Transportation Control Measure Substitution of SR-241 Extension Control Measure with 241-91 Express Lanes Connector

Introduction

The Foothill/Eastern Transportation Corridor Agency (TCA) previously committed to funding of an extension of State Route (SR)-241 between Oso Parkway and the Orange County/San Diego County line as a single transportation control measure (TCM). The new facility would have two lanes in each direction by 2021 and three Lanes in each direction by 2030. The project is designated as ORA052 in the 2015 and pending 2017 FTIPs.

Due to agreements with the Southern California Association of Governments (SCAG) regarding timely implementation, TCA requests that the construction of a direct connector between SR-241 and the SR-91 Express Lanes (241/91 Express Lanes Connector – ORA111207) be approved as a single TCM substitution to the planned SR-241 extension TCM in the Federal Transportation Improvement Program.

This report presents the evaluation factors, methodology, and results that establish that the SR 241/91 Express Lanes Connector project meets all applicable TCM substitution criteria to serve as the TCM replacement for the SR 241 Extension project. The modeling results below demonstrate that the proposed 241/91 Express Lanes Connector TCM substitute will generate equivalent emission reductions compared with the SR-241 extension TCM for all criteria pollutants, for all milestone years.

Project Description

The 241/91 Express Lanes Connector consists of constructing tolled direct connector ramps between SR-241 and the SR-91 Express Lanes. The tolled ramps would connect northbound SR-241 with the eastbound SR-91 Express Lanes, and the westbound SR-91 Express Lanes with southbound SR-241. The 241/91 Express Lanes Connector will be completed by June 2021. The locations of the proposed 241/91 Express Lanes Connector and the currently designated SR-241 extension TCM are graphically illustrated in Attachment A.

Compliance with TCM Substitution Requirements

The 241/91 Express Lanes Connector meets the TCM substitution criteria specified in Clean Air Act Section 176 (c) and EPA's TCM guidance:

- Equivalent Emissions Reduction: The SR 241/91 Express Lanes Connector's emission reductions are equivalent to or greater than those associated with the original SR 241 Extension TCM. OCTA analyzes the countywide emissions impacts of the substitute TCM (241/91 Express Connector) relative to those of

SR-241 extension TCM in the Air Quality Analysis Methodology discussion below.

- Similar Geographic Area: Both the SR-241 extension TCM and the 241/91 Express Lanes Connector TCM substitution projects are located in the Orange County portion of the South Coast Air Basin.

- Adequate Resources: Funding for the 241/91 Express Lanes Connector TCM substitute is constrained in TCA's 2016 Capital Improvement Program, SCAG's federally-approved 2015 FTIP, as well as the 2017 FTIP pending federal approval.

- Similar Time Frame: The proposed 241/91 Express Lanes Connector TCM substitution will be operational by December 2020, equivalent or better than the schedule of the SR-241 extension TCM schedule.

- Timely Implementation: The proposed substitution is the means by which the obstacles to implementation of the SR-241 extension TCM are being overcome.

  Legal Authority and Enforceability: TCA has legal authority and personnel to implement and operate the substitute 241/91 Express Lanes Connector TCM.

- Interagency Collaboration and Consultation: The proposed SR 241-91 Express Lanes Connector TCM substitution was presented to SCAG's Transportation Conformity Working Group for required interagency consultation in February, March, May and July 2016. All agendas for these meetings were publicly noticed. The Working Group represents all affected transportation agencies as well as those agencies that must concur on the proposed TCM substitution, including the Federal Highway Administration, United States Environmental Protection Agency, Caltrans headquarters and local districts, California Air Resources Board, South Coast Air Quality Management District, OCTA and all other County Transportation Commissions within the SCAG region. The proposed modeling assumptions, the proposed air quality analysis methodology, and the preliminary emission reduction modeling results were presented to the Working Group members for review and comment. All comments and recommendations received from SCAG and the Working Group have been incorporated into this report.

Air Quality Analysis Methodology

The air quality impacts were calculated for the existing SR-241 extension TCM and the proposed 241/91 Express Lanes Connector TCM using a multi-step method based on the SCAG emission methodology focused on Orange County. The following 3-step process was used:

Step 1: Obtain daily vehicle miles traveled (VMT) and speed data for freeways and arterials from Orange County Transportation Analysis Model (OCTAM). OCTAM is a conventional four step transportation model used to forecast travel demand with a base year of 2010 (sometimes referred to as the existing year) and a forecast year of 2035. It is consistent with SCAG's regional travel demand model as it incorporates the most recent approved socio-economic data for Orange County and the surrounding region.

Three alternatives for forecast year 2035 were run using OCTAM as part of this study. The coding of all alternatives is consistent with previous OCTAM modeling practices.

