Technical Appendix 2

(**Noise and Vibration**)

to

Attachment A

5-Cities Alliance
Comment Letter

Technical Review of Noise and Vibration Impact Analysis For:

State Route 710 North Study DEIR/EIS

Prepared For:

The Five Cities Alliance

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ACRONYMS

CEQA	California Environmental Quality Act
CNEL	Community Equivalent Noise Level
dB	Decibel
dBA	A-Weighted Decibel
DEIR	Draft Environmental Impact Report
EIS	Environmental Impact Statement
FHWA	Federal Highway Administration
FTA	Federal Transit Administration
LDN	Day-Night Noise Level
Leq(H)	One Hour Equivalent Noise Level
NAC	Noise Abatement Criteria
NADR	Noise Abatement Decision Report
NEPA	National Environmental Protection Act
NSR	Noise Study Report
ROW	Right of Way
TNAP	Traffic Noise Analysis Protocol
TNM	Traffic Noise Model

1.0 Introduction

On behalf of the 5-Cities alliance, we have completed our review of the noise and vibration impact analysis presented in the SR-710 North Study DEIR/EIS and related technical documents including the Noise Study Report and the Groundborne Noise and Vibration Impact Report. This review was conducted primarily by Matthew B. Jones P.E. (CV attached).

This report presents our specific comments and identifies shortcomings in the noise and vibration analysis, including the following key issues and findings.

- The DEIR/EIS does not identify significance thresholds for construction or operation impacts. Had the document adopted typical agency thresholds for these impacts, it would have concluded that both types of impacts are significant.

- Instead, the DEIR/EIS concludes that all construction and operation noise and vibration impacts are less than significant, albeit without any threshold for comparison. We disagree with this conclusion for the reasons detailed below.

- The DEIR/EIS fails to analyze the feasibility of proposed mitigation measures, such as measures requiring compliance with local noise ordinances and local prohibitions on nighttime construction noise.

- The DEIR/EIS does not clearly identify sensitive receptors (i.e., homes) that would experience significant operational noise impacts but for which noise barrier mitigation is not reasonable or feasible. This approach is improper. Such unmitigated impacts must be disclosed as significant and unavoidable.

- The DEIR/EIS fails to analyze interior noise impacts.

Section 1.1 presents detailed discussions of the primary deficiencies with the noise and vibration impact analysis performed for the DEIS/EIR. The first issue is analysis of construction related noise and vibration impacts. Section 1.1.1 discusses issues with the assessment and mitigation of construction noise and vibration impacts. Section 1.1.2 shows that while the analysis concludes that the project will not result in any significant long-term transportation noise impacts, the analysis is incomplete and the conclusion of no significant impact is contradicted by data presented in the DEIR/EIS. Section 1.1.3 discusses how the analysis obfuscates operational noise impacts by not clearly identifying impacted receptors that do not have feasible and reasonable noise abatement and how it minimizes impacts by only presenting them in terms of the number of impacted receptors when a single receptor can represent a number of uses, up to 26 residences in this case (Receptor BR-344). Section 1.1.4 discusses how deficiencies in traffic-modeling assumptions affect the noise impact analysis. Section 2.0 presents our specific comments and provides detailed identification of the flaws in the noise and vibration impact analysis.

1.1 Primary Shortcomings of the Noise and Vibration Impact Analysis

The following subsections discuss the primary shortcomings of the DEIR/EIS. Specifically, those issues that result in understatement of the potential noise and vibration impacts, adequacy of mitigation, or non-identification of significant unavoidable impacts as required by CEQA.

1.1.1 Construction Noise & Vibration

All of the Alternatives will require considerable construction and in some cases this construction will occur nights and weekends. Tunnel construction for the Single Bore Freeway Tunnel Alternative is anticipated to take four to five years to complete, while the Dual Bore Tunnel is anticipated to take five years to complete. Construction of the LRT Alternative is anticipated to take six years to complete. Comment 1) presented in Section 2.1.1 provides an overview of the construction activities that will be required to implement each Alternative summarized from Section 2 of the DEIR EIS.

Despite the extensive construction required the Build Alternatives, the construction noise section of the Noise Study Report consists of two and a half pages of text that describes potential noise impacts from construction of the project in only general terms. The construction section of the DEIR/DEIS document distills this down to just over a page (Page 3.24-11). Much of this general information is repeated in the one and a half page Construction Noise portion of Section 3.14.3.1 starting on Page 3.14-7. The majority of this section addresses vibration and groundbourne noise. Groundbourne noise is noise that is generated inside buildings due to vibrations transmitted through the ground. The assessment of airborne construction noise impacts is non-specific and inadequate.

The CEQA analysis (DEIR/EIS Section 4.2.12 starting on Page 4-69) states, "Measures N-1 and N-2, described in detail in Section 3.14.4, require compliance with the Caltrans Standard Specifications, the County Code, and the city Municipal Codes as applicable. Implementation of Measures N-1 and N-2 would reduce construction noise impacts under the Build Alternatives to a less than significant level." However, while measure N-2 requires compliance with local Municipal Codes for the TSM/TDM, LRT, and BRT alternatives, measure N-1, which is applicable to the Freeway Tunnel Alternatives, only requires compliance with Caltrans Standard Specification Section 14-8.02 and to equip all internal combustion engines with mufflers. The specification only requires that equipment used between the hours of 9 pm and 6 am not exceed 86 dBA at a distance at 50 feet it does not require compliance with local municipal noise ordinances. Note that these are the only two measures that address airborne construction noise impacts. Measures N-3 through N-6 address potential vibration and groundbourne noise impacts.

In order to provide decision makers with complete information on the potential impacts of their decision, the DEIR/EIS must provide a more complete description of the potential noise impacts arising from construction. The analysis should provide specific noise level estimates for all noise sensitive receptors in the immediate vicinity of all construction activities for the build alternatives.

The CEQA analysis concludes that compliance with local Municipal Code construction noise requirements would result in construction noise having a less than significant impact. Local noise ordinances define each community's threshold for allowable construction noise. Therefore, noise exposures greater than the local noise ordinance limits represent a significant noise impact. We assume that measure N-1 did not include the Municipal Code compliance requirement because Caltrans construction activities within State ROW are legally exempted from control by local noise ordinances by state law. However, this exemption does not apply to compliance with CEQA and its requirements to fully disclose impacts and mitigate them to the fullest extent possible.

A simple requirement that construction comply with local Municipal Ordinances is not sufficient to demonstrate that the project will not result in a significant impact under CEQA. The analysis must demonstrate that compliance is feasible. For example, the Pasadena Noise Ordinance prohibits the use of certain pieces of equipment within 500 feet of residential uses during the nighttime hours. The analysis must demonstrate that it is feasible to construct the project, the Freeway Tunnel Alternative in this case, while complying with these restrictions. Similar demonstrations are needed for all construction activities.

As discussed above, the majority of the avoidance, minimization, and/or abatement measures presented in Section 3.14.4.1 (Page 3.14-16) of the DEIR/EIS address vibration and groundbourne noise issues. These impacts are summarized under the Construction Ground-Borne Noise and Vibration heading of Section 3.14.3.1 starting on Page 3.14-8 of the DEIR/EIS. This source material from this summary comes from Section 6 of the Groundborne Noise and Vibration Technical Report.

The analysis concludes that if supply/muck trains are used during the construction of the tunnels under either the LRT or Freeway Tunnel Alternatives, objectionable vibration levels could be experienced at sensitive receptors. However, the analysis shows that the use of a resilient mat system to fasten the tracks will reduce these vibration levels to less than the FTA impact threshold.

The more disconcerting conclusion of the analysis is that Tunnel Boring Machine operation may generate vibration levels of up to 77 VdB at residences directly above the tunnel. The FTA vibration impact threshold for residences and buildings where people sleep is 72 VdB for frequent events (more than 70 events per day), 75 VdB for occasional events (30-70 events per day), and 80 VdB for infrequent events (less than 30 events per day). The document states that the machines will advance 22 feet per day and the 77 VdB vibration levels would probably last no more than two or three days. Because the boring machine operates at a constant rate, it will generate a relatively constant vibration level. This means that objectionable vibration levels could be experienced continuously, 24-hours per day, for two or three days at affected homes. This impact is not even addressed in the CEQA noise section (Section 4.2.12). The section reports that there would not be a significant impact due to the exposure of persons to or generation of excessive ground-borne noise levels despite acknowledgement of this impact. The report tries to minimize the impact because it would last two or three days. However, it fails to mention that the vibration levels would be nearly continuous for this two to three day period.

Avoidance, Minimization, and/or Abatement Measure N-5 (DEIR/EIS Section 3.14.4.1, Page 3.14-17) presents a suite of measures to minimize groundborne noise and vibration. The measure prohibits the use of pile drivers or other high vibration equipment during construction of TSM/TDM and BRT alternatives. LRT construction activities will be required to comply with applicable FTA criteria and guidelines as well as any applicable local regulations related to groundborne noise and vibration. The Freeway Tunnel construction activities will be required to comply with applicable FHWA and Caltrans criteria and guidelines as well as any applicable local regulations related to groundborne noise and vibration. We are not aware of any applicable specific local groundbourne noise and vibration regulations and the requirement to comply with non-existent regulations has no value.

