AIRFIELD & TERMINAL
MODERNIZATION PROJECT

LOS ANGELES INTERNATIONAL AIRPORT (LAX)

DRAFT ENVIRONMENTAL IMPACT REPORT (DRAFT EIR)

Appendix F
Noise

[State Clearinghouse No. 2019049020]

City of Los Angeles
Los Angeles World Airports

LAWA
LOS ANGELES WORLD AIRPORTS

October 2020

Appendix F – Noise

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Appendix F.1 Aircraft Noise Analysis Technical Report

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LAX Airfield and Terminal Modernization Project Draft EIR

Aircraft Noise Analysis

Technical Report

HMMH Project Number 310480
October 2020

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1. Background

HMMH conducted the aircraft noise analysis for the Los Angeles International Airport (LAX) Airfield and Terminal Modernization Project to meet the requirements of the California Environmental Quality Act (CEQA). The purpose of this technical report is to document the aircraft noise modeling approach and input assumptions.

The aircraft noise analysis included a baseline study year (2018) plus one future year (2028) for a total of one (1) baseline year and one (1) forecast year. Therefore, the resulting aircraft noise contours and analysis represent 2018 and 2028 conditions. The one (1) future year (2028) includes with and without project scenarios.

The subsequent sections address the Federal Aviation Administration's (FAA's) Aviation Environmental Design Tool (AEDT),[1] Version 3b inputs developed under the following categories:

- Physical description of the airport layout
- Aircraft operations
- Aircraft noise and performance characteristics
- Runway utilization
- Terrain data
- Meteorological conditions

2. Physical Description of the Airport Layout

LAX is located within the City of Los Angeles and has four (4) runways: 06L/24R, 06R/24L, 07L/25R, and 07R/25L. Figure 1 shows the Airport Diagram and **Table 1** provides the runway specifications required for aircraft noise modeling.

Each end of the runways is designated by a number that, with the addition of a trailing "0", reflects the magnetic heading of the runway to the nearest ten (10) degrees, as seen by the pilot. The runways are oriented on approximate magnetic heading of:

- Runway 06L/24R: 60º and 240º and is 8,926 feet long by 150 feet wide
- Runway 06R/24L: 60º and 240º and is 10,885 feet long by 150 feet wide
- Runway 07L/25R: 70º and 250º and is 12,923 feet long and 150 feet wide
- Runway 07R/25L: 70º and 250º and is 11,095 feet long and 200 feet wide

Runway length, runway width, instrumentation, and declared distances may affect which aircraft might use a particular runway and under what conditions and, therefore, how often a runway would be used relative to the other runways at the airport.

[1] Information regarding AEDT documentation and FAA guidance is available on the official website for AEDT at https://aedt.faa.gov/.

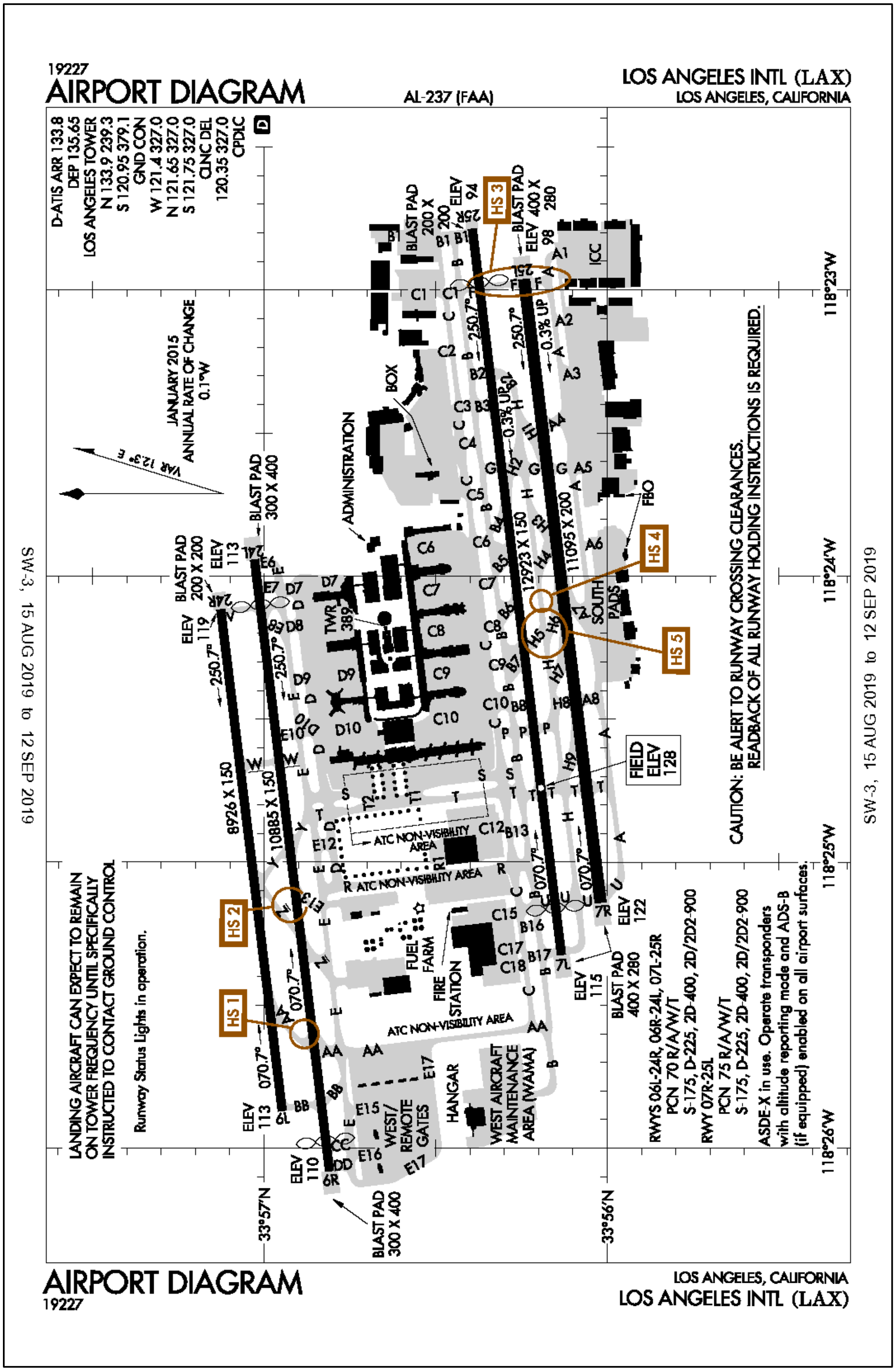

Figure 1. Existing Airport Diagram

Source: FAA, Effective, 15 August 2019 to 11 September 2019

Table 1. Runway Data

Runway	Latitude	Longitude	Elevation (ft. MSL)	Length (ft.)	Approach Angle (degrees)	Displaced Arrival Thresholds (ft)
06L	33.949112472	-118.431159861	113.1	8,926	3.0	0
24R	33.95210392	-118.4019489	118.9	8,926	3.0	0
06R	33.94681578	-118.4346678	109.9	10,885	3.0	537
24L	33.95046328	-118.399046	112.9	10,885	3.0	801
07L	33.93555178	-118.4220649	114.8	12,923	3.0	832
25R	33.93987789	-118.3797779	94.3	12,923	3.0	957
07R	33.93364939	-118.4190183	121.7	11,095	3.0	0
25L	33.93736303	-118.3827139	97.8	11,095	3.0	0
Source: FAA AEDT Version 3b.						

3. Aircraft Operations

Title 14 of the Code of Federal Regulations Part 150 (14 CFR Part 150) and its table of noise/land use compatibility guidelines require the calculation of "yearly Day-Night Average Sound Level (DNL)" values. In California, the Community Noise Equivalent Level, or CNEL, is the recognized noise metric and is allowed by the FAA to replace DNL for the purposes of airport planning.[2] The daily noise exposure (in CNEL) is averaged over a year and is typically a calendar year. AEDT produces these values of exposure utilizing an "average annual day" of airport operations. HMMH analyzed aircraft operations and fleet mix data prepared by Ricondo & Associates, Inc. to develop the average annual day's operations for all modeling scenarios.

Run-up and helicopter operations were not included in the noise analyses due to their periodic, infrequent occurrences during a typical calendar year[3] and the resultant negligible contributions to LAX's overall aircraft noise characteristics. **Table 2** provides the annual operations by aircraft category for 2018 baseline conditions and projected conditions for future year 2028.

Table 2. Annual Operations by Aircraft Category

Category	2018	2028
Passenger	657,394	735,941
Cargo	33,722	38,696
General Aviation	11,004	12,070
Air Taxi	12,069	12,780
Military	355	355
Total	**714,543**	**799,843**
Source: Ricondo & Associates, Inc. Note: Totals may not match exactly due to rounding.		

2 Because California already had a well-established airport community noise metric in CNEL, and because CNEL and DNL are so similar, FAA expressly allows CNEL to be used in lieu of DNL in noise assessments performed for California airports. See U.S. Department of Transportation, Federal Aviation Administration, *1050.1F Desk Reference, V.2*, page 11-2, February 2020. Available: https://www.faa.gov/about/office_org/headquarters_offices/apl/environ_policy_guidance/policy/faa_nepa_order/desk_ref/media/desk-ref.pdf.

3 A total of 912 helicopter operations were positively identified in the calendar year 2018 data set, which corresponds to approximately 0.1% of total operations.

The aircraft operations format for entering data into AEDT includes day, evening, and night arrivals, departures, and pattern/touch-and-go operations (as appropriate) expressed in terms of an average annual day. The average annual day operations are determined by dividing the annual operations by 365 days.

Table 3 presents the average annual daily operations by aircraft type for 2018. **Table 4** presents the average annual daily operations by aircraft type projected for 2028.

Table 3. Annual Average Daily Operations by Aircraft Type (2018)

ANP Aircraft ID	Arrivals				Departures				Grand Total
	Day	Evening	Night	Total	Day	Evening	Night	Total	
7478	0.0000	0.9725	1.9450	2.9175	0.9725	0.0000	1.9450	2.9175	5.8350
717200	11.6701	3.8900	0.0000	15.5601	10.6976	3.8900	0.9725	15.5601	31.1202
737400	0.9725	0.0000	0.9725	1.9450	0.9725	0.0000	0.9725	1.9450	3.8900
737700	75.8554	23.3401	16.5326	115.7281	78.7729	18.4776	15.5601	112.8106	228.5386
737800	123.5081	37.9277	31.1202	192.5559	127.3981	24.3126	42.7902	194.5009	387.0569
747400	6.8075	0.9725	4.8625	12.6426	4.8625	1.9450	5.8350	12.6426	25.2851
757300	13.6151	1.9450	4.8625	20.4226	15.5601	0.9725	3.8900	20.4226	40.8452
767300	10.6976	1.9450	6.8075	19.4501	5.8350	2.9175	10.6976	19.4501	38.9002
767400	0.0000	0.0000	0.9725	0.9725	0.9725	0.0000	0.0000	0.9725	1.9450
777200	5.8350	0.0000	0.9725	6.8075	5.8350	0.9725	0.0000	6.8075	13.6151
777300	8.7525	0.9725	0.9725	10.6976	8.7525	0.0000	2.9175	11.6701	22.3676
757PW	17.5051	5.8350	5.8350	29.1751	20.4226	1.9450	6.8075	29.1751	58.3503
757RR	3.8900	1.9450	0.0000	5.8350	2.9175	0.9725	1.9450	5.8350	11.6701
767CF6	0.0000	0.0000	0.9725	0.9725	0.0000	0.0000	1.9450	1.9450	2.9175
7773ER	25.2851	6.8075	5.8350	37.9277	20.4226	2.9175	15.5601	38.9002	76.8279
7878R	15.5601	2.9175	2.9175	21.3951	12.6426	2.9175	5.8350	21.3951	42.7902
A300-622R	0.9725	0.0000	1.9450	2.9175	1.9450	0.0000	1.9450	3.8900	6.8075
A319-131	27.2301	8.7525	4.8625	40.8452	27.2301	7.7800	4.8625	39.8727	80.7179
A320-211	51.5428	21.3951	13.6151	86.5529	57.3778	8.7525	20.4226	86.5529	173.1058
A321-232	56.4053	17.5051	18.4776	92.3880	63.2128	8.7525	20.4226	92.3880	184.7759
A330-301	0.9725	0.0000	0.0000	0.9725	0.9725	0.0000	0.0000	0.9725	1.9450
A330-343	6.8075	1.9450	1.9450	10.6976	7.7800	1.9450	1.9450	11.6701	22.3676
A340-211	2.9175	0.0000	0.0000	2.9175	2.9175	0.0000	0.0000	2.9175	5.8350
A340-642	0.9725	0.0000	0.0000	0.9725	0.9725	0.0000	0.0000	0.9725	1.9450
A380-841	7.7800	1.9450	1.9450	11.6701	5.8350	0.9725	4.8625	11.6701	23.3401
BD-700-1A11	2.9175	0.0000	0.0000	2.9175	0.9725	0.9725	0.0000	1.9450	4.8625
CL600	15.5601	2.9175	0.9725	19.4501	14.5876	3.8900	0.9725	19.4501	38.9002
CNA208	1.9450	0.9725	0.0000	2.9175	1.9450	0.9725	0.0000	2.9175	5.8350
CNA510	0.0000	0.9725	0.0000	0.9725	0.0000	0.0000	0.0000	0.0000	0.9725
CNA525C	0.9725	0.9725	0.9725	2.9175	1.9450	0.9725	0.0000	2.9175	5.8350
CNA55B	0.9725	0.0000	0.0000	0.9725	0.9725	0.0000	0.0000	0.9725	1.9450
CNA560U	0.9725	0.9725	0.0000	1.9450	0.9725	0.0000	0.0000	0.9725	2.9175
CNA750	1.9450	0.9725	0.0000	2.9175	4.8625	0.0000	0.0000	4.8625	7.7800
CRJ9-ER	21.3951	0.9725	0.0000	22.3676	17.5051	3.8900	0.9725	22.3676	44.7352
DC1010	0.0000	0.0000	0.9725	0.9725	0.0000	0.0000	0.9725	0.9725	1.9450
DC1030	0.9725	0.0000	0.9725	1.9450	0.0000	0.0000	0.9725	0.9725	2.9175
DHC6	6.8075	0.0000	0.0000	6.8075	3.8900	0.9725	0.9725	5.8350	12.6426
DHC830	3.8900	1.9450	0.0000	5.8350	3.8900	1.9450	0.0000	5.8350	11.6701
EMB120	1.9450	0.0000	0.0000	1.9450	1.9450	0.0000	0.0000	1.9450	3.8900
EMB145	0.0000	0.0000	0.0000	0.0000	0.9725	0.0000	0.0000	0.9725	0.9725
EMB175	102.1130	24.3126	7.7800	134.2057	102.1130	18.4776	13.6151	134.2057	268.4113
EMB190	0.9725	0.0000	0.0000	0.9725	0.9725	0.0000	0.0000	0.9725	1.9450
G650ER	0.0000	0.0000	0.0000	0.0000	0.9725	0.0000	0.0000	0.9725	0.9725
GIV	3.8900	0.0000	0.0000	3.8900	4.8625	0.0000	0.0000	4.8625	8.7525
GV	2.9175	0.0000	0.9725	3.8900	2.9175	0.0000	0.9725	3.8900	7.7800
LEAR35	0.9725	0.9725	0.0000	1.9450	0.0000	0.9725	0.0000	0.9725	2.9175
MD11GE	2.9175	0.0000	3.8900	6.8075	0.9725	2.9175	3.8900	7.7800	14.5876
MU3001	0.9725	0.0000	0.0000	0.9725	0.9725	0.0000	0.0000	0.9725	1.9450
PA42	3.8900	0.9725	0.0000	4.8625	3.8900	0.9725	0.0000	4.8625	9.7250
Total	**654.4957**	**177.9684**	**144.9032**	**977.3673**	**657.4132**	**127.3981**	**195.4735**	**980.2848**	**1957.6521**

Source: Ricondo & Associates, Inc.
Note: Totals may not match exactly due to rounding.

Table 4. Projected Annual Average Daily Operations by Aircraft Type (2028)

ANP Aircraft ID	Arrivals				Departures				Grand Total
	Day	Evening	Night	Total	Day	Evening	Night	Total	
7478	0.9726	0.9726	1.9453	3.8905	1.9453	0.0000	0.9726	2.9179	6.8085
717200	0.0000	0.9726	0.0000	0.9726	0.0000	0.9726	0.0000	0.9726	1.9453
737700	38.9055	12.6443	7.7811	59.3308	39.8781	12.6443	6.8085	59.3308	118.6617
737800	160.4851	36.9602	37.9328	235.3781	171.1841	20.4254	41.8234	233.4328	468.8109
747400	3.8905	0.0000	7.7811	11.6716	6.8085	0.9726	3.8905	11.6716	23.3433
757300	1.9453	0.9726	1.9453	4.8632	2.9179	0.9726	0.9726	4.8632	9.7264
767300	7.7811	0.0000	5.8358	13.6169	1.9453	2.9179	8.7537	13.6169	27.2338
777200	1.9453	0.0000	0.9726	2.9179	2.9179	0.0000	0.0000	2.9179	5.8358
777300	7.7811	0.9726	1.9453	10.6990	5.8358	1.9453	0.9726	8.7537	19.4527
737MAX8	22.3706	8.7537	6.8085	37.9328	27.2338	2.9179	7.7811	37.9328	75.8657
757PW	7.7811	2.9179	0.0000	10.6990	8.7537	0.9726	0.9726	10.6990	21.3980
757RR	1.9453	0.0000	0.0000	1.9453	0.0000	0.0000	1.9453	1.9453	3.8905
767CF6	0.0000	0.0000	0.9726	0.9726	0.0000	0.9726	3.8905	4.8632	5.8358
7773ER	28.2065	4.8632	4.8632	37.9328	20.4254	2.9179	12.6443	35.9876	73.9204
7878R	22.3706	6.8085	4.8632	34.0423	21.3980	1.9453	10.6990	34.0423	68.0846
A300-622R	0.0000	0.0000	1.9453	1.9453	1.9453	0.0000	0.9726	2.9179	4.8632
A319-131	22.3706	4.8632	1.9453	29.1791	21.3980	3.8905	2.9179	28.2065	57.3856
A320-211	41.8234	11.6716	9.7264	63.2214	41.8234	9.7264	10.6990	62.2488	125.4701
A321-232	123.5249	45.7139	33.0697	202.3085	133.2512	26.2612	42.7960	202.3085	404.6169
A330-301	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.9726	0.9726	0.9726
A330-343	16.5348	5.8358	8.7537	31.1244	23.3433	1.9453	5.8358	31.1244	62.2488
A340-211	0.9726	0.0000	0.0000	0.9726	0.9726	0.0000	0.0000	0.9726	1.9453
A350-941	28.2065	4.8632	5.8358	38.9055	27.2338	3.8905	7.7811	38.9055	77.8109
A380-841	13.6169	2.9179	3.8905	20.4254	10.6990	2.9179	6.8085	20.4254	40.8507
BD-700-1A11	2.9179	0.0000	0.0000	2.9179	0.9726	0.9726	0.0000	1.9453	4.8632
CL600	11.6716	2.9179	0.9726	15.5622	10.6990	3.8905	0.9726	15.5622	31.1244
CNA208	1.9453	0.9726	0.0000	2.9179	1.9453	0.9726	0.0000	2.9179	5.8358
CNA510	0.0000	0.9726	0.0000	0.9726	0.0000	0.0000	0.0000	0.0000	0.9726
CNA525C	2.9179	1.9453	0.0000	4.8632	3.8905	0.9726	0.0000	4.8632	9.7264
CNA55B	0.9726	0.0000	0.0000	0.9726	0.9726	0.0000	0.0000	0.9726	1.9453
CNA750	3.8905	0.9726	0.0000	4.8632	4.8632	0.0000	0.0000	4.8632	9.7264
CRJ9-ER	26.2612	0.9726	0.9726	28.2065	23.3433	4.8632	0.0000	28.2065	56.4129
DC1010	0.0000	0.0000	0.9726	0.9726	0.0000	0.0000	0.9726	0.9726	1.9453
DC1030	0.9726	0.0000	0.9726	1.9453	0.0000	0.0000	0.9726	0.9726	2.9179
DHC6	6.8085	0.0000	0.0000	6.8085	3.8905	0.9726	0.9726	5.8358	12.6443
DHC830	3.8905	1.9453	0.0000	5.8358	3.8905	1.9453	0.0000	5.8358	11.6716
EMB120	1.9453	0.0000	0.0000	1.9453	1.9453	0.0000	0.0000	1.9453	3.8905
EMB145	0.9726	0.0000	0.0000	0.9726	0.9726	0.0000	0.0000	0.9726	1.9453
EMB175	103.0995	25.2886	9.7264	138.1144	105.0448	18.4801	14.5896	138.1144	276.2288
EMB190	2.9179	0.0000	0.0000	2.9179	2.9179	0.0000	0.0000	2.9179	5.8358
G650ER	0.0000	0.0000	0.0000	0.0000	0.9726	0.0000	0.0000	0.9726	0.9726
GIV	3.8905	0.0000	0.0000	3.8905	4.8632	0.0000	0.0000	4.8632	8.7537
GV	2.9179	0.0000	0.9726	3.8905	2.9179	0.0000	0.9726	3.8905	7.7811
LEAR35	0.9726	0.9726	0.0000	1.9453	0.0000	0.9726	0.0000	0.9726	2.9179
MD11GE	2.9179	0.0000	3.8905	6.8085	0.9726	2.9179	3.8905	7.7811	14.5896
MU3001	0.9726	0.0000	0.0000	0.9726	0.9726	0.0000	0.0000	0.9726	1.9453
PA42	3.8905	0.9726	0.0000	4.8632	3.8905	0.9726	0.0000	4.8632	9.7264
Total	**740.1766**	**190.6368**	**167.2935**	**1098.1069**	**751.8482**	**137.1418**	**204.2537**	**1093.2438**	**2191.3507**

Source: Ricondo & Associates, Inc.
Note: Totals may not match exactly due to rounding.

4. Aircraft Noise and Performance Characteristics

To produce aircraft noise contours, specific noise and performance data must be entered into AEDT for each aircraft type operating at LAX. Noise data are included in the form of Sound Exposure Level (SEL) at a range of distances (from 200 feet to 25,000 feet) from a particular aircraft with engines at a specific thrust level. Performance data include thrust, speed, and altitude profiles for takeoff and landing operations. The AEDT database contains standard noise and performance data for more than 300 different fixed-wing aircraft types, most of which are civilian aircraft. AEDT automatically accesses the noise and performance data for takeoff and landing operations by those aircraft. A single aircraft substitution was made for future year 2028; the 737-10 (IATA Designator 7MX) is still in development and has not yet been certified or delivered to operators. The 737-10 will have a maximum takeoff weight of 197,900 pounds with CFM LEAP-1B engines. As such, HMMH selected the 737-9, which has a listed maximum takeoff weight of 194,700 and is the heaviest of the 737 MAX family available in AEDT, as the best appropriate substitution.

Within the AEDT database, aircraft takeoff or departure profiles are usually defined by a range of trip distances identified as "stage lengths." A longer trip distance or higher stage length is associated with a heavier aircraft due to the increase in fuel requirements for the flight. Stage length determinations were obtained from gated schedules derived from data analyzed by Ricondo & Associates, Inc.

Besides identifying the aircraft type in the database, AEDT has STANDARD and ICAO aircraft flight profiles for takeoffs, landings, and flight patterns or touch-and-go operations. HMMH utilized these standard profiles for all aircraft types for landings. HMMH has historically provided LAWA with AEDT aircraft noise contour results utilizing a proprietary preprocessor tool. The tool inputs into AEDT an unlimited number of modeled flight tracks using actual radar data that reflect real aircraft flight paths. Utilizing actual radar data spanning the entirety of calendar year 2018, provided to HMMH by LAX's Noise & Operations Monitoring System (NOMS) vendor, HMMH generated inputs to produce the aircraft noise contours.[4]

5. Runway Utilization

The primary factor affecting runway use at airports is weather; in particular, the wind direction and wind speed. Additional factors that may affect runway use include the position of the facility or ramp relative to the runways. HMMH derived the 2018 and 2028 runway utilization percentages based on analysis of the 2018 radar data from LAX's NOMS.

Runway utilization slightly varied between years because certain operational groupings (by aircraft type, arrival/departure status, time of day, and stage length) did not exist in the radar data, but were supplied in the operational forecasts from Ricondo & Associates, Inc. HMMH utilized the operations most similar to these groupings, editing the relevant parameters as required to fit the forecast data. **Table 5** presents the runway utilization percentages by scenario year and operational mode. There is no difference between runway utilization in the "With Project" vs. "Without Project" future case scenario (i.e., 2028); therefore, only one set of data is provided.

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[4] Data can be provided upon request by contacting LAWA's Environmental Planning Division at LAXPlanning@lawa.org or (800) 919-3766.