One alternative included neither the SR-241 extension TCM nor the 241/91 Express Lanes Connector TCM substitution. For both the SR-241 extension TCM and the 241/91 Express Lanes Connector TCM substitution, this alternative was used as the "without project" alternative. Note that although the SR-241 extension would be replaced as a TCM, the SR-241 extension project will remain fully programmed and funded in the FTIP and SCAG RTP/SCS. All alternatives without the extension have been modeled only to isolate the emissions changes between the original and substitute TCMs.

The SR-241 extension consists of an extension of SR-241 between the current southern terminus of SR-241 at Oso Parkway and I-5 near the Cristianitos Road interchange. The ten-mile portion of the facility within the SCAG region, from Oso Parkway to the San Diego County line, is the currently designated TCM. The new facility will be built to freeway standards with three lanes (by 2030) in each direction. Consistent with the existing portion SR-241 open to traffic, it is assumed to be a tolled facility. New interchanges are assumed to be constructed between the SR-241 extension TCM and Cristianitos Road, Avenida Pico, and the future Rancho Mission Viejo Development north of Ortega Highway. This alternative was used for the SR-241 extension TCM "with project" analysis.

The proposed 241/91 Express Lanes Connector TCM consists of constructing direct connector ramps between SR-241 and the SR-91 Express Lanes. The ramps will connect northbound SR-241 with the eastbound SR-91 Express Lanes, and the westbound SR-91 Express Lanes with southbound SR-241. Consistent with the current policies on SR-241 and the SR-91 Express Lanes, the connector ramps are assumed to be only available to drivers willing to pay a toll. The project is programmed and budgeted in the FTIP. This alternative was used for the 241/91 Express Lanes Connector TCM substitution "with project" analysis.

Each alternative was modeled separately using OCTAM and post-processed using the National Cooperative Highway Research Program (NCHRP) 255 process. This process provides a standard methodology to refine forecasted volumes on links based on a combination of base year traffic counts, base year model estimates, and forecasted model estimates using incremental adjustments. The output of the travel demand model and post-processing included travel information on both the SR-241

extension TCM and the 241/91 Express Lanes Connector TCM substitution. Loaded link information, intrazonal travel speeds, and intrazonal travel volumes were extracted for all modeled time periods for both alternatives.

Step 2: Input OCTAM model results into the Emission Factors (EMFAC) model. The EMFAC model was developed by the California Air Resources Board and is used throughout California to calculate emission rates from motor vehicles, such as passenger cars and heavy-duty trucks, operating on freeways and local roads for typical summer, winter, and annual conditions. EMFAC model outputs include total emissions for all criteria pollutants for all Orange County.

A spreadsheet tool has been created to modify EMFAC input data to reflect the results of OCTAM runs. The tool was run for the base year, forecast year 2035 and forecast year 2040 using the extracted information from Step 1 as input to update the VMT and vehicle speed data needed by EMFAC. This process was performed multiple times for each modeled alternative in order to analyze conditions for summer, winter, and averaged annual timeframes.

Note that interpolation of travel activity data between base year 2010 and forecast year 2035 results was used to estimate the emissions changes for interim year 2021 and 2031. Since model scenarios for forecast year 2040 do not exist yet, the year 2035 travel forecasts were extrapolated out to 2040 using demographic growth projections. EMFAC model runs have been performed for all milestone years of the TCM substitution analysis.

Step 3: Determine the emissions output for the alternatives modeled in Step 2. Attachments B-J identify the potential emissions-related impacts of the SR-241 extension TCM and 241/91 Express Lanes Connector TCM substitution.

Emission Analysis Findings

The air quality forecasts for the SR-241 Extension TCM were compared with those of the 241/91 Express Lanes Connector TCM substitute project using the methodology described in the previous section. Three forecast years (2021, 2031, and 2040) as well as three seasons (summer, winter, and annual) for all criteria pollutants (Ozone, CO, NO2, PM2.5 and PM10) were compared and their results are summarized in the tables below.

