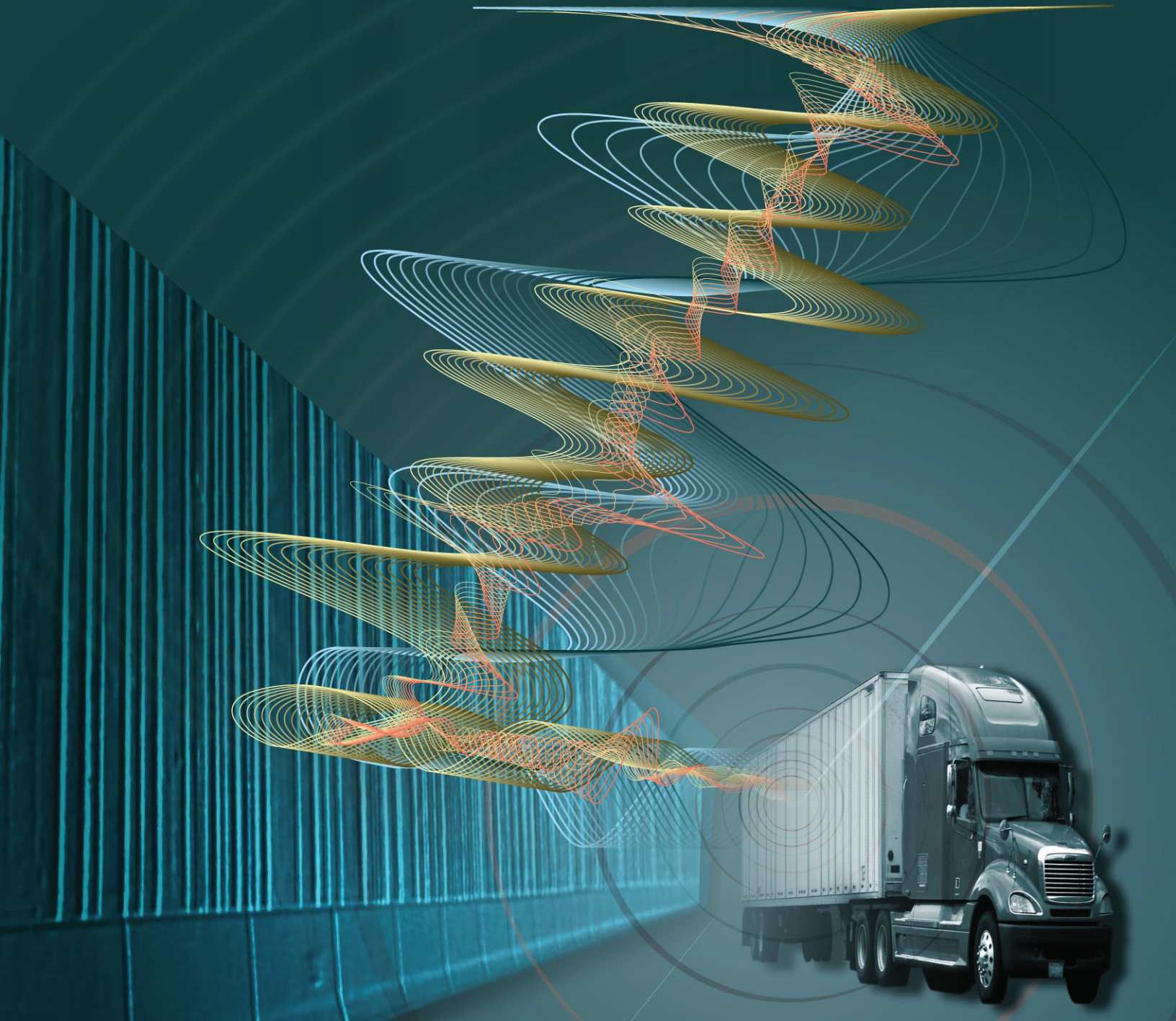
Traffic Noise Analysis Protocol

For New Highway Construction, Reconstruction, and Retrofit Barrier Projects



May 2011

California Department of Transportation
Division of Environmental Analysis

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Acronyms and Abbreviations

Caltrans	California Department of Transportation
CE	Categorical Exclusion
CEQA	California Environmental Quality Act
CFR	Code of Federal Regulations
CNEL	community noise equivalent level
CPI	Construction Price Index
dB	decibel
dBA	A-weighted decibel
FHWA	Federal Highway Administration
FONSI	Finding of No Significant Impact
FTA	Federal Transit Administration
HOT	high-occupancy toll
HOV	high-occupancy vehicle
L_{dn}	day-night level
L_{eq}[h]	1-hour equivalent sound level
NAC	noise abatement criteria
NADR	Noise Abatement Decision Report
NEPA	National Environmental Policy Act
NSR	Noise Study Report
	notice of preparation (NOP)
Protocol	Traffic Noise Analysis Protocol
	Record of Decision (ROD)
RTP	Regional Transportation Plan
RTPA	Regional Transportation Planning Agency
SER	Caltrans Standard Environmental Reference

TeNS	Technical Noise Supplement
TNM®	Traffic Noise Model

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Section 1

Introduction

Title 23, Part 772 of the Code of Federal Regulations (23CFR772), "Procedures for Abatement of Highway Traffic Noise and Construction Noise," outlines procedures for noise studies that are required for approval of Federal-aid highway projects. FHWA published a final rule revising 23CFR772 on July 13, 2010 (Appendix A). The Federal Highway Administration (FHWA) requires that State highway agencies prepare updated state-specific policies and procedures for applying the revised regulation in their state.

The purpose of this *Traffic Noise Analysis Protocol for New Highway Construction, Reconstruction, and Retrofit Barrier Projects* (Protocol) is to present California Department of Transportation (Caltrans) policies and procedures for applying 23CFR772 in California. 23CFR772 applies to all Federal or Federal-aid Highway Projects authorized under title 23, United States Code. Therefore, this regulation applies to any highway project or multimodal project that: (1) requires FHWA approval regardless of funding sources, or (2) is funded with Federal-aid highway funds.

Definitions of key terms used in the Protocol are provided in the glossary provided in Appendix B. Terms defined in the glossary are shown as bold italicized text on first use in the Protocol.

A noise study conducted according to this Protocol must contain the analysis required for completion of environmental documentation under the National Environmental Policy Act (NEPA) and California Environmental Quality Act (CEQA). Refer to the Caltrans Standard Environmental Reference (SER) for guidance on procedures for implementing NEPA and CEQA (California Department of Transportation 2006). Additional general discussion of CEQA and NEPA is provided in Section 7.

In addition, Caltrans has prepared a document titled *Technical Noise Supplement* (TeNS) (California Department of Transportation 2009) to assist noise analysts with the technical aspects of noise impact analysis. The TeNS supplements this Protocol and contains Caltrans noise analysis procedures, practices, and other useful technical background information related to the analysis of highway noise impacts and abatement. Refer to

the TeNS for definitions of technical terms used in the Protocol (http://www.dot.ca.gov/hq/env/noise).

If necessary, the noise study also must contain analysis required under Section 216 of the California Streets and Highway Code. This code relates to how traffic noise from a proposed freeway project affects noise levels in school classrooms. Figure 1 outlines the relationship between the State and Federal regulations and laws, the Protocol, Caltrans guidance, noise study documentation, environmental documentation, and project design.

This Protocol addresses the following main topics.

- Type I: new construction or reconstruction projects.
- Type II: retrofit ***noise abatement*** projects.
- Noise documentation.
- Liaison with local agencies.
- CEQA and NEPA considerations.

This Protocol is a revision of and supersedes the previous *Traffic Noise Analysis Protocol* (California Department of Transportation 2006). Projects that do not have a completed noise study signed and approved by Caltrans (or FHWA for non-delegated projects) by July 13, 2011, will be required to comply with this updated Protocol and the updated regulation. If a project is modified such that a NEPA reevaluation and new noise study are required, the Protocol and regulation in place at that time must be used.

This Protocol was developed by a team from several areas of Caltrans and FHWA. The contributions of the following individuals are greatly appreciated.

Caltrans
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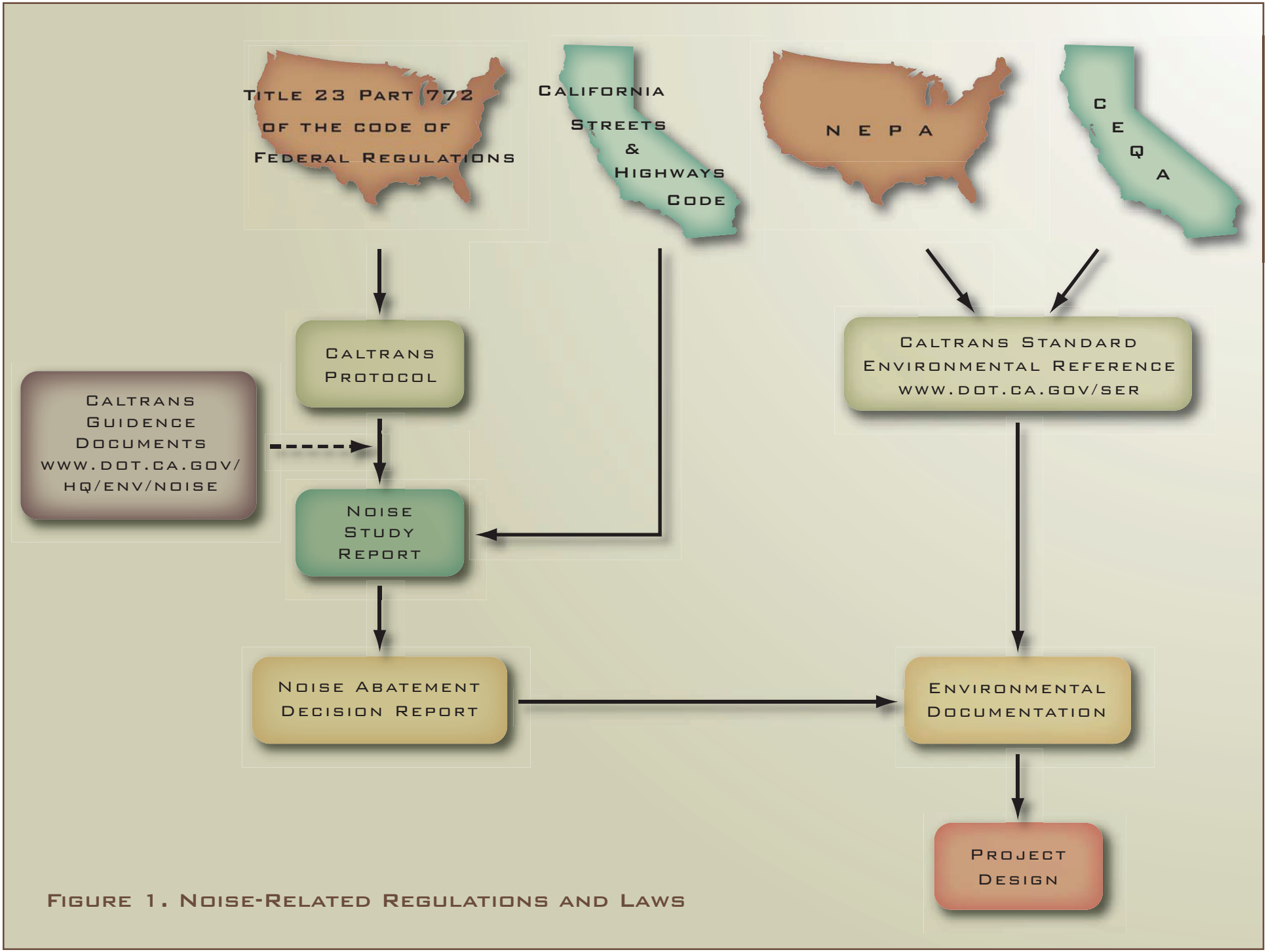

Figure 1. Noise-Related Regulations and Laws

Section 2

Title 23, Part 772, Code of Federal Regulations

The purpose of 23CFR772 is to provide procedures for conducting noise studies and evaluating noise abatement measures to help protect the public's health, welfare, and livability; to supply noise abatement criteria; and to establish requirements for information to be given to local officials for use in the planning and design of highways approved pursuant to title 23 United States Code. As such, 23CFR772 provides procedures for preparing operational and construction noise studies and evaluating noise abatement considered for Federal and Federal-aid highway projects. According to 23CFR772.3, all highway projects that are developed in conformance with this regulation are deemed to be in accordance with the FHWA noise standards. This Protocol provides California policies and procedures for compliance with 23CFR772. The text of 23CFR772 is contained in Appendix A.