The measure also calls for the Project Engineer to develop specific property line vibration limits during final design for inclusion in the construction vibration specifications. Further, regular monitoring will be required to verify compliance with those limits. As discussed in comment 8) in Section 2.0, these provisions lack performance standards and sufficient specificity to be a valid mitigation measure under CEQA.

The final issue with the construction noise and vibration impact assessment in the DEIR/EIS is that it does not adequately address potential impacts from pile driving. The DEIR/EIS acknowledges that for the LRT and Freeway Tunnel Alternatives, "excavation and construction of the tunnel portals and underground stations, including pile driving, where residents are located nearby" "could result in short-term ground-borne noise and vibration" (Page 3.14-9). The Groundborne Noise and Vibration Impacts technical report concludes that, "Pile driving and other vibration producing activity at station sites may impact residential receptors within 200 feet of the construction activity" (Page 6-2). However, this is all the document has to say about the issue and it is not discussed in the CEQA analysis. As discussed above, the CEQA analysis concludes that there would be no significant groundborne noise and vibration impacts. The document requires a much more extensive discussion of the potential impacts from pile driving and similar high-vibration construction activities including a description of where and when these activities are expected to occur and what sensitive receptors are potentially impacted. Moreover, the DEIR/EIS fails to propose mitigation for pile driving associated with the LRT and Freeway Tunnel alternatives, in contrast to proposed mitigation prohibiting pile driving under the TSM/TDM and BRT alternatives. As a result, groundborne noise and vibration impacts remain significant for the LRT and Freeway Tunnel alternatives.

1.1.2 Long-Term Operational Impacts CEQA Significance Determination

The CEQA Long-Term Transportation Noise Impacts discussion is presented on the top half of Page 4-75 of the DEIR/EIS. This analysis of the operational noise impacts under CEQA is minimal and incorrectly concludes that the project will have a less than significant long-term noise impact. This conclusion is based on the assertion that the Build Alternatives would not result in any substantial (perceptible) increases. The text refers to Tables 4.3 through 4.7 as demonstrating this.

The first issue with the less than significant long-term noise impact conclusion is that the document does not define the substantial (perceptible) increase threshold. The second issue is that Tables 4.3 through 4.7 only examine traffic noise level changes along numbered highways and ignores arterial roadways. Traffic volumes and noise levels along arterial roadways will be affected by the project and significant impacts could occur along these roadways. The analysis presented in these tables must be extended to assess potential impacts along arterial roadways.

One of the most critical deficiencies of the DEIR/S is that traffic noise level changes presented in Tables 4.3 through 4.7 are not valid for receptors located along highway segments that will be modified under the build alternative. The analysis of impacts under the FHWA/Caltrans criteria shows that sensitive receptors in the vicinity of the build limits of the Freeway Tunnel Alternatives will be subjected to substantial noise increases. The document concludes that the sound abatement constructed to address the FHWA/Caltrans standards will reduce these impacts to less than significant. However, this ignores those receptors for which sound abatement was found to not be reasonable or feasible and would not be implemented. The analysis concludes that there will be no impacts for receptors outside the Build Alternative limits based on the data shown in Tables 4.3 through 4.7 of the DEIR/EIS (pages 4-76 through 4-82). These tables present the projected change in CNEL noise level with the Project Alternatives. However, these tables only include numbered highways (State Routes and Interstates). The project will also affect traffic volumes along arterial roadways in the project area. Because the analysis does not include arterial roadways, it is incomplete and the conclusion of no significant impact is not supported. Traffic noise level changes along arterials for which the traffic analysis projected traffic volumes must be evaluated to assess potential substantial increases along arterial roadways for all alternatives.

The analysis cites these same tables to conclude that there will be no substantial increases, and therefore no significant impacts, located along the Build Alternatives (i.e., along road segments that will be modified by the project). However, this ignores the limitations of the data shown in Tables 4.3 through 4.7. The noise level changes shown in the tables are solely due to anticipated changes in traffic volumes. The noise level changes presented in the table assume that speeds, traffic mix, and roadway geometry do not change. At a minimum, roadway geometry will change within the limits of the Build Alternative improvements and these tables are not applicable in these areas.

Humans are not able to detect changes of less than 1 dB in a laboratory situation with direct comparison. When comparing fluctuating noise levels without a direct comparison, as in a community noise situation, the generally accepted change in

noise levels that is just noticeable is 3 dB. Three dB is the most typical threshold for a perceptible increase in a community noise setting. The threshold for a significant impact is that the project causes a perceptible increase and the resulting noise level exceeds acceptable levels. The local municipalities have typically defined 65 CNEL as the maximum clearly acceptable noise exposure for residential uses.

Tables 3.14.16 and 3.14.18 show the projected increase in Leq(h) noise levels for the analysis receptors located within the limits of the Build Alternative improvements for the Single Bore and Dual Bore Freeway Tunnel Alternatives. These tables show that many receptors will experience noise level changes greater than 3 dBA. While the table presents changes in peak hour Leq(H) noise levels, changes CNEL levels would be similar.

Based on the long-term noise measurements at sites FML-1 through FML-4, CNEL levels along the freeways are approximately 1 to 3 dB greater than the peak noise hour noise levels. Therefore, receptors with a Leq(q) of 65 dB or greater would be exposed to a CNEL noise level greater than 65 dB—the typical outdoor residential noise level deemed acceptable by the local municipalities. Receptors with a Leq(h) of 62 dB or greater may be exposed to a CNEL noise level greater than 65 CNEL.

Tables 3.14.33 and 3.14.34 shows that under the Single Bore Freeway Tunnel Alternative only two noise barriers, FTNB No. 5 and FTNB No. 10, will be reasonable and feasible assuming no donation of right-of way. Therefore, these are the only two noise barriers that would be implemented with the project. Table 3.14.16 shows that residential receptors FR-7 through FR-15, FR-17 through FR-22, FR-47 through FR-51, FR-68, FR-69, FR-103, FR-106, FR-108, FR-110, and FR-120 will be subjected to noise level increases of 3 dB or greater and an Leq(h) noise level greater than 65 dB even considering the proposed reasonable noise barriers. These 27 receptors represent 310 dwelling units. These dwelling units would be subject to a perceptible noise increase of 3 dB or greater over existing conditions and an exterior noise level of 65 CNEL or greater, a typical CEQA significance threshold for highway noise impacts.

Tables 3.14.32 and 3.14.34 show that under the Dual Bore Freeway Tunnel Alternative only four noise barriers, FTNB No. 5, FTNB No. 6, FNTB. No 9 and FTNB No. 10, will be reasonable assuming no donation of right-of way. Table 3.14.18 shows that residential receptors FR-7 through FR-22, FR-24, FR-25, FR-26, FR-28 through FR-36, FR-41, FR-46 through FR-51, FR-53, FR-68, FR-69, FR-75, FR-80, FR-81, FR-83, FR-88 through FR-100, FR-103 through FR-110, FR-113, and FR-120 will be subjected to noise level increases of 3 dB or greater and an Leq(h) noise level greater than 65 dBA. These 65 receptors represent 348 dwelling units. These dwelling units would be subject to a perceptible noise increase of 3 dB or greater over existing conditions and an exterior noise level of 65 CNEL or greater, a typical CEQA significance threshold for highway noise impacts.

As discussed above, the document does not clearly state the thresholds used to determine the significance of traffic noise impacts from the project. However, the analysis presented above shows that this conclusion is incorrect based on a typical significance threshold. The report cannot rely on the information shown in Table 4.6 and 4.7 to conclude that significant unavoidable traffic noise impacts would not occur with the Freeway Tunnel Alternatives.

A cursory review of Tables 3.14.8 and 3.14.10 did not discover any receptors that may be subject to noise level increases of 3 dB or greater and future with-project noise levels greater than 65 CNEL for the TSM/TDM and BRT alternatives. Caltrans should provide a full analysis to demonstrate this though. Table 3.14.14 shows that, for the LRT Alternative, all receptors with Ldn noise level increases greater than 3 dB without mitigation, mitigation that would reduce these increases less than 3 dB.

1.1.3 Obfuscation of Noise Impacts

The Noise Impact Analysis obfuscates the noise impacts from the project in two ways. First, it presents impacts in terms of the number of analysis receptors, which minimizes the impacts because one receptor can represent multiple uses. The second obfuscation is that the analysis barely mentions receptors where noise impacts are identified but where noise abatement is infeasible. Tables that purport to identify all impacted receptors, only identify those receptors that are impacted and have feasible noise abatement.

