SEPTEMBER 2016

Draft Environmental Impact Report

(DRAFT EIR)

[STATE CLEARINGHOUSE NO. 2015021014]

for Los Angeles International Airport (LAX) Landside Access Modernization Program

City of Los Angeles
Los Angeles World Airports

Appendix M

Los Angeles World Airports

Appendix M

Noise and Vibration

Appendix M Noise and Vibration

M.1 Noise Data Collection

M.1.1 INTRODUCTION

The proposed Landside Access Modernization Program (LAMP) for Los Angeles International Airport (LAX) comprises several development components that would serve to provide enhanced traffic circulation around the airport upon completion. A fundamental understanding of the existing environmental setting and potential impacts associated with the Project is necessary prior to approval and implementation. This technical memo documents fieldwork that was conducted to record existing ambient noise levels at sensitive land uses and regional traffic intersections that would be potentially affected by construction and operation of the LAMP.

The LAX LAMP Project includes the development of a proposed Automated People Mover (APM) system that would extend for approximately 2.25 miles, starting at the Central Terminal Area (CTA) and extending to the future proposed consolidated rental car facility (CONRAC) that would be situated adjacent to Interstate 405 (I-405). For the purposes of this analysis, the Project area considered includes the areas located within the CTA extending east to the I-405, as shown in **Figure M-1**.

The general Project area is roughly bound by the Tom Bradley International Terminal (TBIT) in the CTA on the west, the I-405 on the east, Westchester Parkway/W. Arbor Vitae Street on the north, and Interstate 105 (I-105) on the south. Additionally, the Project would include various roadway improvements that would affect areas south of Century Boulevard along Aviation Boulevard south to I-105; areas along 111th Street between Aviation Boulevard to La Cienega Boulevard and areas west of Sepulveda Boulevard between Sky Way and 96th Street.

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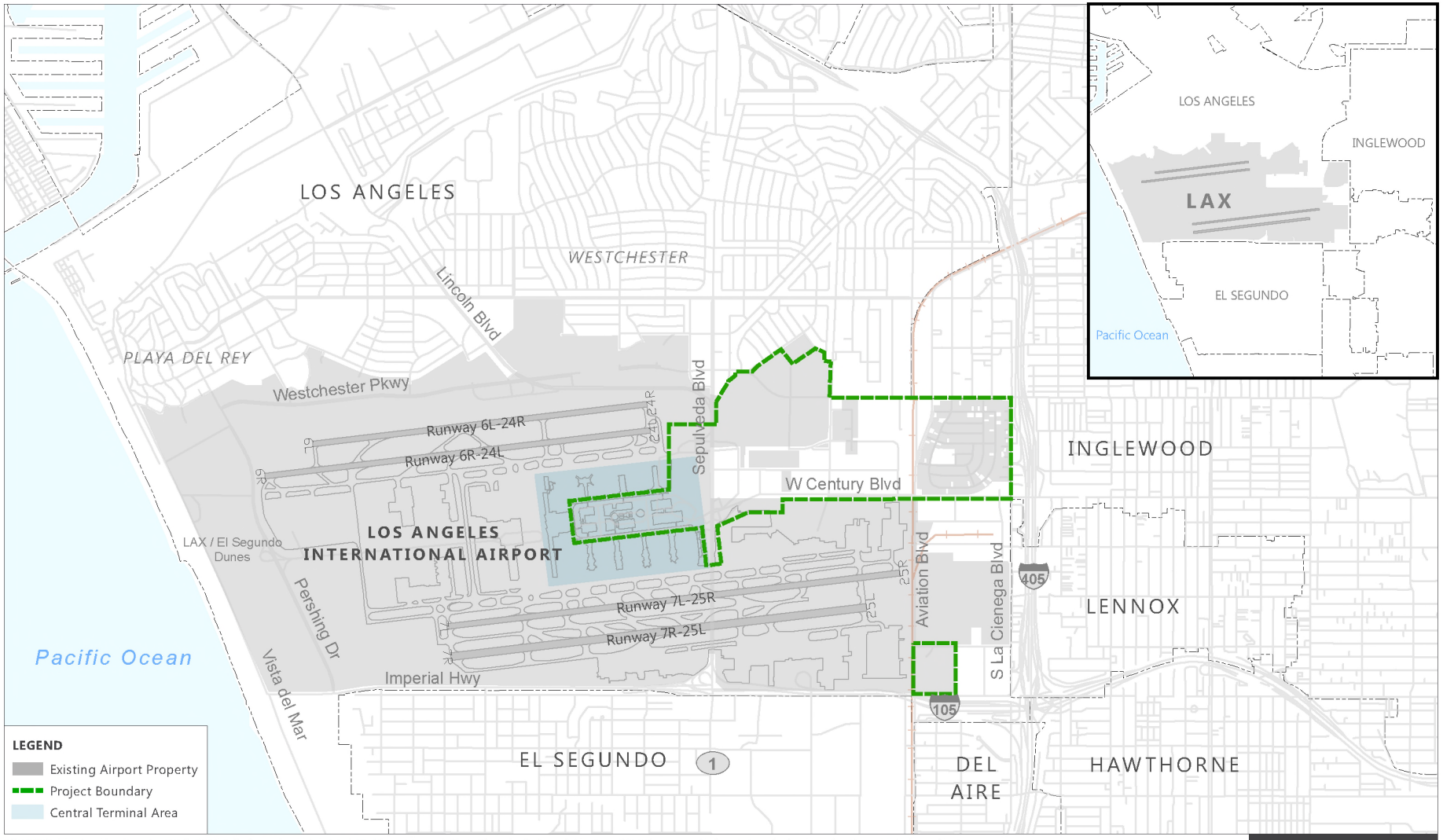

SOURCES: Los Angeles County, 2010, 2011 (city boundary, streets); LAX Airport Layout Plan, Ricondo & Associates, Inc., 2010 (runways, taxiways, terminal area, airport property boundary).
National Geographic World Map, ESRI Database, 2011.
PREPARED BY: Ricondo & Associates, Inc., January 2015.

FIGURE M-1

Project Area

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M.1.2 PURPOSE OF DATA COLLECTION

An ambient noise-monitoring survey was undertaken to establish existing noise levels at various locations near the LAMP Project. The monitoring was conducted to provide data on ambient noise generated by road traffic and the operation of current establishments in the area surrounding LAX, as well as along the roadway network that comprises the study intersections for the LAMP Project traffic study.

Figure M-2 presents the traffic study intersections included in the Project inventory. The study area was divided into Project area and regional locations (corresponding to the traffic study area).

Noise impacts anticipated to be generated by the Project were assessed using sound-modeling techniques to estimate the changes in noise that would result from both construction activities and operation of the LAMP Project. To assess noise impacts on a regional scale, the Federal Highway Administration (FHWA) Highway Traffic Noise Prediction Model (RD-77-108) was used to approximate existing traffic noise levels at sensitive receptors placed along the edge of the street segments between traffic study intersections. Vehicular noise levels along individual roadway segments within the Project area were completed using the SoundPLAN noise modeling software in combination with the FHWA Highway Traffic Noise Model (TNM).

Aircraft noise is not the subject of the survey; therefore, a discussion of the contribution of air traffic to ambient noise levels is excluded from the scope of this work.

The data collection will be used to determine whether construction and operation of the LAMP Project would result in noise levels that exceed applicable significance thresholds.

A significant construction equipment noise impact would occur if the direct and indirect changes in the environment that may be caused by the Project would result in one or more of the following conditions:

- Construction activities lasting more than 1 day would exceed existing ambient exterior noise levels by 10 dB(A) or more at a noise-sensitive use;
- Construction activities lasting more than 10 days in a 3-month period would exceed existing ambient exterior noise levels by 5 dB(A) or more at a noise-sensitive use; or,
- Construction activities would exceed the ambient exterior noise level by 5 dB(A) 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 on Sunday.

These thresholds were utilized because they address physical impacts on the environment and are included in the *L.A. CEQA Thresholds Guide.*[1]

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

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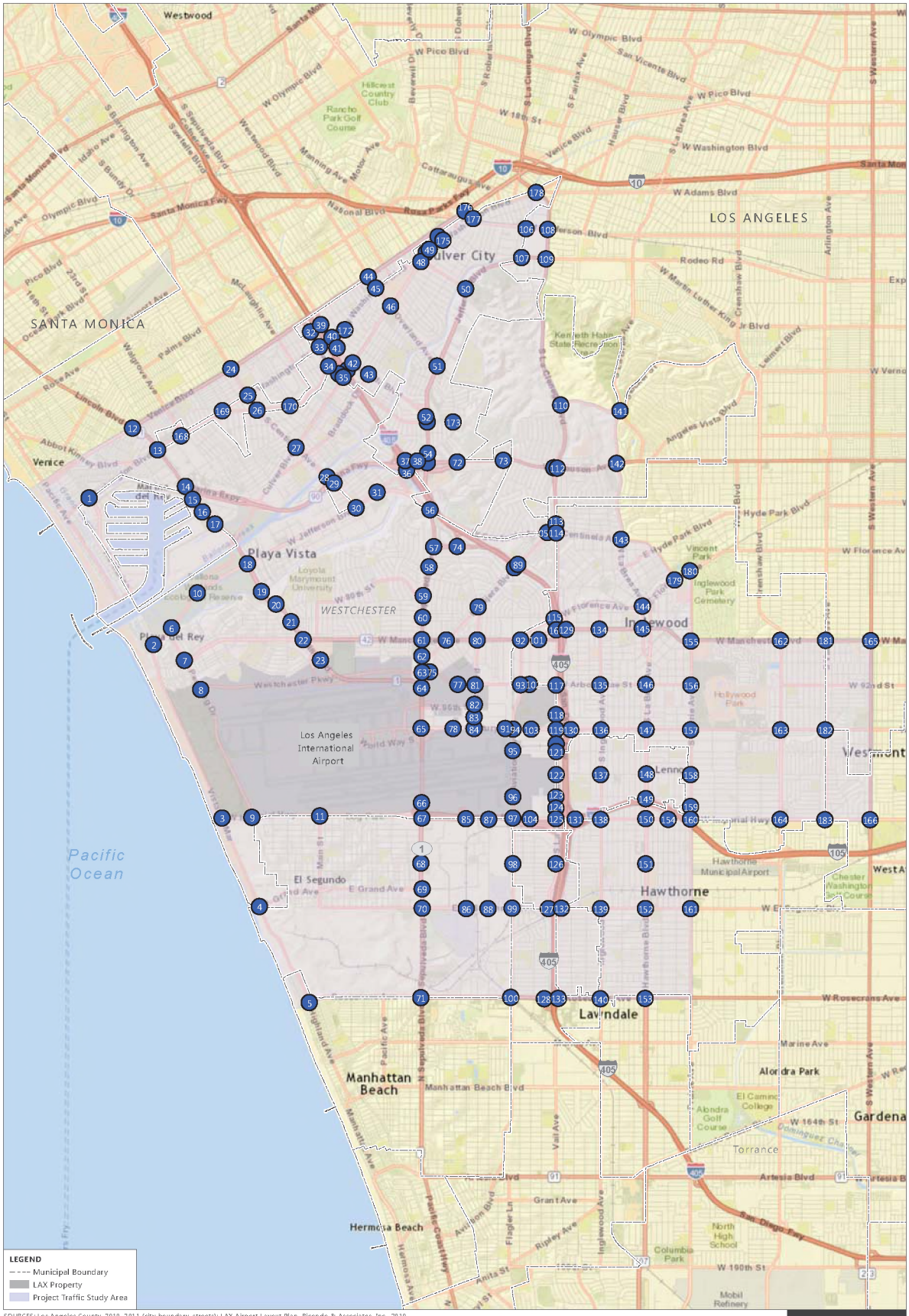

SOURCES: Los Angeles County, 2010, 2011 (city boundary, streets); LAX Airport Layout Plan, Ricondo & Associates, Inc., 2010 (runways, taxiways, terminal area, airport property boundary); National Geographic World Map, ESRI Database, 2011.
PREPARED BY: Ricondo & Associates, Inc., August 2016.

