

4.3 Noise

4.3 Noise

4.3.1 INTRODUCTION

This section focuses on potential noise impacts associated with the proposed roadway and intersection modifications, including placing roadways closer to potential sensitive receptors. The region of influence (study area) is defined to be within a circle having a radius of 500 feet from the center of each intersection. This section incorporates by reference information presented in Section 4.3, Noise of the City of Roseville's 2000 EIR for the 2015 CIP and the 2002 Supplemental EIR for the 2020 CIP.

4.3.2 ENVIRONMENTAL SETTING

Existing land uses within Roseville are dominated by commercial, rural, and residential land uses. There are some light industrial uses, as well as a variety of municipal/public uses, including police and fire facilities, schools, libraries, and City administrative functions. Roseville also has a well-developed system of parks, creeks, trails, and open space. Interstate 80 (I-80), State Route (SR) 65, and the Union Pacific rail yard all bisect the City.

4.3.2.1 Characteristics of Environmental Noise

Noise is generally defined as loud, unpleasant, unexpected, or undesired sound that disrupts or interferes with normal human activities. Although prolonged exposure to high noise levels has been demonstrated to cause hearing loss, the principal human response to environmental noise is annoyance. The response of individuals to similar noise events is diverse and influenced by the type of noise, the perceived importance of the noise and its appropriateness in the setting, the time of day and the type of activity during which the noise occurs, and the sensitivity of the individual.

Sound is a physical phenomenon consisting of minute vibrations that travel through a medium, such as air, and are sensed by the human ear. Sound is generally characterized by a number of variables, including frequency and intensity. Frequency describes the sound's pitch and is measured in Hertz (Hz), while intensity describes the sound's loudness and is measured in decibels (dB). Decibels are measured using a logarithmic scale. A sound level of 0 dB is approximately the threshold of human hearing and is barely audible under extremely quiet listening conditions. Normal speech has a sound level of approximately 60 dB. Sound levels above about 120 dB begin to be felt inside the human ear as discomfort and eventually pain at still higher levels. The minimum change in the sound level of sound energy – averaged over time – that an average human ear can detect is about 3 dB. An increase (or decrease) in sound level of about 10 dB is usually perceived by the average person as a doubling (or halving) of the sound's loudness, and this relation generally holds true for loud sounds and for quieter sounds.

Because of the logarithmic nature of the decibel unit, sound levels cannot be added or subtracted directly and are somewhat cumbersome to handle mathematically. However, some simple guidelines are useful in dealing with sound levels. First, if a sound's intensity is doubled, the sound level increases by 3 dB, regardless of the initial sound level. Thus, for example: 60 dB + 60 dB = 63 dB, and 80 dB + 80 dB = 83 dB.

A Hertz (Hz) indicates the rate at which pressure fluctuations occur. For example, when a drummer beats a drum, the skin of the drum vibrates a number of times per second. A particular tone which makes the drum skin vibrate 100 times per second generates a sound pressure wave that is oscillating at 100 Hz, and this pressure oscillation is perceived as a tonal pitch of 100 Hz. Sound frequencies between 20 Hz and 20,000 Hz are within the range of sensitivity of the best human ear.

Sound from a tuning fork contains a single frequency referred to as a tone. In contrast, most sounds one hears in the environment do not consist of a single frequency, but rather a broad band of frequencies differing in sound level. The method commonly used to quantify environmental sounds consists of evaluating all of the frequencies of a sound according to a weighting system that reflects that human hearing is less sensitive at lower frequencies and higher frequencies than at the mid-range frequencies, e.g., 200 Hz to 5,000 Hz. The most commonly used filter introduces an “A” weighting, and the decibel level measured is called the A-weighted sound level (dBA). In practice, the level of a noise source is conveniently measured using a sound level meter that includes a filter corresponding to the dBA curve.

Although the A-weighted sound level may adequately indicate the level of environmental noise at any instant in time, community noise levels vary continuously. Most environmental noise includes a conglomeration of noise from distant sources that creates a relatively steady background noise in which no particular source is identifiable. A single descriptor called the equivalent sound level (L_{eq}) is the “equivalent” constant sound level that would have to be produced by a given source to equal the fluctuating level measured.

