

Proposed Transportation Control Measure Substitution of Three Toll Road Capital Improvement Projects (FTIP Project IDs: 10254, ORA050, & ORA051) with Three New Traffic Signal Synchronization Projects

Introduction

The Transportation Corridor Agencies (TCA) previously committed to three toll road capital improvement projects along portions of TCA facilities within Orange County: the San Joaquin Hills Transportation Corridor (FTIP Project ID: 10254); the Eastern Transportation Corridor (FTIP Project ID: ORA050); and the Foothill Transportation Corridor-North (FTIP Project ID: ORA051). These three projects are included as committed TCM's in the Southern California Association of Governments' (SCAG) 2020 RTP/SCS (Connect SoCal), 2021 FTIP, and SCAQMD's 2016 South Coast AQMP/Ozone SIPs. Below are the summary project descriptions of these three committed TCMs. Their 2021 FTIP project sheets including detailed project information are included in **Attachment A**.

- The San Joaquin Hills Transportation Corridor (SJHTC, SR-73) is a 15-mile managed toll facility between Interstate 5 (I-5) in San Juan Capistrano and the non-tolled portion of the SR-73 in Irvine. Planned improvements include one (1) additional tolled lane for mixed flow traffic in each direction, plus climbing and auxiliary lanes by 2022.
- The Foothill Transportation Corridor-North (FTC-N, SR-241) is a 12.7-mile managed toll road between Oso Parkway and the Eastern Transportation Corridor. Planned improvements include two (2) additional tolled lanes for mixed flow traffic in each direction, plus climbing and auxiliary lanes by 2022.
- The Eastern Transportation Corridor (ETC, SR- 241/261/133) is a 26.4-mile managed toll road that connects SR-91 to I-5 via SR-261 and SR-133. Planned improvements include two (2) additional tolled lanes for mixed flow traffic in each direction, plus climbing and auxiliary lanes by 2022.

Note that all the existing TCA facilities and the three TCA capital improvement TCM projects are tolled lanes, open to all vehicles, and without discounts to HOVs. In addition, all the three TCA committed TCMs would add toll capacity and are in the TCM category of HOV lanes and their pricing alternatives.

Based upon TCA's 2018 Capital Improvement Program, adopted on June 14, 2018, these committed TCMs will be delayed beyond the scheduled completion dates. Three substitute TCM projects (a combined 33 miles of new signal synchronization projects) are now proposed as a replacement TCM to the previously committed projects.

Description of Proposed Substitute Projects

Orange County Transportation Authority (OCTA) is proposing substitute projects as a replacement to the three previously committed TCMs. The proposed substitute projects consist of three signal synchronization projects spanning approximately 33 miles of roadway and coordinating 136 signalized intersections. The projects involve nearly 10 agencies and have budgets of approximately \$10,600,000. The proposed substitute projects will improve traffic congestion by optimizing travel times on these high-volume corridors. The table below shows the three corridors and the respective details.

Detail on the Replacement Projects					
Arterials	Project Intersections	Project Miles	Participating Agencies	Approximate Project Cost	Fund Sources
1 st Street / Bolsa Avenue	55	13.1	5	\$3,900,000	Measure M2 and Local Funds
Alton Parkway	50	12.8	2	\$3,800,000	Measure M2 and Local Funds
Portola Pkwy/ Santa Margarita Pkwy	31	7.6	3	\$2,900,000	Measure M2 and Local Funds
<i>Summary</i>	<i>136</i>	<i>33.5</i>	<i>10</i>	<i>\$10,600,000</i>	<i>Measure M2 and Local Funds</i>

The proposed substitute projects will be implemented by December 2022. Current funding, as part of Measure M2 and local city matching funds, will be used for these three signal synchronization projects. Project descriptions are listed below and a map of the locations of both the committed and substitute projects is in **Attachment B**. Note that these proposed substitute TCM projects are not in the SCAG's 2021 FTIP yet but will be amended into the 2021 FTIP upon completion of the TCM substitution.

