



VAN NESS AVENUE BUS RAPID TRANSIT AIR QUALITY IMPACT REPORT

Prepared for

PARSONS

Prepared by

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Addendum

TO: Brynna McNulty, Principal Planner
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FROM: Sam Silverman, Senior Associate
Terry A. Hayes Associates Inc.

DATE: April 15, 2013

RE: **Addendum to the Van Ness Avenue Bus Rapid Transit (BRT) Air Quality Impact Report**

Terry A. Hayes Associates Inc. completed an Air Quality Impact Report for the Van Ness BRT Project on August 8, 2011. Various technical analyses in the Air Quality Impact Report were revised on April 15 2013, including updating emission rates for the mobile source analysis from EMFAC2007 to EMFAC 2011 and updating the construction analysis using the current version of the RoadMod program. The purpose of this addendum is not to reflect those changes but to assess the selection of the project Locally Preferred Alternative (LPA), or project design to be carried forward, and public comments received on the Draft Environmental Impact Statement/Environmental Impact Report pertaining to concern about air quality impacts on parallel streets receiving diverted traffic as a result of implementation of the proposed project. Thus, this addendum incorporates additional analysis associated with increased traffic volumes on parallel streets. The following analysis includes criteria pollutant concentrations on parallel streets, a revised localized carbon monoxide (CO) analysis, and additional analysis related to toxic air contaminant (TAC) exposure.

LPA DESCRIPTION AND ANALYSIS

LPA Selection

Three build alternatives and a design option for center-lane Alternatives 3 and 4 were analyzed in the Draft Environmental Impact Statement/Environmental Impact Report (EIS/EIR) and supporting August 2011 Air Quality Impact Report for the Van Ness BRT Project. Per requirements of the National Environmental Policy Act (NEPA), an LPA was selected for the project following circulation of the Draft EIS/EIR. The LPA is a combination and refinement of Build Alternatives 3 and 4 with Design Option B, presented in the Draft EIS/EIR and supporting August 2011 Air Quality Impact Report for the Van Ness BRT Project. The LPA is referred to as “Center-Lane BRT with Right-Side Boarding/Single Median and Limited Left Turns.”

LPA Description: Center-Lane BRT with Right-Side Boarding/Single Median and Limited Left Turns

The LPA is a combination and refinement of the center-running alternatives with limited left turns (Build Alternatives 3 and 4 with Design Option B) and is referred to as Center-Lane BRT with Right-Side Boarding/Single Median and Limited Left Turns. The LPA retains the high-performance features of Build Alternatives 3 and 4 (e.g., maximum transit priority, fewest conflicts), while avoiding the need to acquire left-right door vehicles or remove the entire existing median. Under the LPA, BRT vehicles would run alongside a single median for most of the corridor, similar to Build Alternative 4; however, at station locations, BRT vehicles would transition to the center of the roadway, allowing right-side loading at station platforms as under Build Alternative 3. **Figure 1** provides an aerial schematic of the LPA, which shows the transition between a single median and dual median configuration.

The LPA incorporates Design Option B, the left-turn removal design option that would eliminate all left turns from Van Ness Avenue between Mission and Lombard streets with the exception of a southbound (SB) (two-lane) left turn at Broadway Street. The LPA station locations differ somewhat from those proposed under Build Alternatives 3 and 4 because all of the stations under the LPA are positioned at the near sides of intersections, whereas stations are generally proposed at the far side of intersections under Build Alternatives 3 and 4. Also, under the LPA the northbound Mission Street station proposed under Build Alternatives 3 and 4 was eliminated, and a new southbound station at Vallejo Street was introduced. Lastly, a northbound station at the Vallejo Street location is under consideration as a design variant under the LPA, called the Vallejo Northbound Station Variant. Incorporation of this northbound station at the Vallejo Street/Van Ness Avenue intersection will be decided at the time of project approval. **Figure 2** depicts cross sections of the LPA on a block without a station, and a block with a station, and shows the project alignment. **Figure 3** depicts the Vallejo Northbound Station Variant.

