

IVY STATION TRANSIT ORIENTED MIXED USE DEVELOPMENT PROJECT – NIGHT CONSTRUCTION

Noise and Lighting Technical Report

Prepared for
Bernards Builders & Management Services
8824 National Blvd
Culver City, CA 90232

November 2017



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IVY STATION TRANSIT ORIENTED MIXED USE DEVELOPMENT PROJECT - NIGHT CONSTRUCTION

Noise Technical Report

Executive Summary

The purpose of this Noise Technical Report is to evaluate the potential short-term temporary noise impacts resulting from implementation of the proposed night construction for the proposed Ivy Station Transit-Oriented Mixed-Use Development Project (Project) at 8824 National Boulevard in Culver City (City), California. The Project consists of the development of a 5-story office building and two interconnected 5- to 6-story residential and hotel buildings on a parcel previously developed as a surface parking lot. The three buildings would be built over a 3-level subterranean parking structure, which would require soil excavation and foundation concrete pouring.

In December 2015, ESA prepared a Noise and Vibration Technical Report for the Project's Mitigated Negative Declaration (MND), in accordance with the California Environmental Quality Act (CEQA). The report included a noise analysis of the project's construction, which was to occur during daytime hours only (i.e., no construction during the nighttime), in accordance with the allowable construction hours of the applicable noise ordinances for the Project. The project site is located within both the City of Los Angeles and Culver City. The proposed Office Building is located within both jurisdictions, with the Residential and Hotel Buildings being located entirely within Culver City.

This technical report has been prepared for Bernards Builders & Management Services to support the Culver City environmental review process regarding potential impacts to ambient noise associated with the proposed Project's construction at night. This noise study is required as part of the Project's proposed night construction work plan to the City to obtain a variance to the Culver City Noise Ordinance, which limits construction to daytime hours. The proposed night construction activities on the project site that would generate elevated noise levels potentially impacting nearby residences includes: 1) soil hauling and mass excavation in Culver City and excavated soil hauling route through the City of Los Angeles; and 2) concrete pouring on the Culver City portion of the project site, both of which would occur, though not simultaneously, during the evening and night hours, outside of Culver City's allowable construction hours (off-hours), potentially on weekdays, Saturdays, and holidays. In addition, Bernards requests to work on concrete-related activities such as install of rebar, formwork, clean-up, backfill during off-hours. Such concrete related activities generates less noise than concrete pumping activities.

Based on the assessment conducted in this report, the Project's night construction activities would generate elevated noise levels primarily from the usage of heavy equipment (i.e., concrete pumps) and trucks (i.e., concrete trucks and soil hauling trucks). Project night construction noise generated on-site would attenuate off-site due to below grade soil excavation on-site for concrete pouring (i.e., earthen walls of the excavated pit serving as noise barriers), and attenuate with distance from location of the equipment operating on-site (i.e., concrete pumps and trucks) to the nearest residential land use off-site in Culver City, i.e., "Access", the new mixed-use commercial-residential development southeast of the Project site at the intersection of National and Washington Boulevards.

This report summarizes the Project night construction noise generated on-site and whether these noise levels off-site, attenuated at the nearest residence in Culver City, would conflict with the noise level limits established by Culver City as conditions of a variance the City's noise ordinance. The findings of the analysis are as follows:

- The Project's maximum night construction noise levels, experienced at the nearest offsite sensitive receptor in Culver City (multi-family residential uses located adjacent to southeast of the Project Site), would not exceed Culver City's maximum residential night noise limit of 65 dBA L_{max} for night construction due the noise attenuation achieved by 1) equipment operating below grade in the excavation pit onsite and 2) the distance between the equipment on-site and the nearest residence off-site.
- In addition, The Project's night construction hourly average noise levels of 64 dBA L_{eq} , during concrete pours, would exceed Culver City's 1995 General Plan Noise Element, Noise Standards, nighttime (10:00 p.m. to 7:00 a.m.) levels of 50 dBA L_{eq} for a duration of 30 minutes (City 1995) at the nearest multi-family residential use in Culver City. However, the measured ambient noise levels at the residence ranged from as high as 65.8 dBA L_{eq} at 7:00 p.m. to as low 56.3 dBA L_{eq} at 3:00 a.m during the evening/nighttime period (7:00 p.m. to 7:00 a.m.), with the measured ambient noise levels over this night period of approximately 65 dBA L_{eq} . Therefore, the Project's night construction noise level during continuous concrete pours of 64 dBA L_{eq} at the multi-family residential use would be slightly less than the average ambient night noise level of approximately 65 dBA L_{eq} over the evening/night period. The combined resultant ambient noise level would increase ambient levels by less than 3 dBA, which would be a less than perceptible increase compared to the existing ambient noise level. However, the ambient night noise level during the quietest hour of 3:00 a.m., was measured at approximately 56.3 dBA L_{eq} . The combined resultant ambient noise level would be approximately 65 dBA L_{eq} , which would be an increase of approximately 8 dBA over the 3:00 a.m. ambient levels, would be a perceptible increase during the quietest hour of 3:00 a.m. Therefore, the ambient increase from the night construction noise would range from 3 dBA to 8 dBA (less than perceptible to perceptible) during the loudest to quietest hours over the evening/night period.

Therefore, the Project's night construction noise levels would not exceed the Culver City noise standards at the nearest residence in Culver City. Furthermore, Project night construction noise would not substantially increase ambient noise levels at the nearest residence in Culver City.

Therefore, a variance to the Culver City Noise Ordinance for the Project's night construction would not result in adverse noise impacts.

The Project construction lighting equipment may generate light trespass and/or glare; however, the light trespass illuminance at the nearest residence in Culver City is very low, and is not significant, and the glare from the construction lighting equipment is not visible at the residence. Therefore, a variance to the Culver City Noise Ordinance for the Project's night construction would not result in adverse noise impacts.

1. Introduction

Culver Station, LLC proposes to construct and operate the proposed Ivy Station Transit-Oriented Mixed-Use Development Project (Project) at 8824 National Boulevard in Culver City (City), California. This technical report has been prepared to support the City's environmental review process regarding potential impacts to ambient noise associated with the proposed Project's construction work at night (i.e., during off-hours). This noise study is required as part of the Project's proposed night construction work plan to the City to obtain a variance to the City's Noise Ordinance, which limits construction to daytime hours.

The Project consists of the development of a 5-story office building, and two interconnected 5- to 6-story residential and hotel buildings on a parcel previously developed as the Metro Culver City Station surface parking lot. The three buildings would be built over a 3-level subterranean parking structure, which would require soil excavation and foundation concrete pouring.

This report identifies applicable noise regulations, and evaluates potential short- and long-term noise impacts associated with the proposed night construction of the Project. Where applicable, measures to mitigate or minimize noise impacts associated with the Project are included.

Information used to prepare this analysis included the noise analysis in the Project's Mitigated Negative Declaration (MND), prepared in accordance with the California Environmental Quality Act (CEQA), the Culver City General Plan Noise Element and Municipal Code Noise Ordinance including meetings with Culver City representatives, Project night construction data provided by Bernards Builders & Management Services, and other sources identified herein.

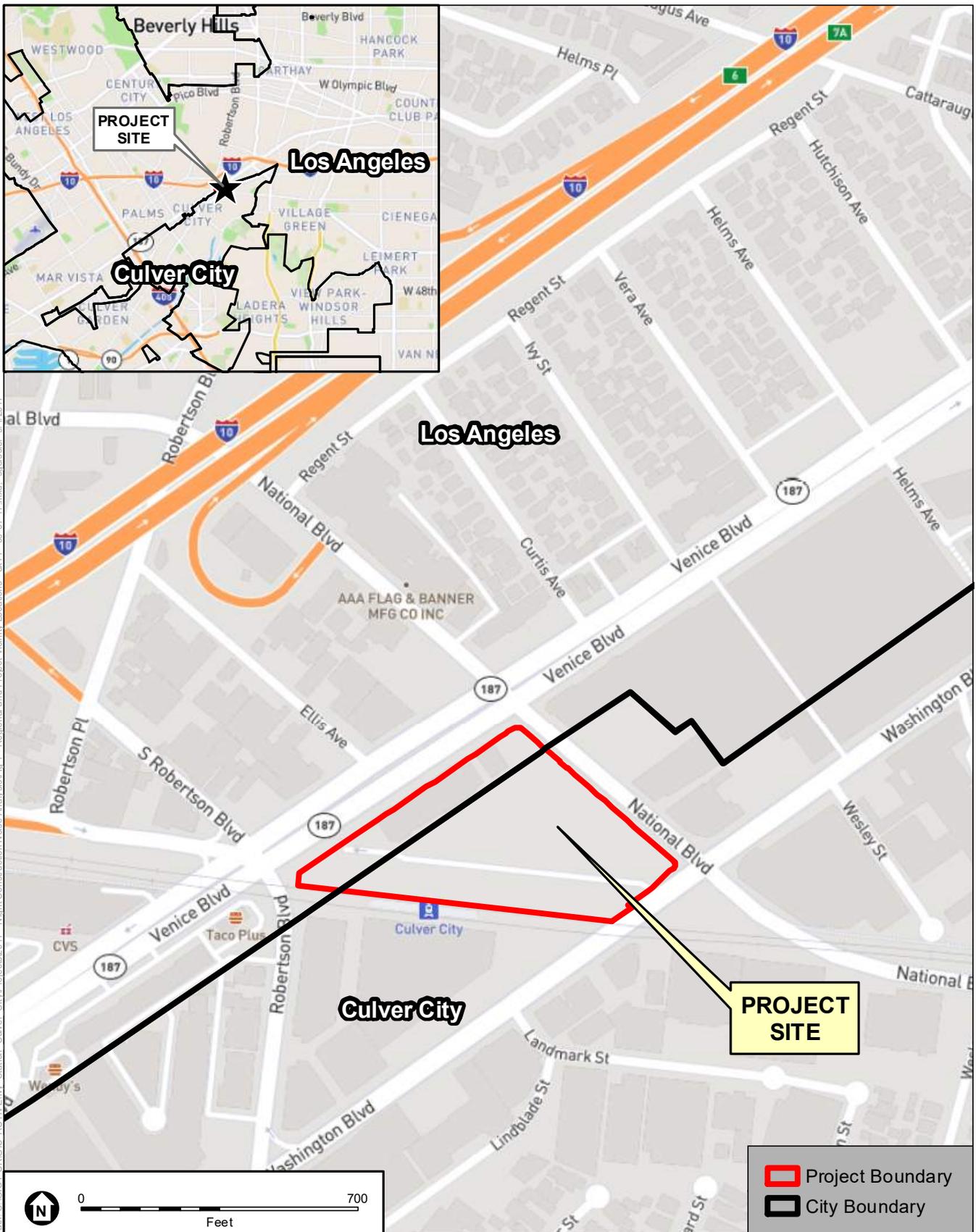
1.1 Project Location

The Project site is located at 8824 National Boulevard in Culver City, California, which is bisected by the boundary of the City of Los Angeles and Culver City, as shown in **Figure 1**. The Project site includes 4.15 acres within Culver City and 1.38 acres within the City of Los Angeles, for a total of approximately 5.53 acres.

The Project site is bounded by Venice Boulevard and commercial uses to the northwest; National Boulevard and commercial uses to the northeast, Washington Boulevard and commercial and light industrial uses to the southeast, and the Metro right-of-way and Metro Station to the south. Interstate 10 (I-10) is located approximately 0.2 miles north of the Project site, as shown in **Figure 2**. Locally, the Project site is within a Transit Oriented Development area, approximately 0.5 miles northeast of Downtown Culver City, approximately 0.1 miles southwest of the Helms District, and approximately 0.3 miles west of the Hayden Tract. Downtown Los Angeles is approximately seven miles east of the Project site.

1.2 Project Background

The Project would include a stand-alone 5-story (approximately 72 feet tall) Office Building with retail and restaurant uses on Level 1 (Ground Level) and office uses on Levels 1 to 5. In addition, two interconnected 5- to 6-story buildings atop a single-level podium are proposed that would

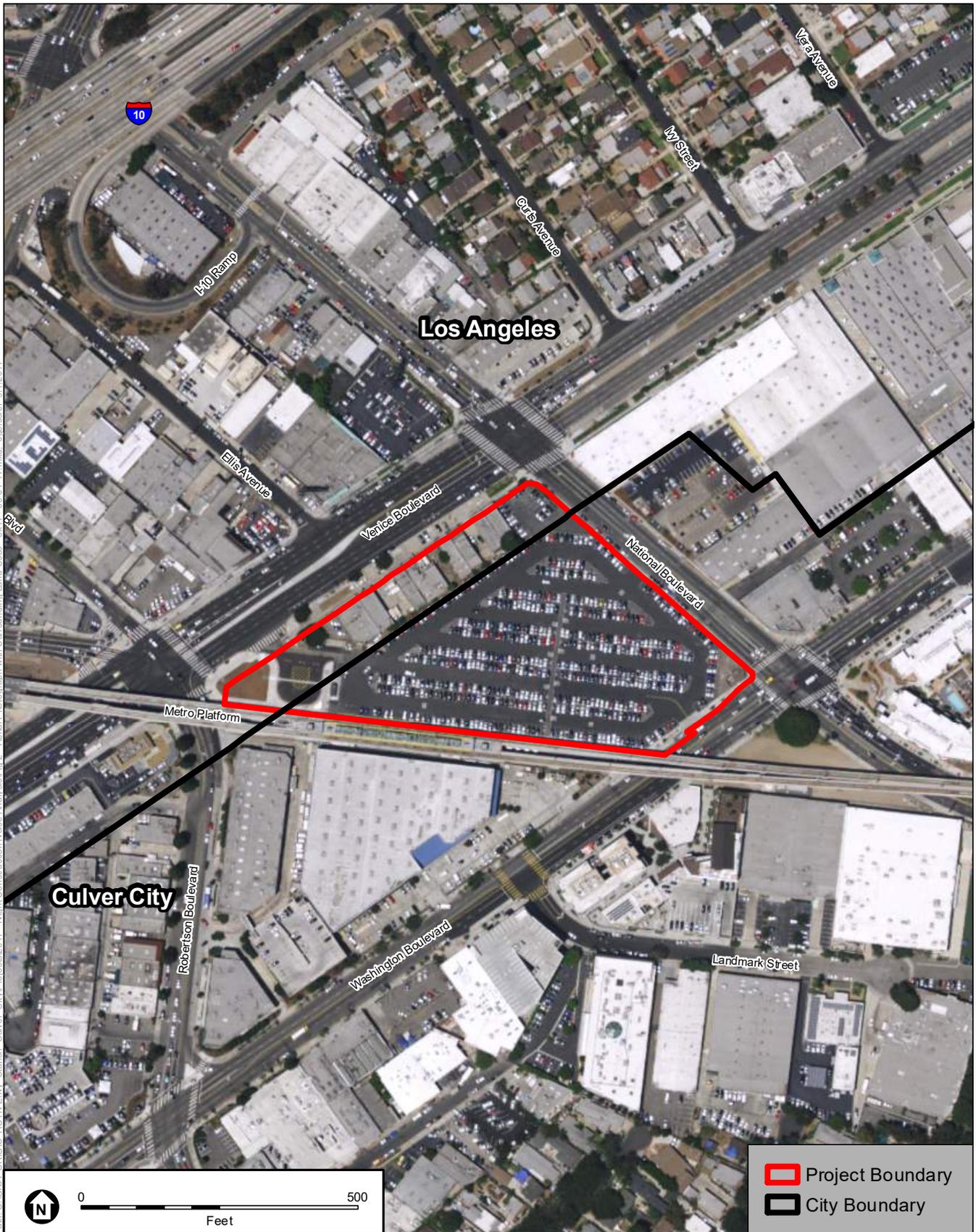


SOURCE: Open Street Map, 2017.

