Appendix J

Noise Technical Report (November 11, 2020)

Noise Technical Report
for
Encompass Health Chula Vista
City of Chula Vista, California

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Acronyms and Abbreviations

Acronym/Abbreviation	Definition
a.k.a.	Also known as
Caltrans	California Department of Transportation
CEQA	California Environmental Quality Act
City	City of Chula Vista
CNEL	Community Noise Equivalent Level
CNMP	construction noise management plan
CVMC	Chula Vista Municipal Code
dB	decibel
dBA	A-weighted decibel
FTA	Federal Transit Administration
ips	inches per second
L_{dn}	day–night average noise level
L_{eq}	equivalent noise level
L_{max}	maximum sound level
L_{min}	minimum sound level
Encompass Health Chula Vista	proposed project
PPV	peak particle velocity
RCNM	Roadway Construction Noise Model
SLM	Sound level meter
SPL	Sound pressure level
ST	Short-term

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1 Introduction and Background

This technical noise report evaluates the potential noise impacts during construction and operation of the proposed Encompass Health Chula Vista (proposed project). This assessment utilizes the significance thresholds in Appendix G of the California Environmental Quality Act (CEQA) Guidelines (14 CCR 15000 et seq.).

1.1 Project Description

The proposed project is an 80-bed inpatient rehabilitation development on an undeveloped 9.79-acre site located in the City of Chula Vista (City), California (Figure 1, Project Location). The project site is located east of Interstate 805, north of Main Street, and west of Brandywine Avenue. The property is located at 517 Shinohara Lane on Assessor's Parcel Number 644-040-01-00. The 80-bed facility is expected to have approximately 210 daily employees. The project construction would be split into two phases: the first phase would provide approximately 50 beds and the subsequent phase would provide up to 30 beds (Figures 2a and 2b, Site Plan – Phase 1 and Site Plan – Phase 2, respectively).

Phase 1

Phase 1 would include a one-story building located in the center of the site with a height ranging from 15 to 24 feet tall, and 50 beds totaling approximately 56,000 square feet. To meet the City's parking requirement of 1.5 spaces per patient bed (120 spaces), this phase of the project includes a total of 144 parking spaces located to both the north and south of the building within surface lots. As most patients would initially arrive at the facility via a non-emergency ambulance, an ambulance bay would be provided at the northern side of the building. A drop-off circle would also be located to the south of the building. Site access would be provided via Shinohara Lane.

Phase 2

Phase 2 consists of a one-story building addition to the northeast corner of phase 1. Phase 2 would match the phase 1 building height of approximately 15 to 24 feet and add approximately 20,000 square feet, bringing the total to approximately 76,000 square feet. This phase of the project reorganizes the layout of the parking spaces but does not decrease the total provided. The ambulance drop-off, which was previously located on the north side of phase 1, would be relocated to the east side of the building in phase 2, and the associated driveway would be moved closer to the eastern property boundary.

1.2 Noise Characteristics

Sound is mechanical energy transmitted by pressure waves in a compressible medium, such as air. Noise is defined as sound that is loud, unpleasant, unexpected, or undesired. The sound pressure level (SPL) has become the most common descriptor used to characterize the loudness of an ambient sound level. The unit of measurement of sound pressure is a decibel (dB). Under controlled conditions in an acoustics laboratory, the trained, healthy human ear is able to discern changes in sound levels of 1 dB when exposed to steady, single-frequency signals in the mid-frequency range. Outside such controlled conditions, the trained ear can detect changes of 2 dB in normal environmental noise. It is widely accepted that the average healthy ear, however, can barely perceive noise level changes of 3 dB. A change of 5 dB is readily perceptible, and a change of 10 dB is perceived as twice or half as loud (Caltrans 2013a). A doubling of sound energy results in a 3 dB increase in sound, which means that a doubling of sound energy (e.g., doubling the number of daily trips along a given road) would result in a barely perceptible change in sound level.

Sound may be described in terms of level or amplitude (measured in dB), frequency or pitch (measured in hertz or cycles per second), and duration (measured in seconds or minutes). Because the human ear is not equally sensitive to sound at all frequencies, a special frequency-dependent rating scale is used to relate noise to human sensitivity. The A-weighted decibel (dBA) scale performs this compensation by discriminating against low and very high frequencies in a manner approximating the sensitivity of the human ear.

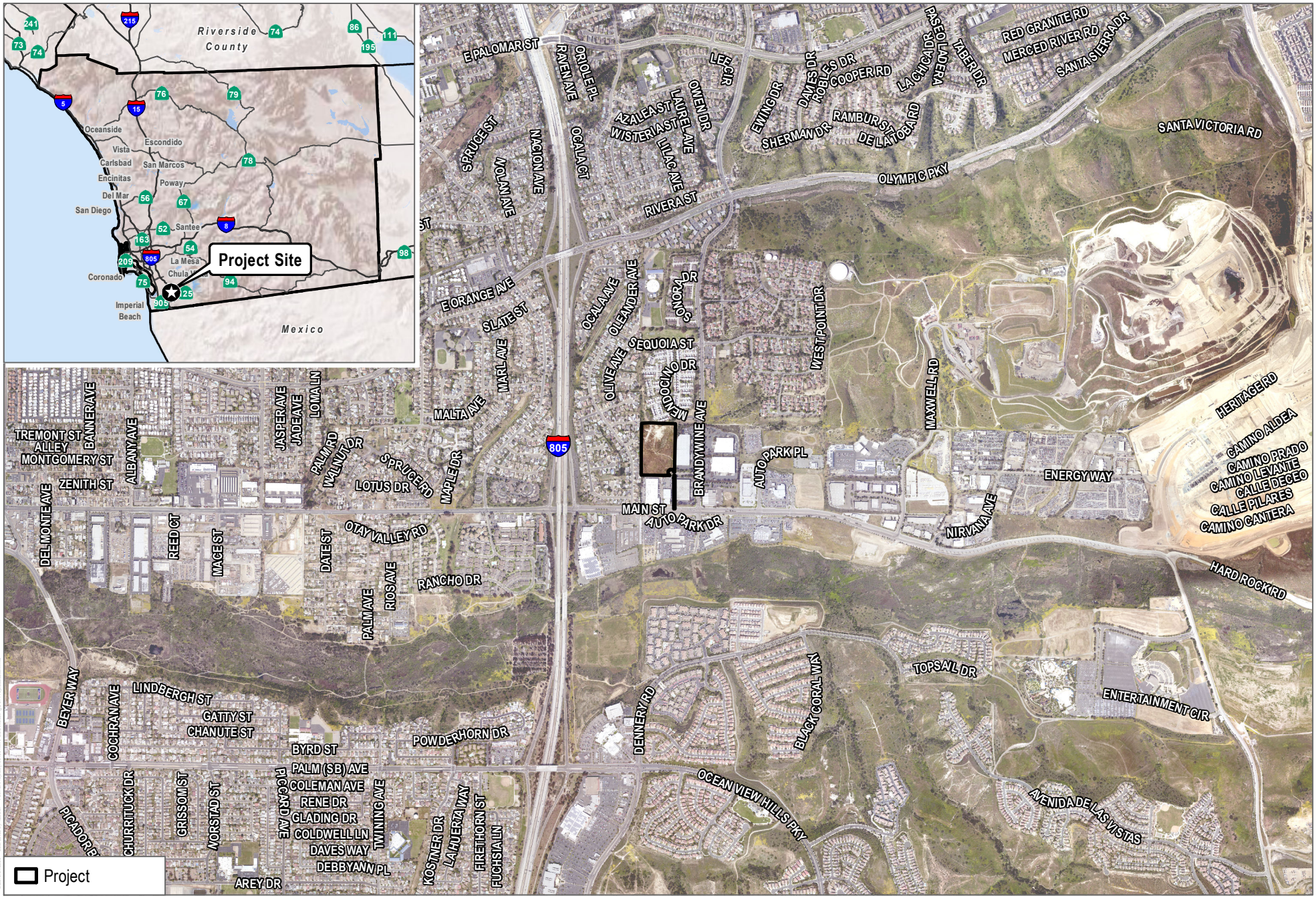
Several descriptors of noise (a.k.a., noise metrics) exist to help predict average community reactions to the adverse effects of environmental noise, including traffic-generated noise. These descriptors include the equivalent noise level over a given period (L_{eq}), the day–night average noise level (L_{dn}), and the community noise equivalent level (CNEL). Each of these descriptors uses units of dBA.

L_{eq} is a decibel quantity that represents the constant or energy-averaged value equivalent to the amount of variable sound energy received by a receptor during a time interval. For example, a 1-hour L_{eq} measurement of 60 dBA would represent the average amount of energy contained in all the noise that occurred in that hour. L_{eq} is an effective noise descriptor because of its ability to assess the total time-varying effects of noise on sensitive receptors, which can then be compared to an established L_{eq} standard or threshold of the same duration. Another descriptor is maximum sound level (L_{max}), which is the greatest sound level measured during a designated time interval or event. The minimum sound level (L_{min}) is often called the *floor* of a measurement period.

Unlike the L_{eq}, L_{max}, and L_{min} metrics, L_{dn} and CNEL descriptors always represent 24-hour periods and differ from a 24-hour L_{eq} value because they apply a time-weighted factor designed to emphasize noise events that occur during the non-daytime hours (when speech and sleep disturbance is of more concern). *Time weighted* refers to the fact that L_{dn} and CNEL penalize noise that occurs during certain sensitive periods. In the case of CNEL, noise occurring during the daytime (7:00 a.m. to 7:00 p.m.) receives no penalty. Noise during the evening (7:00 p.m. to 10:00 p.m.) is penalized by adding 5 dB to the actual levels, and nighttime (10:00 p.m. to 7:00 a.m.) noise is penalized by adding 10 dB to the actual levels. L_{dn} differs from CNEL in that the daytime period is longer (defined instead as 7:00 a.m. to 10:00 p.m.), thus eliminating the dB adjustment for the evening period. L_{dn} and CNEL are the predominant criteria used to measure roadway noise affecting residential receptors. These two metrics generally differ from one another by no more than 0.5–1 dB, and are often considered or actually defined as being essentially equivalent by many jurisdictions.

1.3 Vibration Fundamentals

Vibration is oscillatory movement of mass (typically a solid) over time. It is described in terms of frequency and amplitude and, unlike sound, can be expressed as displacement, velocity, or acceleration. For environmental studies, vibration is often studied as a velocity that, akin to the discussion of sound pressure levels, can also be expressed in dB as a way to cast a large range of quantities into a more convenient scale and with respect to a reference quantity. Vibration impacts to buildings are generally discussed in terms of inches per second (ips) peak particle velocity (PPV), which will be used herein to discuss vibration levels for ease of reading and comparison with relevant standards. Vibration can also be annoying and thereby impact occupants of structures, and vibration of sufficient amplitude can disrupt sensitive equipment and processes (Caltrans 2013b), such as those involving the use of electron microscopes and lithography equipment. Common sources of vibration within communities include construction activities and railroads. Groundborne vibration generated by construction projects is usually highest during pile driving, rock blasting, soil compacting, jack hammering, and demolition-related activities where sudden releases of subterranean energy or powerful impacts of tools on hard materials occur. Depending on their distances to a sensitive receptor, operation of large bulldozers, graders, loaded dump trucks, or other heavy construction equipment and vehicles on a construction site also have the potential to cause high vibration amplitudes.



SOURCE: SANGIS 2017

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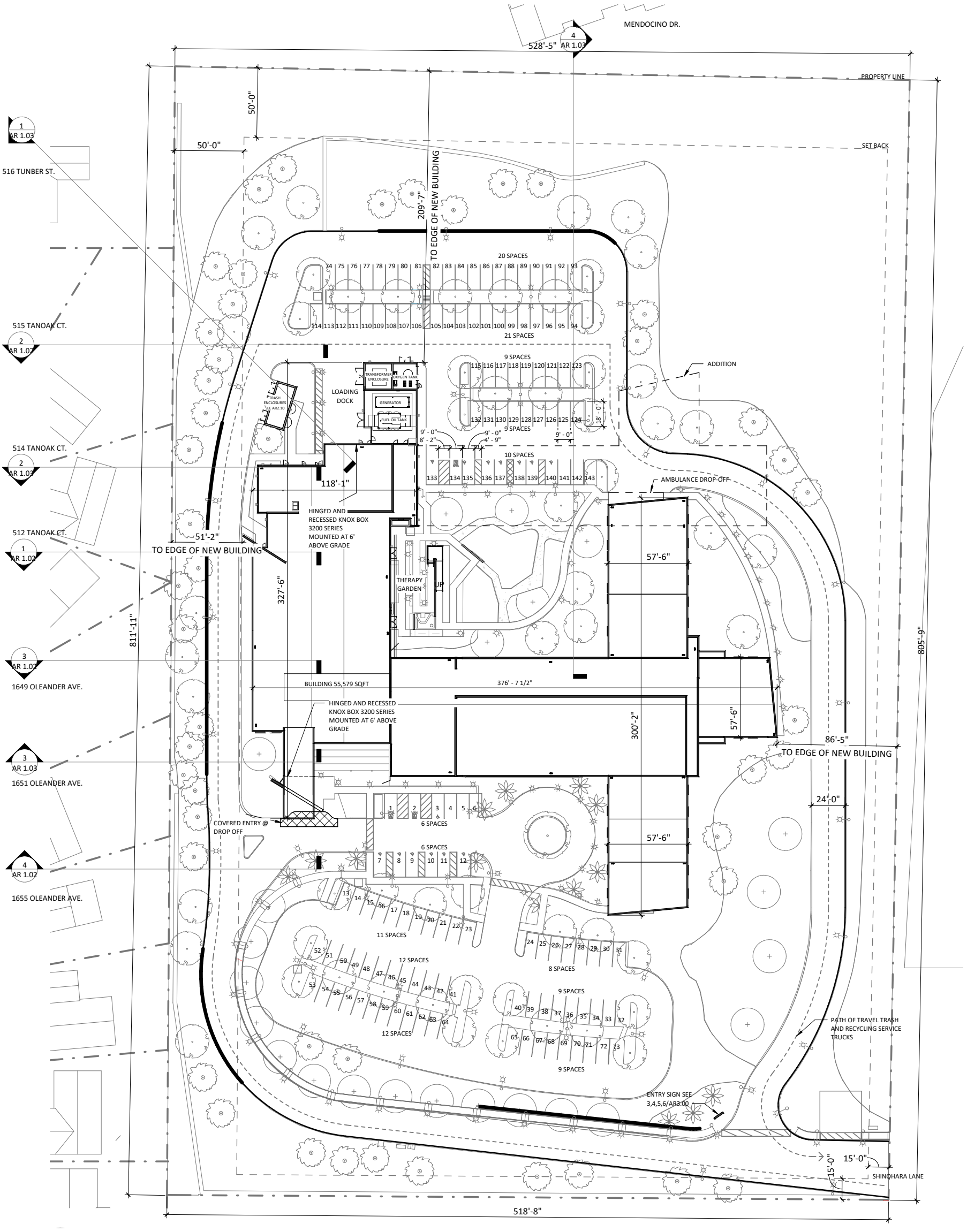
0 1,000 2,000 Feet

FIGURE 1

Project Location

Encompass Health Chula Vista

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SOURCE: Boulder Associates 2020