1. Portola Parkway Signal Synchronization Project (SSP)

The Portola Parkway SSP implements optimized signal timing between Paloma Parkway to Plano Trabuco Road (7.6 miles). The project includes select upgrades to key equipment including Advanced Traffic Controllers (ATC), communications, and detection.

2. 1st Street/Bolsa Avenue SSP

The 1st Street/Bolsa Avenue SSP implements optimized signal timing between Bolsa Avenue to Newport Avenue (13.1 miles). The project includes select upgrades to key equipment including ATC, communications, and detection.

3. Alton Parkway SSP

The Alton Parkway SSP implements optimized signal timing between Red Hill Street to Portola Parkway (12.8 miles). The project includes select upgrades to key equipment including ATC, communications, and detection.

Compliance with TCM Substitution Requirements

- **Equivalent Emissions Reduction:** OCTA has analyzed the countywide emissions of the substitute projects relative to those of previously committed TCM projects. The substitute projects will provide equivalent emission reductions. OCTA used the Orange County Transportation Analysis Model (OCTAM), Emission Factors (EMFAC2017) model, and Congestion Mitigation and Air Quality Improvement Program Emissions Calculator Toolkit (CMAQ Toolkit) for the analysis of the previously committed and proposed substitute alternatives. The following three sections document the OCTAM Model Information, the Emissions Analysis Methodology, and the Emissions Analysis Findings.
- **Similar Geographic Area:** The proposed substitute projects and the previously committed TCM projects are both located in the Orange County portion of the South Coast Air Basin.
- **Full Funding:** Current funding is available for the proposed substitute projects as documented under the previous section Description of Proposed Substitute Projects.
- **Similar Time Frame:** The proposed substitute projects will be operational by December 2022, equivalent to the schedule of the previously committed TCM projects.
- **Timely Implementation:** The proposed substitution is the means by which the obstacles to implementation of previously committed TCM projects is being overcome.
- **Legal Authority:** OCTA has the legal authority and personnel to implement and operate the proposed substitute projects.

OCTAM Model Information

OCTAM is a four-step (trip generation, trip distribution, mode choice, and trip assignment), trip-based travel demand model built on the TransCAD platform. The current model version 5.0 uses 2010 Census data and the SCAG household travel survey to help calibrate the model. The assumptions used in the current model for future forecasting are based on demographic projections from Orange County Projections 2018 and the SCAG 2020 RTP/SCS.

OCTAM forecasts travel demand with a base year of 2016 and a future forecast year of 2045. 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 at the time it was developed.

CMAQ Toolkit

The purpose of the CMAQ Toolkit is to provide users a standardized approach to estimating emission reductions from the implementation of CMAQ projects, including signal synchronization. The CMAQ Toolkit uses emission rates for highway vehicles based on a series of project-scale and national-scale runs of the Motor Vehicle Emission Simulator as well as other data sources. The CMAQ Toolkit is available at the following site: <https://www.fhwa.dot.gov/>. See **Attachment C** for the input and output summaries for the three signal synchronization CMAQ Toolkit applications.

Emissions Analysis Methodology

The emissions were calculated for the previously committed TCM projects and the proposed substitute projects. A multi-step approach was used that combined the OCTAM, EMFAC, and the CMAQ Toolkit. This methodology was developed with the guidance of California Air Resources Board (CARB) staff to better estimate the emissions reduction from signal synchronization improvements. The following process was used:

Step 1: Obtain daily vehicle miles traveled (VMT) and speed data for freeways and arterials from OCTAM for both the previously committed and proposed substitute projects for forecast year 2045. The coding of the alternatives was consistent with OCTAM modeling practice and used the 2020 RTP/SCS network. **Attachment D** includes additional modeling details and summary of modeling files. **Attachment E** includes 2045 OCTAM model output summary statistics for Orange County.

Two alternatives were modeled using OCTAM. The previously committed TCA TCM projects as described earlier were modeled in an alternative referred to as the "TCA TCM Projects" analysis. The second alternative did not include either the previously committed TCM projects or the proposed substitute TCM projects. This "With No Projects" alternative was used as a basis for the "Proposed TCM Substitute Project" analysis, which also used the CMAQ toolkit to estimate the emissions benefits of the replacement signal synchronization projects (see Step 3 below). The "With No Projects" alternative also provides a point of comparison.

