Michael Baker
INTERNATIONAL

Technical Memorandum:
NOISE AND GROUNDBORNE VIBRATION

Kaiser Permanente Riverside Medical Center
Expansion Project

Technical Memorandum

TO:	City of Riverside	**DATE:**	September 13, 2021
FROM:	Michael Baker International	**SUBJECT:**	Noise and Groundborne Vibration for the Kaiser Permanente Riverside Medical Center Expansion Project

PURPOSE

Kaiser Permanente (Applicant) is proposing the Kaiser Permanente Riverside Medical Center Expansion Project (project) in the City of Riverside (City). The project requires California Environmental Quality Act (CEQA) review and City approval of a conditional use permit and design review. The purpose of this technical memorandum is to evaluate potential short- and long-term noise and ground-borne vibration impacts resulting from the construction and operation of the proposed project.

PROJECT LOCATION

The City of Riverside is located in the northwestern portion of Riverside County. The City is bounded on the north by the Cities of Jurupa Valley and Grand Terrace, to the east by the City of Moreno Valley, to the south by the unincorporated community of Woodcrest, and to the west by the Cities of Corona and Norco.

The main project site is located at 10800 Magnolia Avenue (Assessor's Parcel Number [APN] 138-470-010) and is currently developed as the Kaiser Permanente Riverside Medical Center (Medical Center). Up to two off-site temporary parking areas may be utilized for staff and construction parking: 10821 Magnolia Avenue (APN 142-293-028), and at 11510 Magnolia Avenue (APN 132-020-033) (Figure 1, Regional Map).

The approximately 37.5-acre existing Medical Center is located within the La Sierra District of the Magnolia Avenue Specific Plan. It is bounded by Magnolia Avenue, Park Sierra Dive and Polk Street while the nearest major cross street is La Sierra Avenue (Figure 2, Vicinity Map). Regional access to the project area is provided via State Route 91 (SR-91) approximately one-quarter mile to the south. Local access is provided via Magnolia Avenue, Polk Street, and Park Sierra Drive.

PROJECT DESCRIPTION

Kaiser Permanente is proposing the redevelopment of approximately 15.5 acres of the existing 37.5-acre Medical Center in the City of Riverside to expand acute care medical service facilities and ancillary uses (proposed project). The expansion of the existing Medical Center is proposed to address the need for additional adult single occupancy and neonatal intensive care unit (NICU) beds, increase the capacity of operating rooms and interventional radiology, and resolve parking needs and critical functional deficiencies in key clinical services, including the emergency department.

The expanded facilities and uses would consist of a new, approximately 296,000-square-foot, five-story hospital tower, a new two-story diagnostic and treatment (D&T) building, a multi-story 1,200-stall aboveground parking structure, and upgrades to the existing central utility plant. The project would also include ancillary features such as a new patient drop-off canopy, driveways, walkways, surface parking, landscaping, lighting, and signage. The project would also include an emergency generator that would only be used during power outages.

Existing Conditions

The existing Medical Center is situated on approximately 37.5 acres and includes four main buildings located in the center of the site. The existing buildings are surrounded by surface parking lots and one parking structure to the north (see Figure 3, Conceptual Site Plan).

The existing Medical Center is comprised of four Medical Office Buildings (MOB) located in the center of the site and surrounded by surface parking lots, and one parking structure to the north; refer to Table 1, Existing Building Dimensions. The existing facilities contain 226 hospital beds, including 51 single occupancy rooms, 78 double occupancy rooms, and 19 NICU rooms. In total, the existing Medical Center currently contains 2,556 parking stalls on-site (1,994 standard stalls, 377 compact, 169 (Americans with Disabilities Act [ADA] compliant, and 16 van spaces). An existing parking structure is located in the northeast portion of the existing Medical Center campus; refer to Table 2, Existing Parking. There are a total of eight electric vehicle (EV) charging stations, two of which are ADA accessible. The existing site has one bicycle rack at the back of the existing employee parking lot.

Table 1, Existing Building Dimensions

Building	Sq. Footage	# of Floors	Height		Beds	Parking Requirements	
			Roof	Screen		Multiplier	Stalls
MOB 1	402,909	5	70'-10"	93'-6"	226	1 per Bed	226
						1 per 180 SF	219
						1 per 180 SF	174
MOB 2	220,000	5	70'-10"	93'-6"	0	1 per 180 SF	1,222
MOB 3	88,000	3	43'-0"	N/A	0	1 per 180 SF	489
MOB 4	6,027	1	15'-0"	N/A	0	1 per 180 SF	34
Total	716,936						2,364

Table 2, Existing Parking

Type	# of Decks	Height	Parking Stalls
Structure	4	38'-6" Top of Parapet	700
Surface	N/A	N/A	1,856
		Total	2,556

The existing Medical Center supports an operational staff of approximately 3,097 full-time employees and generates approximately 2,521 patient visitors per day.

The Medical Center is accessed through five existing driveways. There are two full-access driveways off of Park Sierra Drive, two full-access driveways from Polk Street, and one right-in and right-out driveway off of Magnolia Avenue.

The majority of off-site staging areas are situated on previously developed land that has since been cleared and graded (see Figure 1, Regional Map). Invasive weeds and other plants have taken root in permeable surfaces and are dispersed intermittently across the staging area parcels. Staging Area 2 [APN 143-180-032] is developed as a paved parking lot with landscaping.

Table 3, Membership Characteristics

City of Riverside	
Average Distance to Nearest KP Facility	4.8 miles
Average Drive Time to Nearest KP Facility	9.9 minutes
County of Riverside (excluding Coachella Valley)	
Average Distance to Nearest KP Facility	6.8 miles
Average Drive Time to Nearest KP Facility	12 minutes
Additional Membership Information	
23% of members in Riverside County (excluding Coachella Valley) live in the City of Riverside	
10% of members in Southern California live in Riverside County (excluding Coachella Valley)	
Coachella Valley accounts for 1% of SoCal membership and 8% of Riverside County membership	

Proposed Project Characteristics

Hospital Tower and D&T Building

The proposed tower would be five stories with a subgrade basement. The proposed power would stand 74.5 feet from ground level to the top of the roof. However, mechanical equipment on the roof would be screened by a parapet and screen which would result in a total building height of 89.5 feet. The proposed tower would provide an additional 152 acute care beds, consisting of 116 single occupancy rooms and 36 NICU rooms. The proposed tower would also include new emergency and surgical departments, 8 operating rooms, 58 emergency department treatment bays, and other hospital related functions, including an inpatient pharmacy. A rotunda connecting the new tower to the existing Medical Center and various outdoor seating areas with meandering pathways and landscaping would also be constructed (see Figure 3, Conceptual Site Plan).

The D&T building would be two stories, approximately 34 feet tall to the parapet top, and constructed adjacent to the northwestern side of the proposed hospital tower. The D&T building would provide direct support to the new emergency and surgical departments as well as expanded diagnostic services and interventional radiology treatment. Upgrades to the existing central utility plant and utility connections from the central utility plant to the new buildings would also be required.

Parking Facilities

As part of the proposed project, a new parking structure with five stories and rooftop parking would be constructed in the southeast corner of the project site. The maximum proposed height of the parking structure would be 70 feet above the ground surface. The parking structure would include approximately 2,500 square feet of interior office space. The parking structure would be constructed over an existing parking lot and modifications would be made to some of the on-site surface parking lots. In total, 1,200 new parking spaces are proposed. All parking would be provided in conformance with City parking regulations and with respect for the site being in a transit priority area.

Existing Medical Center Modifications

As part of the proposed project, the 19 NICU beds at the existing Medical Center would be delicensed and the area would remain as expanded inpatient services for the labor and delivery department.

Sustainability and Energy-Saving Features

In accordance with Kaiser Permanente's long-term environmental stewardship goals, the proposed facilities would be constructed in accordance with the rating system and performance standards to achieve a minimum of Gold certification under the Leadership in Energy and Environmental Design (LEED) Program. The LEED rating system and certification was developed by the US Green Building Council and serves as a guide for the design, construction, and operation of sustainable green buildings. Buildings are awarded points for environmentally significant practices and sustainable features.

Because the LEED certification program does not include parking structures, the proposed parking structure would be designed and constructed in accordance with the rating system and performance standards for certification under the Green Garage Certification Program, which is the parking industry's equivalent of LEED certification, provided by the Green Parking Council, an affiliate of the International Parking Institute.

The project would also be designed to meet or exceed requirements of the most current version of the Title 24 and CALGreen Building Codes. Energy-saving features incorporated into the proposed development are anticipated to include drought-tolerant landscaping, low water and recycled water irrigation systems, energy-saving lighting, mechanical systems, low-flow plumbing fixtures and fittings, and transportation-related sustainability features, such as EV charging stations and bicycle facilities.

Transportation Demand Management Plan

A transportation demand management (TDM) plan would be developed for the project to identify feasible strategies that result in a more efficient use of transportation resources to help relieve traffic congestion, parking demand, and transportation-related air emissions. The TDM plan would guide the efficient use of the existing transportation system and confirm that the transportation-related sustainability features proposed for the project are designed to maximize sustainable transportation usage. The TDM plan would identify different services, facilities, and actions that combined would result in a reduction of single-occupant vehicle trips and/or emissions. These measures may include employee incentives for rideshare or use of public transportation, EV charging stations, and bicycle facilities.

Operations

The proposed project would result in the addition of 152 new beds requiring the support of an operational staff of approximately 746 full-time employees. The employees would work in three shifts: day, evening, and night. The day shift supports approximately 439 employees, evening shift approximately 89 employees, and night shift approximately 218 employees. The expanded facilities would generate approximately 535 additional patient visitors per day.

Utilities

Water

Public water service would be provided by the City's public water system via connection to existing pipelines on Magnolia Avenue. Waterline and storage upgrades are not required to supply water to the project as the existing water system has adequate capacity to serve the project.

Sewer

Wastewater treatment for the project would be provided by the City. The proposed project would connect to an existing 21-inch sewer line located on Magnolia Avenue. Expansion or improvements to the City's sewer system is not required as the existing sewer system has adequate capacity to serve the project.

Stormwater Facilities

The proposed project area is predominantly paved in its existing condition. Approximately 10 percent of the total site would be landscaped. The proposed project would maintain existing on-site drainage patterns and be designed to utilize LID bioretention and biotreatment BMPs and landscaping features to redirect, capture, and treat surface runoff from new development prior to entering the existing storm drain system in Park Sierra Street and Magnolia Avenue. Roof runoff from new buildings would drain into landscaped areas prior to entering the existing storm drain system. No increase in stormwater runoff is anticipated with the implementation of the proposed project and no off-site improvements to the existing stormwater system would be required.

Electricity

Riverside Public Utilities currently provides electrical services to the project site. All electrical lines would be undergrounded and would connect to existing connections at the corner of Magnolia Avenue and Polk Street. The project would also include an emergency generator that would only be used during power outages.

Construction

Construction Phases and Schedule

Project construction would occur over an approximate 58-month time frame in two major build phases comprising seven subphases. Construction of the proposed project has two major phases: one for the parking structure and the other for the new hospital tower and D&T building. Table 4, Construction Phases, describes the activities undertaken in each of the two major construction phases and seven subphases.

Table 4, Construction Phases

Phase	Description	Activities	Construction Duration (Months)
Phases 1-3	Make Ready – Parking Structure	Phases 1 and 2 include reconfiguring the existing hospital ambulance driveway and hospital patient drop-off area. A temporary patient drop-off canopy for the hospital and a new patient drop-off area for MOB 2 will be constructed as part of Phase 2. Following the opening of the new patient drop-off areas, parking reconfiguration and restriping of the ADA parking spots south of MOB 3 and MOB 2 patient drop-off area would be performed as part of Phase 3.	6
Phase 4	Parking Structure	Phase 4 would involve establishing parking structure laydown areas, demolition of existing surface parking, grading, construction of the cast-in-place concrete building structure, construction of the interior 2,500 square feet of office space on the first level, and exterior screening elements.	12
Phase 5	New Ambulance Driveway	Phase 5 involves the reconfiguration of the existing hospital ambulance egress and the construction of the new emergency vehicle driveway that will provide access from Magnolia Avenue.	4
Phases 6-7	New Hospital Tower, D&T Building and Entry Plaza Construction	Phases 6 and 7 involve construction of the new hospital tower and correlating interior and exterior site work, D&T building, upgrades to the existing central utility plant, utility connections from the central utility plant to the new hospital tower and undergrounding of existing aboveground utilities, construction of a new patient entry and drop-off canopy, reconfigured driveways, and landscaping.	36

The construction sequences would be as follows: demolition and grading, underground utility work, construction of building structure, interior buildout, exterior façade work, and final site work such as paving, coating, finishing, and/or landscaping. Construction equipment would be delivered to the site on low-bed trucks (e.g., on boom trucks) unless the equipment can be driven to the site. All construction equipment and materials would be stored on-site in designated staging and laydown areas.

It is anticipated that the work would be completed between the hours of 7:00 a.m. and 7:00 p.m. on weekdays and between the hours 8:00 a.m. and 5:00 p.m. on Saturdays in accordance with the construction time limitations in the City's Municipal Code Section 7.35.020(G).

Earthwork and Grading

The majority of earthwork would be required during the construction of the basement for the new hospital tower. The total depth of excavation for the basement construction is anticipated to be up to 20 feet below the existing ground surface. Project earthwork would require approximately 9,650 cubic yards of cut and 18,500 cubic yards of fill; thus, approximately 8,850 cubic yards of soil import would be required. The material would be disposed of at an approved landfill facility approximately 5 miles from the project site.

Grading would be accomplished with scrapers, motor graders, water trucks, dozers, and compaction equipment. Building materials would be off-loaded and installed using small cranes, boom trucks, forklifts, rubber-tired loaders, rubber-tired backhoes, and other small- to medium-sized construction equipment as needed.

Demolition and New Construction

Demolition and construction would be accomplished with cranes, dozers, and other heavy equipment. Waste materials would be uploaded onto large trucks using small cranes, forklifts, and other construction equipment as needed. Pile driving would not be required for new building construction.

FUNDAMENTALS OF SOUND AND ENVIRONMENTAL NOISE

Sound is mechanical energy transmitted by pressure waves in a compressible medium such as air and is characterized by both its amplitude and frequency (or pitch). The human ear does not hear all frequencies equally. In particular, the ear deemphasizes low and very high frequencies. To better approximate the sensitivity of human hearing, the A-weighted decibel scale (dBA) has been developed. Decibels are based on the logarithmic scale. The logarithmic scale compresses the wide range in sound pressure levels to a more usable range of numbers in a manner similar to the Richter scale used to measure earthquakes. In terms of human response to noise, a sound 10 dBA higher than another is perceived to be twice as loud and 20 dBA higher is perceived to be four times as loud, and so forth. Everyday sounds normally range from 30 dBA (very quiet) to 100 dBA (very loud). On this scale, the human range of hearing extends from approximately 3 dBA to around 140 dBA.

Noise is generally defined as unwanted or excessive sound, which can vary in intensity by over one million times within the range of human hearing; therefore, a logarithmic scale, known as the decibel scale (dB), is used to quantify sound intensity. This A-weighted dB scale has been chosen by most authorities for regulation of environmental noise. Table 5, Typical Indoor/Outdoor Noise Levels and Common Environmental Noise Sources, lists typical indoor and outdoor noise levels.

Noise can be generated by a number of sources, including mobile sources such as automobiles, trucks, and airplanes, and stationary sources such as construction sites, machinery, and industrial operations. Noise generated by mobile sources typically attenuates (is reduced) at a rate between 3 dBA and 4.5 dBA per doubling of distance. The rate depends on the ground surface and the number or type of objects between the noise source and the receiver. The presence of a barrier between the source and the receptor may attenuate noise levels. The actual amount of attenuation depends on the barrier size and the frequency of the noise. A noise barrier may be any natural or human-made feature, such as a hill, tree, building, wall, or berm. Hard and flat surfaces, such as concrete or asphalt, have an attenuation rate of 3 dBA per doubling of distance. Soft surfaces, such as uneven or vegetated terrain, have an attenuation rate of about 4.5 dBA per doubling of distance. Noise generated by stationary sources typically attenuates at a rate between 6 dBA and about 7.5 dBA per doubling of distance.

Table 5, Typical Indoor/Outdoor Noise Levels and Common Environmental Noise Sources

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

Source: California Department of Transportation, *Technical Noise Supplement to the Traffic Noise Analysis Protocol*, September 2013.

There are several metrics used to characterize community noise exposure, which fluctuate constantly over time. One such metric, the equivalent sound level (L_{eq}), represents a constant sound that, over the specified period, has the same sound energy as the time-varying sound. Noise exposure over a longer period is often evaluated based on the Day-Night Sound Level (L_{dn}). This is a measure of 24-hour noise levels that incorporates a 10-dBA penalty for sounds occurring between 10:00 p.m. and 7:00 a.m. The penalty is intended to reflect the increased human sensitivity to noises occurring during nighttime hours, particularly at times when people are sleeping and there are lower ambient noise conditions. Typical L_{dn} noise levels for light and medium density residential areas range from 55 dBA to 65 dBA. Similarly, Community Noise Equivalent Level (CNEL) is a measure of 24-hour noise levels that incorporates a 5-dBA penalty for sounds occurring between 7:00 p.m. and 10:00 p.m. and a 10-dBA penalty for sounds occurring between 10:00 p.m. and 7:00 a.m. to account for noise sensitivity in the evening and nighttime, respectively.

FUNDAMENTALS OF ENVIRONMENTAL GROUNDBORNE VIBRATION

Sources of earth-borne vibrations include natural phenomena (earthquakes, volcanic eruptions, sea waves, landslides, etc.) or man-made causes (explosions, machinery, traffic, trains, construction equipment, etc.). Vibration sources may be continuous (e.g., factory machinery) or transient (e.g., explosions). Ground vibration

consists of rapidly fluctuating motions or waves with an average motion of zero. Several different methods are typically used to quantify vibration amplitude. One is the peak particle velocity (PPV); another is the root mean square (RMS) velocity. The PPV is defined as the maximum instantaneous positive or negative peak of the vibration wave. The RMS velocity is defined as the average of the squared amplitude of the signal. The PPV and RMS vibration velocity amplitudes are used to evaluate human response to vibration.