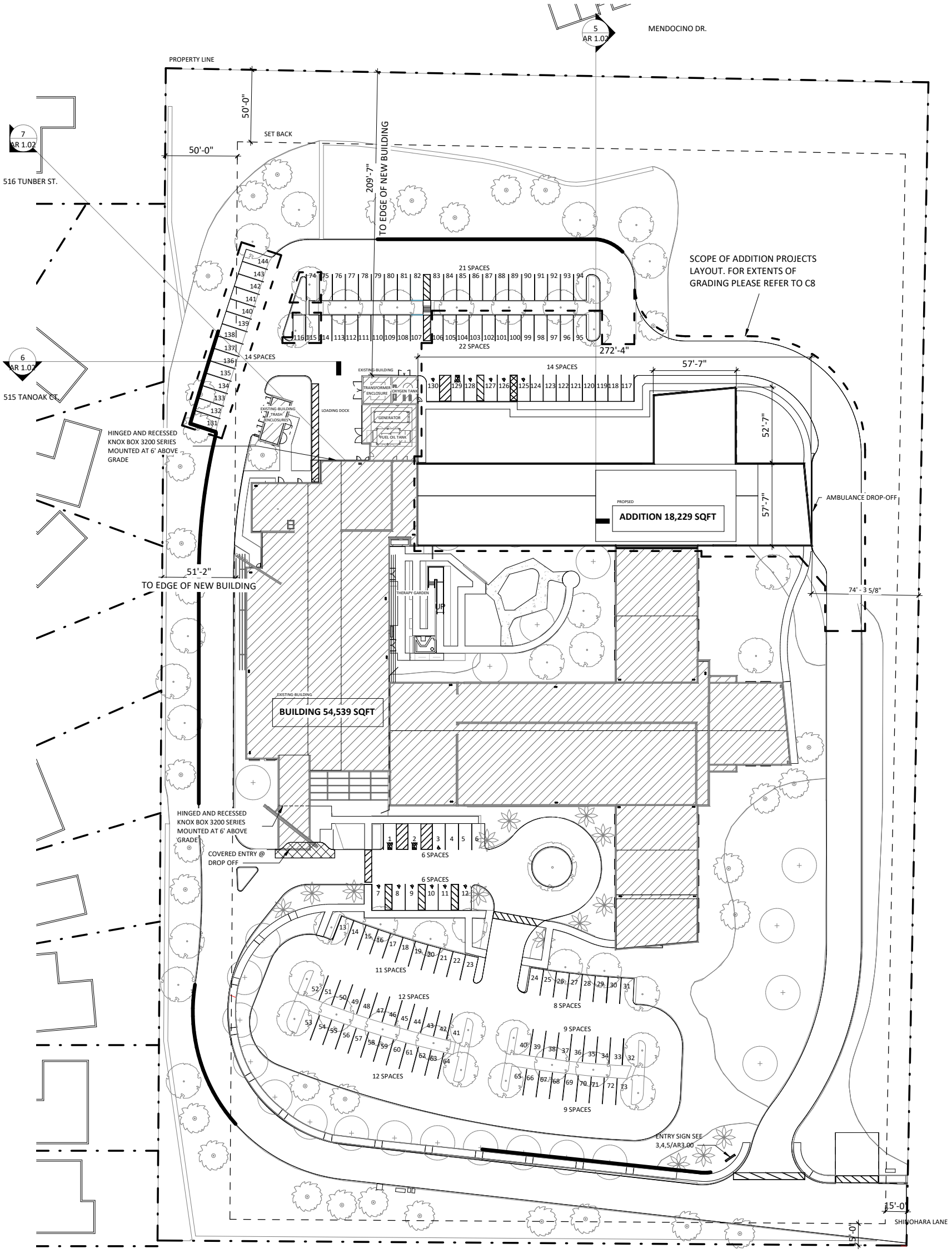
FIGURE 2a

Site Plan - Phase 1

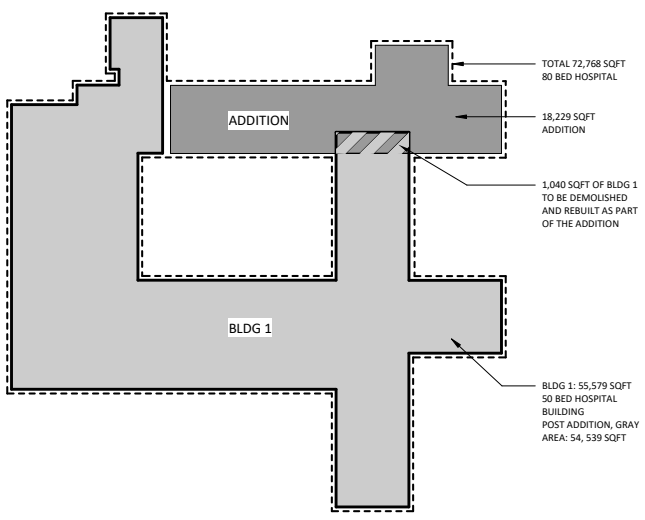
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HOSPITAL AND ADDITION DIAGRAM



BUILDING LEGEND

BUILDING BUILDING 1
(NOT IN THE SCOPE OF ADDITION PROJECT)

ADDITION PARKING COUNTS

NORTH LOT		SOUTH LOT	
ACC. CAR	5	ACC. CAR	7
ACC. VAN	1	ACC. VAN	2
REGULAR	65	REGULAR	64
TOTAL	71	TOTAL	73
		TOTAL SITE PARKING	144

SOURCE: Boulder Associates 2020

FIGURE 2b

Site Plan - Phase 2

Encompass Health Chula Vista

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2 Regulatory Setting

2.1 State

California Code of Regulations, Title 24

Title 24 of the California Code of Regulations sets standards that new development in California must meet. According to Title 24, interior noise levels are not to exceed 45 dBA CNEL in any habitable room (ICC 2019).

California Department of Health Services Guidelines

The California Department of Health Services has developed guidelines of community noise acceptability for use by local agencies (OPR 2017). Selected relevant levels are listed here:

- Below 60 dBA CNEL: normally acceptable for low-density residential use
- 50 to 70 dBA: conditionally acceptable for low-density residential use
- Below 65 dBA CNEL: normally acceptable for high-density residential use and transient lodging
- 60 to 70 dBA CNEL: conditionally acceptable for high-density residential, transient lodging, churches, educational, and medical facilities

The normally acceptable exterior noise level for transient lodging use is up to 65 dBA CNEL. Additionally, this exterior noise level limit is consistent with the City of Chula Vista General Plan Noise Element, which considers hospitals noise-sensitive land uses.

California Department of Transportation

In its Transportation and Construction Vibration Guidance Manual (Caltrans 2013b), the California Department of Transportation (Caltrans) recommends 0.5 ips PPV as a threshold for the avoidance of structural damage to typical newer residential buildings exposed to continuous or frequent intermittent sources of groundborne vibration. For transient vibration events, such as blasting, the damage risk threshold would be 1.0 ips PPV (Caltrans 2013b) at the same type of newer residential structures. For older structures, these guidance thresholds would be more stringent: 0.3 ips PPV for continuous/intermittent vibration sources, and 0.5 ips PPV for transient vibration events. With respect to human annoyance, Caltrans guidance indicates that building occupants exposed to continuous groundborne vibration at a level of 0.1 ips PPV would find it either “strongly perceptible” or “begins to annoy” and thus for purposes of this assessment would be considered a likely significant impact. Although these Caltrans guidance thresholds are not regulations, they can serve as quantified standards in the absence of such limits at the local jurisdictional level.

2.2 Local

The following are summarized or reproduced portions of relevant City regulations and General Plan policies.

City of Chula Vista Municipal Code 19.68 (Noise Ordinance)

The City of Chula Vista Noise Ordinance (Chula Vista Municipal Code [CVMC] Section 19.68) (City of Chula Vista 2020) contains regulations restricting land use related noise-generating activities and operations, so as to avoid

noise nuisance in the community. Section 19.68.030 of the CVMC establishes the maximum allowable exterior noise limits, based upon the classification of the receiving land use. These standards typically apply to stationary sources such as noise from mechanical equipment (including mechanical ventilation and air condition noise, pool pump noise, etc.) or event noise, as opposed to traffic noise. For instance, a school, commercial enterprise, or industrial operation must not generate noise that exceeds a certain specified noise level at any property boundary where an adjacent residential use exists. The property-line noise standards are presented in Table 1.

Table 1. City of Chula Vista Exterior Property-Line Noise Limits

Receiving Land Use Category	Noise Level (dB(A))	
	10 p.m. to 7 a.m. (Weekdays)	*7 a.m. to 10 p.m. (Weekdays)*
	10 p.m. to 8 a.m. (Weekends)	*8 a.m. to 10 p.m. (Weekends)*
All residential (except multiple dwelling)	45	55
Multiple-dwelling residential	50	60
Commercial	60	65
Light industry – I-R and I-L zone	70	70
Heavy industry – I zone	80	80

Note: dBA = A-weighted decibels

Title 17 of the CVMC (Environmental Quality), Chapter 24, addresses managing noisy and disorderly conduct. Section 17.24.040.C.8 specifically addresses restrictions against generation of construction noise in overnight periods. The use of any tools, power machinery, or equipment, or the conduct of construction and building work in residential zones so as to cause noises disturbing to the peace, comfort, and quiet enjoyment of property of any person residing or working in the vicinity, shall be prohibited between the hours of 10:00 p.m. and 7:00 a.m., Monday–Friday, and between the hours of 10:00 p.m. and 8:00 a.m., Saturday and Sunday, except when the work is necessary for emergency repairs required for the health and safety of any member of the community (City of Chula Vista 2020).

Although the City does not set specific numerical limits for noise associated with temporary construction activities, it can be perceived as a nuisance; thus the City restricts the times of day when construction may occur (7:00 a.m.–10:00 p.m., Monday–Friday, and 8:00 a.m.–10:00 p.m., Saturday and Sunday).

Relevant to hospital and medical center operations, a number of CVMC sections allow or exempt the usage of warning devices and noise occurring as a result of emergency response as follows:

- 2.14.020 – Emergency defined. "Emergency" means the actual or threatened existence of conditions of disaster or of extreme peril to the safety of persons and property within this City caused by such conditions as air pollution, fire, flood, storm, epidemic, riot, or earthquake, or other conditions, including conditions resulting from war or imminent threat of war, but other than conditions resulting from a labor controversy, which conditions are or are likely to be beyond the control of the services, personnel, equipment, and facilities of this City, requiring the combined forces of other political subdivisions to combat.
- 19.68.020.L – "Emergency work" means any work performed for the purpose of preventing or alleviating the physical trauma or property damage threatened or caused by an emergency.
- 19.68.020.Z – "Sound amplifying equipment," as used in this chapter, means any machine or device for the amplification of the human voice, music or any other sound. "Sound amplifying equipment," as used in this chapter, shall not be construed as including standard automobile radios when used and

heard only by occupant(s) of the vehicle in which installed, or warning devices on authorized emergency vehicles, or horns or other warning devices on other vehicles used only for traffic safety purposes. This definition shall include remotely located loudspeakers attached to and/or operated from a vehicle.

- 19.68.060.A – Warning Devices. Warning devices necessary for the protection of public safety, as, for example, police, fire and ambulance sirens, and train horns, are exempted from the provisions of this title.
- 19.68.060.C – Exemptions from Exterior Noise Standards. The provisions of CVMC 19.68.030 shall not apply to activities covered by the following sections: 4. Emergency signaling devices.

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3 Existing Conditions

SPL measurements were conducted near the proposed project site on March 6, 2020, to quantify and characterize the existing outdoor ambient sound levels. Table 2 provides the location, date, and time period at which these baseline noise level measurements were performed by an attending Dudek field investigator using a Rion-branded Model NL-52 sound level meter (SLM) equipped with a 0.5-inch, pre-polarized condenser microphone with pre-amplifier. The SLM meets the current American National Standards Institute standard for a Type 1 (Precision Grade) sound level meter. The accuracy of the SLM was verified using a field calibrator before and after the measurements, and the measurements were conducted with the microphone positioned approximately 5 feet above the ground.

Four (4) short-term (ST) noise level measurement locations (ST1–ST4) that represent existing noise-sensitive receivers were selected on and near the proposed project site. These locations are depicted as receivers ST1–ST4 on Figure 3, Noise Measurement Locations. The measured L_{eq} and L_{max} noise levels are provided in Table 2. The primary noise sources at the sites identified in Table 2 consisted of traffic along adjacent roadways, the sounds of leaves rustling, and birdsong. As shown in Table 2, the measured SPL ranged from approximately 72.3 dBA L_{eq} at ST3 to 48.4 dBA L_{eq} at ST4. Beyond the summarized information presented in Table 2, detailed noise measurement data is included in Appendix A, Baseline Noise Measurement Field Data.

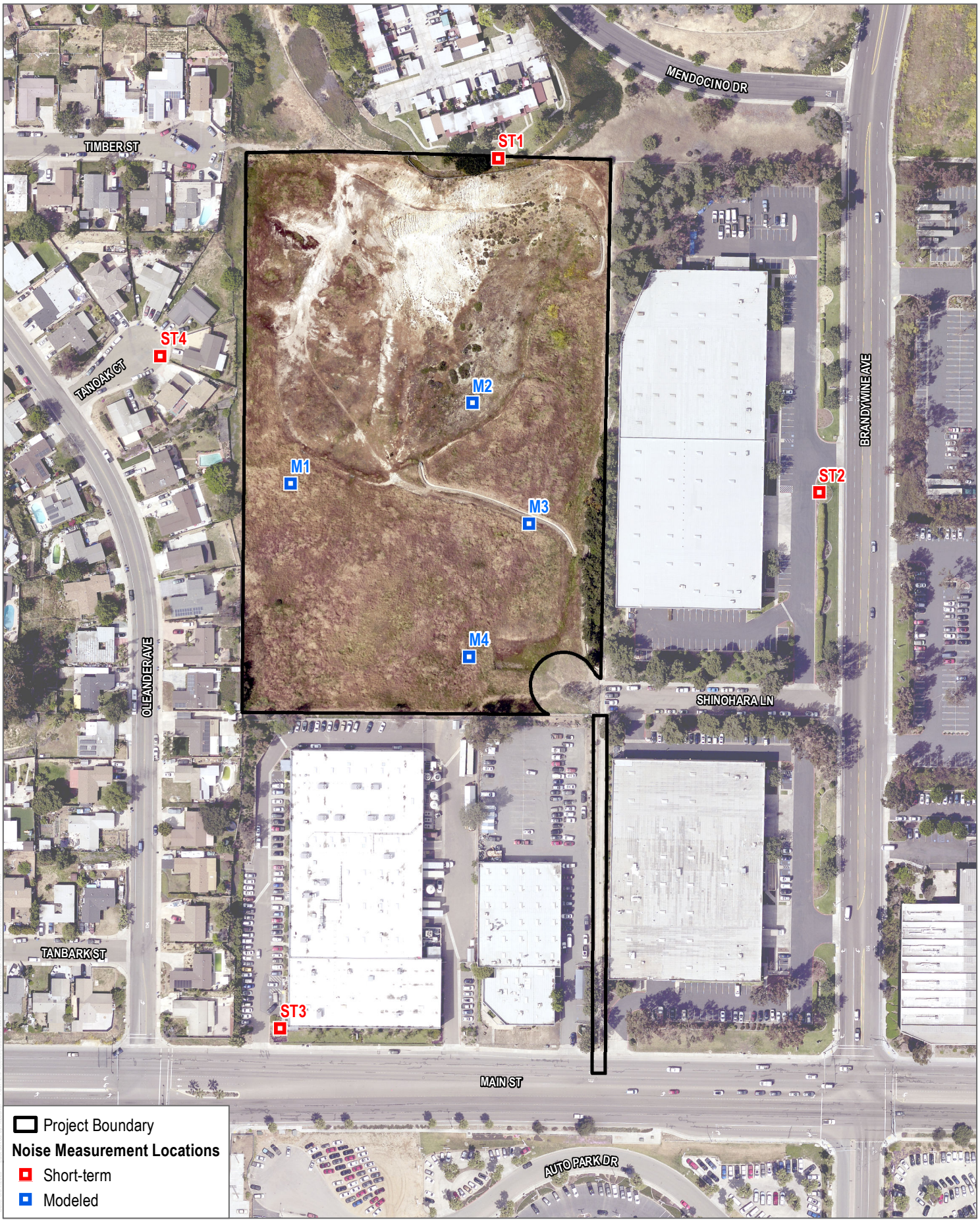
Table 2. Measured Baseline Outdoor Ambient Noise Levels

Site	Location/Address	Date/Time	L_{eq}	L_{max}
ST1	Northern Boundary of project site, on bluff near apartments	2020-03-06, 07:15 AM to 07:25 AM	53.4	67.2
ST2	Northwestern intersection of Brandywine Avenue and Shinohara Lane	2020-03-06, 07:30 AM to 07:40 AM	60	69.9
ST3	North of Main Street between Oleander Avenue and Brandywine Avenue	2020-03-06, 07:40 AM to 07:50 AM	72.3	85.7
ST4	East of Timber Street cul-de-sac	2020-03-06, 07:55 AM to 08:05 AM	48.4	53.9

Source: Appendix A.
Notes: L_{eq} = equivalent continuous sound level (time-averaged sound level); L_{max} = maximum sound level during the measurement interval; dBA = A-weighted decibels; ST = short-term noise measurement locations.

Generally, the measured samples of daytime L_{eq} agree with expectations: ST3 is above 70 dBA due largely to its proximity to Main Street, a major roadway; ST2 is near a less-trafficked Brandywine Avenue; and, ST1 and ST4 are well within the residential neighborhoods and much more distant from these sources of roadway traffic noise.