FIGURE M-2

Overview of Traffic Study Intersections

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A significant transit noise impact would occur if the direct and indirect changes in the environment caused by the proposed Project would result in one or more of the following conditions:

- Transit operations associated with components of the proposed Project cause the ambient noise level measured at the property line of affected noise-sensitive uses to increase by 3 dB(A) CNEL if post-Project noise levels are within the "normally acceptable" or "clearly unacceptable" compatibility category.

- Transit operations associated with components of the proposed Project cause the ambient noise level measured at the property line of affected uses to increase by 5 dB(A) CNEL or greater regardless of compatibility category.

The above thresholds are derived from the *L.A. CEQA Thresholds Guide*[2] relative to railroad noise associated with a proposed project.

M.1.3 METHODOLOGY

Noise measurements were collected in accordance with guidance provided in the Federal Transportation Authority (FTA) document *Transit Noise and Vibration Impact Assessment*.[3] The document outlines procedures and recommendations for assessing potential noise and vibration impacts from transit projects.

Under the FTA guidance document, land use types used in determining noise impact criteria are designated into three land use categories: Category 1, Category 2, and Category 3. Category 1 includes uses where quiet is an essential element in their intended purpose, such as indoor concert halls or outdoor concert pavilions, or National Historic Landmarks where outdoor interpretation routinely takes place. Category 2 includes residences and building where people sleep; while Category 3 includes institutional land uses with primarily daytime and evening use, such as school, places of worship, and libraries. Land use types included in Category 1 and 3 do not occur within the scope of this analysis along the proposed APM guideway.

Larson Davis Model 870, Larson Davis Model 820, and Rion Model NL-31 ANSI Type-1 precision integrating sound level meters (SLMs) were used to measure the noise during the 24-hour collection period at each location. The SLMs were field calibrated before and after the measurements and have annual calibration records traceable to NIST (National Institute of Standards and Technology).

The SLM used to conduct the noise monitoring survey was a Type 1 (precision) Larson Davis Model 831 SLM. This meter meets all requirements of American National Standards Institute (ANSI) S1.4-1983 and ANSI1.43-1997 Type 1 standards[4], as well as International Electrotechnical Commission (IEC) IEC61672-1 Ed. 1.0,

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

3 U.S. Department of Transportation, Office of Planning and Environment, Federal Transit Administration, *Transit Noise and Vibration Impact Assessment*, May 2006.

4 American Institute of Physics for the Acoustical Society of America, *American National Standard Specification for Sound Level Meters*, 1992.

IEC60651 Ed 1.2, and IEC60804 Type 1, Group X standards.[5] The SLM was located approximately 5 feet above ground and was covered with a Larson Davis windscreen. The SLM was field calibrated with an external calibrator prior to operation.

The FTA guidance document recommends that full 24-hour measurements be obtained for residential land uses. For non-residential uses, at least two single-hour recordings be taken on two non-successive weekdays during peak hour activities.[6]

M.1.4 DATA COLLECTION

Noise analysis was conducted at two different levels: Project area (24-hour CNEL) and regional (20-minute Leq) locations that correspond with the traffic study intersection locations. Regional 20-minute recordings were conducted at representative intersections identified in the LAMP inventory that would likely experience traffic volume increases as a result of patron travel to and from the future LAMP components following Project implementation.

Sensitive land uses and establishments situated close to future construction zones were identified in the screening survey.

Acoustic specialists recorded 24-hour measurements of existing ambient ground-level noise at 14 locations in the Project area situated between the LAX CTA and the I-405, through which the APM system would traverse. The 24-hour survey locations are shown on **Figure M-3**; and the ambient 24-hour noise environment results are shown in **Table M-1**.

Two 1-hour measurements were collected at the Concourse Hotel, located on the corner of Sepulveda Boulevard and W. Century Boulevard, due to equipment malfunction during the overnight collection period. Per the FTA guidance document, these measurements were taken on non-successive weekdays during peak-hour activities.

Results of the 24-hour noise monitoring survey, as well as the two single-hour measurements at the Concourse hotel, are provided in **Table M-2,** which presents the average 24-hour noise level, the maximum noise level recorded, and the peak hour of noise at each location. The 24-hour (Leq) noise measurements ranged from a high of 71.4 dB(A) (6101 W. Century Boulevard) to a low of 58.7 dB(A) (9846 Glasgow Place); the CNEL values ranged from a high of 77.4 dB(A) (6101 W. Century Boulevard) to a low of 62.7 dB(A) (9846 Glasgow Place). The highest 24-hour (Leq) and CNEL noise levels were both recorded at 6101 W. Century Boulevard, on the southeast corner of Joe's Airport Parking along W. Century Boulevard, between Vicksburg Avenue and Avion Drive.

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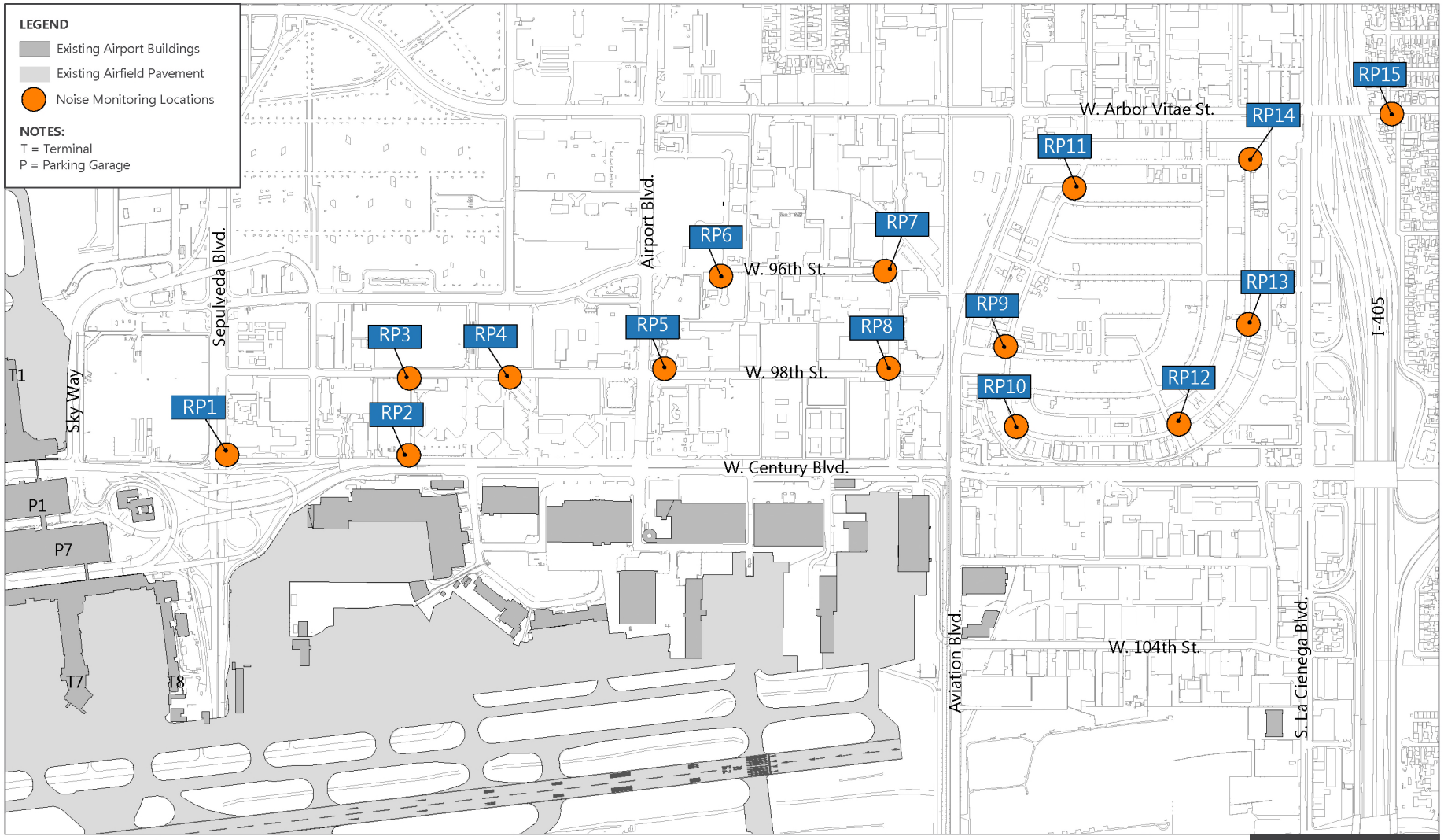
[5] Larson Davis 831, *Advanced Sound Level Meter for Architectural, Environmental, & Product Noise Analysis.* http://www.larsondavis.com/contentstore/mktg/LD_Downloads/831_Lowres.pdf.

[6] U.S. Department of Transportation, Office of Planning and Environment, Federal Transit Administration, *Transit Noise and Vibration Impact Assessment,* May 2006.



SOURCE: HNTB Corp., Los Angeles International Airport Layout Plan, July 2012; Meridian Consultants, July 2015.
PREPARED BY: Ricondo & Associates, Inc., September 2016.

FIGURE M-3

Project Area Noise Monitoring Locations

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Table M-1: Project Area Noise Survey Locations

SURVEY POINTS[1/]	LOCATION DESCRIPTION	UTM E	UTM N	DURATION	START DATE/TIME	END DATE/TIME
6225 W. Century Boulevard	Concourse Hotel, northeast corner of W. Century Boulevard & Sepulveda Boulevard	370998	3757013	1 hour (2)	7/30/2015 16:53 8/4/2015 16:20	7/30/2015 17:53 8/4/2015 17:20
6107 W. 98th Street	Northeast corner of Joe's Airport Parking along W. 98th Street between Vicksburg Avenue & Avion Drive	371404	3757178	24 hours	7/16/2015 9:00	7/17/2015 9:00
6101 W. Century Boulevard	Southeast corner of Joe's Airport Parking along W. Century Boulevard, between Vicksburg Avenue & Avion Drive	371401	3757008	24 hours	7/16/2015 9:00	7/17/2015 9:00
6052 W. 98th Street	East of Skyview Center along W. 98th Street	371627	3757179	24 hours	7/16/2015 7:00	7/17/2015 7:00
9750 Airport Boulevard	Four Points Hotel on the corner of Airport Boulevard & W. 98th Street	371971	3757194	24 hours	7/9/2015 10:00	7/10/2015 10:00
9520 Belford Avenue	Corner of Belford Avenue & 96th Street	372098	3757398	24 hours	7/9/2015 11:00	7/10/2015 11:00
5651 W. 96th Street	Northeast corner of W. 96th Street & Bellanca Avenue	372462	3757406	24 hours	7/9/2015 11:00	7/10/2015 11:00
5705 98th Street	Northwest corner of W. 98th Street & Bellanca Avenue	372468	3757191	24 hours	7/9/2015 11:00	7/10/2015 11:00
9329 Isis Avenue	Alley between W. 93rd Street & W. 94th Street	372884	3757586	24 hours	7/1/2015 12:00	7/2/2015 12:00
5431 W. 98th Street	Northwest corner of Isis Avenue & W. 98th Street	372728	3757236	24 hours	7/9/2015 12:00	7/10/2015 12:00
5450 W. 99th Place	South side of W. 99th Place	372750	3757058	24 hours	7/1/2015 10:00	7/2/2015 10:00
9312 Glasgow Place	Northeast corner of Glasgow Place & 93rd Street	373275	3757646	24 hours	7/1/2015 11:00	7/2/2015 11:00
9714 Glasgow Place	North of 9714 Glasgow Place	373267	3757280	24 hours	7/1/2015 11:00	7/2/2015 11:00
9846 Glasgow Place	Northeast corner of Hindry Avenue & Glasgow Place	373111	3757060	24 hours	7/1/2015 11:00	7/2/2015 11:00
700 W Arbor Vitae Street	Southwest corner of Arbor Vitae Street & Ash Avenue	373590	3757745	24 hours	7/16/2015 8:00	7/17/2015 8:00

NOTE:

1/ Survey Point is closest building address to the measurement location.

