To: Honorable Mayor and Members of the City Council

From: Jennifer Ott, City Manager

Date: November 13, 2024

Supplemental Memo regarding Item 7-B Recommendation to Review, Comment on, and Authorize Mayor to Sign the City's Draft Response Letter to the Port of Oakland Board of Port Commissioners on the Oakland Airport Final Environmental Impact Report. (City Manager 10021833)

SUPPLEMENTAL INFORMATION

This memo is being provided to supplement the staff report already published for the November 19, 2024 City Council meeting to add two new Exhibits: 1) a transmittal letter, which will be attached to the Mayor's comment letter on the FEIR, and 2) examples of environmental mitigation measures from other airport projects.

Respectfully submitted,
Allen Tai, Planning, Building and Transportation Director

Exhibits:
1. Draft Transmittal Letter
2. Illustrative Examples of EIR Mitigation Measures for other Airport Projects

Exhibit 1 – Draft Transmittal Letter from the City Manager to the Port Board

November 21, 2024

Port of Oakland
Board of Port Commissioners
530 Water Street
Oakland, CA 94607

RE: Oakland Airport Terminal Modernization and Development Project Final EIR

Dear President Colbruno and Members of the Board of Port Commissioners,

On behalf of the City of Alameda, I am submitting the attached letter from Mayor Marilyn Ezzy Ashcraft regarding the City's concerns with the Oakland Airport Terminal Modernization and Development Project (Project). Our City and the Port have built a strong foundation of collaboration on several important efforts. We particularly value our partnership through the Oakland-Alameda Adaptation Committee, where we are working together to address flood and sea level rise challenges that affect our shared infrastructure and properties. The City also appreciates the Port's support for our very successful water shuttle program, which is another example of how our partnership delivers tangible benefits to our stakeholders.

Building on this history of successful collaboration, we appreciate the Port's continued efforts to improve regional infrastructure and understand the need for airport safety and improvements to accommodate modern-day travel demands. The Port's commitment to working with local jurisdictions has been evident throughout this process, and we look forward to maintaining this cooperative approach as we address the Project.

While the Mayor's letter outlines specific community impacts and concerns that require attention, City staff are confident that our established partnership provides the foundation needed to develop effective solutions, addressing the following major issues:

- Construction and long-term aircraft noise
- Air quality monitoring and greenhouse gas emissions reduction
- Traffic impacts and congestion
- Commitments to collaboration on reducing adjacency impacts

The City of Alameda respectfully request the Board consider these and other areas of environmental safeguards for Alameda and communities surrounding the airport. We are confident that through our partnership, we can identify solutions that balance the Airport's operational needs with the community's well-being.

We look forward to a continued dialogue with Port staff on this project and other collaborative efforts that serve our region. Please feel free to contact me or Allen Tai, Planning Director, at atai@alamedaca.gov should you have questions or require further information.

Sincerely,

Marilyn Ezzy Ashcraft
Mayor, City of Alameda

Attachment: Mayor's Letter to the Port of Oakland Board of Port Commissioners

Exhibit 2 – Illustrative Examples of Airport Project Mitigation Measures

2020 Sacramento Airport Master Plan Mitigation Monitoring and Reporting Program (MMRP)

Table ES-1: Executive Summary of Impacts and Mitigation

Impacts	Level of Significance Before Mitigation	Mitigation Measure	Level of Significance After Mitigation
AIR QUALITY			
Construction Emissions– Increase of Any Criteria Pollutant for which the Project Region is Non-Attainment The project will involve the construction of buildings, cargo aprons, parking structures, and a new concourse which will release air pollutants (NO_x, ROG and Particulate Matter). Project specific modeling was completed to determine if the project exceeds Sacramento Metropolitan Air Quality Management District thresholds of significance. Project construction will continue through the life of the Master Plan (2040). The number of projects occurring at once is unknown at this time and projects may overlap. This would result in construction emissions exceeding thresholds established for NO_x and particulate matter. Adherence to recommended mitigation measures reduces construction emissions impacts to less than significant.	S	AQ-1 (Prior EIR Mitigation Measure AQ-1 and 2 Revised) All future construction projects which exceed the SMAQMD construction ozone precursor screening thresholds in effect at the time of project submittal shall include an ozone precursor analysis. If the analysis results indicate that the project will generate ozone precursors that exceed the current Sacramento Metropolitan Air Quality Management District thresholds, this mitigation shall apply. This mitigation may be modified if guidance from the Sacramento Metropolitan Air Quality Management District changes in the future. a. The project applicant, or its designee, shall provide a plan for approval by the Sac Metro Air District that demonstrates the heavy-duty off-road vehicles (50 horsepower or more) to be used 8 hours or more during the construction project will achieve a project wide fleet-average 10% NOx reduction compared to the most recent California Air Resources Board (CARB) fleet average. The plan shall have two components: an initial report submitted before construction and a final report submitted at the completion. (Acceptable options for reducing emissions may include use of cleaner engines, low-emission	LS

Impacts	Level of Significance Before Mitigation	Mitigation Measure	Level of Significance After Mitigation
		diesel products, alternative fuels, engine retrofit technology, after-treatment products, and/or other options as they become available.) b. Submit the initial report at least four (4) business days prior to construction activity using the Sac Metro Air District's Construction Mitigation Tool (http://www.airquality.org/businesses/ceqa-land-use-planning/mitigation). c. Provide project information and construction company information. d. Include the equipment type, horsepower rating, engine model year, projected hours of use, and the CARB equipment identification number for each piece of equipment in the plan. Incorporate all owned, leased and subcontracted equipment to be used. e. Submit the final report at the end of the job, phase, or calendar year, as pre-arranged with Sac Metro Air District staff and documented in the approval letter, to demonstrate continued project compliance. The SMAQMD may conduct periodic site inspections to determine compliance. Nothing in this mitigation shall supersede other air	

Impacts	Level of Significance Before Mitigation	Mitigation Measure	Level of Significance After Mitigation
		district, state or federal rules or regulations. This mitigation will sunset on January 1, 2028, when full implementation of the CARB InUse Off-Road Regulation is expected. AQ-2 (Prior EIR Mitigation Measure AQ-4 Revised)To mitigate the additional construction emissions that cannot be offset through implementation of Mitigation Measure AQ-1, above, the following shall apply: Prior to construction activities, SCDA or the project proponent will submit proof that the off-site air quality mitigation fee has been paid to SMAQMD, and that the construction air quality mitigation plan has been approved by SMAQMD and the Environmental Coordinator. The fee will be calculated based on the most current SMAQMD recommended methodology and fee rate available at the time of ground disturbance. AQ-3 (Prior EIR Mitigation Measure AQ-5) The following mitigation measures will be incorporated into the project to minimize the generation of PM_{10} dust during dry construction conditions: a. Enclose, cover, or water twice daily all soil piles. b. Water exposed soil with adequate frequency for continued moist soil.	

Impacts	Level of Significance Before Mitigation	Mitigation Measure	Level of Significance After Mitigation
		c. Water all haul roads twice daily. d. Cover loads of all haul/dump truck securely.	
<u>Operational Emissions– Increase of Any Criteria Pollutant for which the Project Region is Non-Attainment</u> The project consists of the construction of several new structures including a large cargo facility, new concourse, consolidated rental car facility, and commercial uses. All of these facilities will introduce long-term emissions. Modeling indicates that the proposed operational activities will exceed thresholds established for NO_x and ROG. Mitigation is recommend to reduce these emissions, but not to a less than significant level.	S	AQ-4 All projects which include loading docks, including the proposed cargo facility, shall ensure, through sale or leasing agreements, that the haul fleet consist of trucks that as a minimum meet the emissions standards of a 2010 vehicle model, and as trucks are replaced they are replaced with the newest available model. In addition, the project shall include electrical hookups at all loading bays, and electric vehicle charging stations and/or infrastructure (e.g., conduit and panel space) to support future installation of truck charging stations for future zero-emission heavy-duty vehicles. AQ-5 For the proposed cargo facility and other projects which exceed the SMAQMD operational screening levels, Prior to issuance of occupancy permits, project operator(s) shall prepare and submit a Transportation Demand Management (TDM) program detailing strategies that would reduce the use of single-occupant vehicles by employees by increasing the number of trips by walking, bicycle, carpool, vanpool, and transit. The TDM program shall include, but is not limited to, the following:	SU

Impacts	Level of Significance Before Mitigation	Mitigation Measure	Level of Significance After Mitigation
		a. Provide transportation information center and on-site TDM coordinator to educate employers, employees, and visitors of surrounding transportation options; b. Promote bicycling and walking through design features, such as showers for employees, self-service bicycle repair area, etc. around the project site; c. Promote and support carpool/vanpool/rideshare use through parking incentives and administrative support, such as ride-matching service; and d. Incorporate incentives for using alternative travel modes, such as preferential load/unload areas or convenient designated parking spaces for carpool/vanpool users. AQ-6 The proposed cargo facility and other projects which exceed the SMAQMD operational screening levels, shall establish a new, or join and maintain membership in an existing Transportation Management Association. AQ-7 Future development projects under the Airport Master Plan Update shall use low VOC content paints that exceed the regulatory VOC limits put forth by SMAQMD's Rule 442. Low VOC paints shall be no more than 10 grams per liter (g/L) of VOC. Alternatively, the pre-painted material that do not require the use of architectural	

Impacts	Level of Significance Before Mitigation	Mitigation Measure	Level of Significance After Mitigation
		coating may be utilized.	
Mobile Source CO Emissions The proposed project was evaluated to determine if there would be a significant increase in CO emissions. While the project will decrease the level of service for some area roadways, none of the roadways intersections exceed 31,600 vehicles per hour, nor are they limited by vertical or horizontal mixing, and the project fleet average is typical of the Sacramento region. Impacts associated with mobile source CO emissions are less than significant.	LS	None recommended.	LS
Expose Sensitive Receptors to Substantial Pollutant Concentrations The only toxic air contaminant generated by the project is diesel particulate matter (DPM). Given the projects distance from surrounding receptors, prevalent wind direction, and topography DPM emissions will not exceed standards at surrounding receptors. Potential health effects were screened using the latest guidance. Based on the results of the tool, the percent of background health indices would be less than one percent. Therefore, the health effects associated with the proposed cargo facility and Master Plan Update would be negligible.	LS	None Recommended	LS

Impacts	Level of Significance Before Mitigation	Mitigation Measure	Level of Significance After Mitigation
residential development near SMF. Construction of a new community fire station together with the ARFF facility at SMF will ensure adequate fire protection and emergency response to the airport and existing and planned commercial, industrial, and residential development in SMF's vicinity.			
Result in Substantial Adverse Physical Impacts Associated with the Provisions of Law Enforcement Services Law enforcement demand will increase in proportion to passenger activity and increases in commercial and industrial uses at SMF with the proposed project. The SCDA will coordinate with the Sheriff's Department to provide sufficient space for law enforcement activities.	LS	None Recommended.	LS
TRANSPORTATION AND CIRCULATION			
Increase Vehicle Miles Traveled The average VMT per employee for the SACOG Region is 12.58 vehicle miles, and the average VMT per employee for SMF and the cargo facility is 20.52 and 22.59 vehicle miles, respectively. Since the project would increase vehicle miles over the existing SACOG regional average the impact is considered significant. Recommended mitigation will reduce employee VMT, but not to a level of less than significant.	S	TC-1 The following measures shall be implemented by the Cargo Facility proponent to reduce employee VMT: Prior to issuance of occupancy permits, project operator(s) shall prepare and submit a Transportation Demand Management (TDM) program detailing strategies that would reduce the use of single-occupant vehicles by employees by increasing the number of trips by walking, bicycle, carpool, vanpool, and transit. The TDM program shall include, but is not limited to, the following: e. Provide transportation information center	SU

Impacts	Level of Significance Before Mitigation	Mitigation Measure	Level of Significance After Mitigation
		and on-site TDM coordinator to educate employers, employees, and visitors of surrounding transportation options; f. Promote bicycling and walking through design features, such as showers for employees, self-service bicycle repair area, etc. around the project site; g. Promote and support carpool/vanpool/rideshare use through parking incentives and administrative support, such as ride-matching service; and h. Incorporate incentives for using alternative travel modes, such as preferential load/unload areas or convenient designated parking spaces for carpool/vanpool users. TC-2 Prior to issuance of Occupancy permits, the Cargo Facility proponent shall establish a new, or join and maintain membership in an existing Transportation Management Association.	
<u>Conflict with Program or Policy Addressing Circulation System Including Transit, Roadway, Bicycle and Pedestrian Facilities</u> The project is consistent the County Transportation Plan, Bicycle Master Plan and Pedestrian Master Plan. The project includes local and on-site transit service and continues to show proposed extension of those services.	LS	None recommended.	LS

Impacts	Level of Significance Before Mitigation	Mitigation Measure	Level of Significance After Mitigation
Compliance with applicable access and circulation requirements of the County Improvements Standards and the Uniform Fire Code.			
<u>Substantially Increase Roadway Hazards</u> The project will increase traffic on local roadways and freeways. Roadway safety hazards were identified along Elverta Road from Earhart Road to State Route 99. This is a substandard rural roadway where recommended mitigation to widen travel lanes and construct paved should will reduce this safety hazard. Other roadway safety hazards were identified for the southbound I-5/Airport Boulevard off-ramp. In the cumulative conditions, traffic may result in queuing extending onto the freeway. Mitigation involving monitoring and installation of a signalized intersection or roundabout, will reduce this impact to less than significant.	S	TC-3 <u>Elverta Road Improvements (Earhart Road to Power Line Road)</u> Install roadway improvements along this segment of Elverta Road to County standards of 12-foot vehicle lanes with 6-foot paved shoulders. TC-4 <u>Elverta Road Improvements (Power Line Road to State Route 99)</u> If required by the County of Sacramento Department of Transportation, install roadway improvements along this segment of Elverta Road to County standards of 12-foot vehicle lanes with 6-foot paved shoulders. OR Pay fair share, as determined by the County of Sacramento Department of Transportation, for this segment of Elverta Road widening. TC-5 The southbound Airport Boulevard off-ramp shall be monitored as each PAL is completed (PAL 1- 2024, PAL 2- 2028, PAL 3- 2032). If the queue length begins to impede the mainline, the Department of Airports shall install intersection improvements in consultation with Sacramento County Department of Transportation and Caltrans. Improvements	LS

2021 Los Angeles International Airport (LAX)

Airfield and Terminal Modernization Project

MMRP

Los Angeles International Airport (LAX)
Airfield and Terminal Modernization Project

Mitigation Monitoring and Reporting Program

August 2021

This document constitutes the Mitigation Monitoring and Reporting Program (MMRP) for the LAX Airfield and Terminal Modernization Project. This MMRP, prepared in compliance with State CEQA Guidelines Section 15097, specifies the monitoring and reporting requirements for the LAX Airfield and Terminal Modernization Project as described in the Final Environmental Impact Report (EIR) prepared for the Project.

Table 1 provides, by environmental resource topic: the number and title of each mitigation measure identified in the Final EIR; the full text of the subject measure; the impact being addressed; and the timing of implementation, monitoring frequency; and, actions indicating compliance (i.e., reporting). Implementation of all of the measures is the responsibility of Los Angeles World Airports (LAWA), and/or the party carrying out the Project. Some measures will be implemented by the construction contractor(s) in accordance with their contract specifications, which include environmental compliance requirements. LAWA will remain responsible for ensuring that implementation occurs and that monitoring of the mitigation measures is completed in accordance with the MMRP. In compliance with Appendix A of the LAX Specific Plan, LAWA will prepare an MMRP progress report annually that will identify actions taken with respect to the measures applicable in the reporting year.