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SOURCE: SANGIS 2017

DUDEK

0 100 200 Feet

FIGURE 3

Noise Measurement Locations

Encompass Health Chula Vista

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4 Thresholds of Significance

City of Chula Vista Diego Significance Determination Thresholds

The following significance criteria are based on Appendix G of the CEQA Guidelines (14 CCR 15000 et seq.) and will be used to determine the significance of potential noise impacts. Such potential noise and vibration impacts to the community would be considered significant if the proposed project would result in the following:

a. Generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies;
b. Generation of excessive groundborne vibration or groundborne noise levels; and,
c. Expose people residing or working in the project area to excessive noise levels (for a project located within the vicinity of a private airstrip or an airport land use plan, or where such a plan has not been adopted, within 2 miles of a public airport or public use airport).

In light of these above significance criteria, this analysis uses the following standards to evaluate potential noise and vibration impacts.

- Construction noise – The City regulates construction noise by restricting the allowable hours of construction. Section 9.40.110 of the CVMC exempts construction noise from the stationary noise standards, provided that construction occurs between 7:00 a.m. and 10:00 p.m., Monday through Friday, and 8:00 a.m. to 10:00 p.m., Saturday and Sunday. Through adherence to the limitation of allowable construction times provided in the CVMC, the construction-related noise levels would not exceed any standards.
- Off-site project-attributed transportation noise – For purposes for this analysis, a direct roadway noise impact would be considered significant if increases in roadway traffic noise levels attributed to the proposed project were greater than 3 dBA CNEL at an existing noise-sensitive land use.
- Off-site project-attributed stationary noise – For purposes for this analysis, a noise impact would be considered significant if noise from typical operation of heating, ventilation, and air conditioning and other electro-mechanical systems associated with the proposed project exceeded 55 dBA hourly L_{eq} at the property line from 7:00 a.m. to 9:59 p.m., and 45 dBA hourly L_{eq} from 10:00 p.m. to 6:59 a.m.
- Construction vibration – Guidance from Caltrans indicates that a vibration velocity level of 0.2 ips PPV received at a structure would be considered annoying by occupants within (Caltrans 2013b). As for the receiving structure itself, aforementioned Caltrans guidance from Section 2 recommends that a vibration level of 0.3 ips PPV would represent the threshold for building damage risk.

For purposes of disclosure, since current CEQA noise criteria listed above do not consider it, this analysis also evaluates compatibility of on-site noise levels with the City of Chula Vista exterior and interior noise standards of 65 dBA CNEL and 45 dBA CNEL, respectively.

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5 Impact Discussion

a) Would the project result in generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?

Short-Term Construction

Construction noise and vibration are temporary phenomena. Construction noise and vibration levels vary from hour to hour and day to day, depending on the equipment in use, the operations performed, and the distance between the source and receptor.

Equipment that would be in use during construction would include, in part, graders, backhoes, concrete saws, excavators, dump trucks, loaders, cranes, manlifts, cement mixers, pavers, rollers, welders, and air compressors. The typical maximum noise levels for various pieces of construction equipment at a distance of 50 feet are presented in Table 3. Usually, construction equipment operates in alternating cycles of full power and low power, producing average noise levels over time that are less than the listed maximum noise level. The average sound level of construction activity also depends on the amount of time that the equipment operates and the intensity of construction activities during that time.

Table 3. Typical Construction Equipment Maximum Noise Levels

Equipment Type	Typical Equipment (L_{max}, dBA at 50 Feet)
Air compressor	78
Backhoe	78
Concrete pump truck	81
Grader	85
Crane	81
Dump Truck	76
Roller	80
Manlift	75
Generator	72
Front End Loader	79
Paver	77
Concrete Saw	90
Welder	74

Source: DOT 2006.
Note: L_{max} = maximum sound level; dBA = A-weighted decibels.

Aggregate noise emission from proposed project construction activities, broken down by sequential phase, was predicted at two distances to the nearest existing noise-sensitive receptor: 1) from the nearest position of the construction site boundary and 2) from the geographic center of the construction site, which serves as the time-averaged location or geographic *acoustical centroid* of active construction equipment for the phase under study. The intent of the former distance is to help evaluate anticipated construction noise from a limited quantity of equipment or vehicle activity expected to be at the boundary for some period of time, which would be most appropriate for phases such as site preparation, grading, and paving. The latter distance is used in a manner similar

to the general assessment technique as described in Federal Transit Administration (FTA) guidance for construction noise assessment (FTA 2006), when the location of individual equipment for a given construction phase is uncertain over some extent of (or the entirety of) the construction site area. Because of this uncertainty, all the equipment for a construction phase is assumed to operate—on average—from the acoustical centroid. Table 4 summarizes these two distances to the apparent closest noise-sensitive receptor for each of the five sequential construction phases. At the site boundary, this analysis assumes that up to only one piece of equipment of each listed type per phase will be involved in the construction activity for a limited portion of the 8-hour period. In other words, at such proximity, the operating equipment cannot "stack" or crowd the vicinity and still operate. For the acoustical centroid case, which intends to be a geographic average position for all equipment during the indicated phase, this analysis assumes that the equipment may be operating up to all of eight (8) hours per day (i.e., comparable to a typical on-site work shift).

Table 4. Estimated Distances between Construction Activities and the Nearest Noise-Sensitive Receptors

Construction Phase (and Equipment Types Involved)	Distance from Nearest Noise-Sensitive Receptor to Construction Site Boundary (Feet)	Distance from Nearest Noise-Sensitive Receptor to Acoustical Centroid of Site (Feet)
Phase 1		
Site Preparation (Loader)	15	115
Grading (Excavator)	15	115
Building Construction (Crane, Forklift, Backhoe, Welder, Generator)	100	115
Architectural Finishes (Air Compressor)	100	115
Paving (Roller, Backhoe, Dump Truck, Paver, Mixer Truck)	30	115
Phase 2		
Site Preparation (Loader)	15	115
Grading (Concrete Saw, Loader)	30	115
Building Construction (Forklift, Backhoe)	100	115
Architectural Finishes (Air Compressor)	100	115
Paving (Roller, Backhoe, Paver, Dump Truck)	30	115

A Microsoft Excel–based noise prediction model emulating and using reference data from the Federal Highway Administration Roadway Construction Noise Model (RCNM) (FHWA 2008) was used to estimate construction noise levels at the nearest occupied noise-sensitive land use. (Although the RCNM was funded and promulgated by the Federal Highway Administration, it is often used for non-roadway projects, because the same types of construction equipment used for roadway projects are often used for other types of construction.) Input variables for the predictive modeling consist of the equipment type and number of each (e.g., two graders, a loader, a tractor), the duty cycle for each piece of equipment (e.g., percentage of time within a specific time period, such as an hour, when the equipment is expected to operate at full power or capacity and thus make noise at a level comparable to what is presented in Table 3, Typical Construction Equipment Maximum Noise Levels), and the distance from the noise-sensitive receiver. The predictive model also considers how many hours that equipment may be on site and operating (or idling) within an established work shift. Conservatively, no topographical or structural shielding was assumed in the modeling. The RCNM has default duty-cycle values for the various pieces of equipment, which were derived from an extensive study of typical construction

activity patterns. Those default duty-cycle values were used for this noise analysis, which is detailed in Appendix B, Construction Noise Modeling Input and Output, and produce the predicted results displayed in Table 5.

Table 5. Predicted Construction Noise Levels per Activity Phase

Construction Phase (and Equipment Types Involved)	8-Hour L_{eq} at Nearest Noise-Sensitive Receptor to Construction Site Boundary (dBA)	8-Hour L_{eq} at Nearest Noise-Sensitive Receptor to Acoustical Centroid of Site (dBA)
Phase 1		
Site Preparation (Loader)	79.5	67.8
Grading (Excavator)	78.4	69.8
Building Construction (Crane, Forklift, Backhoe, Welder, Generator)	75.5	74.3
Architectural Finishes (Air Compressor)	79.1	73.5
Paving (Roller, Backhoe, Dump Truck, Paver, Mixer Truck)	79.1	66.8
Phase 2		
Site Preparation (Loader)	79.5	67.8
Grading (Concrete Saw, Loader)	79.1	76.4
Building Construction (Forklift, Backhoe)	74.2	73.0
Architectural Finishes (Air Compressor)	74.2	72.9
Paving (Roller, Backhoe, Paver, Dump Truck)	78.5	66.8

Notes: L_{eq} = equivalent noise level; dBA = A-weighted decibels.

As presented in Table 5, the estimated construction noise levels are predicted to be less than 80 dBA L_{eq} over an 8-hour period when activities take place near the western project boundaries. Note that these estimated noise levels at a source-to-receiver distance of 15 feet would only occur when noted pieces of heavy equipment would each operate for a cumulative period from 1 to 3 hours a day. By way of example, a grader might make multiple passes on site that are this close to a receiver; but, for the remaining time during the day, the grader is sufficiently farther away, performing work at a more distant location, or simply not operating. Under these conditions, predicted operation of construction equipment and processes do not exceed noise levels of 80 dBA L_{eq}.

Compared to measurements of the daytime outdoor ambient sound level at representative sample locations as shown in Table 2, predicted construction noise levels ranging in the middle to upper seventies of A-weighted decibels as appearing in Table 5 are considerably higher and would be clearly perceptible to an average listener having healthy human hearing. However, at nearby off-site residences exposed to such construction-related noise, the increased noise levels would typically be relatively short term and temporary—lasting only as long as construction occurs during allowable hours. And because it is anticipated that construction activities associated with the proposed project would take place within the hours of 7:00 a.m. and 10:00 p.m., Monday through Friday, and 8 a.m. to 10 p.m., Saturday and Sunday, the noise-producing activity would thus in compliance with the City's Municipal Code, construction noise impacts would be considered **less than significant**.

Long-Term Operational

Roadway Traffic Noise

The proposed project would result in the creation of additional vehicle trips on local roadways (i.e., Brandywine Avenue and Shinohara Lane), which could result in increased traffic noise levels at adjacent noise-sensitive land uses. Appendix C, Traffic Noise Modeling Input and Output, contains a spreadsheet with traffic volume data (average daily traffic) converted to peak hour traffic for Shinohara Lane and surrounding arterial roadways. These peak hour volumes were calculated by taking 10% of the average daily traffic and using a vehicle distribution of 97% autos, 2% medium trucks, and 1% heavy trucks. Consistent with the example in the Caltrans Technical Noise Supplement ("TeNS") that is considered "fairly typical," peak hour volume is assumed to be 10% of ADT (Caltrans 2013a). In particular, the proposed project would create additional traffic along Shinohara Lane, which according to the Traffic Impact Assessment prepared for the proposed project (Dudek 2020a) would add 480 average daily trips to the segment of Shinohara Lane and adjacent roadways surrounding the project site. ADT volumes are summarized on Table 6, Roadway Segment ADT Volumes (Dudek 2020a). Traffic Volumes on Main street were modeled to recreate the ambient noise levels. These traffic volumes were estimated from the intersection traffic volumes and forecast for Existing 2019 and Buildout 2035 conditions used in the Local Mobility Analysis Encompass Health Chula Vista, prepared by Dudek, July 2020 (Dudek 2020b).

Table 6. Roadway Segment ADT Volumes

Roadway Segment	Existing	Existing plus Project	Substantial Effect Criteria	Buildout	Buildout plus Project	Substantial Effect Criteria
	ADT[1]	*ADT[1]*	*Project ADT >800*	*ADT[1]*	*ADT[1]*	*Project ADT >800*
Brandywine Avenue						
Shinohara Lane to Main Street	9,599	9,935	336	19,300	19,636	336
Shinohara Lane						
West of Brandywine Avenue	58	538	480	85	565	480
Main Street[2]						
West of Brandywine Avenue	22,940	23,180	240	32,980	33,220	240

Notes: LOS is based on City of Chula Vista Roadway Segment LOS Thresholds

1 ADT – Average Daily Traffic

2 Peak hour traffic volumes were multiplied by a factor of 10 to calculate ADT

Potential noise effects from vehicular traffic were assessed using the Federal Highway Administration's Traffic Noise Model version 2.5 (FHWA 2004). Information used in the model included the roadway geometry, posted traffic speeds, and traffic volumes for the above roadway segments with the following scenarios: existing (year 2019), existing plus project, buildout (2035), and buildout plus project. Noise levels were modeled at representative noise-sensitive receivers ST1 through ST4, as shown in Figure 3. Demonstrating validity of the TNM model, predicted traffic noise levels for the existing (2019) without proposed project case shown in Table 6

compare well (i.e., within an average difference of 3 dBA) with the measured L_{eq} magnitudes of ST2 and ST3, which were used to calibrate traffic. Hence, on the basis of the TNM model accuracy for the existing (2019) without project case, future traffic noise levels can be predicted with confidence.

The City's Noise Element establishes a policy for exterior sensitive areas to be protected from high noise levels. The Noise Element sets 65 dBA CNEL for the outdoor areas and 45 dBA CNEL for interior areas as the normally acceptable levels. However, existing levels from traffic already exceed this threshold. For the purposes of this noise analysis, such impacts are considered significant when they cause an increase of 3 dB from existing noise levels. An increase or decrease in noise level of at least 3 dB is required before any noticeable change in community response would be expected (Caltrans 2013a). The receivers were modeled to be 5 feet above the local ground elevation. The noise model results are summarized in Table 7.

Table 7. Roadway Traffic Noise Modeling Results

Modeled Receiver Tag (Location Description)	Existing (2019) Noise Level (dBA CNEL)	Existing (2019) Plus Project Noise Level (dBA CNEL)	Buildout (2050) Noise Level (dBA CNEL)	Buildout (2050) Plus Project Noise Level (dBA CNEL)	Maximum Project-Related Noise Level Increase (dB)
ST1	43.1	42.4	45.8	45.3	0.0
ST2	60.5	60.8	63.5	63.6	0.3
ST3	69.5	69.6	71.1	71.1	0.0
ST4	41.3	41.2	43.2	43.0	0.0

Notes: dBA = A-weighted decibel; CNEL = Community Noise Equivalent Level; dB = decibel.

Table 7 shows that at all four listed representative receivers, the addition of proposed project traffic to the roadway network would result in a CNEL increase of less than 3 dB, which is below the discernible level of change for the average healthy human ear. At some modeled locations, expected traffic noise levels are predicted to decrease due to introduction of the proposed new buildings as sound path occlusion between them and the roadway noise source. Thus, a **less-than-significant impact** is expected for proposed project–related off-site traffic noise increases affecting existing residences in the vicinity.

Traffic Noise Exposure to Future Project Occupants

Aside from exposure to aviation traffic noise, current CEQA noise-related guidelines do not require an assessment of exterior-to-interior noise intrusion, environmental noise exposure to occupants of newly-created project residences, or environmental noise exposure to exterior non-residential uses attributed to the development of the proposed project. Nevertheless, the California Building Code requires that interior background noise levels not exceed a CNEL of 45 dB within habitable rooms. Hence, the following predictive analysis of traffic noise exposure at the exteriors of occupied residences and outdoor living areas is provided for informational purposes.

In addition to the prediction results presented in Table 7, the FHWA TNM software was also used to predict the buildout + Project scenario traffic noise levels at multiple on-site exterior areas, as listed in Table 8. Modeled receptor locations, which appear in Figure 3, include representative positions for the exteriors of the northern, eastern, western, and southern facades.

Table 8. On-Site Exterior Roadway Traffic Noise Modeling Results

Location	Modeled Receiver	Description	Predicted Traffic Noise Exposure at Modeled Receiver (dBA CNEL)
Western Façade	M1	Café area	41
Northern Façade	M2	Private Room	46
Eastern Façade	M3	Private Room	43
Southern Façade	M4	Private Room	39

Notes: dBA = A-weighted decibel; CNEL = community noise equivalent level.

Typically, with the windows open, building shells provide approximately 15 dB (i.e., an average of 12–18 dB [OPR 2017]) of exterior-to-interior noise reduction; while with windows closed residential construction generally provides a minimum of 25 dB attenuation (FHWA 2011). Therefore, rooms exposed to an exterior CNEL not greater than 60 dB would result in an interior background CNEL of 45 dB or less, even with open fenestration. In other words, the arithmetic difference of an exterior noise level less than 60 dBA CNEL and an exposed building façade that provides 15 dB of sound insulation results in an interior background sound level less than 45 dBA CNEL. According to Table 8, no rooms will be exposed to exterior noise levels of greater than 60 dbA CNEL and thus complying with the California Building Code threshold of 45 dB CNEL within habitable rooms.

Stationary Operations Noise

The incorporation of new facilities attributed to development of the proposed project will add a variety of noise-producing mechanical equipment that include those presented and discussed in the following paragraphs. Most of these noise-producing equipment or sound sources would be considered stationary, or limited in mobility to a defined area.