The analysis of operational (permanent) impacts in Section 3.14.3.2 on Pages 3.14-11 through 3.14-15 discuss traffic noise impacts in terms of the number of receptors that have been identified as impacted under the FHWA Noise Abatement Criteria. However, what is not clear is that one receptor can represent more than one household or other use, up to 26 residences in this case. Therefore, the number of receptors is not an appropriate measure to characterize the scope of the potential noise impacts. The document should also show the number of residences and other uses represented by the impacted receptors.

Tables 3.14-21, 3.14-23, 3.14-26, purport to show "Receptor Locations Where the Applicable Noise Abatement Criteria Would be Approached or Exceeded" under the TSM/TDM, BRT, and Freeway Tunnel alternatives. However, these tables only list those receptors that were identified as impacted AND for which implementation of a noise barrier is feasible. Under the TSM/TDM alternative a total of 70 receptors are identified as impacted (i.e., would approach or exceed the NAC) (DEIR/EIS p. 3.14-12). However, the DEIR/EIS proposes noise barriers at only 27 locations. (DEIR/EIS Table 3.14-21). Nine of the receptors listed in the table are not even impacted (i.e., Receptors T1/TR-6, T1/TR-10, T1/TR-30, T1/TR-31, T1/TR-32, T1/TR-35, T2/TR-1, T2/TR-12, and T2/TR-13 are proposed for noise barrier mitigation but is not listed in Table 3.14-8 as being impacted); thus, only 18 of the 70 impacted locations would receive noise barrier mitigation. The receptor locations for which abatement is not feasible are dismissed in a single line in the text, "Of the 70 locations, 43[1] were not considered for abatement . . ." (DEIR/EIS Page 3.14-12). Furthermore, as discussed above, this does not represent the total number of residences and other sensitive uses impacted, just the number of representative receptors.

Under the BRT alternative, 129 receptors were identified as impacted, while only 9 are listed in Table 3.14-23. There are 120 receptors, and even more residences, that are projected to experience traffic noise levels approaching or exceeding the FHWA's Noise Abatement Criteria for which abatement is not feasible. Again, these

[1] This number should be 52.

receptors are dismissed in a single line of text (last sentence of second paragraph under BRT Alternative heading on page 3.14-13 of the DEIR/EIS)

The Freeway Tunnel Alternative is confusing due to Table 3.14.26 addressing both Single Bore and Dual Bore Alternatives. Under the Freeway Tunnel Alternatives, 66 receptors reported as impacted under the Single Bore Alternative and 75 under the Dual Bore Alternative. Table 3.14.26 lists 68 receptors that would receive noise barrier mitigation. When errors on Tables 3.14.16 and 3.14.18 are corrected (See Comment 30) in Section 2.1.5 below), there were actually 70 receptors impacted under the Single Bore Alternative and 84 receptors under the Dual Bore Alternative. Barriers were thus not considered for 11 receptors under the Single Bore Alternative and 15 receptors under the Dual Bore Alternative.

Further, several barriers that were considered for the Freeway Tunnel Alternatives are not considered reasonable and would not be implemented. Under the Single Bore Alternative 12 receptors representing 28 residences were identified as impacted but would not receive noise abatement because it was determined to be not reasonable or not feasible. For the Dual Bore Alternative this increases to 29 receptors representing 68 residences. These receptors are projected be exposed to noise levels approaching or exceeding the FHWA Noise Abatement Criteria with the Freeway Tunnel alternatives.

1.1.4 Traffic Modeling Deficiencies

Traffic noise level predictions are based on traffic volumes estimated by the traffic engineer for the Project. The review of the traffic study prepared for 5-Cities Alliance performed by Nelson\Nygaard Consulting Associates Inc. identified two issues that affect modeled traffic volumes that would also affect traffic noise impacts due to the project, spillback and induced traffic.

The Nelson/Nygaard traffic study review notes that the traffic modeling did not adequately account for spillback that would occur when projected traffic volume on a road segment exceeded its capacity. That is, vehicles are assumed to queue and wait their turn to pass through such bottlenecks. In reality, this large queue would not occur and travelers would adjust their behavior to avoid such bottlenecks with many finding alternative routes on arterial roadways in the project study area. This results in an under prediction of arterial road traffic volumes. As discussed above, the noise analysis is deficient for not examining traffic noise level increases on arterial roadways within the project study area. However, even if this analysis were performed, the noise level increases would be underestimated due to spillback.

As more freeway lane miles and alternative routes are introduced, driving becomes a more convenient option. This serves to induce more vehicle trips from people who otherwise would not have traveled via car or made that trip altogether. That is, as congestion is decreased, people will decide to make trips that they would not have previously made because of congestion. The traffic study review notes that the travel demand model cannot be trusted to accurately estimate this induced travel. Further, the Nelson/Nygaard review notes, that even if the model accurately reflected induced travel, the time period analyzed in the EIR is too short. Research shows roadway projects can result in short-term reductions in congestion due to the increased capacity. However, over time, the reduced congestion induces more

trips to the point where the same level of congestion as without the project is reached—but with a larger number of vehicles. The incorrect and incomplete accounting for induced traffic results in lower traffic volume projections than if the traffic inducing effects were included in the estimates.

The under prediction of with-project traffic volumes used for the noise analysis would result in an under prediction of with-project traffic noise levels. Small differences of noise exposures near significance thresholds can change the determination of significance and mitigation requirements.

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2.0 Comments

The following present our specific comments on the DEIR/EIS document.

2.1 Main DEIR/EIS Document[2]

2.1.1 Construction Noise

1) **The Construction Noise Analysis is Incomplete.** All of the Project Alternatives would require considerable construction to implement. Further, the tunneling for the LRT and Freeway Tunnel Alternatives would proceed 24 hours per day for four to five years. While Tunnel Boring Machine would operate underground, there would be considerable nighttime activities in the portal areas to remove excavated materials and process muck. The CEQA Noise Section (DEIR/EIS Page 4-70) estimates that 360,000 truck trips will be required to haul excavated materials for the Dual Bore Alternative with 360 daily truck trips on a peak day. This equates to 720 truck passes per day, 30 per hour, or one every two minutes on average for an equivalent of 1,000 days.

   Construction of the Freeway Tunnel Alternatives involves the extension of St. John Avenue and widening Pasadena Avenue, demolition of three overcrossings, replacing two with new overcrossings and one with an at-grade roadway, as well as the construction of a new bridge over the Laguna Regulating Basin and a new overpass bridge. The Dual Bore Alternative would require the widening of Ramona Boulevard undercrossing bridge and the SR 710/I-10 bridge. These alternatives would also construct two Operations and Maintenance Buildings at the portals. At the south portal, a 50-foot tall tunnel ventilation structure would be constructed. Ventilation structures would also need to be constructed near the north portal. Two options are being considered, a 50-foot tall structure at the SR 710/SR 134 interchange or four 50-foot tall structures located at the SR 710/Colorado Boulevard interchange.

   The LRT Alternative is proposed to be constructed with two boring machines operating from the southern end of the tunnel. The Freeway Tunnel Alternative would utilize a two boring machines operating from the each end of the tunnel. In addition, the LRT alternative includes the construction of seven stations. Four of these stations will be underground and require considerable excavation. Further, the LRT alternative includes the construction of approximately three miles of aerial track including five bridges over freeways, seven stations, and a maintenance yard. Overnight construction activities would be required where the elevated track crosses SR 60, I-710 or other roadways (DEIR/EIS Page 2-57). Excavation of the first 10 to 15 feet of underground stations would be primarily conducted in the evening and on weekends (DEIR/EIS Page 2-59). Roadway deck installation above the underground stations could require multiple consecutive weekend full roadway closures (DEIR/EIS Page 2-59). One would assume that this would involve noise generating construction activities along with the closures.

[2] Note that these comments also apply to the technical reports where the information has been reproduced from the technical report.

The TSM/TDM alternative proposes improvements that will require construction along eight local streets, 45 intersections, and three other roads, including the widening of a bridge and construction of new bridge. Many of these improvements are included in the other build alternatives as well. The BRT alternative includes the construction of seventeen BRT stations, widening of Atlantic Boulevard, Huntington Drive, and Fair Oaks Avenue as well as ramp modifications at the I-710/SR 60 interchange.

Despite the extensive construction required for the project alternatives the primary technical document, the Noise Study Report, addresses construction noise impacts in two and a half pages and the main DEIR/DEIS document distills this discussion down to a little over one page. Noise impacts from construction and vibration impacts from normal construction activities and pile driving are only discussed generally. The only construction activity impact analysis that specifically address the project are the analysis of vibration and groundborne noise impacts from the Tunnel Boring Machine and the use of supply/muck trains during tunnel construction.

The analysis must provide a more detailed discussion of the specific construction activities and potential impacts for every component of each of the Build Alternatives. This includes a clear discussion of the types of activities that will be required and the noise and vibration levels that may be experienced at nearby sensitive receptors. The identification of the nature and location of nighttime construction activities is especially critical. As discussed in Comment 4) below the analysis must also demonstrate that it is feasible for the construction activities to comply with local noise ordinances.