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Table 1
LAX Airfield and Terminal Modernization Project Mitigation Measures

Mitigation Measures		Impact Being Addressed	Timing of Implementation	Monitoring Frequency	Actions Indicating Compliance
General					
MM-C (ATMP)-1 **Monitoring Agency: LAWA**	**Construction Mitigation Oversight.** LAWA shall require Airfield and Terminal Modernization Project prime contractors to designate an individual responsible for ensuring implementation of all construction-related mitigation measures and LAWA policies/requirements.	Addresses all significant construction-related impacts	Prior to start of construction activities under each construction contract, the prime contractor shall provide to LAWA the name and contact information of the designated individual, and an alternate person to contact if the designated individual is not available (e.g., is on Personal Time Off). This individual shall ensure the implementation of all components of the construction-related MMRP measures through direct inspections, record reviews, and investigations of complaints. The individual shall regularly report in writing to LAWA, at least quarterly or as otherwise specified by LAWA, the status of compliance with each construction-related mitigation measure throughout the duration of construction. If the designated individual or alternate changes, the contractor shall provide the name and contact information of the replacement individual within 5 working days.	Once, upon initiation of each construction contract, and regular reporting to LAWA on the status of compliance. Such reporting shall be subject to periodic review and verification by LAWA staff.	Written records of names and contact information of designated individuals. Reporting regularly on the status of mitigation measure compliance. Documentation that the required contact information was provided will be cited in the annual MMRP status report.
Air Quality					
MM-AQ/GHG (ATMP)-1 **Monitoring Agency: LAWA**	**Rock Crushing Operations.** LAWA shall require Airfield and Terminal Modernization Project contractors to conduct rock-crushing operations on-site to reuse waste rock/concrete generated during construction of the Airfield and Terminal Modernization Project to the maximum extent feasible (determined based on facility capacity and capability, project schedule, costs, and regulatory conditions). Rock-crushing operations (rock-crushing, material laydown, and stockpiling) shall be located away from residential areas in all cases.	Criteria air pollutant emissions and greenhouse gas (GHG) emissions during construction	Feasibility of on-site rock-crushing shall be assessed in conjunction with construction plans, which will be a requirement in all Project-related construction contracts. To assist in assessing the feasibility of on-site rock-crushing operations, LAWA shall provide information related to: (i) the location of sites available at LAX, situated away from residential areas, that could be considered for rock-crushing operations; and (ii) the regulatory requirements for rock crushers and concrete batch plants operated under LAWA's Title V Permit with the South Coast Air Quality Management District. Construction plans submitted for such projects shall describe the feasibility assessment completed relative to on-site rock-crushing, and if determined to be feasible, shall describe the location and proposed operation of that facility.	Once during review of construction plans submitted for projects that may involve rock-crushing operations.	Confirmation by LAWA staff that construction plans include a feasibility assessment for on-site rock-crushing operations, and, if determined to be feasible, that the location and proposed operation is located away from residential areas. Documentation of that review will be cited in the annual MMRP status report.
MM-AQ/GHG (ATMP)-2 **Monitoring Agency: LAWA**	**Use of Renewable Diesel Fuel.** LAWA shall require Airfield and Terminal Modernization Project contractors to use renewable diesel fuel in proposed Project construction off-road equipment and on-site, on-road trucks (i.e., on-site water trucks), as feasible based on commercial renewable fuel availability. For purposes of this measure, commercially-available renewable fuel is defined as renewable fuel that is available in the regional area at a comparable price (i.e., without a substantial premium) and not incurring substantial transportation costs (i.e., higher costs associated with having to transport it to the Project site over substantially longer distances from the supplier[s] of renewable diesel fuel).	Criteria air pollutant emissions and GHG emissions during construction	The requirement for use of renewable diesel fuel shall be included in all Project-related construction contracts. The requirement for each construction project shall include a target goal of the percentage of renewable diesel fuel demand that will be used. Each target goal will take into consideration the size, nature, and duration of the project as well as the extent to which other construction projects underway at LAX have been able to obtain/utilize renewable diesel fuel. Each prime contractor shall include in the construction plan a detailed description of how the target goal for the use of renewable diesel fuel will be met, If the contractor believes the target goal cannot be met, a detailed explanation of that determination must be provided and the contractor will specify the highest percentage of renewable diesel fuel that will be utilized, as well as an alternate target goal. Utilization of renewable diesel fuel will be required throughout the course of construction.	Once during review of construction plans to confirm that an acceptable target goal percentage of renewable diesel fuel utilization is specified. Implementation of renewable diesel fuel utilization will be monitored on an ongoing basis throughout the course of construction, with documentation indicating the percentage of renewable diesel fuel actually utilized provided in the periodic reporting by the individual designated under MM-C (ATMP)-1.	Confirmation by LAWA staff that construction plans include an acceptable target goal for renewable diesel fuel usage. The status of whether the goal is being met shall be included in periodic monitoring reports submitted by the contractor, along with a description of what corrective actions are being taken in the event that the goal is not being met. Those monitoring reports will be reviewed by LAWA staff. Documentation of that review will be cited in the annual MMRP status report.

Table 1
LAX Airfield and Terminal Modernization Project Mitigation Measures

Mitigation Measures		Impact Being Addressed	Timing of Implementation	Monitoring Frequency	Actions Indicating Compliance
MM-AQ/GHG (ATMP)-3 **Monitoring Agency: LAWA**	**Parking Cool Roof.** LAWA shall include in the design requirements for the Airfield and Terminal Modernization Project that a cool roof be installed at the Terminal 9 parking facility to reduce energy use and urban heat-island effects. This requirement will not apply if solar panels are instead installed at the Terminal 9 parking facility.	Criteria air pollutant emissions and GHG emissions during operation	If the Terminal 9 parking facility is determined to be a structure, as opposed to a surface parking lot, provisions for a cool roof shall be incorporated into the design documents, provided that the installation of solar panels is not otherwise proposed.	Once, in conjunction with review of the design documents for the Terminal 9 parking structure.	Confirmation by LAWA staff that the approved design documents for the Terminal 9 parking structure provide for either a) a cool roof, or b) solar panels. Documentation will be cited in the annual MMRP status report.
MM-AQ/GHG (ATMP)-4 **Monitoring Agency: LAWA**	**EV Charging Infrastructure.** LAWA shall install EV charging infrastructure in the Terminal 9 parking facility beyond the minimum amount required by code. The exact number of spaces and types of parking (Electrical Vehicle Supply Equipment [EVSE] or Electric Vehicle Charging Stations [EVCS]) shall be determined during project design and shall exceed the minimum requirements for EVSE and EVCS specified in the code at the time of design by at least 5 percent.	Criteria air pollutant emissions and GHG emissions during operation	Provisions for EV charging infrastructure shall be incorporated into the design documents developed for the Terminal 9 parking facility.	Once, in conjunction with review of the design documents for the Terminal 9 parking facility.	Confirmation by LAWA staff that the approved design documents for the Terminal 9 parking facility include the requirement for at least 5 percent more EVSE or EVCS parking spaces than that required by code. Documentation will be cited in the annual MMRP status report.
MM-AQ/GHG (ATMP)-5 **Monitoring Agency: LAWA**	**Electric Vehicle Purchasing.** LAWA shall update the Electric Vehicle Purchasing Policy to require 100 percent of LAWA's light-duty vehicle fleet to be all-electric by 2031.	Criteria air pollutant emissions and GHG emissions during operation	The LAWA Electric Vehicle Purchasing Policy shall be updated prior to the commencement of operations in Concourse 0 or Terminal 9, whichever comes first.	Once, when the LAWA Electric Vehicle Purchasing Policy is updated.	Board of Airport Commissioners (BOAC) approval of an updated LAWA Electric Vehicle Purchasing Policy requiring 100 percent of LAWA's light-duty vehicle fleet to be all-electric by 2031. Documentation will be cited in the annual MMRP status report.
MM-AQ/GHG (ATMP)-6 **Monitoring Agency: LAWA**	**Solar Energy Technology.** LAWA shall implement solar energy technology, such as, but not limited to, photovoltaic solar panels, on Airfield and Terminal Modernization Project buildings and facilities where feasible based on costs, grid tie-in capability, environmental clearance, compliance with FAR Part 77, and applicable FAA requirements for land leases and funding.	Criteria air pollutant emissions and GHG emissions during operation	Design documents for Concourse 0 and Terminal 9 buildings/facilities (including the Terminal 9 parking structure), shall include a feasibility assessment for incorporating solar energy technology into the building/facility. This requirement will be included in all Project related construction contracts. The required assessment shall take into consideration, but not be limited to, the following factors: costs, grid tie-in capability, environmental clearance, compliance with FAR Part 77, and applicable FAA requirements for land leases and funding. In the event the assessment determines that incorporating solar technology is not feasible, a detailed explanation shall be provided in the design documents submittal.	Once during review of design documents for Concourse 0 and Terminal 9 buildings/facilities (including the Terminal 9 parking structure), to confirm that the required feasibility assessment has been completed, and, where determined feasible, solar technology has been incorporated into the design documents.	Confirmation by LAWA staff that the design documents for Concourse 0 and Terminal 9 buildings/facilities (including the Terminal 9 parking structure) include a feasibility assessment of incorporation of solar technology and if determined feasible, that design documents incorporate such technology. Documentation will be cited in the annual MMRP status report.

Table 1
LAX Airfield and Terminal Modernization Project Mitigation Measures

Mitigation Measures		Impact Being Addressed	Timing of Implementation	Monitoring Frequency	Actions Indicating Compliance
Greenhouse Gas Emissions					
MM-GHG (ATMP)-1 **Monitoring Agency: LAWA**	**Demolition Waste.** LAWA shall require Airfield and Terminal Modernization Project construction contractors to recycle or salvage a minimum of 85 percent of non-hazardous construction and demolition waste generated directly from construction of the Airfield and Terminal Modernization Project.	GHG emissions during construction	Recycling/salvage of construction and demolition waste shall occur throughout Project development, and shall be included as a requirement in all Project-related construction and demolition contracts. That contract requirement shall include a provision that the contractor report periodically on the total percentage of construction and demolition waste that was recycled or salvaged.	Once during preparation of each construction and demolition contract to confirm that the requirements are included in the contract. The recycling or salvaging of construction and demolition waste will be monitored on an ongoing basis throughout the course of construction, with documentation indicating total percentage of construction/demolition waste that was recycled/salvaged provided in the periodic reporting by the individual designated under MM-C (ATMP)-1.	Confirmation by LAWA staff that construction contracts include the requirement for recycling or salvaging of construction waste. Documenting the status of such recycling/salvaging is meeting the minimum 85 percent will occur through LAWA staff's review of periodic reports submitted by contractor's designated individual. Documentation will be cited in the annual MMRP status report.
MM-GHG (ATMP)-2 **Monitoring Agency: LAWA**	**Organic Waste Collection and Diversion.** LAWA shall require that waste collection procedures at Concourse 0 and Terminal 9 conform with LAWA's Organic Waste Collection Program (which is otherwise voluntary).	GHG emissions during operation	Compliance with LAWA's Organic Waste Collection Program shall occur in conjunction with development of LAWA leases/agreements related to operation of Concourse 0 and Terminal 9. Such leases/agreement will include a requirement for compliance with applicable LAWA policies and programs, which, in this case, includes LAWA's Organic Waste Collection Program.	Once, during review of leases/agreements related to the operation of Concourse 0 and Terminal 9.	Confirmation by LAWA staff that requirement to conform with LAWA's Organic Waste Collection Program is included in leases/agreements related to the operation of Concourse 0 and Terminal 9. Documentation will be cited in the annual MMRP status report.
MM-GHG (ATMP)-3 **Monitoring Agency: LAWA**	**Green Procurement.** LAWA shall develop and adopt an airport-wide Green Procurement Policy applicable to LAWA purchasing which will apply to the Airfield and Terminal Modernization Project. The Green Procurement Policy shall identify requirements and standards for products or services that have a lesser or reduced effect on human health and the environment when compared with competing products or services that serve the same purpose.	GHG emissions during operation	Development and adoption of the airport-wide Green Procurement Policy shall occur prior to the commencement of operations in Concourse 0 or Terminal 9, whichever comes first.	Once, when the airport-wide Green Procurement Policy has been adopted.	BOAC approval of LAWA Green Procurement Policy that identifies, at minimum, requirements and standards for products or services that have a lesser or reduced effect on human health and the environment when compared with competing products or services that serve the same purpose. Documentation will be cited in the annual MMRP status report.
MM-GHG (ATMP)-4 **Monitoring Agency: LAWA**	**Enhanced Recycling.** LAWA shall enhance the existing recycling program. The enhancements shall include expanding the number of facilities in the program (including Concourse 0 and Terminal 9), updating agreements requiring tenant diversion goals, and incorporating necessary provisions from the Green Procurement Policy.	GHG emissions during operation	After adoption of the Green Procurement Policy, and prior to the commencement of operations in Concourse 0 and Terminal 9.	Once, prior to the commencement of operations in Concourse 0 and Terminal 9.	Documentation in the annual MMRP status report(s) for the year when LAWA's existing recycling program has been expanded confirming that it has been expanded per the description in the mitigation measure.

Table 1
LAX Airfield and Terminal Modernization Project Mitigation Measures

Mitigation Measures		Impact Being Addressed	Timing of Implementation	Monitoring Frequency	Actions Indicating Compliance
MM-GHG (ATMP)-5 **Monitoring Agency: LAWA**	**Landscaping Water.** LAWA shall use only non-potable water for on-airport landscaping associated with the Airfield and Terminal Modernization Project.	GHG emissions during operation	During preparation of landscape plans for Concourse 0 and Terminal 9 (i.e., requirement to use only non-potable water will be included in the plans).	Once, during design review of landscape plans for Concourse 0 and Terminal 9.	Confirmation by LAWA staff that approved landscape plans for Concourse 0 and Terminal 9 landscaping include the use of only non-potable water. Documentation will be cited in the annual MMRP status report.
Aircraft Noise					
MM-AN (ATMP)-1 **Monitoring Agency: LAWA**	**Sound Insulation Programs.** To mitigate significant impacts to noise-sensitive uses that are newly exposed to 65 dBA CNEL or greater from airport operations in future years of the proposed Project, LAWA will update the Noise Exposure Maps (NEM) for LAX in accordance with Title 14 CFR Part 150, prior to project completion. The NEM is the legal document required by FAA to identify noise-sensitive land uses potentially eligible for noise mitigation funding through the FAA's Airport Improvement Program. LAWA will complete the NEM Report and coordinate with FAA to identify any noise-sensitive land uses eligible for noise mitigation and, in accordance with FAA regulations and guidance, apply for noise mitigation funding for eligible noise-sensitive uses. LAWA will work with the appropriate jurisdiction(s) to determine/establish an appropriate implementation program for any eligible noise mitigation. Property owners' eligibility for noise mitigation will be based upon FAA requirements and the LAX Part 150 NEM in effect at the time of operation or completion of the Project.	Noise impacts on noise-sensitive receptors during operation	Once prior to Project completion, assumed in the EIR to occur in 2028.	Once, when the NEM is updated.	NEM Report once the NEM update occurs. Documentation will be cited in the annual MMRP status report.
Construction Noise					
MM-CN (ATMP)-1 **Monitoring Agency: LAWA**	**Construction Noise Control Plans.** LAWA shall require all prime construction contractors working on the landside access (i.e., roadway) improvements, the Concourse 0 improvements, and the Terminal 9 improvements, including the Terminal 9 APM station, to develop noise control plans to address construction equipment noise at noise-sensitive receptors where construction noise impacts may be significant. Such noise-sensitive receptors include, but may not be limited to, the Residence Inn by Marriott Los Angeles LAX/Century Boulevard, Sheraton Gateway Los Angeles Hotel, H Hotel/Homewood Suites by Hilton Los Angeles International Airport, Hyatt Regency Los Angeles International Airport, and Courtyard Los Angeles LAX/Century Boulevard. (Note: Those are the hotel names/chains as of October 2020. This mitigation requirement still applies to those facilities if the names/chains subsequently change). The noise control plans shall be approved by LAWA prior to implementation. The noise control plans shall calculate the total maximum noise level (in CNEL) associated with construction of each Project component, as well as cumulative noise impacts that account for Project-related activities that would occur concurrently with construction of other Project components and construction of other nearby LAX projects. If the calculated construction-related noise levels indicate an increase of 5 dBA over the existing exterior noise level at any noise-sensitive receptor, the noise control plan shall specify provisions and/or measures to be implemented during construction that will attenuate construction noise levels to be less than 5 dBA over the existing exterior noise level. The noise control plans shall include a section describing noise monitoring equipment, locations and methods for establishing a representative baseline exterior noise level. Potential noise attenuation measures could include, but are not limited to, noise curtains, noise blankets, temporary sound walls, or their equivalent during construction. The noise control plans shall include a provision that states that, if noise levels exceed the 5 dBA increase, LAWA will require the contractor to implement additional noise attenuation measures until the noise increase is less than 5 dBA. To verify efficiency of the construction noise attenuation measures, noise measurements shall be taken at the closest noise-sensitive receptors to confirm that the attenuated construction noise levels are less than 5 dBA over the existing exterior noise level.	Noise impacts on noise-sensitive receptors during construction	Construction specifications and construction contracts pertaining to Concourse 0, Terminal 9, and roadway improvements located in proximity to noise-sensitive receptors shall include the requirement that the construction contractor for each such project shall submit to LAWA for review and approval a construction noise control plan. The construction noise control plan submitted by each contractor shall address the items described in the mitigation measure.	Once, in conjunction with review and approval of each construction noise control plan.	Confirmation by LAWA staff that construction noise control plans have been submitted and approved for Concourse 0, Terminal 9, Terminal 9 APM station and roadway improvements. Documentation will be cited in the annual MMRP status report.
MM-CN (ATMP)-2 **Monitoring Agency: LAWA**	**Construction Scheduling.** The timing and/or sequence of the noisiest on-site construction activities shall avoid noise-sensitive times of the day, as feasible (9:00 p.m. to 7:00 a.m. Monday - Friday; 6:00 p.m. to 8:00 a.m. Saturday; anytime on Sunday or holidays).	Noise impacts on noise-sensitive receptors during construction	This requirement will be included in all Project related construction contracts.	Once, to ensure that construction contracts include this measure.	Confirmation by LAWA staff that construction contracts include this measure. Documentation will be cited in the annual MMRP status report.