Year 2021

Summer Emissions - Ozone (Tons/Day)

	Without Project	With 241 Extension	With Express Connector
ROG	18.4	18.4	18.4
NOx	32.3	32.3	32.3

Carbon Monoxide, Nitrogen Dioxide - Winter Emissions (Tons/Day)

	Without Project	With 241 Extension	With Express Connector
NO2	34.1	34.1	34.1
CO	145.5	145.5	145.5

PM_{10}, $PM_{2.5}$ - Annual Emissions (Tons/Day)

	Without Project	With 241 Extension	With Express Connector
ROG	18.2	18.2	18.2
NOx	34.7	34.7	34.7
PM10	4.6	4.6	4.6
PM2.5	2.2	2.2	2.2

Year 2031

Summer Emissions - Ozone (Tons/Day)

	Without Project	With 241 Extension	With Express Connector
ROG	11.1	11.1	11.1
NOx	16.1	16.1	16.1

Carbon Monoxide, Nitrogen Dioxide - Winter Emissions (Tons/Day)

	Without Project	With 241 Extension	With Express Connector
NO2	16.9	16.9	16.9
CO	78.5	78.4	78.4

PM_{10}, $PM_{2.5}$ - Annual Emissions (Tons/Day)

	Without Project	With 241 Extension	With Express Connector
ROG	10.9	10.9	10.9
NOx	17.2	17.2	17.2
PM10	4.7	4.7	4.7
PM2.5	2.0	2.0	2.0

Year 2040

Summer Emissions - Ozone (Tons/Day)

	Without Project	With 241 Extension	With Express Connector
ROG	7.4	7.4	7.4
NOx	9.1	9.1	9.1

Carbon Monoxide, Nitrogen Dioxide - Winter Emissions (Tons/Day)

	Without Project	With 241 Extension	With Express Connector
NO2	9.5	9.5	9.5
CO	47.3	47.3	47.3

PM_{10}, $PM_{2.5}$ - Annual Emissions (Tons/Day)

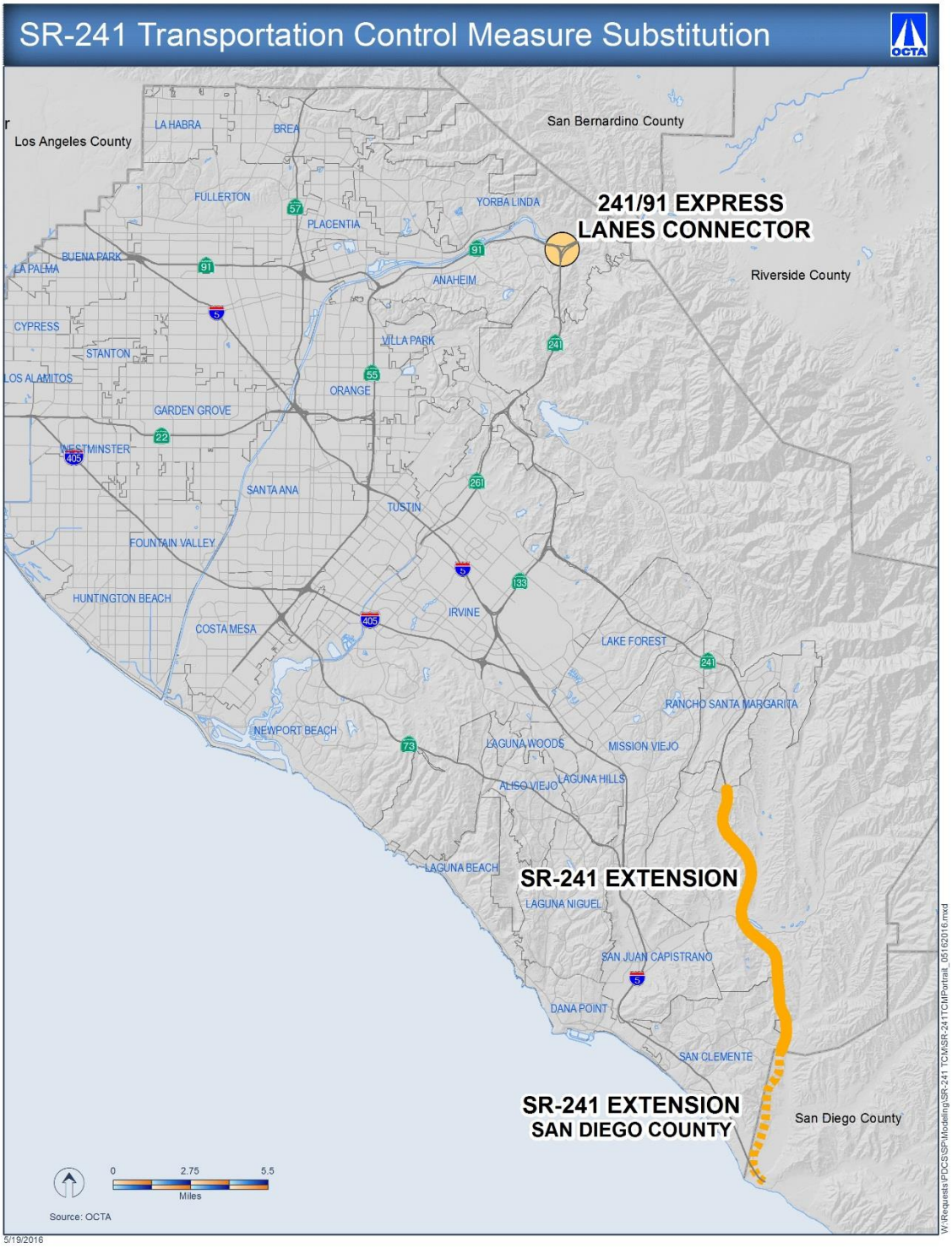
	Without Project	With 241 Extension	With Express Connector
ROG	7.2	7.2	7.2
NOx	9.7	9.7	9.7
PM10	4.7	4.7	4.7
PM2.5	1.9	1.9	1.9