Facility Unit Heating, Ventilation, and Air Conditioning Noise

According to its mechanical roof plan and schedule, the proposed project would feature ten (10) air handling units (AHU), 5 ductless split system units (DSO), and 14 exhaust fans spread across the roof. Using the overall sound levels appearing on the mechanical schedule, or estimated with available fan data (e.g., airflow volume rate and static pressure) these distinct units of rooftop HVAC equipment individually have a sound emission source level between 58 dBA and 78 dBA at 3 feet. The proposed project site plan suggests that the AHU units would be installed behind 6 foot screening walls. The closest existing noise-sensitive residential receptor to the west of the proposed project's building would be as close as approximately 100 horizontal feet to what would be an arrangement of up to 5 AHU units, 3 DSO units, and 5 exhaust fans. However, due to the higher relative elevation of the sources on the roof and sound occlusion of the noise wall, and their horizontal distances away from the noise sensitive receivers as modeled, the predicted sound emission level from the combination of these units would be no more than 44 dBA L_{eq}, and would thus be compliant with the City's nighttime threshold of 45 dBA hourly $L_{eq.}$ Please see Appendix D, Facility HVAC Noise Prediction, for a graphical display of the predicted aggregate noise level from these units, superimposed on an aerial image of the expected layout of the HVAC equipment and proposed project building and the proximate neighboring residences to the west. Under such conditions, the operation of residential air-conditioning units would result in **less-than-significant** noise impacts.

Emergency Generator

The proposed project also features a backup generator that will be installed on ground level north of the main building. The City of Chula Vista exempts noise from the backup generator during actual emergencies, on the basis of CVMC

2.14.020 defining emergencies and CVMC 19.68.020.L defining "emergency work," as previously presented in Section 2.3, such that the latter would logically include operation of the generator during emergency conditions to "alleviate physical trauma" (i.e., continue function of the facility to treat patients). However, noise emission from regular testing at an expected frequency of up to one half-hour test per month during daytime hours would need to comply with the City's established noise limit at the property line: 55 dBA hourly L_{eq}.

The backup generator is expected to be a Cummins 750DQCB model with an F202 "Quiet Site II" type sound enclosure (or comparably performing and sound attenuated equipment). Available sound data from the manufacturer for this generator model agrees with online sound enclosure information (Cummins 2008) and indicates the enclosed operating generator exhibits a casing radiated noise level of 74.8 dBA at a distance of 23 feet, and an exhaust (if muffled with a "critical-grade" silencer, rated at a minimum 35 dBA of noise reduction performance) anticipated to demonstrate 70.4 dBA at 23 feet. Hence, with these two acoustic contributors, the aggregate noise level from the backup generator when tested at full load would yield a property line noise level of 56 dBA hourly L_{eq}. If tested for only up to a 15-minute period, the hourly L_{eq} value would drop by 3 dB (due to halving of time) and become 53 dBA. But if the test must proceed for a full half-hour, then the noise at the nearest western proposed project property boundary may exceed 55 dBA hourly L_{eq} and thus become a significant impact without implementation of **MM-N-2**. Immediately prior to such testing, installation of a temporary sound blanket on the chain-link fence that forms the western perimeter of the backup generator outdoor area could provide noise-reducing linear occlusion between the generator and this potentially impacted portion of the western property line. The installed sound blanket or curtain, with a minimum sound transmission class rating of at least 15, would reduce the operating generator noise in the westerly direction and reduce the property line noise exposure to a level compliant with 55 dBA hourly L_{eq}. When the generator testing is completed, the temporary sound barrier can be removed from the fence and stored until needed for the subsequent monthly test. Usage of the sound blanket or curtain as suggested herein presumes that the generator has sufficient equipment clearance (around its surfaces) to receive proper airflow and vent heat. If, on the other hand, the porous chain-link fence provides a means of airflow to the generator, then the sound curtain or blanket may need to be installed some distance external to and away from the fence—thus not impeding airflow but still furnishing sound path occlusion needed to realize the intended noise reduction. Under such conditions, operation of the backup generator would result in a **less-than-significant with mitigation** noise impact.

Loading Dock Operations

The proposed project also features a loading dock at the north side of the new building facing the stand-by generator area and trash enclosure. For purposes of this analysis, the following assumptions apply:

- At night (10:00 p.m. to 7:00 a.m.), no more than one idling truck per hour is present at this location within a 1-hour period.
- Each idling truck is limited to no more than 5 minutes duration of idling time as regulated by 13 CCR 2485 per the California Air Resources Board.
- Each idling truck emits a reference noise level comparable to 96 dBA sound power from a point source positioned approximately 6 feet above grade (on the paved proposed project site), 18 feet west of the generator fence, and 46 feet north of the proposed main building.

Using the CadnaA sound propagation prediction model, hourly L_{eq} from the idling truck noise emission at the loading dock area was predicted at and beyond the western property line of the proposed project that adjoins several existing

residential properties with addresses shown in Table 9. Key parameters included in the CadnaA "configuration" settings are as follows:

- Average ground absorption coefficient of 0.5 (on a scale of zero to one), representing a combination of acoustically reflective paved surfaces near the sound source and acoustically absorptive vegetated ground cover between the receptor positions and the paved area on site
- Calm meteorological conditions (i.e., less than 0.5 meters per second wind speed in any direction), with 68° Fahrenheit air temperature and 70% relative humidity
- Reflection order of one (single)

Additionally, the CadnaA model space features the following, based on proposed project architectural site plans and section views:

- Receptor positions are at elevations with respect to the 189-foot (above mean sea level) grade level of the proposed project paved area in the vicinity of the loading dock).
- The project site incorporates an earthen berm along the west side of the proposed project area, and ranges in height from 20 feet (at the northern end) to zero feet (at the southern end) above grade.
- The enclosures housing the transformers, oxygen tanks, and trash are included and are at least 12 feet tall with respect to grade; and the Phase 1 proposed main building is at least 15 feet in height above grade. All three structures provide opportunity for occlusion of direct sound paths in the three-dimensional model space.

Predicted hourly noise exposure levels from the idling truck per hour at the loading dock area are presented at eight sample receptors in Table 9, and all are below the City's 45 dBA hourly L_{eq} nighttime limit as shown in Table 1.

Table 9. Estimated Loading Dock Area Noise Emission

Receptor Street Address or Location	Approximate Horizontal Distance to Loading Dock Modeled Noise Emission Source (feet)	Predicted Hourly Leq (dBA)	Exceedance of City Nighttime Limit (45 dBA)?
Southern-most apartment of the complex along Mendocino Drive (north of the project site)	290	36.2	No
516 Timber Street	210	37.6	No
515 Tanoak Court	140	38.3	No
514 Tanoak Court	150	38.8	No
512 Tanoak Court	195	34.6	No
1649 Oleander Avenue	225	24.4	No
1651 Oleander Avenue	305	21.8	No
1655 Oleander Avenue	360	16.4	No

Notes: dBA = A-weighted decibel; L_{eq} = energy-equivalent sound level.

When combined logarithmically with the rooftop HVAC noise emission (studied in the previous subsection), which is not expected to exceed 44 dBA hourly L_{eq}, the loading dock noise should not cause the total (i.e., HVAC + idling truck) to exceed 45 dBA hourly L_{eq} and therefore yield an anticipated less-than-significant impact.

Ambulance Idling

Phase 1

Each of the two development phases of the proposed project has an ambulance "drop-off" area where an idling vehicle may be located. For phase 1, the drop-off location is approximately 40 feet south of the proposed new building southern façade and approximately 100 feet due east of the western property boundary. Although noise from ambulance operations during actual emergency situations may be exempt from City standards, noise from an idling ambulance (without siren or other audible warning device) would be subject to the nighttime hourly L_{eq} noise limit of 45 dBA at night as received by the western project boundary or occupied residences beyond. To evaluate the potential for ambulance vehicle noise to exceed this limit, the CadnaA sound propagation model was used and includes the following assumptions:

- At night (10:00 p.m. to 7:00 a.m.), no more than one idling ambulance vehicle (or fire engine truck) per hour is present at this location within a 1-hour period.
- Each idling truck is limited to no more than 5 minutes duration of idling time as regulated by 13 CCR 2485 per the California Air Resources Board.
- Each idling truck emits a reference noise level comparable to 96 dBA sound power from a point source positioned approximately 6 feet above grade (on the paved proposed project site).

CadnaA model space and calculation settings are the same as those used for the Loading Dock Operations area studied in the previous subsection. Predicted hourly noise exposure levels from the idling truck per hour at the loading dock area are presented at six sample receptors in Table 10, and all are below the City's 45 dBA hourly L_{eq} nighttime limit as shown in Table 1.

Table 10. Estimated Ambulance Idling at Southern Drop-off (Phase 1)

Receptor Street Address or Location	Approximate Horizontal Distance to Loading Dock Modeled Noise Emission Source (feet)	Predicted Hourly L_{eq} (dBA)	Exceedance of City Nighttime Limit (45 dBA)?
515 Tanoak Court	360	27.8	No
514 Tanoak Court	295	32.8	No
512 Tanoak Court	225	36.4	No
1649 Oleander Avenue	200	32.8	No
1651 Oleander Avenue	135	36.3	No
1655 Oleander Avenue	115	31.6	No

Notes: dBA = A-weighted decibel; L_{eq} = energy-equivalent sound level.

When combined logarithmically with the rooftop HVAC noise emission (studied in the previous subsection), which is not expected to exceed 44 dBA hourly L_{eq}, the idling ambulance (or fire truck) noise should not cause the total (i.e., HVAC + idling truck) to exceed 45 dBA hourly L_{eq} and therefore yield an anticipated less-than-significant impact.

Phase 2

Phase 2 of the proposed project introduces an additional ambulance drop-off location that is approximately 65 feet west of the proposed project's eastern property boundary that abuts the existing commercial building (i.e., Curbell Plastics). Utilizing a comparable CadnaA model to that used for the Phase 1 idling ambulance vehicle noise

prediction as presented in the preceding paragraphs, the analysis for Phase 2 incorporates the added Phase 2 proposed building and locates the idling truck noise source at the new location. Including the residential receptor to the north, comparable to the one listed in Table 9, the predicted results in Table 11 indicate that the predicted level at the commercial property boundary does not exceed the 55 dBA hourly L_{eq} nighttime limit for this type of receiver as shown in Table 1.

Table 11. Estimated Ambulance Idling at Eastern Drop-off (Phase 2)

Receptor Street Address or Location	Approximate Horizontal Distance to Loading Dock Modeled Noise Emission Source (feet)	Predicted Hourly L_{eq} (dBA)	City Nighttime Hourly Noise Limit, and exceeded?
Southern-most apartment of the complex along Mendocino Drive (north of the project site)	380	31.6	45 dBA L_{eq}, No
Commercial building to the east	65	52.2	60 dBA L_{eq}, No

Notes: dBA = A-weighted decibel; L_{eq} = energy-equivalent sound level.

When combined logarithmically with the rooftop HVAC noise emission studied in the previous subsection, which is not expected to exceed 44 dBA hourly L_{eq}, the idling ambulance (or fire truck) noise should not cause the total (i.e., HVAC + idling truck) to exceed the applicable City hourly noise limits and therefore yield an anticipated less than significant impact.

b) Would the project result in generation of excessive groundborne vibration or groundborne noise levels?

Conventional Construction Activity Vibration

Construction activities may expose persons to excessive groundborne vibration or groundborne noise, causing a potentially significant impact. Caltrans has collected groundborne vibration information related to construction activities (Caltrans 2013b). Information from Caltrans indicates that continuous vibrations with a PPV of approximately 0.1 ips PPV can be characterized as "begins to annoy" or "strongly perceptible". For context, heavier pieces of construction equipment, such as a bulldozer that may be expected on the project site, have peak particle velocities of approximately 0.089 ips or less at a reference distance of 25 feet (DOT 2006).

Groundborne vibration attenuates rapidly, even over short distances. The attenuation of groundborne vibration as it propagates from source to receptor through intervening soils and rock strata can be estimated with expressions found in FTA and Caltrans guidance. By way of example, for a bulldozer operating on site and as close as the western project boundary (i.e., 24 feet from the nearest receiving occupied structure on Tanoak Court) the estimated vibration velocity level would be 0.094 ips per the equation as follows (FTA 2006):

$$PPV_{rcvr} = PPV_{ref} * (25/D)^{1.5} = 0.094 = 0.089 * (25/24)^{1.5};$$

where PPV_{rcvr} is the predicted vibration velocity at the receiver position, PPV_{ref} is the reference value at 25 feet from the vibration source (the bulldozer), and D is the actual horizontal distance to the receiver. Therefore, at this predicted PPV that is less than the 0.1 ips PPV guidance-based threshold adopted herein, the impact of vibration-induced annoyance to occupants of nearby existing homes would be **less than significant**.

Construction vibration, at sufficiently high levels, can also present a building damage risk. However, the predicted 0.094 ips PPV at the nearest residential receiver 24 feet away from on-site operation of the bulldozer during grading would not surpass the guidance limit of 0.3 to 0.5 ips PPV for preventing damage to residential structures (Caltrans 2013b). Because the predicted vibration level at 24 feet is less than both the annoyance and building damage risk thresholds, vibration from project conventional construction activities is considered less than significant.

Once operational, the proposed project would not be expected to feature major on-site producers of groundborne vibration. Anticipated mechanical systems like pumps are designed and manufactured to feature rotating components (e.g., impellers) that are well-balanced with isolated vibration within or external to the equipment casings. On this basis, potential vibration impacts due to proposed project operation would be **less than significant**.

c) *For a project located within the vicinity of a private airstrip or an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels?*

There are no private airstrips within the vicinity of the project site. The closest airport to the project site is the Brown Field Municipal Airport approximately 2.7 miles southeast of the site. Impacts from aviation overflight noise exposure would be considered **less than significant**.

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6 Mitigation Measures

The following mitigation measure, introduced in Section 5, would apply during daytime operation testing activities for the backup generator.

MM-N-1 Prior to the issuance of a Conditional Use Permit, the City shall include a condition that requires the following:

Prior to backup generator testing, the project owner/manager (or its testing contractor) shall install a temporary sound blanket on the chain-link fence that forms the western perimeter of the backup generator outdoor space. (Alternately, the sound barrier may be hung or suspended from a free-standing structure external to and parallel with the chain-link fence; or, the barrier could be formed from an arrangement of panels. Either method may be required to ensure proper airflow to the operating generator, or to expedite barrier setup on site.) The installed temporary sound blanket, curtain, or panel assembly shall feature a minimum sound transmission class rating of at least 15, and if arranged as multiple elements must not exhibit air-gaps through which noise may bypass the barrier material. When the generator testing is completed, the temporary sound barrier can be disassembled and removed from the site (or stored on site, per project owner/manager discretion) until needed for the subsequent monthly test.

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7 Summary of Findings

This noise report was conducted to predictively quantify construction and operation noise and vibration attributed to the proposed project. The results indicate that potential impacts during construction events would be less than significant. Installation of a temporary barrier during testing of the backup generator, per **MM-N-1**, would result in a less than significant operational noise impact. No further mitigation is required.

