

Appendix I

Noise and Vibration Technical Appendix

Appendix I

Noise and Vibration Technical Documentation

Hilton Universal City Project

Technical Appendix for Noise and Vibration

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Hilton Universal City Project

1. Noise and Vibration Methodology

1. Introduction

ESA conducted a comprehensive noise and vibration impact analysis and report for the Hilton Universal City Project (Project). Noise and vibration associated with construction and operation of the Project were quantified. This technical report describes the methodology used to measure the existing site's ambient noise levels and estimate noise and vibration from construction and operations of the Project.

2. Noise and Vibration Methodology

This section describes the methodology used to measure the existing Project Site's noise environment and calculate noise and vibration resulting from Project construction and operational activities and to evaluate the associated impacts. Construction activities would generate noise primarily from equipment usage and truck hauling. Long-term operational activities would generate emissions through vehicle trips (e.g. employees, visitors, waste disposal, deliveries), stationary sources (e.g. generators, heating, ventilation, and cooling) and outdoor areas.

a) Noise

(1) Noise Attenuation

When noise propagates, or attenuates, over a distance, the noise level reduces with distance depending on the type of noise source and the propagation path. Noise from a localized source (i.e., point source) propagates uniformly outward in a spherical pattern, referred to as "spherical spreading."¹ Noise levels generated by stationary point sources, including stationary mobile sources, such as idling vehicles, are attenuated at a rate between 6 A-weighted decibels (dBA)² for acoustically "hard" sites and 7.5 dBA for "soft" sites for each doubling of distance from the reference measurement, as their energy is continuously spread out over a spherical surface (e.g., for hard surfaces, 80 dBA at 50 feet attenuates to 74 dBA at 100 feet, 68 dBA at 200 feet, etc.). According to Caltrans,

¹ California Department of Transportation, Technical Noise Supplement to the Traffic Noise Analysis Protocol, Section 2.1.4.1 and 2.1.4.2, September 2013.

² The typical human ear is not equally sensitive to this frequency range. As a consequence, when assessing potential noise impacts, sound is measured using an electronic filter that deemphasizes the frequencies below 1,000 hertz (Hz) and above 5,000 Hz in a manner corresponding to the human ear's decreased sensitivity to these extremely low and extremely high frequencies. This method of frequency filtering or weighting is referred to as A-weighting, expressed in units of A-weighted decibels (dBA), which is typically applied to community noise measurements. (M. David Egan, Architectural Acoustics, March 1988, Chapter 1, pages 2, 3, 10, and 11.)

hard sites are those with a reflective surface between the source and the receiver, such as asphalt or concrete surfaces or smooth bodies of water. No excess ground attenuation is assumed for hard sites and the reduction in noise levels with distance (drop-off rate) is simply the geometric spreading of the noise from the source. Soft sites have an absorptive ground surface, such as soft dirt, grass, or scattered bushes and trees, which in addition to geometric spreading, provides an excess ground attenuation value of 1.5 dBA (per doubling distance).³

Roadways and highways consist of several localized noise sources on a defined path and, hence, are treated as “line” sources, which approximate the effect of several point sources. Noise from a line source propagates over a cylindrical surface, often referred to as “cylindrical spreading.” Noise from line sources (e.g., traffic noise from vehicles) are attenuated at a rate between 3 dBA for hard sites and 4.5 dBA for soft sites for each doubling of distance from the reference measurement.⁴ Therefore, noise due to a line source is attenuated less with distance than that of a point source with increased distance.

Structures (e.g., buildings and solid walls) and natural topography (e.g., hills and berms) that obstruct the line-of-sight between a noise source and a receptor further reduce the noise level if the receptor is located within the “shadow” of the obstruction, such as behind a sound wall. This type of sound attenuation is known as “barrier insertion loss.” If a receptor is located behind the wall but still has a view of the source (i.e., the line-of-sight is not fully blocked), barrier insertion loss would still occur but to a lesser extent. Additionally, a receptor located on the same side of the wall as a noise source may actually experience an increase in the perceived noise level as the wall can reflect noise back to the receptor, thereby compounding the noise. Noise barriers can provide noise level reductions ranging from approximately 5 dBA (where the barrier just breaks the line-of-sight between the source and receiver) to an upper range of 20 dBA with a larger barrier.⁵ Additionally, structures with closed windows can further attenuate exterior noise by a minimum of 20 dBA to 30 dBA.⁶

Additionally, receptors located downwind from a noise source can be exposed to increased noise levels relative to calm conditions, whereas locations upwind can have lowered noise levels. Atmospheric temperature inversion (i.e., increasing temperature with elevation) can increase sound levels at long distances (e.g., more than 500 feet). Other factors, such as air temperature, humidity, and turbulence, can also have an effect on noise levels.⁷

(2) Vibration Fundamentals

³ California Department of Transportation, Technical Noise Supplement to the Traffic Noise Analysis Protocol, Section 2.1.4.1 and 2.1.4.2, September 2013.

⁴ California Department of Transportation, Technical Noise Supplement to the Traffic Noise Analysis Protocol, Section 2.1.4.1., September 2013

⁵ California Department of Transportation, Technical Noise Supplement to the Traffic Noise Analysis Protocol, Sections 2.1.4.2 and 5.1.1, September 2013.

⁶ California Department of Transportation, Technical Noise Supplement to the Traffic Noise Analysis Protocol, Section 7.4.2, Table 7-1, September 2013.

⁷ California Department of Transportation, Technical Noise Supplement to the Traffic Noise Analysis Protocol, Section 2.1.4.3., September 2013.

Vibration can be interpreted as energy transmitted in waves through the ground or man-made structures, which generally dissipate with distance from the vibration source. Because energy is lost during the transfer of energy from one particle to another, vibration becomes less perceptible with increasing distance from the source.

As described in the Federal Transit Administration's (FTA) Transit Noise and Vibration Impact Assessment, common sources of groundborne vibration are trains, heavy trucks traveling on rough roads, and construction activities, such as blasting, pile-driving, and operation of heavy earth-moving equipment.⁸

There are several different methods that are used to quantify vibration. The peak particle velocity (PPV) is defined as the maximum instantaneous peak of the vibration signal in inches per second (in/sec), and is most frequently used to describe vibration impacts to buildings.⁹ The root mean square (RMS) amplitude is defined as the average of the squared amplitude of the signal and is most frequently used to describe the effect of vibration on the human body.¹⁰ Decibel notation (VdB) is commonly used to measure RMS. The relationship of PPV to RMS velocity is expressed in terms of the "crest factor," defined as the ratio of the PPV amplitude to the RMS amplitude. PPV is typically a factor of 1.7 to 6 times greater than RMS vibration velocity; FTA uses a crest factor of 4.¹¹ The decibel notation VdB acts to compress the range of numbers required to describe vibration. Typically, groundborne vibration generated by man-made activities attenuates rapidly with distance from the source of the vibration. Sensitive receptors for vibration include buildings where vibration would interfere with operations within the building or cause damage (especially historic buildings and older non-engineered timber and masonry structures), locations where people sleep, and locations with vibration sensitive equipment.¹²

Groundborne noise specifically refers to the rumbling noise emanating from the motion of building room surfaces due to the vibration of floors and walls; it is perceptible only inside buildings.¹³ The relationship between groundborne vibration and groundborne noise depends on the frequency of the vibration and the acoustical absorption characteristics of the receiving room. For typical buildings, groundborne vibration that causes low frequency noise (i.e., the vibration spectrum peak is less than 30 Hz) results in a groundborne noise level that is approximately 50 decibels lower than the velocity level. For groundborne vibration that causes mid-frequency noise (i.e., the vibration spectrum peak is between 30 and 60 Hz), the groundborne noise level will be approximately 35 to 37 decibels lower than the velocity level.¹⁴ Therefore, for typical buildings, the groundborne noise decibel level is lower than the groundborne vibration velocity level at low frequencies.

⁸ Federal Transit Administration, Transit Noise and Vibration Impact Assessment Manual, Section 5.2, 2018.

⁹ Federal Transit Administration, Transit Noise and Vibration Impact Assessment Manual, Section 5.1, 2018.

¹⁰ Federal Transit Administration, Transit Noise and Vibration Impact Assessment Manual, Section 5.1, 2018.

¹¹ Federal Transit Administration, Transit Noise and Vibration Impact Assessment Manual, 2018, Section 5.1.

¹² Federal Transit Administration, Transit Noise and Vibration Impact Assessment Manual, 2018, Sections 6.1, 6.2, and 6.3.

¹³ Federal Transit Administration, Transit Noise and Vibration Impact Assessment Manual, Section 5.4, 2018.

¹⁴ Federal Transit Administration, Transit Noise and Vibration Impact Assessment Manual, Table 6-3 and Table 6-14, September 2018.

The effects of groundborne vibration include movement of the building floors, rattling of windows, shaking of items on shelves or hanging on walls, and rumbling sounds. In extreme cases, the vibration can cause damage to buildings. Building damage is not a factor for most projects, with the occasional exception of blasting and pile-driving during construction or when construction is immediately adjacent to a fragile historic resource. Annoyance from vibration often occurs when the vibration levels exceed the threshold of perception by only a small margin. A vibration level that causes annoyance will be well below the damage threshold for normal buildings.

(3) Existing Noise and Vibration Levels

(a) *Noise-Sensitive Receptor Locations*

Some land uses are considered more sensitive to noise than others due to the types of activities typically involved at the receptor locations and the effect that noise can have on those activities and the persons engaged in them. The City of Los Angeles 2006 L.A. CEQA Thresholds Guide states that residences, schools, motels and hotels, libraries, religious institutions, hospitals, nursing homes, and parks are generally more sensitive to noise than commercial and industrial land uses.¹⁵ It should also be noted that the 2006 L.A. CEQA Thresholds Guide contains screening criteria, including (1) whether construction activities occur within 500 feet of a noise-sensitive use; and (2) whether construction occurs 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 anytime on Sunday. A “no” response to these questions indicates that there would normally be no significant construction noise impacts from the project.¹⁶

The Project Site is in an active, urban area that serves as both a commercial center for the surrounding communities and as a global tourist and entertainment center with offices and multiple hotels. The only existing noise-sensitive use within 500 feet of the Project Site is the Sheraton Hotel with guest rooms located approximately 190 feet west of the Project Site.¹⁷ Other more distant sensitive receptors include residential and open space uses approximately 1,550 feet to the northwest of the Project Site; residential uses approximately 1,100 feet to the southwest of the Project Site; residential uses approximately 760 feet to the south of the Project Site; and residential uses approximately 1,100 feet to the southeast of the Project Site. For informational purposes only, the Existing Hotel Building was analyzed as a noise receptor because the Hilton will remain operational during construction of the Project. The Existing Hotel Building is approximately 40 feet north of the Project construction area.

(b) *Vibration-Sensitive Receptor Locations*

Typically, groundborne vibration generated by man-made activities (i.e., rail and roadway

¹⁵ City of Los Angeles, L.A. CEQA Thresholds Guide, page I.1-3, 2006.

¹⁶ City of Los Angeles, L.A. CEQA Thresholds Guide, page I.1-3, 2006.

¹⁷ Hotel rooms are located on Floors 2 through 14 with rooms facing east towards the Project Site. Due to topographical differences between the Sheraton and the Project Site, Floor 4 of the Sheraton Hotel is roughly at the same elevation as the Project Site's Plaza level. Thus, Floors 1 through 3 of the Sheraton Hotel are at a lower elevation than the Project Site's Plaza level. .

traffic, operation of mechanical equipment and typical construction equipment) diminishes rapidly with distance from the vibration source. Construction activities, such as vibratory pile driving, would have the greatest effect on vibration-sensitive land uses. Energy is lost during the transfer of energy from one particle to another, and, as a result, vibration becomes less perceptible with increasing distance from the source. Therefore, with respect to potential structural damage, structures in close proximity (adjacent) to the Project Site are considered vibration-sensitive. The Sheraton Hotel parking garage as well as the Sheraton Hotel tower are considered vibration sensitive with respect to structural damage. For informational purposes only, the Existing Hotel Building was analyzed as a vibration receptor related to structural damage because the Hilton will remain operational during construction of the Project. The Existing Hotel Building is approximately 40 feet north of the Project construction area.

With respect to human annoyance, sensitive land uses include buildings where use of vibration-sensitive equipment is used (e.g., hospitals, research, and manufacturing), residential land uses and buildings where people normally sleep, schools, churches, and doctor's offices. Industrial or commercial (including office) uses are not considered vibration-sensitive.¹⁸ The Sheraton Hotel tower is considered a vibration sensitive land use with respect to human annoyance since it is a structure where normally people sleep. The parking garage for the Sheraton Hotel is detached from the Sheraton Hotel tower structure where people sleep. As such, since the Sheraton Hotel parking garage is not part of the building where people normally sleep or conduct other vibration-sensitive activities, the parking garage is not considered a vibration-sensitive land use. Therefore, while all adjacent buildings to the Project Site have been considered vibration-sensitive for structural damage, the Sheraton Hotel parking garage is not considered a vibration-sensitive land use for human annoyance. For informational purposes only, the Existing Hotel Building was analyzed as a vibration receptor for human annoyance because the Hilton will remain operational during construction of the Project. The Existing Hotel Building is approximately 40 feet north of the Project construction area.

(c) *Ambient Noise Levels*

The predominant existing noise source surrounding the Project Site is traffic noise from the Hollywood Freeway to the south. Secondary noise sources include the Universal Studios theme park; general commercial-related activities, such as loading dock/delivery truck activities, trash compaction, and refuse service activities; and nearby restaurants and bars.

Ambient noise measurements were taken at five locations, as shown in Figure IV.I-3, *Sensitive Receptors*, of the in Section IV.I, Noise, of the Draft EIR. These measurements represent the ambient noise levels at the nearby land uses in the vicinity of the Project Site.. One long-term (24-hour) measurement was taken at location R1 from Tuesday, September 25, through Wednesday, September 26, 2018¹⁹, and short-term (15-minute)

¹⁸ Federal Transit Administration, Transit Noise and Vibration Impact Assessment, Table 6-1.

¹⁹ Ambient noise levels taken in September 2018 are representative of the Project Site's noise environment. Ambient noise levels during the COVID-19 State of Emergency from early 2020 through early 2023 were considered atypical due to reduced vehicular traffic and, in the case of the Universal Hilton, less pedestrian

noise measurements were taken at locations R2 through R5 on Tuesday, September 25, 2018. The long term measurement was conducted at R1 to capture daytime, nighttime, and 24-hour ambient noise levels. R1 is the closest sensitive receptor to the Project Site and is the most susceptible to operational noise from the Project, which includes mechanical equipment, open space, and parking facilities that may generate noise levels during both day- and nighttime hours. Short-term measurements (15 minutes) at R1 through R5 also provide representative daytime ambient noise levels for receptors and were conducted in accordance with Los Angeles Municipal Code Section 111.00²⁰. The Existing Hotel Building is included as receptor R6. Noise measurements were not conducted at the Existing Hotel Building and measurement location R1 is assumed to be representative of the noise levels at the Existing Hotel Building.

The ambient noise measurements were conducted using the Larson-Davis 820 Precision Integrated Sound Level Meter (SLM). The Larson-Davis 820 SLM is a Type 1 standard instrument as defined in the American National Standard Institute S1.4. All instruments were calibrated and operated according to the applicable manufacturer specification. The microphone was placed at a height of five feet above grade, at the following locations:

- Measurement Location R1: This measurement location represents the existing noise environment at the Project Site's western boundary and is considered representative of the noise environment of the existing Universal Sheraton Hotel adjacent to the west, approximately 190 feet from the Project boundary.
- Measurement Location R2: This measurement location represents the existing noise environment at South Weddington Park and the residential uses approximately 1,550 feet northwest of the Project Site.
- Measurement Location R3: This measurement location represents the existing noise environment at the residential uses approximately 1,100 feet west of the Project Site along Kentucky Drive near the intersection of Fredonia Drive.
- Measurement Location R4: This measurement location represents the existing noise environment of the residential uses approximately 760 feet south of the Project Site along Fredonia Drive, just south of Cahuenga Boulevard.
- Measurement Location R5: This measurement location represents the existing noise environment of the residential uses approximately 1,100 feet southeast of the Project Site along Oak Glen Drive near the intersection of Broadlawn Drive.
- Existing Hotel Building (R6): As mentioned above, the Existing Hotel Building was analyzed as a receptor and is identified as receptor R6. The Existing Hotel Building is approximately 40 feet north of the Project construction area and noise levels are assumed to be similar to those measured at location R1.

A summary of the noise measurement data is provided in **Table 1, Summary of Ambient**

traffic and fewer guests visiting the hotel and nearby theme park. Thus, the ambient noise measurements taken before the COVID-19 State of Emergency are representative of typical ambient noise levels than would have been measured during COVID-19 restrictions.

²⁰ LAMC, Section 111.00. Available at: https://codelibrary.amlegal.com/codes/los_angeles/latest/lamc/0-0-0-193850

Noise Measurements. Daytime noise levels ranged from 56.3 dBA to 63.0 dBA L_{eq} and nighttime noise levels ranged from 54.4 dBA to 60.1 dBA L_{eq} .

TABLE 1
SUMMARY OF AMBIENT NOISE MEASUREMENTS

Location, Duration, Existing Land Uses and, Date of Measurements	Measured Ambient Noise Levels (dBA) ^a			
	Daytime (7 A.M. to 10 P.M.) Hourly L_{eq}	Daytime Average Hourly L_{eq}	Nighttime (10 P.M. to 7 A.M.) Hourly L_{eq}	Nighttime Average Hourly L_{eq}
R1 9/25/2018 to 9/26/2018 (10:24 A.M. to 9:24 A.M.)/Tuesday to Wednesday	56.3 – 61.3	59.6	54.4 – 60.1	57.5
R2 9/25/2018 (10:39 A.M. to 10:54 A.M.)/Tuesday	57.7	N/A	N/A	N/A
R3 9/25/2018 (8:59 A.M. to 9:14 A.M.)/Tuesday	62.1	N/A	N/A	N/A
R4 9/25/2018 (9:20 A.M. to 9:35 A.M.)/Tuesday	63.0	N/A	N/A	N/A
R5 9/25/2018 (11:03 A.M. to 11:18 A.M.)/Tuesday	61.9	N/A	N/A	N/A
R6^a 9/25/2018 to 9/26/2018 (10:24 A.M. to 9:24 A.M.)/Tuesday to Wednesday	56.3 – 61.3	59.6	54.4 – 60.1	57.5

^a R6 represents the Existing Hotel Building and it is assumed that noise levels are the same as R1.

(d) Existing Roadway Noise Levels

Existing roadway Community Noise Equivalent Level (CNEL)²¹ noise levels were calculated for 17 roadway segments located in the vicinity of the Project Site. The roadway segments selected for analysis are considered to be those that are expected to be the most directly impacted by Project-related traffic, which, for the purpose of this analysis, include the roadways that are located near and immediately adjacent to the Project Site. These roadways, when compared to roadways located farther away from the Project Site, would experience the greatest percentage increase in traffic generated by the Project (as distances are increased from the Project Site, traffic is spread out over a

²¹ CNEL: The Community Noise Equivalent Level (CNEL) is the time average A-weighted noise level during a 24-hour day that includes an addition of 5 dBA to measured noise levels between the hours of 7:00 P.M. to 10:00 P.M. and an addition of 10 dBA to noise levels between the hours of 10:00 P.M. to 7:00 A.M. the next day to account for noise sensitivity in the evening and nighttime, respectively.

greater geographic area and its effects are reduced).

