9001-9019 LONG BEACH BOULEVARD HABITAT FOR HUMANITY PROJECT

Appendix F
Noise Study

Habitat for Humanity IS/EA

Noise Impact Study

City of South Gate, CA

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1.0 Introduction

1.1 Purpose of Analysis and Study Objectives

This noise assessment was prepared to evaluate the potential noise impacts for the project study area and to recommend noise mitigation measures, if necessary, to minimize the potential noise impacts. The assessment was conducted and compared to the noise standards set-forth by the Federal, State and Local agencies. Consistent with the City's Noise Guidelines, the project must demonstrate compliance to the applicable noise criterion as outlined within the City's Noise Element and Municipal Code.

The following is provided in this report:

- A description of the study area and the proposed project
- Information regarding the fundamentals of noise
- A description of the local noise guidelines and standards
- An analysis of traffic noise impacts to and from the project site
- An analysis of stationary noise impacts to and from the project site
- An analysis of construction noise impacts

1.2 Site Location and Study Area

The 9001-19 Long Beach Boulevard Residential Project (referenced herein as "Project") site is located in the City of South Gate within the County of Los Angeles; refer to Exhibit A, Location Map. The Project site is approximately 0.66 acres located at 9001-19 Long Beach Boulevard in the western portion of the City, at the southwest corner of the Willow Place and Long Beach Boulevard intersection; refer to Exhibit A, Location Map.

Regional access to the site is provided via the Interstate 105 Freeway (I-5) located south of the Project site, Interstate 110 Freeway (I-10) located west of the Project site, and the Interstate 710 Freeway located east of the Project site. Local access to the site is provided from Long Beach Boulevard and Willow Place.

1.3 Proposed Project Description

The Project proposes the removal of all existing on-site improvements and structures within the 0.66-acre site and construction of a common interest subdivision and affordable housing development. The Project proposes to construct 14 three-story attached townhomes in three buildings (30,700 square feet; 21.21 dwelling units/per acre); refer to Exhibit B, Conceptual Site Plan. Each building will have a maximum height of 31 feet. Twelve (12) of the townhomes will be sold to qualified Low Income Homebuyers at an Affordable Housing Code ("Ownership Units") and two townhomes will be operated as rental housing units for occupancy and tenancy by Extremely Low Income Households ("ELI Housing Units"). All units will have a two-car garage, front porch, and outdoor balcony. The units will include two floor plans: Ownership Units will have three bedrooms and 3.5 bathrooms, and will be approximately 1,589 square feet and ELI Housing Units will have two bedrooms and two bathrooms and will be approximately 1,344 square feet. The common areas will include guest surface parking areas, outdoor

benches, and community green space. Landscaping will be installed in the Project frontage along Willow Place and Long Beach Boulevard.

PARKING

South Gate Municipal Code Section 11.33.080, Urban Mixed-Use Zone Requirements, states that single-family dwellings require two enclosed spaces and 0.2 guest spaces per dwelling unit. The Project would require two enclosed spaces for each of the units for a total of 28 enclosed spaces. An additional three guest spaces would be required based on the market rate units. The Project proposes attached two car garages for the 14 units with two of the units having tandem parking. An additional five open parking stalls for guest parking will be provided on the site.

SITE ACCESS

Access to the Project site is proposed from two driveways, one located on Willow Place and one located on Long Beach Boulevard. Pedestrian access would be provided to the individual units for units 1 and 2 from Willow Place, and units 3 through 14 from Long Beach Boulevard. A private interior driveway system, consistent with Los Angeles County Fire access requirements, would provide access to the individual townhome units; refer to Figure 2-3.

INFRASTRUCTURE

Water and sewer for the individual units will connect to existing laterals in Willow Place and Long Beach Boulevard. An on-site stormwater capture system (dry well system) will be placed under the driveway.

1.4 Report Summary

Ambient noise levels at the proposed project location range from 63-69 dBA during peak traffic times. These levels fall under the “conditionally acceptable” category for multifamily residential uses as shown in the noise compatibility matrix in Exhibit D. The City of South Gate has a residential noise limit (40 dBA nighttime, 50 dBA daytime) that is exceeded by the existing ambient condition; therefore, MD assumes that the exterior ambient noise level is the limit. The City also requires an interior noise level not to exceed 45 dBA CNEL for residential uses, which can be accomplished with proper building shell design.

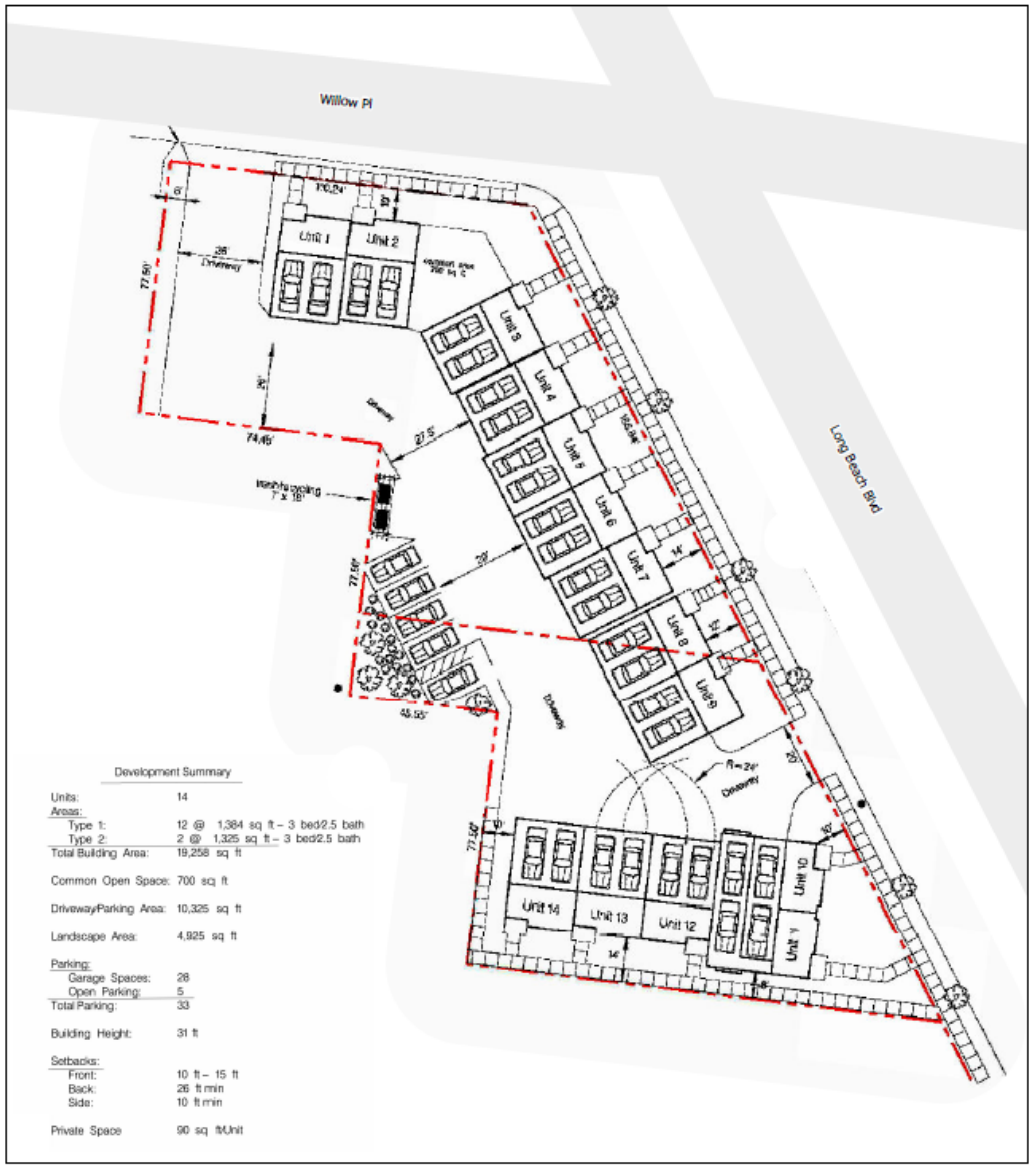
Project plus ambient levels for the building façade will be ~69 dBA CNEL or less. In order to meet the City’s 45 dBA CNEL interior requirement, windows facing the roadway must have at least a 29 STC rating. All other windows and sliding glass doors must have an STC rating of 25 or above. The site is currently within the conditionally acceptable level for the noise compatibility matrix and will not increase in noise level due to this project.

Project plus existing ambient levels for neighboring properties will between 63-70 dBA Leq. The nearby residential properties are currently in the conditionally acceptable CNEL levels according to the noise compatibility matrix (under 70 dBA CNEL). Those properties will not increase from that level due to this project.

Exhibit A

Location Map

Exhibit B
Conceptual Site Plan



N

Legend

Project Boundary

9001-19 LONG BEACH BLVD RESIDENTIAL PROJECT

Figure 2-3. Conceptual Site Plan

0 20 40 Feet

Sources: Habitat for Humanity of Greater Los Angeles; Los Angeles County GIS. Map date: November 16, 2022.

2.0 Fundamentals of Noise

This section of the report provides basic information about noise and presents some of the terms used within the report.

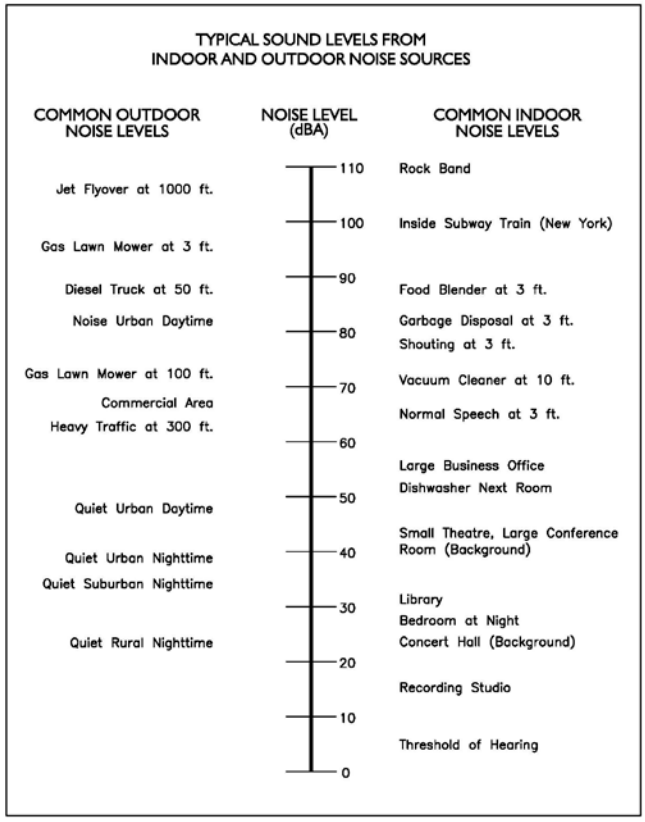
2.1 Sound, Noise and Acoustics

Sound is a disturbance created by a moving or vibrating source and is capable of being detected by the hearing organs. Sound may be thought of as mechanical energy of a moving object transmitted by pressure waves through a medium to a human ear. For traffic, or stationary noise, the medium of concern is air. *Noise* is defined as sound that is loud, unpleasant, unexpected, or unwanted.

2.2 Frequency and Hertz

A continuous sound is described by its *frequency* (pitch) and its *amplitude* (loudness). Frequency relates to the number of pressure oscillations per second. Low-frequency sounds are low in pitch (bass sounding) and high-frequency sounds are high in pitch (squeak). These oscillations per second (cycles) are commonly referred to as Hertz (Hz). The human ear can hear from the bass pitch starting out at 20 Hz all the way to the high pitch of 20,000 Hz.

Exhibit C: Typical A-Weighted Noise Levels



2.3 Sound Pressure Levels and Decibels

The *amplitude* of a sound determines it loudness. The loudness of sound increases or decreases as the amplitude increases or decreases. Sound pressure amplitude is measure in units of micro-Newton per square inch meter (N/m2), also called micro-Pascal (µPa). One µPa is approximately one hundred billionths (0.00000000001) of normal atmospheric pressure. Sound pressure level (SPL or L_p) is used to describe in logarithmic units the ratio of actual sound pressures to a reference pressure squared. These units are called decibels abbreviated dB. Exhibit C illustrates references sound levels for different noise sources.

2.4 Addition of Decibels

Because decibels are on a logarithmic scale, sound pressure levels cannot be added or subtracted by simple plus or minus addition. When two sounds or equal SPL are combined, they will produce an SPL 3 dB greater than the original single SPL. In other words, sound energy must be doubled to produce a 3 dB increase. If two sounds differ by approximately 10 dB, the higher sound level is the predominant sound.

2.5 Human Response to Changes in Noise Levels

In general, the healthy human ear is most sensitive to sounds between 1,000 Hz and 5,000 Hz, (A-weighted scale) and it perceives a sound within that range as being more intense than a sound with a higher or lower frequency with the same magnitude. For purposes of this report as well as with most environmental documents, the A-scale weighting is typically reported in terms of A-weighted decibel (dBA). Typically, the human ear can barely perceive the change in noise level of 3 dB. A change in 5 dB is readily perceptible, and a change in 10 dB is perceived as being twice or half as loud. As previously discussed, a doubling of sound energy results in a 3 dB increase in sound, which means that a doubling of sound energy (e.g. doubling the volume of traffic on a highway) would result in a barely perceptible change in sound level.

Changes in Intensity Level, dBA	Changes in Apparent Loudness
1	Not perceptible
3	Just perceptible
5	Clearly noticeable
10	Twice (or half) as loud

https://www.fhwa.dot.gov/environMent/noise/regulations_and_guidance/polguide/polguide02.cfm

2.6 Noise Descriptors

Noise in our daily environment fluctuates over time. Some noise levels occur in regular patterns, others are random. Some noise levels are constant while others are sporadic. Noise descriptors were created to describe the different time-varying noise levels.

A-Weighted Sound Level: The sound pressure level in decibels as measured on a sound level meter using the A-weighted filter network. The A-weighting filter de-emphasizes the very low and very high frequency components of the sound in a manner similar to the response of the human ear. A numerical method of rating human judgment of loudness.

Ambient Noise Level: The composite of noise from all sources, near and far. In this context, the ambient noise level constitutes the normal or existing level of environmental noise at a given location.

Community Noise Equivalent Level (CNEL): The average equivalent A-weighted sound level during a 24-hour day, obtained after addition of five (5) decibels to sound levels in the evening from 7:00 to 10:00 PM and after addition of ten (10) decibels to sound levels in the night before 7:00 AM and after 10:00 PM.

Decibel (dB): A unit for measuring the amplitude of a sound, equal to 20 times the logarithm to the base 10 of the ratio of the pressure of the sound measured to the reference pressure, which is 20 micro-pascals.

dB(A): A-weighted sound level (see definition above).

Equivalent Sound Level (LEQ): The sound level corresponding to a steady noise level over a given sample period with the same amount of acoustic energy as the actual time varying noise level. The energy average noise level during the sample period.

Habitable Room: Any room meeting the requirements of the Uniform Building Code or other applicable regulations which is intended to be used for sleeping, living, cooking or dining purposes, excluding such enclosed spaces as closets, pantries, bath or toilet rooms, service rooms, connecting corridors, laundries, unfinished attics, foyers, storage spaces, cellars, utility rooms and similar spaces.

L(n): The A-weighted sound level exceeded during a certain percentage of the sample time. For example, L10 in the sound level exceeded 10 percent of the sample time. Similarly, L50, L90 and L99, etc.

Noise: *A*ny unwanted sound or sound which is undesirable because it interferes with speech and hearing, or is intense enough to damage hearing, or is otherwise annoying. The State Noise Control Act defines noise as "...excessive undesirable sound...".

Outdoor Living Area: Outdoor spaces that are associated with residential land uses typically used for passive recreational activities or other noise-sensitive uses. Such spaces include patio areas, barbecue areas, jacuzzi areas, etc. associated with residential uses; outdoor patient recovery or resting areas associated with hospitals, convalescent hospitals, or rest homes; outdoor areas associated with places of worship which have a significant role in services or other noise-sensitive activities; and outdoor school facilities routinely used for educational purposes which may be adversely impacted by noise. Outdoor areas usually not included in this definition are: front yard areas, driveways, greenbelts, maintenance areas and storage areas associated with residential land uses; exterior areas at hospitals that are not used for patient activities; outdoor areas associated with places of worship and principally used for short-term social gatherings; and, outdoor areas associated with school facilities that are not typically associated with educational uses prone to adverse noise impacts (for example, school play yard areas).

Percent Noise Levels: See L(n).

Sound Level (Noise Level): The weighted sound pressure level obtained by use of a sound level meter having a standard frequency-filter for attenuating part of the sound spectrum.

Sound Level Meter: An instrument, including a microphone, an amplifier, an output meter, and frequency weighting networks for the measurement and determination of noise and sound levels.

Single Event Noise Exposure Level (SENEL): The dB(A) level which, if it lasted for one second, would produce the same A-weighted sound energy as the actual event.

2.7 Traffic Noise Prediction

Noise levels associated with traffic depends on a variety of factors: (1) volume of traffic, (2) speed of traffic, (3) auto, medium truck (2–3 axle) and heavy truck percentage (4 axle and greater), and sound propagation. The greater the volume of traffic, higher speeds and truck percentages equate to a louder volume in noise. A doubling of the Average Daily Traffic (ADT) along a roadway will increase noise levels by approximately 3 dB; reasons for this are discussed in the sections above.

2.8 Sound Propagation

As sound propagates from a source it spreads geometrically. Sound from a small, localized source (i.e., a point source) radiates uniformly outward as it travels away from the source in a spherical pattern. The sound level attenuates at a rate of 6 dB per doubling of distance. The movement of vehicles down a roadway makes the source of the sound appear to propagate from a line (i.e., line source) rather than a point source. This line source results in the noise propagating from a roadway in a cylindrical spreading versus a spherical spreading that results from a point source. The sound level attenuates for a line source at a rate of 3 dB per doubling of distance.

As noise propagates from the source, it is affected by the ground and atmosphere. Noise models use hard site (reflective surfaces) and soft site (absorptive surfaces) to help calculate predicted noise levels. Hard site conditions assume no excessive ground absorption between the noise source and the receiver. Soft site conditions such as grass, soft dirt or landscaping attenuate noise at a rate of 1.5 dB per doubling of distance. When added to the geometric spreading, the excess ground attenuation results in an overall noise attenuation of 4.5 dB per doubling of distance for a line source and 7.5 dB per doubling of distance for a point source.

Research has demonstrated that atmospheric conditions can have a significant effect on noise levels when noise receivers are located 200 feet from a noise source. Wind, temperature, air humidity and turbulence can further impact have far sound can travel.

3.0 Ground-Bourne Vibration Fundamentals

3.1 Vibration Descriptors

Ground-borne vibrations consist of rapidly fluctuating motions within the ground that have an average motion of zero. The effects of ground-borne vibrations typically only cause a nuisance to people, but at extreme vibration levels, damage to buildings may occur. Although ground-borne vibration can be felt outdoors, it is typically only an annoyance to people indoors where the associated effects of the shaking of a building can be notable. Ground-borne noise is an effect of ground-borne vibration and only exists indoors, since it is produced from noise radiated from the motion of the walls and floors of a room and may also consist of the rattling of windows or dishes on shelves.

Several different methods are used to quantify vibration amplitude.

PPV – Known as the peak particle velocity (PPV) which is the maximum instantaneous peak in vibration velocity, typically given in inches per second.

RMS – Known as root mean squared (RMS) can be used to denote vibration amplitude

VdB – A commonly used abbreviation to describe the vibration level (VdB) for a vibration source.

3.2 Vibration Perception

Typically, developed areas are continuously affected by vibration velocities of 50 VdB or lower. These continuous vibrations are not noticeable to humans whose threshold of perception is around 65 VdB. Outdoor sources that may produce perceptible vibrations are usually caused by construction equipment, steel-wheeled trains, and traffic on rough roads, while smooth roads rarely produce perceptible ground-borne noise or vibration. To counter the effects of ground-borne vibration, the Federal Transit Administration (FTA) has published guidance relative to vibration impacts. According to the FTA, fragile buildings can be exposed to ground-borne vibration levels of 0.3 inches per second without experiencing structural damage.

3.3 Vibration Perception

There are three main types of vibration propagation: surface, compression, and shear waves. Surface waves, or Rayleigh waves, travel along the ground's surface. These waves carry most of their energy along an expanding circular wave front, similar to ripples produced by throwing a rock into a pool of water. P-waves, or compression waves, are body waves that carry their energy along an expanding spherical wave front. The particle motion in these waves is longitudinal (i.e., in a "push-pull" fashion). P-waves are analogous to airborne sound waves. S-waves, or shear waves, are also body waves that carry energy along an expanding spherical wave front. However, unlike P-waves, the particle motion is transverse, or side-to-side and perpendicular to the direction of propagation.

As vibration waves propagate from a source, the vibration energy decreases in a logarithmic nature and the vibration levels typically decrease by 6 VdB per doubling of the distance from the vibration source. As stated above, this drop-off rate can vary greatly depending on the soil but has been shown to be effective enough for screening purposes, in order to identify potential vibration impacts that may need to be studied through actual field tests.

4.0 Regulatory Setting

The proposed project is located in the City of Santa Rosa and noise regulations are addressed through the efforts of various federal, state and local government agencies. The agencies responsible for regulating noise are discussed below.

4.1 Federal Regulations

The adverse impact of noise was officially recognized by the federal government in the Noise Control Act of 1972, which serves three purposes:

- Publicize noise emission standards for interstate commerce
- Assist state and local abatement efforts
- Promote noise education and research

The Federal Office of Noise Abatement and Control (ONAC) originally was tasked with implementing the Noise Control Act. However, it was eventually eliminated leaving other federal agencies and committees to develop noise policies and programs. Some examples of these agencies are as follows: The Department of Transportation (DOT) assumed a significant role in noise control through its various agencies. The Federal Aviation Agency (FAA) is responsible to regulate noise from aircraft and airports. The Federal Highway Administration (FHWA) is responsible to regulate noise from the interstate highway system. The Occupational Safety and Health Administration (OSHA) is responsible for the prohibition of excessive noise exposure to workers.

The federal government advocates that local jurisdiction use their land use regulatory authority to arrange new development in such a way that “noise sensitive” uses are either prohibited from being constructed adjacent to a highway or, or alternatively that the developments are planned and constructed in such a manner that potential noise impacts are minimized.

Since the federal government has preempted the setting of standards for noise levels that can be emitted by the transportation source, the City is restricted to regulating the noise generated by the transportation system through nuisance abatement ordinances and land use planning.

4.2 State Regulations

Established in 1973, the California Department of Health Services Office of Noise Control (ONC) was instrumental in developing regularity tools to control and abate noise for use by local agencies. One significant model is the “Land Use Compatibility for Community Noise Environments Matrix.” The matrix allows the local jurisdiction to clearly delineate compatibility of sensitive uses with various incremental levels of noise.

The State of California has established noise insulation standards as outlined in Title 24 and the Uniform Building Code (UBC) which in some cases requires acoustical analyses to outline exterior noise levels and to ensure interior noise levels do not exceed the interior threshold. The State mandates that the legislative body of each county and city adopt a noise element as part of its comprehensive general plan.

4.3 City of South Gate Noise Regulations

The local noise element must recognize the land use compatibility guidelines published by the State Department of Health Services. The guidelines rank noise land use compatibility in terms of normally acceptable, conditionally acceptable, normally unacceptable, and clearly unacceptable as illustrated in Exhibit D.

Exhibit D: Land Use Compatibility Guidelines

Table N-4: Noise and Land Use Compatibility Matrix

Land Use Category	Community Noise Exposure (Ldn or CNEL, dBA)			
	Normally Acceptable	Conditionally Acceptable	Normally Unacceptable	Clearly Unacceptable
Residential - Low Density, Single-Family, Duplex, Mobile Homes	50 - 60	55 - 70	70-75	75-85
Residential - Multiple Family	50 - 65	60 - 70	70 - 75	70 – 85
Transient Lodging - Motel, Hotels	50 - 65	60 - 70	70 - 80	80 – 85
Schools, Libraries, Churches, Hospitals, Nursing Homes	50 - 70	60 - 70	70 - 80	80 – 85
Auditoriums, Concert Halls, Amphitheaters	NA	50 - 70	NA	65 – 85
Sports Arenas, Outdoor Spectator Sports	NA	50 - 75	NA	70 – 85
Playgrounds, Neighborhood Parks	50 - 70	NA	67.5 - 75	72.5 – 85
Golf Courses, Riding Stables, Water Recreation, Cemeteries	50 - 70	NA	70 - 80	80 – 85
Office Buildings, Business Commercial and Professional	50 - 70	67.5 - 77.5	75 - 85	NA
Industrial, Manufacturing, Utilities, Agriculture	50 - 75	70 - 80	75 - 85	NA

NA: Not Applicable

Source: Office of Planning and Research, California, General Plan Guidelines, October 2003.

***Normally Acceptable** – Specified land use is satisfactory, based upon the assumption that any buildings involved are of normal conventional construction, without any special noise insulation requirements.*

***Conditionally Acceptable** – New construction or development should be undertaken only after a detailed analysis of the noise reduction requirements is made and needed noise insulation features included in the design. Conventional construction, but with closed windows and fresh air supply systems or air conditioning, will normally suffice.*

***Normally Unacceptable** – New construction or development should be discouraged. If new construction or development does proceed, a detailed analysis of the noise reduction requirements must be made and needed noise insulation features included in the design.*

***Clearly Unacceptable** – New construction or development should generally not be undertaken.*

The City of South Gate outlines their noise regulations and standards within the Noise Element from the General Plan.

<u>City of South Gate General Plan</u>

The Land Use Compatibility Standards are presented in Exhibit D.

Goals, Objectives, and Policies

Goal N1: A reduction in noise levels created by construction and maintenance activities

Objective N1.1: Minimize noise levels from construction and maintenance equipment, vehicles, and activities.

Policies

P.1 Construction activities will be prohibited between the hours of 7:00 PM to 8: 00 AM Monday through Saturday and on Sundays and Federal holidays.

P.2 Construction noise reduction methods will be employed to the maximum extent feasible. These measures may include, but not limited to, shutting off idling equipment, installing temporary acoustic barriers around stationary construction noise sources, maximizing the distance between construction equipment staging areas and occupied sensitive receptor areas, and use of electric air compressors and similar power tools, rather than diesel equipment.

P.3 Prior to approval of project plans and specifications by the City, project applicants and/or construction contractors will identify construction equipment and noise reducing measures, and the anticipated noise reduction.

P.4 The City will require municipal vehicles and noise-generating mechanical equipment purchased or used by the City to comply with noise standards specified in the City's Municipal Code, or other applicable codes.

P.5 The City may exceed the noise standards on a case-by-case basis for special circumstances including emergency situations, special events and expedited development projects.

Goal N3: A reduction of noise spillover or encroachment from commercial/ office/retail, research and development, manufacturing and distribution, and industrial uses on adjoining residential areas and other noise sensitive land uses

Objective N 3.1: Improve ambient noise conditions in sensitive land use areas.

Policies

P.1 The City will identify and work with property owners to reduce or eliminate excessive or loud noise near noise sensitive areas to meet the noise standards in the City's Municipal Code.

P.2 The City should encourage the retrofitting of existing homes to reduce interior noise impacts.

P.3 The City should encourage the use of noise absorbing materials in existing and future development to reduce interior noise impacts to sensitive land uses.

Objective N 3.2: Minimize noise impacts to residential dwelling units located above ground floor commercial/office/retail or civic/institutional uses in mixed-use development projects.

Policies

P.1 New mixed-use structures with commercial/office/retail or civic/institutional and residential uses will incorporate techniques that prevent the transfer of noise and vibration through design and construction technology.

P.2 The City should encourage commercial uses in mixed-use developments that are not noise intrusive to on-site or surrounding noise sensitive land uses.

P.3 The City will prohibit the development of new nightclubs and other high noise-generating entertainment uses directly adjacent to existing and/or planned residential uses, schools, health care facilities, or other noise-sensitive land uses. Such uses may be permitted, at the direction of the City Council, if a noise analysis prepared by an acoustical expert recommends effective mitigation that can ensure compliance with the City's Municipal Code and that the project will incorporate all identified recommendations.

P.4 New mixed-use development projects should locate residential units be away from significant noise generating sources, such as mechanical equipment, entertainment uses, restaurant patios, gathering places, loading and delivery areas, parking lots, and trash enclosures.

P.5 New mixed-use developments with residential components will be required to install signs requesting patrons to be mindful of noise levels in outdoor commercial areas during nighttime hours.

Objective N 3.3: Minimize noise impacts on residential or other noise-sensitive land uses located adjacent to non-residential uses.

Policies

P.1 Truck deliveries to non-residential uses abutting residential or noise sensitive uses will be limited to the hours between 7:00 AMand 10:00 PM.

P.2 New non-residential projects adjacent to residential uses will be required to incorporate noise reducing features into the project design to minimize impacts to nearby residential uses and other noise sensitive land uses.

P.3 The City will prohibit the location of uses characterized by excessive noise, such as industrial uses and fast food restaurants with drive-through speakers, directly adjacent or in close proximity to existing or planned residential uses.

P.4 The City will prohibit the siting of loading and shipping facilities for commercial and industrial operations adjacent to existing or planned residential uses.

P.5 New buildings being developed adjacent to existing and/or planned residential uses or other noise-sensitive land uses will be required to site and operate heating, ventilating,

and air conditioning generators in a manner that limits adverse noise impacts to the greatest extent feasible.

P.6 Wherever feasible, parking areas for new or redeveloped non-residential uses should be buffered and shielded by, but not limited to, walls, fences, and/or adequate landscaping.