The OCTAM forecasts were 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

includes loaded link information, intrazonal travel speeds, and intrazonal travel volumes for all time periods for the alternatives.

Note that the additional toll lanes are part of the existing toll road management and are only available to drivers willing to pay a toll. The projects were programmed and budgeted in the 2019 FTIP Consistency Amendment #19-12.

Step 2: The Emission Factors (EMFAC2017) model was developed by the California Air Resources Board and is used throughout California to calculate emission 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 and forecast year 2045 using the extracted information from Step 1 as input to update the VMT and vehicle speed data needed by EMFAC. Both the "TCA TCM Projects" and the "With No Projects" alternatives were modeled in EMFAC. This process was performed multiple times for the modeled alternatives in order to analyze conditions for summer, winter, and averaged annual timeframes.

Step 3: For the emission reductions from the implementation of the three signal synchronization projects, the CMAQ Toolkit methodology was applied to account for signal synchronization benefits. The CMAQ toolkit was run three times to analyze each signal synchronization project separately. The required input data was collected for each corridor and directly used in the tool, except as described below.

To estimate future-year volumes for the input, observed Average Annual Daily Traffic and peak-hour volumes were factored up using growth factors derived from OCTAM. For each corridor, base year and future year model volumes were obtained for a typical segment to estimate the growth. The truck percentages were estimated from similar arterial corridors in Orange County, as truck data for the specific three corridors was not available.

The CMAQ toolkit estimated emission reductions for each of the three signal synchronization projects. These numbers were summed together, and the totals were subtracted from the EMFAC emissions results of the "With No Projects" analysis to find the emissions of the "Proposed TCM Substitute Projects."

Step 4: Compare the emissions output from Steps 2 and 3 between the alternatives to identify the emissions-related improvements from the proposed substitute TCM projects.

Note that interpolation of travel activity data between base year 2016 and forecast year 2045 (horizon year) results were used to estimate the emissions for interim year 2022 (completion year) and 2037 (2015 8-hour ozone standard attainment year).

Emissions Analysis Findings

The projected emissions from the previously committed TCM projects were compared with those of the proposed substitute projects using the methodology described in the previous section. The results demonstrate that the proposed substitute TCM will yield less than or equivalent amounts of emissions compared with the previously committed TCM for all criteria pollutants for all milestone years. Emissions of all applicable criteria pollutants (Ozone – ROG & NO_x, CO, PM_{2.5}, and PM₁₀) for the three forecast years (2022, 2037, and 2045) are summarized in the tables below.

Year 2022

Emission Reductions (Summer) - Ozone (Kilograms/Day)

	TCA TCM Projects	Proposed TCM Substitute Projects
ROG	- 0.4	- 0.8
NOx	- 0.1	- 4.5

Emission Reduction (Winter) - Carbon Monoxide, Nitrogen Dioxide (Kilograms/Day)

	TCA TCM Projects	Proposed TCM Substitute Projects
NOx	- 0.1	- 4.5
CO	- 9.7	- 44.8

Emission Reductions (Annual) - PM₁₀, PM_{2.5} (Kilograms/Day)

	TCA TCM Projects	Proposed TCM Substitute Projects
ROG	-	- 0.4
NOx	- 0.1	-5.4
PM10	-	- 5.1
PM2.5	-	- 0.9

Year 2037

Emission Reductions (Summer) - Ozone (Kilograms/Day)

	TCA TCM Projects	Proposed TCM Substitute Projects
ROG	- 1.5	- 2.8
NOx	- 0.3	- 15.8

Emission Reductions (Winter) - Carbon Monoxide, Nitrogen Dioxide (Kilograms/Day)

	TCA TCM Projects	Proposed TCM Substitute Projects
NOx	- 0.4	- 15.8
CO	- 33.7	- 156.8

Emission Reductions (Annual) - PM₁₀, PM_{2.5} (Kilograms/Day)