Ivy Station

Figure 1
Regional and Project Vicinity Locations





SOURCE: NAIP, 2016-07-11 (Aerial).

Ivy Station

Figure 2
Aerial Photograph with
Surrounding Land Uses

include a 200-unit Residential Building (up to approximately 79 feet tall) and a 148-room Hotel Building (up to approximately 77 feet tall), both of which would have retail and restaurant uses on the Ground Level. The three buildings would be built over a 3-level subterranean parking structure. The buildings would be connected through a series of landscaped courtyards and open spaces at both the pedestrian and podium levels. **Figure 3** identifies the Project Site Plan. Overall, the project would provide a total of 148 hotel rooms, 200 residential units, approximately 185,000 square feet of office use, 36,200 square feet of retail use, and 16,100 square feet of restaurant use. Only the Office Building has uses in both jurisdictions, with the Residential and Hotel Buildings being located entirely within Culver City.

In December 2015, ESA prepared a Noise and Vibration Technical Report for the Project's Mitigated Negative Declaration (MND), in accordance with the California Environmental Quality Act (CEQA). The report included a noise analysis of the project's construction, which was to occur during daytime hours only (i.e., no construction during the nighttime), in accordance with the allowable construction hours of the applicable noise ordinances for the Project.

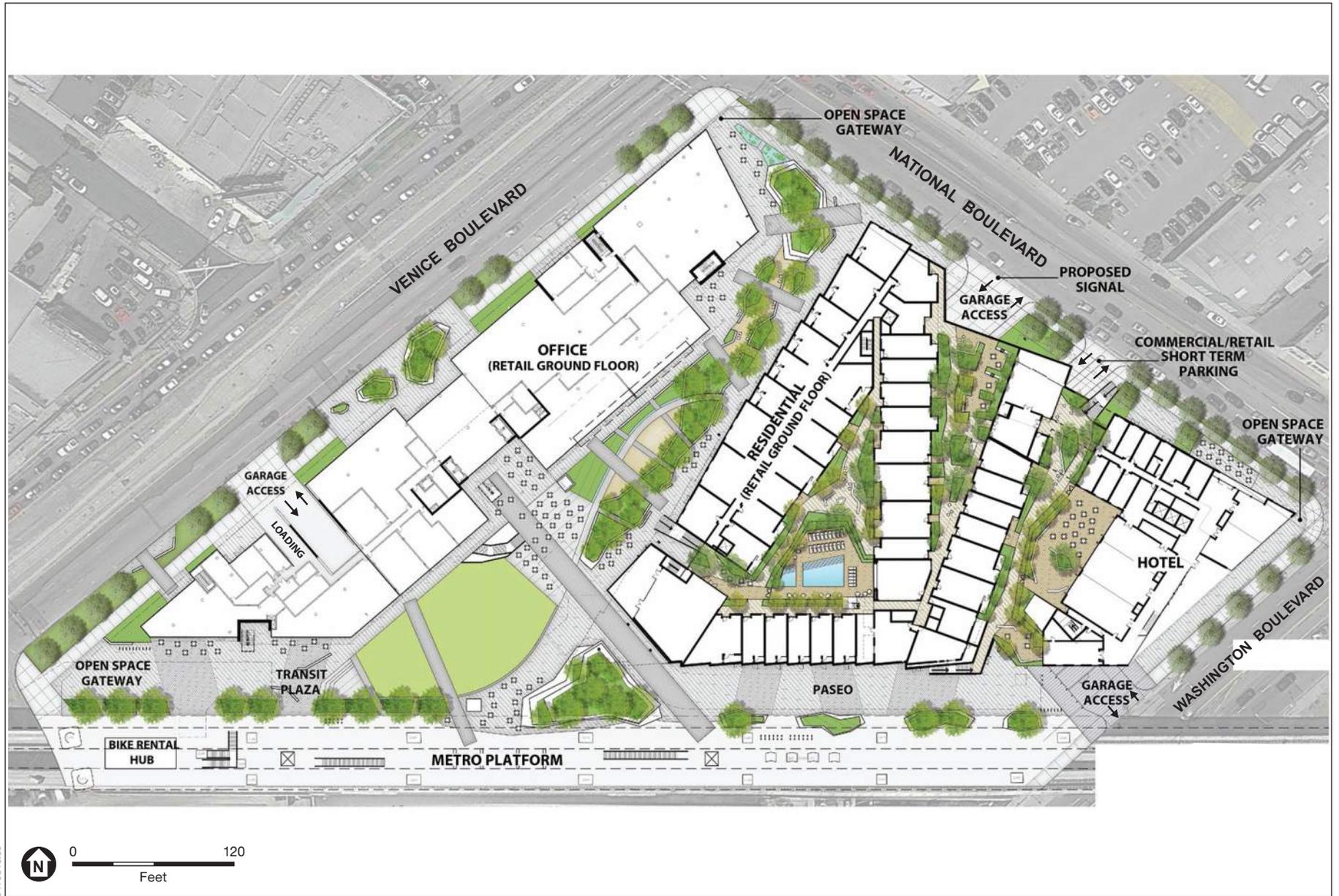
This technical report has been prepared for Bernards Builders & Management Services (Bernards) to support the Culver City environmental review process regarding potential impacts to ambient noise associated with the proposed Project's construction at night. This noise study is required as part of the Project's proposed night construction work plan to the City to obtain a variance to the Culver City Noise Ordinance, which limits construction to daytime hours. The proposed night construction activities on the project site which would generate elevated noise levels potentially impacting nearby residences includes: 1) soil hauling and mass excavation in Culver City and excavated soil hauling through the City of Los Angeles portion of the project site, and 2) concrete pouring on the Culver City portion of the project site, both to occur during the evening and night hours, outside of Culver City's allowable construction hours. In addition, there is also an off-hours request (if approved) to allow work on weekdays, Saturdays, and during the Culver City holiday slowdown. In addition, Bernards request to work on concrete related activities such as install of rebar, formwork, clean-up, backfill during off-hours. Such concrete related activities generates less noise than concrete pumping activities.

2. Project Description

2.1 Project Understanding

Bernards is proposing to submit a project night construction work plan to Culver City to obtain a variance to its noise ordinance to conduct project construction activities outside of the allowable construction hours of City's Noise Ordinance. Bernards requested that ESA assist in this submittal with the preparation of the noise and lighting studies of the proposed night construction work. Bernards provided ESA example noise and lighting studies for a previous project (C3) night construction work plan submitted to the City. ESA would utilize the 2015 Ivy Station noise technical report and MND in the preparation of these proposed night noise and lighting studies.

The Project's proposed night construction activities at the Project site are based data provided to ESA from Bernard via email and phone conversations. The Project's night construction work would occur on the Project site (within both Culver City and the City of Los Angeles) and



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SOURCE: Lowe Enterprises, 2015

Ivy Station

Figure 3
Site Plan

surrounding roadways. However, the focus of this study is the impact of the night construction activities on the nearest residence within the Culver City to the Project site, and the submittal of Bernards night work plan to Culver City to obtain a variance to the City's noise ordinance which prohibits construction during the evening and night hours. Culver City's noise ordinance states that construction activity shall be prohibited, except between the hours of 8:00 A.M. and 8:00 P.M. Mondays through Fridays; 9:00 A.M. and 7:00 P.M. Saturdays; 10:00 A.M. and 7:00 P.M. Sundays.

As a condition of the potential variance to the allowable construction hours of the City's noise ordinance, the City established a noise level limit of 65 dBA Lmax for the Project's proposed night construction. The limit is based on the City's Noise Standards in the Noise Element of the City's 1975 General Plan, which establishes nighttime levels of 65 dBA Leq for a duration of one minute at the property line of the noise sensitive receptor (City 1975) (i.e., 65 dBA Lmax at the property line of the nearest residence).

2.2 Project Description

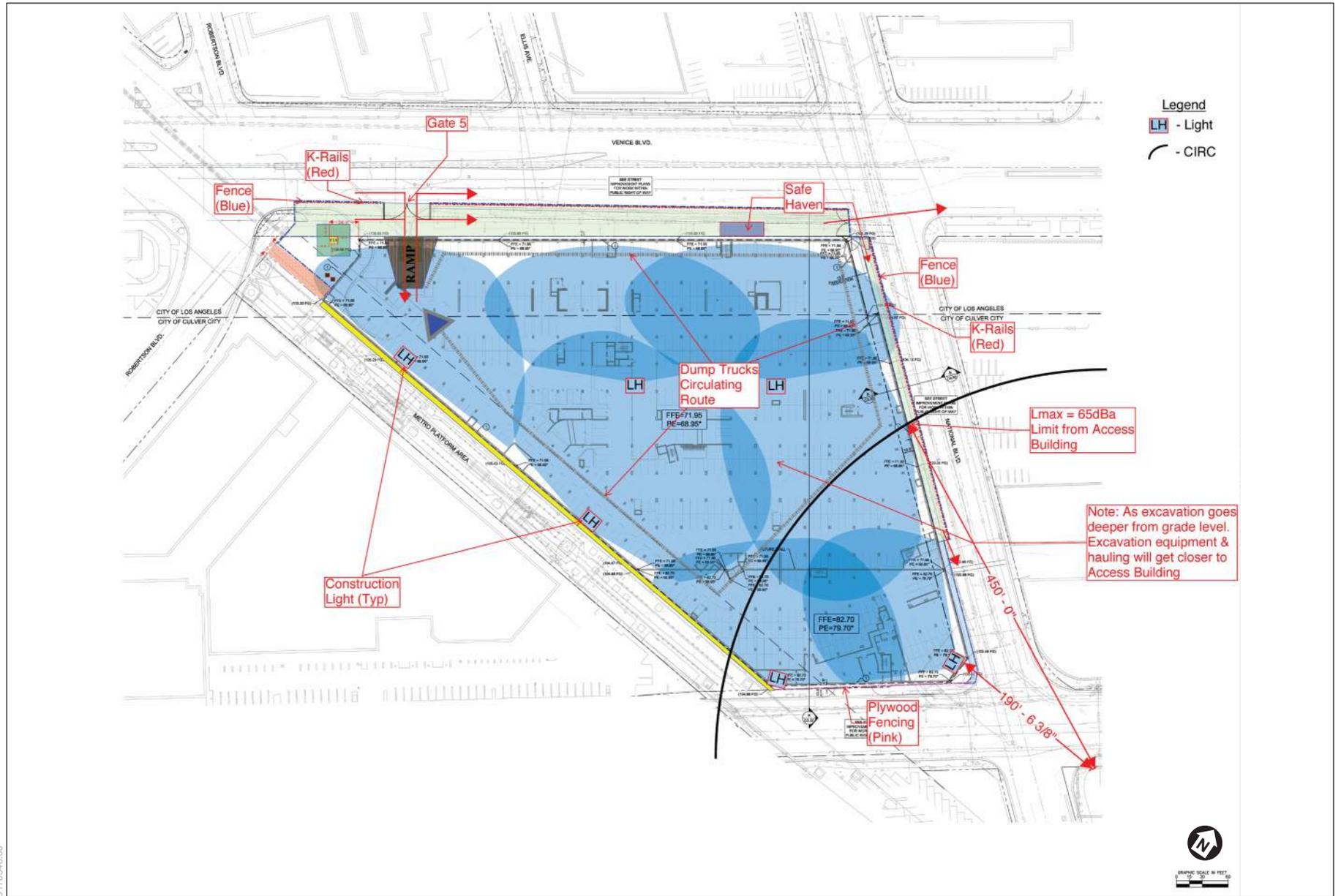
The Project's proposed night construction activity on the Project site would primarily include mass excavation in Culver City with truck hauling through the City of Los Angeles on approved haul routes; and concrete pouring by pumps and boom into the excavated foundations of the proposed buildings on the Project site within Culver City with concrete trucks trips entering and leaving the Project site. In addition, Bernards request to work on concrete related activities such as install of rebar, formwork, clean-up, backfill during off-hours. Such concrete related activities generates less noise than concrete pumping activities.

The Project night construction work would include truck soil hauling for 6 months during excavation, and 13 months for concrete pours, with an estimated 1-2 months of overlap between the soil hauling and concrete pours. During the overlap, the soil hauling and concrete pours may occur on the same day but not at the same time due to limited staging area, since there is only one street access ramp into the Project site's excavation and pour area. Project night construction is anticipated to start in November 2017, and end in November 2018.

Project night construction activity would occur during evening and night hours, potentially anytime outside of the allowable construction hours of the Culver City's noise ordinance of between 8:00 A.M. and 8:00 P.M. Mondays through Fridays; 9:00 A.M. and 7:00 P.M. Saturdays; and 10:00 A.M. and 7:00 P.M. Sundays. Therefore, a variance to the noise ordinance is needed.

Soil Excavation and Hauling

The excavation of soil for the foundations of the proposed buildings on the Project site would occur during the daytime and nighttime. During the off-hours of the City's noise ordinance, all excavation equipment and hauling trucks would be staged approximately 450 feet from the Access Building, not to exceed the 65 dBA Lmax limit. The excavation equipment would gradually move closer to Access as excavation progresses and all equipment is staged below grade night truck hauling, totaling approximately 22,000 heavy truck trips, or 250 trucks per day. **Figure 4** shows the area where the excavation equipment and hauling trucks can operate without exceeding the 65 dBA Lmax threshold (approximately 450 feet from Access at grade level). As



SOURCE: Bernards Builders & Management Services

Ivy Station

Figure 4
Night Soil Excavation and Hauling

excavation progresses, the equipment would move further below grade, and the excavation equipment will gradually get closer to the corner of National and Washington Boulevards. However, the soil hauling trucks would exit the Project Site utilizing Gate #5 on Venice Boulevard within the City of Los Angeles to access I-10 to the north within City of Los Angeles, and would not utilize any street through Culver City.

