Anaheim Canyon Metrolink Station and Track Alignment Project

ORANGE COUNTY, CALIFORNIA
City of Anaheim

Noise Technical Report

Prepared for:
Orange County Transportation Authority

February 2017

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Chapter 1. Introduction

1.1 Report Scope

This report has been prepared to assess the potential noise and vibration impacts associated with the proposed revisions to the Anaheim Canyon Metrolink Station and Track Alignment Project (Anaheim Canyon Station).

1.2 Project Summary

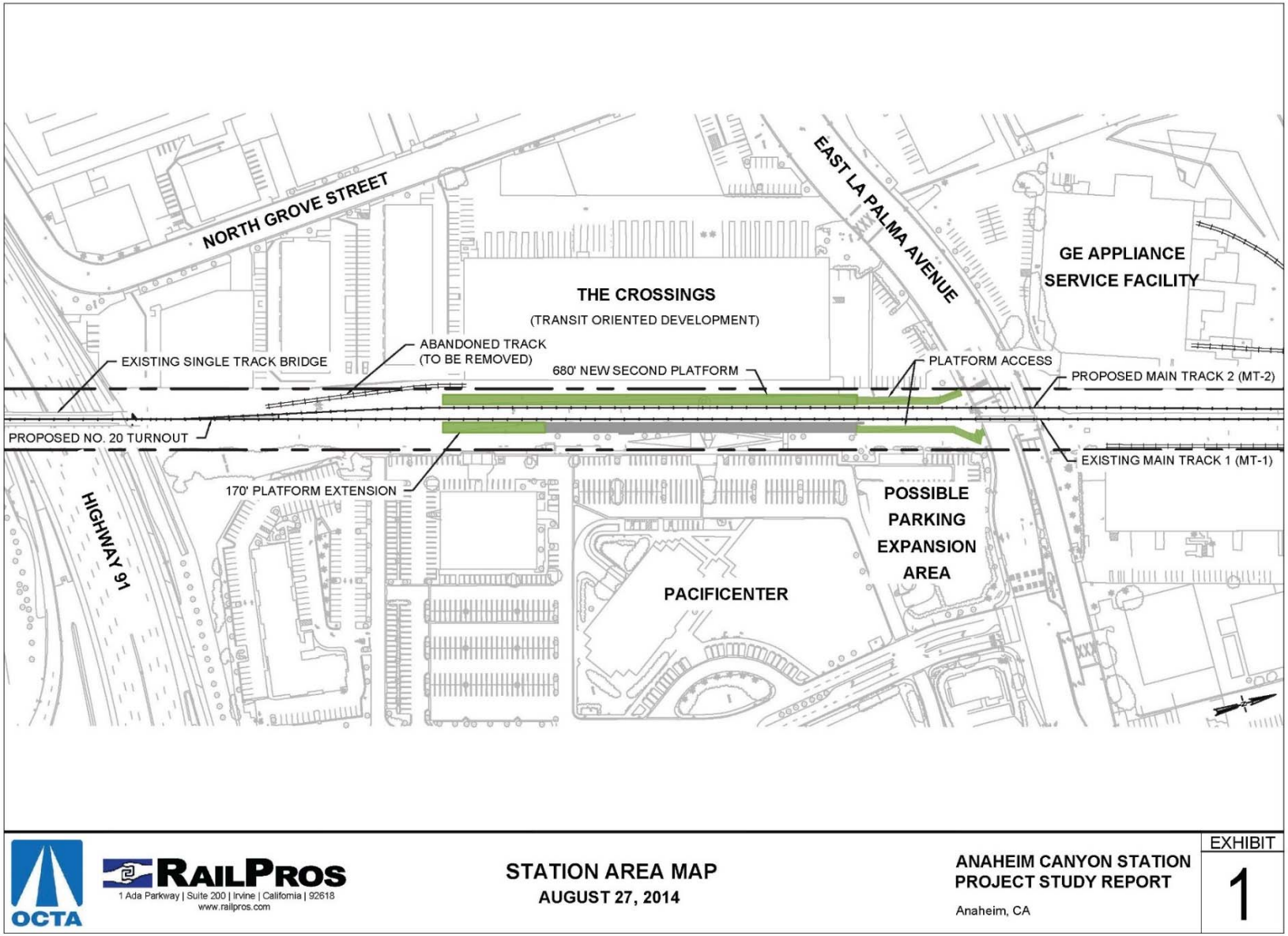
The Anaheim Canyon Station project (Project) proposes a second station track and platform within the existing rail right-of-way and includes associated signal warning devices and street and pedestrian safety improvements to adjacent at-grade crossings without permanently disrupting existing vehicular or rail traffic circulation or requiring land acquisition. The most visible improvement will be the construction of a second station track and platform to allow more than one train to serve the station and/or pass through the station area at a time. This will increase the on-time performance and safety of the train operations. The Project will also include fully ADA compliant improvements to the pedestrian circulation elements at the station. The Orange County Transportation Authority (OCTA) is the lead agency for the Project. The design and construction of the Project is planned to be funded through the Congestion Mitigation and Air Quality (CMAQ) Program and Federal Transit Administration (FTA) formula funds 5337 and 5307. In September 2012, the OCTA Board approved the allocation of $20,051,000 from Federal funds received by the agency to Project.

Anaheim Canyon Station is the only Metrolink commuter rail station on the Inland Empire-Orange County (IEOC) Line in the northeastern part of the City of Anaheim. The Anaheim Canyon Station provides commuters with local and community bus routes, Stationlink rail feeder routes, and Anaheim Transit Network (ATN) shuttle services. A Station Area Map is provided in **Exhibit 1** and the Project Limits are shown in **Figure 1**. The station's address is 1039 North Pacificenter Drive. The station is situated within a 100-foot wide right-of-way along the western edge of the Pacificenter Development in the southwest quadrant of Tustin Avenue and La Palma Avenue. The current station consists of one platform with shade structures, benches and ticket vending machines. The improved Anaheim Canyon Station will remain a multi-modal transit center that accommodates Metrolink commuter rail service, OCTA local and community bus service, Stationlink rail feeder service and Anaheim Resort Transit, along with parking facilities. Key elements of the project include the following:

- Construction of approximately 3,400 linear feet of new siding track (2nd track) and two new turnouts. In the station area, the new track will be built to the west of the existing single track, then to the north of La Palma Avenue, the new track will transition to be built on the east side of the existing track.
- Establish two new Control Points (CPs) at the new turnouts. Associated railroad signal and communications modifications will be required to accommodate new 2nd track and pedestrian safety improvements at grade crossings.
- Construction of improvements to the existing at-grade crossings of E. La Palma Avenue and Tustin Avenue to accommodate the new 2nd track; including new street improvements, relocation of existing railroad signal warning devices and pedestrian safety improvements. Includes reconstruction and widening of sidewalk elements to accommodate the relocation of the pedestrian grade crossing warning devices, gates and channelization railing.

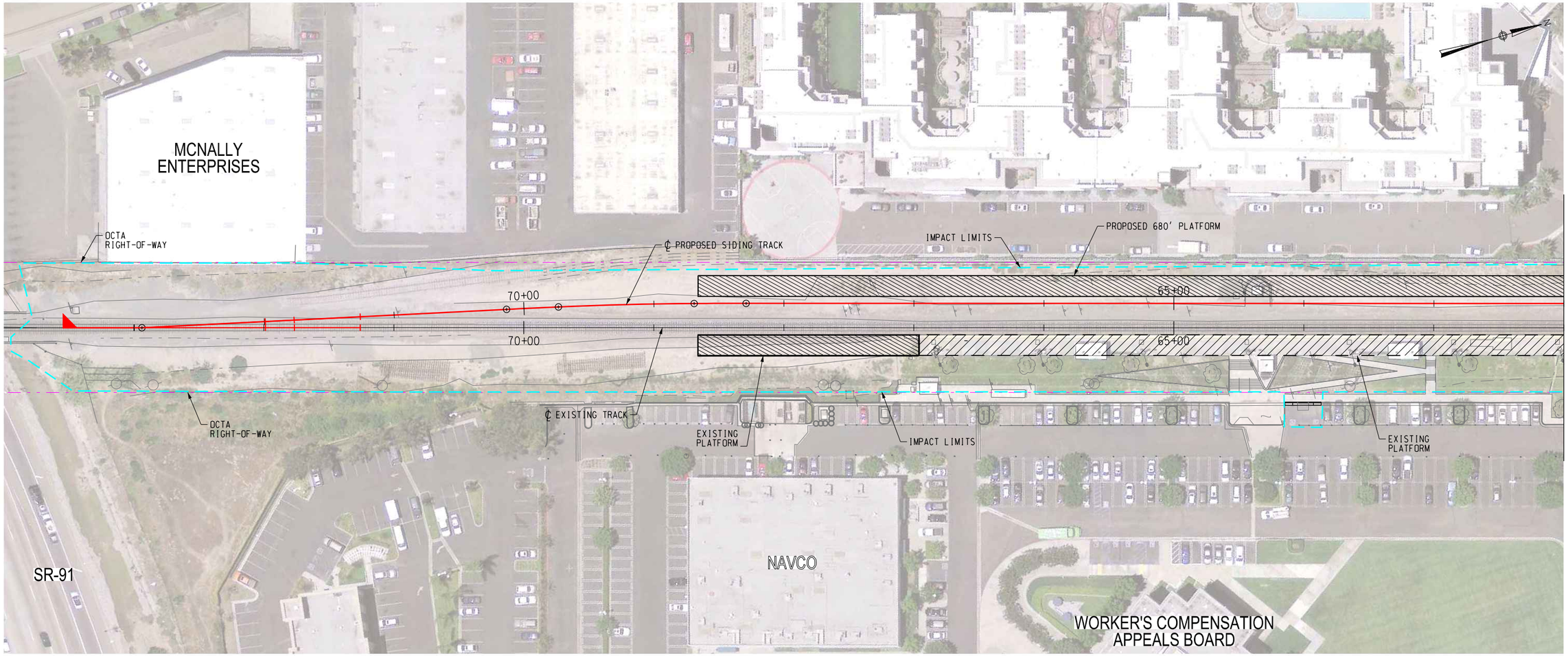
- Closure of an existing driveway along the north edge of La Palma Avenue, just west of the railroad tracks, to accommodate the second track and provide for grade crossing safety improvements. This work will be within City of Anaheim public right-of-way, however a temporary construction easement is anticipated to be required for this work. This driveway closure will not impact access to the private property, because the property has a main driveway approach from E. La Palma Avenue located approximately 295 feet to the west, which will not be affected by the Project.
- Relocation of an existing driveway along the south edge of Tustin Avenue, just east of the railroad tracks, to accommodate the second track and provide the required area for at-grade crossing safety improvements. This work will be within City of Anaheim public right-of-way, however a temporary construction easement is anticipated to be required for this work and the reconfiguration of parking stalls for no net loss of parking to the private property owner.
- Extension of the existing 510-foot long station platform to meet the current required Metrolink standard platform length of 680 feet, which supports an eight-car train.
- Construction of a new 680-foot long second platform and associated facilities on the west side of the new 2nd track.
- Construction of 832 linear feet of retaining wall west of new platform to accommodate the difference in grade from the top of proposed platform to existing ground and to protect excessive fill over an existing 36-inch SoCal Gas line located within a 10-foot easement along the western boundary of the railroad right-of-way.
- Construction of new ADA-compliant pedestrian pathways and sidewalks to provide pedestrian access between the existing parking lot and proposed second platform.
- Construction of improvements to existing parking lot pedestrian ramps to meet ADA compliance. This work will occur within private property currently being leased by the City of Anaheim for station parking. The project would not improve or expand the parking lot.
- Reconstruction of a portion of the existing sidewalk, curb and gutter and roadway, and associated striping to provide a Class II bike path extension across the railroad grade crossing area, along the south edge of eastbound La Palma Avenue up to Tustin Avenue. This work will be within OCTA right-of-way and City of Anaheim public right-of-way.
- Construction of a bus pad/stop on eastbound La Palma Avenue on the nearside of the railroad grade crossing.
- Relocation of an existing Positive Train Control communications tower located in the area proposed for the new second platform. The new location for the tower will be at the south end of new platform.
- Minor grading and drainage improvements, including a culvert extension to accommodate the second track.
- Relocate one Southern California Edison (SCE) power pole in the south east quadrant of the La Palma Avenue grade crossing, and relocate one SCE power pole guy wire on the east side of the railroad right-of-way between La Palma Avenue and Tustin Avenue.
- Extend to the west of the existing track, two (2) existing 60-inch Reinforced Concrete Pipe with concrete collar just south of the Tustin Avenue grade crossing.

The City also has an exclusive use easement with the adjacent Pacificenter landowner for parking which includes 100 spaces (**Figure 2**). The station site also includes four bus bays. This project does not propose any parking expansion.


NORTH GROVE STREET
EAST LA PALMA AVENUE
GE APPLIANCE
SERVICE FACILITY
THE CROSSINGS
(TRANSIT ORIENTED DEVELOPMENT)
EXISTING SINGLE TRACK BRIDGE
ABANDONED TRACK
(TO BE REMOVED)
680' NEW SECOND PLATFORM
PLATFORM ACCESS
PROPOSED MAIN TRACK 2 (MT-2)
PROPOSED NO. 20 TURNOUT
EXISTING MAIN TRACK 1 (MT-1)
170' PLATFORM EXTENSION
HIGHWAY 91
POSSIBLE
PARKING
EXPANSION
AREA
PACIFICENTER
OCTA
RAILPROS
1 Ada Parkway | Suite 200 | Irvine | California | 92618
www.railpros.com
STATION AREA MAP
AUGUST 27, 2014
ANAHEIM CANYON STATION
PROJECT STUDY REPORT
Anaheim, CA
EXHIBIT
1

TO ORANGE, CA
RR WEST

TO RIVERSIDE, CA
RR EAST



MATCH LINE - MTRK 50+00
SEE DRAWING CK-103

LEGEND:

PROJECT FOOTPRINT

FIGURE 1

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HORIZONTAL SCALE: 1"=80'

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NOT FOR CONSTRUCTION

REV.	DATE		BY SUB.	APP.

