NOISE AND VIBRATION IMPACT ANALYSIS

HOSKING AVENUE/SOUTH H STREET COMMERCIAL PROJECT

CITY OF BAKERSFIELD, KERN COUNTY, CALIFORNIA

LSA

February 2019

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HOSKING AVENUE/SOUTH H STREET COMMERCIAL PROJECT

CITY OF BAKERSFIELD, CALIFORNIA

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TABLE OF CONTENTS

APPENDICES

FIGURES AND TABLES

FIGURES

TABLES

LIST OF ABBREVIATIONS AND ACRONYMS

µin/sec	micro inches per second
ADT	average daily traffic
CEQA	California Environmental Quality Act
City	City of Bakersfield
CNEL	Community Noise Equivalent Level
dB	decibels
dBA	A-weighted decibels
FHWA	Federal Highway Administration
ft	foot/feet
FTA	Federal Transit Administration
HVAC	heating, ventilation, and air conditioning
Hz	Hertz
in/sec	inches per second
L_{dn}	day-night average noise level
L_{eq}	equivalent continuous sound level
L_{max}	maximum instantaneous noise level
L_{min}	minimum instantaneous noise level
LSA	LSA Associates, Inc.
L_v	velocity in decibels
PPV	peak particle velocity
project	Hosking Avenue/South H Street Commercial Project
RCNM	Roadway Construction Noise Model
RMS	root-mean-square (velocity)
sf	square feet
Spec.	specification
SR 99	State Route 99
VdB	vibration velocity decibels
VMS	variable message sign
V_{ref}	reference velocity amplitude

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INTRODUCTION

LSA Associates, Inc. (LSA) has completed a Noise and Vibration Impact Analysis for the Hoskins Avenue Commercial Project (project) in the City of Bakersfield, Kern County, California. This Noise and Vibration Impact Analysis examines potential impacts from noise and vibration sources in the project vicinity, including local roadways, through noise monitoring and analysis. Noise modeling was conducted to assess the existing and future roadway traffic noise levels in the project vicinity as well as short-term construction and long-term operational noise and vibration levels. Once operational, the project would generate noise through stationary sources, such as heating, ventilation, and air conditioning (HVAC) equipment, car wash, truck delivery and truck unloading activities, drive-thru speakers, and parking lot activities.

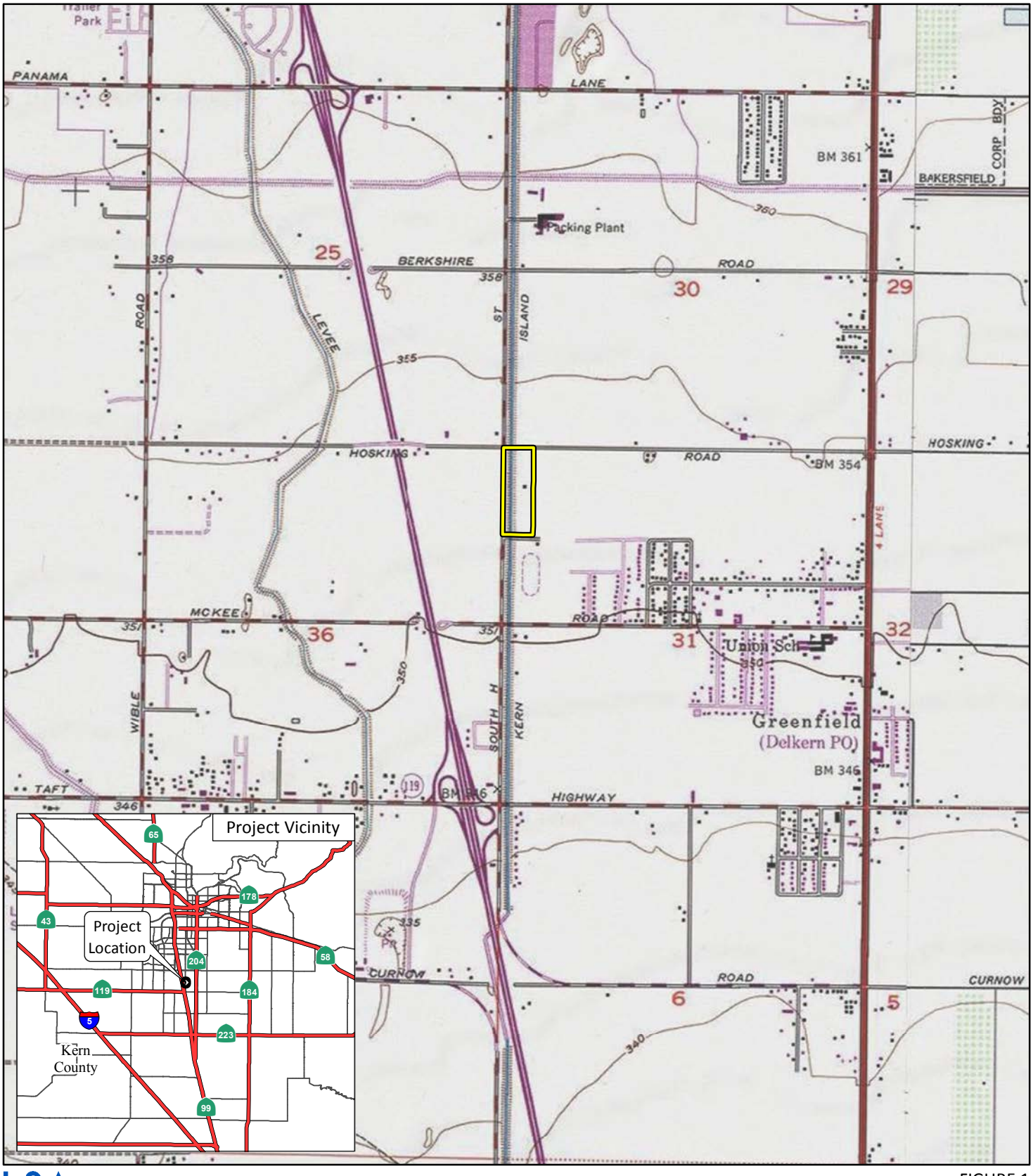
PROJECT DESCRIPTION

The vacant 13-acre project site is located at the southeast corner of Hosking Avenue and South H Street in the City of Bakersfield (City) in Kern County (Assessor's Parcel Number [APN] 517-01-001). The project site is bound to the north by Hosking Avenue and single family residential uses to the east, single family residential uses to the south, and to the west by Kern Island Canal and South H Street. Figure 1 shows the site's regional and local context. Figure 2 depicts an aerial photograph of the project site.

The proposed project would include the development of various commercial uses, including 4,200 square feet (sf) of fast food restaurants with a drive-thru, a 3,000 sf convenience store with a gas station and car wash, 6.86-acre mini-storage, and a sump. The gas station and car wash would include eight gas pumps, a tunnel carwash, and 18 vacuum stations. The proposed project would also include approximately 63 parking stalls throughout the site. A 6-foot-high solid masonry wall would separate the project site from the residential land uses located east of the project site. The project site plan is shown in Figure 3. The proposed project would require a General Plan Amendment and Zone Change from single family residential (L-R, R-1) to Neighborhood Commercial Planned Commercial Development (GC, C-2 PCD).

Access to the project would be provided by two driveways, one on Hosking Avenue and one on South H Street. Access off of South H Street would be provided by a bridge over the Kern Island Canal. Regional access to the site is provided by State Route 99, which is located approximately 0.3 mile west of the project site. The project site is located in an area developed primarily with single-family residential land uses, as well as commercial, religious, and school uses. Horizon Elementary School is located approximately 0.3 mile east of the project site, and Golden Valley High School is located approximately 0.5 mile east of the project site.

Final approval of the zone change is expected by the end of July 2019 with building permits to be pulled within 90 days of zone change approval. Final completion of construction is expected by the end of 2020. It is anticipated that soil would likely be balanced on-site; however, a small amount of soil could be imported if needed. Construction activities are expected to utilize standard construction equipment.



LSA

LEGEND

Project Location

FIGURE 1

N

0 1000 2000

FEET

Hosking Avenue/South H Street Commercial Project

Project Location

SOURCE: USGS 7.5' Quad., *Gosford, CA* (1973)

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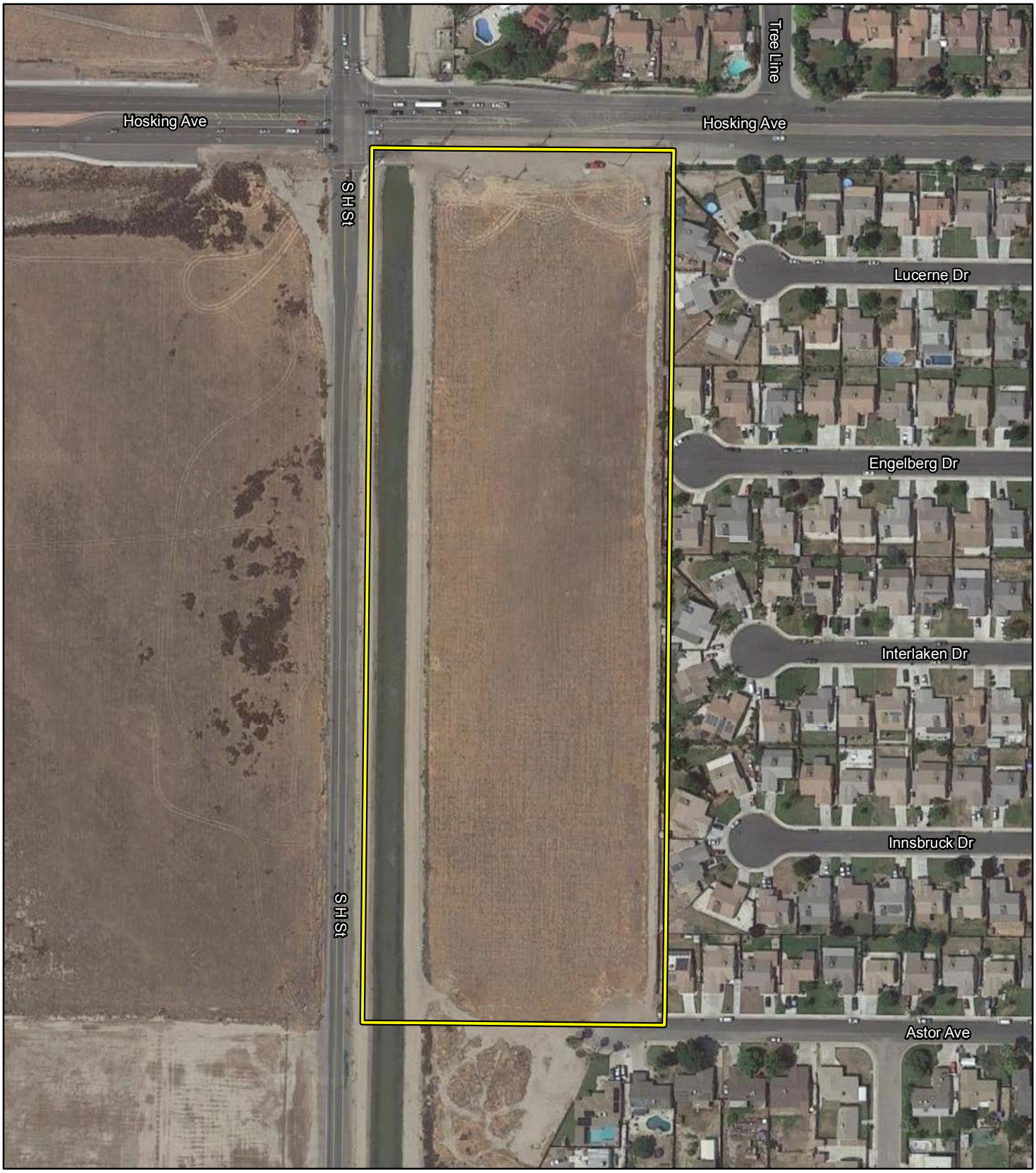

LSA

LEGEND

Project Location

FIGURE 2

N

0 100 200

FEET

Hosking Avenue /South H Street Commercial Project

Project Site

SOURCE: Google Aerial (~2017)

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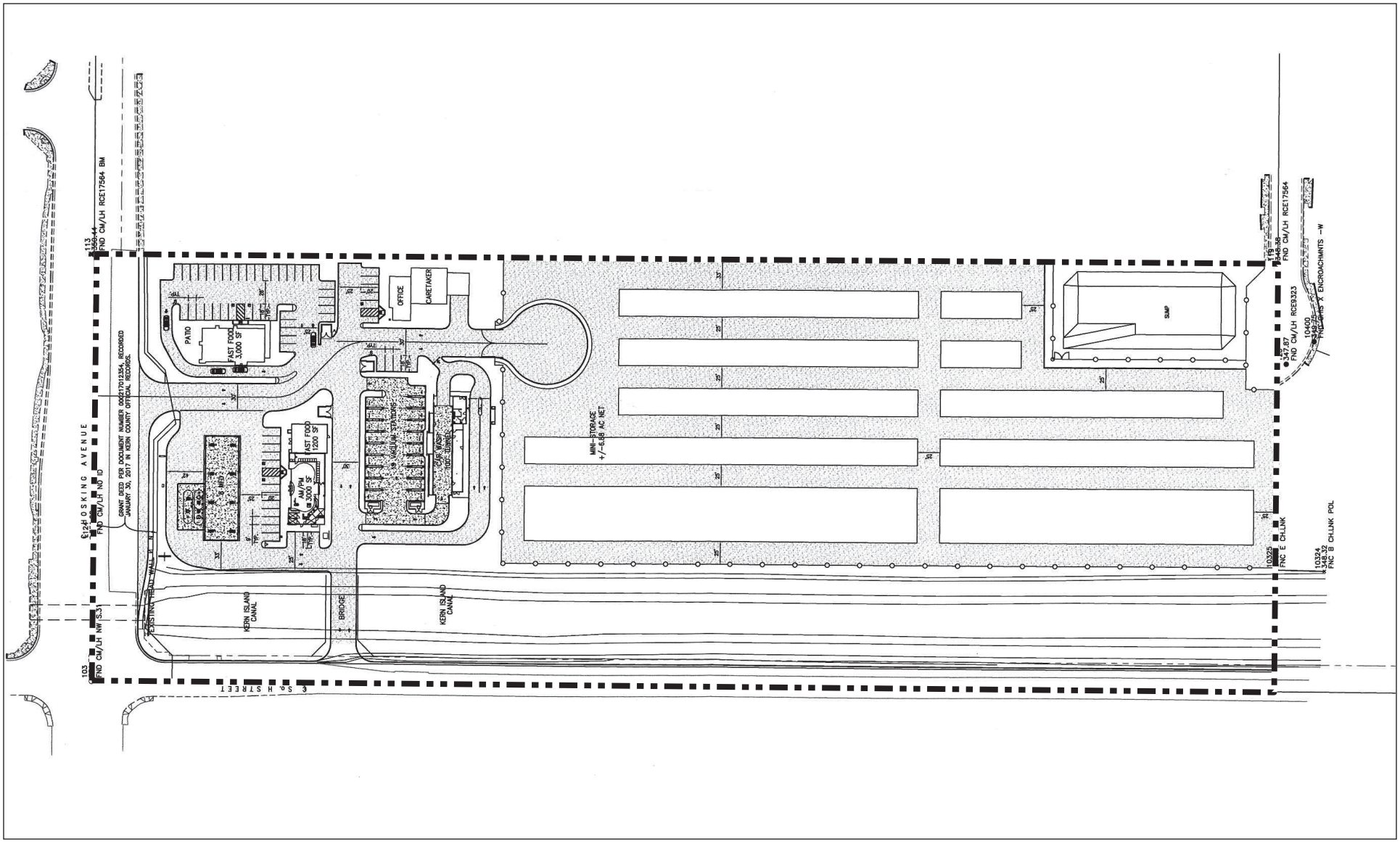

LSA

FIGURE 3

0 50 100
FEET

N

Project Site

Hosking Avenue/South H Street Commercial Project
Site Plan

SOURCE: DEWALT CORPORATION, 2018.