Existing roadway CNEL noise levels were calculated using the Federal Highway Administration's (FHWA's) Highway Noise Prediction Model (FHWA-TNM)²² and traffic volumes at the study intersections analyzed in the Project's Transportation Analysis (TA) Addendum prepared by Linscott, Law & Greenspan, Engineers, April 2023.²³ The model calculates the average noise level at specific locations based on traffic volumes, average speeds, and site environmental conditions. The noise levels along these roadway segments are presented in **Table 2** *Calculated Existing Vehicular Traffic Noise Levels*. the ambient noise environment of the Project vicinity can be characterized by 24-hour CNEL levels attributable to existing traffic on local roadways. The calculated CNEL (at a distance of 50 feet from the roadway centerline) from actual existing traffic volumes on the analyzed roadway segments ranged from 51.5 dBA to 75.8 dBA for residential areas and commercial areas.

TABLE 2
CALCULATED EXISTING VEHICULAR TRAFFIC NOISE LEVELS

Roadway Segment	Adjacent Land Use	Existing Noise Exposure Compatibility Category ^{b,c}	Existing CNEL (dBA) ^a
Barham Blvd n/o Cahuenga Blvd E	Single-Family Residential/Multi-Family Residential	Clearly Unacceptable	75.8
Barham Blvd s/o Cahuenga Blvd E	Commercial	Conditionally Acceptable	73.8
Cahuenga Blvd between Lankershim Blvd and Regal PI	Commercial	Conditionally Acceptable	74.1
Cahuenga Blvd between Regal PI and Universal Studios Blvd	Commercial/Religious	Normally Unacceptable	72.9
Cahuenga Blvd E e/o Barham Blvd	Single-Family Residential	Normally Unacceptable	72.8
Cahuenga Blvd W e/o Universal Studios Blvd	Commercial/Educational	Conditionally Acceptable/Normally Unacceptable	70.7
Cahuenga Blvd w/o Lankershim Blvd	Commercial/Hotel	Conditionally Acceptable/Normally Unacceptable	72.1
Campo de Cahuenga Way between Metro Driveway and Lankershim Blvd	Public Transit	Normally Acceptable	67.9

²²The traffic noise model which was developed based on calculation methodologies provided in the Caltrans TeNS document and traffic data provided in the Project's TA Addendum provided in Appendix K-3 to this Draft EIR. This methodology, considered an industry standard, allows for the definition of roadway configurations, barrier information (if any), and receiver locations.

²³Linscott, Law & Greenspan, Engineers, *Updated Transportation Analysis Addendum for the Hilton Universal City Project*, April 2023. Appendix K-3 of the Draft EIR.

CALCULATED EXISTING VEHICULAR TRAFFIC NOISE LEVELS

Roadway Segment	Adjacent Land Use	Existing Noise Exposure Compatibility Category ^{b,c}	Existing CNEL (dBA) ^a
Campo de Cahuenga Way between US-101 NB/SB On/Off Ramp and Metro Driveway	Freeway Underpass	Normally Acceptable	68.4
Campo de Cahuenga Way w/o US-101 NB/SB On/Off Ramp	Commercial/Single-Family Residential	Conditionally Acceptable	68.2
Lankershim Blvd between Universal Hollywood Dr and US-101 NB Off Ramp	Commercial	Conditionally Acceptable	71.0
Lankershim Blvd between US-101 NB Off Ramp and Cahuenga Blvd	Commercial	Conditionally Acceptable	70.2
Lankershim Blvd n/o Universal Hollywood Dr	Commercial/Multi-family Residential	Conditionally Acceptable/Normally Unacceptable	72.5
Lankershim Blvd s/o Cahuenga Blvd	Commercial/Single-Family Residential	Normally Acceptable/Conditionally Acceptable	63.1
Metro Driveway n/o Campo de Cahuenga Way	Commercial	Normally Acceptable	59.7
Metro Driveway s/o Campo de Cahuenga Way	Commercial	Normally Acceptable	51.5
Regal PI n/o Cahuenga Blvd	Freeway On/Off Ramp	Normally Acceptable	69.5
Regal PI s/o Cahuenga Blvd	Commercial/Single-Family Residential/Multi-Family Residential	Normally Acceptable/Conditionally Acceptable/Normally Acceptable	62.5
Universal Hollywood Dr between Lankershim Blvd and Hilton Driveway	Hotel/Theme Park/Commercial	Normally Unacceptable/Conditionally Acceptable	70.7
Universal Hollywood Dr s/o Hilton Driveway	Hotel/Theme Park/Commercial	Conditionally Acceptable/Normally Acceptable	65.5
Universal Studios Blvd between US-101 SB On Ramp and Cahuenga Blvd W	Commercial	Normally Acceptable	66.3
Universal Studios Blvd between W.C. Fields Dr and US-101 SB On Ramp	Commercial	Normally Acceptable	68.5
Universal Studios Blvd n/o W.C. Fields Dr	Commercial	Normally Acceptable	64.5
US-101 NB Off Ramp e/o Lankershim Blvd	Freeway On/Off Ramp	Normally Acceptable	70.0

CALCULATED EXISTING VEHICULAR TRAFFIC NOISE LEVELS

Roadway Segment	Adjacent Land Use	Existing Noise Exposure Compatibility Category ^{b,c}	Existing CNEL (dBA) ^a
US-101 NB/SB On/Off Ramp n/o Campo de Cahuenga Way	Freeway On/Off Ramp	Normally Acceptable	71.3
US-101 NB/SB On/Off Ramp s/o Campo de Cahuenga Way	Freeway On/Off Ramp	Normally Acceptable	67.6
US-101 SB On Ramp e/o Universal Studios Blvd	Freeway On/Off Ramp	Normally Acceptable	67.2
W.C. Fields Dr between Universal Studios Blvd and Barham Blvd	Commercial/Single-Family Residential/Open Space	Conditionally Acceptable/Conditionally Acceptable/Normally Acceptable	68.2
W.C. Fields Dr w/o Universal Studios Blvd	Commercial/Hotel	Normally Acceptable/Conditionally Acceptable	66.8

^a Calculated based on existing traffic volumes.

^b Based on noise levels calculated at specific distances to the centerline of each analyzed roadway segment.

^c Based on compatibility categories from 2006 L.A. CEQA Thresholds Guide, 2006.

SOURCE: ESA, 2023.

(e) Existing Groundborne Vibration Levels

Aside from periodic construction work occurring throughout the City, field observations noted that other sources of groundborne vibration in the Project Site vicinity are primarily limited to heavy-duty vehicular travel (e.g., refuse trucks, delivery trucks, etc.) on local roadways. Trucks traveling at a distance of 50 feet typically generate groundborne vibration velocity levels of 65 VdB (approximately 0.0068 in/sec PPV).²⁴

(f) Existing Groundborne Noise Levels

As stated earlier, groundborne noise levels would generally be 20 to 50 decibels lower than the velocity level depending on the frequency level of the source.²⁵ With a background groundborne vibration level in residential areas of 50 VdB or lower, groundborne noise levels would be approximately 0 to 30 dBA. A bus traveling at a distance of 50 feet would generate groundborne noise levels of approximately 23 to 38 dBA. The approximate level of human perception of groundborne noise is 25 dBA for low frequency vibration (near 30 Hz) and 40 dBA for mid-frequency vibration (near 60 Hz).²⁶

(4) On-Site Construction

On-site construction noise impacts were evaluated by determining the noise levels

²⁴ FTA, Transit Noise and Vibration Impact Assessment, Figure 5-4.

²⁵ FTA, Transit Noise and Vibration Impact Assessment, p. 146.

²⁶ FTA, Transit Noise and Vibration Impact Assessment, p. 120.

generated by the different types of construction activity anticipated, calculating the construction-related noise level generated by the mix of equipment assumed for all construction activities at nearby sensitive receptor locations, and comparing these construction-related noise levels to existing ambient noise levels (i.e., noise levels without construction noise) at those receptors. Construction activities include demolition of the existing uses on the Project Site and construction of the buildings and any infrastructure improvements needed to serve the Project. More specifically, the following steps were undertaken to assess construction-period noise impacts.

Ambient noise levels at surrounding sensitive receptor locations were determined based on field measurements (see Table 1, above). Ambient noise measurements were conducted using the Larson-Davis 820 Precision Integrated SLM (sound meter). The Larson-Davis 820 sound meter is a Type 1 standard instrument as defined in the American National Standard Institute S1.4. All instruments were calibrated and operated according to the applicable manufacturer specification. The microphone was placed at a height of 5 feet above grade.

1. Typical noise levels for each type of construction equipment expected were obtained from the FHWA Roadway Construction Noise Model (RCNM).
2. Distances between construction site locations (noise sources) and surrounding off-site noise-sensitive receptors were measured using Project architectural drawings, site plans, and Google Earth.
3. The construction noise level was then calculated, in terms of hourly L_{eq} , for sensitive receptor locations based on the standard point-source noise-distance attenuation factor of 6 dBA L_{eq} for each doubling of distance over a hard surface.
4. Construction noise levels were then compared to the construction noise significance threshold discussed below.

Project construction includes construction of the Project Site, which includes the Hotel Expansion Building, Meeting Room Addition, circulation, canopy, landscaping, and the parking garage. Construction of the Project Site (except for the parking garage) includes the following eight construction stages: (1) demolition, (2) site preparation (3) grading/excavation, (4) trenching, (5) foundations, (6) building construction, (7) paving, and (8) architectural coating. Construction of the parking garage includes the following six construction stages: (1) demolition, (2) grading/excavation, (3) foundations, (4) building construction, (5) paving, and (6) architectural coating. Various construction phases during hotel and parking garage construction would overlap. Since construction of the Project as a whole would last more than 10 days, based on the criteria provided in the 2006 L.A. CEQA Thresholds Guide, the construction noise significance threshold used in this analysis is an increase in the ambient exterior noise level of 5 dBA L_{eq} or more at a noise-sensitive use.

Types of construction equipment expected to be used during Project construction could produce maximum noise levels of 74 dBA L_{max} to 95 dBA L_{max} at a reference distance of 50 feet from the noise source according to FHWA reference noise levels. Table IV.I-8, Project Construction Equipment and Associated Noise Levels, lists the construction

equipment type and number assumed for each Project construction stage and FHWA reference noise levels (L_{max}) at 50 feet. These maximum noise levels would occur when equipment is operating at full power. Construction equipment does not typically operate at full power consistently throughout the duration of a given construction stage. The estimated usage factor for the equipment is also shown in **Table 3** and represents the percentage of a specified time period (i.e., an hour) that a piece of equipment is expected to be operational, allowing for the calculation of an average noise level (dBA L_{eq}). The usage factors are based on FHWA's Roadway Construction Noise Model (RCNM) User's Guide.²⁷

TABLE 3
PROJECT CONSTRUCTION EQUIPMENT AND ASSOCIATED NOISE LEVELS

Type of Equipment	Reference Noise Level at 50 Feet, L_{max}	Estimated Usage Factor
Bore/Drill Rig	84	20%
Compactor (ground)	80	20%
Compressor (air)	80	40%
Concrete Saw	90	20%
Crane	85	16%
Crawler Tractor	84	40%
Drum Mixer	80	50%
Dumper/Tender	84	40%
Excavator	85	40%
Forklift	75	10%
Generator	82	50%
Jackhammer	85	20%
Paver	85	50%
Paving Equipment	85	50%
Pumps	77	50%
Roller	85	20%
Skid Steer Loader	80	40%
Surfacing Equipment	85	20%
Tractor/Loader/Backhoe	80	40%
Trencher	82	50%
Vacuum Street Sweeper	80	10%
Vibratory Pile Driver	95	20%

SOURCE: FHWA, 2005

Over the course of a construction day, the highest noise levels would be generated when multiple pieces of construction equipment would operate concurrently. The estimated noise levels at the sensitive receptors were calculated using the FHWA's RCNM and were based on a maximum concurrent operation of equipment, which is considered a worst-case evaluation because the Project would typically use less overall equipment on a daily basis and, as such, would generate lower noise levels.

(5) Off-Site Roadway Noise (Construction and Operation)

²⁷ FHWA, Roadway Construction Noise Model User's Guide.

Roadway noise levels were projected using the FHWA's Highway Noise Prediction Model (FHWA-TNM) model and the roadway traffic volume provided in the TA Addendum for the Project.²⁸ This method allows for the definition of roadway configurations, barrier information (if any), and receiver locations. Roadway noise attributable to Project development was calculated and compared to baseline noise levels that would occur under the "without Project" condition.

Since Project construction activities would last more than 10 days for all phases, the construction noise significance threshold used in this analysis is an increase in the ambient exterior noise level of 5 dBA L_{eq} or more at a noise-sensitive use.

For Project operations, the operational noise significance threshold used in this analysis is whether 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.

(6) On-Site Stationary Point-Source Noise (Operation)

Stationary point-source noise levels were evaluated by identifying the noise levels generated by outdoor stationary noise sources such as rooftop mechanical equipment, parking structure automobile operations, and loading/refuse collection area activity, calculating the hourly L_{eq} noise level from each noise source at sensitive receiver property lines, and comparing such noise levels to existing ambient noise levels. More specifically, the following steps were undertaken to calculate the Project's outdoor stationary noise impacts:

1. Ambient noise levels at surrounding off-site sensitive receptor locations were determined based on field measurement data (see **Table 1**).
2. Distances between stationary noise sources and surrounding sensitive receptor locations were measured using Project architectural drawings, site plans, and Google Earth.
3. Stationary source noise levels were then calculated for each sensitive receptor location based on the standard point-source noise-distance attenuation factor of 6 dBA for each doubling of distance over a hard surface.
4. Noise level increases were compared to the stationary source noise significance thresholds discussed below.
5. For outdoor mechanical equipment, the maximum allowable noise emissions from any and all outdoor mechanical equipment were specified such that noise levels would not exceed the significance threshold discussed below.
6. Parking related noise levels were estimated utilizing the methodology recommended by the FTA for the general assessment of stationary transit noise sources. Using this methodology, the Project's peak hourly noise level that would be generated by the on-site parking levels was estimated using the following FTA equation for a parking lot:²⁹

²⁸Linscott, Law & Greenspan, Engineers, *Transportation Analysis Addendum for the Hilton Universal City Project*, September 2022. Appendix K-3 of this Draft EIR,

²⁹ FTA, Section 4.4, Tables 4.13-14, September 2018.

$L_{eq}(h) = SEL_{ref} + 10\log(NA/1000) - 35.6$, where

$L_{eq}(h)$ = hourly L_{eq} noise level at 50 feet

SEL_{ref} = reference noise level for stationary noise source represented in sound exposure level (SEL) at 50 feet

N_A = number of automobiles per hour

7. The combined noise levels from each operational noise source were estimated and the combined noise level increases were compared to the significance thresholds discussed below.

For purposes of providing a conservative noise analysis for outdoor spaces, the maximum occupant load of the outdoor seating and pool areas on the Basement Level, North and South Plazas, and rooftop Restaurant/Bar was calculated based on an occupancy load factor of 15 square feet per person for an assembly area without fixed seats, and the maximum occupant load of the pool areas was calculated based on an occupancy load factor of 50 square feet per person, according to the California Building Code Table 1004.5 Maximum Floor Area Allowances Per Occupant.³⁰ Although this occupancy load factor provides an overestimation of the occupancy load and associated noise within passive landscaped areas, it has been applied to the square footage of the Project's outdoor spaces to provide a conservative worst-case noise analysis.

Actual capacities for the Project outdoor spaces would be lower and, in some cases substantially lower, due to design considerations, such as building ingress/egress limitations, elevator and stairwell capacities, fire escape route capacities, and other capacity considerations. Noise from female adults, male adults, and children talking at a raised level is approximately 63 dBA, 65 dBA, and 65 dBA, respectively, at a distance of 3 feet.³¹ As a conservative analysis, it is assumed that each outdoor space would be at full capacity and that half of the visitors would be adults (half male and half female) and half would be children. Of the adults and children, half would be talking simultaneously (assuming approximately half of the occupants talking and the other half listening). For outdoor spaces that would include amplified sound/music, it was assumed that the Project would comply with the requirements of Los Angeles Municipal Code (LAMC) Section 112.01³² to ensure that the maximum noise generated by amplified speakers would not exceed the ambient noise level by more than 5 dBA, which falls within the significance threshold identified above.

Sources of noise within the Project's parking structure would primarily include vehicular movements and engine noise, doors opening and closing, and intermittent car alarms. Noise levels within the parking structure would fluctuate with the amount of automobile and human activity. For purposes of providing a conservative analysis of parking facility noise, the peak hour trips for the Project were used.

³⁰ California Building Standards Commission, 2019 Title 24, Part 2, Volume 1 – California Building Code.

³¹ *American Journal of Audiology* Vol.7 21-25 October 1998. doi:10.1044/1059-0889(1998/012).

³² LAMC Section 112.01 prohibits the use of noise amplification devices in excess of the measured ambient noise level plus 5 dBA.

For operational stationary noise, the operational stationary noise significance threshold used in this analysis is whether the project causes the ambient noise level measured at the property line of affected uses to increase by 5 dBA in accordance with LAMC Chapter XI, Section 112.02.

(7) Composite Noise (Operations)

Combined noise levels from each operational noise source were estimated by logarithmically adding together the noise levels from all the operational noise sources at the maximum impacted noise-sensitive receptor locations, assuming simultaneous contribution of noise from each source. As discussed previously, the dBA scale is based on logarithms, where a doubling of sound energy corresponds to a 3 dBA increase (e.g., if two identical noise sources produce noise levels of 50 dBA, the combined sound level would be 53 dBA, not 100 dBA). Composite noise sources include off-site roadway noise and on-site stationary point-source noise, as listed above.

(8) Groundborne Vibration (Construction and Operation)

Groundborne vibration impacts were evaluated by identifying potential vibration sources, measuring the distance between vibration sources and surrounding structure locations, and making a determination based on the significance criteria described in the Vibration Impacts section.

The City currently does not have significance criteria to assess vibration impacts during construction. Thus, FTA guidelines set forth in their 2006 Transit Noise and Vibration Assessment are used to evaluate potential impacts related to construction vibration for both potential building damage and human annoyance. The FTA guidelines regarding construction vibration are the most current guidelines and are commonly used in evaluating vibration impacts.

Based on the FTA guidance, groundborne vibration could result in building damage if any of the following were to occur:

- Project construction activities cause groundborne vibration levels to exceed 0.5 in/sec PPV at the nearest offsite reinforced-concrete, steel, or timber building.
- Project construction activities cause groundborne vibration levels to exceed 0.3 in/sec PPV at the nearest offsite engineered concrete and masonry building.
- Project construction activities cause groundborne vibration levels to exceed 0.2 in/sec PPV at the nearest offsite non-engineered timber building.
- Project construction activities cause groundborne vibration levels to exceed 0.12 in/sec PPV at buildings extremely susceptible to vibration damage, such as historic buildings.

