2.13 Noise

	Potentially Significant Impact	Less-than-Significant with Mitigation	Less-than-Significant Impact	No Impact
Would the project result in:				
a) Generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?	☐	☐	☒	☐
b) Generation of excessive ground-borne vibration or ground-borne noise levels?	☐	☐	☒	☐
c) For a project located within the vicinity of a private airstrip or an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels?	☐	☐	☐	☒

2.13.1 Environmental Setting

This section provides background information on noise and vibration, identifies existing noise sensitive receptors and ambient noise levels in the project area, and presents the regulatory framework for evaluating noise impacts.

2.13.1.1 Existing Conditions

Background on Noise and Ground Vibration

Noise

Noise is commonly defined as unwanted sound that annoys or disturbs people and potentially causes an adverse psychological or physiological effect on human health. Because noise is an environmental pollutant that can interfere with human activities, evaluation of noise is necessary when considering the environmental impacts of a Project.

Sound is mechanical energy (vibration) transmitted by pressure waves over a medium such as air or water. The decibel (dB) scale, a logarithmic scale, is used to quantify sound intensity. In general, human sound perception is such that a change in sound level of 1 dB cannot typically be perceived by the human ear. A change of 3 dB is barely noticeable. A change of 5 dB is clearly noticeable. A change of 10 dB is perceived as doubling or halving the sound level.

Because the human ear is not equally sensitive to all frequencies in the entire spectrum, noise measurements are weighted more heavily for frequencies to which humans are sensitive in a process called *A-weighting*, written as *dBA* and referred to as *A-weighted decibels*. **Table 2.13-1** summarizes typical A-weighted sound levels for different noise sources. Refer to **Appendix J**, *Noise and Vibration Background*, for additional information on sound measurements and other terminology, types of measurements used to characterize the time-varying nature of sound, and influence of atmospheric and physical conditions.

Table 2.13-1. Typical A-weighted Sound Levels

Common Outdoor Activities	Noise Level (dBA)	Common Indoor Activities
	110	Rock band
Jet flyover at 1,000 feet		
	100	
Gas lawnmower at 3 feet		
	90	
Diesel truck at 50 feet at 50 mph		Food blender at 3 feet
	80	Garbage disposal at 3 feet
Noisy urban area, daytime		
Gas lawnmower, 100 feet	70	Vacuum cleaner at 10 feet
Commercial area		Normal speech at 3 feet
Heavy traffic at 300 feet	60	
		Large business office
Quiet urban daytime	50	Dishwasher in next room
Quiet urban nighttime	40	Theater, large conference room (background)
Quiet suburban nighttime		
	30	Library
Quiet rural nighttime		Bedroom at night, concert hall (background)
	20	
		Broadcast/recording studio
	10	
	0	

Source: California Department of Transportation 2013.

Notes: For a point source such as a stationary compressor or construction equipment, sound attenuates based on geometry at rate of 6 dB per doubling of distance. For a line source such as free flowing traffic on a freeway, sound attenuates at a rate of 3 dB per doubling of distance.

dB = Decibel. A unitless measure of sound on a logarithmic scale, which indicates the squared ratio of sound pressure amplitude to a reference sound pressure amplitude. The reference pressure is 20 micro-pascals.

dBA = A-Weighted Decibel. An overall frequency-weighted sound level in decibels that approximates the frequency response of the human ear.

Ground Vibration

Ground vibration is caused by seismic waves radiating along the surface of and downward into the ground. Operation of heavy construction equipment, particularly pile driving equipment and other impact devices such as pavement breakers, create seismic waves that can be felt as ground vibration. Perceptible ground-borne vibration is generally limited to areas within a few hundred feet of construction activities. As seismic waves travel outward from a vibration source, they cause rock and soil particles to oscillate. The rate or velocity (in inches per second) at which these particles move is the commonly accepted descriptor of the vibration amplitude, referred to as the peak particle velocity (PPV). **Table 2.13-2** summarizes typical vibration levels generated by construction equipment. Refer to **Appendix J** for additional information on how vibration levels are estimated.