P.7 The City should encourage existing noise sensitive uses, including schools, libraries, health care facilities, and residential uses in areas where existing or future noise levels exceed 65 dBA CNEL to incorporate fences, walls, landscaping, and/or other noise buffers and barriers, where appropriate and feasible.

P.8 The City should encourage school districts or other educational facilities to locate outdoor activity areas, such as playgrounds and sport fields, away from residential areas.

Goal N 4: Minimize transportation noise impacts from motor vehicles and trains adjacent to residential and other noise sensitive land uses

Objective N 4.1: Work towards the reduction of transportation noise.

Policies

P.1 The City should minimize transportation noise through the proper design of street circulation, coordination of routing, and other traffic control measures (e.g., shifting travel lanes away from impacted units, adding bike ways, etc. to relieve traffic congestion).

P.2 Businesses in industrial areas will be required to manage heavy truck and vehicle access to minimize noise and vibration impacts on adjoining uses.

P.3 The City should discourage through traffic on residential local streets to reduce noise impacts.

P.4 The City will coordinate and work with California Department of Transportation (Caltrans) to minimize freeway noise levels from Interstate 710 (I-710) on nearby noise-sensitive land uses to a level below the State standard of 65 dBA CNEL for exterior noise levels and 45 dBA CNEL for interior residential noise levels.

Objective N 4.2: Minimize noise levels created by the Union Pacific, Southern Pacific, and any future rail systems located in close proximity to residential and other noise-sensitive land uses.

Policies

P.1 The City will work with rail operators to install and maintain noise mitigation features where operations adversely impact existing or planned residential and other noise-sensitive land uses.

P.2 The City will work with rail operators to ensure noise impacts are considered and mitigated through proper design, siting, and construction.

P.3 Future rail projects under the City's control will be required to analyze noise impacts and to identify and incorporate noise reducing features into the project design.

P.4 The City should encourage the construction of noise barriers for residential uses near active rail corridors.

P.5 The City should encourage rail operators to schedule rail train activity during daytime hours.

P.6 The City will require that noise attenuation measures be incorporated into all new development, renovations, and remodels of residential, health care facilities, schools, libraries, senior facilities, and churches in close proximity to existing or known planned rail lines. Sound attenuation measures will reduce interior noise to a maximum of 45 dBA CNEL.

Goal N 5: Implementation Actions Maximize efficiencies in noise abatement through clear and effective policies and ordinances

Objective N 5.1: Continuously review and modify City Plans, Codes, and Ordinances, as appropriate, to ensure noise generating uses are adequately addressed.

Policies

P.1 The City will modify and update the City's Noise Ordinance, land use plans, guidelines, and other regulations regularly and as needed in response to new Federal, State, and County standards and guidelines, as needed.

P.2 The City should review and update the City's policies and regulations affecting noise, as needed.

Goal N 6: Enforce all City noise standards

Objective N 6.1: Ensure residents, businesses, and visitors know and comply with the City's noise standards.

Policies

P.1 The City should make information available to the public regarding the City's noise regulations, the health effects of high noise levels, means of mitigating such levels, as well as abatement and enforcement procedures.

P.2 The City will enforce all City, State, and Federal noise standards.

P.3 The City should enforce established speed limits to control noise levels.

City of South Gate – Noise Ordinance

Section 11.34.080 Maximum sound levels by noise zone.

A. Noise Zone Standards. Table 11.34-1, Noise Zone Standards, establishes noise-level standards and temporary maximum standards applicable to land use categories by noise zone. No person shall make, cause, or allow noise that exceeds the standards of Table 11.34-1, inclusive of ambient noise. These standards are inclusive of all noise sources, including ambient noise, animals, equipment, firearms, people gatherings or parties, tools, vehicles, or other noise source resulting in temporary or sustained noise levels in excess of the standards of Table 11.34-1 and Table 11.34-2, Permitted Temporary Noise Level Increase.

Table 11.34-1 Noise Zone Standards

Noise Zone	Type of Land Use	Noise Standards[1]	
		Noise Level[2]	Time Period
1	Noise Sensitive Area	45 dBA	Anytime
2	Residential Properties	50 dBA	7:00 AM - 10:00 PM
		40 dBA	10:00 PM - 7:00 AM
3	Commercial Properties	55 dBA	Anytime
4	Industrial Properties	65 dBA	Anytime

Notes:
1. MD assumes if the ambient noise exceeds the resulting standard, the ambient noise level shall be the standard.
2. dBA = A-weighted decibel L_{eq} standard.

Table 11.34-2 Permitted Temporary Noise Level Increase

Permitted Maximum Increase[1]	Noise Duration[2]
+5 dBA	30 mins. per hour
+10 dBA	15 mins. per hour
+12 dBA	10 mins. per hour
+15 dBA	5 mins. per hour
+20 dBA	2 mins. per hour

Notes:
1. dBA = A-weighted decibel L_{eq} standard.
2. mins. = minutes

Regulation Summary

The current noise levels at the project location already exceed the base level conditions for residential zones. The noise ordinance does not specify how to apply the noise standard in this case; therefore, consistent with industry practice, MD assumes that if the ambient noise level exceeds the existing noise limit, the ambient noise level becomes the standard. In other words, if the project only noise does not exceed the existing ambient condition, then the project complies with the noise standard.

5.0 Study Method and Procedure

The following section describes the noise modeling procedures and assumptions used for this assessment.

5.1 Noise Measurement Procedure and Criteria

Noise measurements are taken to determine the existing noise levels. A noise receiver or receptor is any location in the noise analysis in which noise might produce an impact. The following criteria are used to select measurement locations and receptors:

- Locations expected to receive the highest noise impacts, such as first row of houses
- Locations that are acoustically representative and equivalent of the area of concern
- Human land usage
- Sites clear of major obstruction and contamination

MD conducted the sound level measurements in accordance to the City and CalTrans technical noise specifications. All measurements equipment meets American National Standards Institute (ANSI) specifications for sound level meters (S1.4-1983 identified in Chapter 19.68.020.AA). The following gives a brief description of the Caltrans Technical Noise Supplement procedures for sound level measurements:

- Microphones for sound level meters were placed 5-feet above the ground for all measurements
- Sound level meters were calibrated (Larson Davis CAL 200) before and after each measurement
- Following the calibration of equipment, a wind screen was placed over the microphone
- Frequency weighting was set on “A” and slow response
- Results of the short-term noise measurements were recorded on field data sheets
- During any short-term noise measurements any noise contaminations such as barking dogs, local traffic, lawn mowers, or aircraft fly-overs were noted
- Temperature and sky conditions were observed and documented

5.2 Short-term Noise Measurement Locations

Three (3) 15-minute noise measurements were selected to represent the ambient noise condition at or near the project site. Short-term noise measurements were conducted at the project site and represent ambient levels at the site. Appendix A includes photos, field sheets, and measured noise data. Exhibit E (next page) illustrates the location of the measurements.

5.3 Stationary Noise Modeling

SoundPLAN (SP) acoustical modeling software was utilized to model future worst-case project operational noise impacts (stationary noise sources) to the on-site and nearest off-site sensitive receptors.

SP is capable of evaluating multiple stationary noise sources at various receiver locations. SP’s software utilizes algorithms (based on the inverse square law and FHWA calculations) to calculate noise level

projections. The software allows the user to input specific noise sources, spectral content, sound barriers, building placement, topography, and sensitive receptor locations.

The future worst-case noise level projections were modeled using reference sound level data for the proposed project parking stalls and AC units. Noise associated with parking stalls include but are not limited to idling cars, doors closing, and starting engine noise. Noise levels associated with parking lots can reach peak levels of 80 dBA. In addition, the model takes into account the point source noise from the Project's fourteen (14) AC units with a reference noise level of 65 dBA at 10 feet from the source, Modeling input and output assumptions are indicated in Appendix C.

5.4 FHWA Roadway Construction Noise Model

The construction noise analysis utilizes the Federal Highway Administration (FHWA) Roadway Construction Noise Model (RCNM), together with several key construction parameters. Key inputs include distance to the sensitive receiver, equipment usage, % usage factor, and baseline parameters for the project site.

The project was analyzed based on the different construction phases. Construction noise is expected to be loudest during the grading phase of construction. The grading level was calculated as a worst-case level.

Exhibit E

Measurement Locations

X = Measurement location

= boundary

6.0 Existing Noise Environment

Three (3) 15-minute ambient noise measurement were conducted at the project site. The measurement measured the 15-minute Leq, Lmin, Lmax and other statistical data (e.g. L2, L8, etc.). The noise measurements were taken to determine the existing baseline noise conditions.

6.1 Short-Term Noise Measurement Results

The results of the short-term noise data are presented in Table 1.

Table 1: Short-term Nosie Measurement Data (dBA)[1]

Date	Start	Stop	15-Minute dB(A)							
			L_{EQ}	L_{MAX}	L_{MIN}	L_2	L_8	L_{25}	L_{50}	L_{90}
6/26/2018	5:21 PM	5:36 PM	62.6	73.6	48.9	70.0	66.7	63.2	60.3	52.9
6/26/2018	5:47 PM	6:02 PM	69.2	85.3	53.0	76.6	72.1	69.9	65.1	57.3
6/26/2018	6:03 PM	6:18 PM	65.8	86.3	50.7	71.6	68.6	65.8	62.7	55.1

Notes:
1. Short-term noise monitoring locations are illustrated in Exhibit E.

Noise data indicates the ambient level ranged between 63 dBA to 69 dBA Leq near the project site. Additional field notes and photographs are provided in Appendix A. It should be noted that the existing noise condition (62-69 dBA, Leq) at the site is greater than the City's daytime noise limit for residential uses (50 dBA, Leq) These ambient levels were used as the noise level limit for the project.

7.0 Future Noise Environment Impacts and Mitigation

This assessment analyzes future noise impacts from the project and compares the results to the City's Noise Standards. The analysis details the estimated exterior noise levels from on-site stationary noise sources.

7.1 Future Exterior Noise

The following outlines the exterior noise levels associated with the proposed project.

7.1.1 Noise Impacts to Off-Site Receptors Due to Stationary Sources

Sensitive receptors that may be affected by project operational noise include adjacent commercial land uses to the south and adjacent residential uses to the southwest and west of the project site. The worst-case stationary noise was modeled using SoundPLAN acoustical modeling software. The model utilizes reference sound level data for the mechanical equipment specified within Section 5.3 of this report.

A total of six (6) receptor locations were modeled to evaluate the proposed project's operational noise impact to adjacent noise sensitive land uses. A receptor is denoted by a yellow dot.

Project Operational Noise Levels

Exhibit F shows the "project only" operational noise levels at the property lines and/or sensitive receptor areas. Exhibit G illustrates the "project only" noise contours at the project site and illustrates how the noise will propagate at the site. Worst-case operational noise levels are anticipated to range between 40 to 60 dBA Leq at the receptors R1 – R6.

Project Plus Ambient Operational Noise Levels

Table 2 demonstrates the project plus ambient noise levels. Project plus ambient noise level projections are anticipated to range between 62.6 to 69.5 dBA Leq at the receptors R1 – R6. The project noise projections are below the City's existing ambient noise levels, and the change in noise level as a result of the project ranges from 0 to 1 dB.

Table 2: Worst-case Predicted Operational Noise Levels (dBA)

Receptor[1]	Floor	Existing Ambient Noise Level (dBA, Leq)[2]	Project Noise Level (dBA, Leq)[3]	Total Combined Noise Level (dBA, Leq)	Exceeds Ordinance?	Change in Noise Level as Result of Project
1	1	69.2	58.0	69.5	NO	0.3
2	1	65.8	54.0	66.1	NO	0.3
3	1	65.8	60.0	66.8	NO	1.0
4	1	65.8	47.0	65.9	NO	0.1
5	1	65.8	44.0	65.8	NO	0.0
6	1	62.6	40.0	62.6	NO	0.0

Notes:
1. Receptors 1 and 2 represent commercial uses. Receptors 3-6 represent residential uses.
2. Ambient Noise condition from short-term noise measurements.
3. See Exhibit F for the operational noise level projections at said receptors.

In addition, Table 2 provides the anticipated change in noise level as a result of the proposed project during operable conditions. As shown in Table 2, the operational noise levels will result in a nominal change at the various sensitive receptors.

When comparing the change in noise level to acoustic characteristics outlined within Section 2.5 of this report, the noise level increase would be not perceptible at the receptors.

As already demonstrated, the project noise levels do not exceed the existing ambient noise level. Therefore, the project's impact is less than significant, and no noise reduction measures are required.

7.1.2 Noise Impacts to Off-Site Receptors Due to Project Generated Traffic

The project would generate 94 daily passenger car equivalent trips of which six (6) would occur in the AM peak hour and seven (7) of which would occur in the PM peak hour. Per the project trip generation and VMT analysis/screening report provided by MAT Engineering, Inc. (*Long Beach Boulevard Multifamily Residential Project Trip Generation & VMT Analysis/Screening, City of South Gate, California*), see Appendix B. This would not result in a substantial increase in traffic noise.

Traffic along the subject roadways would need to double in average daily traffic volumes to generate a 3 dBA increase in noise level. Since the project generates a nominal amount of traffic relative to the existing ADTs, the project's traffic noise level increase would be nominal and therefore less than significant.

7.2 Interior Noise Levels

The future interior noise level was calculated for the sensitive receptor locations using a typical "windows open" and "windows closed" condition. A "windows open" condition assumes 12 dBA of noise attenuation from the exterior noise level. A "windows closed" condition" assumes 20 dBA of noise attenuation from the exterior noise level. Table 3 indicates the first through 3rd floor interior noise levels for the project site.

Table 3: Future 2040 Interior Noise Levels (dBA, CNEL)

Location	Roadway Noise Source	Floor	Noise Level at Building Facade[1]	Interior Noise Reduction Required to Meet Interior Noise Standard of 45 dBA CNEL	Interior Noise Level w/ Typical Residential Windows (STC≥ 25)		STC Rating for Windows Facing Subject Roadway[4]
					Window Open[2]	Windows Closed[3]	
Façade Facing Long Beach Blvd	Long Beach Blvd	1st-3rd	69	24	57	49	29

Notes:
1. Noise level from short-term measurement during peak traffic hours.
2. A minimum of 12 dBA noise reduction is assumed with a "windows open" condition.
3. A minimum of 20 dBA noise reduction is assumed with a "windows closed" condition.
4. Indicates the required STC rating to meet the interior noise standard.

As shown in Table 3, the interior noise level would be about 57 dBA CNEL with the windows open and about 49 dBA CNEL with the windows closed with standard windows. The projections assume typical 2x4 wood frame and stucco construction for multi-family developments. To meet the City's interior 45 dBA CNEL standard a "windows closed" condition is required and windows and sliding glass doors facing Long Beach Boulevard with an STC rating of 29 are required.

The following outlines the glazing requirements for the project to meet interior noise standards:

1. All windows and sliding glass doors on the façade facing on Long Beach Boulevard must have an STC rating of 29 or higher for all floors.

2. All other windows and sliding glass doors must have an STC rating of 25 or higher on all floors.

7.3 Noise Reduction Measures

In order to comply with the City's noise requirements, the following noise reduction measures are required:

1. The project shall achieve a minimum 24 dBA noise reduction in the resident building shell design to meet the City's 45 dBA CNEL interior residential requirement by implementing windows with an STC rating ranging between 25 to 29, depending on façade location.

Exhibit F

Future Operational Noise Levels (Leq)

8.0 Construction Noise Impact

The degree of construction noise may vary for different areas of the project site and also vary depending on the construction activities. Noise levels associated with the construction will vary with the different phases of construction.

8.1 Construction Noise

The Environmental Protection Agency (EPA) has compiled data regarding the noise generated characteristics of typical construction activities. The data is presented in Table 4.

Table 4: Typical Construction Noise Levels[1]

Equipment Powered by Internal Combustion Engines

Type	Noise Levels (dBA) at 50 Feet
Earth Moving	
Compactors (Rollers)	73 - 76
Front Loaders	73 - 84
Backhoes	73 - 92
Tractors	75 - 95
Scrapers, Graders	78 - 92
Pavers	85 - 87
Trucks	81 - 94
Materials Handling	
Concrete Mixers	72 - 87
Concrete Pumps	81 - 83
Cranes (Movable)	72 - 86
Cranes (Derrick)	85 - 87
Stationary	
Pumps	68 - 71
Generators	71 - 83
Compressors	75 - 86

Impact Equipment

Type	Noise Levels (dBA) at 50 Feet
Saws	71 - 82
Vibrators	68 - 82

Notes:
[1] Referenced Noise Levels from the Environmental Protection Agency (EPA)

Construction noise is considered a short-term impact and would be considered significant if construction activities occur during daytime hours. Construction noise will have a temporary or periodic increase in the ambient noise level above the existing within the project vicinity. Furthermore, noise reduction measures are provided to further reduce construction noise. The impact is considered less than significant however construction noise level projections are provided.

Typical operating cycles for these types of construction equipment may involve one or two minutes of full power operation followed by three to four minutes at lower power settings. Noise levels will be

loudest during grading phase. A likely worst-case construction noise scenario during grading assumes the use of a grader, a dozer, and two (2) backhoes operating at 65 feet from the nearest sensitive receptor. Grading is expected to reach up to 83 dBA Leq at the nearest sensitive receptor.

8.2 Construction Vibration

Construction activities can produce vibration that may be felt by adjacent land uses. The construction of the proposed project would not require the use of equipment such as pile drivers, which are known to generate substantial construction vibration levels. The primary vibration source during construction may be from a bulldozer. A large bulldozer has a vibration impact of 0.03 inches per second peak particle velocity (PPV) at 65 feet which is below any risk to architectural damage and on the threshold of perception.

The fundamental equation used to calculate vibration propagation through average soil conditions and distance is as follows:

$$PPV_{equipment} = PPV_{ref} (100/D_{rec})^n$$

Where: PPV_{ref} *= reference PPV at 100ft.*
D_{rec} *= distance from equipment to receiver in ft.*
n = 1.1 (the value related to the attenuation rate through ground)

The thresholds from the Caltrans Transportation and Construction Induced Vibration Guidance Manual in Table 5 (below) provides general thresholds and guidelines as to the vibration damage potential from vibratory impacts.

Table 5: Guideline Vibration Damage Potential Threshold Criteria

Structure and Condition	Maximum PPV (in/sec)	
	Transient Sources	Continuous/Frequent Intermittent Sources
Extremely fragile historic buildings, ruins, ancient monuments	0.12	0.08
Fragile buildings	0.2	0.1
Historic and some old buildings	0.5	0.25
Older residential structures	0.5	0.3
New residential structures	1.0	0.5
Modern industrial/commercial buildings	2.0	0.5

Source: Table 19, Transportation and Construction Vibration Guidance Manual, Caltrans, Sept. 2013.
Note: Transient sources create a single isolated vibration event, such as blasting or drop balls. Continuous/frequent intermittent sources include impact pile drivers, pogo-stick compactors, crack-and-seat equipment, vibratory pile drivers, and vibratory compaction equipment.

Table 6 gives approximate vibration levels for particular construction activities. This data provides a reasonable estimate for a wide range of soil conditions.

Table 6: Vibration Source Levels for Construction Equipment[1]

Equipment	Peak Particle Velocity (inches/second) at 25 feet	Approximate Vibration Level LV (dVB) at 25 feet
Pile driver (impact)	1.518 (upper range)	112
	0.644 (typical)	104
Pile driver (sonic)	0.734 upper range	105
	0.170 typical	93
Clam shovel drop (slurry wall)	0.202	94
Hydromill	0.008 in soil	66
(slurry wall)	0.017 in rock	75
Vibratory Roller	0.21	94
Hoe Ram	0.089	87
Large bulldozer	0.089	87
Caisson drill	0.089	87
Loaded trucks	0.076	86
Jackhammer	0.035	79
Small bulldozer	0.003	58

[1] Source: Transit Noise and Vibration Impact Assessment, Federal Transit Administration, May 2006.

At a distance of 65 feet, a large bulldozer would yield a worst-case 0.03 PPV (in/sec) which just on the threshold of perception and any risk of damage. The impact is less than significant, and no mitigation is required.

8.3 Construction Noise Reduction Measures

Construction operations must follow the City's General Plan and the Noise Ordinance, which states that construction, repair or excavation work performed must occur within the permissible hours. To further ensure that construction activities do not disrupt the adjacent land uses, the following measures should be taken:

1. Construction should occur during the daytime.

2. During construction, the contactor shall ensure all construction equipment is equipped with appropriate noise attenuating devices.

3. The contractor should locate equipment staging areas that will create the greatest distance between construction-related noise/vibration sources and sensitive receptors nearest the project site during all project construction.

4. Idling equipment should be turned off when not in use.

5. Equipment shall be maintained so that vehicles and their loads are secured from rattling and banging.

9.0 References

State of California General Plan Guidelines: 1998. Governor's Office of Planning and Research

City of South Gate: 2035 General Plan Noise Element.

City of South Gate: Section 11.34 Municipal Code. July 2022.

Long Beach Boulevard Multifamily Residential Project Trip Generation & VMT Analysis/Screening, City of South Gate, California. MAT Engineering, Inc. December 1, 2022.

Appendix A:

Field Measurement Data

15-Minute Continuous Noise Measurement Datasheet

Project Name:	Habitat for Humanity IS/EA
Project: #/Name:	0462-2022-034
Site Address/Location:	9001-9019 Long Beach Blvd
Date:	11/15/2022
Field Tech/Engineer:	Jason Schuyler/ Samuel Hord

Site Observations:

The site is directly under a flight path for Long Beach Int. Airport. as such the planes are almost constant in the sound readings. The compressor for the tire shot turned on at 5:54 pm and again later in NM3. Temp 64F winds 0-1 MPH. Traffic on Long Beach Blvd. is the primary noise source.

Sound Meter:	XL2, NTI	**SN:**	A2A-08562-E0
Settings:	A-weighted, slow, 1-sec, 15-minute interval		
Site Id:	NM1, NM2, NM3		

MD ACOUSTICS

15-Minute Continuous Noise Measurement Datasheet - Cont.

Project Name: Habitat for Humanity IS/EA

Site Address/Location: 9001-9019 Long Beach Blvd

Site Id: NM1, NM2, NM3

Figure 1: NM1

Figure 2: NM2

Figure 3: NM3

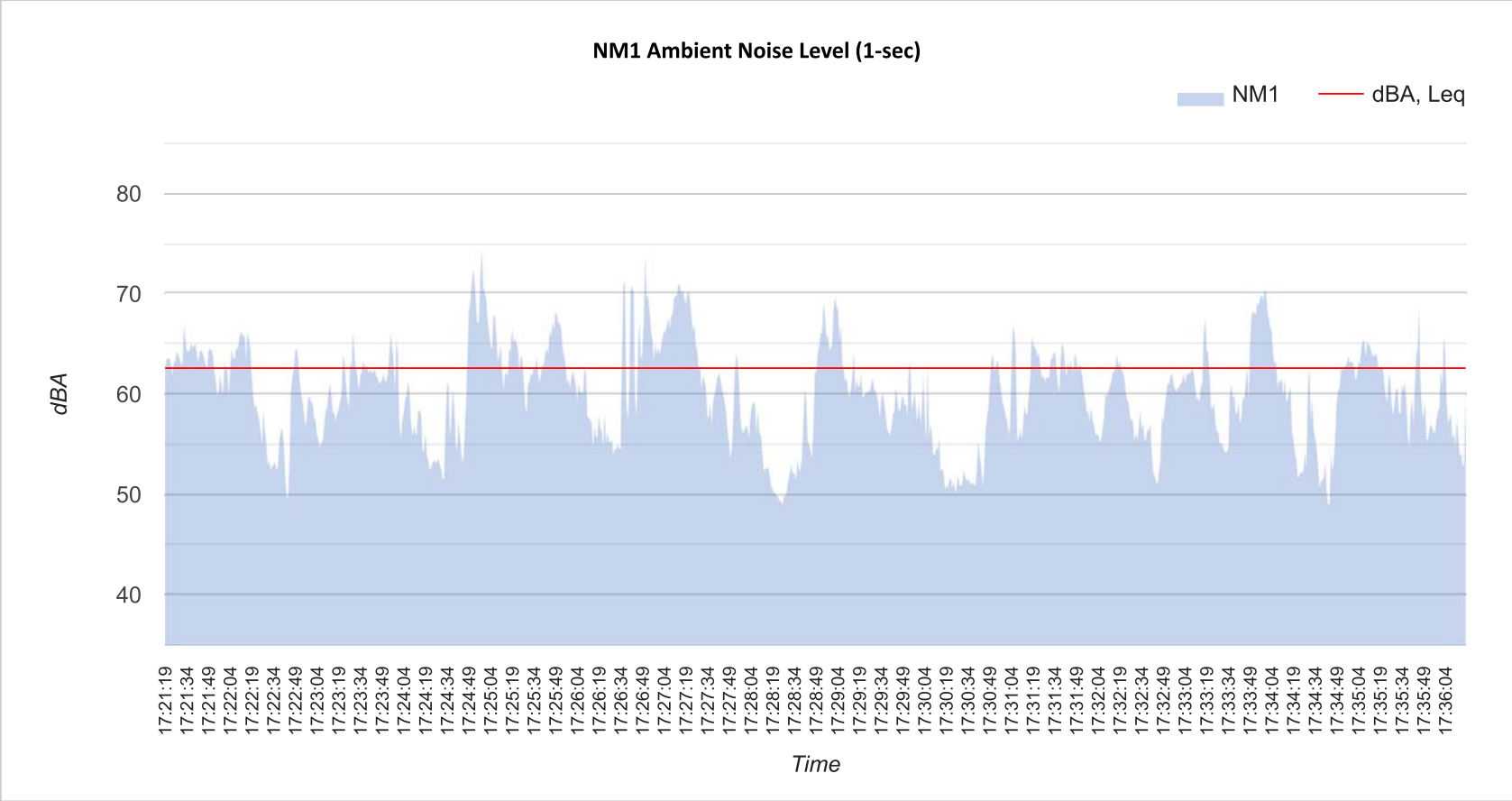
Table 1: Baseline Noise Measurement Summary

Location	Start	Stop	Leq	Lmax	Lmin	L2	L8	L25	L50	L90
NM1	5:21 PM	5:36 PM	62.6	73.6	48.9	70	66.7	63.2	60.3	52.9
NM2	5:47 PM	6:02 PM	69.2	85.3	53.0	76.6	72.1	69.9	65.1	57.3
NM3	6:03 PM	6:18 PM	65.8	86.3	50.7	71.6	68.6	65.8	62.7	55.1

MD ACOUSTICS

15-Minute Continuous Noise Measurement Datasheet - Cont.

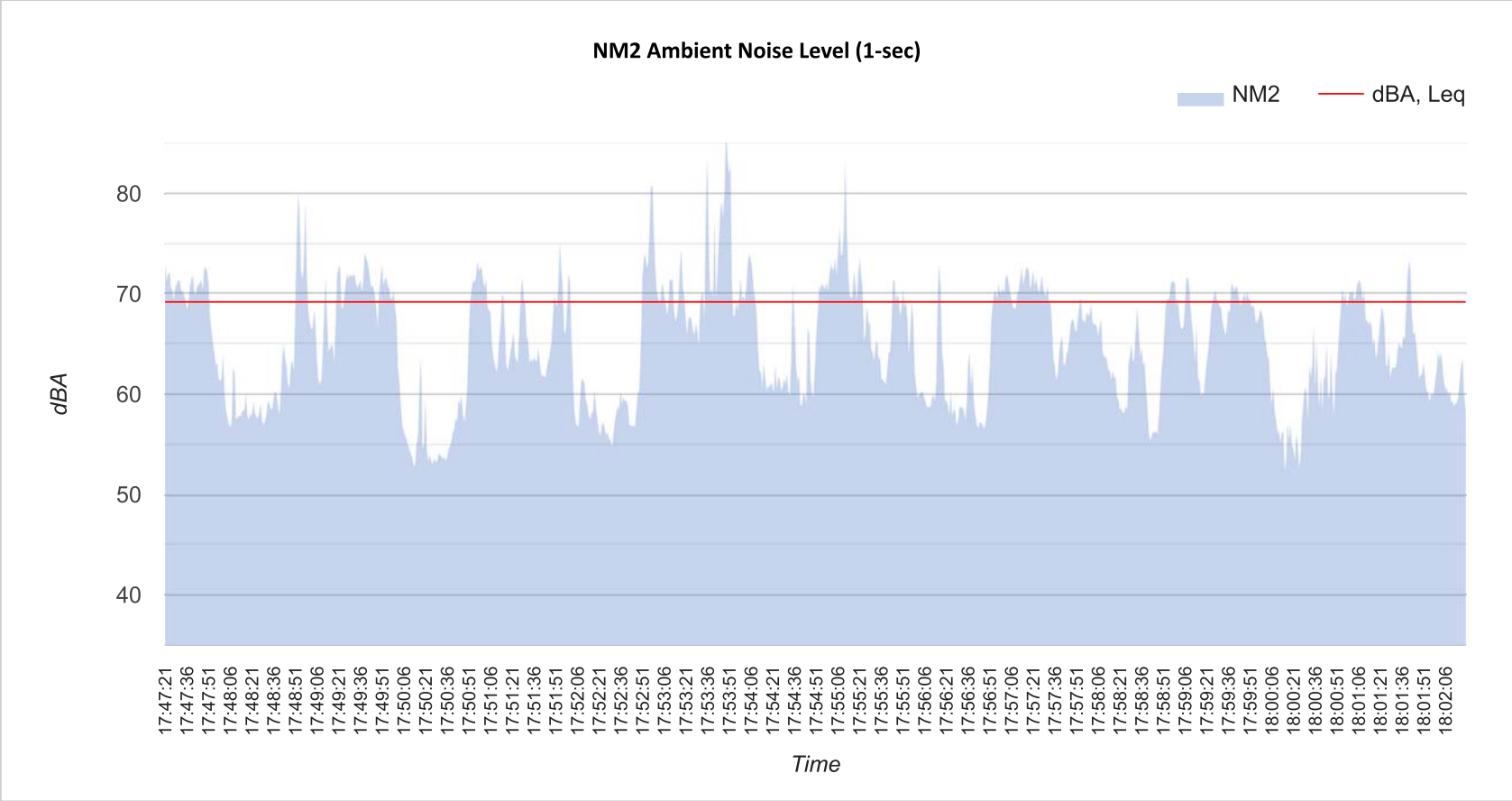
Project Name:	Habitat for Humanity IS/EA	**Site Topo:**	Buildings 1-2 stories tall site	**Noise Source(s) w/ Distance:**
Site Address/Location:	9001-9019 Long Beach Blvd	**Meteorological Cond.:**	64F Winds 0-1MPH	Road, Air plane and residential noise
Site Id:	NM1	**Ground Type:**	buildings and asphalt	



MD ACOUSTICS

15-Minute Continuous Noise Measurement Datasheet - Cont.