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DRAWN BY	J. GONZALEZ
CHECKED BY	A. SOKOL
APPROVED BY	A. SOKOL
DATE	01-20-2017

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STV 100 Years
OCTA ORANGE COUNTY TRANSPORTATION AUTHORITY

SUBMITTED: _____ PROJECT MANAGER
APPROVED: _____

ANAHEIM CANYON METROLINK STATION PROJECT

PROJECT LIMITS
SHEET 1 OF 4

CONTRACT NO.	C-4-1977
DRAWING NO.	CK-101
REVISION	SHEET NO. 1 OF 4
SCALE	AS SHOWN

TO ORANGE, CA
RR WEST

TO RIVERSIDE, CA
RR EAST

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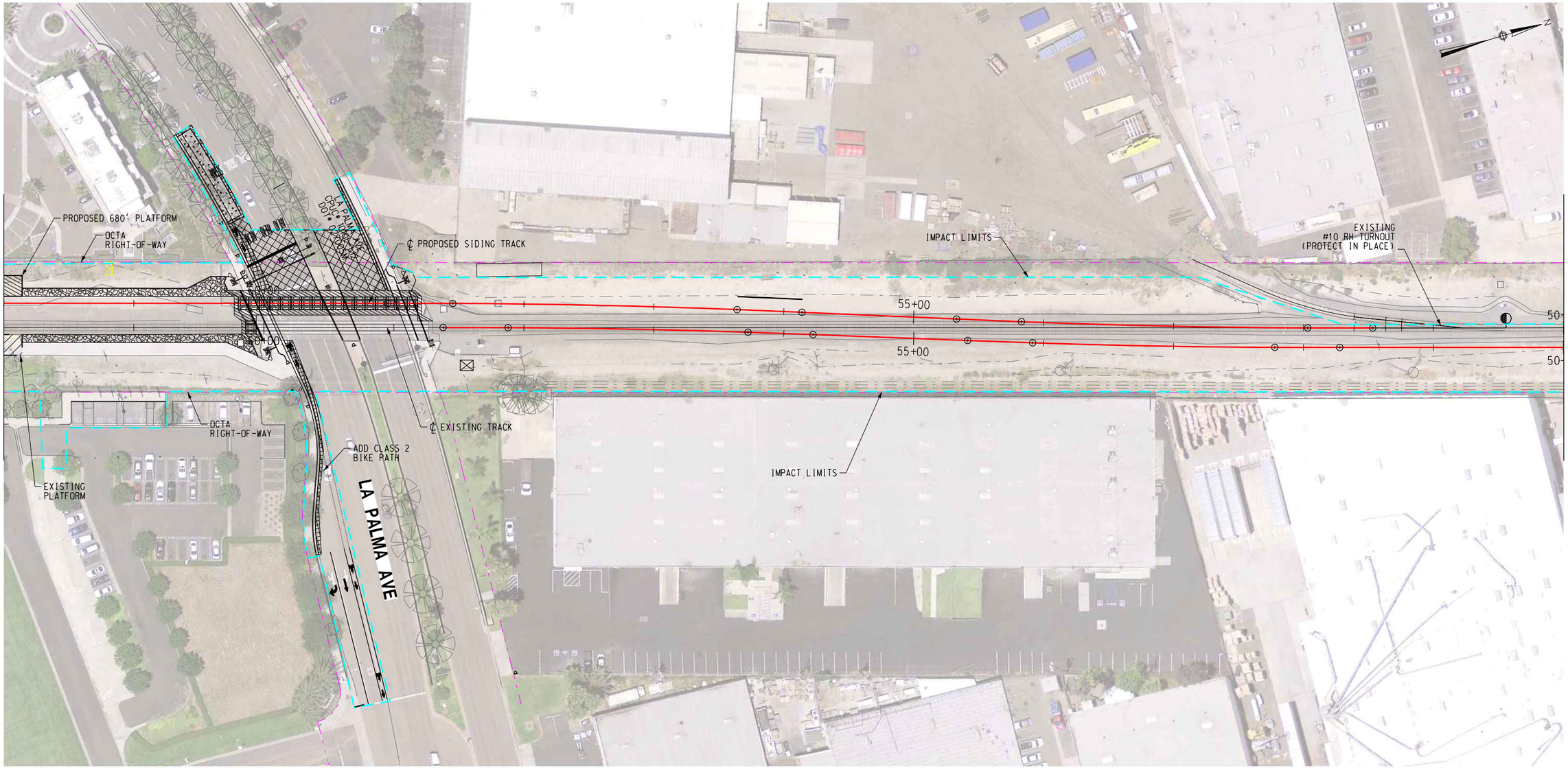
SEE DRAWING CK-101

MATCH LINE - MTRK 50+00
SEE DRAWING CK-103



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ANAHEIM CANYON METROLINK STATION PROJECT

PROJECT LIMITS
SHEET 2 OF 4

CONTRACT NO.	C-4-1977
DRAWING NO.	CK-102
REVISION	SHEET NO. 2 OF 4
SCALE	AS SHOWN

TO ORANGE, CA
RR WEST

TO RIVERSIDE, CA
RR EAST

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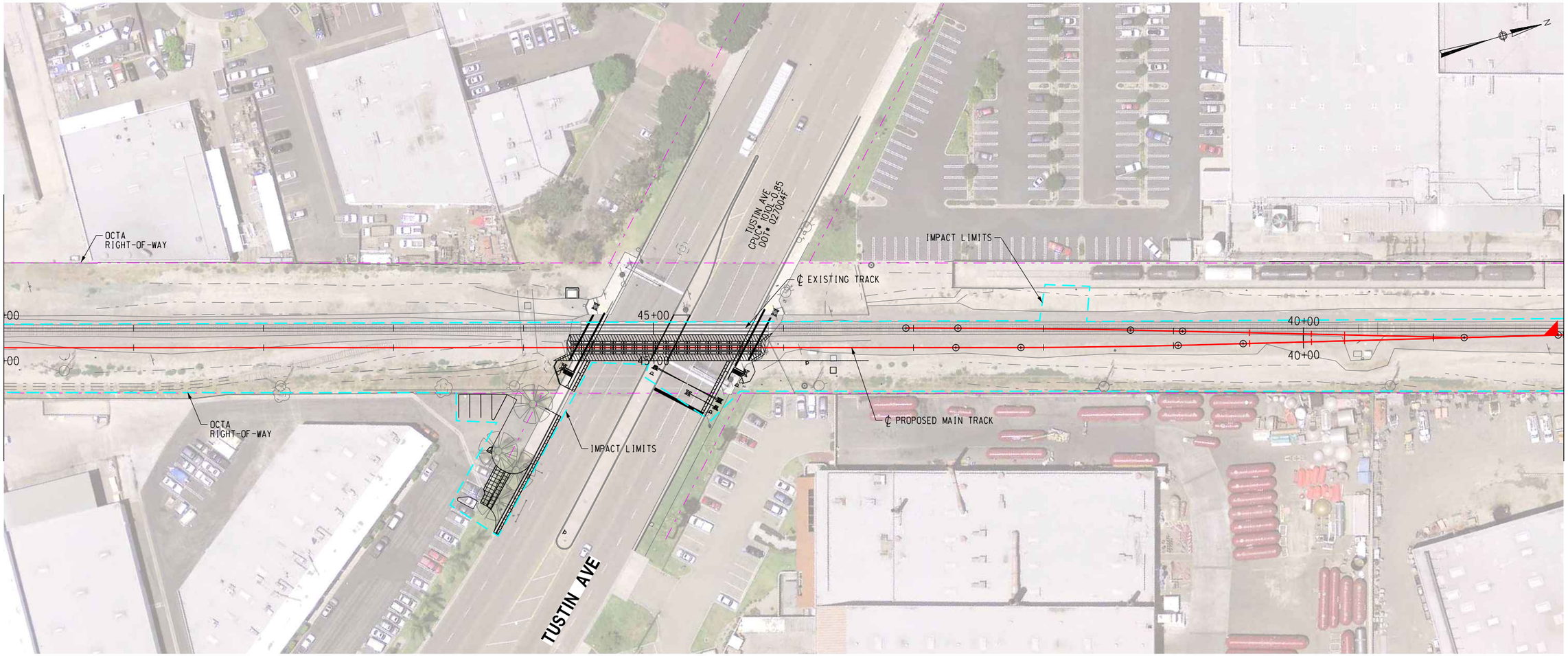
SEE DRAWING CK-102

MATCH LINE - MTRK 38+00
SEE DRAWING CK-104



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ANAHEIM CANYON METROLINK STATION PROJECT

PROJECT LIMITS
SHEET 3 OF 4

CONTRACT NO.	C-4-1977
DRAWING NO.	CK-103
REVISION	SHEET NO. 3 OF 4
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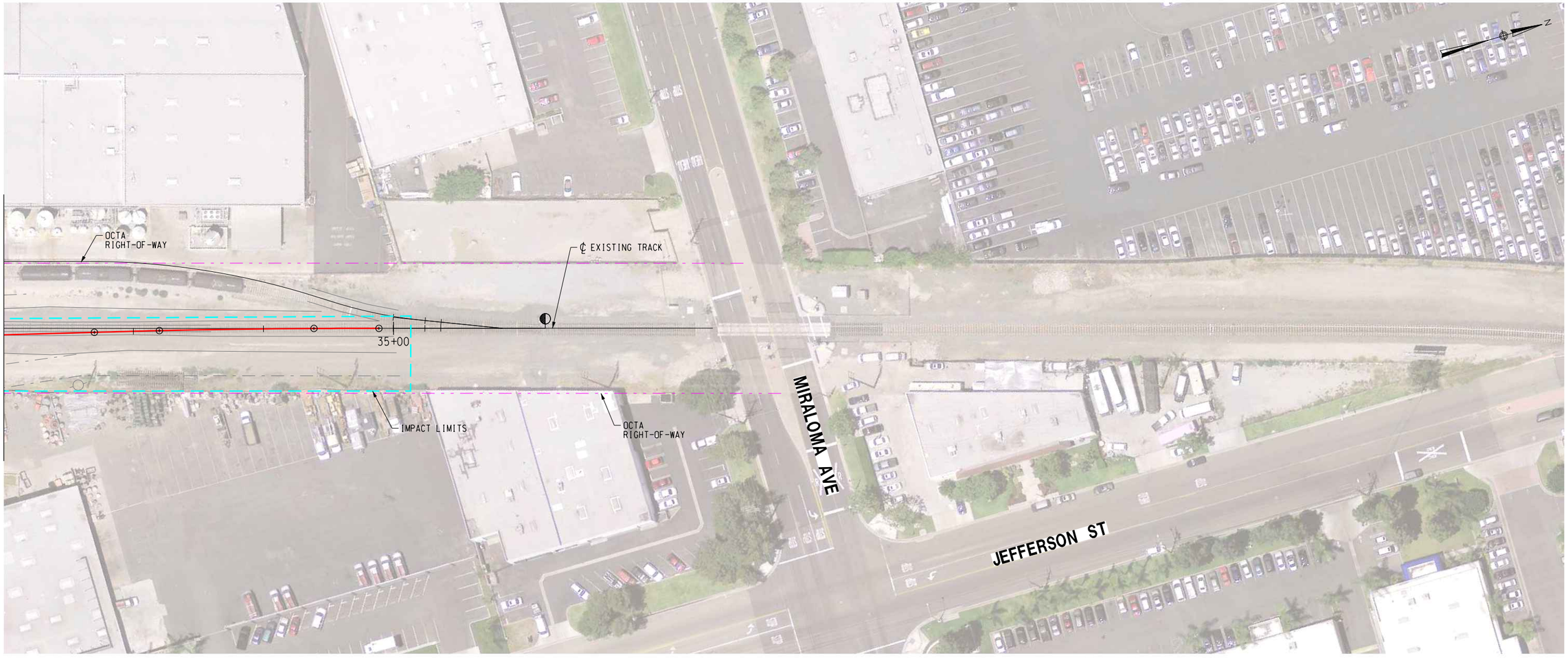
TO ORANGE, CA
RR WEST

TO RIVERSIDE, CA
RR EAST

MATCH LINE - MTRK 38+00
SEE DRAWING CK-103



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ANAHEIM CANYON METROLINK STATION PROJECT

PROJECT LIMITS
SHEET 4 OF 4

CONTRACT NO. C-4-1977
DRAWING NO. CK-104
REVISION
SHEET NO. 4 OF 4
SCALE AS SHOWN

1.3 Noise and Vibration Descriptors

1.3.1. Noise Descriptors

Noise is typically described as unwanted sound. Sound is caused by transmission of mechanical energy that propagates as waves of alternating pressure through a medium (fluids, solids, or gases such as the air). Sound is commonly discussed in terms of a source, path, and receiver. **Figure 3** illustrates a typical source-path-receiver scenario for airborne sound from rail transit. Several factors affect the quality of sound as perceived by the human ear. Sound can be further described in terms of intensity, pitch, and time variation.

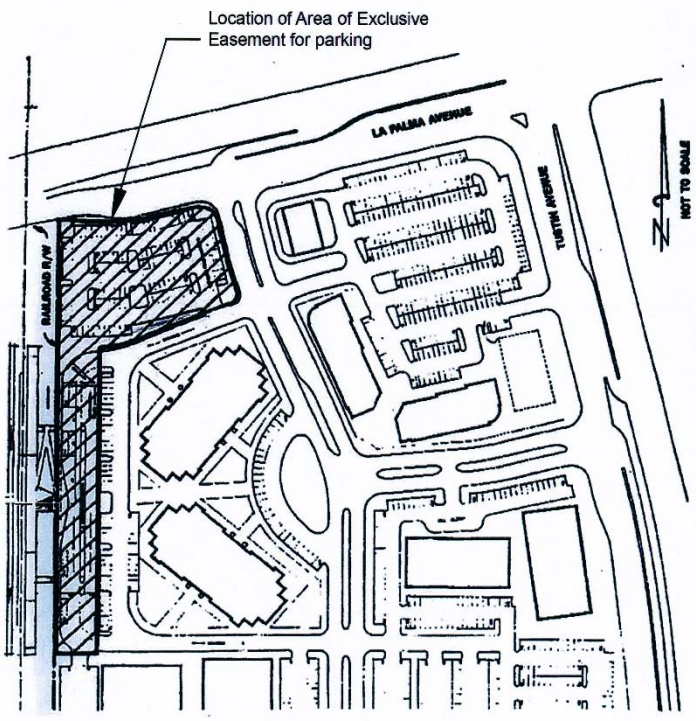


Figure 2 - Exclusive Use Area

The intensity of a sound is determined by the fluctuation in air pressure above and below the atmospheric pressure at equilibrium by sound waves. Sound intensity is usually expressed in terms of the sound pressure level (L_p) in decibel (dB) units. Decibels are logarithmic values of the ratio of the pressure produced by the sound wave to a reference pressure, calculated as:

$L_p = 20 \times \log_{10}(p/p_{ref})$, dB

Where "p" is the RMS pressure and "p_{ref}" is the reference pressure.

Decibels are used instead of actual pressure units to account for the extremely large range of sound pressure values that the human ear is capable of perceiving. For example, a train horn noise of 100 dB has about 5,600 times greater pressure than a very low sound of 35 dB typically found in a rural environment.

