RMS 2025-2028 TIP

APPENDIX A: CMAQ ANALYSES

Emission Reduction Analysis for the City of El Paso Proposed CMAQ Project

Playa Drain Shared Use Path (Yarbrough to Midway)

January 2024

Prepared for

By

Task Summary

The Texas A&M Transportation Institute (TTI) was tasked by the City of El Paso to perform a mobile source emissions analysis for a proposed project in the El Paso metropolitan region. The city is seeking funding from the Congestion Mitigation/Air Quality Improvement Program (CMAQ) to help implement the project.

The project will construct 1.75 miles of pedestrian and bike lane infrastructure improvements in the southeast region of the city along Playa Drain.

Individual Project Analysis

The emissions analysis for the project is presented below. The project name is given along with a brief description of the project. Data sources and analysis assumptions are provided. The equation used from the *Texas Guide to Accepted Mobile Source Emission Reduction Strategies* (MOSERs Guide) is given for the strategy along with the variables of the equation and the equation itself. The results are then computed for the strategy.

It is recommended that the agency conduct a more detailed emissions study of the project as it develops further. The results presented below are valid for CMAQ applications, but more time and effort would increase the accuracy of the emissions benefits. As a result, this analysis should not be used for conformity purposes.

Playa Drain Shared Use Path (Yarbrough to Midway)

The Playa Drain Shared Use Path (Yarbrough-Midway) project will install 1.75 miles of pedestrian and bicycle trail improvements to continue build-out of the Playa Greenway along Playa Drain in the southeast El Paso region. The project will construct pedestrian and bicycle facilities to include signage, sidewalks, landscaping, furnishings, and illumination. The limits of the improvements are from Yarbrough Drive to Midway Drive.

The project will serve the City of El Paso by increasing its regional transportation infrastructure coupled with existing transit projects, educational centers, and commercial developments. Bicycle facilities will support and provide connectivity to existing bicycle facilities Citywide with connection to mass transit facilities and provide an alternative method of transportation. The infrastructure will be installed within City right-of-way and no property acquisition is anticipated.

The components of the project are consistent with the August 2016 City of El Paso Bike Plan.

Data Sources

The City of El Paso provided the project description and project scope information. TxDOT bike count data in the vicinity of the project area from 2021 was acquired from TxDOT's website. These resources provided the research team with a better understanding of the proposed project and potential emissions benefits.

TTI researchers utilized the U.S. EPA MOVES 3.1.0 model to generate emissions rates for the expected vehicle types affected by the project. Researchers used updated summer season inputs based on TCEQ's latest (2023) summer fuel survey, with adjustments for particular properties made to reflect the latest expected "future year" values (i.e., consistent with the pertinent regulations and/or local observations, such as for Reid vapor pressure of gasoline, the average sulfur content of gasoline and diesel, biodiesel ester volume, gasoline benzene content). Fuel supply consists of monthly inputs, for gasoline, one summer formulation and one winter formulation, assigned to months as appropriate, and for diesel, one formulation applied to all months. Gasoline is E10, or 10% ethanol, and diesel is about 4-5% biodiesel. For winter gasoline, the team used the MOVES3.1 January default in the absence of local data.

Vehicle age distributions are consistent with prior analysis. For passenger vehicle source types, researchers used the latest estimates across 31 years based on latest available (end-of-year 2021) El Paso County TxDMV vehicle registration data.

TTI staff used American Community Survey data to compute a bicycle mode share for El Paso, along with a future growth rate for the mode in the region.

Analysis Methods

TTI staff used the analysis method provided in the August 2008 version of the MOSERs Guide, Equation 11.1 – *Bicycle and Pedestrian Lanes or Paths*.

Stated in words, the average annual daily traffic (AADT) of the corridor is multiplied by the percentage of drivers shifting to bicycle mode, multiplied by the bike facility length, multiplied by the speed-based running exhaust emission factor for participants' trip before utilizing the bike lane.

The detailed equation is provided below in Strategy Equation.

The analysis year used is 2033, the first year of operation. *For planning purposes, the emissions benefit of a static program will decline over time.* Without the increased use of the bike lanes over the project lifetime, any benefits accrued by the mode shift to bicycles may be negated by the increased emissions from potential higher traffic volumes in the corridor over time.

Assumptions in the MOVES3.1.0 output for the project included:

- Output created for VOC, CO, NOx, and PM-10.
- Light-duty passenger vehicles and light-duty passenger trucks (SUVs), gasoline and diesel-fueled, are included according to a projected regional VMT fleet mix (Source Type ID 21, 31)
- Running exhaust and evaporative emissions and start emissions rates were calculated. (Process ID 1, 2, 11, 12, 13, 15)
- Considering the project area and the type of trips reduced through the strategy, emissions on Road Type 5, urban unrestricted access were analyzed.
- Overall average speed in the seven roadways is assumed to be 30 mph (Speed bin 7).
- The analysis period is from 7:00 a.m. to 7:00 p.m. on a winter weekday for CO; the same periods on a summer weekday for NOx, VOC, and PM-10. Use of the bicycle lanes can occur throughout the day, but the greatest impact on emissions will occur with any peak hour or daytime mode shift.
- The vehicle-miles traveled (VMT) reduced because of the mode shift to bicycle were distributed proportionally across the 12 hours and by vehicle types and fuel types in line with the vehicle fleet mix in the El Paso region.