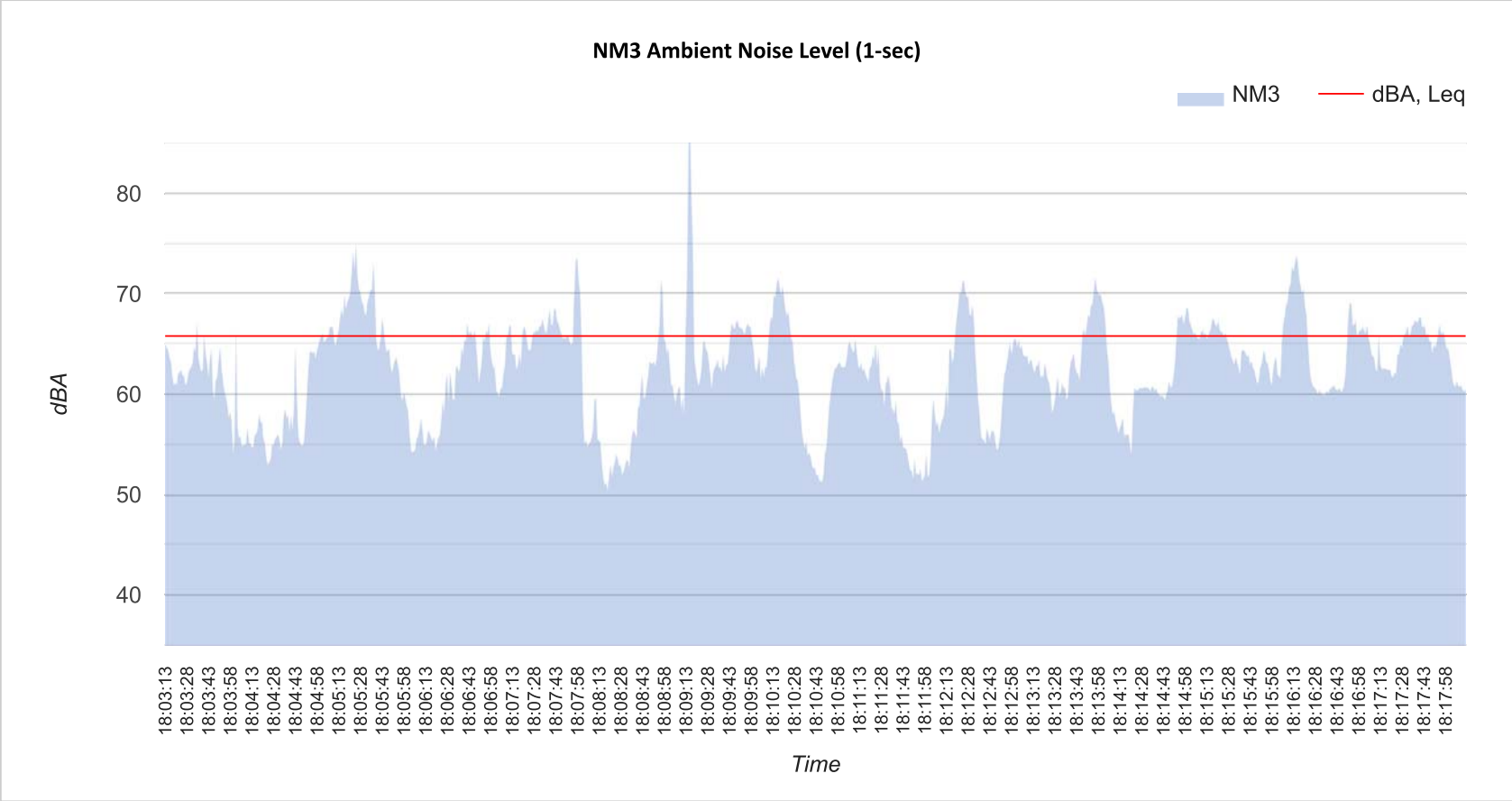
Project Name:	Habitat for Humanity IS/EA	**Site Topo:**	Buildings 1-2 stories tall site	**Noise Source(s) w/ Distance:**
Site Address/Location:	9001-9019 Long Beach Blvd	**Meteorological Cond.:**	64F Winds 0-1MPH	Road, Air plane and residential noise
Site Id:	NM2	**Ground Type:**	buildings and asphalt	



MD ACOUSTICS

15-Minute Continuous Noise Measurement Datasheet - Cont.

Project Name:	Habitat for Humanity IS/EA	**Site Topo:**	Buildings 1-2 stories tall site	**Noise Source(s) w/ Distance:**
Site Address/Location:	9001-9019 Long Beach Blvd	**Meteorological Cond.:**	64F Winds 0-1MPH	Road, Air plane and residential noise
Site Id:	NM3	**Ground Type:**	buildings and asphalt	



MD ACOUSTICS

Appendix B:

Traffic Trip Generation and VMT Analysis

MAT Engineering, Inc.

www.matengineering.com
17192 Murphy Avenue #14902
Irvine, CA 92623
Ph: 949.344.1828

December 1, 2022

Ms. Starla Barker
DE NOVO PLANNING GROUP
180 East Main Street #108
Tustin, CA 92780

Subject: Long Beach Boulevard Multifamily Residential Project Trip Generation & VMT Analysis/Screening, City of South Gate, California

Dear Starla,

MAT Engineering, Inc. is pleased to submit this trip generation study and VMT screening for the proposed Long Beach Boulevard multifamily residential project in the City of South Gate.

This analysis has been prepared in accordance with the scope previously reviewed and approved by City staff. A copy of the approved scope is contained in **Attachment D**.

A. Project Description & Location

The project site is located on the southwest corner of the Long Beach Boulevard / Willow Place intersection in the City of South Gate.

Existing uses on the project site consist of an auto repair/tire shop with an area of approximately 650 square feet.

The proposed project consists of removal of the existing auto repair/tire shop with development of 14 dwelling units of three-story multi-family residential use.

Access for the proposed project is planned via two driveways; one driveway on Willow place and one right-in/right-out driveway on Long Beach Boulevard.

Exhibit A shows the project location. **Exhibit B** shows the proposed site plan.

B. Project Trip Generation

Trip generation represents the amount of trips attracted and produced by a land use.

The trip generation for the existing use and the proposed project is based upon the specific land uses that have been planned for this project and has been determined utilizing the Institute of Transportation Engineers (ITE) trip generation rates which is an industry standard for calculating trips associated with land uses.

Table 1 shows the trip ITE trip generation rates for the existing and also the proposed uses based on the ITE. A copy of the ITE rates descriptions for these land uses is contained in **Attachment B**.

Table 1
ITE Trip Generation Rates

Land Use	ITE Code	Units	Peak Hour						Daily
			AM Peak Hour			PM Peak Hour			
			In	Out	Total	In	Out	Total	
Auto Repair/Care	942	TSF	1.49	0.76	2.25	1.49	1.62	3.11	31.1 *
Multi-family Residential (Low-Rise)	220	DU	0.10	0.30	0.40	0.32	0.19	0.51	6.74

Notes:

Source: 2021 ITE 11th Edition Trip Generation Manual;

TSF = Thousand Square Feet; DU = Dwelling Units

* For auto repair use, since ITE does not have daily rates, the daily rate is derived by multiplying the PM peak hour rate by a factor of 10.0

Utilizing the ITE trip generation rates from **Table 1**, **Table 2** shows a summary of the net trip generation for the proposed project after accounting for the existing land use which will be removed.

Table 2
Project Trip Generation

Land Use	Quantity	Units	ITE Code	Peak Hour						Daily
				AM Peak Hour			PM Peak Hour			
				In	Out	Total	In	Out	Total	
Proposed Use (14 Dwelling Units of Low-Rise Multifamily Residential Units)	14	DU	220	1	5	6	4	3	7	94
Existing Use (650 Square Feet of Auto Repair Use)	0.650	TSF	942	-1	0	-1	-1	-1	-2	-20
			NET Total	**0**	**5**	**5**	**3**	**2**	**5**	**74**

Source::

Institute of Transportation Engineers (ITE) 2021 Trip Generation Manual (11th Edition) Source: 2021 ITE 11th Edition Trip Generation Manual;

As shown in **Table 2**, based on the ITE trip generation rates:

- Without taking any credit for the existing use, the proposed project is forecast to generate approximately 94 daily trips which include approximately 6 AM peak hour trips and approximately 7 PM peak hour trips.

- The existing use generates approximately 20 daily trips which include approximately 1 AM peak hour trips and approximately 2 PM peak hour trips.

- After taking credit for the existing use, the proposed project is forecast to generate approximately 74 NET additional daily trips which include approximately 5 NET additional AM peak hour trips and approximately 5 NET additional PM peak hour trips.

C. Trip Generation Evaluation & Access Analysis

As shown in **Table 2**, after taking credit for the existing use, the proposed project is forecast to generate approximately 74 NET additional daily trips which include approximately 5 NET additional AM peak hour trips and approximately 5 NET additional PM peak hour trips.

Based on industry standards and the Los Angeles County traffic study requirements, typically, a full traffic study is required when a project generates more than 50 peak hour trips or 110 daily trips. Since the proposed project is expected to generate a low number of trips, a full traffic study is not required for the proposed project. Due to the low number of trips, the project is expected to not have an adverse impact on the level of service and operations of the surrounding circulation system and roadway network.

D. Proposed Scope of Vehicle Miles Traveled (VMT) Analysis

In response to Senate Bill (SB) 743, the California Natural Resource Agency certified and adopted new CEQA Guidelines in December 2018 which now identify Vehicle Miles Traveled (VMT) as the most appropriate metric to evaluate a project's transportation impact under CEQA (§ 15064.3).

Effective July 1, 2020, the previous CEQA metric of LOS, typically measured in terms of automobile delay, roadway capacity and congestion, generally will no longer constitute a significant environmental impact.

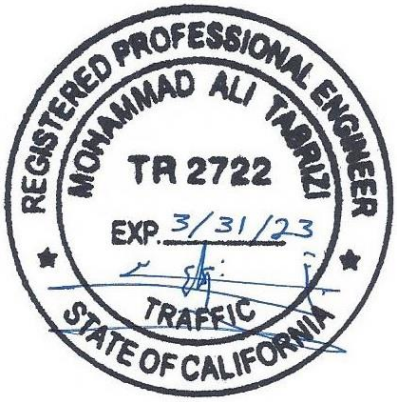
Based on Section 3.1.2.1 of the County of Los Angeles traffic study requirements (July 23, 2020), non-retail projects generating less than 110 daily trips could be screened out from requiring a full VMT analysis. A copy of the guidelines is contained in Attachment C.

Hence, the proposed project screens out for requiring a full VMT analysis and has a less than significant traffic impact under the California Environmental Quality Act (CEQA).

MAT Engineering Inc. appreciates the opportunity to provide this technical letter and memorandum. If you have any questions, concerns, or comments, please contact us at 949-344-1828 or at@matengineering.com.

Respectfully submitted,

MAT ENGINEERING, INC.

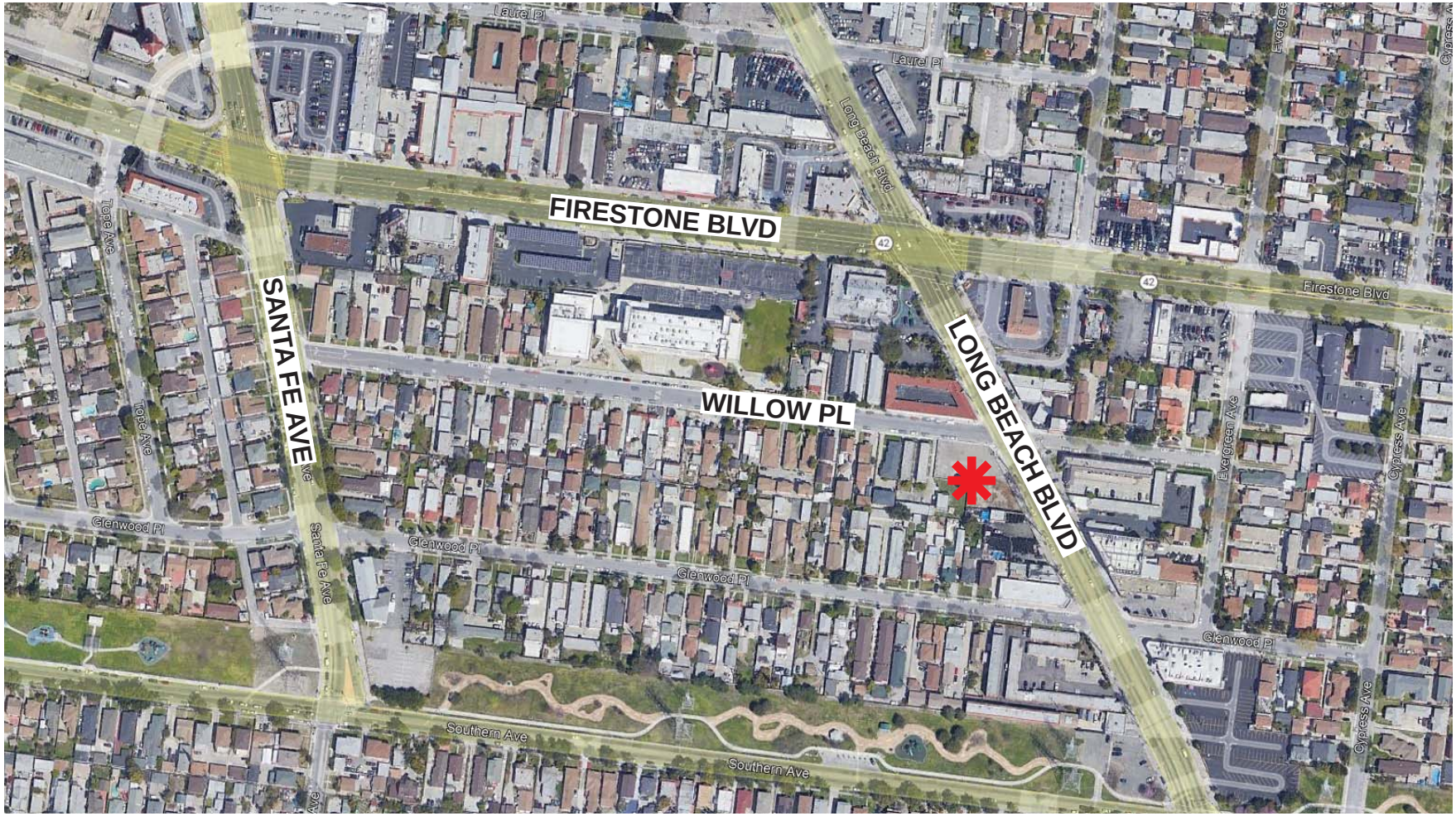


Alex Tabrizi, PE, TE

President

Attachment A

Exhibits



Legend:

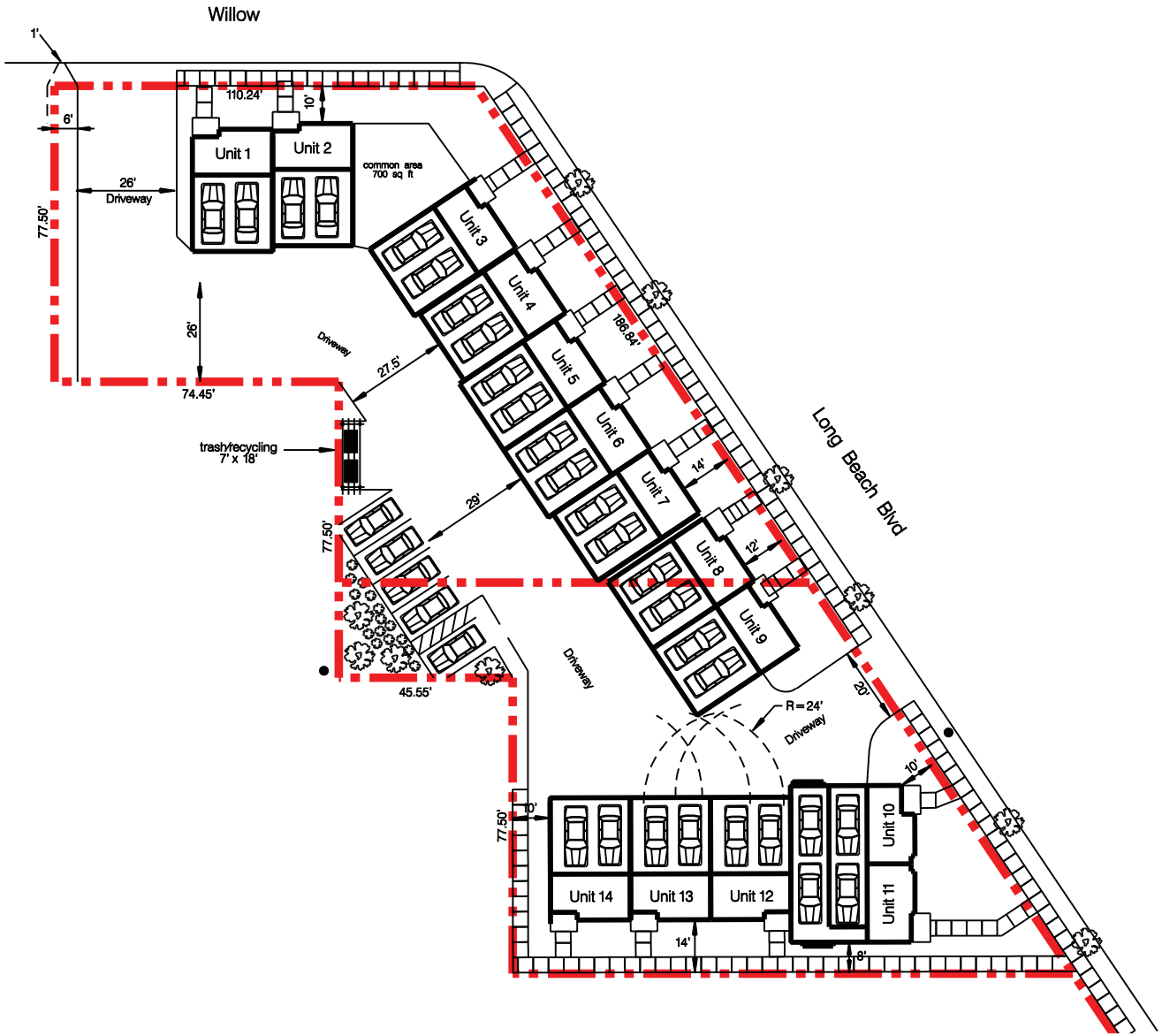
Site Location

Not to Scale

MN ENGINEERING, INC.

Project Location

Exhibit A



Not to Scale

ENGINEERING, INC.

Site Plan

Exhibit B

Attachment B

ITE Data

Land Use: 220
Multifamily Housing (Low-Rise)

Description

Low-rise multifamily housing includes apartments, townhouses, and condominiums located within the same building with at least three other dwelling units and that have two or three floors (levels). Various configurations fit this description, including walkup apartment, mansion apartment, and stacked townhouse.

- A walkup apartment typically is two or three floors in height with dwelling units that are accessed by a single or multiple entrances with stairways and hallways.
- A mansion apartment is a single structure that contains several apartments within what appears to be a single-family dwelling unit.
- A fourplex is a single two-story structure with two matching dwelling units on the ground and second floors. Access to the individual units is typically internal to the structure and provided through a central entry and stairway.
- A stacked townhouse is designed to match the external appearance of a townhouse. But, unlike a townhouse dwelling unit that only shares walls with an adjoining unit, the stacked townhouse units share both floors and walls. Access to the individual units is typically internal to the structure and provided through a central entry and stairway.

Multifamily housing (mid-rise) (Land Use 221), multifamily housing (high-rise) (Land Use 222), affordable housing (Land Use 223), and off-campus student apartment (low-rise) (Land Use 225) are related land uses.

Land Use Subcategory

Data are presented for two subcategories for this land use: (1) not close to rail transit and (2) close to rail transit. A site is considered close to rail transit if the walking distance between the residential site entrance and the closest rail transit station entrance is ½ mile or less.

Additional Data

For the three sites for which both the number of residents and the number of occupied dwelling units were available, there were an average of 2.72 residents per occupied dwelling unit.

For the two sites for which the numbers of both total dwelling units and occupied dwelling units were available, an average of 96.2 percent of the total dwelling units were occupied.

The technical appendices provide supporting information on time-of-day distributions for this land use. The appendices can be accessed through either the ITETripGen web app or the trip

generation resource page on the ITE website (https://www.ite.org/technical-resources/topics/trip-and-parking-generation/).

For the three sites for which data were provided for both occupied dwelling units and residents, there was an average of 2.72 residents per occupied dwelling unit.

It is expected that the number of bedrooms and number of residents are likely correlated to the trips generated by a residential site. To assist in future analysis, trip generation studies of all multifamily housing should attempt to obtain information on occupancy rate and on the mix of residential unit sizes (i.e., number of units by number of bedrooms at the site complex).

The sites were surveyed in the 1980s, the 1990s, the 2000s, the 2010s, and the 2020s in British Columbia (CAN), California, Delaware, Florida, Georgia, Illinois, Indiana, Maine, Maryland, Massachusetts, Minnesota, New Jersey, Ontario (CAN), Oregon, Pennsylvania, South Carolina, South Dakota, Tennessee, Texas, Utah, and Washington.

Source Numbers

188, 204, 237, 300, 305, 306, 320, 321, 357, 390, 412, 525, 530, 579, 583, 638, 864, 866, 896, 901, 903, 904, 936, 939, 944, 946, 947, 948, 963, 964, 966, 967, 1012, 1013, 1014, 1036, 1047, 1056, 1071, 1076

Multifamily Housing (Low-Rise)
Not Close to Rail Transit (220)

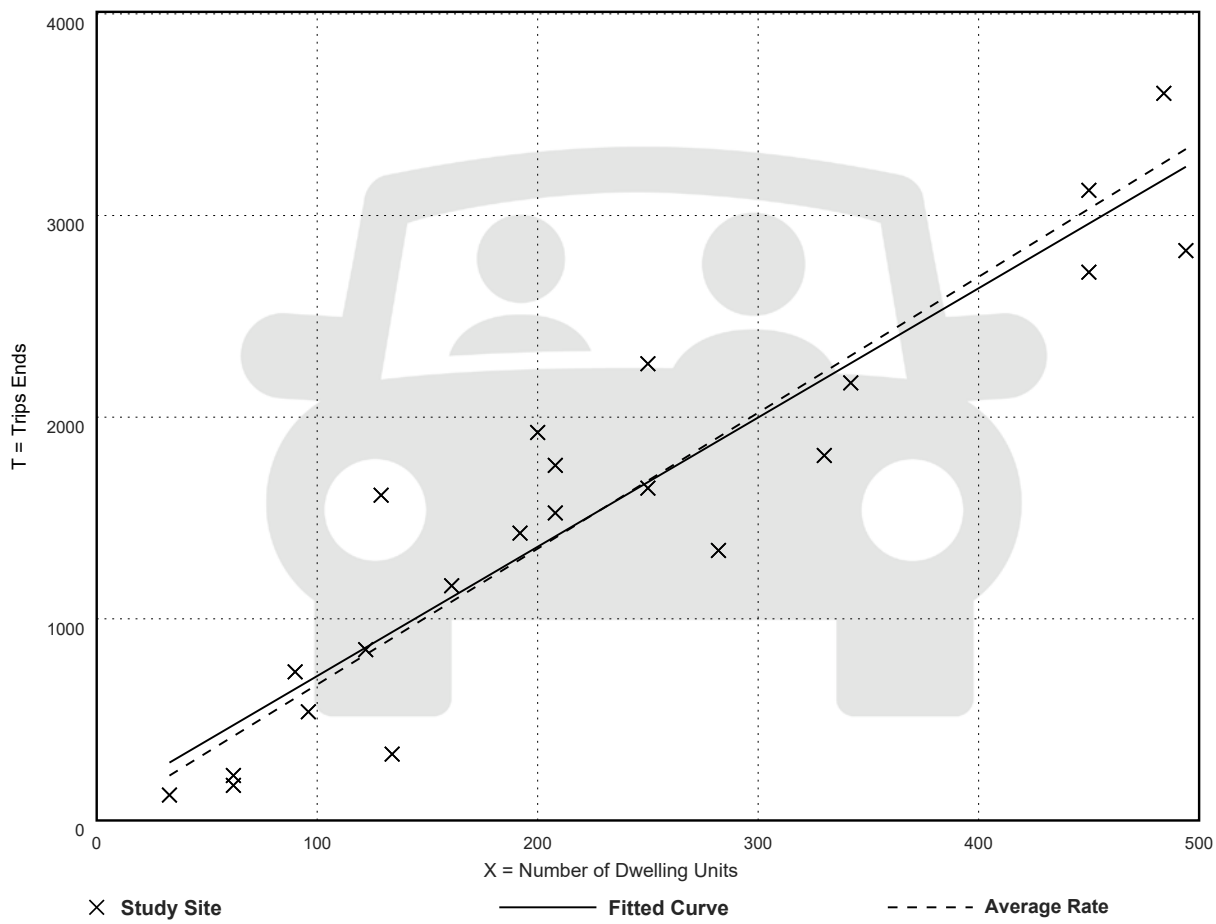
Vehicle Trip Ends vs: Dwelling Units
On a: Weekday

Setting/Location: General Urban/Suburban
Number of Studies: 22
Avg. Num. of Dwelling Units: 229
Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
6.74	2.46 - 12.50	1.79

Data Plot and Equation



Fitted Curve Equation: T = 6.41(X) + 75.31

R^2= 0.86

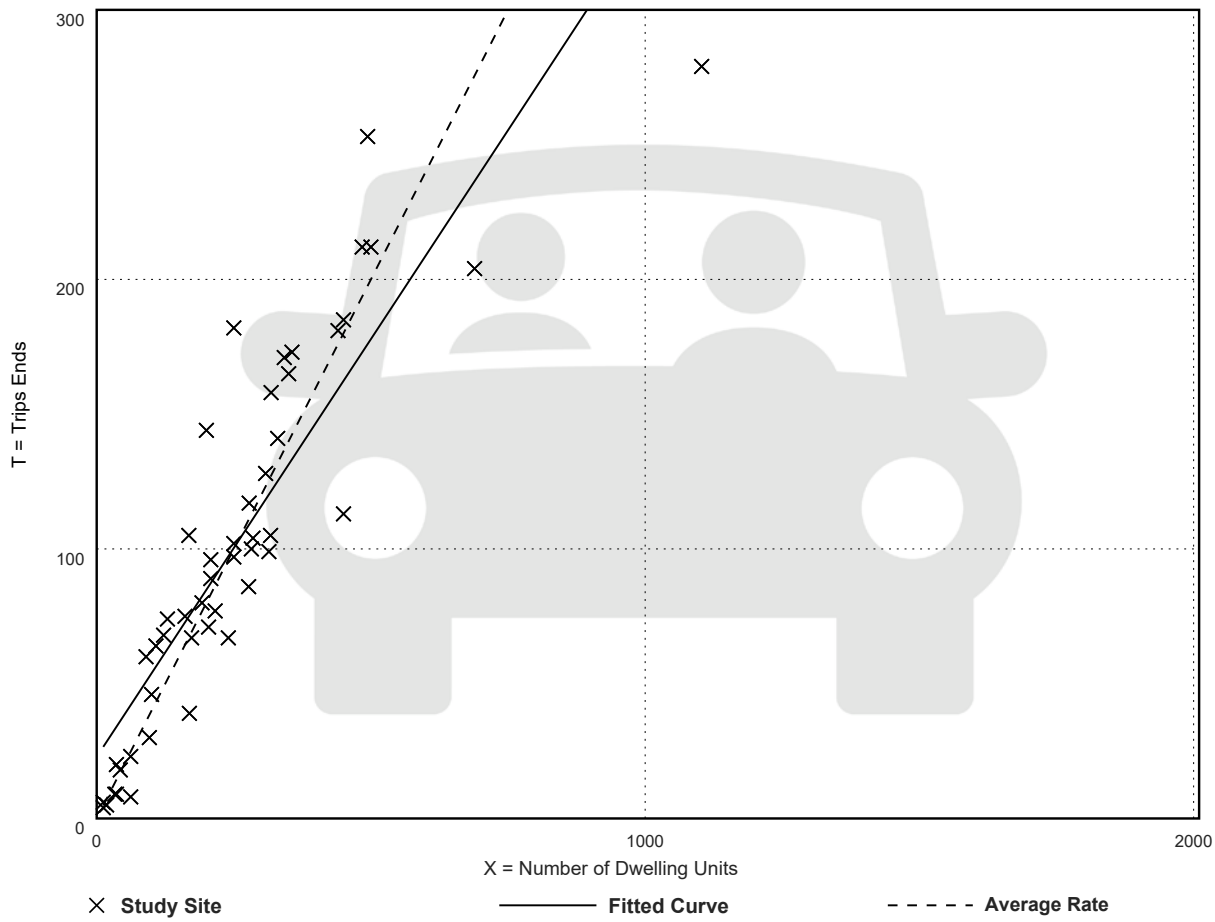
Multifamily Housing (Low-Rise)
Not Close to Rail Transit (220)