Structural impacts from the Project were evaluated based on Caltrans' Transit Noise and Vibration Impact Assessment which provides PPV values for different types of equipment at a distance of 25 feet (See Table 12-2 of the Assessment). The standardized PPV

values can then be attenuated based on the measured distance of the vibration sensitive receptor from the Project Site. The standard attenuation formula is as follows:

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

Where: PPV_{equip} is the PPV in in/sec of the equipment adjusted for distance

PPV_{ref} is the reference vibration level in in/sec at 25 feet

D is the distance from the equipment to the receiver

n is the soil type classification (typically ranging from 1 to 1.5; a factor of 1.5 was used for this analysis)

Based on FTA guidance, construction vibration could be perceived as annoying to humans if any of the following were to occur:

- Project construction activities cause groundborne vibration levels to exceed 72 VdB at off-site sensitive uses, including residential uses.

The FTA guidance classifies the vibration impact levels based on whether the vibration-producing events are frequent, occasional, or infrequent. “Frequent Events” is defined as more than 70 vibration events of the same source per day. “Occasional Events” is defined as between 30 and 70 vibration events of the same source per day. “Infrequent Events” is defined as fewer than 30 vibration events of the same kind per day. The values listed above are applicable to “Frequent Events.” For the purposes of providing a conservative analysis, the vibration analysis provided herein for potential human annoyance compares the estimated vibration levels generated during construction and operation of the Project to the 72 VdB significance threshold for off-site residential uses for “Frequent Event.” The vibration analysis for the Project conservatively used the closest distance to construction activity and the construction phase with the equipment mix that would result in the greatest potential vibration.

Similar to structural impacts, the Project’s human annoyance impacts are calculated using the same methodology from Caltrans’ Transit Noise and Vibration Impact Assessment which provides VdB values for different types of equipment at a distance of 25 feet (See Table 12-2 of the Assessment). The standardized PPV values can then be attenuated based on the measured distance of the vibration sensitive receptor from the Project Site. The standard attenuation formula is as follows:

$$VdB_{\text{equip}} = VdB_{\text{ref}} - 30 \times \log(D/25)$$

Where: VdB_{equip} is the noise level in velocity decibels of the equipment adjusted for distance

VdB_{ref} is the reference vibration level in velocity decibels at 25 feet

D is the distance from the equipment to the receiver

(9) Groundborne Noise

According to the FTA, airborne noise levels would be higher than groundborne noise levels.³³ Unless indoor receptors have substantial sound insulation (e.g., recording studio) and would be exposed to vibration velocities great enough to cause substantial levels of groundborne noise, groundborne noise does not need to be assessed. There are no substantially insulated indoor receptors located within the area surrounding the Project Site; therefore, the effects of airborne noise would still be higher than groundborne noise levels. Accordingly, impacts related to groundborne noise are not analyzed herein.

³³FTA, Transit Noise and Vibration Impact Assessment, p. 124.

Hilton Universal City Project

2. Noise and Vibration Worksheets

Noise and Vibration Calculations and Model Outputs

2.1 Ambient Noise Data

Noise Measurement Data

Project: **Universal Hilton**

Location: **R1**

09/25/18 09/26/18 09/27/18 09/28/18

Start Date and Time

12:00:00 AM		55.6
1:00:00 AM		55.0
2:00:00 AM		54.4
3:00:00 AM		54.9
4:00:00 AM		57.9
5:00:00 AM		60.1
6:00:00 AM		59.7
7:00:00 AM		59.4
8:00:00 AM		59.3
9:00:00 AM		59.9
10:00:00 AM	61.3	
11:00:00 AM	60.8	
12:00:00 PM	61.0	
1:00:00 PM	60.3	
2:00:00 PM	59.4	
3:00:00 PM	59.8	
4:00:00 PM	59.6	
5:00:00 PM	57.0	
6:00:00 PM	56.3	
7:00:00 PM	59.3	
8:00:00 PM	58.8	
9:00:00 PM	58.3	
10:00:00 PM	58.5	
11:00:00 PM	57.0	

9/25/2018	9:00:00 AM	Start
9/26/2018	10:00:00 AM	9/25/18 10:00 AM
9/27/2018	11:00:00 AM	End
9/28/2018	12:00:00 PM	9/26/18 10:00 AM
	1:00:00 PM	
	2:00:00 PM	
	3:00:00 PM	

CNEL	64.6
L _{dn}	64.3
24-hr Max.	61.3
24-hr Min.	54.4
24-hr Nighttime Average ^a	57.5
24-hr Nighttime Max	60.1
24-hr Nighttime Min	54.4
24-hr Daytime Average ^a	59.6
24-hr Daytime Max	61.3
24-hr Daytime Min	56.3
Total Period Average	58.9
Total Period Max	61.3
Total Period Min	54.4
Total Period Daytime Average	59.6
Total Period Daytime Max	61.3
Total Period Daytime Min	56.3
Total Period Nighttime Average	57.5
Total Period Nighttime Max	60.1
Total Period Nighttime Min	54.4

^a Daytime hours are from 7:00 a.m. to 10:00 p.m., and nighttime hours are from 10:00 p.m. to 7:00 a.m.

Universal Hilton

9/25/2018

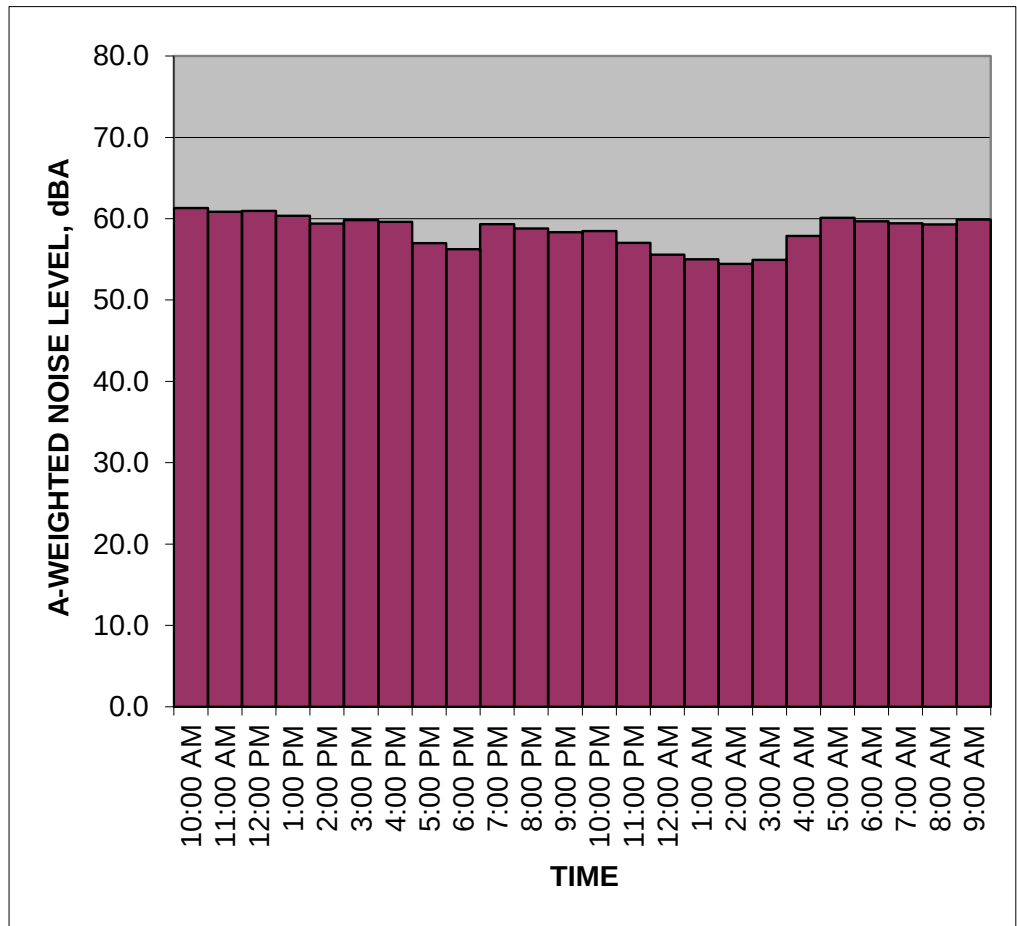
Project: Universal Hilton

Location: R1

Sources: Ambient

Date: September 25-26, 2018

TIME	HNL, dB(A)
10:00 AM	61.3
11:00 AM	60.8
12:00 PM	61.0
1:00 PM	60.3
2:00 PM	59.4
3:00 PM	59.8
4:00 PM	59.6
5:00 PM	57.0
6:00 PM	56.3
7:00 PM	59.3
8:00 PM	58.8
9:00 PM	58.3
10:00 PM	58.5
11:00 PM	57.0
12:00 AM	55.6
1:00 AM	55.0
2:00 AM	54.4
3:00 AM	54.9
4:00 AM	57.9
5:00 AM	60.1
6:00 AM	59.7
7:00 AM	59.4
8:00 AM	59.3
9:00 AM	59.9
CNEL, dB(A):	64.6



NOTES:

Summary

File Name on Meter	R1
File Name on PC	SLM_0005055_LxT_Data_027.00.ldbin
Serial Number	0005055
Model	SoundTrack LxT®
Firmware Version	2.302
User	
Location	Universal Hilton
Job Description	
Note	

Measurement

Description	
Start	2018-09-25 10:24:02
Stop	2018-09-26 10:36:37
Duration	24:12:34.203
Run Time	24:12:34.203
Pause	00:00:00.0
Pre Calibration	2018-09-25 10:17:50
Post Calibration	None
Calibration Deviation	---

Overall Settings

RMS Weight	A Weighting		
Peak Weight	A Weighting		
Detector	Slow		
Preamplifier	PRMLxT1		
Microphone Correction	Off		
Integration Method	Exponential		
Overload	144.4 dB		
	A	C	Z
Under Range Peak	100.6	97.6	102.6 dB
Under Range Limit	49.6	47.6	55.6 dB
Noise Floor	36.5	37.1	44.7 dB

Results

LASeq	58.9 dB	
LASE	108.3 dB	
EAS	7.496 mPa²h	
EAS8	2.477 mPa²h	
EAS40	12.385 mPa²h	
LASpeak (max)	2018-09-25 12:20:05	108.9 dB
LASmax	2018-09-26 09:58:11	85.3 dB
LASmin	2018-09-26 03:05:42	49.1 dB
SEA	-99.9 dB	

LAS > 85.0 dB (Exceedance Counts / Duration)	1	1.1 s
LAS > 115.0 dB (Exceedance Counts / Duration)	0	0.0 s
LASpeak > 135.0 dB (Exceedance Counts / Duration)	0	0.0 s
LASpeak > 137.0 dB (Exceedance Counts / Duration)	0	0.0 s
LASpeak > 140.0 dB (Exceedance Counts / Duration)	0	0.0 s

LCSeq	68.3 dB
LASeq	58.9 dB
LCSeq - LASeq	9.4 dB
LAlseq	60.2 dB
LAeq	58.9 dB
LAlseq - LAeq	1.3 dB

A		C		Z	
dB	Time Stamp	dB	Time Stamp	dB	Time Stamp
Leq	58.9				
LS(max)	85.3	2018/09/26 9:58:11			
LS(min)	49.1	2018/09/26 3:05:42			
LPeak(max)	108.9	2018/09/25 12:20:05			

Summary

File Name on Meter	R2
File Name on PC	SLM_0005055_LxT_Data_027.00.ldbin
Serial Number	0005055
Model	SoundTrack LxT®
Firmware Version	2.302
User	
Location	Universal Hilton
Job Description	
Note	

Measurement

Description	
Start	2018-09-25 10:24:02
Stop	2018-09-26 10:36:37
Duration	24:12:34.203
Run Time	24:12:34.203
Pause	00:00:00.0
Pre Calibration	2018-09-25 10:17:50
Post Calibration	None
Calibration Deviation	---

Overall Settings

RMS Weight	A Weighting		
Peak Weight	A Weighting		
Detector	Slow		
Preamplifier	PRMLxT1		
Microphone Correction	Off		
Integration Method	Exponential		
Overload	144.4 dB		
	A	C	Z
Under Range Peak	100.6	97.6	102.6 dB
Under Range Limit	49.6	47.6	55.6 dB
Noise Floor	36.5	37.1	44.7 dB

Results

LASeq	58.9 dB	
LASE	108.3 dB	
EAS	7.496 mPa²h	
EAS8	2.477 mPa²h	
EAS40	12.385 mPa²h	
LA _{Spk} (max)	2018-09-25 12:20:05	108.9 dB
LA _{Smax}	2018-09-26 09:58:11	85.3 dB
LA _{Smin}	2018-09-26 03:05:42	49.1 dB
SEA	-99.9 dB	

LAS > 85.0 dB (Exceedance Counts / Duration)	1	1.1 s
LAS > 115.0 dB (Exceedance Counts / Duration)	0	0.0 s
LA _{Spk} > 135.0 dB (Exceedance Counts / Duration)	0	0.0 s
LA _{Spk} > 137.0 dB (Exceedance Counts / Duration)	0	0.0 s
LA _{Spk} > 140.0 dB (Exceedance Counts / Duration)	0	0.0 s

LCSeq	68.3 dB
LASeq	58.9 dB
LCSeq - LASeq	9.4 dB
LA _{Ieq}	60.2 dB
LA _{eq}	58.9 dB
LA _{Ieq} - LA _{eq}	1.3 dB

	A		C		Z	
	dB	Time Stamp	dB	Time Stamp	dB	Time Stamp
Leq	58.9					
LS(max)	85.3	2018/09/26 9:58:11				
LS(min)	49.1	2018/09/26 3:05:42				
LPeak(max)	108.9	2018/09/25 12:20:05				

Summary

File Name on Meter R3
File Name on PC SLM_0004285_LxT_Data_014.00.ldbin
Serial Number 0004285
Model SoundTrack LxT®
Firmware Version 2.302
User
Location Universal Hilton
Job Description
Note

Measurement

Description
Start 2018-09-25 08:59:30
Stop 2018-09-25 09:14:30
Duration 00:15:00.0
Run Time 00:15:00.0
Pause 00:00:00.0

Pre Calibration 2018-09-25 08:14:21
Post Calibration None
Calibration Deviation ---

Overall Settings

RMS Weight A Weighting
Peak Weight A Weighting
Detector Slow
Preamp PRMLxT2B
Microphone Correction Off
Integration Method Exponential
Overload 144.1 dB

	A	C	Z
Under Range Peak	100.3	97.3	102.3 dB
Under Range Limit	49.3	47.3	55.3 dB
Noise Floor	36.2	36.8	44.5 dB

Results

LASeq 62.1 dB
LASE 91.7 dB
EAS 162.801 $\mu\text{Pa}^2\text{h}$
EAS8 5.210 mPa^2h
EAS40 26.048 mPa^2h
LASpeak (max) 2018-09-25 09:04:21 88.6 dB
LASmax 2018-09-25 09:07:11 72.6 dB
LASmin 2018-09-25 09:00:18 58.1 dB
SEA -99.9 dB

LAS > 85.0 dB (Exceedance Counts / Duration) 0 0.0 s
LAS > 115.0 dB (Exceedance Counts / Duration) 0 0.0 s
LASpeak > 135.0 dB (Exceedance Counts / Duration) 0 0.0 s
LASpeak > 137.0 dB (Exceedance Counts / Duration) 0 0.0 s
LASpeak > 140.0 dB (Exceedance Counts / Duration) 0 0.0 s

LCSeq 69.6 dB
LASeq 62.1 dB
LCSeq - LASeq 7.5 dB
LAleq 63.1 dB
LAeq 62.1 dB
LAleq - LAeq 1.0 dB

Leq
LS(max)
LS(min)
LPeak(max)

A		C		Z	
dB	Time Stamp	dB	Time Stamp	dB	Time Stamp
62.1					
72.6	2018/09/25 9:07:11				
58.1	2018/09/25 9:00:18				
88.6	2018/09/25 9:04:21				

Summary

File Name on Meter	R4
File Name on PC	SLM_0004285_LxT_Data_015.00.ldbin
Serial Number	0004285
Model	SoundTrack LxT®
Firmware Version	2.302
User	
Location	Universal Hilton
Job Description	
Note	

Measurement

Description	
Start	2018-09-25 09:20:13
Stop	2018-09-25 09:35:13
Duration	00:15:00.0
Run Time	00:15:00.0
Pause	00:00:00.0
Pre Calibration	2018-09-25 08:14:21
Post Calibration	None
Calibration Deviation	---

Overall Settings

RMS Weight	A Weighting		
Peak Weight	A Weighting		
Detector	Slow		
Preamp	PRMLxT2B		
Microphone Correction	Off		
Integration Method	Exponential		
Overload	144.1 dB		
	A	C	Z
Under Range Peak	100.3	97.3	102.3 dB
Under Range Limit	49.3	47.3	55.3 dB
Noise Floor	36.2	36.8	44.5 dB

Results

LASeq	63.0 dB	
LASE	92.6 dB	
EAS	201.800 μPa²h	
EAS8	6.458 mPa²h	
EAS40	32.288 mPa²h	
LASpeak (max)	2018-09-25 09:23:09	94.0 dB
LASmax	2018-09-25 09:23:09	76.5 dB
LASmin	2018-09-25 09:31:04	59.2 dB
SEA	-99.9 dB	

LAS > 85.0 dB (Exceedance Counts / Duration)	0	0.0 s
LAS > 115.0 dB (Exceedance Counts / Duration)	0	0.0 s
LASpeak > 135.0 dB (Exceedance Counts / Duration)	0	0.0 s
LASpeak > 137.0 dB (Exceedance Counts / Duration)	0	0.0 s
LASpeak > 140.0 dB (Exceedance Counts / Duration)	0	0.0 s

LCSeq	73.3 dB
LASeq	63.0 dB
LCSeq - LASeq	10.2 dB
LALeq	64.5 dB
LAeq	63.0 dB
LALeq - LAeq	1.4 dB

	A		C		Z	
	dB	Time Stamp	dB	Time Stamp	dB	Time Stamp
Leq	63.0					
LS(max)	76.5	2018/09/25 9:23:09				
LS(min)	59.2	2018/09/25 9:31:04				
LPeak(max)	94.0	2018/09/25 9:23:09				