TTI staff reviewed the project information to determine values for the individual variables in the MOSERs equation. The MOSERS Guide encourages planners to make conservative, justifiable assumptions about projects. TTI staff determined a valid percentage mode shift from automobile to bicycle by participants in El Paso region. The characteristics of this new facility may provide impetus for significant mode shift, but planners should use available data.

The following assumptions were made for the project:

- Light-duty passenger vehicle and light-duty passenger truck AADT in the project area of 1,800 is estimated. This figure is based on 2022 AADT and ADT traffic counts from TxDOT and the City of El Paso. AADT is estimated based on the data plus a professional estimate of traffic growth and an averaging of the counts. It assumes 80% of the daily traffic along the roadways occurs in the 12-hour daytime period under analysis. It assumes 86% of the traffic is passenger vehicles.
- The current percent bicycle mode share for the El Paso region is estimated to be 2.0% and can serve as an optimistic mode share increase for the new bike facilities.
- The 0.02 increase in mode share represents new cyclists (vehicle trips replaced).
- Bike lane facility length of 1.75 miles is computed.

The emission reductions are presented in kilograms per day (kg/day) in accordance with CMAQ project reporting requirements.

Strategy Equation

Equation 11.1, Bicycle and Pedestrian Lanes or Paths

Daily Emission Reduction = AADT * PMS * L * EF_B

The average annual daily traffic of the corridor multiplied by the percentage of drivers shifting to bike/pedestrian multiplied by the average bicycle trip length multiplied by the speed-based running exhaust emission factor for participants' trip before participating in the bike/pedestrian program.

Final unit of measure: grams/day
Source: Capitol Area MPO (CAMPO)

Variables: **AADT:** Average annual daily traffic in corridor (vehicles/day)

EF_B: Speed-based running exhaust emission factor for participants' trip before participating in the bike/pedestrian program (NO_x, VOC, or CO) (grams/mile)

L: Length of facility (miles)

PMS: Percentage mode shift from driving to bike/pedestrian (decimal)

Analysis

Results

Daily Emission Reduction = AADT * PMS * L * EF_B

Note: Due to the large amount of data generated by the MOVES model and the required off-model computations, for presentation purposes the individual emissions rates are not provided in the results below.

For CO:

1,800 * 0.02 * 1.75 * EF_B = 1015.638 grams/day

Daily emission reduction is equal to 1.016 kg/day

For NOx:

1,800 * 0.02 * 1.75 * EF_B = 11.799 grams/day

Daily emission reduction is equal to 0.012 kg/day

For VOC:

1,800 * 0.02 * 1.75 * EF_B = 22.660 grams/day

Daily emission reduction is equal to 0.023 kg/day

For PM-10:

1,800 * 0.02 * 1.75 * EF_B = 11.087 grams/day

Daily emission reduction is equal to 0.011 kg/day

Summary of Results

The overall emissions analysis results for the project are shown in Table 1. The estimated emissions benefits from the pedestrian and bicycle facilities are modest and are dependent on increased use of bicycles as a travel mode in the city and region. An emissions benefit for the El Paso region can be expected from this project.

Table 1. Estimated Emissions Benefits from Playa Drain Shared Use Path (Yarbrough to Midway)

Pollutant	Emissions Reduction (kg/day)
CO	1.016
NO_x	0.012
VOC	0.023
PM_{10}	0.011

Emission Reduction Analysis for City of El Paso Proposed CMAQ Project

Sunland Park Drive Shared Use Path

January 2024

Prepared for

THE CITY OF EL PASO TEXAS

By

Texas A&M Transportation Institute

Task Summary

The Texas A&M Transportation Institute (TTI) was tasked by the City of El Paso to perform a mobile source emissions analysis for a proposed project in the El Paso metropolitan region. The city is seeking funding from the Congestion Mitigation/Air Quality Improvement Program (CMAQ) to help implement the project.

The project will construct 0.63 miles of pedestrian and bike lane infrastructure improvements in the northwest region of the city along Sunland Park Drive.

Individual Project Analysis

The emissions analysis for the project is presented below. The project name is given along with a brief description of the project. Data sources and analysis assumptions are provided. The equation used from the *Texas Guide to Accepted Mobile Source Emission Reduction Strategies* (MOSERs Guide) is given for the strategy along with the variables of the equation and the equation itself. The results are then computed for the strategy.

It is recommended that the agency conduct a more detailed emissions study of the project as it develops further. The results presented below are valid for CMAQ applications, but more time and effort would increase the accuracy of the emissions benefits. As a result, this analysis should not be used for conformity purposes.

Sunland Park Shared Use Path

The Sunland Park Shared Use Path project will install 0.63 miles of pedestrian and bicycle trail improvements along a major arterial in the northwest El Paso region. The project will construct pedestrian and bicycle facilities to include signage, landscaping, furnishings, and illumination. The limits of the improvements are from Cadiz St. to Mesa St.