Figure 1: Aerial Schematic of LPA

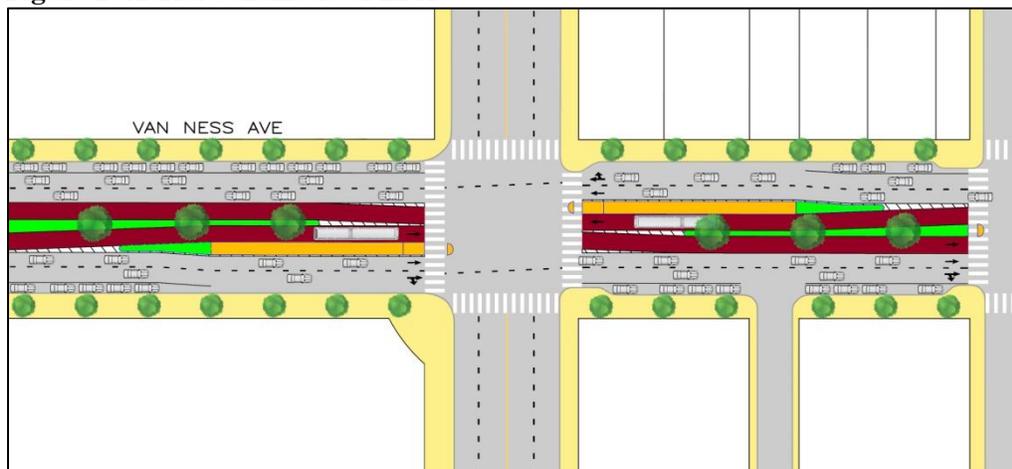


Figure 2: LPA Cross Sections and Alignment Map

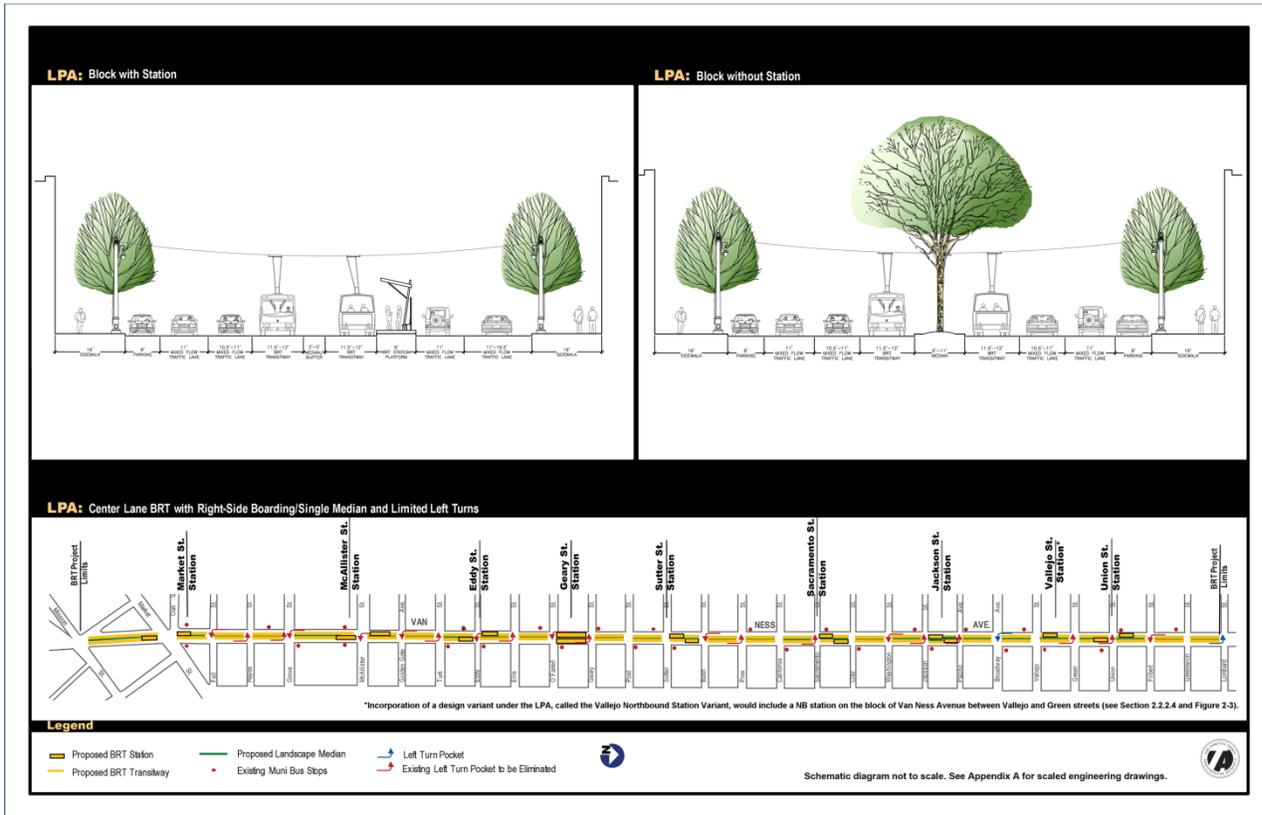
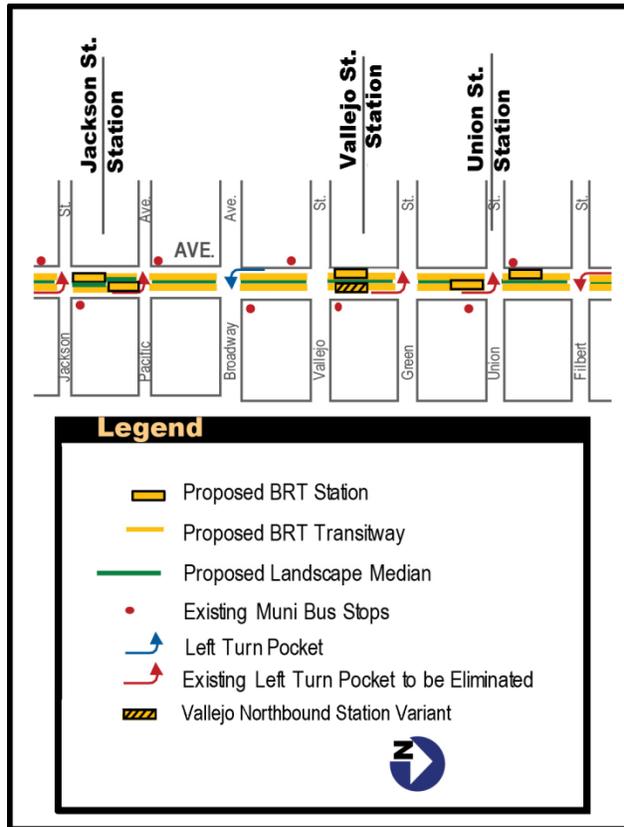


Figure 3: LPA Vallejo Northbound Station Variant



LPA Construction

Construction staging for the LPA would be as described for Build Alternatives 3 and 4, except duration for LPA construction would be longer because it would require rebuilding the curb for the entire median, as well as replacement of the sewer pipeline. Construction for the LPA is anticipated to require approximately 20 months to substantial completion.

LPA Impact Discussion

Again, the LPA is a refinement of the center running alternatives with limited left turns (Build Alternatives 3 and 4 with Design Option B) presented in the August 2011 Air Quality Impact Report for the Van Ness BRT Project. The air quality effects of the LPA are identified as part of the analysis presented for the build alternatives in the August 2011 and April 2013 Air Quality Impact Reports for the Van Ness BRT Project. There would be no substantive difference in operational air quality impacts under the LPA compared with the impacts described for Build Alternatives 3 and 4 with Design Option B, as explained in the following subsections.