Concrete Pouring

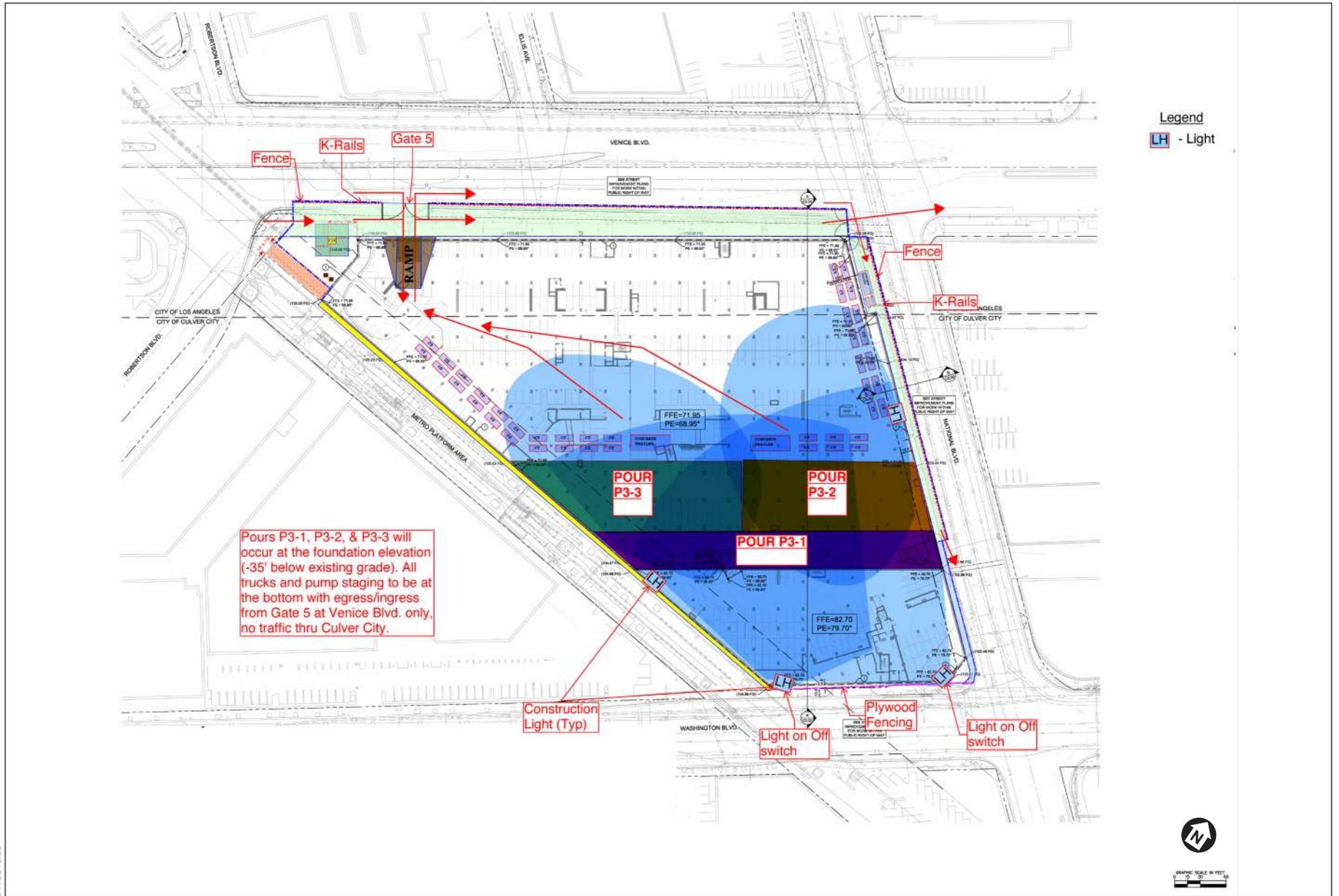
The concrete pouring and staging activities would include the operation of several concrete pumps and concrete trucks, with deliveries related to shoring activities of approximately 400 truck trips. Overall, the Project will have approximately 66 mat foundation and deck pours on the Project site, of which pours P3-1, P3-2, P3-3, and G-4 have been analyzed in this report due to their greater concrete volume (i.e., greater number of pumps and trucks required) and proximity to the nearest residence in Culver City.

Concrete pours P3-1, P3-2, and P3-3 would take place roughly 36 feet below grade, and most of the concrete trucks would be stationed below grade at the bottom of the excavated hole or along Venice Boulevard, and only two concrete trucks would be located at the concrete pump along National Boulevard near the intersection with Venice Boulevard, as shown in **Figure 5**. Concrete pour G-4 would require concrete trucks to stage along National Boulevard; however, to minimize the noise to the nearby receptor, most of the concrete trucks would be staged along Venice Boulevard, and only two concrete trucks would be located at the concrete pump along National Boulevard near the intersection with Venice Boulevard, as shown on **Figure 6**. The concrete pouring plans on Figures 5 and 6, shows the area where the concrete pumps and trucks would be located, and the circulating ingress and egress route the concrete trucks would use during the concrete pouring's. The concrete trucks entering and leaving the Project site would utilize Gate #5 at Venice Boulevard within the City of Los Angeles, and not drive through Culver City. However, the concrete trucks staged along National Boulevard for concrete pour P3-1 would exit the Project site southbound on National Boulevard into Culver City, then turning west on Washington Boulevard (passing within 170 feet of the residential use nearest the Project site in Culver City), and then heading north on Robertson Boulevard, back into the City of Los Angeles towards I-10.

3. Environmental Setting

3.1 Noise Characteristics and Descriptors

Sound can be described as the mechanical energy of a vibrating object transmitted by pressure waves through a liquid or gaseous medium (e.g., air). Noise is generally defined as unwanted sound (i.e., loud, unexpected, or annoying sound). Acoustics is defined as the physics of sound. In acoustics, the fundamental scientific model consists of a sound (or noise) source, a receiver, and the propagation path between the two. The loudness of the noise source and obstructions or atmospheric factors affecting the propagation path to the receiver determines the sound level and characteristics of the noise perceived by the receiver. Acoustics addresses primarily the propagation and control of sound.



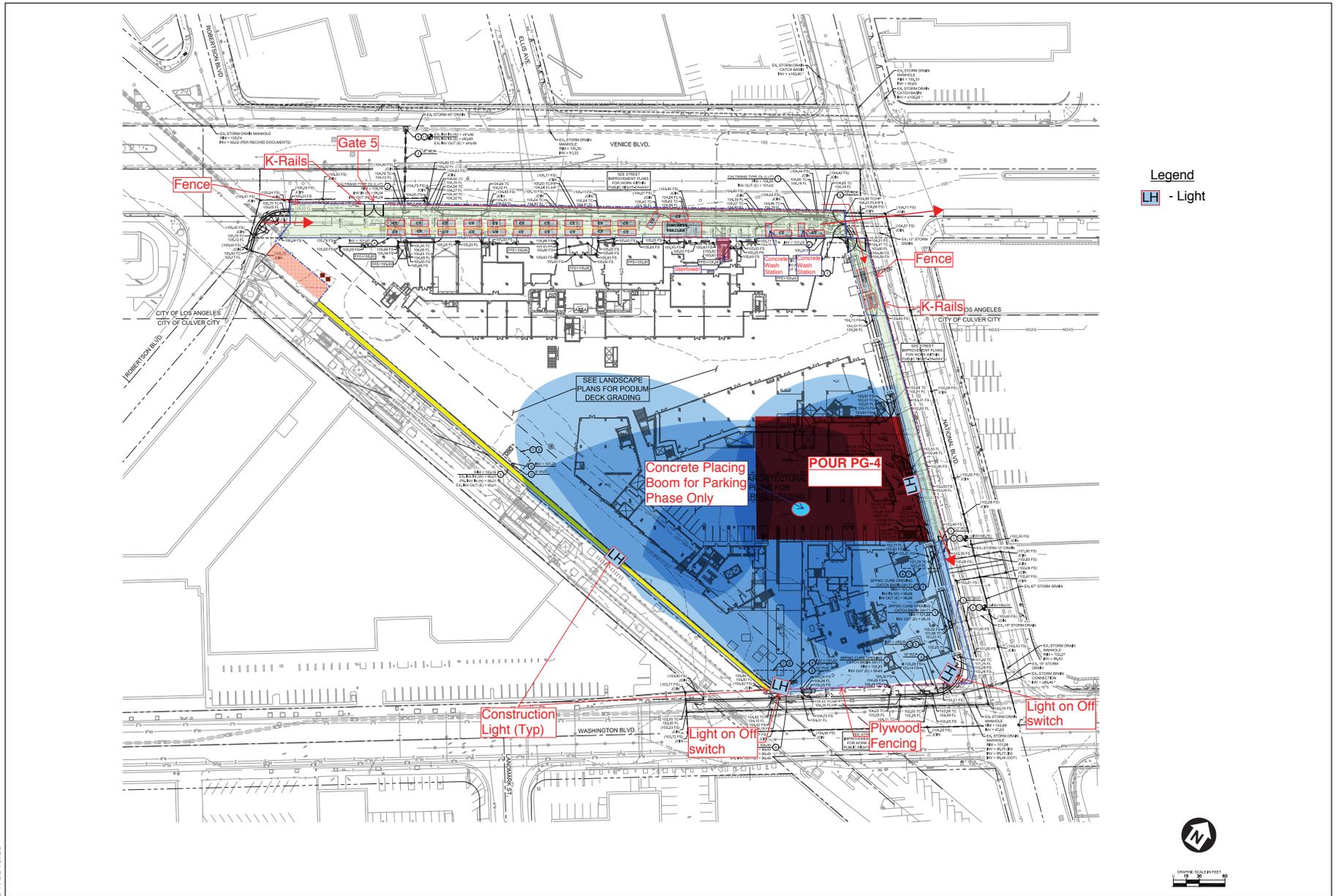
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SOURCE: Bernards Builders & Management Services

Ivy Station

Figure 5
Night Concrete Pours P3-1 & P3-2 and P3-3





SOURCE: Bernards Builders & Management Services

Ivy Station

Figure 6
Night Concrete Pour G-4



Sound, traveling in the form of waves from a source, exerts a sound pressure level (referred to as sound level) that is measured in decibels (dB), which is the standard unit of sound amplitude measurement. The dB scale is a logarithmic scale that describes the physical intensity of the pressure vibrations that make up any sound, with 0 dB corresponding roughly to the threshold of human hearing and 120 to 140 dB corresponding to the threshold of pain. Pressure waves traveling through air exert a force registered by the human ear as sound.

Sound pressure fluctuations can be measured in units of hertz (Hz), which correspond to the frequency of a particular sound. Typically, sound does not consist of a single frequency, but rather a broad band of frequencies varying in levels of magnitude. When all the audible frequencies of a sound are measured, a sound spectrum is plotted consisting of a range of frequency spanning 20 to 20,000 Hz. The sound pressure level, therefore, constitutes the additive force exerted by a sound corresponding to the sound frequency/sound power level spectrum.

The typical human ear is not equally sensitive to all frequencies of the audible sound spectrum. As a consequence, when assessing potential noise impacts, sound is measured using an electronic filter that deemphasizes the frequencies below 1,000 Hz and above 5,000 Hz in a manner corresponding to the human ear's decreased sensitivity to extremely low and extremely high frequencies. This method of frequency weighting is referred to as A-weighting and is expressed in units of A-weighted decibels (dBA). A-weighting follows an international standard methodology of frequency deemphasis and is typically applied to community noise measurements.

Noise Exposure and Community Noise

An individual's noise exposure is a measure of noise over a period of time. A noise level is a measure of noise at a given instant in time. The noise levels are representative of measured noise at a given instant in time; however, they rarely persist consistently over a long period of time. Rather, community noise varies continuously over a period of time with respect to the contributing sound sources of the community noise environment. Community noise is primarily the product of many distant noise sources, which constitute a relatively stable background noise exposure, with the individual contributors unidentifiable. The background noise level changes throughout a typical day, but does so gradually, corresponding with the addition and subtraction of distant noise sources such as traffic. What makes community noise variable throughout a day, besides the slowly changing background noise, is the addition of short-duration, single-event noise sources (e.g., aircraft flyovers, motor vehicles, sirens), which are readily identifiable to the individual.

These successive additions of sound to the community noise environment change the community noise level from instant to instant, requiring the measurement of noise exposure over a period of time to legitimately characterize a community noise environment and evaluate cumulative noise impacts. This time-varying characteristic of environmental noise is described using statistical noise descriptors. The noise descriptors applicable to this Project are summarized below:

L_{eq} : The equivalent sound level used to describe noise over a specified period of time in terms of a single numerical value; the L_{eq} of a time-varying signal and that of a steady signal are

the same if they deliver the same acoustic energy over a given time. The L_{eq} may also be referred to as the average sound level.

L_{max} : The maximum, instantaneous noise level experienced during a given period of time.

CNEL: The Community Noise Equivalent Level, is the average A-weighted noise level during a 24-hour day that is obtained after an addition of 5 dB to measured noise levels between the hours of 7:00 a.m. to 10:00 p.m. and after an addition of 10 dB to noise levels between the hours of 10:00 p.m. to 7:00 a.m. to account for noise sensitivity in the evening and nighttime, respectively.

Noise Effects on People

Noise is generally loud, unpleasant, unexpected, or undesired sound that is typically associated with human activity that is a nuisance or disruptive. The effects of noise on people can be placed into four general categories:

- Subjective effects (e.g., dissatisfaction, annoyance);
- Interference effects (e.g., communication, sleep, and learning interference);
- Physiological effects (e.g., startle response); and
- Physical effects (e.g., hearing loss).

Although exposure to high noise levels has been demonstrated to cause physical and physiological effects, the principal human responses to typical environmental noise exposure are related to subjective effects and interference with activities. Interference effects of environmental noise refer to those effects that interrupt daily activities and include interference with human communication activities, such as normal conversations, watching television, telephone conversations, and interference with sleep. Sleep interference effects can include both awakening and arousal to a lesser state of sleep. With regard to the subjective effects, the responses of individuals to similar noise events are diverse and are influenced by many factors, including the type of noise, the perceived importance of the noise, the appropriateness of the noise to the setting, the duration of the noise, the time of day and the type of activity during which the noise occurs, and individual noise sensitivity.

Overall, there is no completely satisfactory way to measure the subjective effects of noise, or the corresponding reactions of annoyance and dissatisfaction on people. A wide variation in individual thresholds of annoyance exists, and different tolerances to noise tend to develop based on an individual's past experiences with noise. Thus, an important way of predicting a human reaction to a new noise environment is the way it compares to the existing environment to which one has adapted (i.e., comparison to the ambient noise environment). In general, the more a new noise level exceeds the previously existing ambient noise level, the less acceptable the new noise level will be judged by those hearing it. With regard to increases in A-weighted noise level, the following relationships generally occur:

- Except in carefully controlled laboratory experiments, a change of 1 dBA cannot be perceived;

- Outside of the laboratory, a 3 dBA change in noise levels is considered to be a barely perceivable difference;
- A change in noise levels of 5 dBA is considered to be a readily perceivable difference; and
- A change in noise levels of 10 dBA is subjectively heard as doubling of the perceived loudness.

These relationships occur in part because of the logarithmic nature of sound and the dB scale. The human ear perceives sound in a non-linear fashion hence the dB was developed. Because the dB scale is based on logarithms, two noise sources do not combine in a simple additive fashion, but rather logarithmically. Under the dB scale, a doubling of sound energy corresponds to a 3 dBA increase. In other words, when two sources are each producing sound of the same loudness, the resulting sound level at a given distance would be approximately 3 dBA higher than one of the sources under the same conditions. For example, if two identical noise sources produce noise levels of 50 dBA, the combined sound level would be 53 dBA, not 100 dBA. Under the dB scale, three sources of equal loudness together produce a sound level of approximately 5 dBA louder than one source, and ten sources of equal loudness together produce a sound level of approximately 10 dBA louder than the single source.

Noise Attenuation

When noise propagates over a distance, it changes in level and frequency content. The manner in which noise reduces with distance depends on factors such as the type of noise source and the propagation path. Noise from a localized source (i.e., point source) propagates uniformly outward in a spherical pattern; therefore, this type of propagation is referred to as “spherical spreading.” Stationary point sources of noise, including stationary mobile sources such as idling vehicles, attenuate (lessen) at a rate between 6 dBA for acoustically “hard” sites and 7.5 dBA for acoustically “soft” sites for each doubling of distance from the reference measurement as their energy is continuously spread out over a spherical surface. Hard sites are those with a reflective surface between the source and the receiver, such as asphalt or concrete surfaces or smooth bodies of water. No excess ground attenuation is assumed for hard sites and the changes in noise levels with distance (drop-off rate) is simply the geometric spreading of the noise from the source. Soft sites have an absorptive ground surface such as soft dirt, grass, or scattered bushes and trees. In addition to geometric spreading, an excess ground attenuation value of 1.5 dBA (per doubling distance) is normally assumed for soft sites.

Roadways and highways consist of several localized noise sources on a defined path, and hence are treated as “line” sources, which approximate the effect of several point sources. Noise from a line source propagates over a cylindrical surface, often referred to as “cylindrical spreading.” Line sources (e.g., traffic noise from vehicles) attenuate at a rate between 3 dBA for hard sites and 4.5 dBA for soft sites for each doubling of distance from the reference measurement.¹ Therefore, noise due to a line source attenuates less with distance than that of a point source with increased distance.