Table 6, Human Reaction and Damage to Buildings for Continuous or Frequent Intermittent Vibration Levels, displays the reactions of people and the effects on buildings produced by continuous vibration levels. The annoyance levels shown in the table should be interpreted with care since vibration may be found to be annoying at much lower levels than those listed, depending on the level of activity or the sensitivity of the individual. To sensitive individuals, vibrations approaching the threshold of perception can be annoying. Low-level vibrations frequently cause irritating secondary vibration, such as a slight rattling of windows, doors, or stacked dishes. The rattling sound can give rise to exaggerated vibration complaints, even though there is very little risk of actual structural damage.

Table 6, Human Reaction and Damage to Buildings for Continuous or Frequent Intermittent Vibration Levels

Peak Particle Velocity (inches/second)	Approximate Vibration Velocity Level (VdB)	Human Reaction	Effect on Buildings
0.006–0.019	64–74	Range of threshold of perception.	Vibrations unlikely to cause damage of any type.
0.08	87	Vibrations readily perceptible.	Recommended upper level to which ruins and ancient monuments should be subjected.
0.1	92	Level at which continuous vibrations may begin to annoy people, particularly those involved in vibration sensitive activities.	Virtually no risk of architectural damage to normal buildings.
0.2	94	Vibrations may begin to annoy people in buildings.	Threshold at which there is a risk of architectural damage to normal dwellings.
0.4–0.6	98–104	Vibrations considered unpleasant by people subjected to continuous vibrations and unacceptable to some people walking on bridges.	Architectural damage and possibly minor structural damage.

Source: California Department of Transportation, *Transportation Related Earthborne Vibrations*, 2002.

Ground vibration can be a concern in instances where buildings shake and substantial rumblings occur. However, it is unusual for vibration from typical urban sources such as buses and heavy trucks to be perceptible. Common sources for groundborne vibration are planes, trains, and construction activities such as earth-moving which requires the use of heavy-duty earth moving equipment. For the purposes of this analysis, a PPV descriptor with units of inches per section (in/sec) is used to evaluate construction-generated vibration for building damage and human complaints.

EXISTING SETTING

Noise Sensitive Receptors

Noise-sensitive land uses are generally considered to include those uses where noise exposure could result in health-related risks to individuals, as well as places where quiet is an essential element of their intended purpose. Residential dwellings are of primary concern because of the potential for increased and prolonged exposure of individuals to both interior and exterior noise levels. Additional land uses such as parks, historic sites, cemeteries, and recreation areas are considered sensitive to increases in exterior noise levels. Schools, churches, hotels, libraries, and other places where low interior noise levels are essential are also considered noise-sensitive land uses.

The nearest sensitive receptors to the project site are the single-family residences located to the north of the project site next to the existing parking structure on-site; refer to Exhibit 1, *Nearest Sensitive Receptor and Noise Measurement Locations*.

Existing Mobile and Stationary Noise Levels

The majority of the existing noise in the project area is from mobile sources generated from traffic along surrounding roadways including Magnolia Boulevard, SR-91, and trains along the Metrolink railroad.

The primary sources of stationary noise in the project vicinity are urban-related activities (i.e., mechanical equipment, parking areas, and pedestrians). Noise associated with the stationary sources may represent a single-event noise occurrence, short-term, or long-term/continuous noise.

Ambient Noise Measurements

In order to quantify existing ambient noise levels in the project area, Michael Baker International conducted noise measurements on February 23, 2021; refer to Exhibit 1 and Table 7, Noise Measurements. Although the noise measurement sites were not at receptors closest to the project site, they were representative of typical existing noise exposure within and immediately adjacent to the project site.

At the time of the measurements, there were ongoing construction activities on the vacant lands north of Polk Street directly across the project site. To mitigate the impact of temporary construction activities on the ambient noise level measurement, the measurement at Site 1 was taken at the multi-family residences to the northeast of the project site where the temporary construction noise was not audible. Ambient noise measurement taken at Site 1 was representative of the existing noise exposure in the neighborhood to the north of the project site as the major noise source was the traffic noise along Polk Street.

The measurement at Site 2 was taken in front of a single-family home at the end of the Mercer Avenue. This location was chosen due to less exposure to temporary noise sources that may affect the ambient noise level, such as residents driving in and out of driveways, pedestrians and residents talking, dogs barking, etc. Ambient noise measurement taken at Site 2 was representative of the existing noise exposure in the neighborhood to the west of the project site as the major noise source was the traffic noise along Magnolia Avenue.

The 10-minute short-term measurements were taken at each site between 9:30 a.m. and 10:30 a.m. Short-term (L_{eq}) measurements are considered representative of the noise levels throughout the day. The noise measurements were taken during “off-peak” (9:00 a.m. through 3:00 p.m.) traffic noise hours as this provides a

more conservative baseline. During rush hour traffic, vehicle speeds and heavy truck volumes are often low. Free-flowing traffic conditions just before or after rush hour often yield higher noise levels.[1]

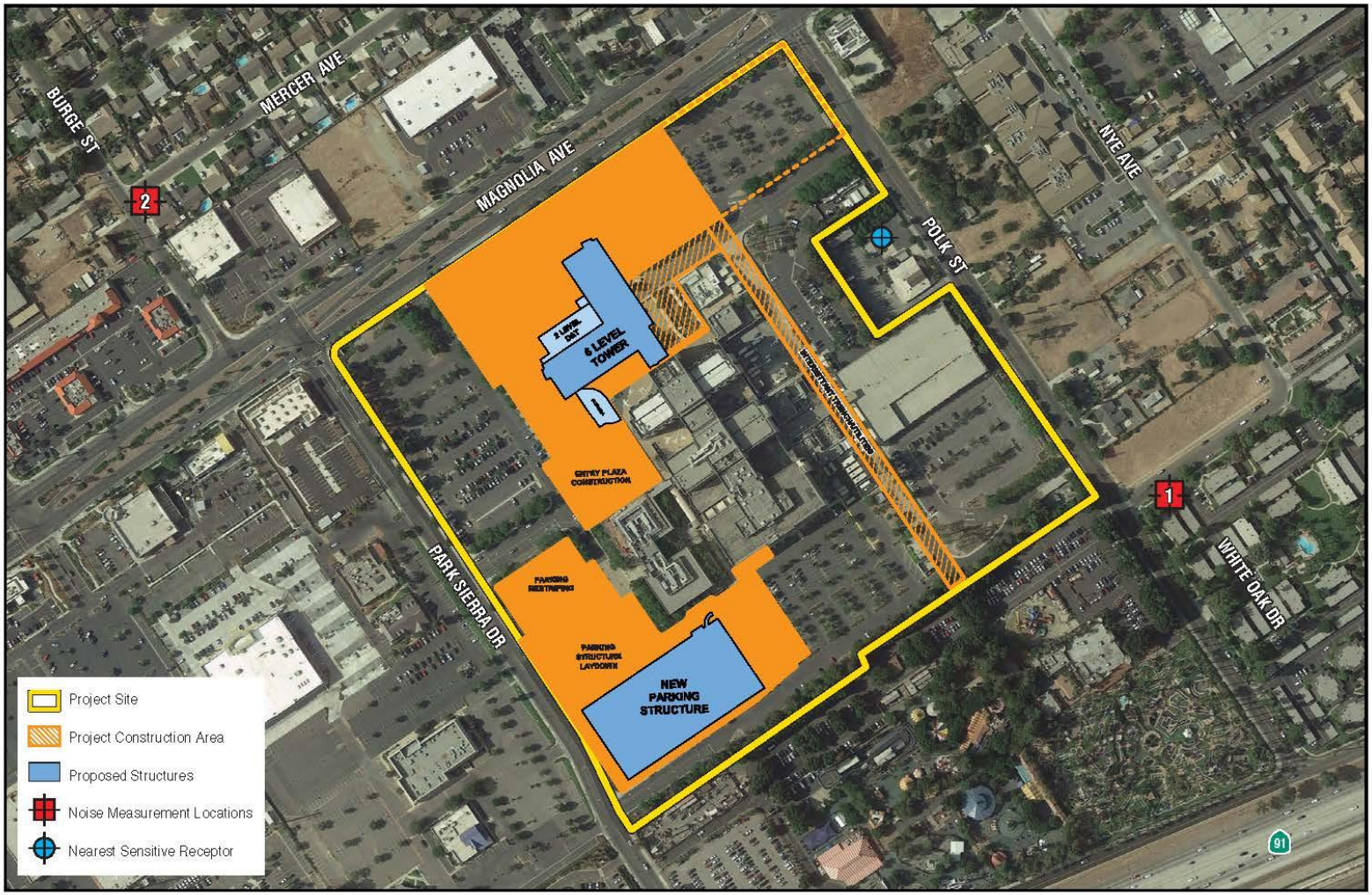
Meteorological conditions were clear skies, warm temperatures, with light wind speeds (approximately 0 to 5 miles per hour), and low humidity. Noise monitoring equipment used for the ambient noise survey consisted of a Brüel & Kjær Hand-held Analyzer Type 2250 equipped with a Type 4189 pre-polarized microphone. The monitoring equipment complies with applicable requirements of the American National Standards Institute (ANSI) for Type I (precision) sound level meters. As shown in Table 7, the ambient recorded noise level in the project vicinity ranged from 51.5 dBA to 58.0 dBA. Refer to Appendix A, Noise Data, for the results of the field measurement.

Table 7, Noise Measurements

Measurement Location Number	Location	L_{eq} (dBA)	L_{max} (dBA)	L_{min} (dBA)	Time
1	At White Oak Drive and Polk Street, next to the multi-family residential building.	58.0	76.2	50.7	9:44 a.m.
2	At Mercer Avenue and Burge Street, in front of the single-family home at 10890 Mercer Avenue.	51.5	70.8	39.4	10:06 a.m.

Note: L_{eq} = equivalent sound level; L_{max} = maximum sound level, the highest individual sound level occurring over a given time period; L_{min} = minimum sound level, the lowest individual sound level occurring over a given time period.
Source: Michael Baker International, February 23, 2021.

[1] California Department of Transportation, *Technical Noise Supplement to the Traffic Noise Analysis Protocol*, September 2013.



Source: Google Earth, September, 2021

NOT TO SCALE

Michael Baker INTERNATIONAL

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NOISE AND GROUNDBORNE VIBRATION TECHNICAL MEMORANDUM
KAISER PERMANENTE RIVERSIDE MEDICAL CENTER EXPANSION PROJECT

Nearest Sensitive Receptor and Noise Measurement Locations

Exhibit 1

REGULATORY SETTING

Federal

U.S. Environmental Protection Agency

The U.S. Environmental Protection Agency (EPA) offers guidelines for community noise exposure in the publication Noise Effects Handbook – A Desk Reference to Health and Welfare Effects of Noise. These guidelines consider occupational noise exposure as well as noise exposure in homes. The EPA recognizes an exterior noise level of 55 decibels day-night level (dB L_{dn}) as a general goal to protect the public from hearing loss, activity interference, sleep disturbance, and annoyance. The EPA and other Federal agencies have adopted suggested land use compatibility guidelines that indicate that residential noise exposures of 55 to 65 dB L_{dn} are acceptable. However, the EPA notes that these levels are not regulatory goals, but are levels defined by a negotiated scientific consensus, without concern for economic and technological feasibility or the needs and desires of any particular community.

State of California

California Noise Control Act of 1973

Sections 46000 through 46080 of the California Health and Safety Code, known as the California Noise Control Act, find that excessive noise is a serious hazard to public health and welfare and that exposure to certain levels of noise can result in physiological, psychological, and economic damage. The act also finds that there is a continuous and increasing bombardment of noise in urban, suburban, and rural areas. The California Noise Control Act declares that the State of California has a responsibility to protect the health and welfare of its citizens by the control, prevention, and abatement of noise. It is the policy of the state to provide an environment for all Californians that is free from noise that jeopardizes their health or welfare.

Office of Planning and Research

The State Office of Planning and Research's *Noise Element Guidelines* include recommended exterior and interior noise level standards for local jurisdictions to identify and prevent the creation of incompatible land uses due to noise. The *Noise Element Guidelines* contain a land use compatibility table that describes the compatibility of various land uses with a range of environmental noise levels in terms of the CNEL. The guidelines also present adjustment factors that may be used to arrive at noise acceptability standards that reflect the noise control goals of the community, the particular community's sensitivity to noise, and the community's assessment of the relative importance of noise pollution.

City of Riverside

Riverside General Plan 2025

The *Riverside General Plan 2025* (General Plan) is intended to implement the community's vision for what Riverside can be by guiding decisions and actions and allow for strategic planning. Specifically, the General Plan Noise Element provides guidelines for determining acceptable and unacceptable community noise exposure limits for various land use categories; refer to Table 8, Noise/Land Use Noise Compatibility Criteria.

Table 8, Noise/Land Use Noise Compatibility Criteria

Land Use Category	Community Noise Exposure (L_{dn} or CNEL, dBA)			
	Normally Acceptable	Conditionally Acceptable	Normally Unacceptable	Conditionally Unacceptable
Single Family Residential*	<60	60 – 65	65 – 70	>70
Infill Single Family Residential*	<65	65 – 75	75 – 80	>80
Commercial- Motels, Hotels, Transient Lodging	<60	60 – 70	70 – 80	>80
School, Libraries, Churches, Hospitals, Nursing Homes	<60	60 – 70	70 – 80	>80
Amphitheaters, Concert Hall, Auditorium, Meeting Hall	NA	45 – 65	45 – 65	>65
Sports Arenas, Outdoor Spectator Sports	NA	45 – 70	45 – 70	>70
Playgrounds, Neighborhood Parks	<70	NA	70 – 75	>75
Golf Courses, Riding Stables, Water Rec., Cemeteries	<70	NA	70 – 80	>80
Office Buildings, Business, Commercial, Professional	<65	65 – 75	>75	NA
Industrial, Manufacturing, Utilities, Agriculture	<70	70 – 80	>80	NA
Freeway Adjacent Commercial, Office, and Industrial Uses	<65	65 – 80	>80	NA

Notes: NA: Not Applicable; L_{dn}: average day/night sound level; CNEL: Community Noise Equivalent Level, dBA: A-weighted Decibel
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.
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.
Normally Unacceptable - New construction or development should be discouraged. If new construction or development does proceed, a detailed analysis of the noise reduction requirements must be made and needed noise insulation features included in the design.
Conditionally Unacceptable – New construction or development should generally not be undertaken, unless it can be demonstrated that noise reduction requirements can be employed to reduce noise impacts to an acceptable level. If new construction or development does proceed, a detailed analysis of noise reduction requirements must be made and needed noise insulation features included in the design.

Source: City of Riverside, *Riverside General Plan 2025, Noise Element, Figure N-10, Noise/Land Use Noise Compatibility Criteria*, November 2007.

The Noise Element also includes objectives and policies emphasizing noise reduction and mitigation. The following are relevant objectives and policies from the Noise Element.

- **Objective N-1**: Minimize noise levels from point sources throughout the community and, wherever possible, mitigate the effects of noise to provide a safe and healthful environment.
    - **Policy N-1.1**: Continue to enforce noise abatement and control measures particularly within residential neighborhoods.
    - **Policy N-1.2**: Require the inclusion of noise-reducing design features in development consistent with standards in Figure N-10 (Noise/Land Use Compatibility Criteria), Title 24 California Code of Regulations and Title 7 of the Municipal Code.
    - **Policy N-1.3**: Enforce the City of Riverside Noise Control Code to ensure that stationary noise and noise emanating from construction activities, private developments/residences and special events are minimized.
    - **Policy N-1.4**: Incorporate noise considerations into the site plan review process, particularly with regard to parking and loading areas, ingress/egress points and refuse collection areas.
    - **Policy N-1.5**: Avoid locating noise-sensitive land uses in existing and anticipated noise-impacted areas.

- **Policy N-1.8**: Continue to consider noise concerns in evaluating all proposed development decisions and roadway projects.

- **Objective N-4**: Minimize ground transportation-related noise impacts.
  - **Policy N-4.1**: Ensure that noise impacts generated by vehicular sources are minimized through the use of noise reduction features (e.g., earthen berms, landscaped walls, lowered streets, improved technology).
  - **Policy N-4.5**: Use speed limit controls on local streets as appropriate to minimize vehicle traffic noise.

Riverside Municipal Code

Title 7, *Noise Control*, of the Riverside Municipal Code (Municipal Code) establishes noise criteria to maintain and preserve the quiet atmosphere of the City, to implement programs aimed at retaining ambient noise levels throughout the City, and to mitigate noise conflict. Chapter 7.25, *Nuisance Exterior Sound Level Limits*, and Chapter 7.30, *Nuisance Interior Sounds Level Limits*, establish exterior and interior sound standards, respectively, for each land use category.

7.25.010 – Exterior sound level limits.

A. Unless a variance has been granted as provided in this title, it shall be unlawful for any person to cause or allow the creation of any noise which exceeds the following:

   1. The exterior noise standard of the applicable land use category, up to five decibels, for a cumulative period of more than 30 minutes in any hour; or

   2. The exterior noise standard of the applicable land use category, plus five decibels, for a cumulative period of more than 15 minutes in any hour; or

   3. The exterior noise standard of the applicable land use category, plus ten decibels, for a cumulative period of more than five minutes in any hour; or

   4. The exterior noise standard of the applicable land use category, plus 15 decibels, for the cumulative period of more than one minute in any hour; or

   5. The exterior noise standard for the applicable land use category, plus 20 decibels or the maximum measured ambient noise level, for any period of time.

B. If the measured ambient noise level exceeds that permissible within any of the first four noise limit categories, the allowable noise exposure standard shall be increased in five decibel increments in each category as appropriate to encompass the ambient noise level. In the event the ambient noise level exceeds the fifth noise limit category, the maximum allowable noise level under said category shall be increased to reflect the maximum ambient noise level.

C. If possible, the ambient noise level shall be measured at the same location along the property line with the alleged offending noise source inoperative. If for any reason the alleged offending noise source cannot be shut down, then the ambient noise must be estimated by performing a measurement in the same general area of the source but at a sufficient distance that the offending noise is inaudible. If the measurement location is on the boundary between two different districts, the noise shall be the arithmetic mean of the two districts.