	TCA TCM Projects	Proposed TCM Substitute Projects
ROG	- 1.5	- 2.9
NOx	- 0.4	- 15.8
PM10	-	- 17.7
PM2.5	-	- 3.2

Year 2045

Emission Reductions (Summer) - Ozone (Kilograms/Day)

	TCA TCM Projects	Proposed TCM Substitute Projects
ROG	- 2.0	- 4.0
NOx	- 0.4	- 21.8

Emission Reductions (Winter) - Carbon Monoxide, Nitrogen Dioxide (Kilograms/Day)

	TCA TCM Projects	Proposed TCM Substitute Projects
NOx	- 0.4	- 21.8
CO	- 46.7	- 216.5

Emission Reductions (Annual) - PM₁₀, PM_{2.5} (Kilograms/Day)

	TCA TCM Projects	Proposed TCM Substitute Projects
ROG	- 2.0	- 4.0
NOx	- 0.4	- 21.8
PM10	-	- 24.5
PM2.5	- 0.1	- 4.4

Attachments

- A. 2021 FTIP Project Sheets of the Three Previously Committed TCM Projects (10254, ORA050, & ORA051)
- B. Map of the Three Previously Committed TCM Projects (10254, ORA050, & ORA051) and the Proposed Substitution Projects
- C. CMAQ Toolkit Input/Output Files
- D. Additional Modeling Details and Summary of OCTAM Files
- E. 2045 OCTAM Model Output Summary Statistics for Orange County

2021 FTIP PROJECT SHEETS

OCTA

2021 Federal Transportation Improvement Program (\$000)

TIP ID: 10254		Implementing Agency: Transportation Corridor Agency (TCA)	
SCAG RTP Project #:	10254	Project Title	(SJHTC) (I-5 IN SAN JUAN CAPISTRANO TO RTE 73 IN IRVINE) (15 MI)
PPNO:		Project Description	SAN JOAQUIN HILLS TRANSPORTATION CORRIDOR (SJHTC - SR 73). 15 MI TOLL RD BETWEEN 1-5 IN SAN JUAN CAPISTRANO & RTE 73 IN IRVINE, CONSISTENT WITH SCAG/TCA MOU 4/5/01. EXISTING 3 M/F EA DIR. 1 ADDITIONAL M/F EA DIR, PLUS CLIMBING & AUX LANES BY 2022.
EA Number:			
IFAS #:			
System	Route	Postmile	
State Hwy	73	9.6 to 25.45	
Program Code	CAN69 - NEW HOV LANE(S)		
Environmental Document	FINAL ENVIRONMENTAL IMPACT REPORT - 06/01/2013		
Conformity Category	TCM Committed		
Total Estimate	\$351,188		
Air Basin	SCAB		
Project Completion Date	12/31/2022		
Current Implementation Status	ROW Acquisition - 02/29/2008		
Project Manager	David Lowe - (949) 754-3488		
Last Modified By	Heidi Busslinger on 03/05/2020		
Administrative Comments:	HBUSSLINGER CTC Only 03/05/2020		
Last Revised: Adoption 21-00 - APPROVED		Total Programmed: \$351,188	