Table 5. Runway Utilization Percentages

Runway End	2018		2028	
	Arrival	Departure	Arrival	Departure
06L	0.7%	0.0%	0.8%	0.0%
06R	1.9%	0.3%	2.1%	0.3%
07L	0.0%	0.6%	0.0%	0.6%
07R	0.7%	0.0%	0.7%	0.0%
24L	0.5%	52.7%	0.4%	49.7%
24R	49.5%	0.2%	46.8%	0.2%
25L	46.1%	14.5%	48.6%	14.8%
25R	0.6%	31.7%	0.6%	34.4%
Total	**100.0%**	**100.0%**	**100.0%**	**100.0%**

Sources: LAX Noise & Operations Monitoring System (NOMS), 2018; HMMH, 2020.

6. Meteorological Conditions

AEDT has several settings that affect aircraft performance profiles and sound propagation based on meteorological data. Meteorological settings include average annual temperature, barometric pressure, and relative humidity at the airport. AEDT holds the following values for annual average weather conditions at LAX:

- Temperature: 63° F
- Pressure: 1011.29 millibars
- Sea-level Pressure: 1015.3 millibars
- Relative Humidity 73.47%
- Dew Point: 53.02° F
- Wind Speed: 6.67 Knots

7. Terrain Data

Terrain data describe the elevation of the ground surrounding the airport and on airport property. If the AEDT user selects the use of terrain data, AEDT uses terrain data to adjust the ground level under the flight paths. The terrain data does not affect the aircraft's performance or noise levels but does affect the vertical distance between the aircraft and a "receiver" on the ground. This, in turn, affects assumptions about how noise propagates over ground. The terrain data were obtained from the U.S. Geological Survey (USGS) National Map Viewer[5] and were used with the terrain feature of the AEDT in generating the aircraft noise contours for LAX.

[5] https://viewer.nationalmap.gov/advanced-viewer/

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Appendix F.2 Roadway Traffic Noise Analysis Technical Report

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LAX Airfield and Terminal Modernization Project Draft EIR

Roadway Traffic Noise Analysis

Technical Report

HMMH Project Number 310480
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Attachment A

1. Noise from Traffic on Off-Airport Roadways

This section provides the results of an analysis of traffic noise from the off-airport roadway network as part of the Airfield and Terminal Modernization Project (ATMP) at LAX International Airport (LAX).

1.1 General Approach and Methodology

The evaluation of project-related noise levels due to traffic on the off-airport roadway network includes a noise monitoring survey and traffic noise predictions using the latest version of the SoundPLAN noise model which implements the latest version of the Federal Highway Administration (FHWA) Traffic Noise Model (TNM Version 2.5).[1]

As discussed in detail below, the methods used during the noise monitoring survey were consistent with FHWA and California Department of Transportation (Caltrans) guidance and policies. The objectives of the noise monitoring survey were to document existing ambient noise levels in noise-sensitive locations adjacent to the off-airport roadway network and to provide a means for validating the traffic-noise prediction model. Short-term noise measurements were performed using a Bruel and Kjaer 2270 (ANSI Type I, "Precision") integrating sound level meter. This noise measurement instrument is calibrated on an annual basis by an independent certification laboratory, following methods and procedures traceable to the National Institute of Standards and Technology (Calibration, Appendix A). The sound level meter was calibrated in the field using a handheld acoustic calibrator at the beginning and end of each measurement period.

Traffic noise levels for the future forecast years, with and without the Project, were computed using the latest version of the SoundPLAN noise model which implements TNM Version 2.5 to compute traffic noise. Using hourly traffic volume data from the traffic demand model developed for the proposed Project, including vehicle mix and distributions, SoundPLAN was used to calculate hourly traffic noise levels expressed in terms of the hourly equivalent sound level (L_{eq}(h)) and the Community Noise Equivalent Level (CNEL) in A-weighted decibels (dBA). Shielding of traffic noise from buildings and effects from intervening terrain were included in the predictions. Traffic noise levels were calculated at receiver points throughout the analysis area representing noise-sensitive land uses that have frequent outdoor human use.

Relative to evaluation of potential impacts related to CNEL, aviation noise, which is a key component of the CNEL setting of the LAX area, was logarithmically added to the roadway CNEL computed for existing traffic noise to establish the existing overall ambient CNEL baseline used for the impacts analysis. Aviation noise levels were developed using the Aviation Environmental Design Tool (AEDT) using LAX Operations and fleet mix for the time period used in the analysis to generate the CNEL value.

Potential traffic noise impacts were evaluated with respect to thresholds of significance characterized by land use compatibility guidelines for traffic noise, as well as changes in the worst noise hour L_{eq} and CNEL.

The primary focus of the analysis presented in this report is on the evaluation of whether future increases in roadway traffic attributable to the ATMP would result in significant noise impacts. However, the future growth in passenger activity at LAX, which would occur with or without the proposed Project, would cause future increases in roadway traffic and future increases in aircraft operations. This increased roadway traffic and aircraft operations would, in turn, result in increased noise levels around the airport. As such, this report includes an evaluation of future noise levels associated with the combination of traffic noise and aircraft noise.

1.2 Regulatory Framework

When evaluating noise from sources other than aircraft arrivals and departures, such as noise from surface transportation improvements, the Federal Aviation Administration (FAA) directs project proponents to use

[1] U.S. Department of Transportation, Federal Highway Administration, *FHWA Traffic Noise Model, Version 1.0 User's Guide*. FHWA-PD-96-009, January 1998. Cambridge, MA: U.S. Department of Transportation, Research and Special Programs Administration, John A. Volpe National Transportation Systems Center, Acoustics Facility. Available: http://www.fhwa.dot.gov/environment/noise/traffic_noise_model/old_versions/tnm_version_10/users_guide/index.cfm.

methods developed by the applicable modal administration or agency.[2] In the case of highway traffic noise, FHWA has developed noise regulations that apply to Federal-aid highway construction projects, as discussed in the following section.

The evaluation of traffic noise for the LAX ATMP Draft EIR addresses the City of Los Angeles's regulatory framework as documented in the Noise Element of the City's General Plan. Significance criteria were developed based upon FHWA and Caltrans regulations and policies, as well as the Los Angeles Noise Element of the General Plan.

1.3 Significance Criteria

Significance criteria for traffic noise impacts were developed based on two different sound level descriptors (noise metrics). The worst-case (loudest hour, also referred to as "worst-hour noise") traffic noise L_{eq} is based upon FHWA and Caltrans regulations and guidelines, and the CNEL threshold is derived from the *L.A. CEQA Thresholds Guide*.[3]

1.3.1 Federal Highway Administration, 23 CFR 772

Title 23 of the Code of Federal Regulations, Part 772 (23 CFR 772) provides the framework and establishes the standards for the assessment and abatement of highway traffic noise in the United States.[4] FHWA published revised noise regulations on July 13, 2010, which then became effective on July 13, 2011. FHWA has also published a guidance document to support the new regulations.[5] The FHWA regulations in 23 CFR 772 apply to all federal or federal-aid highway projects authorized under Title 23, United States Code.

The FHWA established the Noise Abatement Criteria (NAC) shown in **Table 1** for different categories of land use activity to assess the degree of impact of highway traffic and noise on human activity. The NAC are given in terms of dBA L_{eq}(h). The A-weighted sound level is commonly used when measuring environmental noise to provide a single number descriptor that correlates with human subjective response to noise because the sensitivity of human hearing varies with frequency. The A-weighted sound level is widely accepted by acousticians as a proper unit for describing environmental noise. Most environmental noise (and the A-weighted sound level) fluctuates from moment to moment, and it is common practice to characterize the fluctuating level by a single number, L_{eq}. The L_{eq} is the value or level of a steady, non-fluctuating sound that represents the same sound energy as the actual time-varying sound evaluated over the same time period. For traffic noise assessment, L_{eq} is typically evaluated over a one-hour period and may be denoted as L_{eq}(h).

Traffic noise impact under federal guidelines (23 CFR 772.5) would occur for a particular activity category when predicted exterior noise levels approach or exceed the FHWA NAC during the loudest hour of the day for that category or when project-related noise creates a substantial noise increase over existing noise levels. With respect to the first criterion, residential land use is defined as Activity Category B, which has an NAC of 67 L_{eq}(h). Therefore, under this criterion, a traffic noise impact would occur where predicted exterior sound levels approach or exceed 67 dBA L_{eq}(h). FHWA requires state highway agencies to establish an approach level that is at least one decibel less than the NAC for Activity Categories A to E in Table 1. Caltrans defines the word "approach" in "approach or exceed" as within 1 decibel. [6] Therefore, for residential land use in Activity

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2 U.S. Department of Transportation, Federal Aviation Administration, *FAA Order 1050.1F Environmental Impacts: Policies and Procedures v. 2*. Appendix B-1.7, July 16, 2015.

3 City of Los Angeles. *L.A. CEQA Thresholds Guide, Your Resource for Preparing CEQA Analyses in Los Angeles*, 2006. Available: https://planning.lacity.org/odocument/cc8fb2f5-dc6c-47f1-bfc3-864b84621abb/CEQAThresholdsGuide.pdfCity.

4 U.S. Department of Transportation, Federal Highway Administration, *Procedures for Abatement of Highway Traffic Noise and Construction Noise, 75 Fed. Reg. 39,820,* July 13, 2010. Available: http://www.fhwa.dot.gov/environment/noise/regulations_and_guidance/.

5 U.S. Department of Transportation, Federal Highway Administration, FHWA-HEP-10-025, *Highway Traffic Noise: Analysis and Abatement Guidance*, December 2011. Available: http://www.fhwa.dot.gov/environment/noise/regulations_and_guidance/analysis_and_abatement_guidance/revguidance.pdf.

6 California Department of Transportation, Division of Environmental Analysis, *Traffic Noise Analysis Protocol for New Highway Construction, Reconstruction, and Retrofit Barrier Projects*, April 2020. Available: https://dot.ca.gov/-/media/dot-media/programs/environmental-analysis/documents/env/traffic-noise-protocol-april-2020-a11y.pdf.

Category B, the threshold for traffic noise impact is where exterior noise levels are within 1 decibel of 67 dBA L_{eq}(h), or 66 dBA. Under the second criterion, a traffic noise impact would occur when future With-Project noise levels cause a substantial increase over existing noise levels. This EIR uses the second criterion, and relies on Caltrans' definition of a substantial increase of 12 dBA is considered as the basis for determining a significant impact, as further described below. Wherever the traffic noise levels approach or exceed the NAC during the loudest hour of the day or cause a substantial increase in existing noise, consideration of traffic noise abatement measures is warranted. For this analysis, traffic noise levels from the off-airport roadway network were determined for Existing conditions and the future forecast year of 2028.

Table 1. Federal Highway Administration Noise Abatement Criteria

Activity Category	L_{eq}(h)[1]	Description of Activity Category
A	57 (Exterior)	Lands on which serenity and quiet are of extraordinary significance and serve an important public need and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose
B[2]	67 (Exterior)	Residential
C[2]	67 (Exterior)	Active sport areas, amphitheaters, auditoriums, campgrounds, cemeteries, day care centers, hospitals, libraries, medical facilities, parks, picnic areas, places of worship, playgrounds, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, recreation areas, Section 4(f) sites, schools, television studios, trails, and trail crossings
D	52 (interior)	Auditoriums, day care centers, hospitals, libraries, medical facilities, places of worship, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, schools, and television studios
E[2]	72 (exterior)	Hotels, motels, offices, restaurants/bars, and other developed lands, properties or activities not included in A-D or F
F	--	Agriculture, airports, bus yards, emergency services, industrial, logging, maintenance facilities, manufacturing, mining, rail yards, retail facilities, shipyards, utilities (water resources, water treatment, electrical), and warehousing
G	--	Undeveloped lands that are not permitted (without building permits)

Source: 23 CFR 772.
Notes:
1 Hourly equivalent A-weighted sound level (dBA).
2 Includes undeveloped lands permitted for this activity category.

1.3.2 California Department of Transportation, Traffic Noise Analysis Protocol

The FHWA regulations in 23 CFR 772 require state highway agencies to prepare updated state-specific policies and procedures for applying the regulation in their state. Caltrans policies and procedures for implementing 23 CFR 772 are contained in *Traffic Noise Analysis Protocol for New Highway Construction, Reconstruction, and Retrofit Barrier Projects* (the Protocol) in the State of California.[7] Caltrans also has published a guidance document that supplements the Protocol and serves to assist highway noise analysts with the technical aspects of traffic noise analysis.[8]

According to the Caltrans Protocol and consistent with 23 CFR 772, a traffic noise impact occurs when future project noise levels cause a substantial noise increase over existing noise. Specifically, a substantial increase

7 California Department of Transportation, Division of Environmental Analysis, *Traffic Noise Analysis Protocol for New Highway Construction, Reconstruction, and Retrofit Barrier Projects*, April 2020. Available: https://dot.ca.gov/-/media/dot-media/programs/environmental-analysis/documents/env/traffic-noise-protocol-april-2020-a11y.pdf.

8 California Department of Transportation, Division of Environmental Analysis, *Technical Noise Supplement to the Caltrans Traffic Noise Analysis Protocol – A Guide for the Measuring, Modeling, and Abating Highway Operation and Construction Noise Impacts*, Report No. CT-HWANP-RT-13-069.25.2, September 2013. Available: http://www.dot.ca.gov/env/noise/docs/tens-sep2013.pdf.

occurs when a project's predicted worst-hour design-year noise level exceeds the existing worst-hour noise level by 12 dBA or more.

1.4 City of Los Angeles Noise Regulation

1.4.1 City of Los Angeles Municipal Code

The City of Los Angeles Municipal Code (LAMC) (Section 41.40 and Chapter XI, Articles 1 through 6) provides regulations regarding allowable increases in noise levels in terms of established noise criteria. Supplementing these LAMC regulations, the City has also established CNEL guidelines that are used for land use planning purposes. Those regulations and guidelines are described in more detail below.

Chapter XI of the Los Angeles Municipal Code (City of Los Angeles Noise Ordinance) establishes acceptable ambient sound levels to regulate intrusive noises (e.g., stationary mechanical equipment and vehicles other than those traveling on public streets including, but not limited to, those used for construction activity, as further described below) within specific land use zones. In accordance with the City's Noise Ordinance, a noise level increase of 5 dBA over the existing average ambient noise level at an adjacent property line is considered a noise violation. For the purposes of determining whether or not a violation of the City of Los Angeles Noise Ordinance is occurring, the sound level measurements of an offending noise that has a duration of five minutes or less during a one-hour period is reduced by 5 dB to account for people's increased tolerance for short-duration noise events. In cases in which the actual measured ambient noise level is not known, the presumed ambient noise level, as indicated in **Table 2**, is used.

Table 2. City of Los Angeles Presumed Ambient Noise Levels

Zone	Daytime Hours[1] dBA (L_{eq})	Nighttime Hours[2] dBA (L_{eq})
Residential	50	40
Commercial	60	55
Manufacturing (M1, MR1, MR2)	60	55
Heavy Manufacturing (M2, M3)	65	65

Source: Los Angeles Municipal Code, Chapter XI, Article I, Section 111.03.

1 Daytime hours are between 7 a.m. and 10 p.m.

2 Nighttime hours are betwe4en 10 p.m. and 7 a.m.

1.4.2 City of Los Angeles, Noise Element of the General Plan

The City of Los Angeles has developed a Noise Element of the General Plan to guide in the development of noise regulations. The Noise Element of the City of Los Angeles General Plan addresses noise mitigation regulations, strategies, and programs and delineates federal, state, and City jurisdiction relative to rail, automotive, aircraft, and nuisance noise. The City of Los Angeles has adopted local guidelines based, in part, on the community noise compatibility guidelines established by the California Department of Health Services (CDHS) for use in assessing the compatibility of various land use types with a range of noise levels. CNEL guidelines for specific land uses are classified into four categories: (1) "normally acceptable," (2) "conditionally acceptable," (3) "normally unacceptable," and (4) "clearly unacceptable." As shown in **Table 3**, a CNEL value of 55 dBA is the upper limit of what is considered a "normally acceptable" noise environment for multi-family residential uses, although a CNEL as high as 65 dBA is considered "conditionally acceptable." The limit of what is considered "normally unacceptable" for residential uses is set at 75 dBA CNEL.

Table 3. City of Los Angeles Land Use / Noise Compatibility Guidelines

Land Use Category	Exterior Noise Exposure (CNEL in dBA)						
	50	55	60	65	70	75	80
Residential Single Family, Duplex, Mobile Home	A	C	C	C	N	U	U
Residential Multi-Family	A	A	C	C	N	U	U
Transient Lodging, Motel, Hotel	A	A	C	C	N	U	U
School, Library, Church, Hospital, Nursing Home	A	A	C	C	N	N	U
Auditorium, Concert Hall, Amphitheater	C	C	C	C/N	U	U	U
Sports Arena, Outdoor Spectator Sports	C	C	C	C	C/U	U	U
Playground, Neighborhood Park	A	A	A	A/N	N	N/U	U
Golf Course, Riding Stable, Water Recreation, Cemetery	A	A	A	A	N	A/N	U
Office Building, Business, Commercial, Professional	A	A	A	A/C	C	C/N	N
Agriculture, Industrial, Manufacturing, Utilities	A	A	A	A	A/C	C/N	N

Source: Based on Exhibit I in the City of Los Angeles General Plan, Noise Element, February 3, 1999. Available: https://planning.lacity.org/odocument/b49a8631-19b2-4477-8c7f-08b48093cddd/Noise_Element.pdf. (Additional policies within the Noise Element apply to land use categories exposed to aircraft noise).
A = Normally acceptable. Specified land use is satisfactory, based upon assumption buildings involved are conventional construction, without any special noise insulation.
C = Conditionally acceptable. New construction or development only after a detailed analysis of noise mitigation is made and needed noise insulation features are included in project design. Conventional construction, but with closed windows and fresh air supply systems or air conditioning normally will suffice.
N = Normally unacceptable. New construction or development generally should be discouraged. A detailed analysis of noise reduction requirements must be made, and noise insulation features included in the design of a project.
U = Clearly unacceptable. New construction or development generally should not be undertaken.

1.4.3 City of Los Angeles, L.A. CEQA Thresholds Guide

The City of Los Angeles' *L.A. CEQA Thresholds Guide*[9] provides a significance threshold for operational noise, including roadway noise. Per the Guide, a project would normally have a significant impact on noise levels from project operations if the project causes the ambient noise level measured at the property line of affected uses to increase by 3 dBA in CNEL to or within the "normally unacceptable" or "clearly unacceptable" category, or any 5 dBA or greater noise increase.

1.4.4 Significance Thresholds

For purposes of the EIR for the LAX ATMP Project, traffic noise impact will be considered significant if any of the following occur as a result of the proposed Project:

- If, as a direct result of roadway traffic from the Project, the ambient noise level measured at the property line of affected noise-sensitive uses were to increase by 3 dBA CNEL to or within the "normally unacceptable" or "clearly unacceptable" compatibility category, or by 5 dBA or greater within any category.
- If, as a direct result of roadway traffic from the Project, the worst noise (i.e., peak) hour L_{eq} due to traffic on the off-airport roadways would substantially exceed the existing L_{eq} (i.e. an increase of 12 dB, or more) at noise-sensitive receptors.

9 City of Los Angeles. *L.A. CEQA Thresholds Guide, Your Resource for Preparing CEQA Analyses in Los Angeles*, 2006. Available: https://planning.lacity.org/odocument/cc8fb2f5-dc6c-47f1-bfc3-864b84621abb/CEQAThresholdsGuide.pdf.

1.5 Existing Environment

A noise monitoring survey was conducted within the Project study area, consistent with FHWA and Caltrans recommended procedures. The objectives of the monitoring program were to document existing ambient roadway traffic noise levels in noise-sensitive locations and to provide a means for validation of the traffic noise prediction model.

Noise monitoring was conducted at eight short-term (30 minutes in duration) sites in October 2019. Measurement sites were generally located in areas that are representative of noise-sensitive land use exposed to noise from traffic on the off-airport roadway network. Traffic classification counts on the roadways nearest each measurement site were conducted simultaneously with each noise measurement. Due to presence of aircraft noise at LAX, 30-minute measurements were completed to get a longer representative sample. The short-term measurements characterized existing noise levels in the study area but were not necessarily conducted during the loudest hour of the day. They included contributions from sources other than traffic, such as aircraft. **Figure 1** shows the locations of the noise measurement sites within the Project study area. The short-term noise monitoring locations are shown in the study area graphic, and labeled with the prefix "M."

Caltrans guidance states that noise measurements should be 15-minutes or longer, between 8 a.m. and 5 p.m. and when traffic is not at a standstill, which are industry standards and recommended by the FHWA.[10] Industry standard best practice for noise measurements take into account environmental factors such as weather, measurements should be completed when temperatures are fairly standard and not too hot, too cold, or have relative humidity above 80%, wind must be below 15 mph of sustained gusts, the ground must be dry, and clear of ice and snow.

Short-term noise monitoring is not a process to determine design-year noise impacts or noise barrier locations. Short-term noise monitoring provides a level of consistency between what is present in real-world situations and how those situations are represented in the computer noise model. Short-term monitoring does not need to occur everywhere within the study area to validate the computer noise model.

The short-term data collection procedure involved measurement of one-second equivalent sound levels (L_{eq}(s)) over a period of 30 minutes. Continuous logging of events was conducted during the monitoring, so that intervals that included events that were not traffic-related could be excluded during the analysis. For each measurement period, a "Total L_{eq}" (includes non-contaminated sound level contributions from every 1-second interval) and a "Traffic-only L_{eq}" (excludes those intervals that contained noise events unrelated to traffic noise) were determined. By comparing the two totals, the significance of non-traffic events (such as aircraft operations) to the overall noise level can be determined for the measurement period.

The measured noise levels appear in **Table 4** as equivalent sound levels (L_{eq}). As described above, the L_{eq} is a sound-energy average of the fluctuating sound level (in A-weighted decibels, dBA) measured over a specified time. Table 4 provides a description of the measurement location, as well as the start time and the duration of the measurement. Measured noise levels are presented both in terms of the "Total L_{eq}" and in terms of the "Traffic-only L_{eq}".