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BACKGROUND

This section provides background information on the evaluation of noise impacts including the characteristics of sound, measurement of sound, physiological effects of noise, and the regulatory framework for this analysis.

CHARACTERISTICS OF SOUND

Sound is increasing to such disagreeable levels in the environment that it can threaten quality of life. Noise is usually defined as unwanted sound. Noise consists of any sound that may produce physiological or psychological damage and/or interfere with communication, work, rest, recreation, and sleep.

To the human ear, sound has two significant characteristics: pitch and loudness. Pitch is generally an annoyance, while loudness can affect the ability to hear. Pitch is the number of complete vibrations, or cycles per second, of a wave resulting in the tone's range from high to low. Loudness is the strength of a sound that describes a noisy or quiet environment and is measured by the amplitude of the sound wave. Loudness is determined by the intensity of the sound waves combined with the reception characteristics of the human ear. Sound intensity refers to how hard the sound wave strikes an object, which in turn produces the sound's effect. This characteristic of sound can be precisely measured with instruments. The analysis of a project defines the noise environment of the project area in terms of sound intensity and its effect on adjacent sensitive land uses.

MEASUREMENT OF SOUND

Sound intensity is measured through the A-weighted scale to correct for the relative frequency response of the human ear. That is, an A-weighted noise level de-emphasizes low and very high frequencies of sound similar to the human ear's de-emphasis of these frequencies. Unlike linear units (e.g., inches or pounds), decibels are measured on a logarithmic scale representing points on a sharply rising curve.

For example, 10 decibels (dB) is 10 times more intense than 1 dB, 20 dB is 100 times more intense than 1 dB, and 30 dB is 1,000 times more intense than 1 dB. Thirty decibels (30 dB) represents 1,000 times as much acoustic energy as 1 dB. The decibel scale increases on a logarithmic scale, representing the sound pressure energy. A sound as soft as human breathing is about 10 times greater than 0 dB. The decibel system of measuring sound gives a rough connection between the physical intensity of sound and its perceived loudness to the human ear. A 10 dB increase in sound level is perceived by the human ear as only a doubling of the loudness of the sound. Ambient sounds generally range from 30 dB (very quiet) to 100 dB (very loud).

Sound levels are generated from a source, and their decibel level decreases as the distance from that source increases. Sound dissipates exponentially with increasing distance from the noise source. For a single point source, sound levels decrease approximately 6 dB for each doubling of distance from the source. This drop-off rate is appropriate for noise generated by stationary equipment. If noise is produced by a line source (e.g., highway traffic or railroad operations) the sound decreases 3 dB for each doubling of distance in a hard site environment. Line source (noise in

a relatively flat environment with absorptive vegetation) decreases 4.5 dB for each doubling of distance.

There are many ways to rate noise for various time periods, but an appropriate rating of ambient noise affecting humans also accounts for the annoying effects of sound. The equivalent continuous sound level (L_{eq}) is the total sound energy of time-varying noise over a sample period. However, the predominant rating scales for human communities in the State of California are the L_{eq} and Community Noise Equivalent Level (CNEL) or the day-night average noise level (L_{dn}) based on A-weighted decibels (dBA). CNEL is the time-varying noise over a 24-hour period, with a 5 dBA weighting factor applied to the hourly L_{eq} for noises occurring from 7:00 p.m. to 10:00 p.m. (defined as relaxation hours), and a 10 dBA weighting factor applied to noises occurring from 10:00 p.m. to 7:00 a.m. (defined as sleeping hours). L_{dn} is similar to the CNEL scale but without the adjustment for events occurring during the evening hours. CNEL and L_{dn} are within 1 dBA of each other and are normally interchangeable. The City of Bakersfield (City) uses the CNEL noise scale for long-term noise impact assessment.

Other noise rating scales of importance when assessing the annoyance factor include the maximum instantaneous noise level (L_{max}), which is the highest exponential time-averaged sound level that occurs during a stated time period. The noise environments discussed in this analysis for short-term noise impacts are specified in terms of maximum levels denoted by L_{max}, which reflects peak operating conditions and addresses the annoying aspects of intermittent noise. It is often used together with another noise scale, or noise standards in terms of percentile noise levels, in noise ordinances for enforcement purposes. For example, the L_{10} noise level represents the noise level exceeded 10 percent of the time during a stated period. The L_{50} noise level represents the median noise level. Half the time the noise level exceeds this level, and half the time it is less than this level. The L_{90} noise level represents the noise level exceeded 90 percent of the time and is considered the background noise level during a monitoring period. For a relatively constant noise source, the L_{eq} and L_{50} are approximately the same.

Noise impacts can be described in three categories. The first category includes audible impacts that refer to increases in noise levels noticeable to humans. Audible increases in noise levels generally refer to a change of 3 dB or greater because this level has been found to be barely perceptible in exterior environments. The second category, potentially audible, refers to a change in the noise level between 1 dB and 3 dB. This range of noise levels has been found to be noticeable only in laboratory environments. The last category includes changes in noise levels of less than 1 dB, which are inaudible to the human ear. Only audible changes in existing ambient or background noise levels are considered potentially significant.

PHYSIOLOGICAL EFFECTS OF NOISE

Physical damage to human hearing begins at prolonged exposure to noise levels higher than 85 dBA. Exposure to high noise levels affects the entire system, with prolonged noise exposure in excess of 75 dBA increasing body tensions, thereby affecting blood pressure and functions of the heart and the nervous system. In comparison, extended periods of noise exposure above 90 dBA would result in permanent cell damage. When the noise level reaches 120 dBA, a tickling sensation occurs in the human ear, even with short-term exposure. This level of noise is called the threshold of feeling.

As the sound reaches 140 dBA, the tickling sensation is replaced by the feeling of pain in the ear (the threshold of pain). A sound level of 160–165 dBA will result in dizziness or loss of equilibrium. The ambient or background noise problem is widespread and generally more concentrated in urban areas than in outlying, less developed areas. Table A lists definitions of acoustical terms, and Table B shows common sound levels and their sources.

Table A: Definitions of Acoustical Terms

Term	Definitions
Decibel, dB	A unit of measurement that denotes the ratio between two quantities that are proportional to power; the number of decibels is 10 times the logarithm (to the base 10) of this ratio.
Frequency, Hz	Of a function periodic in time, the number of times that the quantity repeats itself in 1 second (i.e., number of cycles per second).
A-Weighted Sound Level, dBA	The sound level obtained by use of A-weighting. The A-weighting filter deemphasizes the very low- and very high-frequency components of the sound in a manner similar to the frequency response of the human ear and correlates well with subjective reactions to noise. (All sound levels in this report are A-weighted, unless reported otherwise.)
L_{01}, L_{10}, L_{50}, L_{90}	The fast A-weighted noise levels that are equaled or exceeded by a fluctuating sound level 1%, 10%, 50%, and 90% of a stated time period.
Equivalent Continuous Noise Level, L_{eq}	The level of a steady sound that, in a stated time period and at a stated location, has the same A-weighted sound energy as the time-varying sound.
Community Noise Equivalent Level, CNEL	The 24-hour A-weighted average sound level from midnight to midnight, obtained after the addition of 5 dBA to sound levels occurring in the evening from 7:00 PM to 10:00 PM and after the addition of 10 dBA to sound levels occurring in the night between 10:00 PM and 7:00 AM.
Day/Night Noise Level, L_{dn}	The 24-hour A-weighted average sound level from midnight to midnight, obtained after the addition of 10 dBA to sound levels occurring in the night between 10:00 PM and 7:00 AM.
L_{max}, L_{min}	The maximum and minimum A-weighted sound levels measured on a sound level meter, during a designated time interval, using fast time averaging.
Ambient Noise Level	The all-encompassing noise associated with a given environment at a specified time; usually a composite of sound from many sources at many directions, near and far; no particular sound is dominant.
Intrusive	The noise that intrudes over and above the existing ambient noise at a given location. The relative intrusiveness of a sound depends upon its amplitude, duration, frequency, and time of occurrence and tonal or informational content, as well as the prevailing ambient noise level.

Source: *Handbook of Acoustical Measurements and Noise Control* (Harris 1991).

Table B: Common Sound Levels and Their Noise Sources

Noise Source	A-Weighted Sound Level in Decibels	Noise Environments	Subjective Evaluations
Near Jet Engine	140	Deafening	128 times as loud
Civil Defense Siren	130	Threshold of Pain	64 times as loud
Hard Rock Band	120	Threshold of Feeling	32 times as loud
Accelerating Motorcycle at a Few Feet Away	110	Very Loud	16 times as loud
Pile Driver; Noisy Urban Street/Heavy City Traffic	100	Very Loud	8 times as loud
Ambulance Siren; Food Blender	95	Very Loud	—
Garbage Disposal	90	Very Loud	4 times as loud
Freight Cars; Living Room Music	85	Loud	—
Pneumatic Drill; Vacuum Cleaner	80	Loud	2 times as loud
Busy Restaurant	75	Moderately Loud	—
Near Freeway Auto Traffic	70	Moderately Loud	—
Average Office	60	Quiet	One-half as loud
Suburban Street	55	Quiet	—
Light Traffic; Soft Radio Music in Apartment	50	Quiet	One-quarter as loud
Large Transformer	45	Quiet	—
Average Residence without Stereo Playing	40	Faint	One-eighth as loud
Soft Whisper	30	Faint	—
Rustling Leaves	20	Very Faint	—
Human Breathing	10	Very Faint	Threshold of Hearing
—	0	Very Faint	—

Source: Compiled by LSA (2015).

CHARACTERISTICS OF GROUND-BORNE VIBRATION

Vibration is the result of rapidly fluctuating motions that have the potential to be perceptible. Ground-borne vibration is almost exclusively a concern inside buildings and is rarely perceived as a problem outdoors, where the motion may be discernible, but there is less adverse reaction without the effects associated with the shaking of a building. Vibration energy propagates from a source through intervening soil and rock layers to the foundations of nearby buildings. The vibration then propagates from the foundation throughout the remainder of the structure. Building vibration may be perceived by occupants as the motion of building surfaces, the rattling of items on shelves or hanging on walls, or a low-frequency rumbling noise, otherwise referred to as ground-borne noise. Typically, sources that have the potential to generate ground-borne noise are likely to produce airborne noise levels that mask the radiated ground-borne noise. The rumbling noise is caused by the vibration of walls, floors, and ceilings that radiate sound waves. Annoyance from vibration often occurs when the vibration exceeds the threshold of perception by 10 dB or less. This is an order of magnitude below the damage threshold for normal buildings.

Typical sources of ground-borne vibration are construction activities (e.g., blasting, pile driving, and operating heavy-duty earthmoving equipment) and occasional traffic on rough roads. Problems with both ground-borne vibration and noise from these sources are usually localized to areas within approximately 100 ft of the vibration source, although there are examples of ground-borne vibration causing interference out to distances greater than 200 ft (FTA 2018). When roadways are smooth, vibration from traffic, even heavy trucks, is rarely perceptible. For most projects, it is assumed that the roadway surface would be smooth enough that ground-borne vibration from street traffic would not exceed the impact criteria; however, construction of the project could result in ground-borne vibration that may be perceptible and annoying.

Ground-borne vibration has the potential to disturb people and damage buildings. Ground-borne vibration is usually measured in terms of vibration velocity, either the root-mean-square (RMS) velocity or peak particle velocity (PPV). RMS is best for characterizing human response to building vibration and PPV is used to characterize potential for damage. Decibel notation acts to compress the range of numbers required to describe vibration. Vibration velocity level in decibels is defined as:

$$Lv = 20 \log10 [V/Vref]$$

where Lv is the vibration velocity in decibels (VdB), "V" is the RMS velocity amplitude, and "Vref" is the reference velocity amplitude, or 1 x 10-6 inches per second used in the United States.

Factors that influence ground-borne vibration and noise include the following:

- **Vibration Source:** Vehicle suspension, wheel types and condition, railroad track/roadway surface, railroad track support system, speed, transit structure, and depth of vibration source
- **Vibration Path:** Soil type, rock layers, soil layering, depth to water table, and frost depth
- **Vibration Receiver:** Foundation type, building construction, and acoustical absorption

Among the factors listed above, there are significant differences in the vibration characteristics when the source is underground compared to at the ground surface. In addition, soil conditions are known to have a strong influence on the levels of ground-borne vibration. Among the most important factors are the stiffness and internal damping of the soil and the depth to bedrock.