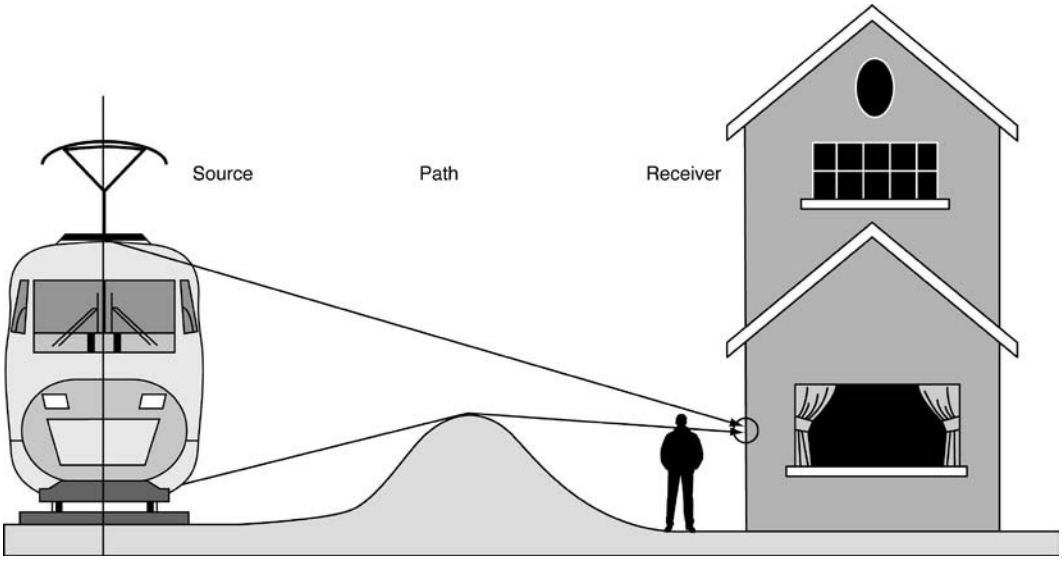
Sound attenuates as a function of the distance between the source and the receiver due to geometric spreading. Geometric spreading loss is due to energy dissipation into three dimensions as sound travels through the air and the wave energy is spread out over an increasingly large area. For point sources, such as stationary equipment or other closely grouped sources, the sound level attenuates at a rate of 6 dB per doubling of distance. For line sources, the sound level will attenuate at 3 dB per doubling of distance. The time-averaged sound level from train vehicles passing along a track will attenuate at a rate of 3 dB per doubling of distance because of the linear nature of the moving source when averaged over time.

In addition to geometric spreading due to distance, sound levels are further attenuated due to ground effects, shielding by structures, or atmospheric absorption. Other atmospheric conditions, such as wind and temperature gradients, can influence the direction of the sound waves as they travel through the air. Atmospheric effects are not normally included in the modeling of rail

transit noise because the effects are generally significant only at large distances beyond the potential noise impact areas for rail transit corridors.

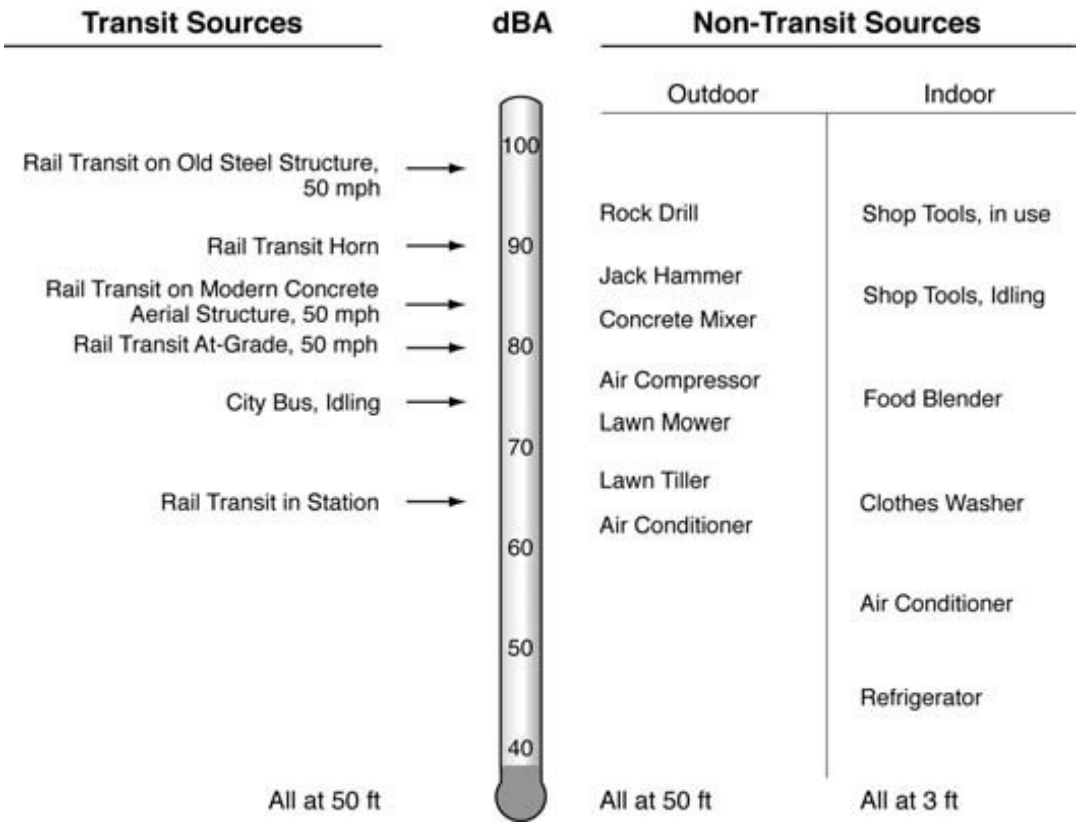
The pitch describes the character and frequency content of noise. It is expressed in terms of the rate of fluctuation of the air pressure in cycles per second or Hertz (Hz). The average human ear is sensitive to noise frequencies between 20 Hz and 20,000 Hz. However, the human hearing system does not respond equally to all frequencies, and it is more sensitive to mid-band frequencies (e.g., 500 to 2,000 Hz). Thus, the A-weighting system de-emphasizes the low and very high frequency components of the sound in a manner similar to the response of the average human ear. The A-weighted sound level (dBA) is commonly used to quantify environmental noise because it correlates well with human response and is expressed in terms of a single number. **Figure 4** provides a comparison of noise levels of transportation and non-transportation related sources. This figure also provides typical noise levels found at different environmental settings (e.g., urban, rural).

Environmental noise commonly varies with time. There are several descriptors to characterize environmental noise according to their duration. The equivalent noise level (L_{eq}) is the logarithmic (or energy) summation over a period of interest, and it is widely used as a single-number descriptor of environmental noise. One common usage of the L_{eq} is the Day-Night Sound Level (L_{dn}). The L_{dn} is the A-weighted L_{eq} for a 24-hour period with a 10 dB penalty applied to noise levels between 10 p.m. and 7 a.m. Many studies have shown that the L_{dn} is well-correlated with human annoyance for community noise. Finally, the community noise equivalent level (CNEL) is the A-weighted L_{eq} for a 24-hour period similar to the L_{dn} except that the 24-hour period is broken into three periods for day, evening, and night with a 5 dB penalty applied to the evening period (7 p.m. to 10 p.m.) and a 10 dB penalty applied to the nighttime period (10 p.m. to 7 a.m.). The noise metrics CNEL and L_{dn} are typically equal or differ by no more than 1 decibel. The L_{dn} descriptor will be used in this report to assess 24-hour noise. Since there is no nighttime operation, where CNEL is used in local ordinances, L_{dn} will be used as a substitute.



Source: FRA, 2012.

Figure 3 Source-Path-Receiver Framework for Airborne Wayside Noise



Source: FTA, 2006.

Figure 4 Typical A-weighted Sound Levels

1.3.2. Vibration Descriptors

Ground vibration is an oscillatory motion of the soil with respect to the equilibrium position and can be quantified in terms of displacement, velocity, or acceleration. Vibration can be described by its peak or root-mean-square (RMS) amplitudes. The RMS amplitude is useful for assessing human annoyance, while peak vibration is most often used for assessing the potential for damage to building structures. Construction vibration is assessed in terms of peak velocity, or peak particle velocity (PPV). Although vibration velocity can be quantified in units of inches per second, it is common to use the velocity level to quantify vibration to cover the wide range of magnitudes that can be encountered. The vibration is expressed in terms of the velocity level (L_v) in decibel units, defined as:

$$L_v = 20 \times \log_{10}(v/v_{ref}) \text{ , VdB}$$

Where "v" is the RMS velocity amplitude and "v_{ref}" is the reference velocity amplitude[8].

[8] The standard reference quantity for vibration velocity in the USA and used by FTA is 1×10^{-6} inches/second, or 1 micro-inch/second.

Thus, the descriptor used in this report to assess ground-borne vibration for human annoyance is the L_v in decibels or VdB[9]. Vibration is a function of the frequency of motion measured in cycles/second or Hz. Ground vibration of concern for transportation sources generally spans from 4 Hz to 60 Hz. The overall vibration is the combined energy of ground motion at all frequencies, and this overall vibration level is used in this analysis.

Vibration attenuates as a function of the distance between the source and the receiver due to geometric spreading and inherent damping in the soil that absorbs energy of the ground motion. Ground-borne vibration from rail transit systems is caused by dynamic forces at the wheel/rail interface. It is influenced by many factors, which include the rail and wheel roughness, out-of-round wheel conditions, the mass and stiffness of the rail vehicle truck, the mass and stiffness characteristics of the track support system, and the local soil conditions.

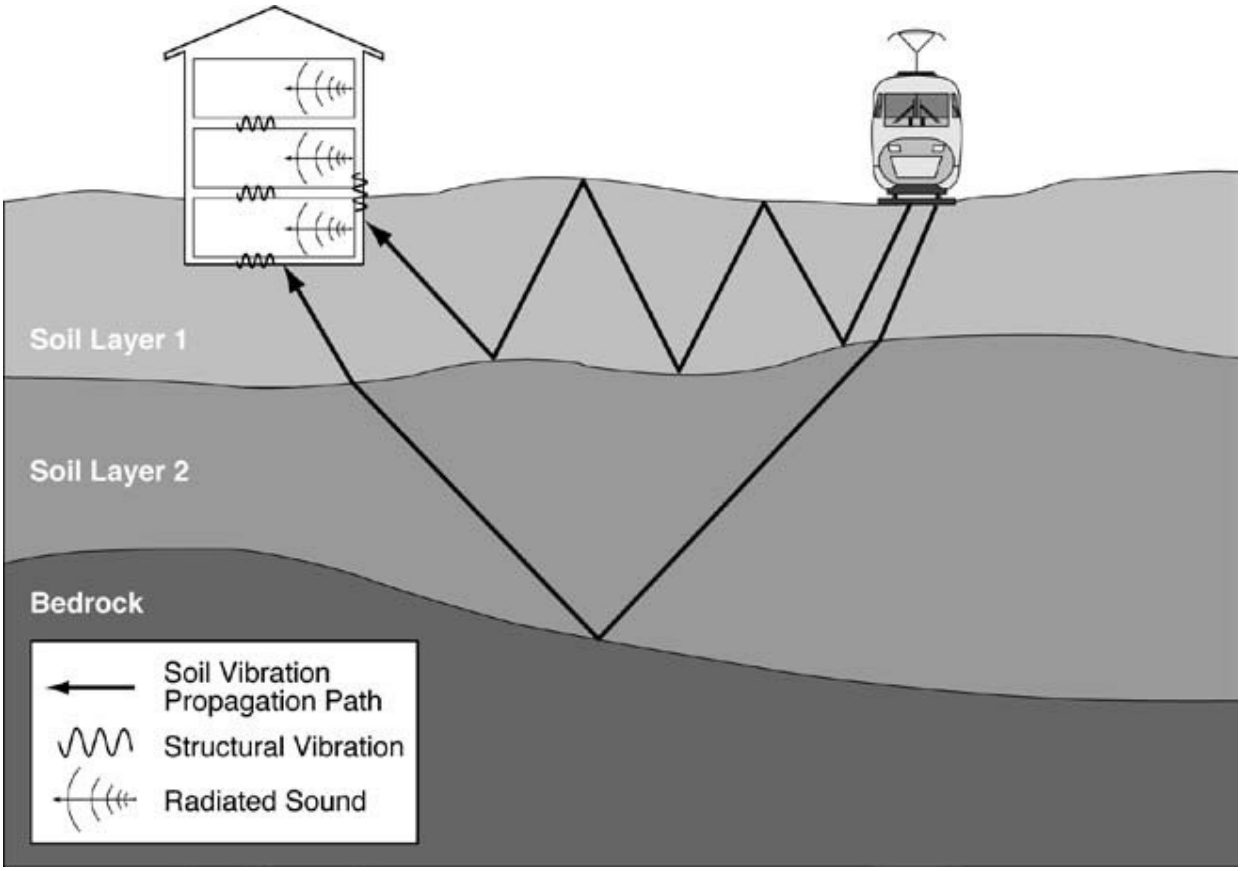
Vibration caused by the transit structure, such as at-grade ballast and tie track, radiates energy into the adjacent soil in the form of different types of waves[10] that propagate through the various soil and rock strata to the foundation of nearby buildings. Buildings respond differently to ground vibration depending on the type of foundation, the mass of the building, and the building interaction with the soil. Once inside the building, vibration propagates throughout the building with some attenuation with distance from the foundation, but often with amplification due to floor resonances. The basic concepts for rail system generated ground vibration are illustrated in **Figure 5**.

Figure 6 illustrates the typical levels of human response and, at much higher levels, the structural response to ground-borne vibration. The figure shows that the threshold of human perception is about 65 VdB, while the threshold for "cosmetic" structural damage is about 100 VdB (re: 1 micro-in/sec). However, the latter threshold, building damage is directly related to the condition of the structure. It is very rare that transportation-generated ground vibration approaches building damage levels.

Groundborne noise is a secondary phenomenon of ground-borne vibration. When building structure vibrates, noise is radiated into the interior of the building. Typically, this is a low frequency sound that would be perceived as a low rumble. The magnitude of the sound depends on the frequency characteristic of the vibration and the manner in which the room surfaces in the building radiate sound. Groundborne noise is quantified by the A-weighted sound level inside the building.