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Appendix A

Baseline Noise Measurement Field Data

DUDEK
CREATOR OF KERATA TECHNOLOGY

FIELD DATA REPORT

Field Noise Measurement Data

Record: 1262	
Project Name	*Encompass*
Observer(s)	*Connor Burke*
Date	*2020-03-06*

Instrument and Calibrator Information	
Instrument Name List	*(ENC) Rion NL-52*
Instrument Name	*(ENC) Rion NL-52*
Instrument Name Lookup Key	*(ENC) Rion NL-52*
Manufacturer	*Rion*
Model	*NL-52*
Serial Number	*553896*
Calibrator Name	*(ENC) LD CAL150*
Calibrator Name	*(ENC) LD CAL150*
Calibrator Name Lookup Key	*(ENC) LD CAL150*
Calibrator Manufacturer	*Larson Davis*
Calibrator Model	*LD CAL150*
Calibrator Serial #	*5152*
Pre-Test (dBA SPL)	*94*
Post-Test (dBA SPL)	*94*
Windscreen	*Yes*
Weighting?	*A-WTD*
Slow/Fast?	*Slow*
ANSI?	*Yes*

Monitoring	
Record #	*1*
Site ID	*ST1*
Site Location Lat/Long	*32.598571, -117.031549*
Begin (Time)	*07:15:00*
End (Time)	*07:25:00*
Leq	*53.4*
Lmax	*67.2*
Lmin	*50.2*
Other Lx?	*L90, L50, L10*
L90	*51.60*
L50	*53*
L10	*55*
Other Lx (Specify Metric)	*L*
Primary Noise Source	*Distant traffic*
Other Noise Sources (Background)	*Birds*
Is the same instrument and calibrator being used as previously noted?	*Yes*
Are the meteorological conditions the same as previously noted?	*Yes*

Description / Photos

Site Photos

Photo	
	
Comments / Description	*Facing southwest.*

Monitoring

Record #	*2*
Site ID	*ST2*
Site Location Lat/Long	*32.596475, -117.029710*
Begin (Time)	*07:30:00*
End (Time)	*07:40:00*
Leq	*60*
Lmax	*69.9*
Lmin	*49.2*
Other Lx?	*L90, L50, L10*
L90	*51.3*
L50	*55.6*
L10	*64.7*
Other Lx (Specify Metric)	*L*
Primary Noise Source	*Traffic*
Other Noise Sources (Background)	*Birds, Distant Traffic*
Other Noise Sources Additional Description	*Sprinklers*
Is the same instrument and calibrator being used as previously noted?	*Yes*
Are the meteorological conditions the same as previously noted?	*Yes*

DUDEK
CREATOR OF KERATA TECHNOLOGY

FIELD DATA REPORT

Source Info and Traffic Counts	
Number of Lanes	4
Lane Width (feet)	10
Roadway Width (feet)	40
Roadway Width (m)	12.2
Distance to Roadway (feet)	25
Distance to Roadway (m)	7.6
Distance Measured to Centerline or Edge of Pavement?	Edge of Pavement
Estimated Vehicle Speed (MPH)	45

Traffic Counts	
Vehicle Count Summary	A 100, MT 4, HT 2, B 1, MC 0
Select Method for Recording Count Duration	Enter Manually
Counting Both Directions?	Yes
Count Duration (minutes)	10
Vehicle Count Tally	
Select Method for Vehicle Counts	Enter Manually
Number of Vehicles - Autos	100
Number of Vehicles - Medium Trucks	4
Number of Vehicles - Heavy Trucks	2
Number of Vehicles - Buses	1
Number of Vehicles - Motorcyles	0

Description / Photos

Site Photos

Photo	



DUDEK
CREATOR OF KERATA TECHNOLOGY

FIELD DATA REPORT

Monitoring	
Record #	*3*
Site ID	*ST4*
Site Location Lat/Long	*32.598651, -117.032479*
Begin (Time)	*07:55:00*
End (Time)	*08:05:00*
Leq	*48.4*
Lmax	*53.9*
Lmin	*44.2*
Other Lx?	*L90, L50, L10*
L90	*44.8*
L50	*47.7*
L10	*50.8*
Other Lx (Specify Metric)	*L*
Primary Noise Source	*Distant traffic*
Other Noise Sources (Background)	*Birds, Distant Aircraft*
Is the same instrument and calibrator being used as previously noted?	*Yes*
Are the meteorological conditions the same as previously noted?	*Yes*

Description / Photos

Site Photos

Photo



DUDEK
CREATOR OF KERATA TECHNOLOGY

FIELD DATA REPORT

Monitoring	
Record #	4
Site ID	ST3
Site Location Lat/Long	33.042369, -117.294620
Begin (Time)	07:40:00
End (Time)	07:50:00
Leq	72.3
Lmax	85.7
Lmin	52.5
Other Lx?	L90, L50, L10
L90	55.2
L50	69.1
L10	75.6
Other Lx (Specify Metric)	L
Primary Noise Source	Traffic
Other Noise Sources (Background)	
Is the same instrument and calibrator being used as previously noted?	Yes
Are the meteorological conditions the same as previously noted?	Yes

Source Info and Traffic Counts	
Number of Lanes	4
Lane Width (feet)	10
Roadway Width (feet)	40
Roadway Width (m)	12.2
Distance to Roadway (feet)	20
Distance to Roadway (m)	6.1
Distance Measured to Centerline or Edge of Pavement?	Edge of Pavement
Estimated Vehicle Speed (MPH)	45

Traffic Counts	
Vehicle Count Summary	A 200, MT 15, HT 8, B 2, MC 2
Select Method for Recording Count Duration	Enter Manually
Counting Both Directions?	Yes
Count Duration (minutes)	10
Vehicle Count Tally	
Select Method for Vehicle Counts	Enter Manually
Number of Vehicles - Autos	333
Number of Vehicles - Medium Trucks	15
Number of Vehicles - Heavy Trucks	8
Number of Vehicles - Buses	2
Number of Vehicles - Motorcyles	2

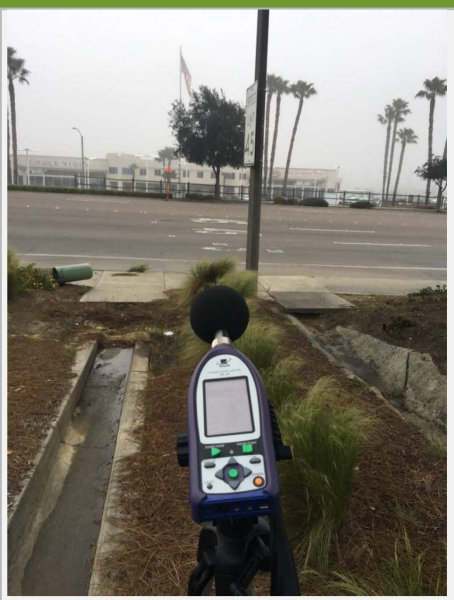
Description / Photos

DUDEK
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FIELD DATA REPORT

Site Photos

Photo	



Appendix B

Construction Noise Modeling Input and Output

To User: bordered cells are inputs, unbordered cells have formulae

noise level limit for construction phase, per County = 80
allowable hours over which Leq is to be averaged (FTA guidance) = 8

Construction Phase	Equipment	Total Equipment Qty	AUF % (from FHWA RCNM)	Reference Lmax @ 50 ft. from FHWA RCNM	Client Equipment Description, Data Source and/or Notes	Source to NSR Distance (ft.)	Distance-Adjusted Lmax	Allowable Operation Time (hours)	Allowable Operation Time (minutes)	Predicted 8-hour Leq
Site Preparation - Phase 1	Front End Loader	1	40	79		15	89.5	2	120	79
							Total for Site Preparation - Phase 1 Phase:			**79.5**
Grading - Phase 1	Excavator	1	40	81		15	91.5	1	60	78
							Total for Grading - Phase 1 Phase:			**78.4**
Building Construction - Phase 1	Crane	1	16	81		100	75.0	8	480	67
	Gradall	1	40	83		100	77.0	8	480	73
	Generator	1	50	72		100	66.0	8	480	63
	Backhoe	1	40	78		100	72.0	8	480	68
	Welder / Torch	1	40	73		100	67.0	8	480	63
							Total for Building Construction - Phase 1 Phase:			**75.5**
Paving - Phase 1	Concrete Mixer Truck	1	40	79		60	77.4	8	480	73
	Roller	1	20	80		60	78.4	8	480	71
	Backhoe	1	40	78		60	76.4	8	480	72
	Paver	1	50	77		60	75.4	8	480	72
	Dump Truck	1	40	76		60	74.4	8	480	70
							Total for Paving - Phase 1 Phase:			**79.1**

To User: bordered cells are inputs, unbordered cells have formulae

noise level limit for construction phase, per County = 80
allowable hours over which Leq is to be averaged (FTA guidance) = 8

Construction Phase	Equipment	Total Equipment Qty	AUF % (from FHWA RCNM)	Reference Lmax @ 50 ft. from FHWA RCNM	Client Equipment Description, Data Source and/or Notes	Source to NSR Distance (ft.)	Distance-Adjusted Lmax	Allowable Operation Time (hours)	Allowable Operation Time (minutes)	Predicted 8-hour Leq
Site Preparation - Phase 1	Front End Loader	1	40	79		115	71.8	8	480	68
							Total for Site Preparation - Phase 1 Phase:			67.8
Grading - Phase 1	Excavator	1	40	81		115	73.8	8	480	70
							Total for Grading - Phase 1 Phase:			69.8
Building Construction - Phase 1	Crane	1	16	81		115	73.8	8	480	66
	Gradall	1	40	83		115	75.8	8	480	72
	Generator	1	50	72		115	64.8	8	480	62
	Backhoe	1	40	78		115	70.8	8	480	67
	Welder / Torch	1	40	73		115	65.8	8	480	62
							Total for Building Construction - Phase 1 Phase:			74.3
Paving - Phase 1	Concrete Mixer Truck	1	40	79		115	71.8	8	480	68
	Roller	1	20	80		115	72.8	8	480	66
	Backhoe	1	40	78		115	70.8	8	480	67
	Paver	1	50	77		115	69.8	8	480	67
	Dump Truck	1	40	76		115	68.8	8	480	65
							Total for Paving - Phase 1 Phase:			73.5

Appendix C

Traffic Noise Modeling Input and Output

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17 March 2020
TNM 2.5

INPUT: ROADWAYS
PROJECT/CONTRACT: Encompass
RUN: Existing

Average pavement type shall be used unless a State highway agency substantiates the use of a different type with the approval of FHWA

Roadway		Points					Flow Control			Segment	
Name	Width	Name	No.	Coordinates (pavement) X	Y	Z	Control Device	Speed Constraint	Percent Vehicles Affected	Pvmt Type	On Struct?
	ft			ft	ft	ft		mph	%		
Main Street west	40.0	point1	1	1,630,243.6	11,831,298.0	0.00				Average	
		point2	2	1,631,042.2	11,831,296.0	0.00				Average	
		point3	3	1,631,750.1	11,831,291.0	0.00					
Main Street East	40.0	point4	4	1,631,739.2	11,831,249.0	0.00				Average	
		point5	5	1,631,575.2	11,831,249.0	0.00				Average	
		point6	6	1,631,411.5	11,831,250.0	0.00				Average	
		point7	7	1,631,157.6	11,831,250.0	0.00				Average	
		point8	8	1,631,006.9	11,831,247.0	0.00				Average	
		point9	9	1,630,759.6	11,831,243.0	0.00				Average	
		point10	10	1,630,238.9	11,831,241.0	0.00					
Brandywine North	40.0	point11	11	1,631,681.5	11,833,245.0	0.00				Average	
		point12	12	1,631,680.0	11,833,066.0	0.00				Average	
		point13	13	1,631,676.6	11,832,873.0	0.00				Average	
		point14	14	1,631,653.1	11,832,722.0	0.00				Average	
		point15	15	1,631,651.0	11,832,639.0	0.00				Average	
		point16	16	1,631,650.8	11,832,374.0	0.00				Average	
		point17	17	1,631,648.9	11,832,120.0	0.00				Average	
		point18	18	1,631,647.4	11,831,344.0	0.00					
Brandywine South	40.0	point19	19	1,631,614.0	11,831,346.0	0.00				Average	
		point20	20	1,631,611.9	11,831,671.0	0.00				Average	
		point21	21	1,631,611.2	11,832,072.0	0.00				Average	
		point22	22	1,631,613.8	11,832,418.0	0.00				Average	
		point23	23	1,631,616.5	11,832,687.0	0.00				Average	
		point24	24	1,631,630.4	11,832,790.0	0.00				Average	
		point25	25	1,631,645.0	11,832,910.0	0.00				Average	

		point26	26	1,631,658.2	11,833,011.0	0.00				Average	
		point27	27	1,631,654.0	11,833,224.0	0.00					
Roadway5	40.0	point28	28	1,631,268.6	11,831,855.0	0.00				Average	
		point29	29	1,631,591.0	11,831,850.0	0.00					

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17 March 2020
TNM 2.5

INPUT: TRAFFIC FOR LAeq1h Volumes
PROJECT/CONTRACT: Encompass
RUN: Existing

Roadway Name	Points Name	No.	Segment Autos V veh/hr	Autos S mph	MTrucks V veh/hr	MTrucks S mph	HTrucks V veh/hr	HTrucks S mph	Buses V veh/hr	Buses S mph	Motorcycles V veh/hr	Motorcycles S mph
Main Street west	point1	1	1113	45	23	45	11	45	0	0	0	0
	point2	2	1113	45	23	45	11	45	0	0	0	0
	point3	3										
Main Street East	point4	4	1113	45	23	45	11	45	0	0	0	0
	point5	5	1113	45	23	45	11	45	0	0	0	0
	point6	6	1113	45	23	45	11	45	0	0	0	0
	point7	7	1113	45	23	45	11	45	0	0	0	0
	point8	8	1113	45	23	45	11	45	0	0	0	0
	point9	9	1113	45	23	45	11	45	0	0	0	0
	point10	10										
Brandywine North	point11	11	466	35	10	35	5	35	0	0	0	0
	point12	12	466	35	10	35	5	35	0	0	0	0
	point13	13	466	35	10	35	5	35	0	0	0	0
	point14	14	466	35	10	35	5	35	0	0	0	0
	point15	15	466	35	10	35	5	35	0	0	0	0
	point16	16	466	35	10	35	5	35	0	0	0	0
	point17	17	466	35	10	35	5	35	0	0	0	0
	point18	18										
Brandywine South	point19	19	466	35	10	35	5	35	0	0	0	0
	point20	20	466	35	10	35	5	35	0	0	0	0
	point21	21	466	35	10	35	5	35	0	0	0	0
	point22	22	466	35	10	35	5	35	0	0	0	0
	point23	23	466	35	10	35	5	35	0	0	0	0

	point24	24	466	35	10	35	5	35	0	0	0	0
	point25	25	466	35	10	35	5	35	0	0	0	0
	point26	26	466	35	10	35	5	35	0	0	0	0
	point27	27										
Roadway5	point28	28	5	25	0	0	0	0	0	0	0	0
	point29	29										

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17 March 2020
TNM 2.5

INPUT: RECEIVERS
PROJECT/CONTRACT: Encompass
RUN: Existing

Receiver Name	No.	#DUs	Coordinates (ground) X	Y	Z	Height above Ground	Input Sound Levels and Criteria Existing LAeq1h	Impact Criteria LAeq1h	Impact Criteria Sub'l	NR Goal	Active in Calc.
			ft	ft	ft	ft	dBA	dBA	dB	dB	
ST1	1	1	1,631,100.2	11,832,604.0	0.00	4.92	53.40	66	10.0	8.0	Y
ST4	2	1	1,630,579.1	11,832,318.0	0.00	4.92	48.40	66	10.0	8.0	Y
ST2	3	1	1,631,521.8	11,831,812.0	0.00	4.92	60.00	66	10.0	8.0	Y
ST3	4	1	1,630,775.1	11,831,345.0	0.00	4.92	72.30	66	10.0	8.0	Y

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17 March 2020
TNM 2.5

INPUT: BARRIERS
PROJECT/CONTRACT: Encompass
RUN: Existing

Barrier									Points											
Name	Type	Height		If Wall	If Berm			Add'tnl	Name	No.	Coordinates (bottom)			Height	Segment				
		Min	Max	$ per Unit Area	$ per Unit Vol.	Top Width	Run:Rise	$ per Unit Length			X	Y	Z	at Point	Seg Ht Increment	Perturbs #Up	#Dn	On Struct?	Important Reflections?
		ft	ft	$/sq ft	$/cu yd	ft	ft:ft	$/ft			ft	ft	ft	ft	ft				
Barrier1	W	0.00	99.99	0.00				0.00	point2	2	1,630,795.1	11,831,766.0	0.00	35.00	0.00	0	0		
									point3	3	1,630,795.0	11,831,368.0	0.00	35.00	0.00	0	0		
									point4	4	1,630,987.6	11,831,371.0	0.00	35.00	0.00	0	0		
									point5	5	1,630,988.2	11,831,478.0	0.00	35.00	0.00	0	0		
									point6	6	1,630,990.0	11,831,768.0	0.00	35.00	0.00	0	0		
									point7	7	1,630,795.1	11,831,766.0	0.00	35.00					
Barrier2	W	0.00	99.99	0.00				0.00	point9	9	1,631,084.1	11,831,605.0	0.00	35.00	0.00	0	0		
									point10	10	1,631,084.0	11,831,414.0	0.00	35.00	0.00	0	0		
									point11	11	1,631,108.9	11,831,378.0	0.00	35.00	0.00	0	0		
									point12	12	1,631,183.1	11,831,378.0	0.00	35.00	0.00	0	0		
									point13	13	1,631,186.5	11,831,603.0	0.00	35.00	0.00	0	0		
									point14	14	1,631,084.1	11,831,605.0	0.00	35.00					
Barrier3	W	0.00	99.99	0.00				0.00	point16	16	1,631,269.1	11,831,761.0	0.00	35.00	0.00	0	0		
									point17	17	1,631,264.1	11,831,447.0	0.00	35.00	0.00	0	0		
									point18	18	1,631,482.1	11,831,446.0	0.00	35.00	0.00	0	0		
									point19	19	1,631,480.5	11,831,755.0	0.00	35.00	0.00	0	0		
									point20	20	1,631,269.1	11,831,761.0	0.00	35.00					
Barrier4	W	0.00	99.99	0.00				0.00	point22	22	1,631,274.2	11,832,373.0	0.00	35.00	0.00	0	0		
									point23	23	1,631,277.5	11,831,986.0	0.00	35.00	0.00	0	0		
									point24	24	1,631,482.2	11,831,986.0	0.00	35.00	0.00	0	0		
									point25	25	1,631,482.4	11,832,463.0	0.00	35.00	0.00	0	0		
									point26	26	1,631,312.2	11,832,461.0	0.00	35.00	0.00	0	0		
									point27	27	1,631,274.2	11,832,373.0	0.00	35.00					

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17 March 2020
TNM 2.5
Calculated with TNM 2.5

RESULTS: SOUND LEVELS
PROJECT/CONTRACT: Encompass
RUN: Existing
BARRIER DESIGN: INPUT HEIGHTS
ATMOSPHERICS: 68 deg F, 50% RH

Average pavement type shall be used unless a State highway agency substantiates the use of a different type with approval of FHWA.