As shown in Table 4, the Total L_{eq} ranged from a low of 59.2 dBA at the Westchester Recreation Center/Park (Site M-4) to a high of 76.2 dBA at 9800 Sepulveda Boulevard at the Hyatt Regency (Site M-7). However, at each measurement site (with the exception of M-8) the value of the Traffic-only L_{eq} is lower than the Total L_{eq}, which is an indication that noise from aircraft operations at LAX contributed to the overall noise level and, in some cases, was the dominant source of noise. The measured Traffic-only L_{eq} at Sites M-4, M-5, M-6, M-7 and M-8 was approximately 0.0 to 3.0 dBA lower than the Total L_{eq}, while the Traffic-only L_{eq} at Site M-2 was

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10 California Department of Transportation, Division of Environmental Analysis, *Technical Noise Supplement to the Caltrans Traffic Noise Analysis Protocol – A Guide for the Measuring, Modeling, and Abating Highway Operation and Construction Noise Impacts*, Report No. CT-HWANP-RT-13-069.25.2, September 2013. Available: http://www.dot.ca.gov/env/noise/docs/tens-sep2013.pdf.

approximately 10 dBA lower than the Total L_{eq}. As Site M-2 is located directly in the flight path of the beginning of the Runway 6L-24R approximately 1,400 away, aircraft arrivals to Runway 6L-24R dominated the noise environment at the time of the measurements.

hmmh

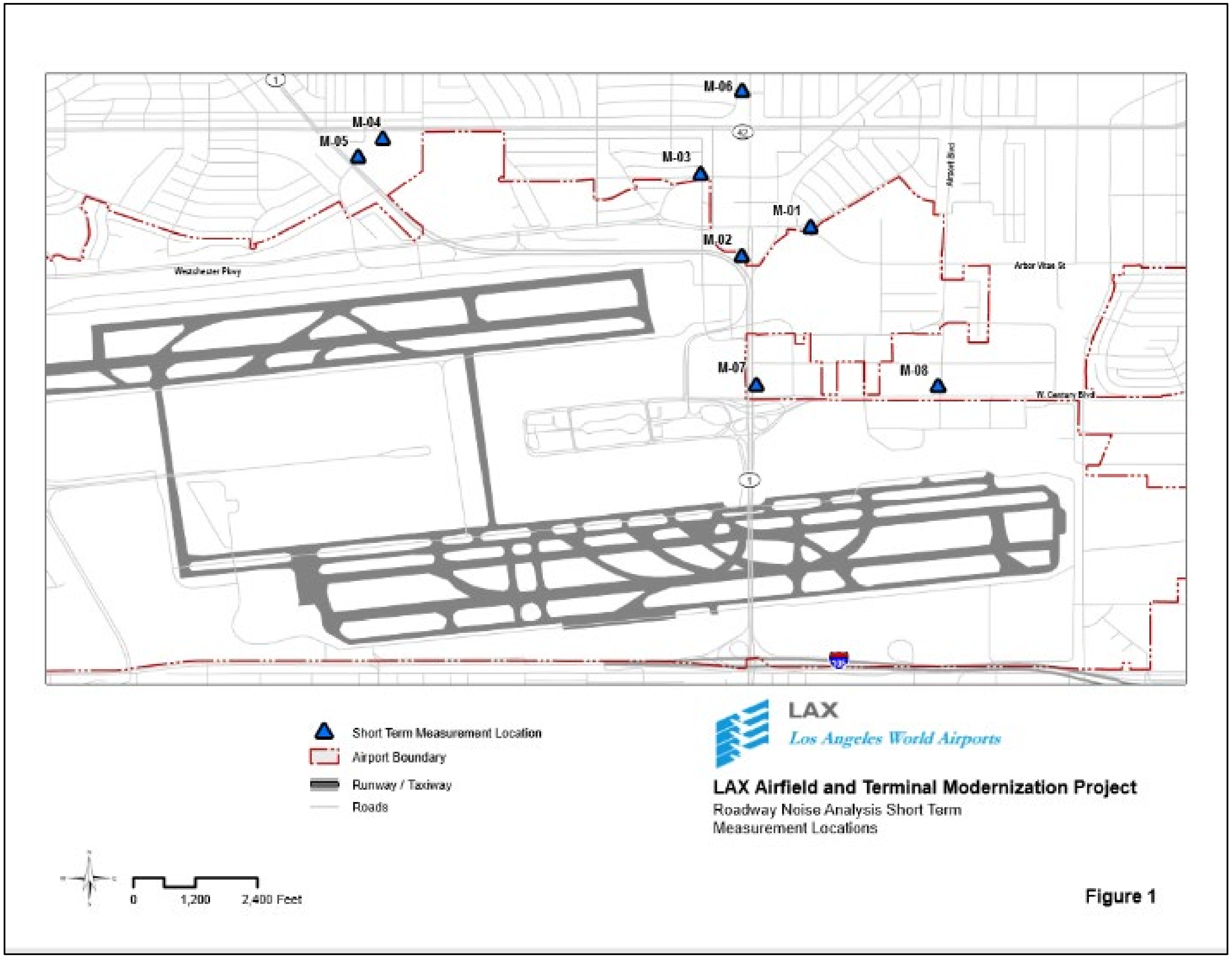

Figure 1. Locations of Short-term Noise Measurement Sites for the Analysis of Roadway Traffic Noise

Table 4. Summary of Short-term Noise Measurements

Site	Address / Location	Time Start (hh:mm:ss)	Date	Duration (minutes)	Measured Total L_{eq} (dBA)	Measured Traffic-only L_{eq} (dBA)	Calculated L_{eq} (dBA)	Difference between Calculated and Measured Traffic (dB)
M-1	Residences at Corner of Will Rogers and Westchester Parkway	9:39:49 a.m.	7-Oct-19	30	67.9	63.5	63.6	0.1
M-2	Airplane Landing Viewpoint Park	10:18:03 a.m.	7-Oct-19	30	75.7	65.8	63.2	-2.6
M-3	Residences at Corner of El Manor Avenue, West 88th Street, & La Tijera Road	11:00:46 a.m.	7-Oct-19	30	65.8	61.7	63.8	2.1
M-4	Westchester Recreation Center/Park	11:56:06 a.m.	7-Oct-19	30	59.2	58.9	56.1	-2.8
M-5	Westchester Senior Center	12:37:08 p.m.	7-Oct-19	30	59.3	58.8	57.1	-1.7
M-6	84th Place and Sepulveda Apartments	01:27:42 p.m.	7-Oct-19	30	68.6	67.4	65.7	-1.7
M-7	9800 Sepulveda Blvd front of Pool for Hyatt Regency	7:00:10 a.m.	8-Oct-19	30	76.2	73.2	73.2	0.0
M-8	Picnic Tables at business of Corner of Century Blvd and Airport Blvd	8:12:03 a.m.	8-Oct-19	30	63.2	63.2	64.4	1.2

Source: HMMH, 2019.

Traffic on the local off-airport roadway network, particularly Highway 1/Sepulveda & Lincoln Boulevard(s), also was a dominant source of noise in the absence of aircraft operations. Other sources of noise in the existing environment included, but were not limited to: biogenic sounds (birds and dogs), distant trains, and light building construction. **Attachment A** of this report provides details of the data acquired during the noise measurement program, including noise monitor output, site sketches, photographs, noise level data with site summary results, and traffic counts with hourly totals.

As described above, the Total L_{eq} noise levels shown in Table 4 account for traffic-related noise and non-traffic noise, such as from aircraft operations that may have occurred during the 30-minute noise measurement period. In such instances, that total noise level may be representative of the existing ambient noise level at that time for the noise-sensitive land use nearby; however, that is different from the existing ambient CNEL noise level for that area, which is also considered in the evaluation of the proposed Project, as presented later in this report. While the Total L_{eq} represents the ambient noise level during that 30-minute period, the CNEL represents the 24-hour hourly average ambient noise level with noise penalties applied to noise during evening and nighttime hours (i.e., a 5 dB penalty is applied to each hour between 7:00 p.m. and 10:00 p.m., and a 10 dB penalty is applied to each hour between 10:00 p.m. and 7:00 a.m.). As such, the 24-hour CNEL noise level will be different from the 30-minute Total L_{eq} noise level at any given location. In short, the short-term noise measurements were not intended to establish the existing baseline ambient noise levels in the Project area, but rather served to focus on the traffic-related noise in validating the efficiency of the traffic noise model for calculating roadway traffic noise levels.

A validation of the noise prediction model was conducted using the traffic counts obtained during the noise monitoring survey. Computed noise levels based on the normalized traffic count data[11] were compared to the corresponding measured noise levels, to confirm the accuracy of the method. As necessary, the modeling assumptions were refined by adjusting speed, roadway width, and removal of event data from measurements to obtain appropriate agreement between the computed and measured values.[12] The validated modeling assumptions at the measurement sites and for the existing geometry were then extended to the proposed Project in each of the future forecast years.

Computed noise levels at the measurement sites using the normalized traffic count data as input to SoundPLAN which implements the FHWA Traffic Noise Model computations (TNM Version 2.5) were slightly lower by approximately 0.7 dBA on average compared to the measured noise levels, with a standard deviation of the differences of 1.8 dBA. In addition, at none of the sites were the variations between measured and computed levels greater than 3 dBA. This agreement confirms that the noise prediction model is validated. The comparison of measured versus computed sound levels at the measurement sites is shown by the values in the rightmost column of the Table 4.

1.6 Evaluation of Traffic Noise Levels for the Future Forecast Years

This section summarizes the evaluation of noise levels due to traffic along the off-airport roadways affected by the proposed Project at LAX which were analyzed and as shown by representative locations in **Figure 2**.

1.6.1 Input to the Model

Traffic noise levels for the future forecast years, with and without the Project, were computed with SoundPLAN which implements the TNM Version 2.5 calculations using existing (Q1 2019) and forecast traffic data. The traffic data were provided as Average Daily Traffic (ADT) volumes for different sections of the study roadways for Existing, Without Project 2028, and Project 2028 conditions. For all future year scenarios, two forecast ADTs were provided for each section of roadway as follows:

- A “Without Project 2028” ADT, which is based upon the traffic demand model developed for the proposed Project and growth of traffic without the Project and implementation of the LAMP Project.
- A “Project 2028” ADT, which includes the growth in traffic that would occur at the airport based upon changes to airport access due to the proposed Project and implementation of the LAMP Project.

Using SoundPLAN model to implement the TNM Version 2.5 calculations of traffic noise, the $L_{eq}(h)$ and CNEL were calculated at locations considered to be representative of noise-sensitive uses near roadways that carry airport-related traffic, as may be affected by the proposed Project - see **Table 5**. The model includes elevation data from the United States Geologic Survey National Elevation Dataset,[13] and accounts for the locations of the roadways and shielding due to rows of buildings or intervening terrain. The model takes into account the width of the off-airport roadways, hourly vehicle volumes and speeds, vehicle mix, and sound propagation over different types of ground.

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11 Traffic counts obtained during the noise monitoring survey were normalized (scaled) to a period of one hour.

12 During the noise monitoring survey, traffic counts were obtained for the local roadway network (i.e. Sepulveda Boulevard, Westchester Parkway, etc.).

13 https://www.usgs.gov/core-science-systems/national-geospatial-program/national-map.

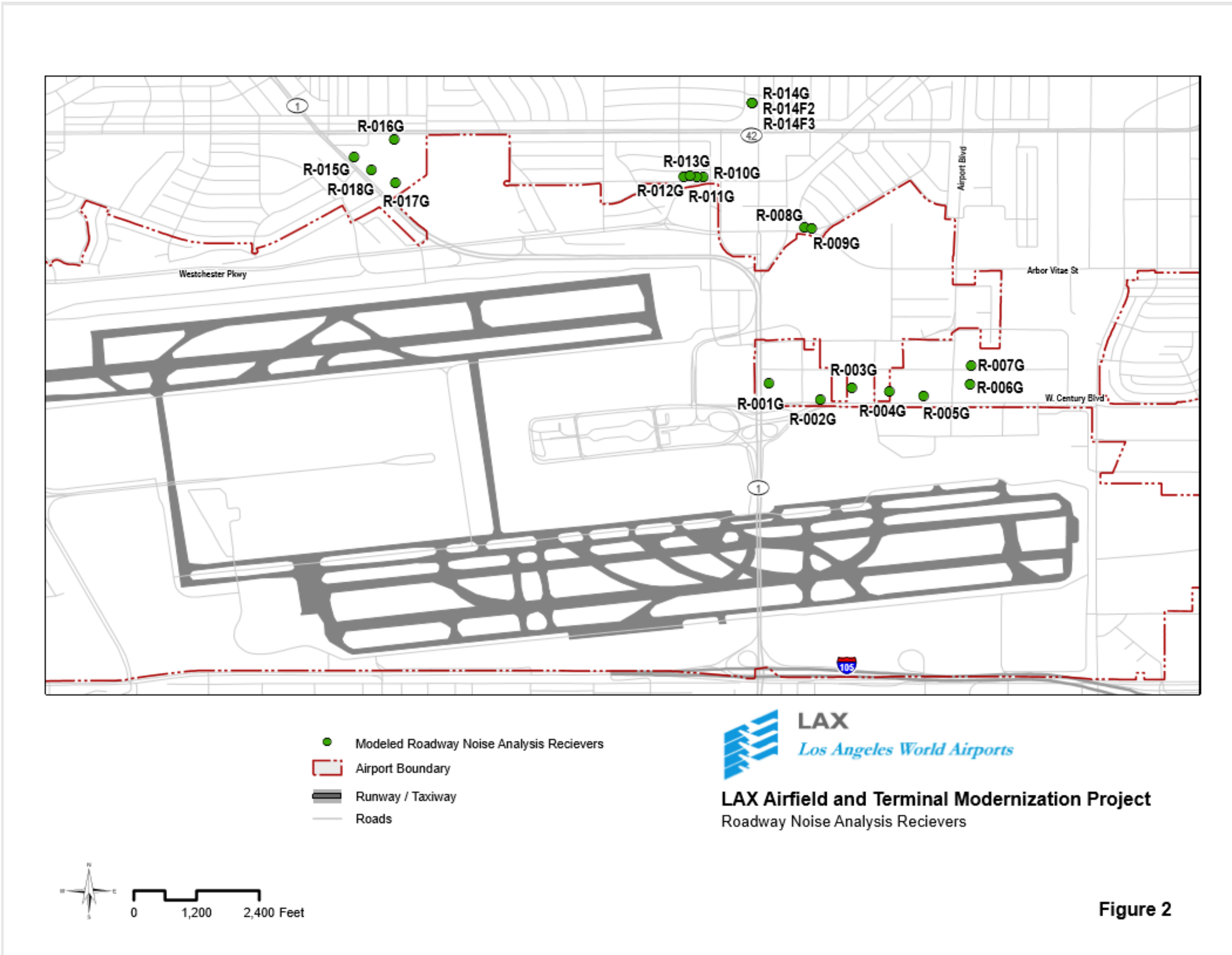

Figure 2. Locations of Noise Modeling Receiver Locations for the Analysis of Roadway Traffic Noise

Table 5. Modelling Locations with Land Use and Dominant Traffic Noise Roadway

Receiver ID	FHWA NAC Designation	Receptor Description	Land Use	Nearest Roadway Contribution
R-001G	E	Hyatt Regency Pool	Hotel	Sepulveda Boulevard
R-002G	E	H Hotel Pool	Hotel	Century Boulevard
R-003G	E	Sheraton Gateway Hotel Pool	Hotel	Century Boulevard
R-004G	E	Crowne Plaza Hotel Pool	Hotel	Century Boulevard
R-005G	E	Residence Inn Hotel Pool	Hotel	Century Boulevard
R-006G	E	Los Angeles Airport Marriott Pool	Hotel	Century Boulevard/Airport Boulevard
R-007G	E	Four Points Hotel Pool	Hotel	98th Street
R-008G	B	Westchester Parkway and Will Rogers Neighborhood	SF Residential	Westchester Parkway
R-009G	B	Westchester Parkway and Will Rogers Neighborhood	SF Residential	Westchester Parkway
R-010G	B	W 88th Street and La Tijera Neighborhood	SF Residential	La Tijera Boulevard
R-011G	B	W 88th Street and La Tijera Neighborhood	SF Residential	La Tijera Boulevard
R-012G	B	W 88th Street and La Tijera Neighborhood	SF Residential	La Tijera Boulevard
R-013G	B	W 88th Street and La Tijera Neighborhood	SF Residential	La Tijera Boulevard
R-014G	B	Sepulveda West Apartments	MF Residential (1st Floor)	Sepulveda Boulevard
R-014F2	B	Sepulveda West Apartments	MF Residential (2nd Floor)	Sepulveda Boulevard
R-014F3	B	Sepulveda West Apartments	MF Residential (3rd Floor)	Sepulveda Boulevard
R-015G	C	Westchester City Park	Recreation	Lincoln Boulevard
R-016G	C	Westchester City Park	Recreation	Lincoln Boulevard
R-017G	C	Westchester City Park	Recreation	Lincoln Boulevard
R-018G	c	Westchester City Park	Recreation	Lincoln Boulevard

Source: HMMH, 2020.
Key:
G = Ground Floor; F2 = Second Floor; F3 = Third Floor, SF = Single Family Residential; MF = Multi-Family Residential

TNM Version 2.5 also requires information about the types of vehicles and the hourly distributions of vehicles on the roadway network. The vehicle mixes and hourly distributions used for the modeling were based upon traffic derived from the regional traffic model, which were provided as vehicle volumes by each hour of the day for 13 vehicle classifications. Those data were compiled into the default vehicle types for TNM Version 2.5[14] and for the time periods shown in **Table 6**.

As noted earlier in Section 1.1, the primary focus of this report is on the assessment of roadway traffic noise impacts; however, an evaluation of combined future traffic noise and future aircraft noise is also provided. The methodology and assumptions associated with calculating aircraft noise levels are described in the *LAX Airfield and Terminal Modernization Project Draft EIR-Aircraft Noise Analysis Technical Report* (HMMH August 2020),

[14] U.S. Department of Transportation, Federal Highway Administration, *FHWA Traffic Noise Model, Version 1.0: Technical Manual*, Report No. FHWA-PD-96-010 and DOT-VNTSC-FHWA-98-2, February 1998. Cambridge, MA: U.S. Department of Transportation, Research and Special Programs Administration, John A. Volpe National Transportation Systems Center, Acoustics Facility. Available: http://www.fhwa.dot.gov/environment/noise/traffic_noise_model/old_versions/tnm_version_10/tech_manual/index.cfm.

provided under separate cover. In estimating the combined traffic and aircraft noise levels at each noise-sensitive receptor evaluated in this report, the AEDT aircraft noise model was used to calculate the future aircraft CNEL value at each receptor location, which was then added logarithmically to the traffic noise CNEL value for that location.

Table 6. Vehicle Mix as Percent of Average Daily Traffic (ADT) for Calculation of CNEL

Condition	Roadway Type	Vehicle Type	Percentages			Overall
			Daytime	Evening	Night	Percentage
Existing 2019	Arterial	Passenger Vehicle	60.8%	8.0%	25.5%	93%
		Medium Truck	1.9%	0.3%	0.8%	4%
		Heavy Truck	1.7%	0.3%	0.8%	3%
	Ramp	Passenger Vehicle	56.5%	8.5%	26.9%	92%
		Medium Truck	2.6%	0.4%	1.3%	4%
		Heavy Truck	2.6%	0.4%	1.3%	4%
	State-Route Full Access	Passenger Vehicle	63.7%	7.6%	25.6%	96%
		Medium Truck	1.3%	0.1%	0.4%	2%
		Heavy Truck	1.2%	0.2%	0.5%	2%
No Project 2028	Arterial	Passenger Vehicle	62.4%	7.2%	23.0%	92%
		Medium Truck	2.4%	0.4%	1.1%	4%
		Heavy Truck	2.1%	0.4%	1.1%	4%
	Ramp	Passenger Vehicle	57.7%	8.3%	26.7%	92%
		Medium Truck	2.1%	0.3%	1.1%	4%
		Heavy Truck	2.5%	0.5%	1.4%	4%
	State-Route Full Access	Passenger Vehicle	57.8%	9.0%	28.9%	96%
		Medium Truck	1.0%	0.1%	0.4%	1%
		Heavy Truck	1.7%	0.3%	0.9%	3%
Proposed Project 2028	Arterial	Passenger Vehicle	61.5%	7.4%	23.2%	92%
		Medium Truck	2.5%	0.4%	1.2%	4%
		Heavy Truck	2.3%	0.4%	1.3%	4%
	Ramp	Passenger Vehicle	58.0%	8.4%	26.7%	93%
		Medium Truck	1.9%	0.3%	1.0%	3%
		Heavy Truck	2.3%	0.4%	1.2%	4%
	State-Route Full Access	Passenger Vehicle	64.4%	7.3%	24.1%	96%
		Medium Truck	1.2%	0.1%	0.4%	2%
		Heavy Truck	1.4%	0.2%	0.6%	2%

Source: Traffic data provided by Fehr and Peers and compiled by HMMH, 2020.

1.6.2 Computed Traffic Noise Levels – Results

Table 7 provides the TNM-computed L_{eq}(h) for Existing conditions (from SoundPLAN) during the worst traffic hour of the day (5 p.m. to 6 p.m.) which was done by comparing traffic volumes of a 24-hour period of traffic generated by Fehr and Peers. Table 7 also summarizes the change in the Peak Hour Traffic L_{eq} for the proposed Project and the Without Project scenario in 2028 compared to Existing conditions. The change in the hourly L_{eq}(h) ranges from -2 to 5 dB relative to Existing conditions for the proposed Project 2028 and from -3 to 5 dB for Without Project conditions 2028. The largest increases in hourly traffic noise levels are expected to occur along new project roadways located east of Sepulveda Boulevard and north of Century Boulevard, as well as from future increases in traffic on existing roadways in that general area. The roadway noise receptor points addressed below in the impacts discussion represent clusters of noise-sensitive land uses in the Project area considered to be most affected by the future increases in traffic.

All the increases in the future hourly L_{eq}(h) relative to Existing conditions are less than 12 dB, which is one of the thresholds of significance. Consequently, the noise impacts from the proposed Project, based on this criterion would be less than significant.

Table 7. Change in Peak Hour Traffic Leq Compared to Existing Conditions

Receiver ID	FHWA NAC Designation	Land Use	Caltrans Approach Criteria	Existing 2019 Peak Hour Traffic Leq dBA Sound Level	No Project 2028 Peak Hour Traffic Leq Sound Level	Change between Existing and Without Project Traffic Leq Sound Levels	Project 2028 Peak Hour Traffic Leq Sound Levels	Change from between Existing and Project Traffic Leq Sound Levels	Significant Impact for Project?
R-001G	E	Hotel	71	53.0	49.8	-3.2	57.5	4.5	No
R-002G	E	Hotel	71	66.1	66.4	0.3	64.6	-1.5	No
R-003G	E	Hotel	71	54.7	59.6	4.9	59.9	5.2	No
R-004G	E	Hotel	71	54.9	56.3	1.4	57.9	3.0	No
R-005G	E	Hotel	71	62.5	64.3	1.8	62.7	0.2	No
R-006G	E	Hotel	71	52.6	53.9	1.3	54.4	1.8	No
R-007G	E	Hotel	71	58.1	61.3	3.2	61.7	3.6	No
R-008G	B	SF	66	63.9	66.4	2.5	64.1	0.2	No
R-009G	B	SF	66	62.6	65.1	2.5	62.8	0.2	No
R-010G	B	SF	66	44.4	45.5	1.1	45.2	0.8	No
R-011G	B	SF	66	44.3	45.5	1.2	45.0	0.7	No
R-012G	B	SF	66	43.3	43.7	0.4	43.4	0.1	No
R-013G	B	SF	66	44.6	45.6	1.0	45.2	0.6	No
R-014G	B	MF	66	49.0	51.6	2.6	48.4	-0.6	No
R-014F2	B	MF	66	51.8	54.3	2.5	51.2	-0.6	No
R-014F3	B	MF	66	58.4	61.3	2.9	58.1	-0.3	No
R-015G	C	Recreation	66	62.7	64.9	2.2	62.3	-0.4	No
R-016G	C	Recreation	66	56.3	55.7	-0.6	55.7	-0.6	No
R-017G	C	Recreation	66	54.8	56.7	1.9	54.3	-0.5	No
R-018G	C	Recreation	66	56.6	58.7	2.1	56.2	-0.4	No
Range of sound levels				**43 - 66**	**44 - 66**	**-3 - 5**	**43 - 65**	**-2 - 5**	

Source: HMMH, 2020.
Key:
G = Ground Floor; F2 = Second Floor; F3 = Third Floor, SF = Single Family Residential; MF = Multi-Family Residential

Table 8 provides the computed CNEL for Existing conditions based on the ADTs developed for this analysis for different sections of the study roadways. Table 8 also summarizes the change in the CNEL for the proposed Project and the Without Project scenario in 2028 relative to Existing conditions, as related to future changes in roadway traffic. There are no instances in which the future CNEL with the Project exceeds the Los Angeles allowable CNEL limit (i.e., the City's Land Use/Noise Compatibility Guidelines). There are also no locations where existing roadway traffic noise CNELs would be increased by 3 dBA or more where the Existing traffic noise levels are already at or above the acceptable land use sound levels. The Without Project scenario in 2028 would not have CNEL increases of 3 dBA or greater at any location and, therefore, would not exceed the acceptable land use noise level designation from the City of Los Angeles.

Table 8. Change in Average Daily Traffic CNEL Compared to Existing Conditions

Receiver ID	Los Angeles Development Land Use Designation	Los Angeles Development Land Use Noise Compatibility-Maximum Acceptable CNEL	Existing 2019 CNEL Sound Level	Without Project 2028 CNEL Sound Level	Change between Existing and Without Project CNEL Sound Levels	Project 2028 CNEL Sound Levels	Change from between Existing and Project CNEL Sound Levels	Significant Impact for Project?
R-001G	Hotel	70	71.8	71.7	-0.1	72.0	0.3	No
R-002G	Hotel	70	72.9	72.9	0.1	72.3	-0.6	No
R-003G	Hotel	70	69.1	69.8	0.7	70.0	0.8	No
R-004G	Hotel	70	69.7	69.8	0.1	70.1	0.4	No
R-005G	Hotel	70	71.9	72.5	0.5	72.0	0.0	No
R-006G	Hotel	70	70.7	70.7	0.0	70.8	0.1	No
R-007G	Hotel	70	70.0	70.7	0.6	70.8	0.8	No
R-008G	SF	70	72.9	73.8	0.9	73.0	0.0	No
R-009G	SF	70	72.6	73.3	0.7	72.6	0.0	No
R-010G	SF	70	68.8	68.8	0.0	68.8	0.0	No
R-011G	SF	70	68.8	68.9	0.0	68.8	0.0	No
R-012G	SF	70	68.9	68.9	0.0	68.9	0.0	No
R-013G	SF	70	68.9	68.9	0.0	68.9	0.0	No
R-014G	MF	70	63.9	64.2	0.3	63.9	-0.1	No
R-014F2	MF	70	64.3	64.7	0.4	64.2	-0.1	No
R-014F3	MF	70	66.0	67.5	1.4	65.9	-0.1	No
R-015G	Recreation	70	68.2	70.5	2.3	68.3	0.1	No
R-016G	Recreation	70	64.4	64.5	0.1	64.2	-0.2	No
R-017G	Recreation	70	65.3	66.0	0.8	65.2	0.0	No
R-018G	Recreation	70	65.2	66.5	1.3	65.2	0.0	No
Range of sound levels			-64 - 73	-64 - 74	0 - 2	64 - 73	-1 - 1	

Source: HMMH, 2020.
Key:
G = Ground Floor; F2 = Second Floor; F3 = Third Floor, SF = Single Family Residential; MF = Multi-Family Residential

1.6.3 Computed Noise Levels for Future Traffic Noise and Aircraft Noise Combined

The analysis above addresses the potential for significant roadway traffic noise impacts associated with future increases in roadway traffic associated with operation of the proposed Project in 2028. As noted in Section 1.1, increases in activity levels at LAX in the future, which would occur with or without the proposed Project, would result in more vehicle traffic and more aircraft operations. This increased roadway traffic and aircraft operations would, in turn, result in increased noise levels around the airport. **Table 9** presents the combined future roadway traffic CNEL and future aircraft CNEL calculated for each of the noise-sensitive receptors. The combined noise levels are evaluated in terms of CNEL and not evaluated relative to worst-hour L_{eq} as that metric and threshold are directed to the evaluation of changes in worse-hour (i.e., peak-hour) surface traffic. Moreover, the combination of traffic and aircraft noise in terms of CNEL characterizes overall daily (24-hour) noise exposure levels, including noise penalties for evening and nighttime noise for both roadway traffic noise and aircraft noise.