2) **Construction Noise and Vibration CEQA Significance Thresholds are Not Clearly Stated.** The CEQA Impact Section 4.2.12 of the DEIR/EIS does not clearly state the thresholds used to determine the significance of the noise and vibration impacts. The document must clearly state the thresholds used to determine the significance of impacts to determine if these thresholds are adequately assessed and to support the finding of no significant impact.

The document recites the Appendix G threshold, which considers whether the Project would expose persons to noise levels in excess of the local municipalities' noise ordinance. See DEIR/EIS, p. 4-69. However, it does not appear to analyze compliance with that threshold.

The document is equally confusing regarding the threshold it is applying to analyze ground-borne noise and vibration impacts from construction. Both Caltrans and FTA provide guidance on acceptable levels of vibration that should be used to establish vibration and groundborne noise significance thresholds, yet the document makes no attempt to describe these acceptable vibration levels.

3) **Analysis of CEQA Impacts from Haul Trucks is Incomplete.** On Page 4-70, the analysis of potential haul truck noise impacts concludes that, "it is expected that the noise impacts associated with haul routes for excavation activities for the LRT and Freeway Tunnel Alternatives would be less than significant." However, the document's only support for this assertion is the assertion that the maximum 360 daily truck trips anticipated during tunnel excavation is a very small percentage of the existing daily volumes on haul route roadways. Note that 360 trips result in twice the number of truck passes as the truck departs and then returns from the disposal location.

   At 35 mph, 720 daily heavy truck passes generate the same noise as a typical arterial roadway with a daily traffic volume (ADT) of 36,000 vehicles. If the project's heavy trucks were added to a roadway with this volume the CNEL noise level along the road would increase by 3 dB (The noise level change due to different traffic volumes is equal to 10 times the base ten logarithm of the ratio of the traffic volumes. Ten times the base ten logarithm of 2 is equal to 3.) As discussed below, an increase of 3 dB is a typical CEQA threshold of significance for traffic noise impacts, and is appropriate here given that construction will span approximately five years. Road segments with lower traffic volumes would experience even greater CNEL increases. At 45 miles per hour, an ADT of 24,000 on an arterial generates the same noise as the construction trucks; at 55 miles per hour, this number is reduced to an ADT of 17,500.

   In other words, the document fails to support its "less than significant" conclusion because it does not present the traffic volumes and speeds, on the roadways that will be serving haul trucks, along with the traffic noise levels with and without the trucks and the increase due to the haul trucks. Absolute noise levels at sensitive receptors must be examined for any road segments if perceptible increases, greater than between 1 and 3 dB to determine if there will be any significant impacts.

4) **The CEQA Conclusion of No Significant Construction Noise Impacts is Incorrect.** The CEQA Noise Analysis Discussion states that because measures N-1 and N-2 described in Section 3.14.4 require compliance with County and Municipal Codes and construction noise impacts under the build alternative will be less than significant. While Measure N-2 requires compliance with the local jurisdiction's Noise Ordinance it is only applied to the TSM/TDM, BRT and LRT alternatives. Measure N-1, applicable to the Freeway Tunnel Alternatives, contains no such provision. This measure requires compliance with Caltrans noise limits for equipment used between 9 pm and 6 am and the use of mufflers, but these measures in no way ensure that the local jurisdiction's noise ordinance is not violated during the construction. Caltrans work within the right-of-way is legally exempted during construction

   While not stated explicitly, the DEIR implies that it is using compliance with the local municipality's noise ordinance as the significance threshold for construction noise impacts. At a minimum, the threshold should require compliance with local noise ordinances as these local standards reflect each community's tolerance for construction noise. However, this is not explicitly

required for the Freeway Tunnel Alternative and Caltrans is legally exempted from compliance with local noise ordinance requirements. Without a requirement to comply or demonstration that Freeway Tunnel construction activities would comply with local noise ordinances the document cannot conclude that construction of the Freeway Tunnel Alternative will not result in any significant noise impacts. Further, the requirement to comply by itself is not sufficient to conclude there will be no significant impacts. The analysis must demonstrate that compliance is feasible. This may not be possible where nighttime construction is required near sensitive noise receptors.

5) **The CEQA Construction Noise Impact Analysis Fails to Analyze the Feasibility of Proposed Mitigation Measures.** As discussed above, the simple requirement that construction activities for the TSM/TDM, LRT and BRT alternatives comply with the local municipality's noise ordinance is not sufficient to guarantee that there will be no significant construction noise impacts if it does not analyze the feasibility of compliance. If nighttime construction occurs near residential areas, compliance may not be feasible. For example, Pasadena Municipal Code 9.36.070 (A) reads "No person shall operate any pile driver, power shovel, pneumatic hammer, derrick power hoist, forklift, cement mixer or any other similar construction equipment within a residential district or within a radius of 500 feet therefrom at any time other than as listed below:." Section 9.36.070 (B) reads "No person shall perform any construction or repair work on buildings, structures or projects within a residential district or within a radius of 500 feet therefrom in such a manner that a reasonable person of normal sensitiveness residing in the area is caused discomfort or annoyance at any time other than as listed below:." The allowable times are 7 am to 7 pm Monday through Friday and 8 am to 5 pm on Saturday. The only way to comply with the first provision is to not have nighttime construction with the equipment listed.

   The DEIR/DEIS must demonstrate that the anticipated construction activities can be completed without violation of the applicable noise ordinances in order to conclude that the requirement to comply with the ordinance is feasible. Otherwise the document cannot support its conclusion that construction noise impacts are mitigated to a level of insignificance.

2.1.2 Construction Vibration and Groundborne Noise

6) **The CEQA Analysis Does Not Identify Significant Construction Vibration Impacts.** The construction vibration analysis concludes that the Tunnel Boring Machines used for the LRT and Freeway Tunnel alternatives may generate vibration levels as high as 77 VdB at homes directly above the tunnel and these vibration levels could persist for two to three days (First paragraph of Section 6.2 of the Groundborne Vibration Impacts Technical Report, page 6-1[3]). The FTA vibration impact threshold for residences and buildings where people sleep is 72 VdB for frequent events (more than 70 events per day). While not stated in the Vibration Technical Report or the DEIR/EIS document, because the Tunnel Boring Machines will operate in a constant manner for 24 hours a day except as they are stopped for maintenance. The vibration levels generated by the machines will be relatively constant while they are in operation. That the FTA's threshold for infrequent events (less than 30 events per day) is 80 VdB shows that vibration tolerance is highly dependent on the frequency of vibration events. Going from under 30 events to over 70 events reduces tolerance by 8 dB. Going from 70 events to nearly continuous vibration is a much greater jump in terms of annoyance.

   Despite this obviously significant impact the CEQA analysis, Section 4.2.12 of the DEIR/EIS, responds to the question of "would the project result in exposure of persons to or generation of excessive ground-borne noise levels, question b," as "Less than significant" for the LRT alternative and "Less than significant impact" for the Freeway Tunnel alternative while providing no discussion of this impact below the checklist table. The following two comments address the inadequacy of vibration avoidance, minimization, and/or abatement measure N-5 to mitigate these impacts.

7) **Measure N-5 Does Not Avoid, Minimize, nor Mitigate the Potential Construction Vibration Impact.** Noise and vibration avoidance, minimization, and/or abatement measure N-5 requires all LRT construction activities to comply with applicable FTA criteria and guidelines as well as any applicable local regulations related to groundbourne noise and vibration and the Freeway Tunnel Alternatives are to comply with FHWA and Caltrans guidelines as well as any applicable local regulations related to groundbourne noise and vibration (DEIR/EIS page 3.14-18 and 3.14-19). Without some description the applicable guidelines and regulations, the actual impact of this measure to reduce, minimize, and/or avoid impacts are unknown. The only component of measure N-5 that actually goes towards reducing vibration levels is the last one that addresses muck/supply trains.

   The DEIR/DEIS should provide a description of the applicable FTA, FHWA, Caltrans, and local jurisdiction regulations related to groundborne noise and vibration and how these will effectively avoid, minimize or reduce impacts. We are not aware of any applicable specific local groundbourne noise and vibration regulations and the requirement to comply with non-existent regulations has

[3] This impact is discussed in the second paragraph under the Potential Effects on all Sensitive Receptors on Page 3.14-9 of the DEIR/EIS but the potential vibration level is not disclosed.

no value. Further, the measure should include specific actions to reduce vibration levels rather than simply monitor them. As a result of the above errors, Measure N-5 fails to reduce construction vibration impacts to less than significant levels.

8) **Measure N-5 is not a Valid CEQA Mitigation Measure for Construction Vibration Impacts.** Noise and vibration avoidance, minimization, and/or abatement measure N-5 calls for the Project Engineer to develop specific property line vibration limits during final design for inclusion in the construction vibration specifications and regular monitoring will be required to verify compliance with those limits. The deferral of the selection of vibration limits to the Project Engineer makes this an invalid mitigation measure under CEQA. There is no reason to not establish acceptable vibration levels at this time. To be valid, such a mitigation measure must include, a specific action to be accomplished, performance standards to be met, and methods to meet the standards presented. For the mitigation measure to result in a no significant impact finding, the feasibility of meeting the performance standards in all anticipated conditions must be demonstrated. Otherwise the potential for a significant unavoidable impact must be acknowledged. To ensure that no significant impacts would occur, potential mitigation measures should include compensation for residents to temporarily relocate as the tunnel boring machines pass under their homes.