In summary, the modeling results demonstrate that the proposed 241/91 Express Lanes Connector TCM substitute project will have the same or less amount of emissions compared with the SR-241 extension TCM for all criteria pollutants for all milestone years.

Attachments

A. SR-241 Transportation Control Measure Substitution Location Map
B. 2021 Without TCM Emissions Results
C. 2021 SR-241 Extension TCM Emissions Results
D. 2021 241/91 Express Connector TCM Emissions Results
E. 2031 Without TCM Emissions Results
F. 2031 SR-241 Extension TCM Emissions Results
G. 2031 241/91 Express Connector TCM Emissions Results
H. 2040 Without TCM Emissions Results
I. 2040 SR-241 Extension TCM Emissions Results
J. 2040 241/91 Express Connector TCM Emissions Results

ATTACHMENT A



ATTACHMENT B

2021 Without TCM Emissions Results

All Emissions Summary | Annual | Process:All | Technology:All

Vehicle Group	CO	NOx	SOx	ROG	PM10	PM2_5
All Vehicles	146.7	34.7	0.3	18.2	4.6	2.2
Light/Medium-Duty Vehicle	130.9	13.0	0.2	16.0	3.4	1.5
Heavy-Duty Truck	13.2	19.7	0.1	2.0	1.0	0.7
Light Heavy-Duty Truck	5.8	4.4	0.0	0.9	0.2	0.1
Medium Heavy-Duty Truck	3.9	6.9	0.0	0.6	0.5	0.3
Heavy Heavy-Duty Truck	3.4	8.5	0.0	0.6	0.4	0.3
Other Vehicle	2.6	2.1	0.0	0.2	0.2	0.1

All Emissions Summary | Summer | Process:All | Technology:All

Vehicle Group	CO	NOx	SOx	ROG	PM10	PM2_5
All Vehicles	147.2	32.3	0.3	18.4	4.6	2.2
Light/Medium-Duty Vehicle	131.6	11.6	0.2	16.2	3.4	1.5
Heavy-Duty Truck	13.0	18.7	0.1	2.0	1.0	0.7
Light Heavy-Duty Truck	5.7	4.1	0.0	0.9	0.2	0.1
Medium Heavy-Duty Truck	3.9	6.5	0.0	0.6	0.5	0.3
Heavy Heavy-Duty Truck	3.4	8.1	0.0	0.5	0.4	0.3
Other Vehicle	2.6	2.0	0.0	0.2	0.2	0.1

All Emissions Summary | Winter | Process:All | Technology:All

Vehicle Group	CO	NOx	SOx	ROG	PM10	PM2_5
All Vehicles	145.5	34.1	0.3	19.7	4.6	2.2
Light/Medium-Duty Vehicle	129.6	12.7	0.2	17.4	3.4	1.5
Heavy-Duty Truck	13.3	19.3	0.1	2.1	1.0	0.7
Light Heavy-Duty Truck	5.8	4.3	0.0	1.0	0.2	0.1
Medium Heavy-Duty Truck	4.0	6.8	0.0	0.6	0.5	0.3
Heavy Heavy-Duty Truck	3.5	8.3	0.0	0.6	0.4	0.3
Other Vehicle	2.6	2.1	0.0	0.2	0.2	0.1

ATTACHMENT C

2021 SR-241 Extension TCM Emissions Results

All Emissions Summary | Annual | Process:All | Technology:All

Vehicle Group	CO	NOx	SOx	ROG	PM10	PM2_5
All Vehicles	146.7	34.7	0.3	18.2	4.6	2.2
Light/Medium-Duty Vehicle	130.8	13.0	0.2	16.0	3.4	1.5
Heavy-Duty Truck	13.2	19.7	0.1	2.0	1.0	0.7
Light Heavy-Duty Truck	5.8	4.4	0.0	0.9	0.2	0.1
Medium Heavy-Duty Truck	3.9	6.9	0.0	0.6	0.5	0.3
Heavy Heavy-Duty Truck	3.4	8.5	0.0	0.6	0.4	0.3
Other Vehicle	2.6	2.1	0.0	0.2	0.2	0.1

