Colorado Transportation Commission
Schedule & Agenda

December 18, 2024
1:00 p.m.

Transportation Commission Workshops

Wednesday, December 18, 2024

Time	Topic	Speaker
1:00 p.m.	PPACG GHG Transportation Report	Darius Pakbaz, John Liosatos & Andrew Gunning (PPACG)
1:45 p.m.	Burnham Yard East Line Easement	John Putnam
2:15 p.m.	Legislative Update	Emily Haddaway and Jeff Sudmeier
2:45 p.m.	Adjourn Workshops – Prepare for Board Meeting to follow	

Transportation Commission Meeting

Wednesday, December 18, 2024

Time	Topic	Speaker
3:00 p.m.	Call to Order, Roll Call	Herman Stockinger
3:05 p.m.	Public Comments	Various
3:15 p.m.	Comments of the Chair and Commissioners	Commissioners
3:25 p.m.	Executive Director's Management Report	Shoshana Lew
3:30 p.m.	Chief Engineer's Report	Keith Stefanik
3:35 p.m.	CTIO Director's Report	Piper Darlington
3:40 p.m.	FHWA Division Administrator Report	John Cater
3:45 p.m.	STAC Report	Gary Beedy
3:50 p.m.	Act on Consent Agenda: Proposed Resolution #1: Approve the Regular Meeting Minutes of November 21, 2024 Proposed Resolution #2: IGA Approval >$750,000 Proposed Resolution #3: 1601 Greeley- US 34 "Merge" PD 1601 Interchange Request Proposed Resolution #4: State Transportation Improvement Program (STIP) Amendment- US 287 Safety Improvements	Herman Stockinger Lauren Cabot Heather Paddock Jamie Collins
3:55 p.m.	Proposed Resolution #5: State Infrastructure Bank (SIB) Rate Update	Jeff Sudmeier
4:00 p.m.	Discuss and Act on Proposed Resolution #6 Burnham Yard East Line Easement	John Putnam

4:05 p.m.	Recognitions	None
4:05 p.m.	Other Matters	None
4:05 p.m.	Adjournment	None

The Bridge and Tunnel Enterprise Board of Directors Meeting will not be meeting in December.

The Fuels Impact Enterprise Board of Directors will not be meeting in December.

Information Only

- Project Budget/Expenditure Memo (Jeff Sudmeier)
- December 2024 TC Grants Memo (Anna Dunn)
- December Budget Supplement Information (Jeff Sudmeier)
- NAAPME Annual Report (Darius Pakbaz - NAAPME Program Admin)
- CTE Annual Report (Kay Kelly - CTE Program Admin)
- Community Access Enterprise Annual Report (Mike Salisbury - Colorado Energy Office)
- Clean Fleet Enterprise Annual Report (Jeremy Neustifter - Clean Fleet Enterprise Manager)
- 2025 Transportation Commission Calendar (Herman Stockinger)

COLORADO
Department of Transportation

Transportation Commission Memorandum

To: State of Colorado Transportation Commission.
CC: Shoshana Lew, Executive Director, CDOT.
Herman Stockinger, Deputy Executive Director, CDOT.
Sally Chafee, Chief of Staff, CDOT.
Darius Pakbaz, Director, Division of Transportation Development
From: Andrew Gunning, Executive Director, PPACG
John Liosatos, Transportation Director, PPACG
William Mast, GIS and Modeling Manager, PPACG
Date: December 18, 2024.

Subject: PPACG 2050 Long Range Transportation Plan (LRTP) Compliance with Greenhouse Gas Planning Standard.

Purpose

As outlined in Chapter 23, Section 134 of the Code of Federal Regulations, the Pikes Peak Area Council of Governments has been designated as the Metropolitan Planning Organization (MPO) for the Pikes Peak Urbanized Area. As the MPO in attainment for air quality conformity, PPACG is required to develop a regional transportation plan that is no more than 5 years old and has a horizon year no less than 20 years into the future. PPACG is preparing to adopt its 2050 LRTP. As required by SB21-260 PPACG must comply with State of Colorado Rule 2 CCR 601-22 that outlines emission reduction levels for the PPACG MPO area for the 2030, 2040, and 2050 analysis years.

Action

Anticipated acceptance of the PPACG GHG Report at the January 2025 Transportation Commission Meeting.

Background

Per SB21-260 and the state GHG rule, the PPACG 2050 LRTP must comply with the rule's emission reduction levels for the PPACG MPO area for the 2030, 2040, and 2050 analysis years. The rule requires PPACG to prepare and submit a GHG Transportation Report (attached) to the Transportation Commission.

For the 2050 LRTP, PPACG developed a new model that utilizes a collaborative land use forecasting approach which replaces isolated methodologies, better aligning regional and local development initiatives into a comprehensive plan. The improved land use forecast is combined with an enhanced Travel Demand Model (TDM) that now includes reasonable remote work considerations, pedestrian and bicycle mode choices, and simulation-based traffic assignment.

Additionally, the 2050 LRTP uses a new Regional Transit Plan that aligns with multimodal goals, detailing 58 projects including Enhanced Transit Corridors and innovative mobility zones. Investments in multimodal projects doubled compared to the previous plan, while several miles of major roadway projects were not advanced from the previous plan into the 2050 LRTP and removed from the model, emphasizing sustainability and equitable transportation access.

Next Steps

The PPACG Board of Directors is anticipated to adopt the 2050 Regional Transportation Plan at its February 12, 2025, meeting.

Attachments

- PPACG draft GHG Transportation Report.

GHG Transportation Report

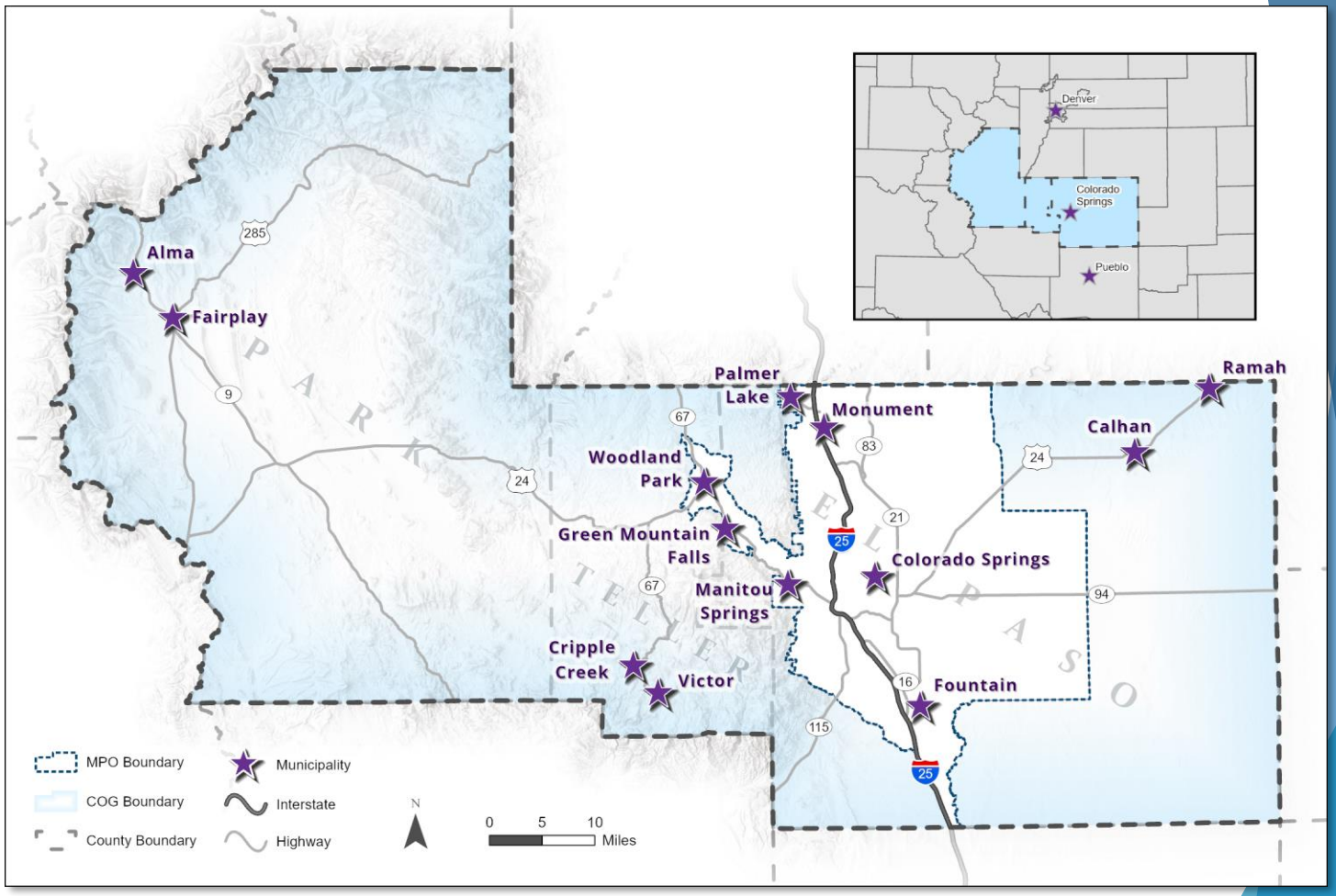
PPACG 2050 plan

Pikes Peak Area
Council of Governments
Communities Working Together

About PPACG

The Pikes Peak Area Council of Governments (PPACG) is a regional organization of sixteen member governments that serves as the administrative body for:

- Pikes Peak area Metropolitan Planning Organization (MPO)
- Area Agency on Aging (AAA)
- Air and Water Quality Planning (Federal 208)
- Military Joint Land Use Study (JLUS)
- Pikes Peak Rural Transportation Authority (PPRTA)



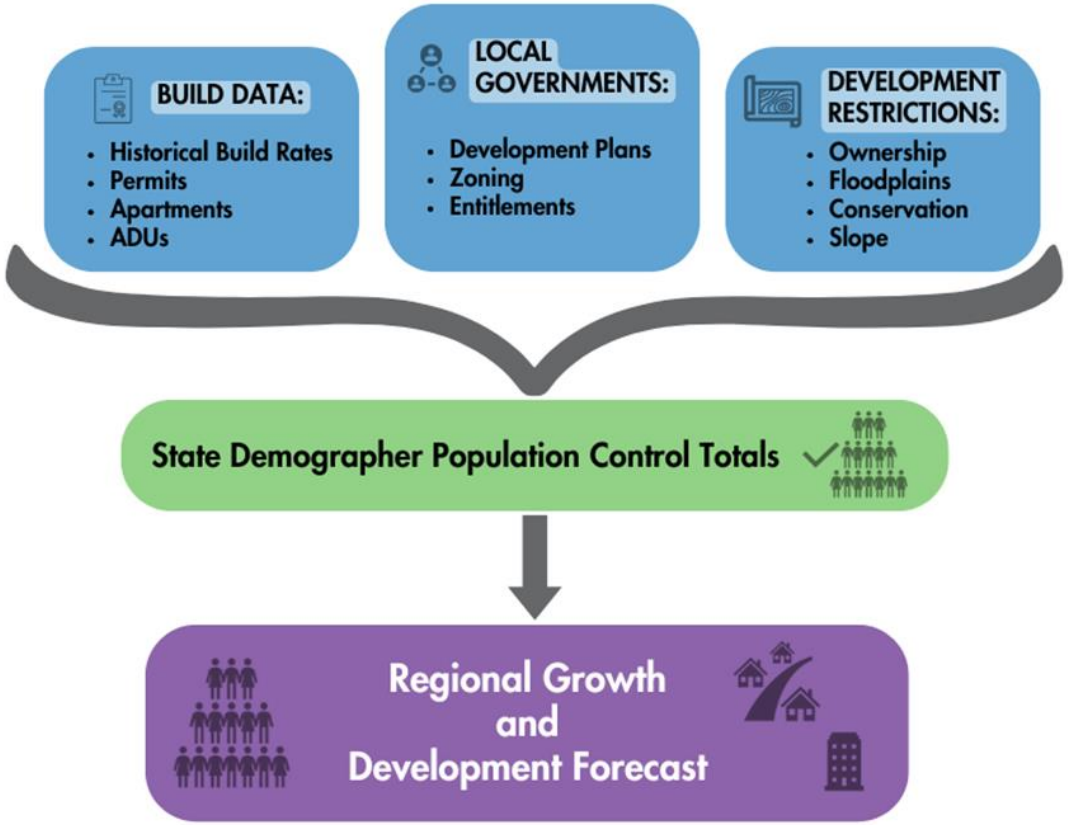
A Better Plan

The PPACG Greenhouse Gas Report presents the planning strategies employed by staff, working in collaboration with local jurisdictions, to produce a 2050 Long Range Transportation Plan (LRTP) that successfully supports a modelled reduction in greenhouse gas (GHG) emissions within the MPO, including:

- A significantly improved land use forecast methodology that empowers coordinated transportation and development planning across jurisdictional boundaries to support healthy mode choices.
- A transportation project mix that reflects and supports the affordable housing and multi-use urban infill goals of local government by more than doubling multimodal project funding compared to the previous plan.
- A heavy emphasis on regional transit improvements with over $1.5 billion of projects identified within the LRTP and corresponding Regional Transit Plan, supported in part through multiple new state funding sources and CDOT's Transit Connections Study.

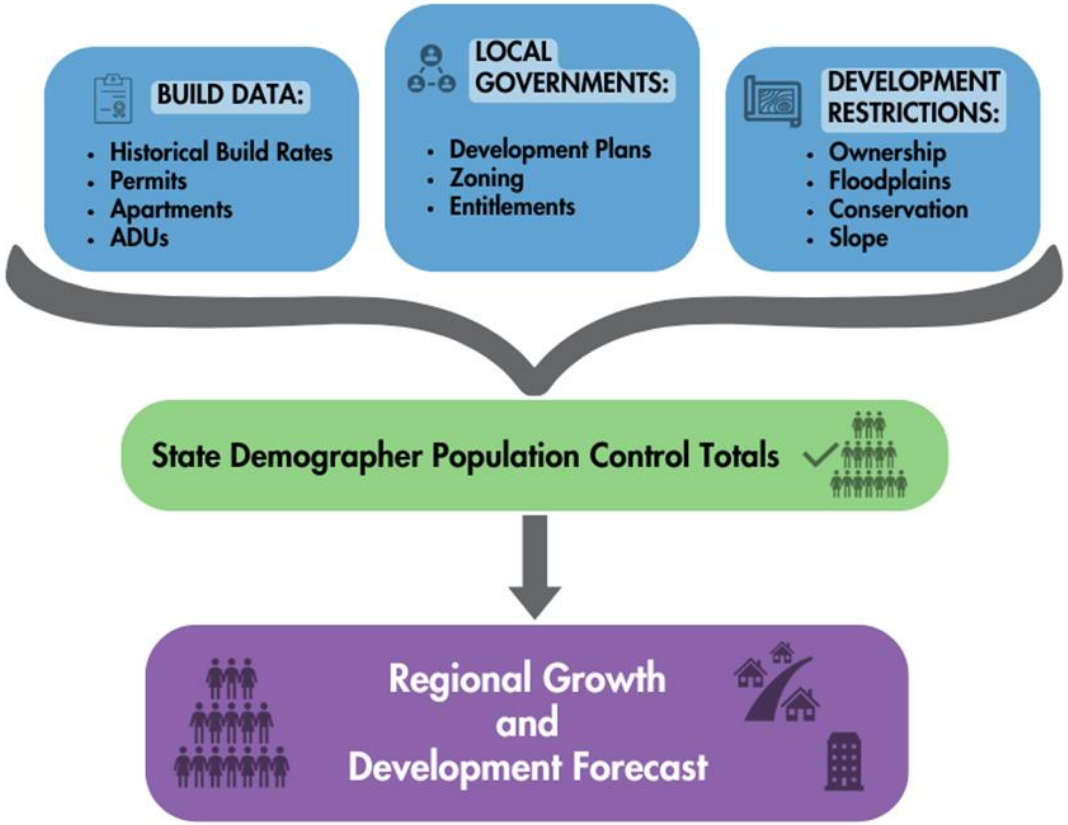
2050 Land Use Forecast

- The previous plan's land use forecast was developed using a 'black box' software approach in isolation from local government planners.
- For the 2050 plan, PPACG moved away from independent forecasting and adopted a collaborative approach, creating a regional "best-fit" model from all the development plans and goals of its member governments.
- The process allowed development plans, zoning, and entitlements to be mapped alongside proposed transportation projects and traditional data like accessory dwelling unit (ADU) permits and residential build rates.



2050 Land Use Forecast (continued)

- Round-table discussions were held to evaluate where suburban growth might be tempered based on historical trends, current and expected development incentives, and utilities requirements, while considering potential zoning and land use changes that would foster mixed-use and transit-oriented communities congruent with the plan's multimodal transportation project mix.
- Ongoing collaborative meetings allow development updates and changes to be reviewed collectively across jurisdictional boundaries.



Development Changes

The updated land use forecast in the 2050 plan reflects many of the recent zoning and development changes that are being adopted throughout the region, but especially important for GHG reduction are the advancements made within the region's central urban area:

- The City of Colorado Springs recently approved a Unified Development Code (UDC) that encourages, and in some cases even requires, higher density and mixed-use development.
- The adopted UDC reduces parking requirements for a number of development types and has several provisions to encourage walkability in new projects.
- A downtown "Form-Based Zone" specifically targets high density development with full parking exemption throughout, and a half a square mile of downtown now has no maximum building height.
- These land use changes are supported by a new downtown circulator, improved bike lanes and roadway lane diets, a robust e-scooter and bike share program, and multiple pedestrian safety improvement projects.

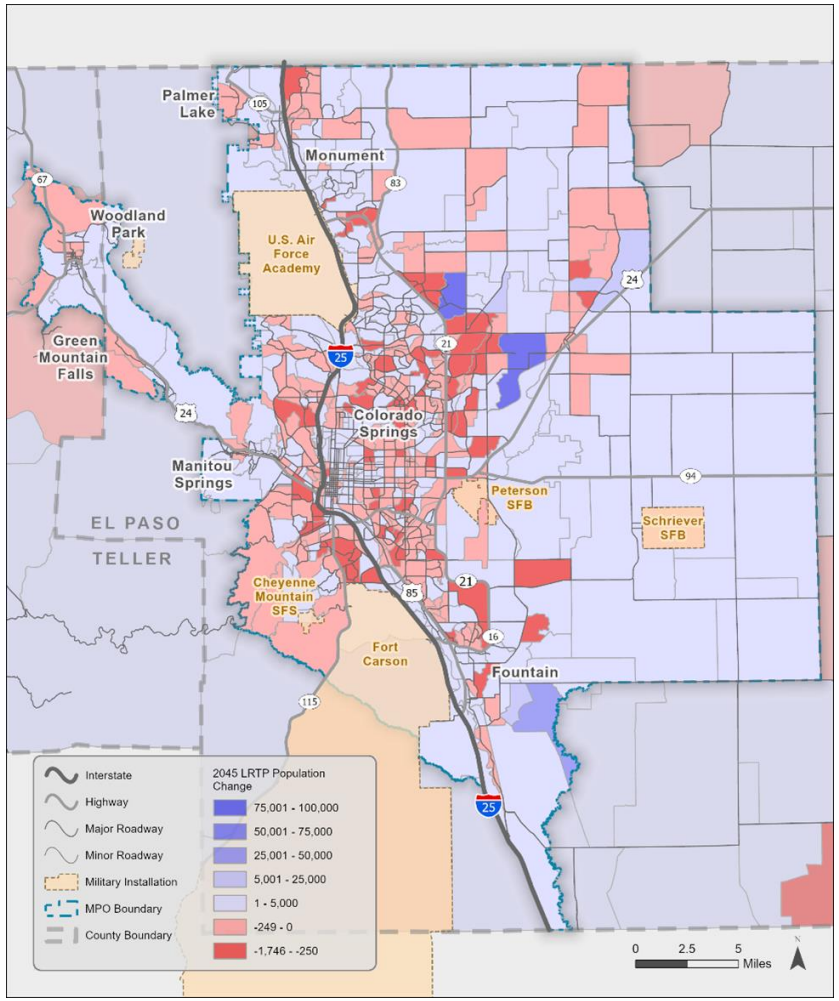
Proposed Development Projects

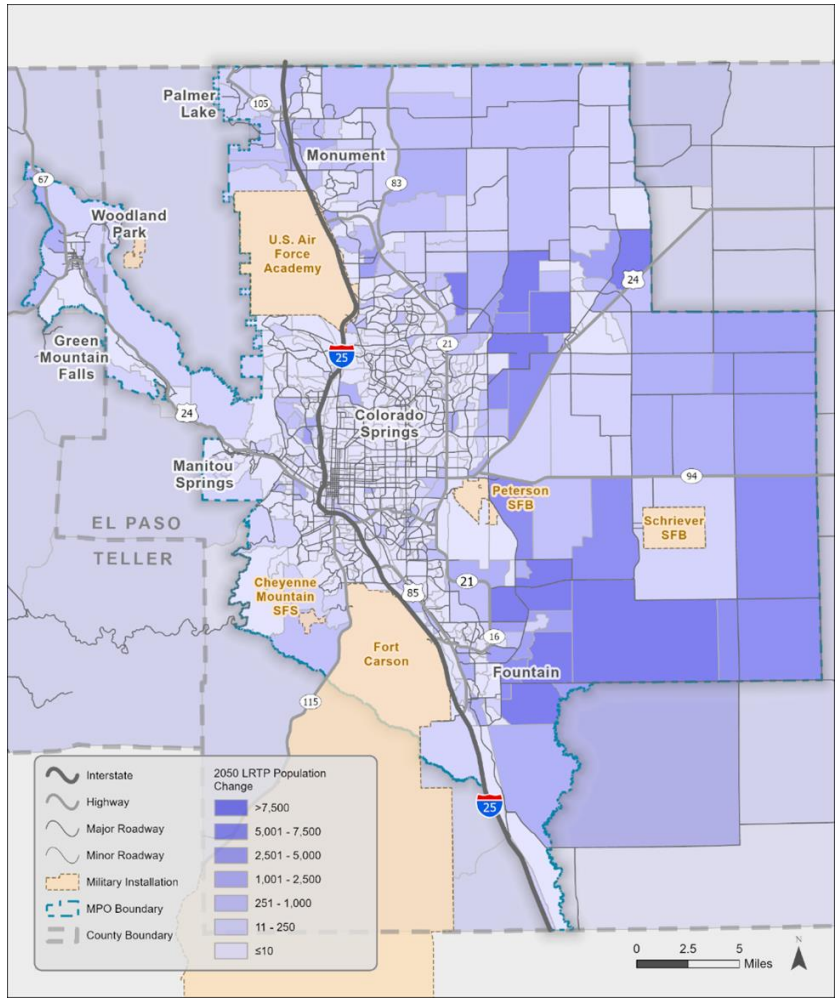
New 27-story mixed use project recently submitted for downtown

Printers Hill mixed use urban development near downtown

New zoning rules for improved residential housing density

Population Change Projections





Population change in the 2045 plan compared to the new 2050 plan on the right

2050 Project Mix

The 2050 LRTP prioritizes multimodal and transit projects in support of a robust, equitable, and healthy transportation system.

- Approximately 69 fewer centerline miles of new roadways are in the 2050 LRTP model network compared to the 2045 plan.
- Almost 40% of the project mix now focuses on bicycle, pedestrian, multimodal, and transit solutions.
- $414 million is allocated to 49 bicycle and pedestrian projects (16%), and $708 million to 30 multimodal projects (13%). In comparison, the previous LRTP allocated only $125 million to all active transportation projects, which includes both bicycle/pedestrian and multimodal initiatives.
- Over 8% of the project mix represents transit projects (19 total), in addition to multiple transit-specific projects funded by the FTA and detailed in the Regional Transit Plan (RTP).
- All the regional transit projects identified in both the 2050 LRTP and RTP total approximately $1.5 billion.

Regional Transit Plan

A new Regional Transit Plan was developed by Mountain Metro Transit (MMT) in coordination with PPACG planners concurrently with the 2050 LRTP to address implementation goals for projects funded through both the LRTP and new state transit programs, including:

- Enhanced Transit Corridors (ETC) - a transit corridor that provides both a higher level of service as well as improved amenities compared to a regular local fixed-route bus, allowing transit to compete with the travel times of private vehicles.
- Innovative Mobility Zones - areas where transit service will be on-demand, facilitating riders to request travel to fixed route services via a call-in number or mobile application.
- New Fixed Routes and new Crosstown Routes
- Improved Capital Infrastructure
- Improved Existing Route Frequency

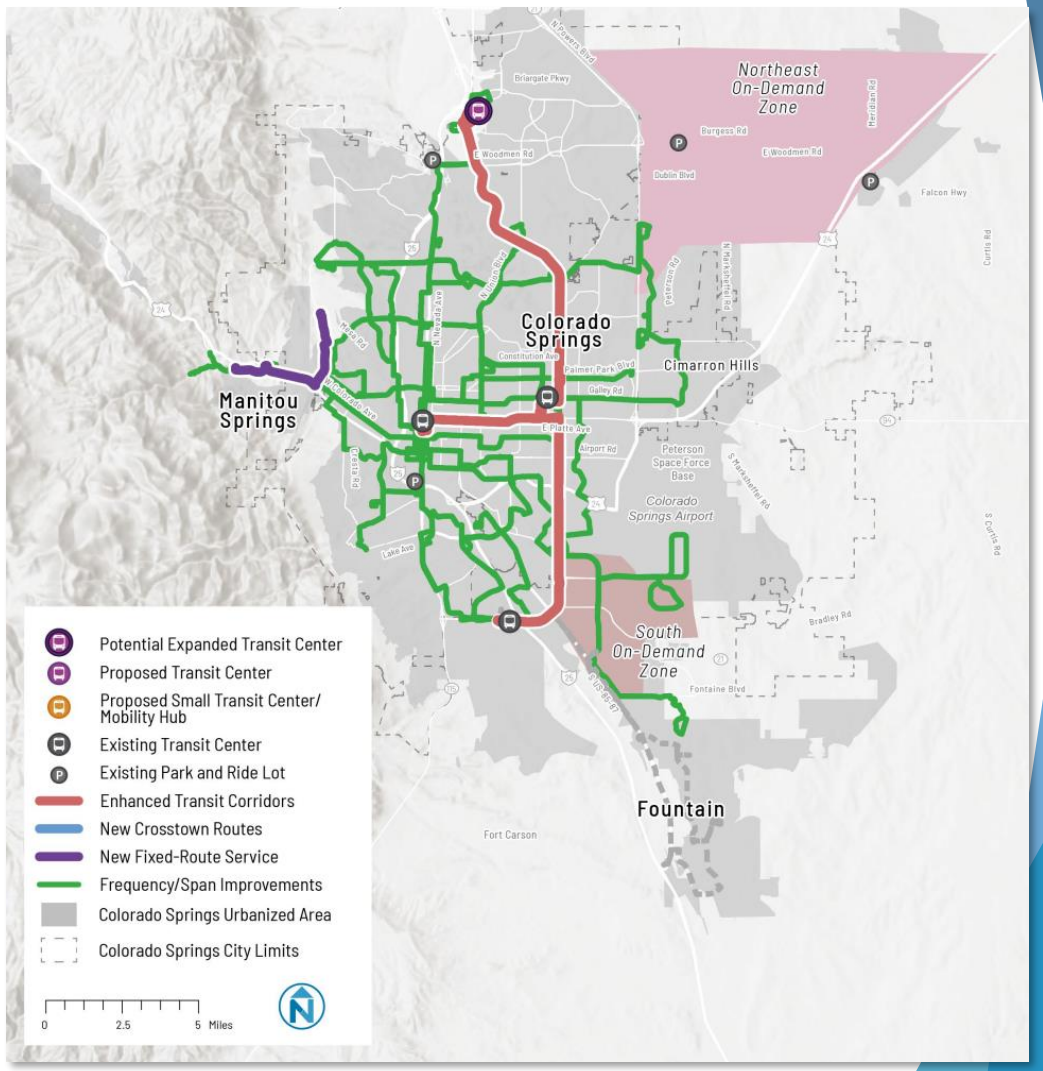
Short-Term Transit Projects

Two Enhanced Transit Corridor (ETC) projects stand out as prime candidates for near-term advancement, based on both demand and the level of planning already completed or underway:

- Academy Boulevard
- Platte Avenue

The Northeast Mobility Zone would capture a large swath of Colorado Springs that has recently experienced – and continues to experience – rapid growth but lacks access to fixed-route transit.

A new Manitou/Garden of the Gods shuttle route would support tourist travel, while service improvements are planned for existing routes.



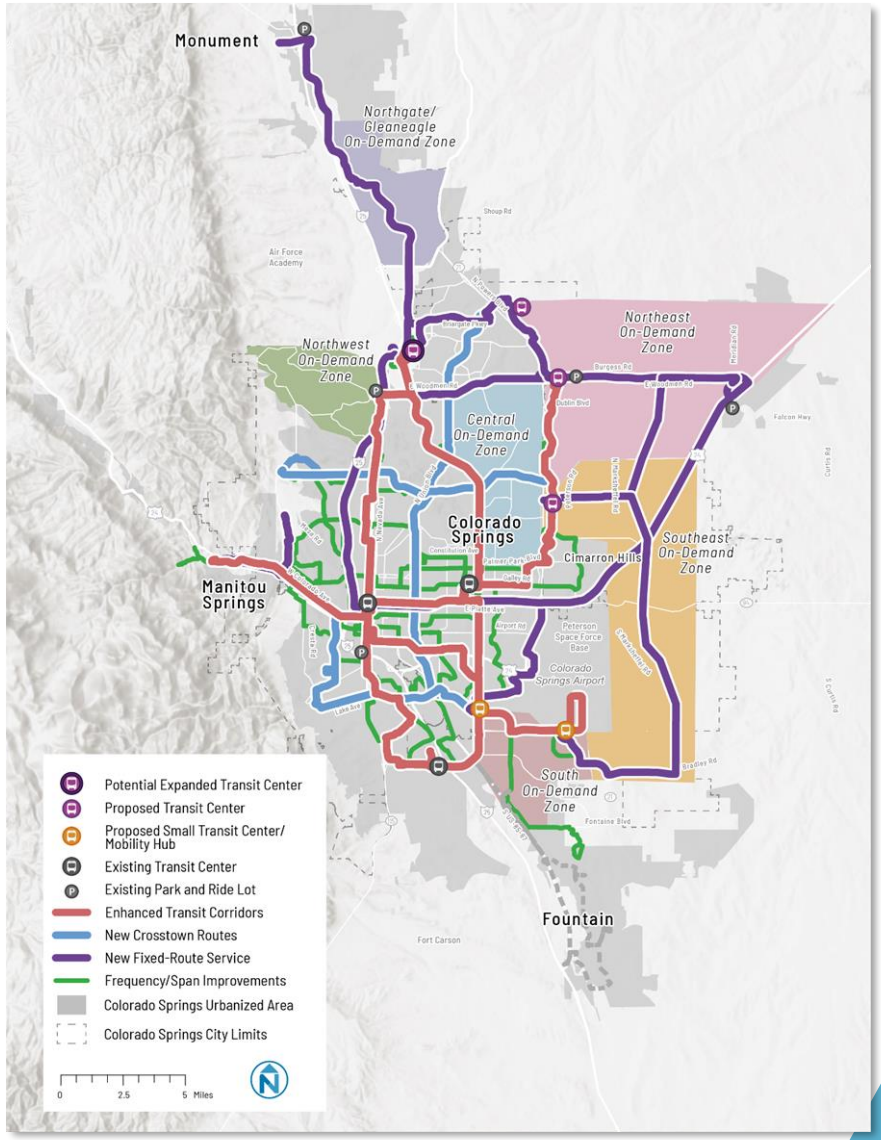
Medium-Term Transit Projects

The 2030-2040 forecast period includes three Enhanced Transit Corridor (ETC) projects:

- North Nevada Avenue
- South Nevada Avenue
- Colorado Avenue

New crosstown routes are introduced on the Lake Avenue and Union Boulevard corridors.

New fixed routes to the Monument and Falcon areas are expected to facilitate transit service to high-growth areas and connect new Mobility Zones to the statewide transit system by tying into existing Bustang services.



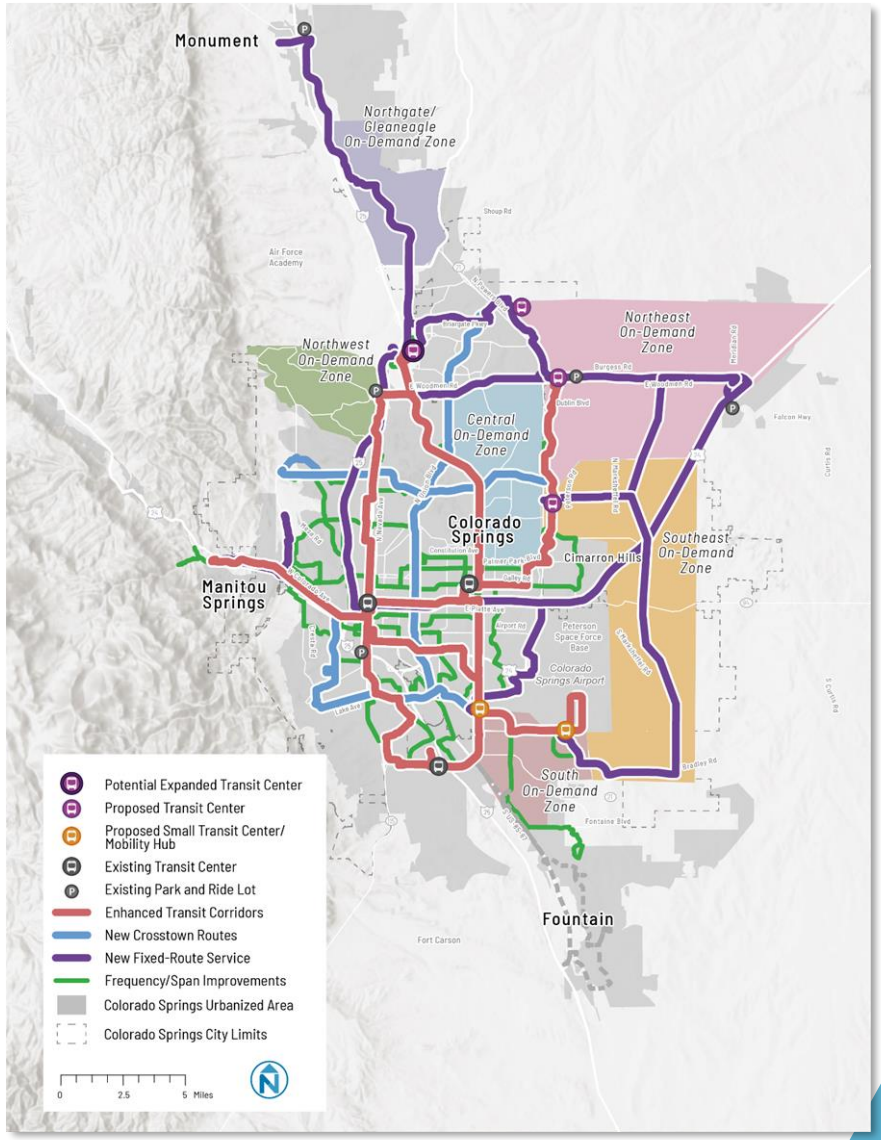
Long-Term Transit Projects

The long-term projects in the 2040-2050 forecast period focus on transit improvements in the future development areas of the Southeast Mobility Zone, including two new ETC projects:

- Airport Road
- Tutt Boulevard

New fixed route services through Banning Lewis Ranch are conceptualized, while the Garden of the Gods and Austin Bluffs Boulevard corridor is enhanced wit a new Crosstown Route.

Service improvements to route frequency are planned for all remaining routes.



Transit Connections Study

In 2024, CDOT's Division of Transit and Rail (DTR) launched the Transit Connections Study (TCS) as part of its effort to build a statewide transit network. Planners from Mountain Metro Transit (MMT), local jurisdictions, and CDOT Region 2 have developed a project list for inclusion in the TCS. This list identifies projects in the Pikes Peak region that align with CDOT's transit goals and represents a more aggressive implementation of the vision laid out in the Regional Transit Plan, designed to leverage increasing funding streams. It includes several service enhancement projects:

- Peterson SFB and Schriever SFB mobility hubs and corridor service
- Park and Ride improvements in Falcon, Monument, and along Woodmen Road
- Express bus service from Monument to downtown Colorado Springs, and from the Falcon area to I-25, overlapping and augmenting existing Bustang stops
- Express bus service along the Powers Boulevard (CO 21) corridor
- Multiple 'last mile' transit connection circulators

Local Government Initiatives

There are also multiple initiatives and activities which have been implemented by the City of Colorado Springs, the region's largest municipality and principal urban area within the MPO, to improve air quality and provide multimodal options beyond the projects and funding included in the new 2050 LRTP and RTP:

- Colorado Springs has a vanpool program that includes schoolpool and carpool programs.
- The city is implementing advance detection on major corridors (roughly 250 intersections). Advance detection provides advanced signal performance measures which are used to improve signal timing and synchronization, reducing unnecessary stops when travelling along the corridor.
- Since October 2021, when the city first launched their scooter-share program, e-scooters have been used for more than 730,000 trips traveling nearly 1 million miles.
- Colorado Springs is constructing new sidewalk connections throughout the city to fill in gaps, provide access to transit stops, and facilitate new trail connections. Further, pedestrian crossing has been improved through multiple signalization and grade separation projects.

Summary

The GHG Transportation Report serves to underscore the substantial benefits achievable through a harmonious land use and transportation planning strategy. The 2050 LRTP has yielded more than just a transportation project list; it has been the impetus to establish new regional forums in support of a collaborative planning methodology between PPACG and local governments, fostering the collective vision and coordination needed to drive meaningful, positive change across the region.

The result is a regional plan that empowers continuing efforts in the region to reshape land use, zoning, parking, and funding in ways that prioritize multimodal transportation, enhance transit, and promote environmentally positive changes in travel behavior that advance more equitable mobility options and significantly reduce greenhouse gas emissions.

Pikes Peak Area Council of Governments

Communities Working Together

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Pikes Peak Area
Council of Governments
Communities Working Together

GHG Transportation Report

For the Pikes Peak Area MPO

Pikes Peak Area
Council of Governments
Communities Working Together

GHG Transportation Report

For the Pikes Peak Area MPO

Submitted to the State Transportation Commission
Pursuant to Code of Colorado Regulations 2 CCR 601-22
December 2024

for the
2050 Long Range Transportation Plan

by the
Pikes Peak Area Council of Governments
15 S. 7th Street, Colorado Springs, CO 80905

Prepared in cooperation with, or financed in part through grants from:

Federal Highway Administration
Federal Transit Administration
Colorado Department of Transportation
Colorado Department of Health and the Environment
Local Member Government Contributions

Contents

1 Executive Summary

This *Greenhouse Gas Report* by the Pikes Peak Area Council of Governments (PPACG) presents the planning strategies employed by staff to produce a 2050 Long Range Transportation Plan (LRTP) that successfully supports a modelled reduction in greenhouse gas (GHG) emissions within the Pikes Peak Area Metropolitan Planning Organization (MPO), including the plan's land use forecast, transportation project mix, and modeling methods. This report demonstrates compliance with the requirements of the state's greenhouse gas rule (2 CCR 601-22) by meeting or exceeding the GHG reduction requirements recorded in Table 1 of the rule.

1.1 Key Highlights

Planning and Modeling Innovations

A collaborative land use forecasting approach replaces isolated methodologies, better aligning regional and local development initiatives into a comprehensive plan. The improved land use forecast is combined with an enhanced Travel Demand Model (TDM) that now includes reasonable remote work considerations, pedestrian and bicycle mode choices, and simulation-based traffic assignment.

Notable Regional Initiatives

A new Regional Transit Plan aligns with multimodal goals, detailing 58 projects including Enhanced Transit Corridors and innovative mobility zones. Investments in multimodal projects doubled compared to the previous plan, while several miles of major roadway projects were not advanced from the previous plan into the 2050 LRTP and removed from the model, emphasizing sustainability and equitable transportation access.

GHG Reduction Strategies

The 2050 LRTP incorporates a diverse mix of projects prioritizing multimodal transportation, including transit enhancements, pedestrian and bicycle infrastructure, and innovative mobility solutions that all promote environmentally positive changes in travel behavior.

1.2 Results

The 2050 LRTP exemplifies balanced, collaborative, and effective planning, seamlessly integrating environmental considerations into the region's long-term transportation strategies. The plan demonstrates full compliance with the state's greenhouse gas rule by exceeding the required reduction targets for all horizon years. For further details, please refer to the full report and Section 4.2 for specific emissions figures.

2 Introduction

2.1 Purpose

This report documents the actions taken by the Pikes Peak Area Council of Governments (PPACG) to incorporate regional Greenhouse Gas (GHG) reduction strategies into the planning and modeling processes of the 2050 Long Range Transportation Plan (LRTP) and satisfy the requirements of Colorado's transportation greenhouse gas rule specified in the Code of Colorado Regulations (2 CCR 601-22).

The planning measures, modeling methods, and emissions analysis results documented in this report demonstrate that the 2050 Long Range Transportation Plan complies with these regulations, and that no additional GHG Mitigation Measures, and by extension an annual Mitigation Action Plan, are necessary for PPACG to satisfy the rule's transportation GHG reduction requirements.

The approval of this GHG Transportation Report by the Transportation Commission is a prerequisite for the 2050 Long Range Transportation Plan to be considered fully compliant with all state and federal rules and regulations when adopted by the PPACG Board of Directors in 2025.

2.2 Background

In June 2021, the Colorado legislature passed Senate Bill (SB) 21-260, titled "Sustainability of the Transportation System." This legislation established new funding sources for transportation and mandated that the state Transportation Commission (TC) create guidelines and procedures to address greenhouse gas (GHG) emissions in transportation planning. It also directed the Colorado Department of Transportation (CDOT) to update statewide transportation planning rules to incorporate GHG reduction goals into specific planning documents adopted by CDOT and the state's Metropolitan Planning Organizations (MPOs).

The result of this effort was the adoption of the "Rules Governing Statewide Transportation Planning Process and Transportation Planning Regions" (2 CCR 601-22) by the Transportation Commission (TC) in December 2021. These rules address the GHG reduction requirements outlined in SB21-260 by setting GHG reduction targets for CDOT and each Metropolitan Planning Organization (MPO) across multiple forecast years. The initial GHG emissions projected from the forecasted land use and transportation network in each MPO's adopted plan were developed by CDOT in collaboration with Cambridge Systematics using the Energy Emissions Reduction and Policy Analysis Tool (EERPAT).

	2030	**2040**	**2050**
Initial GHG Emissions Estimated by CDOT for the Pikes Peak Area MPO	2.2	2.0	2.3

Figure 1: Table of the GHG emissions in Million Metric Tons (MMT) of CO2e (Carbon Dioxide equivalent) estimated by CDOT for the Pikes Peak MPO in 2030, 2040, and 2050

CDOT used the initial GHG emissions estimates, along with each MPO's share of statewide Vehicle Miles Travelled (VMT), to determine the required GHG reduction amounts in Million Metric Tons (MMT) of CO2e (Carbon Dioxide equivalent) for three forecast years: 2030, 2040, and 2050. These reduction amounts are reported for each MPO in Table 1 of the rule.

Table 1: GHG Transportation Planning Reduction Levels in MMT of CO2e

Regional Areas	2025 Reduction Level (MMT)	2030 Reduction Level (MMT)	2040 Reduction Level (MMT)	2050 Reduction Level (MMT)
DRCOG	0.27	0.82	0.63	0.37
NFRMPO	0.04	0.12	0.11	0.07
PPACG	N/A	0.15	0.12	0.07
GVMPO	N/A	0.02	0.02	0.01
PACOG	N/A	0.03	0.02	0.01
CDOT/Non-MPO	0.12	0.36	0.30	0.17
TOTAL	0.43	1.5	1.2	0.7

Figure 2: Table 1 in 2 CCR 601-22 identifies the GHG reduction amounts for PPACG in Million Metric Tons (MMT) of CO2e (Carbon Dioxide equivalent) emissions in 2030, 2040, and 2050

Currently, the Long Range Transportation Plan is the only applicable planning document for which PPACG is required to model GHG emission reductions; other PPACG planning products like the Transportation Improvement Program (TIP) do not require GHG modeling to comply with the rule.

2.3 Planning Area

The Pikes Peak Area Council of Governments (PPACG) boundary encompasses El Paso, Park, and Teller Counties, and serves as a regional forum for cities, towns, tribal governments, counties, transit agencies, and state agencies operating within the region to address common issues. While PPACG administers a variety of programs and services across the entire region, the Long Range Transportation Plan focuses on the Metropolitan Planning Organization (MPO) area.

Federally mandated and funded, MPOs are required to facilitate transportation planning for Census Urbanized Areas (UZA) with populations exceeding 50,000 people. The Pikes Peak Area MPO conducts long-range transportation planning through the LRTP and uses it to guide short-range programming of select federal and state transportation funds. The MPO area includes the cities of Colorado Springs, Fountain, Manitou Springs, and Woodland Park; the towns of Monument, Palmer Lake, and Green Mountain Falls; and urban portions of unincorporated El Paso and Teller Counties.

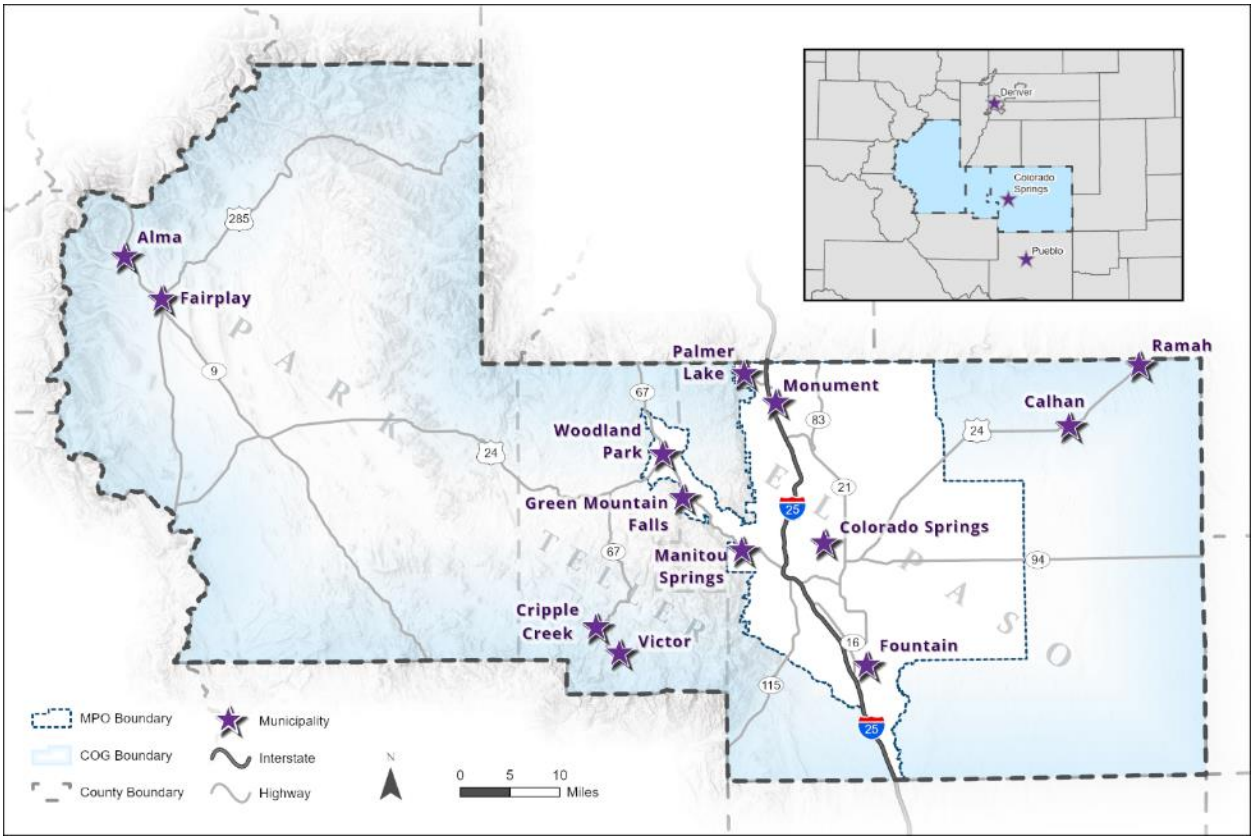


Figure 3: Map of the PPACG region and the MPO area

The Long-Range Transportation Plan (LRTP) is updated every five years and includes planning horizons of at least 20 years. Its primary purpose is to establish the region's transportation vision and goals, evaluate the system as a whole, and identify strategies to optimize the use of public funds in achieving these goals. The LRTP also provides a framework for decision-makers to consider the broader social, economic, and environmental impacts of transportation and land-use choices. Consequently, all transportation projects with the potential to significantly affect transportation or air quality within the metropolitan planning area must be included in the plan.

A critical component of the LRTP is the regional Travel Demand Model (TDM), a tool used to estimate future traffic volumes, average speeds, and travel patterns by analyzing factors such as population changes, land use, employment, and the transportation network. Updating planning assumptions and model inputs like residential locations, job distribution, housing density, transportation projects, and mode choice in the planning forecast can significantly influence predicted traffic volumes and roadway speeds. Projects included in the LRTP are integrated into the TDM to evaluate their impacts on the forecasted travel network and determine their alignment with the plan's goals, including GHG emission reductions.

Transportation projects outside the MPO are evaluated separately by CDOT and incorporated into their modeling process to meet the GHG reduction targets established for non-MPO areas of the state.

2.4 GHG Modeling Procedure

The GHG rule requires new transportation plans to incorporate projects and funding choices designed to model a reduction in GHG emissions relative to a baseline GHG amount in each of the prescribed forecast years. The baseline GHG amount is determined from the adopted plan in place when the rule became effective on January 30, 2022.

The baseline plan for the Pikes Peak Area MPO is the 2045 Long-Range Transportation Plan (LRTP), adopted by PPACG in January 2020. This plan was in effect as of January 30, 2022, and its forecasted population estimates, land use assumptions, and transportation network were used to establish the GHG reduction targets outlined for the MPO in Table 1 of the rule.

The new transportation plan, the 2050 LRTP, must demonstrate GHG emission reductions that meet or exceed the targets recorded in Table 1 of the rule for the compliance years 2030, 2040, and 2050, compared to the adopted 2045 plan.