The project will serve the City of El Paso by increasing its regional transportation infrastructure coupled with existing transit projects, educational centers, and commercial developments. Bicycle facilities will support and provide connectivity to existing bicycle facilities Citywide with connection to mass transit facilities and provide an alternative method of transportation. The infrastructure will be installed within City right-of-way and no property acquisition is anticipated.

The components of the project are consistent with the August 2016 City of El Paso Bike Plan.

Data Sources

The City of El Paso provided the project description and project scope information. This resource provided the research team with a better understanding of the proposed project and potential emissions benefits.

TTI researchers utilized the U.S. EPA MOVES 3.1.0 model to generate emissions rates for the expected vehicle types affected by the project. Researchers used updated summer season inputs based on TCEQ's latest (2023) summer fuel survey, with adjustments for particular properties made to reflect latest expected "future year" values (i.e., consistent with the pertinent regulations and/or local observations, such as for Reid vapor pressure of gasoline, average sulfur content of gasoline and diesel, biodiesel ester volume, gasoline benzene content). Fuel supply consists of monthly inputs, for gasoline, one summer formulation and one winter formulation, assigned to months as appropriate, and for diesel, one formulation applied to all months. Gasoline is E10, or 10% ethanol, and diesel about 4-5% biodiesel. For winter gasoline, used the MOVES3.1 January default in the absence of local data.

Vehicle age distributions are consistent with prior analysis. For passenger vehicle source types, researchers used the latest estimates across 31 years based on latest available (end-of-year 2021) El Paso County TxDMV vehicle registration data.

TTI staff used American Community Survey data to compute a bicycle mode share for El Paso, along with a future growth rate for the mode in the region.

Analysis Methods

TTI staff used the analysis method provided in the August 2008 version of the MOSERs Guide, Equation 11.1 – *Bicycle and Pedestrian Lanes or Paths*.

Stated in words, the average annual daily traffic (AADT) of the corridor is multiplied by the percentage of drivers shifting to bicycle mode, multiplied by the bike facility length, and multiplied by the speed-based running exhaust emission factor for participants' trips before utilizing the bike lane.

The detailed equation is provided below in Strategy Equation.

The analysis year used is 2031, the first year of operation. *For planning purposes, the emissions benefit of a static program will decline over time.* Without the increased use of the bike lanes over the project lifetime, any benefits accrued by the mode shift to bicycles may be negated by the increased emissions from potential higher traffic volumes in the corridor over time.

Assumptions in the MOVES3.1.0 output for the project included:

- Output created for VOC, CO, NOx, and PM-10.
- Light-duty passenger vehicles and light-duty passenger trucks (SUVs), gasoline and diesel-fueled, are included according to a projected regional VMT fleet mix (Source Type ID 21, 31)
- Running exhaust and evaporative emissions and start emissions rates were calculated. (Process ID 1, 2, 11, 12, 13, 15)
- Considering the project area and the type of trips reduced through the strategy, emissions on Road Type 5, urban unrestricted access were analyzed.
- Overall average speed in the seven roadways is assumed to be 30 mph (Speed bin 7).
- The analysis period is from 7:00 a.m. to 7:00 p.m. on a winter weekday for CO; the same periods on a summer weekday for NOx, VOC, and PM-10. Use of the bicycle lanes can occur throughout the day, but the greatest impact on emissions will occur with any peak hour or daytime mode shift.
- The vehicle-miles traveled (VMT) reduced because of the mode shift to bicycle were distributed proportionally across the 12 hours and by vehicle types and fuel types in line with the vehicle fleet mix in the El Paso region.

TTI staff reviewed the project information to determine values for the individual variables in the MOSERs equation. The MOSERS Guide encourages planners to make conservative, justifiable assumptions about projects. TTI staff determined a valid percentage mode shift from automobile to bicycle by participants in El Paso region. The characteristics of this new facility may provide impetus for significant mode shift, but planners should use available data.

The following assumptions were made for the project:

- Light-duty passenger vehicle and light-duty passenger truck AADT in the project area of 2,920 is estimated. This figure is based on 2022 AADT and ADT traffic counts from TxDOT and the City of El Paso. AADT is estimated based on the data plus a professional estimate of traffic growth and an averaging of the counts. It assumes 80% of the daily traffic along the roadways occurs in the 12-hour daytime period under analysis. It assumes 86% of the traffic is passenger vehicles.
- Most of the future users of the facility will generate and replace trips from the residential areas to the north and south of Sunland Park Drive for use of local businesses and facilities. Greater connectedness to the developed bike lane infrastructure in the area will attract riders from adjacent neighborhoods and increase the use of the path and emissions benefits.

- The current percent bicycle mode share for the El Paso region is estimated to be 2.0% and can serve as an optimistic mode share increase for the new bike facilities.
- The 0.02 increase in mode share represents new cyclists (vehicle trips replaced).
- Bike lane facility length of 0.63 miles is computed.

The emission reductions are presented in kilograms per day (kg/day) in accordance with CMAQ project reporting requirements.

Strategy Equation

Equation 11.1, Bicycle and Pedestrian Lanes or Paths

Daily Emission Reduction = AADT * PMS * L * EF_B

The average annual daily traffic of the corridor multiplied by the percentage of drivers shifting to bike/pedestrian multiplied by the average bicycle trip length multiplied by the speed-based running exhaust emission factor for participants' trip before participating in the bike/pedestrian program.