Table 1
LAX Airfield and Terminal Modernization Project Mitigation Measures

Mitigation Measures		Impact Being Addressed	Timing of Implementation	Monitoring Frequency	Actions Indicating Compliance
MM-CN (ATMP)-3 **Monitoring Agency: LAWA**	**Construction Equipment.** Stationary source equipment whose use is flexible with regard to relocation (such as generators and compressors) shall be located at the greatest distance practical from noise-sensitive land uses. "Quiet-design" air compressors and other quieter construction equipment shall be used when feasible and when such technology/equipment is commercially available.	Noise impacts on noise-sensitive receptors during construction	This requirement will be included in all Project related construction contracts.	Once, to ensure construction contracts include this measure.	Confirmation by LAWA staff that construction contracts include this measure Documentation will be cited in the annual MMRP status report(s).
Transportation					
MM-T (ATMP)-1 **Monitoring Agency: LAWA**	**VMT Reduction Program.** Prior to operation of Concourse 0 or Terminal 9, LAWA shall initiate implementation of a Vehicle Miles Traveled (VMT) Reduction Program. The VMT Reduction Program described below includes a variety of VMT reduction strategies that LAWA will choose from in mitigating the VMT impacts of the proposed Project. As further described below, LAWA will monitor on an annual basis for a defined period the effectiveness of the strategies to determine if the required level of mitigation (i.e., the quantified level of VMT reduction) is being achieved. While a broad array of potential VMT mitigation reduction strategies is identified below, this list is not intended to limit future VMT reduction strategies to only those presented herein. If other feasible VMT reduction strategies are identified in the future and are needed to reduce the VMT impacts below the level of significance, they, too, may be implemented. The selection, implementation, and monitoring and reporting of VMT reduction strategies will occur in conjunction with the existing ground transportation management function within LAWA (i.e., in coordination with LAWA's management of employee carpools, vanpools, transit, etc.). VMT Reduction Strategies The pool of potential VMT reduction strategies currently considered available for reducing VMT impacts associated with the proposed Project are described below. For the first four strategies, there is published research about the effectiveness of each of the strategies, and estimates about the effectiveness of each strategy can be made based on conditions at LAX; therefore, an estimate of the amount of VMT reduction associated with these strategies is provided. Following the descriptions of those first four strategies is a listing of additional VMT reduction strategies whose effectiveness in reducing VMT is more difficult to estimate at this time due to the lack of available research or data; nonetheless, these additional VMT reduction strategies are included because, as a matter of professional judgment, they appear to have the potential to result in decrease in VMT. Regardless, the actual effectiveness of the VMT reduction strategies selected for implementation would be validated through annual monitoring and reporting, as further described below. ▪ **Expand LAWA's Rideshare Program** – Currently, LAWA's rideshare program serves LAWA's employees and results in a 13.4 percent commute mode share for the vanpool program and additional participation in carpool matching, transit trip planning, and a guaranteed ride home program. The LAX employee population currently has a 5.5 percent commute mode share for vanpools. Expanding the LAWA program to all LAX employees, with a corresponding expansion of vans in service to meet the increased demand, is expected to produce a similar mode share for ridership programs as is currently seen for LAWA employees. Vanpools are a flexible strategy that accommodate a variety of shift schedules and residential locations, ideal for a large workforce such as that of the LAX campus. Furthermore, vanpools were a frequently-requested program in the 2016 Employee Travel Study of Los Angeles International Airport, which surveyed employees across LAX of all types. When applied to the entire LAX employee pool, this would result in an increase in vanpool mode share for LAX employees of 7.9 percent, representing a shift from employees driving alone to employees driving with others in a vanpool. Additional participation in carpools would also be anticipated as a result of this strategy. Based on the strategy description above, total VMT reduction from this strategy is estimated to be over 60,000 daily employee VMT. This assumes new vanpool riders shift from drive-alone mode share (80 percent of LAX employees) and each van carries six employees (driver plus passengers). ▪ **Through the LAX Transportation Management Organization, Work with Employers on an Employee Telecommuting Program** – The LAX Transportation Management Organization will encourage and provide support, advice, and guidance to employers across the LAX campus in implementing telecommuting programs. Recognizing that LAWA job requirements are not fully representative of all LAX employees, most of whom need to be on-site to fulfill their job duties, a review of job titles across the LAX campus was conducted, resulting in an estimate that four percent of all jobs across LAX could be completed at least partially from home. Based on research related to telecommute programs, a telecommute program that enables an average of 1.5 days per week to be spent working from home, with a four percent eligibility, would result in a 0.88 percent reduction in VMT from the employment site.	Employee VMT impacts, passenger VMT impacts, and induced VMT impacts during operation	Formulation of the ATMP VMT Reduction Plan, including identification of specific strategies to be implemented immediately and delineation of the means and methods to monitor the resultant employment VMT reductions, shall occur prior to the commencement of operations in Concourse 0 or Terminal 9, whichever is operational first.	Monitoring of, and reporting on, the amount of employment VMT reduction achieved from implementation of the VMT reduction strategies shall occur on an annual basis following initial implementation of the ATMP VMT Reduction Plan.	Completion of the initial ATMP VMT Reduction Plan will be documented in the annual MMRP status report for that year. Monitoring and reporting on the effectiveness of the VMT reduction strategies in meeting the employment VMT reduction requirement will occur on an annual basis, beginning one year after initial operation of Concourse 0 or Terminal 9, whichever is operational first. The annual VMT reduction monitoring and reporting results will be summarized in each subsequent annual MMRP status report. Upon achieving the VMT reduction goal of 20.4 per employee (equivalent to a total of 16,450 VMT) per day over five (5) consecutive years, the VMT reduction requirement will be considered complete.

Table 1
LAX Airfield and Terminal Modernization Project Mitigation Measures

Mitigation Measures	Impact Being Addressed	Timing of Implementation	Monitoring Frequency	Actions Indicating Compliance
Based on these assumptions, total VMT reduction from this strategy is estimated to be over 7,000 daily employee VMT. ▪ **Provide On-demand Micro-Transit Shuttle** – Relative to employee VMT reduction, LAWA is currently engaged in the development of an employee shuttle in partnership with the City of Inglewood, and a separate pilot program in partnership with Metro. The expansion of these pilot programs into full programs, and the expansion of the service area beyond the City of Inglewood and the Metro service area, would result in additional reduction of single-occupancy commute trips to LAX from the nearby neighborhoods. Based on a review of employee residential locations, nine percent of employees at LAX live within five miles of the airport. Based on research related to private employee shuttles serving employment centers, an estimated 27 percent of the employees within the service area who would have driven alone would switch to a shuttle if it existed. Based on these assumptions, total VMT reduction from this strategy is estimated to be over 4,700 daily employee VMT. If the service area were expanded to a radius of 10 miles or farther, additional employees with longer commute trip lengths would be expected to switch to using the shuttle, resulting in additional VMT reduction. Micro-transit systems can, as an option, be set up as point-to-point shuttles different from van pools by utilizing larger vehicles, some with amenities, having a dedicated driver, with passenger pick-ups and drop-offs at designated hubs (instead of individual homes). Long-term, these pilot programs can serve as examples of service options that can be expanded into a full program that is available to both employees and passengers, which would result in reduction of private vehicle trips to LAX from passengers who live in the nearby neighborhoods. Based on a review of originating passenger residential locations, three percent of passengers live in neighborhoods within five miles of the airport. Based upon research related to private employee shuttles serving employment centers, which is the best available corollary to this type of passenger micro-transit shuttle, an estimated 27 percent of passengers within the service area who would otherwise drive alone would switch to a shuttle if it existed. If the service area were expanded to a radius of 10 miles, additional passengers with longer trip lengths would be expected to switch to using the shuttle. ▪ **Market and Promote Alternative Transportation Options –** Promotions, marketing, and online trip-planning tools shall be implemented to promote alternative options to get to and from LAX using modes other than a private vehicle. Relative to employee VMT, LAWA currently engages, through its Rideshare program and the LAX Transportation Management Organization, in marketing and promoting alternative options to get to LAX using modes other than a private vehicle. There is opportunity to increase the frequency and diversify the format of marketing and promotions to LAWA employees, increase the number of LAX employees that receive marketing and promotions communications through the expansion of the Rideshare program, and enhance the relevance of existing sources of information such as online trip-planning tools. Promotions and marketing that encourage employees to change their commute habits, including periodic incentives to participate (such as Earth Day promotions), in conjunction with the increasing number of non-auto options to get to LAX in the future, would be anticipated to further reduce employee VMT. Based on available research, the VMT reduction potential from this strategy is grouped with the expansion of the rideshare program, and no additional VMT reductions are assumed to be produced from this strategy in isolation. Relative to passenger VMT reduction, LAX does not currently engage in comprehensive marketing and promotions for alternative options to get to and from LAX using modes other than a private vehicle; therefore, there are certain aspects of marketing and promotion that could, as part of the proposed VMT Reduction Program, be expanded. Online trip-planning tools, such as Google Maps and Metro's trip planner, offer ways for a passenger to get to LAX via public transit or alternative modes. These tools, however, require a passenger to seek out proactively that information. Promotions and marketing that capture passengers' attention at all stages of the trip-making process, in conjunction with the increasing number of non-auto options to get to LAX in the future, would be anticipated to reduce passenger VMT. Additional Strategies Following are additional strategies that could be implemented: ▪ Conduct Parking Study to Price Parking to Reduce VMT ▪ Expand Incentives and Commuter Benefits ▪ Evaluate Modifications to FlyAway Service ▪ Explore Incentive Measures from LAWA Mobility Strategic Plan ▪ Evaluate the Potential for Congestion Pricing in the CTA				

2017 Los Angeles International Airport (LAX) Terminal Modernization MMRP

Los Angeles International Airport (LAX)
Terminals 2 and 3 Modernization Project

Mitigation Monitoring and Reporting Program

June 2017

This document constitutes the Mitigation Monitoring and Reporting Program (MMRP) for the LAX Terminals 2 and 3 (T2/T3) Modernization Project. This MMRP, prepared in compliance with State CEQA Guidelines Section 15097, specifies the monitoring and reporting requirements for the LAX T2/T3 Modernization Project described in the Final Environmental Impact Report (EIR) prepared for the project. In addition to project-specific mitigation measures identified in the Final EIR, Los Angeles World Airports (LAWA) has developed Standard Control Measures that implement existing regulations and/or LAWA plans and policies that would reduce or avoid the project's environmental impacts. Where the Final EIR identified significant impacts associated with the proposed project, in some cases, Standard Control Measures were identified as mitigation measures to avoid or substantially lessen these impacts. In addition, the Final EIR identified Standard Control Measures proposed for implementation that would further reduce certain less-than-significant impacts. All Standard Control Measures identified in the Final EIR are included in this MMRP, whether or not they were identified as mitigation measures to address a significant impact.

Table 1 provides, by environmental resource topic, the number and title of each project-specific mitigation measure identified in the Final EIR; the full text of the subject measure; the impact being addressed; and the timing of implementation, monitoring frequency, and actions indicating compliance (i.e., reporting). Table 2 provides, by environmental resource topic, the number and title of each LAX Standard Control Measure identified in the Final EIR that serve as mitigation measures and other LAX Standard Control Measures that apply to the project; the full text of the subject measure; the impact being addressed; and the timing of implementation, monitoring frequency, and actions indicating compliance (i.e., reporting). Monitoring and implementation of all of the measures are the responsibility of LAWA and/or the party carrying out the project. Some measures will be implemented by the construction contractor(s) in accordance with their contract specifications, which include environmental compliance requirements. LAWA will prepare an MMRP progress report annually that will identify actions taken with respect to the measures applicable in the reporting year.