Under 23CFR772.7, projects are categorized as ***Type I, Type II,*** or ***Type III projects***. FHWA defines a Type I project as a proposed Federal or Federal-aid highway project for the construction of a highway on a new location, the physical alteration of an existing highway where there is either a substantial horizontal or substantial vertical alteration, or other activities discussed in Section 3 below in the definition of a Type I project. A Type II project involves construction of noise abatement on an existing highway with no changes to highway capacity or alignment. A Type III project is a project that does not meet the classifications of a Type I or Type II project. Type III projects do not require a noise analysis.

Under 23CFR772.13, noise abatement must be considered and evaluated for feasibility and reasonableness for Type I projects if the project is predicted to result in a ***traffic noise impact***. In such cases, 23CFR772 requires that the project sponsor "consider" noise abatement before adoption of the NEPA Categorical Exclusion (CE), Finding of No Significant Impact (FONSI), or Record of Decision (ROD). This process involves identification of noise abatement measures that are feasible, reasonable, and likely to be incorporated into the project, and noise impacts for which no noise abatement measures are feasible and reasonable. Figure 2 summarizes the highway noise analysis process.

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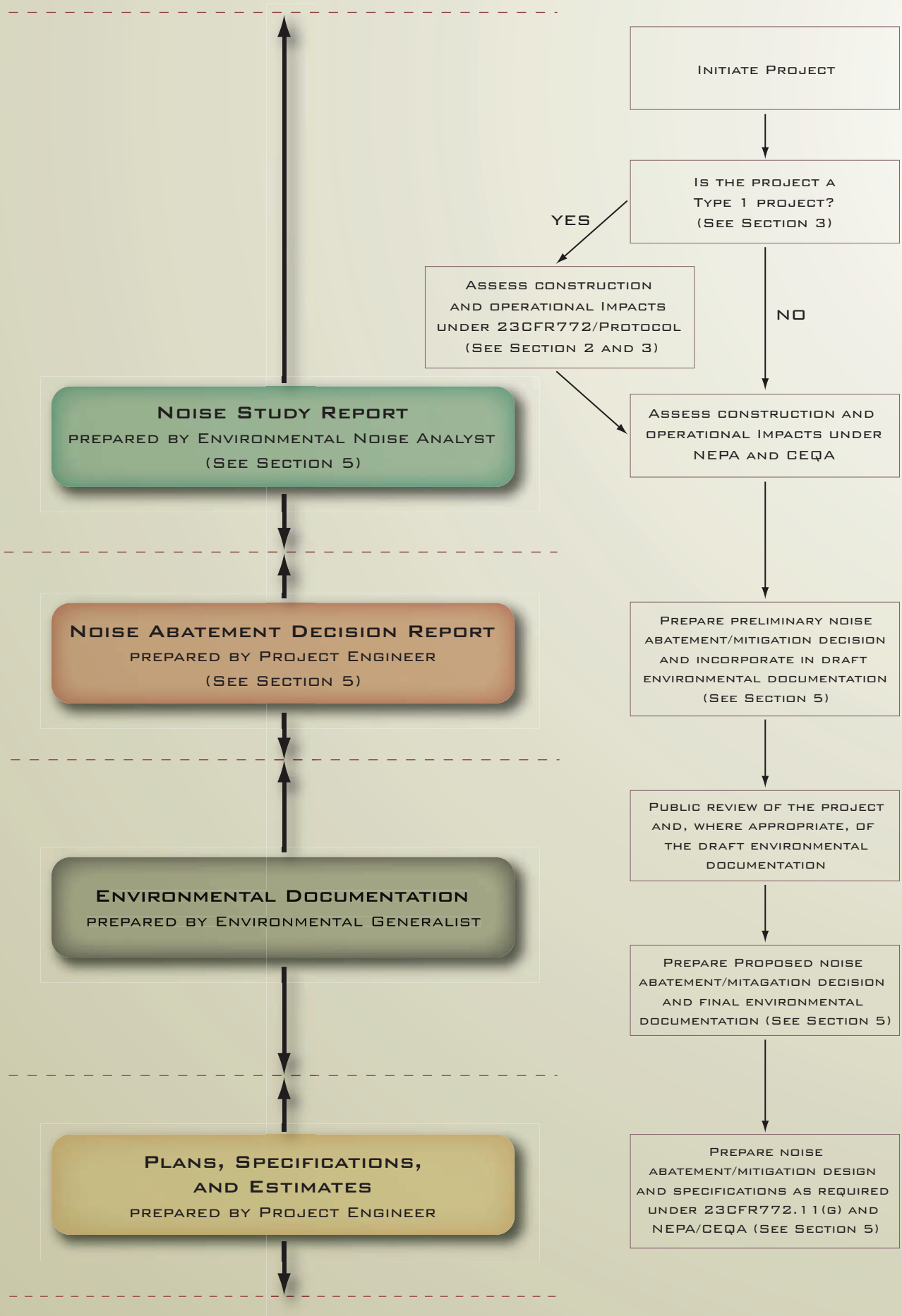

Figure 2. Highway Noise Assessment Flow Chart

Section 3

Type I: New Construction or Reconstruction Projects

23CFR772 defines a ***Type I project*** as a project that involves:

1. The construction of a highway on a new location or
2. The physical alteration of an existing highway where there is either:
   A. Substantial horizontal alteration. A project that halves the distance between the traffic noise source and the closest ***receptor*** between the existing condition to the future build condition, or
   B. Substantial vertical alteration. A project that removes shielding thereby exposing the line-of-sight between the receptor and the traffic noise source. This is done by altering either the vertical alignment of the highway or the topography between the highway traffic noise source and the receptor; or
3. The addition of a through-traffic lane(s). This includes the addition of a through-traffic lane that functions as a high-occupancy vehicle (HOV) lane, high-occupancy toll (HOT) lane, bus lane, or truck climbing lane; or
4. The addition of an auxiliary lane, except for when the auxiliary lane is a turn lane; or
5. The addition or relocation of interchange lanes or ramps added to a quadrant to complete an existing partial interchange; or
6. Restriping existing pavement for the purpose of adding a through-traffic lane or an auxiliary lane; or
7. The addition of a new or substantial alteration of a weigh station, rest stop, ride-share lot, or toll plaza.

If a project is determined to be a Type I project under this definition, the entire project area as defined in the environmental document is a Type I project.

Traffic Noise Impacts

Traffic noise impacts as defined in 23CFR772.5 occur when the ***predicted noise level*** in the ***design year*** approaches or exceeds the Noise Abatement Criteria (NAC) specified in 23CFR772, or a predicted noise level substantially exceeds the ***existing noise level*** (a "substantial" noise increase). Noise levels are expressed in terms the ***A-weighted decibel (dBA)*** and the ***one-hour equivalent sound level*** (***L_{eq}[h])***.

Table 1 summarizes NAC corresponding to various land use activity categories. Activity categories and related traffic noise impacts are determined based on the actual or permitted land use in a given area.

In California a noise level is considered to approach the NAC for a given activity category if it is within 1 dBA of the NAC. In California a substantial noise increase is considered to occur when the project's predicted worst-hour design-year noise level exceeds the existing worst-hour noise level by 12 dBA or more. The use of 12 dB was established in California many years ago and is based on the concept that a 10 dB increase generally is perceived as a doubling of loudness. A collective decision by Caltrans staff, which was approved by FHWA, was made to use 12 dB.

Table 1. Activity Categories and Noise Abatement Criteria (23CFR772)

Activity Category	Activity $L_{eq}[h]$[1]	Evaluation Location	Description of Activities
A	57	Exterior	Lands on which serenity and quiet are of extraordinary significance and serve an important public need and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose.
B[2]	67	Exterior	Residential.
C[2]	67	Exterior	Active sport areas, amphitheaters, auditoriums, campgrounds, cemeteries, day care centers, hospitals, libraries, medical facilities, parks, picnic areas, places of worship, playgrounds, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, recreation areas, Section 4(f) sites, schools, television studios, trails, and trail crossings.
D	52	Interior	Auditoriums, day care centers, hospitals, libraries, medical facilities, places of worship, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, schools, and television studios.
E	72	Exterior	Hotels, motels, offices, restaurants/bars, and other developed lands, properties, or activities not included in A–D or F.
F			Agriculture, airports, bus yards, emergency services, industrial, logging, maintenance facilities, manufacturing, mining, rail yards, retail facilities, shipyards, utilities (water resources, water treatment, electrical), and warehousing.
G			Undeveloped lands that are not permitted.

[1] The $L_{eq}(h)$ activity criteria values are for impact determination only and are not design standards for noise abatement measures. All values are A-weighted decibels (dBA).

[2] Includes undeveloped lands permitted for this activity category.

Predicted exterior traffic noise levels at land uses in Activity Categories A, B, C, and E are evaluated to determine whether traffic noise impacts are predicted to occur. In determining traffic noise impacts for these Activity Categories, primary consideration is given to exterior areas where ***frequent human use*** occurs that would benefit from a lowered noise level. In general, an area of frequent human use is an area where people are exposed to traffic noise for an extended period of time on a regular basis.

As an example, a parking lot of a place of worship is not considered to be an area of frequent human use that would benefit from a lowered noise

level because people only spend a few minutes there getting in and out of their cars and there would be no benefit to a lowered noise level. However, if outdoor worship services are held at this location, this would be an area where people are exposed to noise for an extended period of time and where the ability to hear is important. This then would be considered an area of frequent human use that would benefit from a lowered noise level.

Other examples are outdoor seating areas at restaurants or outdoor use areas at hotels, if those are areas where people spend an extended period of time on a regular basis. One practical test for determining frequent human use is the presence of existing facilities that invite human use such as benches, barbeque facilities, covered group picnic areas, and uncovered picnic tables.

Activity Category A Land Uses

Activity Category A lands are those areas where serenity and quiet are of extraordinary significance. These lands serve an important public need where the preservation of those qualities is essential if the area is to continue to serve its intended purpose.

If a property within the project limits has potential to be an Activity Category A use, consultation with FHWA is required on a case-by-case basis to make the final determination.

Activity Category B Land Uses

Following are general guidelines that can be used to evaluate Activity Category B land uses.

Each residential single-family or multi-family dwelling unit must be counted as one receptor. For modeling purposes, the receptor should be placed at the primary outdoor use area of the dwelling unit. This is typically the backyard of single family dwelling or patio/balcony of a dwelling unit in a multi-family building.

Multi-family and residential community common areas may include pools, ball courts, or other formalized outdoor activity areas. Each of these outdoor activity areas must be counted as one receptor.

Activity Category C Land Uses

The following are general guidelines that can be used to evaluate Activity Category C land uses.