Summary						
File Name on Meter	R5					
File Name on PC	SLM_0004285_LxT_Data_017.00.ldbin					
Serial Number	0004285					
Model	SoundTrack LxT®					
Firmware Version	2.302					
User						
Location	Universal Hilton					
Job Description						
Note						
Measurement						
Description						
Start	2018-09-25 11:03:09					
Stop	2018-09-25 11:18:09					
Duration	00:15:00.0					
Run Time	00:15:00.0					
Pause	00:00:00.0					
Pre Calibration	2018-09-25 08:14:21					
Post Calibration	None					
Calibration Deviation	---					
Overall Settings						
RMS Weight	A Weighting					
Peak Weight	A Weighting					
Detector	Slow					
Preamp	PRMLxT2B					
Microphone Correction	Off					
Integration Method	Exponential					
Overload	144.1 dB					
	A		C		Z	
Under Range Peak	100.3		97.3		102.3	dB
Under Range Limit	49.3		47.3		55.3	dB
Noise Floor	36.2		36.8		44.5	dB
Results						
LASeq	61.9 dB					
LASE	91.4 dB					
EAS	153.215 µPa²h					
EAS8	4.903 mPa²h					
EAS40	24.514 mPa²h					
LASpeak (max)	2018-09-25 11:15:08		87.2		dB	
LASmax	2018-09-25 11:14:08		71.6		dB	
LASmin	2018-09-25 11:13:24		56.8		dB	
SEA	-99.9 dB					
LAS > 85.0 dB (Exceedance Counts / Duration)	0		0.0		s	
LAS > 115.0 dB (Exceedance Counts / Duration)	0		0.0		s	
LASpeak > 135.0 dB (Exceedance Counts / Duration)	0		0.0		s	
LASpeak > 137.0 dB (Exceedance Counts / Duration)	0		0.0		s	
LASpeak > 140.0 dB (Exceedance Counts / Duration)	0		0.0		s	
LCSeq	69.7 dB					
LASeq	61.9 dB					
LCSeq - LASeq	7.9 dB					
LAlaq	62.7 dB					
LAeq	61.9 dB					
LAlaq - LAeq	0.8 dB					
	A		C		Z	
	dB	Time Stamp	dB	Time Stamp	dB	Time Stamp
Leq	61.9					
LS(max)	71.6	2018/09/25 11:14:08				
LS(min)	56.8	2018/09/25 11:13:24				
LPeak(max)	87.2	2018/09/25 11:15:08				

2.2 Construction Noise Calculations

Universal Hilton
On-Site Construction Noise Summary

Construction Phase	Unmitigated												Mitigated											
	Hotel						Garage						Hotel						Garage					
	R1	R2	R3	R4	R5	R6	R1	R2	R3	R4	R5	R6	R1	R2	R3	R4	R5	R6	R1	R2	R3	R4	R5	R6
Demolition	75.1	49.8	62.8	65.1	62.0	78.3	74.5	47.7	61.2	64.2	61.3	62.0	52.1	26.8	39.8	42.1	39.0	70.3	51.5	24.7	38.2	41.2	38.3	54.0
Site Preparation	70.7	44.4	57.4	60.1	56.9	74.1							47.7	21.4	34.4	37.1	33.9	66.1						
Grading	72.2	47.1	60.2	62.3	59.3	75.3	73.3	50.0	63.1	65.9	63.1	63.1	49.2	24.1	37.2	39.3	36.3	67.3	50.3	27.0	40.1	42.9	40.1	55.1
Trenching	75.3	49.1	62.2	64.8	61.6	78.7							52.3	26.1	39.2	41.8	38.6	70.7						
Foundations	79.3	56.7	67.0	69.3	66.2	83.7	70.9	45.8	59.0	62.0	59.1	59.5	56.3	33.7	44.0	46.3	43.2	75.7	47.9	22.8	36.0	39.0	36.1	51.5
Building Construction	75.6	50.1	63.1	65.6	62.4	78.9	73.0	47.1	60.5	63.5	60.6	61.2	52.6	27.1	40.1	42.6	39.4	70.9	50.0	24.1	37.5	40.5	37.6	53.2
Paving	74.9	49.8	62.9	65.2	62.0	78.1	72.9	47.1	60.5	63.5	60.6	61.0	51.9	26.8	39.9	42.2	39.0	70.1	49.9	24.1	37.5	40.5	37.6	53.0
Architectural Coating	66.0	46.9	53.7	56.2	53.0	78.1	65.1	37.8	51.4	54.5	51.5	52.4	43.0	23.9	30.7	33.2	30.0	70.1	42.1	14.8	28.4	31.5	28.5	44.4
Overlaps	80.7	57.5	68.4	70.7	67.6	84.7	75.3	51.4	64.5	67.4	64.6	64.6	57.7	34.5	45.4	47.7	44.6	76.7	52.3	28.4	41.5	44.4	41.6	41.6
Overlaps	77.1	51.3	64.3	66.8	63.6	80.3	73.7	47.6	61.0	64.1	61.1	61.8	62.1	28.3	41.3	43.8	40.6	72.3	58.7	24.6	38.0	41.1	38.1	53.8

Overlapping Phases	R1	R2	R3	R4	R5	R6
Demo (Hotel) + Demo (Garage)	77.9	51.8	65.1	67.7	64.7	78.4
Demo (Hotel) + Grading (Garage)	77.3	52.9	66.0	68.5	65.6	78.4
Site Prep (Hotel) + Grading (Garage)	75.2	51.1	64.1	66.9	64.0	74.4
Grading (Hotel) + Trenching (Hotel) + Grading (Garage)	78.6	53.7	66.8	69.4	66.4	80.4
Grading (Hotel) + Trenching (Hotel) + Grading (Garage) +	79.3	54.3	67.4	70.1	67.1	80.4
Grading (Hotel) + Trenching (Hotel) + Foundations (Garage)	78.0	52.3	65.4	68.0	64.9	80.4
Foundations (Hotel) + Paving (Hotel) + Building Construction (Hotel)	81.3	57.9	69.1	71.5	68.4	84.8
Building Construction (Hotel) + Building Construction (Garage)	77.8	52.0	65.2	67.9	64.8	79.0
Building Construction (Hotel) + Paving (Garage)	77.5	51.9	65.0	67.6	64.6	79.0
Maximum Noise Level	81.3	57.9	69.1	71.5	68.4	84.8
Ambient Daytime Noise Level	59.6	57.7	62.1	63.0	61.9	59.6
Threshold (Ambient + 5 dbA)	64.6	62.7	67.1	68	66.9	64.6
Exceeds Threshold?	Yes	No	Yes	Yes	Yes	Yes
	16.7	-4.8	2.0	3.5	1.5	20.2

Mitigated

Park Zone	R1 (Upper Levels)	R1 (Lower Levels)	R2	R3	R4	R5	R6
Demo (Hotel) + Demo (Garage)	69.9	54.9	43.8	57.1	59.7	56.7	70.4
Demo (Hotel) + Grading (Garage)	69.3	54.3	44.9	58.0	60.5	57.6	70.4
Site Prep (Hotel) + Grading (Garage)	67.2	52.2	43.1	56.1	58.9	56.0	66.4
Grading (Hotel) + Trenching (Hotel) + Grading (Garage)	70.6	55.6	45.7	58.8	61.4	58.4	72.4
Grading (Hotel) + Trenching (Hotel) + Grading (Garage) +	71.3	56.3	46.3	59.4	62.1	59.1	72.4
Grading (Hotel) + Trenching (Hotel) + Foundations (Garage)	70.0	55.0	44.3	57.4	60.0	56.9	72.4
Foundations (Hotel) + Paving (Hotel) + Building Construction (Hotel)	73.3	58.3	49.9	61.1	63.5	60.4	76.8
Building Construction (Hotel) + Building Construction (Garage)	69.8	54.8	44.0	57.2	59.9	56.8	71.0
Building Construction (Hotel) + Paving (Garage)	69.5	54.5	43.9	57.0	59.6	56.6	71.0
Maximum Noise Level	73.3	58.3	49.9	61.1	63.5	60.4	76.8
Ambient Daytime Noise Level	59.6	59.6	57.7	62.1	63.0	61.9	59.6
Threshold (Ambient + 5 dbA)	64.6	64.6	62.7	67.1	68	66.9	64.6
Exceeds Threshold?	Yes	No	No	No	No	No	Yes
	8.7	-6.3	-12.8	-6.0	-4.5	-6.5	12.2

Project: Universal Hilton - Hotel
Construction Noise Impact on Sensitive Receptors

Parameters		
Construction Hours:	8	Daytime hours (7 am to 7 pm)
	0	Evening hours (7 pm to 10 pm)
	5	Nighttime hours (10 pm to 7 am)
Leq to L10 factor		5

Construction Phase				R1				R2				R3				R4				R5				R6									
Equipment Type	No. of Equip.	Reference Noise Level at 50m, Lmax	Acoustical Usage Factor	Distance (m)	Lmax	Leq	L10	Distance (m)	Lmax	Leq	L11	Distance (m)	Lmax	Leq	L12	Distance (m)	Lmax	Leq	L13	Distance (m)	Lmax	Leq	L14	Distance (m)	Lmax	Leq	L16						
Demolition																																	
Compressor (air)	1	80	40%	620	58	54	57	0	2200	37	33	36	10	1500	50	46	49	0	1450	51	47	50	0	1900	48	44	47	0	200	58	54	57	10
Compressor (air)	2	80	40%	450	61	57	60	0	1900	41	37	40	10	1350	53	50	53	0	1000	56	53	56	0	1500	53	49	52	0	100	67	63	66	10
Concrete Saw	1	90	20%	190	78	71	74	0	1550	50	43	46	10	1100	63	56	59	0	760	66	59	62	0	1100	63	56	59	0	40	82	75	78	10
Concrete Saw	1	90	20%	450	71	64	67	0	1900	48	41	44	10	1350	61	54	57	0	1000	64	57	60	0	1500	60	53	56	0	100	74	67	70	10
Concrete Saw	1	90	20%	620	68	61	64	0	2200	47	40	43	10	1500	60	53	56	0	1450	61	54	57	0	1900	58	51	54	0	200	68	61	64	10
Tractor	1	84	40%	190	72	68	71	0	1550	44	40	43	10	1100	57	53	56	0	760	60	56	59	0	1100	57	53	56	0	40	76	72	75	10
Generator	1	82	50%	450	63	60	63	0	1900	40	37	40	10	1350	53	50	53	0	1000	56	53	56	0	1500	52	49	52	0	100	66	63	66	10
Jackhammer	2	85	20%	620	66	59	62	0	2200	45	38	41	10	1500	58	51	54	0	1450	59	52	55	0	1900	56	49	52	0	200	66	59	62	10
Vacuum Street Sweeper	1	80	10%	450	61	51	54	0	1900	38	28	31	10	1350	51	41	44	0	1000	54	44	47	0	1500	50	40	43	0	100	64	54	57	10
Tractor/Loader/Backhoe	1	80	40%	190	68	64	67	0	1550	40	36	39	10	1100	53	49	52	0	760	56	52	55	0	1100	53	49	52	0	40	72	68	71	10
Tractor/Loader/Backhoe	2	80	40%	450	64	60	63	0	1900	41	37	40	10	1350	54	50	53	0	1000	57	53	56	0	1500	53	49	52	0	100	67	63	66	10
Tractor/Loader/Backhoe	1	80	40%	620	61	57	60	0	2200	38	34	37	10	1350	51	47	50	0	1450	54	50	53	0	1900	51	47	50	0	200	61	57	60	10
Dump Truck	1	84	40%	620	62	58	61	0	2200	41	37	40	10	1500	54	50	53	0	1450	55	51	54	0	1900	52	48	51	0	200	62	58	61	10
Site Preparation																																	
Compressor (air)	1	80	40%	620	58	54	57	0	2200	37	33	36	10	1500	50	46	49	0	1450	51	47	50	0	1900	48	44	47	0	200	58	54	57	10
Tractor	1	84	40%	190	72	68	71	0	1550	44	40	43	10	1100	57	53	56	0	760	60	56	59	0	1100	57	53	56	0	40	76	72	75	10
Generator	1	82	50%	450	63	60	63	0	1900	40	37	40	10	1350	53	50	53	0	1000	56	53	56	0	1500	52	49	52	0	100	66	63	66	10
Vacuum Street Sweeper	1	80	10%	620	58	48	51	0	2200	37	27	30	10	1500	50	40	43	0	1450	51	41	44	0	1900	48	38	41	0	200	58	48	51	10
Tractor/Loader/Backhoe	1	80	40%	190	68	64	67	0	1550	40	36	39	10	1100	53	49	52	0	760	56	52	55	0	1100	53	49	52	0	40	72	68	71	10
Tractor/Loader/Backhoe	1	80	40%	450	61	57	60	0	1900	38	34	37	10	1350	51	47	50	0	1000	54	50	53	0	1500	50	46	49	0	100	64	60	63	10
Tractor/Loader/Backhoe	1	80	40%	620	58	54	57	0	2200	37	33	36	10	1500	50	46	49	0	1450	51	47	50	0	1900	48	44	47	0	200	58	54	57	10
Dump Truck	1	84	40%	620	62	58	61	0	2200	41	37	40	10	1500	54	50	53	0	1450	55	51	54	0	1900	52	48	51	0	200	62	58	61	10
Grading																																	
Tractor	1	84	40%	620	62	58	61	0	2200	41	37	40	10	1500	54	50	53	0	1450	55	51	54	0	1900	52	48	51	0	200	62	58	61	10
Tractor	1	84	40%	450	65	61	64	0	1900	42	38	41	10	1350	55	51	54	0	1000	58	54	57	0	1500	54	50	53	0	100	68	64	67	10
Excavator	1	85	20%	190	73	69	72	0	1550	46	41	44	10	1100	58	54	57	0	760	61	57	60	0	1100	58	54	57	0	40	77	73	76	10
Generator	1	82	50%	620	60	57	60	0	2200	39	36	39	10	1500	52	49	52	0	1450	53	50	53	0	1900	50	47	50	0	200	60	57	60	10
Generator (ground)	1	80	20%	620	61	54	57	0	2200	40	32	36	10	1500	53	46	49	0	1450	54	47	50	0	1900	51	44	47	0	200	61	54	57	10
Roller	1	85	20%	450	66	59	62	0	1900	43	36	39	10	1350	56	49	52	0	1000	59	52	55	0	1500	55	48	51	0	100	69	62	65	10
Front End Loader	1	80	40%	190	68	64	67	0	1550	40	36	39	10	1100	53	49	52	0	760	56	52	55	0	1100	53	49	52	0	40	72	68	71	10
Vacuum Street Sweeper	1	80	10%	450	61	51	54	0	1900	38	28	31	10	1350	51	41	44	0	1000	54	44	47	0	1500	50	40	43	0	100	64	54	57	10
Tractor/Loader/Backhoe	1	80	40%	190	68	64	67	0	1550	40	36	39	10	1100	53	49	52	0	760	56	52	55	0	1100	53	49	52	0	40	72	68	71	10
Tractor/Loader/Backhoe	2	80	40%	620	61	57	60	0	2200	40	36	39	10	1500	53	49	52	0	1450	54	50	53	0	1900	51	47	50	0	200	61	57	60	10
Tractor/Loader/Backhoe	1	80	40%	450	61	57	60	0	1900	38	36	39	10	1350	53	52	55	0	1450	54	50	53	0	1900	51	47	50	0	200	61	57	60	10
Trenching																																	
Compressor (air)	1	80	40%	620	58	54	57	0	2200	37	33	36	10	1500	50	46	49	0	1450	51	47	50	0	1900	48	44	47	0	200	58	54	57	10
Drum Mixer	1	80	50%	450	61	58	61	0	1900	38	35	38	10	1350	51	48	51	0	1000	54	51	54	0	1500	50	47	50	0	100	64	61	64	10
Concrete Saw	1	90	20%	190	78	71	74	0	1550	50	43	46	10	1100	63	56	59	0	760	66	59	62	0	1100	63	56	59	0	40	82	75	78	10
Concrete Saw	1	90	20%	450	71	64	67	0	1900	48	41	44	10	1350	61	54	57	0	1000	64	57	60	0	1500	60	53	56	0	100	74	67	70	10
Dump Truck	1	84	40%	620	62	58	61	0	2200	41	37	40	10	1500	54	50	53	0	1450	55	51	54	0	1900	52	48	51	0	200	62	58	61	10
Forklift	1	85	10%	450	56	46	49	0	1900	43	23	26	10	1350	48	36	39	0	1000	49	39	42	0	1500	45	35	38	0	100	59	49	52	10
Generator	1	82	50%	190	70	67	70	0	1550	42	39	42	10	1100	55	52	55	0	760	58	55	58	0	1100	55	52	55	0	40	74	71	74	10
Jackhammer	2	85	20%	450	69	62	65	0	1900	46	39	42	10	1350	59	52	55	0	1000	62	55	58	0	1500	58	51	54	0	100	72	65	68	10
Generator (ground)	2	80	20%	620	63	54	57	0	2200	40	33	36	10	1500	53	46	49	0	1450	54	47	50	0	1900	51	44	47	0	200	61	54	57	10
Tractor/Loader/Backhoe	1	80	40%	450	61	57	60	0	1900	38	34	37	10	1350	51	47	50	0	1000	54	50	53	0	1500	50	46	49	0	100	64	60	63	10
Tractor/Loader/Backhoe	1	80	40%	190	68	64	67	0	1550	40	36	39	10	1100	53	49	52	0	760	56	52	55	0	1100	53	49	52	0	40	72	68	71	10
Tractor/Loader/Backhoe	1	80	40%	450	58	54	57	0	2200	37	33	36	10	1500	50	46	49	0	1450	51	47	50	0	1900	48	44	47	0	200	58	54	57	10
Slurry Trenching Machine	1	82	50%	190	70	67	70	0	1550	42	39	42	10	1100	55	52	55	0	760	58	55	58	0	1100	55	52	55	0	40	74	71	74	10
Foundations																																	
Compressor (air)	1	80	40%	620	58	54	57	0	2200	37	33	36	10	1500	50	46	49	0	1450	51	47	50	0	1900	48	44	47	0	200	58	54	57	10
Compressor (air)	2	80	40%	450	61	57	60	0	1900	38	34	37	10	1350	51	47	50	0	1000	54	50	53	0	1500	50	46	49	0	100	64	60	63	10
V																																	

Project: Universal Hilton - Parking Garage
Construction Noise Impact on Sensitive Receptors

Parameters

Construction Hours:	8 Daytime hours (7 am to 7 pm) 0 Evening hours (7 pm to 10 pm) 0 Nighttime hours (10 pm to 7 am)
Leq to L10 factor	3