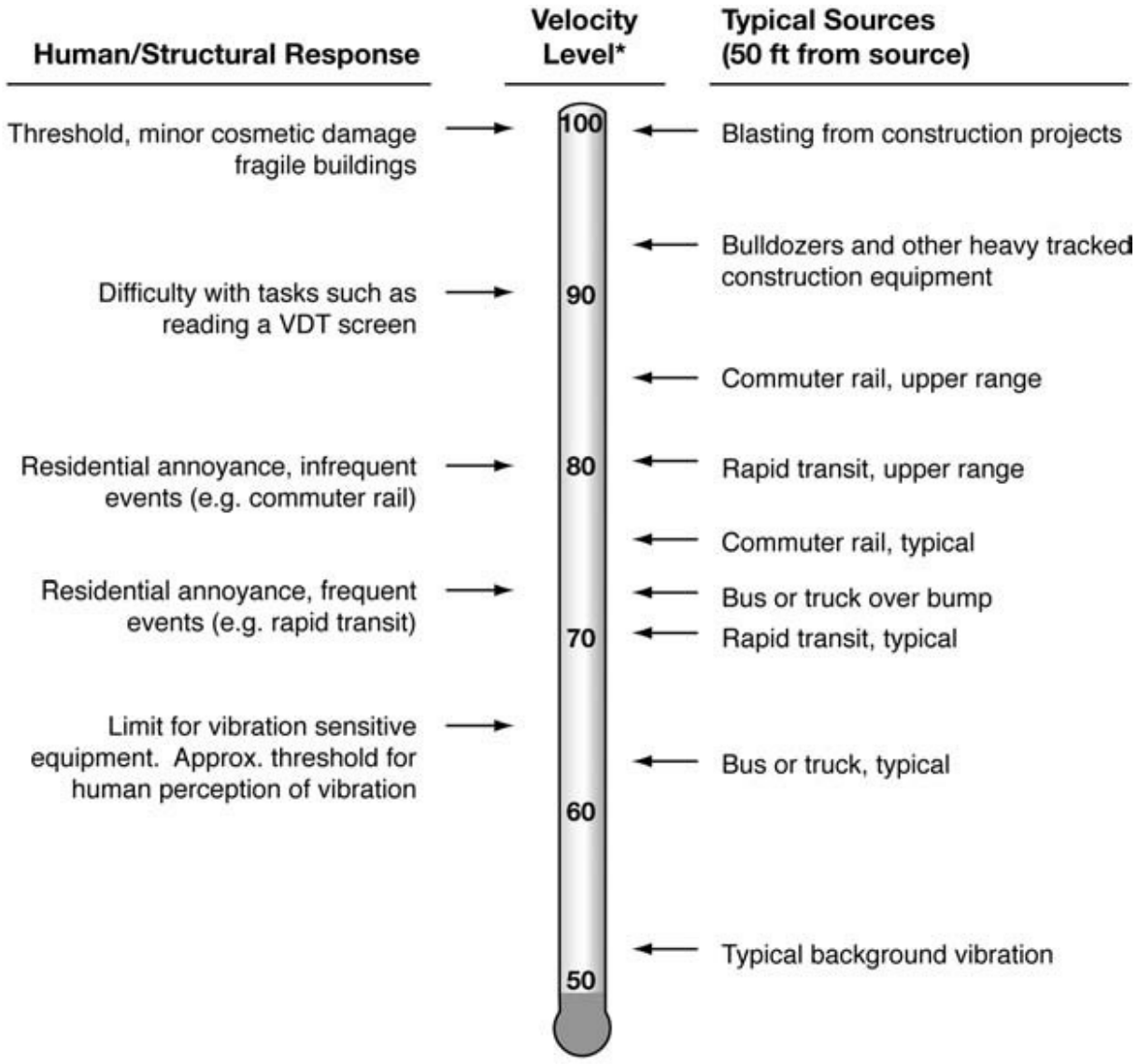
[9] The abbreviation VdB is used in this document for vibration levels to reduce the potential for confusion with sound decibels (dB).

[10] These waves include shear (also known as S, secondary or transverse) in which the ground moves perpendicularly with respect to the direction of vibration movement, and Rayleigh (also known as ground roll) surface waves which move primarily along the surface of the ground, similar in appearance to ripples on the water surface.



Source: FRA, 2012.

Figure 5 Propagation of Groundborne Vibration into Buildings



Source: FTA, 2006.

Figure 6 Typical Levels of Groundborne Vibration

1.4 Summary of Study and Results

This report has been prepared to assess the potential noise and vibration impacts associated with the Anaheim Canyon Station project. In general, the study approach follows the assessment guidelines outlined in the Federal Transit Administration (FTA) Guidance Manual. The basic steps include:

1. Identify noise sensitive land uses.
2. Develop noise prediction models using existing data.
3. Identify applicable impact thresholds.
4. Determine existing and future noise levels.
5. Compare the predicted noise levels to the applicable impact thresholds.
6. Recommend noise mitigation measures.

The results of this study can be summarized as:

- Within the project area, the only land uses that are sensitive to noise and vibration are 1) The Crossings - a recently constructed Transit Oriented Development (TOD) residential apartment complex located roughly 100 feet from the rail line [#3530 and 3560 East La Palma Avenue] and 2) Stay America - an extended stay hotel located approximately 200 feet from the rail line [#1031 North Pacificenter Drive]. The only noise sensitive exterior area of frequent human use is at The Court (the outdoor basketball court at The Crossings).

- The balance of the project area is composed of commercial, office, retail and industrial uses.

- The most important improvement, relative to noise and vibration impacts will be the construction and operation of a second station track and platform.

- The applicable noise standards governing the project site include federal and state standards as well as the standards found in Orange County and the City of Anaheim.

- The potential sources of *operational noise impacts* associated with the project include 1) changes in rail traffic and operations and 2) changes in other vehicular traffic parking and other movements, including mass transit.

    - Relative to rail traffic, the current station operates with a single track and a single platform (16 trains daily on weekdays). Metrolink proposes to increase weekday service to 28 trains per day by 2024. Existing train noise levels are predicted to be between 50 and 56 dBA (L_{dn}). Project-related 2024 noise levels are predicted to be between 52 and 58 dBA (L_{dn}). This level of change is not considered an impact. Therefore the project train traffic increases from existing conditions to 2024 are not anticipated to create a substantial impact over existing sound levels.

    - Relative to other vehicle traffic, the project will alter the operation of some road vehicles and tram/bus circulation patterns. These changes are not in the vicinity of the noise-sensitive receptors and are merely typical city

background sounds. Consequently, the impact of these changes are considered negligible.

- The potential sources of ***operational vibration impacts*** are associated with the operation trains and other vehicles.

    - Based on the FTA's generalized ground surface vibration curve, light rail trains would generate a vibration level of 72 VdB at a distance of 60 feet. Locomotive powered passenger or freight trains traveling at 50 miles per hour would generate a vibration level of 72 VdB at a distance of 200 feet (FTA 2006). Vibration-sensitive land uses located within 200 feet of the line could result in a potential impact. However, since current levels are less than perceptible to residents, future increases in rail traffic would not generate levels of vibration perceptible to residents, as the intensity of vibration would not increase, only the frequency of occurrence.

    - Relative to vibration from the operation of other vehicles, Caltrans finds that trucks do not generate high levels of vibration and if they do the range of effect in very short. Consequently, no significant impacts related to on-road mobile-source vibration impacts are anticipated.

- The potential sources of ***construction noise impacts*** are associated with site preparation, grading, station construction and rail expansion. Implementation of the proposed project is expected to result in a temporary and periodic increase in ambient noise levels in the project vicinity. Mitigation measures have been proposed that will reduce potential impacts associated with noise to a level that is less than significant. Therefore, significant impacts relating to noise are not expected.

- The potential sources of ***construction vibration impacts*** are associated with the operation of equipment which generates vibrations that spread through the ground. It is unlikely that vibration from construction activities will exceed the established thresholds for damage to buildings. In the event that equipment producing high levels of vibration may approach those limits, the noise control plan should also include measures to minimize vibration impacts during construction. Also, representatives from the Construction Authority should be available to discuss vibration related complaints and take appropriate action to minimize the intrusion.

Chapter 2. Project Description

2.1. Location and Project Limits

The station's address is 1039 North Pacificenter Drive, City of Anaheim, Orange County, California. The station is located in the southwest quadrant of Tustin and La Palma Avenues.

The station is situated within a 100-foot wide right-of-way. Other than placement of warning devices, no permanent easements, or right-of-way acquisition is anticipated for the Project based on the current design. A temporary easement from two property owners would be necessary; at the Northwest quadrant of La Palma Ave, and the Southeast quadrant of Tustin Avenue, where we are making driveway and parking lot modifications.

The southern termini of the corridor is just north of the Highway 91 crossing at PS No. 20 TO (72+18.55). The northern termini of the corridor is approximately 500 feet north of the North Tustin Avenue crossing in the vicinity of the Sunny Delight Facility (PS No. 25 TO – 38+80.43).

2.2. Background

Anaheim Canyon Station is the only Metrolink commuter rail station on the IEOC Line in the City of Anaheim. The Anaheim Canyon Station provides commuters with local and community bus routes, Stationlink rail feeder routes, and ATN shuttle services. The current station consists of one platform with shade structures, benches and ticket vending machines. The City has an exclusive use easement with the adjacent PacifiCenter landowner for parking which includes 100 spaces. The station site also includes four bus bays.

The proposed Anaheim Canyon Station project, as approved to scope and funding by the OCTA Board of Directors (Board), is being undertaken to meet current transit demand and to provide for growth requirements through 2035 and beyond. Specifically, OCTA proposes to construct a second station track and platform to allow more than one train to serve the station and/or pass through the station area at a time. This will increase the on time performance and safety of the train operations. The project will also include fully ADA compliant improvements to the pedestrian circulation elements at the station.

2.3. Description of Project-Related Details

Additional Project details are included in the Concept Station and Double Track Alignment Plans (Appendix A. Each major project component is discussed in detail below.)

The Anaheim Canyon Metrolink Station provides commuters with local and community bus routes, Stationlink rail feeder routes, and Anaheim Transit Network (ATN) shuttle services. It is located at 1039 N. PacifiCenter Drive in the northeast part of the City of

Anaheim. The station is situated within a 100-foot wide OCTA-owned right-of-way along the western edge of the PacifiCenter Development south of La Palma Avenue. The current station consists of one platform with shade structures, benches and ticket vending machines. The station is served by a single track.

OCTA proposes to construct a second station track and platform to allow more than one train to serve the station and/or pass through the station area at a time. This will increase the on-time performance of train operations and improve operational flexibility. Grade crossing safety will be enhanced by closing or moving driveways away from the crossings; and overall system safety will be enhanced by allowing trains operating in opposing directions to each have their own dedicated track under normal operation, rather than requiring trains moving in opposing directions sharing a single track.

The project will also include fully ADA compliant improvements to the pedestrian circulation elements at the station.

All improvements will be built within existing OCTA and City of Anaheim public right-of-way, and no disturbance to private parcels or other public property is anticipated to occur, with the exception of reconstruction of several existing parking lot pedestrian ramps to meet ADA compliance, which are located within private property being leased by the City of Anaheim for station parking, as well as for limited temporary construction easements. Temporary construction easements for work adjacent to private property are anticipated where noted below.

The improved Anaheim Canyon Station will remain a multi-modal transit center that accommodates Metrolink commuter rail service, OCTA local and community bus service, Stationlink rail feeder service and Anaheim Resort Transit, along with parking facilities. Key elements of the project include the following:

- Construction of approximately 3,400 linear feet of new siding track (2nd track) and two new turnouts. In the station area, the new track will be built to the west of the existing single track, then to the north of La Palma Avenue, the new track will transition to be built on the east side of the existing track.
- Establish two new Control Points (CPs) at the new turnouts. Associated railroad signal and communications modifications will be required to accommodate new 2nd track and pedestrian safety improvements at grade crossings.
- Construction of improvements to the existing at-grade crossings of E. La Palma Avenue and Tustin Avenue to accommodate the new 2nd track; including new street improvements, relocation of existing railroad signal warning devices and pedestrian safety improvements. Includes reconstruction and widening of sidewalk elements to accommodate the relocation of the pedestrian grade crossing warning devices, gates and channelization railing.
- Closure of an existing driveway along the north edge of La Palma Avenue, just west of the railroad tracks, to accommodate the second track and provide for grade crossing safety improvements. This work will be within City of Anaheim public right-of-way, however a temporary construction easement is anticipated to be required for this work. This driveway closure will not impact access to the private property, because the property has a main driveway approach from E. La

Palma Avenue located approximately 295 feet to the west, which will not be affected by the Project.

- Relocation of an existing driveway along the south edge of Tustin Avenue, just east of the railroad tracks, to accommodate the second track and provide the required area for at-grade crossing safety improvements. This work will be within City of Anaheim public right-of-way, however a temporary construction easement is anticipated to be required for this work and the reconfiguration of parking stalls for no net loss of parking to the private property owner.
- Extension of the existing 510-foot long station platform to meet the current required Metrolink standard platform length of 680 feet, which supports an eight-car train.
- Construction of a new 680-foot long second platform and associated facilities on the west side of the new 2nd track.
- Construction of 832 linear feet of retaining wall west of new platform to accommodate the difference in grade from the top of proposed platform to existing ground and to protect excessive fill over an existing 36-inch SoCal Gas line located within a 10-foot easement along the western boundary of the railroad right-of-way.
- Construction of new ADA-compliant pedestrian pathways and sidewalks to provide pedestrian access between the existing parking lot and proposed second platform.
- Construction of improvements to existing parking lot pedestrian ramps to meet ADA compliance. This work will occur within private property currently being leased by the City of Anaheim for station parking. The project would not improve or expand the parking lot.
- Reconstruction of a portion of the existing sidewalk, curb and gutter and roadway, and associated striping to provide a Class II bike path extension across the railroad grade crossing area, along the south edge of eastbound La Palma Avenue up to Tustin Avenue. This work will be within OCTA right-of-way and City of Anaheim public right-of-way.
- Construction of a bus pad/stop on eastbound La Palma Avenue on the nearside of the railroad grade crossing.
- Relocation of an existing Positive Train Control communications tower located in the area proposed for the new second platform. The new location for the tower will be at the south end of new platform.
- Minor grading and drainage improvements, including a culvert extension to accommodate the second track.
- Relocate one Southern California Edison (SCE) power pole in the south east quadrant of the La Palma Avenue grade crossing, and relocate one SCE power pole guy wire on the east side of the railroad right-of-way between La Palma Avenue and Tustin Avenue.
- Extend to the west of the existing track, two (2) existing 60-inch Reinforced Concrete Pipe with concrete collar just south of the Tustin Avenue grade crossing.

Chapter 3. Existing Conditions

This chapter examines existing conditions within the study area.

3.1. Land Uses (Transportation)

Station and Transit Service
The current station operates with a single track and a single platform - which is 510 feet in length. The existing single track negatively affects reliability in the IEOC corridor. While the single track functions operationally for current levels of service of 8 westbound trains and 8 eastbound trains daily on weekdays, it will not allow for efficient operations with planned additional service of up to 28 commuter rail trains per day. The existing segment of track requires trains to wait outside the limits of the 4.8 mile long single track segment between Control Point (CP) Atwood (at MP 0.00) and CP Katella (MP 4.80), and take turns using the track during train meet and passing movements. This reduces the overall capacity of the system, resulting in increased travel time, reduction of operational flexibility, and resulting in delays to other trains if a train is late. Additionally, the existing single platform does not meet Metrolink's current standard platform length of 680 feet, which allows future station service for train consists of up to eight passenger cars.

Bus and shuttle services to the station are provided by OCTA and the ATN. There are currently two OCTA bus routes that stop at the station including: Routes 410, and 411. The ATN Canyon Shuttle service provides connections to downtown Anaheim seven times a day on weekdays - to correspond with Metrolink southbound trains arriving at the station at 5:50 a.m., 6:22 a.m., 6:58 a.m., 7:44 a.m. and 8:09 a.m. and northbound trains departing the station at 4:24 p.m., 4:36 p.m., 5:20 p.m., 5:55 p.m., and 7:09p.m.

Circulation
Vehicular access to the station occurs either from La Palma Avenue at North Pacificenter Drive, which is a signalized intersection; or from Tustin Avenue and North Pacificenter Drive, which is also signalized. Tustin Avenue provides access to and from the SR 91.