Greenhouse gas emissions are estimated from these plans using the MOtor Vehicle Emission Simulator (MOVES), an emissions modeling program developed by the Environmental Protection Agency (EPA). MOVES utilizes many factors to estimate surface transportation GHG emissions, including:

- Traffic volumes and average speeds by time of day
- The type and age of vehicles in the region
- The vehicle fleet mix by roadway type
- Meteorological conditions
- Fuel types and fuel economy of the vehicle fleet mix
- The adoption rate of electric vehicles into the fleet mix over time

PPACG's only input for emissions modeling is the traffic volume and average speed along each roadway for each hour of a typical workday, generated by the regional Travel Demand Model. All other factors used in the MOVES emissions analysis are developed and maintained by the Air Pollution Control Division (APCD) within the Colorado Department of Public Health and Environment (CDPHE).

The GHG rule requires an Intergovernmental Agreement (IGA) between the APCD, CDOT, and PPACG to define the roles and responsibilities of each agency in conducting the emissions modeling. This includes establishing modeling standards and assumptions for PPACG's Travel Demand Model and specifying the methods and assumptions used by APCD to estimate the millions of metric tons (MMT) of carbon dioxide equivalent (CO2e) emissions generated by the model for each compliance year.

3 Plan Development

3.1 The 2045 LRTP and Model

The 2045 Long-Range Transportation Plan (LRTP) was adopted by the PPACG Board of Directors in January 2020. As the plan in effect on January 30, 2022, it serves as the baseline against which future GHG reductions are measured. Like most regional transportation plans, it contains a forecast of land use and population changes, along with a variety of fiscally constrained projects designed to address the region's transportation needs.

The 2045 LRTP's land use forecast was developed from population and workforce estimates provided by the state demographer's office, which served as regional control totals.

REGIONAL	2015	2020	2025	2030	2035	2040	2045
Population	701,483	758,232	819,138	880,361	940,711	1,001,120	1,055,656
Employment	364,561	401,735	434,104	468,176	495,948	518,862	541,984
El Paso County							
Population	677,022	732,993	791,904	851,955	911,290	970,825	1,024,521
Employment	354,681	390,309	421,464	454,501	481,509	503,824	526,450
Teller County							
Population	24,461	25,239	27,234	28,406	29,421	30,295	31,135
Employment	9,880	11,426	12,640	13,675	14,439	15,038	15,534

Figure 4: Population and employment forecasts from the 2045 LRTP

The distribution of population and employment, along with related household socioeconomic factors such as income and size, was modeled using UrbanSim planning software. The results were aggregated into distinct areas called Transportation Analysis Zones (TAZs), which serve as origins or destinations for trips modeled across the transportation network, such as home-to-work or home-to-school trips. TAZs with larger populations or higher concentrations of employees generate more trips to and from their zones. The 2045 plan forecasted significant population growth in a few concentrated areas within the MPO, while projecting a decline in population throughout much of the existing urban area.

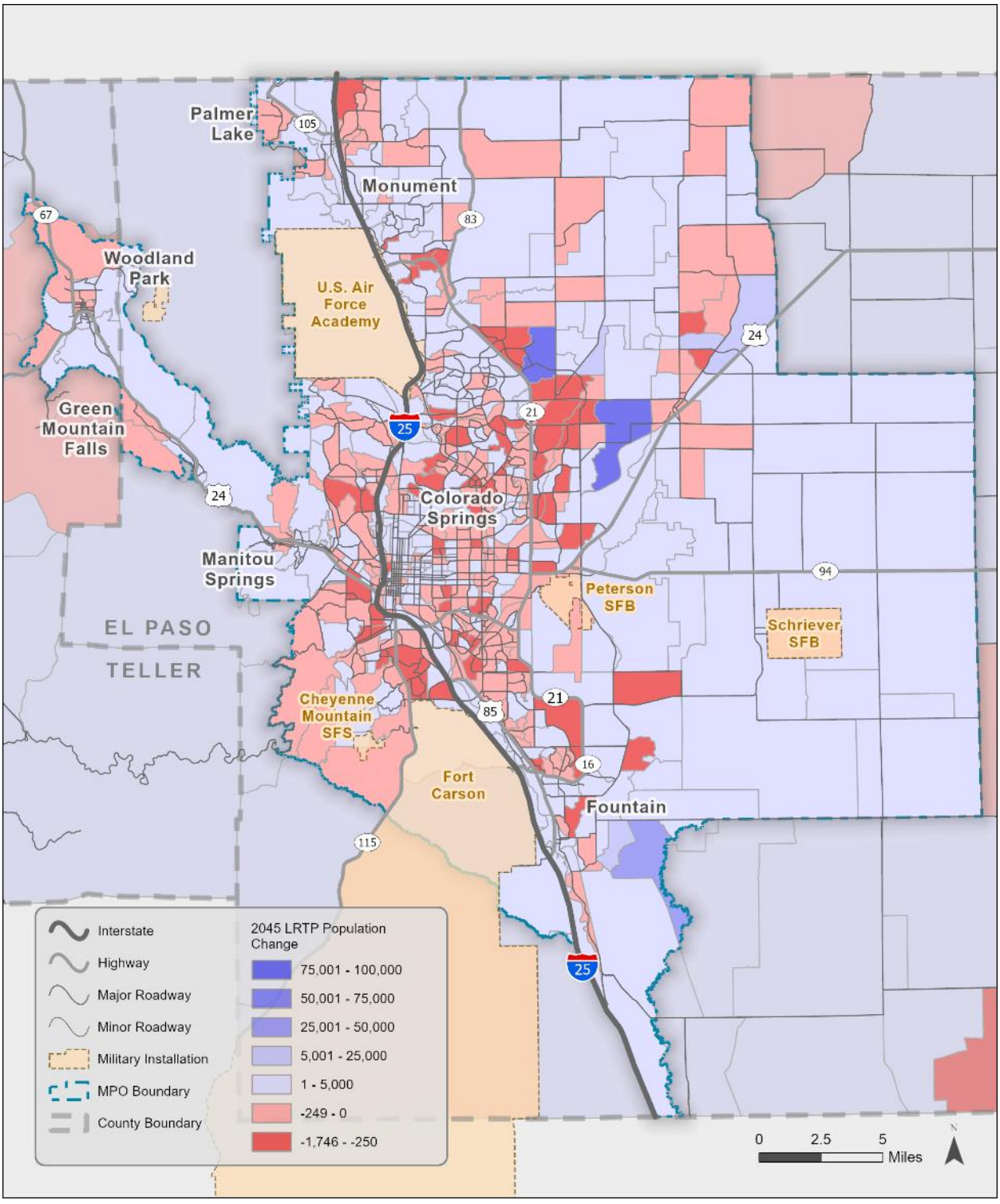


Figure 5: Map of forecasted 2045 LRTP population change

The forecasted population and employment changes were added to the regional Travel Demand Model (TDM) along with the plan's new roadway projects to estimate their combined effect on future travel patterns, and evaluate the alignment of future projects with the plan's goals of improving access, reducing pollution, and minimizing congestion. The TDM also incorporated several illustrative capital projects as part of a funding gap analysis, which identified unmet transportation needs that could be addressed in future plans if additional funding becomes available. Altogether, the 2045 LRTP travel demand model included 202 new centerline miles of major roadways added to the network over the 20 year forecast period. Since PPACG is not subject to air quality conformity analysis—which requires projects to align with staged implementation timeframes—the majority of the new roadway mileage was added between the 2030 and 2040 planning years rather than distributed across a staged timeline.

	2020		2030		2040	2045
Centerline Miles of Roadway in the MPO	**1,166 mi**	20 miles major new roads	**1,186 mi**	182 miles major new roads	**1,368 mi**	**1,368 mi**

Figure 6: Increases in the modeled centerline miles of roadway within the MPO from the 2045 LRTP

The 2045 LRTP also included a mix of transit funding and numerous bicycle and pedestrian projects, such as new multi-use urban trails, however, the travel demand model did not include any new transit lines and did not model pedestrian or bicycle trips as mode choice options.

Vehicle miles traveled (VMT) and population are closely related, as population growth typically drives increases in VMT. A larger population means more people traveling for various purposes, such as commuting to work, attending school, shopping, or accessing services. As the population grows, the number of vehicles on the road often increases, leading to more trips and longer travel distances. However, the relationship between VMT and population is also influenced by factors such as land use patterns, urban density, and transportation options. For example, in car-dependent, sprawling regions, population growth is likely to result in proportionally higher increases in VMT than similar growth in dense urban centers that better accommodate walking or transit mode choices. Understanding this relationship is critical for transportation planning, as it helps predict future travel demand and assess environmental impacts like greenhouse gas emissions.

	2020	2030	2040	2045
VMT in the MPO Area	12,659,333	16,800,165	18,120,837	18,319,508
Total Traffic Volume in the MPO Area	60,621,529	78,640,926	78,983,836	79,485,959

Figure 7: Vehicle Miles Traveled (VMT) and traffic volume in the MPO from the 2045 LRTP

3.2 The 2050 LRTP Land Use Forecast

PPACG collaborated with its local government members, particularly planners from Colorado Springs and El Paso County, to evaluate the strengths and weaknesses of the land use forecast developed for the 2045 LRTP. A primary concern was the forecast's overemphasis on population growth in two major planned developments, which understated the potential impact of urban infill initiatives and affordable housing projects in other areas of the MPO. In agreement with these concerns, PPACG committed to adopting a new approach for the land use forecast in the 2050 LRTP.

For the 2050 LRTP model, PPACG moved away from independent forecasting using tools like UrbanSim and adopted a more collaborative approach, creating a regional "best-fit" model from all the development plans of its member governments. The process allowed known developments and entitlements to be accounted for in the regional land use forecast alongside the use of historical data like accessory dwelling unit (ADU) permits and residential build rates. When concurrent growth scenarios from multiple jurisdictions ended up exceeding the population control totals, round-table discussions were held to evaluate where growth might be tempered based on historical trends, current and expected development incentives, and utilities requirements.

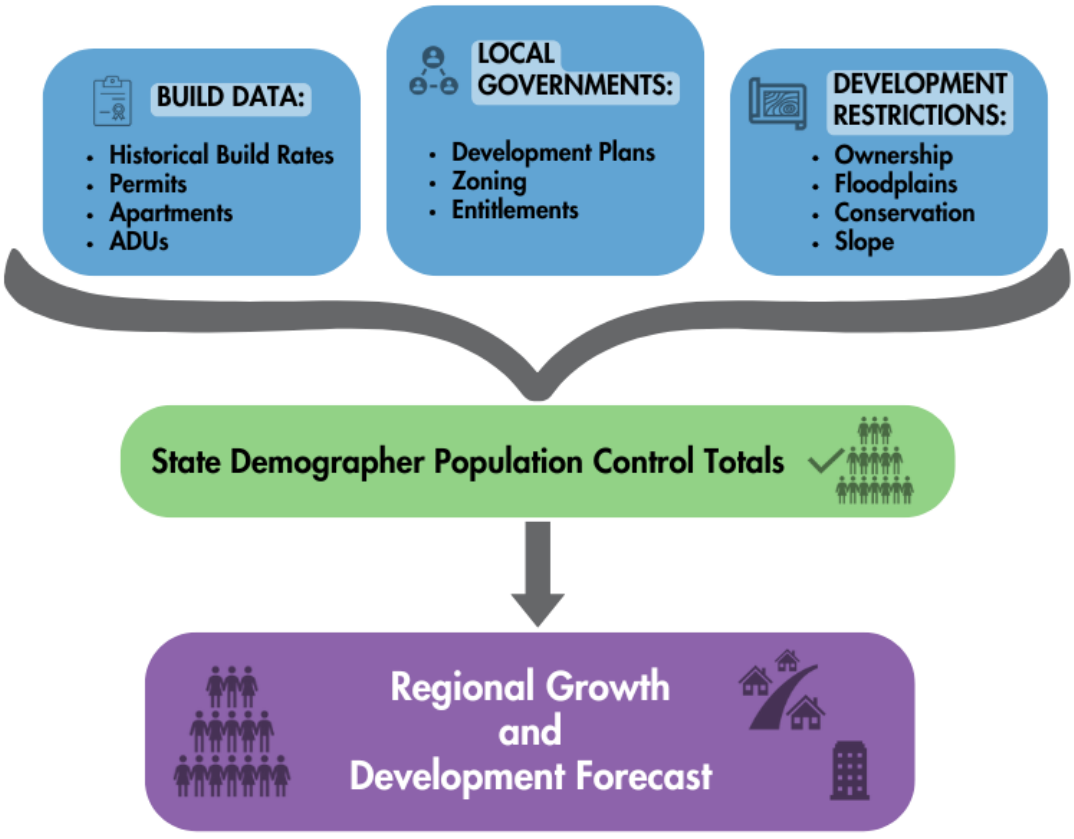


Figure 8: 2050 LRTP Land Use Forecast Process

This effort resulted in a new regional growth dataset that offers a unified development outlook for the entire MPO area, transcending jurisdictional boundaries while still effectively capturing their planned development patterns. The dataset enables quick evaluation of plans across jurisdictions, facilitating coordination of regional, state, and federal funding initiatives, such as programs for transit-oriented communities or mixed-use developments. Widely embraced by local government and utility planners, the dataset is now a fully maintained resource, supported by ongoing collaborative meetings where updates and changes are reviewed collectively. This process ensures the "best-fit" regional picture is continuously refined as annexations, entitlements, and other development plans are updated.

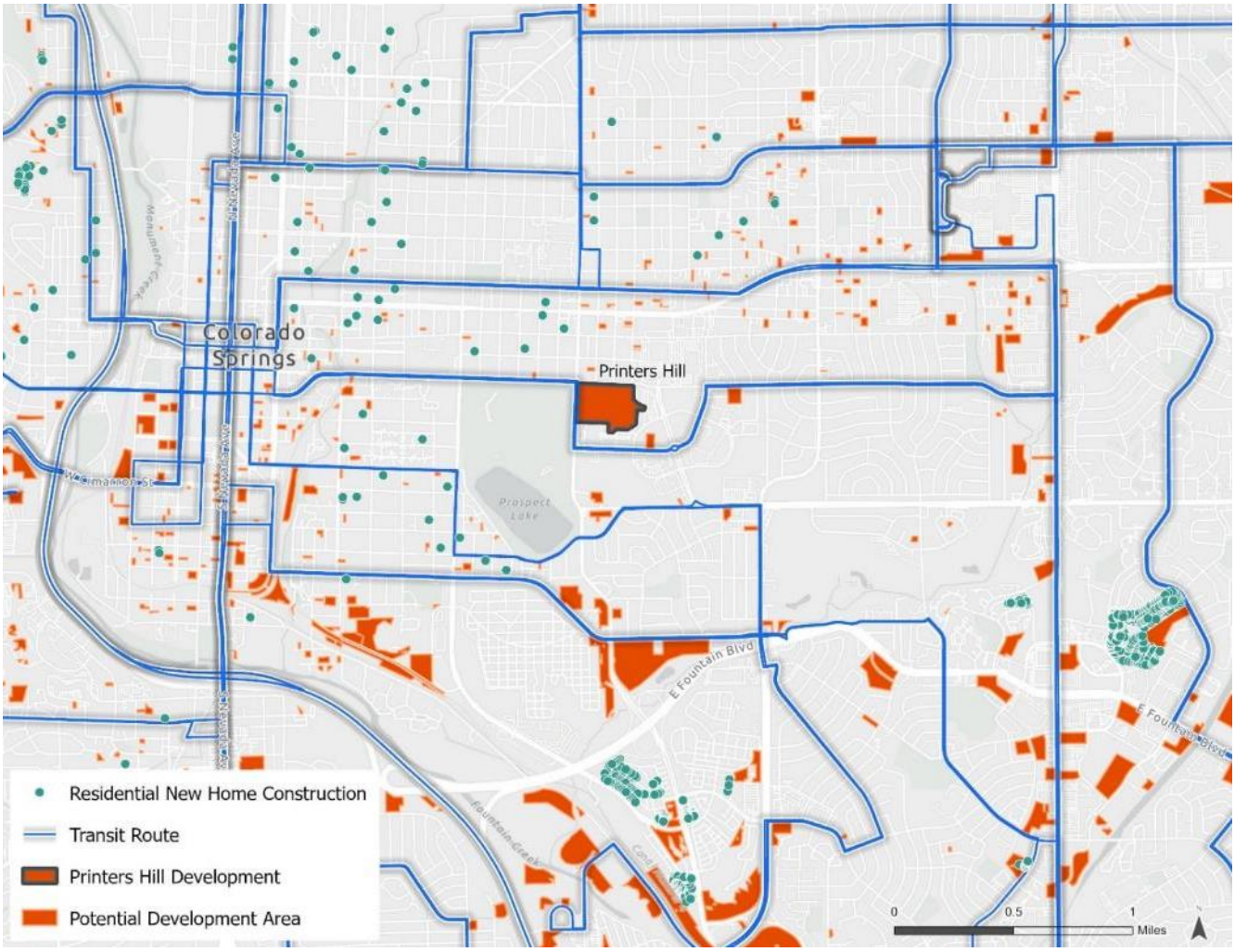


Figure 9: Overview map of the Regional Growth and Development dataset and new home construction in central Colorado Springs, both used to help identify and estimate future land use changes

The new land use model also introduces a transparent approach to employment forecasting. Instead of relying on a "black box" method, it uses development plans, zoning, and entitlements to estimate both the type and number of jobs expected from future commercial and industrial ventures.

Figure 10: A detailed map of the Printers Hill development plan showing housing unit densities, commercial area, and neighboring parks, transit, and other development areas that are all used to forecast changes in population, employment, and trip generation in this area

The 2050 LRTP land use forecast outlines the anticipated growth and distribution of population and jobs in a cohesive framework that adheres to regional control totals while more accurately reflecting the planning and development goals of the region's local governments.

	2030	**2040**	**2050**
2050 LRTP Population Forecast	858,962	958,237	1,023,259
State Demographer's Population Forecast (Control Total)	859,427	958,942	1,023,342

Figure 11: Forecasted population from the 2050 LRTP compared to the state demographer's forecast

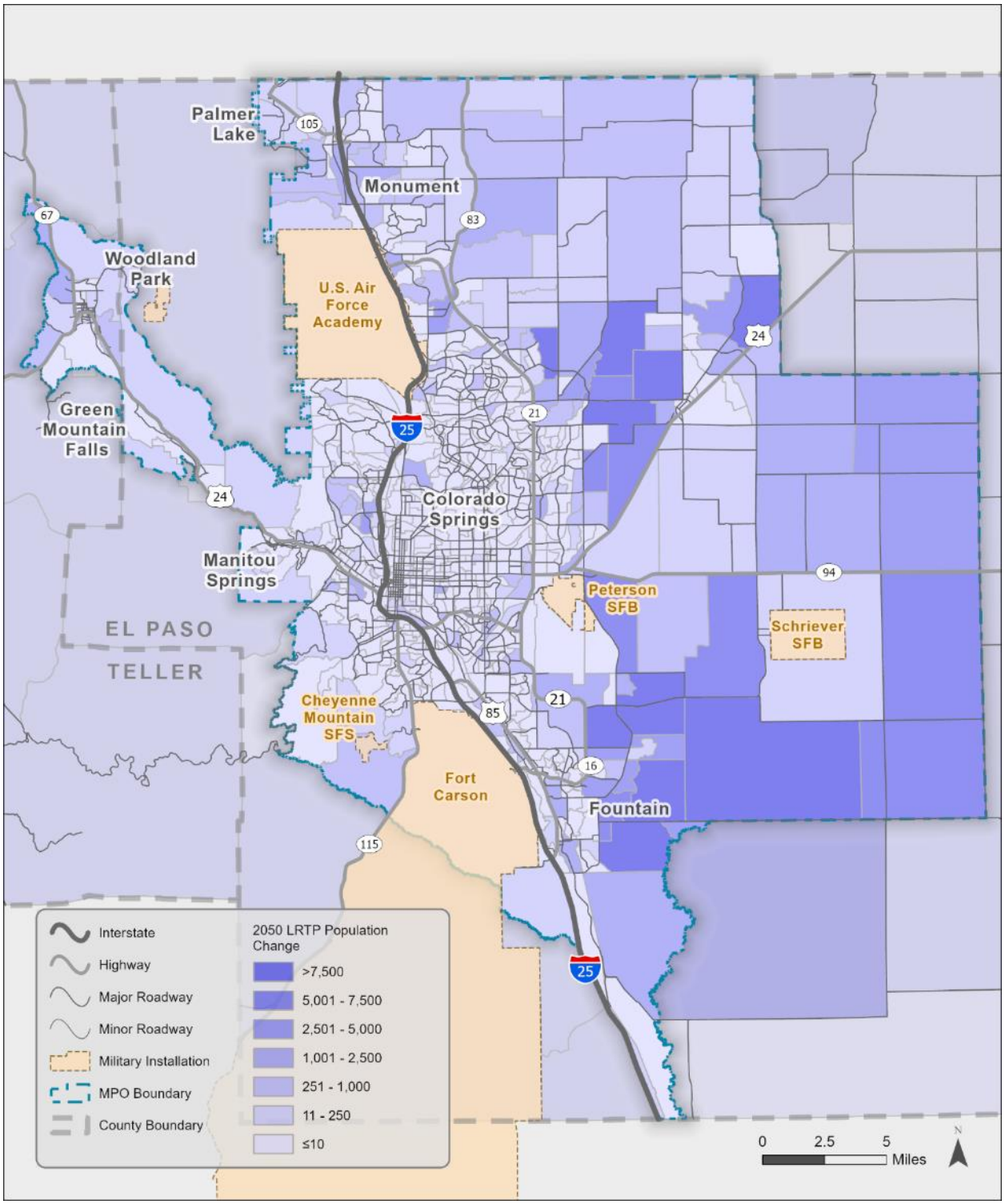


Figure 12: Map of forecasted 2050 LRTP population change

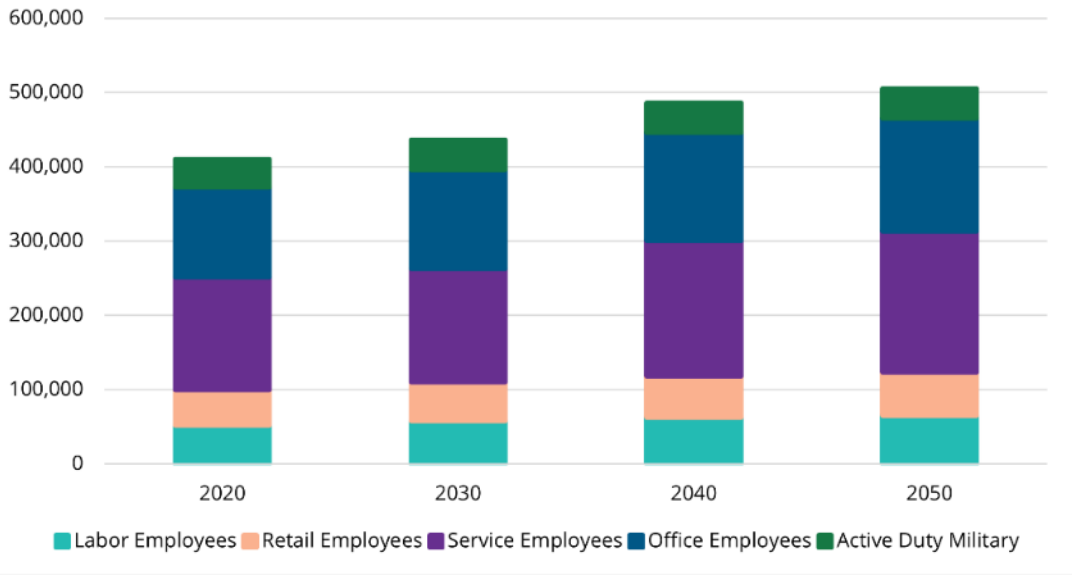


Figure 13: Table of the five employment categories used in the 2050 LRTP and their forecasted change 2020 to 2050

3.3 The 2050 LRTP Travel Demand Model

Senate Bill (SB) 21-260 not only established guidelines to address greenhouse gas (GHG) emissions in transportation planning but also expanded the goals of the Multimodal Transportation and Mitigation Options Fund (MMOF) to support improvements to travel demand models. In 2022, the Transportation Commission (TC) awarded PPACG a grant from the state's MMOF to enhance its Travel Demand Model (TDM) with specific improvements designed to enhance sensitivity to GHG emissions modeling:

- **Pedestrian and Bicycle Mode Choice**
- **Remote Work Considerations**
- **Simulation Based Assignment**
- **Induced Demand Sensitivity**

PPACG collaborated with the PTV Group to implement those and several other updates for the 2050 model, enhancing the model's overall accuracy, efficiency, and ability to forecast different scenarios. The resulting 2050 TDM is a tour-based model that integrates detailed roadway facilities, transit lines, synthetic population at the household and person levels, as well as land use variables such as employment, student enrollment, and shopping activity. With a base year of 2020 to align with Census data and the land use model population, the TDM was calibrated to reflect average daily traffic using counts from both 2019 and 2021. Further, hourly traffic counts were utilized to fine-tune hourly travel demand, supporting dynamic traffic assignment.

The model's key improvements are summarized below, with the full calibration and validation report, including detailed methodologies, available as an appendix item for further review.

3.3.1 New Transportation Analysis Zones (TAZs)

The original TAZ system in the PPACG model was updated to align with the 2020 Census block boundaries and further refined to separate commercial, residential, and military areas into more homogenous zones. These revisions increased the number of zones from 802 to 945, enhancing land use fidelity while maintaining alignment with Census boundaries, simplifying the incorporation of Census data. Additionally, zone connectors—used as access points for traffic and transit trips entering or exiting the network—were improved by adding "stub links" to the network. This change eliminated illogical loading directly into intersections and ensured consistency across both static and dynamic network assignments.

Figure 14: A detailed map of a 100% commercial TAZ surrounded by zones that are almost 100% residential, ensuring that all trips to and from the businesses in this zone are captured in the model

3.3.2 New Population Synthesizer

The PPACG travel model relies on a disaggregate synthetic population to represent individual households and people. This approach enhances the model's ability to analyze travel behavior across various demographic groups and incorporates factors like work-from-home scenarios more effectively. For the updated model, PPACG partnered with PTV to implement PopulationSim, a more advanced population synthesizer than the PopGen system used in the 2045 model.

PopulationSim uses an entropy-maximization method to balance data and generate consistent population weights. This ensures that variables not directly controlled—such as household size or income—remain accurately distributed while avoiding unrealistic weight expansions. The model also allows for "importance factors," which adjust the emphasis on different data inputs based on their reliability.

Another key advantage of PopulationSim is its ability to process all geographic areas simultaneously. This prevents errors common in sequential models like PopGen, which can misrepresent smaller population segments such as university students or low-income households. By using simultaneous list balancing, PopulationSim produces a more accurate synthetic population for these groups.

The result is a refined synthetic population that better represents individual and household travel characteristics. This includes detailed socioeconomic variables like income, job type, household composition, and more—creating a model that more accurately reflects real-world transportation choices across diverse populations in the region.

3.3.3 Added Pedestrian and Bicycle Mode Choice

As previously mentioned, the 2045 model lacked the capability to account for pedestrian or bicycle mode choices. To address this, PPACG staff first conducted an extensive GIS analysis to identify all roadways with bike lanes, multi-use shoulders, adjacent trails, and sidewalks. This data was then incorporated into the updated travel demand model network to identify where bicycle and pedestrian mode choices could potentially be utilized when assigning trips between TAZs.

The mode choice probabilities for taking a walk or bike trip are calculated at the individual level based on a variety of person and household attributes derived from the enhanced population synthesizer. For example, reflecting differences in surveyed travel behavior, university students are more likely to choose walking or biking compared to individuals over the age of 65.

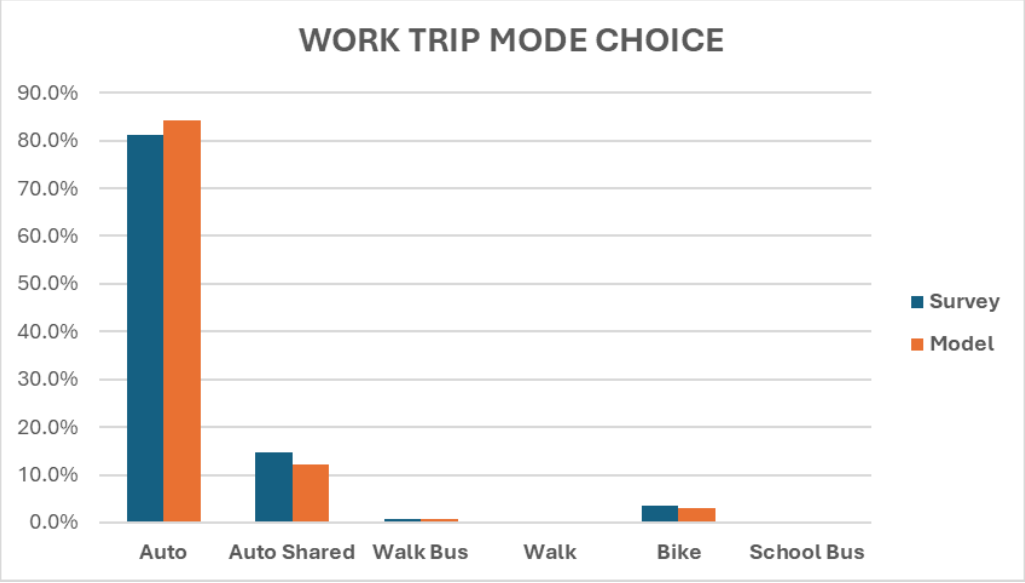


Figure 15: Table showing the distribution of work trip mode choice in the 2050 LRTP model

These mode choice options are fully integrated into each individual's activity chain, enabling the model to represent multi-modal tours for individuals with applicable mode-choice options. This ability is especially useful when modeling non-work trips. For instance, a worker who drives to the office still has a probability of choosing to walk to and from lunch as part of their tour, whereas a person who walks to work won't have a probability of driving to lunch but may choose to share an auto trip or use a rental e-bike if they choose not to walk. A range of possibilities such as these are now accurately represented in the model, allowing a more realistic depiction of pedestrian and bicycle trips throughout the network.

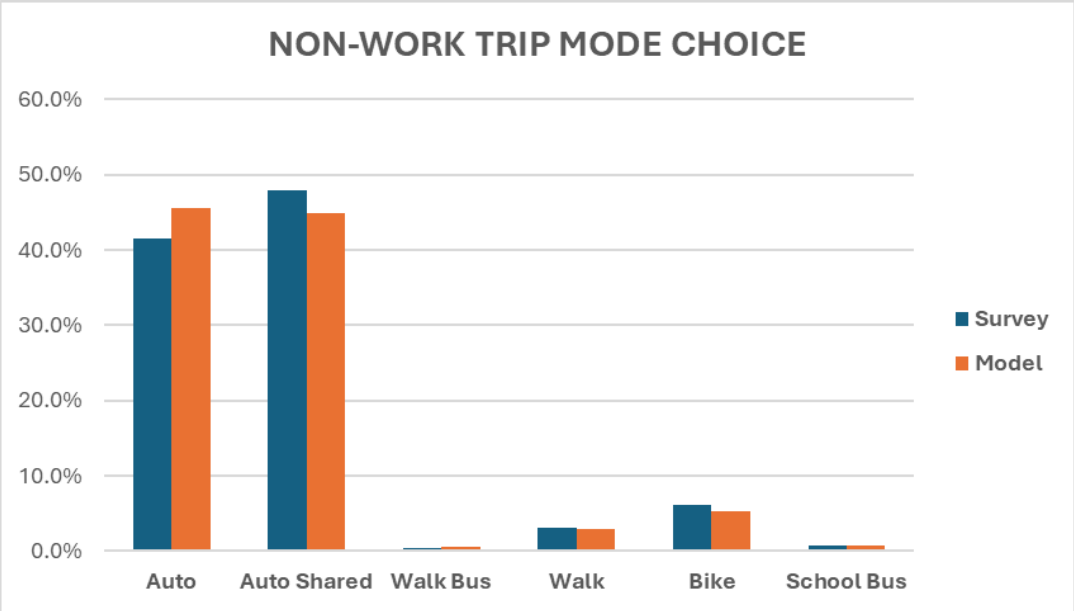


Figure 16: Table showing the distribution of non-work trip mode choice in the 2050 LRTP model

3.3.4 Account for Remote Work

A work-from-home component was integrated into the model using socioeconomic data to estimate the likelihood of remote work based on household attributes such as income and job type. To establish initial remote work frequency coefficients, PTV adopted data from the San Diego Association of Governments (SANDAG) travel demand model, which shares similarities with the PPACG region, including a significant military population and the use of PopulationSim. These coefficients account for multiple remote work options, such as hybrid environments where an individual works remotely only two days a week, and were then calibrated for the PPACG region using available remote-work survey data.

PTV ensured the framework for setting remote work probabilities remains adaptable to evolving employer policies. This flexibility is crucial given the ongoing changes in remote work practices post-pandemic. Additionally, the tour generation model accounts for workers whose roles inherently prevent remote work, such as those in the military, manufacturing, or delivery industries.

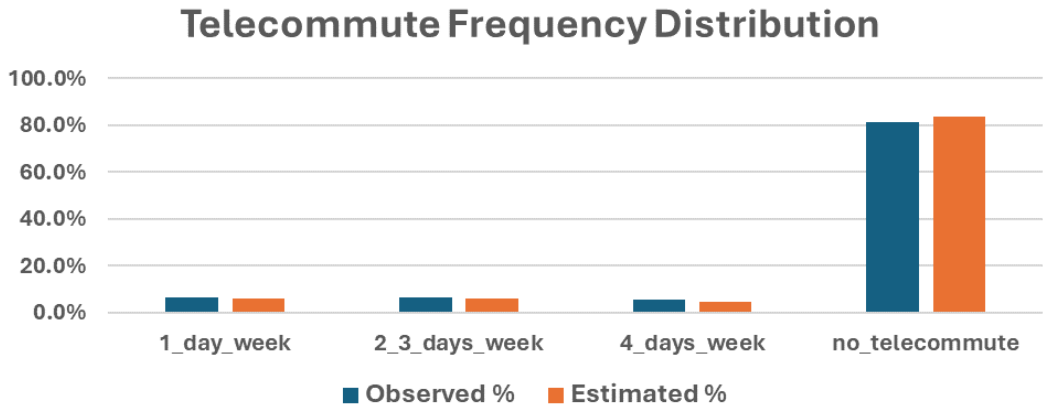


Figure 17: Table showing the distribution of remote work frequency in the 2050 LRTP model

3.3.5 Simulation Based Assignment

One of the most significant upgrades to the travel demand model is the implementation of a full Simulation-Based Assignment (SBA) procedure. SBA dynamically assigns traffic by simulating individual vehicles and persons traveling within the network. This allows the model to realistically represent intersection delays, including the forming and dissolving of queues over time, enabling signal timing efficiencies and operational improvements to influence mode choice and routing.

This upgrade required the model network to be carefully reviewed for the correct number of roadway lanes, posted speeds, and intersection control types. Aerial imagery was used with GIS to code detailed intersection geometry with appropriate turn bays and lane grouping for over 1,500 intersections in the model network.

There are approximately 700 signalized intersections in the network. To simulate traffic queues forming at these intersections, signal phasing plans were developed based on the lane grouping at each approach leg. Green times and splits were calculated using the turn flows obtained from the static traffic assignment, providing a consistent representation of delay across the network. This methodology also ensures compatibility across forecasted network scenarios.

Simulation-Based Assignment (SBA) provides a more accurate reflection of congestion-related impedance compared to static assignment methods. For instance, vehicles waiting through multiple light cycles at a congested intersection have their "stop-and-go" queue times factored into the average vehicle speeds recorded for that link. This level of detail enables SBA to better represent dynamic traffic conditions and travel times during specific timeframes, enhancing the model's precision.

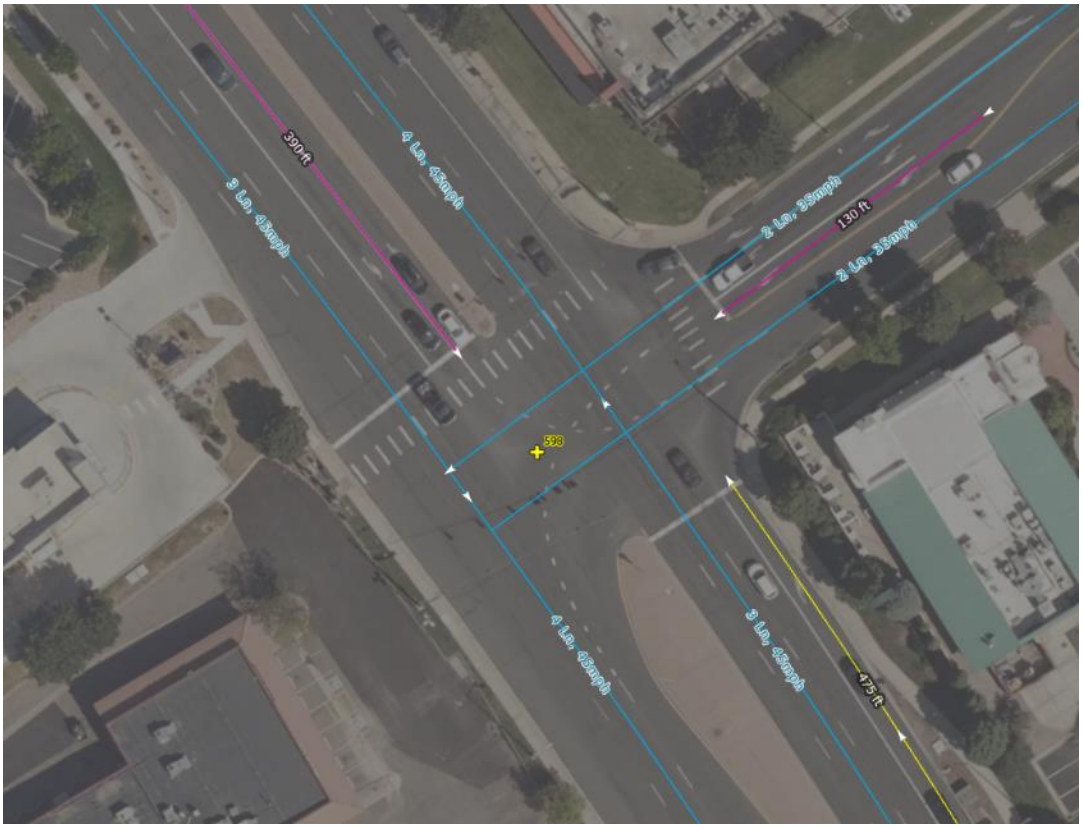


Figure 18: Map of an intersection modeled in GIS with lane count, speed, and geometry, including pocket turn lanes, accurately recorded

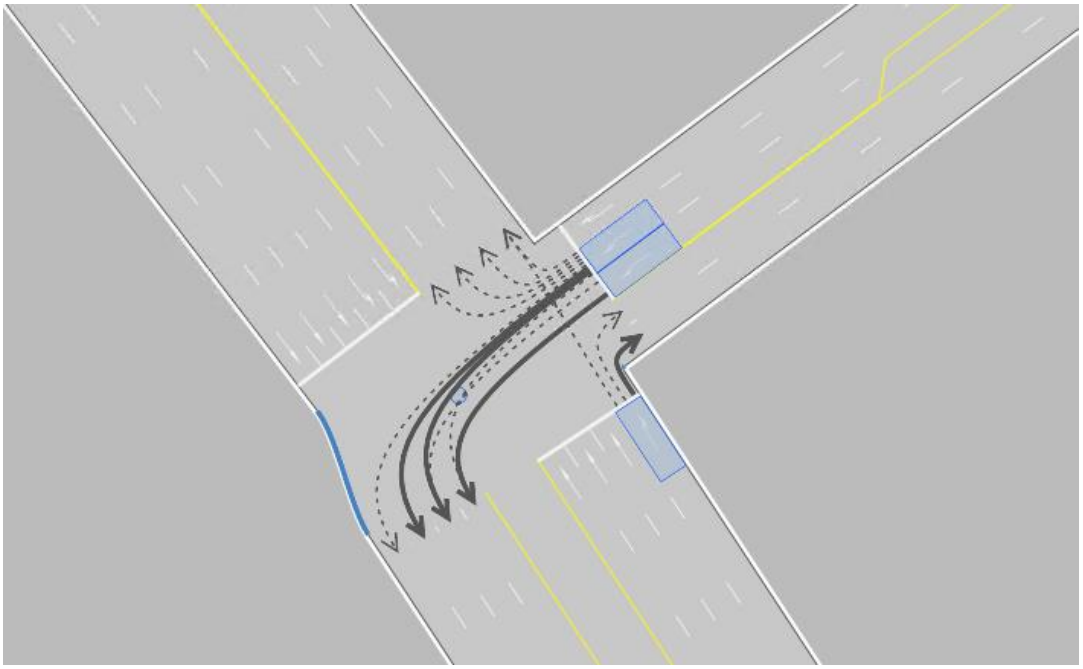


Figure 19: The same intersection as shown in Figure 18 is displayed in the travel model, with all lanes accounted for and allowable turning movements seen for selected lanes

SBA is a powerful tool for transportation planning, enabling more precise simulations of traffic flow and allowing PPACG to work collaboratively with local planners to assess network impacts dynamically. For instance, SBA can evaluate the effects of adjusting signal timings to reduce congestion, analyze the improvement in average vehicle speeds from replacing a congested intersection with an interchange, or model induced demand resulting from such improvements through the reallocation of trips to more attractive routes.

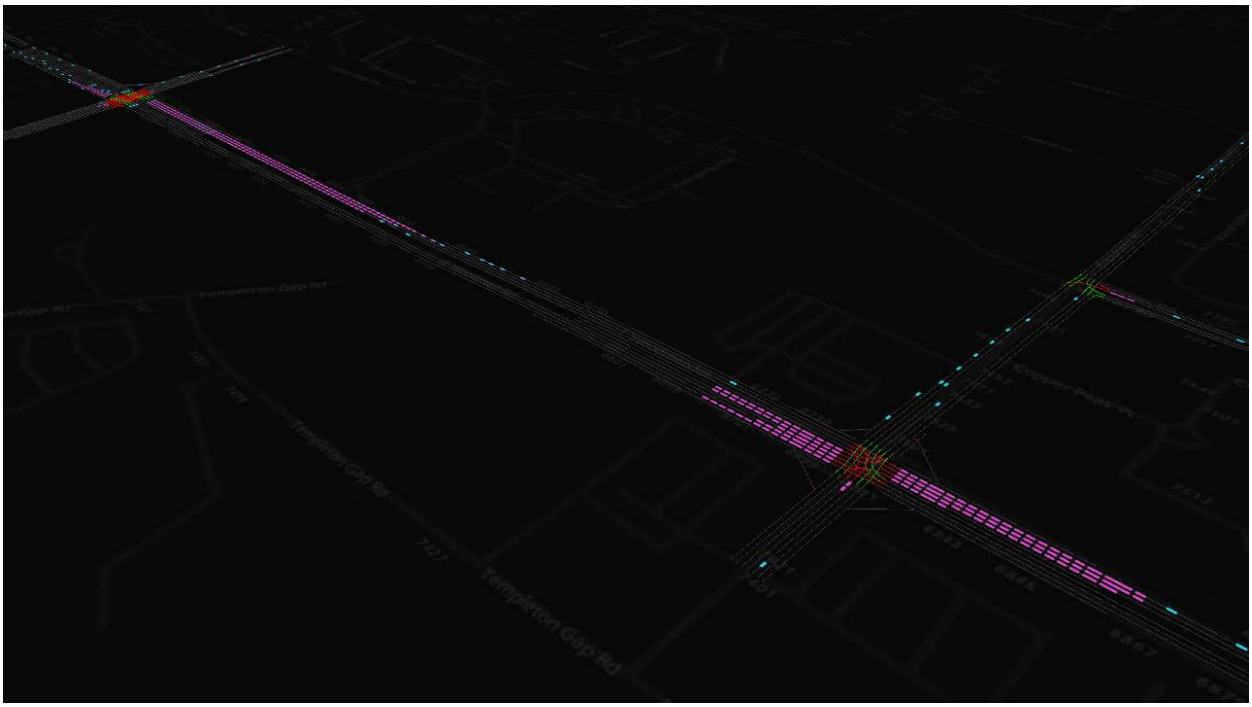


Figure 20: A screen capture of SBA traffic animation along Woodmen Rd in Colorado Springs, with pink vehicles queuing at signalized intersections during the morning commute while the light blue vehicles are in motion along the network

The new 2050 LRTP travel model enables transportation engineers and planners to evaluate the impacts of various scenarios, such as changes in population, employment centers, travel behavior, or infrastructure improvements. By projecting future traffic volumes, the model helps avoid the costs of constructing unnecessary roadways or waiting for severe congestion to develop.

3.4 2050 LRTP Project Mix

The primary purpose of the Long-Range Transportation Plan (LRTP) is to define the region's transportation vision and goals, assess the overall performance of the system, and develop strategies to maximize the effectiveness of public investments in achieving these objectives. To support this mission, the 2050 LRTP incorporates a diverse array of projects submitted by local governments through a collaborative scoring process. These projects are prioritized with input from the Transportation Advisory Committee (TAC), reviewed by other PPACG committees, and refined through public engagement before being adopted by

the PPACG Board of Directors. Once adopted, the projects become eligible for funding from various state and federal programs based on their alignment with each funding program's purpose and eligibility requirements.

3.4.1 Project Funding

The funding available through each program varies annually based on revenue. As of fiscal year 2025, the Pikes Peak region receives approximately $9 million in Surface Transportation Block Grant (STBG) funds, $900,000 in Transportation Alternatives Program (TAP) funds, $1.2 million in Carbon Reduction Program (CRP) funds, and $1.4 million from the Multimodal Transportation and Mitigation Options Fund (MMOF) each year. The specific eligibility requirements of each program means not all funds can be used to support all project types. For example, TAP and MMOF are generally restricted to multi-modal projects like bicycle and transit initiatives. STBG is the most versatile funding source, supporting a wide range of projects and the only funding stream managed by PPACG that can be applied to most roadway projects, including bridge repairs, operational improvements, roadway construction, and can also be flexed to transit.

Extended out from 2020 to 2050, the LRTP financial plan estimates approximately $240.8 million in STBG funding, along with $23 million from TAP, $30.2 million from CRP, and $32.9 million from MMOF, all contingent on securing local matching funds. PPACG also calculates additional funds of approximately $200 million from other discretionary capital grants, and $2 billion generated from the local Pikes Peak Regional Transportation Authority (PPRTA) over the same period. These projections do not include transit-specific funding allocated to Mountain Metropolitan Transit, such as FTA 5307 and other federal funds, which are detailed separately in the Regional Transit Study.

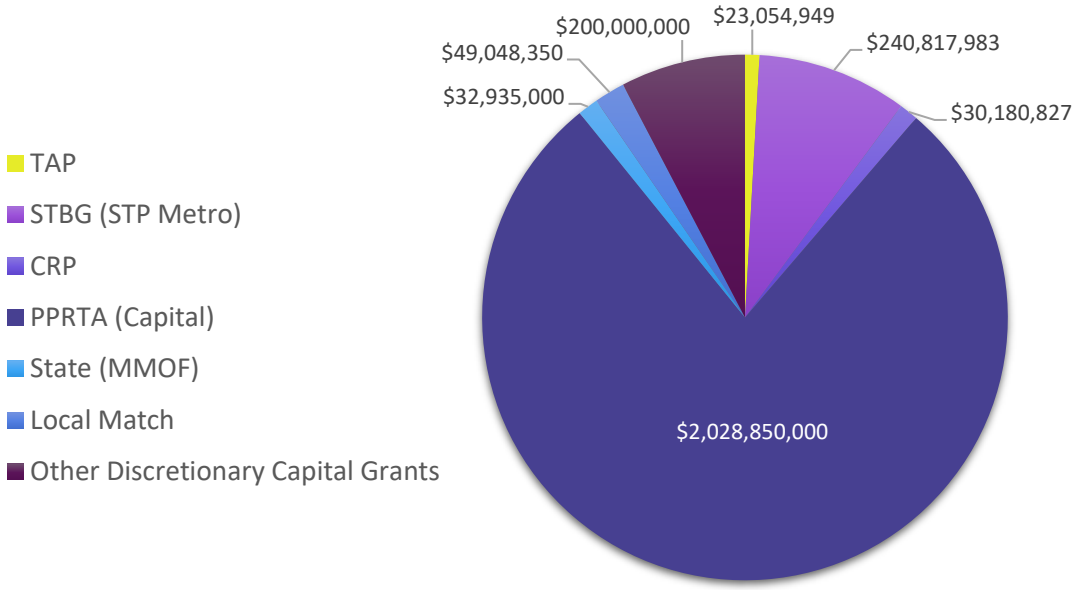


Figure 21: Chart of projected transportation funds by program type from 2020-2050

3.4.2 Project Types

Classifying the entire LRTP project list by type presents challenges because many projects encompass multiple elements that could influence their classification. For instance, the CDOT project to widen the section of US24 stretching from CO21 to Stapleton Road is categorized as a capacity project due to the addition of lanes, yet a significant portion of its funding also addresses corridor safety and operational improvements. For this report, projects are classified according to a primary project type and a secondary type based on their most significant components, and therefore the same project may be counted in two separate categories.