				R1					R2					R3					R4					R5					R6				
				Estimate ed Noise Shieldi ng, dBA					Estimate ed Noise Shieldi ng, dBA					Estimate ed Noise Shieldi ng, dBA					Estimate ed Noise Shieldi ng, dBA					Estimate ed Noise Shieldi ng, dBA									
Construction Phase	No. of Equip.	Reference Noise Level at 50ft, Lmax	Acoustical Usage Factor	Distance e (ft)	Lmax	Leq	L10	Distance e (ft)	Lmax	Leq	L11	Distance e (ft)	Lmax	Leq	L12	Distance e (ft)	Lmax	Leq	L13	Distance e (ft)	Lmax	Leq	L14	Distance (ft)	Lmax	Leq	L16						
Demolition																																	
Compressor (air)	1	80	40%	620	58	54	57	0	2100	38	34	37	10	1500	50	46	49	0	1100	53	49	52	0	1500	50	46	49	10					
Compressor (air)	1	80	40%	450	61	57	60	0	1900	38	34	37	10	1350	51	47	50	0	950	54	50	53	0	1300	52	48	51	10					
Concrete Saw	1	90	20%	190	78	71	74	0	1750	49	42	45	10	1100	63	56	59	0	760	66	59	62	0	1100	63	56	59	10					
Concrete Saw	1	90	20%	450	71	64	67	0	1900	48	41	44	10	1350	61	54	57	0	950	64	57	60	0	1300	62	55	58	10					
Jackhammer	1	85	20%	620	63	56	59	0	2100	43	36	39	10	1500	55	48	51	0	1100	58	51	54	0	1500	55	48	51	10					
Front End Loader	1	80	40%	190	68	64	67	0	1750	39	35	38	10	1100	53	49	52	0	760	56	52	55	0	1100	53	49	52	10					
Vacuum Street Sweeper	1	80	10%	450	61	51	54	0	1900	38	28	31	10	1350	51	41	44	0	950	54	44	47	0	1300	52	42	45	10					
Tractor/Loader/Backhoe	2	80	40%	620	61	57	60	0	2100	41	37	40	10	1500	53	49	52	0	1100	56	52	55	0	1500	53	49	52	10					
Tractor/Loader/Backhoe	1	80	40%	450	61	57	60	0	1900	38	34	37	10	1350	51	47	50	0	950	54	50	53	0	1300	52	48	51	10					
Dump Truck	1	84	40%	190	72	68	71	0	1750	43	39	42	10	1100	57	53	56	0	760	60	56	59	0	1100	57	53	56	10					
Grading																																	
Vibratory Pile Driver	2	95	20%	620	76	69	72	0	2100	56	49	52	10	1500	68	61	64	0	1100	71	64	67	0	1500	68	61	64	10					
Excavator	1	85	40%	190	73	69	72	0	1750	44	40	43	10	1100	58	54	57	0	760	61	57	60	0	1100	58	54	57	10					
Jackhammer	1	85	20%	450	66	59	62	0	1900	43	36	39	10	1350	56	49	52	0	950	59	52	55	0	1300	57	50	53	10					
Compactor (ground)	1	80	20%	620	58	51	54	0	2100	38	31	34	10	1500	50	43	46	0	1100	53	46	49	0	1500	50	43	46	10					
Pumps	1	77	50%	190	65	62	65	0	1750	36	33	36	10	1100	50	47	50	0	760	53	50	53	0	1100	50	47	50	10					
Vacuum Street Sweeper	1	80	10%	620	58	48	51	0	2100	38	28	31	10	1500	50	40	43	0	1100	53	43	46	0	1500	50	40	43	10					
Tractor/Loader/Backhoe	1	80	40%	450	61	57	60	0	1900	38	34	37	10	1350	51	47	50	0	950	54	50	53	0	1300	52	48	51	10					
Dump Truck	1	84	40%	450	65	61	64	0	1900	42	38	41	10	1350	55	51	54	0	950	58	54	57	0	1300	56	52	55	10					
Foundations																																	
Drum Mixer	2	80	50%	620	61	58	61	0	2100	41	38	41	10	1500	53	50	53	0	1100	56	53	56	0	1500	53	50	53	10					
Compressor (air)	2	80	40%	450	64	60	63	0	1900	41	37	40	10	1350	54	50	53	0	950	57	53	56	0	1300	55	51	54	10					
Crane	1	85	16%	190	73	65	68	0	1750	44	36	39	10	1100	58	50	53	0	760	61	53	56	0	1100	58	50	53	10					
Excavator	1	85	40%	620	63	59	62	0	2100	43	39	42	10	1500	55	51	54	0	1100	58	54	57	0	1500	55	51	54	10					
Jackhammer	1	85	20%	190	73	66	69	0	1750	44	37	40	10	1100	58	51	54	0	760	61	54	57	0	1100	58	51	54	10					
Generator	1	82	50%	620	60	57	60	0	2100	40	37	40	10	1500	52	49	52	0	1100	55	52	55	0	1500	52	49	52	10					
Pumps	1	77	50%	450	58	55	58	0	1900	35	32	35	10	1350	48	45	48	0	950	51	48	51	0	1300	49	46	49	10					
Forklift	2	75	10%	190	66	56	59	0	1750	37	27	30	10	1100	51	41	44	0	760	54	44	47	0	1100	51	41	44	10					
Front End Loader	1	80	40%	450	61	57	60	0	1900	38	34	37	10	1350	51	47	50	0	950	54	50	53	0	1300	52	48	51	10					
Vacuum Street Sweeper	1	80	10%	450	61	51	54	0	1900	38	28	31	10	1350	51	41	44	0	950	54	44	47	0	1300	52	42	45	10					
Building Construction																																	
Compressor (air)	2	80	40%	620	61	57	60	0	2100	41	37	40	10	1500	53	49	52	0	1100	56	52	55	0	1500	53	49	52	10					
Drum Mixer	2	80	50%	450	64	61	64	0	1900	41	38	41	10	1350	54	51	54	0	950	57	54	57	0	1300	55	52	55	10					
Concrete Saw	1	90	20%	190	78	71	74	0	1750	49	42	45	10	1100	63	56	59	0	760	66	59	62	0	1100	63	56	59	10					
Concrete Saw	1	90	20%	450	71	64	67	0	1900	48	41	44	10	1350	61	54	57	0	950	64	57	60	0	1300	62	55	58	10					
Crane	1	85	16%	620	63	55	58	0	2100	43	35	38	10	1500	55	47	50	0	1100	58	50	53	0	1500	55	47	50	10					
Pumps	2	77	50%	450	61	58	61	0	1900	38	35	38	10	1350	51	48	51	0	950	54	51	54	0	1300	52	49	52	10					
Forklift	2	75	10%	190	66	56	59	0	1750	37	27	30	10	1100	51	41	44	0	760	54	44	47	0	1100	51	41	44	10					
Front End Loader	1	80	40%	450	61	57	60	0	1900	38	34	37	10	1350	51	47	50	0	950	54	50	53	0	1300	52	48	51	10					
Vacuum Street Sweeper	1	80	10%	620	58	48	51	0	2100	38	28	31	10	1500	50	40	43	0	1100	53	43	46	0	1500	50	40	43	10					
Paving																																	
Concrete Saw	1	90	20%	620	68	61	64	0	2100	48	41	44	10	1500	60	53	56	0	1100	63	56	59	0	1500	60	53	56	10					
Concrete Saw	1	90	20%	190	78	71	74	0	1750	49	42	45	10	1100	63	56	59	0	760	66	59	62	0	1100	63	56	59	10					
Paver	1	85	50%	450	66	63	66	0	1900	43	40	43	10	1350	56	53	56	0	950	59	56	59	0	1300	57	54	57	10					
Compactor (ground)	1	80	20%	450	61	54	57	0	1900	38	31	34	10	1350	51	44	47	0	950	54	47	50	0	1300	52	45	48	10					
Roller	1	85	60%	620	63	56	59	0	2100	43	36	39	10	1500	55	48	51	0	1100	58	51	54	0	1500	55	48	51	10					
Front End Loader	1	80	40%	190	68	64	67	0	1750	39	35	38	10	1100	53	49	52	0	760	56	52	55	0	1100	53	49	52	10					
Front End Loader	1	80	40%	620	58	54	57	0	2100	38	34	37	10	1500	50	46	49	0	1100	53	49	52	0	1500	50	46	49	10					
Vacuum Street Sweeper	1	80	10%	450	61	51	54	0	1900	38	28	31	10	1350	51	41	44	0	950	54	44	47	0	1300	52	42	45	10					
Tractor/Loader/Backhoe	1	80	40%	620	58	54	57	0	2100	38	34	37	10	1500	50	46	49	0	1100	53	49	52	0	1500	50	46	49	10					
Architectural Coating																																	
Compressor (air)	1	80	40%	190	68	64	67	0	1750	39	35	38	10	1100	53	49	52	0	760	56	52	55	0	1100	53	49	52	10					
Compressor (air)	1	80	40%	450	61	57	60	0	1900	38	34	37	10	1350	51	47	50	0	950	54	50	53	0	1300	52	48	51	10					

Universal Hilton Project
Vibration Level Calculations
Based on Federal Transit Administration, Office of Planning and Environment

N = 1.5

Construction Equipment	Project Equipment	Equipment Peak Particle Velocity @ 25 Feet* (inches/second)	Distance to Receptor for < 0.5 PPV (Feet)	Estimated Velocity Decibels @ Distance** (VdB)	Estimated Peak Particle Velocity @ Distance*** (inches/second)
Unmitigated Vibration Levels					
Sheraton Parking Garage					
Pile Driving*	Yes	0.170	100	74.5	0.021
Large Bulldozer or Bore/Drill Rig	Yes	0.089	30	84.6	0.068
Loaded Trucks	Yes	0.076	30	83.2	0.058
Jackhammer	Yes	0.035	30	76.5	0.027
Small Bulldozer	Yes	0.003	30	55.1	0.002
Sheraton Hotel					
Pile Driving*	Yes	0.170	200	65.5	0.008
Large Bulldozer or Bore/Drill Rig	Yes	0.089	200	59.9	0.004
Loaded Trucks	Yes	0.076	200	58.5	0.003
Jackhammer	Yes	0.035	200	51.7	0.002
Small Bulldozer	Yes	0.003	200	30.4	0.000
Existing Hotel Building					
Pile Driving*	Yes	0.170	40	86.4	0.084
Large Bulldozer or Bore/Drill Rig	Yes	0.089	40	80.8	0.044
Loaded Trucks	Yes	0.076	40	79.5	0.038
Jackhammer	Yes	0.035	40	72.7	0.017
Small Bulldozer	Yes	0.003	40	51.4	0.001

Source:

Federal Transit Administration, *Transit Noise and Vibration Impact Assessment Manual*, 2018.

Notes:

* Values taken from Table 7-4.

** Based on the formula $VdB = 20 \times \log_{10} (v/v_{ref})$, where v_{ref} is equal to 1×10^{-6} in/sec (see page 111).

The approximate rms vibration velocity level (v) is calculated from PPV using a crest factor of 4 (see page 184).

*** Based on the formula $PPV(D) = PPV(25 \text{ ft}) \times (25/D)^N$, where D is equal to the distance (see page 185).

N = soil type classification factor (typically ranges from 1 to 1.5)

* Pile driving has been assumed for the construction of the Hotel Expansion Building. It is not anticipated at pile driving is required for the Junior Ballroom/Meeting Room building.

2.3 Off-Site Traffic Noise Calculations

Universal Hilton Traffic Noise Summary Tables
Existing plus Project

Roadway Segment	Existing Land Uses Located Along Roadway Segment	Traffic Noise Levels (dBA CNEL)			Significant Impact?
		Existing	Existing with Project	Increase over Existing	
Barham Blvd n/o Cahuenga Blvd E	Single-Family Residential/Multi-Family Residential	75.8	75.8	0.0	No
Barham Blvd s/o Cahuenga Blvd E	Commercial	73.8	73.8	0.0	No
Cahuenga Blvd between Lankershim Blvd and Regal Pl	Commercial	74.1	74.1	0.0	No
Cahuenga Blvd between Regal Pl and Universal Studios Blvd	Commercial/Religious	72.9	72.9	0.0	No
Cahuenga Blvd E e/o Barham Blvd	Single-Family Residential	72.8	72.8	0.0	No
Cahuenga Blvd W e/o Universal Studios Blvd	Commercial/Educational	70.7	70.7	0.0	No
Cahuenga Blvd w/o Lankershim Blvd	Commercial/Hotel	72.1	72.1	0.0	No
Campo de Cahuenga Way between MTA Driveway and Lankershim Blvd	Public Transit	68.0	68.1	0.2	No
Campo de Cahuenga Way between US 101 NB/SB On/Off Ramp and MTA Driveway	Freeway Underpass	68.4	68.5	0.2	No
Campo de Cahuenga Way w/o US 101 NB/SB On/Off Ramp	Commercial/Single-Family Residential	68.2	68.3	0.1	No
Lankershim Blvd between Universal Hollywood Dr and US 101 NB Off Ramp	Commercial	71.0	71.1	0.1	No
Lankershim Blvd between US 101 NB Off Ramp and Cahuenga Blvd	Commercial	70.2	70.2	0.1	No
Lankershim Blvd n/o Universal Hollywood Dr	Commercial/Multi-family Residential	72.5	72.5	0.1	No
Lankershim Blvd s/o Cahuenga Blvd	Commercial/Single-Family Residential	63.1	63.1	0.0	No
MTA Driveway n/o Campo de Cahuenga Way	Commercial	59.7	59.7	0.0	No
MTA Driveway s/o Campo de Cahuenga Way	Commercial	51.5	51.5	0.0	No
Regal Pl n/o Cahuenga Blvd	Freeway On/Off Ramp	69.5	69.6	0.1	No
Regal Pl s/o Cahuenga Blvd	Commercial/Single-Family Residential/Multi-Family Residential	62.5	62.5	0.0	No
Universal Hollywood Dr between Lankershim Blvd and Hilton Driveway	Hotel/Theme Park/Commercial	70.7	71.2	0.5	No
Universal Hollywood Dr s/o Hilton Driveway	Hotel/Theme Park/Commercial	65.5	65.8	0.3	No
Universal Studios Blvd between US 101 SB On Ramp and Cahuenga Blvd W	Commercial	66.3	66.4	0.1	No
Universal Studios Blvd between W.C. Fields Dr and US 101 SB On Ramp	Commercial	68.5	68.6	0.1	No
Universal Studios Blvd n/o W.C. Fields Dr	Commercial	64.5	64.5	0.0	No
US 101 NB Off Ramp e/o Lankershim Blvd	Freeway On/Off Ramp	70.0	70.1	0.1	No
US 101 NB/SB On/Off Ramp n/o Campo de Cahuenga Way	Freeway On/Off Ramp	71.3	71.4	0.1	No
US 101 NB/SB On/Off Ramp s/o Campo de Cahuenga Way	Freeway On/Off Ramp	67.6	67.6	0.0	No
US 101 SB On Ramp e/o Universal Studios Blvd	Freeway On/Off Ramp	67.2	67.4	0.2	No
W.C. Fields Dr between Universal Studios Blvd and Barham Blvd	Commercial/Single-Family Residential/Open Space	68.2	68.4	0.2	No
W.C. Fields Dr w/o Universal Studios Blvd	Commercial/Hotel	66.8	67.4	0.6	No

Universal Hilton Traffic Noise Summary Tables
Cumulative Year plus Project

Roadway Segment	Existing Land Uses Located Along Roadway Segment	Traffic Noise Levels (dBA CNEL)		Significant Impact?
		Cumulative Year	Cumulative Year with Project	
Barham Blvd n/o Cahuenga Blvd E	Single-Family Residential/Multi-Family Residential	76.2	76.2	No
Barham Blvd s/o Cahuenga Blvd E	Commercial	74.2	74.2	No
Cahuenga Blvd between Lankershim Blvd and Regal PI	Commercial	74.7	74.7	No
Cahuenga Blvd between Regal PI and Universal Studios Blvd	Commercial/Religious	73.5	73.5	No
Cahuenga Blvd E e/o Barham Blvd	Single-Family Residential	73.2	73.2	No
Cahuenga Blvd W e/o Universal Studios Blvd	Commercial/Educational	71.7	71.5	No
Cahuenga Blvd w/o Lankershim Blvd	Commercial/Hotel	72.6	72.6	No
Campo de Cahuenga Way between MTA Driveway and Lankershim Blvd	Public Transit	69.3	69.4	No
Campo de Cahuenga Way between US 101 NB/SB On/Off Ramp and MTA Driveway	Freeway Underpass	69.6	69.7	No
Campo de Cahuenga Way w/o US 101 NB/SB On/Off Ramp	Commercial/Single-Family Residential	68.9	69.0	No
Lankershim Blvd between Universal Hollywood Dr and US 101 NB Off Ramp	Commercial	72.0	72.1	No
Lankershim Blvd between US 101 NB Off Ramp and Cahuenga Blvd	Commercial	70.9	70.9	No
Lankershim Blvd n/o Universal Hollywood Dr	Commercial/Multi-family Residential	73.3	73.4	No
Lankershim Blvd s/o Cahuenga Blvd	Commercial/Single-Family Residential	63.7	63.7	No
MTA Driveway n/o Campo de Cahuenga Way	Commercial	60.0	60.0	No
MTA Driveway s/o Campo de Cahuenga Way	Commercial	51.7	51.7	No
Regal PI n/o Cahuenga Blvd	Freeway On/Off Ramp	70.0	70.1	No
Regal PI s/o Cahuenga Blvd	Commercial/Single-Family Residential/Multi-Family Residential	63.2	63.2	No
Universal Hollywood Dr between Lankershim Blvd and Hilton Driveway	Hotel/Theme Park/Commercial	72.2	72.6	No
Universal Hollywood Dr s/o Hilton Driveway	Hotel/Theme Park/Commercial	68.5	68.6	No
Universal Studios Blvd between US 101 SB On Ramp and Cahuenga Blvd W	Commercial	67.1	66.4	No
Universal Studios Blvd between W.C. Fields Dr and US 101 SB On Ramp	Commercial	69.6	69.7	No
Universal Studios Blvd n/o W.C. Fields Dr	Commercial	65.7	65.7	No
US 101 NB Off Ramp e/o Lankershim Blvd	Freeway On/Off Ramp	71.6	71.6	No
US 101 NB/SB On/Off Ramp n/o Campo de Cahuenga Way	Freeway On/Off Ramp	72.2	72.3	No
US 101 NB/SB On/Off Ramp s/o Campo de Cahuenga Way	Freeway On/Off Ramp	67.9	67.9	No
US 101 SB On Ramp e/o Universal Studios Blvd	Freeway On/Off Ramp	68.9	69.0	No
W.C. Fields Dr between Universal Studios Blvd and Barham Blvd	Commercial/Single-Family Residential/Open Space	68.5	68.6	No
W.C. Fields Dr w/o Universal Studios Blvd	Commercial/Hotel	67.1	67.7	No

Universal Hilton Traffic Noise Summary Tables
Existing plus Cumulative Year with Project