There are no locations where combined existing roadway traffic and aircraft noise CNELs would be increased by 3 dBA or more where the Existing traffic and aircraft combined noise levels are already at or above the acceptable land use sound levels. Similarly, the Without Project scenario in 2028 would not have CNEL increases of 3 dBA or greater at any location and, therefore, would not exceed the acceptable land use noise level designation from the City of Los Angeles.

Table 9. Change in Average Daily Traffic CNEL Compared to with Highway and Aviation Combined

Receiver ID	Los Angeles Development Land Use Designation	Los Angeles Development Land Use Noise Compatibility-Maximum Acceptable CNEL	Existing 2019 CNEL Sound Level	Without Project 2028 CNEL Sound Level	Change between Existing and Without Project CNEL Sound Levels	Project 2028 CNEL Sound Levels	Change from between Existing and Project CNEL Sound Levels	Significant Impact for Project?
R-001G	Hotel	70	71.8	71.5	-0.3	71.9	0.1	No
R-002G	Hotel	70	72.9	72.8	0.0	72.2	-0.7	No
R-003G	Hotel	70	69.1	69.7	0.6	69.8	0.7	No
R-004G	Hotel	70	69.7	69.6	-0.1	69.9	0.2	No
R-005G	Hotel	70	71.9	72.3	0.4	71.8	-0.2	No
R-006G	Hotel	70	70.7	70.5	-0.2	70.5	-0.2	No
R-007G	Hotel	70	70.0	70.5	0.4	70.6	0.6	No
R-008G	SF	70	72.9	73.9	1.0	73.1	0.1	No
R-009G	SF	70	72.6	73.4	0.8	72.7	0.2	No
R-010G	SF	70	68.8	68.6	-0.2	68.6	-0.2	No
R-011G	SF	70	68.8	68.7	-0.2	68.7	-0.2	No
R-012G	SF	70	68.9	68.7	-0.2	68.7	-0.2	No
R-013G	SF	70	68.9	68.7	-0.2	68.7	-0.2	No
R-014G	MF	70	63.9	64.0	0.1	63.7	-0.3	No
R-014F2	MF	70	64.3	64.5	0.3	64.0	-0.3	No
R-014F3	MF	70	66.0	67.4	1.3	65.8	-0.3	No
R-015G	Recreation	70	68.2	70.5	2.4	68.3	0.2	No
R-016G	Recreation	70	64.4	64.5	0.1	64.2	-0.2	No
R-017G	Recreation	70	65.3	66.1	0.9	65.3	0.1	No
R-018G	Recreation	70	65.2	66.5	1.3	65.3	0.1	No
Range of sound levels			**-64 - 73**	**-64 - 74**	**0-2**	**64 - 73**	**-1 - 1**	

Source: HMMH, 2020.

Attachment A

Noise Measurement Data
(Photos, Field Datasheets, Calibration Certificates)

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SHORT-TERM NOISE MEASUREMENT DATA SHEET

PROJECT: LAX ATMP

JOB NO.: 310480.002 Task 3

MEASUREMENT SITE NO.: STM-01

PERSONNEL: DST/VM

ADDRESS/DESCRIPTION: Will Rogers / Westchester Pwky

DATE: 10/7/2019

#	15 Minute Period Starting	Meas'd Leq (dBA)	√ or X	Autos	Medium Trucks	Heavy Trucks	Other Noise Sources	COMMENTS (Include Calibration Data)
1	9:37	68.3						
2								
3								
4								
5								
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								
21								
22								
23								
24								
25								
26								
27								
28								
29								
30								

TOTAL Leq =

SUBSET Leq =

√ = Other sources contributed to Leq

X = Exclude period - contaminated by non-characteristic sources

>> ADD SKETCH AND WEATHER CONDITIONS TO REVERSE OR OTHER SHEET <<

HARRIS MILLER MILLER & HANSON INC.

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PROJECT: LAX ATMP Roadway
JOB NO.: 310480.002 Task 3

TRAFFIC VOLUME COUNT DATA SHEET

ASSESSMENT AREA: ____________ START TIME: 9:37 am
MEASUREMENT SITE NO.: STM-01 END TIME: 10:09 am
ADDRESS/DESCRIPTION: Will Rogers/ Westchester Pkwy DATE: 10/7/2019
PERSONNEL: PST/VM

ROADWAY: Will Rogers/ Westchester Pkwy

		DIRECTION 1: EB	DIRECTION 2: WB
First Sample: 15 **minutes** **Start Time:** 9:37			
	Automobiles	111	105
	Medium Trucks (6 Tires)	17	2
	Heavy Trucks (>6 Tires)		1
	Average speed (mph)		
Second Sample: ____ **minutes** **Start Time:** ____			
	Automobiles		
	Medium Trucks (6 Tires)		
	Heavy Trucks (>6 Tires)		
	Average speed (mph)		
Third Sample: ____ **minutes** **Start Time:** ____			
	Automobiles		
	Medium Trucks (6 Tires)		
	Heavy Trucks (>6 Tires)		
	Average speed (mph)		
Fourth Sample: ____ **minutes** **Start Time:** ____			
	Automobiles		
	Medium Trucks (6 Tires)		
	Heavy Trucks (>6 Tires)		
	Average speed (mph)		

HARRIS MILLER MILLER & HANSON INC.

PROJECT: LAX ATMP

JOB NO.: 310480.002 Task 3

SHORT-TERM NOISE MEASUREMENT SITE LOG

ASSESSMENT AREA: Westchester Pkwy MEASUREMENT SITE NO.: STM-01

ADDRESS: Will Rogers / Westchester Pkwy

OWNER:

DESCRIPTION:

NOISE SOURCES: Plane, Trash truck, Construction, Street sweeper

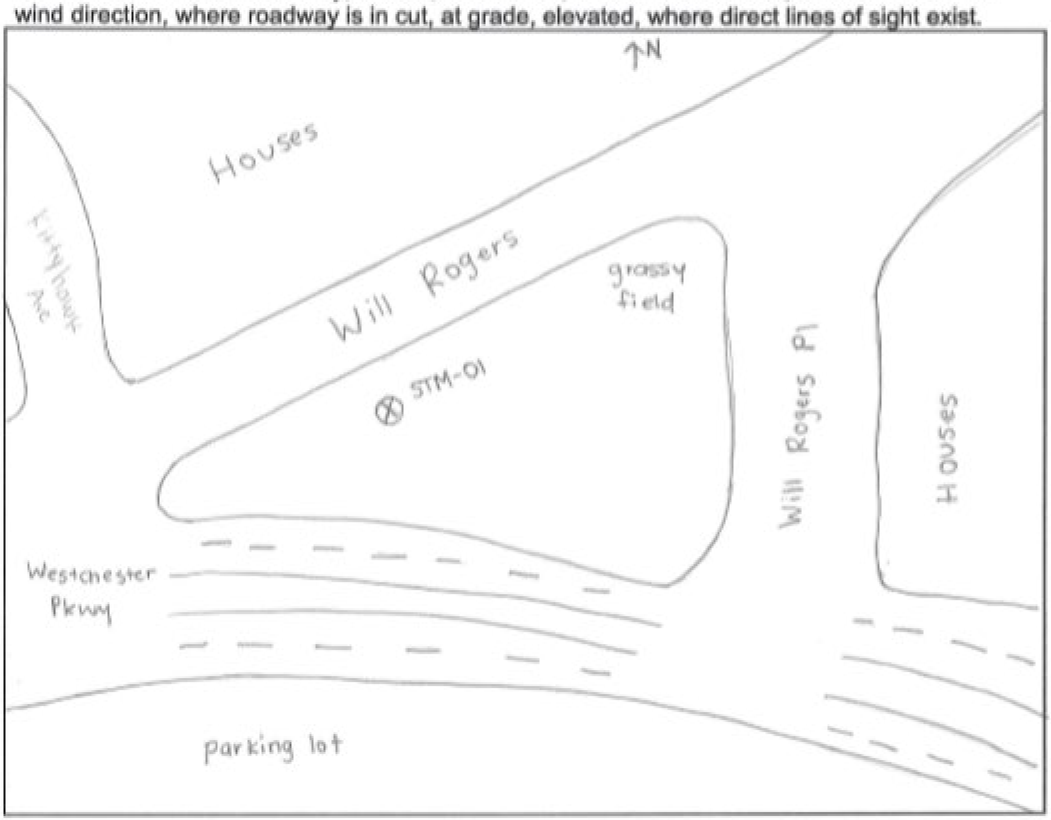
NOISE MONITOR: B&K 2270 KIT 1 S/N: 2579290

MICROPHONE: 4134-B&K S/N: 173368

CALIBRATOR: 1018 NORSONIC S/N: 14059

TEMP. RANGE (°F): 72 WEATHER CONDITIONS: Sunny, 60% humidit slow winds

SITE SKETCH: Show roadway, homes, local roads, reference distances, arrows for North & wind direction, where roadway is in cut, at grade, elevated, where direct lines of sight exist.



STM-01. Photos 1 & 2: Will Rogers/Westchester Parkway, facing East and West

SHORT-TERM NOISE MEASUREMENT DATA SHEET

PROJECT: LAX ATMP

JOB NO.: 310480.002 Task 3

MEASUREMENT SITE NO.: STM-02

PERSONNEL: DST/VM

ADDRESS/DESCRIPTION: In-N-Out Sepulveda

DATE: 10/7/2019

#	15 Minute Period Starting	Meas'd Leq (dBA)	√ or X	Autos	Medium Trucks	Heavy Trucks	Other Noise Sources	COMMENTS (Include Calibration Data)
1	10:18	75.7						
2								
3								
4								
5								
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								
21								
22								
23								
24								
25								
26								
27								
28								
29								
30								

TOTAL Leq =　　　SUBSET Leq =

√ = Other sources contributed to Leq　　X = Exclude period - contaminated by non-characteristic sources

>> ADD SKETCH AND WEATHER CONDITIONS TO REVERSE OR OTHER SHEET <<

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PROJECT: LAX ATMP Roadway
JOB NO.: 310480.002 Task 3

TRAFFIC VOLUME COUNT DATA SHEET

ASSESSMENT AREA:		START TIME:	10:18 am
MEASUREMENT SITE NO.:	STM-02	END TIME:	10:49 am
ADDRESS/DESCRIPTION:	In-N-Out	DATE:	10/7/2019
		PERSONNEL:	DST/VM

ROADWAY: In-N-Out Sepulveda

First Sample: 15 **minutes**
Start Time: 10:18

	DIRECTION 1: SB	DIRECTION 2: NB
Automobiles	276	240
Medium Trucks (6 Tires)	5	2
Heavy Trucks (>6 Tires)	3	1
Average speed (mph)		

Second Sample: ____ **minutes**
Start Time: ________

Automobiles		
Medium Trucks (6 Tires)		
Heavy Trucks (>6 Tires)		
Average speed (mph)		

Third Sample: ____ **minutes**
Start Time: ________

Automobiles		
Medium Trucks (6 Tires)		
Heavy Trucks (>6 Tires)		
Average speed (mph)		

Fourth Sample: ____ **minutes**
Start Time: ________

Automobiles		
Medium Trucks (6 Tires)		
Heavy Trucks (>6 Tires)		
Average speed (mph)		

HARRIS MILLER MILLER & HANSON INC.

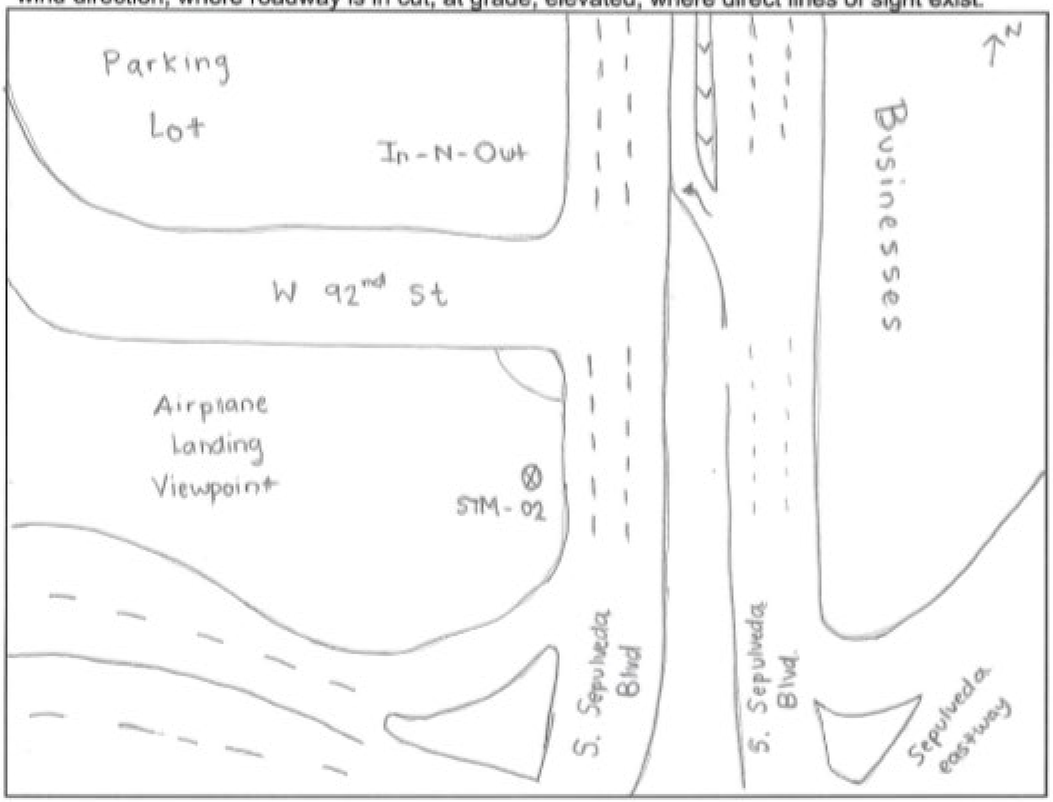
hmmh

PROJECT: LAX ATMP
JOB NO.: 310480.002 Task 3

SHORT-TERM NOISE MEASUREMENT SITE LOG

ASSESSMENT AREA: In-N-Out MEASUREMENT SITE NO.: STM-02
ADDRESS: In-N-Out Sepulveda
OWNER:
DESCRIPTION:
NOISE SOURCES: Plane
NOISE MONITOR: B&K 2270 KIT 1 S/N: 2579290
MICROPHONE: 4134-B&K S/N: 173368
CALIBRATOR: 1018 NORSONIC S/N: 14059
TEMP. RANGE (°F): 72 WEATHER CONDITIONS: Sunny, 60% humidity 9 mph wind

SITE SKETCH: Show roadway, homes, local roads, reference distances, arrows for North & wind direction, where roadway is in cut, at grade, elevated, where direct lines of sight exist.



hmmh

STM-02 Photos 1, 2. Airplane Landing Park, Sepulveda Blvd. Facing East and North.

hmmh

SHORT-TERM NOISE MEASUREMENT DATA SHEET

PROJECT: LAX ATMP
JOB NO.: 310480.002 Task 3
MEASUREMENT SITE NO.: STM-03
PERSONNEL: DST/VM
ADDRESS/DESCRIPTION: El Manor Ave, W 88th
DATE: 10/7/2019

#	15 Minute Period Starting	Meas'd Leq (dBA)	√ or X	Autos	Medium Trucks	Heavy Trucks	Other Noise Sources	COMMENTS (Include Calibration Data)
1	11:00	65.8						
2								
3								
4								
5								
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								
21								
22								
23								
24								
25								
26								
27								
28								
29								
30								

TOTAL Leq =
SUBSET Leq =

√ = Other sources contributed to Leq
X = Exclude period - contaminated by non-characteristic sources

>> ADD SKETCH AND WEATHER CONDITIONS TO REVERSE OR OTHER SHEET <<

HARRIS MILLER MILLER & HANSON INC.

hmmh

hmmh

PROJECT: LAX ATMP Roadway
JOB NO.: 310480.002 Task 3

TRAFFIC VOLUME COUNT DATA SHEET

ASSESSMENT AREA:		START TIME:	11:00
MEASUREMENT SITE NO.:	STM-03	END TIME:	11:31
ADDRESS/DESCRIPTION:	El Manor Ave, W 88th	DATE:	10/7/2019
		PERSONNEL:	DST/VM

ROADWAY:	El Manor Ave, W 88th	DIRECTION 1: EB	DIRECTION 2: WB
First Sample: 15 minutes Start Time: 11:00			
	Automobiles	19	36
	Medium Trucks (6 Tires)	1	
	Heavy Trucks (>6 Tires)		1
	Average speed (mph)		
Second Sample: ____ minutes Start Time: ____			
	Automobiles		
	Medium Trucks (6 Tires)		
	Heavy Trucks (>6 Tires)		
	Average speed (mph)		
Third Sample: ____ minutes Start Time: ____			
	Automobiles		
	Medium Trucks (6 Tires)		
	Heavy Trucks (>6 Tires)		
	Average speed (mph)		
Fourth Sample: ____ minutes Start Time: ____			
	Automobiles		
	Medium Trucks (6 Tires)		
	Heavy Trucks (>6 Tires)		
	Average speed (mph)		

HARRIS MILLER MILLER & HANSON INC.

PROJECT: LAX ATMP

JOB NO.: 310480.002 Task 3

SHORT-TERM NOISE MEASUREMENT SITE LOG

ASSESSMENT AREA: W 88th MEASUREMENT SITE NO.: STM - 03

ADDRESS: El Manor Ave, W 88th

OWNER:

DESCRIPTION:

NOISE SOURCES: Plane, Trash truck, Gardener

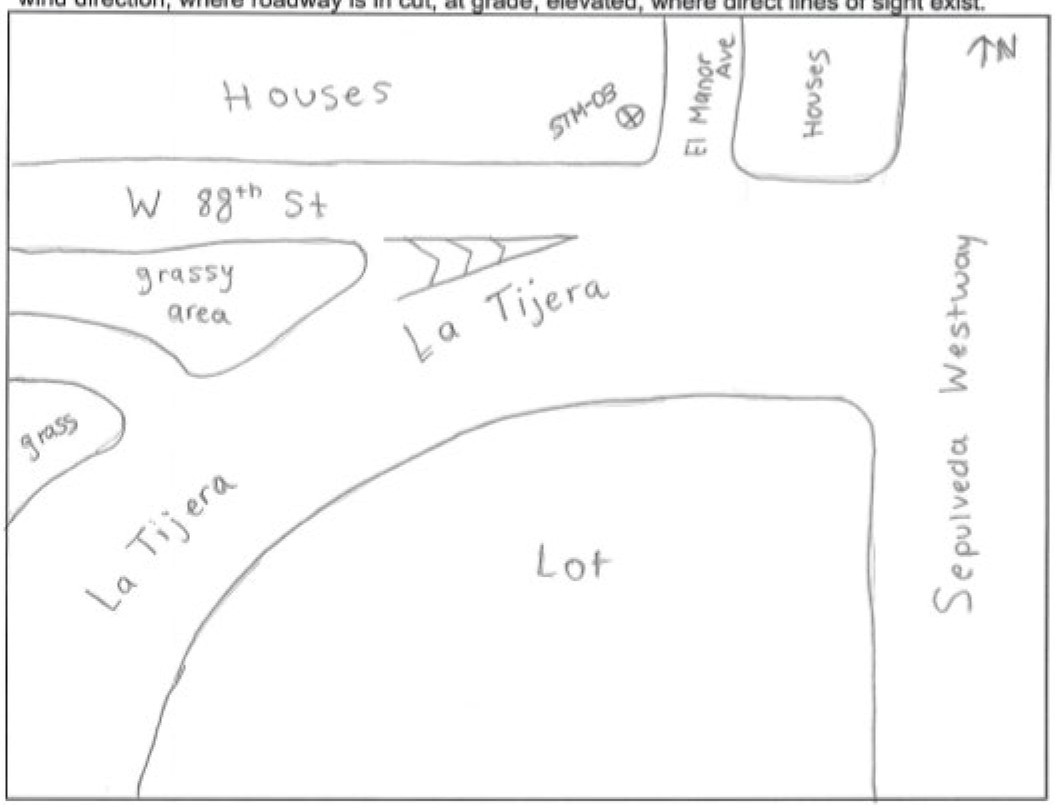
NOISE MONITOR: B&K 2270 KIT 1 S/N: 2579290

MICROPHONE: 4134-B&K S/N: 173368

CALIBRATOR: 1018 NORSONIC S/N: 14059

TEMP. RANGE (°F): 75 WEATHER CONDITIONS: Sunny, 47% humidit ~7 mph wind

SITE SKETCH: Show roadway, homes, local roads, reference distances, arrows for North & wind direction, where roadway is in cut, at grade, elevated, where direct lines of sight exist.



STM-03, photos 1 & 2. El Manor Ave., 88th St. Facing South.

hmmh

SHORT-TERM NOISE MEASUREMENT DATA SHEET

PROJECT: LAX ATMP

JOB NO.: 310480.002 Task 3

MEASUREMENT SITE NO.: STM-04

PERSONNEL: DST/VM

ADDRESS/DESCRIPTION: Westchester Recreation Center

DATE: 10/7/2019

#	15 Minute Period Starting	Meas'd Leq (dBA)	√ or X	Autos	Medium Trucks	Heavy Trucks	Other Noise Sources	COMMENTS (Include Calibration Data)
1	11:56	59.2						
2								
3								
4								
5								
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								
21								
22								
23								
24								
25								
26								
27								
28								
29								
30								

TOTAL Leq =

SUBSET Leq =

√ = Other sources contributed to Leq

X = Exclude period - contaminated by non-characteristic sources

>> ADD SKETCH AND WEATHER CONDITIONS TO REVERSE OR OTHER SHEET <<

HARRIS MILLER MILLER & HANSON INC.

hmmh

hmmh

PROJECT: LAX ATMP Roadway
JOB NO.: 310480.002 Task 3

TRAFFIC VOLUME COUNT DATA SHEET

ASSESSMENT AREA: ______
MEASUREMENT SITE NO.: STM - 04
ADDRESS/DESCRIPTION: Westchester Recreation Center
START TIME: 11:56
END TIME: 12:26
DATE: 10/7/2019
PERSONNEL: DST / VM

ROADWAY:	Westchester Recreation Center W Manchester	DIRECTION 1: EB	DIRECTION 2: WB
First Sample: 15 minutes Start Time: 11:56			
	Automobiles	103	103
	Medium Trucks (6 Tires)	2	4
	Heavy Trucks (>6 Tires)	2	1
	Average speed (mph)		
Second Sample: ____ **minutes** **Start Time:** ______			
	Automobiles		
	Medium Trucks (6 Tires)		
	Heavy Trucks (>6 Tires)		
	Average speed (mph)		
Third Sample: ____ **minutes** **Start Time:** ______			
	Automobiles		
	Medium Trucks (6 Tires)		
	Heavy Trucks (>6 Tires)		
	Average speed (mph)		
Fourth Sample: ____ **minutes** **Start Time:** ______			
	Automobiles		
	Medium Trucks (6 Tires)		
	Heavy Trucks (>6 Tires)		
	Average speed (mph)		

HARRIS MILLER MILLER & HANSON INC.

PROJECT: LAX ATMP

JOB NO.: 310480.002 Task 3

SHORT-TERM NOISE MEASUREMENT SITE LOG

ASSESSMENT AREA: W Manchester MEASUREMENT SITE NO.: STM-04

ADDRESS: Westchester Recreation Center, W Manchester

OWNER:

DESCRIPTION:

NOISE SOURCES: Plane

NOISE MONITOR: B&K 2270 KIT 1 S/N: 2579290

MICROPHONE: 4134-B&K S/N: 173368

CALIBRATOR: 1018 NORSONIC S/N: 14059

TEMP. RANGE (°F): 71 WEATHER CONDITIONS: Sunny, 61% humidity ~5 mph wind

SITE SKETCH: Show roadway, homes, local roads, reference distances, arrows for North & wind direction, where roadway is in cut, at grade, elevated, where direct lines of sight exist.

HARRIS MILLER MILLER & HANSON INC.