D. Where the intruding noise source is an air-conditioning unit or refrigeration system which was installed prior to the effective date of this title, the exterior noise level when measured at the property line shall not exceed 60 dBA for units installed before 1-1-80 and 55 dBA for units installed after 1-1-80.

Table 9 (Table 7.25.010A)
Exterior Noise Standard

Land Use Category	Time Period	Noise Level
Residential	Night (10:00 p.m. to 7:00 a.m.) Day (7:00 a.m. to 10:00 p.m.)	45 dBA 55 dBA
Office/commercial	Any time	65 dBA
Industrial	Any time	70 dBA
Community support	Any time	60 dBA
Public recreation facility	Any time	65 dBA
Nonurban	Any time	70 dBA

Table 10 (Table 7.25.010B)
Land Use Category/Zoning Matrix

Land Use Category	Underlying Zone
Residential	RE, RA-5, RR, RC, R-1-1/2 acre, R-1-13000, R-1-10500, R-1-8500, R-1-7000, R-3-2500, R-3-4000, R-3-3000, R-3-2000, R-3-1500, R-4
Office/commercial	O, CRC, CR-NC, CR, CG
Industrial	BMP, I, AIR
Community support	Any permitted zone
Nonurban	Any permitted zone

7.30.015 - Interior sound level limits.

A. No person shall operate or cause to be operated, any source of sound indoors which causes the noise level, when measured inside another dwelling unit, school or hospital, to exceed: 1.The interior noise standard for the applicable land category area, up to five decibels, for a cumulative period of more than five minutes in any hour; 2.The interior noise standard for the applicable land use category, plus five decibels, for a cumulative period of more than one minute in any hour; 3.The interior noise standard for the applicable land use category, plus ten decibels or the maximum measured ambient noise level, for any period of time.

B. If the measured interior ambient noise level exceeds that permissible within the first two noise limit categories in this section, the allowable noise exposure standard shall be increased in five decibel increments in each category as appropriate to reflect the interior ambient noise level. In the event the interior ambient noise level exceeds the third noise limit category, the maximum allowable interior noise level under said category shall be increased to reflect the maximum interior ambient noise level.

C. The interior noise standard for various land use districts shall apply, unless otherwise specifically indicated, within structures located in designated zones with windows opened or closed as is typical of the season.

Table 11 (Table 7.30.015)
Interior Noise Standard

Land Use Category	Time Period	Noise Level
Residential	Night (10:00 p.m. to 7:00 a.m.) Day (7:00 a.m. to 10:00 p.m.)	35 dBA 45 dBA
School	7:00 a.m. to 10:00 p.m. (while school is in session)	45 dBA
Hospital	Any time	45 dBA

Further, Section 7.35.020(G) establishes limits to construction activities in order to minimize noise sources associated with construction, repair, remodeling, or grading of any real property. It is stated that construction activities shall not take place between the hours of 7:00 p.m. and 7:00 a.m. on weekdays, between the hours of 5:00 p.m. and 8:00 a.m. on Saturdays, or at any time on Sunday or a federal holiday.

Magnolia Avenue Specific Plan

The project is located within the La Sierra District of the *Magnolia Avenue Specific Plan* (Specific Plan; dated November 10, 2009). The vision for the Specific Plan is to designate Magnolia Avenue as a four-lane arterial and a transit corridor; create new zoning categories that promote mixed-use development; condense retail uses into specific areas; develop clear boundaries for districts along the corridor; and revise zoning provisions to be specific to each district. It is noted that no specific objectives or polices from the Specific Plan is applicable to the project.

CALIFORNIA ENVIRONMENTAL QUALITY ACT (CEQA) THRESHOLDS

Based on Appendix G of the State CEQA Guidelines and the City of Riverside's applicable noise standards, the project may have a significant adverse impact related to noise and vibration if it would result in any of the following:

- Generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies;
- Generation of excessive groundborne vibration or groundborne noise levels; and/or
- For a project located within the vicinity of a private airstrip or an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, the project would expose people residing or working in the project area to excessive noise levels.

METHODOLOGY

To assess potential noise impacts, a field investigation was conducted to identify land uses and sensitive receptors that could be subject to construction and operational noise impacts from the project, and ambient noise measurements were collected to establish the existing noise environment.

Noise levels of specific construction equipment were determined and resultant noise levels at those sensitive receptors (at measured distances from the source) were then calculated. Potential long-term (i.e., operational) mobile and stationary source noise were assessed based on site reconnaissance information and documented noise levels.

The RD-77-108 model calculates the average noise level at specific locations based on traffic volumes from the *Traffic Impact Analysis, Kaiser Permanente Riverside Medical Center Expansion* (Traffic Impact Analysis) prepared by LSA Associates (dated June 2021)[2], average speeds represented by the posted speed limit, roadway geometry, and site environmental conditions. As a conservative analysis, shielding features, including topography and intervening buildings, were not considered in the model.

Stationary noise levels were predicted using typical reference noise levels from publications and distances between noise sources and nearest sensitive receptors. Predicted noise levels were then compared with applicable significance thresholds and City standards for determination of significance.

NOISE AND GROUNDBORNE IMPACT ANALYSIS

Impact NOI-1: Generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?

Less Than Significant Impact. Noise-sensitive land uses are locations where people reside or where the presence of unwanted sound could adversely affect the use of the land. Residences, schools, and some passive recreation areas would each be considered noise sensitive. The nearest sensitive receptors to the project site are the predominantly residential neighborhoods located to the north of the proposed project site.

Project Construction

Construction of the proposed project would involve construction activities such as demolition, grading, building construction, paving, and architectural coating. The temporary construction noise associated with on-site equipment could potentially expose sensitive receptors to noise levels in excess of the applicable noise standard and/or result in a noticeable increase in ambient noise levels, and/or an exceedance of daytime hour noise standards. In addition, there would be construction staging areas along Magnolia Avenue that would primarily be used for parking. Traffic associated with staging areas would be temporary and nominal and would not cause perceptible noise increase along adjacent roadways.

Typical noise levels generated by construction equipment are shown in Table 12, Noise Levels Generated by Construction Equipment. It should be noted that the noise levels in maximum sound levels (L_{max}) identified in Table 12 are the highest individual sound occurring at an individual time period. Operating cycles for these types of construction equipment may involve one or two minutes of full power operation followed by three to four minutes at lower power settings. Other primary sources of acoustical disturbance would be due to random incidents, which would last less than one minute (such as dropping large pieces of equipment or the hydraulic movement of machinery lifts).

[2] LSA Associates, *Traffic Impact Analysis, Kaiser Permanente Riverside Medical Center Expansion*, dated June 2021.

Table 12, Noise Levels Generated by Construction Equipment

Type of Equipment	Acoustical Use Factor[1]	L_{max} at 50 Feet (dBA)	L_{max} at 250 Feet (dBA)
Concrete Saw	20	90	76
Crane	16	81	65
Concrete Mixer Truck	40	79	65
Backhoe	40	78	64
Dozer	40	82	68
Excavator	40	81	67
Forklift	40	78	64
Paver	50	77	63
Roller	20	80	66
Tractor	40	84	70
Water Truck	40	80	66
Grader	40	85	71
General Industrial Equipment	50	85	71

Note:
1. Acoustical Use Factor (percent): Estimates the fraction of time each piece of construction equipment is operating at full power (i.e., its loudest condition) during a construction operation.

Source: Federal Highway Administration, Roadway Construction Noise Model (*FHWA-HEP-05-054*), January 2006.

The potential for construction-related noise to affect nearby sensitive receptors would depend on the location and proximity of construction activities to these receptors. The closest sensitive receptors are the single-family residences located to the north of the project site next to the existing parking structure on-site, approximately 250 feet from the nearest project construction area, as shown in Exhibit 1. As shown in Table 12, at the distance of 250 feet, construction noise would be reduced to 63 dBA L_{max} to 76 dBA L_{max} at the closest sensitive receptors. It should be noted that construction activities would occur throughout the project construction area and would not be concentrated in or confined to one specific area of the project site or near sensitive uses. Construction activities in any one area would be temporary and intermittent, and therefore not occur in any one particular area for the entire construction duration.

Due to the temporary nature of construction, coupled with the fact that construction-related noise is a generally accepted reality in urbanized environments, the City does not promulgate standards for construction-generated noise. Noise in the City is regulated by the Municipal Code Title 7, *Noise Control*, which identifies standards, specific noise restrictions, exemptions, and variances for sources of noise in the City. Specifically, Municipal Code Section 7.35.020(G) restricts construction activity such that no person may engage in or conduct construction activity between the hours of 7:00 p.m. and 7:00 a.m. on weekdays, between the hours of 5:00 p.m. and 8:00 a.m. on Saturdays, or at any time on Sunday or a federal holiday. The proposed project would be required to comply with the construction time limitations within Municipal Code Section 7.35.020(G). Adherence to the permitted hours of construction are required in recognition that construction activities undertaken during daytime hours are a typical part of living in an urban environment and do not cause a significant disruption. Thus, a less than significant noise impact would result from construction activities.

Project Operations

Off-Site Mobile Noise

The proposed project would result in additional traffic on adjacent roadways from daily activities, thereby increasing vehicular noise in the vicinity of existing and proposed land uses. Based on the Traffic Impact Analysis, the project would generate 4,464 average daily trips, including 345 trips during the a.m. peak

hour and 349 trips during the p.m. peak hour. The noise levels under "Existing Without Project" and "Existing With Project" scenarios are modeled using Federal Highway Administration's Highway Noise Prediction Model (FHWA RD-77-108) and compared in Table 13, Existing Traffic Noise Levels. Noise modeling assumptions and results are included in Appendix A. As depicted in Table 13, under the "Existing Without Project" scenario, noise levels at 100 feet from roadway centerline would range from approximately 53.0 dBA to 68.3 dBA, with the highest noise levels occurring along La Sierra Avenue between Montlake Drive/Diana Avenue and SR-91 Westbound Ramps. The "Existing With Project" scenario noise levels at 100 feet from roadway centerline would range from approximately 53.4 dBA to 68.4 dBA, with the highest noise levels also occurring along La Sierra Avenue between Montlake Drive/Diana Avenue and SR-91 Westbound Ramps.

Table 13, Existing and Predicted Traffic Noise Levels

Roadway Segment	Existing Without Project					Existing With Project					Difference In dBA @ 100 Feet from Roadway
	ADT	dBA @ 100 Feet from Roadway Centerline	Distance from Roadway Centerline to: (Feet)			ADT	dBA @ 100 Feet from Roadway Centerline	Distance from Roadway Centerline to: (Feet)			
			70 CNEL Noise Contour	65 CNEL Noise Contour	60 CNEL Noise Contour			70 CNEL Noise Contour	65 CNEL Noise Contour	60 CNEL Noise Contour	
Magnolia Avenue											
between SR 91 Westbound Ramps and Filmore Street	27,066	65.2	-	103	222	28,272	65.4	-	106	228	0.2
between Filmore Street and Golden Avenue	26,681	65.1	-	102	220	27,887	65.3	-	105	226	0.2
between Golden Avenue and La Sierra Avenue	26,540	65.1	-	102	219	27,836	65.3	-	105	226	0.2
between La Sierra Avenue and Skofstad Street - Shopping Center Driveway	31,902	65.9	-	115	247	33,956	66.2	-	120	258	0.3
between Skofstad Street - Shopping Center Driveway and Shopping Center Driveway - Park Sierra Drive	27,105	65.2	-	103	222	29,159	65.5	-	108	233	0.3
between Shopping Center Driveway - Park Sierra Drive and Kaiser Driveway 3	28,384	65.4	-	106	229	29,568	65.6	-	109	235	0.2
between Kaiser Driveway 3 and Polk Street	29,566	65.6	-	109	235	30,192	65.7	-	111	238	0.1
between Polk Street and Banbury Drive	27,510	65.3	-	104	224	29,028	65.5	-	108	232	0.2
between Banbury Drive and Tyler Street	30,337	65.5	-	109	234	31,855	65.8	-	112	242	0.2
between Tyler Street and Hole Avenue – Hughes Alley	26,607	65.0	-	100	215	27,321	65.1	-	101	219	0.1
between Hole Avenue – Hughes Alley and Lowes Plaza Driveway – Harrison Street (South Branch)	35,709	66.3	-	121	261	36,333	66.3	-	123	264	0.1
between Lowes Plaza Driveway – Harrison Street (South Branch) and Harrison Street (North Branch)	32,140	65.6	-	110	237	32,764	65.7	-	112	240	0.1
La Sierra Avenue											
between Magnolia Avenue and Montlake	30,973	66.5	59	127	273	31,197	66.6	59	127	274	0.0

Roadway Segment	Existing Without Project					Existing With Project					Difference In dBA @ 100 Feet from Roadway
	ADT	dBA @ 100 Feet from Roadway Centerline	Distance from Roadway Centerline to: (Feet)			ADT	dBA @ 100 Feet from Roadway Centerline	Distance from Roadway Centerline to: (Feet)			
			70 CNEL Noise Contour	65 CNEL Noise Contour	60 CNEL Noise Contour			70 CNEL Noise Contour	65 CNEL Noise Contour	60 CNEL Noise Contour	
Drive – Diana Avenue											
between Montlake Drive – Diana Avenue and SR 91 Westbound Ramps	42,752	68.3	77	165	356	43,600	68.4	78	167	361	0.1
Park Sierra Avenue											
between Magnolia Avenue and Kaiser Driveway 1	6,763	54.7	-	-	44	8,035	55.4	-	-	50	0.7
between Kaiser Driveway 1 and Shopping Center Driveway - Kaiser Driveway 2	4,612	53.0	-	-	-	5,058	53.4	-	-	-	0.4
between Shopping Center Driveway - Kaiser Driveway 2 and Diana Avenue	7,777	55.3	-	-	49	8,223	55.5	-	-	50	0.2
Polk Street											
between Magnolia Avenue and Kaiser Driveway 5	5,327	57.5	-	-	68	6,711	58.5	-	-	80	1.0
between Kaiser Driveway 5 and Kaiser Driveway 6	3,337	55.4	-	-	50	3,515	55.7	-	-	51	0.2
between Kaiser Driveway 6 and Diana Avenue	5,301	57.4	-	-	67	5,479	57.6	-	-	69	0.1

Notes: ADT = average daily traffic; dBA = A-weighted decibels; CNEL = community noise equivalent level; "-" = contour is located within the roadway right-of-way.

Source: Noise modeling is based on traffic data within the *Traffic Impact Analysis, Kaiser Permanente Riverside Medical Center Expansion* prepared by LSA Associates (dated June 2021).

Table 13 also shows the difference between the "Existing Without Project" scenario and the "Existing With Project" scenario. As depicted in Table 13, traffic associated with the proposed project would result in a maximum increase of 1.0 dBA along Polk Street between Magnolia Avenue and Kaiser Driveway 5. A significant impact would result only if both of the following occur: an exceedance of the normally acceptable noise standards for residential uses (i.e., 60 dBA CNEL; refer to Table 8) and a perceptible increase in traffic noise levels (i.e., noise increase would be greater than 3.0 dBA).

As shown in Table 13, although traffic noise levels would exceed 60 dBA CNEL along majority of the roadway segments under both "Existing Without Project" and "Existing With Project" scenarios in the project area, project-generated average daily trips would not cause a perceptible increase in traffic noise levels (i.e., noise increase would be greater than 3.0 dBA) along any of the surrounding roads. As the project would not cause a perceptible increase in traffic noise levels, the proposed project would not significantly increase noise levels along the roadway segments analyzed. Therefore, a less than significant impact would occur in this regard.

Stationary Noise

Mechanical Equipment Noise

Anticipated mechanical equipment noise that would be generate by the proposed project would include Heating Ventilation and Air Conditioning (HVAC) units. The HVAC units would be installed on the rooftop of the proposed hospital tower. Typically, mechanical equipment noise is 55 dBA at 50 feet from the source. Based upon the Inverse Square Law, sound levels decrease by 6 dBA for each doubling of distance

from the source. The closest sensitive receptor are single-family residences located to the north of the project site approximately 550 feet from the proposal hospital tower; refer to Exhibit 1. At this distance, noise levels from the HVAC units would be approximately 34 dBA. Therefore, noise levels from HVAC units would not exceed the City's residential land use exterior noise level standards of 55 dBA CNEL for daytime and 45 dBA CNEL for nighttime, and interior noise level standards of 45 dBA CNEL for daytime and 35 dBA CNEL for nighttime. In addition, HVAC units associated with the existing buildings on-site are located closer to the nearest sensitive receptor than the proposed building. Thus, project-generated HVAC units noise levels would not introduce a new source of noise when compared to existing conditions, and a less than significant impact would occur.

The project would also include an emergency generator that would only be used during power outages in cases of emergency. The emergency generator would be enclosed in a structure. Additionally, emergency generators already exist on-site, and the proposed generators are necessary to support the proposed project. The emergency generators are a precautionary feature that would only be used sporadically. Based on information on the existing Kaiser Permanente hospital network, it can be conservatively assumed that the emergency generators on-site would be used once every 5-10 years, but it is possible that the generators would not be used at all during this period.

Since the generator would only be operated during emergencies, the generators are not considered a "long-term" noise impact. As such, the emergency generators were not included in the project's noise analysis in this memorandum as the generators would not represent reasonable conditions. Thus, emergency generators would not introduce a new source of noise when compared to existing conditions, and a less than significant impact would occur.

Parking Lots

The project proposes a new parking structure in the southeast corner of the project site and would reduce and reorganize surface parking areas to accommodate the new hospital tower on the west of the project site.

Traffic associated with parking lots is typically not of sufficient volume to exceed community noise standards, which are based on a time-averaged scale such as the CNEL scale. However, the instantaneous maximum sound levels generated by a car door slamming, engine starting up, and car pass-bys may be an annoyance to adjacent noise-sensitive receptors. Estimates of the maximum noise levels associated with some parking lot activities are presented in Table 14, Typical Noise Levels Generated by Parking Lots.

Table 14, Typical Noise Levels Generated by Parking Lots

Noise Source	Maximum Noise Levels at 50 Feet from Source (dBA L_{eq})
Car door slamming	61
Car starting	60
Car idling	53
Notes: dBA = A-weighted Decibels; L_{eq} = Equivalent Sound Level Source: Kariel, H. G., *Noise in Rural Recreational Environments*, Canadian Acoustics 19(5), March 10, 1991.	

