EXECUTIVE SUMMARY

This addendum to the December 2004 Final Noise and Vibration Study (NVS) presents the results of the noise impact assessment of two new and previously unstudied design options associated with the Presidio Parkway Diamond Alternative (PPA). The first design option is related to a change in the vertical alignment of the PPA in the area between the east and west tunnels. The second design option is related to the proposed Temporary Construction Detour (TCD) for the PPA with the Diamond option. The proposed detour is realigned both horizontally and vertically from the previously studied detour, primarily the segment from the eastern end of the western tunnel to the Richardson/Gorgas intersection. This report was prepared in support of, and will be summarized in, the Final Environmental Impact Report (FEIS/FEIR) for the South Access to the Golden Gate Bridge – Doyle Drive Project (Doyle Drive Project).

Doyle Drive is located in the Presidio of San Francisco (the Presidio); in the northern part of the City of San Francisco at the southern approach to the Golden Gate Bridge. The purpose of the project is to replace Doyle Drive to improve the seismic, structural, and traffic safety of the roadway within the setting and context of the Presidio and its purpose as a National Park.

The noise analysis was conducted following guidelines in 23 CFR 772 and Caltrans' Traffic Noise Analysis Protocol. Compliance with 23 CFR 772, the Federal Highway Administration's (FHWA) noise standard, satisfies National Environmental Policy Act (NEPA) requirements with respect to traffic noise impacts. The traffic noise analysis was conducted following methodologies that are consistent with the California Environmental Quality Act (CEQA). In addition, the analysis also considered City of San Francisco Noise Ordinance requirements, as appropriate.

Traffic noise levels were predicted at selected receptor sites identified in the 2004 NVS that were near the proposed realignment segments for both the PPA and the TCD for year 2030 conditions. Results of the analysis indicate that traffic noise would exceed the FHWA and Caltrans criteria at 8 of the 14 receptor locations studied under the modeled conditions for the PPA and 13 of 38 modeled sites under the TCD. The abatement measures considered to reduce the predicted traffic noise impacts including horizontal and vertical shifts in the roadway alignment and noise barriers. Both methods of reducing the impact of traffic noise, although feasible, do not appear to be reasonable noise abatement measures.

Since the realignment of both segments of the PPA and the TCD have resulted in this reassessment of noise impacts for the Doyle Drive project, the likelihood of alignment changes resulting in reduced noise impacts is limited. However, this possibility will continue to be investigated during the construction phase to determine if alternative options may be available that currently is unforeseen.

Construction of a temporary noise barrier in the vicinity of the Crissy Field Center was investigated but the cost of providing the wall is expected to exceed the Caltrans reasonable cost allowance. Since lower cost wall options are available in the form of wood, plastic or metal as compared to the standard masonry wall used by Caltrans to set the reasonable cost allowance for a noise barrier, it is possible that a reasonable cost alternative can be developed as part of the design phase reevaluation process. This effort will be coordinated with the Crissy Field Center management to ensure that traffic noise levels from the operation of the TCD are reduced to the extent that is reasonable and feasible.

The application of building insulation techniques at the Crissy Interpretive Center will be explored during the design phase of the proposed project to determine if abatement is needed. The extent and options that would be appropriate will be assessed in coordination with the owners/operators of the building and incorporated into the final design of the project if needed and found to be reasonable and feasible.

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SECTION 1: INTRODUCTION

This addendum presents the results of the reanalysis of traffic noise impacts associated with the South Access to the Golden Gate Bridge – Doyle Drive Project (Doyle Drive Project). The addendum addresses potential noise impacts from the Doyle Drive Project associated with two changed elements of the project: 1) the segment of Doyle Drive within the Presidio Parkway Diamond Alternative (PPA) from Stations 112 to Station 119 that represents a substantial change in the vertical alignment and 2) the realignment of the proposed Temporary Construction Detour (TCD) with the Diamond option associated with the reconstruction of Doyle Drive from a mostly elevated roadway to a mostly at-grade roadway. The findings of this study will be incorporated into the final environmental document prepared for the Doyle Drive Project, as required to meet National Environmental Policy Act of 1969 (NEPA) and California Environmental Quality Act of 1970 (CEQA) standards.

1.1 PROJECT DESCRIPTION

Doyle Drive is located in the Presidio of San Francisco (the Presidio), in the northern part of the City of San Francisco at the southern approach to the Golden Gate Bridge (see Figure 1-1). In 1994, when the US Army transferred jurisdiction of the Presidio to the National Park Service (NPS), it became part of the National Park system and Golden Gate National Recreation Area (GGNRA). In 1998, management of the Presidio was divided between two federal agencies: The Presidio Trust (the Trust), the agency responsible for oversight of 80 percent of the Presidio delineated as Area B; and the NPS, which is responsible for management of the coastal portions of the park (the remaining 20 percent) that are delineated as Area A. Doyle Drive lies predominately within the Area B lands managed by the Trust with a small portion at the western end located in Area A on land operated by the Golden Gate Bridge, Highway and Transportation District (GGBHTD). The Presidio has also been designated a National Historic Landmark District (NHLD) since 1962 with the Doyle Drive roadway determined to be a contributing element to that landmark.

Doyle Drive, the southern approach of Route 101 to the Golden Gate Bridge, is 2.4 kilometers (1.5 miles) long with six traffic lanes. There are three San Francisco approach ramps which connect to Doyle Drive: one beginning at the intersection of Marina Boulevard and Lyon Street; one at the intersection of Richardson Avenue and Lyon Street; and one where Veterans Boulevard (State Route 1) merges into Doyle Drive approximately 1.6 kilometers (one mile) west of the Marina Boulevard approach (see Figure 1-1). Doyle Drive passes through the Presidio on an elevated concrete viaduct (low-viaduct) and transitions to a high steel truss viaduct (high-viaduct) as it approaches the Golden Gate Bridge Toll Plaza.

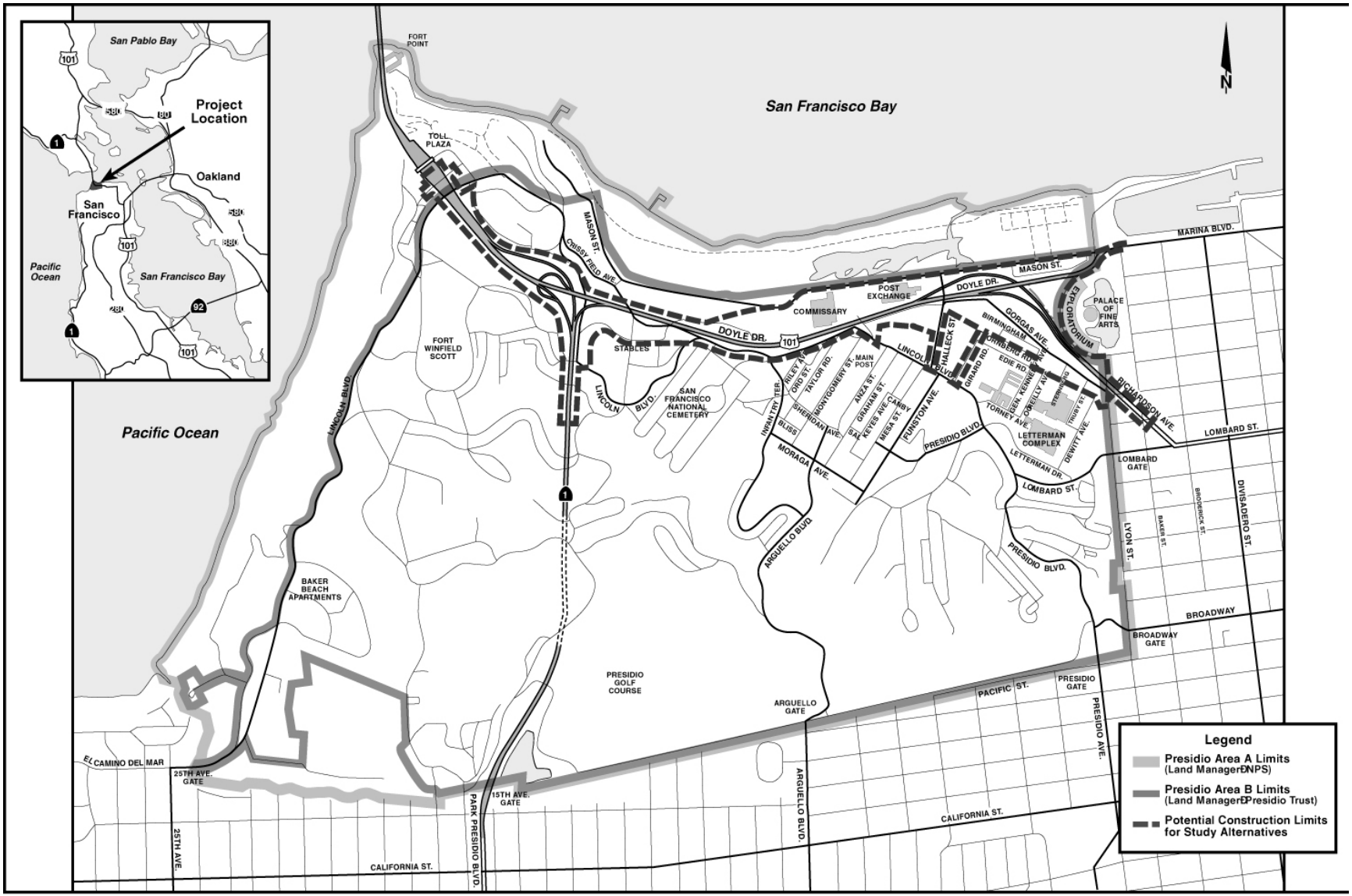
Doyle Drive is nearly 70 years old and it is approaching the end of its useful life, although regular maintenance, seismic retrofit, and partial rehabilitation activities are keeping the structure safe in the short term. However, further structural degradation caused by age and the effects of heavy traffic and exposure to salt air will cause the structures to become seismically and structurally unsafe in the coming years. In addition, the eastern portion of the aging facility is located in a potential liquefaction zone identified on the State of California Seismic Hazard Zones map dated August 2000.

