.							(303) 512-5533
2020 Colorado Electric Vehicle Plan: CDOT worked closely with CEO on plan development; it was released in April 2020. Plan calls for large-scale transition of state transportation system to ZEVs, with goals of light-duty vehicles being 100% electric, and medium- and light-duty vehicles being ZEVs. Plan outlines actions state government, including CDOT, will take to reach goals.			X	X		Criteria pollutants, MSAT, GHG	Michael King Asst. Director of Electrification & Energy Michael.King@state.co.us (303) 757-9997
Denver Regional Council of Governments (DRCOG) Community Mobility Planning and Implementation (CMPI) Program: Administer CMPI Program. Intended to nudge community improvement plans toward implementation. Overall goals of Surface Transportation Block Grant (STBG)-funded program are to support diverse, livable communities; development of connected urban centers and multimodal corridors; a well-connected transportation system that serves all modes of travel; and healthy and active choices. Another goal is to expand access to opportunity for residents of all ages, incomes, and abilities. Ongoing.		X				Criteria pollutants, MSAT, GHG	Gail Hoffman Transportation Planner Gail.Hoffman@state.co.us 303.757.9700

Table B: Current Fiscal Year Air Quality Action Items (Revision #4; July 2020)

Action Item for FY 2021	Strategy Category					Pollutant(s) Affected by Action[1, 2]	Champion/Contact
	System Efficiency	Reduce VMT	Alt. Fuel	Fuel Efficiency	Absorption/ Barrier		
DRCOG Station Area Master Plan/Urban Center (STAMP/UC) Program: CDOT's Division of Transportation Development (DTD) assumed responsibility from Regional Transportation District (RTD) for contract administration of the program using STBG funding. The STAMP/UC program is to develop master plans for station areas or urban centers. Ongoing.		X				Criteria pollutants, MSAT, GHG	Gail Hoffman Transportation Planner Gail.Hoffman@state.co.us 303.757.9700
Division of Transit and Rail (DTR): In partnership with DTD and Rural Transit Assistance Program (RTAP) partners, DTR will provide Colorado transit agencies assistance in planning and implementing electric fleet vehicle conversions, including operational planning, power delivery planning, ZEV procurement and implementation support. Ongoing.			X			Criteria pollutants, MSAT, GHG	Michael King Asst. Director of Electrification & Energy Michael.King@state.co.us (303) 757-9997
DTR Bustang and Outrider service: Continue operations. Planning to add four new rural-regional Outrider routes.		X				Criteria pollutants, MSAT, GHG	David Krutsinger DTR Director David.Krutsinger@state.co.us 303-757-9008
DTR Snowstang and Special Services: Bustang to Broncos and RamsRoute are planned to continue, dependent on decisions of the NFL for home games and CSU for on-campus classes in FY 2021. Snowstang will continue based on participating ski resorts opening for the 2020/2021 ski		X				Criteria pollutants, MSAT, GHG	David Krutsinger DTR Director David.Krutsinger@state.co.us 303-757-9008

Table B: Current Fiscal Year Air Quality Action Items (Revision #4; July 2020)

Action Item for FY 2021	Strategy Category					Pollutant(s) Affected by Action[1, 2]	Champion/Contact
	System Efficiency	Reduce VMT	Alt. Fuel	Fuel Efficiency	Absorption/ Barrier		
season.							
Energy & Emissions Reduction Policy Analysis Tool (EERPAT) Model Refinement: EERPAT, which CDOT will use to forecast effects of policies on GHG emissions, will be refined with an emphasis on freight-related scenarios. Those scenarios include percentage of fuels (CNG, ethanol, and biodiesel), percentage of heavy- and medium-duty trucks, fuel economy, age of trucks, autonomous and connected vehicles for truck platooning, and economic assumptions. Completion Date: Expected to be August 2020			X	X		Criteria pollutants, MSAT, GHG	Michelle Scheuerman Senior Transportation Advisor Michelle.scheuerman@state.co.us 303-757-9700
EV Byways and Parks Program: Coordinate with CEO to develop, award, and implement EV charging grant program focused on electrification of tourist-oriented destinations including scenic byways, state parks, hotels, and other recreational sites.			X			Criteria pollutants, MSAT, GHG	Michael King Asst. Director of Electrification & Energy Michael.King@state.co.us (303) 757-9997
Facility Design Training: Providing bicycle and pedestrian design training to engineers and planners in order to better accommodate active transportation modes and reduce VMT.		X				Criteria pollutants, MSAT, GHG	Betsy Jacobsen Bicycle/Pedestrian/ Byways Section Manager Betsy.jacobsen@state.co.us 303-757-9982

Table B: Current Fiscal Year Air Quality Action Items (Revision #4; July 2020)

Action Item for FY 2021	Strategy Category					Pollutant(s) Affected by Action[1, 2]	Champion/Contact
	System Efficiency	Reduce VMT	Alt. Fuel	Fuel Efficiency	Absorption/ Barrier		
GHG Roadmap: Support CEO, CDPHE, Department of Agriculture, and other state partners in developing scenarios and strategies for achieving state GHG reduction goals as outlined in HB 19-1261.			X			Criteria pollutants, MSAT, GHG	Michael King Asst. Director of Electrification & Energy Michael.King@state.co.us (303) 757-9997
High Demand Bike Corridors (formerly called High Priority Bike Corridors): Proposed bike corridors were adopted in FY2020. Establishing Bicycle Maintenance Level of Service to improve requirements on state-owned bike trails. Result expected to be more people using trails instead of driving.		X				Criteria pollutants, MSAT, GHG	Bryan Meyer Bicycle/Ped Engineer Bryan.Meyer@state.co.us 303-757-9088
High-Performance Transportation Enterprise (HPTE): Continue to find innovative financing solutions such as using Grant Anticipation Revenue Vehicle (GARVEE) bonds and toll revenue backed Transportation Infrastructure Finance and Innovation (TIFIA) loans for projects which have funding gaps as a result of budget shortfalls. Projects along the I-25 North corridor have been identified as a priority as they will increase roadway capacity, improve transit travel times and promote carpooling through free or reduced rates for high-occupancy vehicle (HOV) travel. Ongoing.	X	X				Criteria pollutants, MSAT, GHG	Piper Darlington HPTE Budget & Special Projects Manager Piper.Darlington@state.co.us 303-757-9032
HPTE *Express Lanes Master Plan*: HPTE will work with CDOT Regions 1 and 4, Environmental	X	X				Criteria pollutants, MSAT, GHG	Piper Darlington HPTE Budget & Special Projects Manager