Receiver Name	No.	#DUs	Existing LAeq1h	No Barrier LAeq1h Calculated	Crit'n	Increase over existing Calculated	Crit'n Sub'l Inc	Type Impact	With Barrier Calculated LAeq1h	Noise Reduction Calculated	Noise Reduction Goal	Calculated minus Goal
			dBA	dBA	dBA	dB	dB		dBA	dB	dB	dB
ST1	1	1	53.4	43.1	66	-10.3	10	---	43.1	0.0	8	-8.0
ST4	2	1	48.4	41.3	66	-7.1	10	---	41.3	0.0	8	-8.0
ST2	3	1	60.0	60.5	66	0.5	10	---	60.5	0.0	8	-8.0
ST3	4	1	72.3	69.5	66	-2.8	10	Snd Lvl	69.5	0.0	8	-8.0

Dwelling Units	# DUs	Noise Reduction Min	Avg	Max
		dB	dB	dB
All Selected	4	0.0	0.0	0.0
All Impacted	1	0.0	0.0	0.0
All that meet NR Goal	0	0.0	0.0	0.0

Dudek 17 March 2020
CB TNM 2.5

INPUT: ROADWAYS
PROJECT/CONTRACT: Encompass
RUN: Existing + Project

Average pavement type shall be used unless a State highway agency substantiates the use of a different type with the approval of FHWA

Roadway		Points					Flow Control			Segment	
Name	Width	Name	No.	Coordinates (pavement) X	Y	Z	Control Device	Speed Constraint	Percent Vehicles Affected	Pvmt Type	On Struct?
	ft			ft	ft	ft		mph	%		
Main Street west	40.0	point1	1	1,630,243.6	11,831,298.0	0.00				Average	
		point2	2	1,631,042.2	11,831,296.0	0.00				Average	
		point3	3	1,631,750.1	11,831,291.0	0.00					
Main Street East	40.0	point4	4	1,631,739.2	11,831,249.0	0.00				Average	
		point5	5	1,631,575.2	11,831,249.0	0.00				Average	
		point6	6	1,631,411.5	11,831,250.0	0.00				Average	
		point7	7	1,631,157.6	11,831,250.0	0.00				Average	
		point8	8	1,631,006.9	11,831,247.0	0.00				Average	
		point9	9	1,630,759.6	11,831,243.0	0.00				Average	
		point10	10	1,630,238.9	11,831,241.0	0.00					
Brandywine North	40.0	point11	11	1,631,681.5	11,833,245.0	0.00				Average	
		point12	12	1,631,680.0	11,833,066.0	0.00				Average	
		point13	13	1,631,676.6	11,832,873.0	0.00				Average	
		point14	14	1,631,653.1	11,832,722.0	0.00				Average	
		point15	15	1,631,651.0	11,832,639.0	0.00				Average	
		point16	16	1,631,650.8	11,832,374.0	0.00				Average	
		point17	17	1,631,648.9	11,832,120.0	0.00				Average	
		point18	18	1,631,647.4	11,831,344.0	0.00					
Brandywine South	40.0	point19	19	1,631,614.0	11,831,346.0	0.00				Average	
		point20	20	1,631,611.9	11,831,671.0	0.00				Average	
		point21	21	1,631,611.2	11,832,072.0	0.00				Average	
		point22	22	1,631,613.8	11,832,418.0	0.00				Average	
		point23	23	1,631,616.5	11,832,687.0	0.00				Average	
		point24	24	1,631,630.4	11,832,790.0	0.00				Average	
		point25	25	1,631,645.0	11,832,910.0	0.00				Average	

		point26	26	1,631,658.2	11,833,011.0	0.00				Average	
		point27	27	1,631,654.0	11,833,224.0	0.00					
Roadway5	40.0	point28	28	1,631,268.6	11,831,855.0	0.00				Average	
		point29	29	1,631,591.0	11,831,850.0	0.00					

Dudek 17 March 2020
CB TNM 2.5

INPUT: TRAFFIC FOR LAeq1h Volumes
PROJECT/CONTRACT: Encompass
RUN: Existing + Project

Roadway	Points		Segment									
Name	Name	No.	Autos		MTrucks		HTrucks		Buses		Motorcycles	
			V	S	V	S	V	S	V	S	V	S
			veh/hr	mph	veh/hr	mph	veh/hr	mph	veh/hr	mph	veh/hr	mph
Main Street west	point1	1	1124	45	23	45	12	45	0	0	0	0
	point2	2	1124	45	23	45	12	45	0	0	0	0
	point3	3										
Main Street East	point4	4	1124	45	23	45	12	45	0	0	0	0
	point5	5	1124	45	23	45	12	45	0	0	0	0
	point6	6	1124	45	23	45	12	45	0	0	0	0
	point7	7	1124	45	23	45	12	45	0	0	0	0
	point8	8	1124	45	23	45	12	45	0	0	0	0
	point9	9	1124	45	23	45	12	45	0	0	0	0
	point10	10										
Brandywine North	point11	11	482	35	10	35	5	35	0	0	0	0
	point12	12	482	35	10	35	5	35	0	0	0	0
	point13	13	482	35	10	35	5	35	0	0	0	0
	point14	14	482	35	10	35	5	35	0	0	0	0
	point15	15	482	35	10	35	5	35	0	0	0	0
	point16	16	482	35	10	35	5	35	0	0	0	0
	point17	17	482	35	10	35	5	35	0	0	0	0
	point18	18										
Brandywine South	point19	19	482	35	10	35	5	35	0	0	0	0
	point20	20	482	35	10	35	5	35	0	0	0	0
	point21	21	482	35	10	35	5	35	0	0	0	0
	point22	22	482	35	10	35	5	35	0	0	0	0
	point23	23	482	35	10	35	5	35	0	0	0	0

	point24	24	482	35	10	35	5	35	0	0	0	0
	point25	25	482	35	10	35	5	35	0	0	0	0
	point26	26	482	35	10	35	5	35	0	0	0	0
	point27	27										
Roadway5	point28	28	53	25	0	0	0	0	0	0	0	0
	point29	29										

Dudek
CB

17 March 2020
TNM 2.5

INPUT: RECEIVERS
PROJECT/CONTRACT: Encompass
RUN: Existing + Project

Receiver Name	No.	#DUs	Coordinates (ground) X	Y	Z	Height above Ground	Input Sound Levels and Criteria Existing LAeq1h	Impact Criteria LAeq1h	Impact Criteria Sub'l	NR Goal	Active in Calc.
			ft	ft	ft	ft	dBA	dBA	dB	dB	
ST1	1	1	1,631,100.2	11,832,604.0	0.00	4.92	53.40	66	10.0	8.0	Y
ST4	2	1	1,630,579.1	11,832,318.0	0.00	4.92	48.40	66	10.0	8.0	Y
ST2	3	1	1,631,521.8	11,831,812.0	0.00	4.92	60.00	66	10.0	8.0	Y
ST3	4	1	1,630,775.1	11,831,345.0	0.00	4.92	72.30	66	10.0	8.0	Y
M4	6	1	1,631,061.8	11,832,268.0	0.00	4.92	0.00	66	10.0	8.0	Y
M1	7	1	1,631,143.1	11,832,094.0	0.00	4.92	0.00	66	10.0	8.0	Y
M2	8	1	1,631,061.2	11,831,903.0	0.00	4.92	0.00	66	10.0	8.0	Y
M3	9	1	1,630,801.5	11,832,181.0	0.00	4.92	0.00	66	10.0	8.0	Y

Dudek 17 March 2020
CB TNM 2.5

INPUT: BARRIERS
PROJECT/CONTRACT: Encompass
RUN: Existing + Project

Barrier									Points											
Name	Type	Height		If Wall	If Berm			Add'tnl	Name	No.	Coordinates (bottom)			Height	Segment				
		Min	Max	$ per Unit Area	$ per Unit Vol.	Top Width	Run:Rise	$ per Unit Length			X	Y	Z	at Point	Seg Ht Increment	Perturbs #Up	#Dn	On Struct?	Important Reflections?
		ft	ft	$/sq ft	$/cu yd	ft	ft:ft	$/ft			ft	ft	ft	ft	ft				
Barrier1	W	0.00	99.99	0.00				0.00	point2	2	1,630,795.1	11,831,766.0	0.00	35.00	0.00	0	0		
									point3	3	1,630,795.0	11,831,368.0	0.00	35.00	0.00	0	0		
									point4	4	1,630,987.6	11,831,371.0	0.00	35.00	0.00	0	0		
									point5	5	1,630,988.2	11,831,478.0	0.00	35.00	0.00	0	0		
									point6	6	1,630,990.0	11,831,768.0	0.00	35.00	0.00	0	0		
									point7	7	1,630,795.1	11,831,766.0	0.00	35.00					
Barrier2	W	0.00	99.99	0.00				0.00	point9	9	1,631,084.1	11,831,605.0	0.00	35.00	0.00	0	0		
									point10	10	1,631,084.0	11,831,414.0	0.00	35.00	0.00	0	0		
									point11	11	1,631,108.9	11,831,378.0	0.00	35.00	0.00	0	0		
									point12	12	1,631,183.1	11,831,378.0	0.00	35.00	0.00	0	0		
									point13	13	1,631,186.5	11,831,603.0	0.00	35.00	0.00	0	0		
									point14	14	1,631,084.1	11,831,605.0	0.00	35.00					
Barrier3	W	0.00	99.99	0.00				0.00	point16	16	1,631,269.1	11,831,761.0	0.00	35.00	0.00	0	0		
									point17	17	1,631,264.1	11,831,447.0	0.00	35.00	0.00	0	0		
									point18	18	1,631,482.1	11,831,446.0	0.00	35.00	0.00	0	0		
									point19	19	1,631,480.5	11,831,755.0	0.00	35.00	0.00	0	0		
									point20	20	1,631,269.1	11,831,761.0	0.00	35.00					
Barrier4	W	0.00	99.99	0.00				0.00	point22	22	1,631,274.2	11,832,373.0	0.00	35.00	0.00	0	0		
									point23	23	1,631,277.5	11,831,986.0	0.00	35.00	0.00	0	0		
									point24	24	1,631,482.2	11,831,986.0	0.00	35.00	0.00	0	0		
									point25	25	1,631,482.4	11,832,463.0	0.00	35.00	0.00	0	0		
									point26	26	1,631,312.2	11,832,461.0	0.00	35.00	0.00	0	0		
									point27	27	1,631,274.2	11,832,373.0	0.00	35.00					
Barrier6	W	0.00	99.99	0.00				0.00	point66	66	1,631,086.9	11,831,907.0	154.20	0.00	0.00	0	0		
									point67	67	1,631,087.2	11,831,970.0	157.48	0.00	0.00	0	0		
									point68	68	1,631,087.0	11,832,023.0	157.48	0.00	0.00	0	0		
									point69	69	1,631,098.1	11,832,022.0	157.48	0.00	0.00	0	0		
									point70	70	1,631,096.2	11,832,052.0	167.32	0.00	0.00	0	0		
									point71	71	1,631,112.4	11,832,052.0	167.32	0.00	0.00	0	0		
									point72	72	1,631,112.6	11,832,061.0	167.32	0.00	0.00	0	0		
									point73	73	1,631,139.6	11,832,059.0	167.32	0.00	0.00	0	0		
									point74	74	1,631,140.0	11,832,125.0	167.32	0.00	0.00	0	0		
									point75	75	1,631,111.6	11,832,126.0	167.32	0.00	0.00	0	0		
									point76	76	1,631,112.0	11,832,134.0	167.32	0.00	0.00	0	0		
									point77	77	1,631,095.8	11,832,134.0	167.32	0.00	0.00	0	0		

									point78	78	1,631,095.5	11,832,149.0	170.60	0.00	0.00	0	0		
									point79	79	1,631,086.8	11,832,148.0	170.60	0.00	0.00	0	0		
									point80	80	1,631,088.1	11,832,264.0	180.45	0.00	0.00	0	0		
									point81	81	1,631,037.9	11,832,263.0	180.45	0.00	0.00	0	0		
									point82	82	1,631,036.5	11,832,129.0	167.32	0.00	0.00	0	0		
									point83	83	1,630,897.1	11,832,130.0	177.17	0.00	0.00	0	0		
									point84	84	1,630,896.1	11,832,254.0	200.13	0.00	0.00	0	0		
									point85	85	1,630,911.2	11,832,253.0	200.13	0.00	0.00	0	0		
									point86	86	1,630,911.8	11,832,319.0	203.41	0.00	0.00	0	0		
									point87	87	1,630,853.9	11,832,318.0	200.13	0.00	0.00	0	0		
									point88	88	1,630,855.4	11,832,302.0	200.13	0.00	0.00	0	0		
									point89	89	1,630,811.6	11,832,302.0	200.13	0.00	0.00	0	0		
									point90	90	1,630,811.9	11,832,258.0	200.13	0.00	0.00	0	0		
									point91	91	1,630,817.9	11,832,259.0	200.13	0.00	0.00	0	0		
									point92	92	1,630,817.5	11,832,228.0	190.29	0.00	0.00	0	0		
									point93	93	1,630,808.1	11,832,228.0	190.29	0.00	0.00	0	0		
									point94	94	1,630,806.8	11,832,061.0	177.17	0.00	0.00	0	0		
									point95	95	1,630,827.4	11,832,062.0	177.17	0.00	0.00	0	0		
									point96	96	1,630,827.4	11,832,021.0	167.32	0.00	0.00	0	0		
									point97	97	1,630,846.6	11,832,021.0	167.32	0.00	0.00	0	0		
									point98	98	1,630,847.1	11,832,052.0	177.17	0.00	0.00	0	0		
									point99	99	1,630,896.6	11,832,052.0	177.17	0.00	0.00	0	0		
									point100	100	1,630,896.4	11,832,024.0	167.32	0.00	0.00	0	0		
									point101	101	1,631,036.8	11,832,022.0	157.48	0.00	0.00	0	0		
									point102	102	1,631,037.0	11,831,906.0	154.20	0.00	0.00	0	0		
									point103	103	1,631,086.9	11,831,907.0	154.20	0.00					

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17 March 2020
TNM 2.5
Calculated with TNM 2.5

RESULTS: SOUND LEVELS
PROJECT/CONTRACT: Encompass
RUN: Existing + Project
BARRIER DESIGN: INPUT HEIGHTS
ATMOSPHERICS: 68 deg F, 50% RH

Average pavement type shall be used unless a State highway agency substantiates the use of a different type with approval of FHWA.