Table 2.13-2. Vibration Source Levels for Construction Equipment

Equipment	PPV at 25 Feet	PPV at 50 Feet	PPV at 75 Feet	PPV at 100 Feet	PPV at 175 Feet
Pile driver (sonic/vibratory)	0.734	0.2595	0.1413	0.0918	0.0396
Hoe ram or large bulldozer	0.089	0.0315	0.0171	0.0111	0.0048
Loaded trucks	0.076	0.0269	0.0146	0.0095	0.0041
Jackhammer	0.035	0.0124	0.0067	0.0044	0.0019
Small bulldozer	0.003	0.0011	0.0006	0.0004	0.0002

Source: Federal Transit Administration 2006.
PPV = peak particle velocity

Noise Sensitive Land Uses

Noise sensitive land uses are land uses where people reside or locations where the presence of unwanted noise could adversely affect the use of the land. Noise sensitive land uses typically include residences, schools, hospitals, and churches. Recreational areas where quiet is an important part of the environment can also be considered sensitive to noise.

Land uses surrounding the Project area are mostly industrial and commercial uses. There are residential and recreational uses near the project area. There are no schools, hospitals, or churches within or adjacent to the Project area.

As described in Section 2.3, Air Quality, the closest residences are located on Peralta Street, between 18th and 20th Streets. This is approximately 320 feet south of the proposed Class II bike lanes on 20th Street and 940 feet south of the proposed Class I portion of the Link on West Grand Avenue. In addition, there are some residences in the vicinity of 17th Street, between Mandela Parkway and Willow Street. Peralta Studios, a live/work warehouse space, is located at the southwest corner of West Grand Avenue/Mandela Parkway, which is directly adjacent to the proposed at-grade bike path. The nearest Mixed-Use (Residential/Commercial) land use is located northeast of the project area at 28th Street, between Mandela Parkway and Ettie Street.

Recreational uses include the Bay Bridge Trail on the west end of the alignment, the bicycle/pedestrian pathway along Mandela Parkway, and Raimondi Park on south side of 20th Street, between Wood Street and Campbell Street. Although not an officially designated park, the Mandela Parkway median is public open space that includes a pedestrian/bicycle path, and informal seating areas within 100 feet of the intersection with West Grand Avenue. Recreational users are exposed to the vehicle traffic noise on Mandela Parkway. Raimondi Park is primarily used for active recreation, such as baseball and football activities.

The existing noise environment in the Project area is governed primarily by vehicular traffic traveling on the freeways (I-880, I-80) and roadways (Mandela Parkway, West Grand Avenue, Wood Street, Frontage Road, Maritime Street, and Burma Road). This includes industrial truck traffic and railroad operations. To quantify existing ambient noise levels in the Project area, short-term (15-minute) ambient noise measurements were conducted in April 2013 at various locations around the project area. The day ambient noise measurements indicate that the ambient noise level in parts of the Project area that are not directly exposed to traffic noise from major streets is about 64 dBA L_{eq}. The ambient noise level along the Link and in the parts of the Project area that are directly exposed to traffic noise from major streets is about 67 dBA L_{eq}. Refer to the Noise Analysis (**Appendix J**) for additional detail.

2.13.1.2 Regulatory Setting

Federal and State

There are no federal regulations applicable to the Project.

Caltrans Construction Noise Requirements

Construction noise from Caltrans projects is regulated by Caltrans Standard Specifications Section 14-8.02, "Noise Control," which states:

- Do not exceed 86 dBA at 50 feet from the job site activities from 9:00 p.m. to 6:00 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.

Caltrans Vibration Guidelines

Caltrans developed guidelines for damage and annoyance potential from transient and continuous vibration that is usually associated with construction activity (California Department of Transportation 2004). Pile driving is considered a source of continuous vibration. Refer to **Tables 2.13-3** and **2.13-4**.

Table 2.13-3. Guideline Vibration Damage Potential Threshold Criteria

	Maximum PPV (in/sec)	
Structure and Condition	**Transient Sources**	**Continuous/Frequent Intermittent Sources**
Extremely fragile historic buildings, ruins, ancient monuments	0.12	0.08
Fragile buildings	0.2	0.1
Historic and some old buildings	0.5	0.25
Older residential structures	0.5	0.3
New residential structures	1.0	0.5
Modern industrial/commercial buildings	2.0	0.5

Source: California Department of Transportation 2004.