Table B: Current Fiscal Year Air Quality Action Items (Revision #4; July 2020)

Action Item for FY 2021	Strategy Category					Pollutant(s) Affected by Action[1, 2]	Champion/Contact
	System Efficiency	Reduce VMT	Alt. Fuel	Fuel Efficiency	Absorption/ Barrier		
and Planning, CDOT Executive Management and external stakeholders to prioritize and implement the list of candidate Express Lanes projects identified in *Express Lanes Master Plan*. Priority will be given projects also identified through CDOT statewide planning process. Ongoing.							Piper.Darlington@state.co.us 303-757-9032
I25 Gap Project: Will continue to use local sources of fill and backfill material that meets project specifications. Additional actions begun in FY 2020 but not previously reported: This project has an onsite traffic control center and a variable speed limit program was implemented. Both of these will be used for project life, which is expected to last into Fall 2022. Project funds two extra Bustang routes.	X	X				Criteria pollutants, MSAT, GHG	Chuck Attardo I-25 South Corridor Environmental Manager Chuck.Attardo@state.co.us 303-859-9535
Integrating Resiliency into CDOT Business Processes: One case study has been developed, as described in Appendix A. Project will develop at least four additional case studies to provide proofs of concepts for how CDOT can integrate resiliency into core functions (e.g., long range planning, asset management, operations and maintenance, scoping and engineering,	X	X				Criteria pollutants, MSAT, GHG	Elizabeth Kemp CDOT Resiliency Program Manager Elizabeth.Kemp@state.co.us 303.757.9629

Table B: Current Fiscal Year Air Quality Action Items (Revision #4; July 2020)

Action Item for FY 2021	Strategy Category					Pollutant(s) Affected by Action[1, 2]	Champion/Contact
	System Efficiency	Reduce VMT	Alt. Fuel	Fuel Efficiency	Absorption/ Barrier		
environmental planning documents). Each case study will be designed to drive ideas of resilience into day-to-day operations and find ways to use data, as seen in information developed through I-70 pilot. Throughout case study development, project team will review CDOT's funding and criteria manuals to ensure project outcome includes recommendations for incorporating resilience into these areas. Project is anticipated to lead to greater consideration of resilience in day to day CDOT activities, which is hoped to lead to a decrease in road closures, resulting in decreased VMT.							
National Performance Measures: Report pollutant/precursor reduction benefits from CMAQ funded projects as required under Fixing America's Surface Transportation (FAST) Act. Will be reported to FHWA biennially. Data will be analyzed annually.	X					CO, NOx, VOC, PM10	Darius Pakbaz DTD Performance Data Manager Darius.Pakbaz@state.co.us 303-757-9133
Research Study - Integrating Mobility Energy Productivity Metric into the CDOT Statewide Model: CDOT research branch will begin procurement process, finalize a scope of work, and select a vendor to perform	X					Criteria pollutants, MSAT, GHG	Michael King Asst. Director of Electrification & Energy Michael.King@state.co.us (303) 757-9997

Table B: Current Fiscal Year Air Quality Action Items (Revision #4; July 2020)

Action Item for FY 2021	Strategy Category					Pollutant(s) Affected by Action[1, 2]	Champion/Contact
	System Efficiency	Reduce VMT	Alt. Fuel	Fuel Efficiency	Absorption/ Barrier		
research. Goal is to determine feasibility of integrating National Renewable Energy Laboratory (NREL) mobility metric to CDOT's statewide Travel Demand Model. Metric assesses impacts of transportation technologies. Research will begin in Fall 2020.							
Safe Routes to School: Continue work implementing this program with subdivisions of the state to get more kids biking and walking to school through infrastructure improvements and education. Ongoing		X				Criteria pollutants MSAT, GHG	Melissa Houghton SRTS Program Manager Melissa.Houghton@state.co.us 720-427-9746
Simple Steps/Better Air: Continue public outreach and education program to raise awareness of ground ozone pollution and create behavior change. Will focus on behavior change.		X	X			Criteria pollutants MSAT, GHG	Michael King Asst. Director of Electrification & Energy Michael.King@state.co.us (303) 757-9997
Smart 25 Demonstration Project: See Appendix A for the FY 2020 update, which describes how this project was separated into three projects. Third project, The Infra-Red Traffic Logger (TIRTL) Installation, will be added to second ITS/Electrical Project via Change Modification Order (CMO). Construction, the second project, will be completed in FY 2021. Once completed, CDOT will conduct three months of data collection of existing condition within corridor. Next, there will be a six-month demonstration trial period. It's not known when	X					Criteria pollutants, MSAT, GHG	Zachary Miller Region 1 Central Engineering Section Zachary.Miller@state.co.us 720-382-6381

Table B: Current Fiscal Year Air Quality Action Items (Revision #4; July 2020)

Action Item for FY 2021	Strategy Category					Pollutant(s) Affected by Action[1, 2]	Champion/Contact
	System Efficiency	Reduce VMT	Alt. Fuel	Fuel Efficiency	Absorption/ Barrier		
data collection and demonstration periods will occur. Traffic volumes must be back to relative normal levels to complete this work. Volumes are down due to COVID-19. Once traffic levels return, data collection followed by the demonstration will occur. After demonstration is completed, the system will be shut down and data analyzed. Hot spot analysis will be conducted at the conclusion of the demonstration. The three-month data collection, six-month demonstration, and hot spot analysis will start in FY 2021.							
2045 Statewide Transportation Plan (SWP): Take actions across all modes of travel that would help meet these mobility goal objectives: to reduce per capita VMT by 1% annually and GHG emissions and ozone-causing pollutants from the transportation sector by 1% annually, and to increase ridership of Bustang Outrider by 10% annually. Ongoing.	X	X	X	X		Criteria pollutants, MSAT, GHG	Marissa Gaughan Statewide and Regional Planning Manager Marissa.Gaughan@state.co.us 303.512.4235