Parks and Recreation Areas—Parks range in size and amenities and can include small neighborhood parks, linear green belts, and large regional parks and natural preserves. Recreation areas also may encompass multiple activity areas within a large parcel of land.

Receptors must be located within the park or recreation area boundary for each area with a discrete outdoor activity as discussed below. If the park or recreational area has no discernible formal activity areas (trails, camping facilities, picnic areas, ball fields, etc.), a minimum of one generalized receptor must be placed within the park or recreation area no closer than 100 feet from the edge of the outside traffic lane in the area that best represents the highest expected traffic noise level.

Picnic Areas and Fire Pits—One receptor must be counted for each area of clustered tables and/or fire pits that are oriented or situated as a single functional area.

Campgrounds—One receptor must be counted for each group of 10 formal campsites or camping cabins capable of human occupation. Ten or fewer campsites are counted as one receptor. Informal campsite areas located within formalized campgrounds should be counted as one collective receptor per separated area.

Pavilions—One receptor must be counted for each complex of tables, outdoor cooking facilities, covered pavilions, gazebos, etc., that are oriented or situated to provide a single use area.

Sporting fields—One receptor must be counted for each formalized sporting field, including associated seating, access, pathways, and/or stadium complex. Less formalized activity areas such as grassy areas of a park or recreation area, which are commonly used for informal sporting activity, must be counted as one receptor per area.

Golf Courses—One receptor must be placed for each hole of the golf course in an area (tee box, fairway, or green) that best represents the highest expected traffic noise level for that hole. If other outdoor activity areas exist within the course, such as practice areas, picnic facilities, restaurant outdoor area, etc., each formalized activity area must be evaluated with a separate receptor.

Trails—One receptor must be counted for each formal trail regardless of the pathway orientation. The receptor should be placed no closer than 100 feet from the edge of the outside traffic lane at a location on the trail that best represents the highest expected traffic noise level.

Cemetery—One receptor must be counted for each area of a formalized memorial gathering facility. Individual grave sites, access ways, and informal activity areas are not considered individually sensitive receptors; however, each section of the cemetery that may have informal gathering areas must be assigned a receptor. If there are no formalized or operator-defined informal gathering areas, a generalized receptor must be placed in the property no closer than 100 feet from the edge of the outside traffic lane in an area that best represents the highest expected traffic noise level.

When no noise analysis is necessary for a site because there is no exterior area with frequent human use, this finding must be documented in the project noise study report.

Activity Category D Land Uses

Each building in an Activity Category D area must be counted as one receptor.

In situations where no exterior activities are to be affected by the traffic noise, or where the exterior activities are far from or physically shielded from the roadway in a manner that prevents an impact on exterior activities, Activity Category D is used as the basis of determining noise impacts. Indoor analysis is conducted at Category D land uses only after all outdoor analysis options have been exhausted and after a determination has been made that exterior abatement measures will not be feasible and reasonable.

If a determination has been made that interior noise levels for Activity Category D land uses will be evaluated, a visual inspection of the building construction is conducted and an estimate of the noise reduction provided by the building structure is made based on guidance in Table 7 of the FHWA *Highway Traffic Noise: Analysis and Abatement Guidance* document and other standard acoustical reference data. It is assumed that windows normally will be closed at facilities with air conditioning.

The estimated noise reduction is subtracted from the predicted ***design-year*** noise level at the building façade to determine whether the interior noise level is likely to approach or exceed the interior NAC. Where interior traffic noise impacts are identified, noise abatement in the form of noise barriers will be considered first. In cases where a barrier clearly is not

feasible because of driveway access or other issues, improvement of building shell acoustical insulation is then considered. In order for a building to be considered a benefited receptor the proposed noise abatement must be predicted to provide a least 5 dB of noise reduction.

Interior noise level measurements typically are not conducted and building shell acoustical insulation typically is not evaluated in detail during the environmental review phase. However, there may be special circumstances where this is necessary. Interior noise-level measurements typically will be conducted during final design to confirm the presence of an interior traffic noise impact and to develop final design-level treatments to be implemented.

Activity Category E Land Uses

Receptors must be located within the property boundary for each area with a discrete outdoor activity. This would include common use areas such as pools, ball courts, or other formalized outdoor activity areas. Each of these outdoor activity areas must be counted as one receptor.

If the area has no discernible formal activity areas, a minimum of one generalized receptor must be placed within the property no closer than 100 feet from the edge of the outside traffic lane in the area that best represents the highest expected traffic noise level.

Activity Category F Land Uses

There are no impact criteria for Activity Category F land uses. However, for reporting purposes, one generalized receptor must be placed within the area no closer than 100 feet from the edge of the outside traffic lane that best represents the highest expected traffic noise level.

Activity Category G Land Uses

There are no impact criteria for Activity Category G land uses. However, for reporting purposes, one generalized receptor must be placed within the area no closer than 100 feet from the edge of the outside traffic lane that best represents the highest expected traffic noise level.

With regard to undeveloped lands (Activity Category G), it first must be determined whether the undeveloped land is permitted for development. Development proposed on undeveloped land is considered permitted on

the date of issuance of a building permit by the local jurisdiction or by the appropriate governing entity.

If development proposed on undeveloped land is determined to be permitted (***permitted development***), the land is assigned to the appropriate activity category, and the land is analyzed in the same manner as developed lands in that activity category.

If undeveloped land is not permitted for development by the ***date of public knowledge***, noise level results are documented in the project's environmental clearance documents and noise analysis documents. The date of public knowledge is the date of approval of the CE, FONSI, or the ROD. Federal participation in noise abatement measures will not be considered for lands that are not permitted by the date of public knowledge.

Impact Analysis

When performing a noise impact analysis, the first step is to determine whether traffic noise impacts under 23CFR772 are predicted. Under 23CFR772, a traffic noise impact analysis must be conducted for each project alternative considered in the environmental document. Under the requirements of NEPA, the no-build or no-action alternative also must be evaluated. The steps of the analysis to comply with 23CFR772 are summarized below.

1. Identify existing developed land uses and land that is permitted for development adjacent to the project that may be affected by the project.
2. Determine worst-hour existing noise levels at adjacent land uses.
3. Predict traffic noise levels using traffic characteristics that will yield the worst hourly traffic noise impact for the design year using traffic noise prediction methodology that is consistent with officially approved Caltrans noise prediction models. The current approved methodology at the publishing date of this Protocol is the FHWA Traffic Noise Model® (TNM®).
4. The current highway traffic noise prediction model TNM has been validated at distances within 500 feet of the highway. Receptors that are located beyond 500 feet from the project area do not need to be considered for analysis unless there is a reasonable expectation that noise impacts would extend beyond that boundary. This may require engineering judgment and supplemental noise measurements to determine impacts.

5. Determine whether traffic noise impacts are predicted at adjacent land by comparing predicted worst-hour noise levels in the design year to existing noise levels and the NAC.

The results of this analysis must be provided to local agencies pursuant to 23CFR772.17, which requires Caltrans to inform local officials about estimated future noise levels and to provide information that will allow local communities to avoid noise-incompatible future land development.

Construction Noise Impacts

23CFR772 requires that construction noise be evaluated for all Type I and Type II projects. To perform an assessment of construction noise, land uses or activities that may be affected by noise from construction of the project must be identified. 23CFR772 does not specify specific methods or abatement criteria for evaluating construction noise. However, a reasonable analysis method such as FHWA Roadway Construction Noise Model (Federal Highway Administration 2006) must be used to determine whether construction would result in adverse construction noise impacts on land uses or activities in the project area.

Section 14-8.02, Noise Control, of Caltrans standard specifications provides information that can be considered in determining whether construction would result in adverse noise impacts. The specification states:

- Do not exceed 86 dBA at 50 feet from the job site activities from 9 p.m. to 6 a.m.
- Equip an internal combustion engine with the manufacturer-recommended muffler. Do not operate an internal combustion engine on the job site without the appropriate muffler.

If adverse construction noise impacts are anticipated, project plans and specifications must identify abatement measures that would minimize or eliminate adverse construction noise impacts on the community. When construction noise abatement is identified, Caltrans will consider the benefits achieved and the overall adverse social, economic, and environmental effects and costs of the construction noise abatement measures.

If noise barriers are planned as part of the project, Caltrans will consider constructing the barriers before beginning project construction, so that the barriers can reduce construction noise transmission to adjacent land uses. Barriers can be constructed before project construction through a separate

contract, or as a first phase of work under the project construction contract.

Noise Abatement

Abatement Alternatives in 23CFR772

If traffic noise impacts are predicted, noise abatement measures must be considered. Noise abatement is considered only where frequent human use occurs and where a lowered noise level would be of benefit. For noise abatement to be considered acoustically feasible, it must be predicted to provide at least a 5-decibel (dB) minimum reduction at an ***impacted receptor***. This reduction represents a "readily perceptible change" in the noise level as described in the TeNS.

Noise abatement measures that are determined feasible and reasonable and likely to be incorporated into the project must be identified before adoption of the CE, FONSI, or ROD.

According to 23CFR772(13)(c), Federal funding may be used for the following abatement measures.

1. Construction of noise barriers, including acquisition of property rights, either within or outside the highway right-of-way. Landscaping is not a viable noise abatement measure.
2. Traffic management measures including, but not limited to, traffic control devices and signing for prohibition of certain vehicle types, time-use restrictions for certain vehicle types, modified speed limits, and exclusive lane designations.
3. Alteration of horizontal and vertical alignments.
4. Acquisition of real property or interests therein (predominantly unimproved property) to serve as a buffer zone to preempt development which would be adversely impacted by traffic noise. This measure may be included in Type I projects only.
5. Noise insulation of Activity Category D land use facilities listed in Table 1. Post-installation maintenance and operational costs for noise insulation are not eligible for Federal-aid funding.

Design objectives and criteria for noise abatement measures are discussed in detail in Chapter 1100, "Noise Abatement," of the *Highway Design Manual*. Section 1101 contains general requirements, and Section 1102 discusses design criteria. The Caltrans Project Manager is responsible for

ensuring that the guidance and requirements in the most current version of the *Highway Design Manual* are implemented in the final design.

In addition, 23CFR772 now requires an acoustical design goal for noise abatement. The Caltrans acoustical design goal is that noise abatement must be predicted to provide at least 7 dB of noise reduction at one or more ***benefited receptors***. The NAC in Table 1 are not design goals for noise abatement, but rather are thresholds at which noise impacts are considered to occur.

Noise abatement measures that provide noise reduction of more than 5 dB are encouraged as long as they meet the reasonableness guidelines discussed under Reasonableness below. When a noise barrier is designed, its end locations should be determined by the impacted receptor only, not by any potentially benefited receptors that flank the barrier.

Feasibility

The feasibility of a noise abatement measure is an engineering consideration. Noise abatement must be predicted to reduce noise by at least 5 dB at an impacted receptor to be considered feasible from an acoustical perspective. As stated above, noise abatement measures that provide noise reduction of more than 5 dB are encouraged as long as they meet the reasonableness guidelines covered below.

Feasibility may be restricted by various factors, including topography, access requirements for driveways, presence of local cross streets, underground utilities, other noise sources in the area, and safety considerations. For safety reasons the Caltrans *Highway Design Manual* states that noise barriers should not exceed 14 feet in height (measured from the pavement surface at the face of the safety-shape barrier) when located 15 feet or less from the edge of the traveled way.

Reasonableness

The determination of the reasonableness of noise abatement is more subjective than the determination of its feasibility. As defined in Section 772.5 of the regulation, reasonableness is the combination of social, economic, and environmental factors considered in the evaluation of a noise abatement measure.

The overall reasonableness of noise abatement is determined by the following three factors.

- The noise reduction design goal.
- The cost of noise abatement.
- The viewpoints of benefited receptors (including property owners and residents of the benefited receptors).