Experience with ground-borne vibration indicates (1) vibration propagation is more efficient in stiff, clay soils than in loose, sandy soils; and (2) shallow rock seems to concentrate the vibration energy close to the surface and can result in ground-borne vibration problems at large distances from a railroad track. Factors including the layering of the soil and the depth to the water table can have substantial effects on the propagation of ground-borne vibration. Soft, loose, sandy soils tend to attenuate more vibration energy than hard, rocky materials. Vibration propagation through groundwater is more efficient than through sandy soils.

REGULATORY FRAMEWORK

The State and local framework for noise standards are outlined below. The City has established standards in the General Plan and in the Municipal Code for land use projects that could potentially expose sensitive receptors to excessive noise levels.

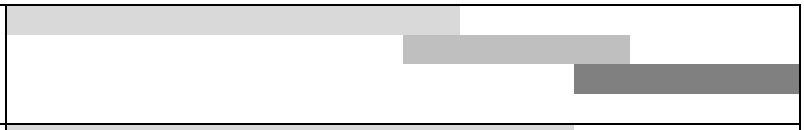
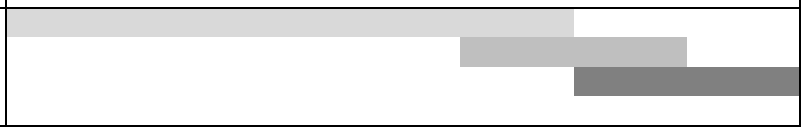
STATE OF CALIFORNIA

The State of California has established regulations that help prevent adverse impacts to occupants of buildings located near noise sources. Additionally, the State has also established land use compatibility guidelines for determining acceptable noise levels for specified land uses, as shown in Table C.

Table C: Land Use Compatibility for Community Noise Environments

	Community Noise Exposure (dBA L_{dn} or CNEL)
Land Use Category	**55 60 65 70 75 80**
Residential – Low Density Single Family, Duplex, Mobile Homes	
Residential – Multi-family	
Transient Lodging – Motels, Hotels	
Schools, Libraries, Churches, Hospitals, Nursing Homes	
Auditoriums, Concerts, Halls, Amphitheaters	
Sports Area, Outdoor Spectator Sports	
Playgrounds, Neighborhood Parks	
Golf Courses, Riding Stables, Water Recreation, Cemeteries	

Table C: Land Use Compatibility for Community Noise Environments

Office Buildings, Businesses Commercial and Professional	
Industrial, Manufacturing Utilities, Agriculture	

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 windows closed and fresh air supply systems or air conditioning will normally suffice.
Normally Unacceptable	New construction or development should generally 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.

Source: Office of Noise Control, California Department of Health.

METROPOLITAN BAKERSFIELD GENERAL PLAN

The City addresses noise in the Noise Element of the Metropolitan Bakersfield General Plan (City of Bakersfield 2002). The goals and policies in the City's General Plan are designed to provide noise compatible land use relationships by establishing noise standards utilized for design and siting purposes and minimize noise impacts from significant noise generators. The following policies are applicable to the proposed project:

- Review discretionary industrial, commercial or other noise-generating land use projects for compatibility with nearby noise-sensitive land uses. Additionally, the development of new noise-generating land uses which are not preempted from local noise regulation will be reviewed if resulting noise levels will exceed the performance standards contained within Table D in areas containing residential or other noise-sensitive land uses.

- Require noise level criteria applied to land uses other than residential or other non-noise-sensitive uses to be consistent with the recommendations of the California Office of Noise Control.

- Encourage vegetation and landscaping along roadways and adjacent to other noise sources in order to increase absorption of noise.

- Establish threshold standards for the determination of the existence of cumulative noise impacts that are significant, and will therefore require mitigation to achieve acceptable noise standards that do not exceed the standards contained in this element.

Table D: Noise Level Performance Standards[1]

Category	Cumulative Number of minutes in any one-hour time period	Exterior Noise Levels dB(A)	
		Daytime 7:00 a.m. to 10:00 p.m.	Nighttime 10:00 p.m. to 7:00 a.m.
1	30	55	50
2	15	60	55
3	5	65	60
4	1	70	65
5	0	75	70

Source: Metropolitan Bakersfield General Plan, Chapter VII, December 2002.
[1] Each of the noise level standards specified in this table shall be reduced by five (5) dB(A) for pure tone noise, noises consisting primarily of speech of music, or for recurring impulsive noises. These noise level standards should be applied at a residential or other noise-sensitive land use and not on the property of a noise-generating land use.
dB(A) = A-weighted decibles

CITY OF BAKERSFIELD MUNICIPAL CODE

The City addresses stationary and construction noise in Chapter 9.22 of the Municipal Code.

General Sound Level Standards Section 9.22.030 of the City Municipal Code defines and regulates noise standards for public health and safety. No person shall create any sound, or allow the creation of any sound, that causes a disturbance or annoyance to persons residing within 1,000 ft of the noise source. The City utilizes various standards in determining a violation of the provisions, including but not limited to; the level of noise, proximity of the noise to residential sleeping facilities, the nature and zoning of the area which the noise occurs, the time of day or night the noise occurs, the duration of the noise, etc. Refrigerator trucks are allowed to operate at all hours within any commercial or manufacturing zone, provided that the use does not emit detrimental noise or vibration impacts to neighboring residential properties between the hours of 10:00 p.m. and 7:00 a.m.

Construction Hours Section 9.22.050 of the City Municipal Code limits construction and demolition activities, when such activities occur within 1,000 ft from the nearest residential dwelling, to between the hours of 6:00 a.m. and 9:00 p.m. on weekdays, and between the hours of 8:00 a.m. and 9:00 p.m. on weekends. A permit is required from the City Manager if construction or demolition is requested to take place between the hours of 9:00 p.m. and 6:00 a.m. The City Manager determines that the public health and safety would not be impaired or disturbed by such a permit. Permits would be granted for a period not to exceed three (3) days.

FEDERAL TRANSIT ADMINISTRATION

The vibration impact criteria included in the *Transit Noise and Vibration Impact Assessment* (FTA 2018; Table 6-3), are used in this analysis to assess potential human annoyance related to ground-borne vibration impacts, as shown in Table E. The criteria account for variation in project types as well as the frequency of events, which differ widely among projects. When there are fewer events per day, it takes higher vibration levels to evoke the same community response. This is accounted for in the criteria by distinguishing between projects with frequent and infrequent events, in which the term "frequent events" is defined as more than 70 events per day.

Table E: Ground-Borne Vibration Impact Criteria For Assessing Human Annoyance

Land Use Category	Ground-Borne Vibration Impact Levels (VdB re 1 µin/sec)		
	Frequent Events[1]	Occasional Events[2]	Infrequent Events[3]
Category 1: Buildings where vibration would interfere with interior operations.	65 VdB[4]	65 VdB[4]	65 VdB[4]
Category 2: Residences and buildings where people normally sleep.	72 VdB	75 VdB	80 VdB
Category 3: Institutional land uses with primarily daytime use.	75 VdB	78 VdB	83 VdB

Source: Table 6-3, *Transit Noise and Vibration Impact Assessment Manual* (FTA 2018).

[1] Frequent events are defined as more than 70 vibration events of the same source per day.

[2] Occasional events are defined as between 30 and 70 vibration events of the same source per day.

[3] Infrequent events are defined as fewer than 30 vibration events of the same kind per day.

[4] This criterion limit is based on levels that are acceptable for most moderately sensitive equipment, such as optical microscopes. Vibration-sensitive manufacturing or research will require detailed evaluation to define the acceptable vibration levels. Ensuring lower vibration levels in a building often requires special design of the HVAC systems and stiffened floors.

µin/sec = microinches per second
µPa = micropascals
dB = decibels
dBA = A-weighted decibels
FTA = Federal Transit Administration
HVAC = heating, ventilation, and air-conditioning
VdB = vibration velocity decibels

The criteria for potential building damage from ground-borne vibration and noise are based on the maximum levels for a single event. Table F lists the potential vibration building damage criteria associated with construction activities, as suggested in the *Transit Noise and Vibration Impact Assessment Manual* (FTA 2018). FTA guidelines show that a vibration level of up to 102 VdB (equivalent to 0.5 in/sec in PPV) (FTA 2018) is considered safe for buildings consisting of reinforced concrete, steel, or timber (no plaster), and would not result in any construction vibration damage. For a non-engineered (those not designed by an engineer or architect) timber and masonry building, the construction building vibration damage criterion is 94 VdB (0.2 in/sec in PPV).

Table F: Construction Vibration Damage Criteria

Building Category	PPV (in/sec)	Approximate L_V (VdB)[1]
Reinforced concrete, steel, or timber (no plaster)	0.50	102
Engineered concrete and masonry (no plaster)	0.30	98
Non-engineered timber and masonry	0.20	94
Buildings extremely susceptible to vibration damage	0.12	90

Source: Table 7-5, *Transit Noise and Vibration Impact Assessment Manual* (FTA 2018).
[1] RMS VdB re 1 µin/sec.
µin/sec = microinches per second
FTA = Federal Transit Administration
in/sec = inches per second
L_V = velocity in decibels
PPV = peak particle velocity
RMS = root-mean-square
VdB = vibration velocity in decibels

THRESHOLDS OF SIGNIFICANCE

Based on the checklist within the *Guidelines for the Implementation of the California Environmental Quality Act (CEQA)*, Appendix G, Public Resource Code Sections 15000–15387, a project will normally have a significant effect on the environment related to noise if it will substantially increase the ambient noise levels for adjoining areas or conflict with adopted environmental plans and the goals of the community in which it is located. The applicable noise standards governing the project site are the criteria in the Noise Element of the Metropolitan Bakersfield General Plan and Chapter 9.22 of the City Municipal Code. The City Municipal Code does not contain specific values for a violation of the provisions set, rather a general provision prohibiting disturbance to the peace or quiet of any neighborhood or discomfort or annoyance to persons residing within 1,000 ft of the noise source. The General Plan has set standards and criteria requiring projects to adopt mitigation measures when a significant increase is expected to occur affecting existing noise-sensitive land uses.

The project would have a significant impact on noise if it would result in:

- Exposure of people to or generate noise levels in excess of standards established in the General Plan or the Municipal Code, and/or the applicable standards of other agencies. The City's General Plan further defines this as a project would result in a significant impact if it would:
    - Result in an increase in noise levels to increase by 5 dBA or more where the ambient noise level is less than 60 dBA CNEL;
    - Result in an increase in noise levels of 3 dBA or more where the ambient noise level is 60 to 65 dBA CNEL; or
    - Result in an increase of noise by 1.5 dBA or more where the ambient noise level is greater than 65 dBA CNEL.
- Exposure of persons to or generation of excessive ground borne vibration or ground borne noise levels;

- Result in a substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project;

- A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project;

- Contribute to cumulative noise impacts in the area. The General Plan further specifies this criterion to state that a project's contribution to noise increase would normally be considered cumulatively considerable and considered significant when ambient noise levels affect existing sensitive land uses and when the following occurs:

    - A project increased the ambient (cumulative without project) noise level by 1 dBA or more;

    And the cumulative with project noise levels cause the following;

    - An increase of the existing ambient noise level by 5 dBA or more, where the existing ambient level is less than 60 dBA CNEL;

    - An increase of the existing ambient noise level by 3 dBA or more, where the existing ambient level is 60 to 65 dBA CNEL;

    - An increase of the existing ambient noise level by 1.5 dBA or more, where the existing ambient level is greater than 65 dBA CNEL.

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EXISTING SETTING

This section describes the existing noise environment in the vicinity of the project site. Noise monitoring and traffic noise modeling were used to quantify existing noise levels at the project site.

OVERVIEW OF THE EXISTING NOISE ENVIRONMENT

The primary existing noise sources in the project area are transportation facilities. Traffic on Hosking Avenue, South H Street, and SR-99 is a steady source of ambient noise.

EXISTING NOISE LEVEL MEASUREMENTS

To assess existing noise levels, LSA conducted one long-term noise measurement and two short-term noise measurements in the vicinity of the project site. The long-term noise measurement was recorded between February 13 and February 14, 2018. The long-term noise measurement captured hourly L_{eq} data as well as CNEL data, which incorporate the nighttime hours. Sources which dominate the existing noise environment include traffic on Hosking Avenue, South H Street, SR-99 and occasional distant aircraft. The short-term noise measurements were recorded on February 13, 2018. The short-term noise measurements captured traffic noise from Hoskings Avenue, South H Street, and SR-99 at two locations. Noise measurement data collected during the long-term and short-term noise monitoring are summarized in Tables G and H, respectively, and shown on Figure 4. Noise measurement sheets are provided in Appendix A.

Table G: Long-Term Noise Level Measurements

Location	Location Description	Daytime Noise Levels[1] (dBA L_{eq})	Evening Noise Levels[2] (dBA L_{eq})	Nighttime Noise Levels[3] (dBA L_{eq})	Average Daily Noise Level (dBA CNEL)
LT-1	Southwest of the backyard of 1519 Kirkwood Avenue	67.9 - 72.2	69 - 69.6	59.8 – 69.0	73.5

Source: Compiled by LSA Associates, Inc. (2019).
[1] Daytime Noise Levels = noise levels during the hours of 7:00 a.m. to 7:00 p.m.
[2] Evening Noise Levels = noise levels during the hours of 7:00 p.m. to 10:00 p.m.
[3] Nighttime Noise Levels = noise levels during the hours of 10:00 p.m. to 7:00 a.m.
dBA = A-weighted decibels
ft = feet
L_{eq}=equivalent continuous sound level

Table H: Short-Term Noise Level Measurements

Location	Location Description	Measured Noise Level[1] (dBA L_{eq})	Daytime Noise Levels[2] (dBA L_{eq})	Evening Noise Levels[3] (dBA L_{eq})	Nighttime Noise Levels[4] (dBA L_{eq})	Average Daily Noise Level (dBA CNEL)
ST-1	West of the backyard of 1510 Lucerne Drive.	59.8	59.6 – 64.0	60.7 - 61.3	51.6 - 60.8	65.3
ST-2	West of the northwest corner of 1510 Interlaken Drive, southwest of shed at 1509 Interlaken Drive	52.6	52.5 - 56.8	53.6 - 54.2	44.4 - 53.6	58.1

Source: Compiled by LSA Associates, Inc. (2019).

[1] Hourly noise levels were calculated based on a 15-minute short-term measurement and then adjusting it to the pattern of the nearest long-term measurement.

[2] Daytime Noise Levels = noise levels during the hours of 7:00 a.m. to 7:00 p.m.