As shown in Table 14, parking lot activities can result in noise levels of up to 61 dBA at a distance of 50 feet. It is noted that parking lot noise are instantaneous noise levels compared to noise standards in the CNEL scale, which are averaged over time. As a result, actual noise levels over time resulting from parking lot activities would be far lower than what is identified in Table 14. There are not any sensitive receptors located within 1,000 feet of the proposed new parking structure. In addition, the project would not

include additional surface parking spaces near the closest sensitive receptor to the north of the project site. Therefore, noise from parking lots would not be different from the existing conditions, and project-generated parking lot noise levels would not introduce a new source of noise when compared to existing conditions. Thus, the impacts would be less than significant.

Mitigation Measures: No mitigation is required.

Impact NOI-2 Exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels?

Less Than Significant Impact. Vibration-sensitive land uses are locations where people reside or where there is a potential for damage to structures like buildings and sidewalks. The nearest structure is a commercial building located to the west of the project site across Magnolia Avenue approximately 170 feet from the project site boundary.

Construction

Project construction can generate varying degrees of groundborne vibration, depending on the construction procedure and construction equipment. Operation of construction equipment generates vibrations that spread through the ground and diminish in amplitude with distance from the source. The effect on buildings located in the vicinity of the construction site often varies depending on soil type, ground strata, and construction characteristics of the receiver building(s). The results from vibration can range from no perceptible effects at the lowest vibration levels, to low rumbling sounds and perceptible vibration at moderate levels, to slight damage at the highest levels. Groundborne vibrations from construction activities rarely reach levels that damage structures.

Construction vibration impacts include human annoyance and building damage. Human annoyance occurs when construction vibration rises significantly above the threshold of human perception for extended periods of time. Building damage can be cosmetic (e.g., plaster cracks) or structural. The distance at which damage from vibration could be experienced can vary substantially depending on the age and composition of the building structure, soil composition and underground geological layer between vibration source and receiver. In addition, not all buildings respond similarly to vibration generated by construction equipment. For example, buildings that are constructed with typical timber frames and masonry show that a vibration level of up to 0.2 in/sec PPV is considered safe and would not result in any construction vibration damage.[3] This evaluation uses the Federal Transit Administration (FTA) architectural damage criterion for continuous vibrations at non-engineered timber and masonry buildings of 0.2 in/sec PPV. The FTA has published standard vibration velocities for construction equipment operations. Typical vibration produced by construction equipment is detailed in Table 15, Typical Vibration Levels for Construction Equipment.

Groundborne vibration decreases rapidly with distance. The nearest structure is a commercial building located to the west of the project site across Magnolia Avenue approximately 170 feet from the project's construction limit. As indicated in Table 15, vibration velocities from typical heavy construction equipment used during project construction would range from 0.0002 (a small bulldozer) to 0.0050 (large bulldozer) in/sec PPV at 170 feet from the source of activity, which would not exceed the FTA's 0.2 in/sec PPV threshold of architectural damage. Therefore, vibration impacts associated with construction would be less than significant.

[3] Federal Transit Administration, *Transit Noise and Vibration Impact Assessment Manual*, September 2018.

Table 15, Typical Vibration Levels for Construction Equipment

Equipment	Approximate peak particle velocity at 25 feet (inches/second)[1]	Approximate peak particle velocity at 170 feet (inches/second)[1]
Large bulldozer	0.089	0.0050
Loaded trucks	0.076	0.0043
Small bulldozer	0.003	0.0002
Jackhammer	0.035	0.0020

Notes:
1. Calculated using the following formula:

$PPV_{equip} = PPV_{ref} \times (25/D)^{1.5}$

where: PPV (equip) = the peak particle velocity in in/sec of the equipment adjusted for the distance

PPV (ref) = the reference vibration level in in/sec from Table 7-4 of the FTA *Transit Noise and Vibration Impact Assessment Manual.*

D = the distance from the equipment to the receiver

Source: Federal Transit Administration, *Transit Noise and Vibration Impact Assessment Manual*, Table 7-4 *Vibration Source Levels for Construction Equipment*, September 2018.

Operation

The project proposes to expand the existing medical center with a new hospital tower and parking structure. The operation of the project would involve occasional truck deliveries and trash pick-up, which would potentially generate groundborne vibration. However, the truck operations would be similar to the existing conditions and would not be substantial. Therefore, the groundborne vibration levels would not be perceptible or felt at surrounding uses. Impacts would be less than significant in this regard.

Mitigation Measures: No mitigation is required.

Impact NOI-3 For a project located within the vicinity of a private airstrip or an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels?

***No Impact*.** The closest airport is the Riverside Municipal Airport, located approximately 3 miles to the north of the project site. The site is not within the Riverside Municipal Airport Influence Area where aircraft noise levels are a concern.[4] Thus, the proposed project would not expose people residing or working in the area to excessive noise levels, and no impacts would occur in this regard.

Mitigation Measures: No mitigation is required.

[4] Riverside County Airport Land Use Commission, Riverside County Airport Land Use Compatibility Plan Policy Document, Map RI-1, Compatibility Map, March 2005.

CUMULATIVE IMPACTS

Short-Term Construction Noise Impacts

Construction activities associated with the proposed project and cumulative projects may overlap, resulting in construction noise in the area. However, as analyzed above, due to the distance between nearest sensitive receptors and project construction area, construction noise impacts on nearby sensitive receptors would be less than significant. The construction activities associated with the cumulative development projects would be required to comply with the City's Municipal Code and would incorporate mitigation measures on a project-by-project basis, as applicable, to reduce construction noise pursuant to CEQA provisions. Therefore, the project's contribution to cumulative short-term construction impacts would be less than cumulatively considerable.

Mitigation Measures: No mitigation is required.

Long-Term (Mobile) Noise Impacts

Long-term cumulative noise impacts from mobile sources would occur primarily as a result of increased traffic on area roadways due to buildout of the proposed project and other projects in the vicinity. When two identical sources are each producing sound of the same loudness, the resulting sound level at a given distance would be 3 dB higher than one source under the same conditions. An increase of 3 dB is widely accepted as "barely perceptible". With regard to traffic noise, traffic volumes would need to roughly double to result in a perceptible change in ambient noise levels.

To determine if cumulative traffic noise levels would increase to a level of significance with the development of the proposed project and other planned projects, traffic data from the Traffic Impact Analysis was analyzed for the following traffic scenarios:

- Existing: Current day noise conditions without construction of the project.
- Cumulative (2040) without Project: Current day noise conditions plus the completion of other permitted, planned projects or approved ambient growth factors.
- Cumulative (2040) with Project: Current day noise conditions with construction of the project plus the completion of other permitted, planned projects or approved ambient growth factors.

As shown in Table 16, Cumulative Traffic Noise, combined effect for roadway segment noise levels would increase up to 0.9 dBA with development of the proposed project and other cumulative projects. As the noise increase would not exceed the 3 dBA threshold, the proposed project would not contribute to a significant cumulative noise impact to any existing or future noise sensitive land use. Therefore, mobile source noise impacts would be less than cumulatively considerable.

Table 16, Cumulative Traffic Noise

Roadway Segment	dBA @ 100 Feet from Roadway Centerline			Combined Effects	Incremental Effects	Cumulatively Significant Impact?[1]
	Existing	Cumulative without Project	Cumulative with Project	Difference in dBA Between Cumulative With Project and Existing	Difference in dBA Between Cumulative With Project and Cumulative Without Project	
Magnolia Avenue						
between SR 91 Westbound Ramps and Filmore Street	66.2	66.2	66.4	1.2	0.2	No
between Filmore Street and Golden Avenue	66.2	66.2	66.3	1.2	0.2	No
between Golden Avenue and La Sierra Avenue	66.4	66.4	66.6	1.5	0.2	No
between La Sierra Avenue and Skofstad Street - Shopping Center Driveway	66.7	66.7	66.9	1.0	0.2	No
between Skofstad Street - Shopping Center Driveway and Shopping Center Driveway - Park Sierra Drive	65.9	65.9	66.2	1.0	0.3	No
between Shopping Center Driveway - Park Sierra Drive and Kaiser Driveway 3	66.0	66.0	66.2	0.8	0.2	No
between Kaiser Driveway 3 and Polk Street	66.2	66.2	66.3	0.7	0.1	No
between Polk Street and Banbury Drive	66.0	66.0	66.2	1.0	0.2	No
between Banbury Drive and Tyler Street	66.4	66.4	66.6	1.1	0.2	No
between Tyler Street and Hole Avenue – Hughes Alley	66.1	66.1	66.1	1.2	0.1	No
between Hole Avenue – Hughes Alley and Lowes Plaza Driveway – Harrison Street (South Branch)	67.7	67.7	67.7	1.5	0.1	No
between Lowes Plaza Driveway – Harrison Street (South Branch) and Harrison Street (North Branch)	67.0	67.0	67.1	1.4	0.1	No
La Sierra Avenue						
between Magnolia Avenue and Montlake Drive – Diana Avenue	67.5	67.5	67.6	1.0	0.0	No
between Montlake Drive – Diana Avenue and SR 91 Westbound Ramps	69.0	69.0	69.1	0.8	0.1	No
Park Sierra Avenue						
between Magnolia Avenue and Kaiser Driveway 1	55.4	55.4	56.0	1.3	0.6	No
between Kaiser Driveway 1 and Shopping Center Driveway - Kaiser Driveway 2	54.3	54.3	54.6	1.6	0.3	No
between Shopping Center Driveway - Kaiser Driveway 2 and Diana Avenue	56.1	56.1	56.3	1.0	0.2	No
Polk Street						
between Magnolia Avenue and Kaiser Driveway 5	58.2	58.2	59.1	1.6	0.9	No
between Kaiser Driveway 5 and Kaiser Driveway 6	56.1	56.1	56.3	0.9	0.2	No
between Kaiser Driveway 6 and Diana Avenue	58.1	58.1	58.2	0.8	0.1	No

Notes:
1. A cumulative impact would occur if the "Combined Effects" and "Incremental Effects" criterion are exceeded, and the modeled noise level exceeds the normally acceptable noise standard shown in Table 8.

Source: Noise modeling is based on traffic data within the *Traffic Impact Analysis, Kaiser Permanente Riverside Medical Center Expansion* prepared by LSA Associates (dated June 2021).

Mitigation Measures: No mitigation is required.

Long-Term (Stationary) Noise Impacts

Although related cumulative projects have been identified within the project study area, the noise generated by stationary equipment on-site cannot be quantified due to the speculative nature of each development. However, each cumulative project would require separate discretionary approval and CEQA assessment, which would address potential noise impacts and identify necessary attenuation measures, where appropriate. Additionally, as noise dissipates as it travels away from its source, noise impacts from stationary sources would be limited to each of the respective sites and their vicinities. As

noted above, the proposed project would not result in significant stationary noise impacts. Therefore, the proposed project would not result in stationary long-term equipment that would significantly affect surrounding sensitive receptors. Thus, the proposed project and identified cumulative projects are not anticipated to result in a significant cumulative impact.

Mitigation Measures: No mitigation is required.

Vibration Impacts

As discussed above, project construction activities would not generate groundborne vibration off-site above the significance criteria (i.e. 0.2 in/sec PPV threshold for construction as established by the FTA), and project operation activities would not generate perceptible groundborne vibration. Although construction activities associated with the proposed project and off-site cumulative projects may overlap, off-site projects within the City would also be subject to the 0.2 in/sec PPV threshold. Further, the cumulative development projects would be required to implement any required mitigation measures on a project-by-project basis, as applicable, pursuant to CEQA provisions. Therefore, the project's contribution to cumulative vibration impacts would be less than cumulatively considerable.

Mitigation Measures: No mitigation is required.

REFERENCES

Documents

1. California Department of Transportation, *Technical Noise Supplement to the Traffic Noise Analysis Protocol*, September 2013.
2. City of Riverside, Magnolia Avenue Specific Plan, November 10, 2009.
3. City of Riverside, *Riverside General Plan 2025, Noise Element*, November 2007.
4. City of Riverside, *Riverside Municipal Code*, https://library.municode.com/ca/riverside/codes/code_of_ordinances, supplemented through Ordinance No. 7408 adopted January 9, 2018.
5. Federal Highway Administration, *Roadway Construction Noise Model (FHWA-HEP-05-054)*, January 2006.
6. Federal Highway Administration, *Roadway Construction Noise Model User's Guide*, January 2016.
7. Federal Transit Administration, *Transit Noise and Vibration Impact Assessment Manual, Table 7-4 Vibration Source Levels for Construction Equipment*, September 2018.
8. Kariel, H. G., *Noise in Rural Recreational Environments*, Canadian Acoustics 19(5), March 10, 1991.
9. LSA Associates, *Traffic Impact Analysis, Kaiser Permanente Riverside Medical Center Expansion,* June 2021.
10. Riverside County Airport Land Use Commission, *Riverside County Airport Land Use Compatibility Plan Policy Document, Map RI-1, Compatibility Map*, March 2005.
11. State Office of Planning and Research, *State of California General Plan Guidelines*, October 2017.
12. U.S. Department of Transportation, *Highway Traffic Noise Analysis and Abatement Policy and Guidance*, https://www.fhwa.dot.gov/environMent/noise/regulations_and_guidance/polguide/polguide02.cfm, accessed March 3, 2021.
13. U.S. Environmental Protection Agency, *Noise Effects Handbook – A Desk Reference to Health and Welfare Effects of Noise*, October 1979 (revised July 1981).

Websites / Programs

1. Google Earth, 2021.

Michael Baker
INTERNATIONAL

Appendix A:
Noise Data

Site Number: 1
Recorded By: Eddie Torres
Job Number: 178170
Date: 2/23/21
Time: 9:45 am
Location: White Oak Drive/Polk Street
Source of Peak Noise: Landscape equipment

Equipment						
Category	**Type**	**Vendor**	**Model**	**Serial No.**	**Cert. Date**	**Note**
Sound	Sound Level Meter	**Brüel & Kjær**	**2250**	**3011133**	**04/08/2019**	
	Microphone	**Brüel & Kjær**	**4189**	**3086765**	**04/08/2019**	
	Preamp	**Brüel & Kjær**	**ZC 0032**	**25380**	**04/08/2019**	
	Calibrator	**Brüel & Kjær**	**4231**	**2545667**	**04/08/2019**	

Weather Data			
Est.	**Duration:** 10 minutes		**Sky:**
	Note: dBA Offset =		**Sensor Height (ft):** 5 ft
	Wind Ave Speed (mph / m/s)	**Temperature (degrees Fahrenheit)**	**Barometer Pressure (inches)**
	0.0	73.7	55.9

Photo of Measurement Location

2250

Instrument:		2250
Application:		BZ7225 Version 4.7.4
Start Time:		02/23/2021 09:44:20
End Time:		02/23/2021 09:54:20
Elapsed Time:		00:10:00
Bandwidth:		1/3-octave
Max Input Level:		142.17

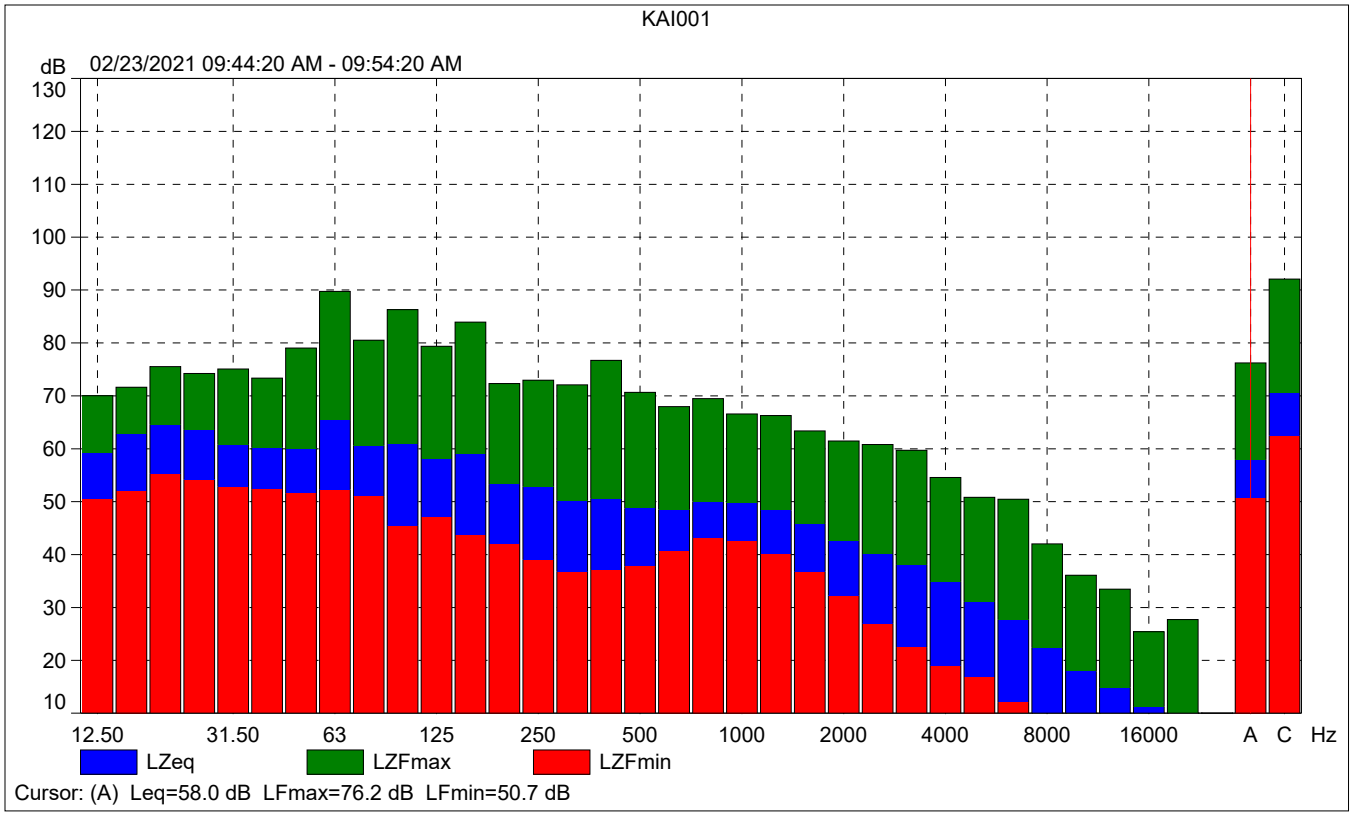
	Time	Frequency
Broadband (excl. Peak):	FSI	AC
Broadband Peak:		C
Spectrum:	FS	Z

