

Proposed Transportation Control Measure Substitution of Three Toll Road Capital Improvement Projects with Three New Traffic Signal Synchronization Projects

February 22, 2022

TCWG SCAG



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TCA TCM Substitution



Replace TCA capital improvement projects (10254, ORA050, and ORA051) along portions of TCA facilities in OC scheduled for completion by the end of 2022



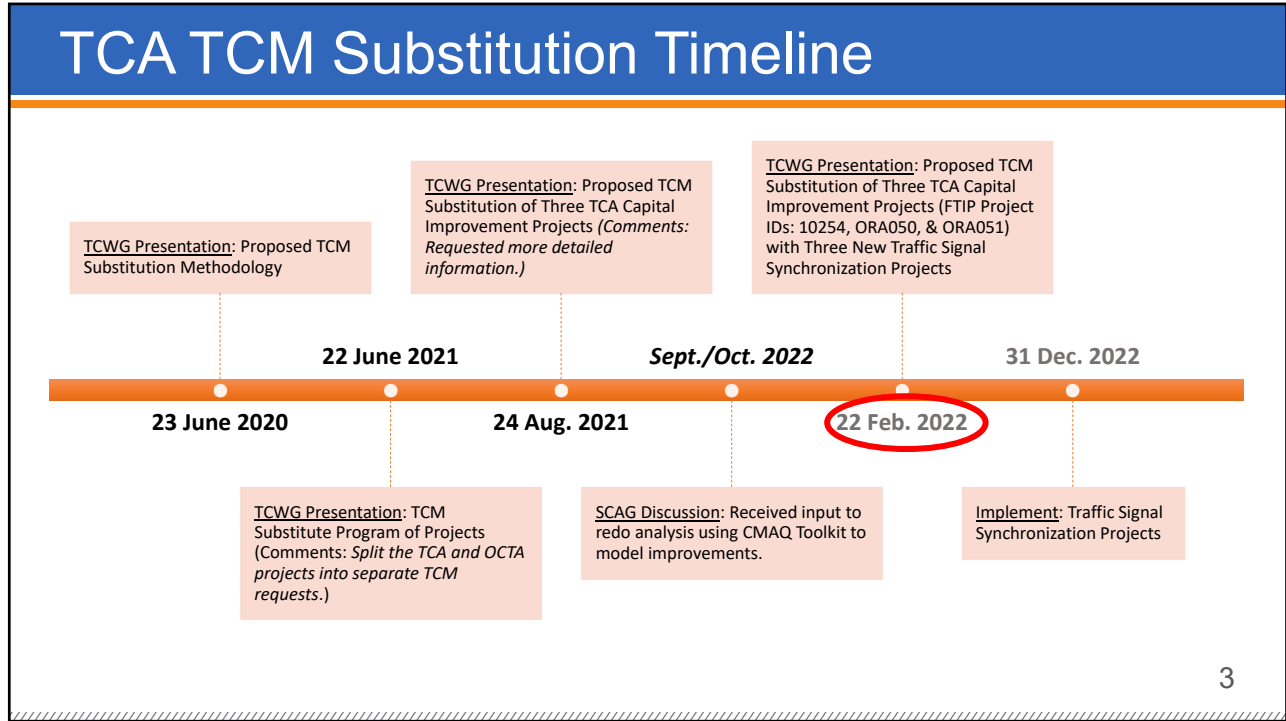
Substitute with three signal synchronization projects (1st Street/ Bolsa Avenue, Alton Parkway, Portola Parkway/Santa Margarita Parkway) to be completed by the end of 2022



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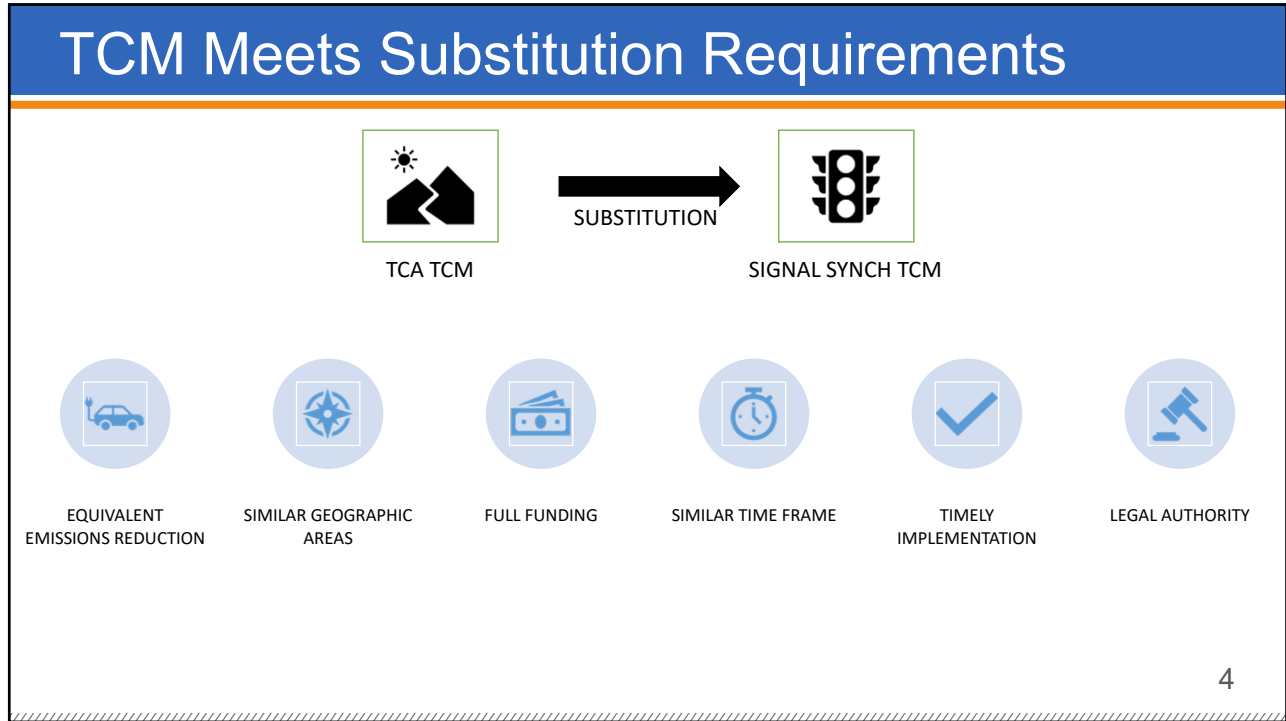
TCA TCM Substitution Timeline