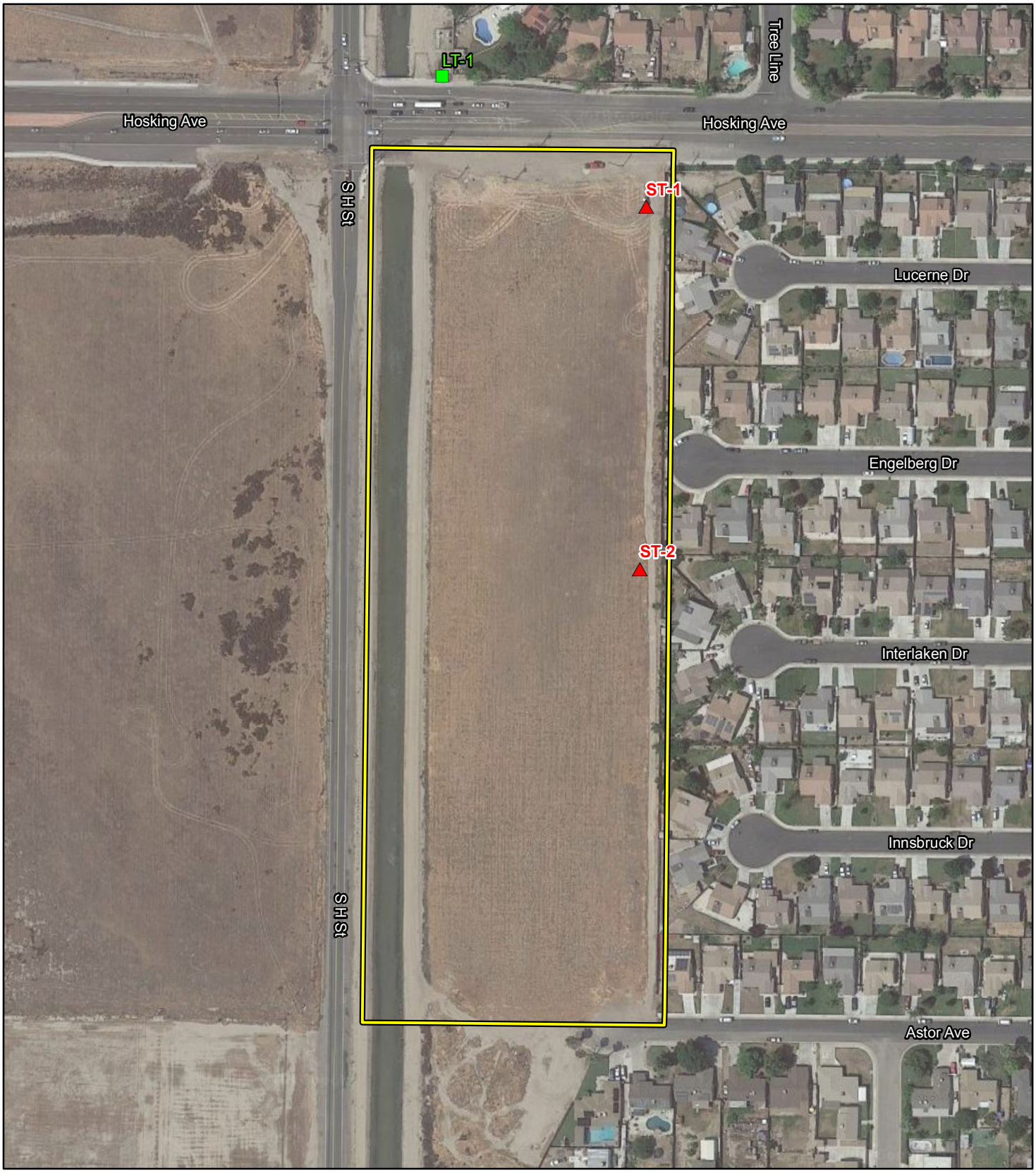
[3] Evening Noise Levels = noise levels during the hours of 7:00 p.m. to 10:00 p.m.

[4] Nighttime Noise Levels = noise levels during the hours of 10:00 p.m. to 7:00 a.m.

dBA = A-weighted decibels

ft = feet

L_{eq} = equivalent continuous sound level



LSA

LEGEND

Project Site

Short-Term Monitoring Location

Long-Term Monitoring Location

FIGURE 4

N

0 100 200

FEET

SOURCE: Google Aerial (~2017)

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Hosking Avenue/South H Street Commercial Project

Noise Monitoring Locations

EXISTING AIRCRAFT NOISE

Airport related noise levels are primarily associated with aircraft engine noise made while aircraft are taking off, landing, or running their engines while still on the ground. The closest airport to the project site is the Bakersfield Municipal Airport located approximately 3 miles northeast of the project site. Based on the March 2011 Airport Land Use Compatibility Plan for Kern County, the project is located beyond the 60 dBA CNEL noise contours of the airport. In addition, there are no private airfields or heliports within 2 miles of the proposed project.

EXISTING TRAFFIC NOISE

Existing roadway traffic noise levels in the project vicinity were assessed using the FHWA highway traffic noise prediction model (FHWA RD-77- 108) and data from the *Traffic Impact Assessment* for the project (DeWalt January 2019). This model uses a typical vehicle mix for urban/suburban areas in California and requires parameters, including traffic volumes, vehicle speed, and roadway geometry, to compute typical equivalent noise levels during daytime, evening, and nighttime hours. The resultant noise levels are weighted and summed over 24-hour periods to determine the CNEL values. Table I provides the existing traffic noise levels in the project vicinity. These noise levels represent the worst-case scenario, which assumes that no shielding is provided between the traffic and the location where the noise contours are drawn. Appendix B provides the specific assumptions used in developing these noise levels and model printouts.

Table I: Existing Traffic Noise Levels Without Project

Roadway Segment	ADT	Centerline to 70 dBA CNEL (ft)	Centerline to 65 dBA CNEL (ft)	Centerline to 60 dBA CNEL (ft)	CNEL (dBA) 50 ft from Centerline of Outermost Lane
Hosking Avenue West of Wible Road	10,220	< 50	97	197	65.8
Hosking Avenue between Wible Road and Hughes Lane	14,495	65	119	247	67.3
Hosking Avenue between Hughes Lane and SR-99 SB Ramps	18,215	72	137	287	68.3
Hosking Avenue between SR-99 SB Ramps and SR-99 NB Ramps	14,700	66	121	249	67.3
Hosking Avenue between SR-99 NB Ramps and South H Street	13,930	61	115	240	67.4
Hosking Avenue between South H Street and Monitor Street	9,845	< 50	95	192	65.6
Hosking Avenue East of Monitor Street	6,720	< 50	77	151	64.1
South H Street South of McKee Road	3,500	< 50	< 50	95	63.5
South H Street between McKee Road and Hosking Avenue	5,505	< 50	60	128	65.4
South H Street between Hosking Avenue and Berkshire Road	6,370	< 50	66	142	66.1
South H Street North of Berkshire Road	6,140	< 50	64	138	65.9

Source: Compiled by LSA Associates, Inc. (2019).
Notes: Traffic noise within 50 ft of the roadway centerline should be evaluated with site-specific information.

ADT = average daily traffic CNEL = Community Noise Equivalent Level dBA = A-weighted decibels

PROJECT IMPACTS

The evaluation of project-related noise and vibration impacts and a determination as to whether they would have a significant effect on the environment includes the following:

- An assessment of the short-term construction noise and vibration levels at the off-site noise sensitive uses and a comparison of those levels to the City's General Plan, Municipal Code Ordinance; and

- An assessment of the project induced long-term noise levels at off-site noise sensitive uses and a comparison of those levels to the City's pertinent noise standards.

- Should it be determined that noise or vibration levels exceed the established standards, where necessary, the required reduction measures to reduce project related noise and vibration impacts to nearby-by sensitive receptors are provided.

SHORT-TERM CONSTRUCTION NOISE IMPACTS

Two types of short-term noise impacts could occur during construction of the proposed project. First, construction crew commutes and the transport of construction equipment and materials to the site for the proposed project would incrementally increase noise levels on access roads leading to the site. It is expected that larger trucks used in equipment delivery would generate higher noise impacts than trucks associated with worker commutes. Although there would be a relatively high single-event noise exposure potential causing intermittent noise nuisance (passing trucks at 50 ft would generate up to a maximum of 84 dBA), the effect on longer-term (hourly or daily) ambient noise levels would be small. The building construction phase would generate the most trips out of all the construction phases [i.e., 22 vehicles at peak hour or 222 vehicles per day] (LSA 2019). Roadways that would be used to access the project site are Hosking Avenue and South H Street, which have estimated existing hourly/daily traffic volumes of 984/9,845 and 550/5505, respectively, near the project site. Construction-related traffic would increase traffic noise levels by 0.1 dBA along Hosking Avenue and 0.2 dBA along South H Street. A noise level increase of less than 3 dBA would not be perceptible to the human ear in an outdoor environment. Therefore, short-term, construction-related impacts associated with worker commute and equipment transport to the project site would not be significant.

The second type of short-term noise impact is related to noise generated during demolition, excavation, grading, and building erection on the project site. Construction is completed in discrete steps, each of which has its own mix of equipment and, consequently, its own noise characteristics. These various sequential phases would change the character of the noise generated on the site and, therefore, the noise levels surrounding the site as construction progresses. Despite the variety in the type and size of construction equipment, similarities in the dominant noise sources and patterns of operation allow construction-related noise ranges to be categorized by work phase. Table J lists typical construction equipment noise levels recommended for noise impact assessments, based on a distance of 50 ft between the equipment and a noise receptor, taken from the FHWA Highway Construction Noise Handbook (FHWA 2006).

Table J: Typical Construction Equipment Noise Levels

Equipment Description	Acoustical Usage Factor (%)	Maximum Noise Level (L_{max}) at 50 ft[1]
Backhoes	40	80
Compactor (ground)	20	80
Compressor	40	80
Cranes	16	85
Dozers	40	85
Dump Trucks	40	84
Excavators	40	85
Flat Bed Trucks	40	84
Forklift	20	85
Front-end Loaders	40	80
Graders	40	85
Impact Pile Drivers	20	95
Jackhammers	20	85
Pick-up Truck	40	55
Pneumatic Tools	50	85
Pumps	50	77
Rock Drills	20	85
Rollers	20	85
Scrapers	40	85
Tractors	40	84
Welder	40	73

Source: Highway Construction Noise Handbook (FHWA 2006).
Note: Noise levels reported in this table are rounded to the nearest whole number.
[1] Maximum noise levels were developed based on Spec 721.560 from the Central Artery/Tunnel (CA/T) program to be consistent with the City of Boston's Noise Code for the "Big Dig" project.
L_{max} = maximum instantaneous sound level

Typical noise levels range up to 88 dBA L_{max} at 50 ft during the noisiest construction phases. The site preparation phase, which includes excavation and grading of the site, tends to generate the highest noise levels because the noisiest construction equipment is earthmoving equipment. Earthmoving equipment includes excavating machinery such as backfillers, bulldozers, draglines, and front loaders. Earthmoving and compacting equipment includes compactors, scrapers, and graders.

Project construction is expected to require the use of scrapers, bulldozers, and water trucks/pickup trucks. Noise associated with the use of construction equipment is estimated to be between 55 dBA L_{max} and 85 dBA L_{max} at a distance of 50 ft from the active construction area for the site preparation phase. As shown in Table J, the maximum noise level generated by each scraper is assumed to be approximately 85 dBA L_{max} at 50 ft. Each dozer would generate approximately 85 dBA L_{max} at 50 ft. The maximum noise level generated by water trucks/pickup trucks is approximately 55 dBA L_{max} at 50 ft from these vehicles. Each doubling of the sound sources with equal strength increases the noise level by 3 dBA. Assuming that each piece of construction equipment operates at some distance from the other equipment, the worst-case combined noise level during this phase of construction would be 88 dBA L_{max} at a distance of 50 ft from the active construction area. Based on a usage factor of 40 percent, the worst-case combined noise level during this phase of construction would be 84 dBA L_{eq} at a distance of 50 ft from the active construction area.

The closest sensitive receptors in the vicinity of the project site are residences located immediately adjacent to the east and are within 50 ft of the project construction boundary. The residences would be exposed to a noise level of 88 dBA L_{max} (84 dBA L_{eq}) or higher at a distance of 50 ft. Although construction noise levels would be higher than existing ambient traffic noise levels, noise generated from construction activities would stop once the project construction is completed. The implementation of minimization measures that include compliance with the construction hours specified in the City's Municipal Code Noise Ordinance, using construction equipment with noise mufflers that are properly operating and maintained, placing construction staging area away from off-site sensitive uses, and placing all stationary construction equipment so that the emitted noise is directed away from sensitive receptors whenever feasible would minimize noise impacts from construction equipment. Therefore, no construction noise impacts would occur with the implementation of minimization measures. No noise reduction measures are required.

SHORT-TERM CONSTRUCTION VIBRATION IMPACTS

This construction vibration impact analysis discusses the level of human annoyance using vibration levels in VdB and will assess the potential for building damage using vibration levels in PPV (in/sec) because vibration levels calculated in RMS are best for characterizing human response to building vibration, whereas the vibration level in PPV is best used to characterize the potential for damage. As shown in Table F, the FTA guidelines indicate that a vibration level up to 102 VdB (equivalent to 0.5 PPV [in/sec]) is considered safe for buildings consisting of reinforced concrete, steel, or timber (no plaster) and would not result in any construction vibration damage (FTA 2018). For a non-engineered timber and masonry building, the construction vibration damage criterion is 94 VdB (0.2 PPV [in/sec]). For buildings extremely susceptible to vibration damage, the construction vibration damage criterion is 90 VdB (0.12 PPV [in/sec]).

Table K shows the PPV and VdB values at a distance of 25 ft from the construction vibration source. The project construction is expected to use a bulldozer and a loaded truck. The greatest levels of vibration are anticipated to occur during the site preparation phase. As shown in Table K, small bulldozers and loaded trucks generate approximately 58 VdB (0.003 PPV [in/sec]) and 86 VdB (0.076 PPV [in/sec]), respectively, of ground-borne vibration when measured at a distance of 25 ft, based on the Transit Noise and Vibration Impact Assessment Manual (FTA 2018). The distance to the nearest buildings for vibration impact analysis is measured between the nearest off-site buildings and the project boundary (assuming the construction equipment would be used at or near the project boundary) because vibration impacts normally occur within the buildings.