		Traffic Noise Levels (dBA CNEL)				
	Existing Land Uses Located Along Roadway Segment	Existing	Cumulative Year with Project	Increase over Existing	Significant Impact?	Project Increment
Roadway Segment						
Barham Blvd n/o Cahuenga Blvd E	Single-Family Residential/Multi-Family Residential	75.8	76.2	0.4	No	0.0
Barham Blvd s/o Cahuenga Blvd E	Commercial	73.8	74.2	0.4	No	0.0
Cahuenga Blvd between Lankershim Blvd and Regal Pl	Commercial	74.1	74.7	0.6	No	0.0
Cahuenga Blvd between Regal Pl and Universal Studios Blvd	Commercial/Religious	72.9	73.5	0.6	No	0.0
Cahuenga Blvd E e/o Barham Blvd	Single-Family Residential	72.8	73.2	0.5	No	0.0
Cahuenga Blvd W e/o Universal Studios Blvd	Commercial/Educational	70.7	71.5	0.8	No	0.0
Cahuenga Blvd w/o Lankershim Blvd	Commercial/Hotel	72.1	72.6	0.5	No	0.0
Campo de Cahuenga Way between MTA Driveway and Lankershim Blvd	Public Transit	68.0	69.4	1.4	No	0.2
Campo de Cahuenga Way between US 101 NB/SB On/Off Ramp and MT	Freeway Underpass	68.4	69.7	1.3	No	0.2
Campo de Cahuenga Way w/o US 101 NB/SB On/Off Ramp	Commercial/Single-Family Residential	68.2	69.0	0.8	No	0.1
Lankershim Blvd between Universal Hollywood Dr and US 101 NB Off Ra	Commercial	71.0	72.1	1.1	No	0.1
Lankershim Blvd between US 101 NB Off Ramp and Cahuenga Blvd	Commercial	70.2	70.9	0.8	No	0.1
Lankershim Blvd n/o Universal Hollywood Dr	Commercial/Multi-family Residential	72.5	73.4	0.9	No	0.1
Lankershim Blvd s/o Cahuenga Blvd	Commercial/Single-Family Residential	63.1	63.7	0.6	No	0.0
MTA Driveway n/o Campo de Cahuenga Way	Commercial	59.7	60.0	0.3	No	0.0
MTA Driveway s/o Campo de Cahuenga Way	Commercial	51.5	51.7	0.3	No	0.0
Regal Pl n/o Cahuenga Blvd	Freeway On/Off Ramp	69.5	70.1	0.6	No	0.1
Regal Pl s/o Cahuenga Blvd	Commercial/Single-Family Residential/Multi-Family Residential	62.5	63.2	0.8	No	0.0
Universal Hollywood Dr between Lankershim Blvd and Hilton Driveway	Hotel/Theme Park/Commercial	70.7	72.6	1.9	No	0.5
Universal Hollywood Dr s/o Hilton Driveway	Hotel/Theme Park/Commercial	65.5	68.6	3.1	No	0.3
Universal Studios Blvd between US 101 SB On Ramp and Cahuenga Blv	Commercial	66.3	66.4	0.1	No	0.1
Universal Studios Blvd between W.C. Fields Dr and US 101 SB On Ram	Commercial	68.5	69.7	1.2	No	0.1
Universal Studios Blvd n/o W.C. Fields Dr	Commercial	64.5	65.7	1.1	No	0.0
US 101 NB Off Ramp e/o Lankershim Blvd	Freeway On/Off Ramp	70.0	71.6	1.6	No	0.1
US 101 NB/SB On/Off Ramp n/o Campo de Cahuenga Way	Freeway On/Off Ramp	71.3	72.3	0.9	No	0.1
US 101 NB/SB On/Off Ramp s/o Campo de Cahuenga Way	Freeway On/Off Ramp	67.6	67.9	0.3	No	0.0
US 101 SB On Ramp e/o Universal Studios Blvd	Freeway On/Off Ramp	67.2	69.0	1.8	No	0.2
W.C. Fields Dr between Universal Studios Blvd and Barham Blvd	Commercial/Single-Family Residential/Open Space	68.2	68.6	0.4	No	0.2
W.C. Fields Dr w/o Universal Studios Blvd	Commercial/Hotel	66.8	67.7	0.9	No	0.6

TRAFFIC NOISE ANALYSIS TOOL



Project Name: Universal Hilton
 Analysis Scenario: Existing
 Source of Traffic Volumes: Linscott, Law, & Greenspan

Segment	Ground Type	Distance from Roadway to Receiver (feet)	Speed (mph)			Peak Hour Volume			Peak Hour Noise Level (Leq(h) dBA)	Noise Level dBA CNEL
			Auto	MT	HT	Auto	MT	HT		
Barham Blvd n/o Cahuenga Blvd E	Hard	30	40	40	35	4802	99	50	75.5	75.8
Barham Blvd s/o Cahuenga Blvd E	Hard	30	40	40	35	3042	63	31	73.5	73.8
Cahuenga Blvd between Lankershim Blvd and Regal Pl	Hard	40	45	45	40	3084	64	32	73.8	74.1
Cahuenga Blvd between Regal Pl and Universal Studios Blvd	Hard	40	45	45	40	2335	48	24	72.6	72.9
Cahuenga Blvd E e/o Barham Blvd	Hard	40	45	45	40	2262	47	23	72.5	72.8
Cahuenga Blvd W e/o Universal Studios Blvd	Hard	40	40	40	35	1975	41	20	70.4	70.7
Cahuenga Blvd w/o Lankershim Blvd	Hard	40	40	40	35	2731	56	28	71.8	72.1
Campo de Cahuenga Way between MTA Driveway and Lankershim Blvd	Hard	45	40	40	35	1181	24	12	67.7	68.0
Campo de Cahuenga Way between US 101 NB/SB On/Off Ramp and MTA Driveway	Hard	45	40	40	35	1293	27	13	68.1	68.4
Campo de Cahuenga Way w/o US 101 NB/SB On/Off Ramp	Hard	45	40	40	35	1253	26	13	67.9	68.2
Lankershim Blvd between Universal Hollywood Dr and US 101 NB Off Ramp	Hard	50	40	40	35	2654	55	27	70.7	71.0
Lankershim Blvd between US 101 NB Off Ramp and Cahuenga Blvd	Hard	50	40	40	35	2174	45	22	69.9	70.2
Lankershim Blvd n/o Universal Hollywood Dr	Hard	50	40	40	35	3715	77	38	72.2	72.5
Lankershim Blvd s/o Cahuenga Blvd	Hard	50	40	40	35	432	9	4	62.8	63.1
MTA Driveway n/o Campo de Cahuenga Way	Hard	25	30	30	25	201	4	2	59.4	59.7
MTA Driveway s/o Campo de Cahuenga Way	Hard	25	30	30	25	30	1	0	51.2	51.5
Regal Pl n/o Cahuenga Blvd	Hard	30	40	40	35	1116	23	12	69.2	69.5
Regal Pl s/o Cahuenga Blvd	Hard	20	45	45	40	106	2	1	62.2	62.5
Universal Hollywood Dr between Lankershim Blvd and Hilton Driveway	Hard	40	45	45	40	1394	29	14	70.4	70.7
Universal Hollywood Dr s/o Hilton Driveway	Hard	35	35	35	30	754	16	8	65.2	65.5
Universal Studios Blvd between US 101 SB On Ramp and Cahuenga Blvd W	Hard	55	40	40	35	986	20	10	66.0	66.3
Universal Studios Blvd between W.C. Fields Dr and US 101 SB On Ramp	Hard	55	40	40	35	1641	34	17	68.2	68.5
Universal Studios Blvd n/o W.C. Fields Dr	Hard	55	30	30	25	1339	28	14	64.2	64.5
US 101 NB Off Ramp e/o Lankershim Blvd	Hard	20	40	40	35	840	17	9	69.7	70.0
US 101 NB/SB On/Off Ramp n/o Campo de Cahuenga Way	Hard	20	40	40	35	1135	23	12	71.0	71.3
US 101 NB/SB On/Off Ramp s/o Campo de Cahuenga Way	Hard	20	40	40	35	478	10	5	67.3	67.6
US 101 SB On Ramp e/o Universal Studios Blvd	Hard	20	40	40	35	441	9	5	66.9	67.2
W.C. Fields Dr between Universal Studios Blvd and Barham Blvd	Hard	25	40	40	35	700	14	7	67.9	68.2
W.C. Fields Dr w/o Universal Studios Blvd	Hard	25	40	40	35	504	10	5	66.5	66.8

TRAFFIC NOISE ANALYSIS TOOL



Project Name: Universal Hilton
 Analysis Scenario: Existing + Project
 Source of Traffic Volumes: Linscott, Law, & Greenspan

Segment	Ground Type	Distance from Roadway to Receiver (feet)	Speed (mph)			Peak Hour Volume			Peak Hour Noise Level (Leq(h) dBA)	Noise Level dBA CNEL
			Auto	MT	HT	Auto	MT	HT		
Barham Blvd n/o Cahuenga Blvd E	Hard	30	40	40	35	4828	100	50	75.5	75.8
Barham Blvd s/o Cahuenga Blvd E	Hard	30	40	40	35	3053	63	31	73.5	73.8
Cahuenga Blvd between Lankershim Blvd and Regal Pl	Hard	40	45	45	40	3103	64	32	73.8	74.1
Cahuenga Blvd between Regal Pl and Universal Studios Blvd	Hard	40	45	45	40	2335	48	24	72.6	72.9
Cahuenga Blvd E e/o Barham Blvd	Hard	40	45	45	40	2271	47	23	72.5	72.8
Cahuenga Blvd W e/o Universal Studios Blvd	Hard	40	40	40	35	1992	41	21	70.4	70.7
Cahuenga Blvd w/o Lankershim Blvd	Hard	40	40	40	35	2737	56	28	71.8	72.1
Campo de Cahuenga Way between MTA Driveway and Lankershim Blvd	Hard	45	40	40	35	1228	25	13	67.8	68.1
Campo de Cahuenga Way between US 101 NB/SB On/Off Ramp and MTA Driveway	Hard	45	40	40	35	1340	28	14	68.2	68.5
Campo de Cahuenga Way w/o US 101 NB/SB On/Off Ramp	Hard	45	40	40	35	1268	26	13	68.0	68.3
Lankershim Blvd between Universal Hollywood Dr and US 101 NB Off Ramp	Hard	50	40	40	35	2714	56	28	70.8	71.1
Lankershim Blvd between US 101 NB Off Ramp and Cahuenga Blvd	Hard	50	40	40	35	2200	45	23	69.9	70.2
Lankershim Blvd n/o Universal Hollywood Dr	Hard	50	40	40	35	3758	77	39	72.2	72.5
Lankershim Blvd s/o Cahuenga Blvd	Hard	50	40	40	35	432	9	4	62.8	63.1
MTA Driveway n/o Campo de Cahuenga Way	Hard	25	30	30	25	201	4	2	59.4	59.7
MTA Driveway s/o Campo de Cahuenga Way	Hard	25	30	30	25	30	1	0	51.2	51.5
Regal Pl n/o Cahuenga Blvd	Hard	30	40	40	35	1135	23	12	69.3	69.6
Regal Pl s/o Cahuenga Blvd	Hard	20	45	45	40	106	2	1	62.2	62.5
Universal Hollywood Dr between Lankershim Blvd and Hilton Driveway	Hard	40	45	45	40	1562	32	16	70.9	71.2
Universal Hollywood Dr s/o Hilton Driveway	Hard	35	35	35	30	807	17	8	65.5	65.8
Universal Studios Blvd between US 101 SB On Ramp and Cahuenga Blvd W	Hard	55	40	40	35	1011	21	10	66.1	66.4
Universal Studios Blvd between W.C. Fields Dr and US 101 SB On Ramp	Hard	55	40	40	35	1688	35	17	68.3	68.6
Universal Studios Blvd n/o W.C. Fields Dr	Hard	55	30	30	25	1339	28	14	64.2	64.5
US 101 NB Off Ramp e/o Lankershim Blvd	Hard	20	40	40	35	861	18	9	69.8	70.1
US 101 NB/SB On/Off Ramp n/o Campo de Cahuenga Way	Hard	20	40	40	35	1160	24	12	71.1	71.4
US 101 NB/SB On/Off Ramp s/o Campo de Cahuenga Way	Hard	20	40	40	35	478	10	5	67.3	67.6
US 101 SB On Ramp e/o Universal Studios Blvd	Hard	20	40	40	35	463	10	5	67.1	67.4
W.C. Fields Dr between Universal Studios Blvd and Barham Blvd	Hard	25	40	40	35	730	15	8	68.1	68.4
W.C. Fields Dr w/o Universal Studios Blvd	Hard	25	40	40	35	580	12	6	67.1	67.4

TRAFFIC NOISE ANALYSIS TOOL



Project Name: Universal Hilton
 Analysis Scenario: Future Baseline
 Source of Traffic Volumes: Linscott, Law, & Greenspan

Segment	Ground Type	Distance from Roadway to Receiver (feet)	Speed (mph)			Peak Hour Volume			Peak Hour Noise Level (Leq(h) dBA)	Noise Level dBA CNEL
			Auto	MT	HT	Auto	MT	HT		
Barham Blvd n/o Cahuenga Blvd E	Hard	30	40	40	35	5236	108	54	75.9	76.2
Barham Blvd s/o Cahuenga Blvd E	Hard	30	40	40	35	3320	68	34	73.9	74.2
Cahuenga Blvd between Lankershim Blvd and Regal Pl	Hard	40	45	45	40	3505	72	36	74.4	74.7
Cahuenga Blvd between Regal Pl and Universal Studios Blvd	Hard	40	45	45	40	2669	55	28	73.2	73.5
Cahuenga Blvd E e/o Barham Blvd	Hard	40	45	45	40	2509	52	26	72.9	73.2
Cahuenga Blvd W e/o Universal Studios Blvd	Hard	40	40	40	35	2507	52	26	71.4	71.7
Cahuenga Blvd w/o Lankershim Blvd	Hard	40	40	40	35	3065	63	32	72.3	72.6
Campo de Cahuenga Way between MTA Driveway and Lankershim Blvd	Hard	45	40	40	35	1592	33	16	69.0	69.3
Campo de Cahuenga Way between US 101 NB/SB On/Off Ramp and MTA Driveway	Hard	45	40	40	35	1712	35	18	69.3	69.6
Campo de Cahuenga Way w/o US 101 NB/SB On/Off Ramp	Hard	45	40	40	35	1478	30	15	68.6	68.9
Lankershim Blvd between Universal Hollywood Dr and US 101 NB Off Ramp	Hard	50	40	40	35	3325	69	34	71.7	72.0
Lankershim Blvd between US 101 NB Off Ramp and Cahuenga Blvd	Hard	50	40	40	35	2564	53	26	70.6	70.9
Lankershim Blvd n/o Universal Hollywood Dr	Hard	50	40	40	35	4494	93	46	73.0	73.3
Lankershim Blvd s/o Cahuenga Blvd	Hard	50	40	40	35	491	10	5	63.4	63.7
MTA Driveway n/o Campo de Cahuenga Way	Hard	25	30	30	25	214	4	2	59.7	60.0
MTA Driveway s/o Campo de Cahuenga Way	Hard	25	30	30	25	32	1	0	51.4	51.7
Regal Pl n/o Cahuenga Blvd	Hard	30	40	40	35	1261	26	13	69.7	70.0
Regal Pl s/o Cahuenga Blvd	Hard	20	45	45	40	126	3	1	62.9	63.2
Universal Hollywood Dr between Lankershim Blvd and Hilton Driveway	Hard	40	45	45	40	1999	41	21	71.9	72.2
Universal Hollywood Dr s/o Hilton Driveway	Hard	35	35	35	30	1479	31	15	68.2	68.5
Universal Studios Blvd between US 101 SB On Ramp and Cahuenga Blvd W	Hard	55	40	40	35	1180	24	12	66.8	67.1
Universal Studios Blvd between W.C. Fields Dr and US 101 SB On Ramp	Hard	55	40	40	35	2124	44	22	69.3	69.6
Universal Studios Blvd n/o W.C. Fields Dr	Hard	55	30	30	25	1730	36	18	65.4	65.7
US 101 NB Off Ramp e/o Lankershim Blvd	Hard	20	40	40	35	1203	25	12	71.3	71.6
US 101 NB/SB On/Off Ramp n/o Campo de Cahuenga Way	Hard	20	40	40	35	1383	29	14	71.9	72.2
US 101 NB/SB On/Off Ramp s/o Campo de Cahuenga Way	Hard	20	40	40	35	518	11	5	67.6	67.9
US 101 SB On Ramp e/o Universal Studios Blvd	Hard	20	40	40	35	644	13	7	68.6	68.9
W.C. Fields Dr between Universal Studios Blvd and Barham Blvd	Hard	25	40	40	35	735	15	8	68.2	68.5
W.C. Fields Dr w/o Universal Studios Blvd	Hard	25	40	40	35	542	11	6	66.8	67.1

TRAFFIC NOISE ANALYSIS TOOL



Project Name: Universal Hilton
 Analysis Scenario: Future + Project
 Source of Traffic Volumes: Linscott, Law, & Greenspan

Segment	Ground Type	Distance from Roadway to Receiver (feet)	Speed (mph)			Peak Hour Volume			Peak Hour Noise Level (Leq(h) dBA)	Noise Level dBA CNEL
			Auto	MT	HT	Auto	MT	HT		
Barham Blvd n/o Cahuenga Blvd E	Hard	30	40	40	35	5261	108	54	75.9	76.2
Barham Blvd s/o Cahuenga Blvd E	Hard	30	40	40	35	3331	69	34	73.9	74.2
Cahuenga Blvd between Lankershim Blvd and Regal Pl	Hard	40	45	45	40	3524	73	36	74.4	74.7
Cahuenga Blvd between Regal Pl and Universal Studios Blvd	Hard	40	45	45	40	2669	55	28	73.2	73.5
Cahuenga Blvd E e/o Barham Blvd	Hard	40	45	45	40	2518	52	26	72.9	73.2
Cahuenga Blvd W e/o Universal Studios Blvd	Hard	40	40	40	35	2349	48	24	71.2	71.5
Cahuenga Blvd w/o Lankershim Blvd	Hard	40	40	40	35	3072	63	32	72.3	72.6
Campo de Cahuenga Way between MTA Driveway and Lankershim Blvd	Hard	45	40	40	35	1638	34	17	69.1	69.4
Campo de Cahuenga Way between US 101 NB/SB On/Off Ramp and MTA Driveway	Hard	45	40	40	35	1759	36	18	69.4	69.7
Campo de Cahuenga Way w/o US 101 NB/SB On/Off Ramp	Hard	45	40	40	35	1493	31	15	68.7	69.0
Lankershim Blvd between Universal Hollywood Dr and US 101 NB Off Ramp	Hard	50	40	40	35	3385	70	35	71.8	72.1
Lankershim Blvd between US 101 NB Off Ramp and Cahuenga Blvd	Hard	50	40	40	35	2590	53	27	70.6	70.9
Lankershim Blvd n/o Universal Hollywood Dr	Hard	50	40	40	35	4537	94	47	73.1	73.4
Lankershim Blvd s/o Cahuenga Blvd	Hard	50	40	40	35	491	10	5	63.4	63.7
MTA Driveway n/o Campo de Cahuenga Way	Hard	25	30	30	25	214	4	2	59.7	60.0
MTA Driveway s/o Campo de Cahuenga Way	Hard	25	30	30	25	32	1	0	51.4	51.7
Regal Pl n/o Cahuenga Blvd	Hard	30	40	40	35	1280	26	13	69.8	70.1
Regal Pl s/o Cahuenga Blvd	Hard	20	45	45	40	126	3	1	62.9	63.2
Universal Hollywood Dr between Lankershim Blvd and Hilton Driveway	Hard	40	45	45	40	2167	45	22	72.3	72.6
Universal Hollywood Dr s/o Hilton Driveway	Hard	35	35	35	30	1533	32	16	68.3	68.6
Universal Studios Blvd between US 101 SB On Ramp and Cahuenga Blvd W	Hard	55	40	40	35	1012	21	10	66.1	66.4
Universal Studios Blvd between W.C. Fields Dr and US 101 SB On Ramp	Hard	55	40	40	35	2171	45	22	69.4	69.7
Universal Studios Blvd n/o W.C. Fields Dr	Hard	55	30	30	25	1730	36	18	65.4	65.7
US 101 NB Off Ramp e/o Lankershim Blvd	Hard	20	40	40	35	1217	25	13	71.3	71.6
US 101 NB/SB On/Off Ramp n/o Campo de Cahuenga Way	Hard	20	40	40	35	1408	29	15	72.0	72.3
US 101 NB/SB On/Off Ramp s/o Campo de Cahuenga Way	Hard	20	40	40	35	518	11	5	67.6	67.9
US 101 SB On Ramp e/o Universal Studios Blvd	Hard	20	40	40	35	665	14	7	68.7	69.0
W.C. Fields Dr between Universal Studios Blvd and Barham Blvd	Hard	25	40	40	35	765	16	8	68.3	68.6
W.C. Fields Dr w/o Universal Studios Blvd	Hard	25	40	40	35	618	13	6	67.4	67.7