Notes for Table B

1. Potential pollutants include:
   - 1.A. Transportation Criteria Pollutants: carbon monoxide (CO), particulate matter of 10 micrometers in diameter or smaller (PM_{10}), particulate matter of 2.5 micrometers in diameter or smaller ($PM_{2.5}$), nitrogen oxides (NO_x), and volatile organic compounds (VOC) (VOCs are not a criteria pollutant, but are a precursor to criteria pollutant ozone, which is not directly emitted by any source)
   - 1.B. Transportation Mobile Source Air Toxics (benzene, acetaldehyde, formaldehyde, acrolein, 1,3-

butadiene, diesel particulate matter plus diesel exhaust organic gases, naphthalene, polycyclic organic matter, and ethylbenzene)

1.C. Transportation Greenhouse Gases (GHG): Carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O)

2. Determining which pollutants will be affected by each action:

2.A. Tailpipes of hydrocarbon fuel powered vehicles emit all three categories of pollutants: criteria pollutants, MSATs, and GHGs. Therefore, emissions of all three categories will be reduced if a strategy reduces VMT, increases system efficiency, increases the use of alternative fuel vehicles, or increases vehicle fuel efficiency. Most strategies will fall into this category.

2.B. Even if a strategy targets a specific pollutant, the strategy will most likely reduce tailpipe emissions. For example, Simple Steps/Better Air is a program that encourages VMT reduction specifically to help address the Denver Front Range ozone issue. However, strategies that reduce ozone precursors also generally reduce emissions of other pollutants.

2.C. Some strategies do target specific pollutants. For example, concrete production creates CO_2. Therefore, the strategy to add more fly ash to a concrete mixture reduces CO_2, but no other pollutants.

Appendix C:

Air Quality Performance Measure Results

FY 2020 Air Quality Performance Measure Results

This appendix contains air quality performance measure results as calculated in Summer 2020. The measures and associated tables are:

- Statewide Motor Vehicle Emissions Performance Measure: Table C-1.
- Change in Statewide On-Road Gasoline Consumption per Capita: Table C-2.
- Greenhouse Gas (GHG) National Performance Measure: Table C-3.
- Summary table of all three performance measures: Table C-4.

All four tables are updated annually. In FY 2017, the first year these tables were published, the baseline year, calendar year (CY) 2011, was reported as well as the most current year for which the required data was available, which was either CY 2014 or CY 2015 (depending on the table). The baseline year was selected because 2011 was the base year of the 2017 Ozone SIP.

When analyzing air pollution trends, both total emissions and emissions per capita should be considered. The tables in this appendix show mixed results regarding Colorado criteria pollutant and GHG emissions. According to the calculation method used for Table C-1, criteria pollutant and GHG emissions decreased between CY 2017 and CY 2018 in both total mass and on a per capita basis, except for CO and VOCs, which increased for both. This may be because the vehicle mix was different. The percentage of light duty vehicles in 2017 was higher. However, according to the method used for Table C-3, GHG emissions increased (criteria pollutant emissions are not calculated in this method), although emissions per capita showed a slight decrease. Although it would be preferable that both types of emissions decrease over time (mass and per capita) regardless of the calculation method, in a state with increasing population, it is not surprising that the total mass of emissions increased between CY 2017 and CY 2018 (based on the method used for Table C-3).

As shown in Table C-2, statewide gasoline consumption increased on both a mass and per capita basis between CY 2017 and CY 2018. Gasoline consumption is directly linked to emissions; if consumption increases, generally emissions also increase. An increase of gasoline consumption on a per capita basis could be explained by people driving more (more vehicle miles travelled [VMT]) or driving less fuel efficient vehicles, or a combination. However, between CY 2017 and CY 2018, VMT per capita decreased from 9,516 miles to 9,475 miles.

Table C-1: Statewide Motor Vehicle Performance Measure Emissions and Emissions per Capita (Revision #4; July 2020)

Measure Parameters		Emissions[1]						
		CO	NO_x	PM_{10}	$PM_{2.5}$	CO_2	CO_{2e}	VOC
Statewide (tons per day)	2011[2,3]	724	197	11.4	6.3	70,885	71,127	34.4
	2015[3,5]	555	135	9.9	4.6	72,550	72,713	21.2
	2016[3,7]	529	116	9.2	4.1	71,947	72,099	18.6
	2017[3,8]	497.1	84.3	8.6	3.5	70,655	70,785	14.5
	2018[3,9]	536.5	57.7	6.0	2.4	59,957	60,062	17.4
Statewide (tons per year)	2011	264,260	71,905	4,161	2,300	25,873,025	25,961,355	12,556
	2015	202,575	49,275	3,614	1,679	26,480,750	26,540,245	7,738
	2016	193,085	42,340	3,358	1,478	26,260,655	26,316,135	6,789
	2017	181,442	30,766	3,135	1,271	25,789,075	25,836,525	5,296
	2018	195,834	21,069	2,193	865	21,884,259	21,922,448	6,341
Statewide (pounds per capita)[4]	2011	103.2	28.1	1.6	0.9	10,105	10,140	4.9
	2015	74.2	18.1	1.3	0.6	9,706	9,728	2.8
	2016	69.7	15.3	1.2	0.5	9,483	9,504	2.5
	2017	64.7	11.0	1.1	0.5	9,195	9,212	1.9
	2018	68.8	7.4	0.8	0.3	7,686	7,700	2.2
Change in Emissions (tons per day)[6]	2011 to 2015	-169	-62	-1.5	-1.7	1,665	1,586	-13
	2015 to 2016	-26	-19	-0.7	-0.5	-603	-614	-2.6
	2016 to 2017	-32	-32	-0.6	-0.6	-1,292	-1,314	-4.1
	2017 to 2018	39	-27	-2.6	-1.1	-10,698	-10,723	2.9
Change in Emissions (tons per year)[6]	2011 to 2015	-61,685	-22,630	-548	-621	607,725	578,890	-4,818
	2015 to 2016	-9,490	-6,935	-256	-201	-220,095	-224,110	-949
	2016 to 2017	-11,644	-11,574	-223	-207	-471,580	-479,610	-1,493
	2017 to 2018	14,393	-9,697	-942	-406	-3,904,816	-3,914,077	1,045
Change in Emissions (pounds per capita)[6]	2011 to 2015	-29	-10	-0.3	-0.3	-399	-412	-2.1
	2015 to 2016	-4.5	-2.8	-0.1	-0.1	-222	-224	-0.4
	2016 to	-5.0	-4.3	-0.1	-0.1	-289	-292	-0.6