The formula for vibration transmission is provided below.

$$L_v dB\ (D) = L_v dB\ (25\ ft) - 30\ Log\ (D/25)$$

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

Table K: Vibration Source Amplitudes for Construction Equipment

Equipment	Reference PPV/L_V at 25 ft	
	PPV (in/sec)	L_V (VdB)[1]
Hoe Ram	0.089	87
Large Bulldozer	0.089	87
Caisson Drilling	0.089	87
Loaded Trucks[2]	0.076	86
Jackhammer	0.035	79
Small Bulldozer	0.003	58

Source: *Transit Noise and Vibration Impact Assessment Manual* (FTA 2018).
[1] RMS VdB re 1 µin/sec.
[2] Equipment shown in bold is expected to be used on site.
µin/sec = microinches per second
ft = feet
FTA = Federal Transit Administration
in/sec = inches per second
L_V = velocity in decibels
PPV = peak particle velocity
RMS = root-mean-square
VdB = vibration velocity in decibels

Table L lists the projected vibration level from construction equipment expected to be used on the project site to the nearest buildings in the project vicinity. Construction equipment expected to be used with the highest vibration generation potential includes small bulldozers and loaded trucks, which would generate 58 VdB (0.003 PPV [in/sec]) and 86 VdB (0.076 PPV [in/sec]), respectively, at 25 ft. The residential buildings to the east and north are located approximately 10 ft and 120 ft, respectively, from the project construction boundary. As shown in Table L, the residential buildings to the east and north would experience vibration levels of up to 98 VdB (0.3 PPV in in/sec) and 66 VdB (0.007 PPV in in/sec), respectively.

Construction vibration levels from construction equipment or activity at the residential buildings to the north of the project site would not exceed the FTA threshold of 94 VdB (0.2 PPV in in/sec) for building damage when bulldozers and loaded trucks operate at the project's northern construction boundary. However, residential buildings directly adjacent to the east would exceed the FTA threshold of 94 VdB (0.2 PPV in in/sec) for building damage when loaded trucks operate at the project construction boundary. Construction vibration levels at all other land uses surrounding the project would be lower, due to the greater distance from the source.

The implementation of vibration reduction measures to use prohibit loaded trucks from operating within 15 ft from the eastern construction boundary would reduce construction vibration levels to 93 VdB (0.164 PPV [in/sec]) or lower. This vibration level would not exceed the FTA threshold of 94 VdB (0.2 in/sec PPV) for building damage. Although this construction vibration level would exceed the vibration annoyance threshold of 72 VdB, construction vibration levels would no longer occur once construction of the project is completed. Construction vibration levels at the residences to the north would not exceed the vibration annoyance threshold of 72 VdB. Therefore, no construction vibration impacts would occur with the implementation of vibration reduction measures.

Table L: Summary of Construction Vibration Levels

Land Use	Direction	Equipment/ Activity	Reference Vibration Level at 25 ft		Distance (ft)[1]	Maximum Vibration Level	
			VdB	PPV		VdB	PPV
Residential	East	Small bulldozers	58	0.003	10	70	0.012
		Loaded trucks	86	0.076	10	98	0.300
Residential	North	Small bulldozers	58	0.003	120	38	0.000
		Loaded trucks	86	0.076	120	66	0.007

Source: Compiled by LSA Associates, Inc. (2019).
Note: The FTA-recommended building damage threshold is 94 VdB (0.2 PPV [in/sec]) at receiving non-engineered timber and masonry structures and 98 VdB (0.3 PPV [in/sec]) at receiving engineered concrete and masonry building industrial structures.
[1] Distances reflect the nearest structure of each land use category in a given direction to the nearest project construction boundary. All other structures of each land use category in the given direction would experience lower vibration levels.
ft = feet PPV = peak particle velocity in/sec = inches per second
FTA = Federal Transit Administration VdB = vibration velocity decibels

LONG-TERM NOISE IMPACTS

The long-term operations of the proposed project would potentially impact off-site land uses and proposed on-site uses from mobile and stationary noise sources. Mobile noise sources include aircraft and traffic noise. Stationary noise sources include proposed on-site truck delivery and truck unloading activities, HVAC equipment, car wash with vacuum stations, drive-thru speaker, and parking lot activities.

Long-Term Aircraft Noise Impacts

The proposed project is approximately 3 miles from the nearest airport. Based on the March 2011 Airport Land Use Compatibility Plan for Kern County, the project is located beyond the 60 dBA CNEL noise contours of the airport. In addition, there are no private airfields or heliports within 2 miles of the proposed project. Therefore, noise generated by aircraft from public airports, public use airports, and private airfields or heliports would not expose people residing or working within the project area to excessive noise levels.

Long-Term Traffic Noise Impacts

The guidelines included in the FHWA Highway Traffic Noise Prediction Model (1977; FHWA RD-77-108) were used to evaluate highway traffic-related noise conditions along roadway segments in the project vicinity. This model requires various parameters, including traffic volumes, vehicle mix, vehicle speed, and roadway geometry to compute typical equivalent noise levels during daytime, evening, and nighttime hours. The resultant noise levels are weighted and summed over 24 hour periods to determine the CNEL values. The standard vehicle mix for Southern California roadways was used for traffic on these roadway segments. Traffic volumes in the project's traffic study (Dewalt 2019) were used to assess the existing and future traffic noise impacts. Tables M and N provide the traffic noise levels for the existing and future (2035) scenarios with and without the project, respectively. These noise levels represent the worst-case scenario, which assumes that no shielding is provided between the traffic and the location where the noise contours are drawn. Appendix B provides the specific assumptions used in developing these noise levels and model printouts.

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Table M: Existing Traffic Noise Levels Without and With Project

Roadway Segment	Existing Without Project					Existing With Project						
	ADT	Centerline to 70 dBA CNEL (ft)	Centerline to 65 dBA CNEL (ft)	Centerline to 60 dBA CNEL (ft)	CNEL (dBA) 50 ft from Centerline of Outermost Lane	ADT	Change in ADT	Centerline to 70 dBA CNEL (ft)	Centerline to 65 dBA CNEL (ft)	Centerline to 60 dBA CNEL (ft)	CNEL (dBA) 50 ft from Centerline of Outermost Lane	Increase over Baseline CNEL (dBA) 50 ft from Centerline of Outermost Lane
Hosking Avenue West of Wible Road	10,220	< 50	97	197	65.8	10,450	230	< 50	99	200	65.9	0.1
Hosking Avenue between Wible Road and Hughes Lane	14,495	65	119	247	67.3	14,960	465	66	122	252	67.5	0.2
Hosking Avenue between Hughes Lane and SR-99 SB Ramps	18,215	72	137	287	68.3	18,795	580	73	140	292	68.4	0.1
Hosking Avenue between SR-99 SB Ramps and SR-99 NB Ramps	14,700	66	121	249	67.3	15,340	640	68	124	256	67.5	0.2
Hosking Avenue between SR-99 NB Ramps and South H Street	13,930	61	115	240	67.4	14,715	785	63	119	249	67.7	0.3
Hosking Avenue between South H Street and Monitor Street	9,845	< 50	95	192	65.6	10,785	940	< 50	100	204	66.0	0.4
Hosking Avenue East of Monitor Street	6,720	< 50	77	151	64.1	6,950	230	< 50	78	154	64.2	0.1
South H Street South of McKee Road	3,500	< 50	< 50	95	63.5	3,560	60	< 50	< 50	96	63.5	0.0
South H Street between McKee Road and Hosking Avenue	5,505	< 50	60	128	65.4	6,115	610	< 50	64	138	65.9	0.5
South H Street between Hosking Avenue and Berkshire Road	6,370	< 50	66	142	66.1	6,720	350	< 50	68	147	66.3	0.2
South H Street North of Berkshire Road	6,140	< 50	64	138	65.9	6,260	120	< 50	65	140	66.0	0.1

Source: Compiled by LSA (2019).
Note: Traffic noise within 50 ft of the roadway centerline should be evaluated with site-specific information.
ADT = average daily traffic
CNEL = Community Noise Equivalent Level
dBA = A-weighted decibels
ft = foot/feet
NB = northbound

Table N: 2035 Traffic Noise Levels Without and With Project

Roadway Segment	Existing Without Project					Existing With Project						
	ADT	Centerline to 70 dBA CNEL (ft)	Centerline to 65 dBA CNEL (ft)	Centerline to 60 dBA CNEL (ft)	CNEL (dBA) 50 ft from Centerline of Outermost Lane	ADT	Change in ADT	Centerline to 70 dBA CNEL (ft)	Centerline to 65 dBA CNEL (ft)	Centerline to 60 dBA CNEL (ft)	CNEL (dBA) 50 ft from Centerline of Outermost Lane	Increase over Baseline CNEL (dBA) 50 ft from Centerline of Outermost Lane
Hosking Avenue West of Wible Road	17,270	70	133	277	68.1	17,500	230	71	134	279	68.1	0.0
Hosking Avenue between Wible Road and Hughes Lane	26,615	87	174	368	70.0	27,080	465	88	176	372	70.0	0.0
Hosking Avenue between Hughes Lane and SR-99 SB Ramps	34,190	101	204	434	71.0	34,770	580	102	206	439	71.1	0.1
Hosking Avenue between SR-99 SB Ramps and SR-99 NB Ramps	31,955	98	196	415	70.6	32,625	670	99	198	421	70.7	0.1
Hosking Avenue between SR-99 NB Ramps and South H Street	34,565	99	205	437	71.4	35,350	785	101	208	443	71.5	0.1
Hosking Avenue between South H Street and Monitor Street	19,395	74	143	299	68.6	20,335	940	76	147	308	68.8	0.2
Hosking Avenue East of Monitor Street	13,570	62	114	236	67.1	13,800	230	62	115	239	67.2	0.1
South H Street South of McKee Road	8,350	< 50	79	170	67.3	8,410	60	< 50	79	170	67.3	0.0
South H Street between McKee Road and Hosking Avenue	14,160	52	112	241	69.5	14,770	610	54	115	248	69.7	0.2
South H Street between Hosking Avenue and Berkshire Road	21,930	70	150	322	71.4	22,100	170	70	151	324	71.5	0.1
South H Street North of Berkshire Road	14,260	52	112	242	69.6	14,380	120	53	113	243	69.6	0.0

Source: Compiled by LSA (2019).
Note: Traffic noise within 50 ft of the roadway centerline should be evaluated with site-specific information.
ADT = average daily traffic
CNEL = Community Noise Equivalent Level
dBA = A-weighted decibels
ft = foot/feet
NB = northbound

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Table M and Table N indicate that the project-related traffic noise would increase by up to 0.5 dBA. Noise level increases of less than 3 dBA would not be perceptible to the human ear in an outdoor environment. Additionally, the increase would be below the 1.5 dBA increase considered significant under the City's General Plan standards. Therefore, no off-site traffic noise impacts would occur, and no noise reduction measures are required.

Long-Term Stationary Noise Impacts

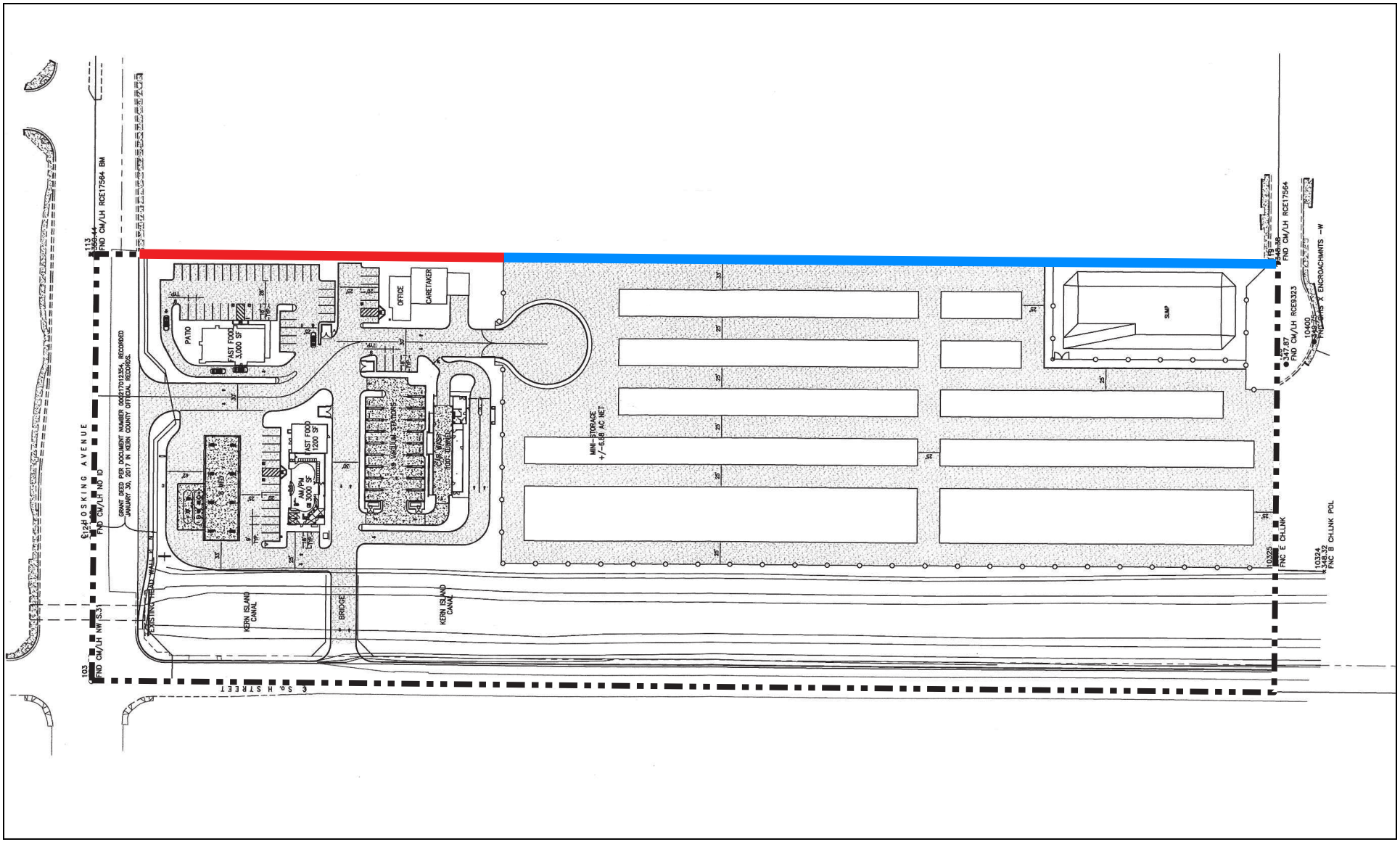
Noise impacts associated with the long-term operation of the project must comply with the noise standards specified in the City's Noise Element of the General Plan, as described above. Stationary noise generated by the proposed project include truck delivery and truck unloading activities, HVAC equipment, car wash with vacuum stations, drive-thru speaker, and parking lot activities.