SOURCE: Meridian Consultants, LLC, August 2016.
PREPARED BY: Meridian Consultants, LLC, August 2016.

Table M-2 (1 of 2): Project Area Noise Measurements

SURVEY POINTS[1/]	LOCATION DESCRIPTION	UTM E	UTM N	DURATION	START DATE/ TIME	END DATE/ TIME	24-HR LEQ (DBA)	LEQ (DAYTIME) (DBA)[2/]	LDN (DBA)[3/]	CNEL (DBA)[4]
6225 W. Century Boulevard	Concourse Hotel, northeast corner of W. Century Boulevard & Sepulveda Boulevard	370998	3757013	1 hour	8/4/2015 16:20	8/4/2015 17:20	76.3[5]	N/A	N/A	N/A
6225 W. Century Boulevard	Concourse Hotel, northeast corner of W. Century Boulevard & Sepulveda Boulevard	370998	3757013	1 hour	7/30/2015 16:53	7/30/2015 17:53	75.7[5]	N/A	N/A	N/A
6107 W. 98th Street	Northeast corner of Joe's Airport Parking along W. 98th Street between Vicksburg Avenue & Avion Drive	371404	3757178	24 hours	7/16/2015 9:00	7/17/2015 9:00	66.2	66.5	72.2	72.4
6101 W. Century Boulevard	Southeast corner of Joe's Airport Parking along W. Century Boulevard. between Vicksburg Avenue & Avion Drive	371401	3757008	24 hours	7/16/2015 9:00	7/17/2015 9:00	71.4	72.0	77.0	77.4
6052 W. 98th Street	East of Skyview Center along W. 98th Street	371627	3757179	24 hours	7/16/2015 7:00	7/17/2015 7:00	71.2	72.4	75.4	75.9
9750 Airport Boulevard	Four Points Hotel on the corner of Airport Boulevard & W. 98th Street	371971	3757194	24 hours	7/9/2015 10:00	7/10/2015 10:00	66.8	67.9	71.4	71.7
9520 Belford Avenue	Corner of Belford Avenue & 96th Street	372098	3757398	24 hours	7/9/2015 11:00	7/10/2015 11:00	63.5	64.7	67.7	68.2
5651 W. 96th Street	Northeast corner of W. 96th Street & Bellanca Avenue	372462	3757406	24 hours	7/9/2015 11:00	7/10/2015 11:00	66.8	67.8	71.3	71.7
5705 98th Street	Northwest corner of W. 98th Street & Bellanca Avenue	372468	3757191	24 hours	7/9/2015 11:00	7/10/2015 11:00	67.2	68.0	72.1	72.4
9329 Isis Avenue	Alley between W. 93rd Street & W. 94th Street	372884	3757586	24 hours	7/1/2015 12:00	7/2/2015 12:00	66.1	67.6	69.1	70.0

Table M-2 (2 of 2): Project Area Noise Measurements

SURVEY POINTS[1/]	LOCATION DESCRIPTION	UTM E	UTM N	DURATION	START DATE/ TIME	END DATE/ TIME	24-HR LEQ (DBA)	LEQ (DAYTIME) (DBA)[2/]	LDN (DBA)[3/]	CNEL (DBA)[4]
5431 W. 98th Street	Northwest corner of Isis Avenue & W. 98th Street	372728	3757236	24 hours	7/9/2015 12:00	7/10/2015 12:00	62.8	63.8	66.8	67.3
5450 W. 99th Place	South side of W. 99th Place	372750	3757058	24 hours	7/1/2015 10:00	7/2/2015 10:00	60.1	61.3	64.2	64.7
9312 Glasgow Place	Northeast corner of Glasgow Place & 93rd Street	373275	3757646	24 hours	7/1/2015 11:00	7/2/2015 11:00	66.0	67.5	69.1	69.9
9714 Glasgow Place	North of 9714 Glasgow Place	373267	3757280	24-hour	7/1/2015 11:00	7/2/2015 11:00	60.3	61.8	63.4	64.4
9846 Glasgow Place	Northeast corner of Hindry Avenue & Glasgow Place	373111	3757060	24 hours	7/1/2015 11:00	7/2/2015 11:00	58.7	60.2	61.9	62.7
700 W. Arbor Vitae Street	Southwest corner of Arbor Vitae Street & Ash Avenue	373590	3757745	24 hours	7/16/2015 8:00	7/17/2015 8:00	65.3	66.5	69.4	69.8

NOTES:

1/ Survey points are the closest building address to the measurement location.

2/ Leq (daytime): 7:00 AM to 10:00 PM.

3/ Ldn: 10 dBA penalty for noise between 10:00 PM and 7:00 AM

4/ CNEL: 5 dBA penalty for noise between 7:00 PM and 10:00 PM, and 10 dBA penalty for noise between 10:00 PM and 7;00 AM.

5/ Two peak-hour measurements at the Concourse Hotel were supplemented due to technical complications with the 24-hour measurement.

SOURCE: Meridian Consultants, LLC, August 2016.
PREPARED BY: Meridian Consultants, LLC, August 2016.

This area is characterized by heavy traffic traveling into and out of the LAX CTA, as well as by frequent air traffic. The lowest 24-hour (Leq) and CNEL noise levels were both recorded at 5507 W. 98th Street, on the northeast corner of Hindry Avenue and Glasgow Place.

The highest single-hour measurement was collected by Meridian at the Concourse Hotel at the intersection of W. Century Boulevard and Sepulveda Boulevard; this was the closest survey location to the LAX CTA.

M.1.5 REGIONAL DATA COLLECTION

Locations within the regional area that corresponds with the traffic study for were selected supplemental 20-minute recordings. Ten (10) intersections were identified that were considered geographically representative of regional study area. Existing ambient noise levels over a 20-minute period were collected during weekday afternoon peak-traffic hours at the 10 locations identified on **Figure M-4**; the results are shown in **Table M-3**.

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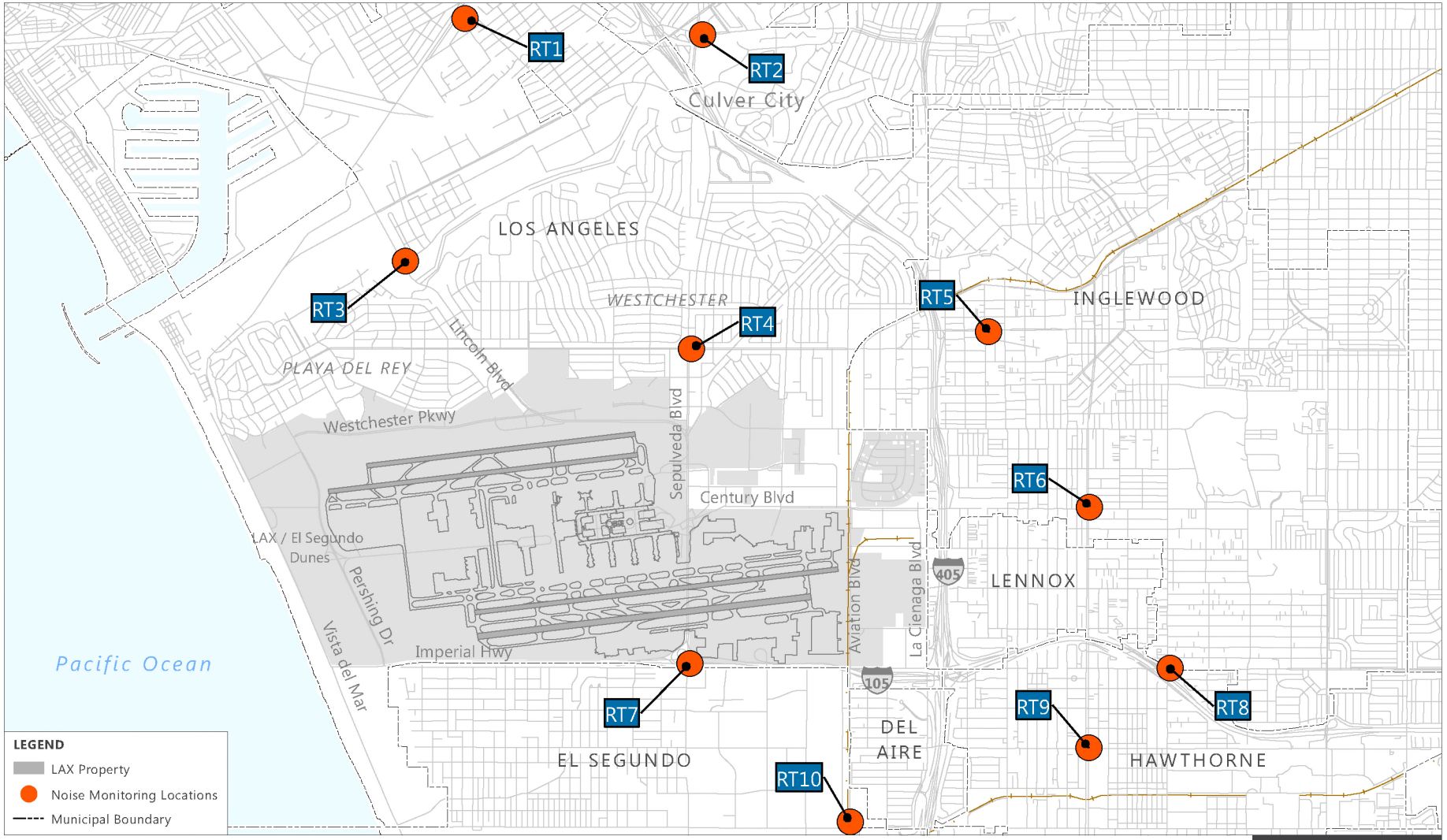

SOURCES: Los Angeles County, 2010, 2011 (city boundary, streets, Land Uses); Los Angeles County, L.A. County GIS Data Portal, County Data, Accessed Online, August 2014; LAX Airport Layout Plan, Ricondo & Associates, Inc., 2010 (runways, taxiways, terminal area, ariport property boundary). National Geographic World Map, ESRI Database, 2011.
PREPARED BY: Ricondo & Associates, Inc., September 2016.

FIGURE M-4

NORTH 0 5,000 ft.