Parking
The City has an exclusive use easement with the adjacent Pacificenter landowner for parking which includes 100 spaces.

Metrolink
Metrolink is planning on expanding service levels. The long-range expansion plan identified by SCRRA, which operates the Metrolink system, is documented in the Strategic Assessment Report.

The IEOC Line serving Anaheim Canyon Station currently operates 16 trains on weekdays (8 southbound, 8 northbound) and 4 trains (2 southbound, 2 northbound) on weekends. The Metrolink Commuter Rail Strategic Assessment Report proposed to increase weekday service to 24 trains by 2015, 26 trains by 2020, and an ultimate service level of 40 trains by 2030. Weekend service would increase to six trains by 2020 and 12 trains by 2030. SCRRA is in the process of completing the 2014 Metrolink 10 Year Strategic Assessment Report which will revise the planned service expansion to provide only 28 trains per day by 2024 – this level of usage will be used in assessments of future train noise levels.

3.2. Land Uses (Noise/Vibration Sensitive Receptors)

For noise/vibration purposes, the project area includes the area along the existing rail line, where rail work will occur – roughly from SR 91 to the south and approximately 500 feet north of the North Tustin Avenue crossing. The land uses identified in this section lie within roughly 300 feet of the centerline. The project area consists of mainly of commercial land uses including warehouses, office buildings, retail businesses, one hotel and one residential complex. The project area is fully developed, there are no pending new developments.

East of Rail Line
Starting at SR 91, the following land uses exist:

- Along North Grove Street: There are 3 commercial/warehouse operations adjacent to the existing track. These include the MEI Warehouse (#1010), a vacant warehouse (#1030) and the Patio Company (#1040).
- The Crossings (#3530 and 3560 East La Palma Avenue): This is the only residential land use in the project area. The facility opened in 1009 and include 312 dwelling units (rental apartments) on 5 floors. It is located immediately opposite of the existing rail station. The Crossing is marketed as TOD, making its proximity a primary marketing feature. Except for The Court, all of these amenities are contained in interior courtyards. Amenities include a resort-style pool, a spacious clubhouse with fireplace and themed courtyards with outdoor seating areas. (see **Figure 7**).

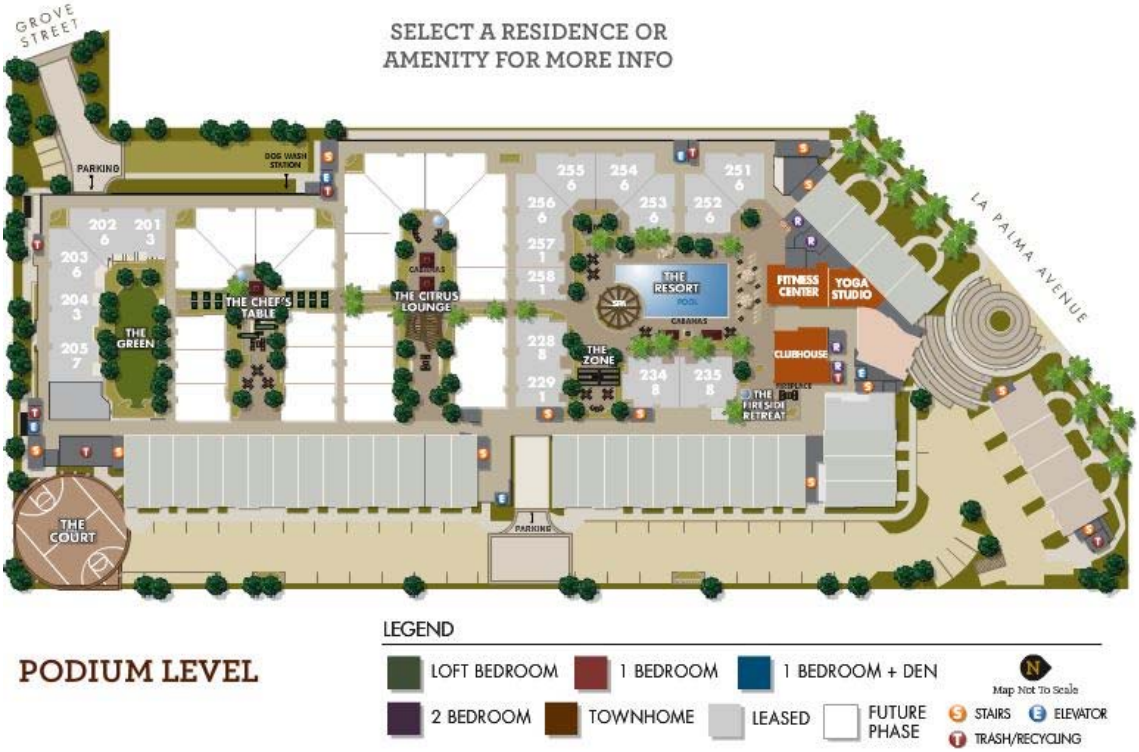


Figure 7 - The Crossing Site Plan (Podium Level)

The Court is an outdoor basketball court in the southwestern corner of the property, adjacent to the rail line. The Crossings is roughly 100 feet from the existing rail line. It is separated from the rail line by shrubbery and walls (masonry and plexi-glass).

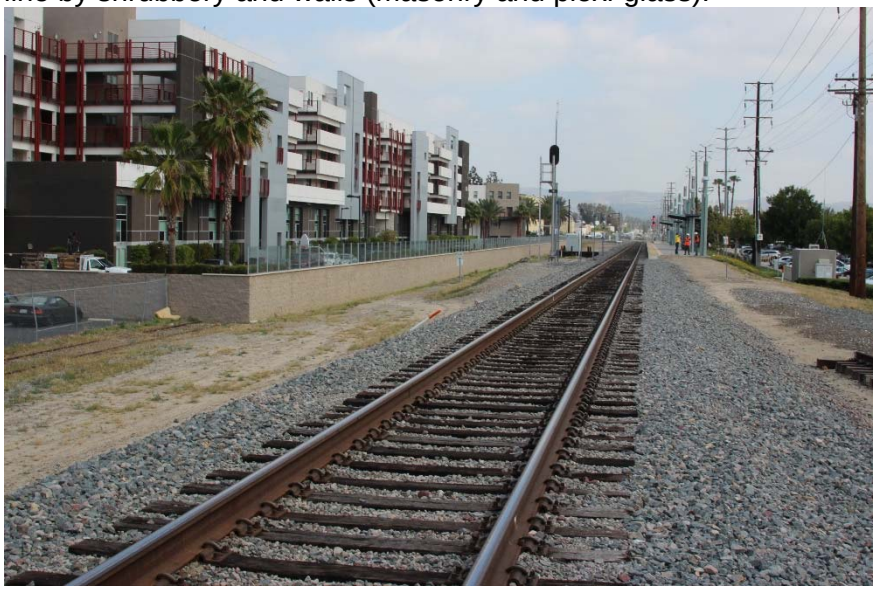


Figure 8 - Typical View of The Court at the Crossings

- GE Healthcare: Located at 3601 East La Palma Avenue this facility is an appliance service facility. Rail spurs give it access to the rail line.
- Industrial complex on East Melville Way: Seven small industrial building are located off of East Melville Way (#180 - #1198). Uses include Radarsconics, Electron Metal finishing, W.C.M.E. and Dooley Enterprises. None have access to the rail line.
- Tustin Enterprise Complex: This is a series of office buildings on the south side of North Tustin Avenue. No outdoor areas of frequent human use exist.
- Sunny Delight Beverage Company: Located at #1230 North Tustin Avenue, this is a large manufacturing/bottling facility. A spur provides access to the rail line.

West of Rail Line

Starting at SR 91, the following land uses exist:

- Stay America Extended Stay (#1031 North Pacificenter Drive): This hotel is designed for longer stays with studios featuring fully-equipped kitchens and work space. The only outdoor area is a small bench area in the parking lot. This facility is roughly 200 feet from the existing rail line.

- Retail Center: A number of small retail operations in a single building, located along North Pacificenter Drive.
- Pacificenter Office Complex. Located directly adjacent to the existing rail station. There are no outdoor facilities.
- Industrial complex between East La Palma and North Tustin: Three industrial and/or warehouse buildings are located in this area. Uses include the Meadow Burke Warehouse, the Jellco Container facility and the Anderson International Trading Company. There are no outdoor recreation areas. A rail spur provides rail access.
- Tustin Strip Center: A strip commercial mall located at the south side of North Tustin Avenue (#1200).
- Xerxes factory: Located at #1210 North Tustin Avenue, this facility fabricates storage tanks. A rail spur provides rail access.

Noise/Vibration Sensitive Land Uses

Within the project area, the only land uses that are sensitive to noise and vibration are:

- The Crossings – a recently constructed TOD residential apartment complex (roughly 100 feet from the rail line).
- The Stay America – an extended stay hotel (200 feet from rail line).

The only noise sensitive exterior area of frequent human use is at The Court (the outdoor basketball court at The Crossings).

3.3. Existing Noise/Vibration Conditions

There are a myriad of noise sources in the City of Anaheim that contribute to the existing noise environment. The major source of noise is vehicular traffic traveling throughout the City on its various roadways and freeways. The City also includes a variety of stationary noise sources. These are primarily from the associated with industrial land uses. While the noises from these stationary sources are audible, they are typically of short duration and as such, do not add substantially to existing noise level. Rail noise from passenger and freight trains running through Anaheim also contribute to the noise levels.

Due to the low number of trains and the minimal noise-sensitive land uses in-situ noise monitoring was not conducted. Further, measurements were not needed because the project is an operation improvement and safety project for schedule reliability. It is not considered a growth inducing project. While no monitoring was conducted for this project, field surveys from similarly situated projects can provide useful background. Twenty-four hour measurements at the Anaheim Metrolink/Amtrak Station at the cross streets of West Katella Avenue and Main Street, in Anaheim was performed on April 6 through April 16, 2010 for the Anaheim Regional Transportation Intermodal Center (ARTIC). Long-term measurements were used to determine the existing cumulative CNEL and Ldn values. Using this methodology, the cumulative noise levels are:

	CNEL (dBA)	L_{dn} (dBA)
Anaheim Metrolink/Amtrak Station	60	59

It is expected that the existing cumulative noise levels at the Anaheim Canyon Station is similar. In fact, the train noise component may be lower. It is reported that there are approximately 22 Amtrak trains and 19 Metrolink trains that arrive and depart from the Anaheim Metrolink/Amtrak Station. This is substantially higher than the number of trains at the Anaheim Canyon Station (16 Metrolink trains and 4-5 freight trains daily on weekdays). Both stations are also affected by

several other noise sources including vehicular traffic and other community-based stationary noise sources. Using the noise prediction models, which are based on formulas provided in the FTA Guidance Manual, the existing noise levels (L_{dn}) from Metrolink train traffic are predicted to be between 50 and 56 dBA. This will be the benchmark for evaluating impacts from train traffic, for both noise sensitive land uses.

Chapter 4. Noise/Vibration Criteria

A project will normally have a significant effect on the environment related to noise if it will substantially increase the ambient noise levels for adjoining areas or conflict with adopted environmental plans and goals of the community in which it is located, including noise land use compatibility guidelines. The applicable noise standards governing the project site include federal and state standards as well as the standards found in the City of Anaheim and the County of Orange Municipal Noise Codes which establish exterior noise acceptability thresholds for identifying impacts to future residents of new development in areas with existing ambient noise. This section further describes these established guidelines.

4.1. Federal Regulations

4.1.1. Noise Control Act of 1972 and Quiet Communities Act of 1978

The Noise Control Act of 1972 (42 USC) and the Quiet Communities Act of 1978 (42 USC 4913) were established by the U.S. Environmental Protection Agency (USEPA) to set performance standards for noise emissions from major sources, including transit sources. Though these acts are still in effect, the enforcement of the stated noise emission standards shifted to state and local governments in 1981.

4.1.2. Federal Railroad Administration

The Federal Railroad Administration (FRA) adopted the USEPA railroad noise standards as its noise regulations (49 CFR 11, part 210) for the purpose of enforcement. The standards provide specific noise limits for stationary and moving locomotives, moving railroad cars, and associated railroad operations in terms of A-weighted sound level at a specified measurement location. The standards are shown in **Table 1**.

Table 1. Summary of EPA/FRA Railroad Noise Standards

Operating Conditions	Measured Distance (Feet)	Standard (dBA) Non-
Switcher Locomotives[1] built on or before 12/31/79		
Stationary[4]	100	73
Idle Stationary[5]	100	93
Non-Idle Moving[6]	100	95
Switcher Locomotives[2] plus Non-Switcher Locomotives built after 12/31/79		
Stationary	100	70
Idle Stationary	100	87
Non-Idle Moving	100	90
Rail Cars[3]		
Speed less than 45 mph	100	88
Speed greater than 45 mph	100	93
Coupling	50	92

Notes: 49 CFR 11, part 210
1) Non-Switcher Locomotives - A road engine that is used in long-haul railcar movement.
2) Switcher Locomotives - A smaller engine that is used in shuttling railcars.
3) Railcar - The car(s) pulled by a train engine.
4) Stationary - Sitting at idle and measured 100 feet from the center line of the track where the train is idling.
5) Idle Stationary - Sitting at idle.

6) Non-Idle Moving - Moving along the rails.
Source: City of Perris General Plan Noise Element, 2005.

4.1.3. Federal Transit Administration

Federal Transit Administration Noise Impact Criteria. Federal noise impact thresholds are defined in the FTA Guidance Manual. The FTA criteria are based on the best available research on community response to noise. The research shows that characterizing the overall noise environment using measures of noise exposure provides the best correlation with human annoyance. The FTA provides different thresholds for different land uses. **Table 2** lists the three FTA land use categories and the applicable noise metric for each category.

The noise sensitive land uses within the project area are Category 2 land uses. For Category 2 land uses (residential areas where people sleep), the noise exposure is characterized using Ldn. In calculating Ldn, noise created during the nighttime hours is more heavily weighted than daytime noise to reflect residents' greater sensitivity to noise during the nighttime hours.

The basic concept of the FTA noise thresholds is that more project noise is allowed in areas where existing noise is higher, but the allowable increase above existing levels of noise exposure decreases in areas where existing noise is higher. The FTA defines two levels of impact: moderate and severe. If the predicted project noise exceeds the moderate threshold, noise mitigation must be considered. If the predicted project noise exceeds the severe threshold, noise mitigation must be included in the project unless there are compelling reasons why mitigation is not feasible.

Table 2: FTA Land Use Categories and Noise Metrics

Land Use Category	Noise Metric (dBA)	Description of Land Use Category
1	Outdoor Leq(h)[a]	Tracts of land where quiet is an essential element of their intended purpose. This category includes lands set aside for serenity and quiet and such land uses as outdoor amphitheaters and concert pavilions, as well as National Historic Landmarks with significant outdoor use. Also included are recording studios and concert halls.
2	Outdoor Ldn	Residences and buildings where people normally sleep. This category includes homes, hospitals, and hotels where a nighttime sensitivity to noise is assumed to be of utmost importance.
3	Outdoor Leq(h)[a]	Institutional land uses with primarily daytime and evening use. This category includes schools, libraries, and churches where it is important to avoid interference with such activities as speech, meditation, and concentration on reading material. Places for meditation or study associated with cemeteries, monuments, museums, campgrounds and recreational facilities can also be considered to be in this category. Certain historical sites and parks are also included.