All Emissions Summary | Summer | Process:All | Technology:All

Vehicle Group	CO	NOx	SOx	ROG	PM10	PM2_5
All Vehicles	147.1	32.3	0.3	18.4	4.6	2.2
Light/Medium-Duty Vehicle	131.6	11.6	0.2	16.2	3.4	1.5
Heavy-Duty Truck	13.0	18.7	0.1	2.0	1.0	0.7
Light Heavy-Duty Truck	5.7	4.1	0.0	0.9	0.2	0.1
Medium Heavy-Duty Truck	3.9	6.5	0.0	0.6	0.5	0.3
Heavy Heavy-Duty Truck	3.4	8.1	0.0	0.5	0.4	0.3
Other Vehicle	2.6	2.0	0.0	0.2	0.2	0.1

All Emissions Summary | Winter | Process:All | Technology:All

Vehicle Group	CO	NOx	SOx	ROG	PM10	PM2_5
All Vehicles	145.5	34.1	0.3	19.7	4.6	2.2
Light/Medium-Duty Vehicle	129.5	12.7	0.2	17.4	3.4	1.5
Heavy-Duty Truck	13.3	19.3	0.1	2.1	1.0	0.7
Light Heavy-Duty Truck	5.8	4.3	0.0	1.0	0.2	0.1
Medium Heavy-Duty Truck	4.0	6.8	0.0	0.6	0.5	0.3
Heavy Heavy-Duty Truck	3.5	8.3	0.0	0.6	0.4	0.3
Other Vehicle	2.6	2.1	0.0	0.2	0.2	0.1

ATTACHMENT D

2021 241/91 Express Connector TCM Emissions Results

All Emissions Summary | Annual | Process:All | Technology:All

Vehicle Group	CO	NOx	SOx	ROG	PM10	PM2_5
All Vehicles	146.7	34.7	0.3	18.2	4.6	2.2
Light/Medium-Duty Vehicle	130.9	13.0	0.2	16.0	3.4	1.5
Heavy-Duty Truck	13.2	19.7	0.1	2.0	1.0	0.7
Light Heavy-Duty Truck	5.8	4.4	0.0	0.9	0.2	0.1
Medium Heavy-Duty Truck	3.9	6.9	0.0	0.6	0.5	0.3
Heavy Heavy-Duty Truck	3.4	8.5	0.0	0.6	0.4	0.3
Other Vehicle	2.6	2.1	0.0	0.2	0.2	0.1

All Emissions Summary | Summer | Process:All | Technology:All

Vehicle Group	CO	NOx	SOx	ROG	PM10	PM2_5
All Vehicles	147.2	32.3	0.3	18.4	4.6	2.2
Light/Medium-Duty Vehicle	131.6	11.6	0.2	16.2	3.4	1.5
Heavy-Duty Truck	13.0	18.7	0.1	2.0	1.0	0.7
Light Heavy-Duty Truck	5.7	4.1	0.0	0.9	0.2	0.1
Medium Heavy-Duty Truck	3.9	6.5	0.0	0.6	0.5	0.3
Heavy Heavy-Duty Truck	3.4	8.1	0.0	0.5	0.4	0.3
Other Vehicle	2.6	2.0	0.0	0.2	0.2	0.1

All Emissions Summary | Winter | Process:All | Technology:All

Vehicle Group	CO	NOx	SOx	ROG	PM10	PM2_5
All Vehicles	145.5	34.1	0.3	19.7	4.6	2.2
Light/Medium-Duty Vehicle	129.6	12.7	0.2	17.4	3.4	1.5
Heavy-Duty Truck	13.3	19.3	0.1	2.1	1.0	0.7
Light Heavy-Duty Truck	5.8	4.3	0.0	1.0	0.2	0.1
Medium Heavy-Duty Truck	4.0	6.8	0.0	0.6	0.5	0.3
Heavy Heavy-Duty Truck	3.5	8.3	0.0	0.6	0.4	0.3
Other Vehicle	2.6	2.1	0.0	0.2	0.2	0.1

ATTACHMENT E

2031 Without TCM Emissions Results

All Emissions Summary | Annual | Process:All | Technology:All

Vehicle Group	CO	NOx	SOx	ROG	PM10	PM2_5
All Vehicles	79.2	17.2	0.3	10.9	4.7	2.0
Light/Medium-Duty Vehicle	70.5	5.9	0.2	9.8	3.7	1.5
Heavy-Duty Truck	7.3	10.3	0.1	1.0	0.8	0.4
Light Heavy-Duty Truck	2.5	1.7	0.0	0.4	0.2	0.1
Medium Heavy-Duty Truck	1.9	4.0	0.0	0.3	0.4	0.2
Heavy Heavy-Duty Truck	2.9	4.6	0.0	0.3	0.2	0.1
Other Vehicle	1.5	1.1	0.0	0.1	0.2	0.1