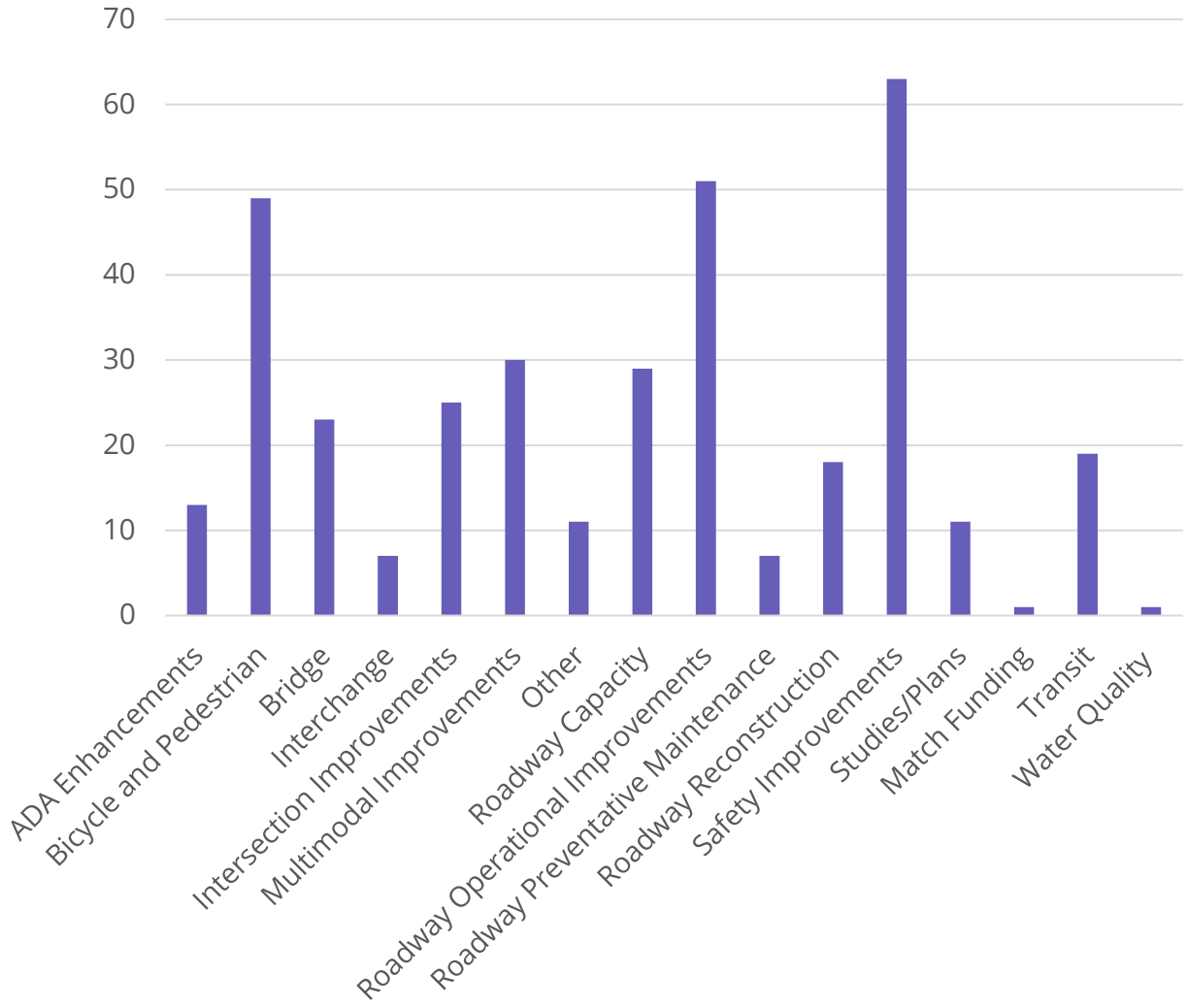


Figure 22: Chart of the number of 2050 LRTP transportation projects by type

The first two goals of the LRTP focus on preserving and enhancing the regional transportation system and ensuring it is efficient and fully connected. To support these goals, nearly 45% of the fiscally constrained project list consists of roadway projects, totaling 105 initiatives. Within this category, 22% (51 projects)

are classified as roadway operational improvements, 12% (29 projects) address capacity by adding new roads or lanes, and 11% (25 projects) focus on preventative maintenance or reconstruction. Many of these projects also contribute to the system's resiliency and redundancy.

Among the capacity projects, eight are anticipated to be fully or partially funded by private sources. Six are CDOT-led projects, two of which are currently funded or partially funded through the Transportation Improvement Program (TIP), while one represents the construction phase of an existing TIP project. Of the capacity projects sponsored by local jurisdictions or multiple agencies, three are already partially or fully funded in the TIP, one is part of Phase 2 of an ongoing TIP project, and nine have secured PPRTA voter-approved funding. PPACG expects the remaining capacity projects to be prioritized for future PPRTA funding, as they address critical connectivity needs, enhance safety by updating lane configurations, and fulfill other regional priorities.

In addition to roadway initiatives, nearly 14% (32 projects) are classified as interchange or intersection improvements, and 10% (23 projects) focus on bridges.

The LRTP also prioritizes multimodal transportation and creating a robust, equitable, and healthy system. Recognizing the importance of alternate transportation modes, the project selection process included specific funding sources like the state MMOF and federal TAP programs, which target alternate mode projects. Approximately 16% (49 projects) are bicycle and pedestrian initiatives, with another 13% (30 projects) classified as multimodal improvements. Additionally, over 8% (19 projects) are transit projects, though these do not account for separate transit-specific projects funded by FTA or detailed in the Regional Transit Plan. Specialized transportation initiatives are also excluded from this fiscally constrained list.

Safety remains a critical priority, with 27% of all projects categorized as safety improvements, and nearly 6% classified as ADA enhancements.

Around 10% of the project mix (23 projects) cover transportation studies, plans, water quality improvements, technological advancements, or other transportation-related enhancements. One project, which serves as a PPRTA funding pool for local match contributions to state or federal discretionary grants, was not classified into a specific category.

Because most projects have multiple characteristics, classifying and reporting the project types by their allocated funding is also challenging because many projects can draw from multiple funding sources to address their various elements. For instance, a project might use TAP funding for sidewalks while utilizing STBG funding for roadway operational improvements.

Of note for this report, when considering only the primary project type, the 2050 LRTP designates $182 million for bicycle and pedestrian projects and $76 million for multimodal projects. In comparison, the 2045 LRTP allocated $125 million to active transportation projects, which included both bicycle/pedestrian and multimodal initiatives. When accounting for both primary and secondary project types, the funding totals increase significantly, with $414 million allocated to bicycle and pedestrian projects and $708 million to multimodal projects. Additionally, local transit projects included in the fiscally constrained list and the Regional Transit Plan total approximately $1.5 billion, while 69 fewer centerline miles of new roadway construction are in the 2050 LRTP model network compared to 2045.

The 2050 LRTP project mix highlights the dedication of PPACG and its local governments to addressing the diverse needs of the regional transportation system while promoting sustainable travel solutions. When assessed through the 2050 travel model, these projects demonstrate their collective impact in advancing mobility and significantly reducing greenhouse gas emissions, paving the way for a cleaner, more connected future.

4 GHG Results

4.1 Considerations for Reducing GHG

PPACG has been a proactive partner in evaluating and advancing the implementation of the "Rules Governing Statewide Transportation Planning Process and Transportation Planning Regions" (2 CCR 601-22) since its first draft in 2021. Through ongoing collaboration with CDOT, other MPOs, statewide modeling coordination meetings, and the Inter-Agency Consultation Team (IACT), PPACG has worked to help address unforeseen challenges with practical, data-driven solutions.

Along the way, PPACG technical staff have focused on responsibly using taxpayer MMOF dollars to significantly update the travel demand model, while planners have actively engaged with local government stakeholders to prioritize projects that help meet rule requirements and uphold equitable transportation solutions. These collective efforts have led to several key considerations for PPACG meeting the GHG reduction goal.

4.1.1 Regional Transit Plan

A new Regional Transit Plan was developed by Mountain Metro Transit (MMT) in coordination with PPACG planners and concurrently with the 2050 LRTP to address implementation goals for projects funded through both the LRTP and new state transit programs. The Regional Transit Plan outlines 58 projects divided into short-term (20), medium-term (21), and long-term (17) projects. The projects are categorized by the following investment themes:

- Enhanced Transit Corridors (ETC)
- New Fixed Routes
- Innovative Mobility Zones
- Extend Service Span
- Improve Capital Infrastructure
- Improve Existing Route Frequency
- New Crosstown Routes

4.1.1.1 Enhanced Transit Corridors

Two Enhanced Transit Corridor (ETC) projects stand out as prime candidates for near-term advancement, based on both demand and the level of planning already completed or underway. MMT has initiated the process of defining an Enhanced Transit project along Academy Boulevard, which is likely to be the first ETC to move forward from the long-term vision. As the highest ridership corridor in the MMT network,

this project has the potential to set a precedent for future ETCs and establish a replicable process for advancing projects to implementation, regardless of the eventual funding source.

The City of Colorado Springs recently completed the Platte Avenue Corridor Study, which identified several potential improvements to Route 5 in the Platte Avenue corridor. While the study did not recommend a specific transit project scope, it can serve as a foundation for MMT and its partners to further define the Platte ETC project in the short term, even if the project's implementation is delayed until the mid-term horizon.

The project team recommends advancing three additional ETC projects after the Academy Boulevard and Platte Avenue corridors: North and South Nevada Avenue and Colorado Avenue. Although the City of Colorado Springs has already studied the North Nevada Avenue corridor, the recommendations from that study should be revisited closer to implementation, with updated corridor conditions and stakeholder engagement to ensure a viable project. Pairing the North Nevada corridor with South Nevada could attract additional outside grant funding by boosting ridership and serving more transit-dependent areas. The Colorado Avenue corridor, already served by MMT's busy Route 3, would complete the east-west ETC spine (along with the Platte Avenue ETC) through central Colorado Springs.

The project team also recommends implementing two additional ETC projects in the long-term phase. The Airport ETC project would connect Downtown Colorado Springs with the Colorado Springs Airport. Until this project is implemented, improvements to Route 37's frequency and span, as well as the South Innovative Mobility Zone, are expected to address transit needs in this area. The Tutt Boulevard ETC would upgrade existing routes and introduce a new Briargate Parkway/Tutt Boulevard local route identified in the implementation phase. Implementation could be phased, with the new local service introduced before upgrading part of the route to an ETC. This corridor is experiencing rapid growth and would benefit from additional time to build ridership and make the necessary connectivity and land use improvements to support a competitive ETC project.

4.1.1.2 Innovative Mobility Zones

Although MMT should conduct a more detailed prioritization before launching its first Innovative Mobility Zone, the project team identifies two promising candidates for an initial launch. The Northeast Mobility Zone would serve a rapidly growing area of Colorado Springs that lacks access to fixed-route transit. This zone would provide valuable data on the transit demand in this part of the community, helping to inform future decisions on new fixed routes. The South Mobility Zone would address an area with expanding industrial jobs, offering another opportunity to test innovative mobility solutions for job centers that are harder to serve with traditional transit.

In the mid-term phase, the plan recommends exploring additional innovative mobility zones in areas experiencing continued growth but not yet ready for fixed-route service, such as the Southeast Zone and the Northgate/Gleneagle Zone. While improvements to fixed-route service frequency and span are being phased in, this phase could also see the implementation of an innovative mobility zone in Central Colorado Springs to further enhance service availability. Depending on the performance of the Northeast Zone, the fixed-route service expansion may prompt adjustments to the zone boundaries to better align with gaps in coverage, or even eliminate the zone entirely.

The final Innovative Mobility Zone, the Northwest Zone, would be implemented in the long term. As other zones are tested and fixed-route services are expanded, some zones may be phased out, or their boundaries may be adjusted to focus resources on areas with the greatest need.

4.1.1.3 Improved Span/Frequency

One of the most promising short-term projects is the expansion of service span on existing routes, particularly on Sunday evenings. This expansion could be achieved with minimal impact on vehicle requirements or the number of operators.

MMT should continue to expand service span during the medium term as vehicle and operator availability allow. If a reliable new funding source is identified, this phase could also include an initial increase in service frequency along routes beyond those identified as ETCs or Crosstown routes.

With the full implementation of the RTP, all routes would be upgraded to at least a 30-minute weekday frequency, with earlier morning and later evening service compared to current schedules, on both weekdays and weekends.

4.1.1.4 Improved Capital Infrastructure

The project team recommends advancing upgrades to the existing Voyager Transit Center in the short term. These upgrades could be incorporated into the Academy Boulevard ETC project, pending the outcome of that study, and would better support the implementation of the I-25/Voyager Express service. In addition to this facility improvement, the short-term implementation period includes a recommendation to launch both a bus stop accessibility/amenity program and a bus speed and reliability program. While initial investments may be limited, establishing a process by which MMT and its partners can systematically improve the passenger experience will provide an important foundation to scale these improvements in future phases of the plan.

Due to the large expansion of fixed-route service in the mid-term phase, the project team has identified several capital projects that would be needed to support the new service. New capital projects include:

- A new transit center at Woodmen Road/Powers Boulevard (near St. Francis Hospital) to serve new local routes along Tutt Blvd and Woodmen Rd.
- A new transit center at Carefree Circle North to connect existing services to new local service along Tutt Boulevard.
- Expansion of the Bus Stop Accessibility/Amenity and Bus Speed and Reliability programs launched during the short-term period
- A new Maintenance Facility to support the expanded bus fleet needed to serve routes launched during this phase and in accordance with expected zero emission vehicle (ZEV) needs as identified in the ZEV Plan

While less pronounced than the medium-term phase, additional capital projects are likely needed to support the remaining projects identified in the long-term horizon. Those include:

- A new transit center near Briargate Parkway and Powers Boulevard to better support network functionality in north/northeast Colorado Springs.

- A new Mobility Hub at Astrozon (near Academy Boulevard and Hancock Expressway) to connect existing services.
- A new Mobility Hub at Innovation Parkway to connect the new Airport ETC to the new Banning Lewis Ranch South route.
- Continuation of the Bus Stop Accessibility/Amenity and Bus Speed and Reliability programs, with the goal to have 100% of bus stops be compliant with the Americans with Disabilities Act (ADA) and to address remaining delay points on local routes that do not receive investment as part of an ETC project.

4.1.1.5 Crosstown Routes

The medium-term implementation phase includes the introduction of two new crosstown routes. The Lake Corridor, which largely replaces the existing Route 4, provides new connections between important job centers near the Broadmoor and south/southeast Colorado Springs. The Union Boulevard Crosstown Corridor combines existing routes 18 and 38 and introduces regular fixed-route service to a part of the region that is currently only served by deviated fixed-route service. This new north-south crosstown route would be anchored by the UC Health Memorial medical center in the north and the Astrozon Boulevard/Hancock Expressway/Academy Boulevard area to the south.

The final crosstown project is the Garden of the Gods Road/Austin Bluffs Parkway corridor. This project would largely replace two existing local routes that would receive frequency/span improvements in the short- and medium-term phases of the plan and depending on a detailed analysis of impacts to vehicle and operator needs could be accelerated through the first phase of systemwide frequency upgrades.

4.1.1.6 New Routes

The medium-term implementation phase includes the majority of the new fixed-route services recommended in the 2050 RTP. However, it is important to note that implementing such a large expansion of MMT's services will require the identification of additional, reliable funding sources beyond the existing system's expected revenue. Most of the new routes in this phase would serve high-growth communities in North and Northeast Colorado Springs, including two new Express routes: one connecting Downtown Colorado Springs to Falcon along US-24, and another linking Downtown Colorado Springs with the Voyager Transit Center along I-25.

The project team recommends implementing the Banning Lewis Ranch South route during the long-term phase, given the expected longer buildout horizon of Banning Lewis Ranch toward US-24 and further south (with the Southeast Zone serving this area in the interim). Additionally, based on long-term growth trends, the team recommends introducing local service between Monument and Voyager Transit Center in the long term. The team also recommends implementing a Garden of the Gods to Manitou Springs circulator in the long-term, following a more thorough study of the benefits and infrastructure needed to operate such a service. Given its focus on serving tourists visiting Manitou Springs and Garden of the Gods Park, this project may be eligible for advancement on a different timeline with unique funding sources that may not be available for other routes in the proposal.

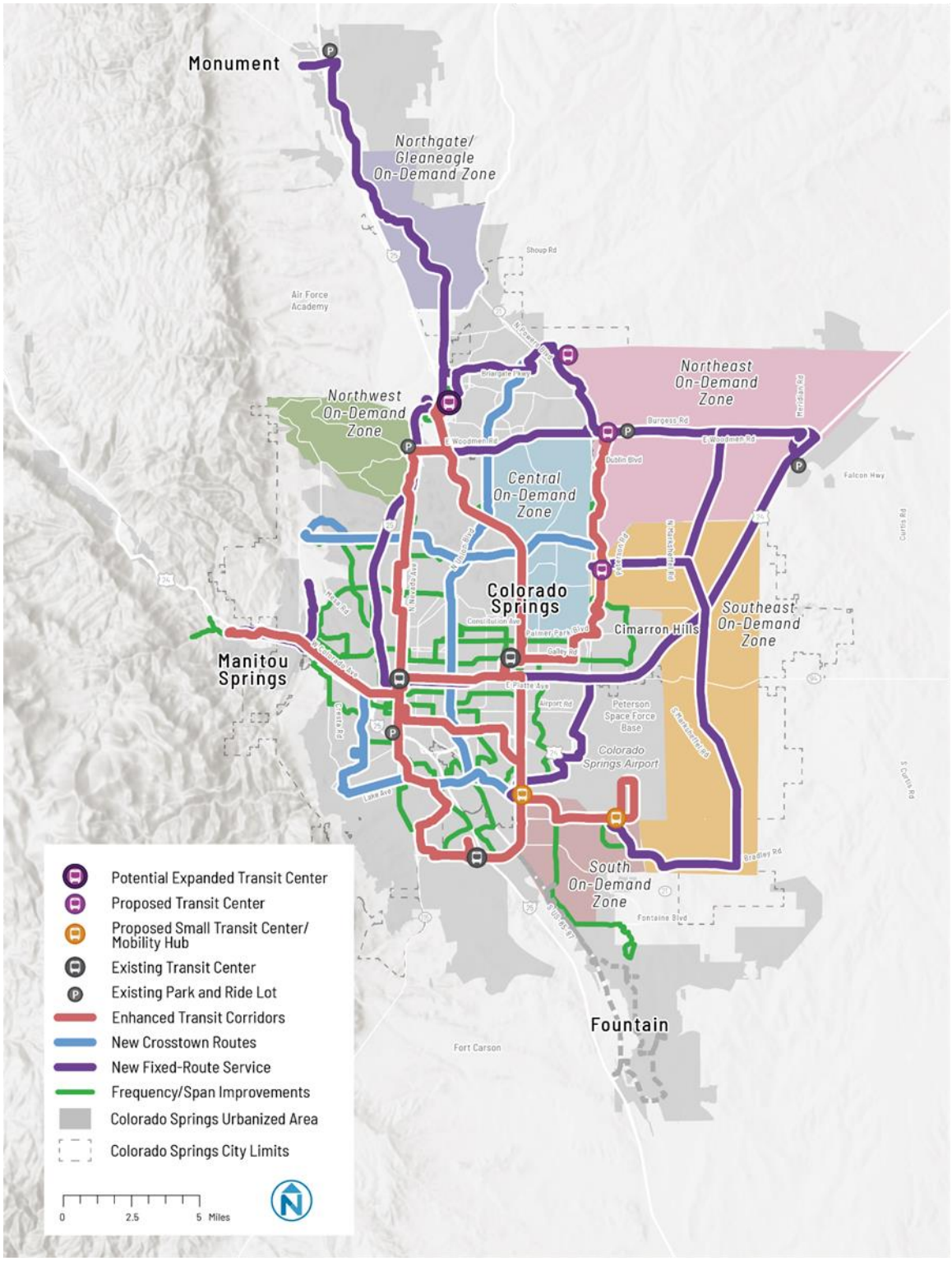


Figure 23: Map of regional transit projects from the transit plan

4.1.2 Transit Connections Study

In 2024, CDOT's Division of Transit and Rail (DTR) launched the Transit Connections Study (TCS) as part of its effort to build a statewide transit network. The study aims to provide a strategic vision for an interconnected statewide transit system, focusing on expanding and improving the Bustang Family of Services, adding passenger rail services, identifying transit gaps and needs, and fostering connections with intercity, regional, and local transit/mobility providers.

Mountain Metro Transit (MMT), local jurisdictions, and CDOT have developed a project list for inclusion in the TCS. This list identifies projects in the Pikes Peak region that align with CDOT's transit goals and represents a more aggressive implementation of the vision laid out in the Regional Transit Plan, designed to leverage increasing funding streams. It includes several service enhancement projects, such as express bus service and localized circulators to address last-mile connections. Additionally, the list features express and flex service as part of the Plains to Peak Corridor, along with several stop and station improvements, including mobility hubs and upgrades to existing connection points. This list is included as an addendum to the Regional Transit Plan.

4.1.3 State Multimodal and Transit Initiatives

Many of the projects and mode choice assumptions incorporated in the Regional Transit Plan and the Transit Connections Study are supported by a host of new state legislation, including:

- SB24-032 Methods to Increase the Use of Transit, provides additional funding for transit in the form of an annual allocation of $7 million to the ozone season transit grant program fund.
- HB24-1152 Accessory Dwelling Units, promotes the development of ADUs, which by extension promotes urban infill and correlates with higher probability of walk, bike, and transit mode choices.
- HB24-1304 Minimum Parking Requirements, prohibits a county or municipality, on or after June 30, 2025, from enforcing minimum parking requirements for real property within a MPO to encourage higher residential density and walk, bike, and transit mode choices.
- HB24-1313 Housing in Transit-Oriented Communities, is intended to provide greater access to transit.
- SB24-184 Support Surface Transportation Infrastructure Development, imposes a $3 a day congestion impact fee on car rentals intended to support the development of Front Range Passenger Rail (FRPR) service.
- SB24-230 Oil & Gas Production Fees, requires the clean transit enterprise to impose a production fee on oil and gas to be used for clean transit.

4.1.4 Modeling the Mode Choice Changes

The 2050 LRTP has more than doubled the funding for transit and multimodal projects compared to the 2045 plan, supported by coordinated planning and programming with local transit providers like MMT and state transit programs run by CDOT, using a host of new funding resources provided by legislation with the explicit goal of promoting multimodal options and transit use. Supporting these initiatives is

PPACG's new travel demand model (TDM), which provides robust capabilities to evaluate the impacts of proposed projects on both transportation efficiency and environmental sustainability.

The following changes were made compared to the 2020 base year model to account for the impacts these initiatives might have on the transportation network. These models constitute what is considered the GHG reduction or action scenarios for each forecast year.

- The transit mode choice probability was increased for general office workers, college students, and individuals over 65 years, for most trip types. This increase in forecasted transit attractiveness as a mode choice also models expected rebound of very low transit boardings in the base year, which likely influenced model calibration.
- In 2030, four new transit routes/lines were added: University of Colorado, Colorado Springs /Colorado College service to downtown, Monument line, Falcon line, and Woodmen line. The North Academy and Voyager lines were coded with shorter 10 minute headway times to reflect planned service improvements.
- In 2040, one new transit line was added: the Union South line. Shorter headways were coded to reflect improved service on the South Academy, Citadel, Union North, and Security Widefield lines.
- In 2050, the FRPR station was added in downtown Colorado Springs with a 30 minute headway service to Denver, and one a new transit line was added to Banning Lewis Ranch. The existing Amazon and Las Vegas transit lines were noticed to not be coded properly to all their stops and were repaired (there was no time to fix this problem in the 2030 and 2040 years before submission), and shorter 15 minute headway service was coded to all routes not already improved in 2030 and 2040.
- Walk mode choice probability for all adults was increased for non-work trips within 2 miles to be more attractive.
- Remote work probability was increased slightly by 4% for office workers and 2% for service workers, for a total remote work probability of around 14%.

	2020		2030		2040		2050	
Auto	1,845,542	*68.87%*	2,028,453	*68.00%*	2,300,422	*68.81%*	2,418,511	*68.05%*
Auto Shared	694,974	*25.93%*	740,937	*24.84%*	825,435	*24.69%*	868,281	*24.43%*
Transit	12,691	*0.47%*	81,389	*2.73%*	83,731	*2.50%*	127,559	*3.59%*
Walk	109,029	*4.07%*	114,512	*3.84%*	113,822	*3.40%*	118,262	*3.33%*
Bike	17,524	*0.65%*	17,757	*0.60%*	19,971	*0.60%*	21,390	*0.60%*
Total Trips	**2,679,761**		**2,983,047**		**3,343,380**		**3,554,003**	

Figure 24: Table of total trips by mode choice in the 2050 LRTP model across all model years

2020		2030		2040		2050	
Static VMT	SBA VMT	Static VMT	SBA VMT	Static VMT	SBA VMT	Static VMT	SBA VMT
14,571,122	**14,672,365**	**15,289,668**	**15,393,629**	**17,415,561**	**17,810,938**	**18,742,536**	**19,472,327**

Figure 25: Table of total vehicle miles traveled (VMT) in the 2050 LRTP model across all model years calculated using both the traditional static assignment and the newer simulation based assignment

4.1.5 New Baseline Model

The GHG rule, "Rules Governing Statewide Transportation Planning Process and Transportation Planning Regions" (2 CCR 601-22), requires that baseline GHG emissions be determined from modeling the regional plan adopted by the MPO when the rule became effective in January 2022. PPACG understood this to mean that the 2045 LRTP travel demand model – being the adopted plan when the rule became effective – would be used to establish the GHG baseline emissions, as its land use and transportation network were utilized to calculate the GHG reduction requirements in Table 1 of the rule. However, in September 2024, CDOT shared their interpretation and instructed PPACG to develop a new baseline model using the 2050 LRTP travel demand model.

PPACG staff and CDOT engaged in several discussions to determine how best to accomplish this, as the 2050 LRTP model represents a substantial improvement over the previous model and includes numerous changes that are incompatible with its predecessor. Some of these challenges include:

- The 2050 model has over 100 new TAZs, with different boundaries and household/employment composition
- Different population and household data, such as income and age brackets, between the models
- The 2045 model uses three worker classes, with no certainty to correctly parse them into the five worker types used in the 2050 model
- The 2045 model network does not have the geometric detail or attributes required for simulation based assignment for 69 centerline miles of major roadway projects removed from the 2050 LRTP

Working closely with CDOT, PPACG used the new 2050 LRTP model to generate a GHG baseline model with the following considerations to the 2045 LRTP:

- The baseline uses the 2045 LRTP land use and population distribution, but scaled to the 2050 LRTP population control total
- The baseline uses the 2050 LRTP workforce and employment distribution
- The baseline reflects the 2045 LRTP model's remote work and mode choice trip distributions
- The baseline contains the 2045 LRTP model's transportation network, using generic intersection geometry adopted where necessary to facilitate simulation based assignment (SBA) and PPACG staff's best estimate for project timelines

While the vehicle miles traveled (VMT) in the new GHG baseline models closely align with the VMT from the adopted 2045 LRTP, the lower average speeds in the baseline models reveal significant congestion in 2040 and 2050, to the point that not all trips in the baseline could be modeled to completion in those years. This is primarily attributed to the conflicting land use forecasts and the transportation project mix adopted in the 2045 LRTP. In retrospect, the nonsynchronous nature of the 2045 plan is apparent; however, it's important to note that as the Pikes Peak Area MPO is in attainment, previous plans did not have emissions budgets. Consequently, previous plans often employed a broader and less constricted approach conducive to their ability to be easily revised in four years' time. The lack of project implementation timelines in previous plans can be considered an example of this approach.

	2030	2040	2045
VMT in the 2045 LRTP for the MPO	16,800,165	18,120,837	18,319,508

	2030	2040	2050
VMT in the new GHG Baseline for the MPO	16,470,841	18,170,984	18,841,427

GHG Baseline Model Avg Speeds

PM rush hour (4pm - 7pm):

	2030	2040	2050	2040	2050
Interstate	69.5 mph	56.5 mph	55.2 mph	38.1 mph	37.1 mph
Highways	48.0 mph	36.7 mph	36.5 mph	22.0 mph	23.5 mph
Principal Arterials	38.6 mph	30.2 mph	29.6 mph	18.5 mph	18.4 mph
Minor Arterials	34.9 mph	28.7 mph	27.5 mph	19.8 mph	17.8 mph
Major Collectors	29.3 mph	25.0 mph	24.0 mph	18.7 mph	17.1 mph
Minor Collectors	24.7 mph	23.6 mph	23.6 mph	22.7 mph	22.9 mph

GHG Reduction Scenario Model Avg Speeds

PM rush hour (4pm - 7pm):

	2030	2040	2050	2040	2050
Interstate	69.2 mph	68.8 mph	68.5 mph	67.7 mph	66.3 mph
Highways	48.5 mph	48.3 mph	47.5 mph	47.3 mph	45.0 mph
Principal Arterials	38.6 mph	38.3 mph	38.3 mph	37.7 mph	37.4 mph
Minor Arterials	34.9 mph	34.9 mph	34.8 mph	34.7 mph	34.4 mph
Major Collectors	29.3 mph	29.2 mph	29.2 mph	29.0 mph	28.9 mph
Minor Collectors	24.2 mph	24.2 mph	24.2 mph	24.1 mph	24.1 mph

Figure 26: Tables of VMT in the original 2045 LRTP model and the new GHG baseline model, and comparisons of average vehicle speeds in the GHG baseline model and the 2050 LRTP model

The baseline models underscore the substantial benefits achievable through a harmonious land use and transportation planning strategy, such as the approach implemented in the 2050 Long Range Transportation Plan. This recent planning effort has yielded more than just a transportation project list and land use forecast; it has been the impetus to establish two new regional forums that enhance collaboration among local government planners. These forums represent a significant step forward, fostering the collective vision and coordination needed to drive meaningful, positive change across the region, and will help ensure the progress made on the 2050 LRTP continues into the next plan.

4.2 GHG Target Reporting

For each compliance year required under the rule, PPACG provided two sets of Excel file outputs from its travel demand model to the Air Pollution Control Division (APCD) of the Colorado Department of Public Health and Environment (CDPHE) for greenhouse gas (GHG) emissions evaluation using the MOtor Vehicle Emission Simulator (MOVES). These files were also supplied to CDOT, and included hourly traffic volumes, hourly average speeds, and details such as functional class, urban classification, number of lanes, and speed limits for each traffic link within the MPO network. The first file output was from the GHG baseline model derived from the adopted 2045 plan's land use and network, while the second file output was from the GHG action/reduction model from the new 2050 plan.

The result of the emissions analysis done by the APCD using the MOVES tool in rates mode to evaluate PPACG's 2050 LRTP through its travel demand model outputs in the following compliance years for Carbon Dioxide equivalent (CO2e) GHG emissions are as follows:

MPO	Year	pollutantID	HPMSid	Total(tons)
ppacog2030GHGbase	2030	98	11	11.69
ppacog2030GHGbase	2030	98	21	2,127.58
ppacog2030GHGbase	2030	98	30	3,049.30
ppacog2030GHGbase	2030	98	40	25.49
ppacog2030GHGbase	2030	98	50	65.56
ppacog2030GHGbase	2030	98	60	336.82
				5,616.44

MPO	Year	pollutantID	HPMSid	Total(tons)
ppacog2030GHGaction	2030	98	11	10.63
ppacog2030GHGaction	2030	98	21	1,679.36
ppacog2030GHGaction	2030	98	30	2,467.42
ppacog2030GHGaction	2030	98	40	20.92
ppacog2030GHGaction	2030	98	50	51.02
ppacog2030GHGaction	2030	98	60	266.38
				4,495.73

MPO	Year	pollutantID	HPMSid	Total(tons)
PPACOG_2040base	2040	98	11	19.49
PPACOG_2040base	2040	98	21	1,470.33
PPACOG_2040base	2040	98	30	4,743.79
PPACOG_2040base	2040	98	40	35.63
PPACOG_2040base	2040	98	50	95.48
PPACOG_2040base	2040	98	60	438.14
				6,802.86

MPO	Year	pollutantID	HPMSid	Total(tons)
PPACOG_2040action	2040	98	11	12.48
PPACOG_2040action	2040	98	21	620.73
PPACOG_2040action	2040	98	30	2,089.30
PPACOG_2040action	2040	98	40	22.35
PPACOG_2040action	2040	98	50	56.23
PPACOG_2040action	2040	98	60	275.80
				3,076.89

MPO	Year	pollutantID	HPMSid	Total(tons)
PPACOG_2050base	2050	98	11	21.76
PPACOG_2050base	2050	98	21	233.90
PPACOG_2050base	2050	98	30	2,970.43
PPACOG_2050base	2050	98	40	38.80
PPACOG_2050base	2050	98	50	105.67
PPACOG_2050base	2050	98	60	483.41
				3,853.97

MPO	Year	pollutantID	HPMSid	Total(tons)
PPACOG_2050action	2050	98	11	14.26
PPACOG_2050action	2050	98	21	98.60
PPACOG_2050action	2050	98	30	1,306.47
PPACOG_2050action	2050	98	40	24.55
PPACOG_2050action	2050	98	50	61.02
PPACOG_2050action	2050	98	60	295.38
				1,800.28

	2030	**2040**	**2050**
GHG Baseline Model	1.72	2.09	1.18
2050 Plan Action/Reduction Model	1.38	0.94	.55
Reduction Amount	.34	1.15	.63
Required Reduction in the Rule	.15	.12	.07
Pass/Fail	Pass	Pass	Pass

These values reported in Million Metric Tons (MMT) of CO2e emissions

Figure 27: Tables comparing GHG baseline emissions and action/reduction scenario emissions

5 Appendices

5.1 Acronyms and Abbreviations

ADA	Americans with Disabilities Act of 1990
ADU	Accessory Dwelling Unit
APCD	Air Pollution Control Division
CAC	community advisory committee
CCR	Code of Colorado Regulations
CDOT	Colorado Department of Transportation
CDPHE	Colorado Department of Public Health and Environment
CRP	Carbon Reduction Program
CO2e	carbon dioxide equivalent
COG	Council of Governments
BRT	Bus Rapid Transit
EV	electric vehicle
FHWA	Federal Highway Administration
FTA	Federal Transit Administration
FY	fiscal year
GHG	greenhouse gas
GIS	geographic information systems
IACT	Inter-Agency Consultation Team
IGA	Intergovernmental Agreement
LRTP	long range transportation plan
mi	miles
MMOF	multimodal transportation and mitigation options fund
MMT	Mountain Metropolitan Transit
MMT	millions of metric tons
MOVES	MOtor Vehicle Emission Simulator
MPO	metropolitan planning organization
mph	miles per hour
PPACG	Pikes Peak Area Council of Governments
SB	Senate Bill
SBA	simulation based assignment
STBG	surface transportation block grant
TAC	transportation advisory committee
TAP	Transportation Alternatives Program
TAZ	transportation analysis zone
TC	Transportation Commission
TDM	travel demand model
TIP	transportation improvement program

UZA	Census designated urbanized area
VMT	vehicle miles traveled
ZEV	zero emission vehicle

5.2 TDM Calibration and Validation Report

The travel model calibration and validation report developed by the PTV Group as part of its 2050 LRTP travel model improvements is attached.

5.3 MOVES Modeling Methodology Memo

The methodology used by the APCD to calculate greenhouse gas emissions for the PPACG 2050 LRTP travel demand model using the MOVES emissions model is attached.

Pikes Peak Travel Demand Model Update

PTV Group in cooperation with the Pikes Peak Area Council of Governments updated the multimodal tour-based travel demand model that represents travel activity in the region. This model update also enhanced the model with the addition of a work from home variable in the tour generation step and a 24hr dynamic traffic assignment model. The dynamic assignment model is a regional scale mesoscopic traffic simulation with more than 700 signalized intersections. The base year for the model is set to 2020.

This transportation planning model is a tour-based model and is a representation of the Colorado Springs area transportation facilities and multimodal travel patterns using these facilities. The model contains inventories of the existing roadway facilities, transit lines, synthetically generation population at the household and person level, as well as land use data such as workers, student enrollment, shopping, employment etc. in the area. The travel demand model was calibrated to reflect average daily traffic on roadway facilities. Further, hourly traffic counts were used to calibrate hourly travel demand for the purpose of dynamic traffic assignment.

The model can be used to measure the impact and evaluate scenarios such as changes in population, employment centers, travel behavior patterns, or roadway improvements. The transportation engineer or planner, using the transportation planning model, can project future traffic volumes without the cost of building inappropriate roadways or waiting for traffic congestion to severely impact travelers.

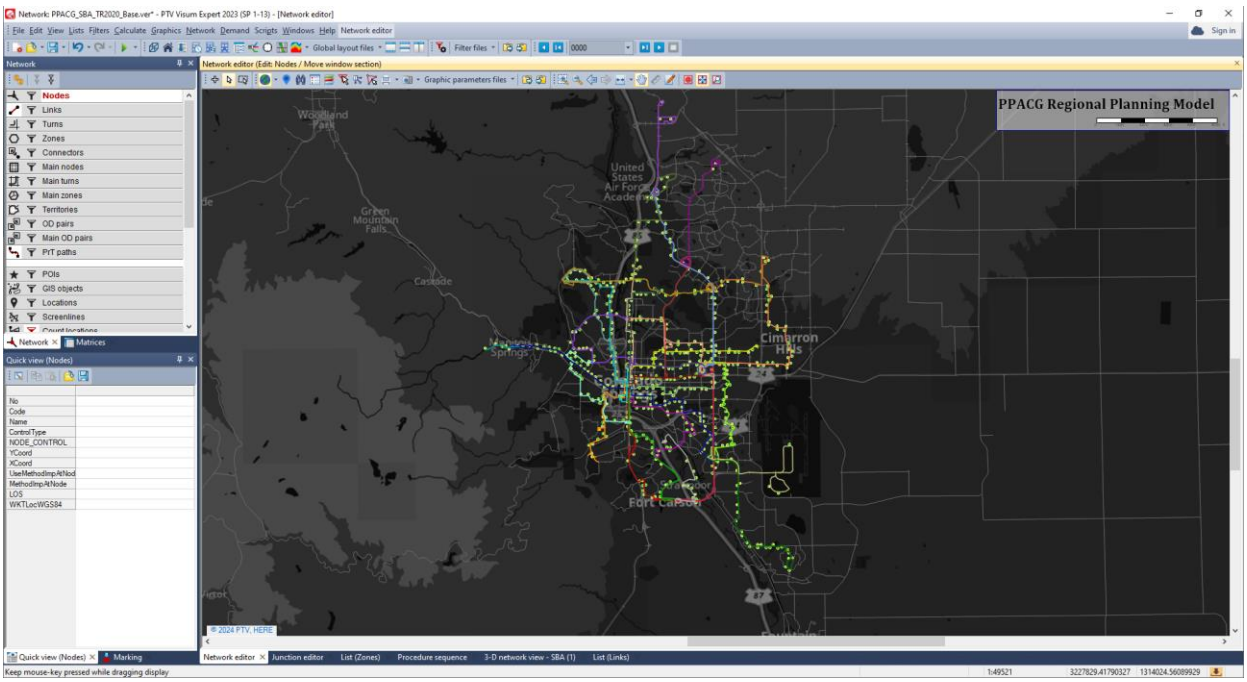
The model was developed using VISUM 2024. VISUM is a Windows based multimodal transportation modeling software and has an array of features implemented in an easy-to-use graphical user interface, thereby making it a very powerful analysis tool for transportation modeling and planning.

This document details the methodology that was used to develop the model. Because modeling is a complex process, much of the theory, terminology, and concepts are also discussed.

1. Model Area Identification

The model area contains El Paso County, Colorado Springs, Manitou Springs, Woodland Park, Green Mountain Falls, Fountain, Palmer Lake and Monument. The major through route in the area is I-25. The route runs in a north-south direction, with Denver in the north and Pueblo in the south. A snapshot of the model area is shown in Figure 1

Figure 1: Travel Demand Model Area – Pikes Peak Area Model



2. Network Development

The updated model network is multi-resolution in structure. Here, the level of detail used in the network assignments can be increased or decreased based on the network assignment method. The static assignment uses a typical link-node structure and applies turn prohibitions and macroscopic volume delay functions to model volume-based network delay. The simulation-based assignment (SBA) uses intersection geometry details and intersection control including signal timings and stop/yield control.

Network development for the model involved the following items:

1) Street network development – lanes, speeds, intersection geometries, signal timings etc.
2) Transit network development – transit lines with related timetable and headway data.
3) Transportation analysis zone refinement and updated centroid connectors.

2.1 Street Network Development

The street network for the model was developed by refinement of the existing travel demand model network using GIS layers and aerial imagery. The roadway classes, speeds, capacities and number of lanes were checked and updated in the entire network. In addition, intersection control, geometry and signal timings were added to the network to represent intersection level delay more accurately for the purpose of dynamic traffic assignment.

The following roadway functional classifications were used for modeling link delays in the model:

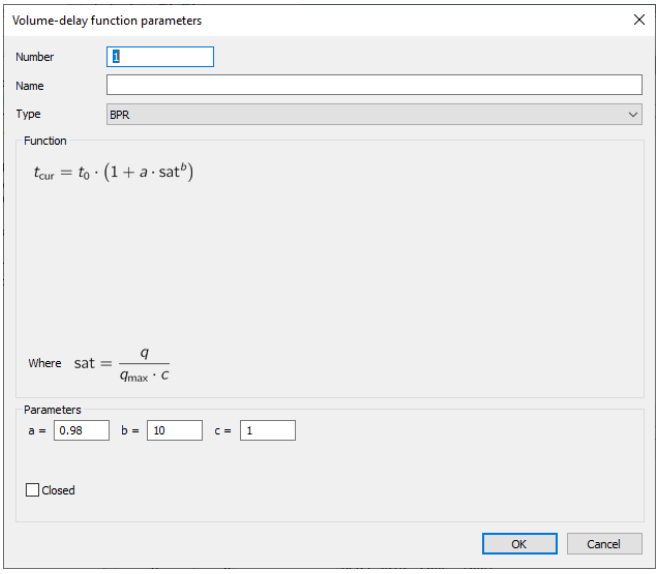
Table 1: Model Link Classification

Type No	Class No	Class Name	Capacity (/hr/ln)	Speed	Delay Function
10	1	Interstate HOV Connection	1500	65	1
11	1	Interstate	2400	80	1
12	1	Interstate	2400	75	1
13	1	Interstate	2400	70	1
14	1	Interstate	2350	65	1
15	1	Interstate	2300	60	1
16	1	Interstate	2250	55	2
17	1	Interstate HOV	1500	75	1
18	1	Interstate HOV	1500	70	1
19	1	Interstate HOV	1500	65	2
20	2	Expressway	2000	65	3
21	2	Expressway	2000	60	3
22	2	Expressway	1850	55	4
23	2	Expressway	1700	50	4
24	2	Expressway	1550	45	4
25	2	Expressway	1500	40	5
26	2	Expressway	1450	35	8
27	2	Expressway	1400	30	9
28	2	Expressway	1350	25	10
29	2	Expressway	1850	70	1
30	3	Principal Arterial	1800	65	4
31	3	Principal Arterial	1800	60	4
32	3	Principal Arterial	1800	55	5
33	3	Principal Arterial	1200	50	5
34	3	Principal Arterial	1000	45	6
35	3	Principal Arterial	900	40	7
36	3	Principal Arterial	850	35	8
37	3	Principal Arterial	800	30	9
38	3	Principal Arterial	800	25	10
40	4	Minor Arterial	1000	55	4
41	4	Minor Arterial	1000	50	5
42	4	Minor Arterial	850	45	6
43	4	Minor Arterial	850	40	7
44	4	Minor Arterial	750	35	8
45	4	Minor Arterial	700	30	9
46	4	Minor Arterial	700	25	10
47	4	Minor Arterial	650	20	10
48	4	Minor Arterial	650	15	10

Type No	Class No	Class Name	Capacity (/hr/ln)	Speed	Delay Function
49	4	Minor Arterial	1000	65	1
50	5	Collector	850	55	5
51	5	Collector	850	50	5
52	5	Collector	650	45	6
53	5	Collector	650	40	7
54	5	Collector	650	35	8
55	5	Collector	650	30	9
56	5	Collector	650	25	10
57	5	Collector	600	20	11
58	5	Collector	600	15	11
59	5	Collector	600	10	11
60	6	Residential	600	35	8
61	6	Residential	600	30	9
62	6	Residential	550	25	10
63	6	Residential	550	20	11
70	7	Ramp	1250	60	3
71	7	Ramp	1200	55	4
72	7	Ramp	1200	50	5
73	7	Ramp	1200	45	6
74	7	Ramp	1200	40	7
75	7	Ramp	1200	35	8
76	7	Ramp	1000	30	9
77	7	Ramp	1000	25	10
78	7	Ramp	1000	20	11
79	7	Ramp	1000	15	12

The above link capacities were applied in the network in combination with BPR volume delay functions to capture volume to capacity-based delay. The functional form is shown in the Figure 2 below.

Figure 2: Link Volume Delay Function for the PPACG Model



Six parameter sets were used in the model. These are shown in the table below:

Table 2: BPR Volume Delay Function Parameters

Delay Function No	BPR_a	BPR_b
1	0.98	10.0
2	0.93	8.0
3	1.00	5.4
4	0.83	2.7
5	0.71	2.1
6	0.15	7.0
7	0.15	7.0
8	0.15	7.0
9	0.15	7.0
10	0.15	7.0
11	0.15	7.0
12	0.15	7.0
13	0.15	7.0

2.2 Transit Network Development

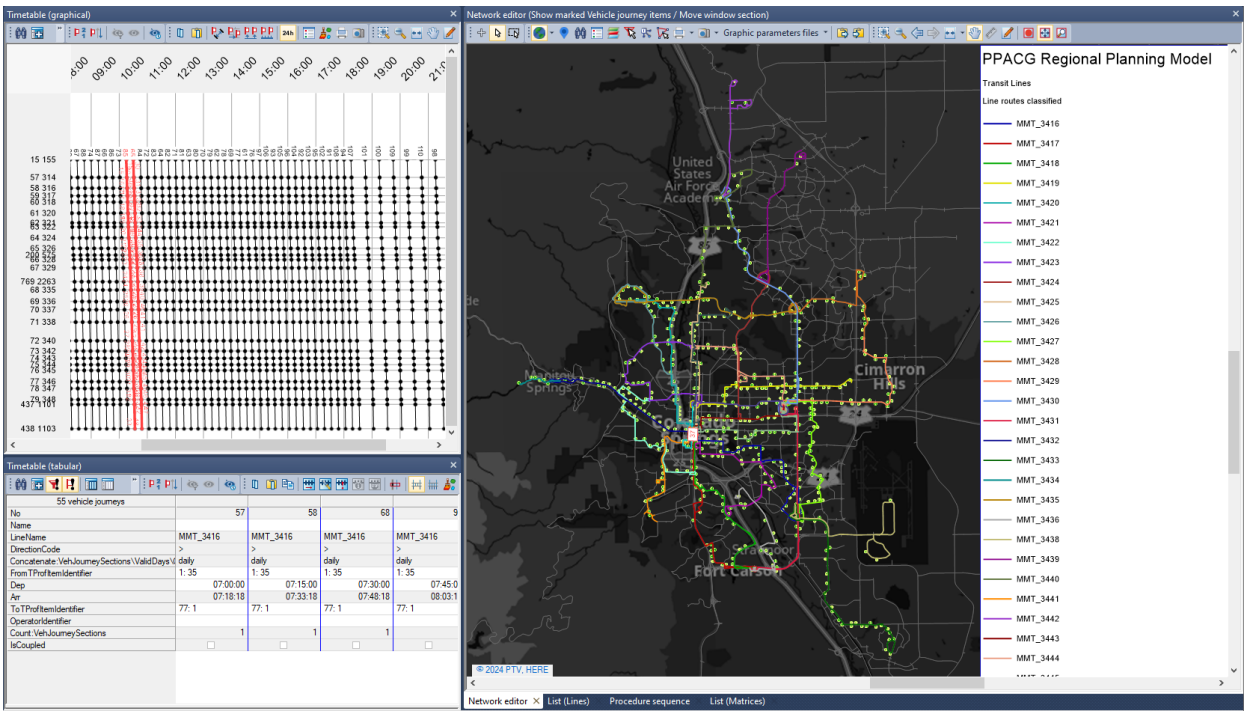
The PPACG tour-based model is designed as a 24-hour model with user defined time of day outputs. As a result, the network from the previous version of the model was completely replaced with a high-resolution transit network based on General Transit Feed Specification (GTFS). This network contains detailed timetable information suitable for timetable-based assignment and other operational analyses related to transit. While the existing model does not use timetable-based transit assignment, storing a timetable allows calculation of transit isochrones by time of day. This is useful in obtaining more realistic measures of transit accessibility and timed transfer connections at a disaggregated level.

A summary of transit lines included in the base model is presented in the table below.

Table 3: Base Model Transit Lines

LINE NAME	ROUTE_ID	ROUTE_NAME	TSYSNAME
MMT_3416	1	Hillside - Hancock Plaza	Bus
MMT_3417	10	Hwy 115 - PPSC	Bus
MMT_3418	11	World Arena - PPSC	Bus
MMT_3419	12	Palmer Park Blvd	Bus
MMT_3420	14	Chestnut St - G.O.G. Rd	Bus
MMT_3421	15	FOUNTAIN BLVD -E CHEYENNE MTN BLVD	Bus
MMT_3422	16	Brookside - Uintah Gardens	Bus
MMT_3423	17	19TH STREET/FILLMORE	Bus
MMT_3424	18	Union Blvd	Bus
MMT_3425	19	WEBER - EAGLE ROCK	Bus
MMT_3426	2	CENTENNIAL BLVD - G.O.G. Rd	Bus
MMT_3427	22	SOUTHBOROUGH VIA MURRAY BLVD	Bus
MMT_3428	23	Barnes Rd. - Tutt Blvd	Bus
MMT_3429	24	Galley Rd - Tutt Blvd	Bus
MMT_3430	25	N. ACADEMY BLVD - VOYAGER	Bus
MMT_3431	27	S. ACADEMY BLVD - PPSC	Bus
MMT_3432	3	COLORADO AVE - MANITOU	Bus
MMT_3433	32	SECURITY/WIDEFIELD	Bus
MMT_3434	33	INCLINE/COG SHUTTLE	Bus
MMT_3435	34	GOG/AUSTIN BLUFFS PKWY	Bus
MMT_3436	35	LAS VEGAS ST/ PPSC	Bus
MMT_3438	37	Amazon/ Airport	Bus
MMT_3439	38	UNION/ CHILDRENS HOSPITAL	Bus
MMT_3440	39	CORPORATE DR - VOYAGER PKWY	Bus
MMT_3441	4	S. 8th STREET - BROADMOOR	Bus
MMT_3442	40	VOYAGER - RAMPART PPSC	Bus
MMT_3443	5	Boulder - Citadel	Bus
MMT_3444	6	FILLMORE - Citadel	Bus
MMT_3445	7	Pikes Peak Ave. - Citadel	Bus
MMT_3446	8	Cache La Poudre - Citadel	Bus
MMT_3447	9	NEVADA - UCCS	Bus
MMT_3448	ZEB	ZEB Downtown Shuttle	Bus

Figure 3: GTFS Based Transit Network for the PPACG Model



2.3 Transportation Analysis Zone Refinement

The original TAZ system for the PPACG model was reviewed and revised to better align with census boundaries and roadway infrastructure. The updated TAZ system consists of 945 zones out of which 11 zones are external stations. The traffic and transit loading points or connectors were also redefined and placed as appropriate. The same loading scheme is used in both static and dynamic network assignments. The updated TAZ system for the PPACG Tour Based Model is illustrated below.