Currently, Doyle Drive has nonstandard design elements, including travel lanes from 2.9 to 3.0 meters (9.5 to 10.0 feet) in width, no fixed median barrier, no shoulders and exit ramps that have tight turning radii. During peak traffic hours, plastic pylons are manually moved to provide a median lane as well as to reverse the direction of traffic flow of several lanes (Project Study Report: Doyle Drive Reconstruction, 1993).

1.2 PROJECT PURPOSE

The purpose of the South Access to the Golden Gate Bridge - Doyle Drive Project is to replace Doyle Drive in order to improve the seismic, structural, and traffic safety of the roadway within the setting and context of the Presidio of San Francisco and its purpose as a National Park.

FIGURE 1-1
PROJECT LOCATION



1.3 ALTERNATIVES DEVELOPMENT

This section describes the build alternatives presented in the DEIS/R, the preferred alternative and a No-Build Alternative in terms of physical and operating characteristics and identifies the recommended preferred alternative. As shown in Figure 1-1, the limits of the project study area are from Merchant Road, just south of the Golden Gate Bridge Toll Plaza, to the intersection of Lombard Avenue/ Broderick Street and Marina Boulevard/ Broderick Street. During the screening process, all alternatives were evaluated for their ability to meet the project's Purpose and Need.

1.3.1 Project Alternatives

This section describes the realigned PPA in terms of physical and operating characteristics and the TCD only. Other alternatives, including the No-Build Alternative, are discussed in detail in the 2004 Final Noise and Vibration Study (NVS) for the Doyle Drive Project.

Alternative 5: Presidio Parkway Alternative (PPA)

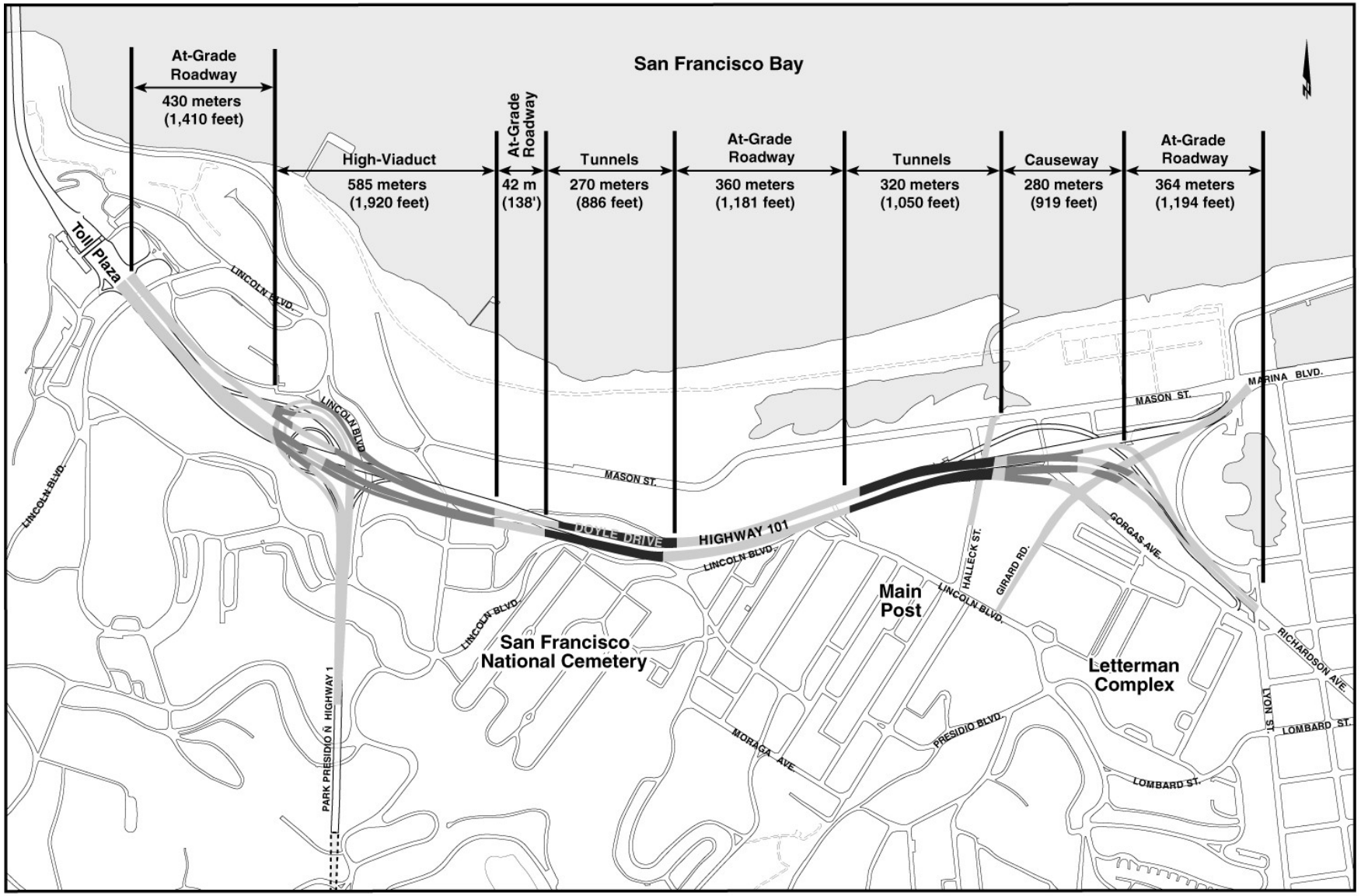
The alignment of the PPA analyzed in this Addendum has been modified when compared to the alignment shown in the 2004 NVS, specifically between Stations 114+00 and 117+80. This generally encompasses the area between the tunnels. The PPA would replace the existing facility with a new six-lane facility and an eastbound auxiliary lane, between the Park Presidio interchange and the new Presidio access at Girard Road (see Figure 1-2). The new facility would have an overall width of up to 45 meters (148 feet), and would incorporate wide landscaped medians and continuous shoulders. To minimize impacts to the park, the footprint of the new facility would include a large portion of the existing facility's footprint east of the Park Presidio interchange. A 450-meter (1,476-foot) high-viaduct would be constructed between the Park Presidio interchange and the San Francisco National Cemetery. Shallow cut-and-cover tunnels would extend 240 meters (787 feet) past the cemetery to east of Battery Blaney. The facility would then continue towards the Main Post in an open depressed roadway with a wide heavily landscaped median. From Building 106 (Band Barracks) cut-and-cover tunnels up to 310 meters long (984 feet) would extend to east of Halleck Street. The facility would then rise slightly on a low level causeway 160 meters (525 feet) long over the site of the proposed Tennessee Hollow restoration and a depressed Girard Road. East of Girard Road the facility would return to existing grade north of the Gorgas warehouses and connect to Richardson Avenue.

At the intersection with Merchant Road, just east of the toll plaza, a design option has been developed for a Merchant Road slip ramp. This option would provide an additional new connection from westbound Doyle Drive to Merchant Road. This ramp would provide direct access to the Golden Gate Visitors' Center and alleviate the congested weaving section where northbound Park Presidio Boulevard merges into Doyle Drive.

The Park Presidio interchange would be reconfigured due to the realignment of Doyle Drive to the south. The exit ramp from eastbound Doyle Drive to southbound Park Presidio Boulevard would be replaced with standard exit ramp geometry and widened to two lanes. The loop of the westbound Doyle Drive exit ramp to southbound Park Presidio Boulevard would be improved to provide standard exit ramp geometry. The northbound Park Presidio Boulevard connection to westbound Doyle Drive would be realigned to provide standard entrance ramp geometry.

The PPA includes options for direct access to the Presidio and Marina Boulevard at the eastern end of the project.