23CFR772 lists optional reasonableness factors that may be considered. However, Caltrans is not not implementing any optional reasonableness factors in this Protocol. The reasonableness of noise abatement therefore is based only on the three required factors listed above. The Project Development Team will make the proposed noise abatement decisions that will be incorporated into the final environmental documentation. Any proposed changes to the noise abatement decision subsequent to adoption of the final environmental document must be reviewed with the District noise specialists to ensure adequate acoustic performance.

Noise Reduction Design Goal

23CFR722 requires that an acoustical design goal be applied to all noise abatement. Caltrans' acoustical design goal is that a barrier must be predicted to provide at least 7 dB of noise reduction at one or more benefited receptors. For a wall to be considered reasonable, the 7-dB design goal must be achieved at one or more benefited receptors. This design goal applies to any receptor and is not limited to impacted receptors.

Cost Considerations

Cost considerations for determining noise abatement reasonableness are evaluated by comparing reasonableness allowances and projected abatement costs. The following discussion provides detailed guidance for calculating reasonableness allowances for projected abatement.

Cost considerations in the reasonableness determination of noise abatement are based on a 2011 allowance per ***benefited receptor*** of $55,000. A benefited receptor is a dwelling unit that is predicted to receive a noise reduction of at least 5 dBA from the proposed noise abatement measure. A receptor can be a benefited receptor even if it is not subject to a traffic noise impact.

The 2011 allowance of $55,000 is based on the published Caltrans annual Construction Price Index (CPI). In the future, the base allowance will be adjusted based on the most recent annual CPI found on the Caltrans web site.

If the engineer's cost estimate for a given proposed noise abatement measure is less than the total reasonableness allowance for all benefited receptors, the noise abatement measure is considered to be reasonable from a cost perspective. The total reasonableness allowance for a given barrier is the reasonableness allowance per receptor multiplied by the number of benefited receptors for that barrier.

The cost calculations of the noise abatement measure must include all items appropriate and necessary for the construction of the noise abatement measure. Examples of cost items that should be included in estimating the construction cost of a noise abatement measure are traffic control, drainage modification, retaining walls, landscaping for graffiti abatement, and right-of-way costs. Only those costs directly related to the construction of the noise abatement should be included in the noise abatement construction estimate.

If visual mitigation requirements include the use of a transparent noise barrier or visual aesthetic treatments, the additional cost shall not be included in the abatement construction cost estimate for the purpose of determining reasonableness. If a retaining wall is a project feature for reasons other than constructing a noise barrier, the cost of the retaining wall is not included in the abatement construction cost estimate. If site conditions require a retaining wall or modification of a planned retaining wall for the proposed noise barrier foundation, the cost of the retaining wall or related modifications is included in the construction cost estimate.

To determine whether a cost is attributable to a noise abatement measure, it must be determined whether the cost would be necessary if no noise abatement measures were constructed. For example, only the portion of the traffic control, landscape, or retaining wall cost that is added because a noise abatement measure is being constructed should be attributed to the cost of the abatement.

The cost of implementing an absorptive surface on a noise barrier that is triggered by either of the conditions described below under Reflected Noise shall not be included in the cost of the abatement.

The reasonableness allowance discussed in this section is calculated independently from the estimated construction cost of the noise abatement measure. The reasonableness allowance is the maximum amount that reasonably should be spent on noise abatement and should be used for comparative purposes only. It should not be construed as a spending goal. If the estimated cost of the noise abatement measure is determined to be less than the reasonableness allowance and the noise abatement goals will be met, it is not necessary to increase spending for noise abatement to the maximum of the reasonableness allowance. However, an effort should be

made to achieve the greatest noise reduction possible within the calculated abatement allowance.

Normally, when abatement in the form of barriers is considered, barriers ranging in height from 6 to 16 feet are evaluated in 2-foot increments. A range of construction costs then can be calculated and compared to the allowance. Barriers more than 16 feet high must be considered if necessary to achieve acoustical feasibility (i.e., at least 5 dB of noise reduction) or reasonableness (i.e., to achieve the 7 dB design goal). Coordination with the project design team is needed to support the final height.

Viewpoints of Benefited Receptors

To evaluate the viewpoints of benefited receptors, letters are sent by registered mail to all property owners and non-owner occupants of benefited receptors asking them to provide a position either in favor of or in opposition to the proposed noise abatement by a specified deadline.

If more than 50% of the votes from responding benefited receptors oppose the abatement, the abatement will not be considered reasonable. Votes from property owners and non-owner occupants of benefited receptors will be surveyed. For owner-occupied dwelling units, the property owner gets one vote. For non-owner-occupied dwelling units, the renter gets 10% of one vote and the owner gets 90% of one vote.

For noise abatement to be located on private property, 100% of owners of property upon which the abatement is to be placed must support the proposed abatement. In the case of proposed noise abatement on private property, no response from a property owner, after a reasonable number of attempts, is considered a *no* vote.

Polling of benefited receptors should be completed prior to circulation of the draft environmental document. The results of the polling and the final reasonableness determination must be included in the CE, FONSI, or ROD.

Special Considerations

Following are special circumstances related to noise abatement.

Outside the Right-of-Way

Noise abatement measures normally are constructed within the State right-of-way. However, under certain topographical and geometric configurations, it may be more effective to construct noise abatement measures outside the right-of-way on private property. If it is determined that noise abatement should be considered for properties adjacent to the freeway and abatement in the State right-of-way is not feasible, construction outside the State right-of-way may be implemented under the conditions described below.

For a proposed abatement location outside the State right-of-way, a permanent easement must be secured for all affected properties to construct and maintain the noise abatement measure. The acquisition of this permanent easement is part of the abatement cost for the purposes of assessing reasonableness. If the noise abatement is determined not to be reasonable, the property owner may donate the permanent easement by signing a waiver of just compensation. Because noise abatement is a consideration, not a requirement, requesting donation of a permanent easement from the property owner when noise abatement is determined not to be reasonable is not a violation of the Uniform Relocation Assistance Act.

On a Federally funded project, FHWA (Caltrans as assigned) will hold Caltrans responsible for structural maintenance of the noise abatement measures. In most cases, right-of-way agreements require the property owner to perform routine maintenance on walls.

Additionally, all owners of property where barriers will be placed must support the proposed noise abatement measure, location, and materials to be used for construction. Each property owner must enter into a contract with Caltrans that specifies that they agree:

- To allow Caltrans personnel, representatives, and contractors to enter their property for purposes of constructing the noise abatement measure and all other related work.
- To allow Caltrans personnel and representatives to enter their property with appropriate prior notification for the purpose of periodic inspection or structural repair of the noise abatement measure.
- To accept aesthetic maintenance responsibility of their respective portion of the noise abatement measure upon its completion and to perpetuate the noise abatement measure's initial aesthetic qualities.
- Not to remove the noise abatement measure without full consent of all other affected property owners and Caltrans.

- That the contract provisions will be a permanent burden on the property involved. Caltrans District Right-of-Way will determine specific wording that, at a minimum, must include the following provision: "The term of this contract shall be a burden that runs with the land, and shall inure and be binding upon the successors, assignees, or transferees of the property owner."

Reflected Noise

In certain configurations, noise reflecting off reflective noise barriers (i.e., noise barriers constructed of noise-reflective materials) or structures can degrade the noise barriers' performance or cause noise increases in areas not protected by the barriers. To avoid this effect, Caltrans' standard practice is that walls be provided with an acoustically absorptive surface with a noise reduction coefficient of 0.80 or greater under either of the following conditions.

- The ratio of the spacing between new parallel barriers or retaining walls and the average height of the barriers or walls is 15:1 or less.
- Receptors on one side of the highway have a direct line of sight from an area of frequent human use that would benefit from a lowered noise level to a new barrier or new retaining wall on the opposite side of the highway.

For comparison with the reasonable allowance, the cost of implementing an absorptive surface that is triggered by either of the conditions described above shall not be included in the cost of the abatement.

Quiet Pavement

Quieter pavement currently is not listed in 23CFR772 as a noise abatement measure for which Federal funding may be used. Caltrans is actively researching the benefits of pavement types in reducing tire noise source levels to demonstrate the long-term noise abatement characteristics of quieter pavement. Information about the ongoing pavement research can be found on the Caltrans web site at:

http://www.dot.ca.gov/hq/esc/Translab/ope/QuieterPavements.html

In some special circumstances, Caltrans may consider using State-only funds to pay for quieter pavement to reduce traffic noise.

Acoustical Analyst Qualifications

Any lead acoustical analyst or staff member responsible for the assessment of traffic noise impacts, traffic noise abatement, or review and approval of final noise reports shall at a minimum have a BS or BA degree in a related field and 5 years of demonstrated experience.

In lieu of 5 years of experience, equivalent qualifications as determined by the Caltrans Environmental Analysis Division or successful completion of all of the following will be allowed:

- INCE Fundamentals examination;
- FHWA course, The Fundamentals and Abatement of Highway Traffic Noise; and
- NHI Course 142051 Highway Traffic Noise.

Noise Analysis Process Summary

Figure 1 contains a flow chart of the highway noise analysis process. The following discussion describes the process.

If the project is exempt from analysis under 23CFR772 (i.e., it is a Type III project, but it is not a Type I project or Type II project), or if no traffic noise impacts are predicted under 23CFR772, no evaluation of abatement is necessary. The project sponsor must report in the applicable draft environmental documentation that the project is exempt from 23CFR772, or that no traffic noise impacts under 23CFR772 are predicted and no noise abatement is required.

If traffic noise impacts are predicted, however, noise abatement must be considered. Information on the acoustic feasibility of noise abatement and noise abatement allowances for a range of noise barrier heights is reported in the noise study report. A specific recommended noise barrier height and information on construction costs are not presented in the noise study report.

The noise abatement recommendation is made after the abatement noise reductions, reasonableness allowances, and construction costs have been calculated and after the viewpoints of benefited receptors have been surveyed. There are two possible outcomes, as described below.

- **Outcome 1:** If the proposed abatement is predicted to provide at least 5 dB of noise reduction, has an estimated cost of construction less than the calculated reasonableness allowance, is acceptable to property

owners/residents, and meets the design goal, the noise abatement is determined to be feasible and reasonable and therefore is recommended. The recommendation is reported in the Noise Abatement Decision Report (NADR) and applicable draft environmental documentation. The following statement of likelihood shall be included in both the NADR and the NEPA portions of the draft and final environmental documentation:

> Based on the studies so far accomplished, Caltrans intends to incorporate noise abatement measures in the form of (a) barrier(s) at **[location]**, with respective lengths and average heights of **[total length and average height measurement]**. Calculations based on preliminary design data indicate that the barrier(s) will reduce noise levels by 5 to **[number]** dBA. If during final design the project has substantially changed, noise barriers might not be provided. The final decision regarding the construction of noise barriers will be made after completion of the public involvement process during the final project design process.

Similar language must be provided for other non-barrier abatement.

- **Outcome 2:** If traffic noise impacts are predicted and the proposed noise abatement is not feasible or reasonable, noise abatement is not recommended. This conclusion is reported in the NADR and applicable draft environmental documentation. The project sponsor states in the NADR and applicable draft environmental documentation that traffic noise impacts exist for which no noise abatement measures are feasible and reasonable. The reasons for this conclusion are also provided.

The final reasonableness determination is included in the CE, FONSI, or ROD.