All Emissions Summary | Summer | Process:All | Technology:All

Vehicle Group	CO	NOx	SOx	ROG	PM10	PM2_5
All Vehicles	79.9	16.1	0.3	11.1	4.7	2.0
Light/Medium-Duty Vehicle	71.3	5.3	0.2	10.1	3.7	1.5
Heavy-Duty Truck	7.1	9.8	0.1	1.0	0.8	0.4
Light Heavy-Duty Truck	2.5	1.6	0.0	0.4	0.2	0.1
Medium Heavy-Duty Truck	1.8	3.8	0.0	0.3	0.4	0.2
Heavy Heavy-Duty Truck	2.9	4.4	0.0	0.3	0.2	0.1
Other Vehicle	1.5	1.0	0.0	0.1	0.2	0.1

All Emissions Summary | Winter | Process:All | Technology:All

Vehicle Group	CO	NOx	SOx	ROG	PM10	PM2_5
All Vehicles	78.5	16.9	0.3	11.8	4.7	2.0
Light/Medium-Duty Vehicle	69.7	5.8	0.2	10.7	3.7	1.5
Heavy-Duty Truck	7.3	10.1	0.1	1.0	0.8	0.4
Light Heavy-Duty Truck	2.5	1.7	0.0	0.5	0.2	0.1
Medium Heavy-Duty Truck	1.9	3.9	0.0	0.3	0.4	0.2
Heavy Heavy-Duty Truck	2.9	4.5	0.0	0.3	0.2	0.1
Other Vehicle	1.5	1.0	0.0	0.1	0.2	0.1

ATTACHMENT F

2031 SR-241 Extension TCM Emissions Results

All Emissions Summary | Annual | Process:All | Technology:All

Vehicle Group	CO	NOx	SOx	ROG	PM10	PM2_5
All Vehicles	79.2	17.2	0.3	10.9	4.7	2.0
Light/Medium-Duty Vehicle	70.4	5.9	0.2	9.8	3.7	1.5
Heavy-Duty Truck	7.3	10.3	0.1	1.0	0.8	0.4
Light Heavy-Duty Truck	2.5	1.7	0.0	0.4	0.2	0.1
Medium Heavy-Duty Truck	1.9	4.0	0.0	0.3	0.4	0.2
Heavy Heavy-Duty Truck	2.9	4.6	0.0	0.3	0.2	0.1
Other Vehicle	1.5	1.1	0.0	0.1	0.2	0.1

All Emissions Summary | Summer | Process:All | Technology:All

Vehicle Group	CO	NOx	SOx	ROG	PM10	PM2_5
All Vehicles	79.8	16.1	0.3	11.1	4.7	2.0
Light/Medium-Duty Vehicle	71.2	5.3	0.2	10.1	3.7	1.5
Heavy-Duty Truck	7.1	9.8	0.1	1.0	0.8	0.4
Light Heavy-Duty Truck	2.5	1.6	0.0	0.4	0.2	0.1
Medium Heavy-Duty Truck	1.8	3.8	0.0	0.3	0.4	0.2
Heavy Heavy-Duty Truck	2.9	4.4	0.0	0.3	0.2	0.1
Other Vehicle	1.5	1.0	0.0	0.1	0.2	0.1

All Emissions Summary | Winter | Process:All | Technology:All

Vehicle Group	CO	NOx	SOx	ROG	PM10	PM2_5
All Vehicles	78.4	16.9	0.3	11.8	4.7	2.0
Light/Medium-Duty Vehicle	69.6	5.8	0.2	10.7	3.7	1.5
Heavy-Duty Truck	7.3	10.1	0.1	1.0	0.8	0.4
Light Heavy-Duty Truck	2.5	1.7	0.0	0.5	0.2	0.1
Medium Heavy-Duty Truck	1.9	3.9	0.0	0.3	0.4	0.2
Heavy Heavy-Duty Truck	2.9	4.5	0.0	0.3	0.2	0.1
Other Vehicle	1.5	1.0	0.0	0.1	0.2	0.1