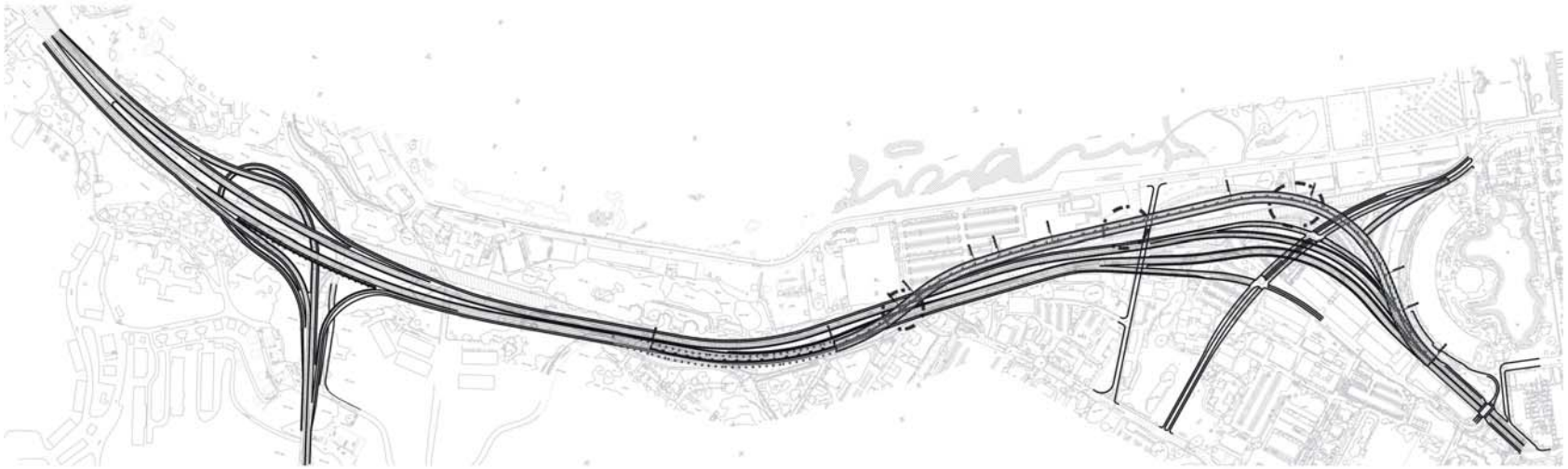
FIGURE 1-2
ALTERNATIVE 5: PRESIDIO PARKWAY



Temporary Construction Detour (TCD)

The proposed TCD associated with the construction of the PPA would be primarily an at-grade roadway as opposed to the mostly elevated roadway that was assessed in the 2004 NVS. The segment of the detour under study would extend from Station 114+00 south and eastward to Station 126+07 north of the intersection of Gorgas and Richardson. The detour would generally occupy the proposed southbound corridor to approximately Station 115+70 and then begin a northeasterly transition into the parking lot of Building 610 (Post Commissary) and then remain north and east of the existing Doyle Drive alignment until it transitions back onto Richardson in the vicinity of the Palace of Fine Arts. The TCD is anticipated to be at or near the existing ground level between the tunnel exit and Richardson, which is the major change in the alignment (see Figure 1-3). The detour is expected to have an overall width of 16.5 meters.

FIGURE 1-3
TEMPORARY CONSTRUCTION DETOUR



SECTION 2: FUNDAMENTALS OF TRAFFIC NOISE

2.1 NOISE PRINCIPLES AND DESCRIPTORS

Noise is defined as unwanted sound. Sound, traveling in the form of waves from a source, exerts a sound pressure level (referred to as sound level) which is measured in decibels (dB). Zero dB is typically the threshold of human hearing and 120 to 140 dB is typically the threshold of pain. Pressure waves traveling through air exert a force registered by the human ear as sound.

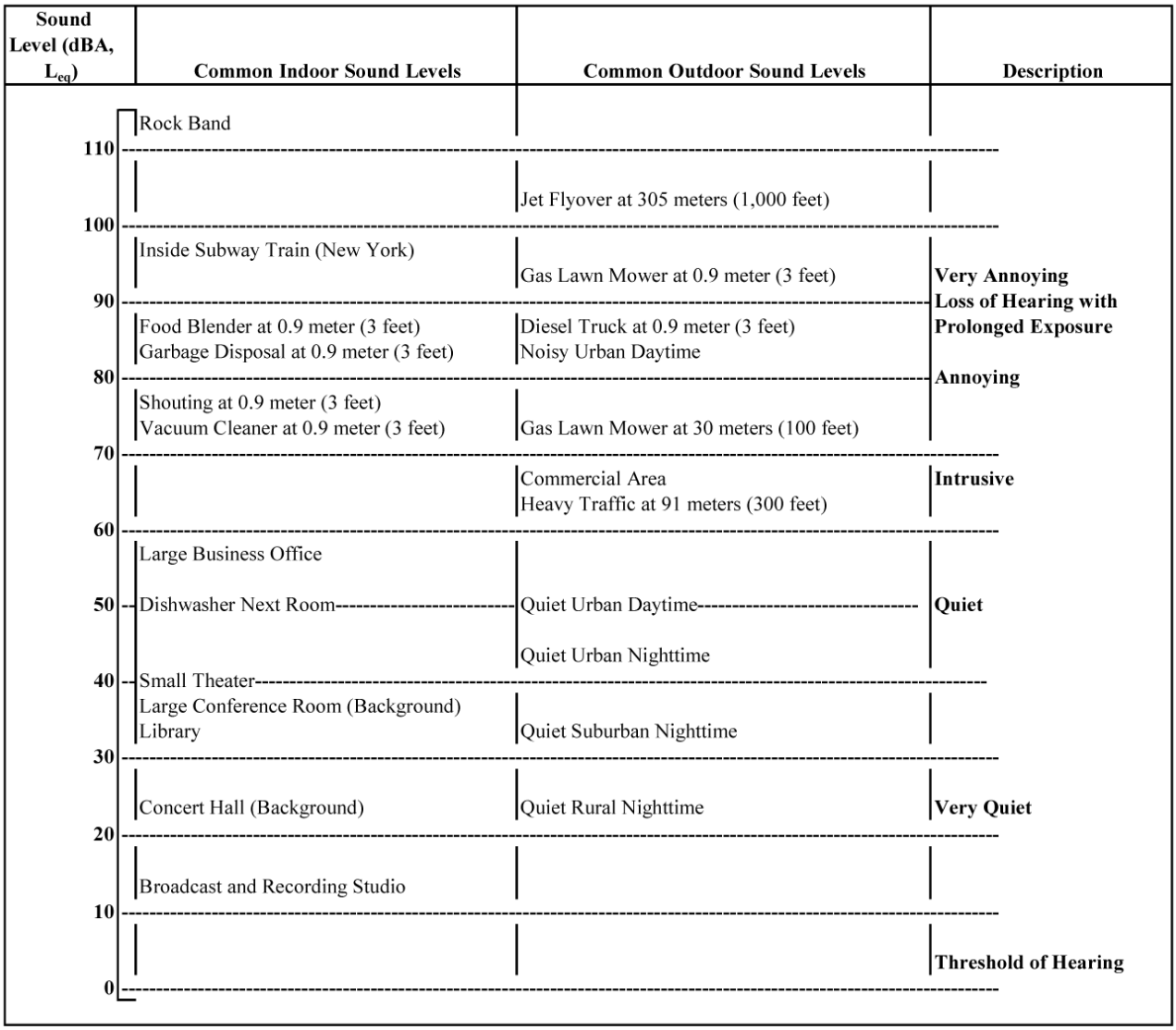
Sound pressure fluctuations can be measured in units of hertz (Hz), which correspond to the frequency of a particular sound. Typically, sound does not consist of a single frequency, but rather a broad band of frequencies varying in levels of magnitude (sound power). When all the audible frequencies of a sound are measured, a sound spectrum is plotted consisting of a range of frequency spanning 20 to 20,000 Hz. The sound pressure level, therefore, constitutes the additive force exerted by a sound corresponding to the sound frequency/sound power level spectrum.

The typical human ear is not equally sensitive to all frequencies of the audible sound spectrum. As a consequence, when assessing potential noise impacts, sound is measured using an electronic filter that de-emphasizes the frequencies below 1,000 Hz and above 5,000 Hz in a manner corresponding to the human ear's decreased sensitivity to low and extremely high frequencies. This method of frequency weighting is referred to as A-weighting and is expressed in units of A-weighted decibels (dBA).[1] Frequency A-weighting follows an international standard methodology of frequency de-emphasis and is typically applied to community noise measurements. Some representative noise sources and their corresponding A-weighted noise levels are shown in Figure 2-1.

This time-varying characteristic of environmental noise is described using the noise descriptor, Leq, which is the equivalent sound level used to describe noise over a specified period of time, typically one hour, in terms of a single numerical value. The Leq is the constant sound level that would contain the same acoustic energy as the varying sound level, during the same time period (i.e., the average noise exposure level for the given time period).

1 All noise levels reported herein reflect A-weighted decibels unless otherwise stated.

FIGURE 2-1
COMPARATIVE SOUND LEVELS



Sources: Caltrans Transportation Laboratory Noise Manual 1982.