9) **The Analysis Does Not Completely Address Potential Construction Vibration Impacts.** The DEIR/EIS acknowledges that for the LRT and Freeway Tunnel Alternatives, "excavation and construction of the tunnel portals and underground stations, including pile driving, where residents are located nearby" "could result in short-term ground-borne noise and vibration" (Page 3.14-9). The Groundborne Noise and Vibration Impacts technical report concludes that, "Pile driving and other vibration producing activity at station sites may impact residential receptors within 200 feet of the construction activity" (Page 6-2). As with the potential boring vibration impact discussed above, this impact is not discussed in the CEQA section and the CEQA section concludes that there would not be a significant impact due to the exposure of persons to or generation of excessive ground-borne noise levels. The CEQA analysis must address and propose mitigation for this significant impact.

10) **The Analysis does Not Address Potential Impacts from Blasting** Section 3.14.3.1 notes that while no blasting is anticipated, it may be evaluated if higher than expected strength bedrock is discovered in the cut-and-cover sections or in the excavation of cross passages (page 3.14-9). The determination of whether blasting will be performed is to be made after more detailed geotechnical information becomes available. This information is repeated in Section 3.24.14.2 (page 3.24-13). The potential for noise and vibration impacts from blasting is quite variable and many of the variables that determine impacts can be adjusted to minimize the potential for impacts. For example, several small blasts can perform the same work as one large blast but result in lower maximum vibration levels. The DEIR/EIS should better indicate where blasting may be used as well as the possibility that it will be used. A performance standard based mitigation measure should be developed

to ensure that any blasting would not result in significant noise and/or vibration impacts. This standard should include planning, notification and monitoring components as well as clear noise and vibration level limits. The DEIR/EIS should discuss feasibility of meeting the limits and alternatives if they cannot be met.

2.1.3 Operational Noise

11) **Thresholds of Significance for Long-Term Stationary Impacts under CEQA are Not Stated Clearly.** The discussion of Long-Term Stationary Noise Impacts starting on Page 4-70 concludes that with the proposed 8-foot high perimeter wall, noise levels would comply with the Alhambra and Los Angeles City Noise Ordinances at surrounding noise sensitive uses. The section should clearly state at the introduction that compliance with the noise ordinance is being used as the threshold of significance.

12) **The Discussion of Long-Term Stationary Impacts is Confusing.** The discussion of Long-Term Stationary Noise Impacts starting on Page 4-70 starts abruptly with information regarding the City of Alhambra and City of Los Angeles Noise Ordinances and then the proposed LRT maintenance yard and noise levels generated by the yard. The purpose of this information is not clear to the reader until the end of the discussion. A few introductory sentences are called for to allow the reader to understand the purpose of the information presented.

13) **Thresholds of Significance for Long-Term Transportation Noise Impacts under CEQA are Not Presented.** As with construction noise and vibration impacts, the DEIR/EIS does not state what threshold of significance apply to its analysis. The discussion of Long-Term Transportation Noise Impacts indicate that because "the Build Alternatives would not result in any substantial increases in noise levels" that no significant impact would occur. While "substantial increase" is not defined, the document appears to define it as "perceptible." For example, the document concludes (albeit incorrectly) that long-term transportation impacts would be less than significant because "the Build Alternatives would not result in any substantial (perceptible) increases in noise levels." DEIR/EIS Page 4-75.

We agree that whether the Project causes a "perceptible" noise increase is the appropriate qualitative threshold. However, it does not appear to be applied properly or consistently. To the extent the document relies on the FHWA/Caltrans Substantial Increase criterion, 12 dB, that level of noise increase is well above a perceptible increase and is not appropriate for use as a threshold of significance. Indeed, a 10 dB increase is perceived as a doubling of noise levels. The FHWA/Caltrans approach/exceed criteria does not consider the change in noise levels due to the project. Therefore, a project resulting in a decrease of noise levels at a sensitive receptor would still need to consider abatement for that receptor if the with project noise level approaches or exceeds the applicable NAC. The 12 dB substantial increase criterion is meant as a backstop measure for projects that introduce traffic noise to receptors with low background noise levels.

Rather, the appropriate format for a CEQA significance threshold for a transportation noise source is that the project causes a perceptible increase in noise and the resulting noise level exceeds an applicable noise standard. This threshold responds to question XII (a) of the CEQA Guidelines Appendix G, "would the project exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?" while recognizing that imperceptible noise level increases would not result in a significant impact.

- "Perceptible noise increase": A 3 dB change is the most typical threshold for a perceptible increase in a community noise setting. The just noticeable difference in noise level perception, the smallest change that can be perceived by a human, for sound is about 1 dB. In areas where high noise levels are experienced the 1 dB threshold may be more valid.

- "Applicable noise standard": In this case the applicable noise standard is defined by the local municipalities' typically in their Noise Element. In California the typical exterior noise standard applied to residences is 65 CNEL and the typical interior noise standard for residences is 45 CNEL. Note that the exterior standard is often limited to private outdoor living areas (enclosed rear yards, patios or balconies, not front yards). Municipalities define noise standards for other uses as well that would be applicable to this analysis.

The threshold for a significant impact is that the project causes a perceptible increase and the resulting noise level exceeds acceptable levels.

The analysis should also analyze cumulative noise impacts. Cumulative noise impacts occur when perceptible noise increases over existing conditions due to the project and all other anticipated traffic growth are anticipated and the resulting noise levels exceed an applicable noise standard. If cumulative impacts are identified and the project is determined to considerably contribute to that impact then the project is responsible for mitigating that impact.

14) **Analysis of CEQA Long-Term Operational Traffic Noise Impacts is Incorrect and Fails to Identify Significant Impacts.** The first paragraph of the Long-Term Transportation Noise Impacts analysis on Page 4-75 states that "because the Build Alternatives would not result in any substantial increases in noise levels in the study area[4] compared to the existing noise levels as shown in Table 4.3, no significant noise impact would occur under CEQA." The paragraph continues to discuss how noise abatement will further reduce noise levels and long-term noise impacts are considered less than significant. The second paragraph states, "Since the Build Alternatives would not result in any substantial (perceptible) increases in noise levels in the study area outside the limits of the physical improvement, long-term noise impacts would be less than significant under CEQA," and references Tables 4.3 through 4.7 as demonstrating this.

[4] The use of "study area" here is a misnomer as it does not mean the Project Study Area as shown in Figure 1-1. The first sentence of the paragraph correctly limits the discussion to "residents in the vicinity of the limits of the Build Alternative Improvements."

There are several problems with the conclusions stated in these paragraphs:

- First, as discussed in comment 13), the DEIR/EIS fails to specify what value of decibel level increase constitutes a substantial or perceptible increase.

- Second, Tables 4.3 through 4.7 only show changes in traffic noise levels along numbered highways. The Alternatives will also affect traffic volumes and noise levels along arterial roadways and sensitive receptors (e.g., homes) within the study area. The analysis must assess noise level changes along arterial roadways to demonstrate that there will not be a significant impact.

- Third, the traffic noise level differences presented in Tables 4.3 through 4.7 only reflect noise level changes due to changes in traffic volumes, they do not reflect noise level changes that will be caused by physical changes to the roadway roads and highways constructed and/or modified by the project. Therefore, the traffic noise level changes presented in these tables are not valid for receptors located along the build portions of the project alternatives. As discussed below, the modeling performed to satisfy the FHWA/Caltrans 23 CFR 772 requirements account for the noise level changes caused by proposed physical changes for receptors located along roads and highways constructed and/or modified by the project. Tables 3.14.16 through 3.14.19 show that many receptors, representing dozens more homes, would experience peak hour noise level changes of 3 dB or more. These receptors would also experience CNEL noise level increases of 3 dB and many would experience resulting CNEL levels greater than the standards defined by local municipalities a standard CEQA threshold of significance. These impacts should have been identified as significant. The DEIR/S's conclusion of less-than-significant ignores these substantial noise level changes at sensitive receptors along the build alternatives.

- Finally, the conclusion ignores the noise level changes at sensitive receptors along the build alternatives that are not eligible for sound abatement under the Federal Highway Noise Abatement Regulation, 23 CFR 772.

Traffic noise level changes experienced by sensitive receptors (e.g., homes) along the roads and highways that will be constructed and/or modified by the project are shown in Tables 3.14.8 and 3.14.9 for the TSM/TDM alternative, Tables 3.14.11 and 3.14.12 for the BRT alternatives, Tables 3.14.16 and 3.14.17 for the Single Bore Freeway Tunnel Alternative, and Tables 3.14.18 and 3.14.19 for the Dual Bore Freeway Tunnel alternative. The noise levels presented in these tables are in terms of peak hour Leq(h). However, the change in CNEL noise levels will be similar to the change in Leq(h) noise levels. Therefore, the change in Leq(h) noise levels is an appropriate surrogate for change in CNEL noise levels. The analysis needs to be be extended to calculate CNEL noise exposures and changes for each of the receptors analyzed in these tables to accurately determine CEQA impacts along the build alternatives.