Vehicle Trip Ends vs: Dwelling Units
On a: Weekday,
Peak Hour of Adjacent Street Traffic,
One Hour Between 7 and 9 a.m.
Setting/Location: General Urban/Suburban
Number of Studies: 49
Avg. Num. of Dwelling Units: 249
Directional Distribution: 24% entering, 76% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.40	0.13 - 0.73	0.12

Data Plot and Equation



Fitted Curve Equation: T = 0.31(X) + 22.85

R^2= 0.79

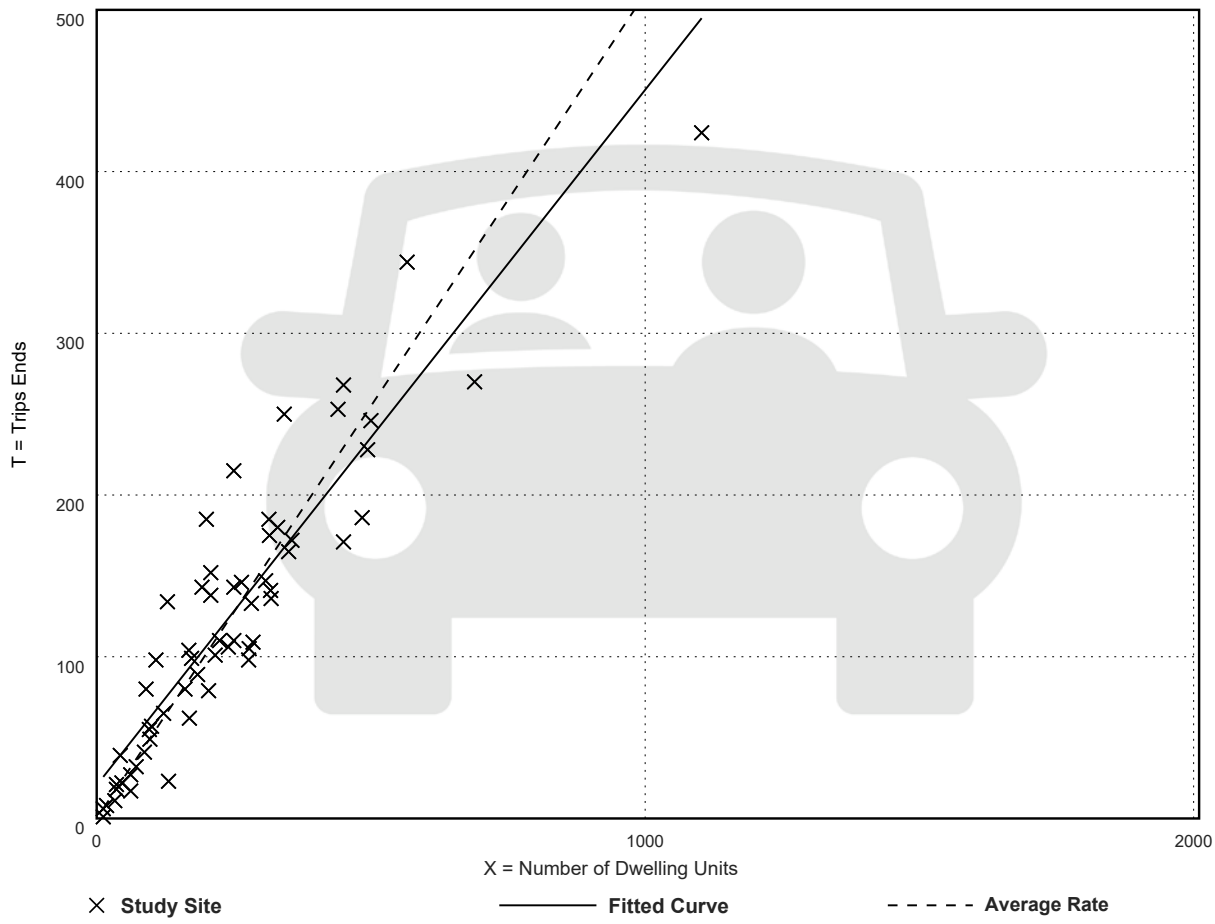
Multifamily Housing (Low-Rise)
Not Close to Rail Transit (220)

Vehicle Trip Ends vs: Dwelling Units
On a: Weekday,
Peak Hour of Adjacent Street Traffic,
One Hour Between 4 and 6 p.m.
Setting/Location: General Urban/Suburban
Number of Studies: 59
Avg. Num. of Dwelling Units: 241
Directional Distribution: 63% entering, 37% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.51	0.08 - 1.04	0.15

Data Plot and Equation



Fitted Curve Equation: T = 0.43(X) + 20.55

R^2= 0.84

Land Use: 942
Automobile Care Center

Description

An automobile care center houses numerous businesses that provide automobile-related services, such as repair and servicing, stereo installation, and seat cover upholstering. Quick lubrication vehicle shop (Land Use 941) and automobile parts and service center (Land Use 943) are related uses.

Additional Data

The sites were surveyed in the 1980s and the 1990s in California and Florida.

Source Numbers

267, 273, 439, 715

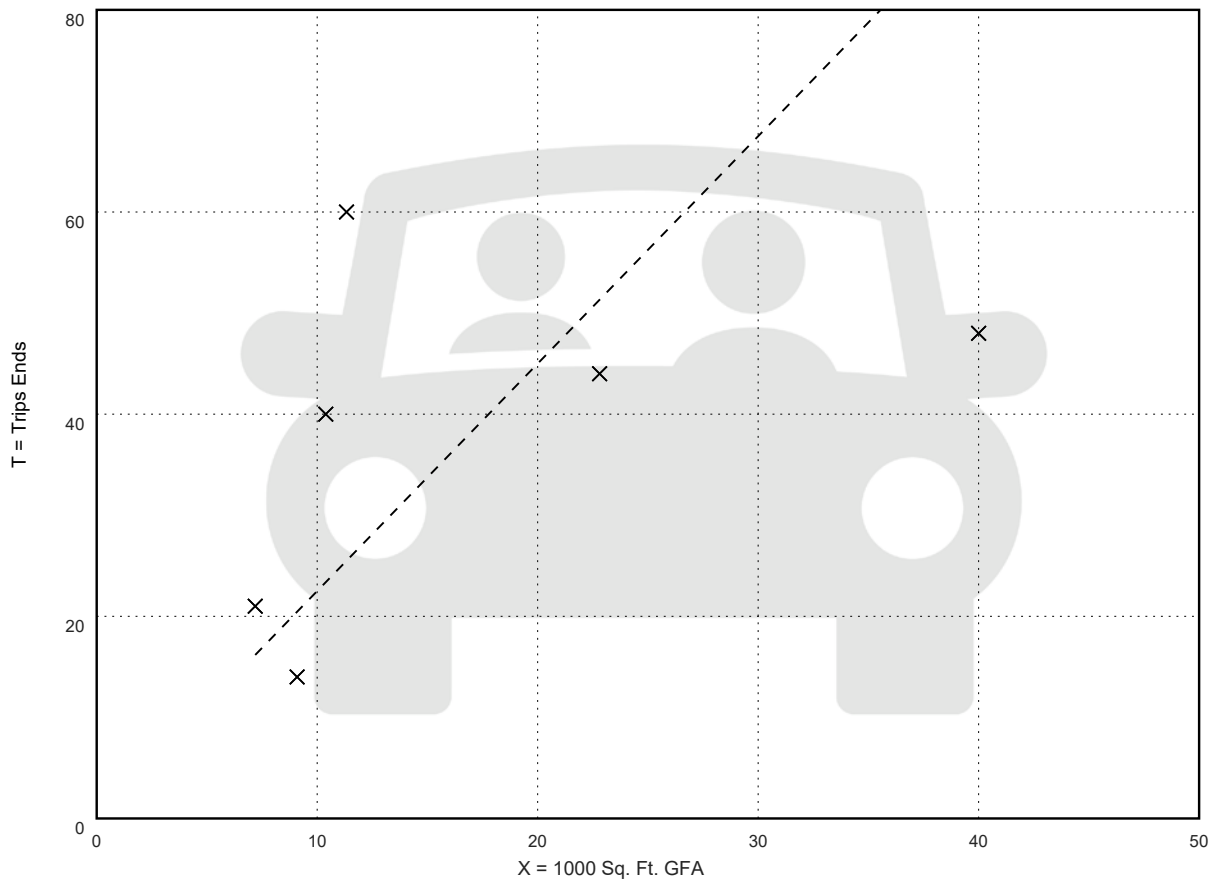
Automobile Care Center
(942)

Vehicle Trip Ends vs: 1000 Sq. Ft. GFA
On a: Weekday,
Peak Hour of Adjacent Street Traffic,
One Hour Between 7 and 9 a.m.
Setting/Location: General Urban/Suburban
Number of Studies: 6
Avg. 1000 Sq. Ft. GFA: 17
Directional Distribution: 66% entering, 34% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
2.25	1.20 - 5.30	1.49

Data Plot and Equation



× **Study Site**

– – – – – **Average Rate**

Fitted Curve Equation: Not Given

R^2= ***

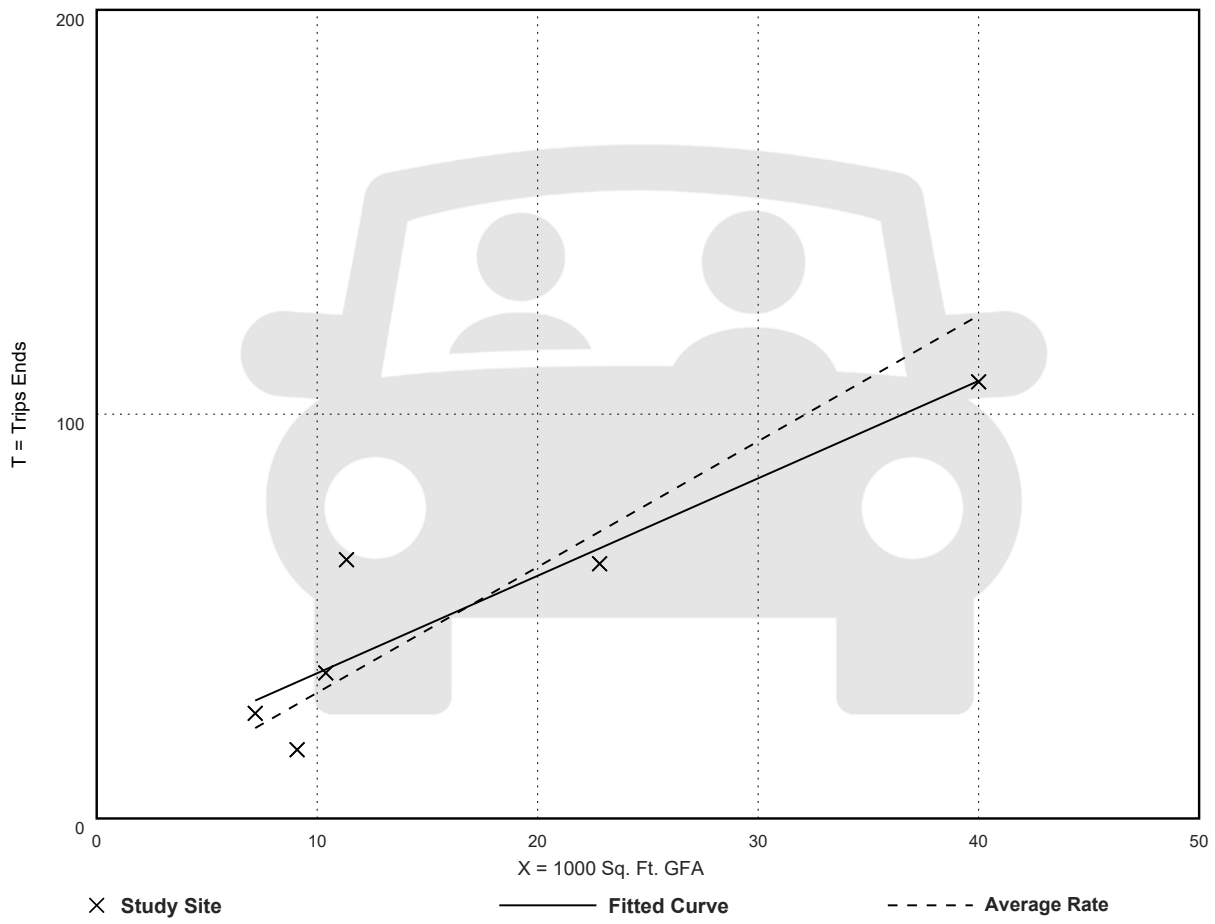
Automobile Care Center
(942)

Vehicle Trip Ends vs: 1000 Sq. Ft. GFA
On a: Weekday,
Peak Hour of Adjacent Street Traffic,
One Hour Between 4 and 6 p.m.
Setting/Location: General Urban/Suburban
Number of Studies: 6
Avg. 1000 Sq. Ft. GFA: 17
Directional Distribution: 48% entering, 52% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
3.11	1.87 - 5.65	1.09

Data Plot and Equation



Fitted Curve Equation: T = 2.41(X) + 11.83

R^2= 0.83

Attachment C

Los Angeles County Public Works Transportation Impact Analysis Guidelines

Los Angeles County
Public Works

Transportation Impact Analysis Guidelines

July 23, 2020
Prepared by Public Works

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Section 1. - Introduction

Public Works generally will require the preparation and submission of a Transportation Impact Analysis for projects that meet the following criteria:

- Development Projects:
  - Estimated to generate a net increase of 110 or more daily vehicle[1] trips.
- Transportation Projects:
  - Likely to induce additional vehicle[1] miles traveled (VMT) by increasing vehicle capacity.
- Projects for which a Transportation Impact Analysis is required by County ordinance; regulation; resolution; court order; or directive from the Board of Supervisors, Regional Planning Commission.

A Transportation Impact Analysis requires analyses and forecasting of impacts or deficiencies to the circulation system generated by the project. The Transportation Impact Analysis identifies feasible measures or corrective conditions to offset any impacts or deficiencies.

The Transportation Impact Analysis shall be prepared under the direction of, and be signed by, a Professional Engineer, registered in the State of California to practice either Traffic or Civil Engineering.

[1] The term vehicle refers to on-road passenger vehicles, specifically cars and light trucks. Heavy-duty trucks should only be included in a traffic impacts analysis for modeling convenience and ease of calculation (e.g., where models or data provide combine auto and heavy-freight VMT) but should not contribute to a finding of significant traffic impact under any circumstances.

Section 2. - Overall Steps

The project applicant shall follow the general steps summarized below when preparing a transportation impact analysis for a discretionary development project or transportation project.

Step 1. Project Memo

The project applicant shall inform Public Works that a new Transportation Impact Analysis is being prepared. In this initial communication, the following information shall be provided:

A. Project Description – Provide a general description of the project, including size (defined by square footage per use and/or number of dwelling units) and use(s). The project description should include information on any phased construction and any unusual conditions. The project description shall specify a building address, Assessor's parcel number, and project title.

B. Project Site Plan – Submit the proposed project site plan, which shall clearly identify driveway or access location(s), loading/unloading areas, and parking design and circulation to help define the distribution of project trips. Considerations for traffic flow and movement should be designed and incorporated early in building and parking layout plans. To minimize and prevent last minute building design changes, project applicants should contact the Public Works Land Development Division and Public Works Traffic Safety and Mobility Division to determine the requirements for driveway width and internal circulation before finalizing the building and parking layout design.

Step 2. Other Agency Contacts

The project applicant shall consult with other agencies or adjacent jurisdictions (e.g., Caltrans, other cities, transit agencies, etc.) that may be affected by site access and travel demands generated by the project to ensure those agencies' transportation-related concerns and issues are properly addressed in the Transportation Impact Analysis. If, as part of site access and circulation evaluation (see Section 4), a Transportation Impact Analysis includes the evaluation of an intersection or intersections in an adjacent local jurisdiction, then any corrective actions deemed necessary to address circulation concerns should be reviewed by and confirmed in writing by that jurisdiction. Written confirmation of consultation with all affected agencies is required.

Step 3. Scoping Document

The project applicant shall prepare and submit a Scoping Document to Public Works through the EPIC-LA portal. The Scoping Document describes the

assumptions and parameters that shall be included in the Transportation Impact Analysis including any analysis requirements from other affected jurisdictions identified in Step 2.

Step 4. Data Collection

The project applicant shall gather qualitative and quantitative data needed to support the required analyses and components of the Transportation Impact Analysis. Traffic count data shall be collected in accordance with standards and methods established in the Transportation Impact Analysis Guidelines.

Step 5. Transportation Impact Analysis Submittal

The project applicant shall submit the completed Transportation Impact Analysis to Public Works through the EPIC-LA portal and ensure that all subsequent submittals of the Transportation Impact Analysis are dated and timestamped.

Step 6. Transportation Impact Analysis Confirmation of Findings Letter

Public Works will prepare and distribute a Transportation Impact Analysis Confirmation of Findings Letter after the fees have been submitted and the Transportation Impact Analysis has been reviewed and approved.

The Transportation Impact Analysis Confirmation of Findings Letter will be limited to summarizing the findings and requirements for the proposed project. Additional fees/deposits may be required should the project applicant request findings and requirements for additional project alternatives.

Step 7. Mitigation and Monitoring

The project applicant may be responsible for ongoing reporting, depending on the nature of the mitigation measures and corrective actions to be implemented by the project. Reporting and monitoring of Transportation Demand Management (TDM) measures implemented by the project to improve mobility options at and around a project site may also be required and will be described in the Transportation Impact Analysis Confirmation of Findings Letter.

Section 3. - California Environmental Quality Act (CEQA) Transportation Impact Analysis Process

Section 3.1. - Development Projects

Section 3.1.1. - Introduction

The updated CEQA Guidelines certified and adopted by the California Natural Resources Agency in December 2018 are now in effect. Accordingly, Public Works recognizes the need to provide information based on guidance from the Office of Planning and Research and the California Air Resources Board on the assessment of vehicle miles traveled (VMT), thresholds of significance, and mitigation measures for development projects and land use plans in accordance with the amended Appendix G question below:

- For a development project, would the project conflict or be inconsistent with CEQA Guidelines section 15064.3, subdivision (b)(1)?

For development projects, the intent of this question is to assess whether a proposed project or plan adequately reduces total VMT. Public Works provides the following guidance regarding screening and impact criteria to address this question. The following screening criteria and impact criteria are only meant to serve as guidance for projects to determine whether a Transportation Impact Analysis should be performed, and the criteria to determine if a project generates a significant transportation impact. The criteria shall be determined on a project-by-project basis as approved by Public Works.

Section 3.1.2. - Screening Criteria

Section 3.1.2.1. - Non-Retail Project Trip Generation Screening Criteria

If the answer is no to the question below, further analysis is not required, and a less than significant determination can be made.

- Does the development project generate a net increase of 110 or more daily vehicle[1] trips[2]?

A project's daily vehicle trip generation should be estimated using the most recent edition of the Institute of Transportation Engineers (ITE) Trip Generation Manual. If the project proposed land use is not listed in the ITE Trip Generation Manual, please submit a trip generation study to Public Works for review and approval.

Section 3.1.2.2. - Retail Project Site Plan Screening Criteria

A project that contains a local serving retail use is assumed to have less than significant VMT impacts for the retail portion of the project. If the answer to the following question

[2] As referenced in the Governor's Office of Planning and Research (OPR), *Technical Advisory on Evaluating Transportation Impacts in CEQA*, December 2018.

is no, a less than significant determination can be made for the portion of the project that contains retail uses.

- Does the project contain retail uses that exceed 50,000 square feet of gross floor area[2]?

However, if the retail project is part of a mixed-use project, then the remaining portion of the project may be subject to further analysis in accordance with other screening criteria in Section 3.1. Projects that include retail uses in excess of the Retail Project Site Plan Screening Criteria need to evaluate the entirety of the project's VMT.

Section 3.1.2.3. – Proximity to Transit Based Screening Criteria

If a project is located near a major transit stop or high-quality transit corridor, the following question should be considered:

- Is the project located within a one-half mile radius of a major transit stop or an existing stop along a high-quality transit corridor[2]?

If the answer to the question above is yes, then the following subsequent questions should be considered:

- Does the project have a Floor Area Ratio[2] less than 0.75?
- Does the project provide more parking than required by the County Code[2]?
- Is the project inconsistent with the SCAG RTP/SCS[2]?
- Does the project replace residential units set aside for lower income households with a smaller number of market-rate residential units[2]?

If the answer to all four questions is no, further analysis is not required, and a less than significant determination can be made.

To determine the proposed change in residential units, the total number of lower income housing units that exist on the project site should be counted and compared to the total number of lower income and market-rate residential units proposed by the project. If there is a net decrease in residential units, the Proximity to Transit Based Screening Criteria cannot be utilized.

Section 3.1.2.4. – Residential Land Use Based Screening Criteria

Independent of the screening criteria for non-retail and retail projects, certain projects that further the State's affordable housing goals are presumed to have less than significant impact on VMT. If the project requires a discretionary action and the answer is yes to the question below, further analysis is not required, and a less than significant determination can be made.

- Are 100% of the units, excluding manager's units, set aside for lower income households[2]?

Section 3.1.3. - Impact Criteria

The project has a potentially significant VMT impact if it meets one or more of the criteria listed below. The impact criteria below are considered as potential options that may be selected as thresholds for determining significance. These impact criteria below are based on guidance published by OPR[2] and CARB[3] but their applicability to a specific project shall be justified with substantial evidence and is not presumed to be appropriate.

- Residential Projects The project's residential VMT[4] per capita would not be 16.8%[3] below the existing residential VMT[4] per capita for the Baseline Area in which the project is located (Table 3.1.3.-1),
- Office Projects. The project's employment VMT[5] per employee exceeding would not be 16.8%[3] below the existing employment VMT[5] per employee for the Baseline Area in which the project is located (see Table 3.1.3.-1),
- Regional Serving Retail Projects. The project would result in a net increase[2] in existing total VMT (see Table 3.1.3.-1),
- Land Use Plans. The plan total VMT per service population[6] (residents and employees) would not be 16.8%[3] below the existing VMT per service population[6] for the Baseline Area in which the plan is located (see Table 3.1.3.-1),
- For other land use types, please contact Public Works to determine which of the above are an appropriate threshold of significance to be utilized (see Table 3.1.3.-1).

Table 3.1.3-1 provides the Baseline VMT for the North and South areas of the County at the time these guidelines were prepared. The Baseline VMT applied in the Transportation Impact Analysis should be consistent with the year that the transportation study begins as defined in the Scoping Document.

[3] As referenced by the VMT reduction goals discussed in the California Air Resources Board, 2017 Scoping Plan-Identified VMT Reductions and Relationship to State Goals, January 2019, Figure 3.
[4] Residential VMT is the VMT generated by Home-Based Work and Home-Based Other trip productions.
[5] Employment VMT is the VMT generated by Home-Based Work trip attractions.
[6] Service population is the sum of the number residents and the number of employees

Table 3.1.3.-1 – Baseline VMT for North and South County

Baseline Area	Residential VMT per Capita	Employment VMT per Employee	Total VMT per Service Population
North County	22.3	19.0	43.1
South County	12.7	18.4	31.1

The geographic boundaries for the North County and South County Baseline Areas are shown in Figure 3.1.3-1.

Figure 3.1.3.-1 North and South County Baseline VMT Boundaries

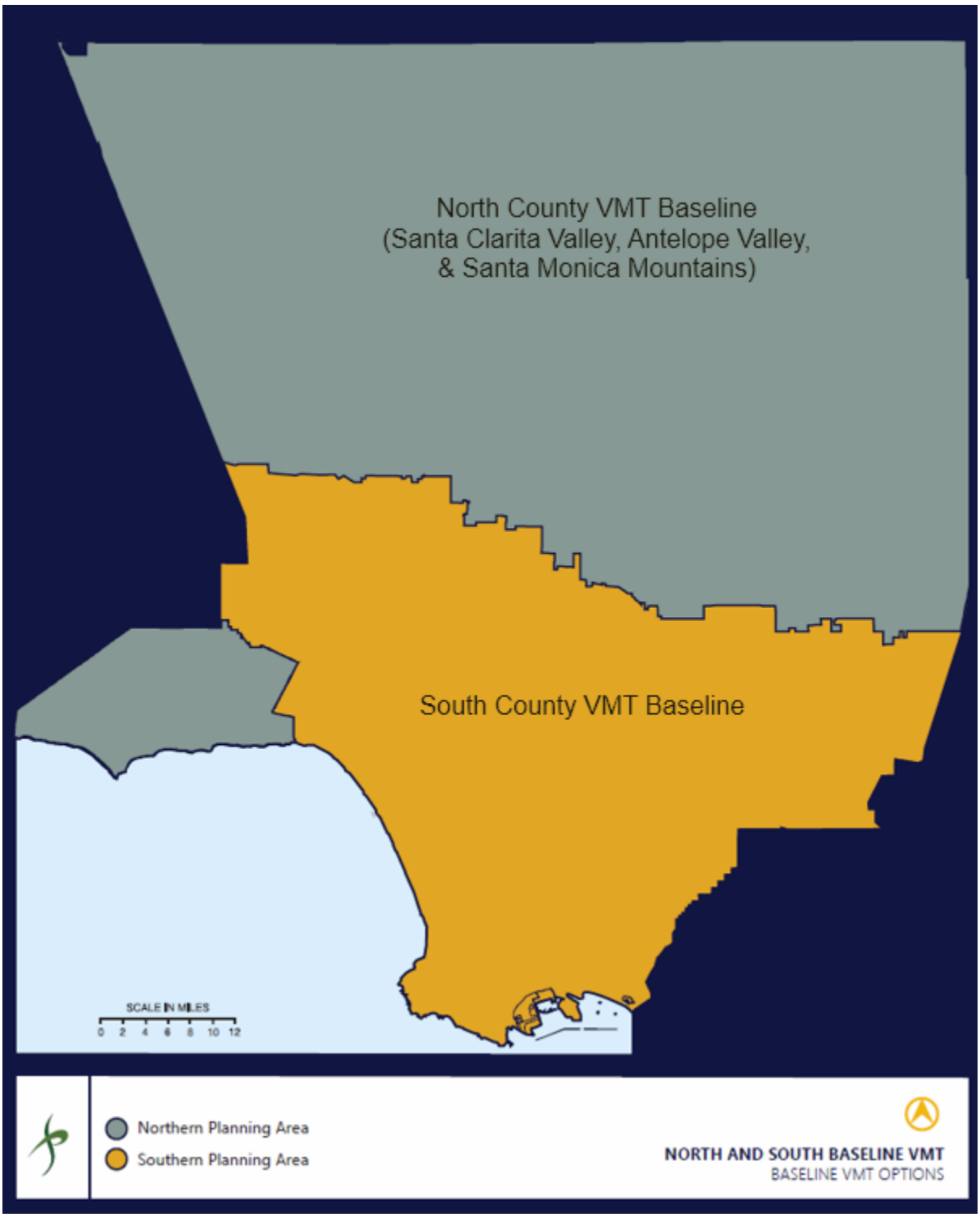


Table 3.1.3.-2 – VMT Impact Criteria (16.8% Below Area Baseline)

Baseline Area	Residential VMT per Capita	Employment VMT per Employee	Total VMT per Service Population (residents and employees)
North County	18.6	15.8	35.9
South County	10.6	15.3	25.9

Section 3.1.4. - Methodology

<u>Section 3.1.4.1 - Evaluation</u>

Screening and impact evaluation should be conducted for the following types of development projects:

- Non-Retail Land Uses:
  - Residential Land Uses:
    - Single-family housing,
    - Multi-family housing,
    - Affordable housing (for lower income households).
  - Office, Manufacturing, or Institutional Land Uses:
    - General office,
    - Medical office,
    - Light industrial,
    - Manufacturing,
    - Warehousing/self-storage,
    - K-12 schools,
    - College/university,
    - Hotel/motel.
- Retail Land Uses:
  - General retail,
  - Furniture store,
  - Pharmacy/drugstore,
  - Supermarket,
  - Bank,
  - Health club,
  - Restaurant,
  - Auto repair,
  - Home improvement superstore,
  - Discount store,
  - Movie theater.

The land uses described above are not intended to be inclusive of every project-type reviewed by Public Works and subject to CEQA. For these and all other land uses, the appropriate screening criteria and impact evaluation shall be determined on a project-by-project basis.

Section 3.1.4.2. - Project Impact Determination

- Residential Projects: Daily vehicle[1] trips, daily VMT, and daily residential VMT[4] per capita for residential projects should be estimated using the SCAG RTP/SCS Travel Demand Forecast Model (as described in the Los Angeles County Senate Bill (SB) 743 Implementation and CEQA Updates Report[7]). Transportation demand management strategies to be included as project design features should be considered in the estimation of a project's daily vehicle trips and VMT (see Section 3.1.5 regarding TDM strategies),

- Office Projects: Daily vehicle[1] trips, daily VMT, and daily employment VMT[5] per employee for office projects should be estimated using the SCAG RTP/SCS Travel Demand Forecast Model (as described Los Angeles County Senate Bill (SB) 743 Implementation and CEQA Updates Report[7]). Transportation demand management strategies to be included as project design features should be considered in the estimation of a project's daily vehicle trips and VMT,

- Regional Serving Retail Projects: The Scoping Document prepared by the project applicant and Public Works will outline one of the following methods for impact determination:

    - Preparation of a market-study-based transportation analysis submitted by the project applicant that demonstrates the project area is underserved for the proposed retail use and that the project will shorten existing shopping trips by creating an intervening location between trip origins and current retail destinations.