Traffic Study Area Noise Monitoring Locations

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Table M-3: Regional Noise Survey Locations

INTERSECTION	LOCATION DESCRIPTION	UTM E	UTM N	DURATION	START DATE/TIME	END DATE/TIME
Centinela Avenue & Culver Boulevard	Northern Corner of Intersection Adjacent to Grass Walkway	368763	3762098	20 minutes	7/28/2015 15:43	7/28/2015 16:03
Sepulveda Boulevard & Slauson Avenue	Northeast Corner Adjacent to Chase Bank	371130	3761790	20 minutes	7/28/2015 16:39	7/28/2015 16:59
Lincoln Boulevard & Jefferson Boulevard	Southeast Corner of Intersection	367902	3759981	20 minutes	7/28/2015 17:54	7/28/2015 18:14
Sepulveda Boulevard & Manchester Avenue	Northeast Corner in front of Medical Imaging Building	371003	3758587	20 minutes	7/28/2015 18:56	7/28/2015 19:16
Inglewood Avenue & Manchester Boulevard	Southeast Corner Outside Carl's Jr.	374196	3758729	20 minutes	7/30/2015 18:35	7/30/2015 18:55
La Brea Avenue & Century Boulevard	Northeast Corner on East Side of La Brea Adjacent to CVS	375016	3756953	20 minutes	7/30/2015 19:09	7/30/2015 19:29
Sepulveda Boulevard & Imperial Highway	Southeast Corner Outside Boeing Parking Lot	370967	3755353	20 minutes	8/4/2015 17:54	17:54/2015 18:14
Prairie Avenue & Imperial Highway	Southeast Corner Outside Mobil Gas Station	375804	3755299	20 minutes	8/4/2015 18:38	8/4/2015 18:58
Hawthorne Boulevard & 120th Street	Northwest Corner Outside Walgreens Building	374945	3754535	20 minutes	8/4/2015 19:09	8/4/2015 19:29
Aviation Boulevard & El Segundo Boulevard	Northeast Corner Outside Parsons Building	372587	3753764	20 minutes	8/4/2015 19:47	8/4/2015 20:07

SOURCE: Meridian Consultants, LLC, August 2016.
PREPARED BY: Meridian Consultants, LLC, August 2016.

Results of the 20-minute noise monitoring survey at regional traffic study intersections are presented in **Table M-4**. The 20-minute Leq values ranged from a high of 76.2 dBA to a low of 69.7 dB). The maximum 20-minute Leq was recorded at the intersection of Prairie Avenue and Imperial Highway. This intersection is characterized by heavy traffic due to its proximity to the I-105 and LAX. The lowest 20-minute Leq was recorded along Hawthorne Boulevard and 120th Street. The primary sources of ambient noise levels at these locations are attributed to road traffic.

Table M-4: Regional Peak-Hour Noise Measurements

INTERSECTION	UTM E	UTM N	DURATION	START DATE/TIME	END DATE/TIME	LEQ (DBA)
Centinela Avenue & Culver Boulevard	368763	3762098	20 minutes	7/28/2015 15:43	7/28/2015 16:03	73.1
Sepulveda Boulevard & Slauson Avenue	371130	3761790	20 minutes	7/28/2015 17:54	7/28/2015 18:14	72.9
Lincoln Boulevard & Jefferson Boulevard	367902	3759981	20 minutes	7/28/2015 16:39	7/28/2015 16:59	72.5
Sepulveda Boulevard & Manchester	371003	3758587	20 minutes	7/28/2015 18:56	7/28/2015 19:16	72.2
Inglewood Avenue & Manchester Boulevard	374196	3758729	20 minutes	7/30/2015 19:09	7/30/2015 19:29	73.2
La Brea Avenue & Century Boulevard	375016	3756953	20 minutes	7/30/2015 18:35	7/30/2015 18:55	72.0
Sepulveda Boulevard & Imperial Highway	370967	3755353	20 minutes	8/4/2015 17:54	17:54/2015 18:14	74.9
Prairie Ave & Imperial Highway	375804	3755299	20 minutes	8/4/2015 19:47	8/4/2015 20:07	76.2
Hawthorne Boulevard & 120th Street	374945	3754535	20 minutes	8/4/2015 19:09	8/4/2015 19:29	69.7
Aviation Boulevard & El Segundo Boulevard	372587	3753764	20 minutes	8/4/2015 18:38	8/4/2015 18:58	74.7

Source: Meridian Consultants, LLC, August 2016.
Prepared by: Meridian Consultants, LLC, August 2016.

M.1.6 SUMMARY

Field measurements of ambient noise levels were conducted to establish existing (ambient) noise conditions in the LAMP Project study area. The focus area was divided into local and regional locations based on the types of activities associated with the Project that would potentially contribute to increased noise levels during construction and operation of the Project.

The measurement locations in the Project area were selected based on proximity to future construction activities and land use types. The regional measurement points were selected outside the immediate Project area to provide a representative sample of geographically distributed intersections that may be subjected to increased traffic volumes as a result of Project implementation.

Results of the noise survey will be used to model anticipated levels of noise that would be generated by construction and operation of various components of the LAMP Project, relying on methodologies outlined by the FTA transit impacts guidance document.

M.2 Road Traffic Noise Model

M.2.1 INTRODUCTION

The proposed Landside Access Modernization Program (LAMP) at the Los Angeles International Airport (LAX) comprises several development components that would serve to provide enhanced traffic circulation around the airport upon completion. A fundamental understanding of the existing environmental setting and potential impacts associated with the Project is necessary prior to approval and implementation of the project. This technical memo documents analysis of measured traffic volumes on road segments identified within the traffic study area and explains the process of deriving modeled estimates of existing road traffic noise levels from turning movement counts obtained by Raju Associates transportation engineers.

The LAX LAMP Project includes the development of a proposed Automated People Mover (APM) system that would run along an elevated guideway approximately 2.25 miles long, starting at the LAX Central Terminal Area (CTA) and extending to the future proposed consolidated rental car facility (CONRAC) that would be situated adjacent to Interstate 405 (I-405) between West Arbor Vitae Street and West Century Boulevard. An overview of the Project components is displayed on Figure M-1.

M.2.2 PURPOSE OF DATA CONVERSION

Raju Associates evaluated an extensive network of roadway intersections to be assessed for increases in traffic volumes as a result of Project implementation. The intersections decided upon represented those near future project components and less proximal sensitive receptors that may be subjected to increased ambient roadway traffic noise.

A total of 183 intersections were identified by Raju Associates; these intersections are identified and numbered on Figure M-2. At each intersection, turning movements were recorded during morning and evening peak traffic hours. This technical memorandum describes the conversion of the collected turning movement data into estimated road traffic noise levels using the Federal Highway Administration (FHWA) Traffic Noise Model (TNM) methodology.

Increases in vehicular traffic volumes can produce increases in noise levels at sensitive receptors along surface streets. The components of the LAX LAMP Project are geographically confined to the area depicted on Figure M-1. However, the reconfiguration of local traffic circulation would have effects on roadway traffic that extend beyond the immediate vicinity of the proposed Project. Additionally, regional growth in the Los Angeles area, in combination with anticipated increases in ridership at LAX, will produce more cars on the roads in the Project vicinity and in the greater regional area shown on Figure M-2.

The process of assessing potential road traffic noise impacts that would be generated by implementation of the LAMP Project requires that estimates of current road traffic noise levels be prepared to establish existing conditions as a baseline for noise impact analyses.

A significant road traffic noise impact would occur if direct and indirect changes in the environment that may be caused by the proposed Project would result in one or more of the following conditions:

- Roadway traffic from the proposed Project causes the ambient noise level measured at the property line of affected uses to increase by 3 dB(A) CNEL if post-Project noise levels are within the "normally unacceptable" or "clearly unacceptable" compatibility category.
- Roadway traffic from the proposed Project causes the ambient noise level measured at the property line of affected uses to increase by 5 dB(A) CNEL or greater noise increase regardless of compatibility category.

M.2.3 TRAFFIC TURNING MOVEMENT SPREADSHEET CONVERSION METHODOLOGY

The traffic turning movement counts were used to calculate estimates of average daily traffic (ADT) volumes on the roadway segments between traffic study intersections. Those ADT values were subsequently input into the FHWA road traffic noise model.

The turning movement counts collected at intersections included in the traffic study area were used to estimate existing noise levels generated by traffic along the roadway segments connecting the intersections. Spreadsheets were prepared using data from the level-of-service (LOS) worksheets provided by Raju Associates[7] to calculate ADT based on the number of vehicles recorded during peak afternoon (p.m.) traffic conditions.

For all directions at each intersection, the number of cars recorded entering and leaving the adjacent roadway segments during the p.m. peak hour was summed to estimate the p.m. peak-hour traffic volume on that stretch of road. Per guidance from Raju Associates, it was assumed that p.m. peak-hour turning movements represented 8 percent (%) of the total daily traffic on the roads. The p.m. peak-hour traffic value was multiplied by a scaling factor of 12 to arrive at an approximation of the ADT for each segment. ADT values were calculated for the intersections at both ends of each roadway segment.

The FHWA originally devised its Highway Traffic Noise Prediction Model (HTNPM, FHWA-RD-77-108)[8] in the 1970s. This noise prediction model was the preferred tool for roadway traffic noise prediction for multiple decades until the release of the FHWA TNM 1.0 model in 1998. The FHWA HTNPM methodology provides a simple interface through which road traffic noise levels can be estimated from ADT values using spreadsheets that take into account vehicle fleet mix, proximity of sensitive receptors, and roadway parameters, including speed limit, number of lanes, and median width.

The FHWA HTNPM methodology was used to approximate existing noise levels at sensitive receptors placed along the edge of the street segments between the traffic study intersections. The model uses logarithmic

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7 Raju Associates, *Transportation Study for the Landside Access Modernization Program DEIR*, July 2016.

8 U.S. Department of Transportation Federal Highway Administration, *Traffic Noise Model*, http://www.fhwa.dot.gov/environment/noise/traffic_noise_model/.

equations to calculate predicted noise levels based on total vehicle counts, fleet mix composition of passenger vehicles, medium trucks, and heavy trucks, as well as physical parameters defining the distance to the nearest sensitive receptor. The model calculates noise associated with a specific line source, and the results characterize noise generated by motor vehicle traffic along the specific roadway segment. The road segments of interest were determined by examining the distance between the intersections and the similarity in the estimated ADT volumes and modeled noise levels along the edge of the roads. Refined road traffic noise modeling will be conducted at representative locations expected to experience the greatest increases in ADT.

M.2.4 REGIONAL ROADWAY TRAFFIC NOISE ESTIMATES

From the 183 intersections in the vicinity of LAX that were analyzed for traffic impacts, 10 intersections were identified as geographically representative regional locations that may experience increased traffic volumes attributable to the proposed Project. **Table M-5** presents the predicted road traffic noise level, for each of the 10 intersections within the larger Traffic Study Area with the assumptions that the LAMP Project is operational, and also shows the associated change in noise as compared to the baseline (2015) conditions without the LAMP Project.

In addition to field measurements, refined noise modeling was conducted for roadway segments in the Project area to estimate existing noise levels. Traffic turning movement counts were used to calculate estimates of ADT volumes on the roadway segments between traffic study intersections. The ADT volumes at the representative intersections were used to estimate existing noise levels generated by traffic along the roadway segments connecting the intersections.