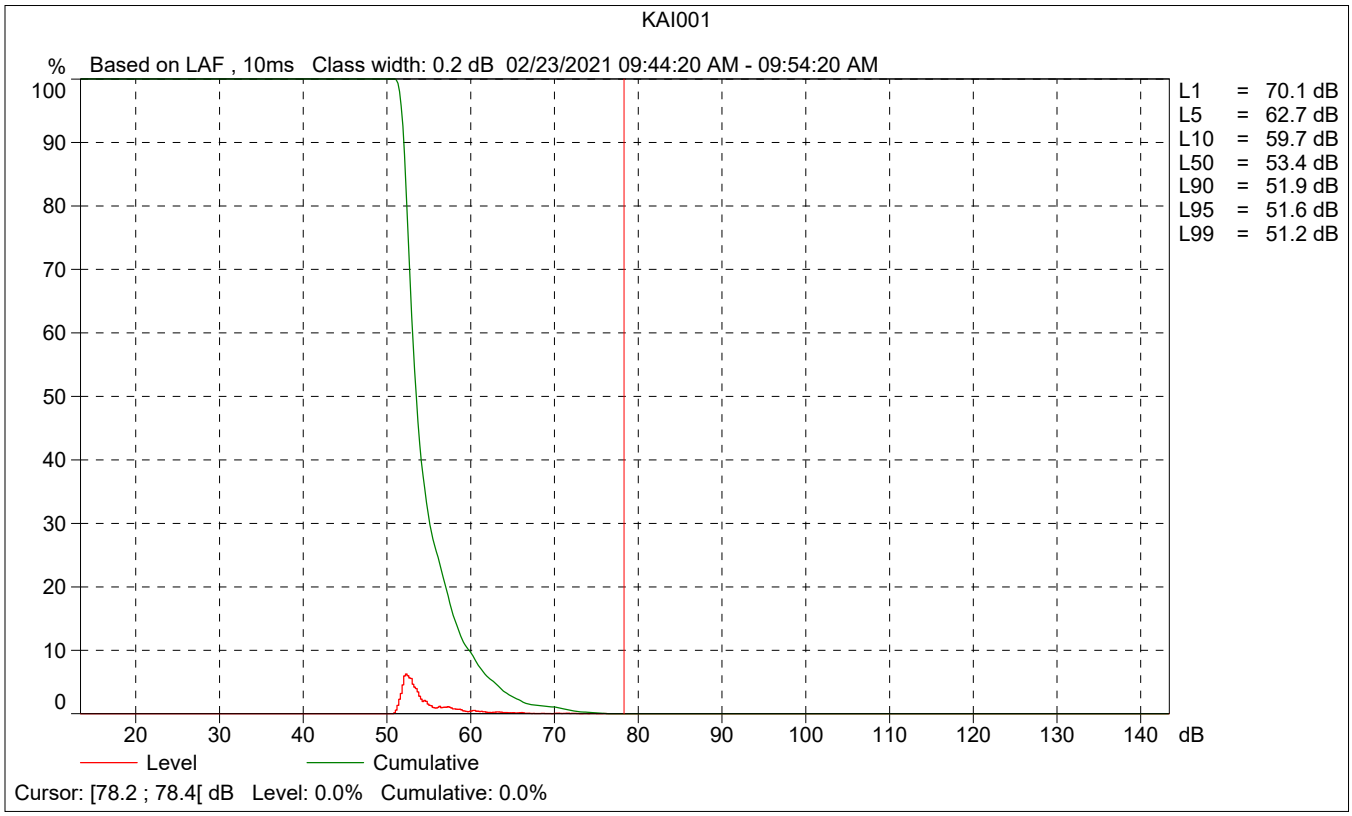
Instrument Serial Number:		3011133
Microphone Serial Number:		3086765
Input:		Top Socket
Windscreen Correction:		UA-1650
Sound Field Correction:		Free-field

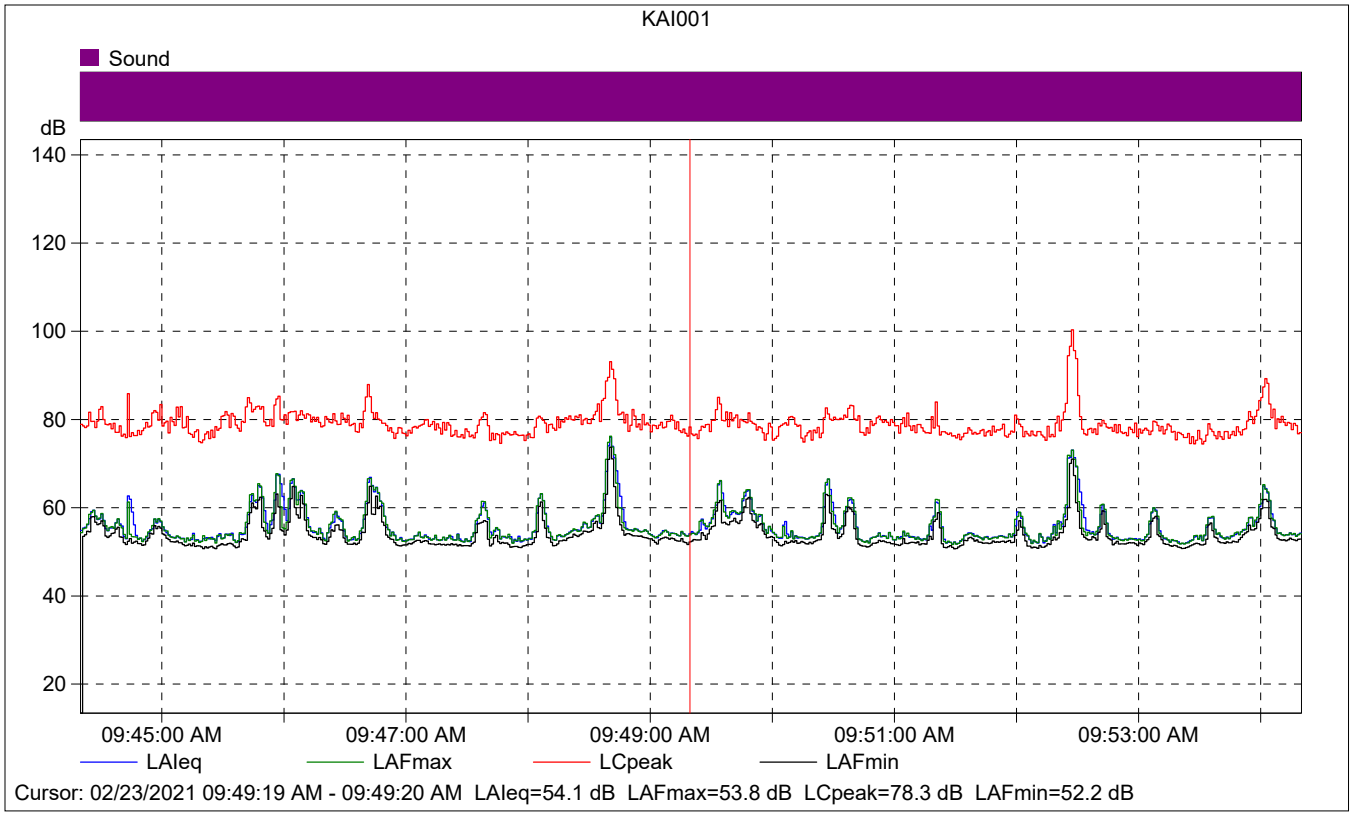
Calibration Time:		01/14/2021 08:34:02
Calibration Type:		External reference
Sensitivity:		43.354082852602 mV/Pa

KAI001

	Start time	End time	Elapsed time	Overload [%]	LAeq [dB]	LAFmax [dB]	LAFmin [dB]
Value				0.00	58.0	76.2	50.7
Time	09:44:20 AM	09:54:20 AM	0:10:00				
Date	02/23/2021	02/23/2021					

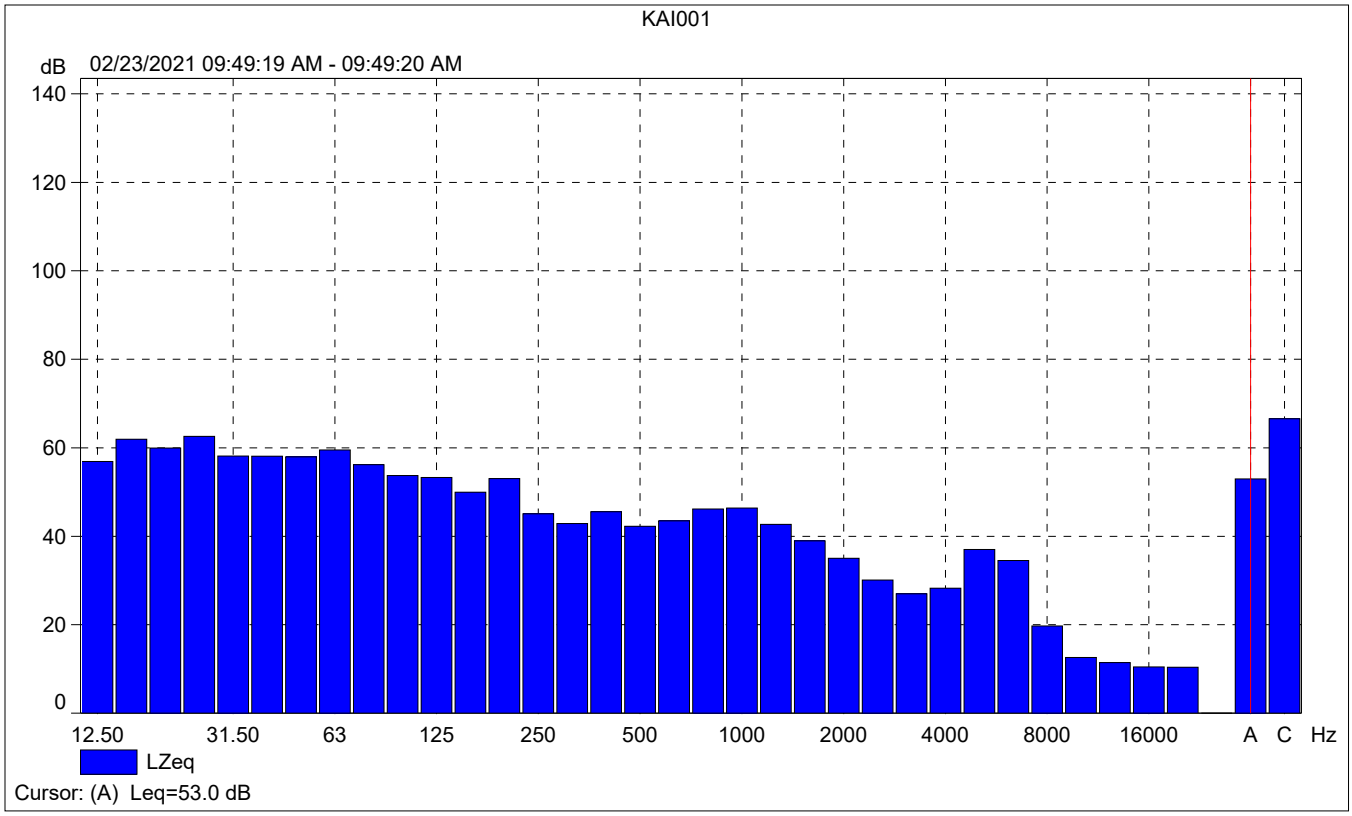

KAI001
dB
02/23/2021 09:44:20 AM - 09:54:20 AM
130
120
110
100
90
80
70
60
50
40
30
20
10
12.50
31.50
63
125
250
500
1000
2000
4000
8000
16000
A
C
Hz
LZeq
LZFmax
LZFmin
Cursor: (A) Leq=58.0 dB LFmax=76.2 dB LFmin=50.7 dB

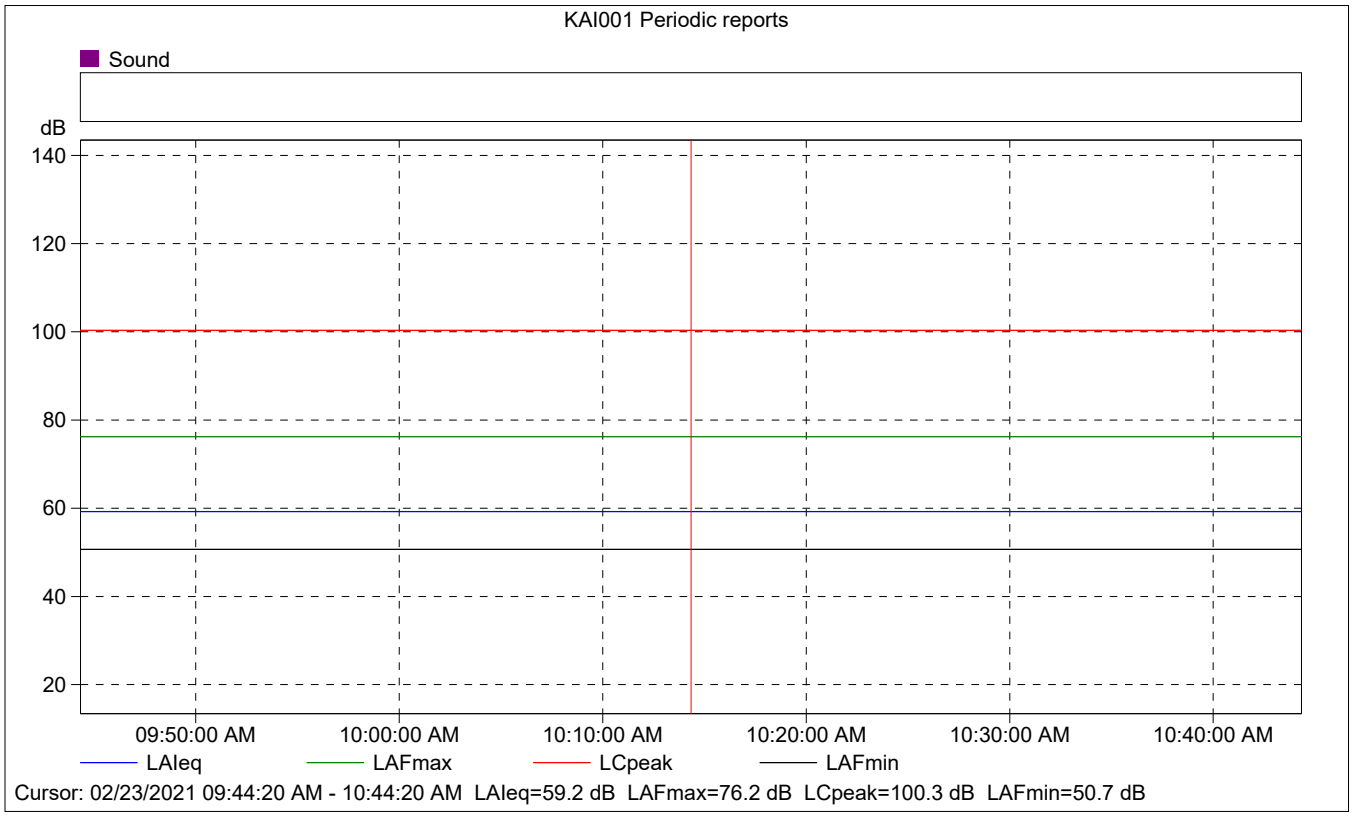

KAI001
%
Based on LAF , 10ms Class width: 0.2 dB 02/23/2021 09:44:20 AM - 09:54:20 AM
100
90
80
70
60
50
40
30
20
10
0
20
30
40
50
60
70
80
90
100
110
120
130
140
dB
L1 = 70.1 dB
L5 = 62.7 dB
L10 = 59.7 dB
L50 = 53.4 dB
L90 = 51.9 dB
L95 = 51.6 dB
L99 = 51.2 dB
Level
Cumulative
Cursor: [78.2 ; 78.4[dB Level: 0.0% Cumulative: 0.0%



KAI001

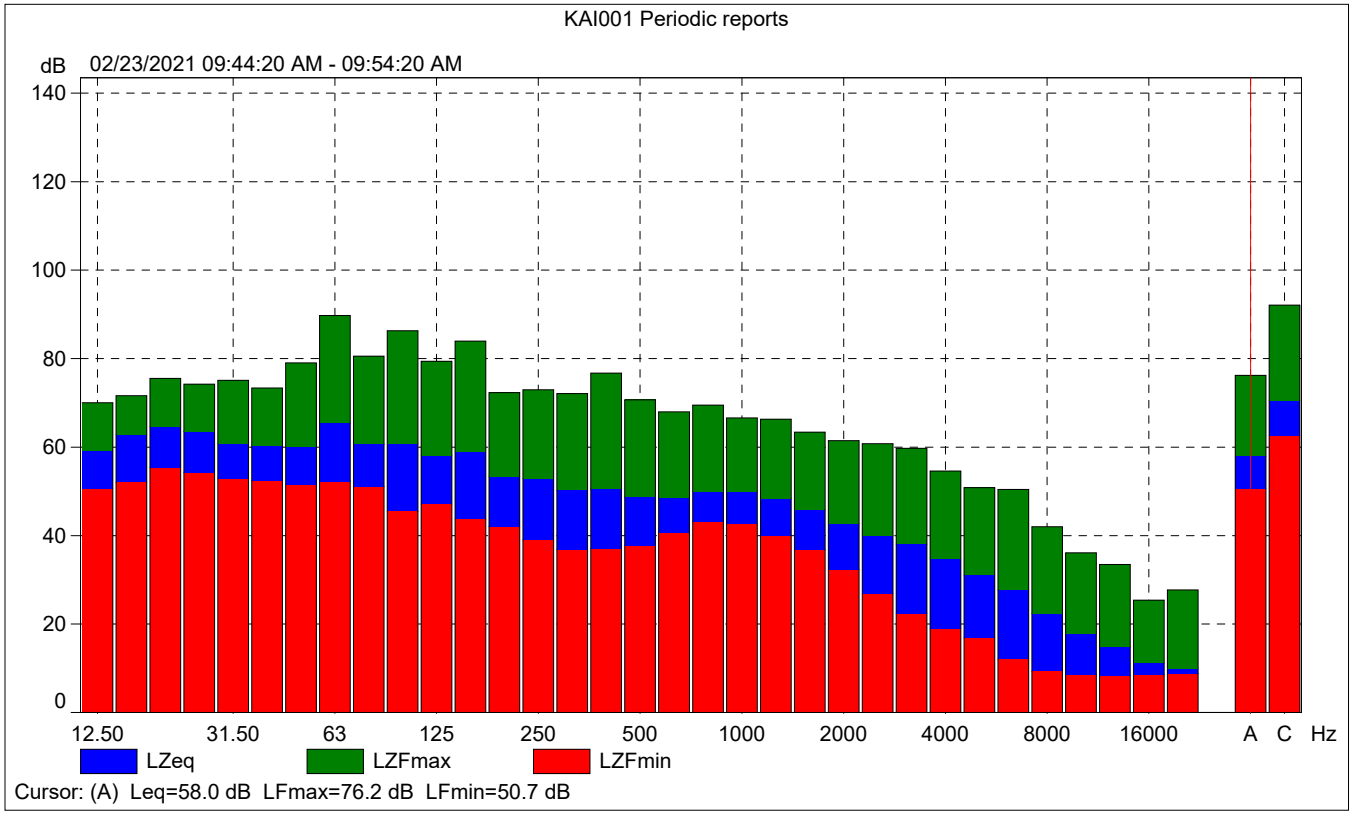
	Start time	Elapsed time	LAIeq [dB]	LAFmax [dB]	LAFmin [dB]
Value			54.1	53.8	52.2
Time	09:49:19 AM	0:00:01			
Date	02/23/2021				