Source: FTA Guidance Manual, 2006

Notes: a. Leq for the noisiest hour of transit related activity during hours of noise sensitivity.

FTA Construction Vibration Criteria

Ground-borne vibration has the potential to disturb people as well as to damage buildings. Although it is rare for transit- induced ground-borne vibration to cause even cosmetic building damage, it is not uncommon for construction processes such as blasting and pile driving to cause vibration of sufficient amplitude to damage nearby buildings. The FTA guideline for construction vibration impact criteria are shown in **Table 3** for various structural categories. Construction Vibration Damage Criteria Thresholds are shown in **Table 4**.

Table 3: Federal Transit Administration Construction Vibration Impact Criteria

Building Category	Vibration Level Damage Impact Criteria (VdB)
Reinforced-concrete, steel or timber (no plaster)	102
Engineered concrete and masonry (no plaster)	98
Non-engineered timber and masonry buildings	94
Buildings extremely susceptible to vibration damage	90

9

Source: Federal Transit Administration, 2006. *Transit Noise and Vibration Impact Assessment.* May.

Table 4. Construction Vibration Damage Criteria Thresholds

Category	Type of Building	Vibration Level (in/sec)	Approximate Lv[1]
Category I	Reinforced-concrete, steel, or timber (no plaster)	0.5	102
Category II	Engineered concrete and masonry buildings	0.3	98
Category III	Non-engineered timber and masonry buildings	0.2	94
Category IV	Buildings extremely susceptible to vibration damage	0.12	90

Notes:
1) RMS velocity in decibels (VdB) re 1 micro-inch/second.
Source: Acoustical Impact Analysis South Perris Industrial, City of Perris. URS Corporation. May 2009 (Appendix I).

FTA Train Related Activity Noise and Vibration Criteria

FTA has established guidelines for evaluating noise exposure levels and vibration impacts from train related activity in their Transit Noise and Vibration Impact Assessment Manual (FTA-VA-90-1003- 06, May 2006). The thresholds are displayed in **Table 5**. This policy document outlines different levels of detail for impact analysis for both noise and vibration; a screening procedure, a general impact assessment, and a detailed analysis. Noise impact criteria for construction and operation of passenger rail facilities are based on the change in outdoor noise exposure using a sliding scale with three receptor categories and three degrees of impact. These criteria apply to various surface transportation modes, including heavy rail. The criteria respond to heightened community annoyance caused by late-night or early morning service and they respond to varying sensitivity of communities to noise from projects during different ambient noise conditions.

Table 5. FTA Vibration Impact Criteria Thresholds

Vibration Category	Groundborne Vibration (GBV) (VdB re: 1 micro-inch/sec)			Groundborne Noise (GBN) (dB re: 20 micro-Pascal's)		
	Frequent Events[1]	Occasional Events[2]	Infrequent Events[3]	Frequent Events	Occasional Events	Infrequent Events
Category 1 (Sensitive)	65 VdB[4]	65 VdB[4]	65 VdB[4]	NA[4]	NA[4]	NA[4]
Category 2 (Residences)	72 VdB	75 VdB	80 VdB	35 VdB	38 VdB	43 VdB
Category 3 (Institutional)	75 VdB	78 VdB	83 VdB	40 VdB	43 VdB	48 VdB

Notes: Vibration-sensitive equipment is generally not sensitive to ground-borne noise.
1) "Frequent Events" is defined as more than 70 events of the same source per day. Most rapid transit projects fall into this category.
2) "Occasional Events" is defined as between 30 and 70 vibration events of the same source per day. Most commuter trunk lines have this many operations.
3) "Infrequent Events" is defined as fewer than 30 vibration events of the same kind per day. This category includes most commuter rail branch lines.
4) This criterion limit is based upon levels that are acceptable for most moderately sensitive equipment such as optical microscopes. Vibration-sensitive manufacturing or research will require detailed evaluation to define the acceptable vibration levels. Ensuring lower vibration levels in a building often requires special design of the HVAC systems and stiffened floors.
Source: Acoustical Impact Analysis South Perris Industrial, City of Perris. URS Corporation, May 2009 (Appendix I)

4.2. State Regulations and Policies

4.2.1. California Noise Control Act of 1973

The California Health and Safety Code established the California Noise Control Act of 1973 (§46000 et seq.) to "establish and maintain a program on noise control." This act mirrors the federal Noise Control Act of 1972 and also defers the enforcement of noise emission standards to local county and city agencies.

4.2.2. California Government Code Section 65302 (f)

California Government Code Section 65302 (f) states that general plans must include a noise element section which identifies and appraises noise problems in the community, and recognizes the guidelines established by the Office of Noise Control. The adopted noise element should serve as a guideline for compliance with the state's noise standards. The Office of Noise Control has prepared a land use compatibility chart for community noise as shown in **Table 6**. It identifies normally acceptable, conditionally acceptable and clearly unacceptable noise levels for various land uses. These standards identify normally acceptable, conditionally acceptable, and clearly unacceptable noise levels for various land uses. A conditionally acceptable designation implies new construction or development should be undertaken only after a detailed analysis of the noise reduction requirements for each land use is made and needed noise insulation features are incorporated in the design. By comparison, a normally acceptable designation indicates that standard construction can occur with no special noise reduction requirements.

Table 6. Land Use Compatibility for Community Noise Environments

Land Use Category	Community Noise Exposure Level Ldn or CNEL, dBA						
	50	55	60	65	70	75	80
Residential-Low Density Single Family, Duplex, Mobile Homes							
Residential-Multiple Family							
Transient Lodging-Motels, Hotels							
Schools, Libraries, Churches, Hospitals, Nursing Homes							
Auditoriums, Concert Halls, Amphitheaters							
Sports Arena, Outdoor Spectator Sports							
Playgrounds, Neighborhood Parks							
Golf Courses, Riding Stables, Water Recreation, Cemeteries							
Office Buildings, Business, Commercial, and Professional							
Industrial, Manufacturing, Utilities, Agriculture							

Normally Acceptable:
Specified land use is satisfactory based upon the assumption that any buildings involved are of normal conventional construction, without any special noise insulation requirements.

Normally Unacceptable:
New construction or development should generally be discouraged. If new construction or development does proceed, a detailed analysis of the noise reduction requirements must be made with needed noise insulation features included in the design. Outdoor areas must be shielded.

Conditionally Acceptable:
New construction or development should be undertaken only after a detailed analysis of the noise reduction requirements is made and needed noise insulation features included in the design. Conventional construction, but with closed windows and fresh air supply systems or air conditioning will normally suffice. Outdoor environment may seem noisy.

Clearly Unacceptable:
New construction or development should generally not be undertake. Construction costs to make the indoor environment acceptable would be prohibitive and the outdoor environment would not be usable.

Source: California Office of Noise Control

4.3. Local Regulations and Policies

Cities and counties in California are preempted by federal law from controlling noise generated from most mobile sources, including noise generated by vehicles and trucks on the roadway, trains on the railroad, and airplanes. Therefore, the states of California's land use compatibility guidelines are adopted as a tool to gauge the compatibility of new development in the noise environment generated by mobile sources.

4.3.1. City of Anaheim General Plan and Noise Ordinance

The Noise Element of the City of Anaheim's General Plan indicates that noise levels are to be attained in habitable exterior areas and need not encompass the entirety of the property, and that special consideration should be given in the case of infill residential development located along the City's arterial corridors or railroad lines in order to achieve an appropriate balance between providing a quality living environment and attractive project design.

The City of Anaheim adopted, as part of the Noise Element, the State of California standards as described previously. Exterior noise levels at residential locations should not exceed a CNEL of 65 dB while interior levels shall not exceed a CNEL of 45 dB in any habitable room as shown in **Table 7**.

The City's Stationary Equipment Noise Ordinance restricts fixed equipment (such as air conditioners, pool filters, compressors, and industrial machinery) from exceeding 55 dBA when measured at any location on a neighboring residential property.

4.3.2. City of Anaheim Municipal Code, Chapter 6.70, Sound Pressure Levels. Section 6.70.

Stationary sources of noise are governed under the local Municipal Code, Chapter 6.70, Sound Pressure Levels. Section 6.70.010 simply states that "No person shall, within the City, create any sound, radiated for extended periods from any premises which produces a sound pressure level at any point on the property in excess of 60 dB (Re 0.0002 Microbar) read on the A-scale of a sound level meter. Readings shall be taken in accordance with the instrument manufacturer's instructions, using the slowest meter response." The section goes on to state, "Traffic sounds, sound created by emergency activities and sound created by governmental units shall be exempt from the applications of this chapter. Sound created by construction or building repair of any premises within the City shall be exempt from the applications of this chapter during the hours of 7 a.m. and 7 p.m."

4.3.3. City of Anaheim Municipal Code, Chapter 6.70, Construction Exceptions

To minimize disturbance by construction noise, the City restricts noise intensive construction activities to the hours specified under Chapter 6.70 of the City of Anaheim Municipal Code (i.e., 7 a.m. to 7 p.m.). These hours shall also apply to any servicing of equipment and to the delivery of materials to or from the site. In addition, construction shall be restricted to weekdays and Saturdays between the hours of 7:00 a.m. and 7:00

p.m. Construction shall not be allowed any time on Sundays or Federally recognized holidays.

Table 7. State of California Interior and Exteriors Noise Standards (CNEL)

Categories	Land Use[1]	CNEL (DBA)	
		Interior[2]	Exterior
Residential	Single and Multi-Family	45[3]	65
	Mobile Homes	--	65[4]
Commercial	Hotel, motel, transient housing	45	--
	Commercial retail, bank, restaurant	55	--
	Office Building, research and development, professional offices	50	--
	Amphitheater, concert hall, auditorium	45	--
	Gymnasium (multi-purpose)	50	--
	Sports Club	55	--
	Manufacturing, warehousing, wholesale, utilities	65	--
	Movie theaters	45	--
Institution/ Public	Hospitals, school classrooms, playgrounds	45	65
	Church, library	45	--
Open Space	Parks	--	65

[1] Indoor environment including kitchens, bathrooms, toilets, closets and corridors.
[2] Outdoor environment limited to: private yard of single-family dwellings; multiple-family patios or balconies accessed from within the dwelling (balconies 6 feet deep of less are exempt); mobile home parks; park picnic areas; school playgrounds; and hospital patios.
[3] Noise level requirements with closed windows, mechanical ventilation or other means of natural ventilation shall be provided as per Chapter 12, Section 1205 of the Uniform Building Code.
[4] Exterior noise levels should be such that interior noise levels will not exceed 45 dBA CNEL.

4.3.4. County of Orange Municipal Code, Section 4-6, Noise Control

In order to control unnecessary, excessive and annoying sounds emanating from unincorporated areas in Orange County, the County has developed Section 4-6, Noise Control, of the Municipal Code to prohibit such sounds generated from all sources. This section of the County's Municipal Code has specific standards established for interior and exterior noise levels for residential areas within the County. **Table 8** displays the County's standards for interior and exterior noise levels for residential land uses.

Table 8. County of Orange Municipal Code Residential Noise Levels

Noise Zone	Noise Level (dBA)	Time Period
Exterior	55	7:00 a.m. - 10:00 p.m.
	50	10:00 p.m. - 7:00 a.m.
Interior	55	7:00 a.m. - 10:00 p.m.
	45	10:00 p.m. - 7:00 a.m.

Source: County of Orange, Municipal Code, Section 4-6

Chapter 5. Operational Impacts

5.1. Operational Noise

There are several potential sources of operational noise impacts associated with the project. These can be grouped into two major categories 1) changes in rail traffic and operations and 2) changes in vehicular traffic and other related vehicle noise source changes. These will be examined here.

The project area consists of primarily of commercial and industrial land uses, including office buildings, restaurants, retail businesses, and one hotel. Within the project area, the only land uses that are sensitive to noise and vibration are:

- The Crossings – a recently constructed TOD apartment complex (100 feet from the tracks) a
- The Stay America – an extend stay hotel (200 feet from the tracks).

The only noise sensitive exterior area of frequent human use is at The Court (the outdoor basketball court at The Crossings).

5.1.1. Train Noise

Noise generated by the event of a single train passing is caused by the train engines and cars, the train horn and by stationary sources at the station. These sources will be discussed here.

The IEOC Line serves the Anaheim Canyon Station via Metrolink trains. It is owned by OCTA. Freight trains also use the corridor. According to metrolink there are 4-5 freight trains per day using the line. In addition, small rail spurs are used by existing businesses along the corridor. While these other rail operations contribute to the ambient noise environment, the proposed project improvements will only affect Metrolink operations.

The current station operates with a single track and a single platform. The existing single track is adequate for current levels of service (16 trains - 8 westbound trains and 8 eastbound trains daily on weekdays). The current Metrolink assessments propose to increase weekday service to 28 trains per day by 2024.

Noise from Train Engines and Cars
Noise from trains is generated by crossing bells, engines, exhaust noise, air turbulence generated by cooling fans, and other gear noise. The interaction of steel wheels with rails also generates noise: (1) rolling noise; (2) impact noise when a wheel encounters a discontinuity in the running surfaces, such as a rail joint, turnout, or crossover; and (3) squeals generated by friction on tight curves.

The new rail line and platform will be located approximately 20 feet west of the existing facilities. Therefore, Metrolink trains arriving and departing from the new southbound station are expected to cause an increase in noise levels, as compared to the existing station. At each arrival and departure there will be a periodic increase in ambient noise

levels that will be audible. However, this increase is expected to last no longer than one minute and will be short in duration. Relative to the noise sensitive land uses, the location of the new rail line/station will only affect The Crossing, as the Stay America is located on the eastern side of the tracks. Since The Crossings is a new construction project (built in 2009) and designed as a Transit-Oriented Development, the apartments were constructed with this rail update incorporated into the design – including the necessary noise abatement measures to make the facility attractive to perspective residents.

As discussed in **Chapter 4**, the method for evaluating impacts will focus on existing and future noise levels as determined by the prediction models included in the FTA Guidance Manual. Comparing the predicted existing/future noise levels to the applicable FTA impact thresholds will identify potential noise impacts.

The operating characteristics used to predict the levels of train noise using the formulas included in Table 6-4 of the FTA Guidance Manual. The general process included the following:

1. Determination of Source Sound Exposure Levels (SELs) at 50 feet
2. Conversion to Noise Exposure at 50 feet (L_{dn} and L_{eq})
3. Adjustment to Sensitive Receptor distances (100 and 200 feet)

The following noise emissions and operating conditions were used:

- A train speed of 50 mph.
- Train Schedule: 16 existing trains. 28 trains in 2024.
- There is one locomotive per three car train.
- Average throttle setting of 8.
- 100% daytime operation.