STM-04. Photos 1 and 2 Westchester recreation center, West Manchester. Facing West and North.

hmmh

SHORT-TERM NOISE MEASUREMENT DATA SHEET

PROJECT: LAX ATMP

JOB NO.: 310480.002 Task 3

MEASUREMENT SITE NO.: STM-05

PERSONNEL: DST/VM

ADDRESS/DESCRIPTION: Senior Center

DATE: 10/7/2019

#	15 Minute Period Starting	Meas'd Leq (dBA)	√ or X	Autos	Medium Trucks	Heavy Trucks	Other Noise Sources	COMMENTS (Include Calibration Data)
1	12:37	59.3						
2								
3								
4								
5								
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								
16								
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18								
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21								
22								
23								
24								
25								
26								
27								
28								
29								
30								

TOTAL Leq =

SUBSET Leq =

√ = Other sources contributed to Leq

X = Exclude period - contaminated by non-characteristic sources

>> ADD SKETCH AND WEATHER CONDITIONS TO REVERSE OR OTHER SHEET <<

HARRIS MILLER MILLER & HANSON INC.

hmmh

hmmh

PROJECT: LAX ATMP Roadway
JOB NO.: 310480.002 Task 3

TRAFFIC VOLUME COUNT DATA SHEET

ASSESSMENT AREA:		START TIME:	12:37
MEASUREMENT SITE NO.:	STM - 05	END TIME:	13:07
ADDRESS/DESCRIPTION:	Senior center	DATE:	10/7/2019
		PERSONNEL:	DST/VM

ROADWAY:	Senior Center Lincoln Blvd	DIRECTION 1: SB	DIRECTION 2: NB
First Sample: 15 minutes Start Time:			
	Automobiles	125	168
	Medium Trucks (6 Tires)	2	1
	Heavy Trucks (>6 Tires)		
	Average speed (mph)		
Second Sample: ____ **minutes** **Start Time:**			
	Automobiles		
	Medium Trucks (6 Tires)		
	Heavy Trucks (>6 Tires)		
	Average speed (mph)		
Third Sample: ____ **minutes** **Start Time:**			
	Automobiles		
	Medium Trucks (6 Tires)		
	Heavy Trucks (>6 Tires)		
	Average speed (mph)		
Fourth Sample: ____ **minutes** **Start Time:**			
	Automobiles		
	Medium Trucks (6 Tires)		
	Heavy Trucks (>6 Tires)		
	Average speed (mph)		

PROJECT: LAX ATMP

JOB NO.: 310480.002 Task 3

SHORT-TERM NOISE MEASUREMENT SITE LOG

ASSESSMENT AREA: Lincoln Blvd MEASUREMENT SITE NO.: STM-05

ADDRESS: Senior Center, Lincoln Blvd

OWNER:

DESCRIPTION:

NOISE SOURCES: Plane, Backup beeper

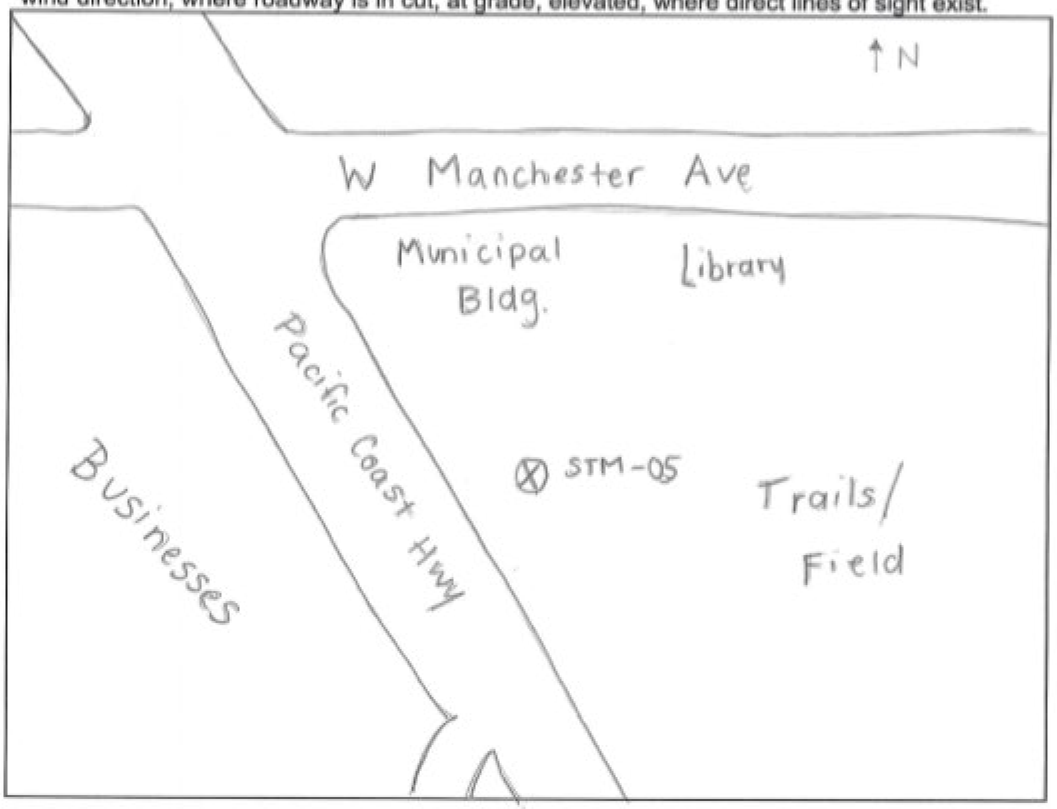
NOISE MONITOR: B&K 2270 KIT 1 S/N: 2579290

MICROPHONE: 4134-B&K S/N: 173368

CALIBRATOR: 1018 NORSONIC S/N: 14059

TEMP. RANGE (°F): 71 WEATHER CONDITIONS: Sunny, 61% humidity ~5 mph wind

SITE SKETCH: Show roadway, homes, local roads, reference distances, arrows for North & wind direction, where roadway is in cut, at grade, elevated, where direct lines of sight exist.



HARRIS MILLER MILLER & HANSON INC.

STM-05. Senior Center, Lincoln Blvd. Photos, 1 & 2 facing North and South.

hmmh

SHORT-TERM NOISE MEASUREMENT DATA SHEET

PROJECT: LAX ATMP

JOB NO.: 310480.002 Task 3

MEASUREMENT SITE NO.: STM-06

PERSONNEL: DST/VM

ADDRESS/DESCRIPTION: 84th Place | Sepulveda

DATE: 10/7/2019

#	15 Minute Period Starting	Meas'd Leq (dBA)	√ or X	Autos	Medium Trucks	Heavy Trucks	Other Noise Sources	COMMENTS (Include Calibration Data)
1	13:27	68.5						
2								
3								
4								
5								
6								
7								
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10								
11								
12								
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24								
25								
26								
27								
28								
29								
30								

TOTAL Leq =

SUBSET Leq =

√ = Other sources contributed to Leq

X = Exclude period - contaminated by non-characteristic sources

>> ADD SKETCH AND WEATHER CONDITIONS TO REVERSE OR OTHER SHEET <<

HARRIS MILLER MILLER & HANSON INC.

hmmh

PROJECT: LAX ATMP Roadway
JOB NO.: 310480.002 Task 3

TRAFFIC VOLUME COUNT DATA SHEET

ASSESSMENT AREA:		START TIME:	13:27
MEASUREMENT SITE NO.:	STM-06	END TIME:	13:58
ADDRESS/DESCRIPTION:	84th Place /	DATE:	10/7/2019
	Sepulveda	PERSONNEL:	DST / VM

ROADWAY: 84th Place / Sepulveda

		DIRECTION 1: SB	**DIRECTION 2:** NB
First Sample: 15 **minutes** **Start Time:** 13:27			
	Automobiles	258	184
	Medium Trucks (6 Tires)	4	
	Heavy Trucks (>6 Tires)	2	
	Average speed (mph)		
Second Sample: ____ **minutes** **Start Time:** ________			
	Automobiles		
	Medium Trucks (6 Tires)		
	Heavy Trucks (>6 Tires)		
	Average speed (mph)		
Third Sample: ____ **minutes** **Start Time:** ________			
	Automobiles		
	Medium Trucks (6 Tires)		
	Heavy Trucks (>6 Tires)		
	Average speed (mph)		
Fourth Sample: ____ **minutes** **Start Time:** ________			
	Automobiles		
	Medium Trucks (6 Tires)		
	Heavy Trucks (>6 Tires)		
	Average speed (mph)		

hmmh

PROJECT: LAX ATMP

JOB NO.: 310480.002 Task 3

SHORT-TERM NOISE MEASUREMENT SITE LOG

ASSESSMENT AREA: Sepulveda MEASUREMENT SITE NO.: STM-06

ADDRESS: 84th Place / Sepulveda

OWNER:

DESCRIPTION:

NOISE SOURCES: Plane, Skateboard

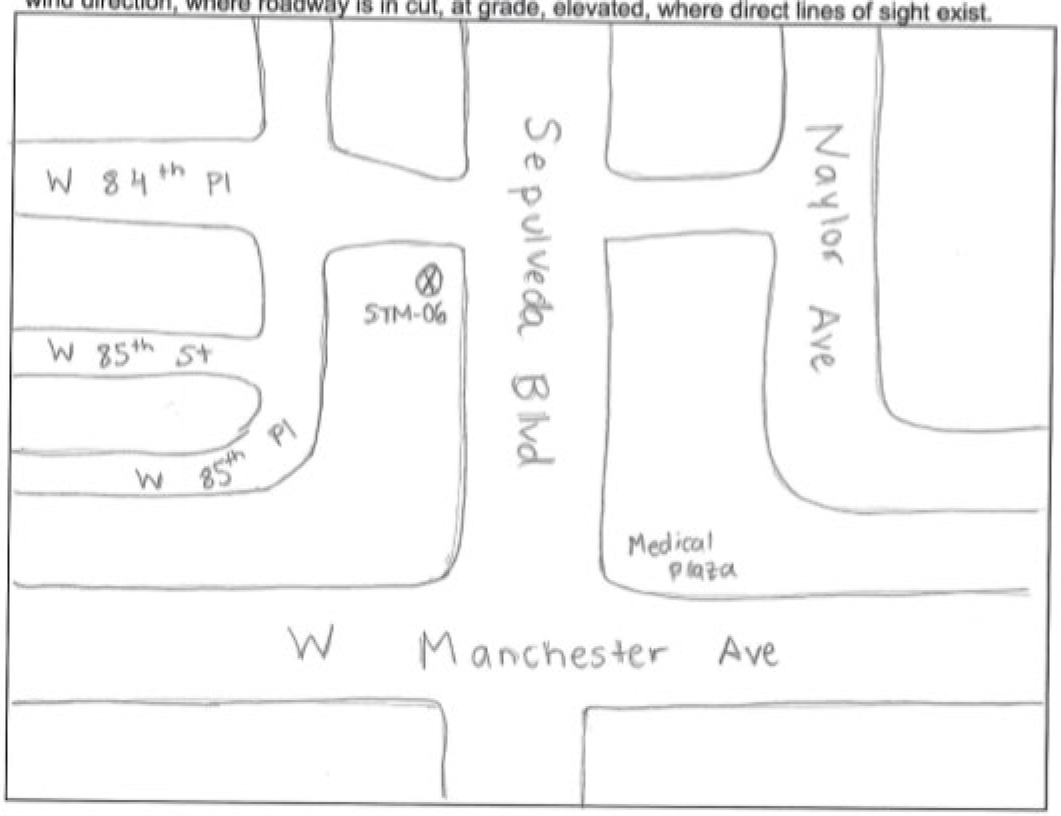
NOISE MONITOR: B&K 2270 KIT 1 S/N: 2579290

MICROPHONE: 4134-B&K S/N: 173368

CALIBRATOR: 1018 NORSONIC S/N: 14059

TEMP. RANGE (°F): 76 WEATHER CONDITIONS: Sunny, 54% humidity ~3 mph wind

SITE SKETCH: Show roadway, homes, local roads, reference distances, arrows for North & wind direction, where roadway is in cut, at grade, elevated, where direct lines of sight exist.



STM-06. 84th Pl, Sepulveda. Photos 1 and 2. Facing North and South.

hmmh

SHORT-TERM NOISE MEASUREMENT DATA SHEET

PROJECT: LAX ATMP

JOB NO.: 310480.002 Task 3

MEASUREMENT SITE NO.: STM-07

PERSONNEL: DST/VM

ADDRESS/DESCRIPTION: 9800 Sepulveda Blvd Front of pool

DATE: 10/8/2019

#	15 Minute Period Starting	Meas'd Leq (dBA)	√ or X	Autos	Medium Trucks	Heavy Trucks	Other Noise Sources	COMMENTS (Include Calibration Data)
1	7:00	76.2						
2								
3								
4								
5								
6								
7								
8								
9								
10								
11								
12								
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23								
24								
25								
26								
27								
28								
29								
30								

TOTAL Leq =

SUBSET Leq =

√ = Other sources contributed to Leq

X = Exclude period - contaminated by non-characteristic sources

>> ADD SKETCH AND WEATHER CONDITIONS TO REVERSE OR OTHER SHEET <<

HARRIS MILLER MILLER & HANSON INC.

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PROJECT: LAX ATMP Roadway
JOB NO.: 310480.002 Task 3

TRAFFIC VOLUME COUNT DATA SHEET

ASSESSMENT AREA:
MEASUREMENT SITE NO.: STM - 07
ADDRESS/DESCRIPTION: 9800 Sepulveda Blvd Front of pool

START TIME: 7:00
END TIME: 7:30
DATE: 10/8/2019
PERSONNEL: DST/YM

ROADWAY:	Sepulveda	DIRECTION 1: NB	DIRECTION 2: SB
First Sample: 15 **minutes** **Start Time:** 7:00			
	Automobiles	702	140
	Medium Trucks (6 Tires)	38	6
	Heavy Trucks (>6 Tires)	3	1
	Average speed (mph)		
Second Sample: ____ **minutes** **Start Time:**			
	Automobiles		
	Medium Trucks (6 Tires)		
	Heavy Trucks (>6 Tires)		
	Average speed (mph)		
Third Sample: ____ **minutes** **Start Time:**			
	Automobiles		
	Medium Trucks (6 Tires)		
	Heavy Trucks (>6 Tires)		
	Average speed (mph)		
Fourth Sample: ____ **minutes** **Start Time:**			
	Automobiles		
	Medium Trucks (6 Tires)		
	Heavy Trucks (>6 Tires)		
	Average speed (mph)		

HARRIS MILLER MILLER & HANSON INC.

PROJECT: LAX ATMP

JOB NO.: 310480.002 Task 3

SHORT-TERM NOISE MEASUREMENT SITE LOG

ASSESSMENT AREA: Front of pool MEASUREMENT SITE NO.:

ADDRESS: 9800 Sepulveda Blvd

OWNER:

DESCRIPTION:

NOISE SOURCES: Plane, motorcycle

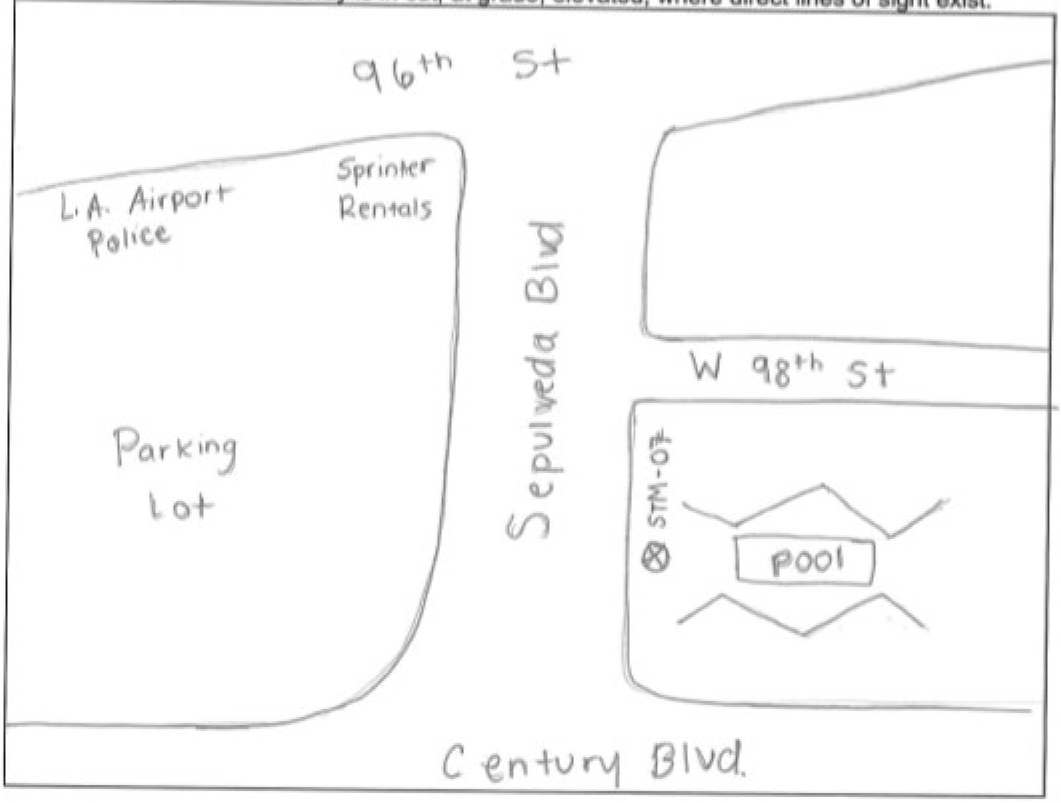
NOISE MONITOR: B&K 2270 KIT 1 S/N: 2579290

MICROPHONE: 4134-B&K S/N: 173368

CALIBRATOR: 1018 NORSONIC S/N: 14059

TEMP. RANGE (°F): 61 WEATHER CONDITIONS: Sunny, 87% humidity ~3 mph wind

SITE SKETCH: Show roadway, homes, local roads, reference distances, arrows for North & wind direction, where roadway is in cut, at grade, elevated, where direct lines of sight exist.



STM-07. 9800 Sepulveda Blvd. Photos 1 & 2. Facing West and South.

SHORT-TERM NOISE MEASUREMENT DATA SHEET

PROJECT: LAX ATMP

JOB NO.: 310480.002 Task 3

MEASUREMENT SITE NO.: STM-08

PERSONNEL: DST/VM

ADDRESS/DESCRIPTION: Century Blvd and Airport Blvd

DATE: 10/8/2019

#	15 Minute Period Starting	Meas'd Leq (dBA)	√ or X	Autos	Medium Trucks	Heavy Trucks	Other Noise Sources	COMMENTS (Include Calibration Data)
1	8:12	63.2						
2								
3								
4								
5								
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								
16								
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18								
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20								
21								
22								
23								
24								
25								
26								
27								
28								
29								
30								

TOTAL Leq =

SUBSET Leq =

√ = Other sources contributed to Leq

X = Exclude period - contaminated by non-characteristic sources

>> ADD SKETCH AND WEATHER CONDITIONS TO REVERSE OR OTHER SHEET <<

HARRIS MILLER MILLER & HANSON INC.

hmmh

PROJECT: LAX ATMP Roadway
JOB NO.: 310480.002 Task 3

TRAFFIC VOLUME COUNT DATA SHEET

ASSESSMENT AREA:		START TIME:	8:12
MEASUREMENT SITE NO.:	STM - 08	END TIME:	8:42
ADDRESS/DESCRIPTION:	Century Blvd	DATE:	10/8/2019
	and Airport Blvd	PERSONNEL:	DST / VM

ROADWAY:	Airport Blvd	DIRECTION 1: NB	DIRECTION 2: SB
First Sample: 15 minutes Start Time: 8:12			
	Automobiles	50	154
	Medium Trucks (6 Tires)	15	26
	Heavy Trucks (>6 Tires)	3	3
	Average speed (mph)		
Second Sample: ____ minutes Start Time: ____			
	Automobiles		
	Medium Trucks (6 Tires)		
	Heavy Trucks (>6 Tires)		
	Average speed (mph)		
Third Sample: ____ minutes Start Time: ____			
	Automobiles		
	Medium Trucks (6 Tires)		
	Heavy Trucks (>6 Tires)		
	Average speed (mph)		
Fourth Sample: ____ minutes Start Time: ____			
	Automobiles		
	Medium Trucks (6 Tires)		
	Heavy Trucks (>6 Tires)		
	Average speed (mph)		

HARRIS MILLER MILLER & HANSON INC.

STM-08. Century Blvd and Airport Blvd. Photos 1 & 2 facing South and North.

Scantek, Inc.
CALIBRATION LABORATORY
ISO 17025: 2005, ANSI/NCSL Z540:1994 Part 1
ACCREDITED by NVLAP (an ILAC MRA signatory)

NVLAP® CALIBRATION
NVLAP Lab Code: 200625-0

Calibration Certificate No.44447

Instrument: **Sound Level Meter**
Model: **2270**
Manufacturer: **Brüel and Kjær**
Serial number: **3011799_KIT#1**
Tested with: **Microphone** 4189 s/n 2578554, 4189 s/n 2008916; **Preamplifier** ZC0032 s/n 6175, ZC0032 s/n 28326
Type (class): **1**
Customer: **Harris Miller Miller & Hanson Inc.**
Tel/Fax: **781-229-0707 x3148 / 781-859-8940**

Date Calibrated: **3/6/2020** *Cal Due:*

Status:	**Received**	**Sent**
In tolerance:	X	X
Out of tolerance:		
See comments:		

Contains non-accredited tests: __ **Yes** X **No**
Calibration service: __ **Basic** X **Standard**

Address: **700 District Avenue, Suite 800, Burlington, MA 01803**

Tested in accordance with the following procedures and standards:
Calibration of Sound Level Meters, Scantek Inc., Rev. 6/26/2015
SLM & Dosimeters – Acoustical Tests, Scantek Inc., Rev. 7/6/2011

Instrumentation used for calibration: Nor-1504 Norsonic Test System:

Instrument - Manufacturer	Description	S/N	Cal. Date	Traceability evidence Cal. Lab / Accreditation	Cal. Due
4838-Norsonic	SME Cal Unit	31052	Oct 31, 2019	Scantek, Inc./ NVLAP	Oct 31, 2020
DS-360-SRS	Function Generator	33584	Oct 23, 2019	ACR Env./ A2LA	Oct 23, 2021
34401A-Agilent Technologies	Digital Voltmeter	MY47011118	Oct 22, 2019	ACR Env. / A2LA	Oct 22, 2020
HM30-Thommen	Meteo Station	1040170/39633	Oct 24, 2019	ACR Env./ A2LA	Oct 24, 2020
PC Program 1019 Norsonic	Calibration software	v.6.1T	Validated Nov 2014	Scantek, Inc.	-
1251-Norsonic	Calibrator	30878	Oct 23, 2019	Scantek, Inc./ NVLAP	Oct 23, 2020

Instrumentation and test results are traceable to SI (International System of Units) through standards maintained by NIST (USA) and NPL (UK).