Final unit of measure: grams/day
Source: Capitol Area MPO (CAMPO)

Variables: **AADT:** Average annual daily traffic in corridor (vehicles/day)

EF_B: Speed-based running exhaust emission factor for participants' trip before participating in the bike/pedestrian program (NO_x, VOC, or CO) (grams/mile)

L: Length of facility (miles)

PMS: Percentage mode shift from driving to bike/pedestrian (decimal)

Analysis

Results

Daily Emission Reduction = AADT * PMS * L * EF_B

Note: Due to the large amount of data generated by the MOVES model and the required off-model computations, for presentation purposes the individual emissions rates are not provided in the results below.

For CO:

2,920 * 0.02 * 0.63 * EF_B = 1851.247 grams/day

Daily emission reduction is equal to 1.851 kg/day

For NOx:

2,920 * 0.02 * 0.63 * EF_B = 25.116 grams/day

Daily emission reduction is equal to 0.025 kg/day

For VOC:

2,920 * 0.02 * 0.63 * EF_B = 38.994 grams/day

Daily emission reduction is equal to 0.039 kg/day

For PM-10:

2,920 * 0.02 * 0.63 * EF_B = 18.082 grams/day

Daily emission reduction is equal to 0.018 kg/day

Summary of Results

The overall emissions analysis results for the project are shown in Table 1. The estimated emissions benefits from the pedestrian and bicycle facilities are modest and are dependent on the increased use of bicycles as a travel mode in the city and region. An emissions benefit for the El Paso region can be expected from this project.

Table 1. Estimated Emissions Benefits from Sunland Park Shared Use Path

Pollutant	Emissions Reduction (kg/day)
CO	1.851
NOx	0.025
VOC	0.039
PM_{10}	0.018

Emission Reduction Analysis for City of Socorro Proposed CMAQ Project

4-D Tigua Spur of Paso del Norte Hike and Bike Trail

January 2024

Prepared for

CITY OF SOCORRO, TEXAS

By

HUITT ZOLLARS

1.0 Task Summary

Huitt-Zollars (HZ) was tasked by the City of Socorro to perform a mobile source emissions analysis for a proposed project within the city limits. The city is seeking funding from the Congestion Mitigation/Air Quality Improvement Program (CMAQ) to help implement the project.

The project will construct 1.59 miles of hike and bike infrastructure improvements between Socorro Rd and Alameda Ave along the Franklin Feeder Canal.

2.0 Individual Project Analysis

The emissions analysis for the project is presented below. The project name is given along with a brief description of the project. Data sources and analysis assumptions are provided. The equation used from the *Texas Guide to Accepted Mobile Source Emission Reduction Strategies* (MOSERs Guide), is given for the strategy along with the variables of the equation and the equation itself. The results are then computed for the strategy.

It is recommended that the agency conduct a more detailed emissions study of the project as it develops further. The results presented below are valid for CMAQ applications, but more time and effort would increase the accuracy of the emissions benefits. As a result, this analysis should not be used for conformity purposes.

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3.0 4-D Tigua Spur of Paso del Norte Hike and Bike Trail

The 4-D Tigua Spur of Paso Del Norte Trail project will install 1.59 miles of pedestrian and bicycle lane improvements. These include a 12-foot HMAC pavement with pedestrian illumination. The limits of the improvements are from Socorro Rd to Alameda Ave along the Franklin Feeder Canal.

The project will serve the City of Socorro by increasing its regional infrastructure coupled with existing transit projects, educational centers, and commercial developments. Bicycle facilities support and provide connectivity to mass transit centers and facilities, and also provide an alternative method of transportation. The project is consistent with the City of Socorro's Comprehensive Plan to provide more pedestrian and bicycle goal 3 to utilize El Paso County Water Improvement District #1 ROW to provide off-road facilities.

4.0 Data Sources

The City of Socorro provided the project description and scope of the project. The following resources provided the team with a better understanding of the proposed project and potential emissions benefits.

- Texas A&M Transportation Institute's *MOSERS Mobile Source Emission Reduction Strategies Excel Sheet*
- The United States Census Bureau *Socorro City, Texas*
- United States Department of Transportation (USDOT) *Average Annual PMT, VMT Person Trips and Trip Length by Trip Purpose*
- 2014 and 2022 Comprehensive Master Plan-City of Socorro
- City of El Paso Bike Plan *August 2016*

5.0 Analysis Methods

HZ used the analysis method provided in the Third Edition 2021 version of the MOSERs Guide, Section 9 – *Bicycle and Pedestrian Lanes or Paths,* Equation 2 – *For a Facility without a Parallel Roadway*.

Stated in words, the number of households in the strategy area of the corridor is multiplied by the average number of trips per household, multiplied by the percentage of drivers shifting to bicycle mode, multiplied by the average auto trip length before implementation, multiplied by the speed-based running exhaust emission factor for participants' trip before utilizing the bike lane.

The detailed equation is provided below.