Table C-1: Statewide Motor Vehicle Performance Measure Emissions and Emissions per Capita (Revision #4; July 2020)

Measure Parameters		Emissions[1]						
		CO	NO_x	PM_{10}	$PM_{2.5}$	CO_2	CO_{2e}	VOC
	2017							
	2017 to 2018	4.1	-3.6	-0.3	-0.1	-1,509	-1,512	0.3

Notes for Table C-1

1. Pollutants: carbon monoxide (CO), nitrogen oxides (NOx), particulate matter with diameter equal to or less than 10 microns (PM10) or 2.5 microns (PM2.5), carbon dioxide (CO2), carbon dioxide equivalent (CO2e), and volatile organic compounds (VOCs)
2. Tons per day values for CY 2011 were obtained from Table 4 of Colorado Air Pollution Control Division's (APCD's) report, which was in Appendix D of the 2017 *Air Quality Action Plan* (version 1).
3. APCD used Environmental Protection Agency (EPA) MOVES2014a model at the "National" scale for each year and two Colorado counties to determine the yearly emission factors (gram/mile per highway performance monitoring system [HPMS] vehicle type and road type) for CO, NO_x, VOC, PM_{10}, $PM_{2.5}$, CO_2, and CO_{2e}. After calculating fractions of HPMS vehicle type by road type from CDOT Automatic Traffic Recorder (ATR) data, these fractions were applied to CDOT-supplied VMT per functional class and area (urban/rural). The emission factors were then multiplied by vehicle miles traveled (VMT), summed over HPMS vehicle class, and converted to tons per day of pollutant per functional class, area type, and year. Calculating $PM_{2.5}$, NO_x, and VOC emissions was recommended by National Cooperative Highway Research Program (NCHRP) Report 809. CDOT determined emissions for additional pollutants should also be calculated. Emissions were calculated by Air Pollution Control Division (APCD) for on-road mobile sources traveling on the following functional classes of roads: 1 (Interstate); 2 (Principal Arterial - Other Freeways and Expressways); 3 (Principal Arterial - Other); 4 (Minor Arterial); 5 (Major Collector); 6 (Minor Collector); and 7 (Local). VMT data is from HPMS data for CYs 2011, 2015, 2016, and 2017, which are published in Federal Highway Administration's (FHWA's) VM-2 Report.
4. Emissions per capita were calculated by dividing the emissions by the number of people in Colorado. Population data represents July 1, the mid-year population; Colorado's population changes daily. Population data: 5,120,686 (2011); 5,456,584 (2015); 5,538,180 (2016); 5,609,445 (2017; accessed 6/10/19); and 5,694,311 (2018; accessed 6/30/20). The data source is: https://demography.dola.colorado.gov/population/population-totals-counties/#population-totals-for-colorado-counties
5. Tons per day (tpd) values for 2015 were obtained from Table 5 of Colorado APCD's report, which was in Appendix D of the 2017 *Air Quality Action Plan* (Version 1).
6. If the change in emissions from an earlier year to a later year (e.g., CY 2015 to CY 2016) is a negative value, the later year emissions (e.g., CY 2016) are less than the earlier year emissions (e.g., CY 2015).
7. Tons per day (tpd) values for CY 2016 were obtained from Table 5 of Colorado APCD's report, which is in Appendix D of this 2018 *Air Quality Action Plan* (Version 2).
8. Tons per day (tpd) values for CY 2017 were obtained from Table 5 of Colorado APCD's report, which is in Appendix D of this 2019 *Air Quality Action Plan* update (Version 3).
9. Tons per day (tpd) values for CY 2018 were obtained from Table 4 of Colorado APCD's report, which is in Appendix D of this 2020 *Air Quality Action Plan* update (Version 4)

Table C-2: Statewide On-Road Gasoline per Capita Performance Measure Data (Revision #4; July 2020)

Measure Parameters		Measure Results
Statewide Gasoline Consumption (gallons)	2011[1]	2,128,402,548
	2014[1,2]	2,219,961,283
	2015[1]	2,314,292,612
	2016[5]	2,384,639,949
	2017[5]	2,365,198,847
	2018[6]	2,440,019,811
Statewide Gasoline Consumption per Capita (gallons per person)[3]	2011	415.6
	2014	414.4
	2015	424.8
	2016	430.6
	2017	421.6
	2018	428.5
Change in Gasoline Consumption (gallons)[4]	2011 to 2014	91,558,735
	2014 to 2015	94,331,329
	2015 to 2016	70,347,337
	2016 to 2017	-19,441,102
	2017 to 2018	74,820,964
Change in Gasoline Consumption per Capita (gallons per person)[4]	2011 to 2014	-1.2
	2014 to 2015	10.4
	2015 to 2016	5.8
	2016 to 2017	-8.9
	2017 to 2018	6.9

Notes for Table C-2

1. Each State reports fuel consumption to FHWA on a monthly basis. Consumption is typically provided from State tax authority records. States' motor-fuel information systems, and, therefore, submitted data, are organized primarily for the purpose of administering State fuel-tax programs. Because of

variations in individual State requirements, reported data are sometimes not comparable among the States. In order to treat States equitably in motor fuel attributions, and include information from all States in the national summary tables published in Highway Statistics on a comparable basis, the FHWA may adjust parts of the States' submissions. The adjustment process fits the data to uniform categories so that national characteristics and trends can be analyzed and projected. Consumption data sources:
https://www.fhwa.dot.gov/policyinformation/statistics/2011/33ga.cfm
https://www.fhwa.dot.gov/policyinformation/statistics/2014/33ga.cfm
https://www.fhwa.dot.gov/policyinformation/statistics/2015/33ga.cfm