Environmental conditions:

Temperature (°C)	Barometric pressure (kPa)	Relative Humidity (%)
23.5	99.55	40.9

Calibrated by:	Lydon Dawkins	**Authorized signatory:**	Steven E. Marshall
Signature	Lydon Dawkins	Signature	Steven E. Marshall
Date	3/6/2020	Date	3/10/2020

Document stored Y:\Calibration Lab\SLM 2020\BNK2270_3011799_KIT#1_M1.doc

hmmh

Scantek, Inc.
CALIBRATION LABORATORY

ISO 17025: 2005, ANSI/NCSL Z540:1994 Part 1
ACCREDITED by NVLAP (an ILAC MRA signatory)

NVLAP®
CALIBRATION
NVLAP Lab Code: 200625-0

Calibration Certificate No.44436

Instrument:	**Acoustical Calibrator**	*Date Calibrated:* **2/27/2020** *Cal Due:*	
Model:	**4231**	*Status:*	**Received** / **Sent**
Manufacturer:	**Brüel and Kjær**	*In tolerance:*	**X** / **X**
Serial number:	**2579290**	*Out of tolerance:*	
Class (IEC 60942):	**1**	*See comments:*	
Barometer type:		*Contains non-accredited tests:*	__Yes **X** No
Barometer s/n:			
Customer:	**Harris Miller Miller & Hanson Inc.**	*Address:*	**700 District Avenue, Suite 800, Burlington, MA 01803**
Tel/Fax:	**781-229-0707 x3148 / 781-229-7939**		

Tested in accordance with the following procedures and standards:
Calibration of Acoustical Calibrators, Scantek Inc., Rev. 10/1/2010

Instrumentation used for calibration: Nor-1504 Norsonic Test System:

Instrument - Manufacturer	Description	S/N	Cal. Date	Traceability evidence Cal. Lab / Accreditation	Cal. Due
4838-Norsonic	SME Cal Unit	31052	Oct 31, 2019	Scantek, Inc./ NVLAP	Oct 31, 2020
DS-360-SRS	Function Generator	33584	Oct 23, 2019	ACR Env / A2LA	Oct 23, 2021
34401A-Agilent Technologies	Digital Voltmeter	MY47011118	Oct 22, 2019	ACR Env. / A2LA	Oct 22, 2020
HM30-Thommen	Meteo Station	1040170/39633	Oct 24, 2019	ACR Env / A2LA	Oct 24, 2020
140-Norsonic	Real Time Analyzer	1406423	Oct 31, 2019	Scantek / NVLAP	Oct 31, 2020
PC Program 1018 Norsonic	Calibration software	v.6.1T	Validated Nov 2014	Scantek, Inc.	-
4134-Bruel&Kjær	Microphone	173368	Oct 23, 2019	Scantek, Inc. / NVLAP	Oct 23, 2020
1203-Norsonic	Preamplifier	14059	Feb 28, 2019	Scantek, Inc./ NVLAP	Feb 28, 2020

Instrumentation and test results are traceable to SI (International System of Units) through standards maintained by NIST (USA) and NPL (UK)

Calibrated by:	Lydon Dawkins	**Authorized signatory:**	Steven E. Marshall
Signature	Lydon Dawkins	Signature	Steven E Marshall
Date	2/27/2020	Date	3/3/2020

Document stored as: Y:\Calibration Lab\Cal 2020\BNK4231_2579290_M1.doc

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Appendix F.3 Construction Equipment Noise Analysis Technical Report

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LAX Airfield and Terminal Modernization Project Draft EIR

Construction Equipment Noise Analysis

Technical Report

HMMH Project Number 310480
October 2020

Prepared for:

CDM Smith

46 Discovery, Suite 250

Irvine, CA 92618

Prepared by:

Vincent Ma

Dillon S. Tannler

Justin W. Cook

HMMH

300 S. Harbor Boulevard, Suite 516

Anaheim, CA 92805

Contents

Figures

Tables

Attachment A

1. Summary

This memorandum includes a noise analysis for planned construction activities for the Los Angeles International Airport (LAX) Airfield and Terminal Modernization Project Environmental Impact Report (EIR) that was prepared pursuant to the requirements of the California Environmental Quality Act. The memorandum is divided into sections that discuss construction noise associated with airfield improvements construction, terminal/concourse construction, roadway improvements construction, and the use of the proposed construction staging areas. Details include the construction activities planned and what equipment would be used.

The LAX Airfield and Terminal Modernization Project ("proposed Project") consists of three major construction efforts: airfield improvements, roadway improvements, and concourse/terminal improvements. Each of these construction phases would take place over the course of several years. This document analyzes the potential for the proposed Project construction to disrupt neighboring residences and other noise-sensitive uses.[1]

The construction noise analysis for the proposed Project determined that impacts from construction noise would be significant for some noise-sensitive receptors without mitigation. Because of the proximity to the airport, the noise-sensitive land uses and residential areas surrounding the airport are subjected to a high level of ambient background noise from aircraft operations. Based on an evaluation of projected construction noise levels at areas with noise-sensitive uses as compared to background noise levels it was determined that significant construction noise impacts could occur. Therefore, noise mitigation has been proposed for construction of the LAX Airfield and Terminal Modernization Project to avoid significant impacts. Detail on construction noise mitigation is provided in Section 7 below to reduce noise impacts at nearby noise-sensitive land uses.

2. Noise

2.1 Noise Descriptors

Noise levels are measured using a variety of scientific metrics. As a result of extensive research into the characteristics of noise and human response to that noise, standard noise descriptors have been developed for noise exposure analyses. The descriptors used in this construction noise analysis are described below.

A-Weighted Sound Pressure Level (dBA): The decibel (dB) is a unit used to describe sound pressure level. When expressed in dBA, the sound has been filtered to reduce the effect of very low and very high frequency sounds, much as the human ear filters sound frequencies. Without this filtering calculated and measured sound levels would include events that the human ear cannot hear (e.g., dog whistles and low frequency sounds, such as the groaning sounds emanating from large buildings with changes in temperature and wind). With A-weighting, calculations and sound monitoring equipment approximate the sensitivity of the human ear to sounds of different frequencies.

Some common sounds on the dBA scale are listed in **Table 1**. As shown, the relative perceived loudness of a sound doubles for each increase of 10 dBA, and a 10 dBA change in the sound level corresponds to a factor of 10 increase or decrease in relative sound energy.

[1] Noise-sensitive uses are places that might contain noise-sensitive equipment; individuals who are particularly susceptible to noise stimuli, such as children or the elderly; or accommodations for people to sleep. Such uses include residences, hospitals, hotels, and schools.

Table 1. Common Sounds on the A-Weighted Decibel Scale

Sound	Sound level (dBA)	Relative loudness (approximate)	Relative sound energy
Rock music, with amplifier	120	64	1,000,000
Thunder, snowmobile (operator)	110	32	100,000
Boiler shop, power mower	100	16	10,000
Orchestral crescendo at 25 feet, noisy kitchen	90	8	1,000
Busy street	80	4	100
Interior of department store	70	2	10
Ordinary conversation, 3 feet away	60	1	1
Quiet automobiles at low speed	50	½	.1
Average office	40	¼	.01
City residence	30	1/8	.001
Quiet country residence	20	1/16	.0001
Rustle of leaves	10	1/32	.00001
Threshold of hearing	0	1/64	.000001
Source: U.S. Department of Housing and Urban Development. Aircraft Noise Impact--Planning Guidelines for Local Agencies, Figure 2-2. 1972.			

In general, humans find a change in sound level of 3 dB is just noticeable, a change of 5 dBA is clearly noticeable, and a change of 10 dB is perceived as a doubling or halving sound level (i.e., an increase of 10 dB is perceived as being twice as loud and a decrease of 10 dB is perceived as being half as loud). Because of the logarithmic scale of the decibel unit, sound levels generally cannot be added or subtracted arithmetically. Two sounds of equal physical intensity will result in the sound level increasing by 3 dB, regardless of the initial sound level. For example, 60 dB plus 60 dB equals 63 dB, 80 dB plus 80 dB equals 83 dB. However, where ambient noise levels are high in comparison to a new noise source, there will be a small change in noise levels. For example, when a 70 dB ambient noise levels are combined with a 60 dB noise source the resulting noise level equals 70.4 dB.

Maximum Noise Level (L_{max}): L_{max} is the maximum or peak sound level during a noise event. The metric accounts only for the instantaneous peak intensity of the sound and not for the duration of the event. As a vehicle or aircraft passes by an observer, the sound level increases to a maximum level and then decreases. Some sound level meters measure and record the maximum or L_{max} level.

Equivalent Continuous Noise Level (L_{eq}): L_{eq} is the sound level, expressed in dBA, of a steady sound that has the same A-weighted sound energy as the time-varying sound over the averaging period. L_{eq} is the average sound level for a specified time period (e.g., 24 hours, 8 hours, 1 hour, etc.). L_{eq} is calculated by integrating the sound energy from all noise events over a given time period and applying a factor for the number of events. L_{eq} can be expressed for any time interval; for example, the L_{eq} representing an averaged level over an 8-hour period would be expressed as $L_{eq}(8)$ and a one-hour period would be $L_{eq}(h)$.

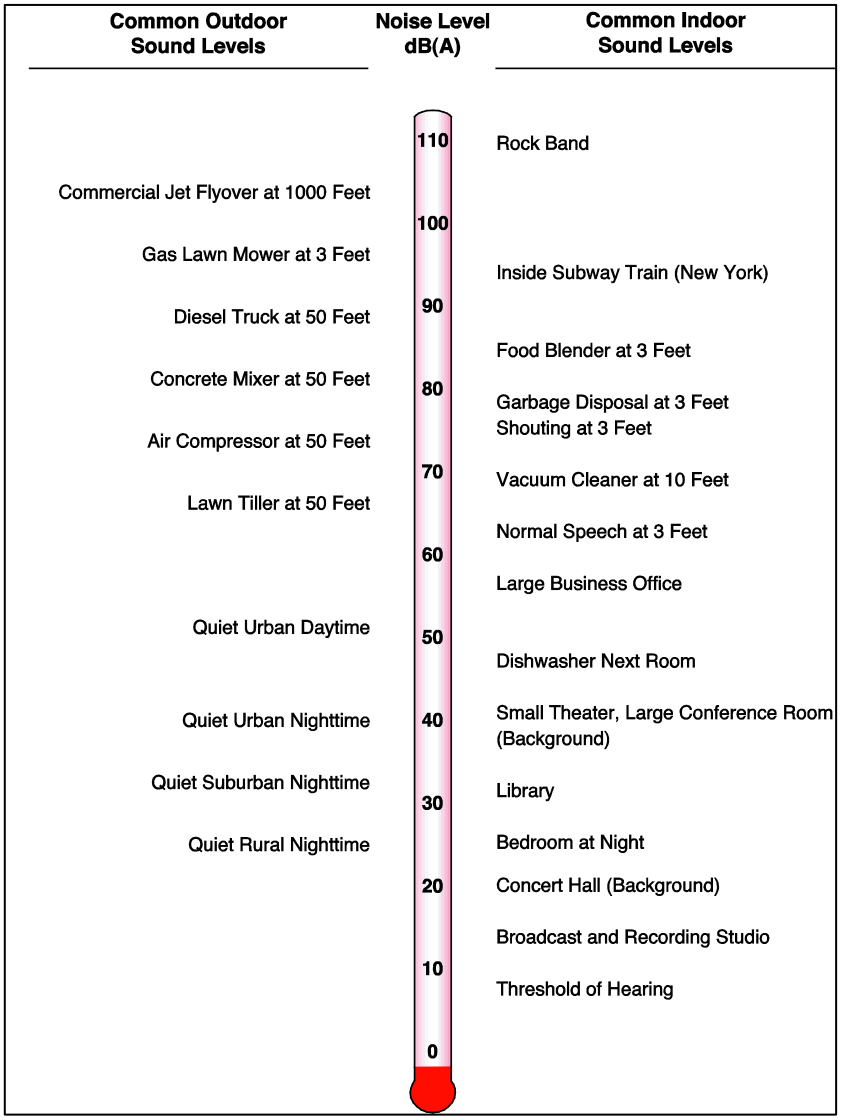

Figure 1. Sound Levels

Source: HMMH 2019

Day-Night Average Sound Level (DNL): DNL, also referred to as L_{dn}, is expressed in dBA and represents the noise level over a 24-hour period. Because environmental noise fluctuates over time, DNL was devised to relate noise exposure over time to human response. DNL is a 24-hour average of the hourly L_{eq}, but with penalties to account for the increased sensitivity to noise events that occur during the more noise-sensitive nighttime periods. Specifically, DNL penalizes noise 10 dBA during the nighttime time period (10:00 p.m. to 7:00 a.m.), but it does not include an evening penalty (7:00 p.m. to 10:00 p.m.). Typically, DNL is about 1 dBA lower than CNEL (described below), although the difference may be greater if there is an abnormal concentration of noise events in the 7:00 p.m. to 10:00 p.m. time period. The U.S. Environmental Protection Agency (USEPA) introduced the metric in 1976 as a single number measurement of community noise exposure. The FAA adopted DNL as the noise metric for measuring aircraft noise under Federal Aviation Regulations (FAR) Part 150, Airport Noise Compatibility Planning. The Department of Housing and Urban Development, the Veterans Administration, the Department of Defense, the United States Coast Guard, and the Federal Transit Administration have also adopted DNL for measuring noise exposure. DNL is used to describe existing and predicted noise exposure in communities in airport environs based on the average daily operations during the year and the average annual operational conditions at an airport. Therefore, at a specific location near an airport, the noise exposure on a particular day is likely to be higher or lower than the annual average noise exposure depending on the specific operations at an airport on that day. DNL is widely accepted as the best available method to describe aircraft noise exposure and is the noise descriptor required for aircraft noise exposure analyses and land use compatibility planning under FAR Part 150 and for environmental assessments for airport improvement projects (FAA Order 1050.1F).

Community Noise Equivalent Level (CNEL): CNEL, expressed in dBA, is the standard metric used in California to represent cumulative noise exposure. Similar to DNL, CNEL provides a single-number description of the sound energy to which a person or community is exposed over a period of 24 hours. CNEL includes penalties applied to noise events occurring after 7:00 p.m. and before 7:00 a.m., when noise is considered more intrusive; it also accounts for the typically lower ambient noise levels during these hours. The penalized time period is further subdivided into evening (7:00 p.m. through 9:59 p.m.) and nighttime (10:00 p.m. to 6:59 a.m.). A 10 dB penalty is added to nighttime noise events (equivalent to a ten-fold increase in aircraft operations) and a 5 dB penalty is added to evening noise events. The evening weighting is the only difference between CNEL and DNL.

2.2 Noise Attenuation

Construction noise typically dissipates at a rate of approximately 6.0 dB for each doubling of distance (between the noise source and the receptor). As an example, construction equipment with mufflers (independent of background ambient noise levels) during excavation and grading may generate a noise level of approximately 86 dBA L_{eq} at 50 feet from the noise source. Based on a sound dissipation rate of 6 dB per doubling of distance, a sound level of 86 dBA at 50 feet from the noise source would be approximately 80 dBA at a distance of 100 feet, 74 dBA at a distance of 200 feet, and so on. That sound drop-off rate does not take into account any intervening shielding (including landscaping or trees) or barriers, such as structures or hills between the noise source and noise receptor. A barrier that breaks the line-of-sight between a source and a receiver will typically result in at least 5 dB of noise reduction. A higher barrier may provide as much as 20 dB of noise reduction.

2.3 Effects of Noise on Humans

The effects of noise on humans can be grouped into three general categories:[2]

- Subjective effects of annoyance, nuisance, dissatisfaction;
- Physiological effects such as starting hearing loss; and,
- Interference with activities such as speech, sleep, and learning.

With respect to annoyance, human response to sound is highly individualized. Many factors influence the response to noise including the character of the noise, the variability of the sound level, the presence of tones or impulses, and the time of day of the occurrence. Additionally, non-acoustical factors, such as individual opinion of the noise source, the ability to adapt to the noise, the attitude towards the source and those associated with it, and the predictability of the noise, all influence the response to noise. These factors result in the reaction to noise being highly subjective, with the perceived effect of a particular noise varying widely among individuals in a community.

Noise-induced hearing loss usually takes years to develop. Hearing loss is one of the most obvious and easily quantifiable effects of excessive exposure to noise. While the loss may be temporary at first, it can become permanent after continued exposure. When combined with hearing loss associated with aging, the amount of hearing loss directly due to the environment is difficult to quantify. Although the major cause of noise-induced hearing loss is occupational, non-occupational sources may also be a factor.

Noise can mask important sounds and disrupt communication between individuals in a variety of settings. This process can cause anything from a slight irritation to a serious safety hazard, depending on the circumstance. Noise can disrupt face-to-face communication and telephone communication, and the enjoyment of music and

[2] U.S. Environmental Protection Agency, Office of Noise Abatement and Control, *Annoyance, Loudness, and Measurement of Repetitive Type of Impulsive Noise Sources,* pg. 3-1, November 1979.

television in the home. Interference with communication has proved to be one of the most important components of noise-related annoyance.

Relative to noise being a source of annoyance, including sleep disturbance, and having health impacts, there are, as further described in Section 4.7.1.1 of the Draft EIR, various uncertainties and debate within the scientific community regarding the exact relationship between noise and these types of impacts, particularly as related to assessing whether there would be a significant impact under CEQA.

3. Methodology

Construction activities typically generate noise from the operation of equipment required for demolition and construction of various facilities. Noise impacts from on-site construction and construction staging areas have been evaluated by considering the different types of construction activity, calculating the construction-related noise level at nearby noise-sensitive receptor locations, and comparing these construction-related noise levels to existing ambient noise level. Specifically, the following steps were undertaken to calculate construction-period noise levels:

1. Existing (ambient) CNEL dBA noise levels at surrounding noise-sensitive receptor locations were estimated based on aircraft noise levels that were modeled in the Federal Aviation Administration's (FAA) Aviation Environmental Design Tool (AEDT) for existing conditions (since aircraft noise is the dominant noise source for areas around LAX, the aircraft noise modeling provides an effective way to estimate existing noise levels in proximity to the nearby noise-sensitive receptors).
2. Typical noise levels for each type of construction equipment were obtained from the Federal Highway Administration's (FHWA) Roadway Construction Noise Model (RCNM). Usage factors for equipment types were included in the calculations, based on factors identified by FHWA as being typical for construction of roadway infrastructure projects and are consistent with the roadway construction efforts for the proposed Project Evening and nighttime penalties were applied and then the noise levels were averaged to determine a 24-hour L_{eq} usage factor. The RCNM construction equipment noise levels are shown in **Table 2**.
3. Distances between construction sites and construction staging area locations (i.e., Project-related noise sources) and surrounding noise-sensitive receptors were measured using Project plans and aerial imagery from building facades or outdoor use areas to nearest edge of construction activity in the preliminary construction plans.
4. Construction noise levels were calculated for noise-sensitive receptor locations based on the conventional standard point source noise-distance attenuation factor of 6.0 dBA for each doubling of distance. Construction noise levels were quantified at predetermined distances from the construction sites and staging areas using CNEL. These calculations are considered conservative, as they do not account for noise reductions from intervening structures, walls, or other barriers.
5. Calculated noise levels associated with Project construction sound level dBA $L_{eq}(h)$ at noise-sensitive receptor locations were then assessed an evening noise penalty of +5 dBA and a nighttime noise penalty of +10 dBA, consistent with noise weighting for determining the 24-hour CNEL dBA, and then logarithmically added to the estimated existing ambient CNEL dBA AEDT noise levels to determine total sound level CNEL.
6. Calculated total noise levels at noise-sensitive receptor locations were then compared to estimated existing ambient noise levels and the identified construction noise significance thresholds.

Table 2. Source Noise Emission Levels for Construction Equipment

Equipment Description	Ground Impact Device?	Acoustical Use Factor (%)[1]	Spec 721.560 Lmax @ 50 ft. (dBA, slow)[2]	Measured Lmax @ 50 ft. (dBA, slow)	No. of Data Samples
All Other Equipment > 5 HP	No	50	85	-- N/A --	0
Auger Drill Rig	No	20	85	84	36
Backhoe	No	40	80	78	372
Bar Bender	No	20	80	-- N/A --	0
Blasting	Yes	-- N/A --	94	-- N/A --	0
Boring Jack Power Unit	No	50	80	83	1
Chain Saw	No	20	85	84	46
Clam Shovel (dropping)	Yes	20	93	87	4
Compactor (ground)	No	20	80	83	57
Compressor (air)	No	40	80	78	18
Concrete Batch Plant	No	15	83	-- N/A --	0
Concrete Mixer Truck	No	40	85	79	40
Concrete Pump Truck	No	20	82	81	30
Concrete Saw	No	20	90	90	55
Crane	No	16	85	81	405
Dozer	No	40	85	82	55
Drill Rig Truck	No	20	84	79	22
Drum Mixer	No	50	80	80	1
Dump Truck	No	40	84	76	31
Excavator	No	40	85	81	170
Flat Bed Truck	No	40	84	74	4
Front End Loader	No	40	80	79	96
Generator	No	50	82	81	19
Generator (<25KVA, VMS signs)	No	50	70	73	74
Gradall	No	40	85	83	70
Grader	No	40	85	-- N/A --	0
Grapple (on backhoe)	No	40	85	87	1
Horizontal Boring Hydro Jack	No	25	80	82	6
Hydra Break Ram	Yes	10	90	-- N/A --	0
Impact Pile Driver	Yes	20	95	101	11
Jackhammer	Yes	20	85	89	133
Man Lift	No	20	85	75	23
Mounted Impact Hammer (hoe ram)	Yes	20	90	90	212
Pavement Scarafier	No	20	85	90	2
Paver	No	50	85	77	9
Pickup Truck	No	40	55	75	1
Pneumatic Tools	No	50	85	85	90
Pumps	No	50	77	81	17
Refrigerator Unit	No	100	82	73	3
Rivit Buster/chipping gun	Yes	20	85	79	19
Rock Drill	No	20	85	81	3
Roller	No	20	85	80	16
Sand Blasting (Single Nozzle)	No	20	85	96	9
Scraper	No	40	85	84	12
Shears (on backhoe)	No	40	85	96	5
Slurry Plant	No	100	78	78	1
Slurry Trenching Machine	No	50	82	80	75
Soil Mix Drill Rig	No	50	80	-- N/A --	0
Tractor	No	40	84	-- N/A --	0
Vacuum Excavator (Vac-truck)	No	40	85	85	149
Vacuum Street Sweeper	No	10	80	82	19

Equipment Description	Ground Impact Device?	Acoustical Use Factor (%)[1]	Spec 721.560 Lmax @ 50 ft. (dBA, slow)[2]	Measured Lmax @ 50 ft. (dBA, slow)	No. of Data Samples
Ventilation Fan	No	100	85	79	13
Vibrating Hopper	No	50	85	87	1
Vibratory Concrete Mixer	No	20	80	80	1
Vibratory Pile Driver	No	20	95	101	44
Warning Horn	No	5	85	83	12
Welder / Torch	No	40	73	74	5

Source: Table 1 in FHWA Roadway Construction Noise Model, Version 1.0 User's Guide.

Notes:

1 Acoustical use factor represents the fraction of time each piece of construction equipment is operating at full power (i.e., its loudest condition) during a construction operation.

2 Spec 721.560 is part of a comprehensive Construction Noise Specification developed in the 1990s that the FHWA Roadway Construction Noise Model took into consideration in developing estimated noise levels for the various types of construction equipment listed in the table. As shown, the table also includes measured noise levels for the subject equipment, which generally support the noise levels of Spec 721.560.

4. Existing Conditions

Many government agencies have established noise standards and guidelines to protect citizens from potential hearing damage and various other adverse effects associated with noise and ground-borne vibration. The City of Los Angeles has adopted a number of policies that are based in part on federal and state regulations and are directed at controlling or mitigating environmental noise effects. The government agency policies that are relevant to the construction noise impacts analysis for the proposed Project are discussed below.

Nearby noise-sensitive receptors or land uses were selected due to proximity to construction activity planned for the proposed Project. To determine background ambient sound levels from aircraft noise, the FAA's AEDT modeling program was utilized. Due to the proximity of these sites to LAX, this was determined to be appropriate. AEDT models aircraft performance in space and time to estimate noise levels. Utilizing flight data acquired through LAX's Airport Noise Monitoring and Management (ANOM) system for 2018Q4 to 2019Q3 background ambient sound levels from aircraft noise were determined.

Table 3 lists the noise-sensitive land uses selected for the construction noise analysis with the AEDT background sound levels and land use description. Noise levels at the locations identified in Table 3 are considered representative of other locations in proximity thereto.

Table 3. Existing Conditions

ID	Receiver Location	Background Conditions CNEL (dBA)1	Land Use Setting
R1	Residential development in Playa del Rey	67.8	Residential north of airport
R2	Saint Bernard High School	67.7	High school in a residential area north of airport
R3	Residential development along southern edge of Westchester	68.4	Residential north of airport
R4	Park West Apartments on Lincoln Boulevard	66.3	Residential north of airport
R5	Residential uses along West 88th Street near Liberator Ave	67.9	Residential north of airport
R6	Residential uses near Westchester Parkway and Kittyhawk Ave	72.0	Residential north-east of airport
R7	Residence Inn by Marriott Los Angeles LAX/Century Boulevard	70.2	Commercial east of airport
R8	Sheraton Gateway Los Angeles Hotel	69.3	Commercial east of airport
R9	H Hotel Los Angeles, Curio Collection by Hilton	70.4	Commercial east of airport
R10	Hyatt Regency Los Angeles International Airport	73.4	Commercial east of airport
R11	Courtyard Los Angeles LAX/Century Boulevard	71.7	Commercial east of airport

Source: HMMH, 2020.

Note:

[1] Background condition obtained through AEDT.

4.1 City of Los Angeles Noise Regulation

The City of Los Angeles Municipal Code (LAMC) (Chapter IV, Article I, Section 41.40, and Chapter XI, Articles 1 through 6) establishes regulations regarding allowable increases in noise levels in terms of established noise criteria. Supplementing these LAMC regulations, the City has also established CNEL guidelines that are used for land use planning purposes. Section 41.40 of the LAMC regulates construction that utilizes power equipment that generates loud noises. This regulation includes various restrictions on noise-generating activities and defines procedures for administering the regulations, including definitions of applicability and provisions for variances or exemptions.[3]

Chapter XI of the Los Angeles Municipal Code (City of Los Angeles Noise Ordinance) establishes acceptable ambient sound levels to regulate intrusive noises (e.g., stationary mechanical equipment and vehicles other than those traveling on public streets, as further described below) within specific land use zones. However, the provisions of Chapter XI do not apply to construction noise. (LAMC Section 112.03.)

5. Threshold of Significance

The proposed Project would result in a significant impact related to construction equipment noise if construction activities would:

- Exceed existing ambient exterior noise levels by 5 dBA or more at a noise-sensitive use in association with the following:

[3] Chapter IV, Section 41.40(j) empowers the Executive Director of the Board of Police Commissioners to make a determination that Section 41.40(c) of the regulations do not apply to major public works projects undertaken by the City of Los Angeles and its proprietary departments.