OCTA

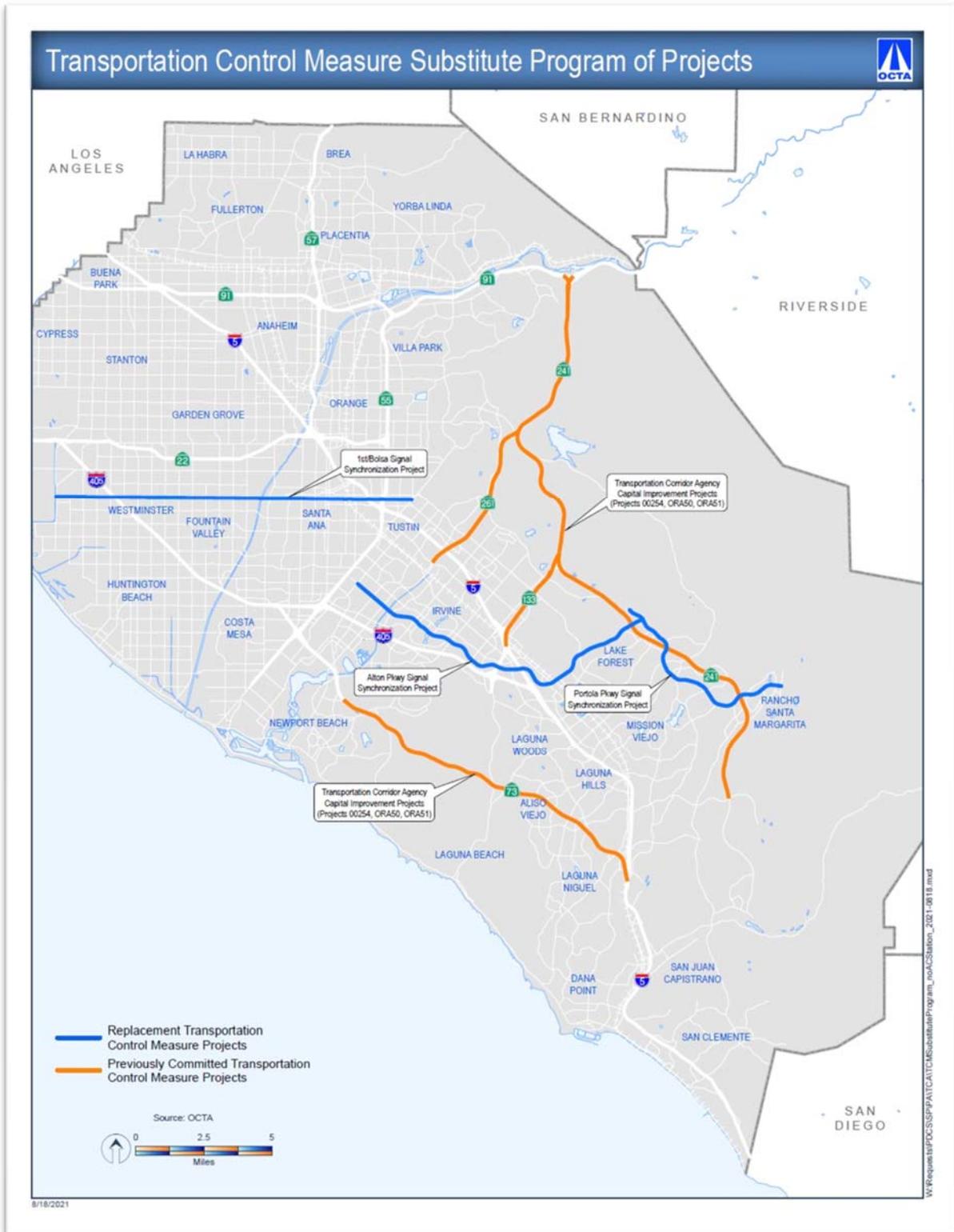
2021 Federal Transportation Improvement Program (\$000)

TIP ID: ORA050		Implementing Agency: Transportation Corridor Agency (TCA)	
SCAG RTP Project #:	ORA050	Project Title	(ETC) (RTE 241/261/133) (FROM RTE 91 TO SR 241/FTC-N AND I-5) (26.4 MI)
PPNO:		Project Description	EASTERN TRANSPORTATION CORRIDOR (ETC- SR 241/261/133) 26.4 MI TOLL ROAD CONNECTS SR 91 to I-5 via SR 261 and SR 133, CONSISTENT WITH SCAG/TCA MOU 4/05/01. EXISTING 2 M/F EA DIR. 2 ADDITIONAL M/F IN EA DIR, PLUS CLIMBING AND AUX LANES BY 2022.
EA Number:			
IFAS #:			
System	Route	Postmile	
State Hwy	241	38.8 to 12.4	
Program Code	CAN69 - NEW HOV LANE(S)		
Environmental Document	FINAL ENVIRONMENTAL IMPACT STATEMENT - 09/23/1994		
Conformity Category	TCM Committed		
Total Estimate	\$631,902		
Air Basin	SCAB		
Project Completion Date	12/31/2022		
Current Implementation Status	Engineering/Plans, Specifications and Estimates (PS&E) - 03/11/2008		
Project Manager	David Lowe - (949) 754-3488		
Last Modified By	Heidi Busslinger on 03/05/2020		
Administrative Comments:	HBUSSLINGER CTC Only 03/05/2020		
Last Revised: Adoption 21-00 - APPROVED		Total Programmed: \$631,902	