Construction Emissions. Construction emissions under the LPA would be similar to that described under Build Alternative 3 and presented in **Table 4.15-9** of the Air Quality Impact Report; except the LPA has different design features on blocks without stations, which would result in a construction period for the LPA approximately 1 month shorter than for Build Alternative 3. This would result in slightly less mass regional construction emissions under the LPA compared to Build Alternative 3. The Bay Area Air Quality Management District's (BAAQMD) approach to analyses of construction impacts is to emphasize implementation of effective and comprehensive control measures for particulate matter rather than detailed quantification of emissions. The construction plan will include a comprehensive list of BAAQMD control measures shown in **Table 4.15-9** of the Air Quality Impact Report. Therefore, construction activity under the LPA would result in a less-than-significant impact.

Regional Operational Emissions – 2035. The LPA is a refinement of center running build alternatives, Build Alternatives 3 and 4 with Design Option B, and the net changes in VMT would be identical for the alternatives; thus the net change in operational emissions for year 2035 would be similar to the changes presented in **Table 3-11** of the Air Quality Impact Report for Build Alternatives 3 and 4 with Design Option B.

Regional Operational Emissions – Existing Plus Project (2007). The LPA is a refinement of center running build alternatives, Build Alternatives 3 and 4 with Design Option B, and the net change in VMT would be identical for the alternatives, and thus the net change in operational emissions would be similar to the changes the same as presented in **Table 3-13** of the Air Quality Impact Report for Build Alternatives 3 and 4 with Design Option B.

Localized Carbon Monoxide Concentrations. Refer to the carbon monoxide discussion presented below for all alternatives.

Toxic Air Contaminants. Refer to the toxic air contaminants discussion presented below for all alternatives.

Odor Emissions. The LPA would not include any land use or activity that typically generates adverse odors, and it would result in a less-than-significant odor impact.

Greenhouse Gas Emissions – 2035. Because the LPA is a refinement of center running build alternatives, Build Alternatives 3 and 4 with Design Option B, the LPA would decrease automobile VMT and associated GHG emissions compared to baseline conditions, and this ton per year decrease would be the same as presented for Build Alternatives 3 and 4 with Design Option B in **Table 3-18**. The LPA would have a beneficial effect on global warming.

Greenhouse Gas Emissions – Existing Plus Project (2007). The LPA is a refinement of center running build alternatives, Build Alternatives 3 and 4 with Design Option B, and automobile VMT under the LPA would be the same as for Build Alternatives 3 and 4 with Design Option B, displayed in **Table 3-20**. Thus, the LPA would cause a reduction in GHG emissions in the Air Basin, resulting in a beneficial global warming impact.

NEPA Analysis – 2035. The LPA is a refinement of center running build alternatives, Build Alternatives 3 and 4 with Design Option B, and the net change in VMT would be identical for the alternatives. Regional emissions, carbon monoxide concentrations, toxic air contaminants, odors, and greenhouse

gases impacts would be identical to the CEQA impacts discussed above. Regional criteria pollutant and GHG emissions would result in beneficial impacts under NEPA. Carbon monoxide concentrations, toxic air contaminants, and odors would not result in adverse impacts under NEPA.

Transportation Conformity Impacts. Transportation conformity is required under Clean Air Act Section 176(c) (42 U.S.C. 7506(c)) to ensure that federally supported highway and transit project activities are consistent with the purpose of the State Implementation Plan (SIP). Conformity to the purpose of the SIP means that transportation activities will not cause new air quality violations, worsen existing violations, or delay timely attainment of the relevant National Ambient Air Quality Standards. The transportation conformity rule (40 CFR 51.390 and Part 93) establishes the criteria and procedures for determining whether transportation activities conform to the SIP. Under the criteria, transportation projects must demonstrate conformity on regional and local levels.