¹ California Department of Transportation (Caltrans), *Technical Noise Supplement* (TeNS). September, 2013.

Additionally, receptors located downwind from a noise source can be exposed to increased noise levels relative to calm conditions, whereas locations upwind can have lowered noise levels. Sound levels can be increased at large distances (e.g., more than 500 feet) due to atmospheric temperature inversion (i.e., increasing temperature with elevation). Other factors such as air temperature, humidity, and turbulence can also have significant effects.

3.2 Existing Conditions

The Project site is currently undergoing Project construction. The Project site is bounded on three sides by four-lane arterials of Venice Boulevard, National Boulevard, and Washington Boulevard; and the Metrorail right-of-way and Culver City Metrorail Station. I-10 is located approximately 0.2 miles north of the Project site. The areas adjacent to the Project site are primarily commercial and light industrial, and the residential development within Culver City. Therefore, the predominant noise source surrounding the Project site is vehicle traffic noise on the adjacent roadways and nearby I-10. Secondary noise sources including existing general commercial activities, loading dock/delivery truck activities, trash compaction, refuse service activities, and landscape maintenance activities.

Existing Ambient Noise Levels

To identify the existing ambient noise environment at the residence in Culver City nearest the Project site, a continuous long-term noise measurement was conducted from Friday August 25, 2017 to Sunday August 27, 2017 at the southeastern corner of the Project site (i.e., adjacent to the nearest residence in Culver City), identified as Receptor (R)4 on **Figure 7**.

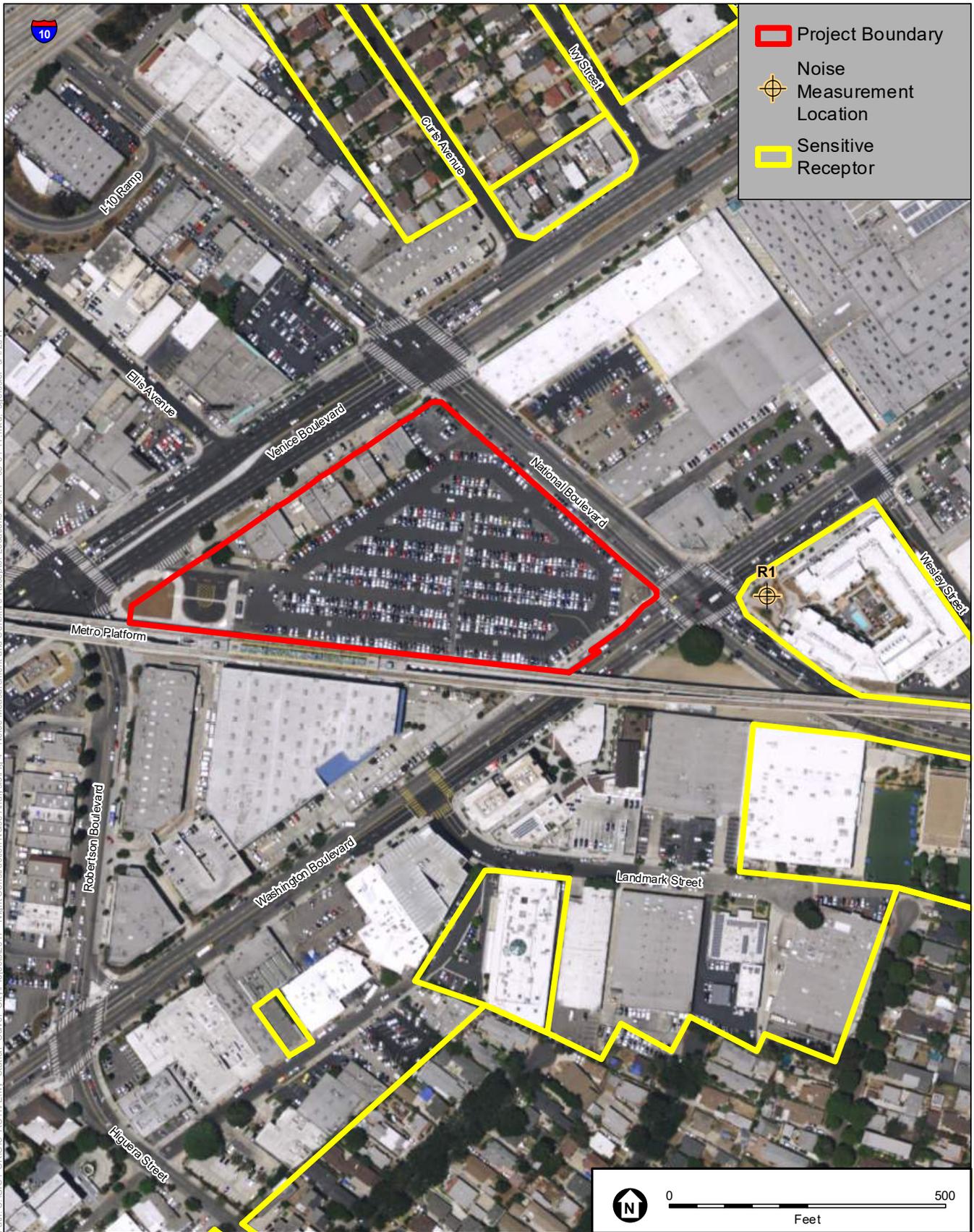
The noise measurement was conducted with Larson Davis model LxT. Type 2 sound level meter. During the measurement, the microphone for sound level meter was placed five feet above the ground surface. The sound level meter was calibrated with a Larson Davis model CAL 200 before and after the measurement. Following the calibration, a wind screen was placed over the microphone, and the frequency weighting was set on “A” and slow response.

The results of the ambient night noise measurement at location R4 are summarized in **Table 1**. As shown in Table 1, on the night of Friday, August 25, 2017, the measured evening/night hourly average noise levels at location R4 ranged from a high of 69.4 dBA L_{eq} at 7:00 p.m. to a low of 57.6 dBA L_{eq} at 3:00 a.m. Overall, for the 12-hour evening/night period (7:00 p.m. to 7:00 a.m.), the average noise level was 65.4 dBA L_{eq} . On the night of Saturday August 26, the measured evening/night hourly average noise levels at location R4 ranged from a high of 68.6 dBA L_{eq} at 7:00 p.m. to a low of 56.3 dBA L_{eq} at 3:00 a.m. Overall, for the 12-hour evening/night period (7:00 p.m. to 7:00 a.m.), the average noise level was 64.5 dBA L_{eq} . The primary noise source during the measurements was vehicle traffic along the roadways adjacent to the Project site.

In addition, in 2015, ambient noise measurements conducted onsite for the 2015 MND provided similar night hourly average noise levels during the midweek at the southwest corner of the project site averaged 66 dBA L_{eq} for the night period (10:00 p.m. to 7:00 a.m.) with hourly averages ranging from 57 to 73 dBA L_{eq} .

TABLE 1
SUMMARY OF AMBIENT NIGHT NOISE MEASUREMENTS

Location, Day of the Week, Date, and Duration	Hourly Average Noise Levels, dBA L _{eq}
R4	
Friday Night, 8/25/17,	
7:00 p.m. to 8:00 p.m.	69.4
8:00 p.m. to 9:00 p.m.	68.7
9:00 p.m. to 10:00 p.m.	66.7
10:00 p.m. to 11:00 p.m.	65.8
11:00 p.m. to 12:00 p.m.	64.5
12:00 p.m. to 1:00 a.m.	65.4
1:00 a.m. to 2:00 a.m.	62.5
2:00 a.m. to 3:00 a.m.	58.6
3:00 a.m. to 4:00 a.m.	57.4
4:00 a.m. to 5:00 a.m.	59.0
5:00 a.m. to 6:00 a.m.	63.0
6:00 a.m. to 7:00 a.m.	65.0
7:00 a.m. to 8:00 a.m.	67.5
7:00 p.m. to 7:00 a.m. (12-hour period)	65.4
R4	
Saturday Night 8/26/17,	
7:00 p.m. to 8:00 p.m.	68.6
8:00 p.m. to 9:00 p.m.	66.5
9:00 p.m. to 10:00 p.m.	65.9
10:00 p.m. to 11:00 p.m.	66.6
11:00 p.m. to 12:00 p.m.	65.5
12:00 p.m. to 1:00 a.m.	62.4
1:00 a.m. to 2:00 a.m.	62.3
2:00 a.m. to 3:00 a.m.	60.9
3:00 a.m. to 4:00 a.m.	56.3
4:00 a.m. to 5:00 a.m.	59.7
5:00 a.m. to 6:00 a.m.	61.6
6:00 a.m. to 7:00 a.m.	63.8
7:00 p.m. to 7:00 a.m. (12-hour period)	64.864.5
SOURCE: ESA, 2017.	



SOURCE: NAIP, 2016-07-11 (Aerial).

Ivy Station

Figure 7
Ambient Noise Measurement and Sensitive Receptor Locations



Noise Sensitive Receptors

Noise sensitive land uses are defined as those specific land uses that have associated indoor and/or outdoor human activities that may be subject to stress and/or significant interference from noise produced by community sound sources. The noise sensitive uses in Culver City closest to the Project site are the multi-family residences at the intersection of National and Washington Boulevards, approximately 170 feet southeast of the Project site across the intersection. This residence represents the nearest sensitive receptors to the Project site, and, therefore, illustrates the worst-case scenario for potential noise impacts from the Project's night construction activities.

3.3 Regulatory Setting

Local

Culver City General Plan Noise Element

The Noise Element of the General Plan identifies noise-sensitive land uses and noise sources, defines areas of noise impact, and establishes goals, policies, and programs to ensure that City residents are protected from excessive noise (Culver City 1995). The noise goals and policies of the Noise Element applicable to the Project's night construction includes:

Policy 2.A Create a comprehensive ordinance establishing noise regulation criteria, and standards for noise sources and receptors to include but not be limited to the following:

- Noise reduction features during site planning to mitigate anticipated noise impacts on affected noise sensitive land uses, such as schools, hospitals, convalescent homes, and libraries.
- Temporary sound barrier installation at construction site if construction noise is impacting nearby noise sensitive land uses.
- Noise abatement and acoustical design criteria for construction and operation of any new development.

The City's noise standards are contained in the City's 1995 General Plan Noise Element, which establishes a nighttime (10:00 p.m. to 7:00 a.m.) levels of 50 dBA Leq for a duration of 30 minutes, and 65 dBA Leq for a duration of one minute, at the property line of the noise sensitive receptor, as shown in **Table 2** below (City 1995).

**TABLE 2
CULVER CITY NOISE STANDARDS**

Daytime levels 7:00 AM – 10:00 PM	Nighttime Levels 10:00 PM – 7:00 AM	Duration
55 dBA - Leq	50 dBA - Leq	30 minute
60 dBA - Leq	55 dBA - Leq	15 minute
65 dBA - Leq	60 dBA - Leq	5 minute
70 dBA - Leq	65 dBA - Leq	1 minute
75 dBA - Leq	70 dBA - Leq	Never

Source: City 1995.

Culver City Municipal Code

Chapter 9.07 of the City of Culver City Municipal Code (CCMC) provides specific noise restrictions and exemptions for noise sources within Culver City. Culver City's noise regulations state that construction activity shall be prohibited, except between the hours of 8:00 A.M. and 8:00 P.M. Mondays through Fridays; 9:00 A.M. and 7:00 P.M. Saturdays; 10:00 A.M. and 7:00 P.M. Sundays.

4. Impacts and Mitigation Measures

This section describes the impact analysis relating to noise and vibration impacts for the project. It describes the methods and applicable thresholds used to determine the impacts of the project.

4.1 Methodology

Project construction noise levels were estimated using the FHWA's Roadway Construction Noise Model (RCNM) and construction equipment information provided by the Applicant. Potential noise levels were identified for the nearest sensitive receptor located offsite in Culver City based on their respective distance from the Project site. To present a conservative impact analysis, the estimated noise levels were calculated for a scenario in which all major heavy construction equipment was assumed to be operating simultaneously for each phase (concrete pouring or excavated soil hauling) and located at the construction area nearest to the affected receptors. These assumptions represent the worst-case noise scenario because construction activities would typically be spread out throughout the project site and would be located further away from the affected receptors. The estimated noise levels at the affected receptor were then analyzed against the construction noise standards established by Culver City to determine whether an exceedance of allowable noise levels would occur.

4.2 Impact Thresholds

As provided to ESA by Culver City, the proposed Project's maximum night construction noise at the property line of the nearest noise sensitive receptor in Culver City shall not exceed 65 dBA $L_{max.}$, based on the City's nighttime noise standards (City 1995). The City's 1995 General Plan

Noise Element, Noise Standards establishes a nighttime (10:00 p.m. to 7:00 a.m.) levels of 50 dBA Leq for a duration of 30 minutes (City 1995), as shown in Table 2.

4.3 Project Impact Analysis

The proposed night construction of the Project would include excavation, truck loading and soil hauling or concrete pouring of building foundations requiring the use of heavy equipment including haul trucks and loaders, and concrete trucks, booms, and pumps, respectively. During the soil hauling or the concrete pours, there would be a different mix of equipment used. As such, construction activity noise levels on and near the Project Site would vary depending on the particular type, number, and duration of use of the equipment for the soil hauling or concrete pours. Individual pieces of construction equipment anticipated during Project night construction could produce maximum noise levels of 79 to 82 dBA L_{max} at a reference distance of 50 feet from the noise source (FHWA 2006). These maximum noise levels would occur when equipment is operating at full power, and includes estimated usage factors for the equipment, which are based on FHWA's RNCM User's Guide.²

During Project construction, the nearest and most notable offsite sensitive receptor in Culver City that would be exposed to the Project's night construction noise would be the existing multi-family residential use located adjacent to the southeast corner of the Project site. During construction activities, the highest noise levels would be generated when multiple pieces of construction equipment are being operated concurrently. As discussed previously, the Project's estimated construction noise levels were calculated for a worse-case scenario in which all construction equipment was assumed to be operating simultaneously and located on the Project site during either the soil excavation and hauling or the concrete pourings, as shown respectively in Figure 4, and Figures 5 and 6.

The estimated noise levels at the offsite sensitive receptors were calculated using FHWA's RCNM, and were based on the concurrent operation of equipment for either soil hauling (i.e., haul trucks and loaders) or concrete pours i.e., concrete trucks, booms, and pumps). The results of the modeled calculations are shown in Appendix A, which include the noise level reductions from the following noise reduction measures that shall be implemented to reduce construction noise levels at the adjacent sensitive receptor during project night construction:

Noise Reduction Measure NOISE-1: All mobile off-road construction equipment operating at the project site shall be equipped with properly operating mufflers. Idling equipment shall be turned off when not in use.

Noise Reduction Measure NOISE-2: The construction contractor(s) shall ensure that the concrete pumps are muffled and enclosed within temporary sheds, incorporate insulation barriers, or other measures to the extent feasible.

Table 3 shows the estimated construction noise levels that would occur at the nearest offsite sensitive use during the Project's night construction activities at the Project Site, including the

² Federal Highway Administration (FHWA), Roadway Construction Noise Model User's Guide, 2006.

implementation of the noise reduction measures. Details for the construction noise calculations for each construction phase are shown in Appendix A.

TABLE 3
ESTIMATED CONSTRUCTION NOISE LEVELS AT OFFSITE NOISE-SENSITIVE USES

Construction Phase	Estimated Maximum Construction Noise Levels (dBA L_{max})	Estimated Average Construction Noise Levels (dBA L_{eq})
Soil Excavation & Hauling	64	62
Concrete Pours:		
P3-1 & P3-2 and P3-3	61	64
G-4	61	64
<i>Culver City Night Noise Standards</i>	65	50

SOURCE: ESA, 2017.