Using these formulas, the train noise levels (L_{dn} at 100 feet) are predicted to 56 under the existing conditions and 58 under the 2024 conditions. At 200 feet, the train noise levels (L_{dn}) are predicted to 50 under the existing conditions and 52 under the 2024 conditions.

When defining an impact, in accordance with the FTA Noise and Vibration Manual, the noise impact criteria are defined by the two curves in **Figure 9**. Below the lower curve, a proposed project is considered to have no noise impact since, on the average, the introduction of the project will result in an insignificant increase in the number of people annoyed by the new noise. This is the case for the noise sensitive receptors at 200 feet. The projected level of 52 dBA is below the impact criteria.

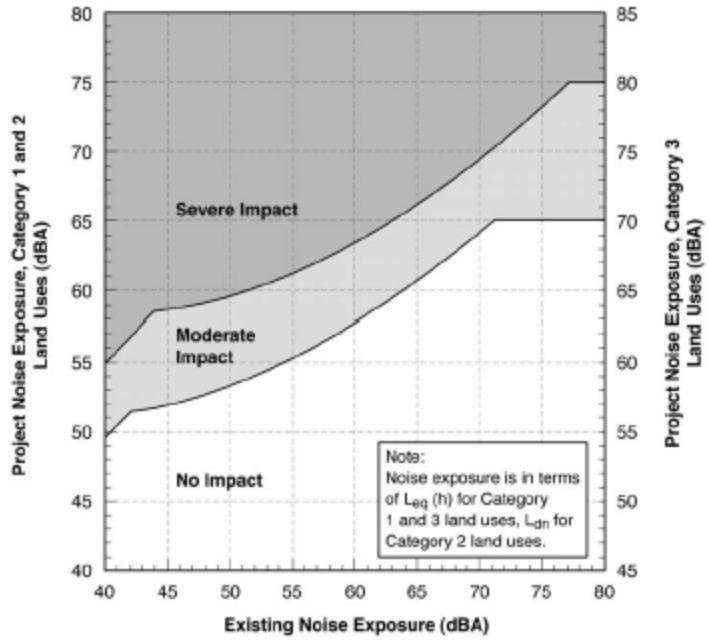


Figure 9: Noise Impact Criteria for Transit Projects (Figure 3-1 of FTA Noise and Vibration Manual)

Between the two curves in **Figure 9**, a project is judged to potentially have a moderate impact. This is the case for the noise sensitive receptors at 100 feet. At these levels, the change in noise is noticeable, but may not be sufficient to cause an adverse reaction. In this transitional area, the increase in the cumulative noise must be considered. This is because any new noise will increase noise levels, even if the new source is less than the existing level. The FTA standard holds that as the existing level of ambient noise increases, the allowable level of transit noise increases, but the total amount that community noise exposure is allowed to increase is reduced. To evaluate projects where moderate impacts potentially exist according to Figure 9, the increase in noise levels are accounted for in **Figure 10**. The 2 dBA increase predicted at 100 feet is below the impact criteria.

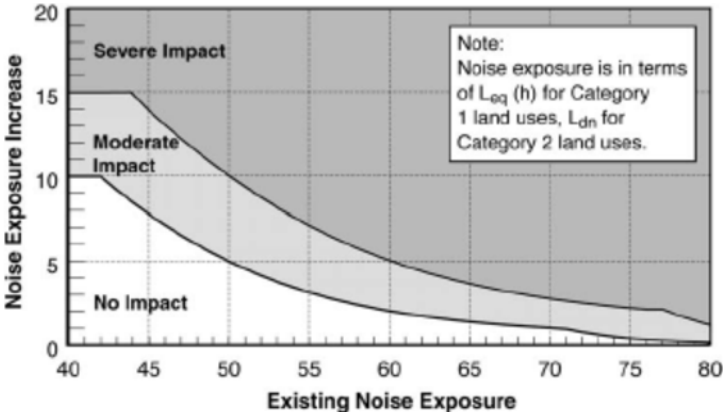


Figure 10: Increase in Cumulative Noise Levels Allowed by Criteria (Figure 3-2 of FTA Noise and Vibration Manual)

Therefore, the proposed 2024 train traffic increases are not anticipated to create an impact or be a substantial change over existing sound levels.

Noise from Train Horns

The FRA regulations require all trains operating on the national rail system to sound horns as they approach an at-grade rail/roadway crossing. The FRA regulations for sounding the locomotive horn include:

- Engineers must sound train horns for a minimum of 15 seconds before a grade crossing, or if the train is traveling faster than 45 mph, when the train is within 1/4 mile of the crossing.

- Train horns must be sounded in the standardized pattern of 2 long, 1 short and 1 long. The horn must continue to sound until the lead locomotive or train car occupies the grade crossing.

The minimum train horn volume is 96 dBA (Lmax) at a distance of 100 feet from the train. The maximum volume is 110 dBA (Lmax) at a distance of 100 feet from the train. Because train horns can dominate the Ldn noise level in a neighborhood, they have been excluded from the train noise calculations. If used, train horns can significantly increase the 24-hour noise level in areas adjacent to at-grade crossings. However, horns are rare because the trains are most often stopping at the station. Further, train horns can be silenced when other safety measures, such as railroad crossing enhancements, compensate for the horns. That is the case at the La Palma Avenue crossing.

In 2005, the FRA finalized a horn rule that provides the opportunity to mitigate the effects of train horn noise by establishing “quiet zones.” The FRA may grant a quiet zone if the affected jurisdiction agrees to implement supplemental safety measures such as four quadrant gates. If the application is approved, freight trains are not required to sound their horns as they approach at-grade crossings. Given the nature and limited number of noise sensitive receivers, the desire for quiet zones would seem limited.

Other Stationary Noises

Operations at the new station include a variety of low-intensity noise associated with using the train. This includes pedestrians, law-enforcement, luggage movement, maintenance equipment etc. Station operations may influence the ambient noise levels at the project site. As was observed during the site reviews, noise associated with the existing station are low and intermittent.

Noise from any existing or future fixed equipment in the project vicinity, or proposed as part of the project, is regulated by the City’s Stationary Equipment Noise Ordinance. This ordinance restricts fixed equipment (such as air conditioners, pool filters, compressors, and industrial machinery) from exceeding 55 dBA when measured at any location on a neighboring residential property. Any plans submitted for a building permit must include documentation that proposed equipment meets this standard. Therefore, implementation of the proposed project would not expose persons in the project vicinity to excessive noise levels from stationary noise sources.

5.1.2. Non-Train Vehicle Noise

Noise from motor vehicles is generated by engine vibrations, the interaction between tires and the road, and the exhaust system. The project has the potential to alter vehicle usage and distribution.

The Anaheim Canyon Station serves OCTA Station Link route 411. ATN also operates a rail feeder service on weekdays from the station to downtown Anaheim. The existing bus bays will remain in place; but improvements to the path of travel to the platforms will need to be made to bring the project into current ADA compliance.

In order to assess the potential for mobile-source noise impacts, it is necessary to determine the noise currently generated by vehicles traveling through the project area. Future parking demand/vehicle usage will be dependent on, not only on the level of train service, but also on developments near the station. Even the presence/absence of adjacent Metrolink stations will affect parking demand/vehicle usage. The Anaheim Canyon Station has typically been utilized as a destination station verses an origin station. Origin Stations are those where riders drive to in the morning and park their cars. However, the Anaheim Canyon Station does serve a number of “station cars”, vehicles used for last mile commutes to final destination, that are left at the station each night. Consequently, the project is not expected to substantially increase the vehicle traffic volume, especially noisy heavy vehicles near the station.

Further, while the project will alter the operation of some road vehicles - such as parking and tram/bus circulation patterns, these changes are not in the vicinity of the noise-sensitive receptors and are merely typical city background sounds for all other users. Consequently, the impact of these changes are considered negligible.

5.2. Operational Vibration

The operation of the Anaheim Canyon Station as a multi-modal transit center involve Metrolink commuter rail service, OCTA local and community bus service, Stationlink rail feeder service, Anaheim Resort Transit service and available parking facilities. The operation of these facilities will be examined regarding vibration.

5.2.1. Train Vibrations

Vibration levels from train-induced vibration are dependent on specific site conditions including geology and the condition of the railroad track and train wheels. The only vibration-sensitive land uses in the project area are the residential land uses. The nearest sensitive land uses in project area are the Crossings Apartments (100 feet from the tracks) and the Stay America Hotel (200 feet from the tracks). These vibration-sensitive land uses have the potential to be impacted by perceptible levels of vibration from rail operations. The balance of the industrial/commercial land use are not considered sensitive to vibration.

Based on the FTA’s generalized ground surface vibration curve, light rail trains would generate a vibration level of 72 VdB at a distance of 60 feet. Locomotive powered passenger or freight trains traveling at 50 miles per hour would generate a vibration level

of 72 VdB at a distance of 200 feet (FTA 2006). Vibration-sensitive land uses located within 200 feet of the line could potentially be an impact. However, since current levels are less than perceptible to residents, future increases in rail traffic would not generate levels of vibration perceptible to residents, as the intensity of vibration would not increase, only the frequency of occurrence.

5.2.2. Other Vehicle Vibrations

Caltrans has studied the effects of propagation of vehicle vibration on sensitive land uses. Caltrans notes that “heavy trucks, and quite frequently buses, generate the highest earthborne vibrations of normal traffic.” Caltrans further notes that the highest traffic-generated vibrations are along the freeways and state routes. Their study finds that vibrations measured on freeway shoulders (five meters from the centerline of the nearest lane) have never exceeded 0.08 inch per second, with the worst combinations of heavy trucks. This level coincides with the maximum recommended safe level for ruins and ancient monuments (and historic buildings). Typically, trucks do not generate high levels of vibration because they travel on rubber wheels and do not have vertical movement which generates ground vibration. Vibrations from trucks may be noticeable if there are any roadway imperfections such as potholes (FTA 1995). Vibration-sensitive structures are not and will not be sited within five meters from the proposed alterations of any vehicle facilities proposed by this project. Consequently, no significant impacts related to on-road mobile-source vibration impacts are anticipated.

5.3 Mitigation for Operational Impacts

Operation of the proposed project is expected to result in negligible noise and vibration impacts. Consequently, additional mitigation measures, beyond Standard Operating Procedures, are not recommended.

Chapter 6. Construction Impacts

This section identifies the noise impacts associated with implementation of the proposed project. Mitigation measures are recommended, as appropriate, for significant impacts to eliminate or reduce them to a less-than-significant level.

6.1. Construction Noise

Development of the Anaheim Canyon Station project is not expected to result in a substantial temporary increase in noise levels, as the result of construction.

Construction impacts are associated with site preparation, grading, station construction and rail expansion. Two types of short-term noise impacts could occur during construction. First, the transport of workers and movement of materials to and from the site could incrementally increase noise levels along local access roads. The second type of short-term noise impact is related to noise generated at the job site during demolition, site preparation, grading, and/or physical construction. These will be described below.

6.1.1. Construction Noise and Worker/Material Delivery Vehicles

The transport of workers and equipment to the construction site would incrementally increase noise levels along site access roadways. Development of project will also require import and export of material. However, the amount of construction traffic is typically small in relation to the total daily traffic volumes on those roadway segments. Additionally, the truck trips would be spread throughout the workday and would primarily occur during nonpeak traffic periods. Therefore, these impacts are less than significant at noise receptors along the construction routes. A doubling of traffic volumes is necessary to increase noise by 3 dB or more. While transport/vehicular operations would result in a noise impact, they would not cause a substantial increase in the ambient noise levels along the roadways. Therefore, they would not result in potential significant noise impacts along the designated routes.

6.1.2. Construction Noise and Physical Construction

The other type of short-term noise impact is related to demolition, site preparation, grading, and/or physical construction. **Table 9** lists typical construction equipment noise levels recommended for noise-impact assessments, based on a distance of 50 feet between the equipment and a noise receptor.

Table 9
Construction Equipment Noise Emission Levels

Construction Equipment	*Typical Noise Level (dBA) at 50 Feet from the Source*	*Construction Equipment*	*Typical Noise Level (dBA) at 50 Feet from the Source*
Air Compressor	81	Pile-Driver (Impact)	101
Backhoe	80	Pile-Driver (Sonic)	96
Ballast Equalizer	82	Pneumatic Tool	85
Ballast Tamper	83	Pump	76
Compactor	82	Rail Saw	90
Concrete Mixer	85	Rock Drill	98
Concrete Pump	71	Roller	74
Concrete Vibrator	76	Saw	76
Crane, Derrick	88	Scarifier	83
Crane, Mobile	83	Scraper	89
Dozer	85	Shovel	82
Generator	81	Spike Driver	77
Grader	85	Tie Cutter	84
Impact Wrench	85	Tie Handler	80
Jack Hammer	88	Tie Inserter	85
Loader	85	Truck	88
Paver	89		

Source: FTA 2000

Construction is performed in distinct steps, each of which has its own mix of equipment and, consequently, its own noise characteristics. However, despite the variety in the type and size of construction equipment, similarities in the dominant noise sources and patterns of operation allow construction-related noise ranges to be categorized by work phase.

Composite construction noise is best characterized by Bolt, Beranek and Newman. In their study, construction noise for development ranges from 77 to 89 dBA L_{eq} when measured at a distance of 50 feet from the construction effort. These values take into account both the number of pieces and spacing of the heavy equipment used in the construction effort. In later phases during building assembly, noise levels are typically reduced from these values and the physical structures further break up line-of-sight noise propagation. Construction of individual developments associated with build-out of the Proposed Project would temporarily increase the ambient noise environment. Because of the limited nature of existing noise-sensitive uses it is improbable that development of the project would involve construction activities that occur within 50 feet of existing noise-sensitive uses. Project-related construction would temporarily increase the ambient noise environment.

However, nighttime construction may generate potential noise impacts on The Crossing Apartments and the Stay America Hotel.

6.1.3. Construction Noise Mitigation Measures

Implementation of the proposed project is expected to result in a temporary and periodic increase in ambient noise levels in the project vicinity above existing noise levels. All other thresholds of significance are not expected to be impacted with the implementation of the proposed project. During construction of the proposed project, noise from construction activities may intermittently dominate the noise environment in the immediate area of construction. Noise from project construction would be regulated through the City of Anaheim Municipal Codes. On-going and during grading, demolition, and construction, the property owner/developer shall be responsible for requiring contractors to implement the following measures to limit construction-related noise:

- N-1: Noise generated by construction shall be limited to 60 dBA along Roadways and the tracks before 7 a.m. and after 7 p.m., as governed by Chapter 6.70, Sound Pressure Levels, of the Anaheim Municipal Code. If 60 dBA is exceeded during these hours, noise attenuation features (i.e. temporary noise barriers, sound curtains, etc.) shall be installed to reduce noise levels to below 60 dBA at the exterior of the affected building. These noise attenuation features may be removed if a qualified noise specialist determines that noise levels are not significantly impacted by nighttime construction;

- N-2: When excessive noise during construction is anticipated before 7 a.m. and after 7 p.m. the contractor shall request an exception to the requirements of Chapter 6.70 of the Anaheim Municipal Code. The request shall be submitted in accordance with the provisions contained in Chapter 6.70 and shall include a construction schedule and a list of equipment to be used during that time frame. This information shall be provided to the Director of Public Works or Chief Building Official for consideration; and

- N-3: Construction equipment and supplies shall be located in staging areas that shall create the greatest distance possible between construction-related noise sources and noise sensitive receivers nearest the project area. This information shall be specified on all grading, excavation and construction plans.