    - Run the SCAG RTP/SCS Travel Demand Forecasting Model (as described in the Los Angeles County Senate Bill (SB) 743 Implementation and CEQA Updates Report[7]) with and without the project. Since the overall number of trips in the model is based on home-based trips and is balanced to home-trip productions, the total number of trips will not be influenced materially by the introduction of the additional retail space. Rather, the model will redistribute home-shopping trips from other retail destinations to the proposed retail destination,

        - If the project is entirely retail, the following steps apply:
            - Determine the traffic analysis zone (TAZ) in which the project is located,

[7] *Los Angeles County Senate Bill (SB) 743 Implementation and CEQA Updates Report*, Fehr & Peers, June 2020

- Convert the project retail land uses into the appropriate employment categories utilized in the model and adjust the socioeconomic parameters in the TAZ appropriately to reflect removal of existing land uses and addition of the project,
- Run the four-step model process for the model existing base year for the four-time periods in the model (AM peak period, midday period, PM peak period, nighttime period) for the base ("no project") scenario and for the "plus project" scenario,
- Calculate total VMT on the model network for each time period and sum to determine daily VMT for each scenario. The total VMT should capture both employee and home-shopping trips. Subtract the daily VMT for the base scenario from the daily VMT for the "plus project" scenario to determine the net change in daily VMT.

▪ If the proposed project is a mixed-use development including more than 50,000 square feet of retail, conduct steps similar to those described above. However, first create a "without retail" model scenario that includes the rest of the project's proposed land uses and then create and run the four-step model for this "with retail" scenario. Subtract the daily VMT for the "without retail" scenario from the daily VMT for the "with retail" scenario to determine the net change in daily VMT.

- Land Use Plans: Daily vehicle[1] trips, daily VMT, and daily total VMT per service population[6] for land use plans should be estimated using the SCAG RTP/SCS Travel Demand Forecast Model (as described Los Angeles County Senate Bill (SB) 743 Implementation and CEQA Updates Report[7]). Transportation demand management strategies to be included as project design features should be considered in the estimation of a project's daily vehicle trips and VMT,

- Unique Land Uses: Some projects will not fit into one of the above categories. In such cases, a customized approach may be required to estimate daily trips and VMT. The methodology and thresholds to be used in such cases should be developed in consultation with and approved by Public Works staff at the outset of the study,

- Mixed-Use Projects: The project VMT impact should be considered significant if any (one or all) of the project land uses exceed the impact criteria for that particular land use, taking credit for internal capture. In such cases, mitigation options that reduce the VMT generated by any or all of the land uses could be considered.

Section 3.1.4.3. - Cumulative Impacts Determination

Land use projects should consider both short- and long-term project effects on VMT. Short-term effects will be evaluated in the detailed project-level VMT analysis. Long-term, or cumulative effects is determined through consistency with the SCAG RTP/SCS. The

RTP/SCS is the regional plan that demonstrates compliance with air quality conformity requirements and GHG reduction targets. As such, projects that are consistent with this plan in terms of development location, density, and intensity, are part of the regional solution for meeting air pollution and GHG goals. Projects that are deemed to be consistent would have a less than significant cumulative impact on VMT. Development in a location where the RTP/SCS does not specify any development may indicate a significant impact on transportation. However, if a project does not demonstrate a significant impact in the project impact analysis, a less than significant impact in the cumulative impact analysis can also be determined. Projects that fall under the RTP/SCS's efficiency-based impact thresholds are already shown to align with the long-term VMT and greenhouse gas reduction goals of SCAG's RTP/SCS.

Land use projects that: (1) demonstrate a project impact after applying an efficiency based VMT threshold and (2) are not deemed to be consistent with the SCAG RTP/SCS could have a significant cumulative impact on VMT. Further evaluation would be necessary to determine whether the project's cumulative impact on VMT is significant. This analysis could be conducted by running the SCAG RTP/SCS Travel Demand Forecasting Model (as described in the Los Angeles County Senate Bill (SB) 743 Implementation and CEQA Updates Report[7]) with the cumulative "no project" scenario representing the RTP/SCS cumulative year conditions and the cumulative "plus project" scenario representing the reallocation of the population and/or employment growth based on the land supply changes associated with the proposed project. Baseline Area VMT, residential VMT per capita, or employment VMT per employee (depending on project type) would be calculated for both scenarios, and any increase in VMT, residential VMT per capita, or employment VMT per employee (depending on project type) above that which was forecasted in the RTP/SCS would constitute a significant impact.

When specifically evaluating the VMT impacts of regional-serving retail, the cumulative analysis would include additional steps under the project impact methodology to compare a cumulative "plus project" scenario with the cumulative "no project" scenario. The cumulative "no project" scenarios represents the adopted RTP/SCS cumulative year conditions (as incorporated into the SCAG RTP/SCS model). This would involve the following additional steps:

- Determine the traffic analysis zone (TAZ) in which the project is located,
- Convert the project land uses into the appropriate employment categories utilized in the RTP/SCS horizon year model. Adjust the socioeconomic parameters in the TAZ appropriately to reflect removal of the existing land uses and addition of the project,
- Run the four-step model process for the model's cumulative "no project" scenario for the four-time periods in the model (AM peak period, midday period, PM peak period, nighttime period). Then do the same for the base cumulative "no project" scenario and for the cumulative "plus project" scenario,
- Calculate total VMT on the model's network for each time period as well as the sum total to determine daily VMT for each scenario. Subtract the daily VMT for the

base cumulative “no project” scenario from the daily VMT for the cumulative “plus project” scenario to determine the net change in daily VMT.

Land use plans that: (1) demonstrate a project impact after applying an efficiency based VMT threshold and (2) are not deemed to be consistent with the SCAG RTP/SCS could have a significant cumulative impact on VMT. Further evaluation would be necessary to determine whether the Plan’s cumulative impact on VMT is significant. This analysis could be conducted by running the SCAG RTP/SCS Travel Demand Forecasting Model (as described in the Los Angeles County Senate Bill (SB) 743 Implementation and CEQA Updates Report[7]) with the cumulative “no project” scenario representing the RTP/SCS cumulative year conditions and the cumulative “plus project” scenario representing the reallocation of the population and/or employment growth based on the land supply changes associated with the proposed plan. Total VMT and VMT per service population would be calculated for both scenarios, and any increase in VMT above that which was forecasted in the RTP/SCS would constitute a significant impact.

Section 3.1.5. - Mitigation

Section 3.1.5.1. - Development Project Mitigations

Potential mitigation measures for a development project’s VMT impacts can include the following:

- Transportation demand management (TDM) strategies beyond those that will be included as project design features. These strategies shall be demonstrated to be effective in reducing VMT. Some of these may include, but are not limited to, the following described in Table 3.1.5-1 below. Substantial evidence should be provided to the Public Works to support the claimed effectiveness of the measure(s),

Table 3.1.5-1: TDM Strategies

Category	Measure
Commute Trip Reduction	• Commute Trip Reduction Programs with Required Monitoring • Ride Sharing Programs • Subsidized or Discounted Transit Programs • Telecommuting • Alternative Work Schedules
Land Use/Location	• Increase Transit Accessibility
Parking Policy/Parking	• Unbundle parking
Neighborhood/Site Enhancement	• Pedestrian Network Improvements • Traffic Calming Measures • Car Sharing Programs

- Additional TDM measures beyond those listed above may be considered, if such measure is used to quantitatively reduce a project's VMT estimate. Substantial evidence should be provided to Public Works to support the effectiveness of the measure,
- For a single-use project, introducing compatible additional land uses to allow for internalization of trips,
- For a mixed-use project, modifying the project's land use mix to increase internalization of trips, reduce external trip generation, and serve the local community.

Section 3.1.5.2. - Land Use Plans Mitigations

Potential mitigation measures for land use plan VMT impacts can include:

- Reallocation of future land use development to increase land use variety and density in transportation-efficient locations (e.g., proximity to jobs and housing, proximity to transit, proximity to services),
- Measures to enhance the public transit system and/or connections to the system including active transportation mode improvements, such as infrastructure improvements, programs, or education and marketing,
- Measures to encourage reduced reliance on automobile trips and encourage transit and active transportation modes.

Section 3.2. - Transportation Projects

Section 3.2.1. - Introduction

Transportation projects that increase vehicular capacity can lead to additional travel on the roadway network, which can include induced vehicle travel due to factors such as increased speeds and induced growth. To provide consistency across transportation projects and achieve the County's sustainability goals, the screening criteria for transportation impacts is based on the question below:

- For a transportation project, would the project conflict or be inconsistent with CEQA Guidelines section 15064.3, subdivision (b)(2)?

For transportation projects, the intent is to assess whether a transportation project induces substantial additional VMT. The following screening criteria and impact criteria are meant to serve as guidance for projects to determine whether a Transportation Impact Analysis should be performed, and whether a project generates a significant transportation impact. The criteria will be considered on a project-by-project basis as approved by Public Works.

Section 3.2.2. - Screening Criteria

If the answer is no to the following question, further analysis will not be required, and a less than significant impact determination can be made for that threshold:

- Would the project include the addition of through traffic lanes on existing or new highways, including general purpose lanes, high-occupancy vehicle (HOV) lanes, peak period lanes, auxiliary lanes, and lanes through grade-separated interchanges (except managed lanes, transit lanes, and auxiliary lanes of less than one mile in length designed to improve roadway safety)[2]?

Transit and active transportation projects and projects that reduce roadway capacity generally reduce VMT and, therefore, are presumed to cause a less-than-significant impact. Transportation projects that are not likely to lead to a substantial or measurable increase in vehicle travel and would, therefore, not be required to prepare an induced travel analysis supported by the OPR technical advisory[2], are listed below:

- Rehabilitation, maintenance, replacement, safety, and repair projects designed to improve the condition of existing transportation assets (e.g., highways; roadways; bridges; culverts; Transportation Management System field elements such as cameras, message signs, detection, or signals; tunnels; transit systems; and assets that serve bicycle and pedestrian facilities) and that do not add additional motor vehicle capacity,
- Roadside safety devices or hardware installation such as median barriers and guardrails,

- Roadway shoulder enhancements to provide "breakdown space" - dedicated space for use only by transit vehicles, to provide bicycle access, or to otherwise improve safety, but which will not be used as automobile vehicle travel lanes,
- Addition of an auxiliary lane of less than one mile in length designed to improve roadway safety,
- Installation, removal, or reconfiguration of traffic lanes that are not for through traffic, such as left, right, and U-turn pockets, two-way left turn lanes, or emergency breakdown lanes that are not utilized as through lanes,
- Addition of roadway capacity on local or collector streets provided the project also substantially improves conditions for pedestrians, cyclists, and, if applicable, transit,
- Conversion of existing general-purpose lanes (including ramps) to managed lanes or transit lanes, or changing lane management in a manner that would not substantially increase vehicle travel,
- Addition of a new lane that is permanently restricted to use only by transit vehicles,
- Reduction in number of through lanes,
- Grade separation to separate vehicles from rail, transit, pedestrians or bicycles, or to replace a lane to separate preferential vehicles (e.g., high-occupancy vehicles [HOV], high-occupancy toll [HOT], or trucks) from general vehicles,
- Installation, removal, or reconfiguration of traffic control devices,
- Installation of traffic metering systems, detection systems, cameras, changeable message signs and other electronics designed to optimize vehicle, bicycle, or pedestrian flow,
- Timing of signals to optimize vehicle, bicycle or pedestrian flow,
- Installation of roundabouts or traffic circles,
- Installation or reconfiguration of traffic calming devices,
- Adoption of, or increase, in tolls,
- Addition of tolled lanes, where tolls are sufficient to mitigate VMT increase.
- Initiation of new transit service,
- Conversion of streets from one-way to two-way operation with no net increase in number of traffic lanes,
- Removal or relocation of off-street or on-street parking spaces,
- Adoption or modification of on-street parking or loading restrictions (including meters, time limits, accessible spaces, and preferential/reserved parking permit programs),
- Addition of traffic wayfinding signage,
- Rehabilitation and maintenance projects that do not add motor vehicle capacity,

- Addition of new or enhanced bike or pedestrian facilities on existing streets/highways or within existing public rights-of-way,
- Addition of Class I bike paths, trails, multi-use paths, or other off-road facilities that serve non- motorized travel,
- Installation of publicly available alternative fuel/charging infrastructure,
- Adding of passing lanes, truck climbing lanes, or truck brake-check lanes in rural areas that do not increase overall vehicle capacity along the corridor.

Section 3.2.3. – Impact Criteria

The project has a potentially significant VMT impact if it meets the criteria listed below. The impact criteria below are considered as a potential option that may be selected as thresholds for determining significance. The impact criteria below is based on guidance published by OPR[2], but their applicability to a specific project shall be justified with substantial evidence and is not presumed to be appropriate.

- The project will increase the project area VMT, as measurable by the SCAG RTP/SCS base year Travel Demand Forecasting Model plus an induced travel elasticity factor per lane mile[2].

Section 3.2.4. - Methodology

Section 3.2.4.1. - Project Impacts Determination

The County utilizes the SCAG RTP/SCS Travel Demand Forecasting Model (as described in the Los Angeles County Senate Bill (SB) 743 Implementation and CEQA Updates Report[7]) that is suitable for assessing change in VMT due to a given roadway project in its land use/transportation context. This model should be used to calculate the change in VMT from transportation projects that, by definition, are considered to have the potential for inducing VMT.

For the direct measurement of project impacts, the SCAG RTP/SCS model's base year network should be modified to reflect the vehicle capacity-enhancements that would result from the proposed transportation project. The base year model should be run with and without the proposed transportation project, without adjusting the model's land use inputs, to isolate the potential change in network VMT with the project as compared to the baseline. The assessment should cover the full area in which driving patterns are expected to change and include supporting evidence for why such area was selected.

The SCAG RTP/SCS model is capable of adjusting trip lengths, mode split, and route choice in response to network changes. However, the model does not include the ability to modify land use in response to changes to the transportation system and will not increase trips to reflect latent demand. Therefore, such induced travel should be estimated by applying an induced demand elasticity factor available from appropriate academic literature.

Accordingly, the VMT impact of a transportation project shall be calculated as the direct change in VMT as estimated by the SCAG RTP/SCS model (as described in the Los Angeles County Senate Bill (SB) 743 Implementation and CEQA Updates Report[7]) with and without the project plus a factor for induced demand calculated as follows:

- Run the SCAG RTP/SCS model with and without the transportation project to isolate the potential direct change in network VMT due to changes in trip length, mode split, and route choice,
- Using the SCAG RTP/SCS model, determine the total modeled lane-miles over the project area that fully captures travel behavior changes resulting from the project,
- Determine the percent change in total lane miles that will result from the project,
- Using the SCAG RTP/SCS model, determine the total existing VMT over that same area,
- Multiply the percent increase in lane miles by the existing VMT and then multiply that by the elasticity factor from the latest induced travel literature to determine the induced VMT,
- Add the induced VMT to the modeled change in network VMT due to trip length, mode split, and route choice.

Section 3.2.4.2. - Cumulative Impacts Determination

Analyses should consider both short- and long-term project effects on VMT. Short-term effects will be evaluated in the project-level VMT analysis described above. Long-term, or cumulative, effects will be determined through consistency with the SCAG RTP/SCS. The RTP/SCS is the regional plan that demonstrates compliance with air quality conformity requirements and greenhouse gas (GHG) reduction targets. As such, transportation projects that are included in this plan are part of the regional solution for meeting air pollution and GHG reduction goals. Transportation projects that are deemed to be consistent would have a less than significant cumulative impact on VMT.

Transportation projects that are not deemed to be consistent could have a significant cumulative impact on VMT. Further evaluation would be necessary to determine whether such a project's cumulative impact on VMT is significant. This analysis would be conducted by running the RTP/SCS cumulative year conditions and the cumulative "plus project" scenario (as described in the Los Angeles County Senate Bill (SB) 743 Implementation and CEQA Updates Report[7]) incorporating the network changes due to the proposed transportation project. An induced demand elasticity factor should be applied to any increase in VMT thus determined, and any increase in VMT would constitute a significant impact because it could jeopardize regional air quality conformity or GHG reduction findings.

Section 3.2.5. – Mitigation

Mitigation measures that could reduce the amount of increased vehicle travel induced by capacity increases could include, but not be limited to, the following measures:

- Converting existing general-purpose lanes to HOV lanes, high occupancy toll (HOT) lanes, toll lanes, or bus lanes to encourage carpools and fund transit improvements,
- Implementing or funding off-site mobility improvements, including the initiation of transportation management organizations (TMOs),
- Implementing intelligent transportation systems (ITS) strategies to improve passenger throughput on existing lanes,
- Additional measures beyond those listed above, may be considered, if such measures are used to quantitatively reduce a project's VMT estimate, substantial evidence should be provided to support the claimed effectiveness of the measure(s).

Section 4. – Site Access Studies

Section 4.1. – Operational Analysis

Section 4.1.1. - Introduction

The site access and circulation constraints related to the provision of access to and from the project site may be analyzed as part of the project's environmental review. The analysis should address the site access and circulation needs of vehicles, bicycles and pedestrians. If the operation analysis is determined to be necessary in consultation with Public Works, operational performance may be quantified for primary site access points, unsignalized intersections integral to the project's site access, and signalized intersections in the vicinity of the project site.

Section 4.1.2. - Screening Criteria

Section 4.1.2.1. - Development Projects

For development projects, if the answer is yes to the following questions, further analysis may be required to assess whether the project would negatively affect project access and circulation:

- Is the project required to submit a Transportation Impact Analysis?
- Does the development project involve a discretionary action that would be reviewed by the Department of Regional Planning?

Section 4.1.3. - Evaluation Criteria

Section 4.1.3.1. - Operational Deficiencies

The Transportation Impact Analysis should include a quantitative evaluation of the project's expected access and circulation operations. Project access is considered constrained if the project's traffic would contribute to unacceptable queuing at nearby signalized intersections. Unacceptable or extended queuing may be defined as follows:

- Spill over from turn pockets into through lanes,
- Spill over into intersections.

Section 4.1.4. - Methodology

Section 4.1.4.1. - Level of Service and Queueing Methodology

Intersection level of service (LOS) and queueing methodologies from the latest edition of the Transportation Research Board Highway Capacity Manual (HCM) should be used to evaluate the operation of the project driveways and nearby intersections. For individual

isolated intersection analysis, the use of software packages such as Synchro, Vistro, or HCS that implement the HCM methodologies is acceptable.

Where oversaturated conditions currently exist, the operational analysis should be conducted using Synchro/SimTraffic or VISSIM simulation models to more accurately reflect the effect of downstream congestion on intersection operations. VISSIM should be used in areas with transit lanes or with high levels of pedestrians conflicting with vehicle turning movements

Section 4.1.4.2. - Study Area

Study locations should be determined in consultation with Public Works and should include:

- All primary project driveway(s),
- Unsignalized and/signalized intersections that are adjacent to the project or that are expected to be integral to the project's site access and circulation plan,
- Additional intersections may be necessary as determined by Public Works.

For most projects, analyze traffic for both the a.m. and p.m. weekday peak hours as determined by 24-hour traffic counts. For some projects, expanding the analysis to include midday or weekend periods may be appropriate if these are expected to be the prime periods of trip generation for the project.

Section 4.1.4.3. - Traffic Counts

Traffic counts should generally be conducted per the following guidance and by Section 4.1.4.2., unless otherwise directed by Public Works:

- Turning movement data at the study intersections:
    - Should be collected in 15-minute intervals,
    - Must include vehicle classifications, pedestrian volume counts, and bicycle counts,
    - Must include a minimum or 2 hours of traffic counts for each of the peak hours,
    - Must be taken on Tuesdays, Wednesdays or Thursdays,
    - Must exclude holidays, and the first weekdays before and after the holiday,
    - Must be taken on days when local schools or colleges are in session,
    - Must be taken on days of good weather, and avoid atypical conditions (e.g., road construction, detours, or major traffic incidents),
- Traffic counts used from other traffic studies in the area may be use if they are reviewed and approved by Public Works.

When simulation analyses are to be conducted, obtain traffic speed and/or travel time data during peak periods to aid in calibration of the simulation model.

Section 4.1.4.4. - Project Trip Distribution

Distribution patterns for project trips should be determined considering a number of factors including, but not limited to, the following:

- Characteristics of the street system serving the project site,
- Level of accessibility of routes to and from the proposed project site,
- Locations of employment and commercial centers,
- Locations of residential areas.

The Transportation Impact Analysis shall include map(s) showing project trip distribution percentages (inbound and outbound) at the study intersections, and project driveway(s). This map shall be pre-approved by Public Works and included in the Transportation Impact Analysis Scoping Document.

Section 4.1.4.5. - Traffic Forecasts

The Transportation Impact Analysis shall estimate traffic conditions for the study horizon year selected during the scoping phase and recorded in the executed Scoping Document. The study shall clearly identify the horizon year and annual ambient growth rate used for the study. For development projects constructed in phases over several years, the Transportation Impact Analysis should analyze intermediary milestones before the buildout and completion of the project. The annual ambient growth rate shall be determined by Public Works staff during the scoping process and can be based on the most recent SCAG Regional Transportation Model or other empirical information approved by Public Works.

The Transportation Impact Analysis shall consider trip generation for known development projects within one-half mile (2,640 foot) radius of the farthest outlying study intersections. Consultation with the Department of Regional Planning or other planning agencies will be required to compile a related projects list.

The traffic forecasts for the project access and circulation constraints are determined by adding project-generated trips to future base traffic volumes, including ambient growth and related projects and conducting the operational analysis.

Any programmed and funded transportation system improvements that are expected to be implemented on or before the project buildout year should be identified in the study, in consultation with Public Works. If programmed improvements include a modification to the existing lane configuration at any of the study intersections, then the study should identify these changes and include the revised lane configuration in the LOS calculations for all future scenarios.

Section 4.1.5. – Recommended Action

Potential corrective actions for project access and circulation constraints can include, but are not limited to:

- Installation of a traffic signal or stop signs or electronic warning devices at site access points,
- Redesign and/or relocation of project access points,
- Redesign of the internal access and circulation system,
- Installation of stop-signs and pavement markings internal to the site,
- Restriction or prohibition of turns at site access points,
- Installation of new traffic signal, left-turn signal phasing, or other vehicle flow enhancements at nearby intersections,
- Reconfiguration of study intersections that reduces gridlock and unsafe conflict points.

Any of the above-mentioned actions shall be recommended in accordance with California Manual on Uniform Traffic Control Devices (CA MUTCD) warrants and criteria, or other criteria deemed appropriate by Public Works.

<u>Section 4.2 – Construction Phase Analysis</u>

Section 4.2.1. - Introduction

This category addresses activities associated with project construction and major in-street construction of infrastructure projects.

Section 4.2.2. - Screening Criteria

If the answer is yes to any of the following questions, further analysis will be required to assess if the project could negatively affect existing pedestrian, bicycle, transit, or vehicle circulation:

- For projects that require construction activities to take place within the right-of-way of a highway, would it be necessary to close any temporary lanes, alleys, or streets for more than one day (including day and evening hours, and overnight closures if on a residential street)?
- For projects that require construction activities to take place within the right-of-way of a Local Street, would it be necessary to temporarily close any lanes, alleys, or streets for more than seven days (including day and evening hours, and including overnight closures if on a residential street)?
- Would in-street construction activities result in the loss of any vehicle, bicycle, or pedestrian access, including loss of existing bicycle parking to an existing land use for more than one day, including day and evening hours and overnight closures if access is lost to residential units?
- Would in-street construction activities result in the loss of any ADA access to an existing transit station, stop, or facility (e.g., layover zone)?

- Would in-street construction activities restrict access to any bus stops for more than one day, or necessitate any rerouting of a bus route?

- Would construction of a project interfere with pedestrian, bicycle, transit, or vehicle circulation and accessibility to adjoining areas?

Please note, that further analysis may determine that a project construction analysis may be required as determined by Public Works.

Section 4.2.3. - Evaluation Criteria

Factors to be considered as part of the construction phase analysis are: location of the project site, functional classification of the adjacent street, availability of alternate routes or additional capacity, temporary loss of bicycle parking, temporary loss of bus stops or rerouting of transit lines, duration of temporary loss of access, affected land uses, and magnitude of the temporary construction activities.

- Temporary transportation constraints:
    - Length of time of temporary street closures or closures of one or more travel lanes,
    - Classification of the street (major arterial, state highway) affected,
    - Existing congestion levels on the affected street segments and intersections,
    - Direct access to freeway on- or off-ramp or other state highway,
    - Presence of emergency services (fire, hospital, etc.) located nearby that regularly use the affected street,
- Temporary loss of access:
    - Length of time of any loss of pedestrian or bicycle circulation outside the construction zone,
    - Length of time of any loss of vehicular, bicycle, or pedestrian access to a parcel within the construction zone,
    - Length of time of any loss of ADA pedestrian access to a transit station, stop, or facility,
    - Availability of nearby vehicular or pedestrian access within 1/2 mile of the lost access,
- Temporary Loss of Bus Stops or Rerouting of Bus Lines:
    - Days and times during which an existing bus stop would be unavailable or existing service would be interrupted,
    - Availability of a nearby location (within 1/2 mile) to which the bus stop or route can be temporarily relocated,
    - Existence of other bus stops or routes with similar routes/destinations within a 1/2- mile radius of the affected stops or routes,
    - Time of interruption on a weekday, weekend or holiday, and whether the existing bus route typically provides service on those day(s).

Section 4.2.4. – Methodology

Describe the physical setting, including the classification of adjacent streets, on-street parking conditions, including bicycle parking, in the immediate vicinity of the construction project, a description of the land uses potentially affected by construction, and an inventory of existing transit lines, bus stops, transit stations, and transit facilities within a 1/2-mile radius of the construction site. Review proposed construction procedures/plans to determine whether construction activity within the street right-of-way would require any of the following:

- Closure of street, sidewalk, or lanes,
- Blocking existing vehicle, bicycle, or pedestrian access along a street or to parcels fronting the street,
- Modification of access to transit stations, stops, or facilities during service hours,
- Closure or movement of an existing bus stop or rerouting of an existing bus line.
- Creation of transportation hazards.

Compare the results to the evaluation criteria to determine the level of deficiency.

Section 4.2.5. - Recommended Action

Potential corrective conditions for project construction constraints can include but are not limited to:

- Implement traffic management plan, including traffic control plans,
    - Consult with Public Works if temporary closure of a travel lane may be necessary to stage equipment in the public right-of-way,
- Modify construction procedures,
- Limit major road obstructions to off-peak hours,
- Coordinate with emergency service and public transit providers,
- Provide alternative vehicular, bicycle, and/or pedestrian access to affected parcels. Consult with Public Works if temporary closure of a travel lane may be necessary to maintain adequate pedestrian and bicycle access as part of the traffic management plan,
- Coordinate access with adjacent property owners and tenants,
- Coordinate with transit agency regarding maintenance of ADA access to transit stations, stops, and transit facilities (e.g., layover zones),
- Coordinate with transit providers regarding need to temporarily close or relocate bus stops or reroute service.

<u>Section 4.3. – Local Residential Street Cut-Through Analysis</u>

Section 4.3.1. - Introduction

Development and transportation projects may be required to conduct a Local Residential Street Cut-Through Analysis (LRSTM). The objective of this analysis is to determine

potential increases in average daily traffic (ADT) volumes on designated Local Streets near a project that can be classified as cut-through trips generated by the project, and that can adversely affect the character and function of those streets. Cut- through trips are defined as trips along a street classified as a Local Street in the County's General Plan, with residential land-use frontage, as an alternative to trips along a highway defined as Limited Secondary, Secondary, Major, Parkway, or Expressway as designated in the County's General Plan for purposes of accessing a destination that is not within the neighborhood within which the Local Street is located.

Cut-through traffic may result from development projects that add vehicle trips to congested arterial street segments, or by transportation projects that reduce vehicular capacity on highway street segments. To mitigate potential adverse impacts from cut-through traffic (e.g., congestion, access issues, and speeding on Local Streets), traffic calming and diverting features should be considered and, if deemed appropriate by Public Works, implemented to offset any anticipated cut-through traffic.

Section 4.3.2. - Screening Criteria

Section 4.3.2.1. - Development Projects

If the answer is yes to the following questions, further analysis may be required to assess whether the project would negatively affect residential streets:

- Is the project required to submit a Transportation Impact Analysis?
- Does the development project involve a discretionary action that would be reviewed by the Department of Regional Planning?

In addition, for development projects to which all of the following circumstances apply, select local residential street segments for analyses during the transportation assessment scoping process:

- The project is located along a current Limited Secondary, Secondary, Major, Parkway, Expressway per the County's General Plan and the study intersections under project build-out conditions (as determined in Section 4.1) operate at a peak hour LOS E or LOS F.

- The project has a potential, based on connectivity to the roadway network, to add automobile traffic to the alternative local residential street route(s) during peak hours,

- An alternative local residential street route (defined as local streets as designated in the County's General Plan passing through a residential neighborhood) provide motorists with a viable alternative route. A viable alternative local residential street route is defined as one which is parallel and reasonably adjacent to the primary route as to make it attractive as an alternative to the primary route. The project applicant in consultation with Public Works shall define which routes are viable

alternative routes, based on, but not limited to, features such as geography and presence of existing traffic control devices, and other criteria as determined by Public Works.

For the purpose of screening for daily vehicle trips, a proposed project's daily vehicle trips should be estimated using the most recent edition of the ITE Trip Generation Manual. If the project proposed land use is not listed in the ITE Trip Generation Manual, please submit a trip generation study to Public Works for review and approval.