Equation 2 – For A Facility without a Parallel Roadway (Section 9 - Bicycle and Pedestrian Lanes or Paths Daily Emission Reduction)

Daily Emission Reduction= $HH_{AREA} * HH_{TRIPS} * PMS * TL_B * EF_B$

Final unit of measure: grams/day
Source: TxDOT's The Texas Guide to Accepted MOSERS, *Third Edition 2021 Module 2*

Variables:

HH_{AREA}**:** Number of households in strategy Area
HH_{TRIPS}**:** Average number of trips per household in strategy area
PMS: Percentage mode shift from driving to bike/pedestrian (decimal)
TL_B**:** Average auto trips length before implementation (miles)
EF_B**:** Speed-based running exhaust and start emissions factor for participants' trip before participating in the bike/pedestrian program (NO_x, VOC, or CO) (grams/mile)

The analysis year used is 2028. *For planning purposes, the emissions benefit of a static program will decline over time.* Without the increased use of the bike lanes over the project lifetime, any benefits accrued by the mode shift to bicycles may be negated by the increased emissions from potential higher traffic volumes in the corridor over time.

HZ staff reviewed the project information to determine values for the individual variables in the MOSERs equation. The MOSERS Guide encourages planners to make conservative, justifiable assumptions about projects. The following assumptions were made for the project to determine the variables for the equation:

- The project area will include the entire city of Socorro, Texas
- Using the 2020 Decennial Census from the US Census Bureau it is assumed that there are 11,148 households in the project area.
- Using the USDOT Average Annual PMT, VMT Person Trips and Trip Length by Trip Purpose it is assumed that the average household conducts four (4) trips per day.
- The 0.02 increase in mode share represents new cyclists (vehicle trips replaced) was based on the City of El Paso Bike Plan, since the City of Socorro does not currently have a bike master plan. This is also consistent with other CMAQ reports in the area.
- Using the US Census Bureau it was determined that the average trip in Socorro Texas takes 15 to 35 minutes. Assuming an average speed of 35 mph and an average of 25 minutes, it was calculated that on average a trip would be 12.5 miles long. This is consistent with the USDOT Average Annual PMT, VMT Person Trips and Trip Length by Trip Purpose of 11.5 miles.
- Using the Texas A&M Transportation Institute's *MOSERS Excel Sheet* and imputing the El Paso Metropolitan Area, Analysis year of 2028, Road Type of Rural-Arterial, and an average trip speed of 30 MPH the Speed-based running exhaust emission factors for the average speed of participants' trip before participating in the bike/pedestrian program were calculated.

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6.0 Analysis

Daily Emission Reduction = HH_{AREA} * HH_{TRIPS} * PMS * TL_B * EF_B

For CO:

11,148 * 4 *0.02* 12.5 * 2.767888 = 30,856 g/day

For NOx:

11,148 * 4 *0.02* 12.5 * 0.063458= 707 g/day

For VOC:

11,148 * 4 *0.02* 12.5 * 0.041811 = 466 g/day

For PM-10:

11,148 * 4 *0.02* 12.5 * 0.054548 = 608 g/day

7.0 Summary of Results

The overall emissions analysis results for the project are shown in **Table 1**. The estimated emissions benefits from the pedestrian and bicycle facilities are dependent on increased use of bicycles as a travel mode in the city and region, however an emissions benefit in the City of Socorro region can be expected from this project. The emission reductions are presented in kilograms per day (kg/day) in accordance to CMAQ project reporting requirements.

Table 1. Estimated Emissions Benefits from 4-D Tigua Spur of Paso del Norte Hike and Bike Trail

Pollutant	Emissions Reduction (kg/day)
CO	30.856
NOx	0.707
VOC	0.466
PM_{10}	0.608

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Emission Reduction Analysis for City of El Paso Proposed CMAQ Project

Border Traveler Information System

January 2024

Prepared for

THE CITY OF EL PASO TEXAS

By

Texas A&M Transportation Institute

Task Summary

The Texas A&M Transportation Institute (TTI) Fort Worth office was tasked by the City of El Paso to perform a mobile source emissions analysis for a proposed project in the El Paso metropolitan region. The city is seeking funding from the Congestion Mitigation/Air Quality Improvement Program (CMAQ) to help implement the project.

The project will develop and install a traveler information system focused on cross-border traffic around the Paso del Norte and Stanton ports of entry.

Individual Project Analysis

The emissions analysis for the project is presented below. The project name is given along with a brief description of the project. Data sources and analysis assumptions are provided. The equation used from the *Texas Guide to Accepted Mobile Source Emission Reduction Strategies* (MOSERs Guide) is given for the strategy along with the variables of the equation and the equation itself. The results are then computed for the strategy.

Given the short time available to conduct this analysis, it is recommended that the agency conduct a more detailed emissions study of the project as it develops further. The results presented below are valid for CMAQ applications, but more time and effort would increase the accuracy of the emissions benefits. As a result, this analysis should not be used for conformity purposes.

Border Traveler Information System

The City of El Paso proposes to develop and install a traveler information system focused on cross-border traffic along the off-system city street network in the vicinity of the Paso Del Norte and Stanton ports of entry in downtown El Paso. The system will include digital directional and informational systems and lane segregation. The goal is to reduce congestion in the downtown area through improved traffic flow, reduced queuing at nearby intersections, and reduction of vehicle idling. The project is intended to connect to multiple comprehensive mobility plan projects, including Loop 375 and IH-10.