- Construction activities lasting more than 10 days in a 3-month period; or
- Construction activities occurring between the hours of 9:00 p.m. and 7:00 a.m. Monday through Friday, before 8:00 a.m. or after 6:00 p.m. on Saturday, or at any time on Sunday.

This threshold is based on the L.A. CEQA Thresholds Guide's significance thresholds for construction noise.[4] It is anticipated that construction of most, if not all, of the improvements associated with the proposed Project would involve construction activities lasting more than ten days in a three month period, and it is likely that Project-related construction may periodically occur within evening/nighttime hours and on weekends; hence, this threshold was utilized for the construction equipment noise impact analysis.

6. Impact Analysis

6.1 Construction Phases

To calculate construction and staging area CNELs, usage factors representing the percentage of time that equipment is used during an hour are used to calculate the L_{eq}(h). The usage factors, which are based on typical construction efforts as documented in FHWA's RCNM, are expressed as a percentage of time that construction activities would be active (i.e., incremental period when maximum equipment noise level would be generated). The resulting L_{eq}(h) can be thought of as average levels. The L_{eq}(h) are then applied a penalty-weighting of 5 dB to the construction noise levels that would occur in the evening (7:00 p.m. to 9:59 p.m.) and 10 dB during nighttime hours (10:00 p.m. to 6:59 a.m.).

Grading and scraping construction activities would be the source of most construction noise associated with the proposed Project. Although not the loudest construction source, grading and scraping would occur across multiple construction activities over a longer period of time than would louder impact devices, such as jackhammers, which would be used for much shorter durations. Construction equipment would generate noise levels as high as 74 dBA L_{max} to 85 dBA L_{max} within 50 feet of its operation.

As shown in Figure 2 and described in Table 3, there are several types of noise-sensitive uses in proximity to the north airfield and around the eastern portion of the airport where the various Project improvement sites and construction staging areas would be located. Locations for analysis were selected based on the types of noise-sensitive uses occurring in the general area and their proximity to anticipated Project construction activities. Figure 2 shows locations of the receivers around the airport that were evaluated in the analysis. **Table 4** shows the noise levels at each receptor with implementation of the proposed Project.

4 City of Los Angeles, *L.A. CEQA Thresholds Guide, Your Resource for Preparing CEQA Analyses in Los Angeles*, 2006.

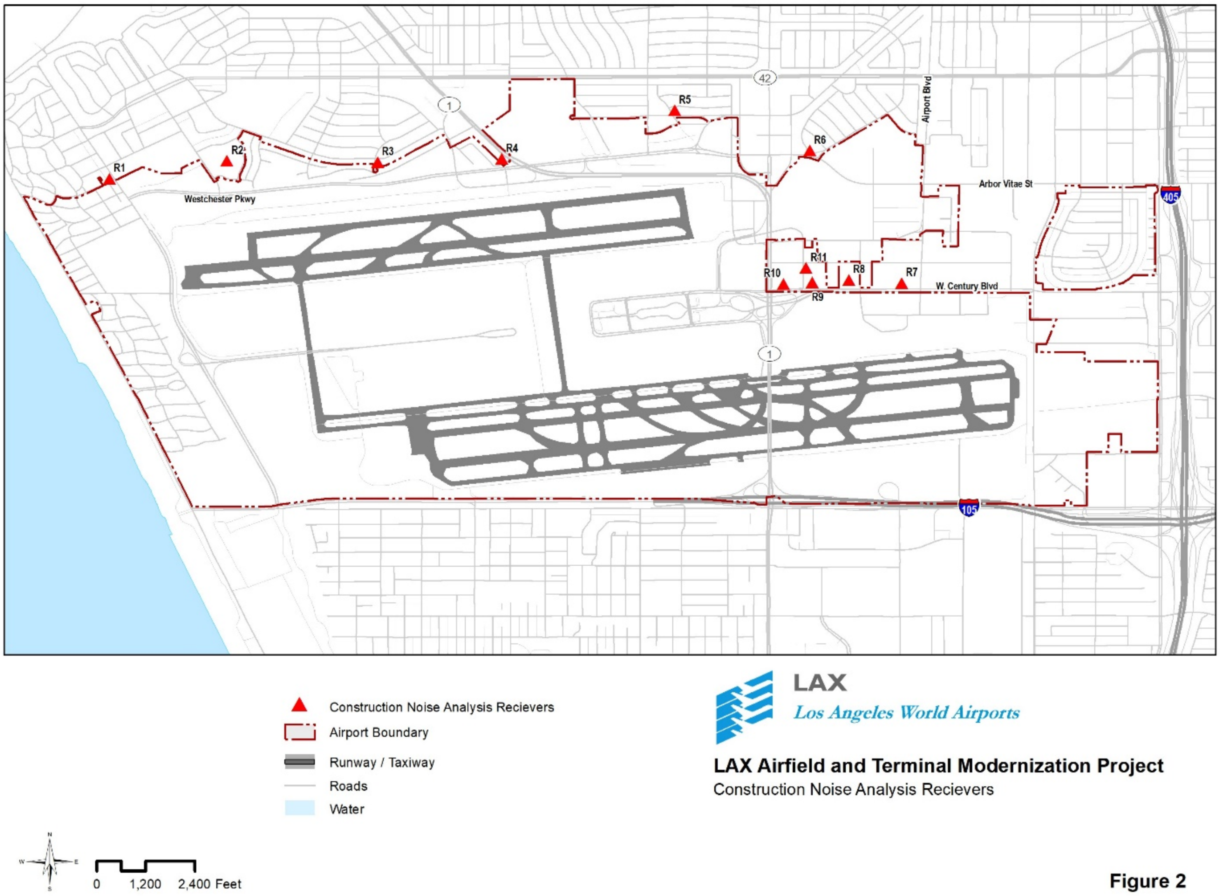

Figure 2. Construction Noise Analysis Receivers

Source: HMMH 2019

6.1.1 Airfield Improvement Construction

The nearest noise-sensitive areas to the airfield improvement sites are The Park West apartments located along Lincoln Boulevard (R4), at approximately 1,200 feet. Construction noise exposure at these residences from airfield improvements would be approximately 69.0 dBA CNEL during the noisiest construction times, not taking into account any intervening structures, walls, etc. This noise level when combined with the background ambient noise level of 66.3 dBA CNEL would result in a combined noise level of 70.9 dBA CNEL, which would not exceed the significance threshold for that location (71.3 dBA CNEL). Similarly, at residences and other noise-sensitive uses located in Westchester and Playa del Rey (R1 through R3 and R5 through R6) impacts related to noise from construction activities would not exceed existing ambient exterior noise levels by more than 5 dB or more and would be less than significant.

Table 4. Construction Noise Levels

ID	Receptor	Background Conditions[1] CNEL (dBA)	Distance from Construction Activity (feet)	Construction Activity	Construction Equipment CNEL (dBA)	Total[2] CNEL (dBA)	Significance Threshold[3]	Above Threshold?
R1	Residential development in Playa del Rey	67.8	3,200	Airfield improvements	60.5	68.5	72.8	No
R2	Saint Bernard High School	67.7	2,500	Airfield improvements	62.6	68.9	72.7	No
R3	Residential development along southern edge of Westchester	68.4	1,500	Airfield improvements	67.1	70.8	73.4	No
R4	Park West Apartments on Lincoln Boulevard	66.3	1,200	Airfield improvements	69.0	70.9	71.3	No
R5	Residential uses along West 88th Street near Liberator Ave	67.9	2,500	Airfield improvements	62.6	69.0	72.9	No
R6	Residential uses near Westchester Parkway and Kittyhawk Ave	72.0	1,750	Airfield improvements	65.7	72.9	77.0	No
		72.0	2,850	Terminal (C0) construction	61.9	72.4	77.0	No
		72.0	1,500	Roadway construction	67.5	73.3	77.0	No
		72.0	NA	Combined airfield improvements, terminal (C0) construction, and roadway construction	70.4	74.3	77.0	No
R7	Residence Inn by Marriott Los Angeles LAX/Century Boulevard	70.2	2,900	Terminal (C0) construction	61.7	70.9	75.2	No
		70.2	900	Terminal (T9) construction	71.9	74.1	75.2	No
		70.2	900	Roadway construction	71.9	74.1	75.2	No
		70.2	NA	Combined terminal (C0 and T9) and roadway construction	75.1	76.3	75.2	Yes[4]
R8	Sheraton Gateway Los Angeles Hotel	69.3	1,600	Terminal (C0) construction	66.9	71.3	74.3	No
		69.3	300	Terminal (T9) construction	81.4	81.7	74.3	Yes[4]
		69.3	100	Roadway construction	91.0	91.0	74.3	Yes[4]
		69.3	NA	Combined terminal (C0 and T9) and roadway construction	91.5	91.5	74.3	Yes[4]

Table 4. Construction Noise Levels

ID	Receptor	Background Conditions[1] CNEL (dBA)	Distance from Construction Activity (feet)	Construction Activity	Construction Equipment CNEL (dBA)	Total[2] CNEL (dBA)	Significance Threshold[3]	Above Threshold?
R9	H Hotel Los Angeles/ Homewood Suites by Hilton Los Angeles International Airport	70.4	1,200	Terminal (C0) construction	69.4	72.9	75.4	No
		70.4	250	Terminal (T9) construction	83.3	83.3	75.4	Yes[4]
		70.4	55	Roadway construction	96.2	96.2	75.4	Yes[4]
		70.4	NA	Combined terminal (C0 and T9) and roadway construction	96.4	96.4	75.4	Yes[4]
R10	Hyatt Regency Los Angeles International Airport	73.4	350	Terminal (C0) construction	80.1	80.9	78.4	Yes[4]
		73.4	550	Terminal (T9) construction	76.2	78.0	78.4	No
		73.4	150	Roadway construction	87.5	87.7	78.4	Yes[4]
		73.4	NA	Combined terminal (C0 and T9) and roadway construction	88.5	88.6	78.4	Yes[4]
R11	Courtyard Los Angeles LAX/Century Boulevard	71.7	1,000	Terminal (C0) construction	71.0	74.4	76.0	No
		71.7	600	Terminal (T9) construction	75.4	76.9	76.7	Yes[4]
		71.7	150	Roadway construction	87.5	87.6	76.7	Yes[4]
		71.7	NA	Combined terminal (C0 and T9) and roadway construction	87.9	88.0	76.7	Yes[4]

Source: HMMH, 2020.
Notes:
1 Background condition obtained through AEDT using 24-hour CNEL dBA.
2 Background plus Project construction noise.
3 Significance Threshold = Background CNEL + 5 dBA
4 Construction equipment noise levels conservatively assume all equipment would be utilized at the same time and at all hours of the 24-hour day, both of which are unlikely.

Key:
C0 = Concourse 0; T9 = Terminal 9

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6.1.2 Roadway Construction

Construction noise exposure at residences northeast of the intersection of Kittyhawk Avenue and Westchester Parkway (R6) during the construction of the proposed landside access improvements (roadways) would be approximately 67.5 dBA CNEL. The anticipated noise level is below the existing ambient noise level of 72.0 dBA CNEL. Therefore, at residences located northeast of the Sepulveda Boulevard and Westchester Parkway intersection, which represents residential receptors nearest to proposed roadway improvements, the impacts related to noise from construction activities would be less than significant.

Hotels along Century Boulevard would be subject to the most disturbance by roadway construction noise due to the proximity to the proposed Project. Construction noise exposure at the H Hotel Los Angeles (R9) would be highest at approximately 96.2 dBA CNEL. Inclusive of the background CNEL from aircraft operating near the area, the total CNEL would be approximately as high as 96.2 dBA CNEL at the hotel, which is the same as construction noise alone and is due to the fact that construction noise would dominate at times over the aviation noise sources. This noise level assumes that all construction equipment is operating at the same time 50 feet from the hotel, which is unlikely. Nevertheless, these construction noise levels can be considered "worst-case" and would be significant. Other than the Residence Inn (R7), other hotels in the area (R8, R10, and R11), would also have significant impacts associated with roadway construction, although to a lesser extent than at the H Hotel (see Table 4). Noise levels at the locations identified in Table 4 are considered representative of other locations in proximity thereto.

It should be noted that the estimated noise levels do not account for any intervening topography, buildings, or other obstructions that would reduce noise. It should also be noted that hotels located in proximity to LAX including, but not limited to, the specific hotels identified above, are subject to the *Sound Insulation Requirements for Noise Sensitive Structures Near Los Angeles International Airport* established by the City of Los Angeles Department of Building and Safety.[5] The purpose of those requirements is to protect persons within designated noise-sensitive buildings from excessive exterior noise, with the goal to ensure that, after proper sound insulation measures are taken, the interior CNEL does not exceed 45 dBA. Given the existing setting of these hotels, being in proximity to aircraft operations at LAX and the associated high noise levels, the outdoor to indoor noise reduction levels at the hotels is greater than in most typical buildings due to extra sound insulation/attenuation features integrated into the buildings' design and construction. While exterior noise levels would exceed the significance thresholds, it is not expected that these exceedances would result in sleep disturbance, given the heightened standards for interior noise insulation.

6.1.3 Terminal/Concourse Construction

Construction of the proposed terminal improvements would not be located near noise-sensitive residential receptors. As shown on Table 4, residences located northeast of the intersection of Kittyhawk Avenue and Westchester Parkway (R6) are approximately 2,850 feet from the closest terminal construction activity. Construction equipment-related noise exposure at these residences would be approximately 61.9 dBA CNEL at its loudest (see Table 4), which is well below existing ambient noise conditions (72.0 dBA CNEL) and would not result in a total noise level that exceeds the significance threshold. Therefore, at residences located northeast of the intersection of Kittyhawk Avenue and Westchester Parkway, impacts related to construction-equipment noise from terminal construction activities would be less than significant.

Hotels along and near Century Boulevard would be subject to disturbance by construction of the new Concourse 0 and Terminal 9 due to their proximity to the proposed sites. Construction noise exposure would range from 71.9 dBA CNEL at the Residence Inn by Marriott (R7) to 83.3 dBA CNEL at the H Hotel/Homewood

[5] City of Los Angeles, Department of Building and Safety, *Information Bulletin/Public – Building Code, Reference No.: LAMC 91.1207, Document No.: P/BC 2014-074, Sound Insulation Requirements for Noise Sensitive Structures Near Los Angeles International Airport*, Effective January 1, 2014. Available: https://www.ladbs.org/docs/default-source/publications/information-bulletins/building-code/sound-insulation-requirements-for-noise-sensitive-structures-near-los-angeles-international-airportib-p-bc2014-074.pdf?sfvrsn=13.

Suites (R9) under worst-case conditions (which assumes all construction equipment is in use over a 24-hour day, and all terminal-related construction activities are occurring at the same time). Total terminal-related noise levels (i.e., background plus Project construction noise) at the Sheraton Gateway Hotel, H Hotel/Homewood Suites, Hyatt Regency, and Courtyard Los Angeles LAX/Century Boulevard would be greater than existing ambient exterior noise levels by 5 dBA or more (see Table 4). Therefore, construction equipment noise from construction of the proposed terminal improvements could result in a temporary but significant impact to noise-sensitive uses in the nearby area including, but not limited to, the Sheraton Gateway, H Hotel/Homewood Suites, Hyatt Regency, and Courtyard Los Angeles LAX/Century Boulevard, under conservative, worst-case conditions.

As noted above, the estimated noise levels do not account for any intervening topography, buildings, or other obstructions that would reduce noise. Hotels located in proximity to LAX including, but not limited to, the specific hotels identified above, are subject to the *Sound Insulation Requirements for Noise Sensitive Structures Near Los Angeles International Airport* established by the City of Los Angeles Department of Building and Safety. Given the existing setting of these hotels, being in proximity to aircraft operations at LAX and the associated high noise levels, the outdoor to indoor noise reduction levels at the hotels is greater than in most typical buildings due to extra sound insulation/attenuation features integrated into the buildings' design and construction. Although exterior noise levels would exceed the significance thresholds, it is not expected that these exceedances would result in sleep disturbance, given the heightened standards for interior noise insulation.

As also noted previously, this analysis conservatively assumes construction activity at all sites would occur simultaneously, that all equipment would be used throughout the entire 24-hour day, and that all construction equipment at each site would be in use simultaneously. This is not expected to occur, as different pieces of construction equipment would be in use during different phases of construction; nighttime construction activities, if any, would be limited; and construction of the various Project components would not all overlap. Therefore, this analysis represents a potential worst-case scenario for construction equipment noise. As a result, actual noise exposure at these receptor locations would likely be lower than identified in Table 4.

6.1.4 Combined Construction of Terminal Improvements and Landside Access Improvements

The five hotels at receptor locations R7 through R11 are situated in proximity to both the proposed terminal improvements and the landside access improvements and could be subject to construction noise impacts from both types of improvements should the subject construction activities occur simultaneously. Combined construction noise from the proposed airfield improvements, the landside access improvements, and proposed Concourse 0 was also evaluated for receptor location R6. Table 4 presents the estimated noise levels at each receptor location for the combined construction activities. As shown, the combined airfield, landside access, and terminal improvements construction noise exposure would be 70.4 dBA CNEL at Receptor R6, which would be less than existing exterior ambient noise levels (72 dBA). Total noise at this receptor would not exceed existing ambient exterior noise levels by 5 dBA.

As shown on Table 4, the combined terminal improvements and landside access improvements construction noise exposure would range from 75.1 dBA CNEL at the Residence Inn by Marriott (R7) to 96.4 dBA CNEL at the H Hotel/Homewood Suites (R9) under worst-case conditions (which assumes all construction equipment is in use over a 24 hour day, and all terminal-related and roadway-related construction activities are occurring at the same time). As shown in Table 4, total noise levels (i.e., background plus terminal and roadway construction noise) would range from 76.3 dBA to 96.4 dBA, and would be greater than existing ambient exterior noise levels by 5 dBA or more at all five hotels analyzed. Therefore, construction equipment noise from potential combined construction of the proposed terminal improvements and the roadway improvements could result in a temporary but significant impact to noise-sensitive uses in the nearby area including, but not limited to, the Residence Inn by Marriott, Sheraton Gateway, H Hotel/Homewood Suites, Hyatt Regency, and Courtyard Los Angeles LAX/Century Boulevard, under conservative, worst-case conditions. It should be noted, as indicated above, although exterior noise levels would exceed the significance thresholds, it is not expected that these exceedances would result in sleep disturbance, given the heightened standards for interior noise insulation.

As noted previously, that actual noise exposure at these receptor locations would likely be lower than the levels analyzed herein because it is unlikely that all equipment would be in use at any one time.

6.1.5 Potential Construction Staging Areas

As shown in **Table 5**, there are several noise-sensitive receptors located near potential construction staging areas. The distances and construction equipment CNELs are provided in Table 5. Staging areas were broken out from construction activity since sound levels for each staging area would be localized, attenuating with distance relatively quickly compared to other construction activities. Staging areas are used primarily for storage of construction vehicles, equipment, and other materials which results in much lower construction noise levels than the phases identified in Table 4. Nevertheless, staging areas noise levels were analyzed for the proposed Project to identify potential impact conditions. Figure 3 shows the locations of the noise-sensitive receptors that were chosen due to their proximity to potential construction staging areas. It should be noted that these staging areas are currently being, or have been, used as staging areas for other construction projects at LAX.

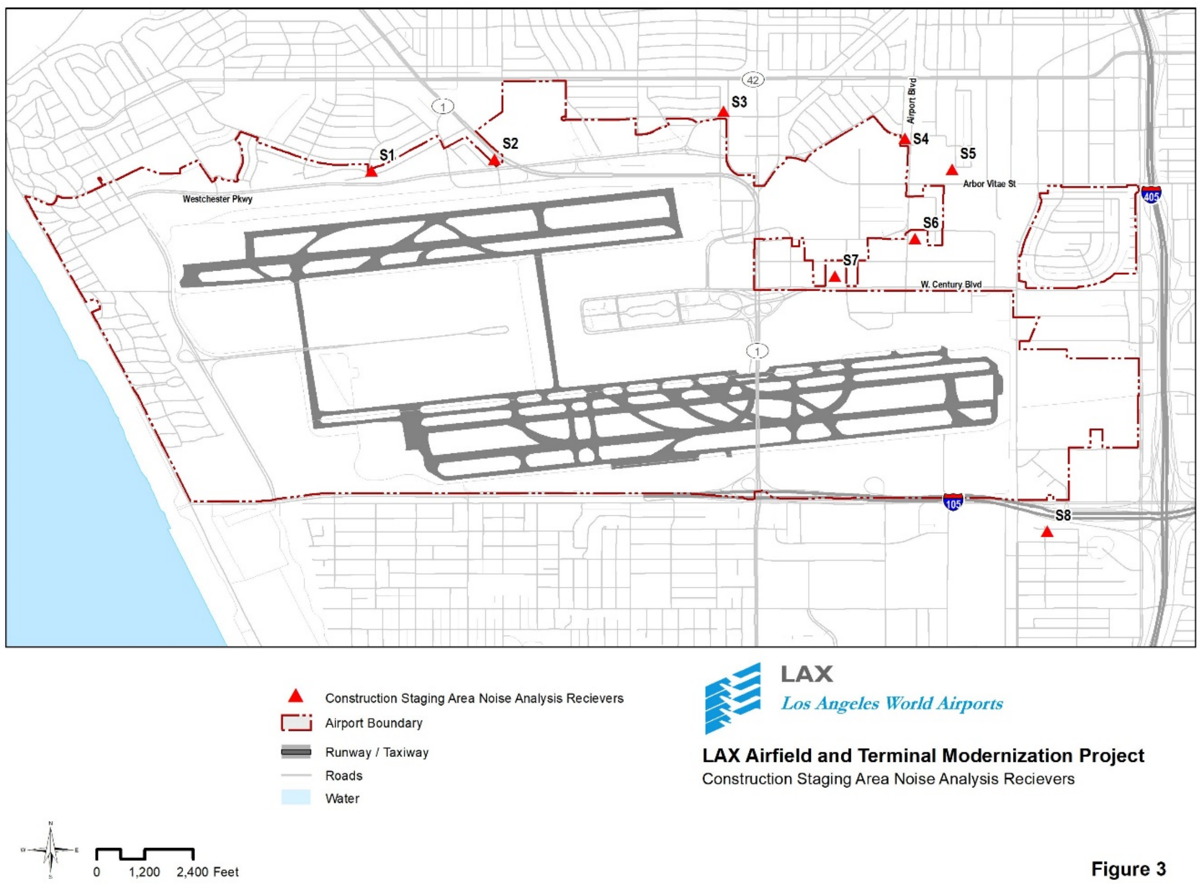

Figure 3. Construction Staging Area Noise Analysis Receivers

Source: HMMH 2019

Table 5. Construction Staging Area Noise Levels

ID	Land Use Setting	Background Conditions[1] CNEL (dBA)	Distance to nearest staging area (feet)	Staging area Construction Equipment CNEL (dBA)	Total[2] CNEL (dBA)	Significance Threshold	Above Threshold?
S1	Residential	68.6	700	55.1	68.8	73.6	No
S2	Residential	67.8	200	66.0	70.0	72.8	No
S3	Residential	68.2	125	70.0	72.2	73.2	No
S4	Residential	71.1	1350	49.4	71.1	76.1	No
S5	Residential	74.0	850	53.4	74.0	79.0	No
S6	Hotel	68.0	150	68.5	71.2	73.1	No
S7	Hotel	69.3	150	68.5	71.9	74.4	No
S8	Residential	66.1	750	67.5 [4]	69.9	71.1	No

Source: HMMH, 2020.

Notes:
[1] Background condition obtained through AEDT using 24-hour CNEL dBA.
[2] Background and staging area construction noise.
[3] Significant Threshold = Background CNEL + 5 dBA.
[4] This noise level is conservative (high) because it assumes concrete batch plant and crusher operations would occur at the south edge of the staging area closest to the nearest residential area; however, the actual placement of those facilities within the staging area would be farther away in the central portion of the staging area where electric power infrastructure for the facilities is located. As such, actual construction noise levels at the nearest residential area would be lower than shown in the table.

Northwest Construction Staging Area: This area is located south of Westchester Parkway between Pershing Drive and Lincoln Boulevard. It is anticipated that this area would be primarily used for construction worker parking, construction trailers/portable offices, as well as storage for tools/supplies/materials. Specifically, operations of this construction staging area would include noise from workers arriving at and departing from the parking area, noise from trucks traveling to and from this area, and noise from on-site activities, such as loading and unloading trucks. No materials processing, including use of a rock crusher or concrete batch plant, is proposed for this construction staging area.

Construction staging activity would occur primarily in the daytime hours and largely involve street-legal vehicles that are quieter than off-road construction equipment. Therefore, the noise from such vehicles at this staging/parking area would be much less than that from the off-road construction equipment considered in this analysis. Based on the nature, location, and anticipated use of this construction staging area, construction equipment noise impacts to nearby residential areas located approximately 200 feet to the north were calculated in RCNM to be less than significant (66.0 dBA CNEL).