Table 1 Project-Specific Mitigation Measures

Mitigation Measures		Impact Being Addressed	Timing of Implementation	Monitoring Frequency	Actions Indicating Compliance
Air Quality					
MM-AQ (T2/T3)-1 **Monitoring Agency:** **LAWA**	**Preferential Use of Renewable Diesel Fuel.** LAWA will require the use of renewable diesel fuel in proposed project construction off-road equipment and on-site, on-road trucks for at least 90 percent of diesel fuel demand. Renewable diesel fuel is available locally for fleetwide use and has been shown to reduce criteria pollutant and greenhouse gas emissions from diesel engines.	Construction-related air pollutant emissions	Included as condition of design and construction of project elements	Once prior to commencement of construction and on-going during construction	Annual reports to document compliance rate

Table 2 Standard Control Measures that are Mitigation Measures or are Otherwise Applicable

Mitigation Measures/Standard Control Measures		Impact Being Addressed	Timing of Implementation	Monitoring Frequency	Actions Indicating Compliance
Air Quality					
LAX-AQ-1 **Monitoring Agency:** **LAWA**	**Construction-Related Air Quality Standard Control Measures.** This measure describes a variety of specific actions to reduce fugitive dust emissions and exhaust emissions from on-road and off-road mobile and stationary sources used in construction. Specific measures are outlined below:				
1a	Post a publicly visible sign(s) with the telephone number and person to contact regarding dust complaints; this person shall respond and take corrective action within 24 hours.	Construction-related air pollutant emissions (fugitive dust)	Prior to initiation of construction activities (e.g., prior to site preparation, grading, demolition, or building construction, whichever occurs first)	Once prior to commencement of construction (by the prime construction contractor)	Inclusion of measure in construction contract(s); status update in first annual MMRP progress report following completion of measure
1b	During construction, the contractor shall demonstrate that all ground surfaces are covered or treated sufficiently to minimize fugitive dust emissions.	Construction-related air pollutant emissions (fugitive dust)	Prior to final occupancy	Once prior to final occupancy	Status update in annual MMRP progress report following occupancy
1c	All areas to be paved should be completed as soon as practical; in addition, building pads should be laid as soon as practical after grading.	Construction-related air pollutant emissions (fugitive dust)	During project construction	Periodically during construction (i.e., as increments of surface-level improvements are completed, confirmation of	Status updates in annual MMRP progress reports

Table 2 Standard Control Measures that are Mitigation Measures or are Otherwise Applicable

Mitigation Measures/Standard Control Measures		Impact Being Addressed	Timing of Implementation	Monitoring Frequency	Actions Indicating Compliance
				paving can occur)	
1d	Prohibit idling or queuing of diesel-fueled vehicles and equipment in excess of five minutes. This requirement will be included in specifications for any LAX projects requiring on-site construction. Exemptions may be granted for safety-related and operational reasons, as defined by CARB or as approved by LAWA.	Construction-related air pollutant emissions (on- and off-road mobile sources)	During project construction	Periodically during construction	Inclusion of measure in construction contract(s); status updates in annual MMRP progress reports
1e	All diesel-fueled equipment used for construction will be outfitted with the best available emission control devices, where technologically feasible, primarily to reduce emissions of diesel particulate matter (PM), including fine PM (PM2.5), and secondarily, to reduce emissions of NOx. This requirement shall apply to diesel-fueled off-road equipment (such as construction machinery), diesel-fueled on-road vehicles (such as trucks), and stationary diesel-fueled engines (such as electric generators). The emission control devices utilized in construction equipment shall be verified or certified by California Air Resources Board or US Environmental Protection Agency for use in on-road or off-road vehicles or engines.	Construction-related air pollutant emissions (on- and off-road mobile sources and stationary sources)	During project construction	Periodically during construction	Inclusion of measure in construction contract(s); status updates in annual MMRP progress reports
1g	To the extent feasible, have construction employees commute during off-peak hours.	Construction-related air pollutant emissions (on-road mobile sources)	During project construction	Periodically during construction	Inclusion of measure in construction contract(s); status updates in annual MMRP progress reports
1h	Make access available for on-site lunch trucks during construction, as feasible and consistent with requirements pertaining to airport security, to minimize off-site worker vehicle trips. (for the proposed project, lunch trucks would not access the CTA)	Construction-related air pollutant emissions (on-	During project construction	Periodically during construction	Status updates in annual MMRP progress reports

Table 2 Standard Control Measures that are Mitigation Measures or are Otherwise Applicable

Mitigation Measures/Standard Control Measures		Impact Being Addressed	Timing of Implementation	Monitoring Frequency	Actions Indicating Compliance
		road mobile sources)			
1i	Utilize on-site rock crushing facility during construction, when feasible, to reuse rock/concrete and minimize off-site truck haul trips.	Construction-related air pollutant emissions (on-road mobile sources)	During project construction (e.g., site preparation, grading, demolition)	Periodically during construction	Status updates in annual MMRP progress reports
1j	Every effort shall be made to utilize grid-based electric power at any construction site, where feasible. Grid-based power can be from a direct hookup or a tie in to electricity from power poles. If diesel- or gasoline-fueled generators are necessary, generators using "clean burning diesel" (i.e., ultra-low sulfur diesel – ULSD) fuel and exhaust emission controls shall be utilized.	Construction-related air pollutant emissions (stationary point sources)	During project construction	Periodically during construction	Inclusion of measure in construction contract(s); status updates in annual MMRP progress reports
1m	The contractor or builder shall designate a person or persons to ensure the implementation of all components of the construction-related air quality measures through direct inspections, record reviews, and investigations of complaints.	Construction-related air pollutant emissions	Prior to commencement of project construction (e.g., site preparation, grading, demolition, or building construction, whichever occurs first)	Once prior to commencement of construction (by prime construction contractor)	Inclusion of measure in construction contract(s); status update in first annual MMRP progress report following completion of measure
1n	Locate rock-crushing operations and construction material stockpiles for all LAX-related construction in areas away from LAX-adjacent residents, to the extent possible, to reduce impacts from emissions of fugitive dust.	Construction-related air pollutant	Prior to construction when identifying proposed locations for	Once prior to use of on-airport rock-crushing operation; periodically	Status updates in first annual progress report following use of on-airport rock-

Table 2 Standard Control Measures that are Mitigation Measures or are Otherwise Applicable

Mitigation Measures/Standard Control Measures		Impact Being Addressed	Timing of Implementation	Monitoring Frequency	Actions Indicating Compliance
		emissions (fugitive dust)	crushing and stockpiling and during project construction in the event such activities need to be relocated	during construction for material stockpiles	crushing operation; status updates in annual MMRP progress reports for material stockpiles
1o	On-road medium-duty and larger diesel-powered trucks used on LAX construction projects with a gross vehicle weight rating of at least 14,001 pounds shall, at a minimum, comply with USEPA 2010 on-road emissions standards for PM10 and NOx. Contractor requirements to utilize such on-road haul trucks or the next cleanest vehicle available will be subject to the provisions of LAWA Air Quality Control Measure 1q below.	Construction-related air pollutant emissions (on-road mobile sources)	Prior to use of such trucks associated with construction activity	Whenever such trucks are added to the project construction program	Inclusion of measure in construction contract(s); status updates in annual MMRP progress reports
1p	All off-road diesel-powered construction equipment greater than 50 horsepower shall meet, at a minimum, USEPA Tier 4 (final) off-road emissions standards. Contractor requirements to utilize Tier 4 (final) equipment or next cleanest equipment available will be subject to the provisions of LAWA Air Quality Control Measure 1q below.	Construction-related air pollutant emissions (off-road mobile sources)	Prior to use of such off-road diesel-powered equipment associated with construction activity	Whenever such equipment is added to the project construction program	Inclusion of measure in construction contract(s); status updates in annual MMRP progress reports
1q	The on-road haul truck and off-road construction equipment requirements set forth in Air Quality Standard Control Measures 1o and 1p above shall apply unless any of the following circumstances exist and the Contractor provides a written finding consistent with project contract requirements that: o The Contractor does not have the required types of on-road haul trucks or off-road construction equipment within its current available inventory and intends to meet the requirements of the Measures 1o and 1p as to a particular vehicle or piece of equipment by leasing or short-term rental, and the Contractor has attempted in good faith and due diligence to lease the vehicle or equipment	Construction-related air pollutant emissions (on- and off-road mobile sources)	Prior to use of such on-road trucks or off-road construction equipment associated with construction activity	Whenever such trucks or equipment are added to the project construction program	Inclusion of measure in construction contract(s); status updates in annual MMRP progress reports. Documentation of good faith efforts and due diligence regarding the

Table 2 Standard Control Measures that are Mitigation Measures or are Otherwise Applicable

<table>
<tr><th colspan="2">Mitigation Measures/Standard Control Measures</th><th>Impact Being Addressed</th><th>Timing of Implementation</th><th>Monitoring Frequency</th><th>Actions Indicating Compliance</th></tr>
<tr><td></td><td>
that would comply with these measures, but that vehicle or equipment is not available.
o The Contractor has been awarded funding by SCAQMD or another agency that would provide some or all of the cost to retrofit, repower, or purchase a piece of equipment or vehicle, but the funding has not yet been provided due to circumstances beyond the Contractor's control, and the Contractor has attempted in good faith and due diligence to lease or short-term rent the equipment or vehicle that would comply with Measures 1o and 1p, but that equipment or vehicle is not available.
o Contractor has ordered a piece of equipment or vehicle to be used on the construction project in compliance with Measures 1o and 1p at least 60 days before that equipment or vehicle is needed at the project site, but that equipment or vehicle has not yet arrived due to circumstances beyond the Contractor's control, and the Contractor has attempted in good faith and due diligence to lease or short-term rent a piece of equipment or vehicle to meet the requirements of Measures 1o and 1p, but that equipment or vehicle is not available.
o Construction-related diesel equipment or vehicle will be used on the project site for fewer than 20 calendar days per calendar year.
In any of the situations described above, the Contractor/ Subcontractor shall provide the next cleanest piece of equipment or vehicle as provided by the step down schedules in Table A for Off-Road Equipment and Table B for On-Road Equipment.
Nothing in the above shall require an emissions control device (i.e., VDECS) that does not meet Occupational Safety and Health Act (OSHA) standards.
Table A
Off-Road Compliance Step Down Schedule
<table>
<tr><th>Compliance Alternative</th><th>Engine Standard</th><th>CARB-verified DECS (VDECS)</th></tr>
<tr><td>1</td><td>Tier 4 interim</td><td>N/A*</td></tr>
<tr><td>2</td><td>Tier 3</td><td>Level 3</td></tr>
<tr><td>3</td><td>Tier 2</td><td>Level 3</td></tr>
</table>
</td><td></td><td></td><td></td><td>exceptions related to unavailability of equipment/vehicles shall include written record(s) of inquiries (i.e., phone log[s]) to at least three (3) leasing/rental companies that provide construction-related on-road trucks of the type specified in Measure 1o above (i.e., medium-duty and larger diesel-powered trucks with a gross vehicle weight rating of at least 14,001 pounds) or diesel-powered off-road construction equipment such as the types to be used by the Contractor, documenting the availability/ unavailability of the required types of trucks/equipment. LAWA will, from</td></tr>
</table>

4	Tier 1	Level 3	
5	Tier 2	Level 2	
6	Tier 2	Level 1	
7	Tier 3	Uncontrolled	
8	Tier 2	Uncontrolled	
9	Tier 1	Level 2	

* Tier 4 (interim or final) or 2007 model year equipment not already supplied with a factory-equipped diesel particulate filter shall be outfitted with Level 3 VDECS.

Equipment less than Tier 1, Level 2 shall not be permitted.

Table B
On-Road Compliance Step Down Schedule

Compliance Alternative	Engine Model Year	CARB-verified DECS (VDECS)
1	2007	N/A*
2	2004	Level 3
3	1998	Level 3
4	2004	Uncontrolled
5	1998	Uncontrolled

* 2007 Model Year equipment not already supplied with a factory-equipped diesel particulate filter shall be outfitted with Level 3 VDECS.

Equipment with a model year earlier than Model Year 1998 shall not be permitted.

Nothing in the above shall require an emissions control device (i.e., VDECS) that does not meet OSHA standards.

time-to-time, conduct independent research and verification of the availability of such vehicles and equipment for lease/rent within a 120-mile radius of LAX, which may be used in reviewing the acceptability of the Contractor's good faith efforts and due diligence.

Regarding the exception for equipment/vehicles to be used for fewer than 20 calendar days, the Contractor shall not consecutively use different equipment or vehicles that perform the same or a substantially similar function in an attempt to use this exception (Measure 1q) to circumvent the intent of Measures 1o and 1p.

Table 2 Standard Control Measures that are Mitigation Measures or are Otherwise Applicable

Mitigation Measures/Standard Control Measures		Impact Being Addressed	Timing of Implementation	Monitoring Frequency	Actions Indicating Compliance
LAX-PR-2 Monitoring Agency: LAWA	**Paleontological Resources Construction Personnel Briefing.** Prior to initiation of grading/ground-disturbing activities, LAWA shall require the PM or PM designee to brief project engineers, project inspectors, construction foreman, drillers and heavy equipment operators in the identification of fossils or fossiliferous deposits and in the correct procedures for notifying the relevant individuals should such a discovery occur.	Loss or destruction of paleontological resources	Prior to commencement of site grading/ground-disturbing activities, as identified in PMTP	Once prior to commencement of site grading/ground-disturbing activities	Inclusion of measure in construction contract(s)
Transportation/Traffic					
LAX-ST-1 Monitoring Agency: LAWA	**Construction Traffic Management Plan** Prior to initiation of construction, LAWA shall require contractors to complete a construction traffic management plan (CTMP). The CTMP shall include a description and illustrations of how the contractor will manage all construction related traffic during both peak and off-peak traffic periods. The CTMP shall detail the haul routes, locations for variable message and other signs, construction deliveries, construction employee shift hours and parking locations, any lane striping changes and traffic signal modifications, and shuttle system operations, if any. The CTMP shall require approval of the LAWA Construction and Logistics Management (CALM) Team prior to implementation. LAWA shall require contractors to implement and comply with the following CTMP measures to reduce construction-related traffic impacts associated with projects at LAX, including: **a. Construction Deliveries** Construction deliveries requiring lane closures shall receive prior approval from the CALM Team. Construction notification of deliveries requiring lane closures shall be made in writing (a minimum of seventy-two (72) hours in advance, unless otherwise coordinated with the CALM Team prior to the required closure(s) when a 72-hour advance written notification is not feasible) in order to allow for any modifications to approved traffic detour plans. Delivery permits from all applicable local agencies shall be obtained thirty (30) days prior to any delivery requiring a lane closure, as feasible. To the extent possible, construction deliveries within the CTA requiring lane closures shall be	Traffic congestion and delay related to construction activities	Prior to commencement of construction for completion of CTMP; during construction for implementation	Once for completion of CTMP; on-going during construction	Inclusion of relevant measures in construction contract(s); approval of CTMP by LAWA's CALM Team; ongoing monitoring of contractor compliance.

Table 2 Standard Control Measures that are Mitigation Measures or are Otherwise Applicable

Mitigation Measures/Standard Control Measures		Impact Being Addressed	Timing of Implementation	Monitoring Frequency	Actions Indicating Compliance
	scheduled during overnight hours (1:00 a.m. to 7:00 a.m.) to minimize impacts to Airport operations. **b. Designated Truck Delivery Hours** To the extent possible, truck deliveries of bulk materials such as aggregate, bulk cement, dirt, etc. to the project site, and hauling of material from the project site, shall be scheduled during off-peak hours to avoid the peak commuter traffic periods on designated haul routes. Peak commuter traffic periods are between 7:00 a.m. to 9:00 a.m. and 4:30 p.m. to 6:30 p.m. Monday through Friday. All deviations to these requirements shall be approved in writing by the CALM Team prior to actual site deliveries. **c. Construction Employee Shift Hours** To the extent possible, the beginning and ending times of work shifts that avoid peak commuter traffic periods (7:00 a.m. to 9:00 a.m. and 4:30 p.m. to 6:30 p.m. Monday through Friday) shall be established. (This measure may not apply to swing shifts.) To avoid peak commuter traffic, work periods may be extended to include weekend and multiple work shifts, when necessary. **d. Designated Truck Routes** For dirt, aggregate, bulk cement, and all other materials and equipment, truck deliveries to the LAX area shall be on designated routes only (freeways and non-residential streets). Designated truck routes shall be limited to: – Aviation Boulevard (Imperial Highway to Manchester Boulevard); – Manchester Boulevard (Aviation Boulevard to I-405); – Florence Avenue (Aviation Boulevard to I-405); – La Cienega Boulevard (north of Imperial Highway); – Pershing Drive (Westchester Parkway to Imperial Highway); – Westchester Parkway (Pershing Drive to Sepulveda Boulevard);				

Table 2 Standard Control Measures that are Mitigation Measures or are Otherwise Applicable

Mitigation Measures/Standard Control Measures		Impact Being Addressed	Timing of Implementation	Monitoring Frequency	Actions Indicating Compliance
	– Century Boulevard (Sepulveda Boulevard to Aviation Boulevard); – Sepulveda Boulevard (Westchester Parkway to Imperial Highway); – Imperial Highway (Pershing Drive to I-405); – I-405; and – I-105 **f. Stockpile Locations** All stockpile locations shall be pre-approved by LAWA and its CALM Team. Stockpile locations/laydown/staging areas shall be accessed by construction vehicles with minimal disruption to adjacent public streets. **g. Construction Employee Parking Locations** If parking for construction employees is not located on, or in proximity to, the work site, shuttle buses shall be used to transport employees to and from the construction areas. Shuttle buses shall comply with all applicable California Air Resources Board (CARB) and South Coast Air Quality Management District (SCAQMD) rules and regulations, and LAWA's Alternative Fuel Policy. All employees, including those of subcontractors and suppliers at all tiers, shall park in the designated parking locations and not on city streets, or in nearby neighborhoods. All construction personnel shall be required to attend an airport project-specific orientation meeting that will cover where to park, where staging areas are located, construction policies, etc.				