Data Sources

The City of El Paso provided project information including project description and scope. These resources provided the research team with a better understanding of the proposed project and potential emissions benefits.

TTI researchers gathered traffic count data for city roadways in the project area from the El Paso Planning Metropolitan Organization's current Travel Demand Model and TxDOT providing District traffic web maps containing 2022 traffic counts. Researchers also developed a 2032 ADT forecast for the two border crossings.

TTI researchers utilized the U.S. EPA MOVES 3.1.0 model to generate emissions rates for the expected vehicle types affected by the project. Researchers used updated summer season inputs based on TCEQ's latest (2023) summer fuel survey, with adjustments for particular properties made to reflect the latest expected "future year" values (i.e., consistent with the pertinent regulations and/or local observations, such as for Reid vapor pressure of gasoline, average sulfur content of gasoline and diesel, biodiesel ester volume, gasoline benzene content). Fuel supply consists of monthly inputs, for gasoline, one summer formulation and one winter formulation, assigned to months as appropriate, and for diesel, one formulation applied to all months. Gasoline is E10, or 10% ethanol, and diesel is about 4-5% biodiesel. For winter gasoline, researchers used the MOVES3.1.0 January default in the absence of local data.

Vehicle age distributions are consistent with prior analysis. For passenger vehicle source types, researchers used the latest estimates across 31 years based on the latest available (end-of-year 2021) El Paso County TxDMV vehicle registration data.

Analysis Methods

TTI staff used a modified version of the analysis method provided in the August 2008 version of the MOSERs Guide, Equation 7.2 - *Traffic Operations*. The equation attempts to estimate the improvements in idling emission and speed changes as a result of operational improvements. For this particular project, the primary benefit is the changes in idling emissions. The modified equation is provided below in Strategy Equation.

Assumptions in the MOVES3.1.0 output for the project included:

- Output created for VOC, CO, NOx, and PM-10.
- The analysis year used is 2033, the first year of operation.

- Light-duty passenger vehicles and light-duty passenger trucks (SUVs), gasoline and diesel-fueled, are included according to a projected regional VMT fleet mix (Source Type ID 21, 31). These vehicle types appear to be the vast majority in the area at this port of entry.
- Idling emissions rates were calculated. (Process ID 1, 15).
- Considering the project area and the type of emissions reduced through the strategy, emissions on Road Type 1, off-network were analyzed.
- Idling speed in MOVES3.1.0 is speed bin 0.
- The analysis period is 24 hours on a winter weekday for CO; the same periods on a summer weekday for NOx, VOC, and PM-10. Use of the information system can occur throughout the day, but the greatest impact on emissions will occur during peak hours.
- The idling emissions reduced because of the project were distributed across the 6-hour peak period and 18-hour off-peak for both northbound and southbound traffic, along with by passenger vehicle types and fuel types in line with the vehicle fleet mix in the El Paso region.

TTI staff reviewed the project information to determine values for the individual variables in the MOSERs equation. The MOSERS Guide encourages planners to make conservative, justifiable assumptions about projects. TTI staff attempted to determine a valid delay reduction in the project area from the information system.

The following assumptions were made for the project:

- In reviewing the data and information provided, the primary emissions benefit from this project is the reduction in idling emissions southbound at the Stanton POE due to reduced queuing along Stanton and its effects on cross traffic along the roadway. Delay will be reduced for northbound traffic traveling through and out of the downtown area, but this traffic will not be directed at the focal point of the POE. There is more opportunity for dispersal on the area streets.
- Light-duty passenger vehicle and light-duty passenger truck AADT in the project area of 12,220 (9,750 northbound for both POE; 2,480 southbound on Stanton) is estimated for 2033. This figure is based on 2022 traffic counts from TxDOT. AADT is estimated based on the data plus a professional estimate of traffic growth and an averaging of the counts. It assumes 80% of the daily traffic along the roadways occurs in the 12-hour daytime period under analysis.
- Average delay reduction is assumed to be one minute (60 seconds) per vehicle for peak period southbound travel through the affected area, 20 seconds for peak northbound and 10 seconds for both directions in off-peak hours.

The emission reductions are presented in kilograms per day (kg/day) in accordance with CMAQ project reporting requirements.

Strategy Equation

Equation 7.2, Traffic Operations (modified)

Daily Emission Reduction = $(I_P + I_{OP}) * EF_I$

Change in idling exhaust emissions from improved traffic flow during the peak and off-peak periods, *Where,*

$I_P = (N_{PH} * V_{H,P} * DR_P)/3600$ seconds per hour
$I_{OP} = (N_{OPH} * V_{H,OP} * DR_{OP})/3600$ seconds per hour

Reduction of idling in the peak and off-peak period

Final unit of measure: grams/day
Source: Texas A&M Transportation Institute (modified from CARB and FHWA Southern Resource Center)

Variables:	**DR_P:**	Estimated delay reduction during peak period (seconds)
	DR_{OP}:	Estimated delay reduction during off-peak period (seconds)
	EF_I:	Idling emission factor (grams/hour)
	I_P:	Peak hour reduction in idling emissions both directions (northbound and southbound) (vehicle-hours)
	I_{OP}:	Off-peak hour reduction in idling emissions both directions (northbound and southbound) (vehicle-hours)
	N_{PH}:	Number of peak hours
	N_{OPH}:	Number of off-peak hours
	$V_{H,P}$:	Number of vehicles that pass through the intersection per hour during the peak period
	$V_{H,OP}$:	Number of vehicles that pass through the intersection per hour during the off-peak period

Analysis

Results

Daily Emission Reduction = $(I_P + I_{OP}) * EF_I$

Note: For presentation purposes, the individual emissions rates are not given in the results below.