Northeast Construction Staging Area: A portion of this construction staging area is located at the intersection of La Tijera and Sepulveda Westway. The other portion is located just south of that between McConnell Avenue and Sepulveda Westway. Part of this area has been used by LAWA for staging of construction and soundproofing activities; a block wall approximately 15 to 20 feet tall, borders the northern and western edges of the staging area (i.e., between the interior of the staging area and residential areas to the north and northwest). This wall will have some attenuation effects by around a 10 dB reduction, however the wall was not included in the analysis to be conservative. It is anticipated that this construction staging/parking area would be used primarily for construction worker parking, construction trailers/portable offices, and/or outdoor storage laydown areas. No materials processing, including use of a rock crusher or concrete batch plant, is proposed for the northeast construction staging/parking area. Based on the nature, location, and anticipated use of the Northeast Construction Staging Area, construction equipment noise impacts to nearby residential areas located approximately 125 feet to the north were calculated in RCNM to be less than significant (70.0 dBA CNEL, not including the attenuation from the wall).

East Construction Staging Areas: Several staging areas to the east of the airport are anticipated to be used primarily for construction worker parking, and for construction trailers/portable offices, storage of tools/supplies/materials, and outdoor storage and laydown areas. These areas are located south of Arbor Vitae Street on both sides of Airport Boulevard between Belford Boulevard and Jenny Avenue, as well as a smaller area south of 96th Street and north of 98th Street near Avion Drive. Based on the nature, location, and anticipated use of this construction area, construction equipment noise impacts to nearby residential areas located approximately 850 feet to the north were calculated in RCNM to be less than significant (53.4 dB CNEL). Anticipated use of this construction area and construction equipment noise impacts to the closest commercial hotel area located approximately 150 feet to the south were calculated in RCNM to be less than significant (68.5 dBA CNEL).

Southeast Construction Staging Area: This area is located southeast of the southern runway complex at the corner of Imperial Highway and Aviation Boulevard. It is anticipated that this area would be used primarily for construction worker parking; construction trailers/portable offices: enclosed storage bins for contractors to keep tools, supplies, and materials; and outdoor storage and laydown areas. There is a potential for materials processing (e.g., a rock crusher or concrete batch plant) to occur within this staging area. The nearest noise-sensitive use (residential) is approximately 750 feet south of the area. The noise levels were calculated in RCNM to be less than significant (69.9 dBA CNEL). An existing eight-foot concrete block wall is located along the north side of 116th Street that fronts the subject residential development. With the concrete block wall and the many other structures that exist between the Southeast Construction Staging Area and the subject residential development, including the Metro Green Line Aviation/LAX Station and several on- and off-ramps that extend to and from the elevated I-105 freeway, it is estimated that noise emanating from construction staging activities at this construction staging area would be attenuated. Even without accounting for the noise reduction provided by the wall and other intervening facilities, based on the nature, location, and anticipated use of this construction area, construction equipment noise impacts to nearby residential areas would be less than significant.

Attachment A shows a breakdown of CNEL dBA sound levels at 50 feet, that is planned for each phase of construction as well as equipment planned to be used with L_{max} values.

7. Construction Noise Mitigation

The following construction noise mitigation measures are recommended for inclusion in the proposed Project.

> **Mitigation Measure MM-CN (ATMP)-1: Construction Noise Control Plans:** LAWA shall require construction contractors working on the landside access (i.e., roadway) improvements, the Concourse 0 improvements, or the Terminal 9 improvements, including the Terminal 9 APM station, to develop noise control plans to address construction equipment noise at noise-sensitive receptors where construction noise impacts may be significant. The noise control plans shall be approved by LAWA prior to implementation. The noise control plans shall calculate the total maximum noise level (in CNEL) associated with construction of the Project component, as well as cumulative noise impacts for Project-related activities that would occur concurrently with construction of other Project components and construction of nearby LAX Landside Access Modernization Program facilities. If the calculated construction-related noise levels indicate an increase of 5 dBA over the baseline exterior noise level at any noise-sensitive receptor, the noise control plan shall specify provisions and/or measures to be implemented during construction that will attenuate construction noise levels to be less than 5 dBA over the baseline exterior noise level. Such provisions could include modifying construction phasing or individual construction activities so that less noise-generating equipment is in operation at any one time. Potential noise attenuation measures could include, but are not limited to, noise curtains, noise blankets, temporary sound walls, or their equivalent during construction. The noise control plans shall include a provision that states that, if noise levels exceed the 5 dBA increase, LAWA will require the contractor to implement additional noise attenuation measures, which could include the installation of

additional equipment, and to repeat the noise measurements, until the noise increase is less than 5 dBA.

Due to the dynamic nature of construction activities, especially for a large diverse project such as the proposed Project, it is not feasible to specify in the planning stage exactly what noise attenuation measures would be implemented for each aspect of Project development. Such decisions are feasible when there are more details known about the specific construction equipment to be used; the operational location and setting (i.e., any intervening noise barriers between the equipment area and nearby noise-sensitive uses); the schedule of each individual component of the proposed Project, including which construction activities would occur concurrently; the schedule for, and duration of, equipment operation; and the nature and location of other nearby construction activity that may overlap with the Project-related construction. Given that such considerations may change over the course of developing the proposed Project improvements, the specification of appropriate construction noise attenuation measures is best determined at the time of construction. With implementation of Mitigation Measure MM-N (ATMP)-1, the need for construction noise attenuation measures would be determined, and the specific noise measures would be identified in noise control plans specific to each Project component. The proposed mitigation measure provides a performance standard that construction noise levels shall not exceed 5 dBA over the baseline exterior noise level at the time of construction and provides a number of feasible options for attaining this standard. With adherence to this performance standard, this measure would mitigate construction noise impacts.

Monitoring during construction ensures that this mitigation measure will be feasible by setting up alerts that the construction contractor, LAWA, or other parties with access can review to ensure an exceedance is or is not attributable to the Project construction effort. In this way, it will be feasible for a construction contractor to adhere to the specification.

In addition to MM-N (ATMP)-1, the following mitigation measures are proposed to further reduce significant impacts related to construction equipment noise.

MM-CN (ATMP)-2: Construction Scheduling: The timing and/or sequence of the noisiest on-site construction activities shall avoid noise-sensitive times of the day, as feasible (9:00 p.m. to 7:00 a.m. Monday - Friday; 6:00 p.m. to 8:00 a.m. Saturday; anytime on Sunday or holidays).

MM-CN (ATMP)-3: Construction Equipment: Stationary source equipment whose use is flexible with regard to relocation (such as generators and compressors) shall be located at the greatest distance practical from noise-sensitive land uses. "Quiet-design" air compressors and other quieter construction equipment shall be used when feasible and when such technology/equipment is commercially available.

8. Summary of Construction Noise Impacts and Mitigation Measures

Table 6. Summary Matrix of Impacts and Mitigation Measures Associated with the Proposed Project Related to Construction Equipment Noise

Environmental Impacts	Impact Determination	Mitigation Measures	Impacts after Mitigation
Impact 1: Implementation of the proposed Project has the potential to cause construction noise levels that would exceed existing ambient exterior noise levels by 5 dBA or more at a noise-sensitive use. As such, this would be a significant impact.	Construction: Significant Operation: Not applicable	MM-CN (ATMP)-1 MM-CN (ATMP)-2 MM-CN (ATMP)-3	Construction: Less than Significant Operation: Not applicable

Table 6. Summary Matrix of Impacts and Mitigation Measures Associated with the Proposed Project Related to Construction Equipment Noise

Environmental Impacts	Impact Determination	Mitigation Measures	Impacts after Mitigation
Impact 2: Implementation of the proposed Project has the potential to cause construction noise levels that would exceed existing ambient exterior noise levels by 5 dBA or more at a noise-sensitive use between the hours of 9:00 p.m. and 7:00 a.m. Monday through Friday, before 8:00 a.m. or after 6:00 p.m. on Saturday, or at any time Sunday. As such, this would be a significant impact.	Construction: Significant Operation: Not applicable	MM-CN (ATMP)-1 MM-CN (ATMP)-2 MM-CN (ATMP)-3	Construction: Less than Significant Operation: Not applicable

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Attachment A

Roadway Construction Table dBA CNEL Noise Level at 50 Feet

Time of Day	Hour	Hourly Activity Factor[1]	Hourly Average Sound Level (L_{eq})[2]	Weight-Hourly Average Sound Level (L_{eq} + Penalty[3])
Nighttime	12:00 a.m. - 1:00 a.m.	38%	90.0	100.0
	1:00 a.m. - 2:00 a.m.	38%	90.0	100.0
	2:00 a.m. - 3:00 a.m.	38%	90.0	100.0
	3:00 a.m. - 4:00 a.m.	38%	90.0	100.0
	4:00 a.m. - 5:00 a.m.	38%	90.0	100.0
	5:00 a.m. - 6:00 a.m.	38%	90.0	100.0
	6:00 a.m. - 7:00 a.m.	38%	90.0	100.0
Daytime	7:00 a.m. - 8:00 a.m.	38%	90.0	90.0
	8:00 a.m. - 9:00 a.m.	38%	90.0	90.0
	9:00 a.m. - 10:00 a.m.	38%	90.0	90.0
	10:00 a.m. - 11:00 a.m.	38%	90.0	90.0
	11:00 a.m. - 12:00 p.m.	38%	90.0	90.0
	12:00 p.m. - 1:00 p.m.	38%	90.0	90.0
	1:00 p.m. - 2:00 p.m.	38%	90.0	90.0
	2:00 p.m. - 3:00 p.m.	38%	90.0	90.0
	3:00 p.m. - 4:00 p.m.	38%	90.0	90.0
	4:00 p.m. - 5:00 p.m.	38%	90.0	90.0
	5:00 p.m. - 6:00 p.m.	38%	90.0	90.0
	6:00 p.m. - 7:00 p.m.	38%	90.0	90.0
Evening	7:00 p.m. - 8:00 p.m.	38%	90.0	95.0
	8:00 p.m. - 9:00 p.m.	38%	90.0	95.0
	9:00 p.m. - 10:00 p.m.	38%	90.0	95.0
Nighttime	10:00 p.m. - 11:00 p.m.	38%	90.0	100.0
	11:00 p.m. - 12:00 a.m.	38%	90.0	100.0
Estimated Daily CNEL[4]				**97.0**

Notes:
1. This is an average usage factor for all of the equipment operating during construction and is based on the default usage factors for each individual piece of equipment that are provided in FHWA's RCNM user's manual (FHWA 2006).
2. Noise value is calculated by adding 10*LOG(Hourly Activity Factor/100) to the RCNM L_{max} dBA at 50 feet for the composite of construction equipment typically associated with the subject type of construction. Hourly activity factor presented is the average usage factor for each piece of equipment in the construction phase.
3. The penalty value added to L_{eq} is the same level used to calculate CNEL to account for the greater sensitivity of nearby land uses in the evening (7:00 p.m. to 10:00 p.m.) and at night (10:00 p.m. to 7:00 a.m.), 5 dB and 10 dB, respectively.
4. CNEL represents cumulative sound level 50 feet from the sources (i.e., construction equipment for a given phase of construction).

Airfield Construction Table dBA CNEL Noise Level at 50 Feet

Time of Day	Hour	Hourly Activity Factor[1]	Hourly Average Sound Level (L_{eq})[2]	Weight-Hourly Average Sound Level (L_{eq} + Penalty[3])
Nighttime	12:00 a.m. - 1:00 a.m.	38%	89.6	99.6
	1:00 a.m. - 2:00 a.m.	38%	89.6	99.6
	2:00 a.m. - 3:00 a.m.	38%	89.6	99.6
	3:00 a.m. - 4:00 a.m.	38%	89.6	99.6
	4:00 a.m. - 5:00 a.m.	38%	89.6	99.6
	5:00 a.m. - 6:00 a.m.	38%	89.6	99.6
	6:00 a.m. - 7:00 a.m.	38%	89.6	99.6
Daytime	7:00 a.m. - 8:00 a.m.	38%	89.6	89.6
	8:00 a.m. - 9:00 a.m.	38%	89.6	89.6
	9:00 a.m. - 10:00 a.m.	38%	89.6	89.6
	10:00 a.m. - 11:00 a.m.	38%	89.6	89.6
	11:00 a.m. - 12:00 p.m.	38%	89.6	89.6
	12:00 p.m. - 1:00 p.m.	38%	89.6	89.6
	1:00 p.m. - 2:00 p.m.	38%	89.6	89.6
	2:00 p.m. - 3:00 p.m.	38%	89.6	89.6
	3:00 p.m. - 4:00 p.m.	38%	89.6	89.6
	4:00 p.m. - 5:00 p.m.	38%	89.6	89.6
	5:00 p.m. - 6:00 p.m.	38%	89.6	89.6
	6:00 p.m. - 7:00 p.m.	38%	89.6	89.6
Evening	7:00 p.m. - 8:00 p.m.	38%	89.6	94.6
	8:00 p.m. - 9:00 p.m.	38%	89.6	94.6
	9:00 p.m. - 10:00 p.m.	38%	89.6	94.6
Nighttime	10:00 p.m. - 11:00 p.m.	38%	89.6	99.6
	11:00 p.m. - 12:00 a.m.	38%	89.6	99.6
Estimated Daily CNEL[4]				**96.6**

Notes:
1. This is an average usage factor for all of the equipment operating during construction and is based on the default usage factors for each individual piece of equipment that are provided in FHWA's RCNM user's manual (FHWA 2006).
2. Noise value is calculated by adding 10*LOG(Hourly Activity Factor/100) to the RCNM L_{max} dBA at 50 feet for the composite of construction equipment typically associated with the subject type of construction. Hourly activity factor presented is the average usage factor for each piece of equipment in the construction phase.
3. The penalty value added to L_{eq} is the same level used to calculate CNEL to account for the greater sensitivity of nearby land uses in the evening (7:00 p.m. to 10:00 p.m.) and at night (10:00 p.m. to 7:00 a.m.), 5 dB and 10 dB, respectively.
4. CNEL represents cumulative sound level 50 feet from the sources (i.e., construction equipment for a given phase of construction).

Terminal Construction Table dBA CNEL Noise Level at 50 Feet

Time of Day	Hour	Hourly Activity Factor[1]	Hourly Average Sound Level (L_{eq})[2]	Weight-Hourly Average Sound Level (L_{eq} + Penalty[3])
Nighttime	12:00 a.m. - 1:00 a.m.	35%	90.0	100.0
	1:00 a.m. - 2:00 a.m.	35%	90.0	100.0
	2:00 a.m. - 3:00 a.m.	35%	90.0	100.0
	3:00 a.m. - 4:00 a.m.	35%	90.0	100.0
	4:00 a.m. - 5:00 a.m.	35%	90.0	100.0
	5:00 a.m. - 6:00 a.m.	35%	90.0	100.0
	6:00 a.m. - 7:00 a.m.	35%	90.0	100.0
Daytime	7:00 a.m. - 8:00 a.m.	35%	90.0	90.0
	8:00 a.m. - 9:00 a.m.	35%	90.0	90.0
	9:00 a.m. - 10:00 a.m.	35%	90.0	90.0
	10:00 a.m. - 11:00 a.m.	35%	90.0	90.0
	11:00 a.m. - 12:00 p.m.	35%	90.0	90.0
	12:00 p.m. - 1:00 p.m.	35%	90.0	90.0
	1:00 p.m. - 2:00 p.m.	35%	90.0	90.0
	2:00 p.m. - 3:00 p.m.	35%	90.0	90.0
	3:00 p.m. - 4:00 p.m.	35%	90.0	90.0
	4:00 p.m. - 5:00 p.m.	35%	90.0	90.0
	5:00 p.m. - 6:00 p.m.	35%	90.0	90.0
	6:00 p.m. - 7:00 p.m.	35%	90.0	90.0
Evening	7:00 p.m. - 8:00 p.m.	35%	90.0	95.0
	8:00 p.m. - 9:00 p.m.	35%	90.0	95.0
	9:00 p.m. - 10:00 p.m.	35%	90.0	95.0
Nighttime	10:00 p.m. - 11:00 p.m.	35%	90.0	100.0
	11:00 p.m. - 12:00 a.m.	35%	90.0	100.0
Estimated Daily CNEL[4]				**97.0**

Notes:
1. This is an average usage factor for all of the equipment operating during construction and is based on the default usage factors for each individual piece of equipment that are provided in FHWA's RCNM user's manual (FHWA 2006).
2. Noise value is calculated by adding 10*LOG(Hourly Activity Factor/100) to the RCNM L_{max} dBA at 50 feet for the composite of construction equipment typically associated with the subject type of construction. Hourly activity factor presented is the average usage factor for each piece of equipment in the construction phase.
3. The penalty value added to L_{eq} is the same level used to calculate CNEL to account for the greater sensitivity of nearby land uses in the evening (7:00 p.m. to 10:00 p.m.) and at night (10:00 p.m. to 7:00 a.m.), 5 dB and 10 dB, respectively.
4. CNEL represents cumulative sound level 50 feet from the sources (i.e., construction equipment for a given phase of construction).

Staging Area Construction Table dBA CNEL Noise Level at 50 Feet

Time of Day	Hour	Hourly Activity Factor[1]	Hourly Average Sound Level (L_{eq})[2]	Weight-Hourly Average Sound Level (L_{eq} + Penalty[3])
Nighttime	12:00 a.m. - 1:00 a.m.	40%	71.0	81.0
	1:00 a.m. - 2:00 a.m.	40%	71.0	81.0
	2:00 a.m. - 3:00 a.m.	40%	71.0	81.0
	3:00 a.m. - 4:00 a.m.	40%	71.0	81.0
	4:00 a.m. - 5:00 a.m.	40%	71.0	81.0
	5:00 a.m. - 6:00 a.m.	40%	71.0	81.0
	6:00 a.m. - 7:00 a.m.	40%	71.0	81.0
Daytime	7:00 a.m. - 8:00 a.m.	40%	71.0	71.0
	8:00 a.m. - 9:00 a.m.	40%	71.0	71.0
	9:00 a.m. - 10:00 a.m.	40%	71.0	71.0
	10:00 a.m. - 11:00 a.m.	40%	71.0	71.0
	11:00 a.m. - 12:00 p.m.	40%	71.0	71.0
	12:00 p.m. - 1:00 p.m.	40%	71.0	71.0
	1:00 p.m. - 2:00 p.m.	40%	71.0	71.0
	2:00 p.m. - 3:00 p.m.	40%	71.0	71.0
	3:00 p.m. - 4:00 p.m.	40%	71.0	71.0
	4:00 p.m. - 5:00 p.m.	40%	71.0	71.0
	5:00 p.m. - 6:00 p.m.	40%	71.0	71.0
	6:00 p.m. - 7:00 p.m.	40%	71.0	71.0
Evening	7:00 p.m. - 8:00 p.m.	40%	71.0	76.0
	8:00 p.m. - 9:00 p.m.	40%	71.0	76.0
	9:00 p.m. - 10:00 p.m.	40%	71.0	76.0
Nighttime	10:00 p.m. - 11:00 p.m.	40%	71.0	81.0
	11:00 p.m. - 12:00 a.m.	40%	71.0	81.0
Estimated Daily CNEL[4]				**78.0 [5]**

Notes:
1. This is an average usage factor for all of the equipment operating during construction and is based on the default usage factors for each individual piece of equipment that are provided in FHWA's RCNM user's manual (FHWA 2006).
2. Noise value is calculated by adding 10*LOG(Hourly Activity Factor/100) to the RCNM L_{max} dBA at 50 feet for the composite of construction equipment typically associated with the subject type of construction. Hourly activity factor presented is the average usage factor for each piece of equipment in the construction phase.
3. The penalty value added to L_{eq} is the same level used to calculate CNEL to account for the greater sensitivity of nearby land uses in the evening (7:00 p.m. to 10:00 p.m.) and at night (10:00 p.m. to 7:00 a.m.), 5 dB and 10 dB, respectively.
4. CNEL represents cumulative sound level 50 feet from the sources (i.e., construction equipment for a given phase of construction).
5. The estimated daily CNEL of 78.0 dBA is representative of staging areas utilized to mobilize and manage construction equipment and/or supplies. In the case of the Southeast Construction Staging Area, there is the potential for material processing (e.g., a rock crusher or concrete batch plant). Should that occur, a conservative (worst-case) estimate of the daily CNEL would be 91.0 dBA at 50 feet. That noise level has been accounted for in the estimated noise level at Receptor S8.

Airfield Construction Equipment Table

Construction Phase	Equipment Type	L_{max} @ 50 feet
Airfield Construction	Backhoe	78.0
	Bobcat S650	79.0
	Boom Truck	74.0
	Bucket Truck	74.0
	Compactors	83.0
	Concrete Delivery Trucks	81.0
	Concrete Trucks	79.0
	Crane	81.0
	Forklift Boom Truck	74.0
	Crew Transport Vehicle	75.0
	Delivery Truck	74.0
	Dozers	82.0
	Excavator	74.0
	Flat Bed Trucks	74.0
	Forklift Boom Truck	74.0
	Generators	81.0
	Grader	85.0
	Haul Trucks	76.0
	Loaders	79.0
	Materials Transfer Vehicle	77.0
	Mechanic's Trucks	74.0
	Milling Machine	77.0
	Paving Machine	77.0
	Pick-up Trucks	75.0
	Seeding Trucks	74.0
	Small Tandem Compactor	83.0
	Striping Truck	74.0
	Texture & Cure Bridge	77.0
	Track hoe	81.0
	Water Truck	74.0
Composite dBA Leq(h) @ 50 Feet		**89.6**
Composite dBA CNEL @ 50 Feet		**96.6**

Source: Connico 2019. Construction equipment planned and sound levels from the Roadway Construction Noise Model by FHWA.

Roadway Construction Equipment Table

Construction Phase	Equipment Type	L_{max} @ 50 feet
Roadway Construction	Backhoe	78.0
	Bobcat S650	79.0
	Boom Truck	74.0
	Bucket Truck	74.0
	Compactors	83.0
	Concrete Delivery Trucks	81.0
	Concrete Pump Truck	81.0
	Concrete Trucks	81.0
	Crane	81.0
	Crew Transport Vehicle	75.0
	Curb Paver	77.0
	Delivery Truck (Semi)	74.0
	Delivery Trucks	74.0
	Dozers	82.0
	Excavator	81.0
	Flat Bed Trucks	74.0
	Forklift Boom Truck	74.0
	Generators	81.0
	Grader	85.0
	Haul Trucks	76.0
	Loaders	79.0
	Materials Transfer Vehicle	77.0
	Mechanic's Trucks	74.0
	Milling Machine	77.0
	Paving Machine	77.0
	Pick-up Trucks	75.0
	Pier Drill	79.0
	Pole Truck and Drill	79.0
	Precast Delivery	74.0
	Precast Delivery (Semi)	74.0
	Small Tandem Compactor	83.0
	Seeding Trucks	74.0
	Striping Truck	74.0
	Texture & Cure Bridge	77.0
	Track hoe	81.0
	Trencher	80.0
	Water/Form Trucks	74.0
	Wire Truck	74.0
Composite dBA Leq(h) @ 50 Feet		**90.0**
Composite dBA CNEL @ 50 Feet		**97.0**

Source: Connico 2019. Construction equipment planned and sound levels from the Roadway Construction Noise Model by FHWA.

Terminal Construction Equipment Table

Construction Phase	Equipment Type	L_{max} @ 50 feet
Terminal Construction	Backhoe	78.0
	Bobcat S650	79.0
	Boom Truck	74.0
	Bucket Truck	74.0
	Central Mix Plant	83.0
	Compactors	83.0
	Concrete Delivery Trucks	81.0
	Concrete Haul Trucks	81.0
	Concrete Pump Truck	81.0
	Concrete Trucks	79.0
	Crane	81.0
	Crew Transport Vehicle	75.0
	Curb Paver	77.0
	Delivery Trucks	74.0
	Dozer	82.0
	Excavator	81.0
	Flat Bed Trucks	74.0
	Forklift Boom Truck	74.0
	Generators	81.0
	Grader	85.0
	Haul Trucks	76.0
	Loader	79.0
	Man Lift	74.0
	Materials Transfer Vehicle	77.0
	Mechanic's Trucks	74.0
	Milling Machine	77.0
	Paving Machine	77.0
	Pick-up Trucks	75.0
	Pier Drill	79.0
	Piling and drilling rig	79.0
	Pump Truck	74.0
	Rubber-tire crane	81.0
	Scissor Lift	74.0
	Seeding Trucks	74.0
	Small Tandem Compactor	83.0
	Striping Truck	74.0
	Texture & Cure Bridge	77.0
	Track hoe	81.0
	Water Truck	74.0
Composite dBA L_{eq}(h) @ 50 Feet		**90.0**
Composite dBA CNEL @ 50 Feet		**97.0**

Source: Connico 2019. Construction equipment planned and sound levels from the Roadway Construction Noise Model by FHWA.

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