Finally, another sound measure known as the day-night average noise level (L_{dn}) describes noise exposure over a 24-hour period. It is calculated by adding a 10-decibel penalty to sound levels at night (10:00 p.m. to 7:00 a.m.) to compensate for the increased sensitivity to noise during the quieter evening and nighttime hours. The L_{dn} is defined by jurisdictions such as the State of California, and implemented by county or city government, to define acceptable land use compatibility with respect to noise. Sound levels of typical noise sources and environments are provided in **Table 4.3-1** to provide a frame of reference.

4.3.2.2 Regional Setting

Ambient sound levels can be characterized based on the types of development present; typically, sound levels in residential areas are relatively low if not affected by a major roadway. Sound levels near commercial areas or along arterial roadways are typically higher than residential areas. Major noise sources are transportation-related. The noise environment within the City is controlled by both traffic from local roadways and railroad operations within their region of influence.

4.3.2.3 Local Setting

The intersection and roadway improvements proposed as part of the 2020 CIP Update are located throughout Roseville and a small section of unincorporated Placer County. Specific improvements are proposed to improve the level of service (LOS) in these areas based on 2020 traffic projections.

Noise Source (at Given Distance)	Noise Environment	A-Weighted Sound Level	Human Judgment of Noise Loudness (Relative to Reference Loudness of 70 Decibels)
Military Jet Takeoff with Afterburner (50 ft)	Carrier Flight Deck	140 Decibels	128 times as loud
Civil Defense Siren (100 ft)		130	64 times as loud
Commercial Jet Take-off (200 ft)		120	32 times as loud Threshold of Pain
Pile Driver (50 ft)	Rock Music Concert	110	16 times as loud
Ambulance Siren (100 ft) Newspaper Press (5 ft) Power Lawn Mower (3 ft)		100	8 times as loud Very Loud
Motorcycle (25 ft) Propeller Plane Flyover (1,000 ft) Diesel Truck, 40 mph (50 ft)	Boiler Room Printing Press Plant	90	4 times as loud
Garbage Disposal (3 ft)	Higher Limit of Urban Ambient Sound	80	2 times as loud
Passenger Car, 65 mph (25 ft) Living Room Stereo (15 ft) Vacuum Cleaner (3 ft) Electronic Typewriter (10 ft)		70	Reference Loudness Moderately Loud
Normal Conversation (5 ft) Air Conditioning Unit (100 ft)	Data Processing Center Department Store	60	1/2 as loud
Light Traffic (100 ft)	Private Business Office	50	1/4 as loud
Bird Calls (distant)	Lower Limit of Urban Ambient Sound	40	1/8 as loud Quiet
Soft Whisper (5 ft)	Quiet Bedroom	30	1/16 as loud
	Recording Studio	20	1/32 as loud Just Audible
		10	1/64 as loud Threshold of Hearing

Source: Compiled by URS Corporation

4.3.3 REGULATORY SETTING

4.3.3.1 Federal

Federal noise standards are not applicable given the absence of federal funding for the proposed project or affected federal lands.

4.3.3.2 State

California Code of Regulations Title 24 establishes standards governing interior noise levels for new multifamily residential units. These standards stipulate that acoustical studies shall be performed prior to construction at building locations where the existing L_{dn} exceeds 60 dBA. These studies are required to establish measures that will limit maximum L_{dn} levels to 45 dBA in any inhabitable room. Based on Title 24 standards that apply to residential structures (excepting single-family detached residences), many communities, including the City of Roseville, have adopted an L_{dn} of 45 as the upper limit on interior noise in all residential units, including single-family detached residences.

4.3.3.3 Local

City of Roseville General Plan

The maximum allowable noise exposure limits for transportation and nontransportation noise sources are discussed below and summarized in **Tables 4.3-2** and **4.3-3**, respectively.