The DEIR/EIS seems to conclude that these impacts would be mitigated by implementation of sound abatement. However, the analysis, once again, ignores those receptors for which implementation of noise abatement is not

reasonable or feasible. For purposes of CEQA impact determination, the analysis should explain that sound mitigation is not feasible or reasonable at certain locations and reach a corresponding conclusion of significant/unavoidable impacts at these locations.

Tables 3.14.16 and 3.14.18 show the projected increase in Leq(h) noise levels for the sensitive receptors located within the limits of the Build Alternative improvements for the Single Bore and Dual Bore Freeway Tunnel Alternatives. These tables show that many receptors will experience perceptible noise level changes of 3 dBA or greater. Based on the long-term noise measurements at sites FML-1 through FML-4, CNEL levels along the freeway are approximately 1 to 3 dB greater than the peak noise hour noise level. Therefore, receptors with a Leq(h) of 65 dBA or greater would be exposed to a CNEL noise level greater than 65 dBA—the typical outdoor residential noise level deemed acceptable by the local municipalities. Receptors with a Leq(h) between 62 and 65 dBA or greater may be exposed to a CNEL noise level greater than 65 dBA.

Table 3.14.34 shows that under the Single Bore Freeway Tunnel Alternative only two noise barriers, FTNB No. 5 and FTNB No. 10, will be reasonable assuming no donation of right-of way. Table 3.14.16 shows that residential receptors FR-7 through FR-15, FR-17 through FR-22, FR-47 through FR-51, FR-68, FR-69, FR-103, FR-106, FR-108, FR-110, and FR-120 will be subjected to noise level increases of 3 dB or greater (i.e., "perceptible" noise increase) and an Leq(h) noise level greater than 65 dB even considering the proposed reasonable noise barriers. These 27 receptors represent 310 dwelling units. These dwelling units would therefore be subject to a perceptible noise increase of 3 dB or greater over existing conditions and an exterior noise level of 65 CNEL or greater, a typical CEQA significance threshold for highway noise impacts.

Table 3.14.34 further shows that under the Dual Bore Freeway Tunnel Alternative only four noise barriers, FTNB No. 5, FTNB No. 6, FNTB. No 9 and FTNB No. 10, will be reasonable assuming no donation of right-of way. Table 3.14.18 shows that residential receptors FR-7 through FR-22, FR-24, FR-25, FR-26, FR-28 through FR-36, FR-41, FR-46 through FR-51, FR-53, FR-68, FR-69, FR-75, FR-80, FR-81, FR-83, FR-88 through FR-100, FR-103 through FR-110, FR-113, and FR-120 will be subjected to noise level increases of 3 dB or greater and an Leq(h) noise level greater than 65 dB. These 65 receptors represent 348 dwelling units. These dwelling units would be subject to a perceptible noise increase of 3 dB or greater over existing conditions and an exterior noise level of 65 CNEL or greater, a typical CEQA significance threshold for highway noise impacts.

The DEIR/EIS must prepare a proper analysis of long-term transportation noise impacts as the existing analysis is insufficient and deficient for the reasons discussed above. In sum, our analysis of the data included in the document shows that there are significant impacts that are not identified or mitigated by the document.

15) **The Methodology Used To Determine the Noise Level Increases Presented in Tables 4.3 Through 4.7 Is Not Documented and Errors May Result in Unidentified Significant Impacts.** The DEIR/EIS only states that the FHWA Traffic Noise Model was used to assess the increase in noise level. The specific data used in the model is not presented. The analysis should take into account changes in traffic volumes, speeds and vehicle mix (truck percentages). The analysis must also account for noise level changes caused by physical changes to the roads and highways constructed and/or modified by the project for receptors in these areas. If all of these factors were not accounted for in the calculation then it is possible that noise level increases greater than those shown in Tables 4.3 through 4.7 could occur and result in unidentified significant impacts.

16) **The Operational Noise Analysis Obfuscates Impacts by Not Accurately Reporting the Number of Sensitive Uses Impacted.** The analyses of operational (permanent) impacts in Section 3.14.3.2 on Pages 3.14-11 through 3.14-15 discuss noise impacts in terms of the number of receptors. However, as shown in Tables 3.14.8, 3.14.11, 3.14.14, 3.14.16, and 3.14.18 each receptor can represent one or more households. Therefore, there are many more households with noise exposures projected to approach or exceed the FHWA's NAC than reported in the document. Under the TSM/TDM alternative the 70 impacted receptors represent 178 residential units and 9 commercial uses. Under the BRT alternative the 118 impacted receptors represent 239 homes and 6 commercial uses. Under the Single Bore Freeway Tunnel Alternative the 69 impacted receptors represent 150 residential units and 4 commercial uses. Under the Dual Bore Freeway Tunnel Alternative the 86 impacted receptors represents 184 residences and 9 commercial uses. The layperson is most likely unaware of the distinction between receptor and household and the reporting of only of number of receptors impacted misleads their perception of the scope of the noise impacts. To allow the reader to accurately understand the noise impacts from the Build Alternatives they must be presented in terms of uses rather than only receptors.

17) **The Operational Noise Analysis Obfuscates Impacts for Which Abatement is Not Feasible.** Tables 3.14-21, 3.14-23, 3.14-26, purport to show "Receptor Locations Where the Applicable Noise Abatement Criteria Would be Approached or Exceeded" under the TSM/TDM, BRT, and Freeway Tunnel alternatives. However, these tables only list those receptors which were identified as impacted AND for which abatement through construction of a noise barrier is feasible. Table 1 presents a summary of the receptors considered (Number of Modeled Receptors) and the number of receptors identified as being impacted. The final three columns of the table show the disposition of those impacts. The final column presents the number of receptors for which noise abatement will be provided with the project (assuming no donation of right of way). This shows that only a small portion of those receptors identified as being impacted will receive noise abatement with the project.

Table 1
Noise Analysis Receptors[1]

Alternative	Number of Modeled Receptors	Total Impacted[2] Receptors	Receptors With No Feasible Noise Abatement	Receptors With No Reasonable Noise Abatement	Number of Receptors to be Provided with Noise Abatement
TSM/TDM	227	70	43 (52)	1	17
BRT	506	129 (118)	120 (109)	2	7
Freeway Tunnel Single Bore[3]	137	66 (69)	3 (5)	46 (47)	20 (17)
Freeway Tunnel Dual Bore[3]	137	75 (86)	3 (12)	44 (45)	28 (29)

1. Note that this table only reports the number of analysis receptors. In many instances one analysis receptor is representative of multiple dwelling units. Therefore, this table does not present the number of impacted residences or other land uses.
2. All impacts were due to with-project noise exposures approaching or exceeding the FHWA/Caltrans NAC. There were no receptors identified to experience increases greater than the FHWA/Caltrans Substantial Increase criterion (≥12 dBA over existing conditions).
3. Due to errors in Tables 3.14.8 through 3.14.18 some of the receptor counts presented here and in the document are incorrect. The numbers in parenthesis is the corrected count when errors in Tables 3.14.8 through 3.14.18 are corrected.

The document discusses the receptors for which noise abatement was considered but not found reasonable. The number of receptors for which abatement was considered but not found reasonable is shown in the "Receptors With No Reasonable Noise Abatement" heading of Table 1. However, there are also a considerable number of receptors for which noise abatement was found to be not feasible. The number of receptors for which abatement was not determined to be reasonable are show in Table 1 under the "Receptors With No Feasible Noise Abatement" heading. These receptors are simply omitted from Tables 3.14-21, 3.14-23, 3.14-26. The DEIR/EIS needs to clearly present receptors that have been identified as impacted under the FHWA criteria for which abatement is not possible. In other words, as Table 1 demonstrates, the Project will result in numerous significant long-term noise impacts, most of which will not receive noise barrier mitigation. These impacts must be disclosed as significant and unavoidable.

18) **The Analysis Does Not Address Potential Long-Term Operational Interior Noise Impacts Under CEQA.** The analysis of long-term operational impacts focuses on exterior noise levels and only addresses interior noise levels under the FHWA/Caltrans Activity Category C which applies to schools and churches. The CEQA analysis of impacts only addresses exterior noise levels and ignores interior noise levels. The appropriate significance threshold for interior noise impacts is the same as exterior noise impacts. A significant impact occurs if the project results in a perceptible noise increase and the resulting noise level exceeds the locally defined interior noise standard. The State of California's General Plan Guidelines (Specifically Appendix C: Noise Element Guidelines) suggest 45 CNEL as an acceptable interior noise standard and most local municipalities have adopted this standard.