Figure 4: Updated TAZ System for the PPACG Model

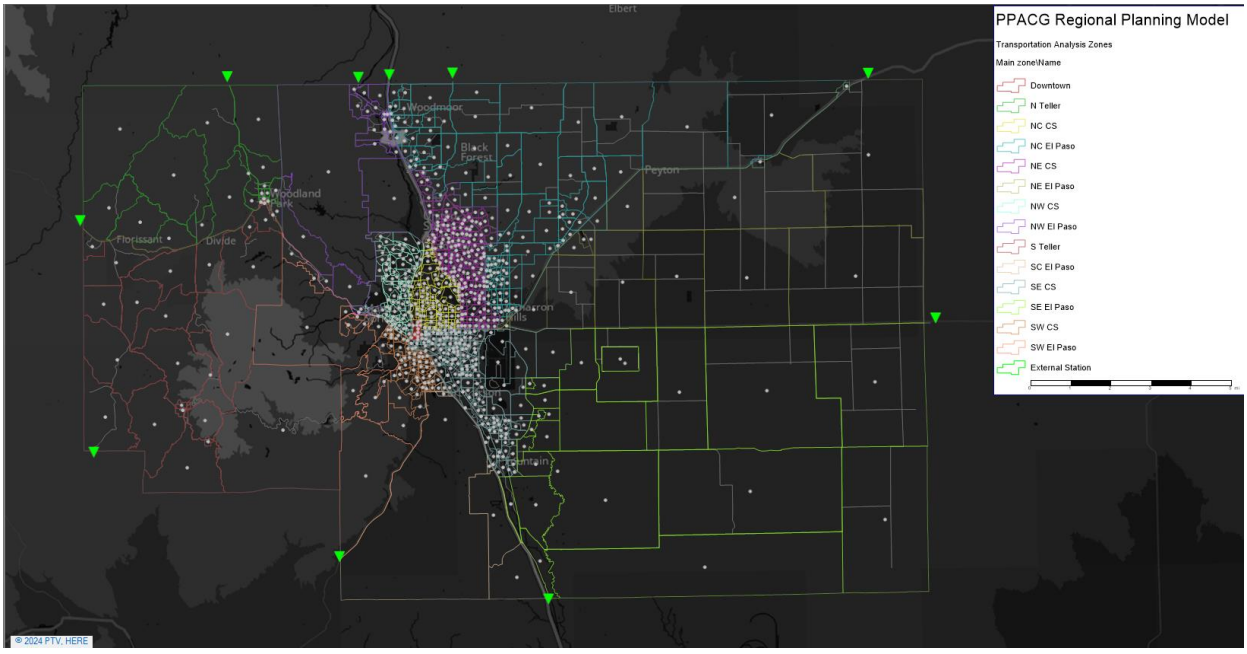


Table 4: PPACG TAZ System Summary

District	Number of Zones
Downtown	72
N Teller	19
NC CS	100
NC El Paso	129
NE CS	182
NE El Paso	14
NW CS	79
NW El Paso	22
S Teller	26
SC El Paso	8
SE CS	183
SE El Paso	23
SW CS	62
SW El Paso	15
External Station	11
TOTAL	**945**

2.4 Land Use Data

The land use and demographic data for the tour-based model was developed from multiple sources. The MPO provided the population and employment cross-sections. Additionally, the land use data related to zone level employment, shopping, recreation and student enrollment was derived from GIS data maintained by the MPO.

2.5 Demographic Data – Population Synthesis

The PPACG model uses a disaggregate synthetic population. The population synthesis process generates household weights for the seed sample that satisfies the marginal distributions. The final weights are then used to expand the seed sample into a disaggregate synthetic population. The use of a synthetic population allows greater flexibility in modeling tour and trip making characteristics by various demographic cross-sections and incorporation of variables to model work-from-home situations in a more robust and flexible manner.

With the advancement of travel demand models in recent years, synthetic population generation has also received research attention. Traditional population synthesizers used Iterative Proportional Fitting (IPF) or Iterative Proportional Updating (IPU) methods while advanced population synthesizers use optimization-based techniques such as entropy maximization and linear programming. PopulationSim[1] is a state-of-the-art population synthesizer software originally developed for the Oregon Department of Transportation (ODOT) and its partner agencies. PopulationSim is an open software developed in the ActivitySim[2] framework and is currently managed by the ActivitySim consortium. PopulationSim offers many technical and usability enhancements over other population synthesizers.

[1] PopulationSim: https://activitysim.github.io/populationsim/
[2] ActivitySim: https://activitysim.github.io/

PopulationSim makes several advancements over traditional population synthesizers such as PopSyn3 and PopGen. These include enhancements resulting from the use of advanced optimization methods, unique features for travel demand model applications, efficient software design, and better interfacing with PTV Visum. The following sub-sections describe these benefits in more detail.

Algorithmic advantages

PopulationSim uses an entropy maximization-based list-balancing approach for generating weights[3]. The entropy-maximization formulation results in uniform weights that are not expanded beyond a user-defined threshold. The uniformity in weights ensures that the distribution of uncontrolled variables is not significantly changed in the process. This unique formulation also allows for the specification of importance factors on each marginal control. The user can set these factors in accordance with their confidence in the quality of the data.

Another important advantage of the PopulationSim algorithm is that it operates simultaneously on all geographic units. This eliminates the errors resulting from the sequential processing of geographies. This is a known problem in the PopSyn3 population synthesizer which results in poor control match for minority population segments such as university students or low-income households. The simultaneous list balancing method used in PopulationSim eliminates this type of error and results in better control match for minority population segments.

Generally, the list balancing or IPF-based process generates floating-point weights. However, for expanding the seed sample, integer weights are required. Many traditional population synthesizers resort to simple or bucket rounding of floating-point weights. This method results in poor control matches and the errors can accumulate over geographic units. Some IPF-based population synthesizers such as PopGen rely on Monte-Carlo draws from a joint distribution of floating-point weights. Again, the Monte-Carlo errors can accumulate and result in poor marginal control matches. PopulationSim uses a linear programming (LP) formulation to convert floating-point weights to integers. As a result, PopulationSim avoids rounding or drawing errors in contrast to other population synthesizers.

Advanced usability features

PopulationSim also offers several unique features that make it a practical choice for many travel demand model applications. These features are described below:

- Person controls

PopulationSim allows the specification of both household and person-level controls. While most population synthesizers offer this feature, some of the traditional ones operate only at the household level.

- Multiple geographies

As stated earlier, the main inputs to the population synthesis process are a seed sample and marginal controls. Typically, most population synthesizers operate at a single geographic level. However, data for marginal controls are generally not available at the same geographic level. For example, the household income distributions may be available at the Traffic Analysis Zone (TAZ) level and the person age distribution might be available at the County level. The available data needs to be transformed to the

[3] See TRB Paper for more details:
https://github.com/ActivitySim/populationsim/blob/master/papers/TRB_Paper_PopulationSim_v6.pdf

same geographic level which can be a time-consuming task and can introduce approximation errors. In contrast, PopulationSim can use data available at multiple geographic levels without any transformation.

- Importance factors for controls

As stated earlier, PopulationSim also allows users to specify importance factors on each control. The PopulationSim algorithm gives higher priority to marginal controls with a higher importance factor. This feature can be very useful in a situation where the user places a higher level of confidence in a certain data source.

- Re-populate feature

Typical model applications for a regional model include corridor studies and traffic impact studies, which require carefully controlled baseline versus build analysis. PopulationSim software offers functionality that supports this type of analysis; a 're-populate' mode in the software adds to or replaces the existing synthetic population in a subset of zones using whatever controls the user is able to provide (for example, households by type).

Software benefits

As mentioned earlier, PopulationSim has a robust open-source software implementation in the ActivitySim framework. Software development adheres to software engineering best practices. The system is under continuous integration (CI), which means the software and documentation are automatically built and tested against sample datasets to ensure that new features do not break the code base for any users. PopulationSim benefits arising from its robust software design are described below:

- Runtime

The Python-based ActivitySim framework makes heavy use of the Numpy and Pandas Python libraries, which allow for the vectorization of operations to reduce overall runtime. This in conjunction with an optimization-based algorithm achieves faster convergence for PopulationSim. Runtime comparison between PopGen and PopulationSim for DVRPC and NFTPO showed significant runtime improvements.

- ActivitySim framework

The software depends on the ActivitySim core and therefore offers the same user experience as the ActivitySim activity-based model, namely the same user interface, customizable expressions, approach to tracing calculations, and data management.

- Documentation and support

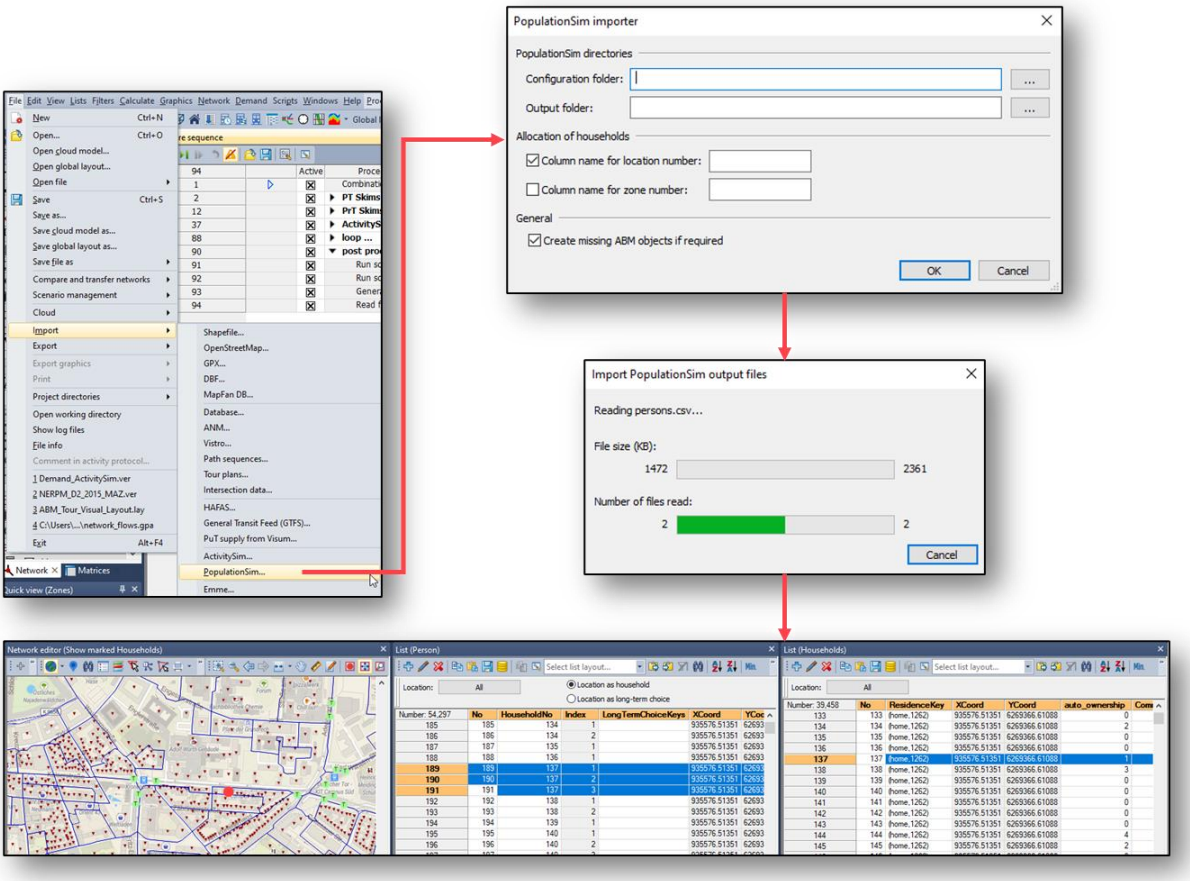
The PopulationSim source code and technical documentation are available at the following public GitHub repository: https://github.com/ActivitySim/populationsim. The technical documentation includes runnable examples and training resources. PopulationSim enjoys a large user community in the US and worldwide. The users can report bugs and issues on the GitHub repository and contribute to the software development.

Integration with PTV Visum

Visum now includes person and household Network Objects to house synthetic populations. Visum's Python API or the GUI-based menu option can be used to import PopulationSim-generated synthetic

population. The user points Visum to an existing PopulationSim setup. The import procedure reads the outputs into Visum and creates network objects as needed.

Figure 5: PTV Visum PopulationSim Import Procedure



The list of land use and demographic variables used in the model is given in the Appendix.

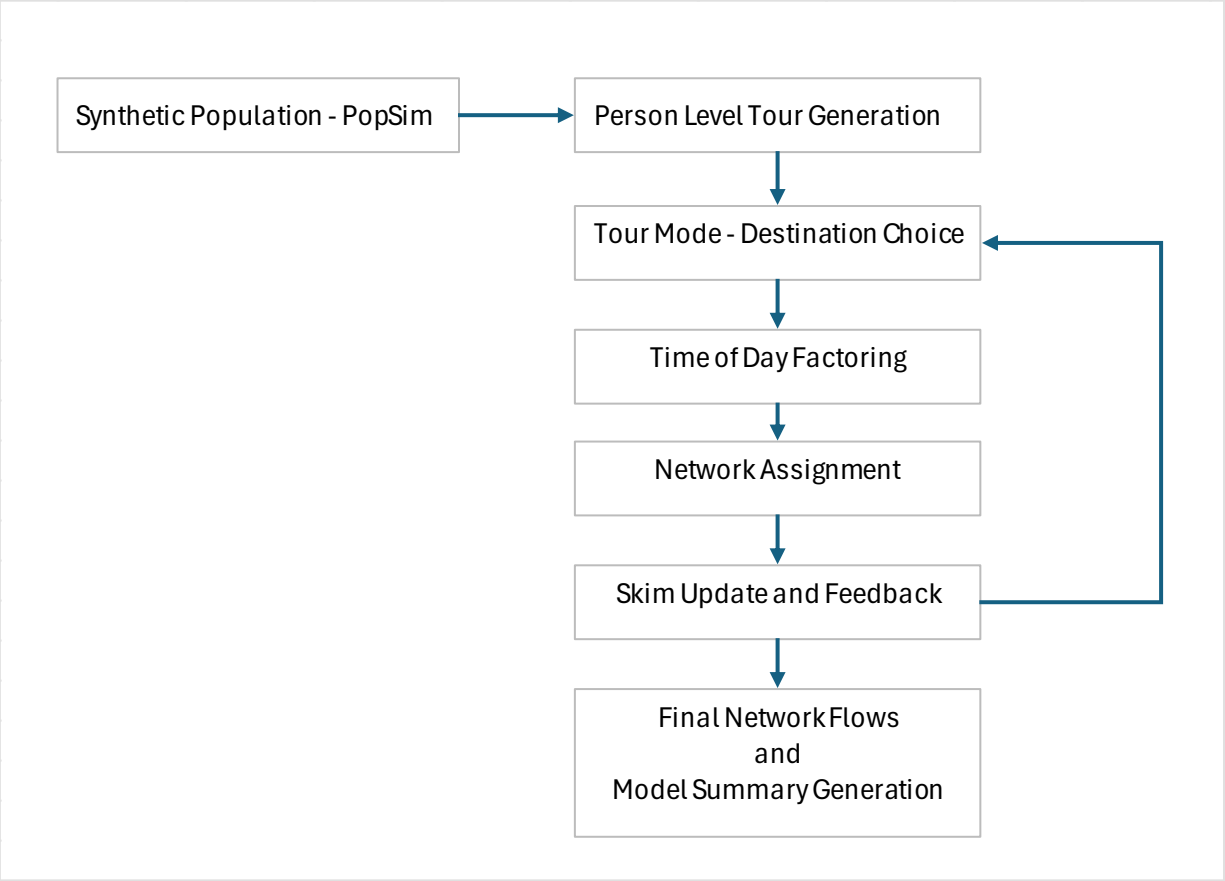
3. Model Approach

The tour-based model structure adopted in Visum is based on a hybrid modeling methodology which explicitly models person tour generation at the individual level and combined mode-destination and time of day choice of homogeneously divided person types at an aggregated zonal level. It involves execution of the following procedures:

1) Tour generation
2) Tour destination choice – with and without rubber banding
3) Tour mode choice – with primary mode choice or leg-by-leg mode choice
4) Time of day calculation – based on trip level time of day factors derived from survey data

The three logical units (mode-destination-time of day choice) are processed simultaneously during the model calculation.

Figure 6: PPACG Tour Based Model Calculation Flow



3.1 Tour Generation

Tour generation (calculating and applying skeletal tour/activity patterns by person type): In the hybrid modeling approach, tour generation is calculated at the person level using a range of person and household attributes. Subsequently, the person level results are aggregated into a set of broader person groups which are used to summarize model results and application of mode-destination and time of day models.

Table 5: PPACG Model Person Groups

CODE	NAME
Worker_GCP	General, Clerical and Professional Workers
Worker_MCT	Manufacturing, Construction and Trades Workers
Worker_MIL	Military Workers

NonWorker	Non-Workers under 65
Senior	Non-Workers 65 and above
Student_Elem	Student Elementary School
Student_High	Student High School
Student_Univ	Student College University

The updated tour generation model incorporates a work-from-home model to accommodate the impact of new work-from-home trends seen after the COVID19 pandemic. The approach used in the PPACG tour generation model to account for work-from-home policies is applied as a post-processing step in tour generation that scales the base tour generation to produce updated tour frequencies for each worker in the synthetic population.

In the first step, a mobility rate is calculated for each person and tour type combination. To calculate mobility rates, daily activity chains derived from a travel survey are broken down into individual home-based tours. Distinct tour types are identified among the complete set of tours and their corresponding probability is calculated. As a result, the sum of the probabilities of a person group can be greater than 1.0 (or 100 %), because a person can execute multiple tours one after the other in a day (for example: first HWH, then HOH).

Consider for example the daily activity chains 5 persons below:

HWH, HWH, HWOH, HWHOH, HOHWH

In the above case, mobility rates for home-based tours (HWH, HWOH, HOH) tours are calculated by counting their occurrence in each of the daily activity chains and dividing it by the total number of daily activity chains.

This produces a mobility rate of 0.8 [4/5] for HWH, a mobility rate of 0.4 [2/5] for HOH and a mobility rate of 0.2 [1/5] for HWOH tours.

Mobility rate extraction from the travel diary coarsely involves the steps below,

1) Extraction of raw chains or daily patterns for each person type

2) Determining unique home-based tours within the chains

3) Counting the occurrence of each tour type in the list of all chains and dividing by the number of activity chains.

The base mobility rates for each person group and tour type derived from the PPACG travel survey are tabulated below. Activities in the tour chain are represented as: H-Home, W-Work, D-Stop on work/school, O-Non-work.

Table 6: Tour Mobility Rates by Person Type

NO	TOUR	WORKER GCP	WORKER MCT	WORKER MIL	NON-WORKER	SENIOR	STUDENT ELEM	STUDENT HIGH	STUDENT UNIV
1	HDDDWDDDH	0	0	0	0	0	0	0	0
2	HDDDWDDH	0	0	0	0	0	0	0	0
3	HDDDWDH	0	0	0	0	0	0	0	0
4	HDDDWH	0.01	0.01	0	0	0	0	0	0
5	HDDSDDH	0	0	0	0	0	0	0.01	0.01
6	HDDSDH	0	0	0	0	0	0	0	0
7	HDDSH	0	0	0	0	0	0	0	0
8	HDDWDDDH	0	0.01	0	0	0	0	0	0
9	HDDWDDH	0	0	0	0	0	0	0	0
10	HDDWDH	0.01	0.01	0	0	0	0	0	0
11	HDDWH	0.01	0	0.01	0	0	0	0	0
12	HDSDDH	0	0	0	0	0	0.01	0	0.01
13	HDSDH	0	0	0	0	0	0.05	0.05	0.01
14	HDSH	0	0	0	0	0	0.03	0.06	0.01
15	HDWDDDH	0.02	0.02	0.02	0	0	0	0	0
16	HDWDDH	0.02	0.01	0.02	0	0	0	0	0
17	HDWDH	0.03	0.01	0.06	0	0	0	0	0
18	HDWH	0.05	0.03	0.04	0	0	0	0	0
19	HOH	0.44	0.41	0.25	0.67	0.55	0.38	0.26	0.44

NO	TOUR	WORKER GCP	WORKER MCT	WORKER MIL	NON-WORKER	SENIOR	STUDENT ELEM	STUDENT HIGH	STUDENT UNIV
20	HOOH	0.16	0.12	0.09	0.26	0.22	0.12	0.05	0.15
21	HOOOH	0.07	0.04	0.03	0.1	0.06	0.04	0.05	0.06
22	HOOOOH	0.09	0.06	0.01	0.11	0.11	0.04	0.03	0.07
23	HSDDH	0	0	0	0	0	0.04	0.1	0.04
24	HSDH	0	0	0	0	0	0.08	0.12	0.03
25	HSH	0	0	0	0	0	0.42	0.5	0.22
26	HWDDDH	0.06	0.05	0.02	0	0	0	0	0
27	HWDDH	0.05	0.05	0.06	0	0	0	0	0
28	HWDH	0.08	0.07	0.07	0	0	0	0	0
29	HWH	0.4	0.5	0.5	0	0	0	0	0

In the second step, a person level work from home multinomial choice model is used to estimate the probability of a person working from home for a given number of days. This provides a scaling factor that is then applied to the 'base' work tour mobility rate for each person. The model coefficients for the telecommute frequency choice model were initially adopted from the SANDAG travel demand model and calibrated to the available remote-work data available in the travel survey. The coefficients adopted in the model are tabulated below.

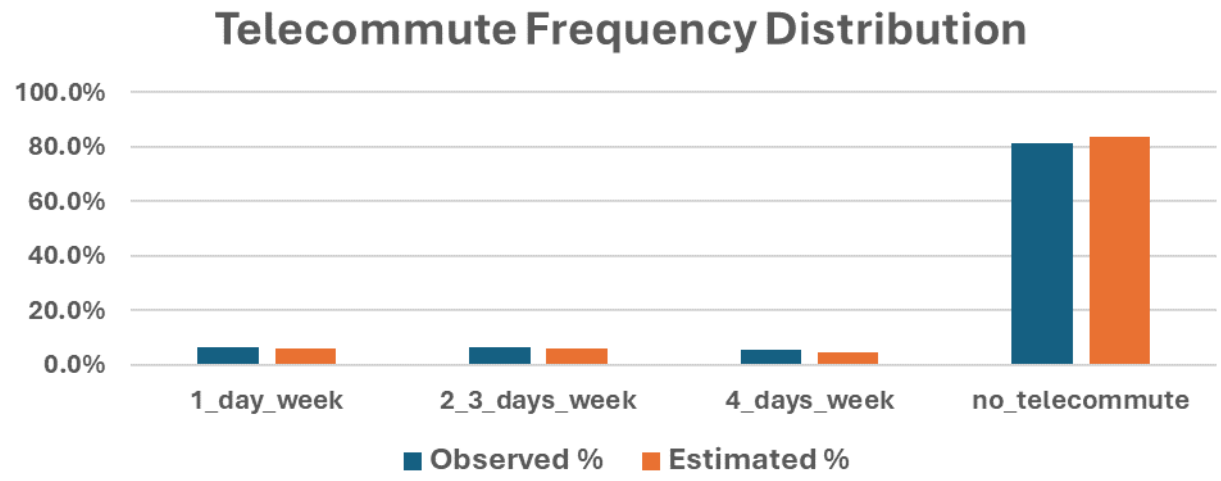
Table 7: Remote Work Choice Model Parameters

		Telecommute Alternative Coefficients			
No	**Variable**	**no_telecommute**	**1_day_week**	**2_3_days_week**	**4_days_week**
1	occp_Services	0	-1.62	-0.65	0
2	occp_SalesOffice	0	-0.62	-0.74	-0.89
3	occp_ResourceConstruct	0	-1.57	0	0
4	occp_TransportMat	0	-14.75	0	0
5	presenceOfChildren0_5	0	0	0	-0.86

		Telecommute Alternative Coefficients			
No	**Variable**	**no_telecommute**	**1_day_week**	**2_3_days_week**	**4_days_week**
6	presenceOfChildren6_12	0	0	0.52	-0.81
7	adultInHousehold_1	0	0.18	0	-0.04
8	adultInHousehold_ge2	0	0	0	0
9	female	0	0	0	0
10	partTimeWorker	0	0	0.42	1.11
11	univStudent	0	0	0.6	0
12	paysToPark	0	0.46	0	0
13	income_60_100k	0	0.56	0.39	0
14	income_100_150k	0	0.64	0.19	0
15	income_150k_pl	0	0.92	0.77	0
16	autos_0	0	0	0.41	0
17	autos_1	0	0	0	0
18	autos_ge3	0	0	-0.73	0
19	avgDistToWork	0	0.02	0	0
20	ASC	0	-3.62	-3.55	-4.57
21	CALIB_CONST	0	0.57	0.77	1.65

The framework above allows a flexible way to account for the impact of remote work policies on work related travel. This flexibility in the model is necessary because the remote work policies of employers are still evolving post-pandemic (COVID19). The tour generation mode considers that certain types of workers may not be able to work remotely due to the nature of their job (military, manufacturing, service). The models are thus applied based on workers classified by occupation types rather than income. The summaries for the base model are shown below.

Figure 7: Telecommute Model Validation



Observed		Estimated		Estimated Scaled		Observed %		Estimated %	
TelecommuteFreq	Workers	TelecommuteFreq	Workers	TelecommuteFreq	Workers	TelecommuteFreq	Percent	TelecommuteFreq	Percent
1_day_week	16,052	1_day_week	18,899	1_day_week	18,899	1_day_week	6.3%	1_day_week	5.9%
2_3_days_week	16,903	2_3_days_week	19,344	2_3_days_week	19,344	2_3_days_week	6.7%	2_3_days_week	6.1%
4_days_week	14,198	4_days_week	14,270	4_days_week	14,270	4_days_week	5.6%	4_days_week	4.5%
no_telecommute	206,952	no_telecommute	266,628	no_telecommute	266,628	no_telecommute	81.4%	no_telecommute	83.5%
Total	254,104	Total	319,141	Total	319,141	Total	100%	Total	100%

Table 8: Summary of Base Year Person Tours

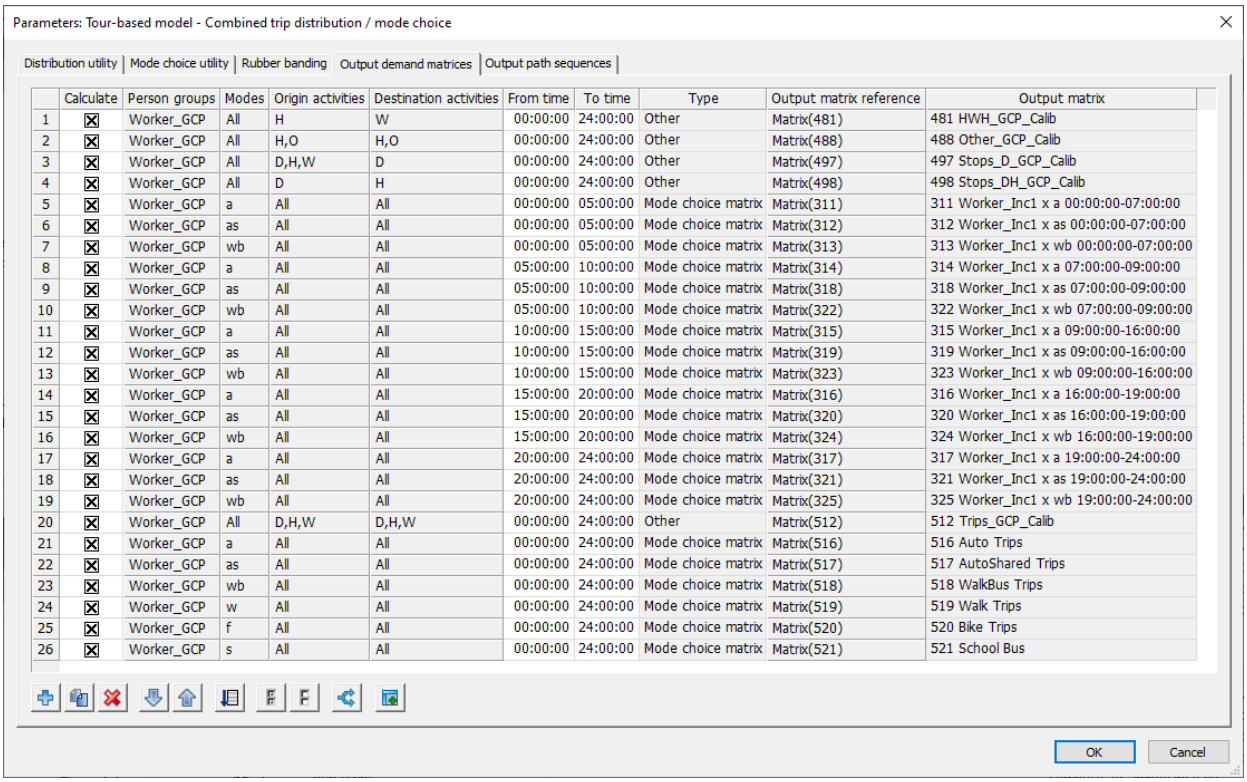
Person Group	Persons	Work/School Tours	Other Tours	Total Tours
Worker_GCP	257,151	179,257	204,696	**383,952**
Worker_MCT	59,428	42,727	39,103	**81,829**
Worker_MIL	22,093	16,766	8,825	**25,591**
NonWorker	112,822	-	129,559	**129,559**
Senior	92,989	-	88,154	**88,154**
Student_Elem	143,255	91,617	84,293	**175,910**
Student_High	47,740	40,155	18,552	**58,706**
Student_Univ	47,864	15,679	34,857	**50,536**

3.2 Tour Based Destination and Mode Choice

Destination choice/trip distribution (determining the trip destination): The hybrid approach used in the PPACG model implements the tour-based destination choice at a zonal aggregate level. Modeling of

tours considers non-home-based trips as part of a trip chain. This makes the non-home-based trips spatially consistent with the overall trip making in the system. Aggregate tour or trip chain calculations are implemented with matrix operations in a multi-threaded optimized framework. This removes the burden of complicated matrix management from the modeler. Instead, outputs can be specified by time of day and with a flexible combination of activities and modes.

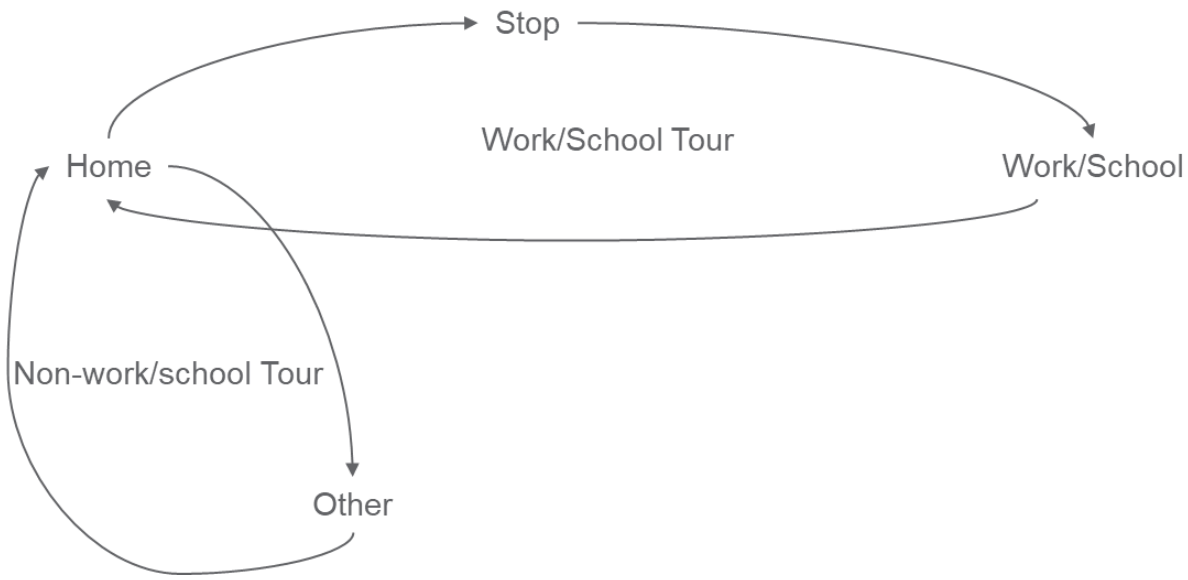
Figure 8: Tour-based Destination-Mode Choice Output Specification



	Calculate	Person groups	Modes	Origin activities	Destination activities	From time	To time	Type	Output matrix reference	Output matrix
1	☒	Worker_GCP	All	H	W	00:00:00	24:00:00	Other	Matrix(481)	481 HWH_GCP_Calib
2	☒	Worker_GCP	All	H,O	H,O	00:00:00	24:00:00	Other	Matrix(488)	488 Other_GCP_Calib
3	☒	Worker_GCP	All	D,H,W	D	00:00:00	24:00:00	Other	Matrix(497)	497 Stops_D_GCP_Calib
4	☒	Worker_GCP	All	D	H	00:00:00	24:00:00	Other	Matrix(498)	498 Stops_DH_GCP_Calib
5	☒	Worker_GCP	a	All	All	00:00:00	05:00:00	Mode choice matrix	Matrix(311)	311 Worker_Inc1 x a 00:00:00-07:00:00
6	☒	Worker_GCP	as	All	All	00:00:00	05:00:00	Mode choice matrix	Matrix(312)	312 Worker_Inc1 x as 00:00:00-07:00:00
7	☒	Worker_GCP	wb	All	All	00:00:00	05:00:00	Mode choice matrix	Matrix(313)	313 Worker_Inc1 x wb 00:00:00-07:00:00
8	☒	Worker_GCP	a	All	All	05:00:00	10:00:00	Mode choice matrix	Matrix(314)	314 Worker_Inc1 x a 07:00:00-09:00:00
9	☒	Worker_GCP	as	All	All	05:00:00	10:00:00	Mode choice matrix	Matrix(318)	318 Worker_Inc1 x as 07:00:00-09:00:00
10	☒	Worker_GCP	wb	All	All	05:00:00	10:00:00	Mode choice matrix	Matrix(322)	322 Worker_Inc1 x wb 07:00:00-09:00:00
11	☒	Worker_GCP	a	All	All	10:00:00	15:00:00	Mode choice matrix	Matrix(315)	315 Worker_Inc1 x a 09:00:00-16:00:00
12	☒	Worker_GCP	as	All	All	10:00:00	15:00:00	Mode choice matrix	Matrix(319)	319 Worker_Inc1 x as 09:00:00-16:00:00
13	☒	Worker_GCP	wb	All	All	10:00:00	15:00:00	Mode choice matrix	Matrix(323)	323 Worker_Inc1 x wb 09:00:00-16:00:00
14	☒	Worker_GCP	a	All	All	15:00:00	20:00:00	Mode choice matrix	Matrix(316)	316 Worker_Inc1 x a 16:00:00-19:00:00
15	☒	Worker_GCP	as	All	All	15:00:00	20:00:00	Mode choice matrix	Matrix(320)	320 Worker_Inc1 x as 16:00:00-19:00:00
16	☒	Worker_GCP	wb	All	All	15:00:00	20:00:00	Mode choice matrix	Matrix(324)	324 Worker_Inc1 x wb 16:00:00-19:00:00
17	☒	Worker_GCP	a	All	All	20:00:00	24:00:00	Mode choice matrix	Matrix(317)	317 Worker_Inc1 x a 19:00:00-24:00:00
18	☒	Worker_GCP	as	All	All	20:00:00	24:00:00	Mode choice matrix	Matrix(321)	321 Worker_Inc1 x as 19:00:00-24:00:00
19	☒	Worker_GCP	wb	All	All	20:00:00	24:00:00	Mode choice matrix	Matrix(325)	325 Worker_Inc1 x wb 19:00:00-24:00:00
20	☒	Worker_GCP	All	D,H,W	D,H,W	00:00:00	24:00:00	Other	Matrix(512)	512 Trips_GCP_Calib
21	☒	Worker_GCP	a	All	All	00:00:00	24:00:00	Mode choice matrix	Matrix(516)	516 Auto Trips
22	☒	Worker_GCP	as	All	All	00:00:00	24:00:00	Mode choice matrix	Matrix(517)	517 AutoShared Trips
23	☒	Worker_GCP	wb	All	All	00:00:00	24:00:00	Mode choice matrix	Matrix(518)	518 WalkBus Trips
24	☒	Worker_GCP	w	All	All	00:00:00	24:00:00	Mode choice matrix	Matrix(519)	519 Walk Trips
25	☒	Worker_GCP	f	All	All	00:00:00	24:00:00	Mode choice matrix	Matrix(520)	520 Bike Trips
26	☒	Worker_GCP	s	All	All	00:00:00	24:00:00	Mode choice matrix	Matrix(521)	521 School Bus

The trip chaining within the tours is calculated in two modes – without rubber-banding (full-tours) and with rubber-banding (half-tours). The methodology for trip chain calculation is described in the next subsections.

Figure 9: Example Tour Types



Tours without Primary Activities

The tour-based destination choice is performed using the gravity/destination choice formulation shown below:

$$P_{ij}^{g} = \frac{Z_j . f(U_{ij}^{g})}{\sum_{k=1}^{N} Z_k . f(U_k^{g})}$$

Where,

P_{ij}^{g} *= Probability of destination/location choice.*

f(U_{ij}) = friction term with specified functional transformation on utility.

Zj = size term related to the destination activity.

If *f(U_{ij})* is used with a logit function, the above equation becomes equivalent to:

$$P_{ij}^{g} = \frac{e^{U_{ij}^{g} + \ln(Z_j)}}{\sum_{k=1}^{N} e^{U_{ik}^{g} + \ln(Z_k)}}$$

Multiplying out the total number of tours with the above probabilities yields the number of trips along the tour leg. Each trip leg of the home-based tour is evaluated by successively applying the above formulation with each destination leg serving as the origin control for the next leg. As an example, a tour with the skeletal structure HOOH, will be calculated as a chain of matrix operations applied to each leg: HO-> OO->OH. The tour generation provides the initial control trip total for the first trip leg.

Tours with Primary Work/School Activities

Work and school tours are modeled using the concept of rubber-banding. Here, a primary destination governs the choice of mode as well as intermediate stop locations on work and school tours. Consider a tour with skeletal structure HSWH (Home-Stop-Work-Home). Since the primary activity in this tour is

Work (W), the chain is split into two half-tours: (1) HSW and (2) WH. The first half-tour HSW is calculated using the attraction size of the work activity as HW. The trips between H and W are then routed through potential stop locations by using the composite utility of the stop attraction size and friction factor of stop locations with respect to the two anchor locations (Home and Work).

Figure 10: Half Tour with Primary Work Destination and Intermediate Stop Location

A general consideration for the insertion of stop locations on primary tours is to minimize out of way travel between the primary activity locations (Home and Work/School). The stop location choice is thus based on the composite utility of the trip legs between the primary anchor locations and stop locations. The formulation for intermediate stop location choice is illustrated below:

$$P_{ik} = \frac{Z_k \times f(U_{ik}^{H\to S} + wU_{kj}^{S\to W})}{\sum_{m=1}^{n} Z_m \times f(U_{im}^{H\to S} + wU_{mj}^{S\to W})}$$

Where,

i=index of origin (home anchor)

j=index of primary destination (work/school)

k=index of intermediate stop location

Zk= size variable for stop location k

f = functional transformation | exp

U(HS), (SW) – utilities of traveling to destination thorough a given stop location

w = weight factor

Destination Choice Model Parameters

The activities considered in the PPACG model are tabulated below:

Activity Name	Activity Code	Anchor Activity
Stop on primary	D	No
Home	H	Yes

Other (Shop/Recreation/Non-work)	O	No
School	S	No
Work	W	No

The size variables used in the model are applied to each person group as a weighted sum of land use variables. The initial set of these weights were based on the SANDAG activity-based model. The weights were then systematically calibrated for the PPACG model to reflect local conditions.

		Land Use Variable												
Person Type	**Activity**	**EMP OFFICE**	**EMP RETAIL**	**EMP SRVC**	**EMP LABOR**	**EMP MIL**	**HH**	**EMEN ROLL**	**HS ENROLL**	**COLL ENROLL**	**EMP SRVC**	**EMP RETAIL**	**EMP OFFICE**	**EMP SRVC**
Senior/Non-Worker	Other	0	0.95	0.3	0	0	0.07	0	0	0	-0.25	-0.8	0	-0.25
Students	Other	0	0.95	0.3	0	0	0.07	0	0	0	-0.25	-0.85	0	-0.25
Workers	Other	0	0.95	0.3	0	0	0.05	0	0	0	-0.25	-0.8	0	-0.25
Elementary	School	0	0	0	0	0	0	1	0	0	0	0	0	0
High	School	0	0	0	0	0	0	0	1	0	0	0	0	0
Post Secondary	School	0	0	0	0	0	0	0	0	1	0	0	0	0
Workers (GCP/MCT)	Stop	0	0.95	0.3	0	0	0.05	0.1	0	0	-0.25	-0.8	0	-0.25
Workers (MIL)	Stop	0	0.95	0.3	0	0	0.05	0.1	0	0	0	0	0	-0.25
Students	Stop	0	0.95	0.25	0.1	0	0.03	0.05	0	0	-0.2	-0.85	0	-0.23
Workers (GCP)	Work	0.94	0.83	0.93	0.11	0	0	0	0	0	0	0	0	0

		Land Use Variable												
Person Type	Activity	EMP OFFICE	EMP RETAIL	EMP SRVC	EMP LABOR	EMP MIL	HH	EM EN ROL L	HS ENRO LL	COLL ENROL L	EMP SRVC	EMP RETAIL	EMP OFFICE	EMP SRVC
Workers (MCT)	Work	0.06	0.17	0.07	0.89	0	0	0	0	0	0	0	0	0
Workers (MIL)	Work	0	0	0	0	1	0	0	0	0	0	0	0	0

The impedance term in the destination choice model was adopted from the SANDAG model and uses the time, distance and various transformations over destination distance. The coefficients in the model were then systematically calibrated to fit trip length distribution observed from the available travel survey. The impedance related utility coefficients in the model are tabulated below:

Table 9: Impedance Related Utility Coefficients in Destination Choice

Person Type	Activity	Time	Dist	Dist^2	Dist^3	ln(Dist +1)
Worker_GCP	Work	-0.04	0.05	0	0	-0.85
Worker_GCP	Other	-0.21	0.04	0	0	-0.75
Worker_GCP	Stop	-1.4	0	0	0	0
Worker_MCT	Work	-0.04	0.05	0	0	-0.85
Worker_MCT	Other	-0.21	0.04	0	0	-0.75
Worker_MCT	Stop	-1.4	0	0	0	0
Worker_MIL	Work	-0.04	0.05	0	0	-0.85
Worker_MIL	Other	-0.21	0.04	0	0	-0.75
Worker_MIL	Stop	-1.4	0	0	0	0
Student_Elem	School	-0.22	-0.07	0	0	-0.9
Student_Elem	Other	-0.21	0.04	0	0	-0.75
Student_Elem	Stop	-1.5	-0.5	-0.03	0	-0.25

Person Type	Activity	Time	Dist	Dist^2	Dist^3	ln(Dist +1)
Student_High	School	-0.4	-0.15	0	0	0
Student_High	Other	-0.21	0.04	0	0	-0.75
Student_High	Stop	-1.5	-0.5	-0.03	0	-0.25
Student_Univ	School	-0.1	-0.05	0	0	-1.1
Student_Univ	Other	-0.21	0.04	0	0	-0.75
Student_Univ	Stop	-1.5	-0.5	-0.03	0	-0.25
NonWorker	Other	-0.21	0.04	0	0	-0.75
Senior	Other	-0.21	0.04	0	0	-0.75

Destination Choice Model Validation

The destination choice models were calibrated for the trip lengths observed in the available household travel survey. A summary of the trip length validation for the modeled primary and secondary trip purposes is given below.

Table 10: Average Trip Length Validation

	Trip Length (miles)	
Purpose	**HH Survey**	**Model**
Work	8.35	8.85
School (K8)	3.31	3.58
High School	4.26	4.47
Post-Secondary	8.61	8.93
Other/non-work	4.74	5.19
Stops on Work Tour	5.15	5.49
Stops on School Tour	4.17	4.47

Figure 11: Work/School Trip Length Validation

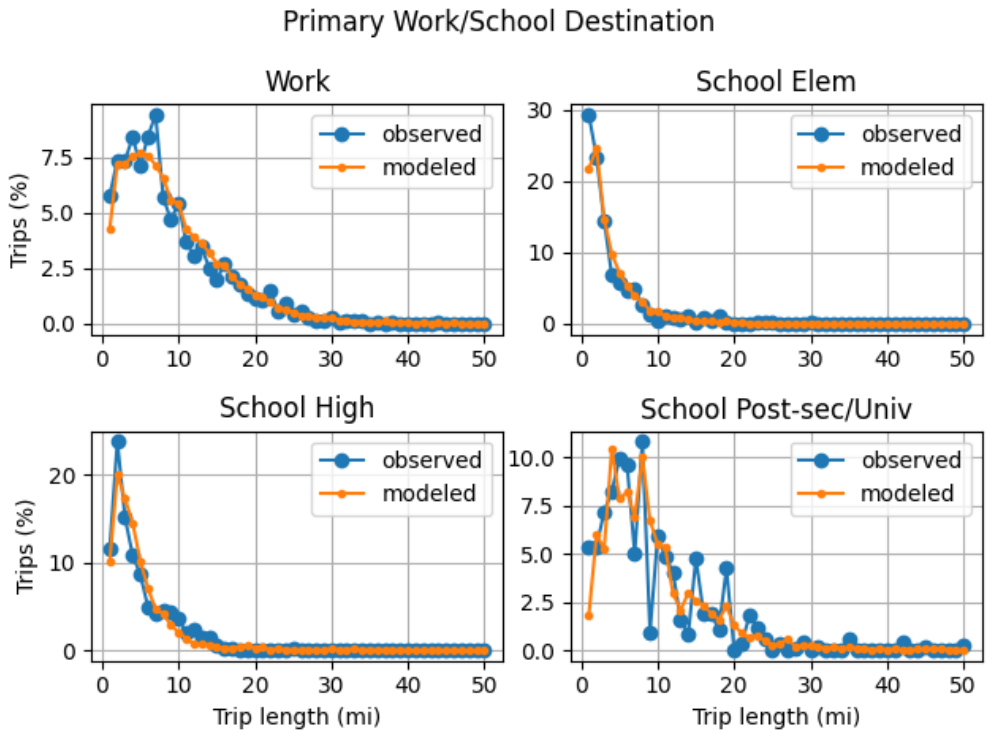
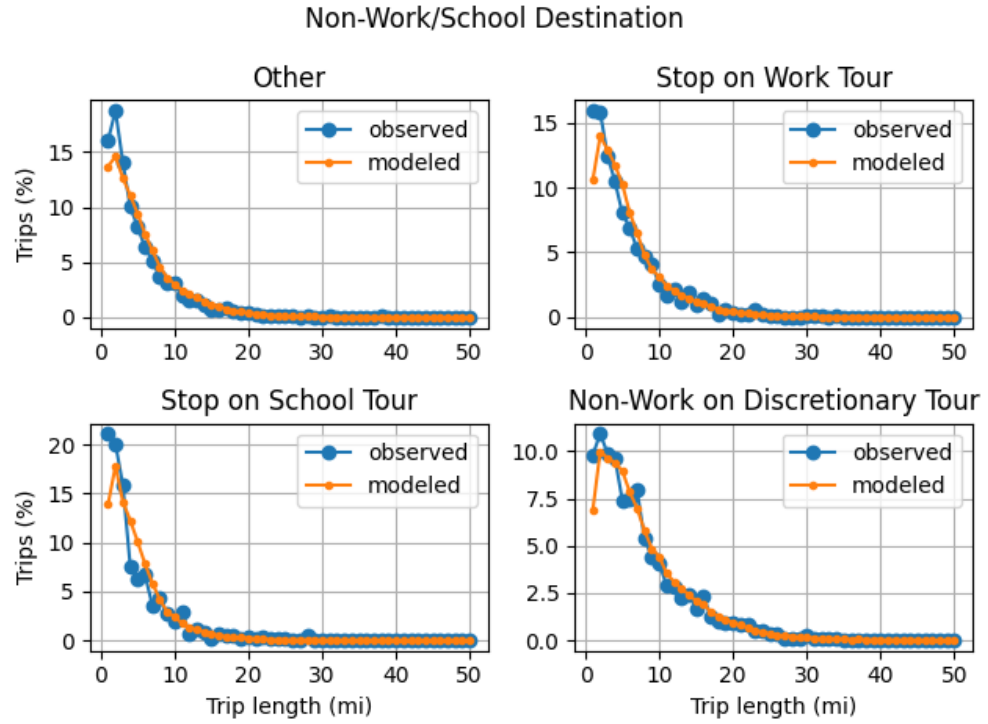


Figure 12: Discretionary and Other Trip Length Validation



Tour Based Mode Choice

Mode choice: The mode choice functional form is the commonly used logit model. Mode choice can be specified at the person type level as well as the destination activity level. In the PPACG model, it is specified at the person type and destination activity level. The freedom of choice restrictions within trip chains where a traveler may switch between travel modes from one leg of the tour to another is accounted for by defining modes as exchangeable or non-exchangeable. Thereafter, the tour-based model calculates a logit choice model. In the tour-based framework, mode choice is computed either based on primary activity when using rubber-banding or applied to each trip leg along the tour when rubber-banding is turned off. Trip chains or tours with work or school were calculated using rubber-banding and other trip chains were calculated using the sequential mode choice model. The coefficients for the mode choice model were adopted from the FHWA-TMIP[4] guidelines. The constants were then adjusted to align the mode choice results with the available travel survey data.

Six travel modes were considered in the PPACG model. The coefficients and calibrated constants for these are summarized in the tables below.