SECTION 3: FEDERAL AND STATE POLICIES AND PROCEDURES FOR NOISE

3.1 OPERATIONAL PHASE

3.1.1 Federal Requirements

Noise is identified in the National Environmental Policy Act as an area for review in terms of environmental impacts of Federal actions. For the Federal Highway Administration (FHWA), the applicable standard is 23 CFR 772. Compliance with 23 CFR 772 will satisfy National Environmental Policy Act (NEPA) requirements with respect to traffic noise impacts. Under 23 CFR 772, noise abatement must be considered for Type I projects when the project would result in a substantial noise increase, or when the predicted noise levels approach, meet, or exceed the "Noise Abatement Criteria," shown in Table 3-1. Following guidance in the Caltrans Traffic Noise Analysis Protocol, “approach” is defined as being within 1 dBA of the FHWA criteria and a noise increase is substantial when the predicted noise levels with the project exceed existing noise levels by 12 dBA, Leq (h).[2]

TABLE 3-1
ACTIVITY CATEGORIES AND NOISE ABATEMENT CRITERIA (NAC)

Activity Category	NAC, Hourly A-Weighted Noise Level (dBA, Leq(h))	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	67 Exterior	Picnic areas, recreation areas, playgrounds, active sport areas, parks, residences, motels, hotels, schools, churches, libraries, and hospitals.
C	72 Exterior	Developed lands, properties, or activities not included in Categories A or B above.
D	--	Undeveloped lands.
E	52 Interior	Residences, motels, hotels, public meeting rooms, schools, churches, libraries, and auditoriums.

Source: 23 CFR 772.

The Presidio Parkway is considered to be a Type I project as defined in 23 Code of Federal Regulations (CFR) 772. A Type I project is defined as a 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 that significantly changes either the horizontal or vertical alignment, or increases the number of through-traffic lanes.

Operational noise impacts for roadway projects with a Federal Highway Administration (FHWA) nexus are defined in 23 CFR 772. An impact occurs if a project would result in a substantial noise increase, or when the predicted noise levels approach, or exceed the Noise Abatement Criteria (NAC) shown in Table 3-1. The

[2] Leq (h) refers to the noisiest one-hour-average noise level over the course of a 24-hour due to motor vehicle traffic. Depending upon average speeds during the peak (traffic) periods, the Leq (h) may or may not coincide with the peak traffic hour.

FHWA noise abatement criteria represent a balance between what is desirable and what is achievable and are based on speech interference.

For park lands, use determines the appropriate criteria. Category A areas include certain pristine or meditative areas. Category B is applicable to open space used for recreational and educational activities, and is the appropriate designation for much of the outdoor use areas at the Presidio and Palace of Fine Arts. Category C applies to any areas with retail or office use.

The National Park Service (NPS) and the Presidio Trust have a desire to provide additional emphasis on noise within the project corridor that lies within the control of each of these two entities. While there are no existing federal noise standards that are specific to the Presidio or the NPS other than the FHWA criteria noted above, the NPS does have a policy set forth in Director's Order #47 *Soundscape Preservation and Noise Management*, which requires that all park facilities be managed to minimize noise pollution. The Presidio Trust Management Plan Final EIS identifies the FHWA criteria as the appropriate federal criteria to apply to the Presidio Trust lands. The EIS also identifies those areas of the Presidio that the Trust's believes warrant special consideration as noise sensitive areas.

3.1.2 State and Local Requirements

Under the California Environmental Quality Act (CEQA), a substantial noise increase may result in a significant adverse environmental effect and must be mitigated or identified as a noise impact for which it is likely that no, or only partial abatement measures are available. For the purposes of CEQA analysis, Caltrans considers a noise increase to be substantial when the predicted noise levels with the project exceed existing noise levels by 12 dBA, Leq(h). Further requirements are found in the California Streets and Highway Code Section 216. Caltrans has also established noise analysis policies in the Traffic Noise Analysis Protocol and the Highway Design Manual. Additional guidance from Caltrans can be found in the Technical Noise Supplement of October 1998 (TeNS), Chapter 30 of the Project Development Procedures Manual, and in Chapter 12 of the Standard Environmental References.

3.2 CONSTRUCTION PHASE

3.2.1 Federal Requirements

FHWA requires that construction noise impacts be addressed consistent with 23 CFR 772.19. The general requirement is to:

- identify potentially impacted land uses or activities which may be affected by noise from construction of the project;
- determine the measures which are needed in the plans and specifications to minimize or eliminate adverse construction noise impacts; and
- incorporate the abatement into the plans and specifications for the project.

Those portions of the NPS Director's Order #47 and the Presidio Trust Management Plan that relate to construction noise impacts and abatement was also used to evaluate the need for and appropriateness of construction noise mitigation.

3.2.2 State and Local Requirements

Caltrans protocol requires that construction noise impacts be addressed on a case-by-case basis, along with likely abatement measures. It is expected that specifications related to noise may be required for this project. General construction-related noise impact analysis is qualitative in nature and is based on a description of the expected construction phases, including the nature of the construction activity (e.g., such as pile driving) and its duration, the types of equipment that would be used, and proximity to noise-sensitive uses.

Additionally, the Presidio Trust Management Plan Final EIS identifies Title 24 of the California Code of Regulation as a regulatory approach to noise control. The noise standards found in this code are related to interior spaces and apply to all new multifamily residential units (hotels, motels, apartments, condominiums, and other attached dwellings that were permitted after 1974. As part of the Trust compliance process, the Trust would enforce the noise insulation requirements equivalent to the standards of Title 24 with building permit conditions.

Compliance with the San Francisco Noise Ordinance requirements would also be required of this project. Details of the anticipated construction phase noise impacts and abatement considerations are noted in Section 8.

SECTION 4: NOISE STUDY METHODS AND PROCEDURES

4.1 SELECTION OF RECEIVERS

The selection of receiver points for modeling the impact of the two alternatives under consideration for this noise study addendum were based on those receivers identified in the 2004 NVS that were within the impact areas of the proposed changes. The receptor points were selected to represent all of the existing buildings within The Presidio that were or might be considered noise sensitive based on existing or anticipated usage and that might be impacted by traffic or construction noise associated with the portion of the Presidio Parkway that was realigned and the realigned temporary construction detour. Receptors outside of these areas were not analyzed in this addendum since no known design factors had changed that would cause the noise impacts to be altered.

4.2 NOISE PREDICTION METHOD

The FHWA Traffic Noise Model (TNM) version 2.5 was used for all future year traffic noise predictions used in this study. This model was developed for FHWA under the guidance of the Noise Analysis Facility at the Volpe National Transportation Systems Center of the U.S. Department of Transportation. First released for use by FHWA in March of 1998, the model has undergone a series of updates. The current version (2.5) was released for use in April of 2004 and has replaced all previously approved noise prediction models used on Federal-aid highway projects. TNM propagates sound energy, in one-third octave bands, between highways and receptors (noise sensitive locations) taking the intervening ground's acoustical characteristics and topography into account.

Future noise levels for both the PPA and the TCD were modeled using TNM. Input to TNM includes traffic volumes (for the noisiest hour), speeds, vertical and horizontal elevations of roadway segments and receptors, and topographic shielding. Vehicle traffic volumes were input by vehicle type to account for the "noisier" engines and elevated emission points of medium-duty and heavy-duty trucks, buses, and motorcycles. Traffic data prepared by DKS Associates was input into the TNM to predict noise levels within the project. The motor vehicle fleet used in the analysis for both the existing and future conditions consisted of automobiles, medium trucks (cargo vehicles with two axles and six tires), heavy trucks (cargo vehicles with three or more axles), buses (9 passenger or more), and motorcycles.

SECTION 5: EXISTING NOISE ENVIRONMENT

5.1 EXISTING NOISE SENSITIVE LAND USES

The Doyle Drive corridor lies within a National Park and land uses in the immediate area are not zoned like a typical urban area within the jurisdiction of a city or county. The corridor contains a mix of open space, residential and office land uses as well as a cemetery and institutional uses related to operations of the Presidio Trust, NPS, YMCA and other conservatory agencies.

5.2 FUTURE LAND USES

The Presidio Trust recently finalized the Presidio Trust Management Plan and certified the accompanying Environmental Impact Statement (EIS). The Management Plan examines future land use expectations within the Presidio. The document shows locations of planned housing retention, removal and replacement within the Presidio and does not identify any location proposed for conversion to residential use within one mile of the project alignment. The Final EIS identifies traffic-generated noise as the major source of environmental noise. The Final EIS further points out that natural sounds are intrinsic elements of the environment that are inherent components of the Presidio's significant natural, historic, cultural, scenic, and recreational resources to be protected. The Final EIS also identifies specific examples of areas where quiet is of significance. These areas include Crissy Marsh, Tennessee Hollow, the Fort Scott parade ground, the National Cemetery, and the World War II Memorial. It is the intent of the Trust to maintain or enhance the noise environment within the Presidio whenever possible.