With closed windows, residential structures achieve between 20 and 25 dB of outdoor-to-indoor noise reduction. However, adequate ventilation per the Uniform Building Code must be provided in order to assume windows can remain closed. When windows are open, the outdoor-to-indoor noise reduction falls to between 12 and 15 dBA. This means that interior noise levels will exceed 45 CNEL when windows are open and exterior noise exposures exceed 57 CNEL. Exterior noise exposures greater than 65 CNEL will result in interior noise levels of greater than 45 CNEL with closed windows.

As discussed in comment 14) above, the CEQA analysis of long-term impacts incorrectly dismisses those receptors located along the build alternative for which noise abatement was considered to address the FHWA requirements but will not be implemented due to infeasibility or unreasonableness. Of these receptors, those with perceptible noise level increases and exterior exposures greater than 57 CNEL will be subject to a significant indoor noise impacts under CEQA in addition to the exterior impacts described in comment 14).

Further, while noise barriers implemented to address the FHWA criteria will reduce noise levels for ground level exterior and first floor interior observers to less than perceptible levels, the analysis does not examine second floor observers, interior or exterior. The effectiveness of a noise barrier is based on how much it breaks line of sight between an observer and a noise source—the more it breaks the line of sight the greater the noise reduction provided. This results in ground level observers receiving considerably higher levels of noise reduction from barriers than second floor observers.

Additional modeling is required to determine the second floor noise exposures of sensitive receptors behind barriers that will be constructed to comply with FHWA criteria. These exposures should be used to assess potential impacts under CEQA by examining the increase in and absolute traffic noise levels for these receptors. Mitigation must be considered for all receptors with discernable increases and unavoidable impacts identified for those without feasible noise reduction options.

19) **Ventilation System Exhaust Noise is not Examined.** The Freeway Tunnel and LRT alternatives include a ventilation system for the proposed tunnel. There is very little detail provided regarding the ventilation system beyond general locations of exhaust vents. The ventilation system will utilize fans and fans generate noise. However, there is no discussion of noise generated by the ventilation system in the DEIR/EIS. The document must address potential noise impacts from operation of the ventilation system.

20) The CEQA analysis of vibration impacts (page 4-75) concludes that "with the implementation of Measure N-5, the ground-borne noise effect would be minimized during the operation of the LRT Alternative." However, measure N-5 only addresses construction vibration; it does not address operational vibration impacts from the LRT Alternative.

21) Table 3.14.14 (Table B.11 of NSR) footnote 1 states that short-term measurements at sites LM-22 through LM-29 use the DNL level measured at long-term site LML-2 as the basis to convert the measured Leq noise level to

LDN. However, the existing noise level shown in the table is not consistent with this statement for Receptors LR-22 through LR-29. The values shown are consistent with using FML-1 as the long-term site. The footnote or the LDN values need to be corrected.

22) The text of the DEIR/EIS states that 129 of 506 receptors would approach or exceed the NAC under the BRT Alternative. However, the Impact Type Column of Table 3.14.11 only show 116 receptors as being impacted. Further, there are three additional receptors that should have been shown as impacted but were not. We would assume that Table B.3 of the Noise Study Report contains the same errors. These errors and the subsequent errors in the analysis and presentation caused by the misidentification of impacted receptors must be corrected.

23) The text of the DEIR/EIS states that 66 of 137 receptors would approach or exceed the NAC under the Single Bore Freeway Tunnel Alternative and the Impact Type Column of Table 3.14.16 shows this number of receptors as being impacted. However, there are errors in the identification of impacts that when corrected results in 69 receptors with noise levels that approach or exceed the NAC. We would assume that Table B.7 of the Noise Study Report contains the same errors. These errors and the subsequent errors in the analysis and presentation caused by the misidentification of impacted receptors must be corrected.

24) The text of the DEIR/EIS states that 75 of 137 receptors would approach or exceed the NAC under the Dual Bore Freeway Tunnel Alternative and the Impact Type Column of Table 3.14.18 shows this number of receptors as being impacted. However, there are errors in the identification of impacts that when corrected results in 86 receptors with noise levels that approach or exceed the NAC. We would assume that Table B.9 of the Noise Study Report contains the same errors. These errors and the subsequent errors in the analysis and presentation caused by the misidentification of impacted receptors must be corrected.

25) Page 119 second line under 7.3.4.2 heading. FR-2 should be LR-2.

2.1.4 Cumulative Impacts

26) **Cumulative Impact Conclusion is Incorrect.** Section 3.25.4.14 includes the following statement, "Additionally, neither the I-10 HOT Lanes, nor the SR 710 North Study Build Alternatives would result in substantial unmitigable long-term noise impacts. Abatement measures are proposed and none of the receptors reach a noise level that exceeds 12 A-weighted decibels (dBA). Therefore, the SR 710 North Study would not contribute to a cumulative noise impact." As discussed above, the conclusion that the SR 710 North Study Build Alternatives would not result in substantial unmitigable long-term noise impacts is incorrect. Further, the statement that none of the receptors are exposed to noise levels exceeding 12 dBA is obviously errant. There are no developed areas that experience noise levels this low. To the extent that the document meant to refer to a 12 dBA *increase*, such a threshold is not an appropriate threshold as it represents a more than doubling of the noise level.

An appropriate threshold is a just perceptible increase which occurs with a 1 to 3 dB noise level increase.

Cumulative traffic noise impacts should be assessed the same as project impacts. That is, a cumulative impact occurs if traffic noise levels are projected to perceptibly increase over existing conditions and the resulting future noise level exceeds the locally defined acceptable level. The analysis will then need to consider the project's contribution to the noise level increase and determine if it is cumulatively considerable. If the project's contribution is cumulatively considerable then it is responsible for providing mitigation. The document failed to provide this analysis.

2.1.5 Noise Study Report

27) **Noise Model Calibration is not Consistent with Caltrans Guidance.** Caltrans guidance (Technical Noise Supplement Section 4.4.1.6) states that model calibration should not be attempted when calculated and measured noise levels agree within 1 dBA and should only be used when the levels agree within 2 dBA if there is great confidence in the accuracy and representativeness of the measurements. Differences between 3 and 4 dBA are routinely calibrated unless the validity of the measurements are in serious doubt. Differences of 5 dBA or more should be approached with caution.

Tables 6.33 through 6.35 of the NSR present the results of the traffic model calibration. These tables show the measured and modeled noise levels for the calibration sites along with the difference, the K-factor. The final column of the table lists the Representative Modeled Receptors. We assume that the K-factors shown were applied to the receptors listed. The tables show that there are a considerable number of receptors with K-factors of less than 1.5 dB.

Per Caltrans guidance, K-Factors of less than 1.5 dB should not be used in the modeling. The analysis should be revised to not omit the use of K-Factors of less than 1.5 dB or provide a detailed explanation of why this guidance was ignored. Making this correction may result in changes to the identification of noise impacts and barrier considerations.

28) **The Analysis of TSM/TDM Impacts Does Not Adequately Discuss Receptors With No Feasible Abatement.** Section 7.1.1 of the NSR states that 70 receptors would approach or exceed the NAC under the TSM/TDM alternative. However, the discussion of impacted receptors on pages 88 and 89 lists only 27 receptors as being subjected to noise levels approaching or exceeding the applicable NAC. The report notes that 43 receptors were not considered for abatement due to driveway or pedestrian access and it appears that it is these receptors that are not presented in the discussion. The report should distinctly and clearly identify ALL impacted receptors (i.e., those with noise exposures approaching or exceeding the NAC). Otherwise it appears that the document is attempting to discount significant and unavoidable noise impacts for which there is no feasible abatement and inappropriately minimize the identification of impacts. The discussion of whether or not there are feasible noise abatement measures for the impacted receptors should be included in Section 7.3.1.

29) **The Analysis of BRT Impacts Does Not Adequately Discuss Receptors With No Feasible Abatement.** Section 7.1.2 of the NSR states that 129 receptors would approach or exceed the NAC under the BRT alternative. However, the discussion of impacted receptors on pages 90 and 91 lists only 9 receptors as being subjected to noise levels approaching or exceeding the applicable NAC. The report notes that 120 receptors were not considered for abatement due to driveway or pedestrian access and it appears that it is these receptors that are not presented in the discussion. The report should distinctly and clearly identify ALL impacted receptors (i.e., those with noise exposures approaching or exceeding the NAC). Otherwise it appears that the document is attempting to discount significant and unavoidable noise impacts for which there is no feasible abatement and inappropriately minimize the identification of impacts. The discussion of whether or not there are feasible noise abatement measures for the impacted receptors should be included in Section 7.3.2.

30) **The Analysis of Freeway Tunnel Impacts Does Not Adequately Discuss Receptors With No Feasible Abatement.** Section 7.1.3 of the NSR states that 66 receptors would approach or exceed the NAC under the single-bore freeway tunnel alternative and 75 receptors would under the dual-bore tunnel alternative. However, the discussion of impacted receptors on pages 92 through 95 lists only 68 receptors as being subjected to noise levels approaching or exceeding the applicable NAC. Further, this information is not consistent with the data shown in Tables B-7 and B-9.