OCTA

2021 Federal Transportation Improvement Program (\$000)

TP ID ORA051		Implementing Agency Transportation Corridor Agency (TCA)																																																																																													
SCAG RTP Project #: ORA051 PPNO: EA Number: IFAS #:		Project Title (FTC-N) (OSO PKWY TO ETC) (12.7MI) Project Description FOOTHILL TRANSPORTATION CORRIDOR-NORTH (FTC-N - SR 241), 12.7 MI TOLL ROAD BETWEEN OSO PKWY AND ETC, CONSISTENT WITH SCAG/TCA MOU 4/05/01. EXISTING 2 M/F IN EA DIR. 2 ADDITIONAL M/F, PLS CLIMBING & AUX LANES BY 2022.																																																																																													
System State Hwy 241	Route Postmile 13.8 to 26.5	<table border="1"> <thead> <tr> <th>Fiscal Year</th> <th>Revenue Source</th> <th>Engineering</th> <th>Right of Way</th> <th>Construction</th> <th>Total Revenue</th> </tr> </thead> <tbody> <tr> <td>06/07</td> <td>PVT - Private</td> <td>\$700</td> <td></td> <td></td> <td>\$700</td> </tr> <tr> <td>07/08</td> <td>PVT - Private</td> <td>\$1,850</td> <td></td> <td>\$100</td> <td>\$1,950</td> </tr> <tr> <td>08/09</td> <td>PVT - Private</td> <td>\$1,570</td> <td></td> <td>\$6,000</td> <td>\$7,570</td> </tr> <tr> <td>09/10</td> <td>PVT - Private</td> <td>\$313</td> <td></td> <td></td> <td>\$313</td> </tr> <tr> <td>10/11</td> <td>PVT - Private</td> <td></td> <td></td> <td>\$34,492</td> <td>\$34,492</td> </tr> <tr> <td>11/12</td> <td>PVT - Private</td> <td>\$20</td> <td></td> <td></td> <td>\$20</td> </tr> <tr> <td>12/13</td> <td>PVT - Private</td> <td></td> <td></td> <td>\$36,166</td> <td>\$36,166</td> </tr> <tr> <td>13/14</td> <td>PVT - Private</td> <td></td> <td></td> <td>\$36,166</td> <td>\$36,166</td> </tr> <tr> <td>15/16</td> <td>PVT - Private</td> <td></td> <td></td> <td>\$0</td> <td>\$0</td> </tr> <tr> <td>16/17</td> <td>PVT - Private</td> <td></td> <td></td> <td>\$0</td> <td>\$0</td> </tr> <tr> <td>17/18</td> <td>PVT - Private</td> <td></td> <td></td> <td>\$50,556</td> <td>\$50,556</td> </tr> <tr> <td>18/19</td> <td>PVT - Private</td> <td></td> <td></td> <td>\$50,556</td> <td>\$50,556</td> </tr> <tr> <td>19/20</td> <td>PVT - Private</td> <td></td> <td></td> <td>\$50,556</td> <td>\$50,556</td> </tr> <tr> <td></td> <td></td> <td>\$4,453</td> <td>\$0</td> <td>\$264,592</td> <td>\$269,045</td> </tr> </tbody> </table>				Fiscal Year	Revenue Source	Engineering	Right of Way	Construction	Total Revenue	06/07	PVT - Private	\$700			\$700	07/08	PVT - Private	\$1,850		\$100	\$1,950	08/09	PVT - Private	\$1,570		\$6,000	\$7,570	09/10	PVT - Private	\$313			\$313	10/11	PVT - Private			\$34,492	\$34,492	11/12	PVT - Private	\$20			\$20	12/13	PVT - Private			\$36,166	\$36,166	13/14	PVT - Private			\$36,166	\$36,166	15/16	PVT - Private			\$0	\$0	16/17	PVT - Private			\$0	\$0	17/18	PVT - Private			\$50,556	\$50,556	18/19	PVT - Private			\$50,556	\$50,556	19/20	PVT - Private			\$50,556	\$50,556			\$4,453	\$0	\$264,592	\$269,045
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CMAQ Toolkit Input/Output Files