Truck Delivery and Truck Loading/Unloading Activities

The fast food restaurant at the northeast of the project site and the self-storage facility would have on-site truck delivery and truck unloading activities on the east side of the two buildings that are located near residences along the east side of the project. Although a typical truck unloading process takes an average of 15 to 20 minutes, the maximum loading and unloading noise level occurs in a much shorter period of time, at most 5 minutes for each truck delivery. Noise levels generated from truck delivery and truck unloading activities at the fast food restaurant would generate a noise level of 75 dBA L_{eq} and 86 dBA L_{max} at 50 ft. The proposed self-storage facility would use small- to medium-sized trucks for delivery and truck loading and unloading activities, which would generate noise levels that range from 60 to 65 dBA L_{eq} at a distance of 50 ft.

Commercial/Fast-Food Analysis. Table O shows the predicted noise levels from truck loading/unloading at the sensitive land uses in the project vicinity. The closest residences to the proposed truck loading/unloading area of the proposed fast food restaurant are single-family residences to the east, located approximately 40 ft from the property line. At a distance of 40 ft, noise would decrease by 6 dBA compared to the noise level measured at 50 ft from the source. The proposed 6 ft high wall along the eastern property line would reduce noise by 4 dBA, resulting in a noise level of 65 dBA L_{eq} (75 dBA – 6 dBA – 4 dBA = 65 dBA) or 76 dBA L_{max} (86 dBA – 6 dBA – 4 dBA = 76 dBA), as shown in Table O. This noise level would exceed the City's exterior daytime maximum noise level standard of 75 dBA but not the 5-minute (L_8) and 1-minute (L_2) noise standard of 65 dBA and 70 dBA, respectively. The noise level would exceed the City's nighttime 5-minute (L_8) and maximum noise level standard of 60 dBA and 70 dBA, respectively, but not the 1-minute (L_2) noise standard of 65 dBA, for residential land uses.

A minimum 8 ft high wall along the eastern property line would reduce noise levels by 11 dBA, so that noise levels from truck deliveries at the fast food restaurant would be reduced to 58 dBA L_{eq} (75 dBA – 6 dBA – 11 dBA = 58 dBA) or 69 dBA L_{max} (75 dBA – 6 dBA – 11 dBA = 69 dBA). Figure 5 shows the location of the wall. These noise levels would not exceed the City's daytime 5-minute (L_8), 1-minute (L_2), and maximum noise standards of 65 dBA, 70 dBA, and 75 dBA, respectively. In addition, these noise levels would not exceed the City's daytime 5-minute (L_8), 1-minute (L_2), and maximum noise standards of 60 dBA, 65 dBA, and 70 dBA, respectively. Therefore, no off-site noise impacts would occur from truck delivery and truck loading/unloading activities with the implementation of a minimum 8 ft high wall along the eastern property line.



LSA

FIGURE 5

SOURCE: DEWALT CORPORATION, 2018.

I:\DWL1901\G\Wall_Location.ai (2/6/19)

Hosking Avenue/South H Street Commercial Project

Wall Location

Self-Storage Analysis. The closest residences to the proposed self-storage facility are single-family residences to the east, located approximately 25 ft from the property line. At a distance of 25 ft, noise would increase by 6 dBA compared to the noise level measured at 50 ft from the source. The proposed 6 ft high wall at the eastern property line would reduce noise by 4 dBA, resulting in a noise level of 67 dBA L_{max} (65 dBA + 6 dBA – 4 dBA = 67 dBA), as shown in Table O. This noise level would exceed the City's exterior daytime 5-minute (L_8) noise standard of 65 dBA L_{eq}, but not the 1-minute (L_2) and maximum (L_{max}) standards of 70 dBA L_{eq} and 75 dBA L_{max}, respectively. In addition, this noise level would exceed the City's exterior nighttime 5-minute (L_8) and 1-minute (L_2) noise standards of 60 dBA L_{eq} and 65 dBA L_{eq}, respectively, but not the maximum (L_{max}) standard of 70 dBA L_{max} for residential land uses. A minimum 8 ft high wall along the eastern property line would reduce noise levels by 12 dBA, so that noise levels from truck loading/unloading areas at the self-storage facility would be reduced to 59 dBA L_{max} (71 dBA - 12 dBA = 59 dBA). This noise level would not exceed the City's exterior daytime 5-minute (L_8) noise standard of 65 dBA and the nighttime 5-minute (L_8) and 1-minute (L_2) noise standards of 60 dBA L_{eq} and 65 dBA L_{eq}, respectively. Figure 5 shows the location of the wall. Therefore, no off-site noise impacts would occur from truck delivery and truck loading/unloading activities with the implementation of a minimum 8 ft high wall along the eastern property line.

Table O: Summary of Truck Delivery and Truck Loading/ Unloading Activity Noise Levels

Land Use	Direction	Location of Activity	Distance from Loading Area (ft)	Reference Noise Level	Distance Attenuation (dBA)	Shielding (dBA)	Noise Level
Residential	East	Fast Food Restaurant	40	75 dBA L_{eq} at 20 ft	6	4	65 dBA L_{eq}
				86 dBA L_{max} at 20 ft	6	4	76 dBA L_{max}
		Self-Storage Facility	25	65 dBA L_{max} at 50 ft	-6	4	67 dBA L_{max}

Source: Compiled by LSA (2019).
dBA = A-weighted decibels
ft = feet
L_{max} = maximum instantaneous noise level

HVAC Equipment

The closest on-site rooftop HVAC equipment would be located approximately 100 ft and 30 ft from the eastern project boundary and are associated with the fast food restaurant and the storage facility office/caretaker building, respectively. It is assumed that rooftop HVAC equipment would be located at the center of the building's rooftop and would operate 24 hours a day as a worst-case scenario. Rooftop HVAC equipment would generate noise levels of 66.6 dBA L_{eq} at 5 ft based on previous measurements conducted by LSA. Table P shows the noise levels generated by HVAC equipment at the closest residences. As shown in Table P, the closest residences would be exposed to exterior noise levels of 46 and 36 dBA L_{eq} generated by HVAC equipment after distance attenuation and a 5 dBA reduction from the roofline and parapet. These noise levels would not exceed the City's daytime and nighttime 30-minute (L_{50}) noise standards of 55 and 50 dBA, respectively. Therefore, no off-site noise impacts would occur from proposed on-site HVAC equipment. No noise reduction measures are required.

Table P: Summary of HVAC Noise Levels

Land Use	Direction	Location of Activity	Distance from HVAC Unit (ft)	Reference Noise Level (dBA L_{max}) at 50 ft	Distance Attenuation (dBA)	Shielding (dBA)	Maximum Noise Level (dBA L_{eq})
Residential	East	Fast Food Restaurant	100	66.6	26	5	36
		Office/Caretaker Building	30	66.6	16	5	46

Source: Compiled by LSA (2019).
dBA = A-weighted decibels
ft = feet
HVAC = heating, ventilation, and air conditioning
L_{eq} = equivalent continuous sound level
L_{max} = maximum instantaneous noise level

Car Wash with Vacuum Stations

The proposed project would include a drive-thru car wash with vacuum stations, which would generate operational noise. Noise reference levels from an existing drive-thru car wash and vacuum stations were obtained from documentation provided by Greve & Associates, LLC (2018). Reference noise levels from the car wash vary depending on the orientation of the receptor location with respect to the car wash tunnel. The car wash tunnel entrance would be facing the residences, generating noise levels of 63.8 dBA L_{eq} at 93 ft, which would be lower than noise levels from the tunnel exit. Noise levels generated by vacuum stations would be 66.5 dBA L_{eq} at 18 ft. The proposed car wash would operate from 7:00 a.m. to 6:00 p.m. in winter and from 7:00 a.m. 7:00 p.m. in summer; therefore, the City's nighttime (10:00 p.m. to 7:00 a.m.) noise standards would not be applicable to these uses.

Table Q presents the noise levels from car wash operations and the vacuum stations at the closest residences located to the east of the project site. As shown in Table Q, noise levels from the car wash operations at the closest residences would reach up to 57 dBA L_{eq}, after a distance attenuation of 5 dBA and a noise level reduction of 2 dBA from the project's proposed 6 ft wall at the property line (63.8 dBA – 5 dBA - 2 dBA = 57 dBA). This average noise level would be equivalent to the maximum instantaneous noise level of 57 dBA L_{max} because noise levels generated from the car wash, such as the blow dryer, would be constant. A noise level of 57 dBA L_{eq} would exceed the City's daytime 30-minute (L_{50}) noise standard of 55 dBA. A minimum 8 ft high wall along the eastern property line would reduce noise levels by 9 dBA, so that noise levels from car wash operations would be reduced to 50 dBA L_{eq} (63.8 dBA - 5 dBA- 9 dBA = 50 dBA). Figure 5 shows the location of the wall. Alternatively, noise reduction measures to incorporate equipment that generates lower noise levels or dampens noise (e.g., installing baffles or silencers on the car wash blow dryer) would be required to comply with the City's noise standard. Therefore, no off-site noise impacts would occur from noise generated by the car wash with the implementation of a minimum 8 ft high wall along the eastern property line.

Also, Table Q shows that the noise levels at the closest residence to the vacuum stations would reach 46 dBA L_{eq} after a distance attenuation of 19 dBA and a noise level reduction of 2 dBA from the project's proposed 6 ft high wall at the property line (66.5 dBA – 19 dBA -2 dBA = 46 dBA). This noise level would not exceed the City's exterior daytime 30-minute (L_{eq}) noise standard of 55 dBA L_{eq}

for residential uses. Therefore, no off-site noise impacts would occur from noise generated by the vacuum stations associated with the car wash. No noise reduction measures are required.

Table Q: Summary of Car Wash Operation Noise Levels

Land Use	Direction	Location of Activity	Distance from Car Wash (ft)	Reference Noise Level (dBA L_{eq})	Distance Attenuation (dBA)	Shielding (dBA)	Noise Level (dBA L_{eq} and L_{max})
Residential	East	Car Wash (Facing Entrance)	160	63.8 at 93 ft	5	2	57
		Vacuum Station	155	66.5 at 18 ft	19	2	46

Source: Compiled by LSA (2019).
dBA = A-weighted decibels L_{eq} = equivalent continuous sound level
ft = feet L_{max} = maximum instantaneous noise level

Drive-Thru Speaker

The project includes a fast food restaurant with a drive-thru at the northeast corner of the project site. Typical noise levels associated with drive-thru restaurants include the speaker for outside orders and cars idling in the drive-thru line. Restaurant noise itself would be contained within the building. Because the drive-thru would operate from 6:00 a.m. to 11:00 p.m., the City's nighttime (10:00 p.m. to 7:00 a.m.) noise standards would be applicable to its operations. The drive-thru speakers would produce noise levels up to 72 dBA L_{max} at a distance of 4 ft. A typical drive-thru speaker does not generate noise continuously and therefore, when averaged over an hour, the L_{eq} would be 61 dBA L_{eq} at 4 ft. The drive-thru speaker would be located approximately 115 ft from the property line of the nearest residence. The distance of 115 ft would attenuate noise levels by 29 dBA to a noise level of 43 dBA L_{max} and 32 dBA L_{eq}. The shielding provided by the proposed 6 ft high wall would reduce noise levels by 3 dBA to noise levels of 40 dBA L_{max} and 29 dBA L_{eq}. These noise levels would not exceed the City's daytime and nighttime 30-minute (L_{50}) noise standard of 55 and 50 dBA, respectively, for residential land uses. Therefore, no off-site noise impacts would occur from proposed on-site drive-thru speaker. No noise reduction measures are required.

Parking Lot Activities

In addition to typical operations, parking lot noise, including engine sounds, car doors slamming, car alarms, and people conversing, would occur as a result of the project at the project site. Typical parking lot activities, such as people conversing or doors slamming, generates approximately 75 dBA L_{max} at 50 ft. The closest residential property line would be located approximately 20 ft east of proposed parking spaces associated with the fast food restaurant. At a distance of 20 ft, noise would be increased by 8 dBA compared to the noise level measured at 50 ft from the source, but the project's proposed 6 ft high wall at the property line would reduce noise by 7 dBA, resulting in a noise level of 71 dBA L_{max} (70 dBA + 8 dBA – 7 dBA = 71 dBA). This noise level would not exceed the City's exterior daytime maximum noise standard of 75 dBA L_{max}. However, it would exceed the City's exterior nighttime maximum noise standard of 70 dBA L_{max}. A minimum 8 ft high wall along the eastern property line would further reduce noise levels by 6 dBA, so that noise levels from parking lot activities would be reduced to 65 dBA L_{max} (71 dBA - 6 dBA = 65 dBA). Figure 5 shows the location of the wall. Therefore, no off-site noise impacts would occur from parking lot activities with the implementation of a minimum 8 ft high wall along the eastern property line.

Land Use Compatibility

In order to assess traffic noise levels from the nearby major roadways surrounding the project site, future (2035) traffic noise levels from Table N were projected from source to the nearest on-site building. The closest building to Hosking Avenue is the fast food restaurant, which is located approximately 95 ft from the centerline and would be exposed to a traffic noise level of 68.5 dBA CNEL. Based on the information in Table C, future (2035) with project traffic noise levels would be normally acceptable for commercial uses. Therefore, noise reduction measures or sound insulation upgrades would be required.

LONG-TERM VIBRATION IMPACTS

The proposed project would not generate vibration. In addition, vibration levels generated from project-related traffic on the adjacent roadways (Hosking Avenue and South H Street) are unusual for on-road vehicles because the rubber tires and suspension systems of on-road vehicles provide vibration isolation. Vibration generated from project-related traffic on the adjacent roadways would be less than significant and no vibration reduction measures are required.