The mitigation measures identified above will reduce potential impacts associated with noise to a level that is less than significant. Therefore, no significant impacts relating to noise have been identified.

6.2. Construction Vibration

Development of the Anaheim Canyon Station project is not expected to result in substantial temporary increase in vibration levels, as the result of construction.

Construction activities can generate varying degrees of ground-borne vibration depending on the construction procedures and equipment used. Operation of construction equipment generates vibrations that spread through the ground and diminish with distance from the source. The effect on buildings near the construction site varies depending on soil type, ground strata, and receptor building construction. The results

from vibration can range from no perceptible effects at the lowest levels, to low rumbling sounds and perceptible vibrations at moderate levels, to slight damage at the highest levels. Ground-borne vibration from construction activities rarely reaches levels that can damage structures, but it can achieve the audible and perceptible ranges in buildings close to a construction site. Ground-borne vibration would be generated by the project during construction activities, primarily during the demolition, grading, and foundation phases. Unless there are extremely large generators of vibration, such as pile drivers, or receptors in close proximity to construction equipment, vibration is generally only perceptible at structures when vibration rattles windows, picture frames, and other objects. **Table 10** lists the maximum levels of vibration that would be experienced at vibration-sensitive structures located 25 feet from the construction equipment.

Table 10
Vibration Source Levels for Construction Equipment

Equipment	*Approximate Velocity Level at 25 Feet (VdB)*	*Approximate RMS[1] Velocity at 25 Feet (in/sec)*
Pile Driver (impact) – Upper Range	112	1.518
Pile Driver (impact) – Lower Range	104	0.644
Pile Driver (sonic) – Upper Range	105	0.734
Pile Driver (sonic) – Lower Range	93	0.170
Clam Shovel Drop (Slurry Wall)	94	0.202
Hydromill (Slurry Wall) – In Soil	66	0.008
Hydromill (Slurry Wall) – In Rock	75	0.017
Vibratory Roller	94	0.210
Hoe Ram	87	0.089
Large Bulldozer	87	0.089
Caisson Drilling	87	0.089
Loaded Trucks	86	0.076
Jackhammer	79	0.035
Small Bulldozer	58	0.003

Source: Federal Transit Administration, USDOT, *Transit Noise and Vibration Impact Assessment*, 2006.

1 RMS velocity calculated from vibration level (VdB) using the reference of 1 microinch per second.

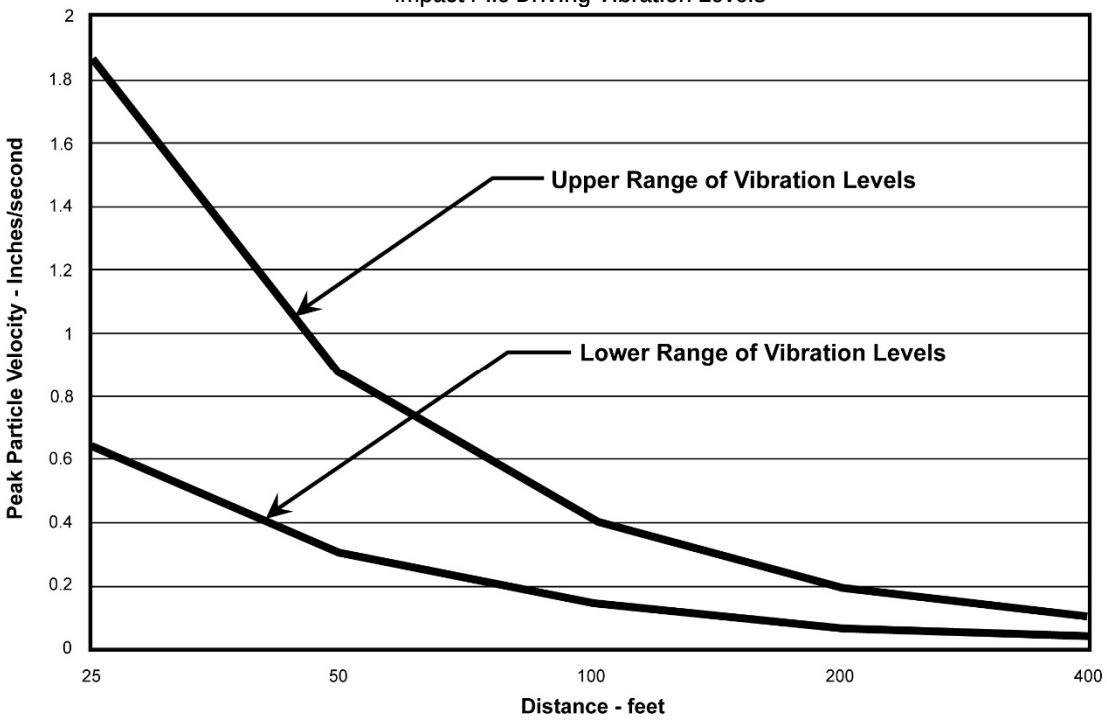
6.2.1. Construction Vibration and Vibration-Induced Structure Damage

Project-related construction vibration was evaluated for its potential to cause structural damage in comparison to the FTA's structural damage criteria. Typically, only construction equipment generating extremely high levels of vibration, such as pile drivers, have the potential for vibration- induced structural damage. Impact pile driving can result in ground borne vibration levels of up to 112 VdB at a distance of 25 feet from the operating equipment. The FTA damage threshold for buildings considered particularly fragile structures is approximately 90 VdB; while the damage threshold for structures made of engineered concrete and masonry is 98 VdB. It is possible that a limited amount of pile driving may be required for the project. Consequently, it was necessary to see if pile driving could cause building damage.

The nearest sensitive land uses in the project area are the Crossings Apartments (100 feet from the tracks) and the Stay America Hotel (200 feet from the tracks).
At these distances, it is unlikely that vibration from construction activities will exceed the thresholds for minor cosmetic damage to buildings. As depicted on **Figure 11** high

intensity vibration dissipates very quickly, as distance increases. Because of the diminishment of vibration over distance, a buffer of approximately 100 feet is typically sufficient to stay within the building damage criterion. At 100 feet vibration diminishes by almost 80 percent.

Figure 11
Impact Pile Driving Vibration Levels



Construction-related vibration can also affect underground facilities (such as buried utilities). The potential impact to underground utilities from construction vibration is far less than the damage risk to buildings. The only construction activity proposed for this project that would generate vibration levels that could damage utilities would be impact pile driving. Vibration from pile driving can be expected to damage buried utilities at distances of up to 100 feet (depending on the utility). The impact pile driving locations should be further evaluated during final design to account for underground facilities.

While the majority of heavy construction equipment would not be in operation exactly at the property line, residences within and surrounding the site would be exposed to construction-related vibration during development. The nearest sensitive land uses in project area are the Crossings Apartments (100 feet from the tracks) and the Stay America Hotel (200 feet from the tracks).

6.2.2. Construction Vibration and Vibration-Induced Annoyance

In addition to building damage, construction vibration could also be an annoyance. Levels of vibration produced by construction equipment were evaluated against the FTA's threshold for barely perceptible vibration annoyance of 78 VdB. Even at a distance of 400 feet, the ground-borne vibration levels of the most intense equipment (impact pile driving) could be in the range of annoyance. However, construction activities would be

restricted to daytime hours when people are the least sensitive to noise intrusions and the number of sensitive/affected land uses are limited.

6.2.3. Construction Vibration Mitigation Measures

In the event that equipment producing high levels of vibration may approach those limits, the noise control plan should also include measures to minimize vibration impacts during construction. Also, representatives from the Construction Authority should be available to discuss vibration related complaints and take appropriate action to minimize the intrusion. Appropriate vibration mitigation measures include:

- Minimizing the use of tracked vehicles and high impact techniques,
- Avoiding vibratory compaction, and
- Vibration monitoring near residences to ensure thresholds are not exceeded.

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CEQA Analysis

This section will examine the noise impacts associated with the Anaheim Canyon Metrolink Station and Track Alignment project in accordance with the requirements of the California Environmental Quality Act (CEQA).

Within the project area, the only land uses that are sensitive to noise and vibration are 1) The Crossings - a recently constructed Transit Oriented Development (TOD) residential apartment complex located roughly 100 feet from the rail line [#3530 and 3560 East La Palma Avenue] and 2) Stay America - an extended stay hotel located approximately 200 feet from the rail line [#1031 North Pacificenter Drive]. The only noise sensitive exterior area of frequent human use is at The Court (the outdoor basketball court at The Crossings). The balance of the project area is composed of commercial, office, retail and industrial uses.

a) Result in exposure of persons to, or generation of, noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?

The applicable noise standards governing the project site include federal and state standards as well as the standards found in the City of Anaheim and the County of Orange Municipal Noise Codes. These establish exterior noise acceptability thresholds for identifying impacts to future residents of new development in areas with existing ambient noise. These standards cover both operational and construction noise impacts.

The primary source of *operational noise* is from rail operation. Changes to rail configuration and rail traffic are predicted. The current station operates with a single track and a single platform. The addition of siding track (a second track) will allow for more efficient operations. Metrolink proposes to increase weekday service from 16 to 28 trains per day by 2024. Train noise levels (Ldn at 100 feet) are predicted to 56 dBA under the existing conditions and 58 dBA under the 2024 conditions. At 200 feet, the train noise levels (Ldn) are predicted to 50 dBA under the existing conditions and 52 dBA under the 2024 conditions.

When defining an impact, in accordance with the FTA Noise and Vibration Manual, both the absolute and cumulative change in noise levels are considered. For the noise sensitive land uses at 200 feet, the absolute change in noise levels is not expected to be noticeable. For the noise sensitive receptors at 100 feet, the change in noise is expected to be noticeable, but not sufficient to cause an adverse reaction. The cumulative noise increase (2 dBA) is below the impact criteria. Further, these levels are compatiable with local, state and federal standards and regulations.

The potential sources of *construction noise impacts* are associated with site preparation, grading, station construction and rail expansion. Implementation of the proposed project is expected to result in a temporary and periodic increase in ambient noise levels in the project vicinity above existing noise levels. Mitigation measures have been proposed

that will reduce potential impacts associated with noise to a level that is less than significant. Therefore, significant impacts relating to noise are not expected.

Consequently, relative to CEQA section (a), the impact is expected to be *Less than Significant*.

b) Result in exposure of persons to or generation of excessive ground-borne vibration or ground-borne noise levels?

In contrast to air-borne noise, ground-borne vibration is not a phenomenon that most people experience every day. Background vibration levels are generally well below the threshold of perception for humans. Vibration is most often a concern only when the vibration affects very sensitive manufacturing or research equipment. Since there are no applicable local vibration requirements; FTA criteria are utilized

The potential sources of *operational vibration impacts* are associated with the operation trains and other vehicles.

- Based on the FTA's generalized ground surface vibration curve, light rail trains would generate a vibration level of 72 VdB at a distance of 60 feet. Locomotive powered passenger or freight trains traveling at 50 miles per hour would generate a vibration level of 72 VdB at a distance of 200 feet (FTA 2006). Vibration-sensitive land uses located within 200 feet of the line could result in a potential impact. However, since current levels are less than perceptible to residents, future increases in rail traffic would not generate levels of vibration perceptible to residents, as the intensity of vibration would not increase, only the frequency of occurrence.

- Relative to vibration from the operation of other vehicles, Caltrans finds that trucks do not generate high levels of vibration and if they do the range of effect in very short. Consequently, no significant impacts related to on-road mobile-source vibration impacts are anticipated.

The potential sources of *construction vibration impacts* are associated with the operation of construction equipment which generates vibrations that spread through the ground Project-related construction vibration was evaluated for its potential to cause structural damage in comparison to the FTA's structural damage criteria. Typically, only construction equipment generating extremely high levels of vibration, such as pile drivers, have the potential for vibration- induced structural damage. Impact pile driving can result in ground borne vibration levels of up to 112 VdB at a distance of 25 feet from the operating equipment. The FTA damage threshold for buildings considered particularly fragile structures is approximately 90 VdB; while the damage threshold for structures made of engineered concrete and masonry is 98 VdB. It is possible that a limited amount of pile driving may be required for the project. Consequently, it was necessary to see if pile driving could cause building damage.

The nearest sensitive land uses in the project area are the Crossings Apartments (100 feet from the tracks) and the Stay America Hotel (200 feet from the tracks).
At these distances, it is unlikely that vibration from construction activities will exceed the thresholds for minor cosmetic damage to buildings. High intensity vibration dissipates very quickly, as distance increases. Because of the diminishment of vibration over

distance, a buffer of approximately 100 feet is typically sufficient to stay within the building damage criterion. At 100 feet vibration diminishes by almost 80 percent.

Consequently, relative to CEQA section (b), the impact is expected to be *Less than Significant*.

c) Result in a substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project?

Potential sources for permanent increases to the ambient noise environment include operational noise. The potential sources of *operational noise impacts* associated with the project include 1) changes in rail traffic and operations and 2) changes in other vehicular traffic and other movements, including mass transit.

- Relative to rail traffic, the current station operates with a single track and a single platform (16 trains daily on weekdays). Metrolink proposes to increase weekday service to 28 trains per day by 2024. Existing train noise levels are predicted to be between 50 and 56 dBA (L_{dn}). Project-related 2024 noise levels are predicted to be between 52 and 58 dBA (L_{dn}). This level of change is not considered an impact. Therefore the project train traffic increases from existing conditions to 2024 are not anticipated to create a substantial impact over existing sound levels.

- Relative to other vehicle traffic, while the project will alter the operation of some road vehicles and tram/bus circulation patterns, these changes are no in the vicinity of the noise-sensitive receptors and are merely typical city background sounds for all other users. Consequently, the impact of these changes are considered negligible.

Consequently, relative to CEQA section (c), the CEQA impact is expected to be *Less than Significant*.

d) Result in a substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project?

The primary temporary noise source is construction. The appropriate CEQA threshold for construction noise is discussed in section (a).

Construction noise levels could exceed these thresholds intermittently and temporarily. However, with adherence to standard construction procedures, the CEQA impact is expected to be *Less than Significant*.

e) For a project located within 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?

There are no airports within 2 miles of the Anaheim Canyon Metrolink Station and Track Alignment project.

Consequently, relative to CEQA section (e), *No Impact* is anticipated.

f) For a project within the vicinity of a private airstrip, would the project expose people residing or working in the project area to excessive noise levels?

There are no airports within 2 miles of the Anaheim Canyon Metrolink Station and Track Alignment project.

Consequently, relative to CEQA section (f), *No Impact* is anticipated.