Table M-5: Traffic Study Area Change in Existing Roadway Noise Levels

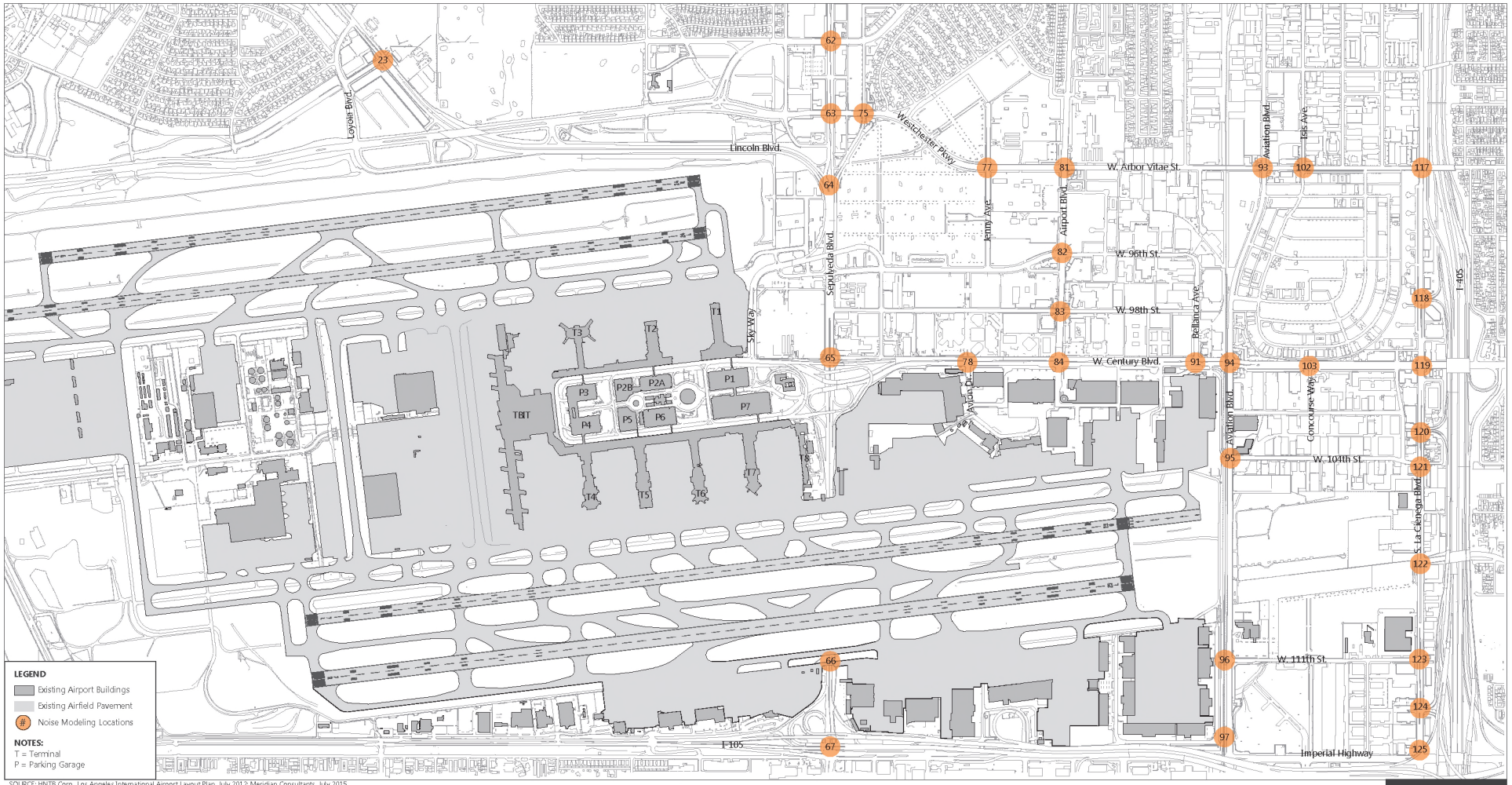
RECEPTOR ID	INTERSECTION	EXISTING (MEASURED)	PROJECT	EXISTING PLUS PROJECT	CALCULATED INCREASE IN NOISE (DB)
RT1	Centinela Avenue & Culver Boulevard	73.1	65.8	73.8	0.7
RT2	Sepulveda Boulevard & Slauson Avenue	72.5	65.0	73.2	0.7
RT3	Lincoln Boulevard & Jefferson Boulevard	72.9	64.6	73.5	0.6
RT4	Sepulveda Boulevard & Manchester Avenue	72.2	65.0	73.0	0.8
RT5	Inglewood Avenue & Manchester Avenue	72.0	60.0	72.3	0.3
RT6	La Brea Avenue & Century Boulevard	73.2	57.4	73.3	0.1
RT7	Sepulveda Boulevard & Imperial Highway	74.9	74.7	77.8	2.9
RT8	Prairie Avenue & Imperial Highway	74.7	67.0	75.4	0.7
RT9	Hawthorne Boulevard & 120th Street	69.7	64.7	70.9	0.8
RT10	Aviation Boulevard & El Segundo Boulevard	76.2	69.2	77.0	0.8

SOURCE: Meridian Consultants, LLC, August 2016.
PREPARED BY: Meridian Consultants, LLC, August 2016.

M.2.5 PROJECT AREA TRAFFIC NOISE MODELING

Roadway modeling of existing (2015), intermediate phase (Year 2024), and full Project build-out (Year 2035) vehicular noise levels along individual roadway segments within the Project Area was completed using the SoundPLAN noise modeling software in combination with FHWA TNM. The Project Area includes roadway segments west of the I-405 and east of the airport between Westchester Parkway/W. Arbor Vitae Street and Imperial Highway, as shown on **Figure M-5**. Traffic volume and road parameter data were exported from the SoundPLAN noise contour visualization software to the TNM model, which is the road traffic noise model preferred by the California Department of Transportation (Caltrans). The TNM model calculates the average noise levels at specific locations based on nearby roadway traffic volumes, average vehicle speeds, roadway geometry, and physical site conditions.

Project traffic generation estimates from Raju Associates were incorporated into the model. The ADT volume was used to calculate the noise level along each roadway segment. Hard (e.g., paved) and soft (e.g., landscaped) surface conditions were used to determine noise contours and potential noise impacts that would occur along the roadways near the Project site. The TNM model is a refinement of the previously recommended HTNPM model that was used as a screening tool for the regional roadway traffic noise analysis discussed above.



SOURCE: HNTB Corp., Los Angeles International Airport Layout Plan, July 2012; Meridian Consultants, July 2015.
PREPARED BY: Ricondo & Associates, Inc., September 2016.

FIGURE M-5

NORTH 0 1,300 ft.

Traffic Study Area Noise Modeling Locations

Drawing: Z:\LAW\AULAX Landside Transportation Program\IOS - Auto\CAD\LAMP_DEIR_Noise_20160829.dwg Layout: M-5 Plotted: Aug 30, 2016, 05:37 PM

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Results of the TNM modeling on roadway segments for existing (2015), intermediate phase (Year 2024), and full Project build-out (Year 2035) in the Project Area are presented in **Tables M-6**, **M-7**, and **M-8**. The modeled noise levels shown are the average Community Noise Equivalent Levels (CNEL) calculated by the model for sensitive receptors assumed to be located adjacent to the street. These values represent the maximum potential CNEL to which sensitive receptors could be exposed from road traffic noise.

M.3 Transit Noise and Vibration

M.3.1 INTRODUCTION

The proposed Landside Access Modernization Program (LAMP) for Los Angeles International Airport (LAX) comprises several development components that would serve to provide enhanced traffic circulation within the airport upon completion. A fundamental understanding of the existing environmental setting and potential impacts associated with the Project is necessary prior to approval and implementation. This technical memo documents fieldwork that was conducted to record existing ambient noise vibration levels at sensitive land uses and local establishments that would be potentially affected by construction and operation of the proposed Project.

The LAX LAMP Project includes the development of a proposed Automated People Mover (APM) system that would extend for approximately 2.25 miles, starting at the Central Terminal Area (CTA) and extending to the future proposed consolidated rental car facility (CONRAC) that would be situated adjacent to Interstate 405 (I-405). For the purposes of this analysis, the Project area considered includes the areas located within the CTA extending east to the I-405, as shown on Figure M-1.

The general Project area is roughly bound by the Tom Bradley International Terminal (TBIT) in the CTA on the west, the I-405 on the east, Westchester Parkway/W. Arbor Vitae Street on the north, and Interstate 105 (I-105) on the south. Additionally, the Project would include various roadway improvements that would affect areas south of Century Boulevard along Aviation Boulevard to I-105; areas along 111th Street between Aviation Boulevard to La Cienega Boulevard; and areas west of Sepulveda Boulevard between Sky Way and 96th Street.

M.3.2 PURPOSE OF DATA COLLECTION

An ambient noise and vibration monitoring survey was undertaken to establish existing noise and ground-borne vibration levels at various locations near the LAMP Project. The monitoring was conducted to provide data on ambient noise ground-borne vibration generated by traffic and operation of current establishments in the area surrounding LAX. The locations selected were either sensitive land uses (residences and hotels) or buildings that were close to where the components of the LAMP Project would be constructed and operate in the future.

Table M-6 (1 of 4): Existing (2015) Modeled Roadway Noise Levels

STUDY INTERSECTION	ROADWAY SEGMENT	2015 WITHOUT PROJECT (CNEL)	2015 WITH PROJECT (CNEL)	COMPARISON OF 2015 WITH PROJECT TO 2015 WITHOUT PROJECT CONDITIONS (CNEL)
	Sepulveda Boulevard			
62	South of La Tijera Boulevard	65.3	64.9	-0.4
63	North of Westchester Parkway	65.6	65.6	0.0
63	South of Westchester Parkway	68.4	67.9	1.5
64	North of Lincoln Boulevard	66.6	66.8	0.2
64	South of Lincoln Boulevard	69.0	71.0	2.0
65	North of Century Boulevard	75.5	75.3	-0.2
65	South of Century Boulevard	75.5	75.0	-0.5
66	North of I-105 Westbound Ramps	76.5	76.3	-0.2
66	South of I-105 Westbound Ramps	74.8	73.9	-0.9
67	North of Imperial Highway	74.8	74.7	-0.1
	Westchester Parkway			
63	East of Sepulveda Boulevard	57.1	57.2	0.1
75	West of Sepulveda Eastway	57.6	57.7	0.1
75	East of Sepulveda Eastway	66.2	66.3	0.1
77	West of Jenny Avenue	61.3	62.8	1.5
77	East of Jenny Avenue	61.9	63.0	1.1
81	West of Airport Boulevard	61.8	62.9	1.1

Table M-6 (2 of 4): Existing (2015) Modeled Roadway Noise Levels

STUDY INTERSECTION	ROADWAY SEGMENT	2015 WITHOUT PROJECT (CNEL)	2015 WITH PROJECT (CNEL)	COMPARISON OF 2015 WITH PROJECT TO 2015 WITHOUT PROJECT CONDITIONS (CNEL)
	Arbor Vitae Street			
81	East of Airport Boulevard	55.9	56.0	0.1
93	West of Aviation Boulevard	60.6	60.5	-0.1
93	East of Aviation Boulevard	64.3	63.9	-0.4
102	West of Isis Avenue	64.4	64.5	0.1
102	East of Isis Avenue	63.4	63.2	-0.2
117	West of La Cienega Boulevard	63.8	64.6	0.8
	Airport Boulevard			
81	South of Westchester Parkway	63.1	62.3	-0.8
82	North of 96th Street	65.6	65.0	-0.6
82	South of 96th Street	65.2	64.4	-0.8
83	North of 98th Street	65.4	65.1	-0.3
83	South of 98th Street	56.2	55.1	-0.9
84	North of Century Boulevard	64.0	63.2	-0.8
	Aviation Boulevard			
93	South of Arbor Vitae Street	60.0	61.6	1.6
94	North of Century Boulevard	68.6	70.4	1.8
94	South of Century Boulevard	66.7	66.9	0.2
95	North of 104th Street	66.8	67.5	0.7
95	South of 104th Street	67.2	67.6	0.4
96	North of 111th Street	59.5	60.2	0.7
96	South of 111th Street	59.4	58.4	-1.0
97	North of Imperial Highway	59.4	58.8	-0.6