Section 4

Type II: Retrofit Noise Abatement Projects

This section addresses retrofit noise abatement on existing transportation facilities for projects proposed within the State right-of-way or projects proposed by any agency using Type II Federal-aid funds under 23 CFR 772. Under current State law, regional transportation planning agencies (RTPAs), rather than Caltrans, are responsible for sponsoring retrofit noise abatement projects. However, abatement proposed for construction within the State right-of-way must be approved by Caltrans and therefore must meet certain minimum requirements as described in this section. In addition, 23 CFR 772 requires that each state that chooses to participate in a Type II program develop a priority system for Type II barriers based on a variety of factors, to rank the projects in the program. Although Caltrans does not directly control funds used by RTPAs for Type II projects, FHWA requires that each state highway agency develop and oversee the priority system used. Retrofit noise abatement discussed in this section applies to all activity categories in Table 1. In identifying areas for retrofit noise abatement, primary consideration must be given to exterior areas. Noise abatement is considered only where frequent human use occurs and a lowered noise level would be beneficial.

Eligibility and Funding

The development and implementation of retrofit noise abatement is an optional program under 23CFR772. Information in this section applies only to retrofit abatement projects proposed within the State right-of-way or projects proposed by any agency using Type II Federal-aid funds. Retrofit noise abatement projects can be eligible for Federal participation if projects are classified as Type II as defined in 23CFR772.5. All Type II projects require approval from FHWA (Caltrans, as assigned). A CE (non-programmatic) is the lowest level of NEPA document allowed for Type II projects.

When Type II projects are proposed for Federal-aid highway participation, the applicable provisions in 23CFR772.15 apply. RTPAs using Federal funds for retrofit noise abatement must follow the requirements of 23CFR772 and either the provisions of this chapter or those of a Federally approved noise abatement policy. Approval of a Type II policy that is

different from the policy described herein is granted by FHWA on a case-by-case basis, with recommendation by and through Caltrans.

23CFR772.15 identifies the following restrictions for Type II projects.

1. No funds made available out of the Highway Trust Fund may be used to construct Type II noise barriers, as defined by this regulation, if such noise barriers were not part of a project approved by the FHWA before November 28, 1995.
2. Federal funds are available for Type II noise barriers along lands that were developed or were under substantial construction before approval of the acquisition of the rights-of-ways for, or construction of, the existing highway.
3. FHWA (Caltrans, as assigned) will not approve noise abatement measures for locations where such measures were previously determined not to be feasible and reasonable for a Type I project.

Qualification Criteria

Caltrans has established the following criteria for retrofit noise abatement proposed within the State right-of-way.

- Activity areas must have been developed before construction of the highway or before any expansion or alteration of the highway that would result in increased traffic noise at the residential areas.
- Existing worst-hour noise level at activity areas must exceed the applicable noise abatement criterion in Table 1.
- Any other FHWA-approved criteria established and implemented by sponsoring RTPAs responsible for retrofit noise abatement program must be met.

Type II Project Priority

As discussed above, FHWA requires that each state highway agency develop and oversee a system to prioritize Type II projects. Caltrans will develop a priority system in coordination with RTPAs in the state and will then submit the proposed system to FHWA for approval. Proposed Type II projects that do not have approved funding and environmental clearance before July 13, 2011, will not be allowed to use Federal-aid funds in the program until the priority system has been approved by FHWA. Caltrans will reanalyze the priority system on a regular interval, not to exceed 5 years.

Impact Analysis

All noise measurements and analysis must be performed in accordance with guidance in the TeNS. All analysis and modeling must be conducted with Caltrans-approved models.

Noise Abatement

Feasibility

For the proposed noise abatement measure to be considered feasible, the noise abatement must be designed to provide a minimum of 5 dBA of noise reduction at impacted receptors. The feasibility criterion is not necessarily a ***noise abatement design*** goal; larger noise reductions are encouraged if they can be achieved within the noise abatement allowance.

Reasonableness

In addition to meeting the feasibility criteria, the proposed noise abatement must be reasonable. A reasonable cost allowance calculation procedure must be established and updated by the sponsoring RTPAs for each responsible region. The reasonable cost allowance calculation procedure must be consistent with the allowance calculation procedure used by Caltrans and must be approved by Caltrans.

The noise abatement recommendation is subject to revision after public and environmental review of the project. As part of this, the viewpoints of benefited receptors must be evaluated and documented. To do this, letters are sent via registered mail to all property owners and non-owner occupants of benefited receptors asking them to provide a position either in favor of or in opposition to the proposed noise abatement by a specified deadline.

If more than 50% of the votes from responding benefited receptors oppose the abatement, the abatement will not be considered reasonable. Votes from property owners and non-owner occupants of benefited receptors will be surveyed. For owner-occupied dwelling units, the property owner gets one vote. For non-owner-occupied dwelling units, the renter gets 10% of one vote and the owner gets 90% of one vote.

For noise abatement to be located on private property, 100% of owners of property upon which the abatement is to be placed must support the

proposed abatement. In the case of proposed noise abatement on private property, no response from a property owner, after a reasonable number of attempts, is considered a *no* vote.

The results of the polling and the final reasonableness determination must be included in the CE.

Design Criteria

The design of noise abatement must be consistent with the guidance and requirements in the Caltrans *Highway Design Manual*. Guidance also can be found in the *Project Development Procedures Manual* (Chapter 30). In addition, 23CFR722 now requires that an acoustical design goal be applied to all noise abatement. Caltrans' acoustical design goal is that a barrier must provide at least 7 dB of noise reduction at one or more benefited receptors. This design goal applies to any receptor and is not limited to impacted receptors.

Other Abatement Considerations

As discussed above under Reflected Noise, certain configurations may exist where noise reflecting off reflective noise barriers (i.e., noise barriers constructed of noise-reflective materials) or structures can degrade the noise barriers' performance or cause noise increases in areas not protected by the barriers. To avoid this effect on Type II projects, Caltrans' standard practice is that walls be provided with an acoustically absorptive surface with a noise reduction coefficient of 0.80 or greater under either of the following conditions.

- The ratio of the spacing between new parallel barriers or retaining walls and the average height of the barriers or walls is 15:1 or less.
- Receptors on one side of the highway have a direct line of sight to a new barrier or new retaining wall on the opposite side of the highway.

When evaluating reasonableness from a cost perspective the cost of implementing an absorptive surface that is triggered by either of the conditions described above shall not be included in the cost of the abatement.

Noise Study Report

The noise study report format and contents, presentation of methods and results of the traffic noise analysis, and presentation of data supporting the conclusions must be in accordance with noise study report guidance in the TeNS.

Noise Abatement Decision

The decision on retrofit noise abatement measures is made by the project proponent, considering the results of the reasonableness determination and information collected during the public input process. The viewpoints of benefited receptors are considered in reaching a final decision on the noise abatement measures to be provided. For noise abatement to be located on private property, 100% of owners of property upon which the abatement is to be placed must support the proposed abatement.

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Section 5

Noise Documentation

This section discusses the various reports that are prepared to document the noise analysis process.

- Noise Study Report
- Noise Abatement Decision Report
- Draft Environmental Documentation
- Final Environmental Documentation

Noise Study Report

Before adoption of the CE, FONSI, or ROD, 23CFR772 requires the identification of noise abatement that is feasible and reasonable and likely to be incorporated into the project. The noise study report is a technical document that identifies traffic noise impacts, acoustically feasible abatement, and reasonable cost allowances for noise abatement. The noise study report shall include a discussion of each of the following items.

- Existing land uses in the vicinity of project alternatives.
- Existing undeveloped land uses for which development is permitted in the vicinity of project alternatives.
- Existing and predicted design-year traffic noise levels at all existing and permitted land uses in the project area under each project alternative, including the No-Build Alternative.
- Traffic noise impacts predicted to occur for each project alternative.
- Noise abatement evaluated, including proposed abatement locations and a discussion of acoustical feasibility and reasonableness allowances.
- Construction noise and measures to minimize or eliminate adverse construction noise impacts.

The non-acoustical feasibility of the noise abatement considered is addressed by the project engineer in the NADR (see Noise Abatement Decision Report below). Non-acoustical feasibility is determined based on

issues such as geometric standards, property access, safety, maintenance, and security. The TeNS provides detailed guidance on noise study report preparation. An annotated outline for noise study reports is provided on the Caltrans website at: http://www.dot.ca.gov/ser/forms.htm

Noise Abatement Decision Report

The NADR is a design responsibility and is prepared to compile information from the noise study report, other relevant environmental studies, and design considerations into a single, comprehensive document before public review of the project. The NADR is prepared by the project engineer after completion of the noise study report and prior to publication of the draft environmental document. The NADR shall include noise abatement construction cost estimates that have been prepared and signed by the project engineer based on site-specific conditions. Chapter 30 of the *Design Development Procedures Manual* describes the reporting requirements for the NADR:
http://www.dot.ca.gov/hq/oppd/pdpm/chap_pdf/chapt30.pdf

The following data are to be included in the NADR.

- Noise abatement reasonableness allowances presented in the noise study report.
- Acoustical feasibility of noise abatement presented in the noise study report.
- Locations and dimensions of noise barriers evaluated.
- Approved cost estimates of acoustically feasible noise abatement.
- Non-acoustical feasibility issues of proposed noise abatement based on the best available design information available.
- Effects of abatement, including effects on cultural resources, scenic views, hazardous materials, biological resources, and other known social, economic, legal, and technical factors.

The NADR shall include a table that summarizes key information related to the proposed noise abatement.

The discussion of secondary effects in the NADR will likely be preliminary because a more detailed analysis of these effects will be contained in the draft environmental document as appropriate. The purpose of presenting the information in the NADR is to highlight the fact that these secondary effects may occur.

The NADR presents the noise abatement recommendation based on acoustical and non-acoustical feasibility factors, noise abatement allowances, and the project engineer's noise abatement construction cost estimate. The NADR does not present the final decision regarding noise abatement. Rather, it presents key information on abatement to be considered in the environmental review process that is based on the best information available at the time the project is subject to public review.

The noise abatement recommendation identified in the NADR will become the proposed noise abatement decision unless compelling information received during the public review or the final design process indicates that it should be changed. The proposed noise abatement decision is included in the final environmental document for approval by Caltrans and FHWA (Caltrans, as assigned). A template for the NADR is available at: http://www.dot.ca.gov/hq/env/noise/.

Draft Environmental Documentation

The draft environmental document and responses to comments on the document through the NEPA or CEQA review process are the primary means of conveying information on noise impacts and abatement to the public. The information in the draft environmental documentation is used to obtain formal input from the adjacent landowners, local community, and general public on the proposed abatement measures.

The noise study report and the NADR shall be completed before the draft environmental document is made available for public review. For the purpose of completing the draft environmental document, the noise study report must include predicted noise levels in the design year for all alternatives, including the No-Build Alternative. If impacts on other resources would result from the proposed noise abatement, these impacts must be summarized in the draft environmental documentation. The noise study report and NADR should be made available for public inspection during the public comment period.

Final Environmental Documentation

Before adoption of a CE, FONSI, or ROD, 23CFR772 requires the identification of noise abatement measures that are reasonable, feasible, and likely to be incorporated into the project. In addition environmental documentation must also identify noise impacts for which no noise abatement measures are feasible and reasonable. Input received from benefited receptors (including property owners and non-owner occupants)

and through the environmental review process is considered in the noise abatement decision. The noise abatement decision must be reported in the final environmental documentation, along with a statement that the noise abatement might change or might not be provided if the project changes substantially during final design.

Categorical Exclusions

There is no formal public review process for Categorical Exclusions. In cases in which Caltrans proposes noise abatement, Caltrans endeavors to engage the public in the noise abatement decision process. The information in the noise study report and the NADR is used to obtain input from the adjacent property owners, local community, and general public on the proposed abatement measures.