- The standard applicable to protect residential land uses from transportation noise sources is an L_{dn} of 60 dBA. If the L_{dn} exceeds 60 dBA but remains at or below 65 dBA, a review of architectural features is necessary to demonstrate that an L_{dn} of 45 dBA or less is achieved for interior spaces. Residential uses include, but are not necessarily limited to, single-family detached and multifamily demised (common-partition) structures. Additional land uses of interest include transient lodging, hospitals, and nursing homes.
- The standards applicable to protect residential land uses from nontransportation noise sources outlined in the Noise Element of the General Plan are a daytime L_{eq} of 50 dBA and a nighttime L_{eq} of 45 dBA.

City of Roseville Noise Ordinance

The City of Roseville has a Municipal Code establishing standards for limiting potential noise impacts from construction activity. The Roseville Noise Ordinance allows construction activity on weekdays between 7:00 a.m. and 7:00 p.m. and on weekends between 8:00 a.m. and 8:00 p.m. and stipulates that all construction equipment used during these time periods shall be maintained in good working order. No quantifiable noise level is specified for construction related activities within the allowable time periods.

Land Use	Outdoor Activity Areas ¹	Interior Spaces	
	L _{dn} /CNEL	L _{dn} /CNEL	L _{eq} , dB ²
Residential	60 ³	45	—
Transient Lodging	60 ³	45	—
Hospitals, Nursing Homes	60 ³	45	—
Theaters, Auditoriums, Music Halls	—	—	35
Churches, Meeting Halls	60 ³	—	40
Office Buildings	—	—	45
Schools, Libraries, Museums	—	—	45
Playgrounds, Neighborhood Parks	70	—	—

Notes:

¹Outdoor activity areas for residential development are considered to be the backyard patios or decks of single-family dwellings, and the patios or common areas where people generally congregate for multifamily developments.

Outdoor activity areas for nonresidential developments are considered to be those common areas where people generally congregate, including pedestrian plazas, seating areas, and outside lunch facilities.

Where the location or activity areas are unknown, the exterior noise level standard shall be applied to the property line of the receiving land use.

²As determined for a typical worst-case hour during periods of use.

³Where it is not possible to reduce noise in outdoor activity areas to 60 L_{dn}/CNEL or less using a practical application of the best available noise reduction measures, an exterior noise level of up to 65 dB L_{dn}/CNEL may be allowed, provided that available exterior noise level reduction measures have been implemented and interior noise levels are in compliance with this table.

Note: Where a proposed use is not specifically listed on this table, the use shall comply with the noise exposure standards for the nearest similar use as determined by the City of Roseville Planning Department. Commercial and industrial uses have not been listed because such uses are not considered to be particularly sensitive to noise exposure.

CNEL = Community Noise Exposure Level.

Source: City of Roseville, General Plan, 1992

TABLE 4.3-3

**CITY OF ROSEVILLE PERFORMANCE STANDARDS FOR
NONTRANSPORTATION NOISE SOURCES OR PROJECTS AFFECTED BY
NONTRANSPORTATION NOISE SOURCES (AS MEASURED AT THE PROPERTY
LINE OF THE NOISE-SENSITIVE USES)**

Noise Level Descriptor	Daytime (7 a.m. to 10 p.m.)	Nighttime (10 p.m. to 7 a.m.)
Hourly L_{eq} , dB	50	45
Maximum Level, dB	70	65

Notes:

Each of the noise levels specified above should be lowered by 5 dB for simple tone noises, noises consisting primarily of speech or music, or for recurring impulsive noises. Such noises are generally considered by residents to be particularly annoying and are a primary source of complaints. These noise level standards do not apply to residential units established in conjunction with industrial or commercial uses (e.g., caretaker dwellings).

No standards have been included for interior noise levels. Standard construction practices should, with the exterior noise levels identified, result in acceptable interior noise levels.