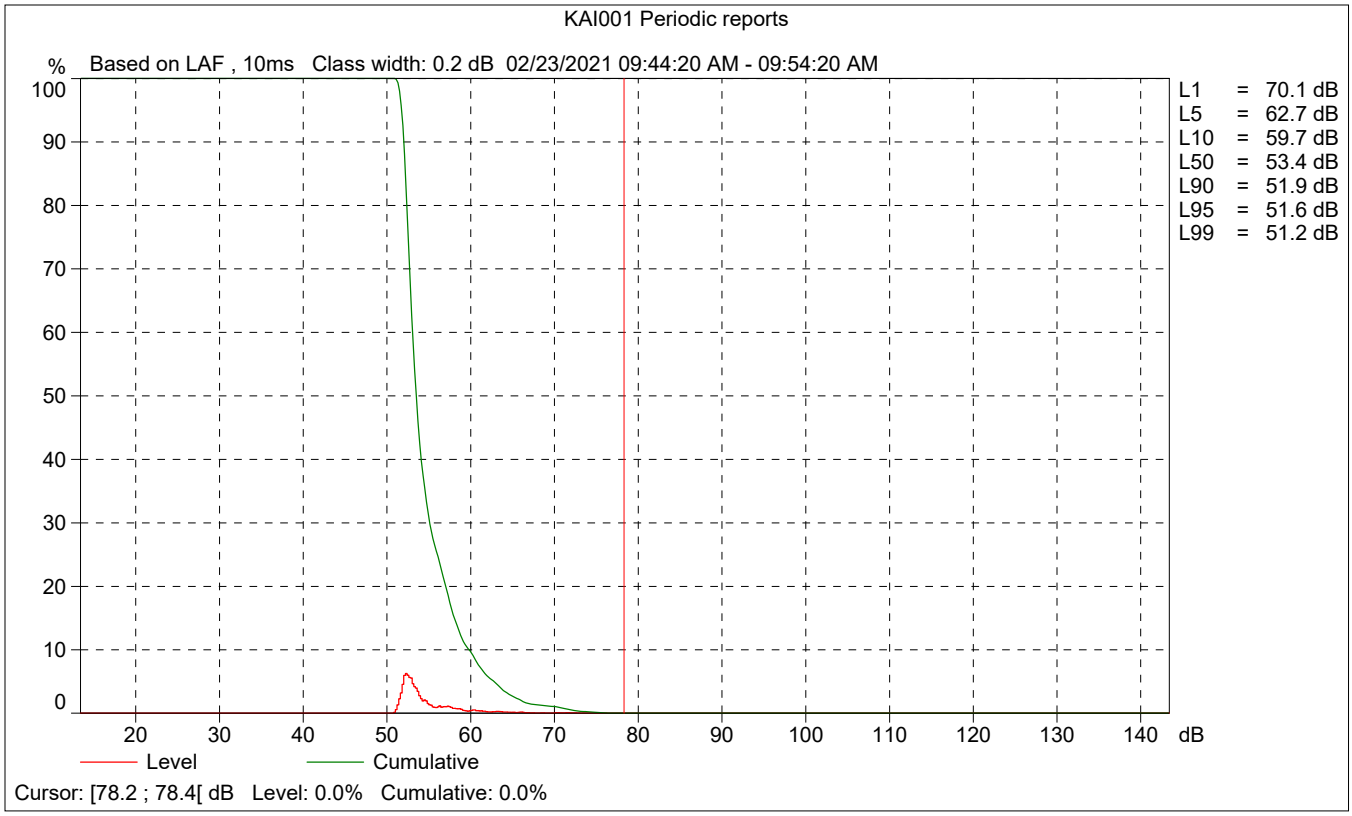

KAI001
dB
02/23/2021 09:49:19 AM - 09:49:20 AM
140
120
100
80
60
40
20
0
12.50
31.50
63
125
250
500
1000
2000
4000
8000
16000
A
C
Hz
LZeq
Cursor: (A) Leq=53.0 dB


KAI001 Periodic reports
Sound
dB
140
120
100
80
60
40
20
09:50:00 AM
10:00:00 AM
10:10:00 AM
10:20:00 AM
10:30:00 AM
10:40:00 AM
LAIeq
LAFmax
LCpeak
LAFmin
Cursor: 02/23/2021 09:44:20 AM - 10:44:20 AM LAIeq=59.2 dB LAFmax=76.2 dB LCpeak=100.3 dB LAFmin=50.7 dB

KAI001 Periodic reports

	Start time	Elapsed time	Overload [%]	LAIeq [dB]	LAFmax [dB]	LAFmin [dB]
Value			0.00	59.2	76.2	50.7
Time	09:44:20 AM	0:10:00				
Date	02/23/2021					




KAI001 Periodic reports
% Based on LAF , 10ms Class width: 0.2 dB 02/23/2021 09:44:20 AM - 09:54:20 AM
100
90
80
70
60
50
40
30
20
10
0
20 30 40 50 60 70 80 90 100 110 120 130 140 dB
L1 = 70.1 dB
L5 = 62.7 dB
L10 = 59.7 dB
L50 = 53.4 dB
L90 = 51.9 dB
L95 = 51.6 dB
L99 = 51.2 dB
Level
Cumulative
Cursor: [78.2 ; 78.4[dB Level: 0.0% Cumulative: 0.0%

Site Number: 2
Recorded By: Eddie Torres
Job Number: 178170
Date: 2/23/21
Time: 10:08 am
Location: Berg Street/Mercer Avenue
Source of Peak Noise:

Equipment						
Category	**Type**	**Vendor**	**Model**	**Serial No.**	**Cert. Date**	**Note**
Sound	Sound Level Meter	**Brüel & Kjær**	**2250**	**3011133**	**04/08/2019**	
	Microphone	**Brüel & Kjær**	**4189**	**3086765**	**04/08/2019**	
	Preamp	**Brüel & Kjær**	**ZC 0032**	**25380**	**04/08/2019**	
	Calibrator	**Brüel & Kjær**	**4231**	**2545667**	**04/08/2019**	

Weather Data			
Est.	**Duration:** 10 minutes		**Sky:**
	Note: dBA Offset =		**Sensor Height (ft):** 5 ft
	Wind Ave Speed (mph / m/s)	**Temperature (degrees Fahrenheit)**	**Barometer Pressure (inches)**
	1.4	76.8	56.3

Photo of Measurement Location

2250

Instrument:		2250
Application:		BZ7225 Version 4.7.4
Start Time:		02/23/2021 10:06:46
End Time:		02/23/2021 10:16:46
Elapsed Time:		00:10:00
Bandwidth:		1/3-octave
Max Input Level:		142.17

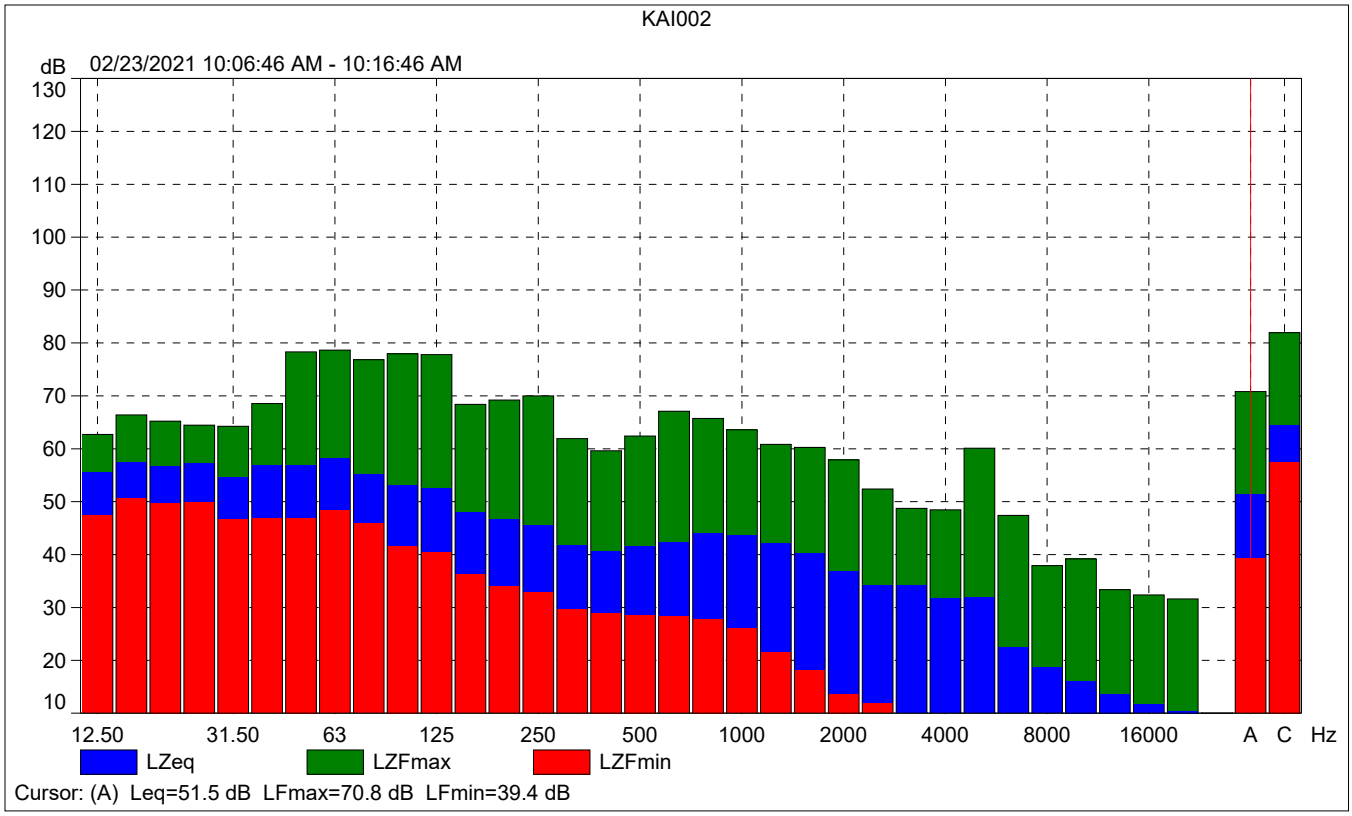
	Time	Frequency
Broadband (excl. Peak):	FSI	AC
Broadband Peak:		C
Spectrum:	FS	Z

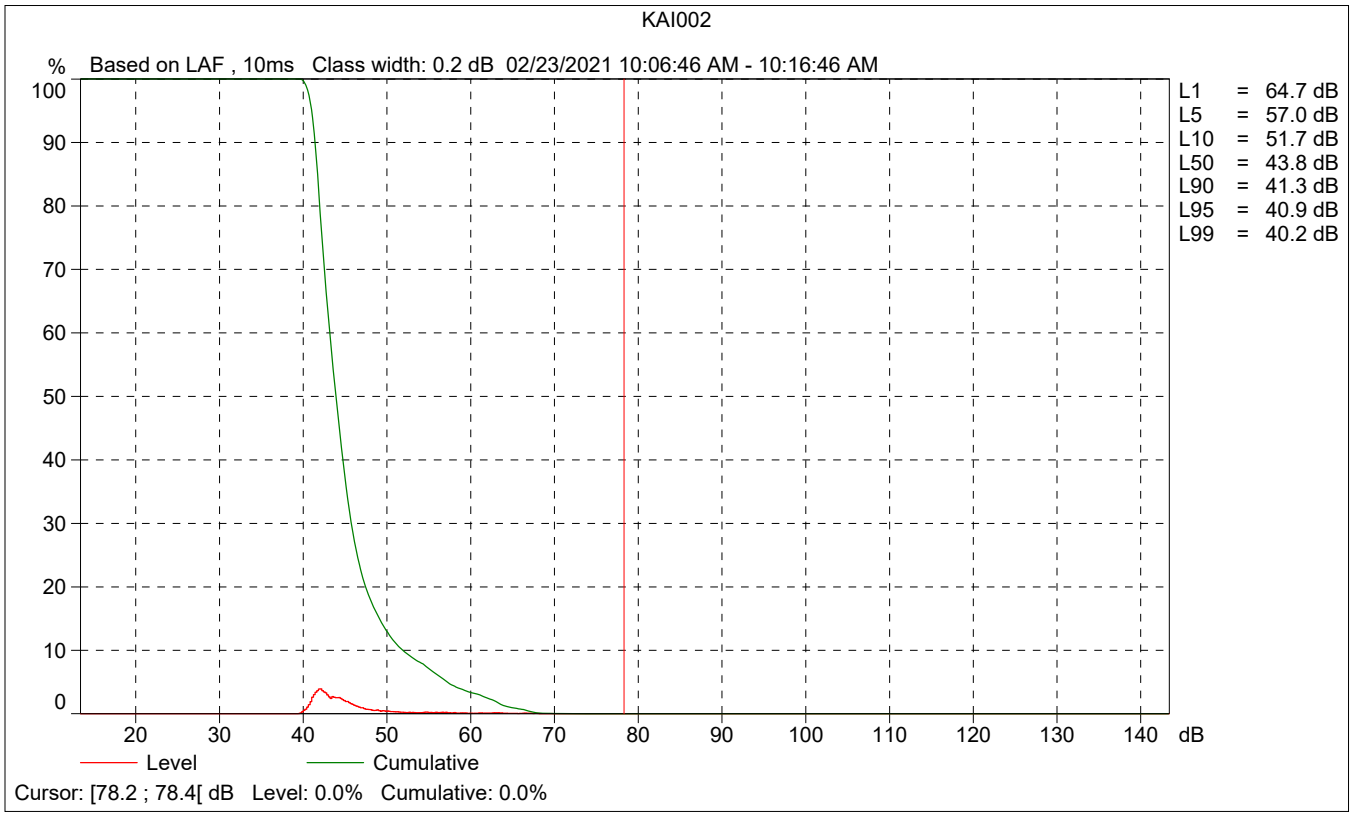
Instrument Serial Number:		3011133
Microphone Serial Number:		3086765
Input:		Top Socket
Windscreen Correction:		UA-1650
Sound Field Correction:		Free-field

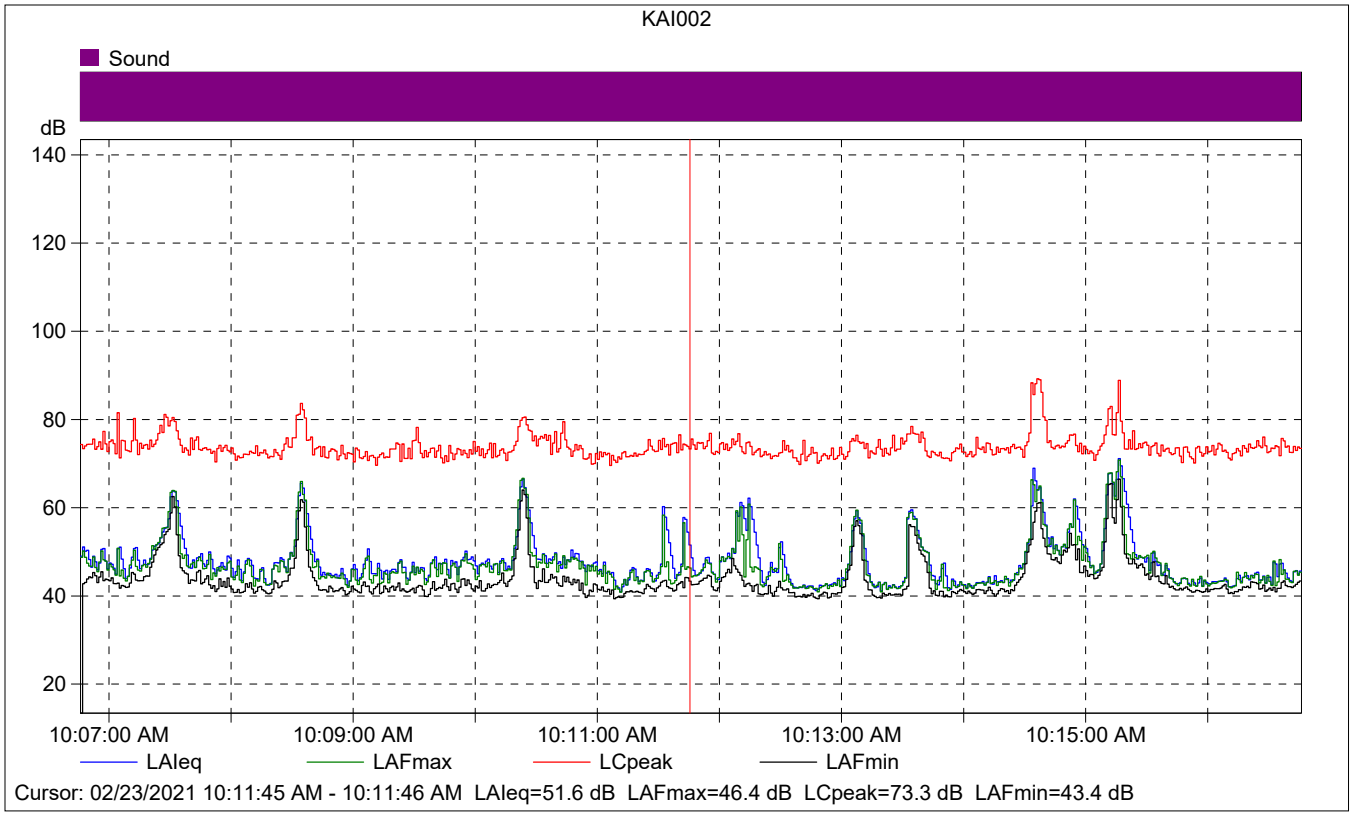
Calibration Time:		01/14/2021 08:34:02
Calibration Type:		External reference
Sensitivity:		43.354082852602 mV/Pa