Table 11: Mode Choice Coefficients

Purpose	Time (Min)	Cost ($)
Work	-0.018	-0.184
Non-work	-0.024	-0.25

Table 12: Calibrated Alternative Specific Constants

Person Type	Purpose	Auto (sov)	Auto (hov)	Transit	Bike	Walk	SchBus
Worker_GCP	Work	0	-3.59	-4.03	-4.04	-3.03	N/A
	Other	0	-1.9	-2.93	-4.04	-2.58	N/A
Worker_MCT	Work	0	-3.59	-5.93	-4.04	-3.03	N/A
	Other	0	-1.9	-4.93	-4.04	-2.58	N/A
Worker_MIL	Work	0	-3.59	-5.93	-4.04	-3.03	N/A
	Other	0	-1.9	-4.93	-4.04	-2.58	N/A
Student_Elem	School	N/A	0	-999	-4.16	-1.76	-0.932
	Other	N/A	0	-999	-4.16	-1.76	N/A

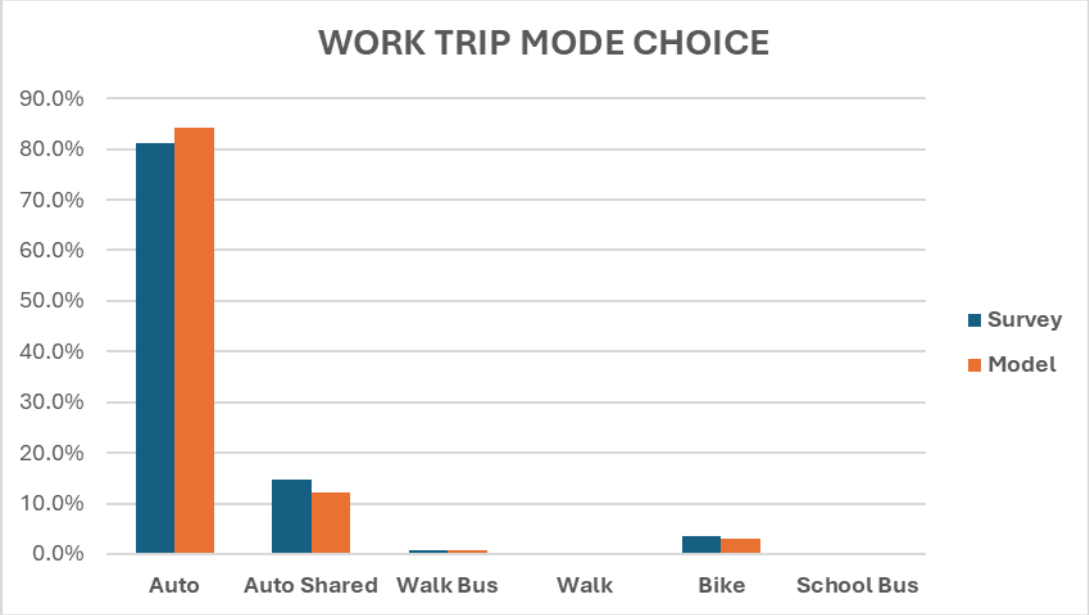
[4] https://www.fhwa.dot.gov/planning/tmip/publications/other_reports/validation_and_reasonableness_2010/fhwahep10042.pdf

Student_High	School	-0.402	0	-4.42	-3.09	-1.46	-0.622
	Other	-0.402	0	-4.42	-3.09	-1.46	-0.622
Student_Univ	School	1.67	0	-1.11	-1.72	-1.45	N/A
	Other	1.67	0	-1.11	-1.72	-1.45	N/A
Non_worker	Other	0	-1.9	-3.43	-999	-3.58	N/A
Senior	Other	0	-1.3	-3.91	-999	-2.73	N/A

Mode Choice Model Validation

The mode choice model was validated against the available expanded survey data. These summaries are presented below.

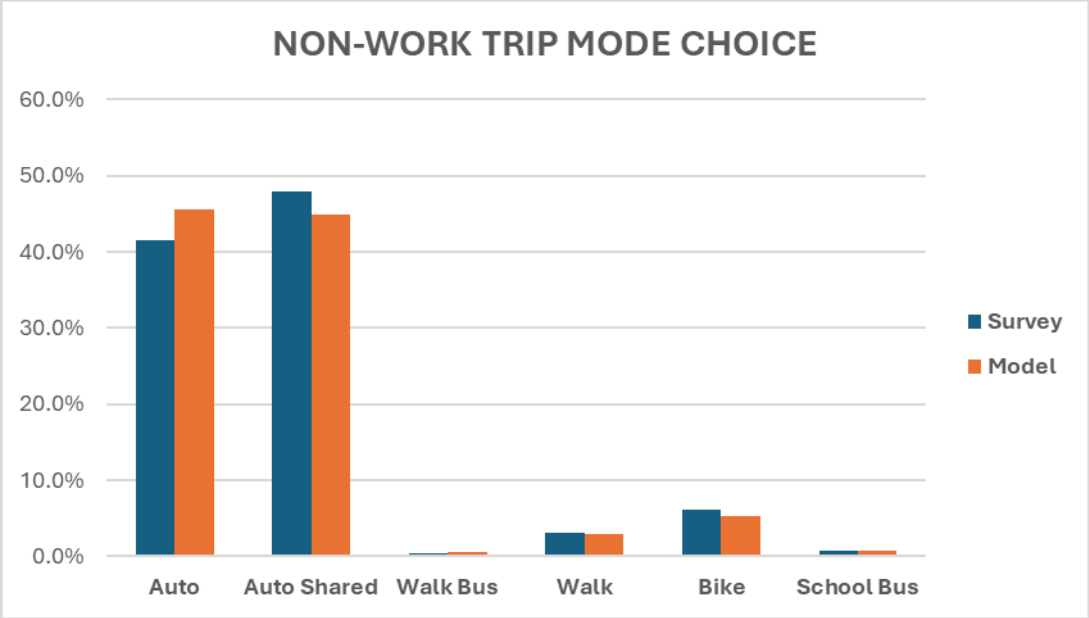
Figure 13: Work Mode Choice Validation



WORK

Observed		Estimated		Estimated Scaled		Observed %		Estimated %	
Mode	Trips	Mode	Trips	Mode	Trips	Mode	Percent	Mode	Percent
Auto	181,419	Auto	200,962	Auto	200,962	Auto	81.2%	Auto	84.2%
Auto Shared	32,606	Auto Shared	28,857	Auto Shared	28,857	Auto Shared	14.6%	Auto Shared	12.1%
Walk Bus	1,574	Walk Bus	1,499	Walk Bus	1,499	Walk Bus	0.7%	Walk Bus	0.6%
Walk	140	Walk	217	Walk	217	Walk	0.1%	Walk	0.1%
Bike	7,684	Bike	7,213	Bike	7,213	Bike	3.4%	Bike	3.0%
School Bus	-	School Bus	-	School Bus	-	School Bus	0.0%	School Bus	0.0%
Total	223,424	Total	238,748	Total	238,748	Total	100%	Total	100%

Figure 14: Non-work Mode Choice Validation



NON WORK

Observed		Estimated		Estimated Scaled		Observed %		Estimated %	
Mode	Trips	Mode	Trips	Mode	Trips	Mode	Percent	Mode	Percent
Auto	786,045	Auto	1,128,195	Auto	1,128,195	Auto	41.5%	Auto	45.6%
Auto Shared	908,111	Auto Shared	1,109,467	Auto Shared	1,109,467	Auto Shared	47.9%	Auto Shared	44.9%
Walk Bus	9,121	Walk Bus	12,699	Walk Bus	12,699	Walk Bus	0.5%	Walk Bus	0.5%
Walk	59,630	Walk	73,503	Walk	73,503	Walk	3.1%	Walk	3.0%
Bike	115,794	Bike	131,939	Bike	131,939	Bike	6.1%	Bike	5.3%
School Bus	15,377	School Bus	16,677	School Bus	16,677	School Bus	0.8%	School Bus	0.7%
Total	1,894,078	Total	2,472,480	Total	2,472,480	Total	100%	Total	100%

3.3 Time of Day Calculation

Time of day calculation: The time-of-day distribution of trips in the aggregate tour-based structure is based on direct application of empirical departure time profiles of each activity pair by person type. These departure time profiles were extracted from the existing travel survey. Since the travel survey was from 2010, it did not account for the post-covid changes seen in the time-of-day distribution of travel. An updated travel survey or other alternative information would allow a more accurate modeling of time-of-day travel patterns. A more detailed discussion around this issue presented in the later section on simulation-based dynamic assignment (SBA).

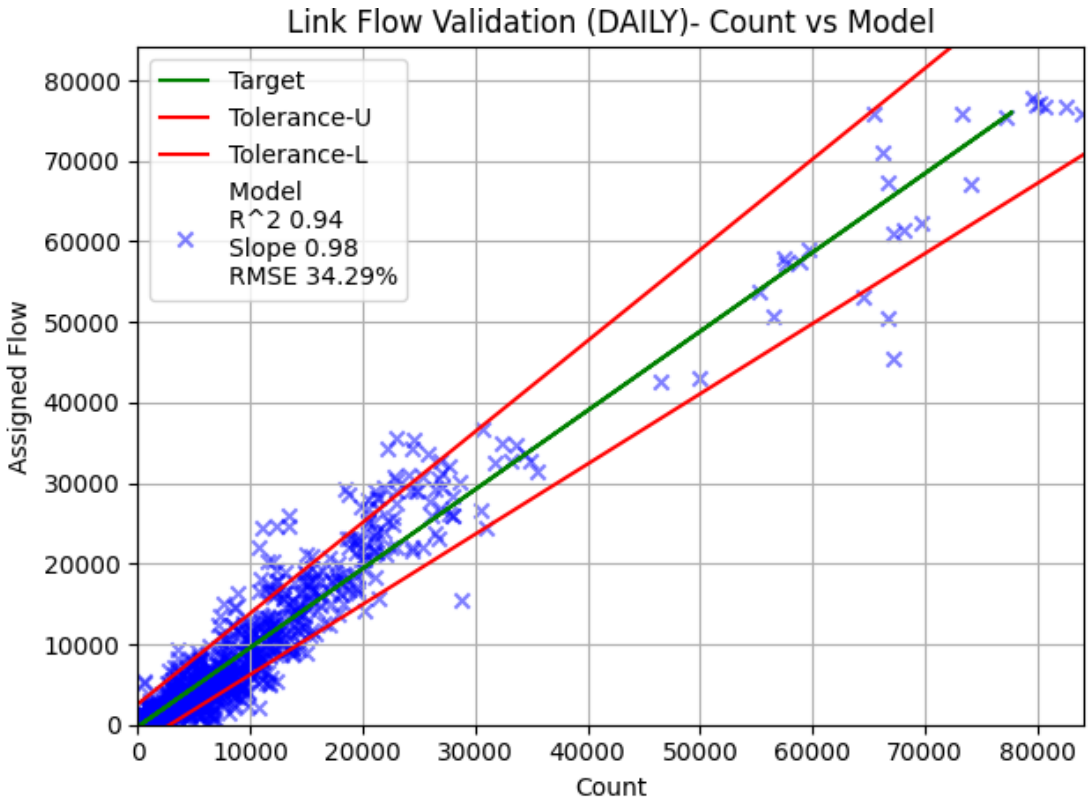
3.4 Network Assignment

Network assignment: Only motorized modes are assigned to obtained network flows in the PPACG model. Traffic assignment is performed for five macro time periods: Early, AM, MD, PM and Evening. Network flows from each of the time periods are aggregated into daily traffic flows. Headway based assignment is used for transit assignment. Demand is calculated at the same resolution as the traffic

assignment and assigned at once with AM, PM periods using an average peak headway and the Early, MD and Evening periods using an average off-peak headway.

Traffic Assignment Validation

The traffic assignment was validated using the AADT model flows and average traffic counts available. An RMSE of 35%, R^2 of 0.94 and slope of 0.98 was achieved for the overall network. The statistics for each major link classification are presented in the table below.



FACTYPE	FACNAME	NUMOBS	SLOPE	%RMSE
1	Interstates	32	0.939	8.10%
2	Expressway	49	1.016	14.80%
3	Principal Arterials	375	1.24	23.80%
4	Minor Arterials	285	0.815	37.10%
5	Collector	312	0.772	59.90%
6	Residential	0	0	N/A
7	Ramp	93	1.007	28.30%

Transit Assignment Validation

The transit assignment was validated against overall line boardings. The mode choice coefficients were adjusted to produce overall line boardings that reflected the overall observed line boardings. The transit system has seen a steady decline in ridership from 2019 to 2021. As a result, an average of total line boardings over this period was used to validate the transit line boardings produced by the model. The transit route choice was not specifically calibrated due to the overall sparsity of ridership and relatively older travel survey. The boardings by route are summarized in the table below.

ROUTE_ID	ROUTE_CODE	ROUTE_NAME	MODEL_BOARDINGS	OBS_BOARDINGS
1	MMT_3416	Hillside - Hancock Plaza	555	564
10	MMT_3417	Hwy 115 - PPSC	218	425
11	MMT_3418	World Arena - PPSC	459	670
12	MMT_3419	Palmer Park Blvd	139	73
14	MMT_3420	Chestnut St - G.O.G. Rd	99	179
15	MMT_3421	FOUNTAIN BLVD -E CHEYENNE MTN BLVD	44	52
16	MMT_3422	Brookside - Uintah Gardens	112	85
17	MMT_3423	19TH STREET/FILLMORE	79	68
18	MMT_3424	Union Blvd	105	20
19	MMT_3425	WEBER - EAGLE ROCK	131	263
2	MMT_3426	CENTENNIAL BLVD - G.O.G. Rd	76	119
22	MMT_3427	SOUTHBOROUGH VIA MURRAY BLVD	322	218
23	MMT_3428	Barnes Rd. - Tutt Blvd	421	258
25	MMT_3430	N. ACADEMY BLVD - VOYAGER	1,556	802
27	MMT_3431	S. ACADEMY BLVD - PPSC	477	458
3	MMT_3432	COLORADO AVE - MANITOU	341	534
32	MMT_3433	SECURITY/WIDEFIELD	189	88
33	MMT_3434	INCLINE/COG SHUTTLE	32	400
34	MMT_3435	GOG/AUSTIN BLUFFS PKWY	158	123
35	MMT_3436	LAS VEGAS ST/ PPSC	28	47
38	MMT_3439	UNION/ CHILDRENS HOSPITAL	64	7
39	MMT_3440	CORPORATE DR - VOYAGER PKWY	123	54
4	MMT_3441	S. 8th STREET - BROADMOOR	155	202

ROUTE_ID	ROUTE_CODE	ROUTE_NAME	MODEL_BOARDINGS	OBS_BOARDINGS
40	MMT_3442	VOYAGER - RAMPART PPSC	51	32
5	MMT_3443	Boulder - Citadel	744	923
6	MMT_3444	FILLMORE - Citadel	137	131
7	MMT_3445	Pikes Peak Ave. - Citadel	235	355
8	MMT_3446	Cache La Poudre - Citadel	32	67
9	MMT_3447	NEVADA - UCCS	237	344
ZEB	MMT_3448	ZEB Downtown Shuttle	438	65
TOTAL			**7,757**	**7,626**

3.5 Simulation Based Dynamic Traffic Assignment (SBA)

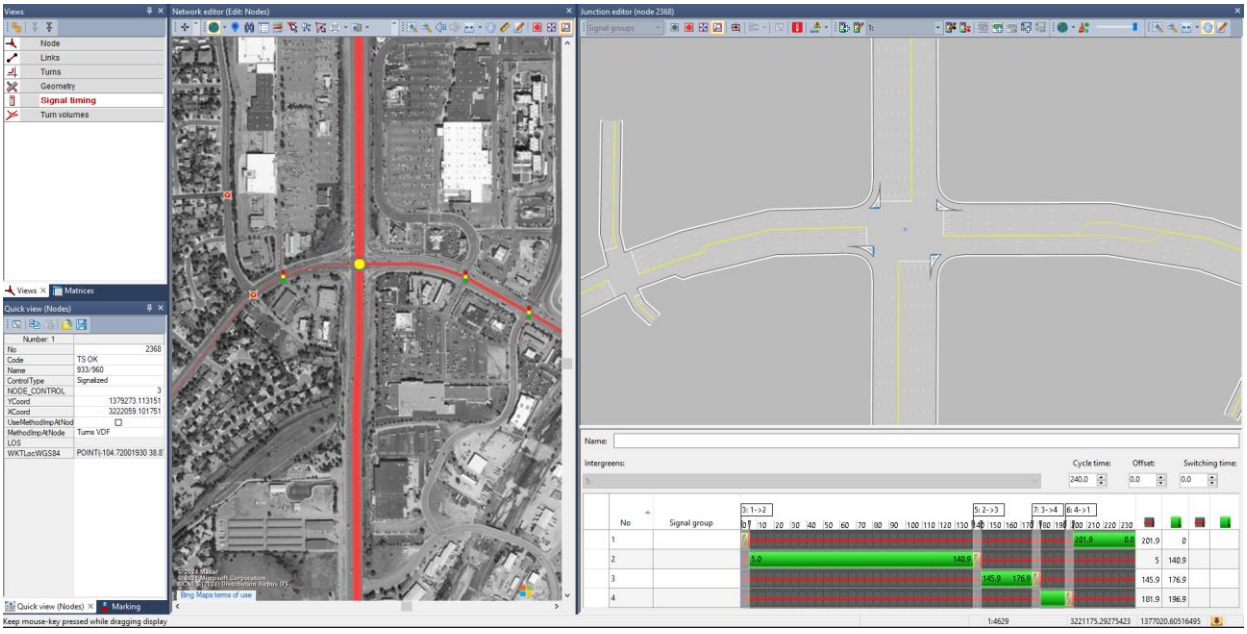
One of the key uses of the PPACG model is evaluation of air quality conformity and GHG analysis. While the actual GHG analysis is performed using US EPA's MOVES software, the link speed and volume inputs required in the analysis are generated using the PPACG model. The link speed and volume inputs are required at hourly intervals. As a result, simulation based dynamic traffic assignment (SBA) integrated into Visum was used as a post-process to obtain network link speeds at hourly intervals with relevant accounting of intersection level delays. SBA involves two components. Network preparation and hourly demand generation. These two items are discussed next.

Network Preparation for SBA

The Visum modeling platform used to implement the PPACG model natively stores multi-resolution network data. Here, the detailed lane geometry and intersection control (signal timings) can be specified in addition to the typical link-node data used in static traffic assignments. The appropriate level of network detail is used or ignored based on the type of traffic assignment selected by the user. The multi-resolution network storage concept is illustrated in the figure below.

The entire PPACG model network was carefully reviewed for the correct number of roadway lanes, posted speeds and intersection control type. Aerial imagery was used to code detailed intersection geometry with appropriate turn bays and lane grouping at all intersections in the model network. The network base year for the model is 2020. There are ~1500 controlled intersections in the model network. Out of these, ~700 intersections are signalized. Signal phasing plans for all these intersections were developed based on the lane grouping at approach legs. The green time and splits were calculated based on turn flows obtained from the static traffic assignment. Coding signal timings in this manner allows an overall consistent delay representation in the network. It also allows the methodology to be extended to all forecast networks.

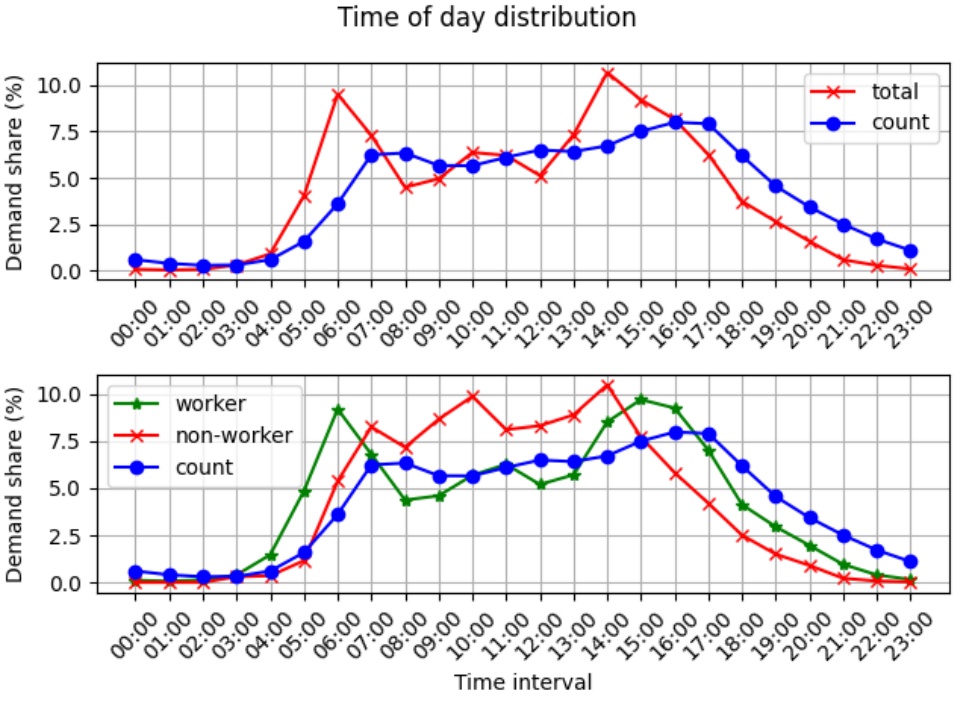
Figure 15: Integrated Multi-resolution Network Representation in Visum



Demand Preparation for SBA

The tour-based model allows flexibility in specifying outputs for any time of day. Ordinarily, the hourly demand for the SBA would be derived by specifying an hourly demand output setting in the tour-based model calculation setup.

Figure 16: Pre-COVID19 Demand Profile vs Post-COVID19 Count Profile



However, the changes in time use patterns seen after COVID19 and time of day factors derived from relatively older travel survey data (2010) made the direct use of time-of-day factors applied to activity pairs unviable. This was clearly seen by plotting the 24-hour demand profiles from the travel survey against the more updated 24-hour count data. The post-COVID19 time-of-day count profiles exhibit a much greater spreading of the traffic flows as opposed to the shaper AM and PM peak flows exhibited by the demand profiles extracted from the pre-COVID19 2010 travel survey. This change in travel pattern presented a major challenge in the development of 24-hour demand profiles and model calibration in general. Since count data was the most updated source of time-of-day distribution of traffic patterns, dynamic matrix estimation was used to re-profile the demand calculated for macro time periods (EA, AM, MD, EV) into hourly trip tables for use in SBA. The link flow validation for hourly flows is tabulated and plotted below. The early morning and late evening time periods have a greater %RMSE due to the overall lower volumes but are within the NCHRP allowable tolerance for hourly flows.

Table 13: SBA Hourly Link Flow Validation

Time Interval	R2	Slope	%RMSE
00:00	0.93	0.86	63.64%
01:00	0.89	0.85	75.01%
02:00	0.87	0.82	74.52%
03:00	0.8	0.82	81.80%
04:00	0.66	0.59	99.22%
05:00	0.76	0.78	72.51%
06:00	0.89	0.91	42.61%
07:00	0.93	0.98	32.52%
08:00	0.95	0.98	31.37%
09:00	0.96	0.98	30.18%
10:00	0.96	0.99	28.19%
11:00	0.96	1.01	28.21%
12:00	0.96	1.01	28.15%
13:00	0.96	1.01	27.65%
14:00	0.96	1.01	27.75%
15:00	0.95	1.02	29.80%
16:00	0.95	1.02	29.45%
17:00	0.95	1.01	29.61%
18:00	0.95	0.99	32.55%
19:00	0.94	0.98	42.88%
20:00	0.93	0.99	47.45%
21:00	0.94	0.96	47.56%
22:00	0.94	0.93	51.48%
23:00	0.93	0.90	58.48%
DAILY	**0.96**	**1.00**	**27.78%**

Figure 17: AM Period Hourly Link Flow Validation

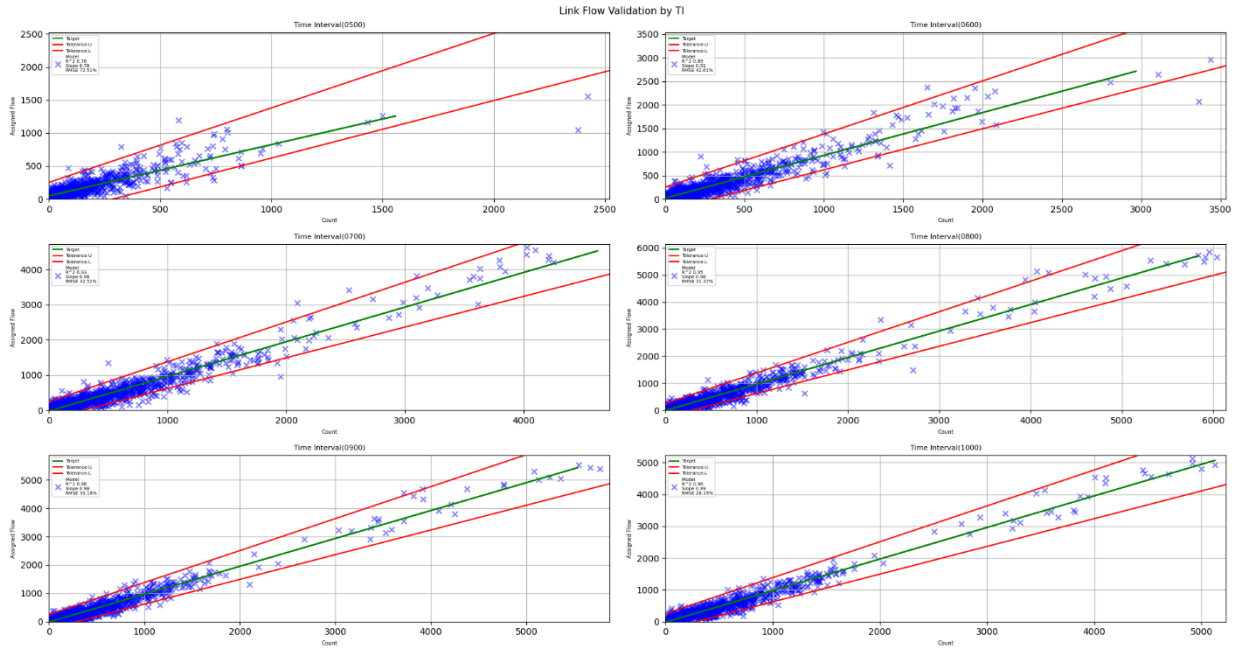


Figure 18: PM Period Link Flow Validation

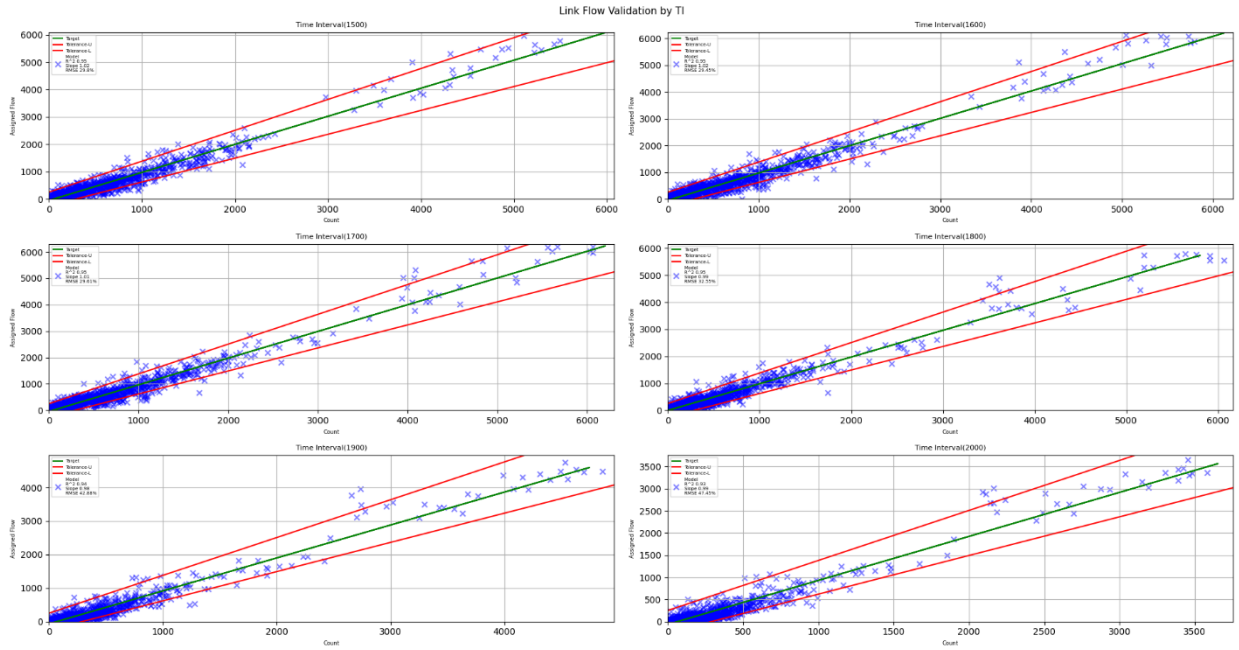
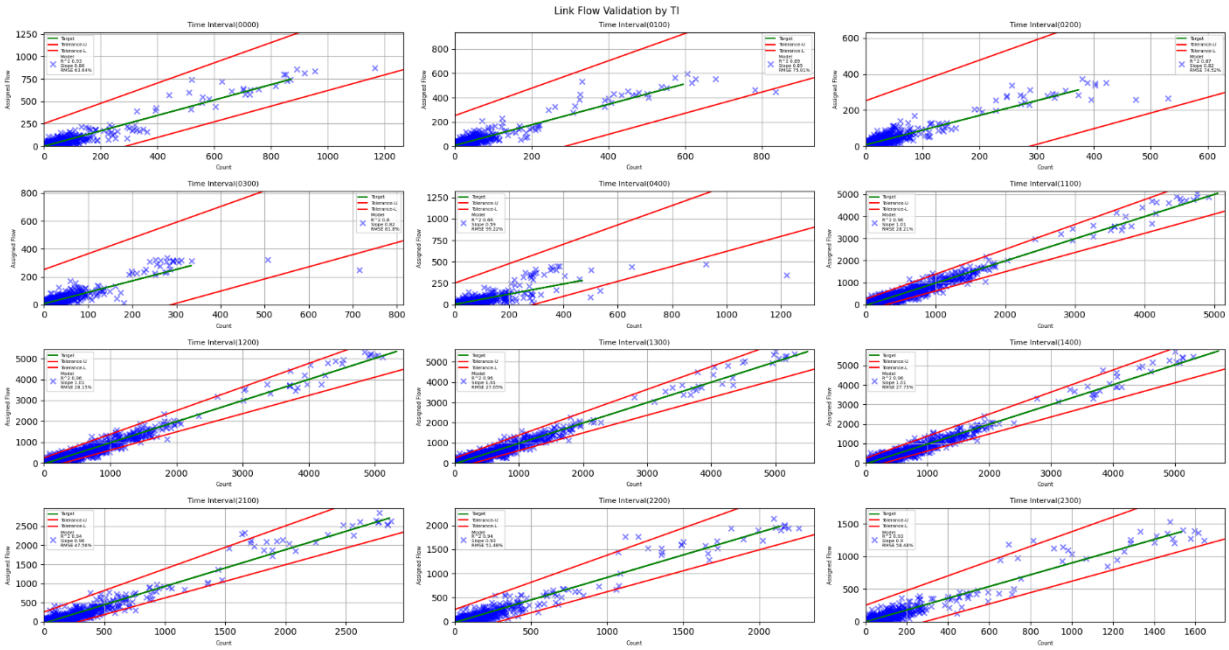


Figure 19: OP Link Flow Validation

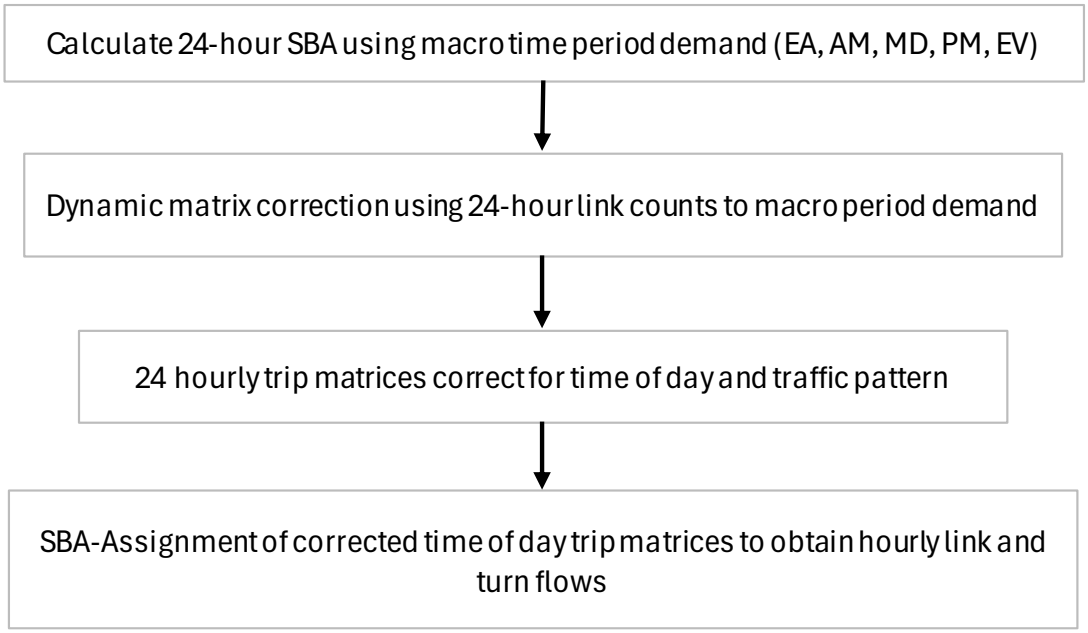


The dynamic matrix estimation method implemented in Visum is based on a least squares minimization formulation. Here, the sum of squared error between network counts and network flows arising from traffic assignment is minimized using a gradient method.

Conceptually, the dynamic matrix estimation method is like the static variant but adds a time dimension to the problem formulation. In the dynamic variant, the rows of the flow matrix no longer correspond to the count locations, but to the cross product of count locations and analysis time intervals; the columns of the flow matrix no longer correspond to the quantity of the OD pairs, but to the entire demand time series. An entry in the flow matrix corresponds to the proportion of the demand of an OD pair during a demand time interval that passes a count location during an analysis time interval.

Since the original seed trip matrices and total number of trips are used in the overall solution formulation, the method also minimizes the distortion of the original matrix structure and preserves the number of trips in the seed matrices. This property also allows the use of adjusted base year hourly trip matrices to generate hourly link flows when assigned using SBA and as a reasonable basis for generating hourly trip matrices for the forecast years. As noted earlier, re-calibration of the tour-based model based on more steady traffic patterns and an updated travel survey would eliminate the necessity of using the dynamic matrix estimation post-process to obtain hourly trip matrices aligned with the observed time of day traffic patterns.

Figure 20: Steps to Obtain Hourly Link Flows - Base Condition



The methodology used in developing hourly trip assignment matrices for the forecast conditions is illustrated in the flowchart below.

4. Remarks

One of the challenges in the model calibration process was that the available travel survey was from 2010, and the latest data used in the model validation was over multiple years starting 2019 and ending 2022 with the COVID19 pandemic and its effects occurring during this period. As a general strategy, the model was thus not overfit to observations. It would be of benefit to take up a more thorough calibration and validation exercise when new travel survey data with a more stable set of observations from new travel trends is available.

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MEMORANDUM

TO: Ms. Marissa Gaughan, CDOT Multimodal Planning Branch Manager

FROM: Dale Tischmak and Jake Fritz

DATE: January 21, 2022

SUBJECT: DRAFT MOVES3 Greenhouse Gas Modeling Methodology (117429-32)

Introduction

This document summarizes the methodology used to calculate greenhouse gas (GHG) emissions for the CDOT Statewide Travel Demand Model (TDM). Previous GHG modeling to support CDOT was conducted by APCD. This methodology replicates APCD's modeling process as best as possible.

For more information about GHG modeling using MOVES, see the *Using MOVES for Estimating State and Local Inventories of On-road Greenhouse Gas Emissions and Energy Consumption* guidance document linked to in the references (i.e., EPA 2016).

The process begins with generating emission rates using the EPA's Motor Vehicle Emission Simulator version 3.0.1 (MOVES3). The emission rates are multiplied by the vehicle miles traveled from the TDM. The result is an emissions inventory. A series of data engineering steps are required to prepare the rates and VMT into desirable and compatible formats.

MOVES3 Run Specifications

The run specification (RunSpec) parameters outlined below were used to calculate GHG emission rates with MOVES. They are consistent with APCD's process to calculate GHG emissions.

The four modeled years 2025, 2030, 2040, and 2050 used the same run specifications except for where specified (e.g., the year being modeled). Each of the four modeled years has six related run specifications to separate the emission rates by vehicle type, as described in the On-road Vehicles section.

Scale

The "Scale" parameters define the model type (on-road or non-road), domain/scale, and calculation type.

Model Type

On-road was the model type selected. This estimates emissions from motorcycles, cars, buses, and trucks that operate on roads.

Non-road/off-network emissions were not included. These emissions are from equipment used in applications such as recreation, construction, lawn and garden, agriculture, mining, etc. and are outside of the scope of this analysis.

Domain/Scale

MOVES allows users to analyze mobile emissions at various scales: National, County, and Project. While the County scale is necessary to meet statutory and regulatory requirements for SIPs and transportation conformity, either the County or National scale can be used for GHG inventories. EPA recommends using the

County scale for GHG analysis. The County scale allows the user to enter county-specific data through the County Data Manager. Providing local data significantly improves the precision of the modeling results (EPA 2016).

The County scale was used.

Calculation Type

MOVES has two calculation types - Inventory (total emissions in units of mass) or Emissions Rates (emissions per unit of distance for running emissions or per vehicle for starts and hotelling emissions) in a look-up table format must be post-processed to produce an inventory. Either may be used to develop emissions estimates for GHGs (EPA 2016).

The Emission Rates calculation type was used.

Time Span

The "Time Span" parameters define the years, months, days, and hours that emissions are calculated.

When Emission Rates is chosen, users may choose to approach the selection of options in the Time Spans Panel differently than when running MOVES in Inventory mode. For example, when modeling running emission rates, instead of entering a diurnal temperature profile for 24 hours, users can enter a range of 24 temperatures in increments that represent the temperatures over a period of time. By selecting more than one month and using a different set of incremental temperatures for each month, users could create a table of running emission rates by all the possible temperatures over an entire season or year (EPA 2016).

When using Emission Rates instead of Inventory, the time aggregation level is automatically set to Hour and no other selections are available. Pre-aggregating time does not make sense when using Emission Rates and would produce emission rates that are not meaningful (EPA 2016). However, the year, month, and day must still be specified and will affect the emission rates calculated.

The time span parameters specified below were also used because the TDM outputs represent an annual average weekday.

Years

The County scale in MOVES allows only a single calendar year in a RunSpec. Users who want to model multiple calendar years using the County scale will need to create multiple RunSpecs, with local data specific to each calendar year, and run MOVES multiple times (EPA 2016).

The years used were 2025, 2030, 2040, and 2050. Emission rates for each of these years were calculated separately. This accounts for information such as a changing age distribution of vehicles and their corresponding fuel efficiency.

Months

MOVES allows users to calculate emissions for any or all months of the year. If the user has selected the Emission Rates option, the Month can be used to input groups of temperatures as a shortcut for generating rate tables for use in creating inventories for large geographic areas (EPA 2016).

The months used were January and July to match the process described by APCD. These represent winter and summer months and generally the extremes in annual weather conditions. This accounts for changes in fuel efficiency between warm and cold temperatures throughout the year. The arithmetic averages of emission rates from January and July were used for the final emissions inventory.

Days

Weekdays and weekend days can be modeled separately in MOVES. MOVES provides the option of supplying different speed and VMT information for weekdays and weekend days to allow the calculation of separate emissions estimates by type of day (EPA 2016).

The days used were weekdays to match the TDM output data. These represented the emission rates for an average weekday. The results were escalated later to approximate a full year.

Hours

The hours used were all 24 hours of the day (i.e., clock hours of 1 AM, 2 AM, 3 AM, etc.). These represent the emission rates for individual hours of a day. This accounts for changes in fuel efficiency between warm and cold temperatures throughout the day.

Geographic Bounds

The "Geographic Bounds" parameter defines the county(s) used. For a county-scale run, only one county can be selected per RunSpec. The county used was Adams County, Colorado. The county defines input parameters such as the meteorology data used to estimate emission rates.

On-road Vehicles

MOVES describes vehicles by a combination of vehicle characteristics (e.g., passenger car, passenger truck, light commercial truck, etc.) and the fuel that the vehicle is capable of using (gasoline, diesel, etc.). The [Panel] is used to specify the vehicle types included in the MOVES run (EPA 2016).

The "On-road Vehicles" parameter defines the source types (i.e., vehicle types) and their fuels (gasoline, diesel, electricity, etc.). All combinations of vehicle types and fuels available in MOVES3 were used to calculate the emission rates. APCD's process, which was being followed, assigns TDM mileage based on a modified HPMS category. To calculate aggregate emission rates for each HPMS category (i.e., merging all of the relevant source types and fuel types), each of the six HPMS categories used a separate RunSpec. It is important to note that APCD's modified HPMS category does not match the MOVES HPMS types for source types 21, 31, and 32. When this methodology document refers to HPMS categories, it is generally referring to APCD's HPMS categories. The figure below illustrates the HPMS categories.

	A	B	C	D	E
1	sourceTyp	sourceTypeName	HPMSVtypeID	HPMSVtypeName	**HPMS from APCD**
2	11	Motorcycle	10	Motorcycles	**10**
3	21	Passenger Car	25	Light Duty Vehicles	**20**
4	31	Passenger Truck	25	Light Duty Vehicles	**30**
5	32	Light Commercial Truck	25	Light Duty Vehicles	**30**
6	41	Other Buses	40	Buses	**40**
7	42	Transit Bus	40	Buses	**40**
8	43	School Bus	40	Buses	**40**
9	51	Refuse Truck	50	Single Unit Trucks	**50**
10	52	Single Unit Short-haul Truck	50	Single Unit Trucks	**50**
11	53	Single Unit Long-haul Truck	50	Single Unit Trucks	**50**
12	54	Motor Home	50	Single Unit Trucks	**50**
13	61	Combination Short-haul Truck	60	Combination Trucks	**60**
14	62	Combination Long-haul Truck	60	Combination Trucks	**60**

Road Type

The Road Type Panel is used to define the types of roads that are included in the run. MOVES defines five different road types as shown in Table 3-1. Generally, all road types should be selected including Off-Network. Selection of road types in the Road Type Panel determines the road types that will be included in the MOVES run results (EPA 2016).

Table 3-1: MOVES Road Types

Roadtypeid	Road type	Description
1	Off-Network	Locations where the predominant activity is vehicle starts, parking and idling (parking lots, truck stops, rest areas, freight or bus terminals)
2	Rural Restricted Access	Rural highways that can be accessed only by an on-ramp
3	Rural Unrestricted Access	All other rural roads (arterials, connectors, and local streets)
4	Urban Restricted Access	Urban highways that can be accessed only by an on-ramp
5	Urban Unrestricted Access	All other urban roads (arterials, connectors, and local streets)

All road types available in MOVES3 were used.

Pollutants and Processes

The Pollutants and Processes Panel allows users to select from various pollutants, types of energy consumption, and associated processes of interest. In MOVES, a pollutant refers to particular types of pollutants or precursors of a pollutant but also includes energy consumption choices. Processes refer to the mechanism by which emissions are released, such as running exhaust or start exhaust. Users should select all relevant processes associated with a particular pollutant to account for all emissions of that pollutant. Generally, for this project, that includes running emissions.

The CO2 Equivalent pollutant is the sum of the global warming potential of other greenhouse gases expressed as a unit of CO2 (EPA 2016) and CO2 Equivalents (CO2e) is the pollutant of interest for these GHG calculations. MOVES requires several other prerequisite pollutants for CO2e; however, only the emission rates for CO2e were needed for this project.

General Output

The "General Output" parameters define the output database, units, and activity.

Output Database

Results from the six related HPMS RunSpecs for a single emissions year can be stored in a single output database for convenience. The RunSpecs must have the same units and aggregation (EPA 2016). A different output database is needed for each year of emission rate calculations. A consistent and informative naming convention for all output databases is very valuable.

One output database was used for each year modeled (i.e., 2025, 2030, 2040, and 2050). Each output database contained results for six RunSpecs, where each RunSpec represented a different APCD HPMS type. The naming convention FHU used was as follows:

[firm]_[pollutant]_[year][region]_[description]_[database type]

[firm] = The company or agency performing the analysis.

[pollutant] = The pollutant(s) of interest.

[year] = The year that emission rates were generated for.

[region] = The geographic area that emission rates were generated for.

[description] = An abbreviated description of relevant notes for the RunSpec.

[database type] = Whether the database was an input or output database.

For example, the database "fhu_ghg_2025sw_wev_in" represented an input database for greenhouse gases, the year 2025, the Statewide Transportation Plan, with electric vehicles, and was performed by FHU.

Units

Users are free to choose any of the mass unit selection options but should generally choose a unit whose magnitude is appropriate for the parameters of the RunSpec (EPA 2016).

The units used for models were grams for mass, joules for energy, and miles for distance.

Activity

MOVES allows the user to select multiple activity output options (e.g., distance traveled, population, etc.). For Emission Rate calculations, distance and population are reported automatically, but the values in the output are intermediate steps in the rate calculation and do not represent the true activity (EPA 2016).

When calculating emission rates (as opposed to emission inventories), MOVES selects the activities hoteling hours, population, and starts without the option of changing them.

Output Emissions Detail

This panel allows the user to select the amount of detail provided in the output database. Certain selections on this panel are made by the MOVES software and cannot be changed, based on selections made on earlier panels. The more boxes checked on this panel, the more detail and segregation provided in the MOVES output database. More detail generally is not helpful for this process so no optional selections should be checked on this panel. For example, if Source Use Type were selected on this panel, emission rates for each of the MOVES vehicle Source Use Type categories would be reported in the output database, which would defeat the purpose of performing MOVES calculations based on consolidated HPMS category.

No optional aggregation selections were made on this panel. Source type detail was captured via the six HPMS RunSpecs for each year modeled, as described in the On-road Vehicles section. Since multiple source types were used for HPMS 30, 40, 50, and 60, emission rates were aggregated for into HPMS categories. That is, emission rates for MOVES source types 31 and 32 were aggregated into the HPMS 30 RunSpec, etc.

Input Database/County Data Manager

After completing the RunSpec, the next step is to supply MOVES with data to create an input database that is the basis for the emission rate calculations. When using the County scale, the County Data Manager (CDM) is used to create an input database and populate it with local data. Modelers can either rely on MOVES default information or local data that the user inputs, as is appropriate for the goals of the MOVES modeling. The data contained in the MOVES default database are typically not the most current or best available for any specific county. Therefore, with the exception of fuels, EPA recommends using local data for MOVES for GHG analyses when available to improve the accuracy of GHG emissions estimates. However, the MOVES default data (county level) may be the only or best source of that data readily available. Also consider that data consistency may be more important than data perfection for some GHG analyses. At a minimum, EPA strongly

encourages the use of local VMT and vehicle population data. EPA believes these inputs have the greatest impact on the quality of results. However, if local data are not available, MOVES default data may be useful for some inputs without affecting the quality of the results (EPA 2016).

In Emissions Rates mode, a full gamut of input data must be provided, described below, for MOVES to run. Some of these inputs actually do not affect the ultimate emission rates (they would affect inventory mode output) but reasonable inputs in the CDM should be used for general data integrity. As a general rule, users should input accurate activity for the scenario being modeled regardless of whether MOVES is being used in Inventory or Emissions Rates mode (EPA 2016).

The "Create Input Database" parameters define the region-specific inputs such as distributions of road types, vehicle age distributions, and meteorology data. The parameters specified in RunSpecs pre-populate the input database with default data for some of the parameters. However, region-specific data should be used when available and not all parameters have default data.

One comprehensive input database was created for each year modeled. Each of the six HPMS RunSpecs for that year used that single input database and were saved to a single output database. The input data were entered with the MOVES County Data Manager window, as specified below.

Age Distribution

A typical vehicle fleet includes a mix of vehicles of different ages, referred to as Age Distribution in MOVES. MOVES covers a 31 year range of vehicle ages, with vehicles 30 years and older grouped together. MOVES allows the user to specify the fraction of vehicles in each of 30 vehicle ages for each of the 13 source types in the model. For estimating on-road GHG emissions, EPA recommends and encourages states to develop age distributions that are applicable to the area being analyzed (EPA 2016).

APCD has developed a vehicle age distribution, and it was used for each year modeled.

Average Speed Distribution

This input is more important for Inventory than Emission Rates. Vehicle power, speed, and acceleration have a significant effect on vehicle emissions, including GHG emissions. MOVES models those emission effects by assigning activity to specific drive cycles. The Average Speed Distribution Importer in MOVES calls for a speed distribution in VHT in 16 speed bins, by each road type, source type, and hour of the day included in the analysis. EPA urges users to develop the most detailed local speed information that is reasonable to obtain. However, EPA acknowledges that average speed distribution information may not be available at the level of detail that MOVES needs (EPA 2016).

The Emission Rates option in MOVES will produce a table of emission rates by road type for each speed bin. Total running emissions are then quantified outside of MOVES by multiplying the emission rates by the VMT for each source type in each vehicle speed category. Users should supply an appropriate speed distribution to produce the necessary emission rates (EPA 2016).

APCD uses MOVES default data for all years in emission rate mode for their GHG models. This was used for each year modeled. Since emission rates were calculated (as opposed to emission inventories), the average speed distribution used in MOVES will not change the emission rates calculated. The speeds are accounted for in the TDM data.

Fuel

Entering this input data into MOVES involves four tables – called FuelFormulation, FuelSupply, FuelUsageFraction, and AVFT (alternative vehicle fuels and technology) – that interact to define the fuels used in the area being modeled.

- The FuelSupply Table identifies the fuel formulations used in a region (the regionCounty Table defines which specific counties are included in these regions) and each formulation's respective market share;
- The FuelFormulation Table defines the properties (such as RVP, sulfur level, ethanol volume, etc.) of each fuel;
- The FuelUsageFraction Table defines the frequency at which E-85 capable (flex fuel) vehicles use E-85 vs. conventional gasoline; and
- The AVFT Table is used to specify the fraction (other than the default included in the sampleVehiclePopulation Table) of fuel types capable of being used (such as flex fuel vehicles) by model year and source type.