TRAFFIC NOISE ANALYSIS TOOL



Project Name: Universal Hilton
Analysis Scenario: Existing + Construction
Source of Traffic Volumes: Linscott, Law, & Greenspan

Segment	Ground Type	Distance from Roadway to Receiver (feet)	Speed (mph)			Peak Hour Volume			Peak Hour Noise Level (Leq(h) dBA)	Noise Level dBA CNEL
			Auto	MT	HT	Auto	MT	HT		
Barham Blvd n/o Cahuenga Blvd E	Hard	30	40	40	35	4802	99	50	75.5	75.8
Barham Blvd s/o Cahuenga Blvd E	Hard	30	40	40	35	3042	63	31	73.5	73.8
Cahuenga Blvd between Lankershim Blvd and Regal Pl	Hard	40	45	45	40	3084	64	32	73.8	74.1
Cahuenga Blvd between Regal Pl and Universal Studios Blvd	Hard	40	45	45	40	2335	48	24	72.6	72.9
Cahuenga Blvd E e/o Barham Blvd	Hard	40	45	45	40	2262	47	23	72.5	72.8
Cahuenga Blvd W e/o Universal Studios Blvd	Hard	40	40	40	35	1975	41	20	70.4	70.7
Cahuenga Blvd w/o Lankershim Blvd	Hard	40	40	40	35	2731	56	28	71.8	72.1
Campo de Cahuenga Way between MTA Driveway and Lankershim Blvd	Hard	45	40	40	35	1181	24	12	67.7	68.0
Campo de Cahuenga Way between US 101 NB/SB On/Off Ramp and MTA Driveway	Hard	45	40	40	35	1293	27	13	68.1	68.4
Campo de Cahuenga Way w/o US 101 NB/SB On/Off Ramp	Hard	45	40	40	35	1253	26	13	67.9	68.2
Lankershim Blvd between Universal Hollywood Dr and US 101 NB Off Ramp	Hard	50	40	40	35	2654	55	27	70.7	71.0
Lankershim Blvd between US 101 NB Off Ramp and Cahuenga Blvd	Hard	50	40	40	35	2174	45	22	69.9	70.2
Lankershim Blvd n/o Universal Hollywood Dr	Hard	50	40	40	35	3715	77	38	72.2	72.5
Lankershim Blvd s/o Cahuenga Blvd	Hard	50	40	40	35	432	9	4	62.8	63.1
Regal Pl n/o Cahuenga Blvd	Hard	30	40	40	35	1116	23	12	69.2	69.5
Regal Pl s/o Cahuenga Blvd	Hard	20	45	45	40	106	2	1	62.2	62.5
Universal Hollywood Dr between Lankershim Blvd and Hilton Driveway	Hard	40	45	45	40	1394	29	14	70.4	70.7
Universal Hollywood Dr s/o Hilton Driveway	Hard	35	35	35	30	754	16	8	65.2	65.5
Universal Studios Blvd between US 101 SB On Ramp and Cahuenga Blvd W	Hard	55	40	40	35	986	20	10	66.0	66.3
Universal Studios Blvd between W.C. Fields Dr and US 101 SB On Ramp	Hard	55	40	40	35	1641	34	17	68.2	68.5
Universal Studios Blvd n/o W.C. Fields Dr	Hard	55	30	30	25	1339	28	14	64.2	64.5
US 101 NB Off Ramp e/o Lankershim Blvd	Hard	20	40	40	35	840	17	9	69.7	70.0
US 101 NB/SB On/Off Ramp n/o Campo de Cahuenga Way	Hard	20	40	40	35	1135	23	12	71.0	71.3
US 101 NB/SB On/Off Ramp s/o Campo de Cahuenga Way	Hard	20	40	40	35	478	10	5	67.3	67.6
US 101 SB On Ramp e/o Universal Studios Blvd	Hard	20	40	40	35	441	9	5	66.9	67.2
W.C. Fields Dr between Universal Studios Blvd and Barham Blvd	Hard	25	40	40	35	700	14	7	67.9	68.2
W.C. Fields Dr w/o Universal Studios Blvd	Hard	25	40	40	35	504	10	5	66.5	66.8
Barham Blvd n/o Cahuenga Blvd E	Hard	30	40	40	35	4872	99	50	75.6	75.9
Barham Blvd s/o Cahuenga Blvd E	Hard	30	40	40	35	3112	63	31	73.6	73.9
Cahuenga Blvd between Lankershim Blvd and Regal Pl	Hard	40	45	45	40	3154	64	32	74.4	74.7
Cahuenga Blvd between Regal Pl and Universal Studios Blvd	Hard	40	45	45	40	2405	48	24	72.7	73.0
Cahuenga Blvd E e/o Barham Blvd	Hard	40	45	45	40	2332	47	23	72.6	72.9
Cahuenga Blvd W e/o Universal Studios Blvd	Hard	40	40	40	35	2045	41	20	70.5	70.8
Cahuenga Blvd w/o Lankershim Blvd	Hard	40	40	40	35	2801	56	28	71.9	72.2
Campo de Cahuenga Way between MTA Driveway and Lankershim Blvd	Hard	45	40	40	35	1251	24	12	67.9	68.2
Campo de Cahuenga Way between US 101 NB/SB On/Off Ramp and MTA Driveway	Hard	45	40	40	35	1363	27	13	68.2	68.5
Campo de Cahuenga Way w/o US 101 NB/SB On/Off Ramp	Hard	45	40	40	35	1323	26	13	68.1	68.4
Lankershim Blvd between Universal Hollywood Dr and US 101 NB Off Ramp	Hard	50	40	40	35	2724	55	27	71.5	71.8
Lankershim Blvd between US 101 NB Off Ramp and Cahuenga Blvd	Hard	50	40	40	35	2244	45	22	70.8	71.1
Lankershim Blvd n/o Universal Hollywood Dr	Hard	50	40	40	35	3785	77	38	72.2	72.5
Lankershim Blvd s/o Cahuenga Blvd	Hard	50	40	40	35	502	9	4	63.4	63.7
Regal Pl n/o Cahuenga Blvd	Hard	30	40	40	35	1186	23	12	70.8	71.1
Regal Pl s/o Cahuenga Blvd	Hard	20	45	45	40	176	2	1	64.1	64.4
Universal Hollywood Dr between Lankershim Blvd and Hilton Driveway	Hard	40	45	45	40	1464	29	14	71.6	71.9
Universal Hollywood Dr s/o Hilton Driveway	Hard	35	35	35	30	824	16	8	67.9	68.2
Universal Studios Blvd between US 101 SB On Ramp and Cahuenga Blvd W	Hard	55	40	40	35	1056	20	10	66.2	66.5
Universal Studios Blvd between W.C. Fields Dr and US 101 SB On Ramp	Hard	55	40	40	35	1711	34	17	69.4	69.7
Universal Studios Blvd n/o W.C. Fields Dr	Hard	55	30	30	25	1409	28	14	64.4	64.7
US 101 NB Off Ramp e/o Lankershim Blvd	Hard	20	40	40	35	910	17	9	70.0	70.3
US 101 NB/SB On/Off Ramp n/o Campo de Cahuenga Way	Hard	20	40	40	35	1205	23	12	71.2	71.5
US 101 NB/SB On/Off Ramp s/o Campo de Cahuenga Way	Hard	20	40	40	35	548	10	5	67.7	68.0
US 101 SB On Ramp e/o Universal Studios Blvd	Hard	20	40	40	35	511	9	5	67.4	67.7
W.C. Fields Dr between Universal Studios Blvd and Barham Blvd	Hard	25	40	40	35	770	14	7	68.3	68.6
W.C. Fields Dr w/o Universal Studios Blvd	Hard	25	40	40	35	574	10	5	69.6	69.9
Barham Blvd n/o Cahuenga Blvd E	Hard	30	40	40	35	70	0	0	0.1	0.1
Barham Blvd s/o Cahuenga Blvd E	Hard	30	40	40	35	70	0	0	0.1	0.1
Cahuenga Blvd between Lankershim Blvd and Regal Pl	Hard	40	45	45	40	70	0	50	0.6	0.6
Cahuenga Blvd between Regal Pl and Universal Studios Blvd	Hard	40	45	45	40	70	0	0	0.1	0.1
Cahuenga Blvd E e/o Barham Blvd	Hard	40	45	45	40	70	0	0	0.1	0.1
Cahuenga Blvd W e/o Universal Studios Blvd	Hard	40	40	40	35	70	0	0	0.1	0.1
Cahuenga Blvd w/o Lankershim Blvd	Hard	40	40	40	35	70	0	0	0.1	0.1
Campo de Cahuenga Way between MTA Driveway and Lankershim Blvd	Hard	45	40	40	35	70	0	0	0.2	0.2
Campo de Cahuenga Way between US 101 NB/SB On/Off Ramp and MTA Driveway	Hard	45	40	40	35	70	0	0	0.2	0.2
Campo de Cahuenga Way w/o US 101 NB/SB On/Off Ramp	Hard	45	40	40	35	70	0	0	0.2	0.2
Lankershim Blvd between Universal Hollywood Dr and US 101 NB Off Ramp	Hard	50	40	40	35	70	0	50	0.8	0.8
Lankershim Blvd between US 101 NB Off Ramp and Cahuenga Blvd	Hard	50	40	40	35	70	0	50	0.9	0.9
Lankershim Blvd n/o Universal Hollywood Dr	Hard	50	40	40	35	70	0	0	0.1	0.1
Lankershim Blvd s/o Cahuenga Blvd	Hard	50	40	40	35	70	0	0	0.5	0.5
Regal Pl n/o Cahuenga Blvd	Hard	30	40	40	35	70	0	50	1.6	1.6
Regal Pl s/o Cahuenga Blvd	Hard	20	45	45	40	70	0	0	1.9	1.9
Universal Hollywood Dr between Lankershim Blvd and Hilton Driveway	Hard	40	45	45	40	70	0	50	1.2	1.2
Universal Hollywood Dr s/o Hilton Driveway	Hard	35	35	35	30	70	0	50	2.7	2.7
Universal Studios Blvd between US 101 SB On Ramp and Cahuenga Blvd W	Hard	55	40	40	35	70	0	0	0.2	0.2
Universal Studios Blvd between W.C. Fields Dr and US 101 SB On Ramp	Hard	55	40	40	35	70	0	50	1.2	1.2
Universal Studios Blvd n/o W.C. Fields Dr	Hard	55	30	30	25	70	0	0	0.2	0.2
US 101 NB Off Ramp e/o Lankershim Blvd	Hard	20	40	40	35	70	0	0	0.3	0.3
US 101 NB/SB On/Off Ramp n/o Campo de Cahuenga Way	Hard	20	40	40	35	70	0	0	0.2	0.2
US 101 NB/SB On/Off Ramp s/o Campo de Cahuenga Way	Hard	20	40	40	35	70	0	0	0.5	0.5
US 101 SB On Ramp e/o Universal Studios Blvd	Hard	20	40	40	35	70	0	0	0.5	0.5
W.C. Fields Dr between Universal Studios Blvd and Barham Blvd	Hard	25	40	40	35	70	0	0	0.3	0.3
W.C. Fields Dr w/o Universal Studios Blvd	Hard	25	40	40	35	70	0	50	3.1	3.1

Project: Universal Hilton

Generator Noise Calculations - R1

Receptor Location	Hotel Expansion	
Generator Noise Levels	79.0	dBA
Reference Distance	23	ft
Distance to R1	350	ft
	-24	dBA
	55.4	dBA
Noise Reduction by Existing Buildings	20	dBA
Noise Levels at R1	35.4	dBA

Receptor Location	Meeting Room Building	
Generator Noise Levels	79.0	dBA
Reference Distance	23	ft
Distance to R2	300	ft
	-22	dBA
	56.7	dBA
Noise Reduction by Existing Buildings	20	dBA
Noise Levels at R2	36.7	dBA

http://resources.kohler.com/power/kohler/industrial/pdf/KD800-2500_G6154.pdf

Project: Universal Hilton

Generator Noise Calculations - R6

Receptor Location	Hotel Expansion	
Generator Noise Levels	79.0	dBA
Reference Distance	23	ft
Distance to R1	40	ft
	-5	dBA
	74.2	dBA
Noise Reduction by Existing Buildings	30	dBA
Noise Levels at R1	44.2	dBA

Receptor Location	Meeting Room Building	
Generator Noise Levels	79.0	dBA
Reference Distance	23	ft
Distance to R2	300	ft
	-22	dBA
	56.7	dBA
Noise Reduction by Existing Buildings	30	dBA
Noise Levels at R2	26.7	dBA

http://resources.kohler.com/power/kohler/industrial/pdf/KD800-2500_G6154.pdf

Project: Universal Hilton

Mechanical Equipment Noise Calculations - R1

Hotel Expansion Building		
Mechanical Equipment Noise Levels	81.9	dBA
Reference Distance	5	ft
Distance to Sheraton	350	ft
	-37	dBA
	45.0	dBA
Noise Reduction by Existing Buildings	0	dBA
Noise Levels at Sheraton	45.0	dBA

Meeting Room Building		
Mechanical Equipment Noise Levels	81.9	dBA
Reference Distance	5	ft
Distance to Sheraton	300	ft
	-36	dBA
	46.3	dBA
Noise Reduction by Existing Buildings	0	dBA
Noise Levels at Sheraton	46.3	dBA

* Exterior reference noise levels for air condenser units, fans, and related equipment, the primary sources of noise from fixed mechanical equipment, would be 81.9 dBA Leq measured at a distance of 5 feet (based on noise data from large shopping center projects in Southern California). Refer to: City of Moreno Valley, Moreno Valley Walmart Noise Impact Analysis, Table 9-

** Distance to receptors assumes that mechanical equipment would be located on the rooftop of the nearest Project Building.

Project: Universal Hilton

Mechanical Equipment Noise Calculations - R6

Hotel Expansion Building		
Mechanical Equipment Noise Levels	81.9	dBA
Reference Distance	5	ft
Distance to Sheraton	40	ft
	-18	dBA
	63.8	dBA
Noise Reduction by Existing Buildings	0	dBA
Noise Levels at Sheraton	63.8	dBA

Meeting Room Building		
Mechanical Equipment Noise Levels	81.9	dBA
Reference Distance	5	ft
Distance to Sheraton	300	ft
	-36	dBA
	46.3	dBA
Noise Reduction by Existing Buildings	0	dBA
Noise Levels at Sheraton	46.3	dBA

* Exterior reference noise levels for air condenser units, fans, and related equipment, the primary sources of noise from fixed mechanical equipment, would be 81.9 dBA Leq measured at a distance of 5 feet (based on noise data from large shopping center projects in Southern California). Refer to: City of Moreno Valley, Moreno Valley Walmart Noise Impact Analysis, Table 9-

** Distance to receptors assumes that mechanical equipment would be located on the rooftop of the nearest Project Building.

Universal Hilton
Open Space Noise Calculation
Summary - R1

Outdoor Space	Capacity	Nearest Distance	Estimated Daytime Leq	Estimated Nighttime Leq	Daytime				Nighttime			
					Existing Ambient	Ambient + Project	Threshold	Exceed?	Existing Ambient	Ambient + Project	Threshold	Exceed?
North Plaza	1069	390	56.3	56.3	59.6	61.3	64.6	No	57.5	60.0	62.5	No
Yard	400	270	40.5	40.5	59.6	59.7	64.6	No	57.5	57.6	62.5	No
Outdoor Pool Area (Basement)	685	350	37.2	37.2	59.6	59.6	64.6	No	57.5	57.5	62.5	No
Outdoor Dining/Pool Area (Rooftop)	360	350	47.1	47.1	59.6	59.8	64.6	No	57.5	57.9	62.5	No

Universal Hilton
Open Space Noise Calculation

North Plaza (West)							
Category	# of Individuals (estimated capacity)	# of Individuals Speaking (half of estimated capacity)	Reference Distance (ft) ¹	Reference Noise Level (dBA) ¹	Combined Noise Level (dBA)	Distance to Receptor (ft)	Noise Level at Receptor (dBA)
Total Capacity	535						
Females (Adult)	133	67	3	55	73.3	390	31.0
Males (Adult)	134	67	3	58	76.3	390	34.0
Children	268	134	3	58	79.3	390	37.0
Total	535	268	-	-	81.7	-	39.4
Amplified Music (85 dBA Leq at 25 feet)			25	80	80.0	390	56.1

Source:

¹ American Journal of Audiology Vol. 7, p. 3 (1998)

North Plaza (East)							
Category	# of Individuals (estimated capacity)	# of Individuals Speaking (half of estimated capacity)	Reference Distance (ft) ¹	Reference Noise Level (dBA) ¹	Combined Noise Level (dBA)	Distance to Receptor (ft)	Noise Level at Receptor (dBA)
Total Capacity	535						
Females (Adult)	133	67	3	55	73.3	450	29.7
Males (Adult)	134	67	3	58	76.3	450	32.7
Children	268	134	3	58	79.3	450	35.7
Total	535	268	-	-	81.7	-	38.2

Source:

¹ American Journal of Audiology Vol. 7, p. 3 (1998)

Source:

¹ American Journal of Audiology Vol. 7, p. 3 (1998)

4th Street Plazas (Total)			
Category	# of Individuals (estimated capacity)	# of Individuals Speaking (half of estimated capacity)	Noise Level at Receptor (dBA)
Total Capacity	1069		
@ 390 feet	535	268	39.4
@ 450 feet	535	268	38.2
Amplified Speakers			56.1
Total	1070	536	56.3

Universal Hilton
Open Space Noise Calculation

Yard (Western Boundary)							
Category	# of Individuals (estimated capacity)	# of Individuals Speaking (half of estimated capacity)	Reference Distance (ft) ¹	Reference Noise Level (dBA) ¹	Combined Noise Level (dBA)	Distance to Receptor (ft)	Noise Level at Receptor (dBA)
Total Capacity	200						
Females (Adult)	50	25	3	55	69.0	270	29.9
Males (Adult)	50	25	3	58	72.0	270	32.9
Children	100	50	3	58	75.0	270	35.9
Total	200	100	-	-	77.4	-	38.3
Amplified Music (85 dBA Leq at 25 feet per NOISE-PDF-5)			25	80	80.0	270	59.3