KAI002

	Start time	End time	Elapsed time	Overload [%]	LAeq [dB]	LAFmax [dB]	LAFmin [dB]
Value				0.00	51.5	70.8	39.4
Time	10:06:46 AM	10:16:46 AM	0:10:00				
Date	02/23/2021	02/23/2021					

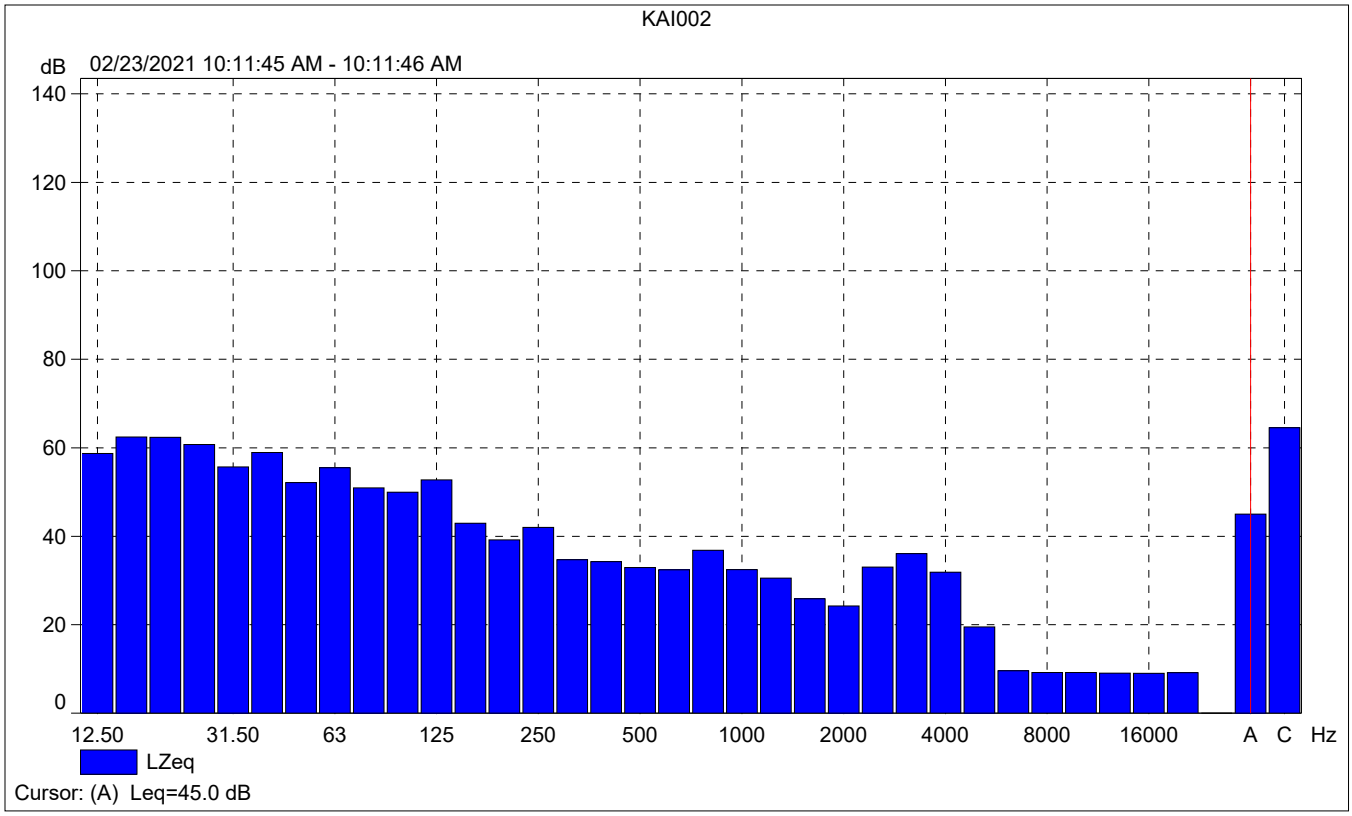

KAI002
dB
02/23/2021 10:06:46 AM - 10:16:46 AM
130
120
110
100
90
80
70
60
50
40
30
20
10
12.50
31.50
63
125
250
500
1000
2000
4000
8000
16000
A
C
Hz
LZeq
LZFmax
LZFmin
Cursor: (A) Leq=51.5 dB LFmax=70.8 dB LFmin=39.4 dB

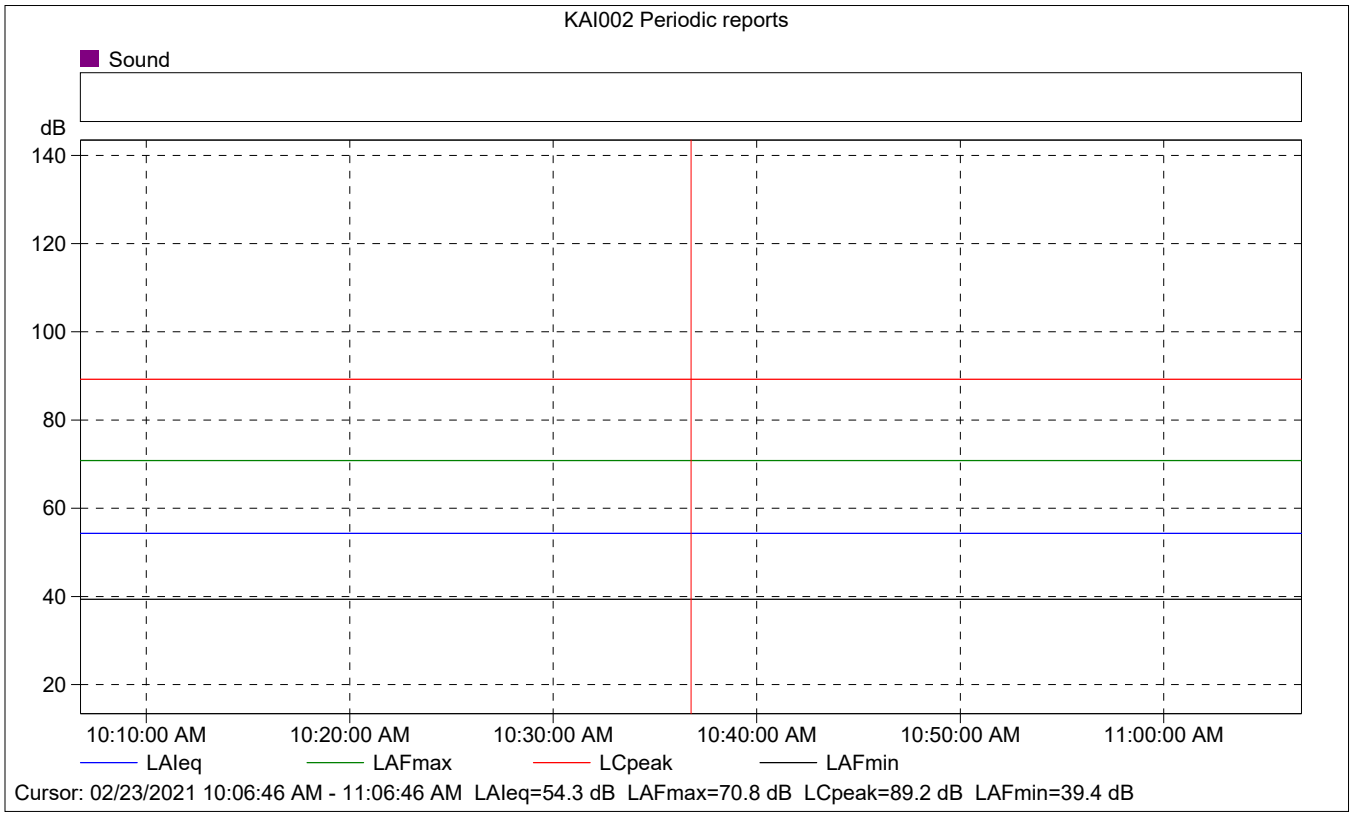

KAI002
%
Based on LAF , 10ms Class width: 0.2 dB 02/23/2021 10:06:46 AM - 10:16:46 AM
100
90
80
70
60
50
40
30
20
10
0
20
30
40
50
60
70
80
90
100
110
120
130
140
dB
L1 = 64.7 dB
L5 = 57.0 dB
L10 = 51.7 dB
L50 = 43.8 dB
L90 = 41.3 dB
L95 = 40.9 dB
L99 = 40.2 dB
Level
Cumulative
Cursor: [78.2 ; 78.4[dB Level: 0.0% Cumulative: 0.0%



KAI002

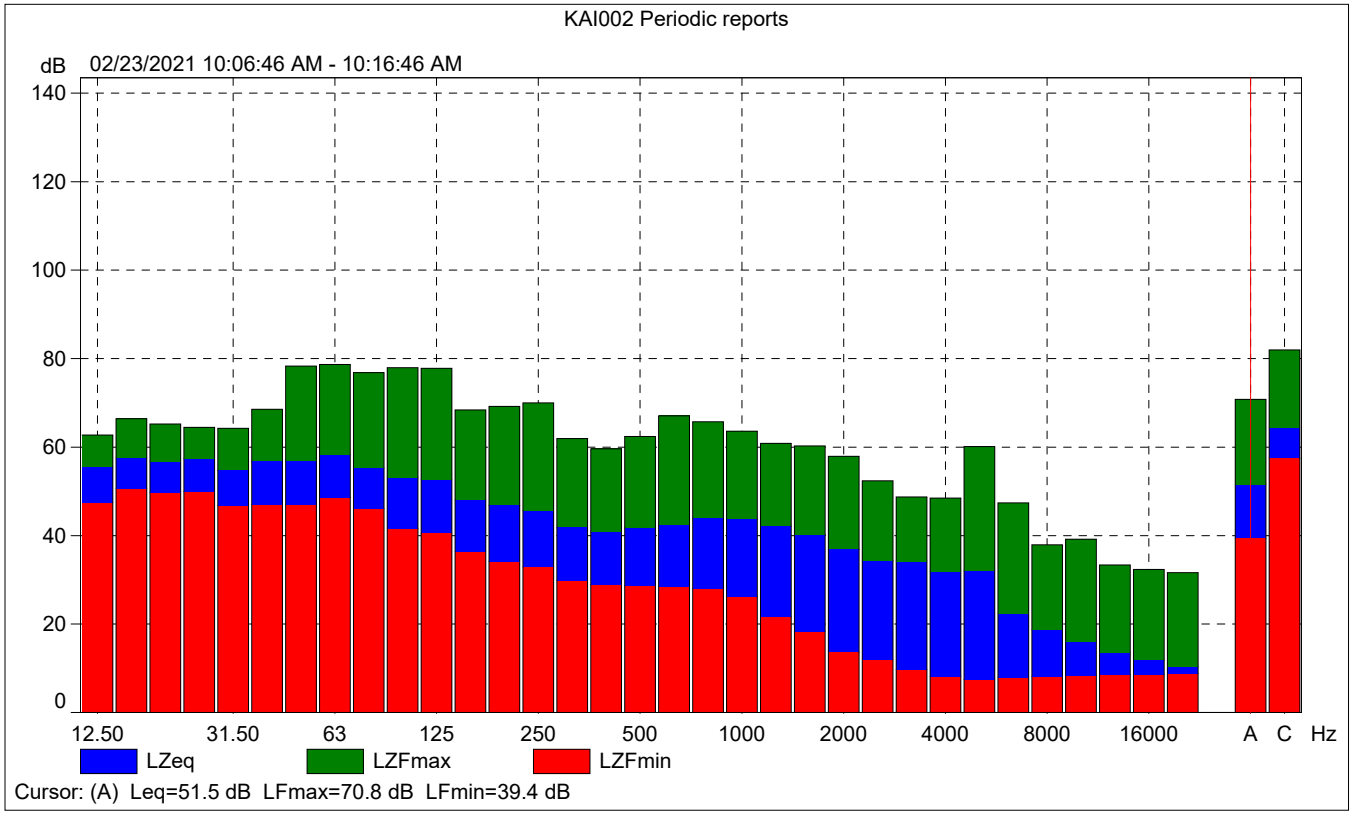
	Start time	Elapsed time	LAIeq [dB]	LAFmax [dB]	LAFmin [dB]
Value			51.6	46.4	43.4
Time	10:11:45 AM	0:00:01			
Date	02/23/2021				

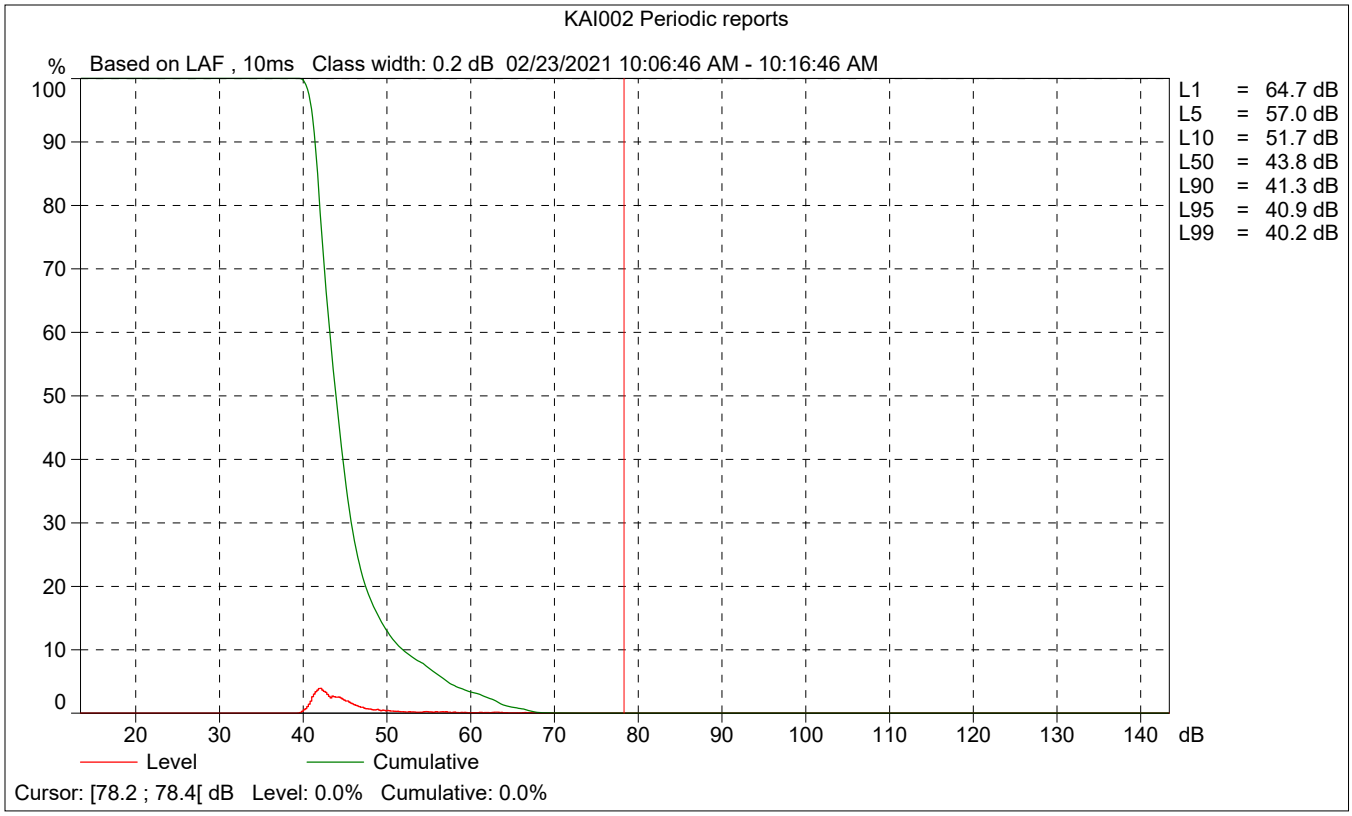

KAI002
dB
02/23/2021 10:11:45 AM - 10:11:46 AM
140
120
100
80
60
40
20
0
12.50
31.50
63
125
250
500
1000
2000
4000
8000
16000
A
C
Hz
LZeq
Cursor: (A) Leq=45.0 dB


KAI002 Periodic reports
Sound
dB
140
120
100
80
60
40
20
10:10:00 AM
10:20:00 AM
10:30:00 AM
10:40:00 AM
10:50:00 AM
11:00:00 AM
LAIeq
LAFmax
LCpeak
LAFmin
Cursor: 02/23/2021 10:06:46 AM - 11:06:46 AM LAIeq=54.3 dB LAFmax=70.8 dB LCpeak=89.2 dB LAFmin=39.4 dB

KAI002 Periodic reports

	Start time	Elapsed time	Overload [%]	LAIeq [dB]	LAFmax [dB]	LAFmin [dB]
Value			0.00	54.3	70.8	39.4
Time	10:06:46 AM	0:10:00				
Date	02/23/2021					