Final Design Considerations

A noise impact analysis typically is based on a preliminary design. The project design may change between the start of the environmental review process and the final design. Changes in the design that could affect noise impacts from a preliminary design or the effectiveness of noise abatement from that design must be evaluated. Because the noise analyst might not be contacted regarding these design changes, it is good practice for the noise analyst to contact the project engineer periodically during plan, specification, and estimate development to keep informed of significant design changes. If the project is changed in a way that would affect the acoustical performance of a barrier, the barrier design must be modified if practical to achieve the noise reduction goals of the original design.

The final step in the noise abatement process is to prepare the final noise abatement/mitigation design and specifications in accordance with the requirements of 23CFR772, NEPA, and CEQA. Barrier data shall be included in the 100% Plans, Specifications, and Estimates as part of the Districts' Ready-to-List data.

23CFR772.13 requires that Caltrans maintain an inventory of all constructed noise abatement measures. The following information must be provided to Caltrans Headquarters once the final design for each barrier is complete.

- cost (overall cost, unit cost per/sq. ft.)
- average height, length, area

- location (state, county, city, route)
- year of construction
- average insertion loss/noise reduction as reported by the model in the noise analysis
- NAC category(s) protected
- material(s) used
- features (absorptive, reflective, surface texture)
- foundation (ground mounted, on structure)
- project type (Type I, Type II)

If noise impacts or noise abatement measures change after approval of the final environmental documentation, FHWA (Caltrans, as assigned) must be consulted to determine whether a written reevaluation or other document is required.

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Section 6
Liaison with Local Agencies

In order to minimize future traffic noise impacts on currently undeveloped lands adjacent to Type I projects, Caltrans is required under 23CFR772.17 to provide information on noise to local officials within whose jurisdiction the highway project is located. This includes information on noise-compatible planning concepts and a best estimate of the future design-year noise levels at various distances from the edge of the nearest travel lane of the highway improvement where the future noise levels "approach" (i.e., are within 1 dB of) the applicable NAC for undeveloped lands or properties within the project limits. At a minimum, Caltrans will identify the distance to each exterior NAC listed in Table 1. This approach may be appropriate in situations where potential future land use types have not yet been identified.

Caltrans also is required to inform local officials regarding eligibility requirements for Type II projects identified in 23CFR772.15(b).

Typically, local agencies place conditions on new subdivisions that require the developer to provide ***noise mitigation*** where noise exceeds or is predicted to exceed noise-compatibility standards adopted by the agency. Noise studies prepared for local agency projects often are evaluated in terms of 24-hour metrics such as the day-night level (L_{dn}) or the community noise equivalent level (CNEL). For the purposes of complying with 23CFR772 and this Protocol, noise levels must be expressed in terms of worst-hour equivalent sound level (L_{eq}[h]).

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Section 7
CEQA and NEPA Considerations

As discussed in Chapter 1, the purpose of the Protocol is to present Caltrans policies and procedures for applying 23CFR772 in California. As part of the environmental review process, noise impacts under CEQA and NEPA must be evaluated. The following discussion is an overview of how noise impacts should be addressed under CEQA and NEPA for projects involving Caltrans.

CEQA

Approach to Assessing CEQA Noise Impacts

Under CEQA, a determination must be made as to whether the proposed project will result in significant adverse environmental effects (i.e., significant environmental impacts). A significant environmental effect under CEQA generally is defined as a substantial or potentially substantial adverse change in the physical environment.

The increase in traffic noise caused by a project is the primary factor considered by Caltrans in assessing the significance of noise impacts under CEQA. The other key factor is the modeled absolute future noise level.

A CEQA analysis must include a description of the physical environmental conditions in the vicinity of the project that existed on the date that the notice of preparation (NOP) was published, or if no NOP is published, the date that the environmental analysis was begun. Section 15125 of the State CEQA Guidelines states that this environmental setting normally will constitute the baseline physical conditions by which a lead agency determines whether an impact is significant. Because CEQA focuses on comparisons to the existing conditions baseline, Caltrans determines the significance of noise impacts under CEQA based on a comparison of design-year with-project conditions to the existing conditions baseline.

The significance of noise impacts under CEQA is determined by the Project Development Team based on the project-related increase in noise

and other project-specific conditions. No single numerical threshold is used on all projects. In the past, Caltrans definition for a *substantial* increase in noise (defined in the Protocol as a 12 dB increase between existing and design-year with-project conditions) has been used. This 12 dB increase should not necessarily be used for all projects. There could be cases where an increase less than 12 dB would approach significance (such as a quiet rural environment) or where a 12 dB increase would not necessarily be deemed significant (noisy urban environment.) It is important to note as well that a 3 dBA difference is generally the point at which the human ear will perceive a difference in noise level.

The absolute future noise level predicted is also a key factor in determining significance. If two people are speaking, 67 dBA is the approximate noise level at which human speech is interfered with. Therefore, if the absolute future noise level is less than 67 dBA, that may be a factor in determining that the noise impact is less than significant. Lastly, in determining significance under CEQA, it is important to take into account the setting of the impact. According to State CEQA Guidelines, Section 15064(b),

> an ironclad definition of significant effect is not always possible because the significance of an activity may vary with the setting. For example, an activity which may not be significant in an urban area may be significant in a rural area.

The determination of CEQA significance therefore is left to the Project Development Team for each project because the team is the most knowledgeable about the specifics of the project area and is in the best position to make the significance determination. The CEQA significance determination is disclosed in the environmental document, not in the noise technical report or the NADR.

It is important that the Project Development Team makes this CEQA significance determination in a well-documented and substantiated manner. Under CEQA, if the determination is made that a noise impact is significant, mitigation that is determined to be feasible must be incorporated into the project. If at a later date that mitigation is dropped from the project, the CEQA environmental document must be recirculated for public review and comment. This is a distinct difference between CEQA and 23CFR772/NEPA.

Documentation of CEQA Noise Impacts

For projects with Federal funding, the Noise Study Report that is prepared for environmental documentation should address 23CFR772 only and

should present the data needed to address CEQA impacts without making the determination of CEQA significance. In this case, the significance of CEQA noise impacts is addressed only in the environmental document. An exception to this occurs when there is no Federal funding on a project and Caltrans is still involved. This could occur on a project that is locally funded but is located on a State highway. In this case, the Noise Study Report does not address 23CFR772 and should address CEQA noise impacts using only the approach described above. This information then is reported in the environmental document as well.

In some cases Caltrans delegates its CEQA lead agency authority to a local agency. Because the lead agency is acting as Caltrans' representative, the Caltrans approach to determining the significance of noise impacts described above still should be used. There may be situations where the local agency may want to address CEQA noise impacts in the environmental document using local noise metrics and methods. This approach may be taken if there is mutual agreement between Caltrans and the local agency.

NEPA

Approach to Assessing NEPA Noise Impacts

A primary difference between NEPA and CEQA is that under NEPA the significance of impacts is not identified on a resource-by-resource basis. Rather, the environmental effects of the project on all resources are considered in determining whether the project as a whole will result in a significant impact. This determination is used primarily to determine the type of NEPA document to be prepared. If project impacts can be mitigated, typically an environmental assessment (EA) will be prepared. If mitigation is not feasible, an environmental impact statement (EIS) is prepared.

Unlike CEQA, NEPA typically focuses on the No-Action or No-Build Alternative rather than existing conditions for the purposes of assessing the potential consequences of project-related changes. In the case of noise, the effect of the project is determined by comparing noise under design-year with-project conditions to noise under design-year no-build conditions. There are no specific thresholds for assessing this incremental project-related increase in noise under NEPA. Rather, the technical information simply is reported and then considered along with the project-related effects on other resources and the context and intensity of noise effects to determine whether the impact of the project as a whole is

significant. When discussing noise impacts under NEPA, no qualifiers such as *significant, adverse,* or *moderate* are used.

In general NEPA noise mitigation above and beyond abatement required under 23CFR772 rarely would be considered or required.

Documentation of NEPA Noise Impacts

Noise impacts under NEPA are not specifically discussed in the Noise Study Report. The Noise Study Report should, however, evaluate noise under design-year no-build conditions (the No-Build Alternative). From this and noise levels predicted for design-year with-project conditions, NEPA noise impact conclusions can be made.

Appendix A

Title 23, Part 772, Code of Federal Regulations

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PART 772—PROCEDURES FOR ABATEMENT OF HIGHWAY TRAFFIC NOISE AND CONSTRUCTION NOISE

Sec.

772.1 Purpose.
772.3 Noise standards.
772.5 Definitions.
772.7 Applicability.
772.9 Traffic noise prediction.
772.11 Analysis of traffic noise impacts.
772.13 Analysis of noise abatement.
772.15 Federal participation.
772.17 Information for local officials.
772.19 Construction noise.
Table 1 to Part 772—Noise Abatement Criteria

Authority: 23 U.S.C. 109(h) and (i); 42 U.S.C. 4331, 4332; sec. 339(b), Pub. L. 104–59, 109 Stat. 568, 605; 49 CFR 1.48(b).

§ 772.1 Purpose.

To provide procedures for noise studies and noise abatement measures to help protect the public's health, welfare and livability, to supply noise abatement criteria, and to establish requirements for information to be given to local officials for use in the planning and design of highways approved pursuant to title 23 U.S.C.

§ 772.3 Noise standards.

The highway traffic noise prediction requirements, noise analyses, noise abatement criteria, and requirements for informing local officials in this regulation constitute the noise standards mandated by 23 U.S.C. 109(1). All highway projects which are developed in conformance with this regulation shall be deemed to be in accordance with the FHWA noise standards.

§ 772.5 Definitions.

Benefited Receptor. The recipient of an abatement measure that receives a noise reduction at or above the minimum threshold of 5 dB(A), but not to exceed the highway agency's reasonableness design goal.

Common Noise Environment. A group of receptors within the same Activity Category in Table 1 that are exposed to similar noise sources and levels; traffic volumes, traffic mix, and speed; and topographic features. Generally, common noise environments occur between two secondary noise sources, such as interchanges, intersections, cross-roads.

Date of Public Knowledge. The date of approval of the Categorical Exclusion (CE), the Finding of No Significant Impact (FONSI), or the Record of Decision (ROD), as defined in 23 CFR part 771.

Design Year. The future year used to estimate the probable traffic volume for which a highway is designed.

Existing Noise Levels. The worst noise hour resulting from the combination of natural and mechanical sources and human activity usually present in a particular area.

Feasibility. The combination of acoustical and engineering factors considered in the evaluation of a noise abatement measure.

Impacted Receptor. The recipient that has a traffic noise impact.

L10. The sound level that is exceeded 10 percent of the time (the 90th percentile) for the period under consideration, with L10(h) being the hourly value of L10.

Leq. The equivalent steady-state sound level which in a stated period of time contains the same acoustic energy as the time-varying sound level during the same time period, with Leq(h) being the hourly value of Leq.

Multifamily Dwelling. A residential structure containing more than one residence. Each residence in a multifamily dwelling shall be counted as one receptor when determining impacted and benefited receptors.

Noise Barrier. A physical obstruction that is constructed between the highway noise source and the noise sensitive receptor(s) that lowers the noise level, including stand alone noise walls, noise berms (earth or other material), and combination berm/wall systems.

Noise Reduction Design Goal. The optimum desired dB(A) noise reduction determined from calculating the difference between future build noise levels with abatement, to future build noise levels without abatement. The noise reduction design goal shall be at least 7 dB(A), but not more than 10 dB(A).

Permitted. A definite commitment to develop land with an approved specific design of land use activities as evidenced by the issuance of a building permit.

Property Owner. An individual or group of individuals that holds a title, deed, or other legal documentation of ownership of a property or a residence.

Reasonableness. The combination of social, economic, and environmental factors considered in the evaluation of a noise abatement measure.