Receiver Name	No.	#DUs	Existing LAeq1h	No Barrier LAeq1h Calculated	Crit'n	Increase over existing Calculated	Crit'n Sub'l Inc	Type Impact	With Barrier Calculated LAeq1h	Noise Reduction Calculated	Noise Reduction Goal	Calculated minus Goal
			dBA	dBA	dBA	dB	dB		dBA	dB	dB	dB
ST1	1	1	53.4	42.4	66	-11.0	10	---	42.4	0.0	8	-8.0
ST4	2	1	48.4	41.2	66	-7.2	10	---	41.2	0.0	8	-8.0
ST2	3	1	60.0	60.8	66	0.8	10	---	60.8	0.0	8	-8.0
ST3	4	1	72.3	69.6	66	-2.7	10	Snd Lvl	69.6	0.0	8	-8.0
M4	6	1	0.0	35.8	66	35.8	10	---	35.8	0.0	8	-8.0
M1	7	1	0.0	38.9	66	38.9	10	---	38.9	0.0	8	-8.0
M2	8	1	0.0	44.4	66	44.4	10	---	44.4	0.0	8	-8.0
M3	9	1	0.0	41.8	66	41.8	10	---	41.8	0.0	8	-8.0

Dwelling Units	# DUs	Noise Reduction Min	Avg	Max
		dB	dB	dB
All Selected	8	0.0	0.0	0.0
All Impacted	1	0.0	0.0	0.0
All that meet NR Goal	0	0.0	0.0	0.0

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INPUT: ROADWAYS
PROJECT/CONTRACT: Encompass
RUN: Buildout

Average pavement type shall be used unless a State highway agency substantiates the use of a different type with the approval of FHWA

Roadway		Points					Flow Control			Segment	
Name	Width	Name	No.	Coordinates (pavement) X	Y	Z	Control Device	Speed Constraint	Percent Vehicles Affected	Pvmt Type	On Struct?
	ft			ft	ft	ft		mph	%		
Main Street west	40.0	point1	1	1,630,243.6	11,831,298.0	0.00				Average	
		point2	2	1,631,042.2	11,831,296.0	0.00				Average	
		point3	3	1,631,750.1	11,831,291.0	0.00					
Main Street East	40.0	point4	4	1,631,739.2	11,831,249.0	0.00				Average	
		point5	5	1,631,575.2	11,831,249.0	0.00				Average	
		point6	6	1,631,411.5	11,831,250.0	0.00				Average	
		point7	7	1,631,157.6	11,831,250.0	0.00				Average	
		point8	8	1,631,006.9	11,831,247.0	0.00				Average	
		point9	9	1,630,759.6	11,831,243.0	0.00				Average	
		point10	10	1,630,238.9	11,831,241.0	0.00					
Brandywine North	40.0	point11	11	1,631,681.5	11,833,245.0	0.00				Average	
		point12	12	1,631,680.0	11,833,066.0	0.00				Average	
		point13	13	1,631,676.6	11,832,873.0	0.00				Average	
		point14	14	1,631,653.1	11,832,722.0	0.00				Average	
		point15	15	1,631,651.0	11,832,639.0	0.00				Average	
		point16	16	1,631,650.8	11,832,374.0	0.00				Average	
		point17	17	1,631,648.9	11,832,120.0	0.00				Average	
		point18	18	1,631,647.4	11,831,344.0	0.00					
Brandywine South	40.0	point19	19	1,631,614.0	11,831,346.0	0.00				Average	
		point20	20	1,631,611.9	11,831,671.0	0.00				Average	
		point21	21	1,631,611.2	11,832,072.0	0.00				Average	
		point22	22	1,631,613.8	11,832,418.0	0.00				Average	
		point23	23	1,631,616.5	11,832,687.0	0.00				Average	
		point24	24	1,631,630.4	11,832,790.0	0.00				Average	
		point25	25	1,631,645.0	11,832,910.0	0.00				Average	

		point26	26	1,631,658.2	11,833,011.0	0.00				Average	
		point27	27	1,631,654.0	11,833,224.0	0.00					
Roadway5	40.0	point28	28	1,631,268.6	11,831,855.0	0.00				Average	
		point29	29	1,631,591.0	11,831,850.0	0.00					

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INPUT: TRAFFIC FOR LAeq1h Volumes
PROJECT/CONTRACT: Encompass
RUN: Buildout

Roadway Name	Points Name	No.	Segment Autos V veh/hr	Autos S mph	MTrucks V veh/hr	MTrucks S mph	HTrucks V veh/hr	HTrucks S mph	Buses V veh/hr	Buses S mph	Motorcycles V veh/hr	Motorcycles S mph
Main Street west	point1	1	1600	45	33	45	16	45	0	0	0	0
	point2	2	1600	45	33	45	16	45	0	0	0	0
	point3	3										
Main Street East	point4	4	1600	45	33	45	16	45	0	0	0	0
	point5	5	1600	45	33	45	16	45	0	0	0	0
	point6	6	1600	45	33	45	16	45	0	0	0	0
	point7	7	1600	45	33	45	16	45	0	0	0	0
	point8	8	1600	45	33	45	16	45	0	0	0	0
	point9	9	1600	45	33	45	16	45	0	0	0	0
	point10	10										
Brandywine North	point11	11	936	35	19	35	10	35	0	0	0	0
	point12	12	936	35	19	35	10	35	0	0	0	0
	point13	13	936	35	19	35	10	35	0	0	0	0
	point14	14	936	35	19	35	10	35	0	0	0	0
	point15	15	936	35	19	35	10	35	0	0	0	0
	point16	16	936	35	19	35	10	35	0	0	0	0
	point17	17	936	35	19	35	10	35	0	0	0	0
	point18	18										
Brandywine South	point19	19	936	35	19	35	10	35	0	0	0	0
	point20	20	936	35	19	35	10	35	0	0	0	0
	point21	21	936	35	19	35	10	35	0	0	0	0
	point22	22	936	35	19	35	10	35	0	0	0	0
	point23	23	936	35	19	35	10	35	0	0	0	0

	point24	24	936	35	19	35	10	35	0	0	0	0
	point25	25	936	35	19	35	10	35	0	0	0	0
	point26	26	936	35	19	35	10	35	0	0	0	0
	point27	27										
Roadway5	point28	28	8	25	0	0	0	0	0	0	0	0
	point29	29										

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INPUT: RECEIVERS
PROJECT/CONTRACT: Encompass
RUN: Buildout

Receiver Name	No.	#DUs	Coordinates (ground) X	Y	Z	Height above Ground	Input Sound Levels and Criteria Existing LAeq1h	Impact Criteria LAeq1h	Impact Criteria Sub'l	NR Goal	Active in Calc.
			ft	ft	ft	ft	dBA	dBA	dB	dB	
ST1	1	1	1,631,100.2	11,832,604.0	0.00	4.92	53.40	66	10.0	8.0	Y
ST4	2	1	1,630,579.1	11,832,318.0	0.00	4.92	48.40	66	10.0	8.0	Y
ST2	3	1	1,631,521.8	11,831,812.0	0.00	4.92	60.00	66	10.0	8.0	Y
ST3	4	1	1,630,775.1	11,831,345.0	0.00	4.92	72.30	66	10.0	8.0	Y

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17 March 2020
TNM 2.5

INPUT: BARRIERS
PROJECT/CONTRACT: Encompass
RUN: Buildout

Barrier									Points											
Name	Type	Height		If Wall	If Berm			Add'tnl	Name	No.	Coordinates (bottom)			Height	Segment				
		Min	Max	$ per Unit Area	$ per Unit Vol.	Top Width	Run:Rise	$ per Unit Length			X	Y	Z	at Point	Seg Ht Increment	Perturbs #Up	#Dn	On Struct?	Important Reflections?
		ft	ft	$/sq ft	$/cu yd	ft	ft:ft	$/ft			ft	ft	ft	ft	ft				
Barrier1	W	0.00	99.99	0.00				0.00	point2	2	1,630,795.1	11,831,766.0	0.00	35.00	0.00	0	0		
									point3	3	1,630,795.0	11,831,368.0	0.00	35.00	0.00	0	0		
									point4	4	1,630,987.6	11,831,371.0	0.00	35.00	0.00	0	0		
									point5	5	1,630,988.2	11,831,478.0	0.00	35.00	0.00	0	0		
									point6	6	1,630,990.0	11,831,768.0	0.00	35.00	0.00	0	0		
									point7	7	1,630,795.1	11,831,766.0	0.00	35.00					
Barrier2	W	0.00	99.99	0.00				0.00	point9	9	1,631,084.1	11,831,605.0	0.00	35.00	0.00	0	0		
									point10	10	1,631,084.0	11,831,414.0	0.00	35.00	0.00	0	0		
									point11	11	1,631,108.9	11,831,378.0	0.00	35.00	0.00	0	0		
									point12	12	1,631,183.1	11,831,378.0	0.00	35.00	0.00	0	0		
									point13	13	1,631,186.5	11,831,603.0	0.00	35.00	0.00	0	0		
									point14	14	1,631,084.1	11,831,605.0	0.00	35.00					
Barrier3	W	0.00	99.99	0.00				0.00	point16	16	1,631,269.1	11,831,761.0	0.00	35.00	0.00	0	0		
									point17	17	1,631,264.1	11,831,447.0	0.00	35.00	0.00	0	0		
									point18	18	1,631,482.1	11,831,446.0	0.00	35.00	0.00	0	0		
									point19	19	1,631,480.5	11,831,755.0	0.00	35.00	0.00	0	0		
									point20	20	1,631,269.1	11,831,761.0	0.00	35.00					
Barrier4	W	0.00	99.99	0.00				0.00	point22	22	1,631,274.2	11,832,373.0	0.00	35.00	0.00	0	0		
									point23	23	1,631,277.5	11,831,986.0	0.00	35.00	0.00	0	0		
									point24	24	1,631,482.2	11,831,986.0	0.00	35.00	0.00	0	0		
									point25	25	1,631,482.4	11,832,463.0	0.00	35.00	0.00	0	0		
									point26	26	1,631,312.2	11,832,461.0	0.00	35.00	0.00	0	0		
									point27	27	1,631,274.2	11,832,373.0	0.00	35.00					

Dudek
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17 March 2020
TNM 2.5
Calculated with TNM 2.5

RESULTS: SOUND LEVELS
PROJECT/CONTRACT: Encompass
RUN: Buildout
BARRIER DESIGN: INPUT HEIGHTS
ATMOSPHERICS: 68 deg F, 50% RH

Average pavement type shall be used unless a State highway agency substantiates the use of a different type with approval of FHWA.

Receiver Name	No.	#DUs	Existing LAeq1h	No Barrier LAeq1h Calculated	Crit'n	Increase over existing Calculated	Crit'n Sub'l Inc	Type Impact	With Barrier Calculated LAeq1h	Noise Reduction Calculated	Noise Reduction Goal	Calculated minus Goal
			dBA	dBA	dBA	dB	dB		dBA	dB	dB	dB
ST1	1	1	53.4	45.8	66	-7.6	10	---	45.8	0.0	8	-8.0
ST4	2	1	48.4	43.2	66	-5.2	10	---	43.2	0.0	8	-8.0
ST2	3	1	60.0	63.5	66	3.5	10	---	63.5	0.0	8	-8.0
ST3	4	1	72.3	71.1	66	-1.2	10	Snd Lvl	71.1	0.0	8	-8.0

Dwelling Units	# DUs	Noise Reduction Min	Avg	Max
		dB	dB	dB
All Selected	4	0.0	0.0	0.0
All Impacted	1	0.0	0.0	0.0
All that meet NR Goal	0	0.0	0.0	0.0

Dudek
CB

17 March 2020
TNM 2.5

INPUT: ROADWAYS
PROJECT/CONTRACT: Encompass
RUN: Existing + Project

Average pavement type shall be used unless a State highway agency substantiates the use of a different type with the approval of FHWA

Roadway		Points					Flow Control			Segment	
Name	Width	Name	No.	Coordinates (pavement) X	Y	Z	Control Device	Speed Constraint	Percent Vehicles Affected	Pvmt Type	On Struct?
	ft			ft	ft	ft		mph	%		
Main Street west	40.0	point1	1	1,630,243.6	11,831,298.0	0.00				Average	
		point2	2	1,631,042.2	11,831,296.0	0.00				Average	
		point3	3	1,631,750.1	11,831,291.0	0.00					
Main Street East	40.0	point4	4	1,631,739.2	11,831,249.0	0.00				Average	
		point5	5	1,631,575.2	11,831,249.0	0.00				Average	
		point6	6	1,631,411.5	11,831,250.0	0.00				Average	
		point7	7	1,631,157.6	11,831,250.0	0.00				Average	
		point8	8	1,631,006.9	11,831,247.0	0.00				Average	
		point9	9	1,630,759.6	11,831,243.0	0.00				Average	
		point10	10	1,630,238.9	11,831,241.0	0.00					
Brandywine North	40.0	point11	11	1,631,681.5	11,833,245.0	0.00				Average	
		point12	12	1,631,680.0	11,833,066.0	0.00				Average	
		point13	13	1,631,676.6	11,832,873.0	0.00				Average	
		point14	14	1,631,653.1	11,832,722.0	0.00				Average	
		point15	15	1,631,651.0	11,832,639.0	0.00				Average	
		point16	16	1,631,650.8	11,832,374.0	0.00				Average	
		point17	17	1,631,648.9	11,832,120.0	0.00				Average	
		point18	18	1,631,647.4	11,831,344.0	0.00					
Brandywine South	40.0	point19	19	1,631,614.0	11,831,346.0	0.00				Average	
		point20	20	1,631,611.9	11,831,671.0	0.00				Average	
		point21	21	1,631,611.2	11,832,072.0	0.00				Average	
		point22	22	1,631,613.8	11,832,418.0	0.00				Average	
		point23	23	1,631,616.5	11,832,687.0	0.00				Average	
		point24	24	1,631,630.4	11,832,790.0	0.00				Average	
		point25	25	1,631,645.0	11,832,910.0	0.00				Average	

		point26	26	1,631,658.2	11,833,011.0	0.00				Average	
		point27	27	1,631,654.0	11,833,224.0	0.00					
Roadway5	40.0	point28	28	1,631,268.6	11,831,855.0	0.00				Average	
		point29	29	1,631,591.0	11,831,850.0	0.00					

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INPUT: TRAFFIC FOR LAeq1h Volumes
PROJECT/CONTRACT: Encompass
RUN: Existing + Project

Roadway	Points		Segment									
Name	Name	No.	Autos		MTrucks		HTrucks		Buses		Motorcycles	
			V	S	V	S	V	S	V	S	V	S
			veh/hr	mph	veh/hr	mph	veh/hr	mph	veh/hr	mph	veh/hr	mph
Main Street west	point1	1	1611	45	33	45	17	45	0	0	0	0
	point2	2	1611	45	33	45	17	45	0	0	0	0
	point3	3										
Main Street East	point4	4	1611	45	33	45	17	45	0	0	0	0
	point5	5	1611	45	33	45	17	45	0	0	0	0
	point6	6	1611	45	33	45	17	45	0	0	0	0
	point7	7	1611	45	33	45	17	45	0	0	0	0
	point8	8	1611	45	33	45	17	45	0	0	0	0
	point9	9	1611	45	33	45	17	45	0	0	0	0
	point10	10										
Brandywine North	point11	11	952	35	20	35	10	35	0	0	0	0
	point12	12	952	35	20	35	10	35	0	0	0	0
	point13	13	952	35	20	35	10	35	0	0	0	0
	point14	14	952	35	20	35	10	35	0	0	0	0
	point15	15	952	35	20	35	10	35	0	0	0	0
	point16	16	952	35	20	35	10	35	0	0	0	0
	point17	17	952	35	20	35	10	35	0	0	0	0
	point18	18										
Brandywine South	point19	19	952	35	20	35	10	35	0	0	0	0
	point20	20	952	35	20	35	10	35	0	0	0	0
	point21	21	952	35	20	35	10	35	0	0	0	0
	point22	22	952	35	20	35	10	35	0	0	0	0
	point23	23	952	35	20	35	10	35	0	0	0	0

	point24	24	952	35	20	35	10	35	0	0	0	0
	point25	25	952	35	20	35	10	35	0	0	0	0
	point26	26	952	35	20	35	10	35	0	0	0	0
	point27	27										
Roadway5	point28	28	56	25	0	0	0	0	0	0	0	0
	point29	29										

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INPUT: RECEIVERS
PROJECT/CONTRACT: Encompass
RUN: Existing + Project

Receiver Name	No.	#DUs	Coordinates (ground) X	Y	Z	Height above Ground	Input Sound Levels and Criteria Existing LAeq1h	Impact Criteria LAeq1h	Impact Criteria Sub'l	NR Goal	Active in Calc.
			ft	ft	ft	ft	dBA	dBA	dB	dB	
ST1	1	1	1,631,100.2	11,832,604.0	0.00	4.92	53.40	66	10.0	8.0	Y
ST4	2	1	1,630,579.1	11,832,318.0	0.00	4.92	48.40	66	10.0	8.0	Y
ST2	3	1	1,631,521.8	11,831,812.0	0.00	4.92	60.00	66	10.0	8.0	Y
ST3	4	1	1,630,775.1	11,831,345.0	0.00	4.92	72.30	66	10.0	8.0	Y
M4	6	1	1,631,061.8	11,832,268.0	0.00	4.92	0.00	66	10.0	8.0	Y
M1	7	1	1,631,143.1	11,832,094.0	0.00	4.92	0.00	66	10.0	8.0	Y
M2	8	1	1,631,061.2	11,831,903.0	0.00	4.92	0.00	66	10.0	8.0	Y
M3	9	1	1,630,801.5	11,832,181.0	0.00	4.92	0.00	66	10.0	8.0	Y

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INPUT: BARRIERS
PROJECT/CONTRACT: Encompass
RUN: Existing + Project