5.3 SENSITIVE RECEPTORS

Land uses considered to be sensitive to noise and vibration, are referred to as sensitive receptors. Some land uses are considered more sensitive to ambient noise and vibration levels than others, due to the types of activities typically occurring. Residences, motels and hotels, schools, libraries, churches, hospitals, nursing homes, auditoriums, and parks and other outdoor recreation areas generally are more sensitive to noise and vibration than are commercial (other than lodging facilities) and industrial land uses.

Noise sensitive receptors that could be affected by the Doyle Drive Project (either the segment of the PPA under consideration for this study or the realigned TCD) have been identified.

5.3.1 Sensitive Receptors within the Doyle Drive Corridor

Sensitive receptors within the Doyle Drive corridor include residential areas. In some cases, these residential areas are in active use. Other residential areas appear to be vacant but are designated as residential and are not slated for removal under the Presidio's General Management Plan Amendment. These areas are presumed to be available for residential purposes in the future. Additional noise-sensitive uses within the study corridor include the National Cemetery and Crissy Field.

SECTION 6: FUTURE NOISE ENVIRONMENT

The future noise environment within the proposed realigned Presidio Parkway alternative and the realigned temporary construction detour was predicted using the TNM Version 2.5 model. All noise level predictions associated with the update of this study use receptor sites gathered in 2004.

6.1 MODELING INPUT PARAMETERS

The basic input parameters used in predicting traffic noise levels associated with this study include the following:

- Roadway data included the width of the roadway, the location of the roadway in relation to other physical features via an x, y, z coordinate system, the type of pavement, flow controls (if any), and whether the roadway was on structure or not.
- Traffic data included vehicle classification, vehicle speed, and vehicle counts.
- Receiver data included location by the x, y, z coordinate system, the height of the receiver above ground, the impact criteria applicable to the receiver, existing noise levels (if available), and the number of dwelling units represented by a receiver (if applicable).

Other parameters that were available for consideration included ground cover, tree zones, terrain lines, and shielding, any or all of which may have been used on a location by location basis.

6.1.1 Traffic Assumptions

The basic traffic assumptions used in this study included traffic classification broken down into five (5) vehicle types: autos, medium trucks, heavy trucks, buses, and motorcycles. Each roadway segment was assigned a volume of traffic based on information provided by DKS Associates. Traffic was split directionally for AM and PM peak hour conditions and was classified based on the same variables. Detailed traffic data can be found in Appendix C of the 2004 NVS.

Speed data used in this study was based on existing posted speeds or a generalized speed based on roadway design or ramp configuration. Mainline traffic was generally set at 88 kph (55 mph) while ramp traffic was generally assigned at 56 kph (35 mph). Most local streets, especially the lower volume two lane streets, were set at 32 kph (20 mph). The speeds assigned are consistent with the traffic speeds measured during the gathering of field data at peak and off-peak traffic conditions within the Doyle Drive corridor during the 2004 NVS.

6.1.2 Results of Modeling

6.1.2.1 Future Year 2030 Results for the Presidio Parkway Alternative (PPA) Realignment

To determine the likely impact of the project on traffic noise levels in the vicinity of the PPA Realignment, 14 of the original 76 receptor sites shown on Figure 6-1(sites 7, 9, 10, 11, 43, 44, 45, 46, 47, 48, 49, 50, 51, and 53) were reanalyzed using TNM Version 2.5. These receptor locations represent a variety of land uses and physical distances to the Doyle Drive project within the realigned segment of the PPA. Future year 2030 conditions only were analyzed for this noise study addendum. A worst case peak traffic level condition was evaluated. Table 6-1 illustrates the predicted noise levels for 2030 traffic for the new alignment design option of the PPA and compares the results with those provided in the 2004 NVS for the original alignment of the PPA. A review of the results shown in Table 6-1 reveals that of the 14 receptor sites reanalyzed, the noise levels of the new PPA realignment design option when compared to the original PPA alignment are expected to decrease or remain the same at 6 sites and increase at 8 sites. The future noise levels are expected to approach or exceed the NAC at sites 10, 44, 45, 46, 47, 48, 49, and 50. Of the 8 sites with an increase, 2 of these sites are classified as Category B land uses (residential, recreational, etc.) while the remaining 6 are identified as commercial, office or mixed use sites under Category C. Of the 14 sites, 11 already approach

or exceed the NAC. The average increase in the traffic noise level as a result of the proposed realignment of the Presidio Parkway is predicted to be about 7.9 dBA over the levels predicted for the original alignment, a change which is typically detectable to the human ear in an exterior setting. This indicates that the proposed realignment of the PPA will create higher noise levels than those predicted in the 2004 NVS.

6.1.2.2 Future Year 2030 Results for the Temporary Construction Detour (TCD) Realignment

To determine the likely impact of the project on traffic noise levels in the vicinity of the proposed realignment of TCD associated with the PPA, 38 of the original 76 receptor sites shown on Figure 6-1(sites 1, 2, 4, 5, 6, 7, 9, 10, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 55, 56, 57, 58, 59, 61, 62, 63, 64, 66, 67, 68, 69, 70, 71, 72, 73, 75, and 76) were reanalyzed using TNM Version 2.5. These receptor locations represent a variety of land uses and physical distances to the Doyle Drive project within the realigned segment of the PPA. Future year 2030 traffic volumes were used to predict the traffic noise from the TCD for the noise study addendum. A worst case peak traffic level condition was evaluated. Table 6-2 illustrates the predicted noise levels for 2030 traffic for the new temporary construction detour alignment associated with the PPA and compares the results with those provided in the 2004 NVS for the original TCD alternative. A review of the results shown in Table 6-2 reveals that of the 38 receptor sites reanalyzed, the noise levels of the new TCD realignment design option when compared to the original TCD alignment are expected to decrease or remain the same at 8 sites and increase at 30 sites. The future noise levels are expected to approach or exceed the NAC at sites 1, 6, 7, 10, 43, 47, 49, 50, 70, 71, 72, 73, and 76. Of the 30 sites with an increase, 6 of these sites are classified as Category B land uses (residential, recreational, etc.) while the remaining 24 are identified as commercial, office and mixed use sites under Category C. Of the 38 sites, 15 already approach or exceed the NAC. The average increase in the traffic noise level as a result of the proposed realignment of the Presidio Parkway TCD is predicted to be about 5 dBA over the previously predicted detour noise levels, a change which is typically detectable to the human ear in an exterior setting. This indicates that the proposed realignment of the Presidio Parkway TCD would create higher noise levels than those predicted in the 2004 NVS.

Following is a brief explanation of each site and the anticipated traffic noise impacts associated with the PPA realignment and the TCD realignment:

Site 1, located at the southwest side of the Palace of Fine Arts to represent the noise levels that could be expected at the exterior of the building closest to Richardson Avenue. Under the TCD realignment, this location is expected to exceed the NAC by 11 dBA.

Site 2, located at the northwest side of the Palace of Fine Arts, represents the noise levels that could be expected at the exterior of the building closest to the Doyle Drive/Girard Road connection to Marina Boulevard. Under the TCD realignment, this location is expected to be below the NAC approach by 6 dBA.

Site 4, located at the southeast corner of Building 1182 (Mason Street Warehouse), represents an area where exterior noise levels are not expected to have an adverse impact on the facility. The NAC would not be exceeded with the TCD realignment.

Site 5, located at the southeast corner of Building 1183/1186 (Mason Street Warehouse), represents an area where exterior noise levels are not expected to have an adverse impact on the facility. The NAC would not be exceeded with the TCD realignment.

Site 6, located at the southwest corner of Building 1184/1185 (Mason Street Warehouse), represents an area where exterior noise levels are expected to exceed the NAC with the TCD realignment due to the fact that the new roadway would be shifted considerably further north and closer to the building and also be at grade.

FIGURE 6-1
NOISE RECEPTOR PREDICTION LOCATIONS

TABLE 6-1
PREDICTED TRAFFIC NOISE LEVELS DURING OPERATION OF PRESIDIO PARKWAY ALTERNATIVE (PPA)

Receptor[1]	Site Description	Assumed Future Land Use[2]	NAC Approach[3]	Existing Condition	Presidio Parkway Alternative		
					Original PPA Diamond 2030[4]	PPA Realignment Diamond Option 2030	Change between Original PPA and PPA Realignment Option
7	Building 603/Crissy Interpretive Center	Educational	66	**68***	56	54	-2
9	Building 610/Post Commissary	Museum	71	69	**71***	68	-3
10	Battery Blaney	Historic	66	**75***	**70***	**72***	2
11	Battery Slaughter	Historic	66	**79***	**66***	63	-3
43	National Cemetery	Cemetery	66	**72***	64	57	-7
44	Building 129/Enlisted Family Quarters	Residential	66	65	57	**71***	14
45	Building 122/Gym	Mixed Use	71	**74***	62	**73***	11
46	Building 108/Storage	Undetermined/ Commercial	71	**74***	63	**73***	10
47	Building 107/Switching Station	Undetermined/ Commercial	71	**76***	68	**74***	6
48	Building 104/Mess Hall	Office	71	70	59	**71***	12
49	Building 105/Mess Hall	Office	71	**76***	**74***	**77***	3
50	Building 106/Offices	Office	71	**80***	**73***	**78***	5
51	Building 211/Former Burger King	Restaurant	71	**75***	66	66	0
53	Building 210/Guard House	Bank and Post Office	71	**71***	63	63	0
Number of sites approaching or exceeding the NAC				11	5	8	

Source: ESA 2006

Notes: [1]For details regarding the receptor location, see Appendix E of the 2004 NVS.