NOISE AND VIBRATION REDUCTION MEASURES

The following noise and vibration reduction measures should be implemented to reduce long-term operational noise impacts and short-term construction noise and vibration impacts:

NOISE

The project construction contractor shall implement the following noise reduction measures during construction of the project:

- Equip all construction equipment, fixed or mobile, with properly operating and maintained mufflers consistent with manufacturers' standards. Equipment should also utilize the best available noise control techniques (e.g., use of intake silencers, ducts, engine enclosures, and acoustically attenuating shields or shrouds, wherever feasible).

- Place all stationary construction equipment so that emitted noise is directed away from sensitive receptors nearest the active project site.

- Locate equipment staging in areas that would create the greatest possible distance between construction-related noise sources and noise-sensitive receptors nearest the active project site during all project construction.

- Prohibit extended idling time of internal combustion engines.

- Limit all noise producing construction activities to the hours of 6:00 a.m. and 9:00 p.m. on weekdays, and between the hours of 8:00 a.m. and 9:00 p.m. on weekends.

The project shall implement the following noise reduction measures to reduce potential noise impacts from long-term operations of the project:

- Construct a minimum 8 ft high wall along the eastern property line, as shown on Figure 5.

VIBRATION

The project construction contractor shall implement the following vibration reduction measures during construction of the project:

- The project construction contractor shall prohibit loaded trucks within 15 ft from the eastern construction boundary.

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APPENDIX A

LONG-TERM AND SHORT-TERM NOISE MEASUREMENT SHEETS

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Noise Measurement Survey – 24 HR

Project Number: DWL1901
Project Name: Hosking Ave/South H Street

Test Personnel: Daniel Kaufman
Equipment: Quest Noisepro DLX

Site Number: LT-1 Date: 2/13/18

Time: From 9:00 AM To 9:00 AM

Site Location: Southwest of the backyard of 1519 Kirkwood Avenue.

Primary Noise Sources: Traffic on Hosking Avenue, South H Street, distant traffic on SR-99, and occasional distant aircraft.

Comments: A 6.5 foot wall shields the homes.

Diagram:

Location Photo:

Noise Measurement Survey

Project Number: DWL1901
Project Name: Hosking Ave/South H Street

Test Personnel: Daniel Kaufman
Equipment: Larson Davis 824

Site Number: ST-1 Date: 2/13/18

Time: From 9:34 AM To 9:50 AM

Site Location: West of the backyard of 1510 Lucerne Drive.

Primary Noise Sources: Traffic on Hosking Avenue, SR-99, and South H Street.

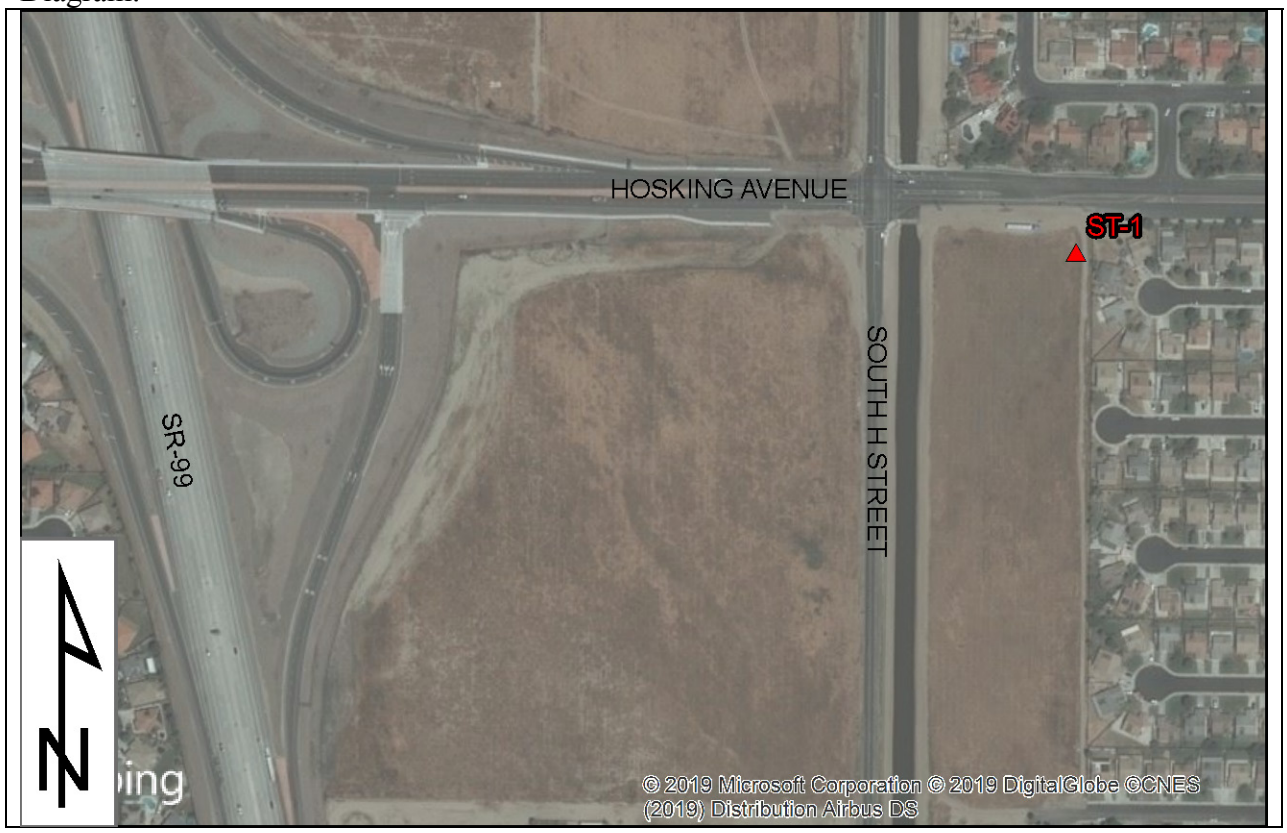
Comments: Filtered aircraft: 9:36-9:37 AM, Filtered pedestrians: 9:43-9:44 AM.

Adjacent Roadways: Hosking Avenue and South H Street.

Measurement Results	
	dBA
L_{eq}	59.8
L_{max}	72.5
L_{min}	48.5
L_{peak}	83.3
L_2	66.2
L_8	64.2
L_{25}	61.0
L_{50}	56.5
L_{90}	51.0
L_{99}	49.6

Atmospheric Conditions	
Average Wind Velocity (mph)	1.0
Maximum Wind Velocity (mph)	3.2
Temperature (F)	56.7
Relative Humidity (%)	55.6

Diagram:



Location Photo:

Noise Measurement Survey

Project Number: DWL1901
Project Name: Hosking Ave/South H Street

Test Personnel: Daniel Kaufman
Equipment: Larson Davis 824

Site Number: ST-2 Date: 2/13/18

Time: From 9:09 AM To 9:28 AM

Site Location: West of the northwest corner of 1510 Interlaken Drive and southwest of shed at 1509 Interlaken Drive.

Primary Noise Sources: Traffic on CA-99, South H Street, and Hosking Avenue.

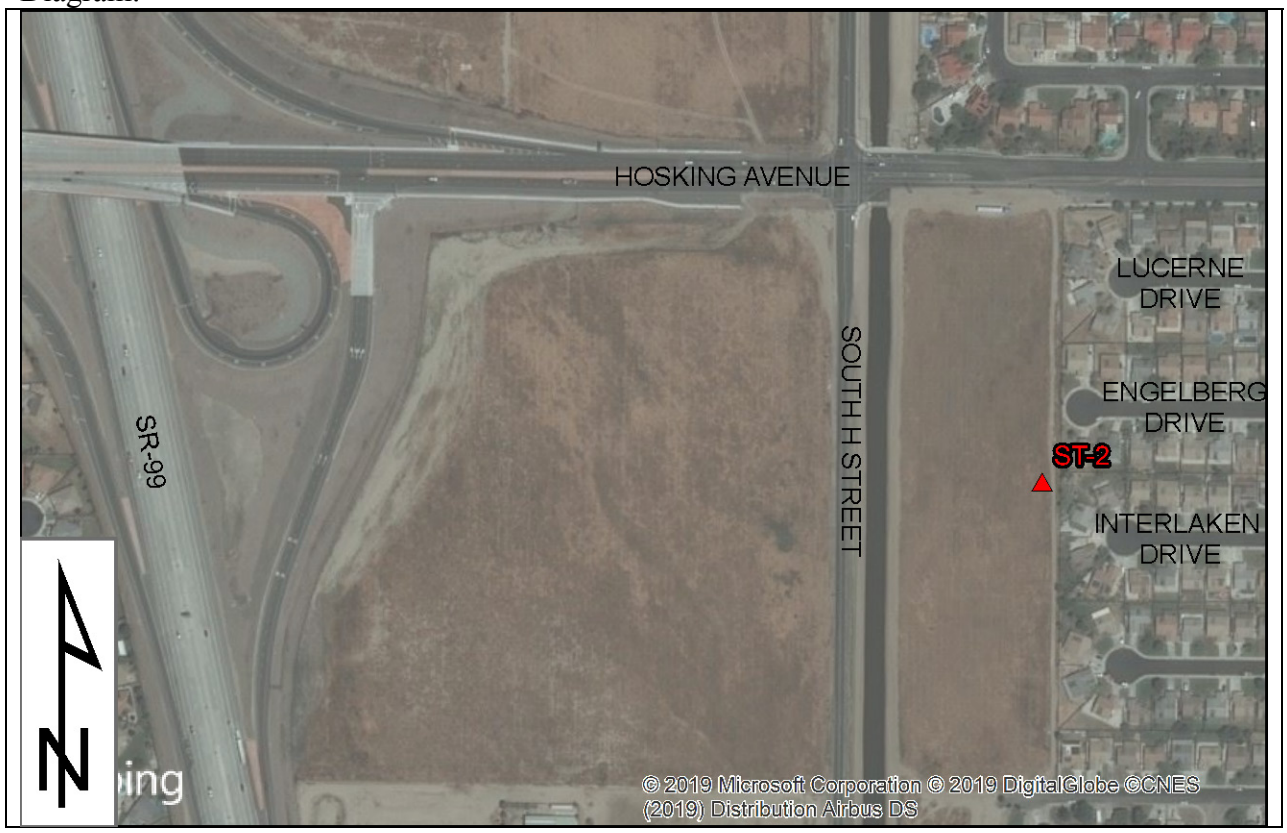
Comments: Some bird noise. Yelling/crying child two houses to the south (occasional, traffic louder.) Filtered aircraft 9:19-9:20 AM, 9:22 AM, 9:26-9:27 AM
Paused due to barking dogs: 9:25 AM

Adjacent Roadways: South H Street, Hosking Avenue

Measurement Results	
	dBA
L_{eq}	52.6
L_{max}	71.2
L_{min}	47.8
L_{peak}	85.0
L_2	55.9
L_8	54.6
L_{25}	53.1
L_{50}	51.7
L_{90}	59.7
L_{99}	48.5

Atmospheric Conditions	
Average Wind Velocity (mph)	2.1
Maximum Wind Velocity (mph)	5.4
Temperature (F)	52.9
Relative Humidity (%)	59.9

Diagram:



Location Photo:

APPENDIX B

FHWA HIGHWAY TRAFFIC NOISE MODEL PRINTOUTS

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TABLE Existing (2018) NP-01
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 02/06/2019
ROADWAY SEGMENT: Hosking Avenue West of Wible Road
NOTES: Hosking Avenue/South H Street Commercial Project - Existing (2018) NP

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 10220 SPEED (MPH): 50 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 38 SITE CHARACTERISTICS: SOFT

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 65.80

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
0.0	97.4	196.9	417.9

TABLE Existing (2018) NP-02
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 02/06/2019
ROADWAY SEGMENT: Hosking Avenue between Wible Road and Hughes Lane
NOTES: Hosking Avenue/South H Street Commercial Project - Existing (2018) NP

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 14495 SPEED (MPH): 50 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 38 SITE CHARACTERISTICS: SOFT

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 67.32

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
64.9	119.4	246.8	526.7

TABLE Existing (2018) NP-03
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 02/06/2019
ROADWAY SEGMENT: Hosking Avenue between Hughes Lane and SR-99 SB Ramps
NOTES: Hosking Avenue/South H Street Commercial Project - Existing (2018) NP

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 18215 SPEED (MPH): 50 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 38 SITE CHARACTERISTICS: SOFT

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 68.31

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
72.0	137.2	286.5	612.9

TABLE Existing (2018) NP-04
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 02/06/2019
ROADWAY SEGMENT: Hosking Avenue between SR-99 SB Ramps and SR-99 NB Ramps
NOTES: Hosking Avenue/South H Street Commercial Project - Existing (2018) NP

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 14700 SPEED (MPH): 50 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 40 SITE CHARACTERISTICS: SOFT

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 67.27

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
66.4	121.1	249.4	531.7

TABLE Existing (2018) NP-05
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 02/06/2019
ROADWAY SEGMENT: Hosking Avenue between SR-99 NB Ramps and South H Street
NOTES: Hosking Avenue/South H Street Commercial Project - Existing (2018) NP

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 13930 SPEED (MPH): 50 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 33 SITE CHARACTERISTICS: SOFT

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 67.42

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
60.9	115.1	239.9	512.8

TABLE Existing (2018) NP-06
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 02/06/2019
ROADWAY SEGMENT: Hosking Avenue between South H Street and Monitor Street
NOTES: Hosking Avenue/South H Street Commercial Project - Existing (2018) NP

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 9845 SPEED (MPH): 50 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 38 SITE CHARACTERISTICS: SOFT

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 65.64

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
0.0	95.4	192.3	407.7

TABLE Existing (2018) NP-07
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 02/06/2019
ROADWAY SEGMENT: Hosking Avenue East of Monitor Street
NOTES: Hosking Avenue/South H Street Commercial Project - Existing (2018) NP

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 6720 SPEED (MPH): 50 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 36 SITE CHARACTERISTICS: SOFT

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 64.08

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
0.0	76.8	150.5	316.8

TABLE Existing (2018) NP-08
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 02/06/2019
ROADWAY SEGMENT: South H Street South of McKee Road
NOTES: Hosking Avenue/South H Street Commercial Project - Existing (2018) NP

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 3500 SPEED (MPH): 50 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 6 SITE CHARACTERISTICS: SOFT