2. When these calculations were first done in 2017, CY 2015 gasoline consumption data was not yet available by FHWA. The most recent year with complete data, as of March 2017, was CY 2014.
3. Population data is as of July 1 of each reported year. Population data: 5,120,686 (2011); 5,356,626 (2014); 5,448,055 (2015); 5,538,180 (2016); 5,609,445 (2017; accessed 6/10/19); and 5,694,311 (2018; accessed 6/30/20). The data represents the mid-year population; Colorado's population changes daily. The data source is: https://demography.dola.colorado.gov/population/population-totals-counties/#population-totals-for-colorado-counties
4. If the change in emissions from an earlier year to a later year (e.g., CY 2017 to CY 2018) is a negative value, the later year emissions (e.g., CY 2018) are less than the earlier year emissions (e.g., CY 2017).
5. While doing the calculations in 2019 for 2016, sought new source for fuel consumption because FHWA only reported data with six significant figures instead of nine, which had been used in the past. Determined that the source of FHWA data was from the Department of Revenue (DOR). Although FHWA data lags by over two years, DOR data is more up to date. Therefore, in 2019, also calculated data for this table for 2017. Source of DOR data: https://www.colorado.gov/pacific/revenue/colorado-motor-fuel-taxes Accessed on 6/11/19.
6. Source of 2018 DOR fuel consumption data: https://www.colorado.gov/pacific/revenue/colorado-motor-fuel-taxes. Accessed on 6/30/20.

Table C-3: Greenhouse Gas National Performance Measure Results (Revision #4; July 2020)

Measure Parameters	Year	Measure Results
Total million VMT (annual total vehicle-miles traveled on all public roads)[1]	2011	46,606
	2015	50,437
	2016	52,152
	2017	53,382
	2018	53,954
NHS million VMT (annual total vehicle-miles traveled on NHS)[1]	2011	23,808
	2015	31,938
	2016	33,047
	2017	33,811
	2018	34,343
Statewide Gasoline/Gasohol Consumption (thousand gallons)[2]	2011	2,079,287
	2015	2,107,254
	2016	2,217,141
	2017	2,196,347
	2018	2,210,977
Statewide Diesel Consumption (thousand gallons)[2]	2011	542,783
	2015	632,740
	2016	636,213
	2017	665,357
	2018	672,871
Tailpipe CO_2 emissions on NHS (total tailpipe CO_2 emissions on NHS in a calendar year) (tons)[3]	2011	24,460,065
	2015	25,714,813
	2016	26,725,112
	2017	26,867,706
	2018	27,081,192
Tailpipe CO_2 emissions on NHS per Capita (tons	2011	4.78

CO_2 per person)[4]	2015	4.71
	2016	4.83
	2017	4.79
	2018	4.76
Change in Tailpipe CO_2 Emissions on NHS (tons)[5]	2011 to 2015	1,254,748
	2015 to 2016	1,010,299
	2016 to 2017	142,594
	2017 to 2018	213,486
Change in Tailpipe CO_2 Emissions per Capita (tons per person)[5]	2011 to 2015	-0.06
	2015 to 2016	0.11
	2016 to 2017	-0.04
	2017 to 2018	-0.03

Notes for Table C-3

1. VMT data is from FHWA's Highway Statistics report "Federal-Aid Highway Travel (VM-3)." 2018 data was accessed on 7/1/20.
2. Fuel consumption data is from FHWA's Highway Statistics report "Motor Fuel Use (MF-21)." 2018 data was accessed on 7/1/20.
3. Although fuel use data for Colorado is available from Colorado sources for fuel sources besides gas and diesel, emission factors for these fuels were not available when these calculations were done in April 2018. Therefore, only emissions from gas and diesel were included in this calculation. Emission factors used were 17.68 pounds CO_2 per gallon of gasoline/gasohol and 22.4 pounds CO_2 per gallon of diesel.
4. Population data: 5,120,686 (2011); 5,456,584 (2015); 5,538,180 (2016); 5,609,445 (2017; accessed 6/10/19); and 5,694,311 (2018; accessed 6/30/20). The data represents the mid-year population (July 1); Colorado's population changes daily. The data source is: https://demography.dola.colorado.gov/population/population-totals-counties/#population-totals-for-colorado-counties
5. If the change in emissions from an earlier year to a later year (e.g., CY 2017 to CY 2018) is a negative value, the later year emissions (e.g., CY 2018) are less than the earlier year emissions (e.g., CY 2017).

Table C-4: Air Quality Performance Measure Summary (Revision #4; July 2020)

Year	Performance Measure			
	Motor Vehicle Emissions - Criteria Pollutants[1,2]	Motor Vehicle Emissions – CO_2[2,3]	On-Road Gasoline Consumption[4]	GHG Tailpipe Emissions – CO_2[5]
2011[6]	355,182 tpy and 0.07 ton/capita/yr	25,873,025 tpy and 5.1 ton/capita/yr	2,128 million gal/yr and 416 gal/capita/yr	24,460,065 tpy and 4.78 tons/capita/yr
2014	Not Determined[7]	Not Determined[7]	2,220 million gal/yr and 414 gal/capita/yr	Not Determined[7]
2015	264,881 tpy and 0.05 ton/capita/yr	26,480,750 tpy and 4.9 ton/capita/yr	2,314 million gal/yr and 425 gal/capita/yr	25,714,813 tpy and 4.71 tons/capita/yr
2016	247,050 tpy and 0.04 ton/capita/yr	26,260,655 tpy and 4.7 ton/capita/yr	2,385 million gal/yr and 431 gal/capita/yr	26,725,112 tpy and 4.83 tons/capita/yr
2017	221,910 tpy and 0.04 ton/capita/yr	25,789,075 tpy and 4.6 ton/capita/yr	2,365 million gal/yr and 422 gal/capita/yr[7]	26,867,706 tpy and 4.79 tons/capita/yr
2018	226,303 tpy and 0.04 ton/capita/yr	21,884,259 tpy and 3.8 ton/capita/yr	2,440 million gal/yr and 429 gal/capita/yr	27,081,192 tpy and 4.76 tons/capita/yr