[2]Based on Presidio Trust Management Plan and consultation with Presidio Trust and NPS staff. IN cases where future land use was undetermined, the existing land use was assumed for land use.

[3]FHWA noise abatement criterion approach based on existing or anticipated land use. Approach is defined by Caltrans as being within one 1dBA of the noise abatement criterion. The applicable NAC is based on either the existing use or the future intended use as defined by the Presidio Trust, where appropriate.

[4]The noise levels predicted for this alternative as presented in the 2004 Noise and Vibration Study.

Bolded numbers indicate a noise level that approaches, equals, or exceeds the NAC.

TABLE 6-2
PREDICTED TRAFFIC NOISE LEVELS DURING THE TEMPORARY CONSTRUCTION DETOUR (TCD) PHASE

Receptor[1]	Site Description	Assumed Future Land Use[2]	NAC Approach[3]	Existing Condition	Temporary Construction Detour Alternatives		
					Presidio Parkway Diamond DEIS TCD Alignment 2030[4]	TCD Realign-ment Option 2030	Change between Presidio Parkway Diamond DEIS TCD and TCD Realignment Option
1	Palace of Fine Arts	Educational	66	**71***	**69***	**77***	8
2	Palace of Fine Arts	Educational	66	**70***	61	60	-1
4	Mason St. Warehouse Building 1182	Office	71	68	55	60	5
5	Mason St. Warehouse Building 1183/1186	Office	71	68	56	65	9
6	Mason St. Warehouse Building 1184/1185	Office	71	69	59	**75***	16
7	Building 603/ Crissy Interpretive Center	Educational	66	**68***	56	**74***	18
9	Building 610 / Post Commissary	Museum	71	69	69	70	1
10	Battery Blaney	Historic	66	**75***	**68***	**69***	1
43	National Cemetery	Cemetery	66	**72***	63	**67***	4
44	Building 129/Enlisted Family Quarters	Residential	66	65	57	61	4
45	Building 122/Gym	Mixed Use	71	**74***	61	65	4
46	Building 108/Storage	Undetermined/ Commercial	71	**74***	61	65	4
47	Building 107/Switching Station	Undetermined/ Commercial	71	**76***	66	**72***	6
48	Building 104/Mess Hall	Office	71	70	58	62	4
49	Building 105/Mess Hall	Office	71	**76***	**72***	**76***	4
50	Building 106/Offices	Office	71	**80***	**71***	**74***	3
51	Building 211/Former Burger King	Restaurant	71	**75***	65	69	4
52	Building 204/Exchange Store	Office	71	68	58	70	12
53	Building 210/Guard House	Bank and Post Office	71	**71***	61	63	2
55	Building 220/Bakers and Cooks School	Office	71	64	54	59	5

TABLE 6-2 (Continued)
PREDICTED TRAFFIC NOISE LEVELS DURING THE TEMPORARY CONSTRUCTION DETOUR (TCD) PHASE

Receptor[1]	Site Description	Assumed Future Land Use[2]	NAC Approach[3]	Existing Condition	Temporary Construction Detour Alternatives		
					Presidio Parkway Diamond DEIS TCD Alignment 2030[4]	TCD Realign-ment Option 2030	Change between Presidio Parkway Diamond DEIS TCD and TCD Realignment Option
56	Building 231/Exchange Gas Station	Undetermined/ Commercial	71	65	66	67	1
57	Building 228/Bakery	Retail	71	65	63	63	0
58	Building 227/Warehouse	Retail	71	64	61	61	0
59	Building 223/Warehouse	Office	71	60	58	60	2
61	Building 1029/Swords to Plowshares	Residential	66	63	60	60	0
62	Building 1030/Swords to Plowshares	Residential	66	63	57	57	0
63	Building 1063/Medical Warehouse	Water Recycling Facility	71	61	61	60	-1
64	Building 1062/Quartermaster Shop	Undetermined/ Commercial	71	59	58	58	0
66	Building 1167/Gorgas Avenue Warehouse	Office	71	65	64	66	2
67	Building 1163/Gorgas Avenue Warehouse	Office	71	64	64	63	-1
68	Building 1169/Gorgas Avenue Warehouse	Office	71	66	64	68	4
69	Building 1162/Gorgas Avenue Warehouse	Office	71	62	62	66	4
70	Building 1170/Gorgas Avenue Warehouse	Office	71	70	**71***	**75***	4

TABLE 6-2 (Continued)
PREDICTED TRAFFIC NOISE LEVELS DURING THE TEMPORARY CONSTRUCTION DETOUR (TCD) PHASE

Receptor[1]	Site Description	Assumed Future Land Use[2]	NAC Approach[3]	Existing	Temporary Construction Detour Alternatives		
					Presidio Parkway Diamond DEIS TCD Alignment 2030[4]	TCD Realign-ment Option 2030	Change between Presidio Parkway Diamond DEIS TCD and TCD Realignment Option
71	Building 1161/Gorgas Avenue Warehouse	Office	71	66	66	**72***	6
72	Building 1160/Gorgas Avenue Warehouse	Office	71	**72***	**71***	**75***	4
73	Building 1152/Presidio YMCA Gym	Office	71	**71***	**71***	**73***	2
75	Building 1004/Officers Quarters	Office	71	55	56	58	2
76	3234 Lyon St.	Residential	66	**75***	**74***	**75***	1
Number of sites approaching or exceeding the NAC				15	8	13	

Notes:
[1]For details regarding the receptor location, see Appendix E of the 2004 NVS.
[2]Based on Presidio Trust Management Plan and consultation with Presidio Trust and NPS staff. IN cases where future land use was undetermined, the existing land use was assumed for land use.
[3]FHWA noise abatement criterion approach based on existing or anticipated land use. Approach is defined by Caltrans as being within one 1dBA of the noise abatement criterion.
[4] The noise levels predicted for this alternative as presented in the 2004 Noise and Vibration Study.
*__Bolded__ numbers indicate noise levels that approach, equal, or exceed the NAC.

Site 7, located at the southeast corner of Building 603 (Crissy Field Center), represents an area where exterior noise levels are expected to exceed the NAC with the realigned TCD by 7 dBA. Noise levels from the PPA realignment would not approach or exceed the NAC due to the fact that Doyle Drive in this area would be enclosed in a tunnel.

Site 9, located at the southeast corner of Building 610/Post Commissary, represents the noise levels that would be expected at the exterior of the building closest to the Doyle Drive. With the realigned PPA and the TCD, the noise level is not expected to equal or exceed the NAC.

Site 10, located at the south side of Battery Blaney, represents the noise levels that would be expected at this outdoor area closest to Doyle Drive. The realigned PPA would exceed the NAC by 5 dBA while the TCD realignment would exceed the NAC by 2 dBA.

Site 11, located at the south side of Battery Slaughter, represents the noise levels that would be expected at this outdoor area next to Doyle Drive. The NAC would not be approached or exceeded by the realigned PPA due to the fact that Doyle Drive would be entering a tunnel near this location. The TCD realignment would not impact this area.

Site 43, located at a gravesite in the National Cemetery south of Doyle Drive (near the intersection of Sheridan Avenue and Lincoln Boulevard), represents the noise levels that would be expected near the northern edge of the cemetery. Noise levels are not expected to exceed the NAC for the realigned PPA. The TCD realignment is expected to equal the NAC.

Site 44, located at the northwest corner of Building 129/Enlisted Family Quarters, represents the noise levels that this residential area south of Doyle Drive and Lincoln Boulevard would expect. The NAC would be exceeded by the realigned PPA by 4 dBA while the TCD realignment would not approach or exceed the NAC.

Site 45, located at the northwest corner of Building 122/Gymnasium (Main Post Community Center), represents the noise levels that this area south of Doyle Drive and Lincoln Boulevard would expect. The NAC would be exceeded by the realigned PPA by 1 dBA and would not be approached or exceeded by the TCD.

Site 46, located at the northwest corner of Building 108/Storage, represents the noise levels that this area south of Doyle Drive and Lincoln Boulevard would expect. The NAC approach would be exceeded by the realigned PPA by 2 dBA. The realigned TCD is not expected to approach or exceed the NAC.

Site 47, located at the northwest corner of Building 107/Switching Station, represents the noise levels that this area south of Doyle Drive and Lincoln Boulevard would expect. The NAC would be exceeded by 2 dBA by the realigned PPA. The realigned TCD would equal to the NAC at this location.

Site 48, located at the northwest corner of Building 104/ Mess Hall, represents the noise levels that this area south of Doyle Drive and Lincoln Boulevard would expect. The NAC would be approached by the realigned PPA while the realigned TCD is not expected to approach or exceed the NAC.