As shown in Table 3, the Project's maximum night construction noise levels would not exceed Culver City's night noise limit of 65 dBA L_{max} at the nearest multi-family residential uses in Culver City, located adjacent to southeast of the Project Site.

The Project's night construction noise levels during concrete pours of 64 dBA L_{eq} at the nearest offsite sensitive receptor in Culver City, would exceed Culver City's 1995 General Plan Noise Element, Noise Standards, nighttime (10:00 p.m. to 7:00 a.m.) levels of 50 dBA L_{eq} for a duration of 30 minutes (City 1995), as shown in Table 2. However, the measured ambient noise levels at the residence ranged from as high as 65.8 dBA L_{eq} at 7:00 p.m. to as low 56.3 dBA L_{eq} at 3:00 a.m during the nighttime period (10:00 p.m. to 7:00 a.m.), with an average ambient noise level over this night period of approximately 65 dBA L_{eq}. Therefore, the Project's night construction noise during continuous concrete pours of 64 dBA L_{eq} at the multi-family residential use would be slightly below the average ambient night noise level of approximately 65 dBA L_{eq}. The combined resultant ambient noise level would increase ambient levels by less than 3 dBA, which would be a less than perceptible increase. However, during the quietest hour of 3:00 a.m the ambient night noise level would be somewhat lower, measured at approximately 56.3 dBA L_{eq}, and therefore, the Project's night construction noise of 64 dBA L_{eq} at the multi-family residential use would be higher than the existing ambient levels. The combined construction noise and existing ambient noise level would be approximately 65 dBA L_{eq}, which would be an increase ambient levels of approximately 8 dBA over existing ambient, which would be a perceptible increase during the quietest hour of 3:00 a.m. Therefore, the ambient increase would range from 3 dBA to 8 dBA (less than perceptible to perceptible) during the construction during the night period.

Other off-hours concrete-related activities such as install of rebar, formwork, clean-up, and backfill would not use equipment of concrete pumping activities, and therefore, would generate lower noise levels.

5. Conclusion

The Project's night construction maximum noise levels would not exceed the City's maximum noise level limit of 65 dBA L_{max} at the property line of the nearest noise sensitive receptor (i.e., nearest residence) in Culver City, as provided by Culver City for a variance to the City's Noise Ordinance. Furthermore, Project night construction noise at the property line of the nearest residence would be slightly less than existing average ambient noise level during the nighttime period, which would not perceptibly increase ambient noise levels at the nearest residence in Culver City during night construction. During the quietest hours of the night, the night construction noise would be somewhat higher than the ambient noise levels, resulting in a perceptible increase at the property line of the nearest residence. Therefore, the ambient increase from the night construction noise would range from 3 dBA to 8 dBA (less than perceptible to perceptible) during the loudest to quietest hours over the evening/night period.

Therefore, the Project's night construction maximum noise levels would not exceed the Culver City maximum noise standards at the nearest residence in Culver City. Furthermore, Project night construction noise would not substantially increase ambient noise levels at the nearest residence in Culver City. Therefore, a variance to the Culver City Noise Ordinance for the Project's night construction would not result in adverse noise impacts.

6. References

Culver City (Culver City), 1995 General Plan Noise Element. 1995.

Federal Highway Administration (FHWA), Roadway Construction Noise Model User's Guide, 2006.

Federal Transit Administration (FTA), Transit Noise and Vibration Impact Assessment, May, 2006.

U.S. Environmental Protection Agency (USEPA), *EPA Identifies Noise Levels Affecting Health and Welfare*, April 1974.

Lighting

In addition to noise, the Project's night construction would include the appropriate lighting equipment (i.e., tower portable lights) associated with the night construction activities (i.e. concrete pours and soil excavation).

Lighting Terminology

Lighting is defined as the state of illumination. Illuminance is the measure of emitted light falling on a surface; luminance is the measure of light reflected or emitted by it. The intensity of outdoor artificial lighting is selected based on its designed use (i.e., security, safety, visibility, or construction/maintenance) during periods of low or no natural light. Illuminance is typically measured in units of light intensity as foot-candles (fc)—the illuminance of one candle on a one square foot surface, located one foot away.

Glare is defined as offensive or undesirable light resulting from an excessively high contrast between a light source and its surrounding background. Glare can result in visual discomfort and reduce the ability to see objects. Glare usually results from a direct line-of-sight with an unshielded lighting source (lamp) from vehicles, streets, parking areas, building and site security, or entertainment/sporting venues. Glare can be controlled by proper design, location, and height of light fixtures and their light output.

Light trespass or spill light is unwanted light outside of the area intended to be illuminated by the lighting source. Light trespass is typically an undesirable condition, where surface illumination extends beyond the designed area of illumination; e.g., light spills from the source property onto an adjacent property. Like glare, light trespass can be controlled by the location and height of the lighting pole in addition to the shielding and glare control of the light source.

Lighting Design Considerations

The proposed lighting design contains design performance measures to reduce glare and light trespass, including appropriate lighting pole height and location, and lamp shielding. Pole heights for the Project's night construction would meet industry standards for lighting this type of activity. Strategic placement of the poles in relation to the activities (concrete pouring) is key to the proper lighting of the site in relation to the neighboring properties. Lamp sources would vary in multiple combinations based on the luminance level requirements of the site facilities. The proposed lighting would include external shielding reflectors to provide light shielding and glare control, decreasing the visibility of these high intensity lamps. The reflector and visor system would reduce light spill by 50 percent. Lighting would be strategically located and aimed toward the targeted construction areas of the project site with visor shields. Lighting along the southwestern site boundary would be directed toward the west to minimize viewing angles from the residences. Four tower portable lights would be placed at grade level on-site directed at the locations of the soil excavation and concrete pours, as shown on Figure 4, and Figures 5 and 6, respectively. The Lighting Calculation Graphics for the Project are provided in Appendix B.

Lighting Analysis

The proposed lighting plan would use appropriate lighting design controls including lamp type, pole location and height, and light shields and visors would reduce the potential for light trespass and glare off-site. Project lighting fixtures would direct light toward the interior of the site. The lighting design would prevent disability glare (i.e., reduction of the ability to see or identify objects). Glare and light spill would be minimized based on the design criteria.

The Project's construction lighting equipment may generate light trespass and/or glare on the project site; however, the light trespass and illuminance at the nearest residence in Culver City would be very low, and not significant, and the glare from the construction lighting equipment would not be visible at the residence. Therefore, a variance to the Culver City Noise Ordinance for the Project's night construction would not result in adverse lighting impacts.

Appendix A

Night Construction Noise Calculations

Project: Ivy Station Nighttime Construction Activities

Construction Noise Impact on Sensitive Receptors

Parameters

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

				Sensitive Receptor				
Construction Phase Equipment Type	No. of Equip.	Reference Noise Level at 50ft, Lmax	Acoustical Usage Factor	Distance (ft)	Lmax	Leq	L10	Estimated Noise Shielding, dBA
Semi Trucks	5	76	20%	622	61	54	57	0
Loader	1	79	50%	622	57	54	57	0
Excavator	1	81	40%	622	59	55	58	0
Concrete Pourings: P3-1 & P3-2 & P3-3				61	64			
Concrete Pump	1	81	20%	575	60	53	56	0
Concrete Trucks	2	79	40%	575	61	57	60	0
Concrete Trucks	2	79	40%	700	59	55	58	0
Concrete Trucks	2	79	40%	715	59	55	58	0
Concrete Trucks	2	79	40%	730	59	55	58	0
Concrete Trucks	2	79	40%	745	59	55	58	0
Concrete Trucks	2	79	40%	760	58	54	57	0
Concrete Trucks	2	79	40%	775	58	54	57	0
Concrete Pouring: G-4				61	64			
Concrete Pump	1	81	20%	575	60	53	56	0
Concrete Trucks	2	79	40%	575	61	57	60	0
Concrete Trucks	2	79	40%	700	59	55	58	0
Concrete Trucks	2	79	40%	715	59	55	58	0
Concrete Trucks	2	79	40%	730	59	55	58	0
Concrete Trucks	2	79	40%	745	59	55	58	0
Concrete Trucks	2	79	40%	760	58	54	57	0
Concrete Trucks	2	79	40%	775	58	54	57	0

Project: Ivy Station Nighttime Construction Activities

Construction Noise Impact on Sensitive Receptors

Parameters

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

					Sensitive Receptor				
Construction Phase	No. of Equipment	Reference Noise Level at 50ft, Lmax	Acoustical Usage Factor	Equipment Elevation	Distance (ft)	Lmax	Leq	L10	Estimated Noise Shielding, dBA
Excavation at the Grade						64	62		
Semi Trucks	5	76	20%		450	64	57	60	0
Loader	1	79	50%	at the grade	450	60	57	60	0
Excavator	1	81	40%	grade	450	62	58	61	0
Excavation at 10 feet Below Grade						59	57		
Semi Trucks	5	76	20%	10 feet	450	59	52	55	5
Loader	1	79	50%	below grade	450	55	52	55	5
Excavator	1	81	40%	grade	450	57	53	56	5
Excavation at 36 feet Below Grade						55	53		
Semi Trucks	5	76	20%	36 feet	180	55	48	51	17
Loader	1	79	50%	below grade	180	51	48	51	17
Excavator	1	81	40%	grade	180	53	49	52	17
Excavation at 10 feet Below Grade						64	62		
Semi Trucks	5	76	20%	10 feet	250	64	57	60	5
Loader	1	79	50%	below grade	250	60	57	60	5
Excavator	1	81	40%	grade	250	62	58	61	5
Excavation at 12 feet Below Grade						64	62		
Semi Trucks	5	76	20%	12 feet	180	64	57	60	8
Loader	1	79	50%	below grade	180	60	57	60	8
Excavator	1	81	40%	grade	180	62	58	61	8

Appendix B

Night Construction Lighting Calculations

LIGHTING CALCULATION REPORT

Date:9/7/2017

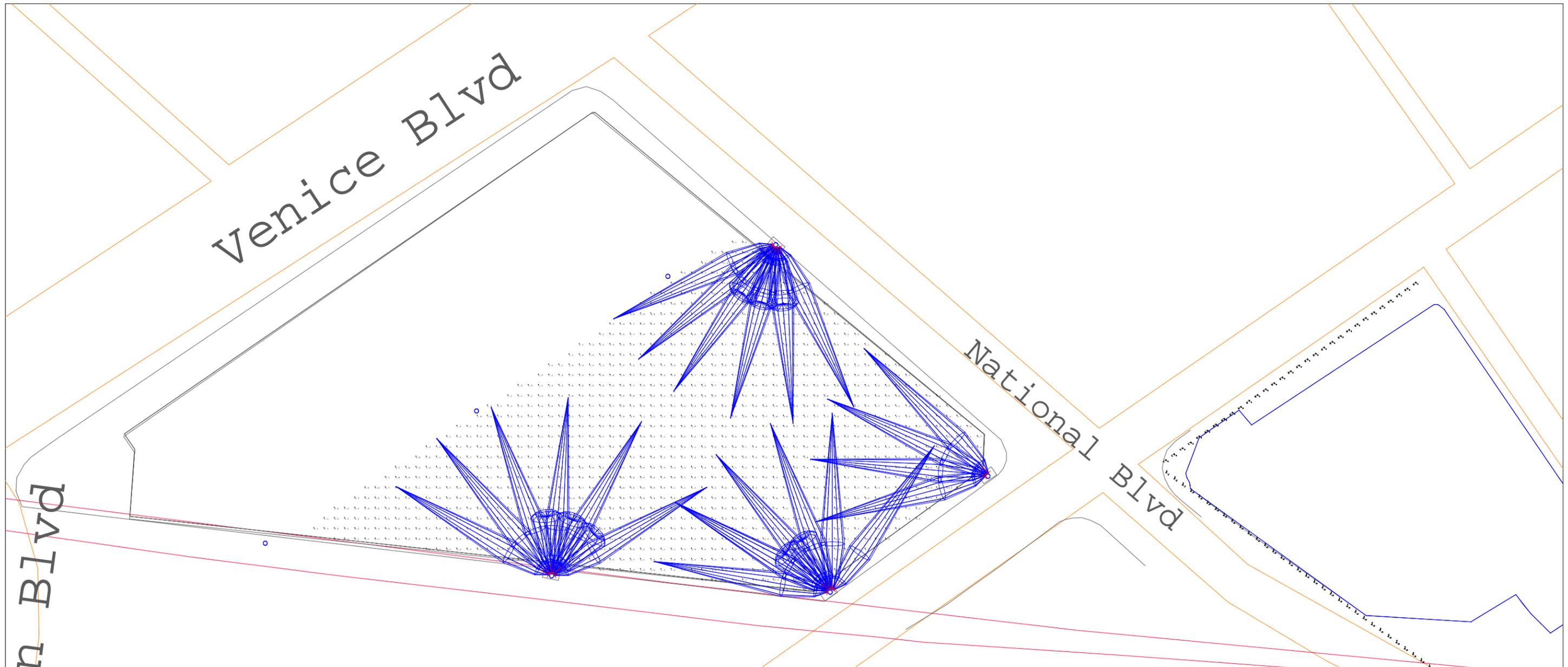


IVY STATION CULVER CITY
 CONSTRUCTION SITE LIGHTING
 ILLUMINANCE LIGHT TRESPASS ANALYSIS AT ADJACENT RESIDENTIAL PROPERTY
 VERTICAL PLANE 1: NATIONAL BOULEVARD
 VERTICAL PLANE 2: WASHINGTON BOULEVARD

ANALYSIS CRITERIA:
LIGHT TRESPASS ILLUMINANCE: MAX 0.74 fc
CALGREEN LZ3, IESNA TABLE 26.4 LIGHTING ZONE 3
CONSTRUCTION AREA ILLUMINANCE: 10 fc AVERAGE
IESNA 10TH EDITION HANDBOOK

Luminaire Schedule						
Symbol	Qty	Label	Total Lamp Lumens	LLF	Description	Lum. Watts
⊙	8	84522	N.A.	1.000		336
⊙	23	84521	N.A.	1.000		336

Calculation Summary							
Label	CalcType	Units	Avg	Max	Min	Avg/Min	Max/Min
CalcPts_Site	Illuminance	Fc	6.44	85.6	0.1	64.40	856.00
Vertical Plane_North_Side_1	Illuminance	Fc	0.01	0.1	0.0	N.A.	N.A.
Vertical Plane_West_Side_3	Illuminance	Fc	0.01	0.1	0.0	N.A.	N.A.