Notes for Table C-4

1. Criteria Pollutants represented in this table are: CO, NO_x, VOC, PM_{10}, $PM_{2.5}$, and VOC. Emissions of each pollutant are reported in Table C-1.
2. The "Motor Vehicle" performance measure represents statewide on-road vehicle emissions from vehicles driven on seven functional classes of roads.
3. Although CO_{2e} emissions were reported in Table C-1, only CO_2 emissions are reported in this table because the "GHG Tailpipe" performance measure reported only CO_2 emissions.
4. The "On-Road Gasoline Consumption" performance measure represents gasoline and diesel purchased statewide for on-road vehicles. Consumption of gasoline is directly linked to emissions, although for this performance measure, emissions are not calculated.
5. The "GHG Tailpipe Emissions" performance measure represents statewide on-road vehicle emissions from vehicles driven on the National Highway System, which covers five of seven functional classes of roads. It does not include minor collector or local roads.
6. The baseline year 2011 was selected because 2011 was the base year of the 2017 Ozone SIP.
7. Values in this table were first calculated in 2017. At that time, the most recent complete data set for calculations done for performance measures "Motor Vehicle Emissions" and "GHG Tailpipe Emissions" was for CY 2015. However, the most recent complete data set for the "On-Road Gasoline Consumption" performance measure was from CY 2014. Therefore, "On-Road Gasoline

Consumption" data lagged the other data types by one year until Revision #3. During the development of the 2019 update, the source of the gasoline consumption data that had been used in the past was found. That source was more up to date, so the performance measure no longer lags.

Appendix D:

2020 Statewide Motor Vehicle Performance Measure Emissions Methodology: Colorado Air Pollution Control Division Report

CDPHE Air Pollution Control Division

June 2020

Colorado Running Motor Vehicle Emissions Inventory: 2018

Calculation Summary

This is an overview of the methods used to calculate the Colorado state emissions inventory for year 2018. We ran the EPA MOVES2014b model at the "National" scale for two CO counties to determine the yearly emission factors (gram/mile per HPMS vehicle type and road type) for CO, NOx, VOC, PM_{10}, $PM_{2.5}$, CO_2, and CO_2 equivalent. After calculating the fractions of HPMS vehicle type by road type from the CDOT ATR data, we applied these fractions to the CDOT-supplied VMT per functional class and area (urban/rural). The emission factors were then multiplied by VMT, summed over HPMS vehicle class, and converted to tons of pollutant per functional class, area type, and year.

CDOT ATR Data

CDOT supplied counts by FHWA vehicle class for permanent and temporary (48 hr) ATR stations. In conjunction with provided shape files for the locations of these stations, we calculated the weekday counts of vehicles by functional class (i.e., interstate, expressway, arterial, etc.) and area type (urban/rural). These counts were then converted from the 13 FHWA vehicles classes to the 6 HPMS vehicle types common to MOVES source types and FHWA classes. Finally, HPMS vehicle type fraction per functional class (FC) and area type (Rural?) were calculated (Table 1). Whether the link fell in the Metro Denver/North Front Range non-attainment area (NAA) was also retained as the MOVES emission factors differ slightly inside and outside of the NAA.

Table 1. 2018 fractions of each of the 6 HPMS vehicle types (weighted by vehicle count) according to area type, functional class (FC), and NAA (nonattainment area) classification.

NAA?	Rural?	FC	10f	20f	30f	40f	50f	60f
1	R	1	0.04191	0.488755	0.449106	0.006958	0.001707	0.011564
1	R	2	0.000552	0.520829	0.477353	3.05E-05	0.000562	0.000674
1	R	3	0.000804	0.518552	0.476536	0.000154	0.000692	0.003262
1	R	4	0.010798	0.509304	0.470654	0.001417	0.003197	0.00463
1	R	5	0.005234	0.495955	0.466715	0.006175	0.012727	0.013194
1	R	6	0.005234	0.495955	0.466715	0.006175	0.012727	0.013194
1	R	7	0.005234	0.495955	0.466715	0.006175	0.012727	0.013194
1	U	1	0.212553	0.400497	0.367752	0.006596	0.000757	0.011845
1	U	2	0.028649	0.506672	0.463491	0.000171	0.000451	0.000566
1	U	3	0.108144	0.463901	0.424795	0.000918	0.00086	0.001381
1	U	4	0.108242	0.400903	0.37575	0.086564	0.010332	0.018208

1	U	5	0.003288	0.517179	0.47547	0.000516	0.002139	0.001409
1	U	6	0.003288	0.517179	0.47547	0.000516	0.002139	0.001409
1	U	7	0.003288	0.517179	0.47547	0.000516	0.002139	0.001409
0	R	1	0.057601	0.482709	0.442697	0.007249	0.000842	0.008903
0	R	2	0.003591	0.490501	0.455187	0.031064	0.007408	0.012251
0	R	3	0.026394	0.490129	0.452214	0.002413	0.004045	0.024805
0	R	4	0.005174	0.505919	0.472927	0.002763	0.006844	0.006373
0	R	5	0.007937	0.504262	0.471481	0.001806	0.007297	0.007218
0	R	6	0.007876	0.502556	0.466785	0.003889	0.007558	0.011336
0	R	7	0.550178	0.221197	0.203517	0.013732	0.000529	0.010847
0	U	1	0.181118	0.417267	0.388902	0.002233	0.008742	0.001739
0	U	2	0.000838	0.518505	0.477586	0.000107	0.001178	0.001786
0	U	3	0.007749	0.503737	0.469743	0.002414	0.007358	0.009
0	U	4	0.00439	0.495433	0.465277	0.004865	0.009187	0.020847
0	U	5	0.004932	0.511191	0.473676	0.002672	0.004775	0.002754
0	U	6	0.031648	0.465342	0.441277	0.005714	0.016315	0.039703
0	U	7	0.04191	0.488755	0.449106	0.006958	0.001707	0.011564

CDOT VMT

The HPMS vehicle fractions in Table 1 were applied to the CDOT VMT that was separated by area type and functional class. Table 2 is the result.