Note: Transient sources create a single isolated vibration event, such as blasting or drop balls. Continuous/frequent intermittent sources include impact pile drivers, pogo-stick compactors, crack-and-seat equipment, vibratory pile drivers, and vibratory compaction equipment.

Table 2.13-4. Guideline Vibration Annoyance Potential Criteria

	Maximum PPV (in/sec)	
Structure and Condition	**Transient Sources**	**Continuous/Frequent Intermittent Sources**
Barely perceptible	0.04	0.01
Distinctly perceptible	0.25	0.04
Strongly perceptible	0.9	0.10
Severe	2.0	0.4

Source: California Department of Transportation 2004.

Note: Transient sources create a single isolated vibration event, such as blasting or drop balls. Continuous/frequent intermittent sources include impact pile drivers, pogo-stick compactors, crack-and-seat equipment, vibratory pile drivers, and vibratory compaction equipment.

Regional and Local

City of Oakland Municipal Planning Code

Construction Noise Standards

Noise standards applicable to temporary construction or demolition work are contained in the Oakland Planning Code Section 17.120.050. For construction noise, the planning code specifies short-term operational standards, which apply to residential and commercial and industrial land uses affected by activities lasting less than 10 days, and long-term operational standards, which apply to activities lasting more than 10 days. Because Project construction would occur for more than 10 days and the Project is located in an industrial and commercial area, the Long-Term Operation commercial, industrial noise standards in **Table 2.13-5** would apply.

Table 2.13-5. City of Oakland Planning Code Maximum Allowable Receiving Noise Level Standards

	Daily 7 a.m. to 7 p.m. (dBA)	Weekends 9 a.m. to 8 p.m. (dBA)
Short-Term Operation[1]		
Residential	80	65
Commercial, Industrial	85	70
Long-Term Operation[2]		
Residential	65	55
Commercial, Industrial	70	60

Source: City of Oakland Planning Code.

[1] Short-Term Operational applies activities that occur for less than 10 days

[2] Long-Term Operational applies activities that occur for more than 10 days

Vibration Standards

Under *17.120.060 – Vibration* of the Oakland Planning Code, ground vibration caused by temporary construction or demolition work is exempt from vibration standards.

City of Oakland Standard Conditions of Approval

As stated in Section 1.7.2, *Permits/Approvals*, the Oakland SCA includes conditions of approval for projects. Several conditions in the SCA are not applicable to the Project because they pertain to projects that are land use developments (e.g., residential or commercial developments) and/or involve stationary sources of noise or vibration. The noise-related SCAs include the following conditions of approval that are applicable to the Project:

61. Construction Days/Hours.

The project applicant shall comply with the following restrictions concerning construction days and hours:

b) Construction activities are limited to between 7:00 a.m. and 7:00 p.m. Monday through Friday, except that pier drilling and/or other extreme noise generating activities greater than 90 dBA shall be limited to between 8:00 a.m. and 4:00 p.m.

c) Construction activities are limited to between 9:00 a.m. and 5:00 p.m. on Saturday. In residential zones and within 300 feet of a residential zone, construction activities are allowed from 9:00 a.m. to 5:00 p.m. only within the interior of the building with the doors and windows closed. No pier drilling or other extreme noise generating activities greater than 90 dBA are allowed on Saturday.

d) No construction is allowed on Sunday or federal holidays.

Construction activities include, but are not limited to, truck idling, moving equipment (including trucks, elevators, etc.) or materials, deliveries, and construction meetings held on-site in a non-enclosed area.

Any construction activity proposed outside of the above days and hours for special activities (such as concrete pouring which may require more continuous amounts of time) shall be evaluated on a case-by-case basis by the City, with criteria including the urgency/emergency nature of the work, the proximity of residential or other sensitive uses, and a consideration of nearby residents'/occupants' preferences. The project applicant shall notify property owners and occupants located within 300 feet at least 14 calendar days prior to construction activity proposed outside of the above days/hours. When submitting a request to the City to allow construction activity outside of the above days/hours, the project applicant shall submit information concerning the type and duration of proposed construction activity and the draft public notice for City review and approval prior to distribution of the public notice.