LIGHTING CALCULATION REPORT

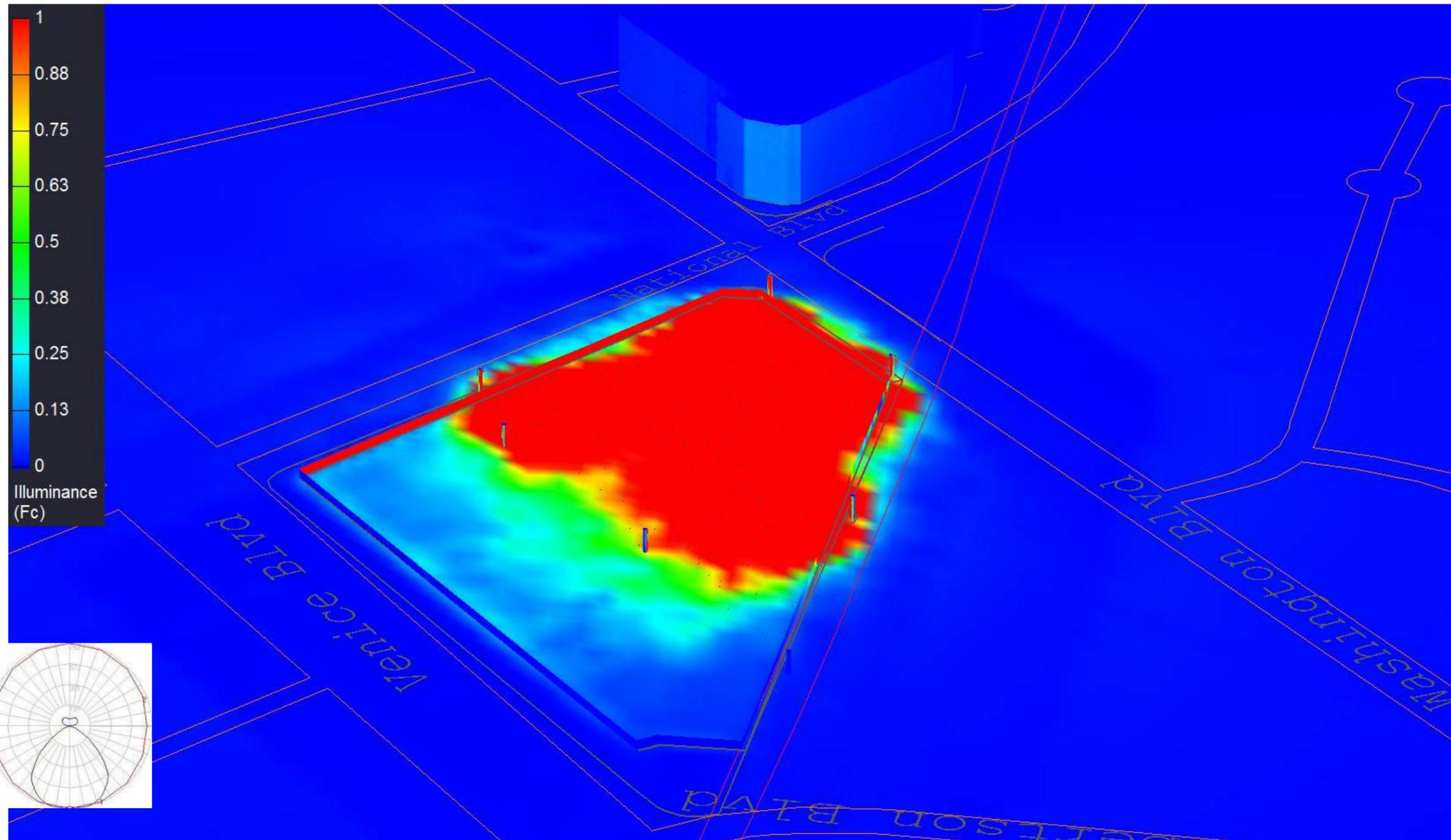
Date:9/7/2017



IVY STATION CULVER CITY
CONSTRUCTION SITE LIGHTING
ILLUMINANCE LIGHT TRESPASS ANALYSIS AT ADJACENT RESIDENTIAL PROPERTY
VERTICAL PLANE 1: NATIONAL BOULEVARD
VERTICAL PLANE 2: WASHINGTON BOULEVARD

ANALYSIS CRITERIA:
LIGHT TRESPASS ILLUMINANCE: MAX 0.74 fc
CALGREEN LZ3, IESNA TABLE 26.4 LIGHTING ZONE 3
CONSTRUCTION AREA ILLUMINANCE: 10 fc AVERAGE
IESNA 10TH EDITION HANDBOOK

Date:9/7/2017



LIGHTING CALCULATION REPORT

Date:9/7/2017

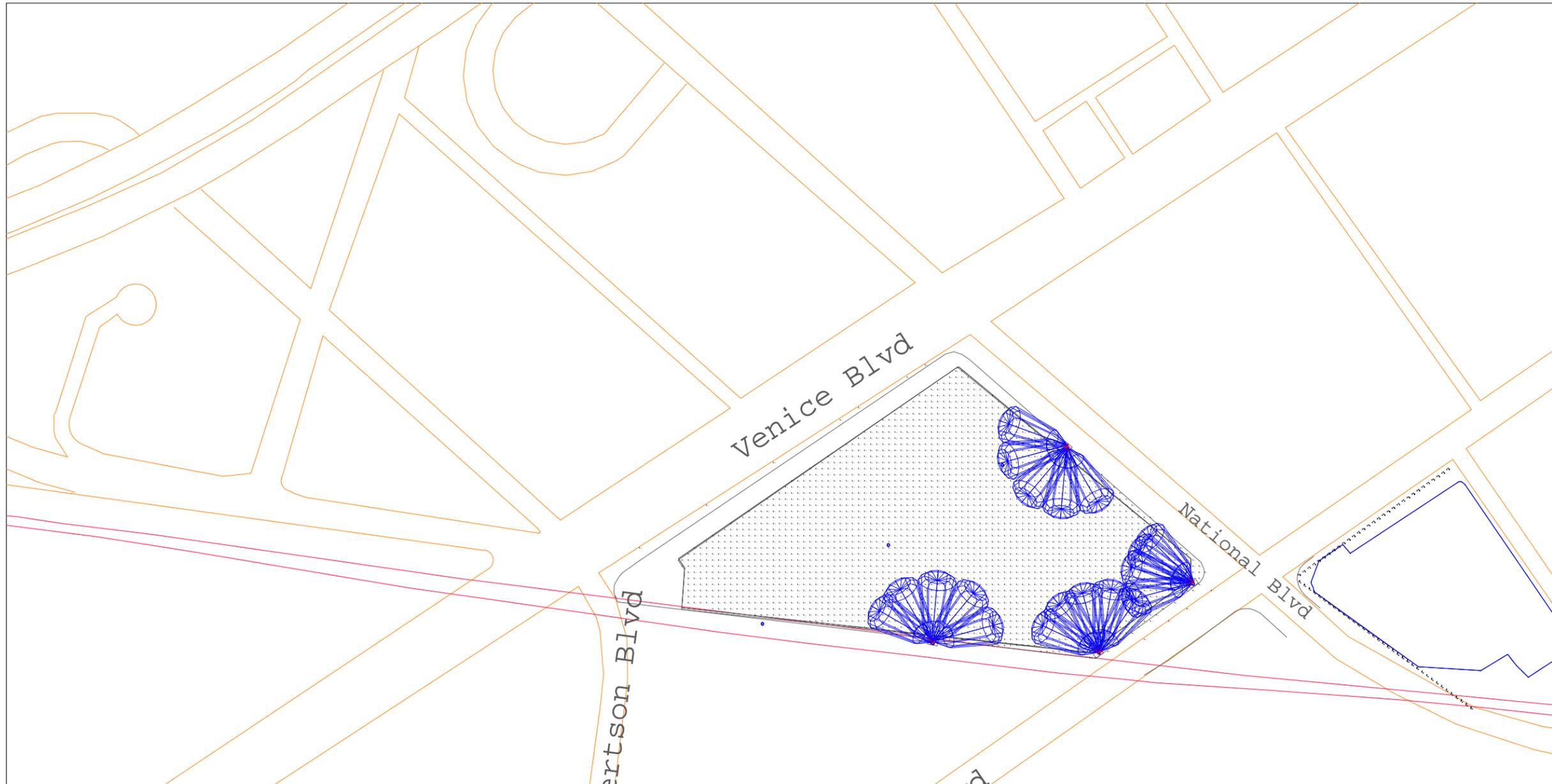


IVY STATION CULVER CITY
 CONSTRUCTION SITE LIGHTING
 ILLUMINANCE LIGHT TRESPASS ANALYSIS AT ADJACENT RESIDENTIAL PROPERTY
 VERTICAL PLANE 1: NATIONAL BOULEVARD
 VERTICAL PLANE 2: WASHINGTON BOULEVARD

ANALYSIS CRITERIA:
LIGHT TRESPASS ILLUMINANCE: MAX 0.74 fc
CALGREEN LZ3, IESNA TABLE 26.4 LIGHTING ZONE 3
CONSTRUCTION AREA ILLUMINANCE: 10 fc AVERAGE
IESNA 10TH EDITION HANDBOOK

Luminaire Schedule						
Symbol	Qty	Label	Total Lamp Lumens	LLF	Description	Lum. Watts
☉	19	84522	N.A.	2.000		336

Calculation Summary							
Label	CalcType	Units	Avg	Max	Min	Avg/Min	Max/Min
CalcPts_Site	Illuminance	Fc	5.53	43.5	0.0	N.A.	N.A.
Vertical Plane_North_Side_1	Illuminance	Fc	0.02	0.2	0.0	N.A.	N.A.
Vertical Plane_West_Side_3	Illuminance	Fc	0.03	0.4	0.0	N.A.	N.A.



Scale: 1 inch= 192 Ft.

LIGHTING CALCULATION REPORT

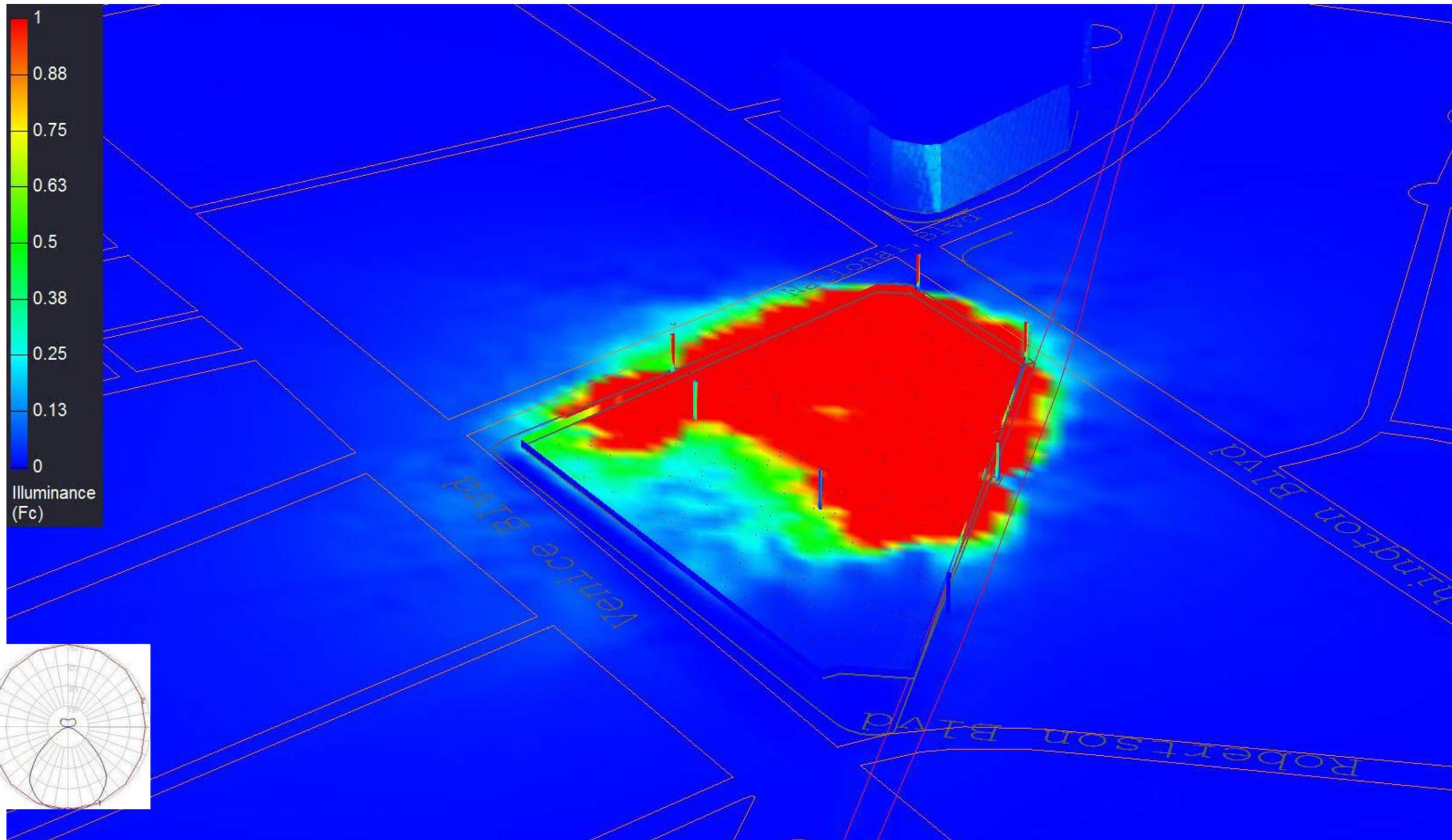
Date:9/7/2017



IVY STATION CULVER CITY
CONSTRUCTION SITE LIGHTING
ILLUMINANCE LIGHT TRESPASS ANALYSIS AT ADJACENT RESIDENTIAL PROPERTY
VERTICAL PLANE 1: NATIONAL BOULEVARD
VERTICAL PLANE 2: WASHINGTON BOULEVARD

ANALYSIS CRITERIA:
LIGHT TRESPASS ILLUMINANCE: MAX 0.74 fc
CALGREEN LZ3, IESNA TABLE 26.4 LIGHTING ZONE 3
CONSTRUCTION AREA ILLUMINANCE: 10 fc AVERAGE
IESNA 10TH EDITION HANDBOOK

Date:9/7/2017



TECHNICAL MEMORANDUM

To: Miki Bizaoui
Bernards Brothers, Inc.

From: Sri Chakravarthy, PE, TE
Saly Heng, EIT
Kimley-Horn and Associates, Inc.

Date: October 9, 2017

Subject: Ivy Station TOD, Culver City, CA – Construction Hauling Traffic Evaluation

BACKGROUND

Kimley-Horn and Associates, Inc. (Kimley-Horn) was contracted by Bernards Brothers Inc. (Bernards) to analyze daily traffic and construction haul routes to be included in the request to expand Ivy Station's construction hours beyond 8:00AM to 7:00PM during weekdays. Ivy Station's construction site is located at the Expo Line Metro Station in Culver City at the northwest corner of Washington Boulevard and National Boulevard. The project size is approximately 6.2 acres and includes a mix of commercial retail, office, residential, and hotel uses. The project will also provide 1,567 parking spaces with the majority of parking located in the site's subterranean parking structure.

According to Ivy Station's Transportation Management Plan (TMP), the site can be accessed by construction vehicles from Venice Boulevard and from National Boulevard. For site access from National Blvd, trucks would travel southbound on National Blvd and enter from the southwest corner of National Blvd and Venice Blvd. Trucks leaving the site would travel southbound on National Blvd, then westbound on Washington Blvd, and northbound on Robertson Blvd. The construction haul routes for Ivy Station in Culver City can be seen in **Attachment 1**.

Currently, the Culver City work hours are from 8:00 AM to 7:00 PM during weekdays. Bernards is proposing to expand the construction work hours to 24 hours during weekdays to expedite the construction timeline, particularly during the concrete pouring phase. If granted the work-hour extension, the concrete phase is anticipated to be shortened from 13 months to only 8 months. This technical memorandum documents the traffic analysis for the extended construction hours.

EXISTING CONDITIONS

Traffic count data was collected for 4 roadway segments adjacent to Ivy Station - Venice Boulevard, National Boulevard, Washington Boulevard, and Robertson Boulevard. 24-hour roadway segment counts were collected on Thursday, August 24, 2017, and Tuesday, August 29th, 2017. The following list indicates the roadway limits and characteristics for each segment:

1. Venice Boulevard, between Robertson Blvd and National Blvd,
 - a. Runs east-west; 3 through lanes in each direction
2. National Boulevard, between Venice Blvd and Washington Blvd,
 - a. Runs north-south; 2 through lanes in each direction
3. Washington Boulevard, between National Blvd and Robertson Blvd, and
 - a. Runs east-west; 2 through lanes in each direction
4. Robertson Boulevard, between Washington Blvd and Venice Blvd.
 - a. Runs north-south; 2 southbound through lanes, and 1 northbound through lane

After reviewing the hourly data, traffic volumes generally peak between 7:00 – 9:00AM in the morning peak period and 4:00 – 6:00PM in the afternoon peak period. Hourly traffic volume trends can be seen in **Figure 1** below. Venice Boulevard experiences higher traffic volumes than the other study segments which may be a result of a greater number of lanes and generally used as an alternative route to Interstate 10, located north of the site. The collected traffic count data are provided in **Attachment 2**.