Where,

$I_{P\text{-}SB}$ = (6 * 407 * 60)/3600 seconds per hour
$I_{OP\text{-}SB}$ = (18 * 101 * 10)/3600 seconds per hour
$I_{P\text{-}NB}$ = (6 * 102 * 20)/3600 seconds per hour
$I_{OP\text{-}NB}$ = (18 * 541 * 10)/3600 seconds per hour

(40.7 + 5.05 + 3.4 + 27.05) = 76.2

For CO:

76.2 * EF_I = 1,507.203 grams/day

Daily emission reduction is equal to 1.507 kg/day

For NOx:

76.2 * EF_I = 163.630 grams/day

Daily emission reduction is equal to 0.164 kg/day

For VOC:

76.2 * EF_I = 84.096 grams/day

Daily emission reduction is equal to 0.084 kg/day

For PM-10:

76.2 * EF_I = 31.193 grams/day

Daily emission reduction is equal to 0.031 kg/day

Summary of Results

The overall emissions analysis results for the project are shown in Table 1. The estimated emissions benefits from the information system are modest. An emissions benefit for the El Paso region can be expected from this project.

Table 1. Estimated Emissions Benefits from Border Traveler Information System

Pollutant	Emissions Reduction (kg/day)
CO	1.507
NOx	0.164
VOC	0.084
PM_{10}	0.031

Emission Reduction Analysis for City of El Paso Proposed CMAQ Project

Video Surveillance and Count Stations - Phase II

January 2024

Prepared for

By

Task Summary

The Texas A&M Transportation Institute (TTI) was tasked by the City of El Paso to perform a mobile source emissions analysis for a proposed project in the El Paso metropolitan region. The city is seeking funding from the Congestion Mitigation/Air Quality Improvement Program (CMAQ) to continue the phased implementation of video surveillance and count stations to improve ITS in the region.

Individual Project Analysis

The emissions analysis for the project is presented below. The project name is given along with a brief description of the project. Data sources and analysis assumptions are provided. The equation used from the *Texas Guide to Accepted Mobile Source Emission Reduction Strategies* (MOSERs Guide) is given for the strategy along with the variables of the equation and the equation itself. The results are then computed for the strategy.

It is recommended that the agency conduct a more detailed emissions study of the project as it develops further. As a result, this analysis should not be used for conformity purposes.

Video Surveillance and Count Stations – Phase II

The City of El Paso seeks to continue implementing phased improvements to the City's Traffic Management Center (TMC). The TMC oversees the operation of the City's Transportation Management Center Computerized Signal System. The system includes the signal timing and coordination for approximately 658 traffic signals. The TMC primary objective is incident management, providing real-time response to incidents with the ability to remotely implement emergency signal timing to help ease traffic congestion due to traffic accidents, special events or construction closures.

This project completes the Video Surveillance and Count Stations Phase I (CSJ 0924-06-239). These projects were initiated by TxDOT on project CSJ 0924-06-244. This project continues the regional plan to interconnect the City's and TxDOT's traffic management centers.

The project includes the installation or integration of new count stations, dynamic message signs, hardware and software, conduit, fiber optic cable, and communication systems into the COEP TMC and TxDOT TransVista. These will be installed at the following intersections in the city:

- Resler & Helen of Troy
- Doniphan & Sunland Park
- Diana & Railroad
- Airport & Airway
- Resler & High Ridge
- Mesa & Executive Center
- Montana & Copia
- Airway & Boeing
- Resler & Redd Rd
- Paisano & Santa Fe
- Montana & Reynolds
- Edgemere & Airway
- Redd & Thorn
- Hondo Pass & Dyer
- Montana & Trowbridge
- Airway & Viscount
- Redd & Doniphan
- Hondo Pass & Railroad
- Alameda & Piedras
- Hawkins & Edgemere
- Hawkins & Viscount
- Hawkins & Market
- Hawkins & Phoenix
- Lee Trevino & Yermoland

- Lee Trevino & Castner

The system will monitor traffic conditions and provide information to drivers about road conditions and proposed alternate routes for use.

This project supports the MPO's goals and objectives of providing Active Traffic Control for the region.

Data Sources

The City of El Paso provided project information including project description and cost estimates. These resources provided the research team with a better understanding of the proposed project and potential emissions benefits.

TTI researchers gathered traffic count data for city roadways ion the project area from TxDOT-provided District traffic web maps containing 2022 traffic counts. Researchers also developed a 2033 ADT estimate through a growth factor and applied it to the 2022 numbers.