2023 Alameda County Transportation Commission Transportation Demand Management Measures

APPENDIX C

TRAVEL DEMAND MANAGEMENT RESOURCES

Table C1 - Menu Of Travel Demand Management Measures

TDM Program	Description	Primary Agency Responsible	City Implementation Mechanism	Recommended Application/ Context	% Trip Reduction	Factors	Source
Trip Reduction Requirements							
Set trip reduction requirements for multifamily residential or commercial development	Require as a condition of approval for developments (either commercial, multifamily residential, or both) that certain TDM measures are implemented on an ongoing basis, or that specified vehicle trip reduction requirements are met.	Cities	Planning code or other municipal ordinance	Any urban area with good transit service; suburban downtowns, commercial and mixed use areas; transit stations. (particularly in high-growth areas)	5%-15%; Enables other strategies	Effects of this strategy depend on the location/accessibility of the development site(s), demographics of the project's residential/commercial occupants/ tenants and the type of measures required. The US EPA notes that "reasonable initial targets for the programs established under a trip reduction ordinance (TRO), might be a 5-10 percent reduction in single occupant vehicle (SOV) trips, with somewhat larger reductions (perhaps 15 percent) if substantial fees for parking are imposed."	https://www.epa.gov/state-and-local-transportation
Establish a Transportation Management Association	Establish an organization to assist businesses in reducing vehicle trips, either by administering programs, providing services (such as shuttle service), or providing technical assistance to businesses. Often implemented together with a trip reduction requirement.	Cities or business associations	Planning code or other municipal ordinance; or voluntary action by business association	Commercial area or other major business or employment districts	6%-7%	The TDM Resource Center (1997) estimated that just by improving coordination, and providing information on travel alternatives, establishment of a TMA can reduce commute-related vehicle trips by 6%-7%, with greater impact when implemented in concert with other trip reduction, TDM and parking management programs and services.	TDM Resource Center (1997), Transportation Demand Management; A Guide to Including TDM Strategies in Major Investment Studies and in Planning for Other Transportation Projects, Office of Urban Mobility, WSDOT (www.wsdot.wa.gov), as cited in the Victoria Transportation Policy Institute's TDM Encyclopedia (http://www.vtpi.org/tdm/tdm44.htm), last updated in 2017.
Implement an employee-trip reduction program for municipal employees	Appoint an employee commute coordinator, and implement incentive programs to reduce single-occupant vehicle commuting among municipal employees. Elements may include: subsidized transit passes; employee parking and/ or parking cash-out programs; commuter checks; direct financial incentives to bike, walk, carpool or take transit; ride sharing; shuttles; vanpools	Cities	Modify agency procedures	Any	4-20%	Management support and the presence of an onsite employee transportation coordinator are important factors in the success of a program. Mandatory employee/commute trip reduction (CTR) ordinances often require employers with more than 50 or 100 employees at a given employment site to implement a CTR program. This reduces the costs of administering TDM programs and compliance with survey and reporting requirements, but prevents such programs from reaching the majority of employees in a given city/region who work for small to mid-sized firms and organizations with less than 50 employees.	Marlon G. Boarnet, Hsin-Ping Hsu and Susan Handy (2010), Draft Policy Brief on the Impacts of Employer-Based Trip Reduction Based on a Review of the Empirical Literature, for Research on Impacts of Transportation and Land Use-Related Policies, California Air Resources Board http://arb.ca.gov/cc/sb375/policies/policies.htm); Philip Winters and Daniel Rudge (1995), Commute Alternatives Educational Outreach, National Urban Transit Institute, Center for Urban Transportation Research, University of South Florida; Tom Rye (2002), "Travel Plans: Do They Work?," Transport Policy, Vol. 9, No. 4 (www.elsevier.com/locate/tranpol), Oct. 2002, pp. 287-298.
Safety Net							
Guaranteed/ Emergency Ride Home program	Provide a guaranteed ride home for people who do not drive to work alone to ensure they are not stranded if they need to go home in the middle of the day due to an emergency, or stay late for work unexpectedly.	GRH in Alameda County is provided by Alameda CTC		Any	9%-38%	Coupled with active program marketing by employers, including marketing of other TDM programs and financial incentives, such as parking pricing, the Alameda County Guaranteed Ride Home program has been shown to reduce drive alone vehicle trips to participating employment sites by as much as 38% (Alameda County Guaranteed Ride Home Program Evaluation, Nelson\Nygaard 2015 annual evaluation).	Alameda County Guaranteed Ride Home Program Evaluation (Nelson\Nygaard 2015, http://grh.alamedactc.org/wp-content/uploads/2016/06/ALAMEDA-CTC-GRH-Evaluation-2015-FINAL.pdf).

Table C1 - Menu Of Travel Demand Management Measures (Cont.)

TDM Program	Description	Primary Agency Responsible	City Implementation Mechanism	Recommended Application/ Context	% Trip Reduction	Factors	Source
Parking Management							
Demand-responsive pricing of on-street spaces	Set on-street parking prices based on parking demand in area to achieve parking availability targets.	Cities	Municipal code; capital project	Urban or suburban downtowns, commercial and mixed use areas; transit stations	4%-18%	One of the most significant factors affecting motorists' choice of whether to drive or travel by another mode is the price of parking at the destination. Moreover, up to 28% of traffic in mixed-use districts is attributable to cruising for parking. By encouraging use of alternative modes and reducing parking search related delays for transit, demand responsive pricing can significantly reduce vehicle trips to major destinations/districts. The impact of parking pricing depends on the overall supply and availability of both on-street and off-street parking and the extent to which employers subsidize such parking.	Low-end estimate per Harvey and Deakin (1997), who estimated that parking pricing for work and non-work trips would reduce regional vehicle trips by 2.8% (Greig Harvey and Elizabeth Deakin (1997), "The STEP Analysis Package: Description and Application Examples," Appendix B, in Apogee Research, Guidance on the Use of Market Mechanisms to Reduce Transportation Emissions, US EPA (Washington DC; www.epa.gov/omswww/market.htm)). High end estimated based on the Victoria Transportation Policy Institute (2016), Trip Reduction Tables (http://www.vtpi.org/tdm/tdm41.htm). Additional resource: http://www.spur.org/publications/spur-report/2009-05-01/critical-cooling.
Use of new meter technologies to allow multiple forms of payment and dynamic pricing	Install parking meters that allow payment by credit card or phone, and that connect to a central system in real-time, allowing for remote programming and management of parking prices.	Cities	Capital project	Urban or suburban downtowns, commercial and mixed use areas; transit stations	Enables demand responsive parking pricing	Installation of new parking management technologies, including new meters and infrastructure to support payment by cell phone and real-time monitoring of parking space utilization and turnover enable implementation of demand responsive parking pricing, which in turn reduces vehicle travel (see Demand Responsive Parking Pricing).	San Francisco Planning and Urban Research (2009). "Critical Cooling." The Urbanist, Issue 482, May, 2009 (http://www.spur.org/publications/spur-report/2009-05-01/critical-cooling).
Use of parking revenue to support other mobility/ neighborhood programs	Dedicate meter revenue from designated area to uses such as mobility improvements, neighborhood or business improvement programs, potentially through the creation of a parking benefit district.	Cities	Form dedicated Transportation Management District to receive funds	Any area with paid parking	Enables investment in Multimodal Infrastructure and TDM Programs	Creation of parking benefit district can directly support vehicle trip reduction by providing funding for investments in other multimodal access programs and services that increase opportunities for access by non-auto modes. The establishment of such districts and provisions requiring meter and permit revenues to be spent within the district can also indirectly support vehicle trip reduction by increasing local political support for demand responsive, market-based pricing of on-street and off-street parking.	
Require "Unbundling" of parking costs from rents and leases	Separate the charge for leasing or buying a unit or square footage in multifamily residential or commercial buildings from charges for parking spaces.	Cities	Modify planning code	Any	6%-16%	"Charging separately for parking is among the most effective strategies to encourage households to own fewer cars, and subsequently reduce vehicle trips. Parking costs are generally subsumed into the sale or rental price of housing and commercial real estate. For residential development, unbundled parking may prompt some residents to dispense with one of their cars and to make more of their trips by other modes. The elasticity of vehicle ownership with respect to price is typically -0.4 to -1.0. Assuming total annual vehicle spending of $7,788 (BLS Consumer Expenditure Survey, 2011), unbundling of an average of $100/month in parking costs would increase perceived transportation costs/vehicle by 15%/year for the typical hh, which in turn is expected to result in a decline in vehicle ownership of 6% (at a price elasticity of -0.4) to 16% (at -0.10), with corresponding declines in vehicle trips."	Victoria Transport Policy Institute (2017), Transportation Elasticities, http://www.vtpi.org/tdm/tdm11.htm; Bureau of Labor Statistics (2012), Consumer Expenditure Survey, 2011, www.bls.gov.

Table C1 - Menu Of Travel Demand Management Measures (Cont.)

TDM Program	Description	Primary Agency Responsible	City Implementation Mechanism	Recommended Application/ Context	% Trip Reduction	Factors	Source
Parking Management, Continued							
Reduced or eliminated minimum parking requirements	In areas that are well-served by transit and other alternatives to driving, allow developers to build residential and commercial buildings with fewer parking spaces or no parking.	Cities	Modify planning code	Any area with quality transit service	9%-16%	Eliminating or reducing off-street parking requirements allows a market based supply of parking, and eliminates the sometimes required over-supply of parking, which encourages property owners/managers to bundle parking in lease/sale agreements and provides an effective subsidy for vehicle travel. This policy reform does not directly influence vehicle travel demand associated with existing development, although elimination of minimum off-street parking requirements does remove a barrier to changes of use, and/or the lease or sale of underutilized private off-street parking constructed in accordance with previous requirements, supporting the development of market-based parking pricing that in turn reduces vehicle travel.	Range of vehicle trip reduction impact of eliminating minium parking requirements on Los Angeles' Westside, as incorporated in the vehicle trip reduction impact analysis conducted for the Los Angeles Westside Mobility Plan (http://www.westsidemobilityplan.com/transportation-demand-model/)
District-based parking management	Manage parking supply in a defined area as a unified whole in order to better manage parking demand between different facilities to eliminate cruising for parking and improve the customer experience.	Cities	Modify city agency procedures;	Urban or suburban downtowns, commercial and mixed use areas; transit stations	Enables compact development	District-based parking management offers the same benefit as shared parking facilities at a wider scale. As with shared parking facilities, the coordinated provision and management of a shared, publicly accessible supply of on-street and off-street parking at a district-scale can reduce vehicle trips by facilitating dense/compact, clustered, and mixed-use development and by reducing expenditure of land and financial resources on off-street parking, thereby reducing an effective subsidy for auto access and mobility.	
Incentivize shared parking	Facilitate the sharing of parking among multiple land uses that have complementary schedules (e.g., an office with greater demand during the day and restaurant with greater demand at night).	Enabled by cities, brokered by private businesses or developments	Modify planning code	Urban or suburban downtowns, commercial and mixed use areas	Enables compact development	Shared parking facilities can reduce vehicle trips by reducing the need for construction of dedicated off-street parking facilities for each land use/activity commensurate with the peak parking demand for that use. By so doing, shared parking facilities can enable dense, clustered development that facilitates a greater share of trips by walking, cycling and public transit. Shared parking can also reduce the total amount of land and financial resources dedicated to parking facilities, in turn reducing the effective subsidy for access by automobile that such expenditures represent. However, if shared parking increases available parking supply and thereby reduces parking prices it may in some cases increase vehicle trips and vehicle miles traveled (VMT).	Shared parking does not directly reduce vehicle travel if it substitutes for increased parking supply. To the degree that it increases the available supply of parking and reduces parking prices it can encourage automobile travel. To the degree that shared parking allows more clustered development can encourage use of alternative modes.
Improved parking wayfinding signage	Install wayfinding signage to make parking easier to find. This can help to shift parking demand away from overfull spaces to underutilized areas and can help reduce local traffic impacts caused by searching for parking.	Cities	Capital project	Urban or suburban downtowns, commercial and mixed use areas; transit stations	Not available	Enhanced wayfinding, signage, and provision of real-time information about parking supply and availability can reduce VMT and traffic congestion by reducing parking search time, but impacts on total vehicle trips are unclear.	
Urban Form and Land Use							
Compact, mixed use development and "park once" districts	Encourage development of districts that allow people to park just once if they drive to reach the district, and walk to destinations within the area once they are there.	Cities are responsible for zoning, land use planning, and development permissions	Amending general plans and zoning codes to plan for and facilitate compact, mixed-use development in appropriate areas. Support implementation of compact, mixed-use development by establishment of public development commissions and other mechanisms to support public investment.	Urban; suburban downtown; transit station	20%-40%	Recent literature indicates that compact development can reduce VMT per capita by 20%-40% compared to conventional "sprawl type" development characterized by low density and segregation of land uses and activities (vehicle trips are assumed to be reduced by a corresponding 20%-40%). Cumulative effects depend on the pace of new development in the County relative to the base of existing development (at a more rapid pace and extensive geographic scale, compact/mixed-use development/redevelopment can lead to greater reduction in vehicle trips.	Ewing, R. K. Bartholomew, S. Winkelman, J. Walters, and D. Chen (2008). Growing Cooler: The Evidence on Urban Development and Climate Change. Washington, DC: Urban Land Institute (ULI), p. 33.

Table C1 - Menu Of Travel Demand Management Measures (Cont.)

TDM Program	Description	Primary Agency Responsible	City Implementation Mechanism	Recommended Application/ Context	% Trip Reduction	Factors	Source
Trip Reduction							
Establish a Transportation Management Association	Establish an organization to assist businesses in reducing vehicle trips, either by administering programs, providing services (such as shuttle service), or providing technical assistance to businesses. Often implemented together with a trip reduction requirement.	Businesses	Voluntary action by business association	Commercial area or other major business or employment districts	6%-7%	The TDM Resource Center (1997) estimated that just by improving coordination, and providing information on travel alternatives, establishment of a TMA can reduce commute-related vehicle trips by 6%-7%, with greater impact when implemented in concert with other trip reduction, TDM and parking management programs and services.	TDM Resource Center (1997), Transportation Demand Management; A Guide to Including TDM Strategies in Major Investment Studies and in Planning for Other Transportation Projects, Office of Urban Mobility, WSDOT (www.wsdot.wa.gov), as cited in the Victoria Transportation Policy Institute's TDM Encyclopedia (http://www.vtpi.org/tdm/tdm44.htm), last updated in 2017.
Implement an employee-trip reduction program	Appoint an employee commute coordinator, and implement incentive programs to reduce single-occupant vehicle commuting among municipal employees. Elements may include: subsidized transit passes; employee parking and/or parking cash-out programs; commuter checks; direct financial incentives to bike, walk, carpool or take transit; ride sharing; shuttles; vanpools.	Businesses		Any	4-20%	Management support and the presence of an onsite employee transportation coordinator are important factors in the success of a program. Mandatory employee/commute trip reduction (CTR) ordinances often require employers with more than 50 or 100 employees at a given employment site to implement a CTR program. This reduces the costs of administering TDM programs and compliance with survey and reporting requirements, but prevents such programs from reaching the majority of employees in a given city/region who work for small to mid-sized firms and organizations with less than 50 employees.	Marlon G. Boarnet, Hsin-Ping Hsu and Susan Handy (2010), Draft Policy Brief on the Impacts of Employer-Based Trip Reduction Based on a Review of the Empirical Literature, for Research on Impacts of Transportation and Land Use-Related Policies, California Air Resources Board http://arb.ca.gov/cc/sb375/policies/policies.htm); Philip Winters and Daniel Rudge (1995), Commute Alternatives Educational Outreach, National Urban Transit Institute, Center for Urban Transportation Research, University of South Florida; Tom Rye (2002), "Travel Plans: Do They Work?," Transport Policy, Vol. 9, No. 4 (www.elsevier.com/locate/tranpol), Oct. 2002, pp. 287-298.
Safety Net							
Guaranteed/ Emergency Ride Home program	Provide a guaranteed ride home for people who do not drive to work alone to ensure they are not stranded if they need to go home in the middle of the day due to an emergency, or stay late for work unexpectedly.	GRH in Alameda County is provided by Alameda CTC		Any	9%-38%	Coupled with active program marketing by employers, including marketing of other TDM programs and financial incentives, such as parking pricing, the Alameda County Guaranteed Ride Home program has been shown to reduce drive alone vehicle trips to participating employment sites by as much as 38% (Alameda County Guaranteed Ride Home Program Evaluation, Nelson\Nygaard 2015).	Alameda County Guaranteed Ride Home Program Evaluation (Nelson\Nygaard 2015, http://grh.alamedactc.org/wp-content/uploads/2016/06/ALAMEDA-CTC-GRH-Evaluation-2015-FINAL.pdf).
Parking Management							
Incentivize shared parking	Facilitate the sharing of parking among multiple land uses that have complementary schedules (e.g., an office with greater demand during the day and restaurant with greater demand at night).	Enabled by cities, brokered by private businesses or developments	Modify planning code	Urban or suburban downtowns, commercial and mixed use areas	Enables compact development	Shared parking facilities can reduce vehicle trips by reducing the need for construction of dedicated off-street parking facilities for each land use/activity commensurate with the peak parking demand for that use. By so doing, shared parking facilities can enable dense, clustered development that facilitates a greater share of trips by walking, cycling and public transit. Shared parking can also reduce the total amount of land and financial resources dedicated to parking facilities, in turn reducing the effective subsidy for access by automobile that such expenditures represent. However, if shared parking increases available parking supply and thereby reduces parking prices it may in some cases increase vehicle trips and vehicle miles traveled.	Shared parking does not directly reduce vehicle travel if it substitutes for increased parking supply. To the degree that it increases the available supply of parking and reduces parking prices it can encourage automobile travel. To the degree that shared parking allows more clustered development it can encourage use of alternative modes.