Section 4.3.3. - Methodology

Section 4.3.3.1. - Development Projects

Future peak hour "without project" traffic conditions for the study intersections in the vicinity of the project identified in Section 4.1 should be developed using the intersection analysis methodologies, including an ambient growth rate to the study horizon year and adding traffic generated by related projects. Future "without project" daily traffic volumes for the local residential streets included in the analysis should be developed by collecting daily traffic counts for the subject streets, adding an ambient growth rate to the study horizon year, and adding traffic generated by related projects, also using methodologies described in Section 4.1.

The methodologies described in Section 4.1 should be applied to estimate the daily and peak hour trip generation of the project and distribute the project trips to the street system to forecast the amount of project traffic that may be added to nearby congested highways. If the nearby study intersections are projected to operate at LOS E or F, the analysis shall include the following:

- Estimate the amount of peak hour project traffic that may instead shift away from the congested facilities to local residential streets,
- Estimate the amount of daily project traffic that may shift to local residential streets, considering that the street system is less congested during non-peak hours than during peak hours,

Section 4.3.4. - Recommended Action

If the analysis indicated the project may result in substantial diversion, the project applicant shall conduct public outreach and develop a Local Residential Street Cut-Through (LRSTM) Plan. The project applicant shall consult with Public Works, and neighborhood stakeholders, and any other stakeholders to collaboratively prepare the LRSTM Plan. Coordination with the appropriate Supervisorial District office may be necessary to designate the stakeholders that should facilitate the public outreach.

The project applicant shall submit a separate scoping document for the LRSTM Plan to Public Works for review and approval as part of the Transportation Impact Analysis which shall include the following items:

- Identify key milestones,
- Summarize the proposed process in developing a LRSTM plan for the local residential street segments of concern,
- Define a public outreach and consensus- building process,
- Propose selection and approval criteria for any evaluated traffic calming measures,
- Provide a funding plan which will include potential sources of funding.

The project applicant shall submit the LRSTM Plan with a cost estimate for the improvements, and a funding plan to Public Works for review and approval, prior to issuance of building permit. The LRSTM Plan shall be prepared in conformance with the guidelines established by Public Works and should contain, at a minimum, the following elements:

- Description of existing facilities and neighborhood traffic conditions,
- Description of proposed neighborhood traffic controls, including sketches of specific street modifications,
- Analysis of any change in existing or future traffic patterns as a result of implementation of the plan,
- Implementation and monitoring program.

The project applicant shall lead public outreach in consultation with Public Works and the affected Supervisorial District office.

The development of the LRSTM plan shall include the analysis of any relevant traffic data, roadway characteristics, and conditions of the local residential street segments of concern.

The LRSTM Plan should prioritize implementing effective traffic calming subject to Public Works guidelines and appropriate warrants, which may include, but is not limited to:

- Traffic circles,
- Speed humps,
- Roadway narrowing effects (raised medians, traffic chokers, etc.),
- Landscaping features,
- Roadway striping changes,
- Traffic control devices,
- Restrictive measures such as turn restrictions, physical barriers, diverters, signal metering, etc.,
    - Restrictive measures should be carefully evaluated to ensure that they do not lead to the diversion of a significant amount of traffic from one local residential street to another local residential street.

For these above-mentioned items, the project applicant shall also be responsible for conducting the engineering evaluation of the potential measures to determine the feasibility regarding drainage, constructability, street design and other pertinent elements.

Section 4.4 - Additional Site Access Analysis

Section 4.4.1 - Introduction

Project access and circulation constraints related to the site plan, and access to and from the project site may be analyzed separately from the Transportation Impact Analysis.

Section 4.4.2. - Screening Criteria

If the answer is yes to any of the following question, additional site access studies may be required to assess the projects site access requirements:

- Would the project provide a driveway on a rural cross section two-lane highway per the County's General Plan?
- Does the project's land use require vehicles to queue on-site?
- Does the project's land use include intermittent events which may exceed the supply of on-site parking?

Section 4.4.3. - Evaluation and Methodology

The project applicant shall prepare and submit a Scoping Document to Public Works through the EPIC-LA portal. The Scoping Document describes the assumptions and parameters that shall be included in the Additional Site Access Studies including any analysis requirements. The additional site access studies required based on the screening criteria from Section 4.4.2. are listed below

- Public Works may evaluate the site access requirements for a driveway on a rural two-lane highway by requesting a Traffic Access Management Study to be conducted,

- Public Works may evaluate the site access requirements for vehicular queuing by requesting a Traffic Queueing Analysis to be conducted,

- Public Works may evaluate the site access requirements for land use with intermittent events that will exceed the supply of on-site parking by requesting a Traffic Event Management Study to be conducted.

Section 4.4.4. - Recommended Actions

Potential corrective actions for project access and circulation will be addressed in the additional site access studies and documented in a Traffic Study Confirmation of Findings Letter from Public Works.

Section 5. - Study Format and Required Content

Each Transportation Impact Analysis should follow a consistent format and organization and include all of the figures, maps, and information presented in this section. The level of detail required for each project's Transportation Impact Analysis should be determined during the scoping process and identified in the Scoping Document.

Section 5.1. - Project Description

A Transportation Impact Analysis shall include a detailed project description at the beginning of the document. The project description should include the following information:

- Project case number, as assigned by the Department of Regional Planning (if applicable Tract Map, Parcel Map, Conditional Use Permit, RPPL),
- Location of the project site, address, Assessor's Block and Lot number(s), cross streets, and Supervisorial District, and Unincorporated Community,
- Existing and proposed total square footage for each type of land use and/or the number of residential units, including the net changes for each type of use,
- Transportation demand management measures proposed as part of the project.

This section shall also include the following maps and figures:

- Project site plan showing driveway locations, loading/unloading area,
- Site map showing study intersections and distance of the project driveway(s) from the adjacent intersections. Include location and identification of all major buildings, driveways, parking areas, and loading docks of the project.

Section 5.2. - Site Conditions

The information on the location and surroundings of the project shall be discussed following the project description, as a different section of the Transportation Impact Analysis. This section will provide a brief, but comprehensive description of the existing transportation infrastructure and conditions in the vicinity of the project. The specific boundaries of the Transportation Impact Analysis area, for both the location and surroundings of the project, should be confirmed during the initial discussion and scoping process with Public Works.

The project context section should include the following information, with the level of detail to be directed by Public Works during the scoping process:

- Street designations, classifications, pedestrian and bicycle facilities existing and planned,

- Description of the study area streets, including the number and width of lanes, direction of flow, on-street parking information, and other significant street information,
- Location of, distance from, and routings to and from on-ramps and off-ramps of regional highways and freeways,
- Description of public transit routes operating on the streets within the Transportation Impact Analysis area, including hours of service, peak period headways, type of vehicle (bus, light rail vehicle, etc.), and service provider.

This section of a Transportation Impact Analysis will also include the following maps and figures:

- Area map showing location of the project and related projects,
- Street maps of the study area indicating street names, classifications, and traffic control,
- Map or diagram of potential pedestrian destinations within 1,320 feet of the edge of a project site,
- Table indicating location, size, name, description, and trip generation of each related project.

Section 5.3. - Analysis, Discussion, and Results

Following the descriptions of the project and its surroundings, the Transportation Impact Analysis shall contain sections that detail the analyses conducted, summarize the results, and identify any significant transportation impacts and mitigation measures for each of the CEQA issue areas identified in Section 3, and any operational deficiencies and corrective actions for the additional areas of analysis identified in Section 4.

The Transportation Impact Analysis should include calculations, data, and descriptions of any transportation analyses conducted to determine project impacts on the transportation system. The Transportation Impact Analysis should describe the results of all project scenarios and describe all project impacts that have been identified.

Section 5.4. – Mitigation Measures and Recommended Actions

Section 5.4.1. - Introduction

When a project is expected to result in significant transportation impacts, as defined in Section 3, or transportation deficiencies, as defined in Section 4, the project's consultant should meet with Public Works to discuss potential transportation mitigation options and corrective actions before submitting a Transportation Impact Analysis. A variety of transportation mitigation measures should be considered to mitigate a project's significant transportation impact to a level of insignificance.

All proposed mitigation measures shall be described in the Transportation Impact Analysis and to the satisfaction of Public Works.

Section 5.4.2. - Transportation Demand Management Measures

Mitigation measures shall minimize vehicle miles traveled through Transportation Demand Management (TDM) strategies. A preliminary draft performance based TDM Program shall be included in the Transportation Impact Analysis for any project seeking trip generation amendments supported by TDM, to the satisfaction of Public Works. The applicant may be allowed to reduce the total project trips and VMT by an amount determined to be commensurate with the measures proposed in the TDM Program.

Section 5.4.3. - Physical Infrastructure Improvements

Construction of physical infrastructure improvements shall encourage walking and biking and the use of transit. Conceptual Traffic Signal Plans and Conceptual Signing and Striping Plans should be prepared for any proposed physical infrastructure improvements and should be submitted to Public Works for review and approval as part of the Transportation Impact Analysis.

Section 5.4.4. - Mitigation Monitoring and Reporting Program in CEQA Documents

Each mitigation measure in the project's mitigation monitoring program should be described separately in the CEQA Document. The following details are required for each measure:

- Identification of the agency responsible for monitoring the measure and coordinating all participants,
- Qualifications, if any, of the necessary monitor(s),
- Monitoring schedule (i.e., the phase of the project, frequency, and completion/termination) – this should be stated for physical mitigation measures required during construction as well as those that are for the operation/life of the project (e.g., TDM program),
- Funding required and sources of funding for monitoring activities by both project and County personnel (especially for long-term monitoring activities).

Attachment D

Approved Scope of Work

ENGINEERING, INC.

MAT Engineering, Inc.

www.matengineering.com
17192 Murphy Avenue #14902
Irvine, CA 92623
Ph: 949.344.1828

November 15, 2022

Ms. Starla Barker
DE NOVO PLANNING GROUP
180 East Main Street #108
Tustin, CA 92780

Subject: Long Beach Boulevard Multifamily Residential Project Trip Generation & VMT Analysis/Screening Scope of Work, City of South Gate, California

Dear Starla,

MAT Engineering, Inc. is pleased to submit this proposed scoping agreement for preparation of a trip generation study and VMT screening for the proposed Long Beach Boulevard multifamily residential project in the City of South Gate.

A. Project Description & Location

The project site is located on the southwest corner of the Long Beach Boulevard / Willow Place intersection in the City of South Gate.

Existing uses on the project site consist of an auto repair/tire shop with an area of approximately 650 square feet.

The proposed project consists of removal of the existing auto repair/tire shop with development of 14 dwelling units of three-story multi-family residential use.

Access for the proposed project is planned via two driveways; one driveway on Willow place and one right-in/right-out driveway on Long Beach Boulevard.

Exhibit A shows the project location. Exhibit B shows the proposed site plan.

B. Project Trip Generation

Trip generation represents the amount of trips attracted and produced by a land use.

The trip generation for the existing use and the proposed project is based upon the specific land uses that have been planned for this project and has been determined utilizing the Institute of Transportation Engineers (ITE) trip generation rates which is an industry standard for calculating trips associated with land uses.

Table 1 shows the trip ITE trip generation rates for the existing and also the proposed uses based on the ITE.

Table 1
ITE Trip Generation Rates - subject to verification.

Land Use	ITE Code	Units	Peak Hour						Daily
			AM Peak Hour			PM Peak Hour			
			In	Out	Total	In	Out	Total	
Auto Repair/Care	942	TSF	1.49	0.76	2.25	1.49	1.62	3.11	31.1 *
Multi-family Residential (Low-Rise)	220	DU	0.10	0.30	0.40	0.32	0.19	0.51	6.74

Notes:
Source: 2021 ITE 11th Edition Trip Generation Manual; - provide cut sheets for ITE codes 942 and 220 in the report.
TSF = Thousand Square Feet; DU = Dwelling Units
* For auto repair use, since ITE does not have daily rates, the daily rate is derived by multiplying the PM peak hour rate by a factor of 10.0

Utilizing the ITE trip generation rates from Table 1, Table 2 shows a summary of the net trip generation for the proposed project after accounting for the existing land use which will be removed.

Table 2
Project Trip Generation - subject to verification

Land Use	Quantity	Units	ITE Code	Peak Hour						Daily
				AM Peak Hour			PM Peak Hour			
				In	Out	Total	In	Out	Total	
Proposed Use (14 Dwelling Units of Low-Rise Multifamily Residential Units)	14	DU	220	1	5	6	4	3	7	94
Existing Use (650 Square Feet of Auto Repair Use)	0.650	TSF	942	-1	0	-1	-1	-1	-2	-20
			NET Total	**0**	**5**	**5**	**3**	**2**	**5**	**74**

Source::

Institute of Transportation Engineers (ITE) 2021 Trip Generation Manual (11th Edition) Source: 2021 ITE 11th Edition Trip Generation Manual;

As shown in Table 2, based on the ITE trip generation rates:

- Without taking any credit for the existing use, the proposed project is forecast to generate approximately 94 daily trips which include approximately 6 AM peak hour trips and approximately 7 PM peak hour trips.

- The existing use generates approximately 20 daily trips which include approximately 1 AM peak hour trips and approximately 2 PM peak hour trips.

- After taking credit for the existing use, the proposed project is forecast to generate approximately 74 NET additional daily trips which include approximately 5 NET additional AM peak hour trips and approximately 4 NET additional PM peak hour trips.

C. Trip Generation Evaluation & Access Analysis

As shown in Table 2, after taking credit for the existing use, the proposed project is forecast to generate approximately 74 NET additional daily trips which include approximately 5 NET additional AM peak hour trips and approximately 4 NET additional PM peak hour trips.

Based on industry standards and the Los Angeles County traffic study requirements, typically, a full traffic study is required when a project generates more than 50 peak hour trips or 110 daily trips. Since the proposed project is expected to generate a low number of trips, MAT Engineering, Inc. proposes preparation of a trip generation memorandum for the project instead of a full traffic study.

The trip generation memorandum will disclose the project's trip generation based on the ITE trip generation rates and draw a conclusion that based on the low number of trips, the proposed project is expected to not result in an adverse level of service impact and operations on the surrounding roadway system.

D. Proposed Scope of Vehicle Miles Traveled (VMT) Analysis

In response to Senate Bill (SB) 743, the California Natural Resource Agency certified and adopted new CEQA Guidelines in December 2018 which now identify Vehicle Miles Traveled (VMT) as the most appropriate metric to evaluate a project's transportation impact under CEQA (§ 15064.3).

Effective July 1, 2020, the previous CEQA metric of LOS, typically measured in terms of automobile delay, roadway capacity and congestion, generally will no longer constitute a significant environmental impact.

Based on County of Los Angeles traffic study requirements, projects generating less than 110 daily trips could be screened out from requiring a full VMT analysis. - Attach copy in the report

Hence, the proposed project is expected to screen out for requiring a full VMT analysis.

MAT Engineering, Inc., will prepare a VMT screening memo for the proposed project based on this screening criteria.

MAT Engineering Inc. appreciates the opportunity to provide this scope of work for review. If you have any questions, concerns, or comments, please contact us at 949-344-1828 or at@matengineering.com.

Respectfully submitted,

MAT ENGINEERING, INC.

Approved by:

11-15-2022

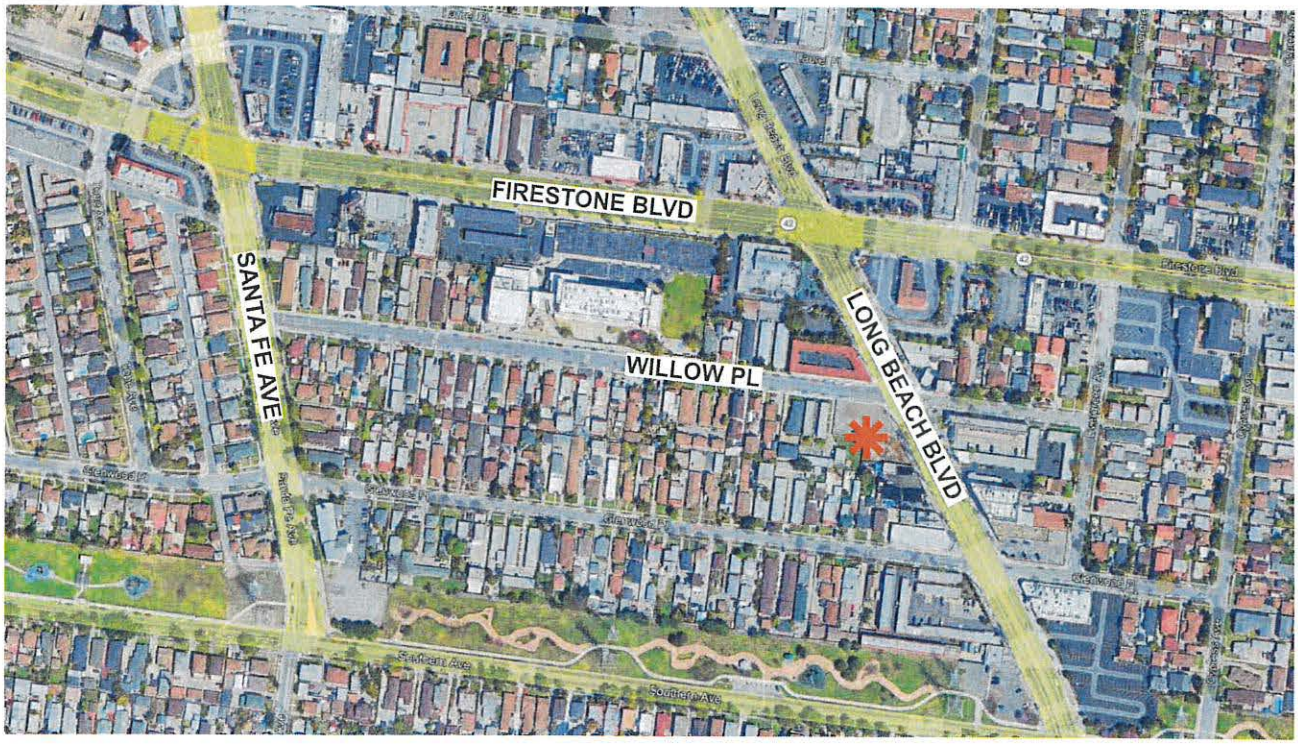
Date

Alex Tabrizi, PE, TE

President

Attachment A

Exhibits



Legend:

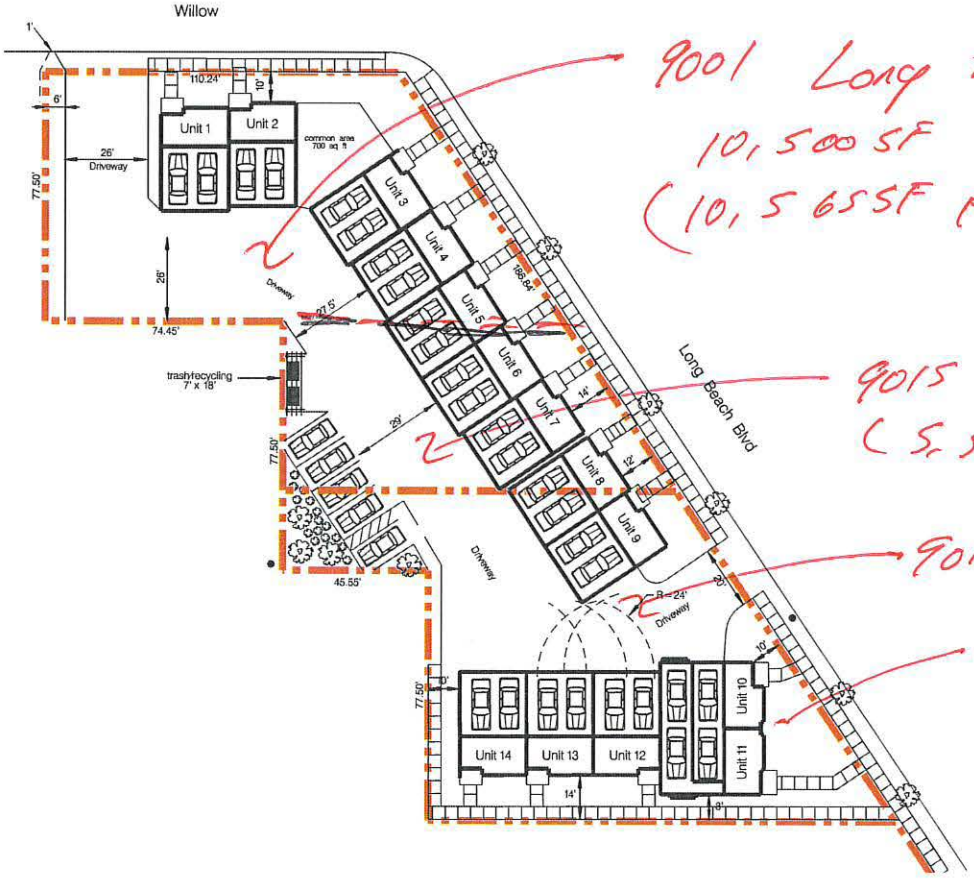
Site Location

Not to Scale

ENGINEERING, INC.

Project Location

Exhibit A



Not to Scale

Provide a scale plan 1" = 20' or 40'

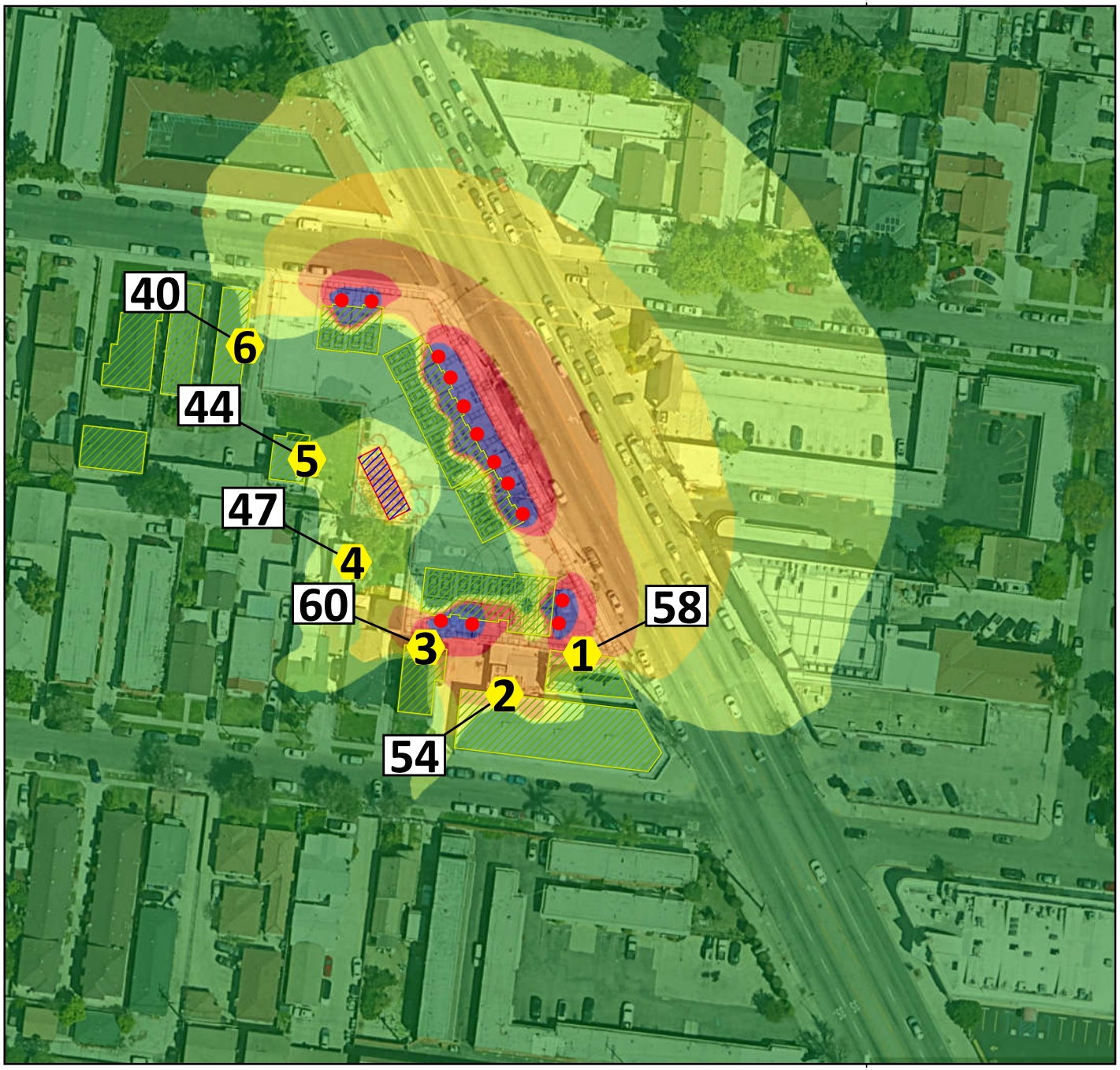
Site Plan

Exhibit B

Size of site plan shall be 24 x 36.

Appendix C:

SoundPlan Input/Output



04622234_Habitat for Humanity IS-EA South Gate
Noise Level Contours

Levels in dB(A)

	< 45
45	- 50
50	- 55
55	- 60
60	- 65
	>= 65

Signs and symbols

- Level table, dBA
- Buildings
- Point Source (HVAC)
- Point Receivers

Length scale 1:70

0 45 90 180 27

MD ACOUSTICS
Sound Solutions for Planning and Design

Habitat for Humanity IS-EA South Gate
Contribution spectra - 001 - Habitat for Humanity: Outdoor SP

Source	Time slice	Sum	25Hz	31.5Hz	40Hz	50Hz	63Hz	80Hz	100Hz	125Hz	160Hz	200Hz	250Hz	315Hz	400Hz	500Hz	630Hz	800Hz	1kHz	1.25kHz	1.6kHz	2kHz	2.5kHz	3.15kHz	4kHz	5kHz	6.3kHz	8kHz	10kHz
		dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)
Receiver R1 Fl G Lr,lim dB(A) Leq,d 58.0 dB(A)																													
HVAC	Leq,d	42.1	-8.8	-2.7	1.3	14.3	19.2	13.2	22.1	24.0	23.0	21.6	21.7	23.6	25.8	26.8	30.7	34.0	30.0	32.0	33.3	31.2	32.1	28.8	29.5	27.0	26.1	19.9	13.1
HVAC	Leq,d	32.6	-11.8	-6.0	-2.3	10.5	15.2	8.9	17.4	19.1	17.7	16.4	16.0	17.4	18.9	19.4	22.7	25.4	20.7	21.9	22.5	19.7	19.8	15.7	15.6	12.3	10.5	3.4	-4.3
HVAC	Leq,d	30.6	-13.4	-7.6	-3.9	8.9	13.6	7.3	15.7	17.4	16.0	14.4	13.9	15.3	16.8	17.2	20.5	23.4	18.7	20.0	20.6	17.7	17.7	13.6	13.4	9.9	8.0	0.6	-7.5
HVAC	Leq,d	52.7	-0.6	5.4	9.4	24.4	29.3	23.3	32.4	34.3	33.3	33.6	33.7	35.6	37.2	38.2	42.2	44.4	40.3	42.3	43.5	41.4	42.4	39.3	40.1	37.9	37.6	32.0	26.3
HVAC	Leq,d	55.9	2.8	10.5	14.5	27.5	32.4	26.4	35.5	37.5	36.4	37.2	37.3	39.3	40.7	41.7	45.7	47.5	43.5	45.5	46.6	44.5	45.5	42.4	43.4	41.2	41.0	35.6	30.1
HVAC	Leq,d	44.4	-6.7	-0.6	3.4	16.4	21.3	15.3	24.2	26.2	25.2	24.3	24.4	26.3	28.3	29.3	33.3	36.2	32.2	34.2	35.4	33.3	34.2	31.0	31.8	29.4	28.7	22.7	16.3
HVAC	Leq,d	28.1	-15.2	-9.5	-5.8	6.9	11.5	5.1	13.5	15.1	13.6	11.2	10.8	12.2	14.1	14.5	17.8	21.1	16.3	17.6	18.2	15.3	15.3	11.1	10.8	7.2	5.2	-2.4	-10.8
HVAC	Leq,d	23.6	-18.4	-12.7	-9.0	3.6	8.1	1.7	9.7	11.2	9.7	6.7	6.1	7.4	9.3	9.6	12.9	16.6	11.8	12.9	13.5	10.5	10.4	6.0	5.5	1.4	-1.3	-9.8	-19.7
HVAC	Leq,d	11.8	-23.9	-18.9	-16.0	-4.2	-0.4	-7.5	-0.2	0.7	-1.4	-4.2	-5.2	-4.2	-3.2	-2.9	0.6	3.5	-1.1	0.3	1.3	-1.4	-1.1	-5.1	-5.3	-9.0	-11.5	-20.2	-30.4
HVAC	Leq,d	9.9	-25.6	-20.8	-18.2	-6.5	-2.8	-10.0	-2.8	-1.9	-4.0	-5.7	-6.7	-5.8	-5.2	-4.7	-1.1	1.4	-3.1	-1.5	-0.3	-2.8	-2.4	-6.3	-6.4	-10.0	-12.6	-21.3	-31.6
HVAC	Leq,d	26.3	-16.2	-10.4	-6.8	5.8	10.4	4.0	12.2	13.7	12.2	9.5	9.0	10.4	12.2	12.5	15.8	19.2	14.4	15.5	16.1	13.2	13.1	8.9	8.5	4.8	2.6	-5.2	-14.0
HVAC	Leq,d	25.3	-17.0	-11.2	-7.6	5.0	9.6	3.2	11.3	12.8	11.3	8.5	7.9	9.3	11.1	11.5	14.8	18.3	13.5	14.6	15.2	12.2	12.2	7.9	7.5	3.7	1.3	-6.8	-16.0
HVAC	Leq,d	24.5	-17.8	-12.1	-8.4	4.2	8.8	2.4	10.5	12.0	10.5	7.5	7.0	8.3	10.2	10.6	13.9	17.5	12.7	13.9	14.5	11.5	11.4	7.1	6.6	2.6	0.1	-8.3	-17.9
Parking	Leq,d	15.4					7.6			13.7			0.3			2.1			1.0			-0.5			-5.7			-17.4	
Remaining contrib. of src "HVAC"	Leq,d																												
Remaining contrib. of src "HVAC"	Leq,d																												
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Habitat for Humanity IS-EA South Gate
Contribution spectra - 001 - Habitat for Humanity: Outdoor SP