The LPA is included in the federal 2011 TIP. FHWA/FTA determined the TIP to conform to the SIP on December 14, 2010. The LPA is consistent with regional conformity guidelines. The California Project-Level Carbon Monoxide Protocol was used to conduct a CO analysis for the LPA. The proposed project satisfies all of the conditions of Level 2 of the CO Protocol in order to be screened out; therefore, the proposed project would not have the potential for causing or worsening violation of the National Ambient Air Quality Standards for CO. The proposed project is not considered a Projects of Air Quality Concern (POAQC) because it does not meet the definition of a POAQC as defined in EPA's Transportation Conformity Guidance. The proposed project would not increase the percentage of diesel vehicles on the roadway, does not involve a bus or rail terminal that significantly increases diesel vehicles, and is not identified in the SIP as a possible PM_{2.5} or PM₁₀ violation site. A particulate matter hotspot analysis is not required for the LPA.

CRITERIA POLLUTANT CONCENTRATIONS ON PARALLEL STREETS

Increased congestion on parallel streets has the potential to increase criteria pollutant concentrations. The maximum PM peak hour volumes on Franklin Street with the project would be 3,443 vehicles in 2035. This volume includes project baseline traffic volumes and then considers increased traffic looking ahead to year 2035 in a "with project," or BRT scenario. Pollutant concentrations were modeled using CALINE4. In response to comments on the Draft Environmental Impact Statement/Environmental Impact Report during public circulation, the wind speed in the model was set at the lowest level allowable to represent potential stagnant wind conditions associated with high-rise apartments and narrow streets. This represents a worst-case scenario for modeling pollutant concentrations. As shown in **Table 1**, the concentrations along Franklin Street would be well below the State standards after implementation of the BRT in year 2035 traffic conditions. Therefore, the proposed project would result in a less-than-significant impact related to criteria pollutant concentrations on parallel streets.

TABLE 1: CRITERIA POLLUTANT CONCENTRATIONS ON PARALLEL STREETS, 2035 WITH BRT			
Pollutant	Concentration at Nearest Sensitive Receptor	State Standard	Significant Impact?
CO (1-Hour)	0.5 ppm	20 ppm	No
CO (8-Hour)	0.35 ppm	9.0 ppm	No
PM _{2.5} (Annual)	1.2 µg/m ³	12 µg/m ³	No
PM ₁₀ (24-Hour)	14 µg/m ³	50 µg/m ³	No
PM ₁₀ (Annual)	2.8 µg/m ³	20 µg/m ³	No
NO ₂ (1-Hour)	0 ppm	0.18 ppm	No
SOURCE: TAHA, 2013.			

LOCALIZED CARBON MONOXIDE CONCENTRATIONS

Occurrences of localized CO concentrations, known as hotspots, are often associated with heavy traffic congestion, which most frequently occur at signalized intersections of high-volume roadways. The BAAQMD has completed technical analyses that indicate that there is no potential for CO hotspot to occur when:

- The project traffic would not increase traffic volumes at affected intersections to more than 44,000 vehicles per hour; and
- The project traffic would not increase traffic volumes at affected intersections to more than 24,000 vehicles per hour where vertical and/or horizontal mixing is substantially limited (e.g., tunnel, parking garage, bridge underpass, natural or urban street canyon, below-grade roadway). The fact that the Van Ness Avenue BRT study area is a highly developed urban area with multi-story buildings and contains streets with canyon-like air dispersion characteristics, means that this criterion may be applied to certain blocks along Van Ness Avenue and some of its parallel streets.

The LPA would not increase traffic volumes at any intersection in the traffic study area (including Van Ness Avenue and five parallel streets: Gough, Franklin, Polk, Larkin, and Hyde) to more than 24,000 vehicles per hour, and it would therefore be consistent with the criteria above. Further analysis of CO concentrations is not required. The LPA would result in less-than-significant impacts related to localized CO concentrations.