Table M-6 (3 of 4): Existing (2015) Modeled Roadway Noise Levels

STUDY INTERSECTION	ROADWAY SEGMENT	2015 WITHOUT PROJECT (CNEL)	2015 WITH PROJECT (CNEL)	COMPARISON OF 2015 WITH PROJECT TO 2015 WITHOUT PROJECT CONDITIONS (CNEL)
	La Cienega Boulevard			
117	South of Arbor Vitae Street	62.2	61.6	-1.0
118	North of I-405 Southbound Ramps	62.2	62.3	0.1
118	South of I-405 SB Ramps	66.9	66.9	0.0
119	North of Century Boulevard	59.5	59.3	-0.2
119	South of Century Boulevard	57.0	56.6	-0.4
120	North of I-405 Southbound Ramps	57.3	57.4	0.1
120	South of I-405 Southbound Ramps	55.9	55.8	-0.1
121	North of 104th Street	55.9	56.2	0.3
121	South of 104th Street	56.3	56.0	-0.3
122	North of Lennox Boulevard	56.1	56.2	0.1
122	South of Lennox Boulevard	56.2	56.0	-0.2
123	North of 111th Street	56.2	56.3	0.1
123	South of 111th Street	58.9	58.2	-0.7
124	North of I-405 Southbound Ramps	58.6	58.7	0.1
124	South of I-405 Southbound Ramps	58.9	58.4	-0.5
125	North of Imperial Highway	65.7	65.6	-0.1

Table M-6 (4 of 4): Existing (2015) Modeled Roadway Noise Levels

STUDY INTERSECTION	ROADWAY SEGMENT	2015 WITHOUT PROJECT (CNEL)	2015 WITH PROJECT (CNEL)	COMPARISON OF 2015 WITH PROJECT TO 2015 WITHOUT PROJECT CONDITIONS (CNEL)
	Century Boulevard			
78	East of Avion Drive	67.8	66.0	-1.8
84	West of Airport Boulevard	68.6	67.3	-1.3
84	East of Airport Boulevard	68.7	66.8	-1.9
91	West of Bellanca Avenue	68.5	67.9	-0.6
91	East of Bellanca Avenue	69.1	68.3	-0.8
94	West of Aviation Boulevard	68.8	67.8	-1.0
94	East of Aviation Boulevard	66.9	65.9	-1.0
103	West of Concourse Way	68.3	67.2	-1.1
103	East of Concourse Way	68.3	68.6	0.3
119	West of La Cienega Boulevard	60.6	60.7	0.1
	Lincoln Boulevard			
23	South of La Tijera Boulevard	71.5	71.3	-0.2
64	North of Sepulveda Boulevard	66.6	66.8	0.2
	111th Street			
96	East of Aviation Boulevard	53.4	58.8	5.4
123	West of La Cienega Boulevard	43.3	50.9	1.6
	104th Street			
95	East of Aviation Boulevard	49.0	46.8	-2.2
121	West of La Cienega Boulevard	52.2	51.6	-0.6

SOURCE: Meridian Consultants, LLC, August 2016.
PREPARED BY: Meridian Consultants, LLC, August 2016.

Table M-7 (1 of 4): Future (2024) Modeled Roadway Noise Levels

STUDY INTERSECTION	ROADWAY SEGMENT	2024 WITHOUT PROJECT (CNEL)	2024 WITH PROJECT (CNEL)	COMPARISON OF 2024 WITH PROJECT TO 2024 WITHOUT PROJECT CONDITIONS (CNEL)
	Sepulveda Boulevard			
62	South of La Tijera Boulevard	70.5	69.9	-0.6
63	North of Westchester Parkway	70.4	70.3	-0.1
63	South of Westchester Parkway	72.1	72.0	-0.1
64	North of Lincoln Boulevard	71.1	71.3	0.2
64	South of Lincoln Boulevard	77.5	77.6	0.1
65	North of Century Boulevard	78.6	78.2	-0.4
65	South of Century Boulevard	78.4	78.3	-0.1
66	North of I-105 Westbound Ramps	79.4	79.3	-0.1
66	South of I-105 Westbound Ramps	77.1	76.9	-0.2
67	North of Imperial Highway	77.6	77.5	-0.1
	Westchester Parkway			
63	East of Sepulveda Boulevard	60.9	60.9	0.0
75	West of Sepulveda Eastway	61.2	61.1	-0.1
75	East of Sepulveda Eastway	63.6	63.7	0.1
77	West of Jenny Avenue	63.0	64.0	1.0
77	East of Jenny Avenue	63.5	64.1	0.6
81	West of Airport Boulevard	63.6	64.1	0.5

Table M-7 (2 of 4): Future (2024) Modeled Roadway Noise Levels

STUDY INTERSECTION	ROADWAY SEGMENT	2024 WITHOUT PROJECT (CNEL)	2024 WITH PROJECT (CNEL)	COMPARISON OF 2024 WITH PROJECT TO 2024 WITHOUT PROJECT CONDITIONS (CNEL)
	Arbor Vitae Street			
81	East of Airport Boulevard	64.2	64.2	0.0
93	West of Aviation Boulevard	64.4	64.1	-0.3
93	East of Aviation Boulevard	66.8	66.3	-0.5
102	West of Isis Avenue	66.7	66.4	-0.3
102	East of Isis Avenue	66.7	66.9	0.2
117	West of La Cienega Boulevard	65.9	67.5	1.6
	Airport Boulevard			
81	South of Westchester Parkway	64.9	64.3	-0.6
82	North of 96th Street	64.5	64.0	-0.5
82	South of 96th Street	63.2	64.2	1.0
83	North of 98th Street	66.9	67.7	0.8
83	South of 98th Street	61.6	61.8	0.2
84	North of Century Boulevard	64.9	65.1	0.2
	Aviation Boulevard			
93	South of Arbor Vitae Street	61.8	63.5	1.7
94	North of Century Boulevard	71.9	73.8	1.9
94	South of Century Boulevard	69.7	70.1	0.4
95	North of 104th Street	69.9	70.2	0.3
95	South of 104th Street	70.1	70.6	0.5
96	North of 111th Street	69.8	70.3	0.5
96	South of 111th Street	63.3	61.7	-1.6
97	North of Imperial Highway	63.3	61.7	-1.6

Table M-7 (3 of 4): Future (2024) Modeled Roadway Noise Levels

STUDY INTERSECTION	ROADWAY SEGMENT	2024 WITHOUT PROJECT (CNEL)	2024 WITH PROJECT (CNEL)	COMPARISON OF 2024 WITH PROJECT TO 2024 WITHOUT PROJECT CONDITIONS (CNEL)
	La Cienega Boulevard			
117	South of Arbor Vitae Street	63.8	63.5	-0.3
118	North of I-405 Southbound Ramps	64.1	63.8	-0.3
118	South of I-405 SB Ramps	63.2	62.8	-0.4
119	North of Century Boulevard	63.2	62.8	-0.4
119	South of Century Boulevard	63.2	63.1	-0.1
120	North of I-405 Southbound Ramps	63.5	63.5	0.0
120	South of I-405 Southbound Ramps	62.3	62.6	0.3
121	North of 104th Street	62.3	62.6	0.3
121	South of 104th Street	62.6	62.7	0.1
122	North of Lennox Boulevard	62.5	62.7	0.2
122	South of Lennox Boulevard	62.5	62.8	0.3
123	North of 111th Street	62.5	62.8	0.3
123	South of 111th Street	62.7	62.5	-0.2
124	North of I-405 Southbound Ramps	62.8	62.6	-0.2
124	South of I-405 Southbound Ramps	62.8	62.4	-0.4
125	North of Imperial Highway	62.1	61.6	-0.5

Table M-7 (4 of 4): Future (2024) Modeled Roadway Noise Levels

STUDY INTERSECTION	ROADWAY SEGMENT	2024 WITHOUT PROJECT (CNEL)	2024 WITH PROJECT (CNEL)	COMPARISON OF 2024 WITH PROJECT TO 2024 WITHOUT PROJECT CONDITIONS (CNEL)
	Century Boulevard			
78	East of Avion Drive	74.0	73.7	-0.3
84	West of Airport Boulevard	73.9	73.7	-0.2
84	East of Airport Boulevard	71.0	68.9	-2.1
91	West of Bellanca Avenue	71.0	70.7	-0.3
91	East of Bellanca Avenue	71.5	71.4	-0.1
94	West of Aviation Boulevard	71.5	70.9	-0.6
94	East of Aviation Boulevard	68.8	67.6	-1.2
103	West of Concourse Way	68.1	66.7	-1.4
103	East of Concourse Way	70.1	70.0	-0.1
119	West of La Cienega Boulevard	70.1	69.8	-0.3
	Lincoln Boulevard			
23	South of La Tijera Boulevard	74.1	74.3	0.2
64	North of Sepulveda Boulevard	-	-	-
	111th Street			
96	East of Aviation Boulevard	59.8	61.1	1.3
123	West of La Cienega Boulevard	59.0	58.0	-1.0
	104th Street			
95	East of Aviation Boulevard	55.4	53.9	-1.5
121	West of La Cienega Boulevard	57.1	56.5	-0.6

SOURCE: Meridian Consultants, LLC, August 2016.
PREPARED BY: Meridian Consultants, LLC, August 2016.

Table M-8 (1 of 3): Future (2035) Modeled Roadway Noise Levels

STUDY INTERSECTION	ROADWAY SEGMENT	2035 WITHOUT PROJECT (CNEL)	2035 WITH PROJECT (CNEL)	COMPARISON OF 2035 WITH PROJECT TO 2035 WITHOUT PROJECT CONDITIONS (CNEL)
	Sepulveda Boulevard			
62	South of La Tijera Boulevard	71.9	71.7	-0.2
63	North of Westchester Parkway	72.2	72.1	-0.1
63	South of Westchester Parkway	72.3	72.1	-0.2
64	North of Lincoln Boulevard	71.2	71.4	0.2
64	South of Lincoln Boulevard	75.4	75.6	0.2
65	North of Century Boulevard	78.8	78.5	-0.3
65	South of Century Boulevard	78.5	78.5	0.0
66	North of I-105 Westbound Ramps	79.5	79.3	-0.2
66	South of I-105 Westbound Ramps	77.2	77.0	-0.2
67	North of Imperial Highway	77.7	77.6	-0.1
	Westchester Parkway			
63	East of Sepulveda Boulevard	61.3	61.1	-0.2
75	West of Sepulveda Eastway	61.5	61.4	-0.1
75	East of Sepulveda Eastway	64.1	64.0	-0.1
77	West of Jenny Avenue	63.5	64.9	1.4
77	East of Jenny Avenue	63.8	65.0	1.2
81	West of Airport Boulevard	63.8	65.0	1.2
	Arbor Vitae Street			
81	East of Airport Boulevard	64.6	64.6	0.0
93	West of Aviation Boulevard	63.6	63.2	-0.4
93	East of Aviation Boulevard	67.4	66.9	-0.5
102	West of Isis Avenue	67.3	67.0	-0.3
102	East of Isis Avenue	67.3	67.6	0.3
117	West of La Cienega Boulevard	66.6	68.1	1.5
	Sepulveda Boulevard			
64	South of Lincoln Boulevard	74.7	74.9	0.2
65	North of Century Boulevard	78.2	77.8	-0.4