Source	Time slice	Sum	25Hz	31.5Hz	40Hz	50Hz	63Hz	80Hz	100Hz	125Hz	160Hz	200Hz	250Hz	315Hz	400Hz	500Hz	630Hz	800Hz	1kHz	1.25kHz	1.6kHz	2kHz	2.5kHz	3.15kHz	4kHz	5kHz	6.3kHz	8kHz	10kHz
		dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)
Remaining contrib. of src "HVAC"	Leq,d																												
Remaining contrib. of src "HVAC"	Leq,d																												
Remaining contrib. of src "Parking"	Leq,d																												
Receiver R2 Fl G Lr,lim dB(A)	Leq,d 53.7 dB(A)																												
HVAC	Leq,d	48.9	-5.3	0.8	4.8	17.8	22.7	16.7	28.0	29.9	29.5	28.8	28.9	31.0	32.9	34.0	37.9	40.9	36.8	38.8	40.0	38.0	38.9	35.7	36.4	34.0	33.3	27.4	21.0
HVAC	Leq,d	18.8	-17.4	-12.2	-9.2	2.8	6.6	-0.6	6.8	7.4	4.9	3.3	2.0	3.4	3.6	3.8	7.4	9.5	5.1	6.8	7.9	5.6	6.8	3.3	3.8	0.9	-0.3	-7.1	-14.6
HVAC	Leq,d	17.0	-18.6	-13.4	-10.4	1.5	5.3	-2.0	5.4	5.9	3.5	1.9	0.7	1.5	1.8	1.7	5.3	7.4	3.0	4.7	5.9	3.5	4.9	1.4	1.8	-1.1	-2.5	-9.5	-17.2
HVAC	Leq,d	37.2	-9.8	-4.1	-0.4	12.2	16.8	10.4	18.9	20.4	18.8	17.9	19.0	20.5	22.1	22.7	26.3	29.6	25.3	27.0	28.2	25.9	26.6	23.1	23.5	20.6	19.3	12.3	4.6
HVAC	Leq,d	42.9	-7.8	-1.9	1.9	14.7	19.5	13.4	22.2	24.1	22.9	23.4	23.4	25.3	27.1	28.1	32.0	34.8	30.8	32.7	33.9	31.8	32.7	29.4	30.1	27.6	26.9	20.8	14.3
HVAC	Leq,d	51.2	-1.1	4.9	8.9	21.9	26.9	20.9	29.9	32.8	31.7	31.5	31.6	33.6	35.4	36.4	40.4	43.1	39.0	41.0	42.2	40.2	41.1	37.9	38.7	36.4	35.8	30.0	23.8
HVAC	Leq,d	16.1	-19.2	-14.1	-11.1	0.8	4.5	-2.8	4.5	5.1	2.7	1.1	-0.1	0.7	1.0	0.9	4.4	6.6	2.2	3.9	5.0	2.7	4.0	0.5	0.8	-2.1	-3.6	-10.8	-18.9
HVAC	Leq,d	12.8	-23.3	-18.3	-15.4	-3.6	0.1	-7.1	0.2	0.9	-1.4	-2.6	-3.7	-2.8	-2.5	-1.5	1.5	3.5	-0.8	1.6	2.9	0.5	1.1	-2.6	-2.6	-6.0	-8.2	-16.5	-26.0
HVAC	Leq,d	9.9	-26.5	-21.8	-19.1	-7.5	-3.8	-11.0	-3.8	-3.0	-5.1	-5.9	-6.9	-6.0	-5.6	-5.2	-1.4	1.5	-2.8	-1.0	0.3	-2.1	-1.6	-5.4	-5.4	-9.1	-11.6	-20.3	-30.7
HVAC	Leq,d	11.2	-26.3	-21.5	-18.8	-7.2	-3.5	-10.8	-3.5	-2.7	-4.8	-5.9	-6.9	-4.1	-3.8	-3.4	1.0	3.0	-1.3	0.5	1.8	-0.6	-0.1	-3.9	-4.0	-7.7	-10.4	-19.2	-29.8
HVAC	Leq,d	14.6	-21.1	-15.9	-13.0	-1.1	2.6	-4.6	2.7	3.3	0.9	-0.3	-1.4	-0.6	-0.4	-0.4	2.9	5.0	0.7	2.4	3.6	1.3	2.8	-0.7	-0.4	-3.5	-5.2	-12.6	-21.0
HVAC	Leq,d	14.0	-21.7	-16.5	-13.6	-1.7	2.0	-5.2	2.1	2.7	0.4	-0.6	-1.7	-0.8	-0.6	-0.7	2.3	4.0	-0.3	1.4	3.4	1.1	1.7	-1.9	0.0	-3.2	-5.0	-12.7	-21.6
HVAC	Leq,d	13.4	-23.1	-18.0	-15.1	-3.3	0.4	-6.8	0.4	1.1	-1.2	-2.5	-3.6	-2.8	-1.5	-1.6	2.0	4.3	0.0	1.7	3.6	1.3	1.9	-1.8	-1.7	-5.2	-7.3	-15.3	-24.7
Parking	Leq,d	17.7					9.3			16.0			4.1			5.5			4.4			2.2			-3.1			-14.7	
Remaining contrib. of src "HVAC"	Leq,d																												
Remaining contrib. of src "HVAC"	Leq,d																												
Remaining contrib. of src "HVAC"	Leq,d																												
Remaining contrib. of src "HVAC"	Leq,d																												
Remaining contrib. of src "HVAC"	Leq,d																												
Remaining contrib. of src "HVAC"	Leq,d																												
Remaining contrib. of src "HVAC"	Leq,d																												
Remaining contrib. of src "HVAC"	Leq,d																												

Habitat for Humanity IS-EA South Gate
Contribution spectra - 001 - Habitat for Humanity: Outdoor SP

Source	Time slice	Sum	25Hz	31.5Hz	40Hz	50Hz	63Hz	80Hz	100Hz	125Hz	160Hz	200Hz	250Hz	315Hz	400Hz	500Hz	630Hz	800Hz	1kHz	1.25kHz	1.6kHz	2kHz	2.5kHz	3.15kHz	4kHz	5kHz	6.3kHz	8kHz	10kHz
		dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)
Remaining contrib. of src "HVAC"	Leq,d																												
Remaining contrib. of src "HVAC"	Leq,d																												
Remaining contrib. of src "HVAC"	Leq,d																												
Remaining contrib. of src "HVAC"	Leq,d																												
Remaining contrib. of src "HVAC"	Leq,d																												
Remaining contrib. of src "Parking"	Leq,d																												
Receiver R3 Fl G Lr,lim dB(A) Leq,d 59.7 dB(A)																													
HVAC	Leq,d	58.3	4.8	10.8	16.5	29.5	34.5	28.5	37.6	39.6	38.5	39.8	39.8	41.8	43.2	44.2	48.1	49.9	45.9	47.9	49.0	46.9	47.9	44.8	45.8	43.7	43.4	38.1	32.6
HVAC	Leq,d	18.0	-18.2	-13.2	-10.3	1.5	5.2	-2.1	5.3	5.8	3.3	2.4	1.2	1.9	2.3	3.1	6.8	8.8	4.6	6.4	7.6	5.4	6.2	2.8	3.4	0.8	-0.2	-6.7	-13.8
HVAC	Leq,d	18.2	-18.5	-13.5	-10.6	1.1	4.8	-2.6	4.7	5.3	2.9	1.7	1.7	2.6	2.9	3.5	7.3	9.3	5.0	6.8	8.0	5.8	6.5	3.1	3.6	0.8	-0.3	-7.1	-14.5
HVAC	Leq,d	22.9	-14.5	-9.2	-6.0	6.2	10.2	3.3	11.1	11.9	9.8	8.4	7.2	8.0	9.2	9.0	12.0	14.0	9.3	10.8	11.6	9.1	9.6	6.1	6.4	3.7	2.6	-3.9	-10.9
HVAC	Leq,d	26.6	-12.6	-7.1	-3.7	8.7	13.0	6.3	14.4	15.5	13.6	12.0	11.1	12.0	12.9	13.0	16.0	18.2	13.4	14.6	15.1	12.5	12.8	8.9	9.1	6.1	4.8	-1.8	-8.9
HVAC	Leq,d	53.9	0.1	6.2	12.3	25.3	30.3	24.3	33.4	35.3	34.3	34.7	34.8	36.8	38.3	39.3	43.3	45.6	41.6	43.6	44.7	42.7	43.6	40.5	41.4	39.2	38.9	33.4	27.6
HVAC	Leq,d	18.6	-20.4	-15.4	-12.5	-0.7	5.0	-2.4	4.9	5.5	3.1	2.8	2.6	3.5	3.5	3.9	7.6	9.5	5.4	7.3	8.6	6.5	7.3	3.9	4.4	1.6	0.4	-6.4	-14.0
HVAC	Leq,d	14.4	-23.2	-18.2	-15.4	-3.6	0.1	-7.1	0.2	0.8	-1.5	-2.7	-3.8	-2.9	-0.8	-0.6	3.1	5.3	1.1	3.8	5.2	2.9	3.6	0.0	0.1	-3.1	-5.1	-12.9	-21.8
HVAC	Leq,d	17.4	-20.7	-15.2	-11.8	0.5	4.8	-1.9	5.8	6.8	4.9	1.8	0.7	1.5	2.8	2.8	5.8	9.3	4.4	5.9	6.7	3.8	3.9	-0.2	-0.5	-4.3	-6.7	-15.1	-24.9
HVAC	Leq,d	14.5	-21.9	-16.6	-13.4	-1.3	2.8	-4.2	3.2	4.0	1.8	-0.6	-1.9	-1.3	-0.7	-0.3	2.9	5.5	0.9	2.4	3.4	0.8	1.2	-2.7	-2.8	-6.4	-8.7	-17.1	-26.8
HVAC	Leq,d	16.0	-21.4	-16.4	-13.6	-1.8	1.8	-5.5	1.8	2.4	0.0	-0.7	-0.3	0.6	0.7	1.4	5.2	7.0	2.9	4.8	6.3	4.1	4.8	1.4	1.8	-1.1	-2.5	-9.5	-17.4
HVAC	Leq,d	15.0	-22.4	-17.4	-14.6	-2.9	0.8	-6.6	0.7	1.4	-1.0	-1.7	-1.3	-0.4	-0.2	0.5	4.3	6.2	2.0	3.9	5.2	3.0	3.7	0.3	0.6	-2.3	-3.8	-11.0	-19.2
HVAC	Leq,d	13.7	-23.1	-18.1	-15.3	-3.6	0.1	-7.2	0.1	0.8	-1.5	-2.5	-3.6	-2.8	-2.4	-1.6	2.2	4.0	-0.2	3.0	4.3	2.1	2.8	-0.7	-0.4	-3.5	-5.2	-12.6	-21.2
Parking	Leq,d	32.5					18.4			27.8			16.5			22.1			24.8			26.0			22.5			13.2	
Remaining contrib. of src "HVAC"	Leq,d																												
Remaining contrib. of src "HVAC"	Leq,d																												
Remaining contrib. of src "HVAC"	Leq,d																												
Remaining contrib. of src "HVAC"	Leq,d																												
Remaining contrib. of src "HVAC"	Leq,d																												

Habitat for Humanity IS-EA South Gate
Contribution spectra - 001 - Habitat for Humanity: Outdoor SP

Source	Time slice	Sum	25Hz	31.5Hz	40Hz	50Hz	63Hz	80Hz	100Hz	125Hz	160Hz	200Hz	250Hz	315Hz	400Hz	500Hz	630Hz	800Hz	1kHz	1.25kHz	1.6kHz	2kHz	2.5kHz	3.15kHz	4kHz	5kHz	6.3kHz	8kHz	10kHz
		dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)
Remaining contrib. of src "HVAC"	Leq,d																												
Remaining contrib. of src "HVAC"	Leq,d																												
Remaining contrib. of src "HVAC"	Leq,d																												
Remaining contrib. of src "HVAC"	Leq,d																												
Remaining contrib. of src "HVAC"	Leq,d																												
Remaining contrib. of src "HVAC"	Leq,d																												
Remaining contrib. of src "HVAC"	Leq,d																												
Remaining contrib. of src "HVAC"	Leq,d																												
Remaining contrib. of src "Parking"	Leq,d																												
Receiver R4 Fl G Lr,lim dB(A) Leq,d 47.5 dB(A)																													
HVAC	Leq,d	44.3	-9.5	-3.7	0.1	12.9	17.7	11.5	20.2	25.6	26.0	24.8	24.7	26.6	28.6	29.5	33.4	36.5	32.4	34.3	35.5	33.3	34.1	30.8	31.4	28.8	27.9	21.7	14.9
HVAC	Leq,d	21.0	-15.2	-9.8	-6.5	5.7	9.8	2.8	10.5	11.3	8.9	6.7	5.3	5.8	6.2	6.0	9.2	11.4	6.8	8.2	9.1	6.5	7.0	3.4	3.8	1.0	-0.3	-7.0	-14.4
HVAC	Leq,d	20.5	-10.4	-10.3	-7.1	5.1	9.1	2.1	9.8	10.5	8.2	6.2	4.8	5.3	5.5	5.4	8.7	10.9	6.3	7.8	8.8	6.4	7.0	3.4	3.8	0.9	-0.3	-7.0	-14.3
HVAC	Leq,d	18.1	-12.1	-12.1	-9.0	3.0	6.9	-0.2	7.3	8.0	5.6	3.3	2.1	2.8	3.3	3.1	6.4	8.7	4.1	5.6	6.6	4.1	4.7	1.1	1.4	-1.5	-2.9	-9.8	-17.5
HVAC	Leq,d	18.1	-17.5	-12.3	-9.3	2.7	6.4	-0.8	6.5	7.1	4.7	2.7	1.5	2.2	2.8	2.7	6.1	9.2	4.6	6.5	7.5	4.9	5.4	1.8	2.0	-1.0	-2.5	-9.5	-17.4
HVAC	Leq,d	42.9	-12.0	-6.4	-2.8	9.7	14.2	7.6	15.8	17.1	23.9	22.1	22.0	24.2	26.6	27.5	31.4	35.1	31.0	33.0	34.3	32.1	33.0	29.7	30.2	27.6	26.5	19.9	12.8
HVAC	Leq,d	28.0	-14.1	-8.4	-4.7	7.9	12.5	6.1	14.5	15.9	14.4	12.3	11.7	12.9	14.4	14.6	17.7	20.5	15.7	16.8	17.4	14.4	14.5	10.3	10.2	6.8	5.0	-2.2	-10.0
HVAC	Leq,d	17.2	-19.4	-14.2	-11.0	1.0	5.0	-2.1	5.5	6.2	3.8	2.4	1.1	1.7	1.9	2.0	5.8	7.9	3.5	5.2	6.3	4.0	4.6	1.0	1.3	-1.7	-3.2	-10.3	-18.3
HVAC	Leq,d	19.0	-18.5	-13.0	-9.7	2.5	6.7	-0.1	7.6	8.6	6.5	3.9	2.7	3.6	4.6	4.6	7.7	10.7	5.8	7.1	7.8	5.0	5.2	1.2	1.1	-2.2	-4.1	-11.6	-20.2
HVAC	Leq,d	17.7	-19.2	-13.9	-10.7	1.5	5.5	-1.4	6.1	6.9	4.6	2.4	1.1	1.7	2.2	1.9	5.0	7.6	6.1	7.2	7.7	4.7	4.7	0.6	0.4	-3.0	-4.8	-12.3	-20.8
HVAC	Leq,d	19.7	-17.3	-12.0	-8.8	3.3	7.4	0.4	8.1	8.9	6.7	5.4	4.1	4.8	5.2	5.0	8.3	10.7	6.1	7.6	8.6	6.1	6.6	3.1	3.4	0.6	-0.6	-7.3	-14.6
HVAC	Leq,d	18.5	-18.4	-13.2	-10.0	2.0	6.0	-1.0	6.6	7.4	5.1	3.9	2.6	3.2	3.5	3.3	7.2	9.4	4.9	6.6	7.7	5.3	5.9	2.3	2.7	-0.2	-1.5	-8.3	-15.8
HVAC	Leq,d	17.5	-19.2	-14.0	-10.9	1.2	5.2	-1.9	5.7	6.4	4.0	2.7	1.4	2.0	2.3	2.1	6.3	8.4	4.0	5.7	6.8	4.4	5.1	1.5	1.8	-1.1	-2.5	-9.5	-17.2
Parking	Leq,d	39.3					24.5			34.1			24.7			30.0			31.9			32.5			29.2			21.3	
Remaining contrib. of src "HVAC"	Leq,d																												
Remaining contrib. of src "HVAC"	Leq,d																												

Habitat for Humanity IS-EA South Gate
Contribution spectra - 001 - Habitat for Humanity: Outdoor SP

Source	Time slice	Sum	25Hz	31.5Hz	40Hz	50Hz	63Hz	80Hz	100Hz	125Hz	160Hz	200Hz	250Hz	315Hz	400Hz	500Hz	630Hz	800Hz	1kHz	1.25kHz	1.6kHz	2kHz	2.5kHz	3.15kHz	4kHz	5kHz	6.3kHz	8kHz	10kHz
		dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)
Remaining contrib. of src "HVAC"	Leq,d																												
Remaining contrib. of src "HVAC"	Leq,d																												
Remaining contrib. of src "HVAC"	Leq,d																												
Remaining contrib. of src "HVAC"	Leq,d																												
Remaining contrib. of src "HVAC"	Leq,d																												
Remaining contrib. of src "HVAC"	Leq,d																												
Remaining contrib. of src "HVAC"	Leq,d																												
Remaining contrib. of src "HVAC"	Leq,d																												
Remaining contrib. of src "HVAC"	Leq,d																												
Remaining contrib. of src "HVAC"	Leq,d																												
Remaining contrib. of src "HVAC"	Leq,d																												
Remaining contrib. of src "Parking"	Leq,d																												
Receiver R5 Fl G Lr,lim dB(A)	Leq,d 43.8 dB(A)																												
HVAC	Leq,d	39.0	-15.9	-10.3	-6.7	5.9	10.4	3.9	12.0	19.3	20.0	17.2	17.1	19.0	22.3	23.3	27.1	31.5	27.4	29.3	30.7	28.5	29.2	25.8	26.1	23.1	21.4	14.1	5.8
HVAC	Leq,d	19.6	-17.5	-12.2	-9.0	3.2	7.2	0.2	7.9	8.7	6.4	4.1	2.8	4.5	5.3	5.1	8.6	10.7	6.0	7.5	8.5	6.1	6.6	3.0	3.3	0.2	-1.4	-8.7	-16.8
HVAC	Leq,d	16.8	-19.4	-14.2	-11.1	1.0	4.9	-2.2	5.3	5.9	3.4	2.5	1.1	1.6	1.5	1.3	5.2	7.1	2.9	4.7	6.0	3.7	4.5	1.1	1.5	-1.3	-2.6	-9.4	-16.9
HVAC	Leq,d	18.3	-19.3	-13.9	-10.6	1.7	5.9	-0.9	6.8	7.8	5.7	3.2	2.1	2.9	3.9	3.8	6.7	9.8	5.0	6.2	7.2	4.4	4.6	0.6	0.4	-3.1	-5.2	-13.1	-22.1
HVAC	Leq,d	16.8	-20.4	-15.1	-12.0	0.1	4.0	-3.1	4.3	5.1	2.9	0.7	-0.5	2.7	3.1	3.0	6.2	8.2	3.5	4.8	6.2	3.7	4.1	0.3	0.3	-3.1	-5.3	-13.3	-22.5
HVAC	Leq,d	37.3	-18.1	-12.6	-9.3	2.9	7.0	0.2	7.9	8.8	16.7	15.9	15.8	17.8	20.4	21.4	25.3	29.8	25.7	27.6	29.1	26.9	27.6	24.2	24.5	21.5	20.0	12.6	4.2
HVAC	Leq,d	19.9	-16.5	-11.2	-7.9	4.3	8.3	1.3	8.9	9.7	7.3	5.3	3.9	4.4	4.9	4.6	8.3	10.4	5.8	7.4	8.4	6.0	6.6	3.0	3.3	0.3	-1.0	-7.9	-15.4
HVAC	Leq,d	19.4	-16.8	-11.6	-8.4	3.7	7.7	0.6	8.2	8.9	6.5	5.3	3.9	4.4	4.3	4.3	7.6	9.6	5.2	7.0	8.1	5.8	6.5	3.1	3.6	0.9	-0.1	-6.7	-13.8
HVAC	Leq,d	20.4	-15.3	-10.0	-6.8	5.3	9.3	2.3	9.9	10.6	8.2	6.3	4.9	5.4	5.6	5.3	8.5	10.6	6.1	7.6	8.5	6.1	6.7	3.2	3.6	0.9	-0.3	-6.8	-14.0
HVAC	Leq,d	21.1	-14.9	-9.6	-6.3	5.8	9.9	2.9	10.6	11.4	9.0	7.1	5.7	6.2	6.4	6.1	9.2	11.3	6.7	8.2	9.1	6.6	7.2	3.7	4.2	1.4	0.3	-6.2	-13.3
HVAC	Leq,d	18.9	-17.7	-12.4	-9.3	2.8	6.7	-0.3	7.3	7.9	5.5	4.5	3.1	3.6	3.9	3.6	7.3	9.2	5.0	6.8	8.0	5.7	6.5	3.1	3.6	0.8	-0.3	-7.0	-14.2
HVAC	Leq,d	19.0	-17.7	-12.4	-9.3	2.7	6.7	-0.4	7.2	7.9	5.5	4.6	3.2	3.7	3.9	3.8	7.4	9.3	5.1	6.9	8.2	5.9	6.7	3.3	3.8	1.1	0.0	-6.5	-13.7
HVAC	Leq,d	19.0	-17.5	-12.2	-9.1	3.0	7.0	-0.1	7.5	8.2	5.8	4.8	3.3	3.8	3.7	3.7	7.3	9.2	5.0	6.8	8.0	5.7	6.5	3.1	3.6	1.0	-0.1	-6.6	-13.7

Habitat for Humanity IS-EA South Gate
Contribution spectra - 001 - Habitat for Humanity: Outdoor SP

Source	Time slice	Sum	25Hz	31.5Hz	40Hz	50Hz	63Hz	80Hz	100Hz	125Hz	160Hz	200Hz	250Hz	315Hz	400Hz	500Hz	630Hz	800Hz	1kHz	1.25kHz	1.6kHz	2kHz	2.5kHz	3.15kHz	4kHz	5kHz	6.3kHz	8kHz	10kHz
		dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)
Parking	Leq,d	39.8					24.9			34.5			25.3			30.6			32.4			33.0			29.8			21.9	
Remaining contrib. of src "HVAC"	Leq,d																												
Remaining contrib. of src "HVAC"	Leq,d																												
Remaining contrib. of src "HVAC"	Leq,d																												
Remaining contrib. of src "HVAC"	Leq,d																												
Remaining contrib. of src "HVAC"	Leq,d																												
Remaining contrib. of src "HVAC"	Leq,d																												
Remaining contrib. of src "HVAC"	Leq,d																												
Remaining contrib. of src "HVAC"	Leq,d																												
Remaining contrib. of src "HVAC"	Leq,d																												
Remaining contrib. of src "HVAC"	Leq,d																												
Remaining contrib. of src "HVAC"	Leq,d																												
Remaining contrib. of src "HVAC"	Leq,d																												
Remaining contrib. of src "HVAC"	Leq,d																												
Remaining contrib. of src "Parking"	Leq,d																												
Receiver R6 Fl G Lr,lim dB(A)	Leq,d 39.8 dB(A)																												
HVAC	Leq,d	23.5	-23.1	-18.1	-15.3	-3.6	0.0	-7.4	-0.2	6.6	4.7	7.1	6.1	6.9	6.6	7.8	10.6	11.3	6.1	7.1	8.8	16.6	17.0	13.2	12.9	9.0	6.0	-3.5	-14.9
HVAC	Leq,d	14.3	-22.2	-17.0	-13.9	-1.8	2.0	-5.1	2.1	2.7	0.3	-1.6	-2.9	-0.6	-0.5	-0.8	2.8	5.2	1.1	2.8	4.1	1.8	2.3	-1.4	-1.3	-4.7	-6.8	-14.9	-24.3
HVAC	Leq,d	14.1	-22.0	-16.8	-13.7	-1.6	2.3	-4.9	2.4	3.0	0.5	-0.9	-2.2	-1.6	-1.5	-1.7	2.7	4.6	0.3	2.1	3.4	1.1	2.1	-1.5	-1.4	-4.6	-6.6	-14.4	-23.3
HVAC	Leq,d	11.4	-23.5	-18.2	-15.2	-3.3	0.5	-6.8	0.2	0.8	-1.7	-3.1	-4.4	-3.6	-3.3	-3.4	-0.5	1.9	-2.6	-1.0	0.2	-2.3	-1.9	-5.7	-5.8	-9.4	-11.8	-20.3	-30.4
HVAC	Leq,d	13.3	-23.0	-17.6	-14.4	-2.3	1.8	-5.2	2.1	3.0	0.8	-1.6	-2.8	-2.1	-1.3	-1.4	1.5	4.6	-0.1	1.1	2.0	-0.8	-0.6	-4.7	-5.0	-8.8	-11.5	-20.2	-30.6
HVAC	Leq,d	18.2	-22.1	-16.7	-13.5	-1.3	2.8	-4.1	3.4	4.3	3.6	5.8	4.9	5.9	6.3	6.1	8.9	10.0	4.8	5.8	6.4	3.5	3.7	-0.2	-0.3	-3.8	-6.0	-14.3	-24.1
HVAC	Leq,d	18.0	-20.2	-14.9	-10.3	1.8	6.6	-0.5	6.9	7.5	5.0	4.0	2.6	3.3	3.3	3.4	6.4	8.1	3.8	5.6	6.8	4.5	5.2	1.6	1.9	-1.2	-2.9	-10.4	-19.0
HVAC	Leq,d	17.4	-18.4	-13.2	-10.2	1.7	5.5	-1.8	5.5	6.0	3.5	2.3	1.1	1.8	2.0	2.2	5.8	8.0	3.7	5.4	6.6	4.3	5.0	1.6	2.0	-0.8	-2.0	-8.7	-16.2

Habitat for Humanity IS-EA South Gate
Contribution spectra - 001 - Habitat for Humanity: Outdoor SP

Source	Time slice	Sum	25Hz	31.5Hz	40Hz	50Hz	63Hz	80Hz	100Hz	125Hz	160Hz	200Hz	250Hz	315Hz	400Hz	500Hz	630Hz	800Hz	1kHz	1.25kHz	1.6kHz	2kHz	2.5kHz	3.15kHz	4kHz	5kHz	6.3kHz	8kHz	10kHz
		dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)
HVAC	Leq,d	27.7	-11.6	-6.0	-2.4	10.1	14.5	7.9	16.1	17.4	15.5	13.9	13.0	14.3	15.0	14.9	17.6	19.3	14.0	14.7	15.2	12.2	12.3	8.5	8.6	5.7	4.4	-2.2	-9.3
HVAC	Leq,d	38.3	-9.4	-3.7	0.1	12.8	17.6	11.3	20.0	21.7	20.3	19.5	20.2	21.9	23.6	24.3	27.9	30.9	26.5	28.2	29.2	26.7	27.3	23.7	24.0	21.0	19.6	12.7	4.9
HVAC	Leq,d	15.5	-20.2	-14.9	-11.8	0.3	4.2	-2.9	4.6	5.2	2.8	1.3	-0.1	0.4	0.5	0.3	3.6	5.7	1.3	3.0	4.2	1.9	2.5	-1.0	-0.6	-3.6	-5.1	-12.2	-20.3
HVAC	Leq,d	16.5	-19.4	-14.2	-11.0	1.1	5.1	-2.0	5.5	6.1	3.7	2.2	0.8	1.3	1.4	1.1	4.5	6.6	2.2	3.9	5.1	3.2	3.8	0.3	0.7	-2.3	-3.7	-10.8	-18.7
HVAC	Leq,d	18.3	-18.2	-12.9	-9.7	2.5	6.5	-0.4	7.2	8.1	5.9	4.0	2.7	3.4	3.9	3.7	7.0	9.1	4.3	5.7	6.5	4.3	4.9	1.3	1.6	-1.3	-2.6	-9.5	-17.2
Parking	Leq,d	32.0					17.1			26.4			15.2			21.7			25.1			26.2			22.3			12.2	
Remaining contrib. of src "HVAC"	Leq,d																												
Remaining contrib. of src "HVAC"	Leq,d																												
Remaining contrib. of src "HVAC"	Leq,d																												
Remaining contrib. of src "HVAC"	Leq,d																												
Remaining contrib. of src "HVAC"	Leq,d																												
Remaining contrib. of src "HVAC"	Leq,d																												
Remaining contrib. of src "HVAC"	Leq,d																												
Remaining contrib. of src "HVAC"	Leq,d																												
Remaining contrib. of src "HVAC"	Leq,d																												
Remaining contrib. of src "HVAC"	Leq,d																												
Remaining contrib. of src "HVAC"	Leq,d																												
Remaining contrib. of src "HVAC"	Leq,d																												
Remaining contrib. of src "HVAC"	Leq,d																												
Remaining contrib. of src "Parking"	Leq,d																												