Site 49, located at the northwest corner of Building 105/ Mess Hall, represents the noise levels that this area south of Doyle Drive and Lincoln Boulevard would expect. The NAC would be exceeded by the realigned PPA by 5 dBA with the TCD exceeding the NAC by 4 dBA.

Site 50, located at the northwest corner of Building 106/Band Barracks (Union Pacific offices), represents the noise levels that this area south of Doyle Drive and Lincoln Boulevard would expect. The NAC would be exceeded by the realigned PPA by 6 dBA, with the realigned TCD exceeding the NAC by 2 dBA.

Site 51, located at the northwest corner of Building 211 (former Burger King), represents the noise levels that this area south of Doyle Drive would expect. The NAC would not be exceeded by the realigned PPA or the realigned TCD.

Site 53, located at the northwest corner of Building 210/Guard House, represents the noise levels that this area south of Doyle Drive would expect. The NAC would not be approached or exceeded by either the realigned PPA or the realigned TCD at this location.

Site 55, located at the northwest corner of Building 220/Bakers and Cooks School, represents the noise levels that this area south of Doyle Drive would expect. The NAC would not be approached or exceeded by realigned TCD.

Site 56, located at the northwest corner of Building 231/Exchange Gas Service Station, represents the noise levels that this area south of Doyle Drive would expect. The NAC would not be approached or exceeded by the realigned TCD.

Site 57, located at the northwest corner of Building 228/Bakery, represents the noise levels that this area south of Doyle Drive would expect. The NAC would not be approached or exceeded by the realigned TCD.

Site 58, located at the northwest corner of Building 227/Warehouse, represents the noise levels that this area south of Doyle Drive would expect. The NAC would not be approached or exceeded by the realigned TCD.

Site 59, located at the northeast corner of Building 223/Warehouse, represents the noise levels that this area south of Doyle Drive would expect. The NAC would not be approached or exceeded by the realigned TCD.

Site 61, located at the northwest corner of Building 1029/Swords to Plowshares, represents the noise levels that this residential area south of Doyle Drive would expect. The NAC would not be approached or exceeded by the realigned TCD.

Site 62, located at the northwest corner of Building 1030/Swords to Plowshares, represents the noise levels that this residential area south of Doyle Drive would expect. The NAC would not be approached or exceeded by the realigned TCD.

Site 63, located at the northwest corner of Building 1063/Medical Supply, represents the noise levels that this area south of Doyle Drive and west of Gorgas Avenue would expect. The NAC would not be approached or exceeded by the realigned TCD.

Site 64, located at the northwest corner of Building 1062/Quartermaster Shop, represents the noise levels that this area south of Doyle Drive and west of Gorgas Avenue would expect. The NAC would not be approached or exceeded by the realigned TCD.

Site 66, located at the northwest corner of Building 1167/Gorgas Avenue Warehouse, represents the noise levels that this area west of Richardson Avenue and east of Gorgas Avenue would expect. The NAC would not be approached or exceeded by the realigned TCD.

Site 67, located at the northwest corner of Building 1163/Gorgas Avenue Warehouse, represents the noise levels that this area west of Richardson Avenue and east of Gorgas Avenue would expect. The NAC would not be approached or exceeded by the realigned TCD.

Site 68, located at the northwest corner of Building 1169/Gorgas Avenue Warehouse, represents the noise levels that this area west of Richardson Avenue and east of Gorgas Avenue would expect. The NAC would not be approached or exceeded by the realigned TCD.

Site 69, located at the northwest corner of Building 1162/Gorgas Avenue Warehouse, represents the noise levels that this area west of Richardson Avenue and east of Gorgas Avenue would expect. The NAC would not be approached or exceeded by the realigned TCD.

Site 70, located on the east side of Building 1170/Gorgas Avenue Warehouse, represents the noise levels that this area west of Richardson Avenue and east of Gorgas Avenue would expect. The NAC would be exceeded by 3 dBA by the realigned TCD.

Site 71, located on the east side of Building 1161/Gorgas Avenue Warehouse, represents the noise levels that this area west of Richardson Avenue and east of Gorgas Avenue would expect. The NAC would be equaled by the realigned TCD.

Site 72, located at the northeast corner of Building 1160/Gorgas Avenue Warehouse, represents the noise levels that this area west of Richardson Avenue and east of Gorgas Avenue would expect. The NAC would be exceeded by 3 dBA by the realigned TCD.

Site 73, located at the northeast corner of Building 1152/Presidio YMCA, represents the noise levels that this area west of Richardson Avenue and east of Gorgas Avenue would expect. The NAC would be exceeded by 1 dBA for the realigned TCD.

Site 75, located at the southeast corner of Building 1004/Officers Quarters, represents the noise levels that this area west of Richardson Avenue and at the corner of O'Reilly Avenue and Edie Road would expect. The NAC would not be approached or exceeded by the realigned TCD.

Site 76, located at the center of the residential building at 3234 Lyon Street at the corner of Lyon Street and Richardson Avenue, represents the noise levels that this residential area east of Richardson Avenue would expect. The NAC would be exceeded by the realigned TCD by 8 dBA.

The realignment of the Presidio Parkway Alternative, as noted in Table 6-1, is expected to have a noticeable traffic noise level increase on Building 129, 122, 108, 107, 104, and 106 with a minor increase as Building 105 and a minor decrease at Building 610. As noted in the detailed information for each site shown above, the bulk of these buildings are currently vacant or are designated for commercial use with no exterior areas of frequent human use where a lowered noise level would be of benefit. Therefore additional consideration of noise abatement in the form of noise barrier walls beyond those considered in the 2004 NVS was determined to be unwarranted. As noted in the 2004 NVS, the use of soundproofing and quieter pavement surfaces will be explored in detail as part of the design phase of this project

The realigned Temporary Construction Detour, as shown in Table 6-2, has the potential is increase the noise levels at 28 sites when compared to the predicted noise levels for the TCD shown in the 2004 NVS. This increase is expected to range from 1 to 18 dBA. The increase in the expected traffic noise level associated with the aligned TCD is primarily attributable to the general shift to the north and to the placement of the roadway in an at-grade condition in areas where it was previously anticipated to be elevated.

The greatest increase in noise level is expected to be at the Crissy Interpretive Center, Buildings 1183, 1184 1185 and 1186 (Mason St. Warehouses), Building 204 and the Palace of Fine Arts. While all buildings and public use areas within the Doyle Drive corridor that could be impacted by traffic noise from the TCD were evaluated, specific concerns related to the impacts on the Crissy Field Center were reviewed in detail. The Crissy Interpretive Center is a community environmental facility that offers a wide variety of programs such as workshops and special events. The Center also houses a media lab, arts workshop, urban ecology lab, and resource library and is used for many educational functions such as summer programs. Concerns about the continued operation of the Center during and following construction have been raised.

Based on the results of the traffic noise modeling effort completed as part of this study, no basic increase in traffic noise is expected over the No-Build scenario with either the original Presidio Parkway Alternative or the realigned alternative. The greatest concern related to traffic noise impacts is associated with the TCD and the construction process itself. While the construction impacts have been noted in detail in the 2004 NVS, the impacts associated with the realigned TCD are noticeably greater (5 dBA or more increase) at 9 locations.

SECTION 7: NOISE ABATEMENT ALTERNATIVES

Consistent with 23 CFR 772, noise abatement must be considered for Type I projects when the predicted noise level approaches or exceeds the NAC or when the project results in a substantial noise increase (defined by Caltrans as an increase of 12 dBA or more). Section 5 identified a number of locations where traffic noise exposure currently is anticipated to approach, equal, or exceed the NAC within the realigned segment of the PPA. Since abatement for this area was considered in the 2004 NVS, further consideration of abatement is not warranted since the overall composition of this alternative has not changed.

However, the change in the horizontal and vertical alignment of the proposed realigned TCD associated with the PPA does warrant further consideration of abatement options, especially in the vicinity of the Crissy Field Center. Consistent with Caltrans protocol and FHWA requirements, noise abatement is only considered where noise impacts are predicted and where frequent human use occurs and a lowered noise level would be of benefit. This approach gives primary consideration to exterior areas. If there are no exterior activities that are affected by traffic noise, then the interior criterion shown in Category E of the FHWA regulations will be used as the basis for determining whether noise abatement is reasonable and feasible.

The abatement measures considered for the traffic noise associated with the TCD to reduce the predicted exterior traffic noise impacts were:

- Alteration of horizontal and vertical roadway alignment,
- Temporary noise barriers, and
- Building insulation.

7.1 ALTERATION OF HORIZONTAL AND VERTICAL ROADWAY ALIGNMENT

Alteration of the horizontal and vertical roadway alignment of the TCD has resulted in a minimization of impacts on the removal of several buildings within the Doyle Drive corridor but has also resulted in an increase in operational traffic noise levels at a number of buildings within the project area, most notably the Crissy Field Center. Because of the limited space to place the TCD between the existing roadway and nearby buildings, further options to shift the horizontal or vertical roadway alignment appear to be very limited. While minor adjustments are possible, it is unlikely that major shifts in alignment will be possible that would provide substantial noise relief to the impacted sites. Detailed assessment of this possibility will continue as part of the design process.