62. Construction Noise

The project applicant shall implement noise reduction measures to reduce noise impacts due to construction. Noise reduction measures include, but are not limited to, the following:

a) Equipment and trucks used for project construction shall utilize the best available noise control techniques (e.g., improved mufflers, equipment redesign, use of intake silencers, ducts, engine enclosures and acoustically-attenuating shields or shrouds) wherever feasible.

b) Except as provided herein, impact tools (e.g., jack hammers, pavement breakers, and rock drills) used for project construction shall be hydraulically or electrically powered to avoid noise associated with compressed air exhaust from pneumatically powered tools. However, where use of pneumatic tools is unavoidable, an exhaust muffler on the compressed air exhaust shall be used; this muffler can lower noise levels from the exhaust by up to about 10

dBA. External jackets on the tools themselves shall be used, if such jackets are commercially available, and this could achieve a reduction of 5 dBA. Quieter procedures shall be used, such as drills rather than impact equipment, whenever such procedures are available and consistent with construction procedures.

c) Applicant shall use temporary power poles instead of generators where feasible.

d) Stationary noise sources shall be located as far from adjacent properties as possible, and they shall be muffled and enclosed within temporary sheds, incorporate insulation barriers, or use other measures as determined by the City to provide equivalent noise reduction.

e) The noisiest phases of construction shall be limited to less than 10 days at a time. Exceptions may be allowed if the City determines an extension is necessary and all available noise reduction controls are implemented.

63. Extreme Construction Noise

a) Construction Noise Management Plan Required

Prior to any extreme noise generating construction activities (e.g., pier drilling, pile driving and other activities generating greater than 90 dBA), the project applicant shall submit a Construction Noise Management Plan prepared by a qualified acoustical consultant for City review and approval that contains a set of site-specific noise attenuation measures to further reduce construction impacts associated with extreme noise generating activities. The project applicant shall implement the approved Plan during construction. Potential attenuation measures include, but are not limited to, the following:

e) Erect temporary plywood noise barriers around the construction site, particularly along on sites adjacent to residential buildings;

f) ii. Implement “quiet” pile driving technology (such as pre-drilling of piles, the use of more than one pile driver to shorten the total pile driving duration), where feasible, in consideration of geotechnical and structural requirements and conditions;

g) Utilize noise control blankets on the building structure as the building is erected to reduce noise emission from the site;

h) Evaluate the feasibility of noise control at the receivers by temporarily improving the noise reduction capability of adjacent buildings by the use of sound blankets for example and implement such measure if such measures are feasible and would noticeably reduce noise impacts; and

i) Monitor the effectiveness of noise attenuation measures by taking noise measurements.

b) Public Notification Required

The project applicant shall notify property owners and occupants located within 300 feet of the construction activities at least 14 calendar days prior to commencing extreme noise generating activities. Prior to providing the notice, the project applicant shall submit to the City for review and approval the proposed type and duration of extreme noise generating activities and the proposed public notice. The public notice shall provide the estimated start and end dates of the extreme noise generating activities and describe noise attenuation measures to be implemented.

64. Project-Specific Construction Noise Reduction Measures

    The project applicant shall submit a Construction Noise Management Plan prepared by a qualified acoustical consultant for City review and approval that contains a set of site-specific noise attenuation measures to further reduce construction noise impacts on an adjacent sensitive receptor or business. The project applicant shall implement the approved Plan during construction.

65. Construction Noise Complaints

    The project applicant shall submit to the City for review and approval a set of procedures for responding to and tracking complaints received pertaining to construction noise, and shall implement the procedures during construction. At a minimum, the procedures shall include:

    a) Designation of an on-site construction complaint and enforcement manager for the project;

    b) A large on-site sign near the public right-of-way containing permitted construction days/hours, complaint procedures, and phone numbers for the project complaint manager and City Code Enforcement unit;

    c) Protocols for receiving, responding to, and tracking received complaints; and

    d) Maintenance of a complaint log that records received complaints and how complaints were addressed, which shall be submitted to the City for review upon the City's request.