Source: City of Roseville, General Plan, 1992

4.3.4 IMPACTS

4.3.4.1 Methods of Analysis

This section identifies and discusses the environmental noise impacts resulting from the proposed project and suggests Mitigation Measures to reduce the level of impact. **Tables 3-4** and **3-5** in Chapter 3, Project Description, indicate the intersections and roadways modifications proposed as part of the 2020 CIP Update. This evaluation of potential noise impacts focuses on improvements categorized as Widening projects in the above-referenced Chapter 3 tables; these improvements would place the roadway and intersection closer to existing land uses from that identified (and previously evaluated) in the current 2020 CIP. This section also discusses the noise modeling performed to evaluate anticipated noise levels for 2020 No Project conditions (Scenario 4) and 2020 Plus Project conditions (Scenario 5) at intersections proposed to be widened. This modeling also accounted for the three roadway widening projects proposed as part of the project (i.e., Fiddymont Road from Pleasant Grove Boulevard to Baseline Road; Roseville Parkway from Galleria Boulevard to West Mall; and Roseville Parkway from West Mall to Gibson Drive), which are adjacent to these intersections.

Noise levels were calculated using the Federal Highway Administration Traffic Noise Model (TNM) Version 2.5, with reference to known topographical conditions and the assumed surface traffic conditions. It was assumed that noise levels within a few hundred feet of roadways are dominated by noise from traffic moving through each of the intersections being evaluated. For properties within about 500 feet of the center of each intersection, the traffic was modeled to accommodate the potential changes of noise levels caused by changes in the proportions of vehicular traffic accelerating from a stop at an intersection versus free-flowing traffic moving through an intersection at a constant speed. Noise model outputs are provided in Appendix G.

In areas with greater relative contributions from other noise sources, such as railway or industrial sources, the relative changes of project noise levels from the CIP improvements would be less than the results tabulated below for this analysis.

4.3.4.2 Standards of Significance

As described in CEQA Guidelines (Appendix G), a significant impact would occur if the proposed project would result in the following:

- Exposure of persons to or generation of noise levels in excess of established standards;
- Exposure of persons to or generation of excessive ground-borne vibration or ground-borne noise levels;
- A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project;
- A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project; and
- Exposure to excessive airport or airstrip related noise levels.

Potential significant impacts are evaluated using the following criteria:

- Proposed project construction activities would create unacceptable short-term sound levels at noise sensitive receptors. For the purposes of this Draft Subsequent EIR, construction noise is considered unacceptable if it exceeds an hourly average of 70 dBA L_{eq} at a given receptor during hours of use for schools and churches, and at hospitals, for extended periods of time, or if construction activities would take place outside of hours stipulated in the City's noise ordinance.
- Proposed project-generated traffic would result in sound levels exceeding thresholds recommended in the Noise Element of the City's General Plan. An increase resulting in a calculated noise exposure to greater than 60 dBA L_{dn} is considered significant. For the purposes of this Draft Subsequent EIR, in areas where existing outdoor sound levels already exceed 60 dBA L_{dn} a project-generated increase of 3 dBA or greater at outdoor activity areas is considered significant.

4.3.4.3 Impacts and Mitigation Measures

IMPACT 4.3-1:	Construction equipment would generate short-term noise level increases at noise-sensitive locations
APPLICABLE ORDINANCES AND STANDARDS:	City of Roseville Noise Ordinance
SIGNIFICANCE WITH ORDINANCES AND STANDARDS:	Potentially Significant
MITIGATION MEASURE:	Mitigation Measure 4.3-1: Develop and implement a Construction Noise Abatement Program
RESIDUAL SIGNIFICANCE:	Less than Significant

Noise impacts from construction would result from the operation of construction equipment. The magnitude of impact would depend on the type of construction activity, the noise level generated by various pieces of construction equipment, the number of sources operating concurrently, the duration of the construction phase, the distance between the noise source and receptor, and the presence or absence of noise barriers, including topographical features that will change as project construction activity progresses.

The City would adhere to their Noise Ordinance, requiring that construction activity occur on weekdays between 7 a.m. and 7 p.m. and on weekends between 8 a.m. and 8 p.m. In accordance with the Municipal Code, all construction equipment shall be fitted with factory-installed muffling devices or better and all construction equipment shall be maintained in good working order. However, even with implementation of the City's Noise Ordinance, **potentially significant** noise impacts could occur if construction activities occurred in the vicinity of sensitive noise receptors (i.e., schools and hospitals) during allowed construction hours. Potential sensitive receptors are located within 500 feet of proposed construction as follows:

- One school at Intersection 178 (Washington Blvd/All America);
- Two schools at Intersection 179 (Cottonwood Drive/Cirby Way);
- One hospital facility (under construction) with surgical procedures that are potentially noise sensitive at Intersection 19 (Eureka Road/Douglas Blvd);
- A church, the "Light of the Gospel," at Intersection 15 (Orlando Avenue/Cirby Way).