Table C1 - Menu Of Travel Demand Management Measures (Cont.)

TDM Program	Description	Primary Agency Responsible	City Implementation Mechanism	Recommended Application/ Context	% Trip Reduction	Factors	Source
Multimodal Infrastructure							
Bicycle sharing services	Bicycles are available to members for short-term rental and can be returned at any bike share station. Bike share may be offered in city neighborhoods, near transit hubs, or at major employment centers.	Cities or private bicycle sharing companies (usually at invitation of a city)		Urban; suburban downtown; transit station	Impacts depend on conditions	A survey of bikeshare users in four major cities (Minneapolis, Montreal, Toronto, and Washington DC) by Shaheen and Martin (2015) found that 25-52% reported reducing their automobile travel and 1.9-3.6% reported reducing their vehicle ownership. The impact depends on the larger bike network and bicycling conditions. This research does not state if the shift from automobile trips to bicycle trips is for commute or non-commute trips, nor does the research state at what time of day these trips occur, i.e., peak or non-peak trips.	Victoria Transport Policy Institute (2017), Public Bike Systems: Automated Bike Rentals for Short Utilitarian Trips, www.vtpi.org/tdm/tdm126.htm.
Enhanced transit service	Improve transit service to better serve potential riders and shift travel from driving trips.	Transit agencies, funded by cities, counties, TMAs, BIDs, regional agencies		Any	Impacts depend on the level and quality of improvements	The elasticity of transit use with respect to transit service frequency is about 0.4, which means that a 1.0% increase in service (measured by transit vehicle mileage or operating hours) increases average ridership by 0.4%. Not all persons will be shifting from auto to transit, so the relationship is not one to one.	Brian E. McCollom, Richard H. Pratt (2004), Transit Pricing and Fares – Traveler Response to Transportation System Changes, TCRB Report 95, Transportation Research Board (www.trb.org); available at http://onlinepubs.trb.org/onlinepubs/tcrp/tcrp_rpt_95c12.pdf.
High Occupancy Vehicle/Toll (HOV/HOT) lanes	Implement a system of express lanes for high-occupancy vehicles, transit, and/or people who pay a toll. This provides a time savings to people who commute by modes other than driving alone.	Highway districts, often led by counties or regional agencies		Freeways, any context	2% to 30%	Comsis (1993) and Turnbull, Levinson and Pratt (2006) find that HOV facilities can reduce vehicle trips on a particular roadway by 4-30%. Ewing (1993) estimates that HOV facilities can reduce peak-period vehicle trips on individual facilities by 2-10%, and up to 30% on very congested highways if HOV lanes are separated from general-purpose lanes by a barrier. Turnbull, Levinson and Pratt (2006) suggest that HOV highway lanes are most effective at reducing automobile use on congested highways to large employment centers in large urban areas with 25 or more buses per hour during peak periods, where transit provides time savings of at least 5 to 10 minutes per trip.	Comsis Corporation (1993), Implementing Effective Travel Demand Management Measures: Inventory of Measures and Synthesis of Experience, USDOT and Institute of Transportation Engineers (www.ite.org); available at www.bts.gov/ntl/DOCS/474.html. Katherine F. Turnbull, Herbert S. Levinson and Richard H. Pratt (2006), HOV Facilities – Traveler Response to Transportation System Changes, TCRB Report 95, Transportation Research Board (www.trb.org); available at http://onlinepubs.trb.org/onlinepubs/tcrp/tcrp_rpt_95c2.pdf.
Financial Incentives							
Transit "fare free" zones	Transit agency provides free rides in designated zone.	Transit agencies, can be initiated/funded by cities, transportation management associations (TMAs), business districts	Can be implemented directly by transit agency, or another organization can form a funding partnership with the transit agency	Urban or suburban downtowns	Not available	Impact of transit fare-free zones is highly context specific. Some cities have seen very large increases in transit ridership within free-fare zones.	Henry Grabar (2012), "What Really Happens When a City Makes Its Transit System Free?" available at http://www.citylab.com/work/2012/10/what-really-happens-when-city-makes-its-transit-system-free/3708/.

Travel Demand Management Checklist

The Travel Demand Management (TDM) Element of the Alameda County Congestion Management Program requires each jurisdiction to comply with the Required Program. This requirement can be satisfied in three ways. The legislation declares the following:

- Option 1: Adopting "Design Strategies for encouraging alternatives to using auto through local development review" prepared by ABAG and the Bay Area Air Quality Management District;
- Option 2: Adopting new design guidelines that meet the individual needs of the local jurisdictions and the intent of the goals of the TDM Element; or
- Option 3: Providing evidence that existing local policies and programs meet the intent of the goals of the TDM Element.

For jurisdictions that have chosen to satisfy this requirement by Option 2 or 3 above, the following checklist has been prepared. To ensure consistency and equity throughout Alameda County, this checklist identifies the components of a design strategy that should be included in a local program to meet the minimum CMP conformity requirements. The required components highlighted in bold type are shown at the beginning of each section. A jurisdiction must answer "Yes" to each of the required components to be considered consistent with the CMP. Each jurisdiction will be asked to annually certify that it is complying with the TDM Element. Local jurisdictions will not be asked to submit the back-up information to the CMA justifying its response; however, it should be available at the request of the public or neighboring jurisdictions.

Questions regarding optional program components are also included. Local jurisdictions are encouraged but not required to answer these questions. This checklist will help the CMA to further support local jurisdictions and TDM activities throughout the county.

(Note: **Bold type face** indicates those components that must be included in the "Required Program" to be found in compliance with the Congestion Management Program.)

Bicycle Facilities

Goal

To develop and implement design strategies that foster the development of a countywide bicycle program that incorporates a wide range of bicycle facilities to reduce vehicle trips and promote bicycle use for commuting, shopping and school activities, and recreation. (Note: examples of facilities are bike paths, lanes, or racks.)

Local Responsibilities

1. **Does your jurisdiction have design strategies or adopted policies that include the following?**
   - A. **A system of bicycle facilities that connects residential and/or non-residential development to other major activity centers?**
     Yes _____ **No** _____
   - B. Bicycle facilities that provide access to transit?
     Yes ____ No ____
   - C. Construction of bicycle facilities needed to fill gaps, (i.e., gap closure), not provided through the development review process?
     Yes ____ No ____
   - D. Consideration of bicycle safety such as safe crossing of busy arterials or along bike trails?
     Yes ____ No ____
   - E. Bicycle storage and bicycle parking for (A) multi-family residential and/or (B) non-residential developments?
     Yes ____ No ____

2. How does your jurisdiction implement these strategies? Please identity.
   - Zoning Ordinance _____
   - Design Review _____
   - Standard Conditions of Approval _____
   - Capital Improvement Program _____
   - Specific Plan _____
   - Other _____

Pedestrian Facilities

Goal

To develop and implement design strategies that reduce vehicle trips and foster access for commuting, shopping, recreation, and school activities.

Local Responsibilities

3. **Does your jurisdiction have design strategies or adopted policies that incorporate and provide for the following?**
   - **A. Reasonably direct, convenient, accessible, and safe pedestrian connections to major activity centers, transit stops, or hubs parks/open space and other pedestrian facilities?**
     Yes ____ No ____
   - **B. Construction of pedestrian paths needed to fill gaps, (i.e., gap closure), not provided through the development process?**
     Yes ____ No ____
   - C. Safety elements such as convenient crossing at arterials?
     Yes ____ No ____
   - D. Amenities such as lighting, street trees, and trash receptacles that promote walking?
     Yes ____ No ____
   - E. Encouraging uses on the first floor that are pedestrian oriented, entrances that are conveniently accessible from the sidewalk or transit stops, or other strategies that promote pedestrian activities in commercial areas?
     Yes ____ No ____

4. How does your jurisdiction implement these strategies? Please identity.
   - Zoning Ordinance _____
   - Design Review _____
   - Standard Conditions of Approval _____
   - Capital Improvement Program _____
   - Specific Plan _____
   - Other _____

Transit

Goal

To develop and implement design strategies in cooperation with the appropriate transit agencies that reduce vehicle trips and foster the use of transit for commuting, shopping, recreation, and school activities.

Local Responsibilities

5. **Does your jurisdiction have design strategies or adopted policies that incorporate the following?**
   - **A. Provide for the location of transit stops that minimize access time, facilitate intermodal transfers, and promote reasonably direct, accessible, convenient and safe connections to residential uses and major activity centers?**
     Yes ____ No ____
   - **B. Provide for transit stops that have shelters or benches, trash receptacles, street trees or other street furniture that promote transit use?**
     Yes ____ No ____
   - **C. Include a process for including transit operators in development review?**
     Yes ____ No ____
   - D. Provide for directional signage for transit stations and/or stops?
     Yes ____ No ____
   - E. Include specifications for pavement width, bus pads or pavement structure, length of bus stops, and turning radii that accommodates bus transit?
     Yes ____ No ____

6. How does your jurisdiction implement these strategies? Please identity.
   - Zoning Ordinance _____
   - Design Review _____
   - Standard Conditions of Approval _____
   - Capital Improvement Program _____
   - Specific Plan _____
   - Other _____

Carpools and Vanpools

Goal

To develop and implement design strategies that reduce the overall number of vehicle trips and foster carpool and vanpool use.

Local Responsibilities

7. Does your jurisdiction have design strategies or adopted policies that incorporate the following?
   A. For publicly owned parking garages or lots, are there preferential parking spaces and/or charges for carpools or vanpools?
      Yes ____ No ____
   B. Convenient or preferential parking for carpools and vanpools in non-residential developments?
      Yes ____ No ____
   C. Information and marketing to support carpool and vanpool matching series and for use on city website, social media, and printed materials?
      Yes ____ No ____
   D. Policies that support reducing free parking or providing incentives to businesses to decrease free parking?
      Yes ____ No ____

8. How does your jurisdiction implement these strategies? Please identity.
   - Zoning Ordinance _____
   - Design Review _____
   - Standard Conditions of Approval _____
   - Capital Improvement Program _____
   - Specific Plan _____
   - Other _____

Park and Ride

Goal

To develop design strategies that reduce the overall number of vehicle trips and provide park and ride lots at strategic locations.

Local Responsibilities

9. Does your jurisdiction have design strategies or adopted policies that incorporate the following?
   A. Promotion of park-and-ride lots located near freeways or major transit hubs using city outreach methods?
      Yes ____ No ____
   B. Process that provides input to Caltrans to insure HOV by-pass at metered freeway ramps?
      Yes ____ No ____

10. How does your jurisdiction implement these strategies? Please identity.
    - Zoning Ordinance _____
    - Design Review _____
    - Standard Conditions of Approval _____
    - Capital Improvement Program _____
    - Specific Plan _____
    - Other _____

Appendix F1—Menu of Travel Demand Management Measures, Alameda County TDM Program: City and Public Agency Measures

TDM Program	Description	Primary Agency Responsible	City Implementation Mechanism	Recommended Application/ Context	% Trip Reduction	Factors	Source
Trip Reduction Requirements							
Set trip reduction requirements for multifamily residential or commercial development	Require as a condition of approval for developments (either commercial, multifamily residential, or both) that certain TDM measures are implemented on an ongoing basis, or that specified vehicle trip reduction requirements are met.	Cities	Planning code or other municipal ordinance	Any urban area with good transit service; suburban downtowns, commercial and mixed use areas; transit stations. (particularly in high-growth areas)	5%-15%; Enables other strategies	Effects of this strategy depend on the location/accessibility of the development site(s), demographics of the project's residential/commercial occupants/ tenants and the type of measures required. The US EPA notes that "reasonable initial targets for the programs established under a trip reduction ordinance (TRO), might be a 5-10 percent reduction in single occupant vehicle (SOV) trips, with somewhat larger reductions (perhaps 15 percent) if substantial fees for parking are imposed."	https://www.epa.gov/state-and-local-transportation
Establish a Transportation Management Association	Establish an organization to assist businesses in reducing vehicle trips, either by administering programs, providing services (such as shuttle service), or providing technical assistance to businesses. Often implemented together with a trip reduction requirement.	Cities or business associations	Planning code or other municipal ordinance; or voluntary action by business association	Commercial area or other major business or employment districts	6%-7%	The TDM Resource Center (1997) estimated that just by improving coordination, and providing information on travel alternatives, establishment of a TMA can reduce commute-related vehicle trips by 6%-7%, with greater impact when implemented in concert with other trip reduction, TDM and parking management programs and services.	TDM Resource Center (1997), Transportation Demand Management; A Guide to Including TDM Strategies in Major Investment Studies and in Planning for Other Transportation Projects, Office of Urban Mobility, WSDOT (www.wsdot.wa.gov), as cited in the Victoria Transportation Policy Institute's TDM Encyclopedia (http://www.vtpi.org/tdm/tdm44.htm), last updated in 2017.
Implement an employee-trip reduction program for municipal employees	Appoint an employee commute coordinator, and implement incentive programs to reduce single-occupant vehicle commuting among municipal employees. Elements may include: subsidized transit passes; employee parking and/ or parking cash-out programs; commuter checks; direct financial incentives to bike, walk, carpool or take transit; ride sharing; shuttles; vanpools	Cities	Modify agency procedures	Any	4-20%	Management support and the presence of an onsite employee transportation coordinator are important factors in the success of a program. Mandatory employee/commute trip reduction (CTR) ordinances often require employers with more than 50 or 100 employees at a given employment site to implement a CTR program. This reduces the costs of administering TDM programs and compliance with survey and reporting requirements, but prevents such programs from reaching the majority of employees in a given city/region who work for small to mid-sized firms and organizations with less than 50 employees.	Marlon G. Boarnet, Hsin-Ping Hsu and Susan Handy (2010), Draft Policy Brief on the Impacts of Employer-Based Trip Reduction Based on a Review of the Empirical Literature, for Research on Impacts of Transportation and Land Use-Related Policies, California Air Resources Board http://arb.ca.gov/cc/sb375/policies/policies.htm); Philip Winters and Daniel Rudge (1995), Commute Alternatives Educational Outreach, National Urban Transit Institute, Center for Urban Transportation Research, University of South Florida; Tom Rye (2002), "Travel Plans: Do They Work?," Transport Policy, Vol. 9, No. 4 (www.elsevier.com/locate/tranpol), Oct. 2002, pp. 287-298.
Safety Net							
Guaranteed/ Emergency Ride Home program	Provide a guaranteed ride home for people who do not drive to work alone to ensure they are not stranded if they need to go home in the middle of the day due to an emergency, or stay late for work unexpectedly.	GRH in Alameda County is provided by Alameda CTC		Any	9%-38%	Coupled with active program marketing by employers, including marketing of other TDM programs and financial incentives, such as parking pricing, the Alameda County Guaranteed Ride Home program has been shown to reduce drive alone vehicle trips to participating employment sites by as much as 38% (Alameda County Guaranteed Ride Home Program Evaluation, Nelson\Nygaard 2015 annual evaluation).	Alameda County Guaranteed Ride Home Program Evaluation (Nelson\Nygaard 2015, http://grh.alamedactc.org/wp-content/uploads/2016/06/ALAMEDA-CTC-GRH-Evaluation-2015-FINAL.pdf).