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 63.48

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL	70 CNEL	65 CNEL	60 CNEL	55 CNEL
	0.0	0.0	95.1	204.5

TABLE Existing (2018) NP-09
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 02/06/2019
ROADWAY SEGMENT: South H Street between McKee Road and Hosking Avenue
NOTES: Hosking Avenue/South H Street Commercial Project - Existing (2018) NP

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 5505 SPEED (MPH): 50 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 6 SITE CHARACTERISTICS: SOFT

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 65.44

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
0.0	59.9	128.5	276.5

TABLE Existing (2018) NP-10
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 02/06/2019
ROADWAY SEGMENT: South H Street between Hosking Avenue and Berkshire Road
NOTES: Hosking Avenue/South H Street Commercial Project - Existing (2018) NP

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 6370 SPEED (MPH): 50 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 6 SITE CHARACTERISTICS: SOFT

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* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 66.08

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
0.0	65.9	141.6	304.7

TABLE Existing (2018) NP-11
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 02/06/2019
ROADWAY SEGMENT: South H Street North of Berkshire Road
NOTES: Hosking Avenue/South H Street Commercial Project - Existing (2018) NP

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 6140 SPEED (MPH): 50 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 6 SITE CHARACTERISTICS: SOFT

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* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 65.92

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL			
70 CNEL	65 CNEL	60 CNEL	55 CNEL
0.0	64.4	138.1	297.3

TABLE Existing (2018) P-01
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 02/06/2019
ROADWAY SEGMENT: Hosking Avenue West of Wible Road
NOTES: Hosking Avenue/South H Street Commercial Project - Existing (2018) P

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 10450 SPEED (MPH): 50 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 38 SITE CHARACTERISTICS: SOFT

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* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 65.90

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
0.0	98.7	199.8	424.1

TABLE Existing (2018) P-02
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 02/06/2019
ROADWAY SEGMENT: Hosking Avenue between Wible Road and Hughes Lane
NOTES: Hosking Avenue/South H Street Commercial Project - Existing (2018) P

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 14960 SPEED (MPH): 50 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 38 SITE CHARACTERISTICS: SOFT

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* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 67.45

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
65.8	121.7	251.9	537.8

TABLE Existing (2018) P-03
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 02/06/2019
ROADWAY SEGMENT: Hosking Avenue between Hughes Lane and SR-99 SB Ramps
NOTES: Hosking Avenue/South H Street Commercial Project - Existing (2018) P

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 18795 SPEED (MPH): 50 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 38 SITE CHARACTERISTICS: SOFT

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* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 68.44

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
73.1	139.9	292.5	625.8

TABLE Existing (2018) P-04
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 02/06/2019
ROADWAY SEGMENT: Hosking Avenue between SR-99 SB Ramps and SR-99 NB Ramps
NOTES: Hosking Avenue/South H Street Commercial Project - Existing (2018) P

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 15340 SPEED (MPH): 50 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 40 SITE CHARACTERISTICS: SOFT

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* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 67.46

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
67.7	124.2	256.4	546.9

TABLE Existing (2018) P-05
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 02/06/2019
ROADWAY SEGMENT: Hosking Avenue between SR-99 NB Ramps and South H Street
NOTES: Hosking Avenue/South H Street Commercial Project - Existing (2018) P

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 14715 SPEED (MPH): 50 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 33 SITE CHARACTERISTICS: SOFT

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* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 67.65

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
62.5	119.1	248.6	531.8

TABLE Existing (2018) P-06
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 02/06/2019
ROADWAY SEGMENT: Hosking Avenue between South H Street and Monitor Street
NOTES: Hosking Avenue/South H Street Commercial Project - Existing (2018) P

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 10785 SPEED (MPH): 50 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 38 SITE CHARACTERISTICS: SOFT

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* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 66.03

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
0.0	100.4	203.9	433.1

TABLE Existing (2018) P-07
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 02/06/2019
ROADWAY SEGMENT: Hosking Avenue East of Monitor Street
NOTES: Hosking Avenue/South H Street Commercial Project - Existing (2018) P

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 6950 SPEED (MPH): 50 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 36 SITE CHARACTERISTICS: SOFT

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* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 64.23

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
0.0	78.2	153.7	323.9

TABLE Existing (2018) P-08
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 02/06/2019
ROADWAY SEGMENT: South H Street South of McKee Road
NOTES: Hosking Avenue/South H Street Commercial Project - Existing (2018) P

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 3560 SPEED (MPH): 50 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 6 SITE CHARACTERISTICS: SOFT

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* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 63.55

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL	70 CNEL	65 CNEL	60 CNEL	55 CNEL
	0.0	0.0	96.2	206.8

TABLE Existing (2018) P-09
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 02/06/2019
ROADWAY SEGMENT: South H Street between McKee Road and Hosking Avenue
NOTES: Hosking Avenue/South H Street Commercial Project - Existing (2018) P

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 6115 SPEED (MPH): 50 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 6 SITE CHARACTERISTICS: SOFT

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 65.90

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
0.0	64.2	137.8	296.5

TABLE Existing (2018) P-10
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 02/06/2019
ROADWAY SEGMENT: South H Street between Hosking Avenue and Berkshire Road
NOTES: Hosking Avenue/South H Street Commercial Project - Existing (2018) P

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 6720 SPEED (MPH): 50 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 6 SITE CHARACTERISTICS: SOFT

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* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 66.31

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
0.0	68.3	146.7	315.8

TABLE Existing (2018) P-11
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 02/06/2019
ROADWAY SEGMENT: South H Street North of Berkshire Road
NOTES: Hosking Avenue/South H Street Commercial Project - Existing (2018) P

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 6260 SPEED (MPH): 50 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 6 SITE CHARACTERISTICS: SOFT

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* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 66.00

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
0.0	65.2	139.9	301.2

TABLE 2035 NP-01
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 02/06/2019
ROADWAY SEGMENT: Hosking Avenue West of Wible Road
NOTES: Hosking Avenue/South H Street Commercial Project - 2035 NP

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 17270 SPEED (MPH): 50 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 38 SITE CHARACTERISTICS: SOFT

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 68.08

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
70.2	132.8	276.7	591.6

TABLE 2035 NP-02
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 02/06/2019
ROADWAY SEGMENT: Hosking Avenue between Wible Road and Hughes Lane
NOTES: Hosking Avenue/South H Street Commercial Project - 2035 NP

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 26615 SPEED (MPH): 50 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 38 SITE CHARACTERISTICS: SOFT

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 69.96

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
87.5	174.0	367.6	788.6

TABLE 2035 NP-03
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 02/06/2019
ROADWAY SEGMENT: Hosking Avenue between Hughes Lane and SR-99 SB Ramps
NOTES: Hosking Avenue/South H Street Commercial Project - 2035 NP

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 34190 SPEED (MPH): 50 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 38 SITE CHARACTERISTICS: SOFT

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* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 71.04

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL			
70 CNEL	65 CNEL	60 CNEL	55 CNEL
100.6	204.2	433.8	931.6

TABLE 2035 NP-04
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 02/06/2019
ROADWAY SEGMENT: Hosking Avenue between SR-99 SB Ramps and SR-99 NB Ramps
NOTES: Hosking Avenue/South H Street Commercial Project - 2035 NP

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 31955 SPEED (MPH): 50 GRADE: .5

	TRAFFIC DISTRIBUTION PERCENTAGES		
	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 40 SITE CHARACTERISTICS: SOFT

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* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 70.65

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL			
70 CNEL	65 CNEL	60 CNEL	55 CNEL
97.6	195.9	414.9	890.5

TABLE 2035 NP-05
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 02/06/2019
ROADWAY SEGMENT: Hosking Avenue between SR-99 NB Ramps and South H Street
NOTES: Hosking Avenue/South H Street Commercial Project - 2035 NP

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 34565 SPEED (MPH): 50 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 33 SITE CHARACTERISTICS: SOFT

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* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 71.36

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
99.5	204.8	436.7	938.6

TABLE 2035 NP-06
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 02/06/2019
ROADWAY SEGMENT: Hosking Avenue between South H Street and Monitor Street
NOTES: Hosking Avenue/South H Street Commercial Project - 2035 NP

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 19395 SPEED (MPH): 50 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 38 SITE CHARACTERISTICS: SOFT

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* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 68.58

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
74.3	142.6	298.5	639.0

TABLE 2035 NP-07
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 02/06/2019
ROADWAY SEGMENT: Hosking Avenue East of Monitor Street
NOTES: Hosking Avenue/South H Street Commercial Project - 2035 NP

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 13570 SPEED (MPH): 50 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 36 SITE CHARACTERISTICS: SOFT

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* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 67.14

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
61.9	114.2	236.2	504.1

TABLE 2035 NP-08
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 02/06/2019
ROADWAY SEGMENT: South H Street South of McKee Road
NOTES: Hosking Avenue/South H Street Commercial Project - 2035 NP

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 8350 SPEED (MPH): 50 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 6 SITE CHARACTERISTICS: SOFT

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* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 67.25

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
0.0	78.9	169.5	364.9

TABLE 2035 NP-09
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 02/06/2019
ROADWAY SEGMENT: South H Street between McKee Road and Hosking Avenue
NOTES: Hosking Avenue/South H Street Commercial Project - 2035 NP

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 14160 SPEED (MPH): 50 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 6 SITE CHARACTERISTICS: SOFT

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 69.55

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
52.3	112.0	240.9	518.8

TABLE 2035 NP-10
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 02/06/2019
ROADWAY SEGMENT: South H Street between Hosking Avenue and Berkshire Road
NOTES: Hosking Avenue/South H Street Commercial Project - 2035 NP

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 21930 SPEED (MPH): 50 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 6 SITE CHARACTERISTICS: SOFT

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* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 71.44

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
69.7	149.8	322.4	694.5

TABLE 2035 NP-11
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 02/06/2019
ROADWAY SEGMENT: South H Street North of Berkshire Road
NOTES: Hosking Avenue/South H Street Commercial Project - 2035 NP

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 14260 SPEED (MPH): 50 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 6 SITE CHARACTERISTICS: SOFT

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* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 69.58

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
52.5	112.5	242.0	521.3

TABLE 2035 P-01
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 02/06/2019
ROADWAY SEGMENT: Hosking Avenue West of Wible Road
NOTES: Hosking Avenue/South H Street Commercial Project - 2035 P

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 17500 SPEED (MPH): 50 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 38 SITE CHARACTERISTICS: SOFT

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* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 68.13

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
70.7	133.9	279.1	596.8

TABLE 2035 P-02
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 02/06/2019
ROADWAY SEGMENT: Hosking Avenue between Wible Road and Hughes Lane
NOTES: Hosking Avenue/South H Street Commercial Project - 2035 P

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 27080 SPEED (MPH): 50 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 38 SITE CHARACTERISTICS: SOFT

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* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 70.03

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
88.3	175.9	371.9	797.7

TABLE 2035 P-03
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 02/06/2019
ROADWAY SEGMENT: Hosking Avenue between Hughes Lane and SR-99 SB Ramps
NOTES: Hosking Avenue/South H Street Commercial Project - 2035 P

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 34770 SPEED (MPH): 50 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 38 SITE CHARACTERISTICS: SOFT

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* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 71.12

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL			
70 CNEL	65 CNEL	60 CNEL	55 CNEL
101.6	206.4	438.6	942.1

TABLE 2035 P-04
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 02/06/2019
ROADWAY SEGMENT: Hosking Avenue between SR-99 SB Ramps and SR-99 NB Ramps
NOTES: Hosking Avenue/South H Street Commercial Project - 2035 P

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 32625 SPEED (MPH): 50 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 40 SITE CHARACTERISTICS: SOFT

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* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 70.74

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
98.7	198.5	420.7	902.9

TABLE 2035 P-05
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 02/06/2019
ROADWAY SEGMENT: Hosking Avenue between SR-99 NB Ramps and South H Street
NOTES: Hosking Avenue/South H Street Commercial Project - 2035 P

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 35350 SPEED (MPH): 50 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 33 SITE CHARACTERISTICS: SOFT

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* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 71.46

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
100.8	207.8	443.3	952.7

TABLE 2035 P-06
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 02/06/2019
ROADWAY SEGMENT: Hosking Avenue between South H Street and Monitor Street
NOTES: Hosking Avenue/South H Street Commercial Project - 2035 P

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 20335 SPEED (MPH): 50 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 38 SITE CHARACTERISTICS: SOFT

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* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 68.79

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
76.0	146.9	308.0	659.4

TABLE 2035 P-07
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 02/06/2019
ROADWAY SEGMENT: Hosking Avenue East of Monitor Street
NOTES: Hosking Avenue/South H Street Commercial Project - 2035 P

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 13800 SPEED (MPH): 50 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 36 SITE CHARACTERISTICS: SOFT

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* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 67.21

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
62.3	115.3	238.8	509.7

TABLE 2035 P-08
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 02/06/2019
ROADWAY SEGMENT: South H Street South of McKee Road
NOTES: Hosking Avenue/South H Street Commercial Project - 2035 P

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 8410 SPEED (MPH): 50 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 6 SITE CHARACTERISTICS: SOFT

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* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 67.28

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL	70 CNEL	65 CNEL	60 CNEL	55 CNEL
	0.0	79.2	170.3	366.7

TABLE 2035 P-09
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 02/06/2019
ROADWAY SEGMENT: South H Street between McKee Road and Hosking Avenue
NOTES: Hosking Avenue/South H Street Commercial Project - 2035 P

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 14770 SPEED (MPH): 50 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 6 SITE CHARACTERISTICS: SOFT

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* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 69.73

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
53.7	115.2	247.8	533.6

TABLE 2035 P-10
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 02/06/2019
ROADWAY SEGMENT: South H Street between Hosking Avenue and Berkshire Road
NOTES: Hosking Avenue/South H Street Commercial Project - 2035 P

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 22100 SPEED (MPH): 50 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 6 SITE CHARACTERISTICS: SOFT

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* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 71.48

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
70.1	150.6	324.1	698.0

TABLE 2035 P-11
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 02/06/2019
ROADWAY SEGMENT: South H Street North of Berkshire Road
NOTES: Hosking Avenue/South H Street Commercial Project - 2035 P

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 14380 SPEED (MPH): 50 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 6 SITE CHARACTERISTICS: SOFT

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* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 69.61

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
52.8	113.1	243.4	524.2