Habitat for Humanity IS-EA South Gate
Contribution level - 001 - Habitat for Humanity: Outdoor SP

Source	Source group	Source ty	Tr. lane	Leq,d dB(A)	A dB
Receiver R1 Fl G Lr,lim dB(A) Leq,d 58.0 dB(A)					
Parking	Default parking lot noise	PLot		15.4	0.0
HVAC	Default industrial noise	Point		9.9	0.0
HVAC	Default industrial noise	Point		11.8	0.0
HVAC	Default industrial noise	Point		23.6	0.0
HVAC	Default industrial noise	Point		24.5	0.0
HVAC	Default industrial noise	Point		25.3	0.0
HVAC	Default industrial noise	Point		26.3	0.0
HVAC	Default industrial noise	Point		28.1	0.0
HVAC	Default industrial noise	Point		30.6	0.0
HVAC	Default industrial noise	Point		32.6	0.0
HVAC	Default industrial noise	Point		42.1	0.0
HVAC	Default industrial noise	Point		44.4	0.0
HVAC	Default industrial noise	Point		55.9	0.0
HVAC	Default industrial noise	Point		52.7	0.0
Receiver R2 Fl G Lr,lim dB(A) Leq,d 53.7 dB(A)					
Parking	Default parking lot noise	PLot		17.7	0.0
HVAC	Default industrial noise	Point		11.2	0.0
HVAC	Default industrial noise	Point		9.9	0.0
HVAC	Default industrial noise	Point		12.8	0.0
HVAC	Default industrial noise	Point		13.4	0.0
HVAC	Default industrial noise	Point		14.0	0.0
HVAC	Default industrial noise	Point		14.6	0.0
HVAC	Default industrial noise	Point		16.1	0.0
HVAC	Default industrial noise	Point		17.0	0.0
HVAC	Default industrial noise	Point		18.8	0.0
HVAC	Default industrial noise	Point		48.9	0.0
HVAC	Default industrial noise	Point		51.2	0.0
HVAC	Default industrial noise	Point		42.9	0.0
HVAC	Default industrial noise	Point		37.2	0.0
Receiver R3 Fl G Lr,lim dB(A) Leq,d 59.7 dB(A)					
Parking	Default parking lot noise	PLot		32.5	0.0
HVAC	Default industrial noise	Point		14.5	0.0
HVAC	Default industrial noise	Point		17.4	0.0
HVAC	Default industrial noise	Point		14.4	0.0
HVAC	Default industrial noise	Point		13.7	0.0
HVAC	Default industrial noise	Point		15.0	0.0
HVAC	Default industrial noise	Point		16.0	0.0
HVAC	Default industrial noise	Point		18.6	0.0
HVAC	Default industrial noise	Point		18.2	0.0
HVAC	Default industrial noise	Point		18.0	0.0
HVAC	Default industrial noise	Point		58.3	0.0
HVAC	Default industrial noise	Point		53.9	0.0
HVAC	Default industrial noise	Point		26.6	0.0

Source	Source group	Source ty	Tr. lane	Leq,d dB(A)	A dB	
HVAC	Default industrial noise	Point		22.9	0.0	
Receiver R4 Fl G Lr,lim dB(A) Leq,d 47.5 dB(A)						
Parking	Default parking lot noise	PLot		39.3	0.0	
HVAC	Default industrial noise	Point		17.7	0.0	
HVAC	Default industrial noise	Point		19.0	0.0	
HVAC	Default industrial noise	Point		17.2	0.0	
HVAC	Default industrial noise	Point		17.5	0.0	
HVAC	Default industrial noise	Point		18.5	0.0	
HVAC	Default industrial noise	Point		19.7	0.0	
HVAC	Default industrial noise	Point		28.0	0.0	
HVAC	Default industrial noise	Point		20.5	0.0	
HVAC	Default industrial noise	Point		21.0	0.0	
HVAC	Default industrial noise	Point		44.3	0.0	
HVAC	Default industrial noise	Point		42.9	0.0	
HVAC	Default industrial noise	Point		18.1	0.0	
HVAC	Default industrial noise	Point		18.1	0.0	
Receiver R5 Fl G Lr,lim dB(A) Leq,d 43.8 dB(A)						
Parking	Default parking lot noise	PLot		39.8	0.0	
HVAC	Default industrial noise	Point		21.1	0.0	
HVAC	Default industrial noise	Point		20.4	0.0	
HVAC	Default industrial noise	Point		19.4	0.0	
HVAC	Default industrial noise	Point		19.0	0.0	
HVAC	Default industrial noise	Point		19.0	0.0	
HVAC	Default industrial noise	Point		18.9	0.0	
HVAC	Default industrial noise	Point		19.9	0.0	
HVAC	Default industrial noise	Point		16.8	0.0	
HVAC	Default industrial noise	Point		19.6	0.0	
HVAC	Default industrial noise	Point		39.0	0.0	
HVAC	Default industrial noise	Point		37.3	0.0	
HVAC	Default industrial noise	Point		16.8	0.0	
HVAC	Default industrial noise	Point		18.3	0.0	
Receiver R6 Fl G Lr,lim dB(A) Leq,d 39.8 dB(A)						
Parking	Default parking lot noise	PLot		32.0	0.0	
HVAC	Default industrial noise	Point		38.3	0.0	
HVAC	Default industrial noise	Point		27.7	0.0	
HVAC	Default industrial noise	Point		17.4	0.0	
HVAC	Default industrial noise	Point		18.3	0.0	
HVAC	Default industrial noise	Point		16.5	0.0	
HVAC	Default industrial noise	Point		15.5	0.0	
HVAC	Default industrial noise	Point		18.0	0.0	
HVAC	Default industrial noise	Point		14.1	0.0	
HVAC	Default industrial noise	Point		14.3	0.0	
HVAC	Default industrial noise	Point		23.5	0.0	
HVAC	Default industrial noise	Point		18.2	0.0	

Habitat for Humanity IS-EA South Gate
Contribution level - 001 - Habitat for Humanity: Outdoor SP

Source	Source group	Source ty	Tr. lane	Leq,d dB(A)	A dB	
HVAC	Default industrial noise	Point		13.3	0.0	
HVAC	Default industrial noise	Point		11.4	0.0	

Habitat for Humanity IS-EA South Gate
Octave spectra of the sources in dB(A) - 001 - Habitat for Humanity: Outdoor SP

Name	Source type	l or A	Li	R'w	L'w	Lw	KI	KT	LwMax	DO-Wall	Time histogram	Emission spectrum	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz	16kHz
		m,m²	dB(A)	dB	dB(A)	dB(A)	dB	dB	dB(A)	dB			dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)
HVAC	Point				82.7	82.7	0.0	0.0		0	100%/24h	HVAC: 67.7dB @ 3ft - Carrier 50TFQ0006 -	58.9	67.8	70.5	75.3	77.0	76.8	73.8	69.5	57.7
HVAC	Point				82.7	82.7	0.0	0.0		0	100%/24h	HVAC: 67.7dB @ 3ft - Carrier 50TFQ0006 -	58.9	67.8	70.5	75.3	77.0	76.8	73.8	69.5	57.7
HVAC	Point				82.7	82.7	0.0	0.0		0	100%/24h	HVAC: 67.7dB @ 3ft - Carrier 50TFQ0006 -	58.9	67.8	70.5	75.3	77.0	76.8	73.8	69.5	57.7
HVAC	Point				82.7	82.7	0.0	0.0		0	100%/24h	HVAC: 67.7dB @ 3ft - Carrier 50TFQ0006 -	58.9	67.8	70.5	75.3	77.0	76.8	73.8	69.5	57.7
HVAC	Point				82.7	82.7	0.0	0.0		0	100%/24h	HVAC: 67.7dB @ 3ft - Carrier 50TFQ0006 -	58.9	67.8	70.5	75.3	77.0	76.8	73.8	69.5	57.7
HVAC	Point				82.7	82.7	0.0	0.0		0	100%/24h	HVAC: 67.7dB @ 3ft - Carrier 50TFQ0006 -	58.9	67.8	70.5	75.3	77.0	76.8	73.8	69.5	57.7
HVAC	Point				82.7	82.7	0.0	0.0		0	100%/24h	HVAC: 67.7dB @ 3ft - Carrier 50TFQ0006 -	58.9	67.8	70.5	75.3	77.0	76.8	73.8	69.5	57.7
HVAC	Point				82.7	82.7	0.0	0.0		0	100%/24h	HVAC: 67.7dB @ 3ft - Carrier 50TFQ0006 -	58.9	67.8	70.5	75.3	77.0	76.8	73.8	69.5	57.7
HVAC	Point				82.7	82.7	0.0	0.0		0	100%/24h	HVAC: 67.7dB @ 3ft - Carrier 50TFQ0006 -	58.9	67.8	70.5	75.3	77.0	76.8	73.8	69.5	57.7
HVAC	Point				82.7	82.7	0.0	0.0		0	100%/24h	HVAC: 67.7dB @ 3ft - Carrier 50TFQ0006 -	58.9	67.8	70.5	75.3	77.0	76.8	73.8	69.5	57.7
HVAC	Point				82.7	82.7	0.0	0.0		0	100%/24h	HVAC: 67.7dB @ 3ft - Carrier 50TFQ0006 -	58.9	67.8	70.5	75.3	77.0	76.8	73.8	69.5	57.7
HVAC	Point				82.7	82.7	0.0	0.0		0	100%/24h	HVAC: 67.7dB @ 3ft - Carrier 50TFQ0006 -	58.9	67.8	70.5	75.3	77.0	76.8	73.8	69.5	57.7
HVAC	Point				82.7	82.7	0.0	0.0		0	100%/24h	HVAC: 67.7dB @ 3ft - Carrier 50TFQ0006 -	58.9	67.8	70.5	75.3	77.0	76.8	73.8	69.5	57.7
Parking	PLot	73.66			55.3	74.0	0.0	0.0		0	100%/24h	Typical spectrum	57.3	68.9	61.4	65.9	66.0	66.4	63.7	57.5	44.7

Appendix D:

Reference Data

Project:	Sound Library		**Site Observations:**
Job Number:	0000-2020-02		Measured @ 10'
Site Address/Location:	Residential		
Date:	07/02/2020		
Field Tech/Engineer:	Robert Pearson		
Source/System:	Day & Night N4A5		
General Location:	Measured @ 10'		
Sound Meter:	NTi XL2	**SN:** NA	
Settings:	A-weighted, fast, 1-sec, 60-sec duration		
Meteorological Cond.:	Clear sky - Morning		

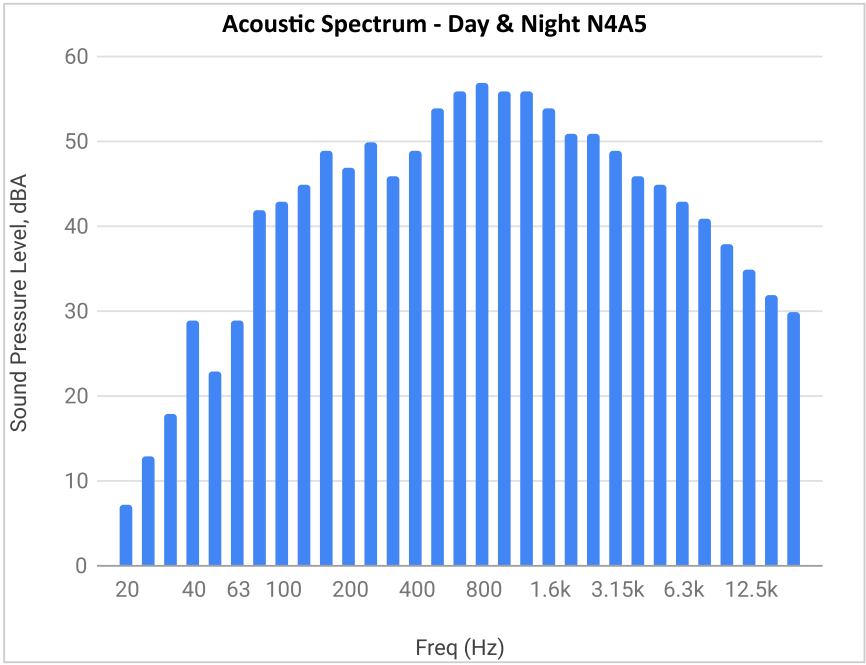
Leq	Lmin	Lmax
64.9	0.0	0.0

Ln 2	Ln 8	Ln 25	Ln 50	Ln 90	Ln 99
0.0	0.0	0.0	0.0	0.0	0.0

Table 1: Summary Measurement Data

Source/System	Overall Source	Overall dB(A)	3rd Octave Band Data (dBA)																														
			20	25	31.5	40	50	63	80	100	125	160	200	250	315	400	500	630	800	1k	12.5	1.6k	2k	2.5k	3.15	4k	5k	6.3k	8k	10k	12.5	16k	20k
Day & Night N4A5	HVAC	64.9	7.3	13.0	18.0	29.0	23.0	29.0	42.0	43.0	45.0	49.0	47.0	50.0	46.0	49.0	54.0	56.0	57.0	56.0	56.0	54.0	51.0	51.0	49.0	46.0	45.0	43.0	41.0	38.0	35.0	32.0	30.0

Figure 1: Day & Night N4A5



Appendix E:

Construction Calcs

Activity	L_{eq} at 133 feet dBA	L_{Max} at 65 feet dBA
Grading	83	86
Building Construction	81	83
Paving	81	84

Equipment Summary	Reference (dBA) 50 ft Lmax
Rock Drills	96
Jack Hammers	82
Pneumatic Tools	85
Pavers	80
Dozers	85
Scrappers	87
Haul Trucks	88
Cranes	82
Portable Generators	80
Rollers	80
Tractors	80
Front-End Loaders	86
Hydraulic Excavators	86
Graders	86
Air Compressors	86
Trucks	86

Grading

		Noise Level Calculation Prior to Implementation of Noise Attenuation Requirements								
No.	Equipment Description	Reference (dBA) 50 ft Lmax	Quantity	Usage Factor[1]	Distance to Receptor (ft)	Ground Effect	Shielding (dBA)	Calculated (dBA) Lmax	Calculated (dBA) Leq	Energy
1	Grader	86	1	40	65	0.5	0	83.2	79.2	82642150.6
2	Dozer	85	1	40	65	0.5	0	82.2	78.2	65644993.6
3	Tractor/Backhoe	80	2	40	65	0.5	0	80.2	76.2	41517539.4
							Lmax*	**86**	**Leq**	**83**
							Lw	**117**	**Lw**	**114**

Source: MD Acoustics, July 2018.
1- Percentage of time that a piece of equipment is operating at full power.
dBA – A-weighted Decibels
Lmax- Maximum Level
Leq- Equivalent Level

Feet	Meters	Ground Effect	No Shielding Leq dBA	1 dBA Shielding Leq dBA	2 dBA Shielding Leq dBA	3 dBA Shielding Leq dBA	4 dBA Shielding Leq dBA	5 dBA Shielding Leq dBA	6 dBA Shielding Leq dBA	7 dBA Shielding Leq dBA	8 dBA Shielding Leq dBA	9 dBA Shielding Leq dBA	10 dBA Shielding Leq dBA	11 dBA Shielding LeqdBA	12 dBA Shielding Leq dBA	13 dBA Shielding Leq dBA	14 dBA Shielding Leq dBA	15 dBA Shielding Leq dBA
50	**15.2**	**0.5**	**83**	**82**	**81**	**80**	**79**	**78**	**77**	**76**	**75**	**74**	**73**	**72**	**71**	**70**	**69**	**68**
60	18.3	0.5	81	80	79	78	77	76	75	74	73	72	71	70	69	68	67	66
70	21.3	0.5	79	78	77	76	75	74	73	72	71	70	69	68	67	66	65	64
80	24.4	0.5	78	77	76	75	74	73	72	71	70	69	68	67	66	65	64	63
90	27.4	0.5	76	75	74	73	72	71	70	69	68	67	66	65	64	63	62	61
100	30.5	0.5	75	74	73	72	71	70	69	68	67	66	65	64	63	62	61	60
110	33.5	0.5	74	73	72	71	70	69	68	67	66	65	64	63	62	61	60	59
120	36.6	0.5	73	72	71	70	69	68	67	66	65	64	63	62	61	60	59	58
130	39.6	0.5	72	71	70	69	68	67	66	65	64	63	62	61	60	59	58	57
140	42.7	0.5	72	71	70	69	68	67	66	65	64	63	62	61	60	59	58	57
150	45.7	0.5	71	70	69	68	67	66	65	64	63	62	61	60	59	58	57	56
160	48.8	0.5	70	69	68	67	66	65	64	63	62	61	60	59	58	57	56	55
170	51.8	0.5	69	68	67	66	65	64	63	62	61	60	59	58	57	56	55	54
180	54.9	0.5	69	68	67	66	65	64	63	62	61	60	59	58	57	56	55	54
190	57.9	0.5	68	67	66	65	64	63	62	61	60	59	58	57	56	55	54	53
200	61.0	0.5	68	67	66	65	64	63	62	61	60	59	58	57	56	55	54	53
210	64.0	0.5	67	66	65	64	63	62	61	60	59	58	57	56	55	54	53	52
220	67.1	0.5	67	66	65	64	63	62	61	60	59	58	57	56	55	54	53	52
230	70.1	0.5	66	65	64	63	62	61	60	59	58	57	56	55	54	53	52	51
240	73.1	0.5	66	65	64	63	62	61	60	59	58	57	56	55	54	53	52	51
250	76.2	0.5	65	64	63	62	61	60	59	58	57	56	55	54	53	52	51	50
260	79.2	0.5	65	64	63	62	61	60	59	58	57	56	55	54	53	52	51	50
270	82.3	0.5	64	63	62	61	60	59	58	57	56	55	54	53	52	51	50	49
280	85.3	0.5	64	63	62	61	60	59	58	57	56	55	54	53	52	51	50	49
290	88.4	0.5	64	63	62	61	60	59	58	57	56	55	54	53	52	51	50	49
300	91.4	0.5	63	62	61	60	59	58	57	56	55	54	53	52	51	50	49	48
310	94.5	0.5	63	62	61	60	59	58	57	56	55	54	53	52	51	50	49	48
320	97.5	0.5	63	62	61	60	59	58	57	56	55	54	53	52	51	50	49	48
330	100.6	0.5	62	61	60	59	58	57	56	55	54	53	52	51	50	49	48	47
340	103.6	0.5	62	61	60	59	58	57	56	55	54	53	52	51	50	49	48	47
350	106.7	0.5	62	61	60	59	58	57	56	55	54	53	52	51	50	49	48	47
360	109.7	0.5	61	60	59	58	57	56	55	54	53	52	51	50	49	48	47	46
370	112.8	0.5	61	60	59	58	57	56	55	54	53	52	51	50	49	48	47	46

Building Construction

		Noise Level Calculation Prior to Implementation of Noise Attenuation Requirements								
No.	Equipment Description	Reference (dBA) 50 ft Lmax	Quantity	Usage Factor[1]	Distance to Receptor (ft)	Ground Effect	Shielding (dBA)	Calculated (dBA) Lmax	Calculated (dBA) Leq	Energy
1	Cranes	82	1	40	65	0.5	0	79.2	75.2	32900432.8
2	Forklift/Tractor	80	2	40	65	0.5	0	80.2	76.2	41517539.4
3	Generator	80	1	40	65	0.5	0	77.2	73.2	20758769.7
4	Tractor/Backhoe	80	1	40	65	0.5	0	77.2	73.2	20758769.7
							Lmax*	**83**	**Leq**	**81**
							Lw	**114**	**Lw**	**112**

Source: MD Acoustics, July 2018.
1- Percentage of time that a piece of equipment is operating at full power.
dBA – A-weighted Decibels
Lmax- Maximum Level
Leq- Equivalent Level

Feet	Meters	Ground Effect	No Shielding Leq dBA	1 dBA Shielding Leq dBA	2 dBA Shielding Leq dBA	3 dBA Shielding Leq dBA	4 dBA Shielding Leq dBA	5 dBA Shielding Leq dBA	6 dBA Shielding Leq dBA	7 dBA Shielding Leq dBA	8 dBA Shielding Leq dBA	9 dBA Shielding Leq dBA	10 dBA Shielding Leq dBA	11 dBA Shielding LeqdBA	12 dBA Shielding Leq dBA	13 dBA Shielding Leq dBA	14 dBA Shielding Leq dBA	15 dBA Shielding Leq dBA
50	**15.2**	**0.5**	**81**	**80**	**79**	**78**	**77**	**76**	**75**	**74**	**73**	**72**	**71**	**70**	**69**	**68**	**67**	**66**
60	18.3	0.5	79	78	77	76	75	74	73	72	71	70	69	68	67	66	65	64
70	21.3	0.5	77	76	75	74	73	72	71	70	69	68	67	66	65	64	63	62
80	24.4	0.5	76	75	74	73	72	71	70	69	68	67	66	65	64	63	62	61
90	27.4	0.5	74	73	72	71	70	69	68	67	66	65	64	63	62	61	60	59
100	30.5	0.5	73	72	71	70	69	68	67	66	65	64	63	62	61	60	59	58
110	33.5	0.5	72	71	70	69	68	67	66	65	64	63	62	61	60	59	58	57
120	36.6	0.5	71	70	69	68	67	66	65	64	63	62	61	60	59	58	57	56
130	39.6	0.5	70	69	68	67	66	65	64	63	62	61	60	59	58	57	56	55
140	42.7	0.5	69	68	67	66	65	64	63	62	61	60	59	58	57	56	55	54
150	45.7	0.5	69	68	67	66	65	64	63	62	61	60	59	58	57	56	55	54
160	48.8	0.5	68	67	66	65	64	63	62	61	60	59	58	57	56	55	54	53
170	51.8	0.5	67	66	65	64	63	62	61	60	59	58	57	56	55	54	53	52
180	54.9	0.5	67	66	65	64	63	62	61	60	59	58	57	56	55	54	53	52
190	57.9	0.5	66	65	64	63	62	61	60	59	58	57	56	55	54	53	52	51
200	61.0	0.5	66	65	64	63	62	61	60	59	58	57	56	55	54	53	52	51
210	64.0	0.5	65	64	63	62	61	60	59	58	57	56	55	54	53	52	51	50
220	67.1	0.5	65	64	63	62	61	60	59	58	57	56	55	54	53	52	51	50
230	70.1	0.5	64	63	62	61	60	59	58	57	56	55	54	53	52	51	50	49
240	73.1	0.5	64	63	62	61	60	59	58	57	56	55	54	53	52	51	50	49
250	76.2	0.5	63	62	61	60	59	58	57	56	55	54	53	52	51	50	49	48
260	79.2	0.5	63	62	61	60	59	58	57	56	55	54	53	52	51	50	49	48
270	82.3	0.5	62	61	60	59	58	57	56	55	54	53	52	51	50	49	48	47
280	85.3	0.5	62	61	60	59	58	57	56	55	54	53	52	51	50	49	48	47
290	88.4	0.5	62	61	60	59	58	57	56	55	54	53	52	51	50	49	48	47
300	91.4	0.5	61	60	59	58	57	56	55	54	53	52	51	50	49	48	47	46
310	94.5	0.5	61	60	59	58	57	56	55	54	53	52	51	50	49	48	47	46
320	97.5	0.5	60	59	58	57	56	55	54	53	52	51	50	49	48	47	46	45
330	100.6	0.5	60	59	58	57	56	55	54	53	52	51	50	49	48	47	46	45
340	103.6	0.5	60	59	58	57	56	55	54	53	52	51	50	49	48	47	46	45
350	106.7	0.5	60	59	58	57	56	55	54	53	52	51	50	49	48	47	46	45
360	109.7	0.5	59	58	57	56	55	54	53	52	51	50	49	48	47	46	45	44
370	112.8	0.5	59	58	57	56	55	54	53	52	51	50	49	48	47	46	45	44

Paving

		Noise Level Calculation Prior to Implementation of Noise Attenuation Requirements								
No.	Equipment Description	Reference (dBA) 50 ft Lmax	Quantity	Usage Factor[1]	Distance to Receptor (ft)	Ground Effect	Shielding (dBA)	Calculated (dBA) Lmax	Calculated (dBA) Leq	Energy
1	Pavers	86	1	40	65	0.5	0	83.2	79.2	82642150.6
2	Rollers	80	1	40	65	0.5	0	77.2	73.2	20758769.7
3	Paving Equipment	80	1	40	65	0.5	0	77.2	73.2	20758769.7
							Lmax*	**84**	**Leq**	**81**
							Lw	**116**	**Lw**	**113**

Source: MD Acoustics, July 2018.
1- Percentage of time that a piece of equipment is operating at full power.
dBA – A-weighted Decibels
Lmax- Maximum Level
Leq- Equivalent Level

Feet	Meters	Ground Effect	No Shielding Leq dBA	1 dBA Shielding Leq dBA	2 dBA Shielding Leq dBA	3 dBA Shielding Leq dBA	4 dBA Shielding Leq dBA	5 dBA Shielding Leq dBA	6 dBA Shielding Leq dBA	7 dBA Shielding Leq dBA	8 dBA Shielding Leq dBA	9 dBA Shielding Leq dBA	10 dBA Shielding Leq dBA	11 dBA Shielding LeqdBA	12 dBA Shielding Leq dBA	13 dBA Shielding Leq dBA	14 dBA Shielding Leq dBA	15 dBA Shielding Leq dBA
50	**15.2**	**0.5**	**81**	**80**	**79**	**78**	**77**	**76**	**75**	**74**	**73**	**72**	**71**	**70**	**69**	**68**	**67**	**66**
60	18.3	0.5	79	78	77	76	75	74	73	72	71	70	69	68	67	66	65	64
70	21.3	0.5	77	76	75	74	73	72	71	70	69	68	67	66	65	64	63	62
80	24.4	0.5	76	75	74	73	72	71	70	69	68	67	66	65	64	63	62	61
90	27.4	0.5	75	74	73	72	71	70	69	68	67	66	65	64	63	62	61	60
100	30.5	0.5	73	72	71	70	69	68	67	66	65	64	63	62	61	60	59	58
110	33.5	0.5	72	71	70	69	68	67	66	65	64	63	62	61	60	59	58	57
120	36.6	0.5	71	70	69	68	67	66	65	64	63	62	61	60	59	58	57	56
130	39.6	0.5	71	70	69	68	67	66	65	64	63	62	61	60	59	58	57	56
140	42.7	0.5	70	69	68	67	66	65	64	63	62	61	60	59	58	57	56	55
150	45.7	0.5	69	68	67	66	65	64	63	62	61	60	59	58	57	56	55	54
160	48.8	0.5	68	67	66	65	64	63	62	61	60	59	58	57	56	55	54	53
170	51.8	0.5	68	67	66	65	64	63	62	61	60	59	58	57	56	55	54	53
180	54.9	0.5	67	66	65	64	63	62	61	60	59	58	57	56	55	54	53	52
190	57.9	0.5	66	65	64	63	62	61	60	59	58	57	56	55	54	53	52	51
200	61.0	0.5	66	65	64	63	62	61	60	59	58	57	56	55	54	53	52	51
210	64.0	0.5	65	64	63	62	61	60	59	58	57	56	55	54	53	52	51	50
220	67.1	0.5	65	64	63	62	61	60	59	58	57	56	55	54	53	52	51	50
230	70.1	0.5	64	63	62	61	60	59	58	57	56	55	54	53	52	51	50	49
240	73.1	0.5	64	63	62	61	60	59	58	57	56	55	54	53	52	51	50	49
250	76.2	0.5	63	62	61	60	59	58	57	56	55	54	53	52	51	50	49	48
260	79.2	0.5	63	62	61	60	59	58	57	56	55	54	53	52	51	50	49	48
270	82.3	0.5	63	62	61	60	59	58	57	56	55	54	53	52	51	50	49	48
280	85.3	0.5	62	61	60	59	58	57	56	55	54	53	52	51	50	49	48	47
290	88.4	0.5	62	61	60	59	58	57	56	55	54	53	52	51	50	49	48	47
300	91.4	0.5	61	60	59	58	57	56	55	54	53	52	51	50	49	48	47	46
310	94.5	0.5	61	60	59	58	57	56	55	54	53	52	51	50	49	48	47	46
320	97.5	0.5	61	60	59	58	57	56	55	54	53	52	51	50	49	48	47	46
330	100.6	0.5	60	59	58	57	56	55	54	53	52	51	50	49	48	47	46	45
340	103.6	0.5	60	59	58	57	56	55	54	53	52	51	50	49	48	47	46	45
350	106.7	0.5	60	59	58	57	56	55	54	53	52	51	50	49	48	47	46	45
360	109.7	0.5	60	59	58	57	56	55	54	53	52	51	50	49	48	47	46	45
370	112.8	0.5	59	58	57	56	55	54	53	52	51	50	49	48	47	46	45	44

VIBRATION LEVEL IMPACT

Project:	Habitat for Humanity IS/EA	Date: 12/20/22
Source:	Large Bulldozer	
Scenario:	Unmitigated	
Location:	Project Site	
Address:		

PPV = PPVref(25/D)^n (in/sec)

DATA INPUT

Equipment = Type	2	Large Bulldozer	INPUT SECTION IN BLUE
PPVref =	0.089	Reference PPV (in/sec) at 25 ft.	
D =	65.00	Distance from Equipment to Receiver (ft)	
n =	1.10	Vibration attenuation rate through the ground	

Note: Based on reference equations from Vibration Guidance Manual, California Department of Transportation, 2006, pgs 38-43.

DATA OUT RESULTS

PPV =	**0.031**	IN/SEC	OUTPUT IN RED