In Table B-7 there are three receptors that show A/E in the Impact Type column yet the noise level in the With Project column does not approach or exceed the NAC, specifically, Receptors FR-29, FR-46 and FR-109. There are seven receptors With Project noise levels approaching or exceeding the NAC that are not shown as A/E in the Impact Type column. Specifically, FR-38, FR-39, FR-54, FR-68, FR-91, FR-114, and FR-133. In Table B-9 are nine receptors With Project noise levels approaching or exceeding the NAC that are not shown as A/E in the Impact Type column. Specifically, FR-50, FR-57, FR-68, FR-69, FR-73, FR-81, FR-100, FR-114, and FR-121.

The report does not note that for the Freeway Tunnel Alternatives 8 receptors were not considered for abatement due to driveway or pedestrian access under both Single and Dual Bore Alternatives. Note that when the corrections presented above are made this number jumps to 6 receptors under the single bore alternative, and 12 receptors under the dual bore alternative. The report should distinctly and clearly identify ALL impacted receptors (i.e., those with noise exposures approaching or exceeding the NAC). Otherwise it appears that the document is attempting to discount significant and unavoidable noise impacts for which there is no feasible abatement and inappropriately minimize the identification of impacts. The discussion of whether or not there are feasible noise abatement measures for the impacted receptors should be included in Section 7.3.2.

31) **The Analysis Obfuscates Impacts by Only Presenting the Number of Analysis Receptors Impacted Rather Than the Number of Residences**

Represented by the Receptors. The discussion of impacts presented in Section 7.1 only presents the number of analysis receptors that are identified as being impacted. In many cases a single receptor is used to represent multiple dwelling units. This discussion should clearly present the total number of dwelling units and other uses that are projected to experience traffic noise levels approaching or exceeding the NAC.

32) **There are errors in Tables B.1, B.7 and B.9 of the NSR.** Tables B.1, B.7 and B.9 of the NSR show a number of receptors with noise exposures approaching or exceeding the NAC for the activity category identified in the table for the receptor that are erroneously not identified as impacted.

33) It is not clear how the Spec 721.560 Lmax noise levels for construction equipment are relevant to this project. The NSR should explain why this information is relevant or remove it. Table 3.14-20 of the DEIR/EIS is more appropriate. (Interestingly the source of this table in the DEIR/EIS is listed as the Noise Study Report but it is not the same table.)

Resume

Matthew B. Jones P.E.

Project Manager

Education

Bachelor of Science – Engineering Physics, Acoustics Specialization, University of California, San Diego, Summa Cum Lade

A.A. Liberal Arts with a Certificate in Recording Arts, Golden West College, Huntington Beach, CA

Professional Registration

Registered Professional Engineer in the State of California (Electrical #17156)

Overview

Mr. Jones has over 20 years of experience in acoustics, noise, and air quality. He has prepared noise and air quality technical reports for hundreds of Environmental Impact Reports (EIRs) and Environmental Impact Assessments (EISs) as well as specialty studies. Work efforts include project management, software development, engineering analysis, report preparation, as well as noise and air quality monitoring. Mr. Jones is involved in the development of many in-house computer modeling and data analysis programs and is well versed in many regulatory and non-regulatory air quality and noise modeling programs as well as ArcView GIS.

Noise Impact Assessments

Mr. Jones has prepared noise assessments for a wide range of projects with the majority being residential, commercial, and mixed-use developments ranging from a few residential units or office buildings, to large specific plans with thousands of units and hundreds of thousands of square feet of commercial uses. He has also prepared assessments for include landfills, water treatment plants, cement batch plants, schools, parks, truck repair facilities, car washes, and a natural gas pipeline pump station. Mr. Jones has prepared traffic noise assessments for many new highway and highway improvement projects involving the application of the Federal Highway Administration's (FHWA) Highway Noise Abatement Regulation. He is intimately familiar with the FHWA Traffic Noise Model (TNM) in both the algorithms used and the use of the modeling software. Mr. Jones also has considerable experience in the measurement and modeling of aircraft noise levels. He is fluent in the use of the FAA's INM and HNM models and was part of the beta testing team for the FAA's newest model the Aviation Environmental Design Tool (AEDT).

Air Quality and Greenhouse Gas Impact Assessments

Mr. Jones' has extensive experience quantifying criteria pollutant and greenhouse gas emissions from a variety of sources and applying an assortment of criteria to evaluate the impacts of those emissions. In addition, he is well versed in dispersion modeling and the prediction of air pollutant concentrations at sensitive receptors. This includes assessing the impacts of toxic air contaminants. Mr. Jones is experienced with many air quality models including SCAQMD's URBEMIS and CalEEMod, EPA's AERMOD, ISCST3, SCREEN3, CALINE3QHC, and MOBILE, FAA's EDMS and AEDT, CARB's EMFAC and URBEMIS, and Caltrans' CALINE4. He has prepared air quality and greenhouse gas assessments for a variety of projects and purposes, primarily CEQA and/or NEPA documents for residential/commercial developments, landfills and waste management, highways, and airports. He has considerable experience applying the Federal Clean Air Act's General and Transportation conformity requirements as well as specific requirements prescribed by the FAA and FHWA for airport and highway air quality assessments including involvement in FAA's Voluntary Airport Low Emissions (VALE) grant program applications. Mr. Jones has been involved in projects in several states including Arkansas, Idaho, Louisiana, and Texas, and several California Air Districts including the Bay Area, South Coast, and San Joaquin.

Representative Projects

Sonoma, CA
Charles M. Schultz-Sonoma County Airport
- Air Quality and Greenhouse Gas assessments for Master Plan Update proposing a variety of airport improvement projects.
- Analyzed impacts from toxic air contaminants on surrounding area.

Orange County, CA
John Wayne Airport (SNA) Settlement Agreement Amendment Project
- Noise Assessment for EIR to extend existing agreement between the airport and the City of Newport Beach and citizen groups including increases to limits on passengers and flights.
- Analyzed 10 years of operations and noise data to inform future operation estimates.
- Assessed aircraft and traffic noise impacts for four future scenarios implemented in three phases.

Orange County, CA
South Orange County Transportation Infrastructure Improvement Project
- Noise Assessment for SEIR/EIS for extension of SR-241 to connect with I-5 .
- Analyzed noise impacts for 14 different alignments and two existing road improvement alternatives.
- Measured noise levels at 74 sites and modeled noise levels for 122 receptors

Orange County, CA
Noise Study Report-Foothill Transportation Corridor-South
- Noise barrier assessment for extension of SR-241 to connect with I-5.
- Considered sound abatement options for impacted receptors per Caltrans and FHWA requirements.
- Measured noise levels at 18 sites and modeled noise levels at 144 receptors

Wilmington, CA
Harbor Community Benefit Foundation School & Residential Sound Insulation Program
- Measured noise levels at 25 locations in the Wilmington Community to identify and quantify noise generated by activities associated with the operation of Port of Los Angeles.
- Generated noise contour maps for Port related noise sources throughout community
- Developed program to select and prioritize implementation of Sound Insulation.

Saguache County, CO
Tessera Solar
- Prepared critique of project proponent prepared noise assessment for solar generating facility for county board.
- Provided testimony at public hearing

Los Angeles, CA
I-405 HOV Lane Addition
- Air Quality Assessment for addition of HOV lane to northbound I-405 through the Sepulveda Pass.
- Analyzed potential impacts from Mobile Source Air Toxics
- Prepared Air Quality Conformity Analysis to demonstrate compliance with Transpiration Conformity Requirements of Federal Clean Air Act

Irvine, CA
Planning Area 18/39 General Plan Amendment & Zone Change
- Noise and Air Quality Assessments for proposed development of 6,050 residential units.
- Assessed potential impacts from mobile source air toxics on proposed residences located near major freeway.
- Assessed potential impacts on project from existing amphitheater and water park on proposed residences.

Azusa, CA
Azusa Material Recovery Facility & Transfer Station
- Noise, Air Quality and Greenhouse Gas Assessments for new municipal waste transfer station with materials recovery.
- Assessed potential changes in air pollutant and GHG emissions due to re-routing of trucks and operation of facility compared to no-project conditions
- Assessed potential traffic noise impacts due to trucks on area roads and from facility operation.

Los Angeles CA
Light Rail Inverse Condemnation Lawsuit
- Provided noise and vibration consulting to defense legal team in inverse condemnation suit from construction and operation of a light rail facility.
- Reviewed and critiqued information submitted by plaintiff's experts.
- Performed and analyzed noise and vibration measurements for XX residences.
- Noise and vibration excluded from lawsuit in summary judgment

Costa Mesa, CA
Pacific Amphitheater Re-Opening Season
- Perform community noise measurements for re-opening season of Amphitheater with a history of noise issues that had been reconfigured.
- Noise levels as well as subjective audibility were recorded and reported to City staff the day following each event.