In general, users should review/use the default fuel formulation and fuel supply data provided in MOVES, with important exceptions noted below. EPA strongly recommends using the default fuel properties for a region unless a full local fuel property study exists.

The GHG effects of changes in the fuel mix used by vehicles can be modeled in MOVES. AVFT can be used to change the fraction of future vehicles using gasoline, diesel, CNG and electricity. These changes will be reflected in MOVES GHG emission rates.

The FuelUsageFraction Table allows the user to change the frequency at which E-85 capable vehicles use E-85 fuel vs. conventional fuel, when appropriate. MOVES contains default estimates of E-85 fuel usage for each county in the U.S. In most cases, users should rely on the default information.

The AVFT Table allows users to modify the fraction of vehicles using different fuels and technologies in each model year. In other words, the Fuel Tab allows users to define the split between diesel, gasoline, ethanol, CNG, and electricity, for each vehicle type and model year. For transit buses, the default table assumes that gasoline, diesel, and CNG buses are present in the fleet for most model years. If the user has information about the fuel used by the transit bus fleet in the county modeled, the user should be sure it is reflected in the AVFT Table (EPA 2016). ***NOTE: This tab can be critically important in CDOT's GHG calculations. This is where electric vehicle percentages, etc. are defined. This tab may vary among CDOT's scenarios and should not be overlooked.***

APCD uses MOVES default data for fuel supply, fuel formulation, and fuel usage fraction for all years in their GHG models. For AVFT, APCD uses custom inputs that includes electric vehicles for all years. These were used for each year modeled.

Meteorology

Ambient temperature and relative humidity data are important inputs for estimating on-road GHG emissions with MOVES. Ambient temperature and relative humidity are important for estimating GHG emissions from motor vehicles as these affect air conditioner use. MOVES requires a temperature (in degrees Fahrenheit) and relative humidity (in terms of a percentage, on a scale from 0 to 100) for each hour selected in the RunSpec. EPA recommends that users input the average daily temperature profile for each month if they are modeling all 12 months. Temperature assumptions used for estimating on-road GHG emissions should be based on the latest available information. The MOVES database includes default monthly temperature and humidity data for every county in the country. These default data are based on average monthly temperatures for each county from the National Climatic Data Center for the period from 2001 to 2011. These national defaults can be used for a GHG inventory, or more recent data can be used (EPA 2016).

If the Emission Rate calculation type is chosen in the RunSpec, users can enter a different temperature and humidity for each hour of the day to create an emission rate table that varies by temperature for running emissions processes. Emission rates for all running processes that vary by temperature can be post-processed outside of MOVES to calculate emissions for any mix of temperatures that can occur during a day. This creates

the potential to create a lookup table of emission rates by temperature for the range of temperatures that can occur over a longer period of time such as a month or year from a single MOVES run (EPA 2016).

MOVES default meteorology data was used for all years. The county used was Adams County, Colorado for the months of January and July. Emission rates were post-processed to average winter and summer emission rates.

Road Type Distribution

MOVES does not have default data for this input, so it must be developed. The fraction of VMT by road type varies from area to area and can have a significant effect on GHG emissions from on-road mobile sources. EPA expects states to develop and use their own specific estimates of VMT by road type (EPA 2016).

If the Emission Rates option is used, MOVES will automatically produce a table of running emission rates by road type. Running emissions would then be quantified outside of MOVES by multiplying the emission rates by the VMT on each road type for each source type in each speed bin. In that case, data entered using the Road Type Distribution Importer is still required, but is not used by MOVES to calculate the rate. However, road type distribution inputs are important for Emission Rates runs involving non-running processes, because they are used by MOVES to calculate the relative amounts of running and non-running activity, which in turn affects the rates for the non-running processes (EPA 2016).

APCD uses a custom road type distribution for all years in their GHG models. This was used for each year modeled. Since emission rates were calculated (as opposed to emission inventories), the road type distribution used in MOVES will not change the emission rates calculated. The road types are accounted for in the TDM.

Source Type Population

MOVES does not have default data for this input, so it must be developed. APCD uses a custom source type distribution for all years in their GHG models. These data were used for each year modeled. The source type populations used in MOVES will not change the emission rates calculated. However, source population data are still needed as inputs for an emission rates MOVES run.

Vehicle Type VMT

MOVES does not have default data for this input, so it must be developed. EPA believes VMT inputs have the greatest impact on the results of a state or local GHG or energy consumption analysis. Regardless of calculation type, MOVES requires VMT as an input. MOVES can accommodate whatever VMT data is available: annual or average daily VMT, by HPMS class or MOVES source type. Therefore, there are four possible ways to enter VMT, allowing users the flexibility to enter VMT data in whatever form they have. EPA recommends that the same approach be used in any analysis that compares two or more cases (e.g., the base year and a future year) in a GHG analysis (EPA 2016).

The Output Emission Detail panel determines the detail with which MOVES will produce emission rates for running emissions, such as by source type and/or road type in terms of grams per mile. Total emissions are quantified outside of MOVES by multiplying the emission rates by the VMT for each source type and road type. However, users will still need to enter data using the Vehicle Type VMT Importer that reflects the VMT in the total area where the lookup table results will be applied. This is necessary because MOVES uses the relationship between source type population and VMT to determine the relative amount of time vehicles spend parked vs. running (EPA 2016).

APCD uses HPMS as the source type and annual as the time span for their GHG models. This was used for each year modeled. Since emission rates were calculated (as opposed to emission inventories), the VMT used in MOVES will not change the emission rates calculated. The VMT values are in the TDM data. However, VMT data are still needed as inputs for an emissions rate MOVES run.

Inspection/Maintenance Program

If a model is examining any nonattainment/maintenance areas, an inspection and maintenance (I/M) program may apply. I/M program inputs should be those used for SIP and conformity analyses and are generally available as defaults within MOVES. However, if a user is modeling CO2, N2O, and/or elemental carbon emissions only, or modeling area where no I/M program applies, the user should check the box on this tab (EPA 2016).

APCD uses the check box for "No I/M Program" for the Statewide Transportation Plan, since there is not a statewide emissions program that applies in these areas. This was used for each year modeled.

Others

APCD assumes MOVES default values for the starts, hoteling, idle, retrofit data, and generic tabs. This was left as is for each modeled year.

Output Database

When a RunSpec is executed in MOVES, the results are stored in the output database specified in the "General Output" parameters. HeidiSQL (or equivalent software) can be used to view and export the calculated emission rates.

MOVES Rate per Distance Table

The critical table in the output database with the calculated emission rates was the "rateperdistance" table. It contained emission rates for each combination of month, hour, pollutant, road type, speed bin, and vehicle type as specified in the RunSpec. The MOVESScenarioID field was the mechanism used by FHU to identify the HPMS source type.

The table was filtered to include only CO2e (i.e., pollutant ID 98) emission rates and exported to a comma-separated value (CSV) file. Because the table included emission rates for both January and July, and MOVES speed bins are not discrete speeds in miles per hour, post-processing of the emission rates was required to calculate emission inventories.

Processed Emission Rates

APCD provided several Access databases with calculation tools for processing the MOVES and TDM data. These Access databases are the basis for the post-MOVES data processing. The instructions contained below provide a narrative of what occurs, but these actions are already built into the Access databases.

The MOVES rate per distance output table needed to be manipulated to produce emission rates that could be related to the calculated vehicle speeds for road links in the TDM data. The emission rates for January and July needed to be averaged to create composite emission rates. The emission rates for the 16 speed bins (which cover 5 MPH ranges) in MOVES were linearly interpolated to provide emission rates for every mile per hour speed from 1 to 75, which is how speed data are presented in the TDM data.

The resulting table includes a total of 43,776 unique emission rates. That is, an emission rate for each combination of:

- MOVES Road Types 2-5
- HPMS Types 10/20/30/40/50/60
- Hours 1-24
- Speeds 1-75

Processing Annual Average Emission Rates

For each year/rate per distance table (i.e., this process must be repeated for 2025, 2030, 2040, and 2050):

- Filter to include only CO2e (pollutant ID 98) emission rates
- There were unique emission rates for each combination of:
  - Road type
  - HPMS type
  - Speed Bin
  - Hour
  - Month
- To get the average emission rates per year, each combination of road type, HPMS type, average speed bin, and hour were summed and divided by two (to average the corresponding emission rates for January and July)
- Seasonally averaged emission rate = (Winter Rate + Summer Rate)/2

Interpolating Emission Rates from Speed Bin to Integer Speeds

After seasonally averaging the emission rates, these rates were used to interpolate (linearly) between speed bins to get an emission of rate for every mile per hour for the speeds of 1 to 75 miles per hour. In general, the process used was:

- For adjacent speed bins, subtract the lower bin number emission rate from the higher bin number emission rate and divide by five to calculate a per mile per hour change in the emission rate (NOTE: emission rates generally decrease with increased speed)
- Add the appropriate emission rate change to the lower bin avgBinSpeed value to interpolate each mile per hour emission rate between the avgBinSpeed values
- For reference, the table below illustrates the MOVES speed bins
- Example for interpolating emission rate of 11 mph:
  - Speed per mph = 11 mph
  - Speed of Lower Speed Bin = 10 mph
  - Number of Speeds per Speed Bin = 5 (= 2.5 for speed bin 1; = 5 for all other speed bins)
  - ER of Lower Speed Bin = 4055 g/m (dummy data)
  - ER of Upper Speed Bin = 3421 g/m (dummy data)
  - 4055 + (3421 – 4055) * (11 – 10)/5 = 3928

avgSpeedBinID	avgBinSpeed	avgSpeedBinDesc
1	2.5	speed < 2.5mph
2	5	2.5mph <= speed < 7.5mph
3	10	7.5mph <= speed < 12.5mph
4	15	12.5mph <= speed < 17.5mph
5	20	17.5mph <= speed <22.5mph
6	25	22.5mph <= speed < 27.5mph
7	30	27.5mph <= speed < 32.5mph
8	35	32.5mph <= speed < 37.5mph
9	40	37.5mph <= speed < 42.5mph
10	45	42.5mph <= speed < 47.5mph
11	50	47.5mph <= speed < 52.5mph
12	55	52.5mph <= speed < 57.5mph
13	60	57.5mph <= speed < 62.5mph
14	65	62.5mph <= speed < 67.5mph
15	70	67.5mph <= speed < 72.5mph
16	75	72.5mph <= speed

Processed TDM

The TDM data are usually presented as an ESRI polyline shapefile format with each traffic link represented as one record (feature) and attributed with distances, total volumes, volumes per time period, and speeds per time period. A series of post-processing steps were performed to relate the relevant TDM data with the appropriate MOVES emission rates, as described below. The first step described below was done using ArcGIS. The other steps were done using the tools in the Access databases.

The resulting table includes aggregated VMT for each combination of:

- MOVES Road Types 2-5
- HPMS Types 10/20/30/40/50/60
- Hours 1-24
- Speeds 2.5-75

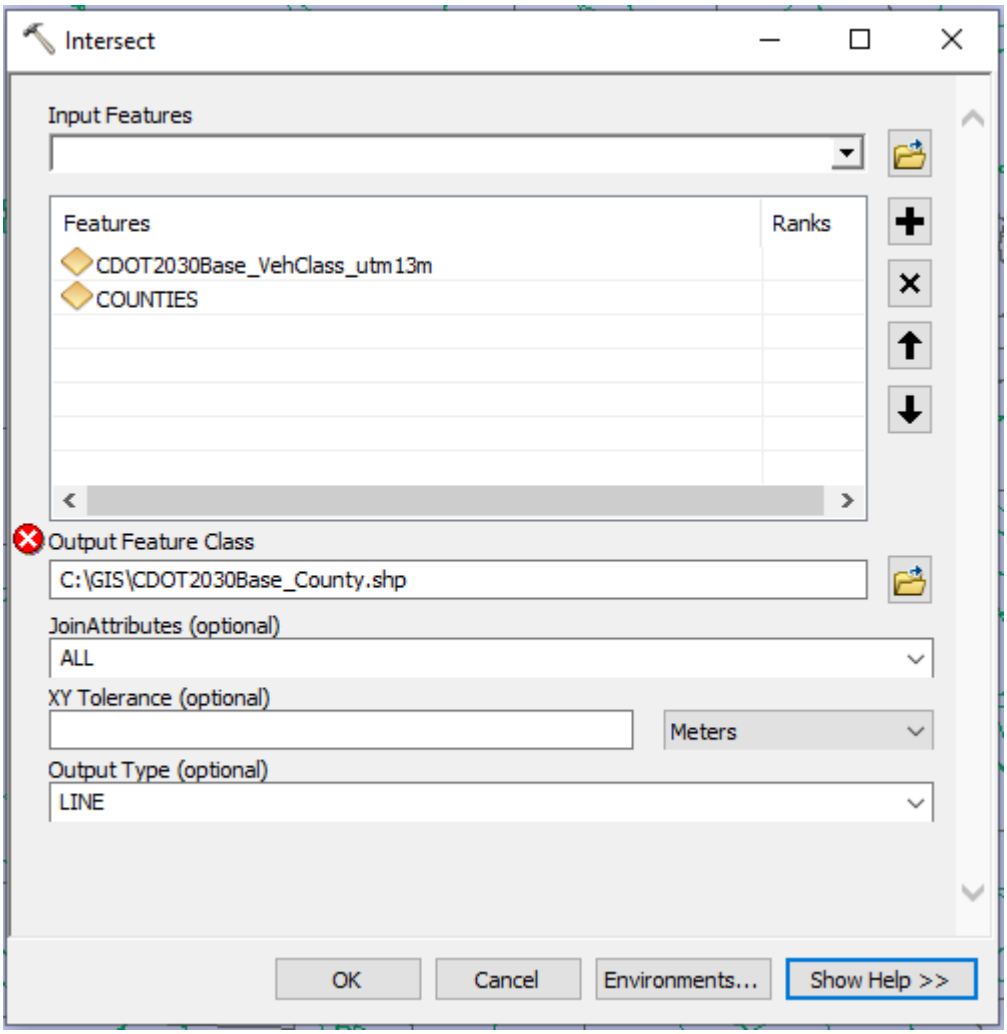
This process provides respective county names for each link to aggregate VMT by geography/region.

Attribute TDM with County Name

The first step was to attribute each link with the county name. The county information was necessary because it was used later in the process to filter VMT (and thus, on-road emissions inventory) by geography/region (e.g., MPO or non-MPO traffic). Performing this step later in the process would require significant modifications to the process.

The ArcGIS geoprocessing tool "Intersect" was used to attribute the TDM shapefile with county names for each roadway link (feature). The Input Features were the TDM shapefile and CDOT's "COUNTIES" shapefile that can be downloaded from OTIS. Unnecessary fields in the counties shapefile were deleted, so that the fields remaining were FID, Shape*, COUNTY, and CO_FIPS. The Output Feature Class name and file path could change, depending on the user's preference. The Join Attributes parameter was set to "ALL" which kept attributes from both input features. The Output Type parameter was set to "LINE" which set the output feature class to be the geometry of the TDM shapefile. The Environment was defaults except for the Output

Coordinate System. That was set to the projected coordinate system, "GRS_1980_UTM_Zone_13N" which matched the TDM shapefile's coordinate system.



The resulting output feature class had the same geometry and attributes as the TDM shapefile except for the following changes:

- Each link was attributed with the county name and FIPS number.
- Links within multiple counties were split (divided) into separate features at the county line(s). In these cases:
  - Both features still had the same attributes except for the county name and FIPS.
  - The distance attribute in the "DIST" field was now invalid since the feature was split.

To account for changes in distances for links that were in multiple counties, a new field "cntyMiles" was added to the output feature class. The geoprocessing tool "Calculate Geometry" was used on the "cntyMiles" field to calculate the distance of each link in miles. The "cntyMiles" field, rather than the "DIST" field, was used later in Access to calculate VMT.

The resulting attribute table was saved as a CSV file and used in the following steps.

Access Database

The TDM CSV file from the step above was imported into an Access database. The remaining post-processing steps were performed in this Access database, as described below.

Speeds

The TDM speeds were in floating decimal format and rounded to the nearest integer. Speeds less than 2.75 mph were rounded to 2.5 mph. This was because emission rates for speeds of 2.5 mph or less were the same, as described in the Processed Emission Rates section.

Time Periods

The TDM model provides aggregated data for 10 blocks of time for a day, not hour by hour—see the "name" column below. The data for these TDM periods were recategorized/interpolated into data for discrete clock hours 1-24 based on methodology from APCD.

The PeriodHour24 table below was used to split the TDM data for different time periods (AM1, PM2, OP1, etc.) into 24 clock hour time periods. VMT was calculated for each combination of integer speed (2.5 – 75mph), interstate (yes or no), road functional class (1-8), rural (yes or no), periodCog (1-10), and county.

The periodCog 1-10 were related to hours 1-24 as shown in the "hour" column. That provided a VMT per clock hour for each combination of speed and functional class. This was used to relate the VMT to fractions of VMT by HPMS per functional class and hour.

The cVMT was divided by the number of "periods" corresponding with each clock hour to calculate the VMT.

PeriodHour24

Interval	periodCog	name	hour	hrsT	periods
11:00 PM - 6:30AM	7	Op1.bin	1	7.5	7
11:00 PM - 6:30AM	7	Op1.bin	2	7.5	7
11:00 PM - 6:30AM	7	Op1.bin	3	7.5	7
11:00 PM - 6:30AM	7	Op1.bin	4	7.5	7
11:00 PM - 6:30AM	7	Op1.bin	5	7.5	7
11:00 PM - 6:30AM	7	Op1.bin	6	15	7
6:30-7:00 AM	1	Am1.bin	7	1	1
7:00-8:00 AM	2	Am2.bin	8	1	1
8:00-9:00 AM	3	Am3.bin	9	1	1
9:00 AM - 11:30 AM	8	Op2.bin	10	2.5	2.5
9:00 AM - 11:30 AM	8	Op2.bin	11	2.5	2.5
	9	Op3.bin	12	3.5	7
	8	Op2.bin	12	2.5	5
11:30 AM - 3:00 PM	9	Op3.bin	13	3.5	3.5
	9	Op3.bin	14	3.5	3.5
	9	Op3.bin	15	3.5	3.5
3:00-5:00 PM	4	Pm1.bin	16	2	2
3:00-5:00 PM	4	Pm1.bin	17	2	2
5:00-6:00 PM	5	Pm2.bin	18	1	1
6:00-7:00 PM	6	Pm3.bin	19	1	1
7:00-11:00 PM	10	Op4.bin	20	4	4
7:00-11:00 PM	10	Op4.bin	21	4	4
7:00-11:00 PM	10	Op4.bin	22	4	4
7:00-11:00 PM	10	Op4.bin	23	4	4
11:00 PM - 6:30AM	7	Op1.bin	24	7.5	7

Fraction of VMT by HPMS

Once VMT was calculated for each road functional class and clock hour, the fractions of VMT by HPMS for each corresponding functional class and clock hour were applied. This calculated the VMT for HPMS 10-60. The fractions used were from APCD and were consistent with their methodology.

FractionsByHourHPMSnaaT

NAA?	Weld?	Rural?	FC	Hr	10f	20f	30f	40f	50f	60f
-1	W	R	1	1	1.12494375281236E-03	0.442984079764564	0.408981870287873	8.24958752062397E-04	3.60606876834793E-03	0.14247807867434
-1	W	R	1	2	6.50325162581291E-04	0.418107821883677	0.388118179039889	1.40070035017509E-03	5.57032759041272E-03	0.186152645973265
-1	W	R	1	3	1.1907462009526E-03	0.402448608970853	0.376594285267901	1.92787480154 23E-03	8.86488378110699E-03	0.208973600977645
-1	W	R	1	4	1.88772529102432E-03	0.400795540811441	0.375296865809669	3.5956672209987E-03	8.74568726325532E-03	0.209678513603612
-1	W	R	1	5	1.27600843728028E-03	0.438002933384539	0.406922735865401	8.59352621025494E-04	5.91653137282429E-03	0.14702243831893
-1	W	R	1	6	9.86892049192773E-04	0.462978652961131	0.429325812630245	1.88521686320158E-03	5.20852159466524E-03	9.96149039015637E-02
-1	W	R	1	7	8.56477631797771E-04	0.47063947538398	0.437825973989187	1.19740562115417E-03	7.50554404406707E-03	8.19751233298142E-02

Road Types

The TDM used roadway functional classes that were recategorized to MOVES road types. That allowed the road types from the TDM to be related to the emission rates.

RTt

DRCOG Facil	FHWA facility type	rural?	FHWA	Urban	MOVESrt	fhwaRT	fcCode	Intestate
1	Principal Arterial - Interstate	-1	R	R	2	1	1	1
1	Principal Arterial - Interstate	-1	R	R	2	1	1	0
1	Principal Arterial - Interstate	0	N	U	4	11	1	0
1	Principal Arterial - Interstate	0	N	U	4	11	1	1
2	Principal Arterial - Other	-1	N	R	3	2	2	0
2	Principal Arterial - Other Freeways or Expressway	0	N	U	4	12	2	0
3	Principal Arterial - Other	-1	N	R	3	2	3	0
3	Principal Arterial - Other	0	N	U	5	14	3	0
4	Minor Arterial	-1	N	R	3	6	4	0
4	Minor Arterial	0	N	U	5	16	4	0
5	Major Collector	-1	N	R	3	7	5	0
5	Collector	0	N	U	5	17	5	0
6	Principal Arterial	-1	R	R	2	1	1	0
6	Principal Arterial	0	N	U	4	11	1	0
8	Local System	-1	N	R	3	9	7	0
8	Local System	0	N	U	5	19	7	0

Filter by Geography/Region

The statewide GHG inventory was filtered to contain VMT for all counties in Colorado except for the nine-county region in the ozone non-attainment area. The nine counties excluded were Adams, Arapahoe, Boulder, Broomfield, Denver, Douglas, Jefferson, Larimer, and Weld. The statewide results were subdivided further into Pikes Peak area and the rest of the state.

Emissions Inventory

The processed emission rates table and the processed VMT table were related by road type, HPMS type, hour, and speed. This relate was used to multiply the emission rate (g/mi) by the VMT (mi) to get a total in grams of CO2e for an average weekday. The formula used was:

- CO2e (g/day) = SUM(Emission Rate (g/mi) * VMT (mi))
- CO2e (MMt/day) = CO2e (g/day) * 1 (MMt) / 1e+12 (g)
- CO2e (MMt/year) = CO2e (MMt/day) * 338 (TDM weekdays/calendar year)

The calculated emissions inventory was for on-road emissions. Non-road emissions were not included in this calculation.

References

EPA. 2016. *Using MOVES for Estimating State and Local Inventories of On-road Greenhouse Gas Emissions and Energy Consumption*. June. https://nepis.epa.gov/Exe/ZyPDF.cgi?Dockey=P100OW0B.pdf

COLORADO
Department of Transportation

Transportation Commission Memorandum

To: Transportation Commission
From: John Putnam
Date: December 12, 2024

Subject: Burnham Lead Acquisition

Purpose

Policy direction from the Commission regarding proposed transaction to acquire Burnham Lead from Union Pacific Railroad.

Action

CDOT seeks Commission approval of a Resolution supporting acquisition of the Burnham Lead and associated easements from Union Pacific for $19.4 Million. CDOT seeks to have this approval extend to all contributing agencies, all contracts, amendments, and option letters that stem from the original project except where there are substantial changes to the project and/or funding of the project. It is important to note that the funds being utilized for the easement are not CDOT directed funds and have no effect on the CDOT-directed budget.

Background

The Colorado Transportation Investment Office (CTIO) purchased Burnham Yard in 2021 and has undertaken a study of track alignments on the property. The study presented to the Commission last month concluded that realignment of the Consolidated Main Line to the Burnham Lead was not necessary for Front Range Passenger Rail service of expansion of Interstate 25. However, acquisition of the Burnham Lead will support safe and efficient access for redevelopment of Burnham Yard and closure of three at-grade crossings.

Next Steps

CDOT will proceed with purchase of the Burnham Lead to support redevelopment of the Burnham Yard property and to close three at-grade crossings. As CTIO presented last month, it aims to dispose of the Burnham Lead property for redevelopment by Spring 2026. CDOT will also present any amendments if there has been any substantial changes to the project and/or funding.

Attachments

Resolution

COLORADO
Department of Transportation

Burnham Lead Purchase

December 18, 2024

About Burnham Yard

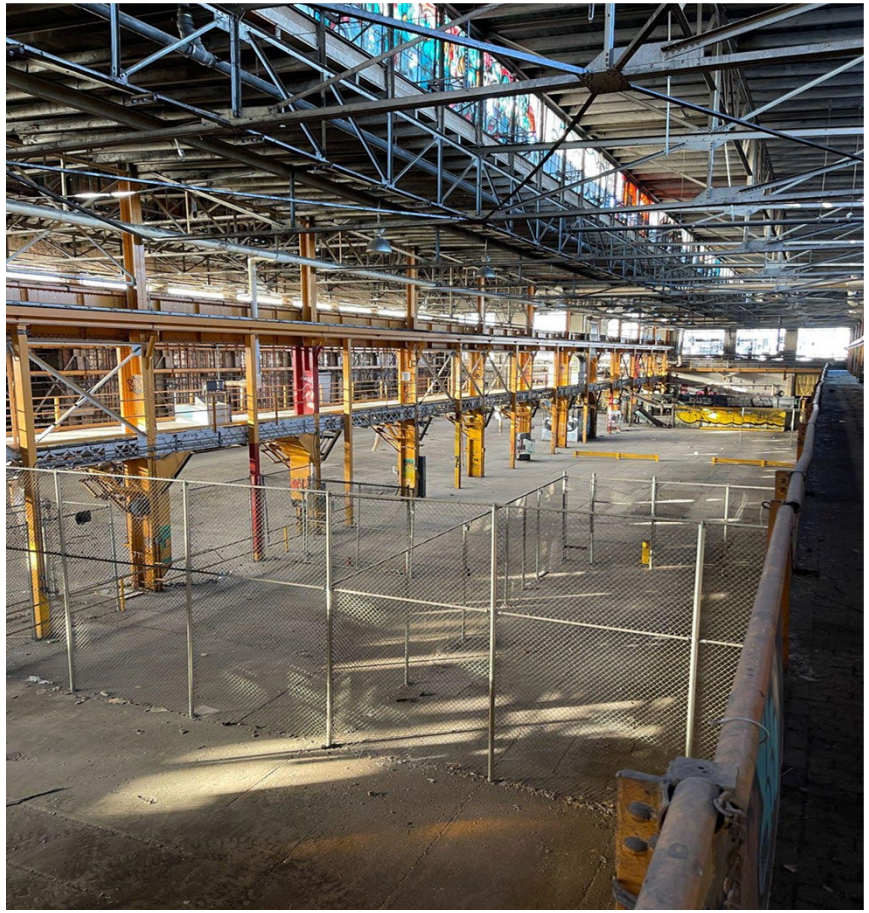
- The site is adjoining the La Alma-Lincoln Park neighborhood of central Denver and lies between four of Denver's main road arteries: I-25 to the west, Santa Fe Drive to the east, Colfax Avenue to the north, and 6th Avenue to the south.

- The roughly 60-acre property is approximately 1.05 miles long and extends from 13th Avenue at its northern extent to 4th Avenue at the southern.

- The site is bounded by RTD light rail lines and a mixture of industrial properties to the west.

Burnham Yard- Ownership Details

- The site was put up for sale in 2019 and CTIO purchased the property in May 2021 for $50.0 million.
- As part of the purchase, CTIO and CDOT entered into an Intra-Agency Agreement and lease agreement for $15.0 million, which covered initial rent for 5 years.
- CDOT initial indicated that the transportation related parcels to be retained would be roughly 15 acres and would determine final boundaries within 3 and a half years.
- CTIO would then sell the remaining 45 acres and use the proceeds to pay of the loans it secured to buy the property.
- A transportation planning study to determine track alignment was initiated in October 2022.



UP Track Easement

- Three heavy rail at grade crossings at 13th Ave, Rio Ct. and Shoshone St.

Freight train on UP Lead at Burnham Yard adjacent to RTD 10th & Osage LRT Station

Burnham Lead Transaction

1. State will purchase Union Pacific Burnham Lead and associated easement
   - From just south of Burnham Yard to Consolidated Main Line between 13th Street and Colfax
2. Total purchase price of $19,400,000
   - $13,400,000 to reflect appraised value of real estate
   - $6,000,000 to reflect the reduced operating capacity for the Burnham Lead
   - Non-CDOT-Directed funding; no effect on CDOT-directed budget
3. Resolution supports proposed transaction

COLORADO
Department of Transportation

Transportation Commission Memorandum

To: Transportation Commission
From: Emily Haddaway, CDOT Legislative Liaison
Date: December 6th, 2024

Subject: December 2024 Legislative Update

Purpose

The Colorado General Assembly will reconvene in January for the 2025 Legislative session. There are several transportation-related legislative agenda items the Polis Administration is pursuing that CDOT would like to bring to the attention of the Transportation Commission.

Action

This is an informational update and no action is needed at this time.

Background

On January 8th, the 2025 Colorado General Assembly will convene at the State Capitol. The accompanying slide deck outlines the four CDOT decision items Governor Polis included in his budget proposal on November 1st. Decision Item #3 and Decision Item #4 were also discussed at the November Transportation Commission meeting. The final slides outline a new legislative proposal that would generate additional funding for the Bridge and Tunnel Enterprise and create the new ROAD (Road Operations, Asset Management, and Drivability) Enterprise. CDOT plans to pursue this legislation next session.

Next Steps

CDOT will commence more regular legislative updates to the Transportation Commission after the legislature convenes in January.

Attachments

Attached is the corresponding slide deck that outlines these legislative proposals.

COLORADO
Department of Transportation

December Legislative Update

December 18, 2024

R-01 - Multimodal Options Fund Spending Authority

The Multimodal Transportation and Mitigation Options Fund (MMOF) original appropriations have recently lapsed and the program no longer has access to the full fund balance.

- The Department is requesting an increase in spending authority to align with the forecasted fund balance of the MMOF. The Department also requests one additional year of roll forward authority of SB 21-260 ARPA appropriations, which are set to lapse following FY 2024-25.
- Additionally, the Department requests legislation to continuously appropriate the MMOF to the Department. This would address current challenges with administering the budget and prevent spending authority gaps in the future. It would also allow the MMOF program to access its full fund balance, which will allow the Department to distribute more funding to local multimodal projects, which is needed to meet rising program demand.

Forecasted Fund Balance vs Forecasted Spending Authority

FY 2025-26 Incremental Request	**Amount**
Forecasted FY 2024-25 Year Ending Fund Balance	$132,927,753
Forecasted Available FY 2025-26 Spending Authority	$82,515,513
FY 2025-26 Incremental Request	**$50,412,240**

Decision Item R-02

R-02 - Continuous Spending Authority for Clean Transit Enterprise Cash Fund

- This request is being submitted by CDOT on behalf of the Clean Transit Enterprise (CTE) Board. Similar to the MMOF request above, the CTE is requesting that the JBC sponsor legislation to continuously appropriate the Clean Transit Enterprise Cash Fund.
- The request aims to resolve ongoing problems with grant delivery due to the longer procurement timeline associated with the purchasing of transit vehicles.
- The request also standardizes the administration of CTE funding, as SB 24-230 added three new non-appropriated cash funds to the Clean Transit Enterprise.
- By approving the request, CTE will be able to be more responsive to transit agency funding needs that typically span multiple fiscal years and fund a greater number of grant awards to further support the electrification of transit in Colorado.
- CTE Cash Funds:
  - Clean Transit Enterprise Fund (Annually Appropriated)
  - Local Transit Operations Cash Fund (Continuously Appropriated)
  - Local Transit Grant Program Cash Fund (Continuously Appropriated)
  - Rail Funding Program Cash Fund (Continuously Appropriated)

Decision Item R-03

R-03 - Reduce S.B. 21-260 Transfers and Extend the Funding

As part of statewide efforts across agencies to balance the State's budget, the Department requests a reduction in the General Fund transfer to the State Highway Fund by $39.0 million in FY 2025-26 and by $24.5 million in FY 2026-27. Additionally, the Department requests an increase in future year funding to ensure CDOT receives the total amount as enacted in SB 21-260 (see below).

- Under this proposal, $10.0M of the FY 2025-26 General Fund transfer and $25.0M of the FY 2026-27 General Fund transfer would be utilized for Bustang operations.
- The Department will attempt to maintain current project schedules despite the outward shift, however, this proposal could result in some projects being delayed.

Current Transfers vs Proposed Transfers

Fiscal year	FY25	FY26	FY27	FY28	FY29	FY30	FY31	FY32	FY33	Cumulative
Current Law	$100.0	$100.0	$100.0	$100.0	$100.0	$82.5	$82.5	$82.5	$0.0	$747.5
Proposal	$100.0	$61.0	$75.5	$100.0	$100.0	$100.0	$100.0	$100.0	$11.0	$747.5
Difference	$0.0	-$39.0	-$24.5	$0.0	$0.0	$17.5	$17.5	$17.5	$11.0	$0.0

Decision Item R-04

R-04 - Reduce Road Safety Surcharge and Distribution Update

As part of statewide efforts across agencies to help balance the State's budget, the Department proposes a reduction to the Road Safety Surcharge, resulting in a decrease in state revenue subject to TABOR.

- The surcharge would be reduced by $11.10 to all weight based charges, resulting in a $65.1 million reduction. This would decrease the state's total cash revenue subject to TABOR.
- Absent a backfill from other sources, this proposal would lead to a $65.1 million reduction in capital construction programs, with direct impacts to FASTER safety programs and asset management.
- It is anticipated that prior to finalizing the FY 2025-26 Annual Budget Allocation Plan in the Spring, impacts to the FASTER Safety program will be offset by reallocating funds from other programs.
- To eliminate any impact to local governments from this request, this proposal would amend the current statutory formula distributions to ensure that revenue to counties and municipalities will not be impacted.

Forecast Under Current Law vs Proposed Forecast

Forecast Calculation	FY 2025-26	FY 2026-27
Road Safety Surcharge Revenue Under Current Law	$151.3 M	$153.9 M
Road Safety Surcharge Revenue With Fee Reductions	$86.2 M	$87.8 M
Change to Road Safety Surcharge	**-$65.1 M**	**-$66.2 M**

Creation of the CDOT R.O.A.D. Enterprise and Expansion of Bridge and Tunnel Enterprise

- **Continued and reliable road maintenance is essential to keeping Colorado safe, connected, and resilient.**
  - Increasing costs, aging assets, increased demands on the system, and expanding funding obligations of the Highway Users Tax Fund (HUTF), the primary state source of highway maintenance funding, pose continued challenges to the adequate maintenance of the state highway system.
- **The state must address these challenges and ensure critical maintenance and asset management functions are adequately funded through a dedicated revenue source.**
- **The Polis Administration is pursuing a 2025 legislative concept that draws upon proven methods for delivering transportation projects.**
  - A lesson learned in the past decades is that CDOT's narrowly dedicated enterprises have been extremely effective, both in targeting dollars to a specific and accountable purpose and in protecting those dollars against some of the swings of the budget cycle and special interests.
  - Establishing a dedicated enterprise that cannot be redirected to any other purpose, the state will solidify and strengthen our commitment to rural and urban road repair and maintenance as a foremost priority, complementing the highly effective Bridge and Tunnel Enterprise that has dramatically reduced the state's inventory of poor bridges and improved national rankings

Creation of the CDOT R.O.A.D. Enterprise and Expansion of Bridge and Tunnel Enterprise Continued

This proposal contains two key elements:

- **Expansion of the Bridge and Tunnel Enterprise (BTE)**
  - This enterprise has proven its efficacy and should be expanded as the state's primary delivery method for bridge and tunnel repair. This proposal would increase the Bridge Safety Surcharge, an existing Colorado fee levied at the point of registration. Utilize this revenue to fund additional critical bridge and tunnel repairs, replacement, and maintenance. An $8 increase across weight categories would generate $45m in yearly revenue.
- **Creation of ROAD (Road Operations, Asset Management, and Driveability) Enterprise**
  - Colorado's road conditions lag bridge conditions, in part because they lack the dedicated revenue source that exists for bridge and tunnel repair. In the past, limited dollars have often been prioritized toward new capacity expansion at the expense of basic maintenance.
  - This enterprise would be funded with a new Road Impact Fee, applicable to special fuels. The Road Impact Fee would be eligible to fund paving and surface treatment in urban and rural areas, guardrail and cable rail replacement, road safety striping and safety signage, and other similar expenses. A $.03 per gallon special fuels fee would generate $20m a year in revenue. A commensurate registration fee on heavy duty zero emission vehicles would ensure that the fund remains solvent as use of special fuels transitions to clean energy, and that electric and hydrogen vehicles pay their fair share.

Arriba Rest Area Project Overview

REQUEST SUMMARY:

- CDOT is requesting $281,672 to fund environmentally friendly xeriscaping at the CDOT Arriba Rest Area in order to reduce water consumption.

WHY IS THIS NEEDED NOW?

- Climate change is driving a historic drought throughout the Southwest. This proposal would save between 420,000 - 630,000 gallons of water per year and enable compliance with the Republican River Basin Agreement and the water reduction and water efficiency executive orders.

REPUBLICAN RIVER BASIN AGREEMENT:

- Arriba is located in the Republican River Basin. An agreement with neighboring basin states requires Colorado to reduce consumption of water from the basin by 2029.

EXECUTIVE ORDERS:

- This request would help meet the objectives of the “Greening of State Government” Executive order D 2022 016 by reducing potable water consumption.
- By installing water efficient landscaping, this project would be in compliance with the “Water Efficiency Landscaping Policy for State Facilities” Executive Order # D 2023 018.

Questions and Discussion

Transportation Commission (TC) Meeting Notes
November 20, 2024 - November 21,2024
Workshops - Wednesday, November 20, 2024

Attendance:

Ten Transportation Commissioners were present: Chair: Terry Hart, Vice Chair: Eula Adams, James Kelly, Yessica Holguin, Mark Garcia, Shelley Cook, Karen Stuart, Barbara Bowman, Rick Ridder, and Todd Masters. Commissioner Hannah Parsons was excused.

Burnham Yard Briefing - (Joint TC/Colorado Transportation Investment Office [CTIO] Board of Directors Workshop) - Piper Darlington

Purpose and Action:

To update the TC and the CTIO Board of Directors on the Burnham Yard property and the final report for the Burnham Yard transportation planning study. No action was required.

Discussion:

- CTIO bought the property for $50 million in May 2021, with CDOT planning to own 15 acres for $15 million via an Inter-agency agreement. A planning study for the Burnham Yard was conducted to evaluate realigning the track for the potential relocation of the Consolidated Main Line, expansion of RTD Light Rail, and provision of Front Range Passenger Rail (FRPR) right-of-way.
- The planning study found moving FRPR to the La Ama-Lincoln Park and Baker neighborhoods would create substantial noise and vibration impacts for residents, FRPR would not receive a substantial benefit having separate tracks in this area, Burnham Yard is too expensive (not zoned, no utilities on the site, and too isolated) to use for FRPR for passing and staging areas, Safety investments would benefit all users for grade separation or other safety improvements if they were installed at 13th Avenue, Sante Fe Drive, and Kalamath Street. CDOT does not need to retain any of the initially identified 15 acres for transportation related purposes. CTIO is still looking at opportunities for safety, connectivity and flexibility for multi-modal projects, as CTIO prepares to sell the property by May 2026.
- Commissioner Ridder asked if an environmental issue exists on the property. CTIO found that Burnham Yard is not a superfund site, and is fairly clean except for a few areas.
- Commissioner Adams expressed concern for the proposed sale date May 2026 being too optimistic and it was noted that no interest from potential buyers has been received to date.
- Commissioner Garcia suggested considering a property trade vs. a formal sale.
- Commissioner Cook asked if a pedestrian bridge was part of the preliminary design for the area, and it was explained that it has not been considered at this stage.

- Commissioner Hart asked if CTIO and CDOT have a future need for right-of-way to consider preserving. Piper Darlington, CTIO Director, responded that the FRPR team was coordinated with during the planning process. No discussion has occurred at this time for CTIO to reserve a portion of right-of-way for the future.

Right of Way Condemnation Authorization Request - Keith Stefanik

Purpose and Action:

CDOT Region 1 seeks condemnation authorization of one fee simple parcel necessary for Project Number NHPP 2073-206. TC adoption of a resolution, in accordance with Colorado Revised Statute §43-1-208, granting approval to CDOT to initiate and conduct condemnation proceedings was requested.

Discussion:

- No substantial comments or concerns were raised by Commissioners.

Budget Workshop - Jeff Sudmeier and Bethany Nichols

FY 2024-2025 Budget Amendment

Purpose and Action:

To review the fourth budget amendment to the FY 2024-25 Annual Budget in accordance with Policy Directive (PD) 703.0. The Division of Accounting and Finance (DAF) is requesting the TC to review and adopt the fourth budget amendment to the FY 2024-25 Annual Budget, which consists of one item that requires TC approval. The proposed amendment reallocates $382,800 from the TC Program Reserve Fund in the Commission Reserve Funds to the Property line of the budget to fund improvements at the Sterling and Virginia Dale Rest Areas located in Region 4.

Discussion:

- No substantial comments were raised by the Commissioners.

FY2026 Draft Proposed Annual Budget

Purpose and Action:

To review and approve the Proposed FY 2025-26 Annual Budget Allocation Plan. DAF is requesting the TC to review and adopt the Proposed FY 2025-26 Annual Budget Allocation Plan. The TC will be asked to adopt the Final Budget at the meeting in March 2025 after the plan is updated based on the December 2024 revenue forecast, and to reflect approval of Decision Items, updates to common policy, and any other changes.

Discussion:

- A Commissioner asked if the numbers moved out to the future accounted for inflation. Jeff Sudmeier, CDOT Chief Financial Officer, responded that no, these numbers do not account for inflation.
- This budget change should not impact the current ongoing 10-Year Plan projects. The updated 10-Year Plan will be adjusted as is necessary.
- $10 million is being set aside for Bustang operations.
- Commissioners Garcia and Cook noted the negative impacts of TABOR and the need to DeBruce.
- Executive Director Lew pointed to the success of the creation of enterprises to fund special projects, with more opportunities to address funding shortfalls. Changes in the federal administration were raised related to CDOT's funding. Director Lew also noted that generally formula programs do not change much, but discretionary funding sources may be influenced more. Changes would occur during the reauthorization process. Changes are often reflected in the Notice of Funding Availability.
- STAC Chair, Gary Beedy, noted that STAC reviewed proposed budget information and asked for CDOT staff to send this presentation to all of STAC. STAC is available to help the TC members lobby for funds.
- Commissioners Stuart expressed concerns with the loss of funds to asset management programs.
- The hope of the TC is that CDOT will eventually be able to backfill the funds removed from the budget for FY 2026. The concept of revising SB 260 to accomplish this.
- The concept of using the Redistribution funds to backfill the lost funding was proposed.
- Commissioner Holguin commented that larger messaging related to the disbenefits of Taxpayers Bill of Rights (TABOR) is required. There is a need to make these cuts in budget real for CDOT customers.

1601 Greeley- US 34 "Merge" PD 1601 Interchange Request - Heather Paddock

Purpose and Action:

The CDOT 1601 Policy and Procedural Directives outline the guiding principles and steps necessary to approve a new interchange, or interchange modification, on the interstate, freeway, or state highway system. The Greeley Mobility Enhancements for Regional Growth and Equity (MERGE) project includes two new interchanges and a regional mobility hub along US 34 between 35th Avenue and 47th Avenue. This proposed project is a Type 1 project, which is subject for approval by the TC. The Type 1 category includes proposals for new interchanges on the state highway system with a functional classification of interstate or freeway; and any type of proposal on the state highway system not initiated by CDOT that anticipates CDOT cost-sharing participation. CDOT is participating with 10-Year Plan funds for the proposed regional mobility hub. The 1601 Procedural Directive states that new interchanges in a Metropolitan Planning Organization (MPO) boundary should make a 'good faith effort' to reach a 3% reduction in Average Daily Trips (ADT) on the interchange ramps.

The MERGE Project falls within the North Front Range MPO (NFR MPO) boundary. The goal for Transportation Demand Management (TDM) strategies at the US 34/47th Avenue and US 34/35th Avenue interchanges is to reach a reduction of 1,015 and 881 daily trips, respectively, which is 3% of the total ADT at the interchange ramps. The TC is requested to review and discuss the MERGE project and TDM strategies applied to the project. The requested action is the approval of the MERGE project through the 1601 Interchange Approval Procedure, and will be requested at the December 2024 TC meeting.

Discussion:

- Commissioner Kelly noted the project is in his region, and he took a tour of the area. This project is a strong example of taking older land use concepts (parking lots), and expressed strong support for this project. It is a great example of multimodal transportation in Colorado.
- Commissioners Stuart and Cook expressed support for this project.

BTE Build America Bond Refunding Workshop - Patrick Holinda

Purpose and Action:

To request approval from the Bridge and Tunnel Enterprise ("BTE" or the "Enterprise") Board of Directors (Board) to move forward with the Colorado Bridge and Tunnel Enterprise Senior Revenue Refunding Bonds, Series 2024B ("Series 2024B Bonds") issuance. Staff requested approval from the Board of the attached Approving Resolution for the Colorado Bridge and Tunnel Enterprise Series 2024B Bonds. This resolution provides approval for staff to proceed with the transaction if parameters related to the size and the final maturity date of the transaction, and average annual debt service savings generated by the transaction, are met. The resolution also grants the Enterprise Director, Enterprise Chief Financial Officer, or any member of the Enterprise Board the authority to determine the specific terms of the bonds and execute and deliver Bond Documents on behalf of the Enterprise.

Discussion:

- No substantial comments were raised by the Commissioners.

Access Appeal Regarding Modification of Eagle View Access to US Hwy 550A, Durango, CO - Julie Constan

Purpose and Action:

The purpose of this workshop was to summarize and inform the TC of the access appeals submitted by six property owners in Region 5 regarding modification of the access from Eagle View Drive to U.S. Highway 550A located at milepost at 13.96, in Durango, Colorado, and the access appeal process outlined in the State Highway Access Code (2 CCR 601-1, 2.9). Region 5 recently received six separate access appeals from six different property owners in Eagle View Estates located in Durango, Colorado, all of which arise out of the modification of the access from Eagle View Drive to U.S. Highway 550A (the "Access"). The following property owners submitted their appeals between September 25 and November 7, 2024: Andrew R. and Cristina E. Baumker; Sharon A. Cook; William & Rebecca Counley; Kasten Properties, LLC, via

Jessie & Allison Kasten; Wayne & Debbie Kjonaas; and Margaret E. Pyle Descendents (sic) Trust via Margaret E. Pyle, Trustee (the "Property Owners"). The appeals were originally submitted between September 25 and September 30, 2024; however, each of the appeals included issues that are unrelated to their Access and outside the jurisdiction of an access appeal. The Property Owners were given the option to review and revise their appeals, and each has done so. The revised appeals were received between October 23 and November 7, 2024.

In accordance with the Colorado State Highway Access Code, the Property Owners have requested a hearing before the Transportation Commission (the "TC"). The TC will make the determination if the appeal goes through the Internal Administrative Review Committee process, or through the Department of Personnel and Administration, Office of Administrative Courts process. CDOT staff request that the appeals should be heard by the Department of Personnel and Administration, Office of Administrative Courts. CDOT requested that each Property Owner submit their own Access Appeal, consistent with the Code which does not contemplate collective property owner appeals; however, CDOT staff request that the six appeals be consolidated into one matter to be heard in the Office of Administrative Courts, as all six appeals concern the same access and each property owner has raised the same issues to be addressed in the appeal, and will therefore include the same witnesses and evidence.

Discussion:

- Commissioner Garcia asked about the specific traffic movements (U-turn pattern) for the access provided to landowners along this project. Questions were answered to the Commissioner's satisfaction.

Adjournment

This meeting adjourned at 3:41 pm.

Thursday, November 21, 2024

Call to Order, Roll Call

Ten Transportation Commissioners were present: Chair: Terry Hart, Vice Chair: Eula Adams, James Kelly, Yessica Holguin, Mark Garcia, Shelley Cook, Karen Stuart, Barbara Bowman and Rick Ridder, and Todd Masters. Commissioner Hannah Parsons was excused.

Public Comments

- Tom Peterson, Director of the Colorado Asphalt Pavement Association, apologized for the report they submitted with a logo that was inappropriate. The logo will be removed and they will refrain from inserting logos in their reports to CDOT in the future.
    - The asphalt industry in Colorado is a 9 million ton industry and works in 42 counties of Colorado

- Percentage of work for CDOT is traditionally 30-35%, but it dropped recently to 20%; a change or 5% is a concern for the industry.
- Recognized CDOT has limited funds and capable engineers to identify pavement maintenance needs for delivering the right treatments at the right time.
- Adding a new plant in Colorado to address needs.

Comments of the Chair and Commissioners

- Commissioner Masters attended the Region 4 military appreciation event for Veterans Day, was overwhelmed by the number of CDOT employees who have served, and also how the event appropriately honored the military. There is a need to remember this honor all year long.
- Commissioner Garcia noted the early snow storm and the work of CDOT maintenance crews. Wolf Creek opened early this year, and Garcia was impressed with how the roads were kept clear of snow. The Commissioner also attended the San Luis Valley TPR meeting remotely.
- Commissioner Holguin recognized and thanked Jessica Myklebust, CDOT Region 1 Transportation Director, and CDOT Region 1 teammembers, Angie Drum and Ryan Noles for their work on the Bus Rapid Transit (BRT) project. There is both excitement and trepidation regarding this project. The comments from the public were appreciated. At the Nonattainment Area Air Pollution Mitigation Enterprise (NAAPME) meeting, they learned that they have released the Notice of Funding Availability (NOFA) for their program.
- Commissioner Cook attended the Division of Transit and Rail (DTR) hosted event for Mountain (Passenger) Rail. The meeting was well attended and coordinated. Roughly 170 people attended. Cook also attended the DRCOG Regional Transportation Commission meeting with TIP amendments that would benefit CDOT Region 4 including: $10 million to cover project cost escalation, $2 million for American with Disabilities Act (ADA) improvements, and a safety median for $11 million. The Commissioner was impressed by the mobility hub presentation also.
- Commissioner Ridder echoed Commissioner Cook's comments regarding the DTR-hosted meeting for Mountain Rail, and is looking forward to the report on this project anticipated for delivery at the end of this year. Ridder noticed how contractors working for CDOT on projects do a good job representing CDOT seamlessly. The Wolford project is 95% complete.
- Commissioner Stuart mentioned several press conference events that occurred over the past weeks: The Winter Park train expansion of service that was funded by the Colorado Transportation Investment Office (CTIO); the Federal Railroad Association Consolidated Rail Infrastructure and Safety Improvements (CRISI) grant award of $66 million for positive train control on a rail segment in Westminster. Stuart attended the Legislative Efficiency and Accountability Committee meeting with Chair Hart. A presentation on the Dig Once Project (concept to install infrastructure during project construction once, without the need to revisit the site for future infrastructure installations), and another presentation from the Audit Division were both impressive. Commissioner Stuart has been appointed to the Transit Pass Exploratory Committee, along with other leaders of transit agencies. The purpose is to explore how transit connections between transit providers can occur smoothly to enhance access and use

of transit as a mode. The Commissioner attended the Loveland Mobility Hub event in Region 4, led by Heather Paddock, CDOT Region 4 Transportation Director, which also noted the birth of the Longmont Mobility Hub. Stuart also cannot wait for the eventual CO 7 Mobility Hub.