69. Vibration Impacts on Adjacent Structures or Vibration-Sensitive Activities

    Requirement: The project applicant shall submit a Vibration Analysis prepared by an acoustical and/or structural engineer or other appropriate qualified professional for City review and approval that establishes pre-construction baseline conditions and threshold levels of vibration that could damage the structure and/or substantially interfere with activities located at an adjacent property or adjacent vibration-sensitive activity. The Vibration Analysis shall identify design means and methods of construction that shall be utilized in order to not exceed the thresholds. The applicant shall implement the recommendations during construction.

2.13.2 Discussion of Potential Impacts

a. The Project would result in a less than significant impact related to the generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies.

Construction Noise

During construction of the Project, noise from construction activities may intermittently dominate the noise environment in the immediate area of construction. **Table 2.13-6** summarizes noise levels produced by construction equipment that is expected to be used on this Project. L_{max} sound levels at 50 feet are shown along with the typical acoustical use factors. The acoustical use factor is the percentage of time each piece of construction equipment is assumed to be operating at full power (i.e., its noisiest condition) during construction operation and is used to estimate L_{eq} values from L_{max} values. For example, the L_{eq} value for a piece of equipment that operates at full power and 50 percent of the time (acoustical use factor of 50) is 3 dB less than the L_{max} value.

Table 2.13-6. Typical Noise Levels by Construction Equipment

		Typical Noise Level (dBA) at 50 feet from Source	
Equipment	**Acoustical Use Factor (%)**	**L_{max}**	**L_{eq}**
Backhoe	40	78	74
Compactor	20	83	76
Compressor	40	78	74
Concrete pump Truck	20	81	74
Concrete Saw	20	90	83
Crane	16	81	73
Dump Truck	40	76	72
Loader	40	79	75
Generator	50	81	78
Pile Driver	20	101	94
Jackhammer	20	89	82
Lift	20	75	68
Paver	50	77	74
Pneumatic Tools	50	85	82
Roller	20	80	73
Sand Blasting	20	96	89
Tractor	40	84	80
Welder	40	74	70

Source: Federal Highway Administration 2006

L_{max} = The maximum sound level measured during the measurement period.

L_{min} = The minimum sound level measured during the measurement period.

L_{eq} = The equivalent steady state sound level that in a stated period of time would contain the same acoustical energy.

Construction of the elevated portion of the Link requires pile driving for the supporting columns. A reasonable worst-case construction noise level assumes that the three loudest pieces of equipment would operate concurrently (concrete saw, pile driver, and sand blasting). The combined L_{eq} level for these three pieces of equipment is 96 dBA at 50 feet.

For construction of the at-grade portion of the Link on West Grand Avenue, a reasonable worst-case construction noise level assumes that the three loudest pieces of equipment would operate concurrently (concrete saw, jackhammer, and sand blasting). The combined L_{eq} level for these three pieces of equipment is 91 dBA at 50 feet.

Table 2.13-7 summarizes the estimated construction noise levels at the nearest noise-sensitive use (Peralta Studios live/work space), which is located about 75–100 feet from proposed elevated structure and within 50 feet from the Link on West Grand Avenue and Class II bike lane on Campbell Street. The Link by Peralta Studios could experience noise levels as high as 92 dBA L_{eq} during the construction of elevated structure and 91 dBA L_{eq} during the construction of the Link. However, due to the intermittent nature of construction and because construction activities are not typically occurring in the exact same location for the duration of the construction window, construction noise would likely be considerably lower than this at this location most of the time. In addition, note that it is unlikely that the three loudest pieces of equipment for each activity would be operating simultaneously and in the same exact location; however, this

assumption allows for a conservative analysis of potential construction noise effects. Further, intermittent construction noise would most likely not dominate the ambient noise environment in these areas, which is generally dominated by vehicle traffic on the freeway ramps, Mandela Parkway, and West Grand Avenue.