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TCM Meets Substitution Requirements



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Emissions Analysis Methodology

Step 1: Obtain roadway daily VMT and speed data from OCTAM for "TCA TCM Projects" and "No Project" Alternatives

- Existing 2016 and Future 2045

Step 2: Run EMFAC 2017 using input data from OCTAM for both the "TCA TCM Projects" and "No Project" Alternatives

- Performed for summer, winter, and annual

Step 3: Apply CMAQ Toolkit methodology to account for signal synchronization benefits

- Inputs: average annual daily traffic, peak hour volumes, average cycle length, average number of lanes, existing travel time, and truck percentages
- Outputs: emissions reductions for the three signal synchronization projects
- Estimate EMFAC emissions results of the "Proposed TCM Substitute Projects" by subtracting the signal synchronization benefits from the "With No Projects"
- 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).

Step 4: Compare emissions outputs from Steps 2 and 3 between the alternatives to identify the emission-related improvements

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OCTAM Model Information

Traditional 4-
Step Model

TransCAD
Platform

Consistent with
SCAG Model

OCP 2018
SCAG RTP

Base Year 2016
Future Year 2045

OCTAM VMT and
Speeds Input to
EMFAC 2017

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CMAQ Toolkit



Standardized approach to estimating emissions reductions due various projects



Good tool to apply to Signal Synchronization Projects, Bike Projects, etc.



Available at the following site:
<https://www.fhwa.dot.gov>

1st Street/Bolsa Avenue Example

INPUT		User Guide	
Reset to Default Values	Evaluation Year	2030	
	Area Type	Urban	
	Corridor Length	13.1	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			
	Volume (both directions)	3,200	1227.777778 veh/hr
	Existing Average Speed	27	21 miles per hour
	Travel Time Savings	464	329 minutes
	Proposed Average Speed	35	25 miles per hour
EMISSION REDUCTIONS			
Pollutant	Peak-hour Kilograms/day	Off-Peak Kilograms/day	Total Kilograms/day
Carbon Monoxide (CO)	24.493	59.372	84.466
Particulate Matter <2.5 µm (PM _{2.5})	1.081	0.540	1.621
Particulate Matter <10 µm (PM ₁₀)	6.055	2.503	8.558
Nitrogen Oxide (NOx)	3.610	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

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Emissions Analysis Findings



Compared projected emissions from the TCA TCM and Proposed Substitute Projects with No Build



Results show Proposed Substitute Projects TCM will yield less than or equivalent amounts of emissions for all criteria pollutants for all milestone years compared to TCA TCM



The results are summarized in the staff reports tables

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Emissions Reductions from No Build (Kg/Day)

Year 2022 Emissions Reduction (Kg/Day)	TCA TCM Project	Proposed TCM Substitute Project
Summer		
ROG	-0.4	-0.8
NOx	-0.1	-4.5
Winter		
NOx	-0.1	-4.5
CO	-9.7	-44.8
Annual		
ROG	-	-0.4
Nox	-0.1	-5.4
PM10	-	-5.1
PM2.5	-	-0.9

Year 2037 Emissions Reduction (Kg/Day)	TCA TCM Project	Proposed TCM Substitute Project
Summer		
ROG	-1.5	-2.8
NOx	-0.3	-15.8
Winter		
NOx	-0.4	-15.8
CO	-33.7	-156.8
Annual		
ROG	-1.5	-2.9
Nox	-0.4	-15.8
PM10	-	-17.7
PM2.5	-	-3.2

Year 2045 Emissions Reduction (Kg/Day)	TCA TCM Project	Proposed TCM Substitute Project
Summer		
ROG	-2.0	-4.0
NOx	-0.4	-21.8
Winter		
NOx	-0.4	-21.8
CO	-46.7	-216.5
Annual		
ROG	-2.0	-4.0
Nox	-0.4	-21.8
PM10	-	-24.5
PM2.5	-0.1	-4.4

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Questions?



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