The development of a Construction Noise Abatement Program would reduce these potential noise impacts to sensitive receptors to **less-than-significant** levels.

IMPACT 4.3-2:	Transportation noise sources in excess of an L_{dn} of 60 dBA under Existing Plus Project conditions
APPLICABLE ORDINANCES AND STANDARDS:	City of Roseville Noise Element
SIGNIFICANCE WITH ORDINANCES AND STANDARDS:	Less than Significant
MITIGATION MEASURE:	None required
RESIDUAL SIGNIFICANCE:	Less than Significant

A qualitative evaluation of Existing Plus Project conditions (Scenario 2) was conducted because the proposed project is focused on relieving 2020 traffic congestion in Roseville that could occur due to growth in the City and future development outside the City limits, which will result in increased traffic inside of the City limits. Most of the improvements are not needed to accommodate existing traffic demand, and in fact, would not be constructed under existing conditions.

The functional result of Existing Plus Project conditions would be to add capacity at existing (and some planned but not yet constructed) intersections and at some roadways. Some locations would have increases in traffic volumes and noise levels as a result of the proposed improvements and other locations would have decreases in traffic volumes and noise levels due to potential redistribution of traffic resulting from improvements. As described in Section 4.1.3.1, the number of intersections operating at unacceptable conditions (LOS D or worse) would decrease with the addition of the proposed project to existing conditions.

Impact 4.3-3 provides a quantitative noise analysis of the project alternatives under 2020 Plus Project conditions (Scenario 5). This analysis concludes that the net effect of changes to the LOS at each intersection for the various modeling conditions would not change the noise exposures at these locations, except for a decrease in noise levels at one location. Noise increases under Existing Plus Project conditions would likely be similar to those under 2020 conditions. Therefore, this impact is considered **less than significant**.

IMPACT 4.3-3:	Transportation noise sources in excess of an L_{dn} of 60 dBA under 2020 Plus Project conditions
APPLICABLE ORDINANCES AND STANDARDS:	City of Roseville Noise Element
SIGNIFICANCE WITH ORDINANCES AND STANDARDS:	Less than Significant
MITIGATION MEASURE:	None required
RESIDUAL SIGNIFICANCE:	Less than Significant

The noise modeling for 2020 No Project (Scenario 4) and 2020 Plus Project conditions (Scenario 5) was performed using the available information regarding traffic volumes; posted speed limits; and assumptions provided by the City regarding the proportions of automobiles and trucks. The LOS at each intersection was used as a basis for defining the proportions of vehicles entering an intersection from each direction that are either accelerating from a stop or moving through at a steady speed. The land uses were reviewed at each intersection and then used as a means of identifying receptor locations within a radius of influence of about 500 feet. As such, the survey of land uses directed the set of receptors used to calculate a representative average at each of the intersections.

Table 4.3-4 summarizes the results of the analysis for 2020 No Project and 2020 Plus Project conditions. The results show the energy average (L_{dn}) noise exposure of a representative set of receivers for each intersection. The calculated exposures of the No Project conditions, with available traffic data, range from 62 dBA to 70 dBA. The calculated exposures of the Plus Project conditions range from 61 dBA to 70 dBA. Considered to the nearest decibel, Intersection 69 has a 1 dB reduction associated with project improvements. The net effect of changes to the level of service at each intersection for the various modeling conditions does not change the noise exposures to a significant extent.

TABLE 4.3-4			
SUMMARY OF NOISE LEVELS AT INTERSECTIONS PROPOSED FOR WIDENING			
Intersection ID	Calculated Noise Exposure, L _{dn} , dBA		
	2020 No Project (Scenario 4)	2020 Proposed Project (Scenario 5)	Change from Proposed Project minus No Project
15	65	65	0
19	70	70	0
69	62	61	-1
91	67	67	0
100	66	66	0
104	68	68	0
105	65	65	0
165	— ¹	70	—
178	— ¹	60	—
179	— ¹	69	—

¹These intersections are not part of the No Project condition (Scenario 4) because they are among nine intersections added to the CIP as part of the proposed project.