ATTACHMENT G

2031 241/91 Express Connector TCM Emissions Results

All Emissions Summary | Annual | Process:All | Technology:All

Vehicle Group	CO	NOx	SOx	ROG	PM10	PM2_5
All Vehicles	79.2	17.2	0.3	10.9	4.7	2.0
Light/Medium-Duty Vehicle	70.5	5.9	0.2	9.8	3.7	1.5
Heavy-Duty Truck	7.3	10.3	0.1	1.0	0.8	0.4
Light Heavy-Duty Truck	2.5	1.7	0.0	0.4	0.2	0.1
Medium Heavy-Duty Truck	1.9	4.0	0.0	0.3	0.4	0.2
Heavy Heavy-Duty Truck	2.9	4.6	0.0	0.3	0.2	0.1
Other Vehicle	1.5	1.1	0.0	0.1	0.2	0.1

All Emissions Summary | Summer | Process:All | Technology:All

Vehicle Group	CO	NOx	SOx	ROG	PM10	PM2_5
All Vehicles	79.9	16.1	0.3	11.1	4.7	2.0
Light/Medium-Duty Vehicle	71.3	5.3	0.2	10.1	3.7	1.5
Heavy-Duty Truck	7.1	9.8	0.1	1.0	0.8	0.4
Light Heavy-Duty Truck	2.5	1.6	0.0	0.4	0.2	0.1
Medium Heavy-Duty Truck	1.8	3.8	0.0	0.3	0.4	0.2
Heavy Heavy-Duty Truck	2.9	4.4	0.0	0.3	0.2	0.1
Other Vehicle	1.5	1.0	0.0	0.1	0.2	0.1

All Emissions Summary | Winter | Process:All | Technology:All

Vehicle Group	CO	NOx	SOx	ROG	PM10	PM2_5
All Vehicles	78.4	16.9	0.3	11.8	4.7	2.0
Light/Medium-Duty Vehicle	69.6	5.8	0.2	10.7	3.7	1.5
Heavy-Duty Truck	7.3	10.1	0.1	1.0	0.8	0.4
Light Heavy-Duty Truck	2.5	1.7	0.0	0.5	0.2	0.1
Medium Heavy-Duty Truck	1.9	3.9	0.0	0.3	0.4	0.2
Heavy Heavy-Duty Truck	2.9	4.5	0.0	0.3	0.2	0.1
Other Vehicle	1.5	1.0	0.0	0.1	0.2	0.1

ATTACHMENT H

2040 Without TCM Emissions Results

All Emissions Summary | Annual | Process:All | Technology:All

Vehicle Group	CO	NOx	SOx	ROG	PM10	PM2_5
All Vehicles	47.9	9.7	0.2	7.2	4.7	1.9
Light/Medium-Duty Vehicle	42.0	2.7	0.2	6.6	3.8	1.6
Heavy-Duty Truck	4.8	6.4	0.1	0.5	0.7	0.3
Light Heavy-Duty Truck	1.0	0.4	0.0	0.2	0.2	0.1
Medium Heavy-Duty Truck	1.0	2.8	0.0	0.1	0.4	0.2
Heavy Heavy-Duty Truck	2.8	3.1	0.0	0.2	0.2	0.1
Other Vehicle	1.0	0.6	0.0	0.1	0.1	0.1

All Emissions Summary | Summer | Process:All | Technology:All

Vehicle Group	CO	NOx	SOx	ROG	PM10	PM2_5
All Vehicles	48.7	9.1	0.3	7.4	4.7	1.9
Light/Medium-Duty Vehicle	42.9	2.4	0.2	6.8	3.8	1.6
Heavy-Duty Truck	4.8	6.2	0.1	0.5	0.7	0.3
Light Heavy-Duty Truck	1.0	0.4	0.0	0.2	0.2	0.1
Medium Heavy-Duty Truck	1.0	2.8	0.0	0.1	0.4	0.2
Heavy Heavy-Duty Truck	2.8	3.0	0.0	0.2	0.2	0.1
Other Vehicle	1.0	0.6	0.0	0.1	0.1	0.1

All Emissions Summary | Winter | Process:All | Technology:All

Vehicle Group	CO	NOx	SOx	ROG	PM10	PM2_5
All Vehicles	47.3	9.5	0.2	7.8	4.7	1.9
Light/Medium-Duty Vehicle	41.4	2.6	0.2	7.2	3.8	1.6
Heavy-Duty Truck	4.9	6.3	0.1	0.5	0.7	0.3
Light Heavy-Duty Truck	1.0	0.4	0.0	0.2	0.2	0.1
Medium Heavy-Duty Truck	1.0	2.8	0.0	0.1	0.4	0.2
Heavy Heavy-Duty Truck	2.9	3.0	0.0	0.2	0.2	0.1
Other Vehicle	1.0	0.6	0.0	0.1	0.1	0.1