Appendix F1—Menu of Travel Demand Management Measures, Alameda County TDM Program: City and Public Agency Measures, Continued

TDM Program	Description	Primary Agency Responsible	City Implementation Mechanism	Recommended Application/ Context	% Trip Reduction	Factors	Source
Parking Management							
Demand-responsive pricing of on-street spaces	Set on-street parking prices based on parking demand in area to achieve parking availability targets.	Cities	Municipal code; capital project	Urban or suburban downtowns, commercial and mixed use areas; transit stations	4%-18%	One of the most significant factors affecting motorists' choice of whether to drive or travel by another mode is the price of parking at the destination. Moreover, up to 28% of traffic in mixed-use districts is attributable to cruising for parking. By encouraging use of alternative modes and reducing parking search related delays for transit, demand responsive pricing can significantly reduce vehicle trips to major destinations/districts. The impact of parking pricing depends on the overall supply and availability of both on-street and off-street parking and the extent to which employers subsidize such parking.	Low-end estimate per Harvey and Deakin (1997), who estimated that parking pricing for work and non-work trips would reduce regional vehicle trips by 2.8% (Greig Harvey and Elizabeth Deakin (1997), "The STEP Analysis Package: Description and Application Examples," Appendix B, in Apogee Research, Guidance on the Use of Market Mechanisms to Reduce Transportation Emissions, US EPA (Washington DC; www.epa.gov/omswww/market.htm)). High end estimated based on the Victoria Transportation Policy Institute (2016), Trip Reduction Tables (http://www.vtpi.org/tdm/tdm41.htm). Additional resource: http://www.spur.org/publications/spur-report/2009-05-01/critical-cooling.
Use of new meter technologies to allow multiple forms of payment and dynamic pricing	Install parking meters that allow payment by credit card or phone, and that connect to a central system in real-time, allowing for remote programming and management of parking prices.	Cities	Capital project	Urban or suburban downtowns, commercial and mixed use areas; transit stations	Enables demand responsive parking pricing	Installation of new parking management technologies, including new meters and infrastructure to support payment by cell phone and real-time monitoring of parking space utilization and turnover enable implementation of demand responsive parking pricing, which in turn reduces vehicle travel (see Demand Responsive Parking Pricing).	San Francisco Planning and Urban Research (2009). "Critical Cooling," The Urbanist, Issue 482, May, 2009 (http://www.spur.org/publications/spur-report/2009-05-01/critical-cooling).
Use of parking revenue to support other mobility/ neighborhood programs	Dedicate meter revenue from designated area to uses such as mobility improvements, neighborhood or business improvement programs, potentially through the creation of a parking benefit district.	Cities	Form dedicated Transportation Management District to receive funds	Any area with paid parking	Enables investment in Multimodal Infrastructure and TDM Programs	Creation of parking benefit district can directly support vehicle trip reduction by providing funding for investments in other multimodal access programs and services that increase opportunities for access by non-auto modes. The establishment of such districts and provisions requiring meter and permit revenues to be spent within the district can also indirectly support vehicle trip reduction by increasing local political support for demand responsive, market-based pricing of on-street and off-street parking.	
Require "Unbundling" of parking costs from rents and leases	Separate the charge for leasing or buying a unit or square footage in multifamily residential or commercial buildings from charges for parking spaces.	Cities	Modify planning code	Any	6%-16%	"Charging separately for parking is among the most effective strategies to encourage households to own fewer cars, and subsequently reduce vehicle trips. Parking costs are generally subsumed into the sale or rental price of housing and commercial real estate. For residential development, unbundled parking may prompt some residents to dispense with one of their cars and to make more of their trips by other modes. The elasticity of vehicle ownership with respect to price is typically -0.4 to -1.0. Assuming total annual vehicle spending of $7,788 (BLS Consumer Expenditure Survey, 2011), unbundling of an average of $100/month in parking costs would increase perceived transportation costs/vehicle by 15%/year for the typical hh, which in turn is expected to result in a decline in vehicle ownership of 6% (at a price elasticity of -0.4) to 16% (at -0.10), with corresponding declines in vehicle trips."	Victoria Transport Policy Institute (2017), Transportation Elasticities, http://www.vtpi.org/tdm/tdm11.htm; Bureau of Labor Statistics (2012), Consumer Expenditure Survey, 2011, www.bls.gov.

2019 Alameda County Transportation Commission Transportation Demand Management Measures

Appendix F2—Menu of Travel Demand Management Measures, Alameda County TDM Program: Public or Private Organization Measures

TDM Program	Description	Primary Agency Responsible	City Implementation Mechanism	Recommended Application/ Context	% Trip Reduction	Factors	Source
Trip Reduction							
Establish a Transportation Management Association	Establish an organization to assist businesses in reducing vehicle trips, either by administering programs, providing services (such as shuttle service), or providing technical assistance to businesses. Often implemented together with a trip reduction requirement.	Businesses	Voluntary action by business association	Commercial area or other major business or employment districts	6%-7%	The TDM Resource Center (1997) estimated that just by improving coordination, and providing information on travel alternatives, establishment of a TMA can reduce commute-related vehicle trips by 6%-7%, with greater impact when implemented in concert with other trip reduction, TDM and parking management programs and services.	TDM Resource Center (1997), Transportation Demand Management; A Guide to Including TDM Strategies in Major Investment Studies and in Planning for Other Transportation Projects, Office of Urban Mobility, WSDOT (www.wsdot.wa.gov), as cited in the Victoria Transportation Policy Institute's TDM Encyclopedia (http://www.vtpi.org/tdm/tdm44.htm), last updated in 2017.
Implement an employee-trip reduction program	Appoint an employee commute coordinator, and implement incentive programs to reduce single-occupant vehicle commuting among municipal employees. Elements may include: subsidized transit passes; employee parking and/or parking cash-out programs; commuter checks; direct financial incentives to bike, walk, carpool or take transit; ride sharing; shuttles; vanpools.	Businesses		Any	4-20%	Management support and the presence of an onsite employee transportation coordinator are important factors in the success of a program. Mandatory employee/commute trip reduction (CTR) ordinances often require employers with more than 50 or 100 employees at a given employment site to implement a CTR program. This reduces the costs of administering TDM programs and compliance with survey and reporting requirements, but prevents such programs from reaching the majority of employees in a given city/region who work for small to mid-sized firms and organizations with less than 50 employees.	Marlon G. Boarnet, Hsin-Ping Hsu and Susan Handy (2010), Draft Policy Brief on the Impacts of Employer-Based Trip Reduction Based on a Review of the Empirical Literature, for Research on Impacts of Transportation and Land Use-Related Policies, California Air Resources Board http://arb.ca.gov/cc/sb375/policies/policies.htm); Philip Winters and Daniel Rudge (1995), Commute Alternatives Educational Outreach, National Urban Transit Institute, Center for Urban Transportation Research, University of South Florida; Tom Rye (2002), "Travel Plans: Do They Work?," Transport Policy, Vol. 9, No. 4 (www.elsevier.com/locate/tranpol), Oct. 2002, pp. 287-298.
Safety Net							
Guaranteed/ Emergency Ride Home program	Provide a guaranteed ride home for people who do not drive to work alone to ensure they are not stranded if they need to go home in the middle of the day due to an emergency, or stay late for work unexpectedly.	GRH in Alameda County is provided by Alameda CTC		Any	9%-38%	Coupled with active program marketing by employers, including marketing of other TDM programs and financial incentives, such as parking pricing, the Alameda County Guaranteed Ride Home program has been shown to reduce drive alone vehicle trips to participating employment sites by as much as 38% (Alameda County Guaranteed Ride Home Program Evaluation, Nelson\Nygaard 2015).	Alameda County Guaranteed Ride Home Program Evaluation (Nelson\Nygaard 2015, http://grh.alamedactc.org/wp-content/uploads/2016/06/ALAMEDA-CTC-GRH-Evaluation-2015-FINAL.pdf).
Parking Management							
Incentivize shared parking	Facilitate the sharing of parking among multiple land uses that have complementary schedules (e.g., an office with greater demand during the day and restaurant with greater demand at night).	Enabled by cities, brokered by private businesses or developments	Modify planning code	Urban or suburban downtowns, commercial and mixed use areas	Enables compact development	Shared parking facilities can reduce vehicle trips by reducing the need for construction of dedicated off-street parking facilities for each land use/activity commensurate with the peak parking demand for that use. By so doing, shared parking facilities can enable dense, clustered development that facilitates a greater share of trips by walking, cycling and public transit. Shared parking can also reduce the total amount of land and financial resources dedicated to parking facilities, in turn reducing the effective subsidy for access by automobile that such expenditures represent. However, if shared parking increases available parking supply and thereby reduces parking prices it may in some cases increase vehicle trips and vehicle miles traveled.	Shared parking does not directly reduce vehicle travel if it substitutes for increased parking supply. To the degree that it increases the available supply of parking and reduces parking prices it can encourage automobile travel. To the degree that shared parking allows more clustered development it can encourage use of alternative modes.

Appendix F2—Menu of Travel Demand Management Measures, Alameda County TDM Program: Public or Private Organization Measures

TDM Program	Description	Primary Agency Responsible	City Implementation Mechanism	Recommended Application/ Context	% Trip Reduction	Factors	Source
Multimodal Infrastructure							
Bicycle sharing services	Bicycles are available to members for short-term rental and can be returned at any bike share station. Bike share may be offered in city neighborhoods, near transit hubs, or at major employment centers.	Cities or private bicycle sharing companies (usually at invitation of a city)		Urban; suburban downtown; transit station	Impacts depend on conditions	A survey of bikeshare users in four major cities (Minneapolis, Montreal, Toronto, and Washington DC) by Shaheen and Martin (2015) found that 25-52% reported reducing their automobile travel and 1.9-3.6% reported reducing their vehicle ownership. The impact depends on the larger bike network and bicycling conditions. This research does not state if the shift from automobile trips to bicycle trips is for commute or non-commute trips, nor does the research state at what time of day these trips occur, i.e., peak or non-peak trips.	Victoria Transport Policy Institute (2017), Public Bike Systems: Automated Bike Rentals for Short Utilitarian Trips, www.vtpi.org/tdm/tdm126.htm.
Enhanced transit service	Improve transit service to better serve potential riders and shift travel from driving trips.	Transit agencies, funded by cities, counties, TMAs, BIDs, regional agencies		Any	Impacts depend on the level and quality of improvements	The elasticity of transit use with respect to transit service frequency is about 0.4, which means that a 1.0% increase in service (measured by transit vehicle mileage or operating hours) increases average ridership by 0.4%. Not all persons will be shifting from auto to transit, so the relationship is not one to one.	Brian E. McCollom, Richard H. Pratt (2004), Transit Pricing and Fares – Traveler Response to Transportation System Changes, TCRB Report 95, Transportation Research Board (www.trb.org); available at http://onlinepubs.trb.org/onlinepubs/tcrp/tcrp_rpt_95c12.pdf.
High Occupancy Vehicle/Toll (HOV/HOT) lanes	Implement a system of express lanes for high-occupancy vehicles, transit, and/or people who pay a toll. This provides a time savings to people who commute by modes other than driving alone.	Highway districts, often led by counties or regional agencies		Freeways, any context	2% to 30%	Comsis (1993) and Turnbull, Levinson and Pratt (2006) find that HOV facilities can reduce vehicle trips on a particular roadway by 4-30%. Ewing (1993) estimates that HOV facilities can reduce peak-period vehicle trips on individual facilities by 2-10%, and up to 30% on very congested highways if HOV lanes are separated from general-purpose lanes by a barrier. Turnbull, Levinson and Pratt (2006) suggest that HOV highway lanes are most effective at reducing automobile use on congested highways to large employment centers in large urban areas with 25 or more buses per hour during peak periods, where transit provides time savings of at least 5 to 10 minutes per trip.	Comsis Corporation (1993), Implementing Effective Travel Demand Management Measures: Inventory of Measures and Synthesis of Experience, USDOT and Institute of Transportation Engineers (www.ite.org); available at www.bts.gov/ntl/DOCS/474.html. Katherine F. Turnbull, Herbert S. Levinson and Richard H. Pratt (2006), HOV Facilities – Traveler Response to Transportation System Changes, TCRB Report 95, Transportation Research Board (www.trb.org); available at http://onlinepubs.trb.org/onlinepubs/tcrp/tcrp_rpt_95c2.pdf.
Financial Incentives							
Transit "fare free" zones	Transit agency provides free rides in designated zone.	Transit agencies, can be initiated/funded by cities, transportation management associations (TMAs), business districts	Can be implemented directly by transit agency, or another organization can form a funding partnership with the transit agency	Urban or suburban downtowns	Not available	Impact of transit fare-free zones is highly context specific. Some cities have seen very large increases in transit ridership within free-fare zones.	Henry Grabar (2012), "What Really Happens When a City Makes Its Transit System Free?" available at http://www.citylab.com/work/2012/10/what-really-happens-when-city-makes-its-transit-system-free/3708/.

Appendix F3.1—Comprehensive Inventory of Performance Measures for Existing and Potential Applications: Multimodal Accessibility and Transportation/Land Use Integration

Measure/Concept	Metric	Applications	Data Sources	Considerations	CTP Goals (CMP Goals)	Report/Document (as applicable)
Mode Share – Work Trips	• Percent of low-income households (<$25,000 per year) within 20-minute drive or 30-minute transit ride of activity center • Percent of low-income households (<$25,000 per year) within 0.5 miles of elementary school	• Evaluate scenarios • Track trends	American Community Survey		Multimodal	Performance Report
Mode Share – School Trips	• Daily hours spent walking or biking	• Evaluate scenarios • Track trends	• Household Travel Survey • Safe Routes to School surveys		Multimodal	Performance Report; Safe Routes to School Annual Report
Travel Time – Work Trips	• Average travel time to commute to work in minutes • Percent of workers with commute exceeding specified threshold (e.g., 1 hour)	• Track trends	American Community Survey		Affordable; Efficient	Performance Report
Land Use Approvals in PDAs	• New housing units within PDAs • New retail, office, and government square footage within PDAs	• Track trends	Land use database populated by local jurisdictions		Integrated Healthy Environment (Land Use)	Performance Report (if data is available); Priority Development Area Investment and Growth Strategy (PDA IGS)
Land Use Approvals Within Half Mile of Transit	• New housing units within half-mile of high-frequency transit • New retail, office, and government square footage within half-mile of high-frequency transit	• Track trends	Land use database populated by local jurisdictions		Integrated Healthy Environment (Land Use)	Performance Report (if data is available); PDA IGS

Appendix F3.2— Comprehensive Inventory of Performance Measures for Existing and Potential Applications: Roadway