Table M-8 (2 of 3): Future (2035) Modeled Roadway Noise Levels

STUDY INTERSECTION	ROADWAY SEGMENT	2035 WITHOUT PROJECT (CNEL)	2035 WITH PROJECT (CNEL)	COMPARISON OF 2035 WITH PROJECT TO 2035 WITHOUT PROJECT CONDITIONS (CNEL)
	Airport Boulevard			
81	South of Westchester Parkway	65.4	64.0	-1.4
82	North of 96th Street	65.1	63.9	-1.2
82	South of 96th Street	64.0	62.9	-1.1
83	North of 98th Street	67.5	66.3	-1.2
83	South of 98th Street	62.0	61.2	-0.8
84	North of Century Boulevard	65.6	64.2	-1.4
	Aviation Boulevard			
93	South of Arbor Vitae Street	62.3	63.4	1.1
94	North of Century Boulevard	72.4	74.7	2.3
94	South of Century Boulevard	69.9	70.5	0.6
95	North of 104th Street	69.9	70.6	1.0
95	South of 104th Street	69.3	70.0	0.7
96	North of 111th Street	69.2	69.5	0.3
96	South of 111th Street	70.3	68.5	-1.8
97	North of Imperial Highway	70.3	68.9	-1.4
	La Cienega Boulevard			
117	South of Arbor Vitae Street	64.0	63.8	-0.2
118	North of I-405 Southbound Ramps	64.2	64.1	-0.1
118	South of I-405 Southbound Ramps	63.4	63.0	-0.4
119	North of Century Boulevard	63.3	63.0	-0.3
119	South of Century Boulevard	63.6	63.4	-0.2
120	North of I-405 Southbound Ramps	63.9	63.7	-0.2
120	South of I-405 Southbound Ramps	62.8	62.9	0.1
121	North of 104th Street	62.8	62.9	0.1
121	South of 104th Street	63.0	63.1	0.1
122	North of Lennox Boulevard	63.0	63.0	0.0
122	South of Lennox Boulevard	63.0	63.1	0.1
123	North of 111th Street	63.0	63.1	0.1

Table M-8 (3 of 3): Future (2035) Modeled Roadway Noise Levels

STUDY INTERSECTION	ROADWAY SEGMENT	2035 WITHOUT PROJECT (CNEL)	2035 WITH PROJECT (CNEL)	COMPARISON OF 2035 WITH PROJECT TO 2035 WITHOUT PROJECT CONDITIONS (CNEL)
123	South of 111th Street	63.1	62.8	-0.3
124	North of I-405 Southbound Ramps	63.1	62.9	-0.2
124	South of I-405 Southbound Ramps	63.1	62.6	-0.5
125	North of Imperial Highway	62.4	61.9	-0.5
	Century Boulevard			
78	East of Avion Drive	74.5	73.4	1.1
84	West of Airport Boulevard	74.2	73.4	-0.8
84	East of Airport Boulevard	71.3	69.4	-1.9
91	West of Bellanca Avenue	71.3	71.3	0.0
91	East of Bellanca Avenue	71.8	71.3	-0.5
94	West of Aviation Boulevard	71.8	71.2	-0.6
94	East of Aviation Boulevard	69.2	68.1	-1.1
103	West of Concourse Way	68.7	67.5	-1.2
103	East of Concourse Way	70.6	70.3	-0.3
119	West of La Cienega Boulevard	71.0	70.3	-0.7
	Lincoln Boulevard			
23	South of La Tijera Boulevard	74.2	74.4	0.2
64	North of Sepulveda Boulevard	72.8	72.3	-0.5
	111th Street			
96	East of Aviation Boulevard	61.5	61.7	0.2
123	West of La Cienega Boulevard	58.5	57.9	-0.6
	104th Street			
95	East of Aviation Boulevard	60.8	54.6	-6.2
121	West of La Cienega Boulevard	57.6	56.9	-0.7

SOURCE: Meridian Consultants, LLC, August 2016.
PREPARED BY: Meridian Consultants, LLC, August 2016.

The data would be used to determine whether construction and operation of the LAMP Project would result in noise and ground-borne vibration levels that exceed applicable regulatory thresholds.

A significant transit noise impact would occur if the direct and indirect changes in the environment caused by the proposed Project would result in one or more of the following conditions:

- Transit operations associated with components of the proposed Project cause the ambient noise level measured at the property line of affected uses to increase by 3 dB(A) CNEL if post-Project noise levels are within the "normally acceptable" or "clearly unacceptable" compatibility category.
- Transit operations associated with components of the proposed Project cause the ambient noise level measured at the property line of affected uses to increase y 5 dB(A) CNEL or greater regardless of compatibility category.

These thresholds are derived from the *L.A. CEQA Thresholds Guide*[9] relative to railroad noise associated with a proposed project.

A significant transit vibration impact would occur if the direct and indirect changes in the environment caused by the proposed Project would result in one or more of the following conditions:

- Vibration or ground-borne noise levels exceed the Federal Transit Authority (FTA)-recommended maximum acceptable level threshold of 72 VdB for residences and buildings where people normally sleep, including hotels.
- Vibration levels exceed approximately 80 VdB at residential land uses for infrequent events and 72 VdB for frequent events.

These thresholds are derived from the 2006 FTA *Transit Noise and Vibration Impact Assessment.*[10]

Ground-borne vibration impacts that would be generated by implementation of the Project were assessed using modeling techniques to estimate the incremental increase in ground-borne vibration that would result from construction activities and operation of the APM component of the Project.

M.3.3 TRANSIT NOISE METHODOLOGY

Potential operational transit noise levels of the proposed Project were calculated with the computer noise model SoundPLAN, which generates computer simulations of noise propagation from sources such as rail noise. Rail noise emissions were modelled according to the industry standard rail noise prediction methodologies adopted by the Federal Railroad Administration (FRA). The FRA noise prediction model

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

10 U.S. Department of Transportation, Office of Planning and Environment, Federal Transit Administration, *Transit Noise and Vibration Impact Assessment,* May 2006.

calculates an A-weighted noise level at a receiver location through direct propagation or taking into account shielding provided by barriers.

The terrain for the Project site is relatively flat and the top-of-rail elevation ranges from 70 feet above grade within the CTA to 40 feet above grade near the Intermodal Transportation Facility (ITF) West and APM Maintenance and Storage Facility (MSF).

Train lengths are expected to be approximately 175 to 185 feet long and could consist of anywhere between 2 to 4 (or potentially 5) cars depending on the technology/operating system supplier. Trains would operate on traction power with no overhead catenary.[11] Based on the geometry (including station spacing) of the APM guideway, the maximum practical speed would be approximately 45 miles per hour (mph). The maximum round trip time (with dwell at each station) is approximately 1200 seconds, or 2 minutes. Based on this, with an approximately 4.3-mile-long round trip distance, the average speed is approximately 13 to 15 mph (when station dwell times are included), or approximately 18-20 mph (not including station dwell times). For station approaches, it was assumed that the train approach and departure speed would be approximately 10 to 15 mph. Furthermore, this means the train is cruising at practical maximum speeds and decelerate upon approach to station, with a zero speed at its berthing location. Station dwells are estimated to be no less than for purposes of computing the round trip times and fleet sizing/capacities (and may be permitted to vary with the technology door configuration/sizes during operations. The estimate dwelling times for each station are as follows: West Station = 45 seconds; Center Station = 25 seconds; East Station = 30 seconds; ITF West = 35 seconds; ITF East = 25 seconds; and CONRAC = 45 seconds.

M.3.4 VIBRATION METHODOLOGY

Ground-borne vibration measurements were collected in accordance with guidance provided in the FTA document.[12] The document outlines procedures and recommendations for assessing potential noise and vibration impacts from transit projects.

The scale of the LAMP Project is extensive, involving construction of a raised guideway and several loading terminals along the corridor of the proposed APM system between the CTA of LAX and the future proposed CONRAC that would be situated adjacent to the I-405.

Under the FTA guidance document, land use types used in determining noise impact criteria are designated into three land use categories: Category 1, Category 2, and Category 3. Category 1 includes uses where quiet is an essential element in their intended purpose, such as indoor concert halls or outdoor concert pavilions, or National Historic Landmarks where outdoor interpretation routinely takes place. Category 2 includes residences and building where people sleep, while Category 3 includes institutional land uses with primarily

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[11] A catenary is a system of overhead wires used to supply electricity to a locomotive, streetcar, or light rail vehicle which is equipped with a pantograph.

[12] U.S. Department of Transportation, Office of Planning and Environment, Federal Transit Administration, *Transit Noise and Vibration Impact Assessment,* May 2006.

daytime and evening uses, such as school, places of worship, and libraries. Land use types included in Category 1 and 3 do not occur within the scope of this analysis along the proposed APM guideway.

The FTA guidance document[13] recommends that vibration measurements be collected along the entire Project corridor for impact assessment of transit projects. Testing locations were selected to provide a representative sample of ambient vibration levels in the areas surrounding the Project components between the CTA and the future CONRAC facility. The locations were chosen based on land use type and proximity to areas of anticipated heavy construction. Ground-borne vibration was measured over a 30-minute interval at each location in accordance with the guidance set forth in the FTA methodology. The FTA methodology suggests that the maximum average root-mean-square (RMS) vibration levels be reported over the range of human perception, which spans from 8 to 80 Hz. Results of the vibration survey will be used to model potential vibration impacts from construction and operation of the LAMP Project. The existing ambient vibration levels in the area are primarily attributed to road traffic and typical operations of nearby businesses.

The basic approach for a General Vibration Assessment is to define a curve, or set of curves, that predicts the overall ground-surface vibration as a function of distance from the source, apply adjustment to those vibration curves to account for site- or system-specific factors such as speed and system design, and estimate the vibration levels for uses located along the transit corridor.[14] **Figure M-6** presents the generalized ground surface vibration curves at representative North American transit systems. The top curve applies to trains that are powered by diesel or electric locomotives, which includes intercity passenger trains and commuter rail trains. The curve for rapid transit rail cars covers both heavy and light-rail vehicles on at-grade and subway tracks.

In estimating the transit vibration levels associated with the proposed Project, all three vibration curves were used for the APM systems. Based on adjustment factors presented in the 2006 FTA *Transit Noise and Vibration Impact Assessment*[15] manual, each base curve was reduced by 10 dB to account for the design of the APM systems to operate on an elevated structure. Speed adjustments were also made, with 0.9 dB being subtracted to the vibration curve for rapid transit or light rail vehicles to reduce the default speed of 50 mph to 45 mph, and 3.5 dB was added to rubber-tired vehicles to increase the default speed of 30 mph to 45 mph.

M.3.5 DATA COLLECTION

Refer to *LAWA Landslide Access Modernization Program Existing Noise Data Collection Summary* for description of Project area data collection.

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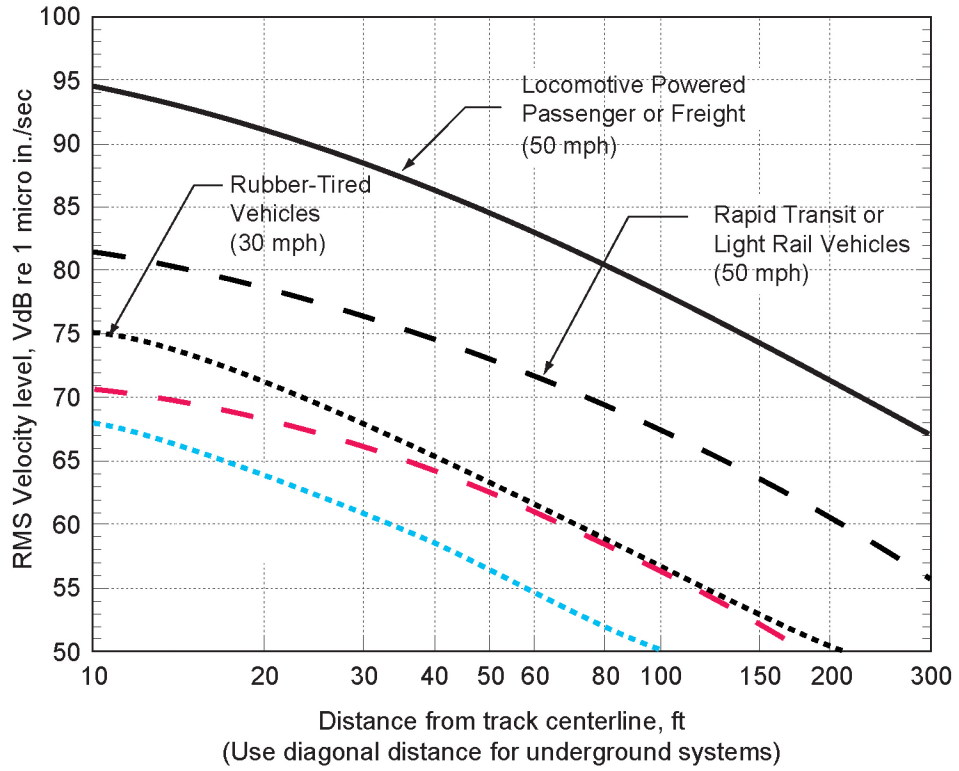
13 U.S. Department of Transportation, Office of Planning and Environment, Federal Transit Administration, *Transit Noise and Vibration Impact Assessment,* May 2006.