Table 2. 2018 CDOT VMT/day by HPMS vehicle class (10 through 60), hpms facility type (FC), and area type (Rura/urban).

NAA?	Rural	FC	10	20	30	40	50	60
-1	R	1	858,997	10,017,683	9,205,008	142,619	34,991	237,016
-1	R	2	6,998	6,602,855	6,051,684	386	7,131	8,540
-1	R	3	14,861	9,583,293	8,806,807	2,855	12,781	60,291
-1	R	4	142,983	6,743,870	6,232,090	18,759	42,328	61,310
-1	R	5	30,337	2,874,659	2,705,173	35,794	73,768	76,473
-1	R	6	12,845	1,217,109	1,145,350	15,155	31,233	32,378
-1	R	7	12,845	1,217,109	1,145,350	15,155	31,233	32,378
-1	U	1	935,234	1,762,194	1,618,117	29,021	3,333	52,117

-1	U	2	21,441	379,183	346,867	128	337	424
-1	U	3	322,606	1,383,875	1,267,216	2,739	2,566	4,120
-1	U	4	143,728	532,334	498,935	114,943	13,719	24,177
-1	U	5	5,538	871,142	800,888	868	3,603	2,373
-1	U	6	47	7,340	6,748	7	30	20
-1	U	7	7,431	1,168,981	1,074,708	1,165	4,834	3,184
0	R	1	367,872	3,082,859	2,827,318	46,295	5,375	56,862
0	R	3	27,050	3,695,067	3,429,037	234,011	55,803	92,286
0	R	4	114,554	2,127,273	1,962,714	10,474	17,557	107,661
0	R	5	9,944	972,421	909,009	5,311	13,155	12,249
0	R	6	6,459	410,367	383,690	1,470	5,938	5,874
0	R	7	6,410	408,979	379,869	3,165	6,151	9,225
0	U	1	4,883,170	1,963,264	1,806,343	121,876	4,695	96,271
0	U	2	662	1,524	1,421	8	32	6
0	U	3	7,632	4,724,715	4,351,850	974	10,737	16,274
0	U	4	34,276	2,228,301	2,077,929	10,677	32,548	39,810
0	U	5	15,169	1,711,748	1,607,558	16,809	31,741	72,029
0	U	6	398	41,213	38,188	215	385	222
0	U	7	146,732	2,157,476	2,045,901	26,493	75,642	184,077
		Totals	8,136,219	67,886,834	62,725,766	857,373	521,646	1,287,647

MOVES2014b Emission Factors

We ran the EPA MOVES2014b model in inventory mode at the "National" scale, which relies on the national default database (i.e., for VMT, Inspection & Maintenance (I/M) Programs, Regional Fuel Supply, Age Distribution, Meteorology, etc.) and thus is not appropriate for regulatory purposes. Because the I/M programs differ in the NAA, Adams County represents the Denver Metro/North Front Range (DMNFR) NAA while El Paso County represents the rest of the state. We restricted this inventory to on-network running emissions, so we excluded MOVES road type 1 (off-network). We selected MOVES output by year, county, road type, pollutant, and activity (distance traveled) with the standard units of grams, miles, and Joules. The main inputs are summarized in Table 3 below. The full text of the run specification file is reproduced in Attachment 1 to this Appendix.

Table 3. Primary MOVES inputs used to calculate CDOT running emissions inventories.

MOVES2014b Inputs	Details
Scale	National Inventory
Time Spans	Time Aggregation: Hour Years: 2018 Months: January & July Days: Weekdays only Hours: All hours

Geographic Bounds	State: Colorado Counties: Adams (8001) and El Paso (8041)
On Road Vehicles	All Fuel & Source Use Type combinations
Road Type	On Network: 2-5
Pollutants and Processes	CO = 2; NO_x = 3; VOC = 87 PM_{10} = 100+106+107 $PM_{2.5}$ = 110+116+117 CO_2 = 90; CO_2 equivalent = 98 >> select additional prerequisites when prompted For ProcessIDs = 1, 9, 10, 11, 12, 13, 15
General Output	Units: Grams, Joules, Miles Activity: Distance Traveled
Output Emissions Detail	Time: Year Location: County On and Off Road: Road Type & Source Use Type

Only January and July are selected to emphasize the high-pollution seasons for CO and ozone precursors, respectively. In addition, only weekdays are selected.

We used the national default VMT per county and determined the weekday year-average emission factors for each pollutant in post-processing (MOVES emissions/MOVES VMT). We also performed the following conversions: 1) MOVES source type to HPMS vehicle type, 2) MOVES road type to FHWA functional class, and 3) County to area type (Urban or Rural and NAA or Non-NAA).

These emission factors per HPMS vehicle class, functional class, and area type (Attachment 2) were multiplied by the VMT in Table 2 to yield the total annual emissions below (Table 4 for 2018).

A process flowchart to compute final emissions is shown in Attachment 3.

Table 4. 2018 weekday running emissions inventory.