Barrier									Points											
Name	Type	Height		If Wall	If Berm			Add'tnl	Name	No.	Coordinates (bottom)			Height	Segment				
		Min	Max	$ per Unit Area	$ per Unit Vol.	Top Width	Run:Rise	$ per Unit Length			X	Y	Z	at Point	Seg Ht Incre-ment	Perturbs #Up	#Dn	On Struct?	Important Reflec-tions?
		ft	ft	$/sq ft	$/cu yd	ft	ft:ft	$/ft			ft	ft	ft	ft	ft				
Barrier1	W	0.00	99.99	0.00				0.00	point2	2	1,630,795.1	11,831,766.0	0.00	35.00	0.00	0	0		
									point3	3	1,630,795.0	11,831,368.0	0.00	35.00	0.00	0	0		
									point4	4	1,630,987.6	11,831,371.0	0.00	35.00	0.00	0	0		
									point5	5	1,630,988.2	11,831,478.0	0.00	35.00	0.00	0	0		
									point6	6	1,630,990.0	11,831,768.0	0.00	35.00	0.00	0	0		
									point7	7	1,630,795.1	11,831,766.0	0.00	35.00					
Barrier2	W	0.00	99.99	0.00				0.00	point9	9	1,631,084.1	11,831,605.0	0.00	35.00	0.00	0	0		
									point10	10	1,631,084.0	11,831,414.0	0.00	35.00	0.00	0	0		
									point11	11	1,631,108.9	11,831,378.0	0.00	35.00	0.00	0	0		
									point12	12	1,631,183.1	11,831,378.0	0.00	35.00	0.00	0	0		
									point13	13	1,631,186.5	11,831,603.0	0.00	35.00	0.00	0	0		
									point14	14	1,631,084.1	11,831,605.0	0.00	35.00					
Barrier3	W	0.00	99.99	0.00				0.00	point16	16	1,631,269.1	11,831,761.0	0.00	35.00	0.00	0	0		
									point17	17	1,631,264.1	11,831,447.0	0.00	35.00	0.00	0	0		
									point18	18	1,631,482.1	11,831,446.0	0.00	35.00	0.00	0	0		
									point19	19	1,631,480.5	11,831,755.0	0.00	35.00	0.00	0	0		
									point20	20	1,631,269.1	11,831,761.0	0.00	35.00					
Barrier4	W	0.00	99.99	0.00				0.00	point22	22	1,631,274.2	11,832,373.0	0.00	35.00	0.00	0	0		
									point23	23	1,631,277.5	11,831,986.0	0.00	35.00	0.00	0	0		
									point24	24	1,631,482.2	11,831,986.0	0.00	35.00	0.00	0	0		
									point25	25	1,631,482.4	11,832,463.0	0.00	35.00	0.00	0	0		
									point26	26	1,631,312.2	11,832,461.0	0.00	35.00	0.00	0	0		
									point27	27	1,631,274.2	11,832,373.0	0.00	35.00					
Barrier6	W	0.00	99.99	0.00				0.00	point66	66	1,631,086.9	11,831,907.0	154.20	20.00	0.00	0	0		
									point67	67	1,631,087.2	11,831,970.0	157.48	20.00	0.00	0	0		
									point68	68	1,631,087.0	11,832,023.0	157.48	20.00	0.00	0	0		
									point69	69	1,631,098.1	11,832,022.0	157.48	20.00	0.00	0	0		
									point70	70	1,631,096.2	11,832,052.0	167.32	20.00	0.00	0	0		
									point71	71	1,631,112.4	11,832,052.0	167.32	20.00	0.00	0	0		
									point72	72	1,631,112.6	11,832,061.0	167.32	20.00	0.00	0	0		
									point73	73	1,631,139.6	11,832,059.0	167.32	20.00	0.00	0	0		
									point74	74	1,631,140.0	11,832,125.0	167.32	20.00	0.00	0	0		
									point75	75	1,631,111.6	11,832,126.0	167.32	20.00	0.00	0	0		
									point76	76	1,631,112.0	11,832,134.0	167.32	20.00	0.00	0	0		
									point77	77	1,631,095.8	11,832,134.0	167.32	20.00	0.00	0	0		

									point78	78	1,631,095.5	11,832,149.0	170.60	20.00	0.00	0	0		
									point79	79	1,631,086.8	11,832,148.0	170.60	20.00	0.00	0	0		
									point80	80	1,631,088.1	11,832,264.0	180.45	20.00	0.00	0	0		
									point81	81	1,631,037.9	11,832,263.0	180.45	20.00	0.00	0	0		
									point82	82	1,631,036.5	11,832,129.0	167.32	20.00	0.00	0	0		
									point83	83	1,630,897.1	11,832,130.0	177.17	20.00	0.00	0	0		
									point84	84	1,630,896.1	11,832,254.0	200.13	20.00	0.00	0	0		
									point85	85	1,630,911.2	11,832,253.0	200.13	20.00	0.00	0	0		
									point86	86	1,630,911.8	11,832,319.0	203.41	20.00	0.00	0	0		
									point87	87	1,630,853.9	11,832,318.0	200.13	20.00	0.00	0	0		
									point88	88	1,630,855.4	11,832,302.0	200.13	20.00	0.00	0	0		
									point89	89	1,630,811.6	11,832,302.0	200.13	20.00	0.00	0	0		
									point90	90	1,630,811.9	11,832,258.0	200.13	20.00	0.00	0	0		
									point91	91	1,630,817.9	11,832,259.0	200.13	20.00	0.00	0	0		
									point92	92	1,630,817.5	11,832,228.0	190.29	20.00	0.00	0	0		
									point93	93	1,630,808.1	11,832,228.0	190.29	20.00	0.00	0	0		
									point94	94	1,630,808.8	11,832,061.0	177.17	20.00	0.00	0	0		
									point95	95	1,630,827.4	11,832,062.0	177.17	20.00	0.00	0	0		
									point96	96	1,630,827.4	11,832,021.0	167.32	20.00	0.00	0	0		
									point97	97	1,630,846.6	11,832,021.0	167.32	20.00	0.00	0	0		
									point98	98	1,630,847.1	11,832,052.0	177.17	20.00	0.00	0	0		
									point99	99	1,630,896.6	11,832,052.0	177.17	20.00	0.00	0	0		
									point100	100	1,630,896.4	11,832,024.0	167.32	20.00	0.00	0	0		
									point101	101	1,631,036.8	11,832,022.0	157.48	20.00	0.00	0	0		
									point102	102	1,631,037.0	11,831,906.0	154.20	20.00	0.00	0	0		
									point103	103	1,631,086.9	11,831,907.0	154.20	20.00					

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TNM 2.5
Calculated with TNM 2.5

RESULTS: SOUND LEVELS
PROJECT/CONTRACT: Encompass
RUN: Existing + Project
BARRIER DESIGN: INPUT HEIGHTS
ATMOSPHERICS: 68 deg F, 50% RH

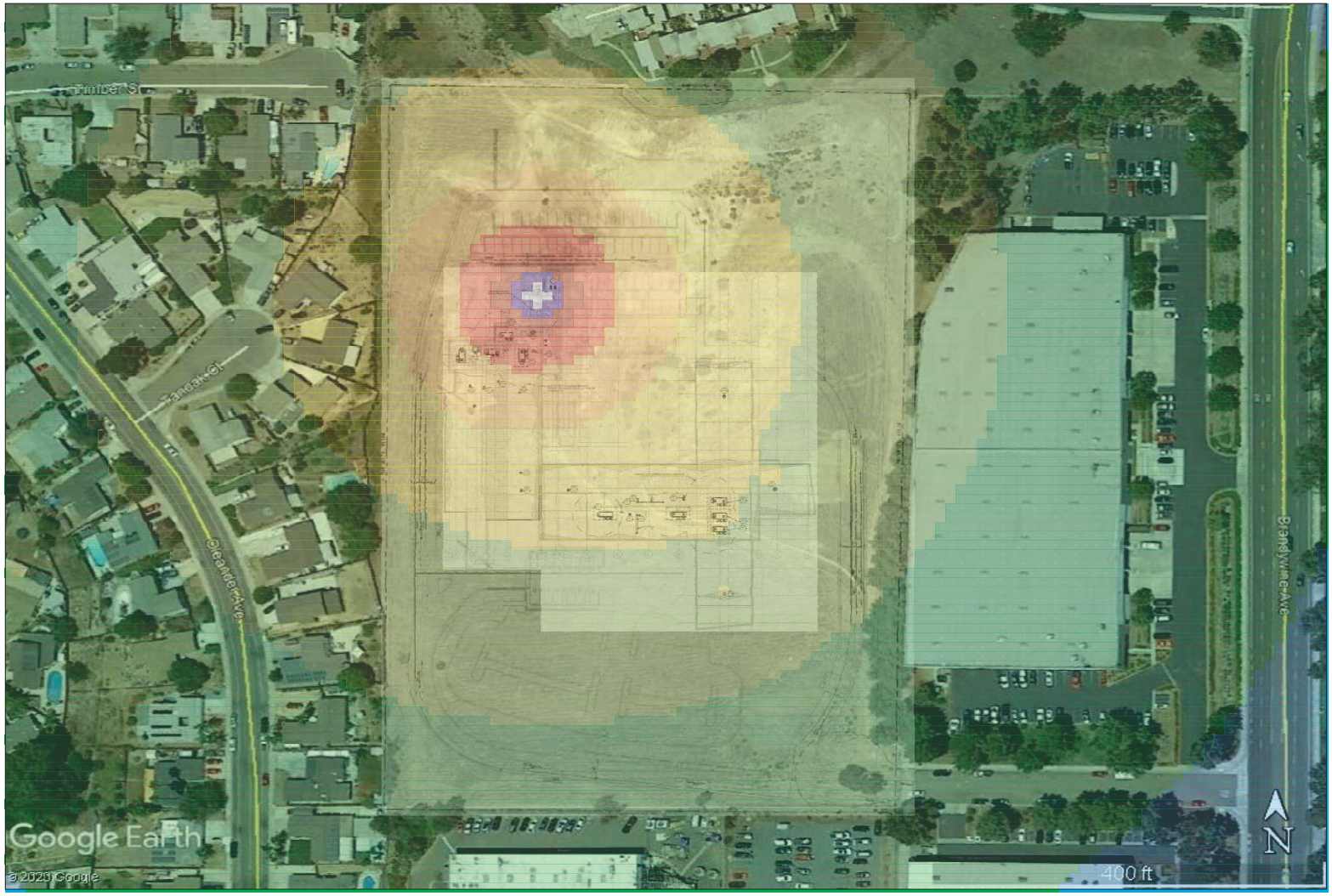
Average pavement type shall be used unless a State highway agency substantiates the use of a different type with approval of FHWA.

Receiver Name	No.	#DUs	Existing LAeq1h	No Barrier LAeq1h Calculated	Crit'n	Increase over existing Calculated	Crit'n Sub'l Inc	Type Impact	With Barrier Calculated LAeq1h	Noise Reduction Calculated	Noise Reduction Goal	Noise Reduction Calculated minus Goal
			dBA	dBA	dBA	dB	dB		dBA	dB	dB	dB
ST1	1	1	53.4	45.3	66	-8.1	10	---	45.3	0.0	8	-8.0
ST4	2	1	48.4	43.0	66	-5.4	10	---	43.0	0.0	8	-8.0
ST2	3	1	60.0	63.6	66	3.6	10	---	63.6	0.0	8	-8.0
ST3	4	1	72.3	71.1	66	-1.2	10	Snd Lvl	71.1	0.0	8	-8.0
M4	6	1	0.0	38.8	66	38.8	10	---	38.8	0.0	8	-8.0
M1	7	1	0.0	41.0	66	41.0	10	---	41.0	0.0	8	-8.0
M2	8	1	0.0	46.1	66	46.1	10	---	46.1	0.0	8	-8.0
M3	9	1	0.0	43.4	66	43.4	10	---	43.4	0.0	8	-8.0

Dwelling Units	# DUs	Noise Reduction Min	Noise Reduction Avg	Noise Reduction Max
		dB	dB	dB
All Selected	8	0.0	0.0	0.0
All Impacted	1	0.0	0.0	0.0
All that meet NR Goal	0	0.0	0.0	0.0

Appendix D

Facility HVAC Noise Prediction



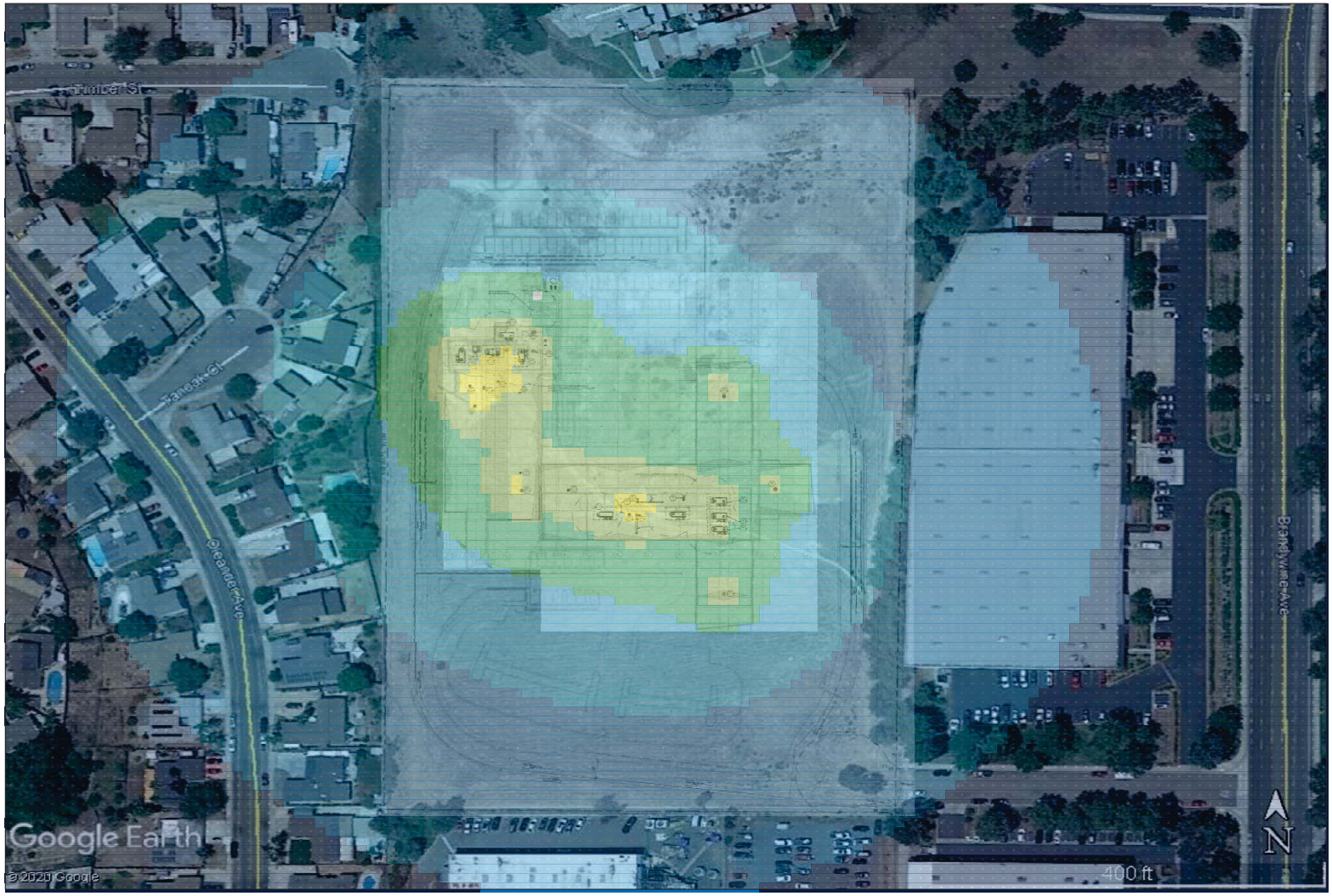
Output SPL Legend
(user: enter dBA values in table)

Color	dBA range High	Low
	80	75
	75	70
	70	65
	65	60
	60	55
	55	50
	50	45
	45	40
	40	35
	35	30

Selected Receptors
(user: enter rcvr tag from input map)

Tag	dBA		
ST1	53.4	9	72
N1	55.3	9	60
W1	59.5	32	37
S1	48.3	84	54
E1	52.2	30	87

Sonrisa Solar - Predicted Operation Noise from Inverters, Substation Transformer(s), and Battery Storage (BESS) Cooling Systems



Output SPL Legend
(user: enter dBA values in table)

Color	dBA range High	Low
	80	75
	75	70
	70	65
	65	60
	60	55
	55	50
	50	45
	45	40
	40	35
	35	30

Selected Receptors
(user: enter rcvr tag from input map)

Tag	dBA
ST1	36.0
N1	36.9
W1	43.2
S1	37.0
E1	37.7