7.2 TEMPORARY NOISE BARRIERS

When evaluating temporary noise barriers, a number of factors must be considered including:

- Lateral clearances (sufficient distances from the traveled way to the barrier),
- Sight distance requirements (providing for sufficient stopping sight distance),
- Access requirements for the properties being protected,
- Barrier dimensions (length and height),
- Construction materials, and
- Aesthetics

Construction of a temporary noise barrier at sites that are on local streets such as Richardson Avenue, Lyon Street, Marina Boulevard, Mason Street, Lincoln Boulevard, Gorgas Avenue, Montgomery Street, Girard Road and Halleck Street that intersect or cross the TCD would not be feasible because driveways would need to be maintained to provide access to those properties. As such, there appear to be no reasonable measures to reduce the predicted traffic noise with the proposed TCD Alternative at Sites 1 and 2 (the Palace of Fine Arts Building), Sites 6 (the Mason Street Warehouses), Site 47 (Building 107), Site 49 (Building 105), Site 50 (Building 106), Site 70 and 72 (Gorgas Avenue Warehouses), Site 73 (YMCA Building) and at Receptor 76 (residential area along Lyon St. and Richardson Avenue).

Site 7 (the Crissy Field Center) appears to have the potential to be benefited by the construction of a temporary noise barriers along the TCD, depending upon cost and effectiveness considerations. To determine whether a temporary noise barrier would be reasonable and feasible at this location, the Caltrans protocol was applied to a series of noise barrier options for this site. The Caltrans protocol identifies a reasonable noise barrier as one that provides at least 5 dBA of traffic noise reduction at a reasonable cost. The cost effectiveness of a noise barrier is determined by a base allowance of $32,000 per benefited receiver that is adjusted upwards based on the absolute noise levels predicted to occur, the increase between the Build and No-Build Alternatives, the amount of noise reduction that can be achieved, and the antiquity of the impacted receptors in the project corridor. This provides for a total noise abatement allowance for noise barriers that are considered feasible. This protocol was applied to the noise barrier concepts discussed below.

Since the Caltrans protocol is based on a noise barrier wall design, all noise barriers were treated as though a wall was used. In fact, this may not actually be the final decision as the project progresses towards final design and construction. There are a wide variety of noise barrier options, in terms of both material and design, than can minimize the visual impact as well as reducing the traffic noise level. The primary options include a rigid wall, an earth berm, or a combination of the two. There are also variations of the earth berm concept such as crib walls or living walls, which are typically a concrete structure in a triangular shape filled with soil and planted to resemble a mount of earth. The advantage of this design over an earth berm is that less horizontal space is required to achieve a similar height, which can be important in a limited space environment such as the Doyle Drive corridor.

Within the rigid wall concept, which is probably the most common structural noise abatement method employed, there are a number of combinations of design elements including glass, plastic, metal, concrete, steel, and other materials. The details of the noise abatement option would be coordinated during the design phase for any noise barrier option that is determined to be preliminarily reasonable and feasible. This would give all interested parties the opportunity to provide input into the aesthetics of the barrier as well as the materials to be employed. Due to the constraints that may be placed on noise barrier design such as utility locations, drainage, structural loading limits, and maintenance issues, the specific type of barrier material to be used and the exact placement of the barrier can only be estimated at this time. Where visual impacts could result from the placement of a noise barrier, a decision would have to be made as to what constitutes a reasonable compromise between the two in order to accommodate both desires.

Table 7-1 illustrates the results of an assessment of the reasonableness and feasibility of providing a temporary noise barrier in the vicinity of the Crissy Field Center to reduce the impact of the traffic noise levels that would be generated during the operational life of the TCD. A variety of noise barriers were investigated at heights of 2.44 m to 4.88 m and at lengths varying from 117 m to 147 m. The barrier was analyzed as though it was placed at the edge of the safety shoulder of the roadway along the north side of the TCD and optimized at 3.05 meters in height and 117 meters in length. The barrier wall is predicted to achieve a 6 dBA reduction at these dimensions.

The most recent Caltrans information regarding noise barrier costs was employed, which includes a base allowance of $32,000 with an increase of $4,000 because the absolute noise levels are between 70 and 74 dBA. An additional $2,000 was allowed because the build versus existing noise levels are between 3 and 7 dBA. Another $2,000 was added because the achievable noise reduction was between 6 and 8 dBA. Finally an additional $10,000 was incorporated into the allowable amount because the building pre-dated 1978. This created a total reasonable allowance for this site of $50,000.

Using the current cost estimate of $\$175/m^2$ for a masonry wall, the estimated cost of the temporary noise barrier is $62,448.75, which exceeds the allowable cost of $50,000. It is possible that a lower cost material such as wood, plastic or metal could be substituted for the masonry wall and creates a lower cost wall option.

7.3 BUILDING INSULATION

Consideration of the noise level impacts inside the Crissy Interpretive Center has identified that no interior noise levels that approach or exceed the FHWA Interior NAC of 52 dBA will results from the operation of the TCD under a closed window condition. Given the type of building structure (masonry with single-glazed windows) found at the Crissy Interpretive Center, it could be reasonably assumed that the noise reduction (exterior to interior) would be on the magnitude of 49 dB (minus the lower reduction for the windows, which would be on the order of 24 dB) using the HUD guidance offered in *The Noise Guidebook.* Therefore, an effective inside/outside reduction on the order of 25 dB could be expected with the doors and windows closed. This would reduce the predicted TCD interior noise level to approximately 50 dB, which is 2 dB below the FHWA interior criteria found in the NAC,

Given this anticipated condition, additional noise reduction would not be required to ensure that the interior space would continue to be usable as an educational facility. However, if open-window conditions are routinely experienced, the noise reduction provided by the building envelope would be less, depending upon the amount of wall space with open windows. This reduction could result in an interior noise level that would approach or exceed the interior NAC. Since the Crissy Interpretive Center is a two story building with limited window space on the ground floor level, it is anticipated that only second-story activities would be impacted by the noise from the TCD, especially when one considers that the second floor would receive very limited (if any) benefit from the proposed temporary construction noise barrier.

To ensure that potential noise impacts to the Crissy Interpretive Center associated with the TCD can meet or exceed the FHWA NAC, the following commitments are made.

1. A detailed building noise reduction analysis will be conducted during the design phase of this project that will evaluate the building's construction material and the location and volume of window space within the building envelope.
2. Operational characteristics of the building envelope will be investigated during the design phase (in concert with the owner/operator of the building) to determine the amount of time (if any) that windows and/or doors remain in the open position during normal operating hours (if any).
3. If open window or door conditions are found to exist on a routine basis during the design phase investigation, the economic reasonableness of keeping these openings closed will be investigated. This may result in the required use of air conditioning during warmer days to ensure that the windows and doors will remain closed to ensure that the noise reduction is at its maximum. By keeping the doors and windows closed, further noise reduction is not required.
4. If the building is not air conditioned, the feasibility of retrofitting the building for this condition will be investigated during the design phase. If the use of air conditioning is feasible and economically reasonable, air conditioning installation as part of the construction project is recommended.
5. If the detailed building noise reduction analysis conducted during the design phase identifies other potential sources of noise leaks (ventilation openings, damaged or missing door gaskets, etc.) that could cause the interior noise level to approach or exceed the NAC, the feasibility and economic reasonableness of having these repairs made as part of the construction project will be pursued to ensure that the interior noise levels will not exceed the NAC.

The views of the impacted property owner would be a major consideration in reaching a final decision on the reasonableness of abatement measures to be provided. The opinions of the property owners would be obtained through the use of public involvement techniques that may include public hearings, community meetings, or other means as appropriate.

If pertinent parameters change substantially during the final project design, the preliminary noise abatement design could be changed or eliminated from the final project design. A final decision of the construction of the noise abatement would be made upon completion of the project design.

TABLE 7-1
NOISE BARRIER PRELIMINARY REASONABLENESS DETERMINATION

Alternative	Location	Length (m)	Height (m)	Preliminary Reasonable Cost Allowance Per Benefited Unit[1]	Number of Benefited Units*	Preliminary Reasonable Barrier Total Construction Cost Allowance	Estimated Barrier Construction Cost[2]	Preliminary Reasonable (Yes/No)
Presidio Parkway Temporary Construction Detour	Crissy Field Center	117	3.05	$50,000	1	$50,000	$62,448.75	No

Source: Environmental Science Associates, 2006

Notes: [1]Based on Caltrans TNAP, October 1998 as modified.

[2]Barrier cost is based on Caltrans TNAP value of $175/meter^2 for a standard masonry block wall.

*The number of benefited units is based on a frontage factor of 30.5 meters being equivalent to one residential lot where the area will receive a reduction of 5 dBA or more based on Caltrans TNAP.

The height and length of the barrier were optimized to enhance the cost effectiveness of this barrier.

SECTION 8.0: REFERENCES

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