Rural	FC	Total VMT	CO (tons)	NOx (tons)	CO2 (tons)	CO2e (tons)	PM10 (tons)	PM25 (tons)	VOC (tons)
R	1	26,882,894	116.98	11.80	11,072.20	11,086.81	0.74	0.42	2.60
R	2	12,677,594	47.92	3.59	4,902.33	4,908.35	0.27	0.14	0.67
R	3	26,014,142	68.30	8.94	10,430.98	10,448.15	0.97	0.35	1.71
R	4	17,581,574	48.56	5.80	7,067.33	7,078.53	0.64	0.22	1.32
R	5	7,718,294	20.55	2.88	3,185.50	3,190.61	0.30	0.11	0.54
R	6	3,267,867	8.72	1.22	1,349.46	1,351.62	0.13	0.05	0.23
R	7	3,267,867	8.72	1.25	1,355.84	1,358.01	0.13	0.05	0.23

U	1	13,275,634	112.17	9.44	5,757.18	5,769.03	0.58	0.37	5.94
U	2	752,033	2.85	0.21	291.62	292.04	0.02	0.01	0.06
U	3	12,095,304	41.90	3.65	5,541.37	5,554.26	0.76	0.19	1.62
U	4	5,751,378	20.27	3.09	2,872.94	2,880.26	0.48	0.16	0.93
U	5	5,139,465	16.19	2.14	2,519.92	2,525.58	0.39	0.11	0.55
U	6	94,814	0.31	0.03	44.07	44.18	0.01	0.00	0.01
U	7	6,896,625	23.10	3.69	3,566.12	3,574.08	0.59	0.19	0.96
	Totals	141,415,485	536.53	57.72	59,956.88	60,061.50	6.01	2.37	17.37

Attachment 1. MOVES Run Specification (RunSpec) File for Running Emissions

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        <emissionprocess selected="false"/>
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RunSpec file continued…

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    <outputshidling value="false"/>
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    </donotexecute>

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    <lookuptableflags scenarioid="" truncateoutput="true" truncateactivity="true"
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</runspec>
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Attachment 2. MOVES Emission Factors (EFs)

2018

Restricted	Rural	NAA?	HPMS	roadTypeID	CO g/m	NOx_g/m	CO2 g/m	CO2e_g/m	PM10 g/m	PM25 g/m	VOC g/m
1	R	1	10	2	13.05	0.82	399.46	400.44	0.04	0.03	0.76
0	R	1	10	3	13.17	0.81	382.64	383.87	0.04	0.02	0.94
1	U	1	10	4	13.11	0.81	392.75	393.84	0.04	0.03	0.84
0	U	1	10	5	13.12	0.68	381.11	383.01	0.05	0.03	1.41
1	R	1	20	2	2.70	0.16	299.21	299.53	0.02	0.01	0.04
0	R	1	20	3	1.78	0.14	300.59	300.99	0.03	0.01	0.04
1	U	1	20	4	2.50	0.15	300.91	301.27	0.02	0.01	0.04
0	U	1	20	5	2.08	0.14	364.27	364.95	0.05	0.01	0.06
1	R	1	30	2	4.22	0.35	404.32	404.87	0.02	0.01	0.06

0	R	1	30	3	2.80	0.29	400.66	401.36	0.03	0.01	0.06
1	U	1	30	4	3.85	0.32	402.10	402.72	0.03	0.01	0.06
0	U	1	30	5	3.06	0.28	472.67	473.86	0.06	0.01	0.08
1	R	1	40	2	2.88	6.70	1296.91	1301.15	0.28	0.22	0.45
0	R	1	40	3	2.57	5.55	1073.94	1078.92	0.34	0.24	0.52
1	U	1	40	4	2.97	6.48	1269.25	1274.08	0.33	0.25	0.51
0	U	1	40	5	2.96	6.28	1182.70	1190.75	0.54	0.34	0.74
1	R	1	50	2	2.97	2.05	971.61	972.81	0.13	0.09	0.18
0	R	1	50	3	2.92	1.95	905.44	907.16	0.17	0.09	0.24
1	U	1	50	4	3.23	2.08	991.64	993.08	0.16	0.10	0.21
0	U	1	50	5	4.01	2.63	1225.41	1228.38	0.32	0.15	0.40
1	R	1	60	2	1.18	5.55	1715.12	1716.19	0.26	0.19	0.21
0	R	1	60	3	1.34	5.70	1731.08	1732.50	0.35	0.23	0.25
1	U	1	60	4	1.28	5.58	1715.14	1716.42	0.32	0.22	0.23
0	U	1	60	5	1.82	6.83	2045.96	2048.38	0.66	0.36	0.38
1	R	0	10	2	13.16	0.84	399.46	400.42	0.04	0.03	0.75
0	R	0	10	3	13.28	0.83	382.64	383.85	0.04	0.02	0.93
1	U	0	10	4	13.23	0.84	392.75	393.83	0.04	0.03	0.84
0	U	0	10	5	13.24	0.70	381.11	382.98	0.05	0.03	1.40
1	R	0	20	2	3.08	0.21	296.68	297.01	0.02	0.01	0.05
0	R	0	20	3	2.05	0.18	297.74	298.15	0.03	0.01	0.05
1	U	0	20	4	2.86	0.20	298.24	298.61	0.02	0.01	0.05
0	U	0	20	5	2.41	0.18	360.15	360.84	0.05	0.01	0.07
1	R	0	30	2	4.85	0.43	401.03	401.60	0.02	0.01	0.08
0	R	0	30	3	3.23	0.35	397.03	397.75	0.03	0.01	0.08
1	U	0	30	4	4.42	0.39	398.68	399.32	0.03	0.01	0.08
0	U	0	30	5	3.55	0.34	467.53	468.73	0.06	0.01	0.11

1	R	0	40	2	2.89	6.79	1285.56	1289.80	0.28	0.22	0.45
0	R	0	40	3	2.58	5.62	1063.07	1068.04	0.34	0.24	0.52
1	U	0	40	4	2.97	6.56	1257.61	1262.45	0.33	0.25	0.51
0	U	0	40	5	2.96	6.36	1168.67	1176.72	0.54	0.34	0.74
1	R	0	50	2	2.99	2.09	962.27	963.47	0.13	0.09	0.18
0	R	0	50	3	2.94	1.98	895.31	897.03	0.17	0.09	0.24
1	U	0	50	4	3.25	2.11	981.68	983.13	0.16	0.10	0.21
0	U	0	50	5	4.04	2.67	1210.16	1213.13	0.32	0.15	0.39
1	R	0	60	2	1.18	5.63	1700.37	1701.44	0.26	0.19	0.21
0	R	0	60	3	1.34	5.78	1715.16	1716.58	0.35	0.23	0.25
1	U	0	60	4	1.28	5.66	1699.88	1701.16	0.32	0.22	0.23
0	U	0	60	5	1.82	6.92	2024.81	2027.23	0.66	0.36	0.38

Attachment 3. Emissions Calculation Process