TOXIC AIR CONTAMINANT EXPOSURE

Operational Activity

Increased congestion on parallel streets also has the potential to increase exposure to toxic air contaminants. An assessment was completed both for the segment with greatest incremental increases in annual average daily traffic and the highest total of annual average daily traffic. The greatest incremental change in parallel street traffic between the No Build Alternative and Build Alternatives would be along Franklin Street north of Market Street under either center lane configured alternative (Build Alternatives 3 and 4). The total average daily traffic along this segment would be 29,419 vehicles in 2035 and the

incremental increase as a result of the proposed project would be 8,612 vehicles. The BAAQMD has published screening tables for assessing mobile source PM_{2.5} concentrations and cancer risk from surface streets. The screening tables indicate that, at a receptor distance of 50 feet, approximately 30,000 annual average daily vehicles would generate an annual PM_{2.5} concentration of 0.147 µg/m³. As shown in **Table 2**, the project-related incremental increase would be responsible for approximately 0.043 µg/m³, or 29 percent, of the annual PM_{2.5} exposure. The lifetime cancer risk associated with 30,000 annual average daily vehicles would be 3.56 persons in one million. The project-related incremental increase would be responsible for approximately 1.0 person in one million of the cancer risk. The project PM_{2.5} concentration (0.043 µg/m³) is approximately 0.4 percent of the annual PM_{2.5} State standard and ten times below (1.0 person) the project-level threshold for cancer risk of 10 persons in one million. The cumulative PM_{2.5} concentration (0.147 µg/m³) would also be less than annual PM_{2.5} State standard and less than the threshold for cancer risk of 10 persons in one million.

TABLE 2: TOXIC AIR CONTAMINANT CONCENTRATIONS ON PARALLEL STREETS, 2035 WITH BRT			
Scenario	Concentration at Nearest Sensitive Receptor	BAAQMD Threshold	Significant Impact?
Greatest Incremental Change in Traffic Volume (Franklin Street north of Market Street)			
Annual PM _{2.5} – Project Specific	0.043 µg/m ³	12 µg/m ³	No
Annual PM _{2.5} – Cumulative	0.147 µg/m ³	12 µg/m ³	No
Health Risk – Project Specific	1.0 Person	10 Persons	No
Health Risk – Cumulative	3.6 Persons	100 Persons	No
Highest Daily Traffic Volume (Franklin Street north of Geary Street)			
Annual PM _{2.5} – Project Specific	0.025 µg/m ³	12 µg/m ³	No
Annual PM _{2.5} – Cumulative	0.267 µg/m ³	12 µg/m ³	No
Health Risk – Project Specific	0.6 Persons	10 Persons	No
Health Risk – Cumulative	6.5 Persons	100 Persons	No
SOURCE: TAHA, 2013.			

The highest parallel street traffic volume would be 47,823 average daily annual vehicles along Franklin Street north of Geary Street under both center lane configured alternatives (Build Alternatives 3 and 4). The project contribution along this segment would be 4,486 annual average daily vehicles in 2035. The screening tables indicate that, at a receptor distance of 50 feet, approximately 50,000 annual average daily

vehicles would generate an annual $PM_{2.5}$ concentration of $0.267 \mu\text{g}/\text{m}^3$. The project-related incremental increase would be responsible for approximately $0.025 \mu\text{g}/\text{m}^3$, or nine percent, of the annual $PM_{2.5}$ exposure. The lifetime cancer risk associated with 50,000 annual average daily vehicles would be 6.49 persons in one million. The project-related incremental increase would be responsible for approximately 0.60 person in one million, or nine percent, of the cancer risk. The project $PM_{2.5}$ concentration ($0.025 \mu\text{g}/\text{m}^3$) would be approximately 0.2 percent of the annual $PM_{2.5}$ State standard and ten times below (0.60 person) the project-level threshold for cancer risk of 10 persons in one million. The cumulative $PM_{2.5}$ concentration ($0.267 \mu\text{g}/\text{m}^3$) also would be less than the annual $PM_{2.5}$ State standard and less than the threshold for cancer risk of 10 persons in one million.

Overall, the increase in $PM_{2.5}$ concentration would not be a significant percent of the State standard and the lifetime cancer risk would be less than the project-level threshold of 10 persons in one million for cancer risk. Therefore, the proposed would result in a less-than-significant impact related to operational TAC exposure.