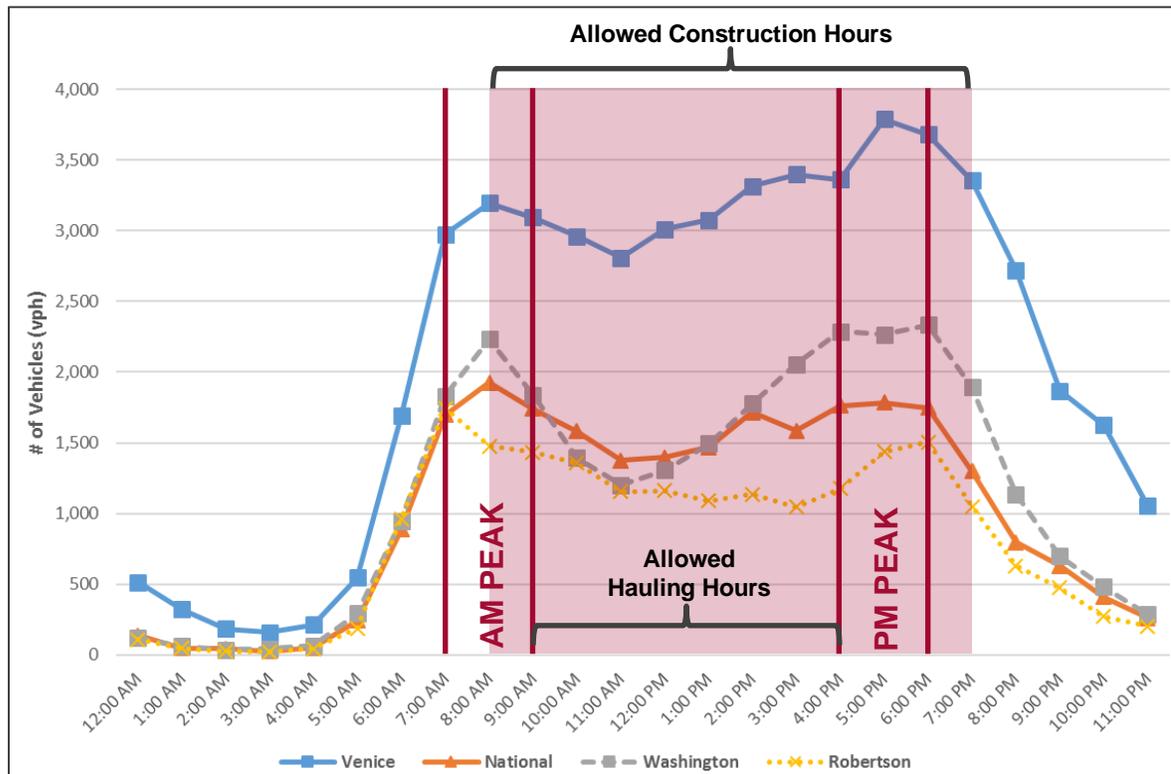


Figure 1: Current 24-Hour Volume Counts & Hour Restrictions

Figure 1 illustrates that the majority of roadway segments experience a drop off of traffic volumes of well over 60 percent when comparing data during work hours (8:00AM to 7:00PM) to off-hours (7:00PM to 8:00AM). The figure also indicates current construction hours, along with allowed hauling hours if AM and PM peak periods were avoided.

ANALYSIS

Using the traffic data collected, the impact of additional truck volumes was evaluated. According to Bernards, trucks volumes may vary between 12 and 36 trucks per hour given an 8-hour construction window. For this analysis, a conservative estimate of 36 trucks per hour was used. A heavy vehicle conversion factor of 2 passenger cars per truck was used to calculate the equivalent passenger car volume, consistent with the 2010 Highway Capacity Manual methodology.

If construction vehicles were to avoid both AM and PM peak traffic periods, hauling would be limited to only seven (7) hours per day from 9:00AM to 4:00PM. Given the nature of concrete work, a constant flow of concrete will need to travel to the site until the full pour for each section is completed. With currently permitted work hours, a 7-hour hauling window would require a greater volume of trucks per hour. If work hours were expanded to a 24-hour schedule, there would be greater flexibility with scheduling concrete pours. An expanded schedule would allow hauling between 6:00 PM to 7:00 AM, a 13-hour window thereby avoiding peak periods. **Table 1** presents hourly traffic with construction traffic during work hours and off-hours.

Table 1: Average Non-Peak Hourly Volumes with Construction Traffic

Study Segment	No Construction Trucks		With Construction Trucks	
	Non-Peak Work Hours (9AM – 4PM)	Non-Peak Off Hours (6PM-7AM)	Non-Peak Work Hours (9AM – 4PM)	Non-Peak Off-Hours (6PM-7AM)
Venice Boulevard , between Robertson Blvd and National Blvd	3,095	1,380	3,167	1,452
National Boulevard , between Venice Blvd and Washington Blvd	1,552	507	1,624	579
Washington Boulevard , between National Blvd and Robertson Blvd	1,582	647	1,654	719
Robertson Boulevard , between Washington Blvd and Venice Blvd	1,197	426	1,269	498

Construction truck volumes were added to the average hourly volumes during non-peak work hours and non-peak off-hours. With construction traffic, the maximum 36 trucks, which is equivalent to 72 passenger cars, were added to current roadway volumes. From **Table 1**, the average hourly volumes during non-peak off-hours with construction traffic are still less than that of the average hourly volumes during non-peak work hours without construction traffic. It should also be noted that given there are two access points to the site, one on Venice Blvd and one on National Blvd, construction trucks may occupy different roadway segments depending on the haul route utilized.

CONCLUSION

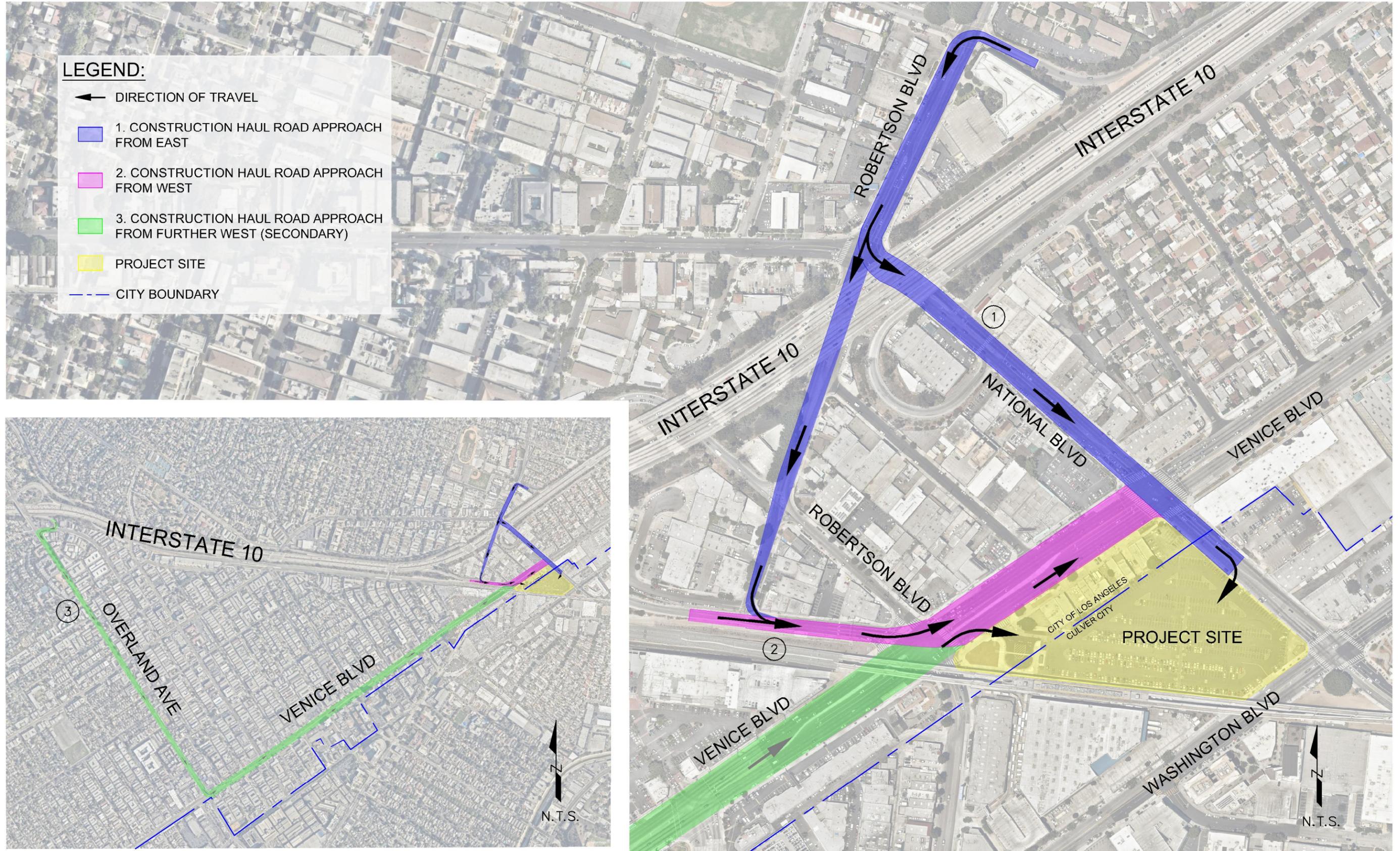
If work hours were expanded to a 24-hour schedule, there would be greater flexibility with scheduling concrete pours. The frequency of trucks entering the construction area could be lowered by lengthening the hauling period. The analysis indicates that the average hourly volumes during non-peak off-hours with construction traffic are still less than that of the average hourly volumes during non-peak work hours without construction traffic. In addition, extended work hours would allow workers and

Attachment No. 4

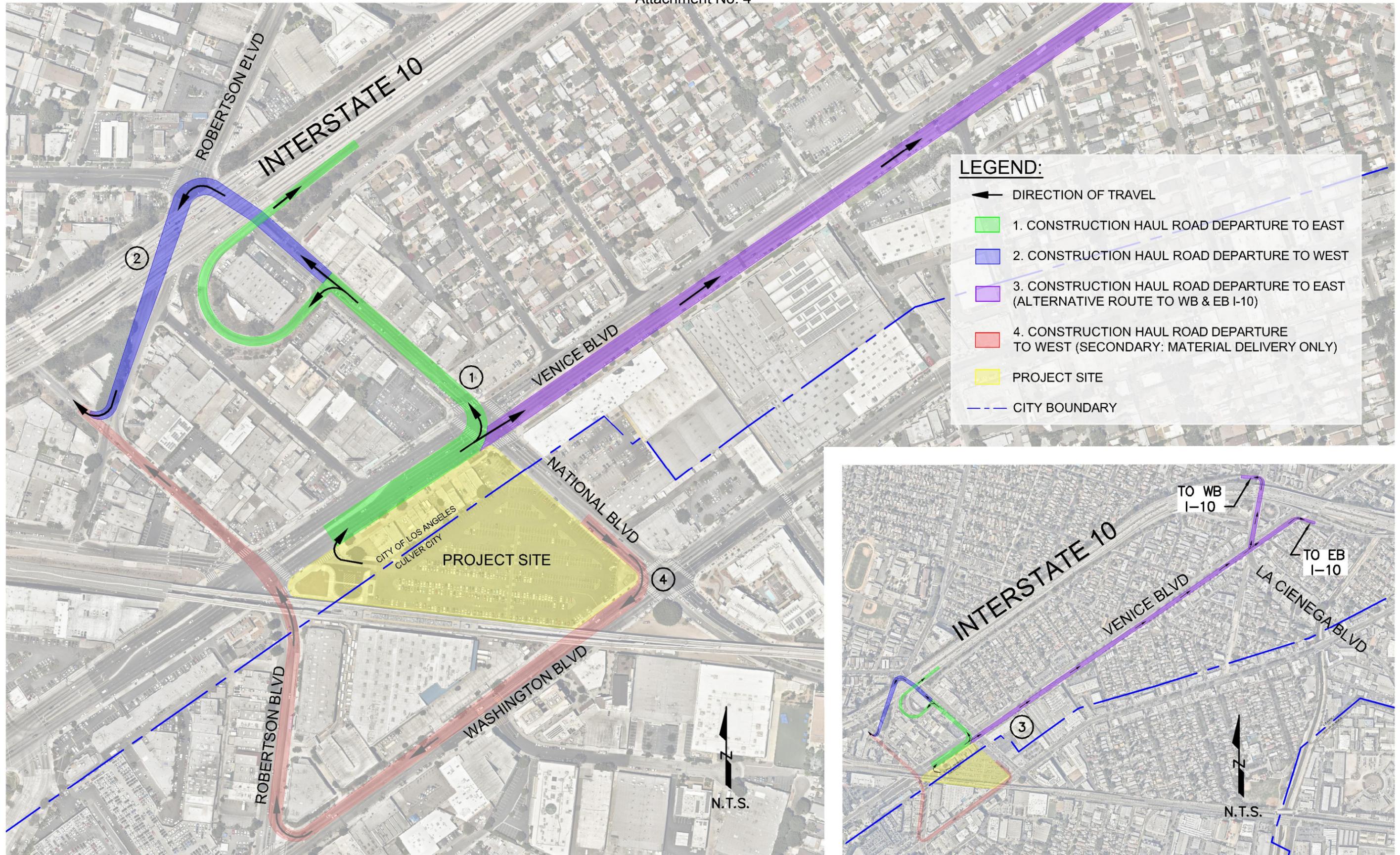
construction trucks to travel and arrive to the site during non-peak periods. For example, if an 8-hour work period is scheduled from 9:00PM to 5:00AM, workers would be able to travel to and from the construction site well outside both the PM and AM peak periods.