- Commissioner Bowman congratulated CDOT Region 3 Transportation Director, Jason Smith, on the opening of the US 50 Blue Mesa Bridge. Bowman attended the San Luis Valley Durango-Silverton Narrow Gauge railroad event, and recognized Julie Constan, CDOT Region 5 Transportation Director, for the work on the US 550/14th Street project. A collaboration between Scenic Byaways and this project's celebration for 250 years of our nation and 150 years of the state of Colorado was interesting. A CDOT collaboration with the Colorado Tourism office for Safety and the Economy was recognized and appreciated.
- Commissioner Kelly noted this is his last meeting serving as a TC member. Kelly noted his new found appreciation for CDOT, as the Commissioner had not always had a positive outlook on public agencies, Kelly has been very impressed with the CDOT staff and their efficient and dedicated work ethic. Recognized and thanked the TC members, especially Herman Stockinger, CDOT Deputy Executive Director, and CDOT Executive Director, Shoshana Lew. Commissioners Hart and Adams wished Commissioner Kelly the best of luck.
- Commission Vice Chair Adams has been traveling to east Africa recently. Noted the importance for travelers to keep in mind safety over the holiday season.
- Commission Chair Hart recognized CDOT staff, in particular, maintenance crew work during the recent snow storms. Noted that the Governor's Vision 2035 is providing CDOT with its "marching orders" in terms of working to reduce Greenhouse gas emissions related to transportation.

Executive Director's Management Report - Shoshana Lew

- It has been a packed few weeks with grant awards to CDOT and response to winter storms.
- Both grant awards were the first to be awarded during the first submittal, the US 287 North and CRISI grants.
- CDOT is closer to being fully staffed compared to previous years, and this demonstrates that CDOT's recruiting and training approach has been effective.
- CDOT is making the transition from construction project closure to winter seasonal snow and ice removal and holiday traffic increases. Director Lew noted that maintenance crews are appreciated as they need to work, while other staff takes time off.
- Director Lew attended several moving memorial events recently, and cautioned folks to please drive carefully with the winter season approaching, as everyone plays a part in being safe.

Chief Engineer's Report - Keith Stefanik

- A grant award of $32 million was received from the Low Carbon Transportation Materials Grant program to CDOT. Thanks to staff in CDOT Materials/Geotech.
- The month of October 2024 was a record for spending at CDOT with $120 million spent.

- Eight projects are going out to bid this week for FY 2026.
- Plans now for the FY 2026 construction season anticipate a healthy program also, with roughly 92 projects identified so far, for roughly just under $1 billion of awarded projects.

Colorado Transportation Investment Office (CTIO) Director's Report - Piper Darlington

- At the last CTIO Board meeting they held a safety and tolling enforcement workshop.
- CTIO is rolling out tolling on 70 Central, I-25 South Gap, and the US 36 projects.
- There is a waiver of penalties when these toll lanes open, but after January 2025 penalties will be in place.
- Records indicate that civil penalties change behavior after one or two fines charged for violations of PPSL or crossing the double lines on the highways. Lots of media coverage and notifications will be part of the notice provided. An A-Line train wrap will also be part of spreading the word on the new tolls being enforced. A larger campaign is planned for 2025.

FHWA Division Administrator Report - John Cater

- This is National Crash Responder Week. Multiple agencies get involved in response to a crash where 7 million occur in a year across the nation. Emergency response agencies include: DOTs, Law Enforcement, Fire and Medical Rescue, Towing, etc. They need to continue to improve coordinating responses to crashes/traffic incidents safely and effectively. Held a great event in the Stapleton/Central Park area bringing together response entities with Director Lew and the Governor present.
- Administrator Cater congratulated CDOT Region 3 for the reopening of the US 50 Blue Mesa Bridge project with over 51,000 bolts installed in the bridges.
- FHWA is very busy preparing for the new Administration, providing briefings, and other activities required to prepare for this transition.

Statewide Transportation Advisory Committee (STAC) Report - Gary Beedy, STAC Chair

- The last STAC meeting was held remotely, during the snow storm event. The Storm brought 36 inches of snow, and in Burlington, there was guard rail damage just after the new guard rails were installed.
- STAC discussed the FY 2026 Budget Allocation Proposal
- A STAC 2025 Work Plan was overviewed.
    - The plan includes a review of Policy Directives - 1601, 1602, and 1610
- Also STAC wants to work more closely with the TC in decision making, where it is possible, to help obtain more funding, and also help get other legislation passed that is important to both parties.
- STAC appreciates the focus on transit hubs, but also recognized that in five years or so, these facilities will require funding for maintenance, and we need to plan for this.

- The next STAC meeting will be on January 9th and will be virtual.
- Commissioner Cook noted the need for earlier coordination with the STAC on updates.

Discuss and Act on Consent Agenda - Herman Stockinger

- Proposed Resolution #1: Approve the Regular Meeting Minutes of October 16-17, 2024 - Herman Stockinger
- Proposed Resolution #2: Authorizing CDOT to execute Intergovernmental Contracts, Amendments, and Option Letters over $750,000 for projects - Keith Stefanik.
- Proposed Resolution #3: Disposal – Old Aguilar Maintenance Site, 131 West Main St, Aguilar, Las Animas County - Shane Ferguson
- Proposed Resolution #4: Disposal – Parcel 36-EX, US Highway 285 (Formerly State Highway 70), Lakewood, Jefferson County - Jessical Myklebust
- Proposed Resolution #5: Approve Referral of CDOT Region 5 Access Appeals to the Office of Administrative Courts, C.R.S. § 43-2-147(6)(c) & 2 CCR 601-1(2.9) - Julie Constan

A motion by Commissioner Cook was raised to approve, and seconded by Commissioner Ridder, and passed unanimously.

Discuss and Act on Proposed Resolution #6: Right of Way Condemnation Authorization Request - Keith Stefanik

The project is R1 SH-287 Resurfacing: I-70 to 92nd Ave, Project #: NHPP 2073-206, Project Code: 23780

A motion by Commissioner Bowman was raised to approve, and seconded by Commissioner Masters, and passed unanimously.

Discuss and Act on Proposed Resolution #7: 4th Budget Amendment of FY 25 - Jeff Sudmeier

A motion by Commissioner Stuart was raised to approve, and seconded by Commissioner Holguin, and passed unanimously.

Discuss and Act on Resolution n #8: Draft Proposed FY 2026 Budget - Jeff Sudmeier

A motion by Commissioner Kelly was raised to approve, and seconded by Commissioner Masters, and passed unanimously.

Adjournment

The meeting was adjourned at approximately 10:10. The next Transportation Commission meeting will be held on Wednesday, December 18, 2024.

COLORADO
Department of Transportation

Transportation Commission Memorandum

To: Transportation Commission
From: Lauren Cabot
Date: December 5, 2024

Subject: Intergovernmental Agreements over $750,000.00

Purpose

Compliance with CRS §43-1-110(4) which requires intergovernmental agreements involving more than $750,000 must have approval of the Commission to become effective. In order stay in compliance with Colorado laws, approval is being sought for all intergovernmental agencies agreements over $750,000 going forward.

Action

CDOT seeks Commission approval for all IGAs contracts identified in the attached IGA Approved Projects List each of which are greater than $750,000. CDOT seeks to have this approval extend to all contributing agencies, all contracts, amendments, and option letters that stem from the original project except where there are substantial changes to the project and/or funding of the project.

Background

CRS §43-1-110(4) was enacted in 1991 giving the Chief Engineer the authority to negotiate with local governmental entities for intergovernmental agreements conditional on agreements over $750,000 are only effective with the approval of the commission.

Most contracts entered into with intergovernmental agencies involve pass through funds from the federal government often with matching local funds and infrequently state money. Currently, CDOT seeks to comply with the Colorado Revised Statutes and develop a process to streamline the process.

Next Steps

Commission approval of the projects identified on the IGA Project List including all documents necessary to further these projects except where there are substantial changes to the project and/or funding which will need re-approval. Additionally, CDOT will present to the Commission on the Consent Agenda every month listing all the known projects identifying the region, owner of the project, project number, total cost of the project, including a breakdown of the funding source and a brief description of the project for their approval. CDOT will also present any IGA Contracts which have already been executed if there has been any substantial changes to the project and/or funding.

Attachments

IGA Approved Project List

COLORADO
Department of Transportation

Transportation Commission Memorandum

To: Colorado Transportation Commission

From: Darius Pakbaz, Director, Division of Transportation Development,
Jamie Collins, STIP Manager, Division of Transportation Development

Date: December 5, 2024

Subject: Amendment to Include FHWA Grant Funding for US287 Safety Improvements in the STIP

Purpose

The purpose of this memo is to inform the Transportation Commission of the pending STIP Amendment to include $33.7 million for the US287 Safety Improvements project in the FY2025 – FY2028 STIP.

Action

Department staff is requesting your approval of the attached Amendment package so that CDOT may subsequently submit the Amendment to the Federal Highway Administration (FHWA) Colorado Division Office. Once the Amendment is approved, this funding will move from its 'pending' status to 'approved' in the STIP database in SAP.

Background

The Federal Highway Administration (FHWA) has awarded CDOT a grant to address safety concerns along the US287 corridor from Boulder County to the Wyoming state line. This amendment addresses the segments of US287 that fall within the Upper Front Range TPR. The Denver Regional Council of Governments and the North Front Range MPO are amending their respective TIPs for the segments that fall within their respective MPO areas. The total award from FHWA is $43.7 million.

Per 23 CFR 450, a 30 day public comment period has been conducted. The comment period opened on October 30, 2024 and will close on December 18, 2024. To date, no comments have been received.

Next Steps

Once the Amendment is approved, Department staff will forward the Amendment package to FHWA and will approve the amendment in the STIP database in SAP.

Attachments

Attachment 1 – STIP Amendment table detailing the funding scenario for this project
Attachment 2 – Resolution for approval of this Amendment package

COLORADO
Department of Transportation

FY2025 - FY2028 STIP - Policy Amendment 2

for Transportation Commission Approval on December 19, 2024

CDOT Region	STIP ID	STIP Description	Funding Program	Amounts in Dollars FY2025 Amount	FY2026 Amount	FY2027 Amount	FY2028 Amount	Reason for Amendment
4	SR46600.107	US287 Safety Improvements	Discretionary Funding (DIS)	$33,684,000				The project consists of approximately 15 distinct safety improvements on US287 between Ted's Place (MP 355) and the Wyoming Border (MP 385). Improvements include passing lanes, slope flattening, shoulder widening, intersection expansion and reconfiguration, signing and striping, and wildlife mitigation.

If you have any questions or comments regarding the amendment actions above, please submit them to:

Jamie Collins, Colorado Department of Transportation
jamie.collins@state.co.us
303-757-9092

Comments will be taken until close of business on **December 18, 2024.**

COLORADO
Department of Transportation

Transportation Commission Memorandum

To: Transportation Commission
From: Heather Paddock, Region 4 Transportation Director
Date: December 18, 2024

Subject: Proposed Resolution 3 - 1601 Interchange Approval for U.S. 34 & 47th Ave. and U.S. 34 & 35th Ave. Interchanges

Purpose

The CDOT 1601 Policy and Procedural Directives outline the guiding principles and steps necessary to approve a new interchange or interchange modification on the interstate, freeway, or state highway system.
The U.S. 34 & 47th Ave. and U.S. 34 & 35th Ave. Interchanges are Type 1 projects, subject to approval by the Transportation Commission. The Type 1 category includes (1) proposals for new interchanges on the state highway system with a functional classification of interstate or freeway; and (2) any type of proposal on the state highway system not initiated by CDOT that anticipates CDOT cost sharing participation.

The 1601 Procedural Directive states that new interchanges within an MPO boundary should make a good faith effort to reach a 3% reduction in Average Daily Trips (ADT) at the interchange on-ramps. The goal for TDM Strategies at U.S. 34 & 47th Ave. and U.S. 34 & 35th Ave. Interchanges is to reach a reduction of 1,015 and 881 daily trips respectively, which is 3% of the total ADT at the interchanges.

Action

Discuss and Act on Proposed Resolution 3. A presentation on the MERGE project was given to the Transportation Commission at the workshop held in November 2024.

Background

The MERGE project is being developed in partnership with the City of Greeley, who is the public agency project applicant. In 2019, CDOT completed a Planning and Environmental Linkage Study (PEL) for US 34 from Loveland to Kersey. The US 34/35th Avenue and US 34/47th Avenue interchanges were identified as a high priority in the PEL. In 2023, the City of Greeley completed their 2045 Transportation Master Plan which identifies US 34 as a priority corridor for multimodal investments. The two interchanges have also been identified on the NFR MPO Tier 1 project list for the 2024-2027 TIP.

US 34 was initially constructed in the 1970's as a bypass from US 34 Business (10th Street). Since construction of the bypass, the city has grown significantly with much of the growth centered around the bypass. Today, the proposed interchanges and regional mobility hub are at the center of Greeley and surrounded by commercial development, residential housing, and schools. The area is commonly referred to as the '*Centerplace of Greeley*'. The city has grown by 17% in the last decade, and is expected to grow by 45% in the next two decades. The City's vision is to have an ample, easy, and connected transportation system that provides seamless mobility to enrich lives and promote economic vitality.

The existing infrastructure, two at-grade signalized intersections, are the #1 and #3 highest crash locations in the City of Greeley. Crossing US 34 by foot or bike is stressful and unsafe due to the number of lanes and conflict points encountered with vehicles. The area is surrounded by Historically Disadvantaged Communities (DI) with 5.4% of the Greeley households not having access to a vehicle, making them reliant on other modes of transportation such as transit, walking and biking. While the city has strong transit service around the University of Northern Colorado (UNC), downtown, and 10th Street, it lacks transit service to residents south of US 34 and to the west. The MERGE project will provide three locations within one-mile for people to walk, ride or roll north-to-south with reduced, or eliminated, conflict points. This will allow residential neighborhoods south of US 34 to safely connect to the vast amenities at the *Centerplace of Greeley* north of US 34. It will also provide a new regional transit line serving a large portion of residents who are currently not served in southwest Greeley. This new transit service, launching with the opening of the regional mobility hub, along with reconfiguring existing transit service lines, will increase the Greeley Evans Transit (GET) system by 74% in miles-of-routes, as well as provide a 20% improvement on transit travel times. The project will reduce 40% of air pollutants and will realize an immediate 40% reduction in crashes due to the grade separated interchanges. This will all be accomplished without adding capacity or general-purpose lanes.

The MERGE project team *(CDOT Region 4, CDOT Headquarters, City of Greeley, and the NFR MPO)* have been working together in partnership to justify the need for the interchange(s), ensuring the design configuration fits within the existing and proposed land use of the area, and that the TDM strategies presented will be effective and successful. The proposed transit service and regional mobility hub will connect to existing transit services such as Greeley-Evans Transit (GET), City of Loveland Transit (COLT), CDOT's Bustang, and the new NFR MPO's LINKNoCo service.

Seeing that this project is at the center of a diverse and bustling area of the community, it is expected that this is a "place" or "destination" that begins or ends a trip. From a traffic modeling standpoint, there are almost as many vehicles moving north and south as there are east and west; therefore, the volume of traffic moving on the ramps is significant, and is 75% of the volume on mainline US 34 and greater than the north and southbound movements. Per PD 1601, the identified trip reduction goal for this project is 3%, which equates to a total of 1,896 daily trips between the

two interchanges. The city, through their current land use planning, proposed transit service, micro mobility improvements, and TDM good faith effort strategies, anticipate a 3.31% and 3.08% ADT reduction at the 47th and 35th interchanges. This project is projected to reduce 2,024 daily trips, thus meeting the 3% goal.

Recommendation

Approve staff's recommendation that the MERGE project has sufficiently met the determination of need for the interchange(s), the interchange configuration, and the TDM strategies as they align with the community's needs for expanded mobility and transit connections.

Next Steps

1. Conduct NEPA Evaluation.
2. Develop Final IGA between the City of Greeley and CDOT.

Attachments

- MERGE System Level Study (available by request to Daniel.Mattson@state.co.us)

COLORADO
Department of Transportation

Memorandum

To: The Transportation Commission
From: Jeff Sudmeier, CDOT Chief Financial Officer
Date: December 19, 2024
Subject: State Infrastructure Bank (SIB) Interest Rate Recommendation for the Second Half of Fiscal Year 2024-25

Purpose

The purpose of this memorandum is to outline the proposed Colorado State Infrastructure Bank (SIB) interest rate for loans originating in the second half of State Fiscal Year 2024-25 and the origination fee schedule for Fiscal Year 2024-25.

Action

The Division of Accounting and Finance (DAF) recommends that the Transportation Commission (TC) hold the current SIB interest rate at/to 3.50% for loans originating in Fiscal Year 2024-25 Q3/Q4 and maintain the recommended origination fee schedule detailed in this memorandum.

Background

SIB Loan Rates: The SIB, established in 43-1-113.5(3) C.R.S. and Rule V. Article 2 of 2CCR 605-1, requires that the TC set bi-annual interest rates for SIB Loans. Established rates over the past 18 months have been:

FY 2023-24 Q1/Q2: 3.50%	FY 2023-24 Q3/Q4: 3.50%	FY 2024-25 Q1/Q2: 3.50%

Origination Fee Schedule: Rule V, Article 3 of 2 CCR 605-1 outlines the following origination fee schedule to be maintained for the current fiscal year as adopted by the TC. The TC may at their discretion apply the fee, the maximum of:

- 1.00% for loan proceeds up to $1 million
- 0.75% on the loan proceeds over $1 million up to $2.5 million
- 0.50% on the loan proceeds over $2.5 million up to $5 million
- 0.25% on the loan proceeds over $5 million

Rate Recommendations/Interest Rate Outlook for US Treasury Market

The current U.S. Treasury market and Federal Funds Rate, as well as the Department's Financial Advisor's projections for the US Treasury market and Federal Funds Rate are used to determine the SIB interest rate. Medium to long-term interest rates (Taxable and Tax-Exempt) have remained relatively constant over the first half of CDOT's fiscal year, even with the Fed executing rate cuts of 50 and 25 basis points at the last two FOMC meetings. The 10-year US Treasury yield, which serves as the benchmark for the SIB interest rate, has seen some fluctuations since the beginning of the fiscal year, albeit less volatile than previous memorandums. The 10-year US Treasury hit a low of 3.70% in September and a recent high of 4.44% in mid-November.

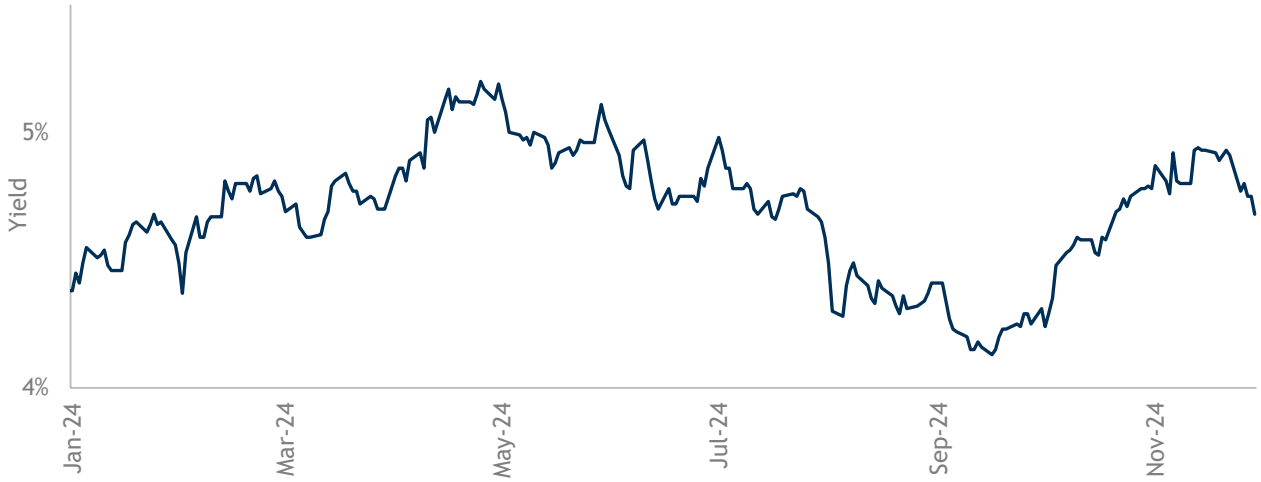
- This recommendation is based on the following:
  - Despite some early, emerging weakness in housing, construction and manufacturing, the storyline of a solid economy remains intact. The backdrop of ongoing consumer resilience and positive business investment underscores the persistent strength of domestic activity.
  - Going forward, if economic data remains as solid as it has and inflation stays "sticky", there is ample support and justification for the Fed to potentially hold policy steady at the start of next year or even as early as the December meeting.
  - For the market, despite the recent pivot in monetary policy, resulting in 75bps of rate cuts in three months, longer-dated yields remain relatively unchanged. Market consensus currently does not point to any near-term rate changes, as evidenced in the table below:

Market Consensus Rate Forecast

Rate Type	Current	Q4 2024	Q1 2025	Q2 2025	Q3 2025
Fed Funds Rate	4.75	4.55	4.25	3.95	3.75
US 2-Year	4.13	4.11	3.96	3.76	3.64
US 10-Year	4.18	4.30	4.24	4.15	4.11
US 30-Year	4.36	4.52	4.47	4.40	4.36

Source: Bloomberg (11/29/2024)

10-Year UST Movement in Calendar Year 2024 YTD



Options and Recommendation

1. **Staff Recommendation:** Maintain the current SIB interest rate at 3.50% for all SIB loans originating in Fiscal Year 2024-25 Q3/Q4 and maintain the recommended origination fee schedule for all loans during the same period.
2. Adopt a new interest rate determined by the Transportation Commission.
3. Deny the recommended SIB loan interest rate, request additional staff analysis, and/or delay approval consideration for a future month.

Next Steps

If approved as recommended, Department staff will apply the approved interest rate and origination fee schedule to all SIB loans originating in the second half of Fiscal Year 2024-25.

Attachments:

Attachment A: Proposed SIB Rate Resolution

COLORADO
Department of Transportation

Transportation Commission Memorandum

To: The Transportation Commission
From: Jeff Sudmeier, Chief Financial Officer
Date: December 18, 2024

Subject: Monthly Cash Balance Update

Purpose

To provide an update on cash management, including forecasts of monthly revenues, expenditures, and cash balances for the State Highway Fund, SB 17-267 Trustee Account, and American Rescue Plan Act funds.

Action

No action is requested at this time.

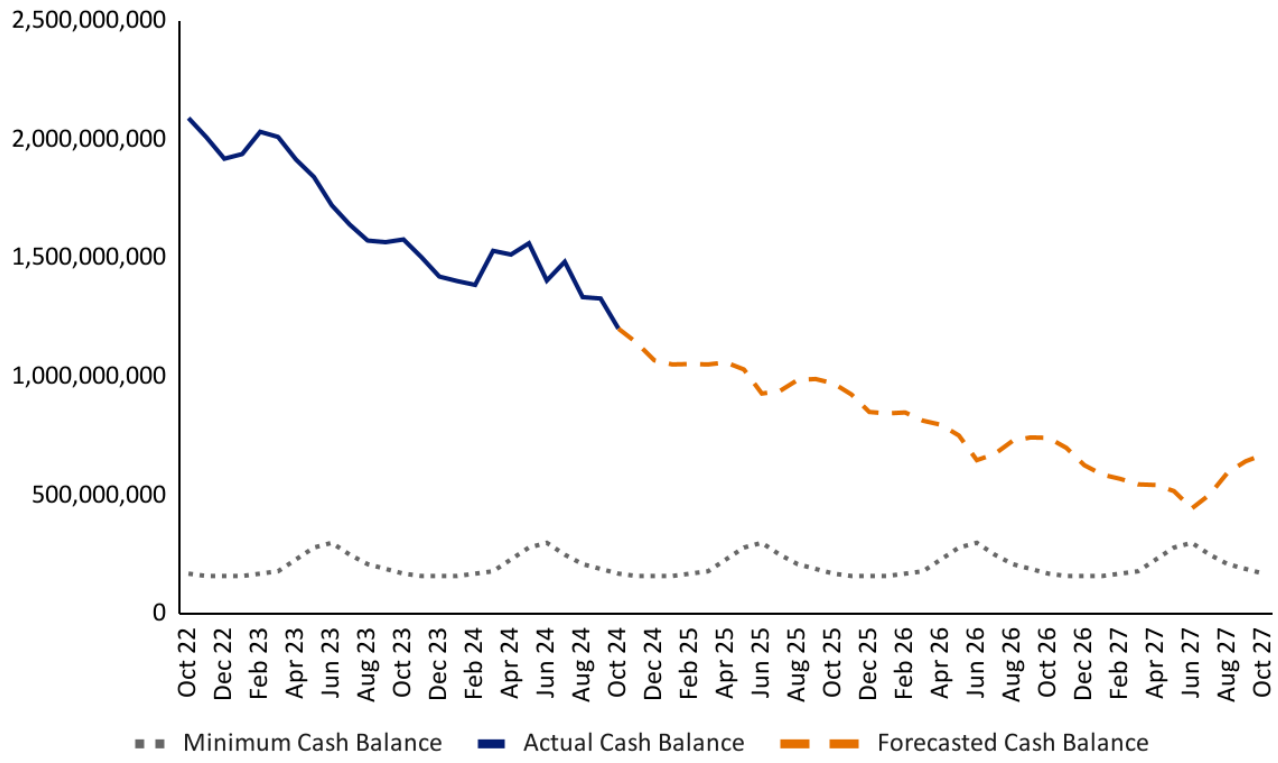
Summary

The actual cash balance for October 2024 was $1.20 billion; $1.03 billion above that month's minimum cash balance target of $170.00 million. October's cash balance includes $571.00 million in the State Highway Fund and $635.81 million in the Senate Bill 267 trustee account.

Figure 1 below outlines the Department's 36-month cash forecast. The primary drivers in this forecast include revenue from the state Highway Users Tax Fund (HUTF), federal reimbursements, payments to contractors, and General Fund transfers made pursuant to SB 21-260.

The Fund 400 Cash Balance is expected to gradually decrease over the forecast period as projects funded with SB 17-267 and other legislative sources progress through construction. The sections below provide additional information on the revenues and expenditures forecasted for this memo.

Figure 1 - Fund 400 Cash Forecast



Cash Balance Overview

The Transportation Commission's directive (Policy Directive 703.0) outlines targeted minimum cash balances to limit the risk of a cash overdraft at the end of a month to, at most, a probability of 1/1,000 (1 month of 1,000 months ending with a cash overdraft). The forecasted cash balance is expected to remain above the targeted minimum cash balance through the forecast period.

The cash balance forecast is limited to the State Highway Fund (Fund 400 and affiliated funds and trustee accounts). This forecast does not include other statutory Funds, including the Multimodal Mitigation and Transportation Options Fund and funds associated with CDOT enterprises.

Revenue Sources Forecasted

The State Highway Fund revenues forecasted in this cash balance include:

- Highway Users Tax Fund - This primarily includes Motor Fuel Taxes, Vehicle Registration Fees, Road Usage Fees, and Retail Delivery fees.
- Miscellaneous State Highway Fund Revenue - This revenue includes proceeds from the sale of state property, interest earned on balances in the cash fund, the issuance of oversize/overweight permits, and revenue from various smaller sources.
- SB 17-267 - This bill directed the State Treasurer to execute lease-purchase agreements on existing state facilities to generate revenue for priority transportation projects.

- General Fund Transfers- Pursuant to SB 21-260, annual General Fund transfers will be made to the State Highway Fund between FY 2024-25 to FY 2031-32. This cash forecast assumes these transfers will be made in July of each year.

Expenditure Sources Forecasted

The State Highway Fund expenditures forecasted in this cash balance include:

- Payments to construction contractors (described in more detail in the section below)
- Staffing expenses and program-related professional services
- Right of Way Acquisition
- Debt Service
- Transfers between CDOT and other state entities
- Maintenance and facilities expenditures
- Grant expenditures
- Other expenditures related to services and equipment.

Cash Payments to Construction Contractors

The current forecast of payments to construction contractors under state contracts (grants paid out under inter-government agreements for construction are accounted for elsewhere in the expenditure forecast) from Fund 400 is shown in Figure 2 below.

Figure 2 - Cash Payments to Construction Contractors (millions)

CY 2019 (actual)	CY 2020 (actual)	CY 2021 (actual)	CY 2022 (actual)	CY 2023 (actual)	CY 2024 (forecast)
$669	**$774**	**$615**	**$841**	**$860**	**$801***

*This is a preliminary forecast that will be updated as additional project schedule detail becomes available.

Figure 3 details CY23 baseline and actual expenditures for the State Highway Fund (see Figure 2 above) as well as Bridge and Tunnel Enterprise. CDOT sets the CY baseline in January each year, using the best estimates, forecast, and schedule information available at the time.

Including Bridge Enterprise, October month end expenditures were corresponding to an Expenditure Performance Index (XPI) of 1.04 (actual expenditures vs. baseline). There were $669.8M actual expenditures YTD vs. the baseline of $646.4M. The CY 23 baseline included expenditures from 169 projects, while the current CY 24 baseline includes expenditures from 196 projects. Figure 4 details the current CY24 baseline and actual expenditures.

Figure 3 - Dashboard View, CY 23 Year End

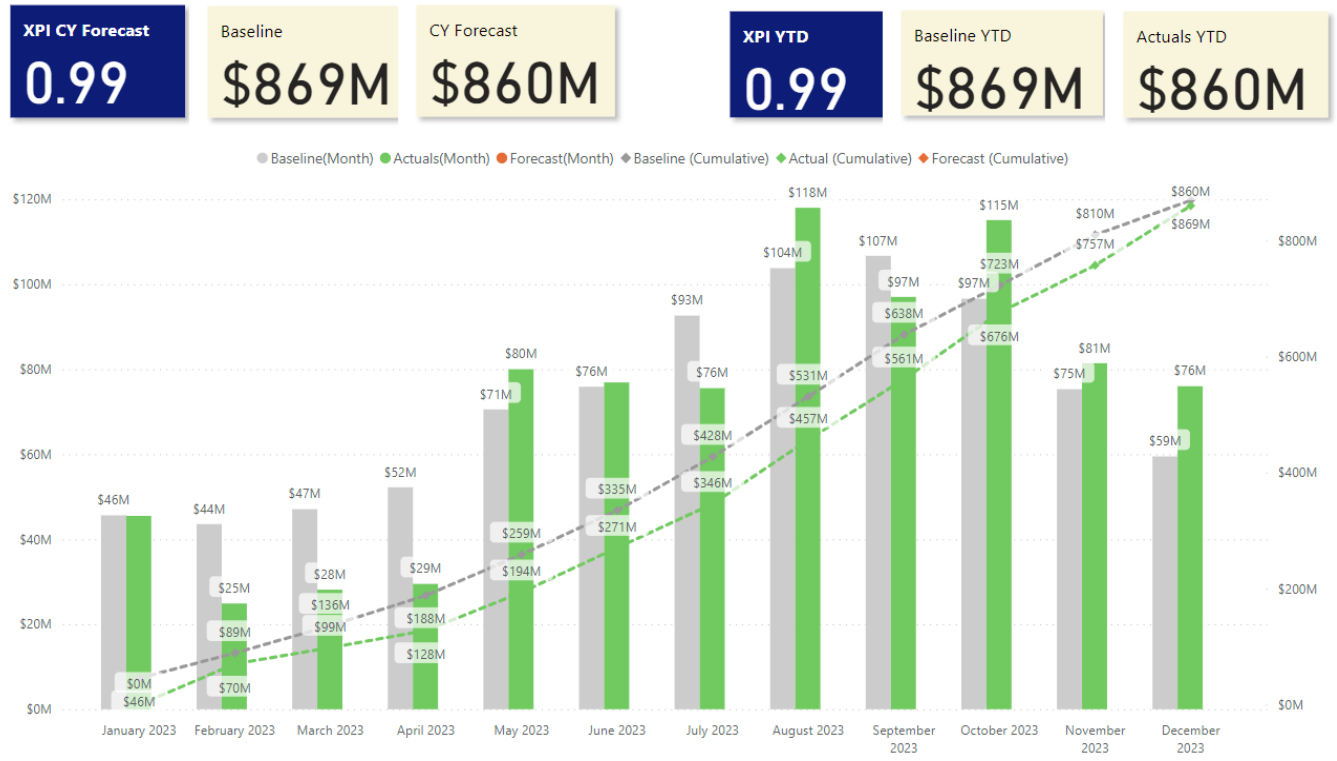
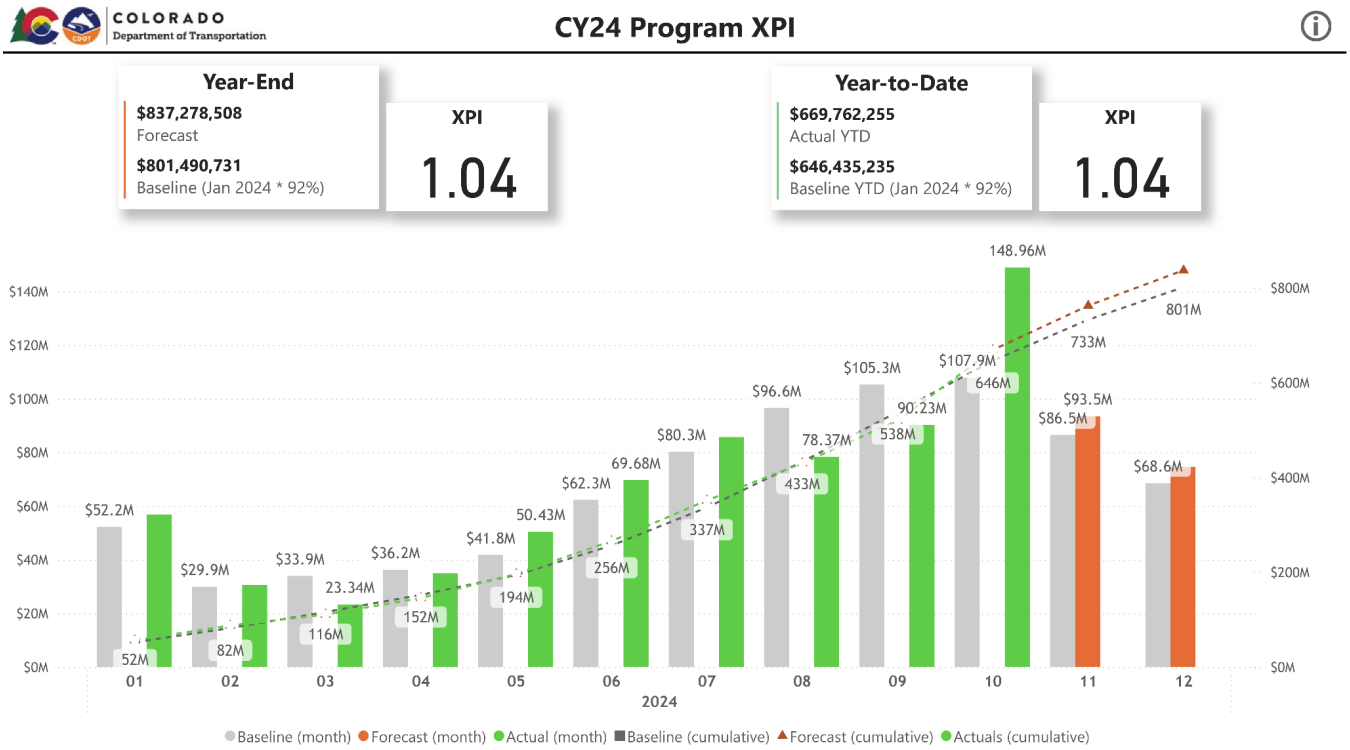


Figure 4 - Dashboard View, CY 24



COLORADO
Department of Transportation

Transportation Commission Memorandum

To: Colorado Transportation Commission

From: Anna Dunn, Grants Coordinator in OPGR

Date: December 6th, 2024

Subject: Update to the Transportation Commission on CDOT's submitted, in progress, and forthcoming grant applications

Purpose

To share progress on submitted applications, as well as current and future coordination of proposals to anticipated federal discretionary programs, primarily under the Infrastructure Investment Jobs Act (IIJA).

Action

Per PD 703.0, when the department intends to apply for grants with a match consisting of previously approved funding, no action is necessary by the Commission, but we provide the Commission with the projects we intend to pursue. If the match requires an additional commitment of funds not already approved by the Commission, or Bridge & Tunnel Enterprise (BTE), staff brings the projects to the Commission as an action item, with the additional funding being made contingent on a successful application and grant award.

As always, Commissioners and CDOT staff are encouraged to contact CDOT's in-house grant team with questions, comments, and suggestions.

Background

For information on closed 2022 and 2023 grant programs and awarded proposals, please refer to archived TC Grants Memos from December 2023 or prior.

The following discretionary grant programs have closed and awards have been announced:

1. MULTIMODAL PROJECT DISCRETIONARY GRANTS (MPDG): A multi-billion dollar "umbrella" program that contains Mega, INFRA, and Rural Surface Transportation.
    - I-76 Phase IV Reconstruction in Region 4
        - $29.1M Awarded!
    - US 160 Safety & Mobility Improvements in Region 5
        - $58.9M Awarded!
2. RECONNECTING COMMUNITIES AND NEIGHBORHOODS (RCN)
    - Federal & Colfax Cloverleaf Interchange Planning Grant in Region 1
        - $2M Awarded!
3. STRENGTHENING MOBILITY AND REVOLUTIONIZING TRANSPORTATION (SMART)
    - I-25 Coordinated Adaptive Ramp Metering (CARM) Expansion in Region 1
        - $1.4M Awarded!

4. RAISE
    - I-270 & Vasquez Interchange Planning in Region 1 w/ Adams County
        - $4.8M Awarded!
5. BIP Planning
    - CO 96 Critical Bridges Replacement Feasibility Analysis
        - $760,000 Awarded!
6. 5339s (Low-No Emissions and Bus & Bus Facilities)
    - CDOT submitted applications for 11 agencies, and were awarded the following to support local agencies in grant administration and project delivery:
        - $1,951,080 awarded for Telluride to modernize the Galloping Goose Transit Maintenance Facility
        - $418,359 awarded for Archuleta County Mountain Express Transit to build a new park-and-ride facility in Aspen Springs, and support a new bus route from Aspen Springs to Pagosa Springs, Bayfield, and Durango.
        - $4,573,000 awarded for Eagle Valley Transportation Authority to buy hybrid-electric buses to replace older diesel vehicles
        - $32,837,664 awarded for Roaring Fork Transportation Authority (RFTA) to modernize its Glenwood Springs Operations and Maintenance Facility to support its planned zero-emission bus fleet.
        - $659,089 awarded for Durango Transit to replace aging buses and improve safety at several bus stops
        - $1,516,108 awarded for Gunnison Valley Rural Transportation Authority to purchase new buses and expand the Gunnison Valley RTA's fleet.
7. MULTIMODAL PROJECT DISCRETIONARY GRANTS (MPDG): A multi-billion dollar “umbrella” program that contains Mega, INFRA, and Rural Surface Transportation.
    - US 287 Corridor Safety Project in Region 4
        - $47.2M Awarded!
8. CONSOLIDATED RAIL INFRASTRUCTURE & SAFETY IMPROVEMENTS (CRISI) GRANT PROGRAM
    - Modernizing Rail on the Front Range: PTC Installation & Grade Crossing Safety and Operational Improvements
        - $66.4M Awarded!
9. ADVANCING DIGITAL CONSTRUCTION MANAGEMENT SYSTEMS (ADCMS)
    - Revised application to establish CDOT’s first vehicle-mounted LiDAR and Photogrammetry program.
        - $1.44M Awarded!

The following discretionary grant programs have closed, but applications are still being reviewed:

1. BRIDGE INVESTMENT PROGRAM (BIP) - LARGE BRIDGE
    - CDOT revised the Region 1 I-270 Corridor Improvements Bridge Bundle application
2. ADVANCED TRANSPORTATION TECHNOLOGY and INNOVATION (ATTAIN)
    - CDOT’s Traffic Safety and Engineering Services Branch submitted an application to purchase equipment, software, and training materials to establish CDOT’s first LiDAR and Photogrammetry technology program.
3. CONGESTION RELIEF PROGRAM (CRP)
    - The Federal Blvd BRT Service Builder Project in Region 1
4. VEHICLE TECHNOLOGIES OFFICE (VTO) TECHNOLOGY INTEGRATION (TI)
    - OIM submitted two applications to two different “areas of interest”

        - Community-Driven Data Solutions: Using Advanced Artificial Intelligence to Address Transportation Equity in Colorado
        - Colorado ZEV Emergency Responder Safety Training Program
5. MULTIMODAL PROJECT DISCRETIONARY GRANTS (MPDG): Rural Surface Transportation grants are still under review, even though Mega and INFRA have been awarded.
    - Kings Valley Drive & US 285 Grade-Separation in Region 1 w/ Jefferson County
    - US 50 Safety & Highway Improvements for Freight and Travel (SHIFT) in Region 2 w/ Otero County
    - State-Wide Avalanche Protocol (SWAP) in Regions 3 & 5
    - US 550 & Animas River Crossing Project in Region 5 w/ La Plata County
6. ACTIVE TRANSPORTATION INFRASTRUCTURE INVESTMENT PROGRAM (ATIIP)
    - CO 7 Bike and Ped Improvements in Regions 1 & 4
    - Bridging Denver Area Network Gaps in R1
    - CO 145 Rural Active Connection and Equity in R5
7. WILDLIFE CROSSINGS PILOT PROGRAM (WCPP)
    - US 40 Empire Crossing in R1
    - I-25 Raton Pass Multi-State Network Connectivity in R2
    - I-70 East Vail Pass Wildlife Crossings in R3
    - US 287 Wildlife Crossing Infrastructure in R4
8. RAILROAD CROSSING ELIMINATION (RCE)
    - US 40 Crossings East & West of Craig Planning Project in R3
9. RECONNECTING COMMUNITIES PROGRAM (RCP)
    - Federal Blvd & US 36 BRT Connection Planning Project in R1
    - US85 Bridge Replacement & Multimodal Connections – Venetucci Blvd to Fountain Creek in R2
10. BRIDGE INVESTMENT PROGRAM (BIP) - PLANNING
        - I-70 West Applewood to Lakewood Critical Bridges Planning in R1
11. BRIDGE INVESTMENT PROGRAM (BIP) - OTHER than LARGE BRIDGE (>$100M)
    - US50 Blue Mesa Bridges Emergency Repairs

IN PROGRESS

CDOT is actively pursuing the following discretionary grant program(s):

1. RAISE
    - CDOT is pursuing grants for 8 Mile in Region 2, an I-76 Paving Bundle in R4, I-70 and Kipling in Region 1, and a Mountain Rail Resilience and Safety Bundle in Region 3, subject to final approval from the Executive Director.
2. PROTECT
    - CDOT is pursuing grants for Glenwood Canyon RESCUE in Region 3, Avalanche Mitigation (SWAP) in Region 3 and 5, and a Culvert package. Exact locations on the culvert package are pending. All grants are subject to final approval from the Executive Director and relevant partner agencies.
3. National Scenic Byways Program
    - CDOT staff has worked with local agencies to prepare two applications for this program:
        - Mount Blue Sky Scenic Byway: Interpretation & Corridor Management Plan
        - Roadside Markers Improvements on Colorado Byways

CDOT DISCRETIONARY GRANT SUCCESS BY THE NUMBERS

Since the IIJA was signed into law in November 2021…

- CDOT has been awarded $508.6M, including both direct and indirect via local agency partnerships
- 18 priority projects featured in our 10 Year Plan have won a federal discretionary grant
- The Floyd Hill to Veterans Memorial Tunnels Improvements Project received CDOT's largest award to date at $100M

Next Steps

Grants team will work with management to finalize its slate of RAISE and PROTECT grants.

COLORADO
Department of Transportation

Transportation Commission Memorandum

To: The Transportation Commission
From: Jeff Sudmeier, Chief Financial Officer
Bethany Nicholas, Colorado Department of Transportation Budget Director
Date: December 19, 2024
Subject: December Budget Supplement

No Items for Approval. Balances of TC Funds are as follows:

Transportation Commission Contingency Reserve Fund Reconciliation

Date	Transaction Description	Amount	Balance
June-24	Balance 12S24		$3,677,851
July-24	Balance 1S25		$19,972,392
August-24	Balance 2S25		$19,972,392
September-24	Balance 3S25		$20,017,044
October-24	Balance 42S25		$20,102,544
November-24	Balance 52S25		$20,102,544
December-24	Balance 62S25		$20,102,544

Cost Escalation Fund Reconciliation

Date	Transaction Description	Amount	Balance
June-24	Balance 12S24		$9,608,937
July-24	Balance 1S25		$9,698,442
August-24	Balance 2S25		$9,879,960
September-24	Balance 3S25		$7,597,670
October-24	Balance 4S25		$6,136,803
November-24	Balance 5S25		$2,709,912
November-24	Region 4 Project 25058 (Rural Roads over I-70)	-$145,267	
December-24	Pending Balance 6S25		$2,564,645

Transportation Commission Program Reserve Fund Reconciliation

Date	Transaction Description	Amount	Balance
June-24	Balance 1S24		$6,870,207
July-24	Balance 1S25		$5,015,869
August-24	Balance 2S25		$4,415,869
September-24	Balance 3S25		$55,339,033
October-24	Balance 4S25		$50,439,033
November-24	Balance 5S25		$50,056,233
	Correction to Budget Amendment - dark fiber lease / small cell permit revenue		-$12,755
December-24	Pending Balance 6S25		$50,043,478

Transportation Commission Maintenance Reserve Fund Reconciliation

Date	Transaction Description	Amount	Balance
June-24	Balance 12S24		$0
July-24	Balance 1S25		$12,000,000
August-24	Pending Balance 2S25		$12,000,000
September-24	Balance 3S25		$12,000,000
October-24	Balance 4S25		$12,000,000
November-24	Pending Balance 2S25		$20,000,000

COLORADO
Department of Transportation

Transportation Commission Memorandum

To: State of Colorado Transportation Commission.
From: Darius Pakbaz, Administrator - Nonattainment Air Pollution Mitigation Enterprise
Date: December 18, 2024

Subject: Nonattainment Air Pollution Mitigation Enterprise - 2024 Annual Report

Purpose

The Nonattainment Area Air Pollution Mitigation Enterprise (NAAPME) is required by C.R.S. § 43-4-1303 (10)(a)(IV) to submit an annual report regarding its activities and funding to the Transportation Commission. The annual report for the Enterprise is presented to the Commission for calendar year 2024.

Action

Informational only, no action required.

Background

The Nonattainment Area Air Pollution Mitigation Enterprise (NAAPME) was created as part of SB21-260 legislation in 2021. The Enterprise is a government-owned business within CDOT to execute the business purpose as outlined in statute. The Enterprise's business purpose is "to mitigate the environmental and health impacts of increased air pollution from motor vehicle emissions in nonattainment areas that results from the rapid and continuing growth in retail deliveries made by motor vehicles and in prearranged rides provided by transportation network companies by providing funding for eligible projects that reduce traffic, including demand management projects that encourage alternatives to driving alone or that directly reduce air pollution, such as retrofitting of construction equipment, construction of roadside vegetation barriers, and planting trees along medians."

Next Steps

Please contact NAAPME staff with any questions regarding the 2024 Annual Report.

Attachments

- Attachment A - Nonattainment Area Air Pollution Mitigation Enterprise 2024 Annual Report

COLORADO

Department of Transportation

Nonattainment Area Air Pollution Mitigation Enterprise

NAAPME 2024 Annual Report

Pursuant to C.R.S. § 43-4-1303 (10)(a)(IV)

Reporting Period: January 1, 2024 to December 31, 2024

Background

The Nonattainment Area Air Pollution Mitigation Enterprise (NAAPME, or the Enterprise) was established within the Colorado Department of Transportation (CDOT) to support projects that mitigate the environmental and health impacts of increased air pollution from motor vehicles in nonattainment areas of Colorado. Created by Colorado Senate Bill 21-260 (SB 21-260, "Sustainability of the Transportation System"), the Enterprise imposes an Air Pollution Retail Delivery Fee and an Air Pollution per Ride Fee to fund programs and projects that fulfill its business purpose.

The primary business purpose of the NAAPME is to "mitigate the environmental and health impacts of increased air pollution from motor vehicle emissions in nonattainment areas that results from the rapid and continuing growth in retail deliveries made by motor vehicles and in prearranged rides provided by transportation network companies by providing funding for eligible projects that reduce traffic, including demand management projects that encourage alternatives to driving alone or that directly reduce air pollution, such as retrofitting of construction equipment, construction of roadside vegetation barriers, and planting trees along medians."

Nonattainment areas in Colorado are designated areas from the U.S. Environmental Protection Agency (EPA) that do not meet ambient air pollution standards. Ozone is the only identified pollutant in which parts of Colorado are currently in nonattainment for these standards. Currently Adams, Arapahoe, Boulder, Broomfield, Denver, Douglas, Jefferson, a portion of Larimer, and Weld Counties are in the designated ozone nonattainment area within the state.