Alton Parkway

INPUT		User Guide
Reset to Default Values	Evaluation Year	2030
	Area Type	Urban
	Corridor Length	12.8 miles
	Number of Signalized Intersections	50
	Number of Lanes (one direction)	2
	Posted Speed Limit	45 miles per hour (1 - 75 MPH)
	Average Cycle Length	130 seconds
	Truck Percentage	4%
	Annual Average Daily Traffic (AADT) (both directions)	48,200 veh/day
	Peak-hour Volume (both directions)	3,500 veh/hr
	Existing Corridor Travel Time	33 minutes
	Total peak hours per day (AM+PM)	6

OUTPUT		Calculate Output
PERFORMANCE		
	PEAK-HOUR	OFF-PEAK
Volume (both directions)	3,500	1511.111111 veh/hr
Existing Average Speed	29	22 miles per hour
Travel Time Savings	500	334 minutes
Proposed Average Speed	31	26 miles per hour

EMISSION REDUCTIONS			
Pollutant	Peak-hour	Off-Peak	Total
	Kilograms/day	Kilograms/day	Kilograms/day
Carbon Monoxide (CO)	36.343	57.971	94.214
Particulate Matter <2.5 µm (PM _{2.5})	1.270	0.740	2.010
Particulate Matter <10 µm (PM ₁₀)	7.298	3.519	10.817
Nitrogen Oxide (NOx)	4.878	5.340	10.218
Volatile Organic Compounds (VOC)	1.157	1.044	2.200
Carbon Dioxide Equivalent (CO ₂ e)	13,767.170	10,777.891	24,045.061
Total Energy Consumption (MMBTU)	180.829	134.737	315.566

Portola Parkway

INPUT		User Guide
Reset to Default Values	Evaluation Year	2030
	Area Type	Urban
	Corridor Length	7.6 miles
	Number of Signalized Intersections	31
	Number of Lanes (one direction)	3
	Posted Speed Limit	50 miles per hour (1 - 75 MPH)
	Average Cycle Length	130 seconds
	Truck Percentage	4%
	Annual Average Daily Traffic (AADT) (both directions)	43,900 veh/day
	Peak-hour Volume (both directions)	4,000 veh/hr
	Existing Corridor Travel Time	21 minutes
	Total peak hours per day (AM+PM)	8

OUTPUT		Calculate Output
PERFORMANCE		
	PEAK-HOUR	OFF-PEAK
Volume (both directions)	4,000	1305.555556 veh/hr
Existing Average Speed	22	25 miles per hour
Travel Time Savings	254	183 minutes
Proposed Average Speed	27	29 miles per hour

EMISSION REDUCTIONS			
Pollutant	Peak-hour	Off-Peak	Total
	Kilograms/day	Kilograms/day	Kilograms/day
Carbon Monoxide (CO)	31.371	4.480	35.852
Particulate Matter <2.5 µm (PM _{2.5})	0.454	0.134	0.789
Particulate Matter <10 µm (PM ₁₀)	2.425	2.089	4.514
Nitrogen Oxide (NOx)	2.224	0.824	3.048
Volatile Organic Compounds (VOC)	0.362	0.227	0.790
Carbon Dioxide Equivalent (CO ₂ e)	6,377.144	3,930.320	10,307.665
Total Energy Consumption (MMBTU)	83.771	51.754	135.484