Attachment 1

Construction Hauling Routes



CONSTRUCTION HAUL ROUTE - APPROACH



CONSTRUCTION HAUL ROUTE - DEPARTURE

Attachment 2

24-Hour Volume Counts

Attachment No. 4

Prepared by NDS/ATD

VOLUME

Venice Blvd Bet. Robertson Blvd & National Blvd

Day: Thursday
Date: 8/24/2017

City: Culver City
Project #: CA17_5512_001

DAILY TOTALS					NB	SB	EB	WB	Total
					0	0	28,142	24,780	52,922

AM Period	NB	SB	EB	WB	TOTAL	PM Period	NB	SB	EB	WB	TOTAL			
00:00			96	52	148	12:00			364	373	737			
00:15			73	72	145	12:15			359	396	755			
00:30			86	56	142	12:30			375	386	761			
00:45			40	295	38	218	12:45		404	1502	355	1510	759	3012
01:00			56	36	92	13:00			377	374	751			
01:15			53	39	92	13:15			461	320	781			
01:30			42	33	75	13:30			418	322	740			
01:45			47	198	18	126	13:45		446	1702	358	1374	804	3076
02:00			25	25	50	14:00			444	377	821			
02:15			31	16	47	14:15			463	376	839			
02:30			24	22	46	14:30			431	401	832			
02:45			23	103	17	80	14:45		421	1759	403	1557	824	3316
03:00			27	19	46	15:00			468	399	867			
03:15			20	17	37	15:15			460	404	864			
03:30			22	24	46	15:30			456	397	853			
03:45			13	82	18	78	15:45		466	1850	349	1549	815	3399
04:00			20	16	36	16:00			441	356	797			
04:15			20	26	46	16:15			450	398	848			
04:30			26	33	59	16:30			463	397	860			
04:45			34	100	40	115	16:45		463	1817	393	1544	856	3361
05:00			45	37	82	17:00			492	440	932			
05:15			57	60	117	17:15			466	463	929			
05:30			65	81	146	17:30			523	457	980			
05:45			79	246	123	301	17:45		483	1964	467	1827	950	3791
06:00			99	134	233	18:00			516	412	928			
06:15			149	196	345	18:15			501	427	928			
06:30			171	303	474	18:30			506	391	897			
06:45			241	660	396	1029	18:45		492	2015	437	1667	929	3682
07:00			263	413	676	19:00			506	365	871			
07:15			315	453	768	19:15			498	377	875			
07:30			365	417	782	19:30			501	362	863			
07:45			383	1326	365	1648	19:45		445	1950	302	1406	747	3356
08:00			450	367	817	20:00			473	250	723			
08:15			458	349	807	20:15			492	254	746			
08:30			502	274	776	20:30			424	253	677			
08:45			463	1873	333	1323	20:45		362	1751	215	972	577	2723
09:00			424	339	763	21:00			338	179	517			
09:15			410	388	798	21:15			295	178	473			
09:30			360	397	757	21:30			238	198	436			
09:45			363	1557	413	1537	21:45		265	1136	176	731	441	1867
10:00			332	416	748	22:00			285	147	432			
10:15			368	398	766	22:15			225	139	364			
10:30			330	439	769	22:30			216	187	403			
10:45			320	1350	356	1609	22:45		216	942	211	684	427	1626
11:00			357	345	702	23:00			170	166	336			
11:15			310	344	654	23:15			160	96	256			
11:30			337	381	718	23:30			125	101	226			
11:45			352	1356	381	1451	23:45		153	608	81	444	234	1052
TOTALS			9146	9515	18661	TOTALS			18996	15265	34261			
SPLIT %			49.0%	51.0%	35.3%	SPLIT %			55.4%	44.6%	64.7%			

DAILY TOTALS					NB	SB	EB	WB	Total
					0	0	28,142	24,780	52,922

AM Peak Hour			08:00	06:45	08:00	PM Peak Hour			17:30	17:00	17:00
AM Pk Volume			1873	1679	3196	PM Pk Volume			2023	1827	3791
Pk Hr Factor			0.933	0.927	0.978	Pk Hr Factor			0.967	0.978	0.967
7 - 9 Volume	0	0	3199	2971	6170	4 - 6 Volume	0	0	3781	3371	7152
7 - 9 Peak Hour			08:00	07:00	08:00	4 - 6 Peak Hour			17:00	17:00	17:00
7 - 9 Pk Volume	0	0	1873	1648	3196	4 - 6 Pk Volume	0	0	1964	1827	3791
Pk Hr Factor	0.000	0.000	0.933	0.909	0.978	Pk Hr Factor	0.000	0.000	0.939	0.978	0.967

Attachment No. 4

Prepared by NDS/ATD

VOLUME

National Blvd Bet. Venice Blvd & Washington Blvd

Day: Tuesday
Date: 8/29/2017

City: Culver City
Project #: CA17_5512_002

DAILY TOTALS					NB	SB	EB	WB	Total
					13,031	11,585	0	0	24,616

AM Period	NB	SB	EB	WB	TOTAL	PM Period	NB	SB	EB	WB	TOTAL
00:00	23	18			41	12:00	198	131			329
00:15	22	18			40	12:15	221	146			367
00:30	9	16			25	12:30	229	142			371
00:45	18	72	15	67	33	12:45	170	818	159	578	329
01:00	4	9			13	13:00	175	151			326
01:15	6	6			12	13:15	178	170			348
01:30	6	6			12	13:30	176	185			361
01:45	6	22	4	25	10	13:45	197	726	238	744	435
02:00	5	9			14	14:00	215	212			427
02:15	4	5			9	14:15	182	228			410
02:30	3	7			10	14:30	209	230			439
02:45	7	19	3	24	10	14:45	187	793	251	921	438
03:00	3	1			4	15:00	163	230			393
03:15	8	5			13	15:15	155	252			407
03:30	1	2			3	15:30	155	207			362
03:45	5	17	2	10	7	15:45	165	638	258	947	423
04:00	3	6			9	16:00	164	276			440
04:15	6	7			13	16:15	185	262			447
04:30	11	2			13	16:30	182	273			455
04:45	12	32	3	18	15	16:45	177	708	245	1056	422
05:00	20	13			33	17:00	204	243			447
05:15	19	15			34	17:15	191	247			438
05:30	35	31			66	17:30	215	227			442
05:45	63	137	45	104	108	17:45	205	815	253	970	458
06:00	59	26			85	18:00	215	244			459
06:15	133	54			187	18:15	223	245			468
06:30	213	48			261	18:30	206	239			445
06:45	282	687	73	201	355	18:45	174	818	202	930	376
07:00	289	105			394	19:00	184	186			370
07:15	313	107			420	19:15	168	194			362
07:30	277	126			403	19:30	148	173			321
07:45	303	1182	179	517	482	19:45	110	610	138	691	248
08:00	246	240			486	20:00	87	95			182
08:15	272	216			488	20:15	104	107			211
08:30	275	189			464	20:30	115	102			217
08:45	248	1041	240	885	488	20:45	89	395	99	403	188
09:00	242	193			435	21:00	95	84			179
09:15	247	234			481	21:15	79	72			151
09:30	231	175			406	21:30	72	73			145
09:45	244	964	176	778	420	21:45	86	332	69	298	155
10:00	259	173			432	22:00	61	64			125
10:15	263	154			417	22:15	46	62			108
10:30	266	115			381	22:30	38	49			87
10:45	231	1019	120	562	351	22:45	46	191	42	217	88
11:00	220	112			332	23:00	32	40			72
11:15	213	145			358	23:15	40	31			71
11:30	228	128			356	23:30	34	29			63
11:45	193	854	135	520	328	23:45	35	141	19	119	54
TOTALS	6046	3711			9757	TOTALS	6985	7874			14859
SPLIT %	62.0%	38.0%			39.6%	SPLIT %	47.0%	53.0%			60.4%

DAILY TOTALS					NB	SB	EB	WB	Total
					13,031	11,585	0	0	24,616

AM Peak Hour	07:00	08:00		08:00	PM Peak Hour	17:30	15:45		17:45		
AM Pk Volume	1182	885		1926	PM Pk Volume	858	1069		1830		
Pk Hr Factor	0.944	0.922		0.987	Pk Hr Factor	0.962	0.968		0.978		
7 - 9 Volume	2223	1402	0	0	3625	4 - 6 Volume	1523	2026	0	0	3549
7 - 9 Peak Hour	07:00	08:00		08:00	4 - 6 Peak Hour	17:00	16:00			17:00	
7 - 9 Pk Volume	1182	885	0	0	1926	Volume	815	1056	0	0	1785
Pk Hr Factor	0.944	0.922	0.000	0.000	0.987	Pk Hr Factor	0.948	0.957	0.000	0.000	0.974

Attachment No. 4

Prepared by NDS/ATD

VOLUME

Washington Blvd Bet. National Blvd & Robertson Blvd

Day: Thursday
Date: 8/24/2017

City: Culver City
Project #: CA17_5512_003

DAILY TOTALS					NB	SB						Total	
					0	0						28,089	
					13,442							14,647	
AM Period	NB	SB	EB	WB	TOTAL		PM Period	NB	SB	EB	WB	TOTAL	
00:00			29	8	37		12:00			134	150	284	
00:15			21	14	35		12:15			148	172	320	
00:30			16	2	18		12:30			143	185	328	
00:45			16	82	13	37	29	119	147	572	229	736	1308
01:00			6	12	18		13:00			153	187	340	
01:15			7	4	11		13:15			163	198	361	
01:30			9	7	16		13:30			183	191	374	
01:45			6	28	12	35	18	63	193	692	227	803	1495
02:00			7	6	13		14:00			231	221	452	
02:15			7	2	9		14:15			193	201	394	
02:30			6	4	10		14:30			237	213	450	
02:45			3	23	1	13	4	36	264	925	216	851	1776
03:00			8	5	13		15:00			269	202	471	
03:15			2	3	5		15:15			312	204	516	
03:30			8	5	13		15:30			354	174	528	
03:45			7	25	6	19	13	44	325	1260	216	796	2056
04:00			5	5	10		16:00			318	221	539	
04:15			3	2	5		16:15			366	217	583	
04:30			4	16	20		16:30			359	274	633	
04:45			14	26	16	39	30	65	290	1333	242	954	2287
05:00			18	24	42		17:00			304	240	544	
05:15			17	35	52		17:15			344	239	583	
05:30			20	62	82		17:30			327	278	605	
05:45			31	86	87	208	118	294	253	1228	282	1039	2267
06:00			29	100	129		18:00			312	209	521	
06:15			45	129	174		18:15			375	306	681	
06:30			62	193	255		18:30			324	274	598	
06:45			89	225	303	725	392	950	276	1287	260	1049	2336
07:00			104	289	393		19:00			303	216	519	
07:15			108	287	395		19:15			298	255	553	
07:30			159	344	503		19:30			252	175	427	
07:45			193	564	347	1267	540	1831	221	1074	172	818	1892
08:00			196	333	529		20:00			206	143	349	
08:15			207	357	564		20:15			176	133	309	
08:30			193	337	530		20:30			146	80	226	
08:45			227	823	384	1411	611	2234	136	664	116	472	1136
09:00			177	289	466		21:00			125	83	208	
09:15			190	314	504		21:15			122	88	210	
09:30			144	314	458		21:30			66	63	129	
09:45			170	681	242	1159	412	1840	77	390	73	307	697
10:00			145	273	418		22:00			72	66	138	
10:15			117	212	329		22:15			77	58	135	
10:30			110	203	313		22:30			56	50	106	
10:45			142	514	191	879	333	1393	47	252	57	231	483
11:00			144	177	321		23:00			40	45	85	
11:15			106	165	271		23:15			49	39	88	
11:30			144	167	311		23:30			38	15	53	
11:45			131	525	167	676	298	1201	36	163	24	123	286
TOTALS			3602	6468	10070		TOTALS			9840	8179	18019	
SPLIT %			35.8%	64.2%	35.9%		SPLIT %			54.6%	45.4%	64.1%	

DAILY TOTALS					NB	SB						Total	
					0	0						28,089	
					13,442							14,647	

AM Peak Hour			08:00	08:00	08:00	PM Peak Hour			15:45	17:30	17:30
AM Pk Volume			823	1411	2234	PM Pk Volume			1368	1075	2342
Pk Hr Factor			0.906	0.919	0.914	Pk Hr Factor			0.934	0.878	0.860
7 - 9 Volume	0	0	1387	2678	4065	4 - 6 Volume	0	0	2561	1993	4554
7 - 9 Peak Hour			08:00	08:00	08:00	4 - 6 Peak Hour			16:00	17:00	16:15
7 - 9 Pk Volume	0	0	823	1411	2234	Volume	0	0	1333	1039	2292
Pk Hr Factor	0.000	0.000	0.906	0.919	0.914	Pk Hr Factor	0.000	0.000	0.911	0.921	0.905

Attachment No. 4

Prepared by NDS/ATD

VOLUME

Robertson Blvd Bet. Washington Blvd & Venice Blvd

Day: Thursday
Date: 8/24/2017

City: Culver City
Project #: CA17_5512_004

DAILY TOTALS					NB	SB	EB	WB	Total		
					7,091	12,651	0	0	19,742		
AM Period	NB	SB	EB	WB	TOTAL	PM Period	NB	SB	EB	WB	TOTAL
00:00	13	25			38	12:00	86	193			279
00:15	8	21			29	12:15	74	215			289
00:30	6	9			15	12:30	105	221			326
00:45	7	34	18	73	25 107	12:45	103	368	166	795	269 1163
01:00	9	4			13	13:00	90	171			261
01:15	5	6			11	13:15	109	174			283
01:30	8	6			14	13:30	90	168			258
01:45	2	24	6	22	8 46	13:45	95	384	192	705	287 1089
02:00	1	5			6	14:00	106	205			311
02:15	1	5			6	14:15	95	173			268
02:30	3	4			7	14:30	87	203			290
02:45	2	7	6	20	8 27	14:45	89	377	179	760	268 1137
03:00	4	3			7	15:00	110	153			263
03:15	0	8			8	15:15	107	153			260
03:30	1	1			2	15:30	98	152			250
03:45	1	6	5	17	6 23	15:45	107	422	166	624	273 1046
04:00	0	3			3	16:00	128	161			289
04:15	4	6			10	16:15	111	179			290
04:30	6	11			17	16:30	129	178			307
04:45	3	13	12	32	15 45	16:45	117	485	172	690	289 1175
05:00	9	20			29	17:00	164	199			363
05:15	8	20			28	17:15	128	186			314
05:30	8	35			43	17:30	177	212			389
05:45	25	50	62	137	87 187	17:45	169	638	201	798	370 1436
06:00	29	59			88	18:00	213	207			420
06:15	58	132			190	18:15	177	208			385
06:30	80	209			289	18:30	172	196			368
06:45	119	286	277	677	396 963	18:45	155	717	178	789	333 1506
07:00	122	280			402	19:00	137	180			317
07:15	146	302			448	19:15	130	165			295
07:30	174	267			441	19:30	97	147			244
07:45	164	606	290	1139	454 1745	19:45	84	448	108	600	192 1048
08:00	99	224			323	20:00	70	88			158
08:15	112	264			376	20:15	66	105			171
08:30	133	263			396	20:30	44	117			161
08:45	146	490	235	986	381 1476	20:45	50	230	89	399	139 629
09:00	138	225			363	21:00	39	95			134
09:15	141	232			373	21:15	51	78			129
09:30	129	220			349	21:30	30	72			102
09:45	112	520	237	914	349 1434	21:45	25	145	86	331	111 476
10:00	117	245			362	22:00	32	61			93
10:15	81	254			335	22:15	20	45			65
10:30	94	258			352	22:30	13	37			50
10:45	78	370	229	986	307 1356	22:45	17	82	46	189	63 271
11:00	96	211			307	23:00	28	32			60
11:15	78	204			282	23:15	13	40			53
11:30	70	223			293	23:30	10	35			45
11:45	84	328	188	826	272 1154	23:45	10	61	35	142	45 203
TOTALS	2734	5829			8563	TOTALS	4357	6822			11179
SPLIT %	31.9%	68.1%			43.4%	SPLIT %	39.0%	61.0%			56.6%

DAILY TOTALS					NB	SB	EB	WB	Total		
					7,091	12,651	0	0	19,742		
AM Peak Hour	07:00	07:00			07:00	PM Peak Hour	17:30	17:30		17:30	
AM Pk Volume	606	1139			1745	PM Pk Volume	736	828		1564	
Pk Hr Factor	0.871	0.943			0.961	Pk Hr Factor	0.864	0.976		0.931	
7 - 9 Volume	1096	2125	0	0	3221	4 - 6 Volume	1123	1488	0	0	2611
7 - 9 Peak Hour	07:00	07:00			07:00	4 - 6 Peak Hour	17:00	17:00			17:00
7 - 9 Pk Volume	606	1139	0	0	1745	4 - 6 Pk Volume	638	798	0	0	1436
Pk Hr Factor	0.871	0.943	0.000	0.000	0.961	Pk Hr Factor	0.901	0.941	0.000	0.000	0.923