Construction Activity

Construction-related activities could result in the generation of TACs, specifically diesel PM, from on-road haul trucks and off-road equipment exhaust emissions. Due to the variable nature of construction activity, the generation of TAC emissions would be temporary; especially considering the short amount of time equipment is typically located near sensitive land uses. Build Alternative 3 represents the longest construction period of each alternative, which is 21 months. Current models and methodologies for conducting health risk assessments are associated with longer-term exposure periods of 9, 40, and 70 years, which do not correlate well with the temporary and highly variable nature of construction activities. This makes it difficult to produce accurate estimates of health risk.

An analysis was completed to assess the potential health risks associated with construction TAC emissions, despite the difficulties described above. On-site $PM_{2.5}$ emissions (e.g., equipment exhaust) were input into the AERMOD dispersion model approved by the United States Environmental Protection Agency. TAC concentrations along Van Ness Avenue were obtained using local meteorological conditions and adjacent sensitive receptors placed on both sides of construction activity. In addition, the concentrations obtained from AERMOD were modified using a Lifetime Exposure Adjustment factor because exposure to construction emissions would be short-term and intermittent as construction activity moves along Van Ness Avenue. The results indicate that the cancer risk would be less than one person in one million at residences along Van Ness Avenue and the annual $PM_{2.5}$ concentration would be $0.14 \mu\text{g}/\text{m}^3$. The cancer risk would be less than the 10 persons in one million threshold and the annual $PM_{2.5}$ concentration would be 0.7 percent of the State standard, which would not be considered a significant increase in ambient concentration. Additionally, implementation of the BAAQMD Basic Construction Mitigation Measures, which are required for all project alternatives, including the LPA, would reduce TAC emissions. Therefore, the proposed project would result in a less-than-significant impact related to construction TAC exposure.

Idle Emissions

Additional analysis was undertaken to specifically address potential increases in vehicle idling and associated air emissions. The Van Ness Avenue BRT Project would convert two mixed-travel lanes to

bus-only lanes (i.e., one lane each in NB and SB directions) and reduce left-turn opportunities along Van Ness Avenue. This would potentially increase vehicle idling and associated air emissions. An idle emissions analysis was completed using the CAL3QHC dispersion model at intersections that would experience the highest vehicle delay in the 2035 horizon year. This was identified as the Gough Street/Hayes Street intersection with a PM peak hour volume of 3,954 PM vehicles and an average delay of 195 seconds per vehicle. CAL3QHC incorporates methods for estimating queue lengths and the contribution of emissions from idling vehicles. The model permits the estimation of total air pollution concentrations from both moving and idling vehicles. It is a reliable tool for predicting concentrations of inert air pollutants near signalized intersections. Because idle emissions account for a substantial portion of the total emissions at an intersection, the model is relatively insensitive to traffic speed, a parameter difficult to predict with a high degree of accuracy on congested urban roadways without a substantial data collection effort. The model calculates CO and PM concentrations. One-hour CO concentrations were converted into eight-hour concentrations using conversion factors established by the EPA. One-hour PM concentrations were converted into 24-hour and annual concentrations using conversion factors established by the EPA. Consistent with SF-CHAMP, the analysis assumed that heavy-duty vehicles represent two percent of vehicle volumes and the emission rate was adjusted accordingly. As shown in **Table 3**, the idle emissions would be well below the State standards after implementation of the BRT in year 2035 traffic conditions.

TABLE 3: IDLE EMISSIONS, 2035 WITH BRT (LPA)			
Pollutant	Sidewalk Concentrations	State Standard	Significant Impact?
CO (1-hour)	0.1 ppm	20 ppm	No
CO (8-hour)	0.07 ppm	9.0 ppm	No
PM10 (24-hour)	4 µg/m ³	50 µg/m ³	No
PM10 (Annual)	0.8 µg/m ³	20 µg/m ³	No
PM2.5 (Annual)	0.3 µg/m ³	12 µg/m ³	No
SOURCE: TAHA, 2013.			