Table 2.13-7. Estimated Reasonable Worst-Case Noise Levels at Nearest Noise-Sensitive Use by Construction Activities

	L_{eq} Noise Level (dBA)	
Construction Activity	**At 50 feet from Source**	**Peralta Studios**
Elevated Link structure with pile driving	96	92 (at 75 feet)
At-grade Link without pile driving	91	91 (at 50 feet)

Further, Project construction would be conducted in accordance with Caltrans Standard Specifications Section 14-8.02, Noise Control, and the City of Oakland's SCAs. As described in detail above, applicable SCAs include 61 (limits on days/hours of construction operation), 62 (requirement to implement noise reduction measures to reduce construction noise), 63 (requirement of a construction noise management plan for extreme construction noise and requirement of notification for property owners within 300 feet of extreme noise-generating construction activities), 64 (requirement for project-specific construction noise reduction measures) and 65 (requirement to generate procedures for responding to and tracking construction noise complaints). Because the project would comply with the local restrictions on construction noise and because construction activities would follow the City of Oakland's SCAs, construction related noise impacts would be less than significant.

Operational Noise

Construction of the new Link would require permanently closing or vacating the existing West Grand Avenue alley[15] to provide the right-of-way for the new Link. It would also require creating a cul-de-sac on Willow Street and installing bollards on Campbell Street, where they currently intersect with West Grand Avenue, to prevent vehicular traffic from crossing the new Link on West Grand Avenue. In addition, a new 100-space parking lot located on the west side of Wood Street would be constructed to provide vehicle parking for Link users.

Changes to these local streets would result in redistribution of traffic to surrounding local streets. However, traffic volumes on West Grand Avenue alley, Willow Street, and Campbell Street are generally low.[16] To result in a 3 dB increase in traffic noise, which is generally not considered to be perceptible outside of controlled laboratory conditions,[17] a doubling of traffic volumes would need to occur. Therefore, the redistribution of traffic on these streets is not expected to cause a substantial traffic increase on surrounding local streets or cause a noticeable traffic noise increase at the Mandela Parkway median, Raimondi Park, Peralta Studios live/work warehouse space, or other sensitive land uses.

[15] West Grand Avenue alley is a narrow one-way street on the south side of Grand Avenue, between Wood Street and Mandela Parkway.

[16] Based on the traffic counts conducted at the Campbell Street/West Grand Avenue alley intersection in October 2013, the peak hour traffic volume on Campbell Street was 145 vehicles in the afternoon or PM peak hour.

[17] California Department of Transportation, *Technical Noise Supplement to the Traffic Noise Analysis Protocol*, September 2013, *https://dot.ca.gov/-/media/dot-media/programs/environmental-analysis/documents/env/tens-sep2013-a11y.pdf*, accessed July 9, 2020.

Link users and existing Bay Bridge Trail users utilizing the new Wood Street parking lot would generate localized vehicle trips on surrounding streets that provide the access to the parking lot. As described in Section 2.17, *Transportation/Traffic*, the parking lot is anticipated to generate 50 vehicle trips in the afternoon peak hour on weekdays and 150 midday peak hour trips on weekends (Fehr and Peers 2014). Vehicle trips generated by the parking lot are not expected to cause a substantial traffic increase on surrounding streets or cause a noticeable traffic noise increase at Mandela Parkway median, Raimondi Park, or Peralta Studios, or other sensitive land uses. This is because the afternoon peak hour traffic volumes on Mandela Parkway are about 564 vehicles per hour in the southbound direction and about 393 vehicles per hour in the northbound direction.[18] A doubling of the traffic volumes on Mandela Parkway would be required to result in a 3 dB (i.e., barely noticeable) increase in noise. Thus the 50 and 150 Project-generated weekday and weekend vehicle trips, respectively, in the peak hour would result in much less than a 3 dB, or a barely noticeable (if noticeable at all), increase in noise. Therefore, traffic noise impacts from Project operation would be less than significant.

b. The Project would result in a less than significant impact as a result of exposing people to or generation of excessive ground-borne vibration or ground-borne noise levels.

Construction of the elevated Link structure would require the use of pile drivers, which have the potential to cause substantial ground vibration that could affect surrounding land uses. The nearest recreational sensitive receptors (Mandela Parkway median and Raimondi Park) are approximately 500 and 600 feet from the elevated structure, respectively. The Peralta Studios live/work space building would be within 100 feet of pile driving activities.