Receptor. A discrete or representative location of a noise sensitive area(s), for any of the land uses listed in Table 1.

Residence. A dwelling unit. Either a single family residence or each dwelling unit in a multifamily dwelling.

Statement of Likelihood. A statement provided in the environmental clearance document based on the feasibility and reasonableness analysis completed at the time the environmental document is being approved.

Substantial Construction. The granting of a building permit, prior to right-of-way acquisition or construction approval for the highway.

Substantial noise increase. One of two types of highway traffic noise impacts. For a Type I project, an increase in noise levels of 5 to 15 dB(A) in the design year over the existing noise level.

Traffic Noise Impacts. Design year build condition noise levels that approach or exceed the NAC listed in Table 1 for the future build condition; or design year build condition noise levels that create a substantial noise increase over existing noise levels.

Type I Project. (1) The construction of a highway on new location; or,

(2) The physical alteration of an existing highway where there is either:

(i) Substantial Horizontal Alteration. A project that halves the distance between the traffic noise source and the closest receptor between the existing condition to the future build condition; or,

(ii) Substantial Vertical Alteration. A project that removes shielding therefore exposing the line-of-sight between the receptor and the traffic noise source. This is done by either altering the vertical alignment of the highway or by altering the topography between the highway traffic noise source and the receptor; or,

(3) The addition of a through-traffic lane(s). This includes the addition of a through-traffic lane that functions as a HOV lane, High-Occupancy Toll (HOT) lane, bus lane, or truck climbing lane; or,

(4) The addition of an auxiliary lane, except for when the auxiliary lane is a turn lane; or,

(5) The addition or relocation of interchange lanes or ramps added to a quadrant to complete an existing partial interchange; or,

(6) Restriping existing pavement for the purpose of adding a through-traffic lane or an auxiliary lane; or,

(7) The addition of a new or substantial alteration of a weigh station, rest stop, ride-share lot or toll plaza.

(8) If a project is determined to be a Type I project under this definition then the entire project area as defined in the environmental document is a Type I project.

Type II Project. A Federal or Federal-aid highway project for noise abatement on an existing highway. For a Type II project to be eligible for Federal-aid funding, the highway agency must develop and implement a Type II program in accordance with section 772.7(e).

Type III Project. A Federal or Federal-aid highway project that does not meet the classifications of a Type I or Type II project. Type III projects do not require a noise analysis.

§ 772.7 Applicability.

(a) This regulation applies to all Federal or Federal-aid Highway Projects authorized under title 23, United States Code. Therefore, this regulation applies to any highway project or multimodal project that:

(1) Requires FHWA approval regardless of funding sources, or

(2) Is funded with Federal-aid highway funds.

(b) In order to obtain FHWA approval, the highway agency shall develop noise policies in conformance with this regulation and shall apply these policies uniformly and consistently statewide.

(c) This regulation applies to all Type I projects unless the regulation specifically indicates that a section only applies to Type II or Type III projects.

(d) The development and implementation of Type II projects are not mandatory requirements of section 109(i) of title 23, United States Code.

(e) If a highway agency chooses to participate in a Type II program, the highway agency shall develop a priority system, based on a variety of factors, to rank the projects in the program. This priority system shall be submitted to and approved by FHWA before the highway agency is allowed to use Federal-aid funds for a project in the program. The highway agency shall re-analyze the priority system on a regular interval, not to exceed 5 years.

(f) For a Type III project, a highway agency is not required to complete a noise analysis or consider abatement measures.

§ 772.9 Traffic noise prediction.

(a) Any analysis required by this subpart must use the FHWA Traffic Noise Model (TNM), which is described in "FHWA Traffic Noise Model" Report No. FHWA–PD–96–010, including Revision No. 1, dated April 14, 2004, or any other model determined by the FHWA to be consistent with the methodology of the FHWA TNM. These publications are incorporated by reference in accordance with section 552(a) of title 5, U.S.C. and part 51 of title 1, CFR, and are on file at the National Archives and Record Administration (NARA). For information on the availability of this material at NARA, call (202) 741–6030 or go to *http://www.archives.gov/federal_register/code_of_federal_regulations/ibr_locations.html.* These documents are available for copying and inspection at the Federal Highway Administration, 1200 New Jersey Avenue, SE., Washington, DC 20590, as provided in part 7 of title 49, CFR. These documents are also available on the FHWA's Traffic Noise Model Web site at the following URL: *http://www.fhwa.dot.gov/environment/noise/index.htm.*

(b) Average pavement type shall be used in the FHWA TNM for future noise level prediction unless a highway agency substantiates the use of a different pavement type for approval by the FHWA.

(c) Noise contour lines may be used for project alternative screening or for land use planning to comply with § 772.17 of this part, but shall not be used for determining highway traffic noise impacts.

(d) In predicting noise levels and assessing noise impacts, traffic characteristics that would yield the worst traffic noise impact for the design year shall be used.

§ 772.11 Analysis of traffic noise impacts.

(a) The highway agency shall determine and analyze expected traffic noise impacts.

(1) For projects on new alignments, determine traffic noise impacts by field measurements.

(2) For projects on existing alignments, predict existing and design year traffic noise impacts.

(b) In determining traffic noise impacts, a highway agency shall give primary consideration to exterior areas where frequent human use occurs.

(c) A traffic noise analysis shall be completed for:

(1) Each alternative under detailed study;

(2) Each Activity Category of the NAC listed in Table 1 that is present in the study area;

(i) *Activity Category A.* This activity category includes the exterior impact criteria for lands on which serenity and quiet are of extraordinary significance and serve an important public need, and where the preservation of those qualities is essential for the area to continue to serve its intended purpose. Highway agencies shall submit justifications to the FHWA on a case-by-case basis for approval of an Activity Category A designation.

(ii) *Activity Category B.* This activity category includes the exterior impact criteria for single-family and multifamily residences.

(iii) *Activity Category C.* This activity category includes the exterior impact criteria for a variety of land use facilities. Each highway agency shall adopt a standard practice for analyzing these land use facilities that is consistent and uniformly applied statewide.

(iv) *Activity Category D.* This activity category includes the interior impact criteria for certain land use facilities listed in Activity Category C that may have interior uses. A highway agency shall conduct an indoor analysis after a determination is made that exterior abatement measures will not be feasible and reasonable. An indoor analysis shall only be done after exhausting all outdoor analysis options. In situations where no exterior activities are to be affected by the traffic noise, or where the exterior activities are far from or physically shielded from the roadway in a manner that prevents an impact on exterior activities, the highway agency shall use Activity Category D as the basis of determining noise impacts. Each highway agency shall adopt a standard practice for analyzing these land use facilities that is consistent and uniformly applied statewide.

(v) *Activity Category E.* This activity category includes the exterior impact criteria for developed lands that are less sensitive to highway noise. Each highway agency shall adopt a standard practice for analyzing these land use facilities that is consistent and uniformly applied statewide.

(vi) *Activity Category F.* This activity category includes developed lands that are not sensitive to highway traffic noise. There is no impact criteria for the land use facilities in this activity category and no analysis of noise impacts is required.

(vii) *Activity Category G.* This activity includes undeveloped lands.

(A) A highway agency shall determine if undeveloped land is permitted for development. The milestone and its associated date for acknowledging when undeveloped land is considered permitted shall be the date of issuance of a building permit by the local jurisdiction or by the appropriate governing entity.

(B) If undeveloped land is determined to be perrmitted, then the highway agency shall assign the land to the appropriate Activity Category and analyze it in the same manner as developed lands in that Activity Category.

(C) If undeveloped land is not permitted for development by the date of public knowledge, the highway agency shall determine noise levels in accordance with 772.17(a) and document the results in the project's environmental clearance documents and noise analysis documents. Federal participation in noise abatement measures will not be considered for lands that are not permitted by the date of public knowledge.

(d) The analysis of traffic noise impacts shall include:

(1) Identification of existing activities, developed lands, and undeveloped lands, which may be affected by noise from the highway;

(2) For projects on new or existing alignments, validate predicted noise level through comparison between measured and predicted levels;

(3) Measurement of noise levels. Use an ANSI Type I or Type II integrating sound level meter;

(4) Identification of project limits to determine all traffic noise impacts for the design year for the build alternative. For Type II projects, traffic noise impacts shall be determined from current year conditions;

(e) Highway agencies shall establish an approach level to be used when determining a traffic noise impact. The approach level shall be at least 1 dB(A) less than the Noise Abatement Criteria for Activity Categories A to E listed in Table 1 to part 772;

(f) Highway agencies shall define substantial noise increase between 5 dB(A) to 15 dB(A) over existing noise levels. The substantial noise increase criterion is independent of the absolute noise level.

(g) A highway agency proposing to use Federal-aid highway funds for a Type II project shall perform a noise analysis in accordance with § 772.11 of this part in order to provide information needed to make the determination required by § 772.13(a) of this part.

§ 772.13 Analysis of noise abatement.

(a) When traffic noise impacts are identified, noise abatement shall be considered and evaluated for feasibility and reasonableness. The highway agency shall determine and analyze alternative noise abatement measures to abate identified impacts by giving weight to the benefits and costs of abatement and the overall social, economic, and environmental effects by using feasible and reasonable noise abatement measures for decision-making.

(b) In abating traffic noise impacts, a highway agency shall give primary consideration to exterior areas where frequent human use occurs.

(c) If a noise impact is identified, a highway agency shall consider abatement measures. The abatement measures listed in § 772.15(c) of this part are eligible for Federal funding.

(1) At a minimum, the highway agency shall consider noise abatement in the form of a noise barrier.

(2) If a highway agency chooses to use absorptive treatments as a functional enhancement, the highway agency shall adopt a standard practice for using absorptive treatment that is consistent and uniformly applied statewide.

(d) Examination and evaluation of feasible and reasonable noise abatement measures for reducing the traffic noise impacts. Each highway agency, with FHWA approval, shall develop feasibility and reasonableness factors.

(1) Feasibility:

(i) Achievement of at least a 5 dB(A) highway traffic noise reduction at impacted receptors. The highway agency shall define, and receive FHWA approval for, the number of receptors that must achieve this reduction for the noise abatement measure to be acoustically feasible and explain the basis for this determination; and

(ii) Determination that it is possible to design and construct the noise abatement measure. Factors to consider are safety, barrier height, topography, drainage, utilities, and maintenance of

the abatement measure, maintenance access to adjacent properties, and access to adjacent properties (*i.e.* arterial widening projects).

(2) Reasonableness:

(i) Consideration of the viewpoints of the property owners and residents of the benefited receptors. The highway agency shall solicit the viewpoints of all of the benefited receptors and obtain enough responses to document a decision on either desiring or not desiring the noise abatement measure. The highway agency shall define, and receive FHWA approval for, the number of receptors that are needed to constitute a decision and explain the basis for this determination.

(ii) Cost effectiveness of the highway traffic noise abatement measures. Each highway agency shall determine, and receive FHWA approval for, the allowable cost of abatement by determining a baseline cost reasonableness value. This determination may include the actual construction cost of noise abatement, cost per square foot of abatement, the maximum square footage of abatement/benefited receptor and either the cost/benefited receptor or cost/benefited receptor/dB(A) reduction. The highway agency shall re-analyze the allowable cost for abatement on a regular interval, not to exceed 5 years. A highway agency has the option of justifying, for FHWA approval, different cost allowances for a particular geographic area(s) within the State, however, the highway agancy must use the same cost reasonableness/construction cost ratio statewide.

(iii) Noise reduction design goals for highway traffic noise abatement measures. When noise abatement measure(s) are being considered, a highway agency shall achieve a noise reduction design goal. The highway agency shall define, and receive FHWA approval for, the design goal of at least 7 dB(A) but not more than 10 dB(A), and shall define the number of benefited receptors that must achieve this design goal and explain the basis for this determination.