TTI researchers utilized the U.S. EPA MOVES 3.1.0 model to generate emissions rates for the expected vehicle types affected by the project. Researchers used updated summer season inputs based on TCEQ's latest (2023) summer fuel survey, with adjustments for particular properties made to reflect latest expected "future year" values (i.e., consistent with the pertinent regulations and/or local observations, such as for Reid vapor pressure of gasoline, average sulfur content of gasoline and diesel, biodiesel ester volume, gasoline benzene content). Fuel supply consists of monthly inputs, for gasoline, one summer formulation and one winter formulation, assigned to months as appropriate, and for diesel, one formulation applied to all months. Gasoline is E10, or 10% ethanol, and diesel about 4-5% biodiesel. For winter gasoline, used the MOVES3.1 January default in the absence of local data.

Vehicle age distributions are consistent with prior analysis. For passenger vehicle source types, researchers used the latest estimates across 31 years based on latest available (end-of-year 2021) El Paso County TxDMV vehicle registration data.

Traffic data for the city roadways was garnered from TxDOT traffic count data for the El Paso District available online.

Analysis Methods

TTI staff used the analysis method provided in the State of Texas MOSERs Guide, Equation 7.4 – *Intelligent Transportation Systems (ITS)*. The equation estimates the sum of each ITS link's change in running exhaust emissions resulting from improved traffic flow due to the ITS improvements. The equation is provided below in Strategy Equation.

The equation is valid for CMAQ purposes but a more robust analysis that models the hundreds of individual intersections would provide a more accurate estimate of the emissions benefits derived from the improvements.

Assumptions in the MOVES3.1.0 output for the project included:

- Output created for VOC, CO, NOx, and PM-10.
- The analysis year is 2033.
- Light-duty passenger vehicles and light-duty passenger trucks (SUVs), motorcycles, light commercial trucks, single unit short and long-haul trucks, and combination short and long-haul trucks, gasoline and diesel-fueled, are included according to a projected regional VMT fleet mix (Source Type ID 11, 21, 31, 32, 41, 42, 43, 51, 52, 53, 54, 61, 62).
- Running exhaust and evaporative emissions, break wear and tire wear emissions rates were calculated. (Process ID 1, 9, 10, 11, 12, 13, 15)
- Considering the project area and the type of emissions reduced through the strategy, emissions on Road Type 5, urban unrestricted access were analyzed.
- An average city network speed improvement from 30 mph to 35 mph is assumed (speed bin 7 to speed bin 8) resulting from implementation.
- The analysis period is from 6:00 a.m. to 7:00 p.m. on a winter weekday for CO; the same periods on a summer weekday for NOx, VOC, and PM-10. The effects of the signalization program can occur throughout the day, but the greatest impact on emissions will occur during any peak hours or daytime activity.
- The emissions reduced from the project were distributed across the 13 hours and by vehicle types and fuel types in line with the vehicle fleet mix in the El Paso region.

TTI staff reviewed the project information to determine values for the individual variables in the MOSERs equation. The MOSERS Guide encourages planners to make conservative, justifiable assumptions about projects.

The following assumptions were made for the project:

- A 2033 average daily VMT of 462,165 is estimated for the 24 intersections affected by installation of the equipment. This was computed through compilation of 2022 traffic counts at or near the intersections and then applying a 1.105 percent annual growth factor.
- Assumes 80% of the daily traffic along the roadways occurs in the 13-hour daytime period under analysis. Thus, projected 2033 daily VMT affected by the project is 369,732.
- Each intersection is assumed 1 mile with one-quarter mile in each direction considered the affected area.

The emission reductions are presented in kilograms per day (kg/day) in accordance with CMAQ project reporting requirements.

Strategy Equation

Equation 7.4, Intelligent Transportation Systems (ITS)

Daily Emission Reduction = $$\sum_{i=1}^{n}[\mathbf{L}_i * \mathbf{ADT}_i * (\mathbf{EF}_B - \mathbf{EF}_A)_i]$$

The sum of each ITS link's change in running exhaust emissions resulting from improved traffic flow.

Variables: **ADT_i:** Average daily traffic for each affected roadway

EF_A: Speed-based running exhaust emission factor after implementation (NO_x and VOC) (grams/mile)

EF_B: Speed-based running exhaust emission factor before implementation (NO_x and VOC) (grams/mile)

L_i: Length of each roadway affected by signalization program (miles)

N: Number of affected corridors

For this analysis, the **L** and **ADT** are essentially the estimated VMT (369,732) affected by the project. The VMT was distributed through the 13-hour analysis period and multiplied by the result of the emission rate differences. This created a total estimated emissions reduction for the 2033 analysis year for the final, implemented project shown in Table 1 below.

Summary of Results

The emissions analysis results for the Video Surveillance and Count Stations – Phase II are shown in Table 1. The analysis shows a significant emissions benefit in the El Paso region can be expected from this project.

Table 1. Estimated Emissions Benefits for Video Surveillance and Count Stations – Phase II

Pollutant	Emissions Reduction (kg/day)
CO	35.73
NOx	4.68
VOC	1.84
PM_{10}	5.33

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