1st Street Bolsa

INPUT		User Guide
Reset to Default Values	Evaluation Year	2030
	Area Type	Urban
	Corridor Length	11.1 miles
	Number of Signalized Intersections	55
	Number of Lanes (one direction)	3
	Posted Speed Limit	40 miles per hour (1 - 75 MPH)
	Average Cycle Length	130 seconds
	Truck Percentage	4%
	Annual Average Daily Traffic (AADT) (both directions)	41,300 veh/day
	Peak-hour Volume (both directions)	3,200 veh/hr
	Existing Corridor Travel Time	29 minutes
	Total peak hours per day (AM+PM)	6

OUTPUT		Calculate Output
PERFORMANCE		
	PEAK-HOUR	OFF-PEAK
Volume (both directions)	3,200	1227.777778 veh/hr
Existing Average Speed	27	21 miles per hour
Travel Time Savings	404	329 minutes
Proposed Average Speed	35	29 miles per hour

EMISSION REDUCTIONS			
Pollutant	Peak-hour	Off-Peak	Total
	Kilograms/day	Kilograms/day	Kilograms/day
Carbon Monoxide (CO)	24.493	59.972	84.466
Particulate Matter <2.5 µm (PM _{2.5})	1.081	0.540	1.621
Particulate Matter <10 µm (PM ₁₀)	6.055	2.563	8.558
Nitrogen Oxide (NOx)	3.630	3.674	7.284
Volatile Organic Compounds (VOC)	0.593	0.785	1.378
Carbon Dioxide Equivalent (CO ₂ e)	9,934.215	8,617.225	18,551.441
Total Energy Consumption (MMBTU)	129.993	113.095	243.088

Additional Modeling Details and Summary of OCTAM Files

OCTAM was used to develop future 2045 forecasts of VMT by speed bin. The following provides details on the modeled alternative:

- TCA TCM – Previously committed project alternative 2045
 - With the three committed TCA TCM projects (10254, ORA050, & ORA051) coded into the transportation network
- No Build – Removal of previously committed project alternative 2045
 - With the three TCA TCM projects removed

The highway network for each scenario includes the input scenario assumptions. The four fixed-format binary files in the asn-LVOL subdirectories contain the post-processed forecast outputs.

Key data fields in the TransCAD Geographic File (TCMBase.DBD and TCMTCARepNB.DBD):

- AB_LN/BA_LN: Number of lanes in the AB/BA directions
- AB_LVOL/BA_LVOL: Post-processed forecast volumes in the AB/BA directions

The modeling output files are attached to this correspondence. Each scenario is packaged in a separate zip file:

- TCMTCA.zip – TCA TCM
- TCMNoBuild.zip – No Build

The forecast outputs were post-processed per the NCHRP-255 approach. EMFAC2017 was then used to forecast emissions using VMT by speed bin from the two OCTAM runs.

ATTACHMENT E

**2045 OCTAM Model Output Summary Statistics for Orange County
Previously Committed versus No Build**

	Committed Projects	No Build
Total Population	3,534,620	3,534,620
Household Population	3,488,505	3,488,505
Total Dwelling Units	1,154,416	1,154,416
Employment	1,980,433	1,980,433
Total Vehicle Hours of Delay	465,247	474,375
Daily Vehicle Hours Traveled	2,511,972	2,522,018
Daily Vehicle Miles Traveled	83,745,416	83,743,858
Daily Peak Vehicle Hours Traveled	1,620,755	1,630,908
Daily Peak Vehicle Miles Traveled	47,069,400	47,070,444
Total Person Hours of Delay	634,437	646,885
Daily Person Hours Traveled	3,425,470	3,439,169
Daily Person Miles Traveled	114,200,070	114,197,945
Daily Peak Person Hours Traveled	2,180,856	2,194,518
Daily Peak Person Miles Traveled	63,335,670	63,337,075
Avg. Spd. - Arterials Peak	25.0	25.0
Avg. Spd. - Arterial AM Pk Period	24.2	24.2
Avg. Spd. - Arterial PM Pk Period	25.7	25.6
Avg. Spd. - All Facilities Peak	31.6	31.3
Avg. Spd. - All Facilities - AM Pk Period	30.6	30.3
Avg. Spd. - All Facilities PM Pk Period	32.3	32.1

^ The CMAQ Toolkit used the No Build OCTAM Model