ATTACHMENT I

2040 SR-241 Extension TCM Emissions Results

All Emissions Summary | Annual | Process:All | Technology:All

Vehicle Group	CO	NOx	SOx	ROG	PM10	PM2_5
All Vehicles	47.8	9.7	0.2	7.2	4.7	1.9
Light/Medium-Duty Vehicle	41.9	2.7	0.2	6.6	3.8	1.6
Heavy-Duty Truck	4.9	6.4	0.1	0.5	0.7	0.3
Light Heavy-Duty Truck	1.0	0.4	0.0	0.2	0.2	0.1
Medium Heavy-Duty Truck	1.0	2.8	0.0	0.1	0.4	0.2
Heavy Heavy-Duty Truck	2.9	3.1	0.0	0.2	0.2	0.1
Other Vehicle	1.0	0.6	0.0	0.1	0.1	0.1

All Emissions Summary | Summer | Process:All | Technology:All

Vehicle Group	CO	NOx	SOx	ROG	PM10	PM2_5
All Vehicles	48.6	9.1	0.3	7.4	4.7	1.9
Light/Medium-Duty Vehicle	42.8	2.4	0.2	6.8	3.8	1.6
Heavy-Duty Truck	4.8	6.2	0.1	0.5	0.7	0.3
Light Heavy-Duty Truck	1.0	0.4	0.0	0.2	0.2	0.1
Medium Heavy-Duty Truck	1.0	2.8	0.0	0.1	0.4	0.2
Heavy Heavy-Duty Truck	2.8	3.0	0.0	0.2	0.2	0.1
Other Vehicle	1.0	0.6	0.0	0.1	0.1	0.1

All Emissions Summary | Winter | Process:All | Technology:All

Vehicle Group	CO	NOx	SOx	ROG	PM10	PM2_5
All Vehicles	47.3	9.5	0.2	7.8	4.7	1.9
Light/Medium-Duty Vehicle	41.3	2.6	0.2	7.2	3.8	1.6
Heavy-Duty Truck	4.9	6.3	0.1	0.5	0.7	0.3
Light Heavy-Duty Truck	1.0	0.4	0.0	0.2	0.2	0.1
Medium Heavy-Duty Truck	1.0	2.8	0.0	0.1	0.4	0.2
Heavy Heavy-Duty Truck	2.9	3.0	0.0	0.2	0.2	0.1
Other Vehicle	1.0	0.6	0.0	0.1	0.1	0.1

ATTACHMENT J

2040 241/91 Express Connector TCM Emissions Results

All Emissions Summary | Annual | Process:All | Technology:All

Vehicle Group	CO	NOx	SOx	ROG	PM10	PM2_5
All Vehicles	47.9	9.7	0.2	7.2	4.7	1.9
Light/Medium-Duty Vehicle	42.0	2.7	0.2	6.6	3.8	1.6
Heavy-Duty Truck	4.9	6.4	0.1	0.5	0.7	0.3
Light Heavy-Duty Truck	1.0	0.4	0.0	0.2	0.2	0.1
Medium Heavy-Duty Truck	1.0	2.8	0.0	0.1	0.4	0.2
Heavy Heavy-Duty Truck	2.8	3.1	0.0	0.2	0.2	0.1
Other Vehicle	1.0	0.6	0.0	0.1	0.1	0.1

All Emissions Summary | Summer | Process:All | Technology:All

Vehicle Group	CO	NOx	SOx	ROG	PM10	PM2_5
All Vehicles	48.7	9.1	0.3	7.4	4.7	1.9
Light/Medium-Duty Vehicle	42.9	2.4	0.2	6.8	3.8	1.6
Heavy-Duty Truck	4.8	6.2	0.1	0.5	0.7	0.3
Light Heavy-Duty Truck	1.0	0.4	0.0	0.2	0.2	0.1
Medium Heavy-Duty Truck	1.0	2.8	0.0	0.1	0.4	0.2
Heavy Heavy-Duty Truck	2.8	3.0	0.0	0.2	0.2	0.1
Other Vehicle	1.0	0.6	0.0	0.1	0.1	0.1

All Emissions Summary | Winter | Process:All | Technology:All

Vehicle Group	CO	NOx	SOx	ROG	PM10	PM2_5
All Vehicles	47.3	9.5	0.2	7.8	4.7	1.9
Light/Medium-Duty Vehicle	41.4	2.6	0.2	7.2	3.8	1.6
Heavy-Duty Truck	4.9	6.3	0.1	0.5	0.7	0.3
Light Heavy-Duty Truck	1.0	0.4	0.0	0.2	0.2	0.1
Medium Heavy-Duty Truck	1.0	2.8	0.0	0.1	0.4	0.2
Heavy Heavy-Duty Truck	2.9	3.0	0.0	0.2	0.2	0.1
Other Vehicle	1.0	0.6	0.0	0.1	0.1	0.1