The PPV vibration level from use of the pile drivers at the nearest reactional sensitive land uses would be approximately 0.008 inches/second at Mandela Parkway median and substantially less than this at Raimondi Park. Using the criteria in **Table 2.13-4**, a PPV of 0.008 is less than the lowest Caltrans annoyance criterion, barely perceptible. Therefore, vibration impacts related to annoyance would not be excessive at Mandela Parkway median or Raimondi Park.

The PPV at the Peralta Studios live/work space would be, at most, approximately 0.1413 inches/second in the area of the building that is closest (75 feet) to the pile driving activity occurring near the Campbell Street/West Grand Avenue alley intersection (**Table 2.13-2**). Although this property has been identified as eligible for listing on the NRHP and CRHR (refer to MR-4 in Section 2.5.1), this property is not considered a fragile historic building.

A PPV of 0.1413 could be strongly perceptible in the area of the Peralta Studios live/work space, adjacent to the Campbell Street/West Grand Avenue intersection. However, pile driving activities that would affect the building would be short in duration because the Campbell Street/West Grand Avenue intersection is at the terminus of the elevated bike path. Thus, the majority of the pile driving activity would not occur near the Peralta Studios live/work space. In addition, in most of the building the PPV would be less than 0.0396 (see **Table 2.13-2**). This is because most of the building is located more than 175 feet from the nearest proposed pile driving activity near the intersection of West Grand Avenue and Campbell Street/West Grand Avenue intersection. A PPV of 0.0396 would be less than distinctly perceptible. Because strongly perceptible vibration from pile driving activities would be temporary and only occur in a small area of the Peralta Studios building, ground vibration impacts from pile driving activities related to annoyance would not be characterized as excessive. Further, temporary construction activities are exempt from vibration standards in the Oakland Planning Code. Consequently, vibration impacts related to annoyance would be considered less than significant.

[18] Based on the traffic counts conducted at the Mandela Parkway/West Grand Avenue intersections in October 2013.

Buildings in the vicinity of the elevated structure consist of industrial warehouses that would not be particularly sensitive to ground vibration caused by Project pile-driving activities. As discussed above, the PPV would be 0.0396 inches/second beyond 175 feet of the pile driving activities. This PPV is less than half of the vibration damage potential for the most fragile structures (extremely fragile historic buildings, ruins, ancient monuments), as shown in **Table 2.13-3**. According to the architectural historians who conducted the analysis in Section 2.5, *Cultural Resources*, there are no structures within 175 feet of West Grand Avenue between Wood Street and Campbell Street, where pile driving activities would occur, that would be considered extremely fragile historic buildings, ruins, or ancient monuments. There is one property at 1657 West Grand Avenue that may be eligible for the NRHP (refer to MR-4 in Section 2.5.1 and **Figure 2.5-1**). However, this property is not considered to be an extremely fragile historic building. The property includes very large steel storage sheds with very high tensile strength because they were designed for heavy equipment use around and inside the structures. It is mostly likely to fall under the Caltrans vibration-related damage category of historic and/or some old buildings, which has a damage criterion of 0.25 PPV for continuous/frequent intermittent sources (such as construction). The vibration level cited above of, at most, approximately 0.14 PPV inches/second, along with the vibration level for most of the Perlata Studios live/work space cited above of 0.0396 PPV inches/second are both below this damage criterion. Thus, as was the case for vibration-related annoyance impacts on nearby sensitive uses, potential vibration-related damage impacts on surrounding buildings would be less than significant.

c. The Project would have no impact as a result of exposing people to excessive noise levels due to Project location within the vicinity of a private airstrip or within two miles of a public airport or public use airport.

The Project is not located within an airport land use plan or within two miles of a public use airport. In addition, the project is not located within the vicinity of a private air strip. Therefore, the project would not expose people in the Project area to excessive noise levels from aircraft. There would be no impact related to the exposure of persons to excessive noise levels from aircraft.

2.13.3 Mitigation Measures

No mitigation measures are required.