As shown in **Table 4.3-4**, all intersections would have a noise level higher than 60 dBA under No Project conditions. Therefore, the appropriate significance threshold used to determine whether the proposed project would have significant noise impacts during operations was the 3 dBA or greater increase criterion. Since none of the identified intersections are expected to experience an increase in noise levels of 3 dBA or greater, no potentially significant noise impacts were identified at these intersections. Based on a review of the changes of LOS at other intersections that are considered as part of the broader project evaluation, this analysis concludes that a change of more than 1 dBA is not expected at these additional intersections due to project improvements. Note also that where other noise sources such as railways or industrial sources are a potential issue, the addition of these secondary noise sources only serves to further reduce the potential changes of total noise exposures at receptors due to proposed project improvements. Therefore, potential noise impacts from operations of the project would be considered **less than significant**.

4.3.5 MITIGATION MEASURES

Mitigation Measure 4.3-1: Develop and implement a Construction Noise Abatement Program

This Mitigation Measure applies to Impact 4.3-1.

Prior to construction plan approval for each improvement, develop and implement a Construction Noise Abatement Program. The plan shall require that:

- All construction vehicles or equipment, fixed or mobile, shall be equipped with properly operating and maintained mufflers;
- Stockpiling and/or vehicle staging areas shall be identified on the improvement plans and shall be located as far as is practical from existing occupied dwellings;

Specific noise control measures shall be identified that would reduce the hourly noise level of construction activity to 70 dBA or lower where feasible as determined by the Public Works Director during hours of use for schools and churches, and at hospitals. Those potential sensitive receptors located within 500 feet of proposed construction are as follows.

- One school at Intersection 178 (Washington Boulevard/All America).
- Two schools at Intersection 179 (Cottonwood Drive/Cirby Way).
- One hospital facility (under construction) with surgical procedures that are potentially noise sensitive at Intersection 19 (Eureka Road/Douglas Boulevard).
- A church, the “Light of the Gospel,” at Intersection 15 (Orlando Avenue/Cirby Way).

Specific noise control measures shall be identified that would reduce the hourly average noise level of construction activity to 70 dBA, L_{eq} or lower at other noise-sensitive receptors where feasible. The construction contractor shall consider implementation of the following measures in the construction noise control plan:

- 1) Select equipment capable of performing the necessary tasks with the lowest feasible noise-emission level and the lowest feasible height for the acoustic center of noise emissions.
- 2) Noise barriers may be required to block the line of sight from noise sources to noise-sensitive receivers of concern or to further reduce noise levels beyond that provided by line-of-sight breaks afforded by topographical features. The noise barriers could be constructed using either plywood sheets or other solid material that provide sufficient mass per unit surface area (perhaps approaching 4 pounds per square foot) and have minimal openings between the top of barrier and ground surface (perhaps as little as 1 percent). Noise barriers of a given height are generally most effective when placed as close to either the source or receiver as possible, and perhaps at two such separate locations. The least desirable location is generally at a middle distance between sources and receptors. The plan should identify the proper height, location, and effectiveness of a noise barrier in terms of the expected hourly average noise level due to construction activity at noise-sensitive receivers of concern, with the objective of reducing construction activity noise that contributes to an hourly average of 70 dBA or less.
- 3) Disseminate essential information to residences and implement a complaint/response tracking system. The construction contractor shall notify residents within 500 feet of the construction areas of the construction schedule in writing before construction begins. The construction contractor will designate a

noise disturbance coordinator who will be responsible for responding to complaints regarding construction noise. The coordinator will determine the cause of the complaint and will ensure reasonable measures are implemented to correct the problem when feasible. A contact telephone number for the noise disturbance coordinator will be conspicuously posted on construction site fences and will be included in the written notification of the construction schedule sent to nearby residents.