14 U.S. Department of Transportation, Office of Planning and Environment, Federal Transit Administration, *Transit Noise and Vibration Impact Assessment,* May 2006.

15 U.S. Department of Transportation, Office of Planning and Environment, Federal Transit Administration, *Transit Noise and Vibration Impact Assessment,* May 2006.



LEGEND

Adjusted Curves *

Rapid Transit or Light Rail Vehicle

Rubber Tired Vehicle

* Adjusted for speed and elevated system

SOURCES: Department of Transportation, Transit Noise and Vibration Impact Assessment (May 2006).

PREPARED BY: Meridian Consultants, LLC, August 2015.

FIGURE M-6

Generalized Ground Service Vibration Curves

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The acoustic analysis firm Acentech was subcontracted to provide fieldwork for the measurement of existing ground-borne vibration levels at sensitive land uses and other receptors along the corridor of the future APM system. Acentech's remote monitoring system using a Wilcoxin Research Model 793L low-frequency accelerometer was used to collect ⅓ octave band ground vibration. The vibration measurement system was calibrated with standards traceable to the National Institute of Standards and Technology (NIST). The accelerometer was fixed to a smooth surface on the ground to ensure that vertical vibration was accurately captured. Vibration data was acquired with a flat frequency response range of 6 to 400 Hz, as recommended by the FTA. Ground-borne vibration measurements were obtained at 15 locations between the CTA at LAX and the I-405 by acoustic technicians from Acentech.

Figure M-7 presents a map of the selected measurement points. **Table M-9** provides the approximate address and a brief description of the locations at which vibration levels were recorded.

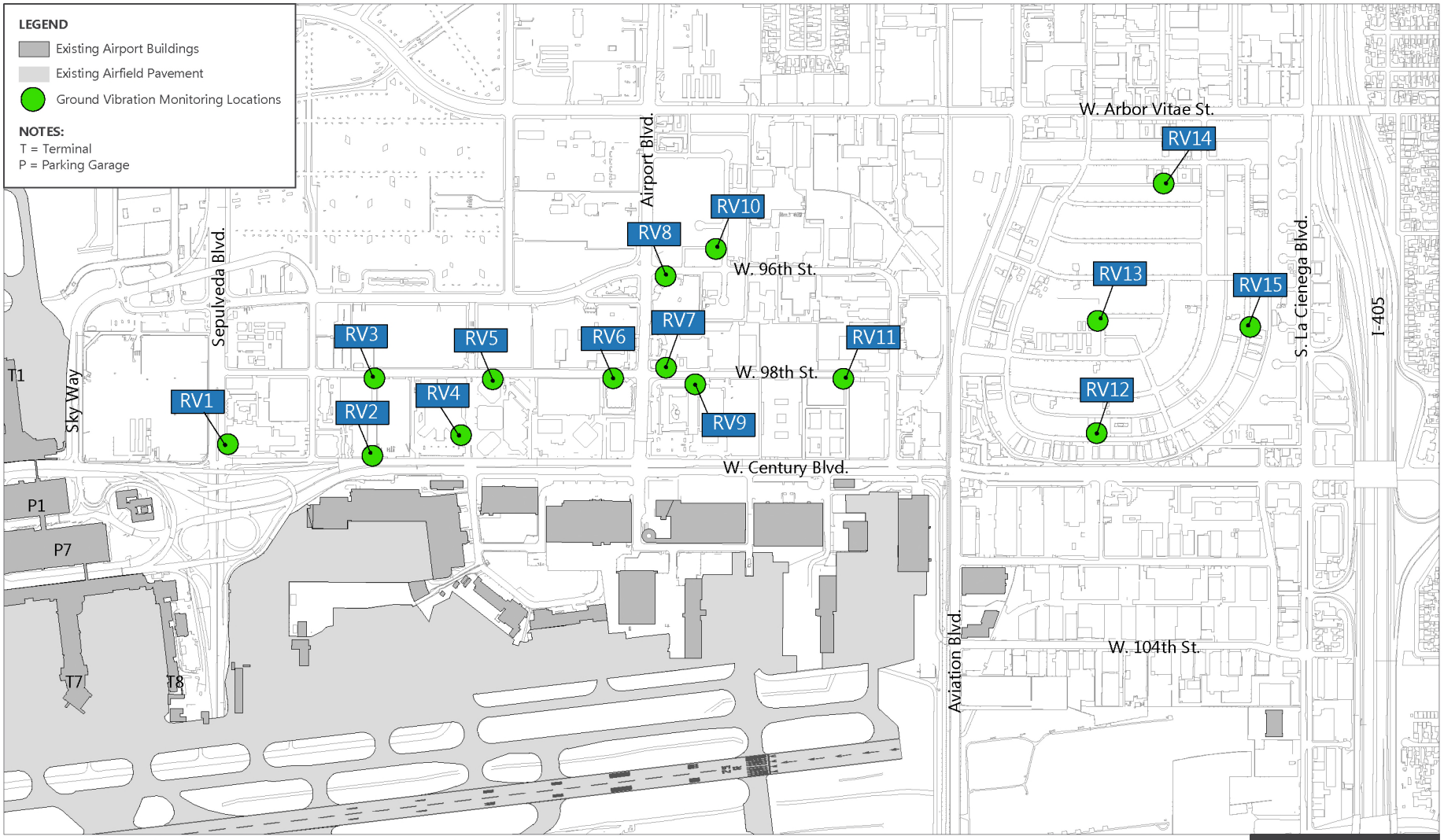
Table M-10 presents the results of the vibration survey. The vibration velocity is expressed in vibration decibels (VdB) and is the maximum average RMS value measured on the frequency range between 8 and 80 Hz.

Existing ambient RMS vibration levels ranged in magnitude from 38 VdB to 58 VdB at the 15 locations. The maximum vibration level of 58 VdB was measured at 9620 Airport Boulevard, on the corner of W. 96th Street and Airport Boulevard at the northern portion of Renaissance Hotel. In general, the higher vibration levels were measured in the western half of the study area, closer to the LAX CTA, which is characterized by heavier traffic volumes and greater amounts of activity relative to the Manchester Square residential community situated adjacent to the I-405.

M.3.6 SUMMARY

An ambient vibration survey was conducted to establish existing ground-borne vibration conditions along the future corridor of the LAX LAMP APM system. Acoustic specialists collected measurements of ground-borne vibration at 15 locations over 30-minute intervals. The measurements were recorded adjacent to Category 2 land uses as defined by the FTA, as well as at supplemental locations adjacent to anticipated construction areas.

The data collected will be used to predict maximum vibration levels that would result from construction and operation of the LAX LAMP APM system. The maximum levels will be compared to applicable thresholds of significance as designated by the FTA, and mitigation measures will be identified if warranted.



SOURCE: HNTB Corp., Los Angeles International Airport Layout Plan, July 2012; Meridian Consultants, July 2015.
PREPARED BY: Ricondo & Associates, Inc., September 2016.

FIGURE M-7

NORTH 0 1,100 ft.

Ground Vibration Monitoring Locations

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Table M-9: Project Area Vibration Survey Locations

SURVEY POINTS[1/]	DESCRIPTION	UTM E	UTM N	DURATION	DATE MEASURED
6225 W. Century Boulevard	Western portion of Concourse Hotel, Corner of Century Boulevard and Sepulveda Boulevard	371003	3757036	30 minutes	7/30/2015
6151 W. Century Boulevard	Southern portion of Joe's Airport Parking exit, along W. Century Boulevard	371322	3757007	30 minutes	7/16/2015
6141 W. 98th Street	Joe's Airport Parking entrance on W. 98th Street	371328	3757180	30 minutes	7/16/2015
6101 W. Century Boulevard	Southeast portion of Sheraton Hotel along Avion Drive	371519	3757052	30 minutes	7/16/2015
6032 W. Century Boulevard	Skyview Center, east of Avion Drive	371591	3757175	30 minutes	7/16/2015
9801 Airport Boulevard	North portion of Embassy Suites, West of Airport Boulevard	371857	3757175	30 minutes	7/9/2015
9750 Airport Boulevard	Northern portion of Four Points Hotel, east of Airport Boulevard	371975	3757197	30 minutes	7/9/2015
9620 Airport Boulevard	Northern portion of Renaissance Hotel, corner of W. 96th Street and Airport Boulevard	371976	3757400	30 minutes	7/9/2015
5855 W. Century Boulevard	Northern portion of Marriot Hotel, east of Airport Boulevard along W. 98th Street	372039	3757159	30 minutes	7/9/2015
9520 Belford Avenue	Between W. 95th Street and W. 96th Street	372089	3757459	30 minutes	7/9/2015
5730 W. 98th Street	Northeast corner of Hilton Hotel, west of Bellanca Avenue	372368	3757169	30 minutes	7/9/2015
5357 99th Place	East of 5357 99th Place, 30 feet from curb	372929	3757042	30 minutes	7/1/2015
5431 W. 98th Street	Corner of W. 97th Street and Atwell Place, east of Bright Star Charter	372934	3757291	30 minutes	7/9/2015
5324 W. 93rd Street	Southern alley, east of Isis Avenue	373083	3757596	30 minutes	7/16/2015
9714 Glasgow Place	South of W. 96th Street	373272	3757275	30 minutes	7/1/2015

NOTES:

1/ Survey points are the closest building address to the measurement location.

SOURCE: Meridian Consultants, LLC, August 2016.

PREPARED BY: Meridian Consultants, LLC, August 2016.

Table M-10: Local Sensitive Land Use Ground-borne Vibration Measurements

SURVEY POINTS[1/]	UTM E	UTM N	DURATION	DATE MEASURED	MAXIMUM VIBRATION VELOCITY (VDB)
6225 W. Century Boulevard	371003	3757036	30 minutes	7/30/2015	55
6151 W. Century Boulevard	371322	3757007	30 minutes	7/16/2015	56
6141 W. 98th Street	371328	3757180	30 minutes	7/16/2015	57
6101 W. Century Boulevard	371519	3757052	30 minutes	7/16/2015	56
6032 W. Century Boulevard	371591	3757175	30 minutes	7/16/2015	49
9801 Airport Boulevard	371857	3757175	30 minutes	7/9/2015	56
9750 Airport Boulevard	371975	3757197	30 minutes	7/9/2015	48
9620 Airport Boulevard	371976	3757400	30 minutes	7/9/2015	58
5855 W. Century Boulevard	372039	3757159	30 minutes	7/9/2015	47
9520 Belford Avenue	372089	3757459	30 minutes	7/9/2015	48
5730 W. 98th Street	372368	3757169	30 minutes	7/9/2015	50
5357 99th Place	372929	3757042	30 minutes	7/1/2015	51
5431 W. 98th Street	372934	3757291	30 minutes	7/9/2015	38
5324 W. 93rd Street	373083	3757596	30 minutes	7/16/2015	39
9714 Glasgow Place	373272	3757275	30 minutes	7/1/2015	46

NOTES:

1/ Survey points are the closest building address to the measurement location.

SOURCE: Meridian Consultants, LLC, August 2016.
PREPARED BY: Meridian Consultants, LLC, August 2016.


Los Angeles
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