Projects funded by the Enterprise look towards reducing the impact of air pollution from ozone in the current nonattainment areas of Colorado. The Enterprise has identified three focus areas in which projects can support this objective, as outlined in its 10-Year Plan:

- **Sustainably reduce traffic congestion**
  Projects that provide alternatives to single occupancy travel including transit services, active transportation alternatives, and carpool alternatives, as well as roadway operations improvements that sustainably reduce congestion, such as traffic incident management:
  - Expanding interregional transit services (e.g., Bustang);
  - Development and expansion of bus rapid transit services;
  - Mobility Hubs: destinations for transit services that connect interregional and local services, including first and last miles services, electric vehicle charging, and bike parking;
  - New and expanded sidewalks and bike paths; and
  - New and expanded vanpool, carpool, and other services for commuter travel.

- **Reduce the environmental and health impacts of transportation**
  Reducing impacts from the construction and ongoing operation of transportation projects:
  - Reduce the impact of large highway construction projects;
  - Retrofitting construction equipment for highway projects;
  - Air quality monitoring for larger highway construction projects; and
  - Roadside vegetation barriers.

- **Improve neighborhood connectivity for communities adjacent to highways**
  Fund mitigation measures that help reconnect communities and provide multimodal options to move along and across large urban corridors:
  - More sidewalks and bike paths along major corridors and local roads;
  - Safer bike and pedestrian connectivity along busy urban streets; and
  - Projects that reduce traffic speeds along busy urban streets.

Calendar Year 2024 Summary

“Community Clean Transportation AssistanceProgram (CCTAP)”

The Enterprise Board of Directors approved its first grant funding program in September 2024. The Community Clean Transportation Assistance Program (CCTAP) was officially authorized by the Enterprise on November 4, 2024, with $17 million available to eligible entities for projects that will help reduce the environmental and health impacts of transportation in the Nonattainment Area.

The Enterprise is currently reaching out to planning agencies in this area about CCTAP, and responding to a growing number of emails for further information. A press release, webinar, FAQ document, technical assistance, and other information will also be made available to (including resources in Spanish).

CCTAP Application Timeline

- November 2024 through February 2025: Open period for questions, technical assistance, and identification of engineering review of proposed project.
- 5:00 p.m., Feb. 25, 2025: Deadline to Submit Draft Applications for Review
- March through April 2025: Technical review of applications review for project feasibility.
- 5:00 p.m., April 30, 2025: Deadline to Submit Final Applications.
- May 2025: Applications evaluated by Enterprise staff
- 4:30 p.m., June 26, 2025: Board of Directors review and award projects.
- No later than July 31, 2025: Award Notices Sent to Applicable Parties

Board Meetings

Throughout Calendar Year 2024, the Enterprise and its Board of Directors worked to build on the foundation of its 10-Year Plan, expanding on those concepts and learning more about needs with stakeholders throughout the ozone nonattainment area. Throughout the year, the Board of Directors met eleven times, with discussions ranging from decisions regarding funding programs for the Enterprise to administrative and budgetary actions.

January 2024

The Board of Directors meeting was held on January 25th, with informational presentations and discussion on the following topics:

- Local Match Requirements for the CDOT Multimodal Transportation Options Fund (MMOF);
- Approval of Proposal for NAAPME Program Evaluation Criteria; and
- Accessibility and Translation of NAAPME Materials.

February 2024

The Board of Directors meeting was held on February 22nd, with informational presentations and discussion on the following topics:

- Adoption of the NAAPME FY 2024-25 Budget;
- Adoption of Rideshare and Retail Delivery Fee adjustments for FY 2024-25;
- Enterprise Financing Strategies; and
- Allocation of NAAPME Program Funds.

March 2024

The Board of Directors meeting was held on March 28th, with informational presentations and discussion on the following topics:

- Colorado General Assembly - Legislative Session Update;
- Board Chair and Vice-Chair Elections; and
- Allocation of NAAPME Program Funds.

April 2024

The Board of Directors meeting was held on April 25th, with informational presentations and discussion on the following topics:

- Board Policy Regarding Fiscal Management; and
- Allocation of NAAPME Program Funds.

May 2024

The Board of Directors meeting was held on May 23rd, with informational presentations and discussion on the following topics:

- Board Policy Regarding Fiscal Management; and
- Allocation of NAAPME Program Funds.

June 2024

The Board of Directors meeting was held on June 27th, with informational presentations and discussion on the following topics:

- Approved Board Policy Regarding Financial Management;
- Approved Enterprise Spending Plan;
- Approved revised NAAPME 10-Year Plan; and
- Allocation of NAAPME Program Funds.

July 2024

The Board of Directors meeting was held on July 25th, with informational presentations and discussion on the following topics:

- Large Projects Grant Program Discussion; and
- Allocation of NAAPME Program Funds.

August 2024

The Board of Directors meeting was held on August 29th, with informational presentations and discussion on the following topics:

- Annual Open Records Training; and
- Allocation of NAAPME Program Funds.

September 2024

The Board of Directors meeting was held on September 25th, when they approved a Small Grant Funding Program and directed NAAPME Staff to create a Notice of Funding Opportunity (NOFO) for it.

October 2024

The Board of Directors meeting was held on October 31st, with informational presentations and discussion on the following topics:

- Review of draft Fiscal Year 2025 Budget;
- Update on NOFO Progress for Small Grant Funding Opportunity.

December 2024

The Board of Directors meeting was held on December 5th, with informational presentations and discussion on the following topics:

- Review and approve the Enterprises' Calendar Year 2024 Annual Report.
- Review and approve Fiscal Year 2025 Budget Reconciliation

Enterprise Budget

Fiscal Year 2023-24

Colorado's State fiscal Year 2023-24 concluded on June 30, 2024. Most expenditures for this fiscal year were administrative to continue to support the establishment of the Enterprise and identify funding programs in line with the objectives outlined in statute and the Enterprise's 10-Year Plan. Enterprise expenses totaled $38,756. The Enterprise allocated $200,000 to the Board contingency fund for the fiscal year, which was not used. These funds, and unused administrative expenses ($330,682) were added to the roll-forward of funds allocated to Enterprise funded programs ($19,444,258).

Fiscal Year 2024-25

The Board of Directors adopted the Fiscal Year 2024-25 Budget in February 2024, allocating $30.33 million in anticipated revenue for the fiscal year. This amount represents the total funds available for the Enterprise to invest in its initiatives during Fiscal Year 2024-25. As the Board advances its decisions regarding the Enterprise's program of projects, it is expected that funds will be allocated to specific initiatives, including the CCTAP program and the broader grant program with a primary focus on supporting Bus Rapid Transit (BRT) projects, all aligned with its business purpose. Table 1 presents the estimated breakdown by revenue allocation category for the fiscal year.

Table 1 - NAAPME Fiscal Year 2024-25 Budget Overview

Budget Line Item	Total Estimated Revenues	Total Estimated Expenditures	Total Estimated Allocations
Total Estimated Revenues	$30,325,919		
Total Programmed & Project Support Services		$25,870,000	
Total Administrative & Operating Activities		$181,000	
Total Debt Service		$0	
Total Board Contingency Reserve			$200,000
Total Revenues	**$30,325,919**		
Total Expenditures		**$26,051,000**	
Unbudgeted Revenues	**$4,274,919**		

Staff provided a budget amendment to the approved fiscal year 2024-25 budget, which the Board approved in December 2024. This amendment reconciled the discrepancies from estimated revenue collection and remaining funds from fiscal year 2023-24 to actuals from that year.

Fee Levels for the Air Pollution Per Ride Fee and Air Pollution Mitigation Retail Delivery Fee

In accordance with Colorado Revised Statutes § 43-4-1303(7)(c)(I) & (II), the Board is able to adjust the fee levels for both the Air Pollution per Ride fee and the Air Pollution Mitigation Retail Delivery fee. The NAAPME Board adopted new fee levels for fiscal year 2024-25, based on recommendations from the Colorado Department of Revenue and Enterprise, specifically:

- Increased Air Pollution per Ride fee for Non-Carshare and Gasoline Powered Vehicles from 23 ¼ Cents to 24 Cents;
- Increased Air Pollution per Ride fee for Carshare / Zero Emission Vehicle (ZEV) Rideshare rides from 12 Cents to 12 ¾ Cents; and
- Increased Air Pollution Mitigation Retail Delivery fee from 73/100 of one cent to 75/100 of one cent.

The revised fee levels were reported to the Colorado Department of Revenue ahead of the statutory deadline of March 15th.

Financial Status Report

The Air Pollution per Ride fee and Air Pollution Mitigation Retail Delivery fee established by statute are ongoing revenue streams for the Enterprise. Along with fee adjustments approved by the Board in February 2024, the Board reviewed and approved an updated revenue estimate for fiscal year 2024-25 through fiscal year 2026-27. Table 2 details the estimated revenue collection by fee for these years, replacing original estimates from previously.

Table 2 - Estimated Future Revenue Collection by Fiscal Year and Source

Revenue Sources	Fiscal Year 2024-25	Fiscal Year 2025-26	Fiscal Year 2026-27
Air Pollution Mitigation Retail Delivery Fee	$2.7 Million	$3.0 Million	$3.4 Million
Air Pollution Mitigation Per Ride Fee	$8.4 Million	$10.4 Million	$12.7 Million
Totals	**$11.1** Million	**$13.4** Million	**$16.1** Million

Upcoming Activities

The Nonattainment Enterprise expects to spend most of its efforts in Winter-Spring 2025 on administration of the Community Clean Transportation Assistance Program. This will include reaching out to eligible communities in the Nonattainment Area, answering technical questions about the grant and eligibility, and begin the process of accepting grant applications. It is anticipated that the Board of Directors will make grant awards for this funding opportunity in June of 2025. Enterprise staff will then update publicly available information regarding the status of funding through its public dashboard regarding funding decisions and statuses of projects.

The Enterprise will also work with other parts of CDOT on how best to establish and administer a larger grant program for entities wishing to expand BRT programs throughout the Nonattainment Area. This will include final budgetary allocation for a program, establishment of eligibility criteria and how to evaluate applications, and other administrative efforts related to this with advice and confirmation from the Board of Directors. Establishment of a program for this effort is anticipated to be completed by the end of fiscal year 2025.

While this is not an exhaustive list of all the potential activities for calendar year 2025, it should be an exciting and busy year for the Nonattainment Area Air Pollution Mitigation Enterprise, which looks forward to beginning helping communities throughout the Denver Metro and North Front Range areas of Colorado.

COLORADO
Department of Transportation

Transportation Commission Memorandum

To: THE TRANSPORTATION COMMISSION
From: Craig Secrest, Director, Clean Transit Enterprise
Date: December 18, 2024

Subject: Clean Transit Enterprise 2024 Annual Report

Purpose
Informational

Action
No action required

Background
In 2021, Colorado Senate Bill 21-260 created the Clean Transit Enterprise (CTE) within the Colorado Department of Transportation (CDOT) to support public transit electrification planning efforts, facility upgrades, fleet vehicle replacements and the purchase/installation of electric vehicle charging and fueling infrastructure. The Enterprise imposes a Clean Transit Retail Delivery Fee to fund its operations and is empowered to issue grants, loans and rebates to support the electrification of public transit in Colorado. In 2024, Colorado Senate Bill 24-230 added an additional business purpose to the CTE to support a diverse array of investment in public transit through a revenue stream from Oil and Gas Production Fees.

Pursuant to C.R.S. § 43-4-1203 (10)(a)(IV), the CTE is required to prepare an annual report regarding its activities and funding and to present this report to the CDOT Transportation Commission, along with the Transportation and Local Government and Energy and Environment Committees of the House of Representatives and the Transportation and Energy Committee of the Senate.

The CTE's third year of activities consisted of ongoing administrative activities, grant-making activities for the CTE zero emission transit planning awards, and the preparation, release and award of CTE's first notice of funding availability in the zero emission capital projects category. The CTE Board of Directors approved capital grants for 1 facility project, 1 infrastructure project, and 9 vehicle projects totaling $15,000,000 in September 2024.The CTE also initiated efforts to implement provisions of SB24-230.

Next Steps
Please feel free to follow up with CTE staff if you have any questions or comments.

Attachments
Clean Transit Enterprise Annual Report CY2024

COLORADO
Department of Transportation
Clean Transit Enterprise

Clean Transit Enterprise (CTE) 2024 Annual Report

Pursuant to C.R.S. § 43-4-1203 (10)(a)(IV)
Reporting Period encompasses January 1 - December 31, 2024

Background

In 2021, Colorado Senate Bill 21-260 (SB 21-260) established the Clean Transit Enterprise (CTE) within the Colorado Department of Transportation (CDOT) to "reduce and mitigate the adverse environmental and health impacts of air pollution and greenhouse gas emissions produced by motor vehicles used to make retail deliveries by supporting the replacement of existing gasoline and diesel transit vehicles with electric motor vehicles, including motor vehicles that originally were powered exclusively by internal combustion engines but have been converted into electric motor vehicles; providing the associated charging infrastructure for electric transit fleet motor vehicles; supporting facility modifications that allow for the safe operation and maintenance of electric transit motor vehicles; and funding planning studies that enable transit agencies to plan for transit vehicle electrification" (CRS 43-4-1203). The Enterprise imposes a Clean Transit Retail Delivery Fee to fund its operations and has the power to issue grants, loans, and rebates to support the electrification of public transit in Colorado.

In 2024, with the passage of SB24-230, an additional business purpose was added to CTE to include, "investing in public transit, including vehicles, infrastructure, equipment, materials, supplies, maintenance, and operations and staffing, to achieve the level of frequent, convenient, and reliable transit that is known to increase ridership by replacing car trips with bus and rail trips and forms of transit known to support denser land use patterns that further reduce pollution due to shorter trip lengths and greater walking and cycling mode share." (CRS 43-4-1203). With this new business purpose and a new revenue stream from Oil and Gas Production Fees, the CTE will begin to fund a more diverse array of transit-oriented projects across the state in future years.

Public transit electrification projects funded by the CTE Clean Transit Retail Delivery Fee will help the state reach its targets of 1,000 transit zero-emission vehicles (ZEVs) on Colorado roads by 2030 and a 100% zero-emission transit fleet by 2050. These targets, which were established by the 2020 Colorado EV Plan, further elaborated in the 2021 Colorado Transit Zero-Emission Vehicle Roadmap, and recommitted to in the 2023 Colorado EV Plan, apply to rubber-tired, conventionally fueled transit buses, cutaways, vans, minivans and automobiles. They do not apply to commuter rail, light rail and gondola systems, as these modes are frequently powered by electricity already.

Funding for public transportation operations and capital expenses through the CTE Oil and Gas Production Fees will accelerate Colorado towards its goals related to expanded transit service, increased transit frequency, and improved system-wide transit network connectivity with the goal of maximizing transit ridership, therefore decreasing vehicle miles traveled, greenhouse gas emissions and air pollutants. The CTE will prioritize transit service improvements in communities with high transit propensity, such as low income communities, communities of color, communities with high density populations, communities with zoning and other local policies that support higher density along transit lines, communities with low vehicle ownership

rates, the disability community, seniors, and other populations that use transit more frequently than the general population.

To ensure transparency and accountability of the CTE, a 10 Year Plan for the Clean Transit Retail Delivery Fee business purpose was approved by the CTE Board at its May 25, 2022 meeting and is posted on the CTE Website. No changes to the existing CTE Ten Year Plan were made in 2024. The CTE is also required to maintain and regularly update a public accountability dashboard, which was launched in 2024 and is posted on the CTE Website.

Board of Directors

All of the powers of the CTE, as described in Section 43-4-1203, et seq., C.R.S., and as otherwise provided by law, are vested in the CTE Board. The CTE Board manages the business and affairs of the Enterprise and consists of nine members determined pursuant to the composition and qualifications outlined in Section 43-4-1203(2)(a)(I), C.R.S.

All Board members received the approval of the Senate Transportation and Energy Committee on March 15, 2022 and confirmation from the Colorado Senate on March 21, 2022. The remaining three members were designated by the heads of the state agencies - CDOT, Colorado Department of Public Health and Environment (CDPHE) and Colorado Energy Office (CEO). In August 2024, CDOT Executive Director, Shoshana Lew replaced Erik Sabina as the designated representative for the Colorado Department of Transportation.

For terms expiring 9/28/2024

- Matt Frommer (Denver): Member with expertise in zero-emissions transportation, motor vehicle fleets or utilities
- Bonnie Trowbridge (Berthoud): Member representing a public advocacy group that has transit or comprehensive transit expertise
- Dawn Block (La Junta): Member representing a transportation-focused organization that services an environmental justice community

For terms expiring 9/28/2025

- Mark Garcia (Pagosa Springs): Member of the Transportation Commission and have statewide transportation expertise
- Cris Jones (Boulder): Member representing an urban area, having transit expertise
- David Averill (Telluride): Member representing a rural area having transit expertise

State Agency Appointments

- Shoshana Lew: Colorado Department of Transportation Executive Director
- Kelly Blynn: Colorado Energy Office designee
- Richard Coffin: Colorado Department of Public Health and Environment designee

Articles of Organization and Bylaws

The CTE Articles of Organization and Bylaws were approved by the Board on February 22, 2022. The Articles of Organization cover the name, authority, purpose, TABOR exemption, enterprise board, officers, powers, revenues and expenditures and process for amendments to the Articles of Organization. The Bylaws cover the Board composition, duties and responsibilities; Meetings of the Board; Open Meetings and Open Records; Officers and Staff; Fiscal Year and Budget; Amendment Process and other Miscellaneous provisions. No modification of the existing CTE Articles of Organization and Bylaws occurred in 2024.

Board Officers

The CTE Board, using the directions provided in the Bylaw and Articles of Organization, re-elected Matt Frommer as Board Chair and David Averill as Vice-Chair at the February 20, 2024 Board Meeting. Kay Kelly, Chief of Innovative Mobility at CDOT, the CTE Program Administrator and Deseri Scott, Program Assistant in the Office of Innovative Mobility at CDOT, the CTE Secretary remained in their positions as appointed at the July 13, 2022 Board Meeting. No change in the officers of the CTE Board occurred in 2024.

Calendar Year 2024 Accomplishments

The third year of activities for the CTE consisted of a mix of ongoing administrative activities, grant-making activities for the CTE zero emission transit planning awards, and the preparation, release and award of CTE's first notice of funding availability in the zero emission capital projects category. CTE is also engaged in start-up efforts for the enterprise's new business purpose and revenue stream associated with SB24-230 and has recently hired Craig Secrest as the CTE Director, who will be the first dedicated staff member for the enterprise.

Clean Transit Retail Delivery Fee Inflationary Adjustments

SB 21-260 established several new fees on the delivery of items that are subject to the state sales tax, including the retail delivery fee, a portion of which funds the activities of the CTE. The CTE was required by CRS 43-4-1203 (6)(g) to conduct a rulemaking in accordance with the administrative procedures act "to promulgate rules to set the amount of the clean transit retail delivery fee at or below the maximum amount authorized in this section and to govern the process by which the enterprise accepts applications for, awards, and oversees grants, loans and rebates…". CRS 43-4-1203 (7)(b) initially set the rate at $0.03 per delivery, which is the maximum amount established by SB 21-260, although the fee may be adjusted for inflation in future years.

On February 20, 2024, the CTE Board approved an inflationary adjustment from $0.0311 to $0.0322 for FY25, beginning on July 1, 2024. The CTE board will work with staff of CDOT, the

Colorado Department of Revenue (DOR) and other subject matter experts on whether further inflationary adjustments to the fee are merited for FY 25-26.

Launch of Public Accountability Dashboard

In July 2024, the CTE launched its public accountability dashboard to share data related to funded projects across the state. The dashboard can be filtered by Fiscal Year, Project Category, Project Status, and whether or not it is located within an Enhanced Incentive Area of the state. It also includes an interactive map, tables, and bar graphs showing progress over time. All data can be downloaded by public users, as well.

This dashboard will be automatically updated as new projects are added and existing projects are completed in future years. The dashboard can be viewed on the CTE website.

Zero Emission Transit Grant Program Awards

In 2024, working off of progress by the CTE staff and board in 2023 where expectations for program design, and application review and selection criteria were finalized, the board and staff focused on issuing awards for the first round of CTE planning grants awarded in October 2023, along with reviewing and awarding the first round of projects in the capital grant categories. At their meeting on September 24, 2024 the Board approved applications in the capital grants category for 1 facility project, 1 infrastructure project, and 9 vehicle projects which will result in 28 zero emission transit vehicle purchases. Staff are now working to issue contracts to the selected agencies. Awards for this calendar year are summarized in the tables below:

Facilities

Applicant Name	*Project Title*	*Funding Request*	*Recommendation*	*Recommended Funding Amount*
Via Mobility Services	Via Mobility Services Renewable Energy Microgrid Project	$1,500,000	Award	$1,500,000

Infrastructure

Applicant Name	*Project Title*	*Funding Request*	*Recommendation*	*Recommended Funding Amount*
Town of Avon	Town of Avon: 2024 EV Charging Equipment	$384,000	Award	$384,000

Vehicles

Applicant Name	*Project Title*	*Funding Request*	*Recommendation*	*Recommended Funding Amount*
Laradon Hall Society for Exceptional Children and Adults	Laradon Hall: Van Replacement	$238,484	Award	$238,484
Roaring Fork Transportation Authority (RFTA)	RFTA: Replace 10 Diesel Buses with Battery Electric Buses (BEBs)	$7,800,000	Partial Award	$5,460,000
Developmental Disabilities Resource Center (DDRC)	DDRC Transit: 4 Vehicle Replacements	$150,000	Award	$150,000
Town of Breckenridge	Town of Breckenridge: VW Funds Gap Request	$4,204,445	Partial Award	$2,943,112
Town of Telluride	Town of Telluride: 1 Bus Replacement	$164,507	Award	$164,507
Town of Winter Park	Town of Winter Park: 2 Electric Bus Purchase	$1,380,600	Partial Award	$966,420
Town of Avon	Town of Avon: - 2024 2 BEV Buses	$1,714,706	Award	$1,714,706
City of Fort Collins	City of Fort Collins, Transfort: 4 Bus Replacements (updated to 1 bus)	$882,945	Award	$882,945
City of Boulder	City of Boulder: 2 Battery Electric Buses - Expansion	$1,550,378	Partial Award	$595,826

In the fall of 2024, the Board reviewed grant requirements and scoring criteria for the ZEV planning awards in preparation for the release of the second round of ZEV planning grants expected to be released in November 2024.

Passage of SB24-230

In 2024, the General Assembly passed Senate Bill 24-230 which added a new business purpose to the CTE funded by an Oil and Gas Production fee. The Enterprise will impose a production fee, paid quarterly, for all oil and gas produced in the state on or after July 1, 2025. In consultation with the Energy and Carbon Management Commission and based upon average gas and oil spot prices, the CTE will set production fee levels and publish production fee amounts to the CTE website. The Department of Revenue will collect the fees and transfer the revenue to the CTE to be distributed in the following apportionments:

- 70% for local transit operations in expanding services and prioritizing transit improvements in communities with the greatest need;
- 20% to the rail funding program cash fund for passenger rail projects and service; and
- 10% for local transit competitive grant programs for transit providers.

These funds will be used to reduce transportation-related greenhouse gas emissions and other air pollutants, and to achieve levels of frequent, convenient, and reliable transit that are known to increase transit ridership, allowing residents to replace car trips with bus and rail trips.

Budget

The CTE Board established and approved its proposed budget for FY 24-25 at the October 10, 2023 Board meeting. An updated budget, accounting for increased spending authority was proposed and approved by the Board at their February 2, 2024 meeting.

Elements of the CTE annual budget include Administrative and Agency Operations to support day-to-day operations of the enterprise, Contingency Reserve to handle unexpected expenses that are outside the range of the usual budget, and Programmed Funds that will be made available in the form of grants, loans, rebates, and revenue bonds from the Clean Transit Retail Delivery Fee to transit agencies to support zero emission vehicle transition. In the future, CTE grants from the Oil and Gas Production fees will support transit expansion and passenger rail projects.

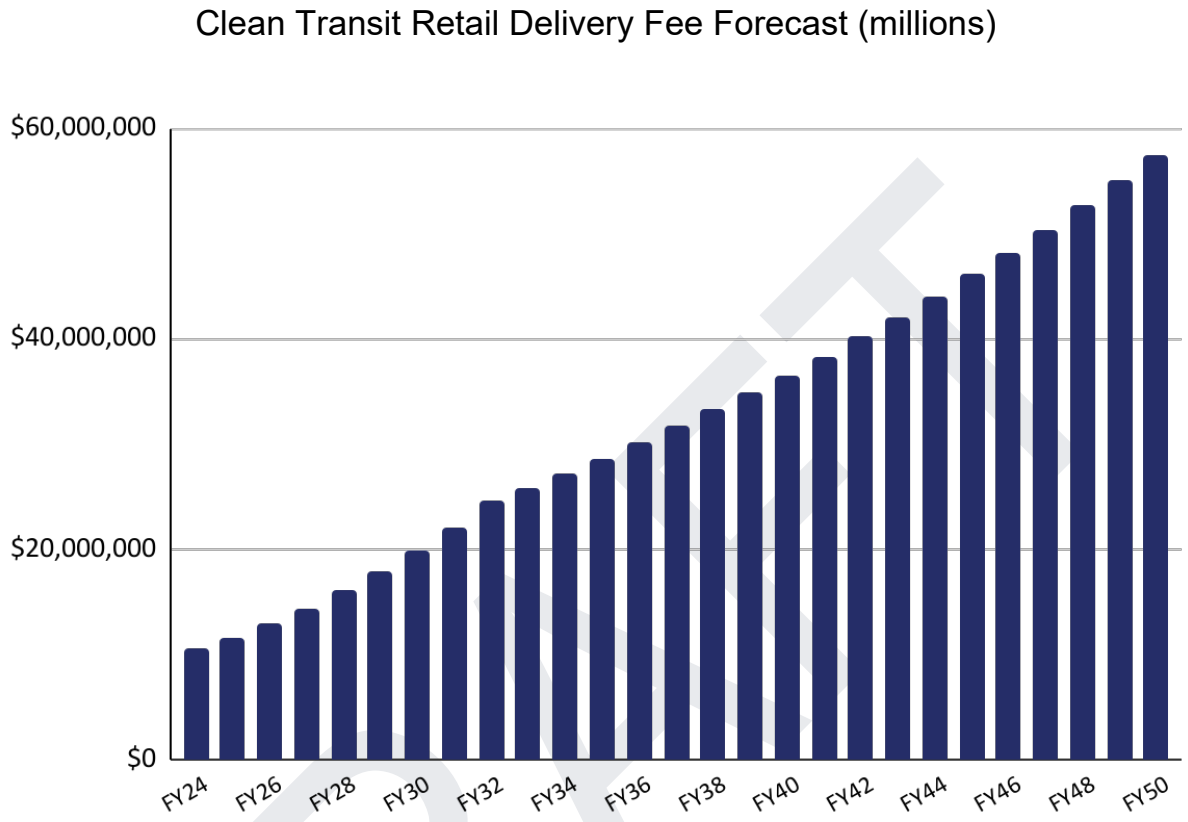
CTE Final FY25 Budget

Line Item	FY 2024-25
TOTAL SPENDING AUTHORITY	**$18,134,321**
Clean Transit Retail Delivery Fee	$18,134,321
ADMINISTRATION & AGENCY OPERATIONS	**$560,450**
Staff Salaries	$450,250
Attorney General's Office Fees	$5,000
Office of State Audit - Annual Financial Audit	$2,000
Professional Services	$100,000
Administrative Expenses	$3,200
Board / Staff Travel	$2,000
Board Meeting Expenses	$200
Supplies / Registration Fees / Etc.	$1,000
CONTINGENCY RESERVE	**$990,239**
Board Reserve Fund (10% of FY 25 Revenue)	$990,239
PROGRAMMED FUNDS	**$16,583,632**
Programmed Funds	$16,583,632
TOTAL – CTE	**$18,134,321**

Financial Status Report

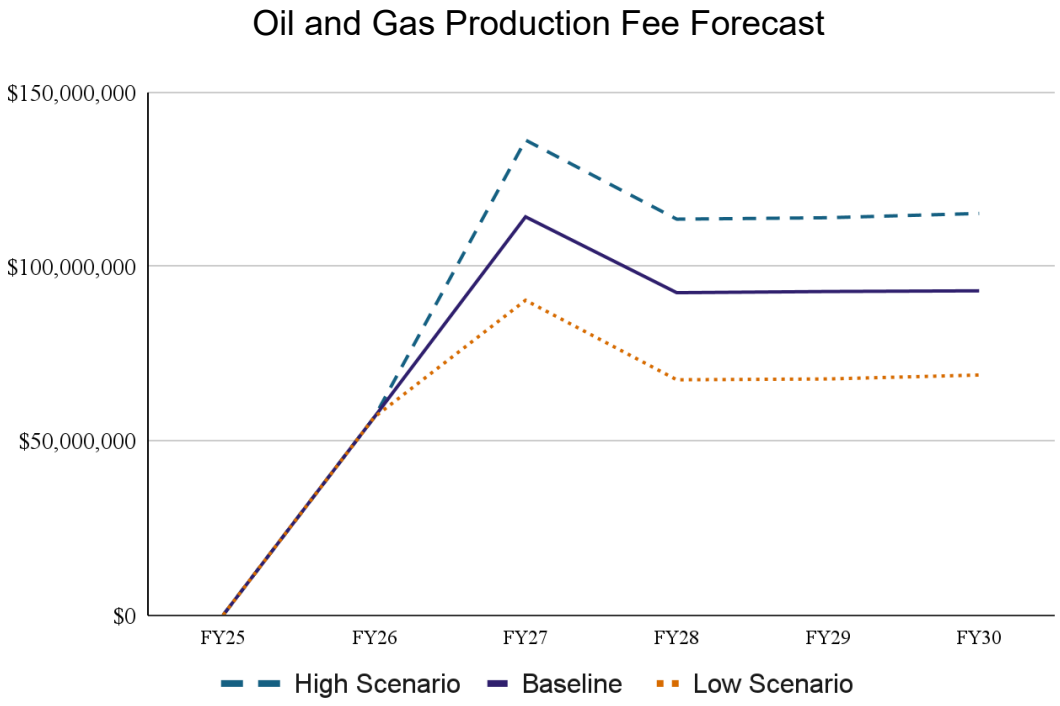
The retail delivery fees established in SB 21-260 provide an on-going revenue stream which CDOT staff have estimated through 2050. In FY 2023-2024 the CTE collected over $10.6 million in Retail Delivery Fee Revenue. It is forecasted to collect $11.3 million for FY 2024-2025 in Retail Delivery Fee Revenue.

The table below outlines CDOT's current revenue forecast for the Clean Transit Retail Delivery Fee through FY 2049-2050.



The CTE's new revenue source from Oil and Gas Production Fees will be foundational for accelerating the availability, accessibility, and efficiency of public and multimodal transportation for Coloradans. The Oil and Gas Production fees are forecasted to generate revenue of $56.7 million in FY 2025-2026 and $116.3 million in FY 2026-2027. Per SB 24-230, the CTE will distribute these revenues into three funds: the Local Transit Operations Cash Fund, the Local Transit Grant Program Cash Fund, and the Rail Funding Program Cash Fund. To enable the CTE to begin program development and implementation of the Oil and Gas Production Fees portfolio prior to the start of fee collection on July 1, 2025, the Colorado Transportation Commission provided a $600,000 loan to the enterprise to fund start-up costs, staff time, meeting-related expenses, consultant support, formula development, and stakeholder engagement.

The table below outlines CDOT's current revenue forecast for the Oil and Gas Production Fees through FY30.



Upcoming Activities

Looking ahead to 2025, the Office of Innovative Mobility and the Division of Accounting and Finance expect to hire several additional staff positions to support CTE's administrative and grant-making activities. Further, the CTE is preparing to issue additional notices of funding availability, both in the planning and capital categories for zero-emissions transit vehicles. The recently hired CTE Director will begin working on a stakeholder outreach process to support program design for the implementation of the new SB24-230 cash funds. This will involve developing a formula to distribute funds to eligible transit agencies with the Local Transit Operations Cash Fund, along with development of award criteria and solicitation/selection processes for the Local Transit Grant Program Cash Fund and program requirements for the Rail Funding Program Cash Fund.

COLORADO
Department of Transportation

Transportation Commission Memorandum

To: Transportation Commission Members

From: Mike Salisbury, Director of Transportation Programs at the Colorado Energy Office and Board Administrator of the Community Access Enterprise

Date: December 19, 2024

Subject: Annual Report of the Community Access Enterprise

Purpose

To provide the Transportation Commission a copy of the Annual Report for the Community Access Enterprise for FY23-24

Action

Informational only

Background

SB21-260 requires that the Community Access Enterprise submit an Annual Report to the Legislature and the Transportation Commission.

Next Steps

Not applicable-informational only

Attachments

FY23-24 Annual Report for the Community Access Enterprise

COLORADO
Energy Office

Community Access Enterprise FY2024 Annual Report

DRAFT

December 2024

Table of Contents

Background

Senate Bill 21-260, Sustainability of the Transportation System, created the Community Access Enterprise (CAE or enterprise), housed within the Colorado Energy Office (CEO). Pursuant to section 24-38.5-303(10)(a)(IV), C.R.S., the CAE is required to prepare an annual report regarding its activities and funding, and present the report to the Transportation Commission, the Transportation & Local Government and Energy & Environment Committees of the House of Representatives, and the Transportation & Energy Committee of the Senate. In addition, the enterprise is required to post the annual report on its website. This third annual report covers the CAE's activities and funding during Fiscal Year 2024 (FY2024) from July 1, 2023 to June 30, 2024.

As detailed in section 24-38.5-303(3) C.R.S., the business purpose of the CAE is to support the widespread adoption of electric motor vehicles in an equitable manner. The CAE continues to work in furtherance of its business purpose by directly investing in transportation infrastructure and incentivizing the acquisition and use of electric motor vehicles and electric alternatives to motor vehicles in communities, including but not limited to disproportionately impacted communities, and by owners of older, less fuel efficient, and higher polluting vehicles.

Board of Directors

The governing board of the CAE was first appointed in September 2021 and the seven board members meet the statutory requirements in section 24-38.5-303(2) C.R.S. In FY2024, a new board member, Paul Bony of the Yampa Valley Sustainability Council, was appointed by Governor Polis and approved by the Legislature due to a vacancy.

Over the course of the year, state staff and external stakeholders presented to the board regarding numerous CAE-related issues including charging infrastructure, electrified mobility programs, EV readiness plans, workforce development, outreach and engagement, utility transportation electrification programs (TEPs), environmental

justice, and more. As new CAE-funded programs were launched during FY2024, including Vehicle Exchange Colorado, Local Government EV Readiness, Community Accelerated Mobility Project, program staff presented programmatic updates for the board's input and feedback.

All board meetings are open to the public and meeting agendas, presentations and recordings are available on the CAE website.

Retail Delivery Fee

Collection of the retail delivery fee began on July 1, 2022 by the Department of Revenue (DOR) on behalf of the CAE (and other enterprises) as detailed in section 24-38.5-303(7)(c) C.R.S. Of the 27 cent ($0.27) total retail delivery fee, the CAE received six and nine-tenths cents ($0.069). Retail delivery fee revenue from DOR began to be transferred to the enterprise in August 2022.

The board approved a resolution at the February 2024 meeting to increase the retail delivery fee due to inflation as determined by DOR. DOR increased the total retail delivery fee from 28 cents ($0.28) to 29 cents ($0.29) with the enterprise portion increasing from seven cents ($0.070) to seven cents and forty-one hundredths ($0.0741). The adjusted retail delivery fee went into effect at the start of FY25 on July 1, 2024. This inflation adjustment will be completed by DOR annually per section 24-38.5-303(7)(c)(II), C.R.S.

Ten-Year Plan

In May 2022, the board unanimously approved the Ten-Year Plan for the enterprise, which was published and posted to the enterprise website, as required by section 24-38.5-303(10)(a)(I) C.R.S. The Ten-Year Plan makes recommendations for the enterprise to execute its business purpose during state fiscal years 2022-23 through 2031-32. The Ten-Year Plan recommended that the CAE provide funding to continue

the growth of successful, existing CEO transportation electrification programs as well as the development of new programs that meet the business purpose of the enterprise.

FY2024 Budget

Based on the recommendations of the Ten-Year Plan, the board approved the FY2024 budget at the June 2023 meeting as outlined in the table below.

Table 1. CAE Revenue and Expenditures

CAE Revenue and Expenditures	Amount
Projected FY2024 CAE revenue	$21,700,000
FY2023 Non-encumbered funds	$5,386,000
FY2023 Collected Revenue not programmed	$1,200,000
FY2023 Reserves for Programming	$2,000,000
Total FY2024 Budget Available	$30,286,000
Administrative expenses	-$1,007,769
Reserve (5%)	-$1,085,000
Total Program funding FY2024	$28,193,231
Programs	**FY2024 Budget**
Charge Ahead Colorado	$6,175,000
DCFC Plazas	$12,175,000
Fleet ZERO	$4,700,000
E-cargo bike pilot	$600,000
Community Accelerated Mobility Project (CAMP) Technical Readiness	$600,000
Community Accelerated Mobility Project (CAMP) Implementation	$2,000,000
Vehicle Exchange Colorado	$25,000
Service Panel Upgrade + Residential Resources	$500,000

CAE Revenue and Expenditures	Amount
Research + Technical Support + Stakeholder Engagement	$1,415,000
TOTAL	**$28,190,000**

A 5% reserve was approved by the board in the FY2024 budget. This ensures that programs can be funded to respond to programmatic changes that may impact the budget.

Over the course of FY2024, the board approved four budget requests utilizing CAE reserves and existing budgets totalling $3.7 million for the Vehicle Exchange Colorado program and $240,000 for Local Government EV Readiness Plans.

FY2024 Program Activities

As previously noted, the CAE provides funding to continue the growth of successful, existing CEO transportation electrification programs as well as the development of new programs that meet the business purpose of the enterprise. Activities about each program that is funded, in whole or in part, by the CAE in FY2024 is below.

Charge Ahead Colorado (CAC)

Charge Ahead Colorado is CEO's long-standing charging infrastructure program providing grants to support the installation of community-based Level 2 and Direct Current Fast-Charging (DCFC) infrastructure. CAC is funded in part by CAE to grow the program and meet applicant demand. Enhanced incentives are available for chargers located at income-qualified housing developments and for qualifying, community-serving entities (libraries, schools, community centers, and others) located in disproportionately impacted communities. To meet CAC's goals, a new program manager was hired in FY2024. In FY2024,174 awards for 901 ports were made totaling $5,741,370 in CAE investments. CAC offers a rolling application available for

qualifying entities proposing smaller-scale projects (six ports or less) on an ongoing basis to further facilitate priority area projects.

Direct Current Fast-Charging (DCFC) Plazas (Plazas)

The Plazas program, an existing CEO program developed in partnership with CDOT, is funded in part by CAE. This program focuses on increasing access to high-speed charging in communities and along highway corridors across Colorado. Funding tiers are based on geographic location and an enhanced incentive is available for projects located in a disproportionately impacted community. In FY2024, awards were announced from the initial Plazas round that occurred in March 2023. This resulted in over $12M in projects being awarded. Of that, the CAE funded approximately $4.3M of projects in communities such as Buena Vista, Montrose, Pueblo, Parachute, Highlands Ranch amongst others. The CAE offered a subsequent funding round in October 2023. This funding round resulted in a total allocation of $19.8M, of which, the CAE funded approximately $5.5M in projects. The two funding rounds resulted in 156 DCFC ports installed throughout Colorado including communities such as Colorado Springs, Dolores, Lakewood, Denver, Grand Junction, amongst others.

Fleet Zero-Emission Resource Opportunity (Fleet-ZERO)

The Fleet Zero-Emission Resource Opportunity (Fleet-ZERO) program is funded in part by the CAE. Fleet-ZERO incentivizes the installation of charging infrastructure to support the transition of light-, medium-, and heavy-duty fleets to EVs. Prioritization is provided for all projects located in a disproportionately impacted community and enhanced incentives are available for all equity-qualifying entities. Over the course of FY2024's two grant rounds, CAE funded approximately $2.3M for 22 organizations, supporting the deployment of about 280 fleet EV charging ports at around 40 sites. In July 2023, Fleet-ZERO additionally launched a rolling application offered year-round and only available to equity-qualifying entities requesting funding for smaller scale fleet electrification projects. During FY2024, approximately $165,000 in funding

requests from 8 organizations were awarded through the Fleet-ZERO rolling application, supporting about 50 fleet EV charging ports at 14 different sites.

E-Cargo Bike Commercial Delivery Pilot Program

The e-cargo pilot grant program awarded five (5) grants to projects around the state. This program seeks to implement projects that will use e-cargo bikes for commercial delivery, public shared e-cargo bike programs, delivery services, or fleet usage. These projects have deployed e-cargo bikes for both fleet usage and public shared e-cargo bike programs.

Community Accelerated Mobility Project (CAMP)

The Technical Readiness Planning Phase for the CAMP program launched during August 2023. During FY2024, the CAMP program issued five grant awards for the Technical Readiness Planning Phase; and zero grant awards for the Implementation Phase. Additional stakeholder engagement was conducted for both CAMP phases during FY2024. The third Request for Applications ("RFA") round for the Technical Readiness Planning Phase and the first RFA round for the Implementation Phase are scheduled to launch during early FY2025.

Vehicle Exchange Colorado (VXC)

The VXC program launched during August 2023. During FY2024, the VXC program had 1,301 point-of-sale rebates issued. This was approximately 6.5 times the program's fiscal year goal of 200 rebates issued. 879 of these VXC rebates issued were redeemed during FY2024. The VXC program has two key partners: APTIM; and Clear the Air Foundation. The company, APTIM, was selected as a program administrator through a Request for Proposal ("RFP") process. The nonprofit organization, Clear the Air Foundation, was issued a purchase order ("PO") to coordinate vehicle recycling for the VXC program. The VXC program budget was later increased to $5,725,000 in order to meet public demand for FY2024.

Local Government EV Readiness Planning

During FY2024, the CAE provided grants to four organizations to develop EV readiness plans. The following organizations were awarded funding: Chaffee County; Garfield Clean Energy; Routt County;and Town of Mt. Crested Butte. Upon completion, these EV readiness plans are anticipated to help these local communities better prepare for their transitions to electric transportation.

Research, Technical Support and Stakeholder Engagement

In FY2024, this program area focused on stakeholder engagement by supporting the ReCharge Colorado coaching program, the EV CO education and awareness campaign, and the creation of Community Advisory Committees across Colorado.

Funding Dashboard

The enterprise is required by section 24-38.5-303(10)(a)(II), C.R.S. to create, maintain, and update a publicly available dashboard that summarizes the project status of all transportation programs that receive funding from the Community Access Enterprise. This dashboard also includes electric transportation programs that receive funding from other, complimentary funding sources. Users can filter the data by fiscal year, program, CAE funding, project county (if applicable), project status, and disproportionately impacted community classification.

COLORADO
Department of Transportation

Transportation Commission Memorandum

To: Transportation Commissioners
From: Jeremy Neustifter, Clean Fleet Enterprise Board Manager
Date:

Subject: Colorado Clean Fleet Enterprise Board Annual Report

Purpose

Per § 25-7.5-103(11)(a)(IV), to provide the Clean Fleet Enterprise's annual report to the Transportation Commission

Action

No actions are necessary.

Background

Senate Bill 21-260, "Sustainability of the Transportation System," established the Colorado Clean Fleet Enterprise Board (CFE). As per § 25-7.5-103(11)(a)(IV), C.R.S., the CFE is required to prepare an annual report detailing its activities and funding. This report is to be presented to the Transportation Commission, the Transportation and Local Government and Energy and Environment Committees of the House of Representatives, and the Transportation and Energy Committee of the Senate. The annual report will also be published on the CFE's website.

Next Steps

The Clean Fleet Enterprise will provide its next annual report in December 2025.

Attachments

Clean Fleet Enterprise 2024 Annual Report

COLORADO
Clean Fleet Enterprise
Department of Public Health & Environment

December 11, 2024

Colorado General Assembly
200 E Colfax Avenue
Denver, CO 80203

Re: Colorado Clean Fleet Enterprise Board Annual Report

Dear State Senators and Representatives:

Senate Bill 21-260, "Sustainability of the Transportation System," established the Colorado Clean Fleet Enterprise Board ("CFE" or "Board"). As per § 25-7.5-103(11)(a)(IV), C.R.S., the CFE is required to prepare an annual report detailing its activities and funding. This report is to be presented to the Transportation Commission, the Transportation and Local Government and Energy and Environment Committees of the House of Representatives, and the Transportation and Energy Committee of the Senate. The annual report will also be published on the CFE's website.

Background and Ten-Year Plan

"The business purpose of the enterprise is to incentivize and support the use of electric motor vehicles, including motor vehicles that originally were powered exclusively by internal combustion engines but have been converted into electric motor vehicles, and, to the extent temporarily necessitated by the limitations of current electric motor vehicle technology for certain fleet uses, compressed natural gas motor vehicles that are fueled by recovered methane, by businesses and governmental entities that own or operate fleets of motor vehicles, including fleets composed of personal motor vehicles owned or leased by individual contractors who provide prearranged rides for transportation network companies or deliver goods for a third-party delivery service..." (§ 25-7.5-103 C.R.S)

In compliance with SB21-260, the CFE adopted a Ten-Year Plan in May of 2022 and published it on its website (CFE Ten-Year Plan). The Ten-Year Plan established five program portfolios:

1. Clean Fleet Vehicle and Technology Portfolio
2. Clean Fleet Transportation Network Company (TNC) Portfolio
3. Remote Sensing Prioritization Portfolio
4. Clean Fleet Vehicle Workforce Development Portfolio
5. Clean Fleet Planning, Research, and Evaluation Portfolio

Milestones Achieved in 2023

In March 2023, the CFE launched its first grant program, the Clean Fleet Vehicle & Technology Grant Program, under the Vehicle and Technology Portfolio. The CFE received 39 applications from various entities across Colorado, including for-profit and non-profit companies, universities, and local governments. These applicants requested funding for a total of approximately 181 vehicles and $25 million. In September 2023, the board approved 17 awards for this first round, allocating $14 million for 73 vehicles. The $14 million awarded accounts for the majority of funds that were available during FY 2023-24 under the CFE's spending authority. The awarded vehicles were a mix of battery electric, hydrogen fuel cell electric, and recovered methane fuel types, and range from local delivery vehicles to transit buses.

As required by SB21-260, the CFE published its public accountability dashboard, which provides updates on the Ten-Year Plan, funding status, and progress of each project.

Milestones Achieved in 2024

Clean Fleet Vehicle and Technology Grant Portfolio

On April 22, 2024, the CFE launched the second round of its Clean Fleet Vehicle and Technology portfolio grants, with an application deadline of June 21, 2024. Thirty eight applications were received from various entities across Colorado, including for-profit and non-profit companies, universities, and local governments, with requests for funding to supplement the costs of 188 vehicles. Twenty seven applications advanced to the review stage with requests for a total of $26.5M in funding for 135 vehicles. The majority of requested funding was for battery-electric vehicles with four applications requesting funding for renewable natural gas powered vehicles. In September 2024, the Board approved funding for all eligible round 2 applications.

Since the launch of the Clean Fleet Vehicle and Technology grant portfolio, $34.6M in awards have been approved by the Board for a total of 181 vehicles, taking into account applications that were withdrawn prior to contract execution.

Transportation Network Company (TNC) Grant Portfolio

In February 2024, the CFE launched the first round of its Transportation Network Company Grant Portfolio, with applications due May 2024. Transportation Network Companies are companies that use digital platforms or mobile apps to connect passengers with drivers who use their personal vehicles to provide on-demand transportation services, as defined by the Public Utilities Commission, such as Lyft, Uber, HopSkipDrive, River North, or Drivers Cooperative - Colorado. The purpose of the TNC grant portfolio is to increase the number of electric vehicles used in TNC fleets and electrified vehicle miles traveled by TNC drivers. The Clean Fleet TNC grant program is one of the first in the nation.

Uber and Lyft each submitted applications requesting a total of $3.78M; however, only $3.1M was available in the CFE budget. In August 2024, the Board approved awards to Lyft and Uber totalling $3.1M. It is estimated that contracts will be executed in early 2025.

Remote Sensing Prioritization Portfolio:

During the summer of 2024, the CFE worked with a third-party contractor to provide remote sensing services to identify high-emitting medium and heavy-duty vehicles. This Portfolio focused on identifying high-emitting, older vehicles for replacement, particularly in disproportionately impacted communities and areas with air quality issues.

Additionally, the CFE is developing grant programs in the coming months as follows:

- Clean Fleet Vehicle Workforce Development Portfolio: This portfolio will focus on driver and maintenance training to ensure a sufficient supply of workers as the market for these technologies grows.
- Clean Fleet Planning, Research and Evaluation Portfolio: This portfolio will support fleets in developing strategies for vehicle electrification, researching new technology, and evaluating program areas for potential improvements and efficiency gains.

To fund these initiatives, the Department of Revenue (DOR) began collecting fees from retail deliveries and prearranged rides on July 1, 2022. The CFE collected approximately $9.1M in revenue from January 2024 - September 2024 and $33.1M in revenue since fee collection began in July 2022.

For additional information, please contact cdphe_cleanfleets@state.co.us.

Regards,

Jeremy Neustifter
Board Manager
Colorado Clean Fleet Enterprise

CC: Michael Ogletree, Director, Air Pollution Control Division, CDPHE
Mike Beck, Environmental Health and Protection Operations Officer, CDPHE
Steve McCannon, Mobile Sources Program Manager, CDPHE

2025 Transportation Commission Calendar

January
Jan. 15 – Workshops/Committee Meetings
Jan. 16 – Commission Board Meeting

February
Feb. 19 – Workshops/Committee Meetings
Feb. 20 – Commission Board Meeting

March
March 19 – Workshops/Committee Meetings
March 20 – Commission Board Meeting

April
April 16 – Workshops/Committee Meetings
April 17 – Commission Board Meeting

May
May 14 – Workshops/Committee Meetings
May 15 – Commission Board Meeting

June
June 18 – Full Day Workshops and Board Meeting (Virtual)

July
July 16 – Workshops/Committee Meetings
July 17 – Commission Board Meeting

August
Aug. 20 – Workshops/Committee Meetings
Aug. 21 – Commission Board Meeting

September
Sept. 17 – Workshops/Committee Meetings
Sept. 18 – Commission Board Meeting

October
Oct. 15 – Workshops/Committee Meetings
Oct. 16 – Commission Board Meeting

November
Nov. 19 – Workshops/Committee Meetings
Nov.20 – Commission Board Meeting

December – Subject to Change
Dec. 17 – Afternoon Workshops and Board Meeting (Virtual)