KAI002 Periodic reports
% Based on LAF , 10ms Class width: 0.2 dB 02/23/2021 10:06:46 AM - 10:16:46 AM
100
90
80
70
60
50
40
30
20
10
0
20 30 40 50 60 70 80 90 100 110 120 130 140 dB
L1 = 64.7 dB
L5 = 57.0 dB
L10 = 51.7 dB
L50 = 43.8 dB
L90 = 41.3 dB
L95 = 40.9 dB
L99 = 40.2 dB
Level
Cumulative
Cursor: [78.2 ; 78.4[dB Level: 0.0% Cumulative: 0.0%

TRAFFIC NOISE LEVELS AND NOISE CONTOURS

Project Number: 178170
Project Name: Kaiser Permanente Riverside Medical Center Expansion Project
Scenario: Existing

Background Information

Model Description: FHWA Highway Noise Prediction Model (FHWA-RD-77-108) with California Vehicle Noise (CALVENO) Emission Levels.
Source of Traffic Volumes: Traffic Impact Analysis
Community Noise Descriptor: L_{dn}: _____ CNEL: X

Assumed 24-Hour Traffic Distribution:	Day	Evening	Night
Total ADT Volumes	77.50%	12.90%	9.60%
Medium-Duty Trucks	84.80%	4.90%	10.30%
Heavy-Duty Trucks	86.50%	2.70%	10.80%

Analysis Condition				Design		Vehicle Mix		Distance from Centerline of Roadway					
		Median	ADT	Speed	Alpha	Medium	Heavy	CNEL at	Distance to Contour				Calc
Roadway, Segment	Lanes	Width	Volume	(mph)	Factor	Trucks	Trucks	100 Feet	70 CNEL	65 CNEL	60 CNEL	55 CNEL	Dist
Magnolia Avenue													
between SR 91 Westbound Ramps and Filmore Street	4	52	27,066	40	0.5	1.8%	0.7%	65.2	-	103	222	477	100
between Filmore Street and Golden Avenue	4	52	26,681	40	0.5	1.8%	0.7%	65.1	-	102	220	473	100
between Golden Avenue and La Sierra Avenue	4	52	26,540	40	0.5	1.8%	0.7%	65.1	-	102	219	471	100
between La Sierra Avenue and Skofstad Street - Shopping Center Driveway	4	52	31,902	40	0.5	1.8%	0.7%	65.9	-	115	247	533	100
between Skofstad Street - Shopping Center Driveway and Shopping Center Driveway - Park Sierra Drive	4	52	27,105	40	0.5	1.8%	0.7%	65.2	-	103	222	478	100
between Shopping Center Driveway - Park Sierra Drive and Kaiser Driveway 3	4	52	28,384	40	0.5	1.8%	0.7%	65.4	-	106	229	493	100
between Kaiser Driveway 3 and Polk Street	4	52	29,566	40	0.5	1.8%	0.7%	65.6	-	109	235	506	100
between Polk Street and Banbury Drive	4	52	27,510	40	0.5	1.8%	0.7%	65.3	-	104	224	483	100
between Banbury Drive and Tyler Street	6	20	30,337	40	0.5	1.8%	0.7%	65.5	-	109	234	505	100
between Tyler Street and Hole Avenue – Hughes Alley	6	20	26,607	40	0.5	1.8%	0.7%	65.0	-	100	215	463	100
between Hole Avenue – Hughes Alley and Lowes Plaza Driveway – Harrison Street (South Branch)	6	20	35,709	40	0.5	1.8%	0.7%	66.3	-	121	261	563	100
between Lowes Plaza Driveway – Harrison Street (South Branch) and Harrison Street (North Branch)	5	20	32,140	40	0.5	1.8%	0.7%	65.6	-	110	237	511	100
La Sierra Avenue													
between Magnolia Avenue and Montlake Drive – Diana Avenue	4	20	30,973	45	0.5	1.8%	0.7%	66.5	59	127	273	587	100
between Montlake Drive – Diana Avenue and SR 91 Westbound Ramps	6	22	42,752	45	0.5	1.8%	0.7%	68.3	77	165	356	767	100
Park Sierra Avenue													
between Magnolia Avenue and Kaiser Driveway 1	2	12	6,763	25	0.5	1.8%	0.7%	54.7	-	-	44	95	100
between Kaiser Driveway 1 and Shopping Center Driveway - Kaiser Driveway 2	2	12	4,612	25	0.5	1.8%	0.7%	53.0	-	-	-	74	100
between Shopping Center Driveway - Kaiser Driveway 2 and Diana Avenue	2	12	7,777	25	0.5	1.8%	0.7%	55.3	-	-	49	105	100
Polk Street													
between Magnolia Avenue and Kaiser Driveway 5	3	12	5,327	40	0.5	1.8%	0.7%	57.5	-	-	68	147	100
between Kaiser Driveway 5 and Kaiser Driveway 6	2	12	3,337	40	0.5	1.8%	0.7%	55.4	-	-	50	107	100
between Kaiser Driveway 6 and Diana Avenue	2	0	5,301	40	0.5	1.8%	0.7%	57.4	-	-	67	145	100

"-" = contour is located within the roadway right-of-way.

TRAFFIC NOISE LEVELS AND NOISE CONTOURS

Project Number: 178170
Project Name: Kaiser Permanente Riverside Medical Center Expansion Project
Scenario: Existing+Project

Background Information

Model Description: FHWA Highway Noise Prediction Model (FHWA-RD-77-108) with California Vehicle Noise (CALVENO) Emission Levels.
Source of Traffic Volumes: Traffic Impact Analysis
Community Noise Descriptor: L_{dn}: _____ CNEL: X

Assumed 24-Hour Traffic Distribution:	Day	Evening	Night
Total ADT Volumes	77.50%	12.90%	9.60%
Medium-Duty Trucks	84.80%	4.90%	10.30%
Heavy-Duty Trucks	86.50%	2.70%	10.80%

Analysis Condition				Design		Vehicle Mix		Distance from Centerline of Roadway					
		Median	ADT	Speed	Alpha	Medium	Heavy	CNEL at	Distance to Contour				Calc
Roadway, Segment	Lanes	Width	Volume	(mph)	Factor	Trucks	Trucks	100 Feet	70 CNEL	65 CNEL	60 CNEL	55 CNEL	Dist
Magnolia Avenue													
between SR 91 Westbound Ramps and Filmore Street	4	52	28,308	40	0.5	1.8%	0.7%	65.4	-	106	228	492	100
between Filmore Street and Golden Avenue	4	52	27,923	40	0.5	1.8%	0.7%	65.3	-	105	226	487	100
between Golden Avenue and La Sierra Avenue	4	52	27,874	40	0.5	1.8%	0.7%	65.3	-	105	226	487	100
between La Sierra Avenue and Skofstad Street - Shopping Center Driveway	4	52	34,018	40	0.5	1.8%	0.7%	66.2	-	120	258	556	100
between Skofstad Street - Shopping Center Driveway and Shopping Center Driveway - Park Sierra Drive	4	52	29,221	40	0.5	1.8%	0.7%	65.5	-	108	233	502	100
between Shopping Center Driveway - Park Sierra Drive and Kaiser Driveway 3	4	52	29,603	40	0.5	1.8%	0.7%	65.6	-	109	235	507	100
between Kaiser Driveway 3 and Polk Street	4	52	30,210	40	0.5	1.8%	0.7%	65.7	-	111	238	514	100
between Polk Street and Banbury Drive	4	52	29,074	40	0.5	1.8%	0.7%	65.5	-	108	232	501	100
between Banbury Drive and Tyler Street	6	20	31,901	40	0.5	1.8%	0.7%	65.8	-	112	242	522	100
between Tyler Street and Hole Avenue – Hughes Alley	6	20	27,343	40	0.5	1.8%	0.7%	65.1	-	101	219	471	100
between Hole Avenue – Hughes Alley and Lowes Plaza Driveway – Harrison Street (South Branch)	6	20	36,353	40	0.5	1.8%	0.7%	66.3	-	123	264	569	100
between Lowes Plaza Driveway – Harrison Street (South Branch) and Harrison Street (North Branch)	5	20	32,784	40	0.5	1.8%	0.7%	65.7	-	112	240	518	100
La Sierra Avenue													
between Magnolia Avenue and Montlake Drive – Diana Avenue	4	20	31,203	45	0.5	1.8%	0.7%	66.6	59	127	274	590	100
between Montlake Drive – Diana Avenue and SR 91 Westbound Ramps	6	22	43,626	45	0.5	1.8%	0.7%	68.4	78	167	361	777	100
Park Sierra Avenue													
between Magnolia Avenue and Kaiser Driveway 1	2	12	8,074	25	0.5	1.8%	0.7%	55.5	-	-	50	107	100
between Kaiser Driveway 1 and Shopping Center Driveway - Kaiser Driveway 2	2	12	5,072	25	0.5	1.8%	0.7%	53.4	-	-	-	79	100
between Shopping Center Driveway - Kaiser Driveway 2 and Diana Avenue	2	12	8,237	25	0.5	1.8%	0.7%	55.5	-	-	51	109	100
Polk Street													
between Magnolia Avenue and Kaiser Driveway 5	3	12	6,753	40	0.5	1.8%	0.7%	58.6	-	-	80	173	100
between Kaiser Driveway 5 and Kaiser Driveway 6	2	12	3,521	40	0.5	1.8%	0.7%	55.7	-	-	51	111	100
between Kaiser Driveway 6 and Diana Avenue	2	0	5,485	40	0.5	1.8%	0.7%	57.6	-	-	69	148	100

"-" = contour is located within the roadway right-of-way.

TRAFFIC NOISE LEVELS AND NOISE CONTOURS

Project Number: 178170
Project Name: Kaiser Permanente Riverside Medical Center Expansion Project
Scenario: Cumulative (2040)

Background Information

Model Description: FHWA Highway Noise Prediction Model (FHWA-RD-77-108) with California Vehicle Noise (CALVENO) Emission Levels.
Source of Traffic Volumes: Traffic Impact Analysis
Community Noise Descriptor: L_{dn}: _____ CNEL: X

Assumed 24-Hour Traffic Distribution:	Day	Evening	Night
Total ADT Volumes	77.50%	12.90%	9.60%
Medium-Duty Trucks	84.80%	4.90%	10.30%
Heavy-Duty Trucks	86.50%	2.70%	10.80%

Analysis Condition				Design		Vehicle Mix		Distance from Centerline of Roadway					
		Median	ADT	Speed	Alpha	Medium	Heavy	CNEL at	Distance to Contour				Calc
Roadway, Segment	Lanes	Width	Volume	(mph)	Factor	Trucks	Trucks	100 Feet	70 CNEL	65 CNEL	60 CNEL	55 CNEL	Dist
Magnolia Avenue													
between SR 91 Westbound Ramps and Filmore Street	4	52	34,243	40	0.5	1.8%	0.7%	66.2	-	120	259	559	100
between Filmore Street and Golden Avenue	4	52	33,858	40	0.5	1.8%	0.7%	66.2	-	119	257	554	100
between Golden Avenue and La Sierra Avenue	4	52	36,039	40	0.5	1.8%	0.7%	66.4	-	124	268	578	100
between La Sierra Avenue and Skofstad Street - Shopping Center Driveway	4	52	38,255	40	0.5	1.8%	0.7%	66.7	-	130	279	601	100
between Skofstad Street - Shopping Center Driveway and Shopping Center Driveway - Park Sierra Drive	4	52	32,078	40	0.5	1.8%	0.7%	65.9	-	115	248	535	100
between Shopping Center Driveway - Park Sierra Drive and Kaiser Driveway 3	4	52	32,978	40	0.5	1.8%	0.7%	66.0	-	117	253	545	100
between Kaiser Driveway 3 and Polk Street	4	52	34,160	40	0.5	1.8%	0.7%	66.2	-	120	259	558	100
between Polk Street and Banbury Drive	4	52	32,777	40	0.5	1.8%	0.7%	66.0	-	117	252	542	100
between Banbury Drive and Tyler Street	6	20	37,151	40	0.5	1.8%	0.7%	66.4	-	124	268	578	100
between Tyler Street and Hole Avenue – Hughes Alley	6	20	34,075	40	0.5	1.8%	0.7%	66.1	-	118	253	545	100
between Hole Avenue – Hughes Alley and Lowes Plaza Driveway – Harrison Street (South Branch)	6	20	49,273	40	0.5	1.8%	0.7%	67.7	70	150	324	697	100
between Lowes Plaza Driveway – Harrison Street (South Branch) and Harrison Street (North Branch)	5	20	44,221	40	0.5	1.8%	0.7%	67.0	63	136	294	632	100
La Sierra Avenue													
between Magnolia Avenue and Montlake Drive – Diana Avenue	4	20	39,011	45	0.5	1.8%	0.7%	67.5	69	148	318	685	100
between Montlake Drive – Diana Avenue and SR 91 Westbound Ramps	6	22	50,493	45	0.5	1.8%	0.7%	69.0	86	185	398	857	100
Park Sierra Avenue													
between Magnolia Avenue and Kaiser Driveway 1	2	12	7,953	25	0.5	1.8%	0.7%	55.4	-	-	49	106	100
between Kaiser Driveway 1 and Shopping Center Driveway - Kaiser Driveway 2	2	12	6,239	25	0.5	1.8%	0.7%	54.3	-	-	42	90	100
between Shopping Center Driveway - Kaiser Driveway 2 and Diana Avenue	2	12	9,404	25	0.5	1.8%	0.7%	56.1	-	-	55	119	100
Polk Street													
between Magnolia Avenue and Kaiser Driveway 5	3	12	6,265	40	0.5	1.8%	0.7%	58.2	-	-	76	164	100
between Kaiser Driveway 5 and Kaiser Driveway 6	2	12	3,924	40	0.5	1.8%	0.7%	56.1	-	-	55	119	100
between Kaiser Driveway 6 and Diana Avenue	2	0	6,234	40	0.5	1.8%	0.7%	58.1	-	35	75	161	100

"-" = contour is located within the roadway right-of-way.

TRAFFIC NOISE LEVELS AND NOISE CONTOURS

Project Number: 178170
Project Name: Kaiser Permanente Riverside Medical Center Expansion Project
Scenario: Cumulative (2040)+Project

Background Information

Model Description: FHWA Highway Noise Prediction Model (FHWA-RD-77-108) with California Vehicle Noise (CALVENO) Emission Levels.
Source of Traffic Volumes: Traffic Impact Analysis
Community Noise Descriptor: L_{dn}: _____ CNEL: X

Assumed 24-Hour Traffic Distribution:	Day	Evening	Night
Total ADT Volumes	77.50%	12.90%	9.60%
Medium-Duty Trucks	84.80%	4.90%	10.30%
Heavy-Duty Trucks	86.50%	2.70%	10.80%

Analysis Condition				Design		Vehicle Mix		Distance from Centerline of Roadway					
		Median	ADT	Speed	Alpha	Medium	Heavy	CNEL at	Distance to Contour				Calc
Roadway, Segment	Lanes	Width	Volume	(mph)	Factor	Trucks	Trucks	100 Feet	70 CNEL	65 CNEL	60 CNEL	55 CNEL	Dist
Magnolia Avenue													
between SR 91 Westbound Ramps and Filmore Street	4	52	35,485	40	0.5	1.8%	0.7%	66.4	-	123	265	572	100
between Filmore Street and Golden Avenue	4	52	35,100	40	0.5	1.8%	0.7%	66.3	-	122	264	568	100
between Golden Avenue and La Sierra Avenue	4	52	37,373	40	0.5	1.8%	0.7%	66.6	-	128	275	592	100
between La Sierra Avenue and Skofstad Street - Shopping Center Driveway	4	52	40,371	40	0.5	1.8%	0.7%	66.9	-	134	289	623	100
between Skofstad Street - Shopping Center Driveway and Shopping Center Driveway - Park Sierra Drive	4	52	34,194	40	0.5	1.8%	0.7%	66.2	-	120	259	558	100
between Shopping Center Driveway - Park Sierra Drive and Kaiser Driveway 3	4	52	34,197	40	0.5	1.8%	0.7%	66.2	-	120	259	558	100
between Kaiser Driveway 3 and Polk Street	4	52	34,804	40	0.5	1.8%	0.7%	66.3	-	122	262	565	100
between Polk Street and Banbury Drive	4	52	34,341	40	0.5	1.8%	0.7%	66.2	-	121	260	560	100
between Banbury Drive and Tyler Street	6	20	38,715	40	0.5	1.8%	0.7%	66.6	-	128	276	594	100
between Tyler Street and Hole Avenue – Hughes Alley	6	20	34,811	40	0.5	1.8%	0.7%	66.1	-	119	257	553	100
between Hole Avenue – Hughes Alley and Lowes Plaza Driveway – Harrison Street (South Branch)	6	20	49,917	40	0.5	1.8%	0.7%	67.7	70	152	327	704	100
between Lowes Plaza Driveway – Harrison Street (South Branch) and Harrison Street (North Branch)	5	20	44,865	40	0.5	1.8%	0.7%	67.1	64	138	296	639	100
La Sierra Avenue													
between Magnolia Avenue and Montlake Drive – Diana Avenue	4	20	39,241	45	0.5	1.8%	0.7%	67.6	69	148	319	688	100
between Montlake Drive – Diana Avenue and SR 91 Westbound Ramps	6	22	51,367	45	0.5	1.8%	0.7%	69.1	87	187	402	866	100
Park Sierra Avenue													
between Magnolia Avenue and Kaiser Driveway 1	2	12	9,264	25	0.5	1.8%	0.7%	56.1	-	-	55	118	100
between Kaiser Driveway 1 and Shopping Center Driveway - Kaiser Driveway 2	2	12	6,699	25	0.5	1.8%	0.7%	54.7	-	-	44	95	100
between Shopping Center Driveway - Kaiser Driveway 2 and Diana Avenue	2	12	9,864	25	0.5	1.8%	0.7%	56.3	-	-	57	123	100
Polk Street													
between Magnolia Avenue and Kaiser Driveway 5	3	12	7,691	40	0.5	1.8%	0.7%	59.1	-	-	87	188	100
between Kaiser Driveway 5 and Kaiser Driveway 6	2	12	4,108	40	0.5	1.8%	0.7%	56.3	-	-	57	123	100
between Kaiser Driveway 6 and Diana Avenue	2	0	6,418	40	0.5	1.8%	0.7%	58.2	-	35	76	165	100

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