Source:

¹ American Journal of Audiology Vol. 7, p. 3 (1998)

Yard (Eastern Boundary)							
Category	# of Individuals (estimated capacity)	# of Individuals Speaking (half of estimated capacity)	Reference Distance (ft) ¹	Reference Noise Level (dBA) ¹	Combined Noise Level (dBA)	Distance to Receptor (ft)	Noise Level at Receptor (dBA)
Total Capacity	200						
Females (Adult)	50	25	3	55	69.0	340	27.9
Males (Adult)	50	25	3	58	72.0	340	30.9
Children	100	50	3	58	75.0	340	33.9
Total	200	100	-	-	77.4	-	36.3

Source:

¹ American Journal of Audiology Vol. 7, p. 3 (1998)

River Balcony North (Total)			
Category	# of Individuals (estimated capacity)	# of Individuals Speaking (half of estimated capacity)	Noise Level at Receptor (dBA)
Total Capacity	400		
@ 270 feet	200	100	38.3
@ 340 feet	200	100	36.3
Total	400	200	40.5

Universal Hilton
Open Space Noise Calculation

Pool Deck B4asement (Northern Boundary)							
Category	# of Individuals (estimated capacity)	# of Individuals Speaking (half of estimated capacity)	Reference Distance (ft) ¹	Reference Noise Level (dBA) ¹	Combined Noise Level (dBA)	Distance to Receptor (ft)	Noise Level at Receptor (dBA)
Total Capacity	229						
Females (Adult)	57	29	3	55	69.6	350	28.3
Males (Adult)	58	29	3	58	72.6	350	31.3
Children	114	57	3	58	75.6	350	34.2
Total	229	115	-	-	78.0	-	36.7
Amplified Music (85 dBA Leq at 25 feet)			25	80	80.0	350	57.1

Source:

¹ American Journal of Audiology Vol. 7, p. 3 (1998)

Pool Deck Basement (Center)							
Category	# of Individuals (estimated capacity)	# of Individuals Speaking (half of estimated capacity)	Reference Distance (ft) ¹	Reference Noise Level (dBA) ¹	Combined Noise Level (dBA)	Distance to Receptor (ft)	Noise Level at Receptor (dBA)
Total Capacity	229						
Females (Adult)	57	29	3	55	69.6	400	27.1
Males (Adult)	57	29	3	58	72.6	400	30.1
Children	114	57	3	58	75.6	400	33.1
Total	228	115	-	-	78.0	-	35.5

Source:

¹ American Journal of Audiology Vol. 7, p. 3 (1998)

Pool Deck Basement (Southern Boundary)							
Category	# of Individuals (estimated capacity)	# of Individuals Speaking (half of estimated capacity)	Reference Distance (ft) ¹	Reference Noise Level (dBA) ¹	Combined Noise Level (dBA)	Distance to Receptor (ft)	Noise Level at Receptor (dBA)
Total Capacity	228						
Females (Adult)	57	29	3	55	69.6	450	26.1
Males (Adult)	57	29	3	58	72.6	450	29.1
Children	114	57	3	58	75.6	450	32.0
Total	228	115	-	-	78.0	-	34.5

Source:

¹ American Journal of Audiology Vol. 7, p. 3 (1998)

Pool Deck Basement (Total)			
Category	# of Individuals (estimated capacity)	# of Individuals Speaking (half of estimated capacity)	Noise Level at Receptor (dBA)
Total Capacity	685		
@ 350 feet	229	115	36.7
@ 400 feet	228	115	35.5
@ 450 feet	228	115	34.5
Amplified Speakers	-	-	57.1
Total w/ Shielding	685	345	37.2
Reduction from Noise Shielding			-20

Universal Hilton							
Open Space Noise Calculation							

Pool Deck Rooftop (Eastern Boundary)							
Category	# of Individuals (estimated capacity)	# of Individuals Speaking (half of estimated capacity)	Reference Distance (ft) ¹	Reference Noise Level (dBA) ¹	Combined Noise Level (dBA)	Distance to Receptor (ft)	Noise Level at Receptor (dBA)
Total Capacity	90						
Females (Adult)	22	11	3	55	65.4	350	24.1
Males (Adult)	23	12	3	58	68.8	350	27.5
Children	45	23	3	58	71.6	350	30.3
Total	90	46	-	-	74.1	-	32.7
Amplified Music (85 dBA Leq at 25 feet)			25	80	80.0	350	57.1

Source:

¹ American Journal of Audiology Vol. 7, p. 3 (1998)

Pool Deck Rooftop (Center)							
Category	# of Individuals (estimated capacity)	# of Individuals Speaking (half of estimated capacity)	Reference Distance (ft) ¹	Reference Noise Level (dBA) ¹	Combined Noise Level (dBA)	Distance to Receptor (ft)	Noise Level at Receptor (dBA)
Total Capacity	90						
Females (Adult)	22	11	3	55	65.4	430	22.3
Males (Adult)	23	12	3	58	68.8	430	25.7
Children	45	23	3	58	71.6	430	28.5
Total	90	46	-	-	74.1	-	30.9

Source:

¹ American Journal of Audiology Vol. 7, p. 3 (1998)

Pool Deck Rooftop (Western Boundary)							
Category	# of Individuals (estimated capacity)	# of Individuals Speaking (half of estimated capacity)	Reference Distance (ft) ¹	Reference Noise Level (dBA) ¹	Combined Noise Level (dBA)	Distance to Receptor (ft)	Noise Level at Receptor (dBA)
Total Capacity	90						
Females (Adult)	22	11	3	55	65.4	475	21.4
Males (Adult)	23	12	3	58	68.8	475	24.8
Children	45	23	3	58	71.6	475	27.6
Total	90	46	-	-	74.1	-	30.1

Source:

¹ American Journal of Audiology Vol. 7, p. 3 (1998)

Pool Deck Rooftop (Northern Boundary)							
Category	# of Individuals (estimated capacity)	# of Individuals Speaking (half of estimated capacity)	Reference Distance (ft) ¹	Reference Noise Level (dBA) ¹	Combined Noise Level (dBA)	Distance to Receptor (ft)	Noise Level at Receptor (dBA)
Total Capacity	90						
Females (Adult)	22	11	3	55	65.4	620	19.1
Males (Adult)	23	12	3	58	68.8	620	22.5
Children	45	23	3	58	71.6	620	25.3
Total	90	46	-	-	74.1	-	27.8

Source:

¹ American Journal of Audiology Vol. 7, p. 3 (1998)

Pool Deck Rooftop (Total)			
Category	# of Individuals (estimated capacity)	# of Individuals Speaking (half of estimated capacity)	Noise Level at Receptor (dBA)
Total Capacity	360		
@ 350 feet	90	46	32.7
@ 430 feet	90	46	30.9
@ 475 feet	90	46	30.1
@ 620 feet	90	46	27.8
Amplified Speakers			57.1
Total	360	184	47.1
Reduction from Noise Shielding			-10

Universal Hilton
Open Space Noise Calculation
Summary - R6

Outdoor Space	Capacity	Nearest Distance	Estimated Daytime Leq	Estimated Nighttime Leq	Daytime				Nighttime			
					Existing Ambient	Ambient + Project	Threshold	Exceed?	Existing Ambient	Ambient + Project	Threshold	Exceed?
North Plaza	1069	325	57.9	57.9	59.6	61.8	64.6	No	57.5	60.7	62.5	No
Yard	400	300	39.6	39.6	59.6	59.6	64.6	No	57.5	57.6	62.5	No
Outdoor Pool Area (Basement)	685	100	48.0	48.0	59.6	59.9	64.6	No	57.5	58.0	62.5	No
Outdoor Dining/Pool Area (Rooftop)	360	130	55.7	55.7	59.6	61.1	64.6	No	57.5	59.7	62.5	No

Universal Hilton
Open Space Noise Calculation

North Plaza (West)							
Category	# of Individuals (estimated capacity)	# of Individuals Speaking (half of estimated capacity)	Reference Distance (ft) ¹	Reference Noise Level (dBA) ¹	Combined Noise Level (dBA)	Distance to Receptor (ft)	Noise Level at Receptor (dBA)
Total Capacity	535						
Females (Adult)	133	67	3	55	73.3	325	32.6
Males (Adult)	134	67	3	58	76.3	325	35.6
Children	268	134	3	58	79.3	325	38.6
Total	535	268	-	-	81.7	-	41.0
Amplified Music (85 dBA Leq at 25 feet)			25	80	80.0	325	57.7

Source:

¹ American Journal of Audiology Vol. 7, p. 3 (1998)

North Plaza (East)							
Category	# of Individuals (estimated capacity)	# of Individuals Speaking (half of estimated capacity)	Reference Distance (ft) ¹	Reference Noise Level (dBA) ¹	Combined Noise Level (dBA)	Distance to Receptor (ft)	Noise Level at Receptor (dBA)
Total Capacity	535						
Females (Adult)	133	67	3	55	73.3	385	31.1
Males (Adult)	134	67	3	58	76.3	385	34.1
Children	268	134	3	58	79.3	385	37.1
Total	535	268	-	-	81.7	-	39.5

Source:

¹ American Journal of Audiology Vol. 7, p. 3 (1998)

Source:

¹ American Journal of Audiology Vol. 7, p. 3 (1998)

4th Street Plazas (Total)			
Category	# of Individuals (estimated capacity)	# of Individuals Speaking (half of estimated capacity)	Noise Level at Receptor (dBA)
Total Capacity	1069		
@ 325 feet	535	268	41.0
@ 385 feet	535	268	39.5
Amplified Speakers			57.7
Total	1070	536	57.9

Universal Hilton							
Open Space Noise Calculation							

Yard (Western Boundary)							
Category	# of Individuals (estimated capacity)	# of Individuals Speaking (half of estimated capacity)	Reference Distance (ft) ¹	Reference Noise Level (dBA) ¹	Combined Noise Level (dBA)	Distance to Receptor (ft)	Noise Level at Receptor (dBA)
Total Capacity	200						
Females (Adult)	50	25	3	55	69.0	300	29.0
Males (Adult)	50	25	3	58	72.0	300	32.0
Children	100	50	3	58	75.0	300	35.0
Total	200	100	-	-	77.4	-	37.4
Amplified Music (85 dBA Leq at 25 feet per NOISE-PDF-5)			25	80	80.0	300	58.4

Source:

¹ American Journal of Audiology Vol. 7, p. 3 (1998)

Yard (Eastern Boundary)							
Category	# of Individuals (estimated capacity)	# of Individuals Speaking (half of estimated capacity)	Reference Distance (ft) ¹	Reference Noise Level (dBA) ¹	Combined Noise Level (dBA)	Distance to Receptor (ft)	Noise Level at Receptor (dBA)
Total Capacity	200						
Females (Adult)	50	25	3	55	69.0	370	27.2
Males (Adult)	50	25	3	58	72.0	370	30.2
Children	100	50	3	58	75.0	370	33.2
Total	200	100	-	-	77.4	-	35.6

Source:

¹ American Journal of Audiology Vol. 7, p. 3 (1998)

River Balcony North (Total)			
Category	# of Individuals (estimated capacity)	# of Individuals Speaking (half of estimated capacity)	Noise Level at Receptor (dBA)
Total Capacity	400		
@ 300 feet	200	100	37.4
@ 370 feet	200	100	35.6
Total	400	200	39.6

Universal Hilton
Open Space Noise Calculation

Pool Deck Basement (Northern Boundary)							
Category	# of Individuals (estimated capacity)	# of Individuals Speaking (half of estimated capacity)	Reference Distance (ft) ¹	Reference Noise Level (dBA) ¹	Combined Noise Level (dBA)	Distance to Receptor (ft)	Noise Level at Receptor (dBA)
Total Capacity	229						
Females (Adult)	57	29	3	55	69.6	100	39.2
Males (Adult)	58	29	3	58	72.6	100	42.2
Children	114	57	3	58	75.6	100	45.1
Total	229	115	-	-	78.0	-	47.6
Amplified Music (85 dBA Leq at 25 feet)			25	80	80.0	100	68.0

Source:

¹ American Journal of Audiology Vol. 7, p. 3 (1998)

Pool Deck Basement (Center)							
Category	# of Individuals (estimated capacity)	# of Individuals Speaking (half of estimated capacity)	Reference Distance (ft) ¹	Reference Noise Level (dBA) ¹	Combined Noise Level (dBA)	Distance to Receptor (ft)	Noise Level at Receptor (dBA)
Total Capacity	229						
Females (Adult)	57	29	3	55	69.6	150	35.6
Males (Adult)	57	29	3	58	72.6	150	38.6
Children	114	57	3	58	75.6	150	41.6
Total	228	115	-	-	78.0	-	44.0

Source:

¹ American Journal of Audiology Vol. 7, p. 3 (1998)

Pool Deck Basement (Southern Boundary)							
Category	# of Individuals (estimated capacity)	# of Individuals Speaking (half of estimated capacity)	Reference Distance (ft) ¹	Reference Noise Level (dBA) ¹	Combined Noise Level (dBA)	Distance to Receptor (ft)	Noise Level at Receptor (dBA)
Total Capacity	228						
Females (Adult)	57	29	3	55	69.6	200	33.1
Males (Adult)	57	29	3	58	72.6	200	36.1
Children	114	57	3	58	75.6	200	39.1
Total	228	115	-	-	78.0	-	41.5

Source:

¹ American Journal of Audiology Vol. 7, p. 3 (1998)

Pool Deck Basement (Total)			
Category	# of Individuals (estimated capacity)	# of Individuals Speaking (half of estimated capacity)	Noise Level at Receptor (dBA)
Total Capacity	685		
@ 100 feet	229	115	47.6
@ 150 feet	228	115	44.0
@ 200 feet	228	115	41.5
Amplified Speakers	-	-	68.0
Total w/ Shielding	685	345	48.0
Reduction from Noise Shielding			-20

Universal Hilton							
Open Space Noise Calculation							

Pool Deck Rooftop (Eastern Boundary)							
Category	# of Individuals (estimated capacity)	# of Individuals Speaking (half of estimated capacity)	Reference Distance (ft) ¹	Reference Noise Level (dBA) ¹	Combined Noise Level (dBA)	Distance to Receptor (ft)	Noise Level at Receptor (dBA)
Total Capacity	90						
Females (Adult)	22	11	3	55	65.4	130	32.7
Males (Adult)	23	12	3	58	68.8	130	36.1
Children	45	23	3	58	71.6	130	38.9
Total	90	46	-	-	74.1	-	41.3
Amplified Music (85 dBA Leq at 25 feet)			25	80	80.0	130	65.7

Source:

¹ American Journal of Audiology Vol. 7, p. 3 (1998)

Pool Deck Rooftop (Center)							
Category	# of Individuals (estimated capacity)	# of Individuals Speaking (half of estimated capacity)	Reference Distance (ft) ¹	Reference Noise Level (dBA) ¹	Combined Noise Level (dBA)	Distance to Receptor (ft)	Noise Level at Receptor (dBA)
Total Capacity	90						
Females (Adult)	22	11	3	55	65.4	430	22.3
Males (Adult)	23	12	3	58	68.8	430	25.7
Children	45	23	3	58	71.6	430	28.5
Total	90	46	-	-	74.1	-	30.9

Source:

¹ American Journal of Audiology Vol. 7, p. 3 (1998)

Pool Deck Rooftop (Western Boundary)							
Category	# of Individuals (estimated capacity)	# of Individuals Speaking (half of estimated capacity)	Reference Distance (ft) ¹	Reference Noise Level (dBA) ¹	Combined Noise Level (dBA)	Distance to Receptor (ft)	Noise Level at Receptor (dBA)
Total Capacity	90						
Females (Adult)	22	11	3	55	65.4	475	21.4
Males (Adult)	23	12	3	58	68.8	475	24.8
Children	45	23	3	58	71.6	475	27.6
Total	90	46	-	-	74.1	-	30.1

Source:

¹ American Journal of Audiology Vol. 7, p. 3 (1998)

Pool Deck Rooftop (Northern Boundary)							
Category	# of Individuals (estimated capacity)	# of Individuals Speaking (half of estimated capacity)	Reference Distance (ft) ¹	Reference Noise Level (dBA) ¹	Combined Noise Level (dBA)	Distance to Receptor (ft)	Noise Level at Receptor (dBA)
Total Capacity	90						
Females (Adult)	22	11	3	55	65.4	620	19.1
Males (Adult)	23	12	3	58	68.8	620	22.5
Children	45	23	3	58	71.6	620	25.3
Total	90	46	-	-	74.1	-	27.8

Source:

¹ American Journal of Audiology Vol. 7, p. 3 (1998)

Pool Deck Rooftop (Total)			
Category	# of Individuals (estimated capacity)	# of Individuals Speaking (half of estimated capacity)	Noise Level at Receptor (dBA)
Total Capacity	360		
@ 130 feet	90	46	41.3
@ 430 feet	90	46	30.9
@ 475 feet	90	46	30.1
@ 620 feet	90	46	27.8
Amplified Speakers			65.7
Total	360	184	55.7
Reduction from Noise Shielding			-10



Parking Related Noise Analysis

Project Name: Universal Hilton

AM or PM Peak Hour Trips
Leq

367	trips
52	dBA

$$\text{Leq}(h) = \text{SELref} + 10\log(\text{NA}/1000) - 35.6$$

Where: $\text{Leq}(h)$ = hourly Leq noise level at 50 feet

SELref (92 dBA SEL) = reference noise level for stationary noise source represented in sound exposure level (SEL) at 50 feet

NA = number of automobiles per hour

Project: Universal Hilton

Parking Structure Noise - R1

Parking Structure Noise Level	52.0	dBa
Reference Distance	50	ft
Distance to Sheraton	190	ft
	-12	dBa
	40.5	dBa
		dBa
Noise Reduction	0	dBa
Noise Levels at Sheraton	41	dBa

AM or PM Peak Hour Trips	246	trips
Leq	50	dBa

$$Leq(h) = SEL_{ref} + 10\log(NA/1000) - 35.6$$

Where: $Leq(h)$ = hourly Leq noise level at 50 feet

SEL_{ref} (92 dBA SEL) = reference noise level for stationary noise source represented in sound exposure level (SEL) at 50 feet

NA = number of automobiles per hour

Project: Universal Hilton

Parking Structure Noise - R6

Parking Structure Noise Level	52.0	dBa
Reference Distance	50	ft
Distance to Hilton Hotel Tower	350	ft
	-17	dBa
	35.2	dBa
		dBa
Noise Reduction	0	dBa
Noise Levels at Hilton Hotel Tower	35.2	dBa

AM or PM Peak Hour Trips	246	trips
Leq	50	dBa

$$Leq(h) = SEL_{ref} + 10\log(NA/1000) - 35.6$$

Where: $Leq(h)$ = hourly Leq noise level at 50 feet

SEL_{ref} (92 dBA SEL) = reference noise level for stationary noise source represented in sound exposure level (SEL) at 50 feet

NA = number of automobiles per hour

2.4 Operational Stationary Noise Calculations