Measure/Concept	Metric	Applications	Data Sources	Considerations	CTP Goals (CMP Goals)	Report/Document (as applicable)
Travel Times	• Average travel time per trip in minutes for representative origin-destination pairs	• Evaluate scenarios • Track trends • Diagnose deficiencies • Prioritize investments • Perform before/after analysis	• Travel model	Most closely aligns to user experience and desired outcome	Connected	LOS Monitoring Report, if data is collected
Vehicle Throughput	• Average daily traffic • Peak-hour vehicle flows	• Evaluate scenarios • Track trends • Perform before/after analysis	• Caltrans Performance Monitoring System (PeMS) • Bay Area Toll Authority • Project-level data collection		Connected	Before/after study—Express Lanes
Person throughput	• Product of average daily traffic or peak-hour vehicle flows and average vehicle occupancy	• Evaluate scenarios • Track trends	• PeMS • Bay Area Toll Authority and vehicle occupancy counts or assumptions (could come from household travel surveys)		Efficient; Cost-effective	Before/after study—Express Lanes
Travel Speeds/ Level of Service	• Speeds of segments • Number of segments with speeds below threshold • LOS of segments • Congested speed based on average p.m. peak period	• Evaluate scenarios • Diagnose deficiencies • Track trends • Perform before/after analysis	Commercial speed data	Measures congestion intensity at particular locations (mobility) but does not directly measure ability to get to destinations (accessibility)	Efficient; Connected	LOS Monitoring Report; Before/after study—Express Lanes; Multimodal Arterial Plan
HOV or HOT Lane Travel Time Competitiveness	• Ratio of speed in HOV/HOT lane to general purpose lane	• Track trends • Diagnose deficiencies	• Floating car surveys • Bay Area Toll Authority • Commercial speed data in future • Alameda CTC express lane sensors		Efficient	Before/after study—Express Lanes; Express Lanes Monthly Operations Report
Person Hours of Delay	• Excess travel time due to facility operating below specified threshold	• Evaluate scenarios • Track trends	Commercial speed data and vehicle occupancy counts or assumptions	• Threshold for delay should be grounded in operational and economic considerations • Consideration should be given as to whether to normalize by motorists or traveling public	Efficient	Performance Report

Appendix F3.2—Comprehensive Inventory of Performance Measures for Existing and Potential Applications: Roadway (continued)

Measure/Concept	Metric	Applications	Data Sources	Considerations	CTP Goals (CMP Goals)	Report/Document (as applicable)
Bottlenecks and Queues	• Percent of lane-miles operating below given speed	• Track trends • Diagnose deficiencies • Perform before/after analysis	• Commercial speed data • Alameda CTC express lane sensors		Efficient	Before/after study—Express Lanes
Pavement Condition Index (PCI)	• Average PCI • Percent of lane-miles that are poor, failed, and at-risk • Unmet maintenance needs over 28 years assuming current paving conditions • Unmet maintenance needs over 28 years to get local roads to certain PCI	• Evaluate blueprint scenarios • Track trends			Well-maintained	Performance Report; Multimodal Arterial Plan
Collisions and Rate	• Collisions • Collisions per million annual VMT	• Track trends • Diagnose deficiencies • Prioritize investments • Perform before/after analysis	Caltrans/California Highway Patrol Statewide Integrated Traffic Record System (SWITRS) database and PeMS		Safe	Performance Report; Multimodal Arterial Plan
Travel Reliability Index	• P.M. peak hour volume-to-capacity ratio	• Diagnose deficiencies • Perform before/after analysis	• Traffic count data from local jurisdictions and other agencies • Roadway capacity information from local jurisdictions	• Measures congestion intensity at particular locations (mobility) but does not directly measure ability to reach destinations • Measures reliability of travel through segments	Reliable	Multimodal Arterial Plan
ITS Infrastructure	• Level of ITS infrastructure	• Evaluate infrastructure ITS level	Data from local jurisdictions	• Measured using categorical classification of four-point index for level of ITS technology in a corridor	Connected; Efficient	Multimodal Arterial Plan

Appendix F3.3—Comprehensive Inventory of Performance Measures for Existing and Potential Applications: Transit

Measure/Concept	Metric	Applications	Data Sources	Considerations	CTP Goals (CMP Goals)	Report/Document (as applicable)
Corridor Level Transit Speed	• Average travel time per trip in minutes for representative origin-destination pairs • Route-level average travel speed	• Evaluate scenarios • Track trends • Diagnose deficiencies • Prioritize investments • Perform before/after analysis	Transit agencies	• Most closely aligns to user experience • Should be assessed for representative travel markets	Connected (mobility, economic)	LOS Monitoring Report starting in 2018
Systemwide Travel Speed	• Average speed including delays from boarding/ alighting, signals, and traffic congestion • Average p.m. peak-hour transit travel speed	• Evaluate scenarios • Track trends • Diagnose deficiencies • Prioritize investments • Perform before/after analysis	Transit agencies		Connected (mobility, economic)	Performance Report; Countywide Transit Plan
Transit system Reliability	• Ratio of average p.m. peak-hour transit travel speed to non-peak-hour transit speed • Reduction in transit travel time (peak/off-peak)	• Evaluate scenarios • Track trends • Prioritize investments • Perform before/after analysis	Transit agencies		Connected (mobility, economic)	Countywide Transit Plan; Multimodal Arterial Plan
Ridership	• Annual boardings • Average weekday or weekend boardings • Per capita transit use • Per capita daily transit ridership • Passenger miles traveled • Percentage of intra-county passenger trips on transit	• Evaluate scenarios • Track trends • Prioritize investments • Perform before/after analysis	• National Transit Database • APC data • Alameda CTC model		Multimodal	Performance Report; Countywide Transit Plan
Service Utilization	• Boardings per revenue vehicle hour (RVH) or revenue vehicle mile (RVM)	• Evaluate scenarios • Track trends • Diagnose deficiencies • Prioritize investments	• National Transit Database • APC data	Can be measured at system- or line-level	Multimodal; Efficient	Performance Report
Load Factor	• Passenger miles traveled per RVM • Passenger miles per seat-miles	• Track trends	• National Transit Database	A basic measure of vehicle occupancy	Efficient; Reliable	Performance Report; Countywide Transit Plan

Appendix F3.3—Comprehensive Inventory of Performance Measures for Existing and Potential Applications: Transit (continued)

Measure/Concept	Metric	Applications	Data Sources	Considerations	CTP Goals (CMP Goals)	Report/Document (as applicable)
On-Time Performance	• Percent of time arriving at stops within specified window of scheduled time	• Track trends • Diagnose deficiencies • Prioritize investments • Perform before/after analysis	Transit agencies	Can be assessed at system- or line-level	Reliable	Performance Report
Cost Effectiveness	• Operating cost per RVH or RVM • Operating cost per rider • Farebox recovery ratio	• Evaluate scenarios • Track trends	National Transit Database		Cost-effective	Performance Report
Service Interruptions	• Mean time between service delays (rail) • Average miles between revenue vehicle failures (bus)	• Track trends	National Transit Database		Well-maintained;Reliable	Performance Report
Transit Fleet Age	• Average age of fleet • Percent of useful life expended of vehicles • Cost of mid-life overhaul and/or replacement before plan horizon year	• Track trends • Prioritize investments	• National Transit Database		Well-maintained	Performance Report; Countywide Transit Plan
Public Transit Accessibility	• Percent households by income level within 0.25-mile of a bus route or 0.5-mile of a rail transit stop • Number of households/jobs within 0.5 miles of transit station • Number of Communities of Concern affected by proposed projects	• Evaluate scenarios • Perform before/after analysis	GIS analysis		Multimodal; Accessible; Equitable; Connected	Countywide Transportation Plan; Countywide Transit Plan

Appendix F3.4—Comprehensive Inventory of Performance Measures for Existing and Potential Applications: Bicycling

Measure/Concept	Metric	Applications	Data Sources	Considerations	CTP Goals (CMP Goals)	Report/Document (as applicable)
Counts at Multiple Locations	• Total bicyclists counted in Alameda CTC count program (63 locations, designated time periods)	• Track trends	Alameda CTC Countywide Bicycle/Pedestrian Count Program	Annual count program collects one-day counts, so disaggregation below planning area level is not advisable	Multimodal	Performance Report
Collisions Involving Bicyclists	• Total collisions involving bicyclists • Injury and fatal collisions involving bicyclists	• Track trends • Diagnose deficiencies	SWITRS	Data typically 2 years out of date	Safe	Performance Report
Bicyclist Collision Severity	• Percent of fatal or severe injury collisions involving bicyclists	• Track trends • Diagnose deficiencies	SWITRS	Data typically 2 years out of date	Safe	Countywide Transit Plan; Multimodal Arterial Plan
Local Master Plan Adoption	• Number of jurisdictions with local master plan adopted within last 5 years	• Track trends	Local jurisdictions		Integrated; Connected	Countywide Transit Plan; Multimodal Arterial Plan
Miles of Network Built	• Miles of countywide facilities implemented • Percent of network mileage implemented •Miles of "innovative"facilities constructed (e.g., using design features recently adopted to Highway Design Manual)	• Track trends	• Alameda CTC GIS database • Local jurisdictions		Connected	Performance Report
Community Members Participating in Programs	• Community members participating in bicycle safety education • Community members counted at Bike to Work Day energizer stations • Number of schools with Safe Routes to Schools programs by type	• Track trends	• Countywide program progress reports • Safe Routes to Schools Annual Report		Connected; Accessible	Performance Report
Cyclist Comfort and Safety	• Level of traffic stress analysis	• Diagnose deficiencies • Prioritize investment	Field observation	Methodology that classifies facilities into one of four levels of Traffic Stress (LTS) indicating the comfort of cyclists' experience using the facility	Multimodal; Accessible; Safe	Multimodal Arterial Plan

Appendix F3.5—Comprehensive Inventory of Performance Measures for Existing and Potential Applications: Pedestrian/Walking

Measure/Concept	Metric	Applications	Data Sources	Considerations	CTP Goals (CMP Goals)	Report/Document (as applicable)
Counts at Multiple Locations	• Total pedestrians counted in Alameda CTC count program (63 locations, designated time periods)	• Track trends	Alameda CTC Countywide Bicycle/Pedestrian Count Program	Annual count program collects one-day counts, so disaggregation below planning area level is not advisable	Multimodal	Performance Report
Collisions Involving Pedestrians	• Total collisions involving pedestrians • Injury and fatal collisions involving pedestrians	• Track trends • Diagnose deficiencies	Caltrans/California Highway Patrol SWITRS database	Data typically 2 years out of date	Safe	Performance Report
Pedestrian Collision Severity	• Percent of fatal or severe injury collisions involving pedestrians	• Track trends • Diagnose deficiencies	Caltrans/California Highway Patrol SWITRS database	Data typically 2 years out of date	Safe	Performance Report
Local Master Plan Adoption	• Number of jurisdictions with local master plan adopted within last 5 years	• Track trends	Local jurisdictions		Integrated; Connected	Performance Report
Number of Pedestrian Projects Complete	• Number of projects completed by type	• Track trends	Local jurisdictions		Connected	Performance Report
Pedestrian Comfort and Safety	• Pedestrian comfort index	• Diagnose deficiencies	Field observation	Index accounting for factors including sidewalk width, presence of buffer between sidewalk and roadway, land use context, roadway classification, average daily traffic, number of lanes, and speed limit	Multimodal; Safe	Multimodal Arterial Plan

Appendix F3.6—Comprehensive Inventory of Performance Measures for Existing and Potential Applications: Goods Movement

Measure/Concept	Metric	Applications	Data Sources	Considerations	CTP Goals (CMP Goals)	Report/Document (as applicable)
GHG Emissions	• Tons of greenhouse gas (GHG) emissions from freight operations	• Prioritize investments • Evaluate scenarios	Travel model and Air Resource Board Emission Factor (EMFAC) model		Healthy Environment (air quality)	Goods Movement Plan; Rail Strategy Study
Air Quality	• Tons of PM2.5 emissions from freight operations • Tons of NOx emissions from freight operations	• Prioritize investments • Evaluate scenarios	Travel model and EMFAC model		Healthy Environment (air quality)	Goods Movement Plan; Rail Strategy Study
Equity	• Freight impacts such as light, noise pollution, safety, air pollution, and encroachment on specific, adjacent communities most affected	• Diagnose deficiencies • Prioritize investments	• GIS analysis (to identify communities) • Qualitative assessment and project-level studies (to determine impacts)		Equitable	Goods Movement Plan; Rail Strategy Study
Travel-time Delay	• Excess time due to travel below specified threshold (trucks) • Excess time due to congestion (rail, terminals)	• Diagnose deficiencies • Prioritize investments • Perform before/after analysis • Evaluate scenarios	• Commercial speed data • Caltrans PeMS • Travel model • Project-level studies (e.g., Project Study Reports, Environmental Impact Reports (EIRs))		Efficient (mobility)	Goods Movement Plan
Buffer Time Index	• Ratio of 95th percentile travel time to free-flow travel time for freight (truck) routes (freeway and some conventional highways)	• Prioritize investments	• Commercial speed data • Caltrans PeMS		Reliable (mobility)	Goods Movement Plan
Truck-involved Crashes	• Crashes involving trucks	• Diagnose deficiencies • Track trends	Caltrans/California Highway Patrol SWITRS database		Safe	Goods Movement Plan
Rail Collisions	• Crashes at at-grade rail crossing	• Diagnose deficiencies	Federal Rail Authority Office of Safety Analysis		Safe	Goods Movement Plan; Rail Strategy Study
Freight Infrastructure Conditions	• PCI on truck routes • Bridge condition rating	• Diagnose deficiencies • Evaluate scenarios	MTC StreetSaver		Well-maintained	Goods Movement Plan

Appendix F3.6—Comprehensive Inventory of Performance Measures for Existing and Potential Applications: Goods Movement (continued)

Measure/Concept	Metric	Applications	Data Sources	Considerations	CTP Goals (CMP Goals)	Report/Document (as applicable)
Resiliency	• Addresses freight system vulnerability to major service disruptions due to major natural or other events	• Diagnose deficiencies	Qualitative assessment and project-level studies		Well-maintained	Goods Movement Plan
Use of Innovative Technology	• Use of ITS and other innovative technologies such as zero emissions	• Prioritize investments	Qualitative assessment		Efficient; Cost-effective	Goods Movement Plan
Multimodal Connectivity and Redundancy	• Freight route access from/to locations with significant freight activities	• Diagnose deficiencies • Prioritize investments	• GIS analysis and qualitative assessment		Connected (land use)	Goods Movement Plan; Rail Strategy Study
Compatibility with Land-use Decisions	• Locations and corridors with significant freight activities in proximity to non-compatible land uses currently and in the future	• Diagnose deficiencies • Prioritize investments	• GIS analysis and qualitative assessment		Integrated (land use)	Goods Movement Plan
Jobs and Economic Impact	• Jobs generated by project • Economic output generated by project • Jobs in goods movement- dependent industries	• Prioritize investments • Track trends • Perform before/after analysis • Evaluate scenarios	IMPLAN model		Cost-effective (economic)	Goods Movement Plan
Truck Route Accommodation Index	• Truck Route Accommodation Index	• Diagnose deficiencies • Prioritize investments	• Field observation • Data from jurisdictions	Index based on a three-point scoring system to measure curb-lane width and on-street parking in urban environments	Connected	Multimodal Arterial Plan

Appendix F3.7—Comprehensive Inventory of Performance Measures for Existing and Potential Applications: Environment, Equity, and Health

Measure/Concept	Metric	Applications	Data Sources	Considerations	CTP Goals (CMP Goals)	Report/Document (as applicable)
Activity Center Accessibility	• Percent of low-income households (<$25,000 per year) within 20-minute drive or 30-minute transit ride of activity center • Percent of low-income households (<$25,000 per year) within 0.5 miles of elementary school	• Evaluate scenarios	American Community Survey and GIS analysis	Best for less-frequent reporting as measure not highly dynamic	Equitable; Integrated; Connected (land use)	Countywide Transportation Plan
Physical Activity	• Daily hours spent walking or biking	• Evaluate scenarios • Track trends	• Travel model and off-model tools • California Health Interview Survey		Multimodal; Healthy environment	Countywide Transportation Plan
GHG Emissions	• Tons of daily GHG emissions (CO_2 equivalent) from passenger and freight transportation	• Evaluate scenarios	Travel model and Air Resource Board EMFAC model	Data limitations preclude annual monitoring	Healthy environment (air quality)	Countywide Transportation Plan
PM 2.6 Emissions	• Tons of daily particulate matter emissions from passenger and freight transportation	• Evaluate scenarios	Travel model and Air Resource Board EMFAC model	Data limitations preclude annual monitoring	Healthy environment (air quality)	Countywide Transportation Plan