(iv) The reasonableness factors listed in § 772.13(d)(5)(i), (ii) and (iii), must collectively be achieved in order for a noise abatement measure to be deemed reasonable. Failure to achieve § 772.13(d)(5)(i), (ii) or (iii), will result in the noise abatement measure being deemed not reasonable.

(v) In addition to the required reasonableness factors listed in § 772.13(d)(5)(i), (ii), and (iii), a highway agency has the option to also include the following reasonableness factors: Date of development, length of time receivers have been exposed to highway traffic noise impacts, exposure to higher absolute highway traffic noise levels, changes between existing and future build conditions, percentage of mixed zoning development, and use of noise compatible planning concepts by the local government. No single optional reasonableness factor can be used to determine reasonableness.

(e) Assessment of Benefited Receptors. Each highway agency shall define the threshold for the noise reduction which determines a benefited receptor as at or above the 5 dB(A), but not to exceed the highway agency's reasonableness design goal.

(f) Abatement Measure Reporting: Each highway agency shall maintain an inventory of all constructed noise abatement measures. The inventory shall include the following parameters: type of abatement; cost (overall cost, unit cost per/sq. ft.); average height; length; area; location (State, county, city, route); year of construction; average insertion loss/noise reduction as reported by the model in the noise analysis; NAC category(s) protected; material(s) used (precast concrete, berm, block, cast in place concrete, brick, metal, wood, fiberglass, combination, plastic (transparent, opaque, other); features (absorptive, reflective, surface texture); foundation (ground mounted, on structure); project type (Type I, Type II, and optional project types such as State funded, county funded, tollway/turnpike funded, other, unknown). The FHWA will collect this information, in accordance with OMB's Information Collection requirements.

(g) Before adoption of a CE, FONSI, or ROD, the highway agency shall identify:

(1) Noise abatement measures which are feasible and reasonable, and which are likely to be incorporated in the project; and

(2) Noise impacts for which no noise abatement measures are feasible and reasonable.

(3) Documentation of highway traffic noise abatement: The environmental document shall identify locations where noise impacts are predicted to occur, where noise abatement is feasible and reasonable, and locations with impacts that have no feasible or reasonable noise abatement alternative. For environmental clearance, this analysis shall be completed to the extent that design information on the alterative(s) under study in the environmental document is available at the time the environmental clearance document is completed. A statement of likelihood shall be included in the environmental document since feasibility and reasonableness determinations may change due to changes in project design after approval of the environmental document. The statement of likelihood shall include the preliminary location and physical description of noise abatement measures determined feasible and reasonable in the preliminary analysis. The statement of likelihood shall also indicate that final recommendations on the construction of an abatement measure(s) is determined during the completion of the project's final design and the public involvement processes.

(h) The FHWA will not approve project plans and specifications unless feasible and reasonable noise abatement measures are incorporated into the plans and specifications to reduce the noise impact on existing activities, developed lands, or undeveloped lands for which development is permitted.

(i) For design-build projects, the preliminary technical noise study shall document all considered and proposed noise abatement measures for inclusion in the NEPA document. Final design of design-build noise abatement measures shall be based on the preliminary noise abatement design developed in the technical noise analysis. Noise abatement measures shall be considered, developed, and constructed in accordance with this standard and in conformance with the provisions of 40 CFR 1506.5(c) and 23 CFR 636.109.

(j) Third party funding is not allowed on a Federal or Federal-aid Type I or Type II project if the noise abatement measure would require the additional funding from the third party to be considered feasible and/or reasonable. Third party funding is acceptable on a Federal or Federal-aid highway Type I or Type II project to make functional enhancements, such as absorptive treatment and access doors or aesthetic enhancements, to a noise abatement measure already determined feasible and reasonable.

(k) On a Type I or Type II projects, a highway agency has the option to cost average noise abatement among benefited receptors within common noise environments if no single common noise environment exceeds two times the highway agency's cost reasonableness criteria and collectively all common noise environments being averaged do not exceed the highway agency's cost reasonableness criteria.

§ 772.15 Federal participation.

(a) *Type I and Type II projects.* Federal funds may be used for noise abatement measures when:

(1) Traffic noise impacts have been identified; and

(2) Abatement measures have been determined to be feasible and

reasonable pursuant to § 772.13(d) of this chapter.

(b) *For Type II projects.* (1) No funds made available out of the Highway Trust Fund may be used to construct Type II noise barriers, as defined by this regulation, if such noise barriers were not part of a project approved by the FHWA before the November 28, 1995.

(2) Federal funds are available for Type II noise barriers along lands that were developed or were under substantial construction before approval of the acquisition of the rights-of-ways for, or construction of, the existing highway.

(3) FHWA will not approve noise abatement measures for locations where such measures were previously determined not to be feasible and reasonable for a Type I project.

(c) *Noise Abatement Measures.* The following noise abatement measures may be considered for incorporation into a Type I or Type II project to reduce traffic noise impacts. The costs of such measures may be included in Federal-aid participating project costs with the Federal share being the same as that for the system on which the project is located.

(1) Construction of noise barriers, including acquisition of property rights, either within or outside the highway right-of-way. Landscaping is not a viable noise abatement measure.

(2) Traffic management measures including, but not limited to, traffic control devices and signing for prohibition of certain vehicle types, time-use restrictions for certain vehicle types, modified speed limits, and exclusive lane designations.

(3) Alteration of horizontal and vertical alignments.

(4) Acquisition of real property or interests therein (predominantly unimproved property) to serve as a buffer zone to preempt development which would be adversely impacted by traffic noise. This measure may be included in Type I projects only.

(5) Noise insulation of Activity Category D land use facilities listed in Table 1. Post-installation maintenance and operational costs for noise insulation are not eligible for Federal-aid funding.

§ 772.17 Information for local officials.

(a) To minimize future traffic noise impacts on currently undeveloped lands of Type I projects, a highway agency shall inform local officials within whose jurisdiction the highway project is located of:

(1) Noise compatible planning concepts;

(2) The best estimation of the future design year noise levels at various distances from the edge of the nearest travel lane of the highway improvement where the future noise levels meet the highway agency's definition of "approach" for undeveloped lands or properties within the project limits. At a minimum, identify the distance to the exterior noise abatement criteria in Table 1;

(3) Non-eligibility for Federal-aid participation for a Type II project as described in § 772.15(b).

(b) If a highway agency chooses to participate in a Type II noise program or to use the date of development as one of the factors in determining the reasonableness of a Type I noise abatement measure, the highway agency shall have a statewide outreach program to inform local officials and the public of the items in § 772.17(a)(1) through (3).

§ 772.19 Construction noise.

For all Type I and II projects, a highway agency shall:

(a) Identify land uses or activities that may be affected by noise from construction of the project. The identification is to be performed during the project development studies.

(b) Determine the measures that are needed in the plans and specifications to minimize or eliminate adverse construction noise impacts to the community. This determination shall include a weighing of the benefits achieved and the overall adverse social, economic, and environmental effects and costs of the abatement measures.

(c) Incorporate the needed abatement measures in the plans and specifications.

TABLE 1 TO PART 772—NOISE ABATEMENT CRITERIA

[Hourly A–Weighted Sound Level_decibels (dB(A)) [1]]

Activity category	Activity Leq(h)	Criteria [2] L10(h)	Evaluation location	Activity description
A	57	60	Exterior	Lands on which serenity and quiet are of extraordinary significance and serve an important public need and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose.
B [3]	67	70	Exterior	Residential.
C [3]	67	70	Exterior	Active sport areas, amphitheaters, auditoriums, campgrounds, cemeteries, day care centers, hospitals, libraries, medical facilities, parks, picnic areas, places of worship, playgrounds, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, recreation areas, Section 4(f) sites, schools, television studios, trails, and trail crossings.
D	52	55	Interior	Auditoriums, day care centers, hospitals, libraries, medical facilities, places of worship, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, schools, and television studios.
E [3]	72	75	Exterior	Hotels, motels, offices, restaurants/bars, and other developed lands, properties or activities not included in A–D or F.
F				Agriculture, airports, bus yards, emergency services, industrial, logging, maintenance facilities, manufacturing, mining, rail yards, retail facilities, shipyards, utilities (water resources, water treatment, electrical), and warehousing.
G				Undeveloped lands that are not permitted.

[1] Either Leq(h) or L10(h) (but not both) may be used on a project.
[2] The Leq(h) and L10(h) Activity Criteria values are for impact determination only, and are not design standards for noise abatement measures.
[3] Includes undeveloped lands permitted for this activity category.

Appendix B
Glossary

Terms provided in this glossary are indicated with bold italicized text on their first use in this document.

A-Weighted Decibel (dBA). Unit of sound pressure level in decibels on the "A-weighted" scale.

Benefited receptor. The recipient of an abatement measure that receives a noise reduction at or above the minimum threshold of 5 dB(A).

Date of public knowledge. The date of approval of the Categorical Exclusion (CE), the Finding of No Significant Impact (FONSI), or the Record of Decision (ROD), as defined in 23 CFR part 771. In cases where there is no Federal involvement, it is the date the California Environmental Quality Act Negative Declaration or Environmental Impact Report is certified.

Design year. The future year used to estimate the probable traffic volume for which a highway is designed.

Existing noise level. The worst noise hour resulting from the combination of natural and mechanical sources and human activity usually present in a particular area.

Frequent human use. In general, an area where people are exposed to traffic noise for an extended period of time on a regular basis.

Impacted receptor. Receptors that are predicted to be exposed to a traffic noise impact as defined in 23CFR772.

Noise abatement. Noise attenuation measures for traffic or construction noise impacts defined in 23CFR772.

Noise abatement design. The acoustic design of a noise abatement measure based on all California Department of Transportation–approved noise prediction models or methods and proposed physical features that affect the acoustical performance based on the best available input information at the time of the design.

Noise mitigation. Noise attenuation measures provided for adverse environmental effects identified under the National Environmental Policy Act or significant adverse environmental effects identified under the California Environmental Quality Act.

One-hour equivalent sound level, L_{eq}(h). L_{eq} is the equivalent steady-state sound level which in a stated period of time contains the same acoustic energy as the time-varying sound level during the same time period. L_{eq}(h) is the hourly value of L_{eq}.

Permitted development. A definite commitment to develop land with an approved specific design of land use activities as evidenced by the issuance of a building permit.

Predicted noise level. A future noise level, based on modeling, resulting from natural and mechanical sources and human activity that is considered usually present in a particular area. A predicted noise level may be for build or no-build conditions.

Receptor. A discrete or representative location of a noise-sensitive area(s), for any of the land uses listed in Table 1.

Traffic noise impact. A traffic noise impact occurs when design-year build condition noise levels approach or exceed the noise abatement criteria (NAC) listed in Table 1 for the future build condition; or design-year build condition noise levels that create a substantial noise increase over existing noise levels. In California a noise level is considered to approach the NAC for a given activity category if it is within 1 dBA of the NAC. A substantial noise increase occurs when the project's predicted worst-hour design-year noise level exceeds the existing worst-hour noise level by 12 dBA or more.

Type I project. Proposed Federal or Federal-aid highway project for the construction of a highway on a new location or the physical alteration of an existing highway where there is either a substantial horizontal or substantial vertical alteration. Refer to Section 3 above and 23CFR772.5 for details on the types of projects that qualify as Type I.

Type II project. A proposed Federal or Federal-aid highway project for noise abatement on an existing highway.

Type III project. A proposed Federal or Federal-aid highway project that does not meet the classifications of a Type I or Type II project. Type III projects do not require a noise analysis.

Appendix C
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