Appendix C – Noise Analysis

NOISE IMPACT ANALYSIS

THE BAY THEATER REVITALIZATION

SEAL BEACH, CALIFORNIA

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Date:

April 18, 2017

Project No.: P17-001 N

NOISE SETTING

Sound is mechanical energy transmitted by pressure waves in a compressible medium such as air. Noise is generally considered to be unwanted sound. Sound is characterized by various parameters that describe the rate of oscillation of sound waves, the distance between successive troughs or crests, the speed of propagation, and the pressure level or energy content of a given sound. In particular, the sound pressure level has become the most common descriptor used to characterize the loudness of an ambient sound level.

Loud or soft, noisy or quiet, high-and-low pitch are all qualitative terms used to describe sound. These terms are relative descriptions. The science of acoustics attempts to quantify the human perception of sound into a quantitative and measurable basis. Amplitude is the measure of the pressure exerted by sound waves. Amplitude may be so small as to be inaudible by humans, or so great as to be painful. Frequency refers to pitch or tone. The unit of measure is in cycles per second called “hertz”. Very low frequency bass tones and ultra-high frequency treble are difficult for humans to detect. Many noise generators in the ambient world are multi-spectral.

The decibel (dB) scale is used to quantify sound pressure levels. Although decibels are most commonly associated with sound, "dB" is a generic descriptor that is equal to ten times the logarithmic ratio of any physical parameter versus some reference quantity. For sound, the reference level is the faintest sound detectable by a young person with good auditory acuity.

Since the human ear is not equally sensitive to all sound frequencies within the entire auditory spectrum, human response is factored into sound descriptions by weighting sounds within the range of maximum human sensitivity more heavily in a process called “A-weighting,” written as dB(A). Any further reference in this discussion to decibels written as "dB" should be understood to be A-weighted.

Leq is a time-averaged sound level; a single-number value that expresses the time-varying sound level for the specified period as though it were a constant sound level with the same total sound energy as the time-varying level. Its unit is the decibel (dB). The most common averaging period for Leq is hourly.

Because community receptors are more sensitive to unwanted noise intrusion during more sensitive evening and nighttime hours, state law requires that an artificial dBA increment be added to quiet time noise levels. The 24-hour noise descriptor with a specified evening and nocturnal penalty is called the Community Noise Equivalent Level (CNEL). CNEL’s are a weighted average of hourly Leq’s.

PLANNING STANDARDS

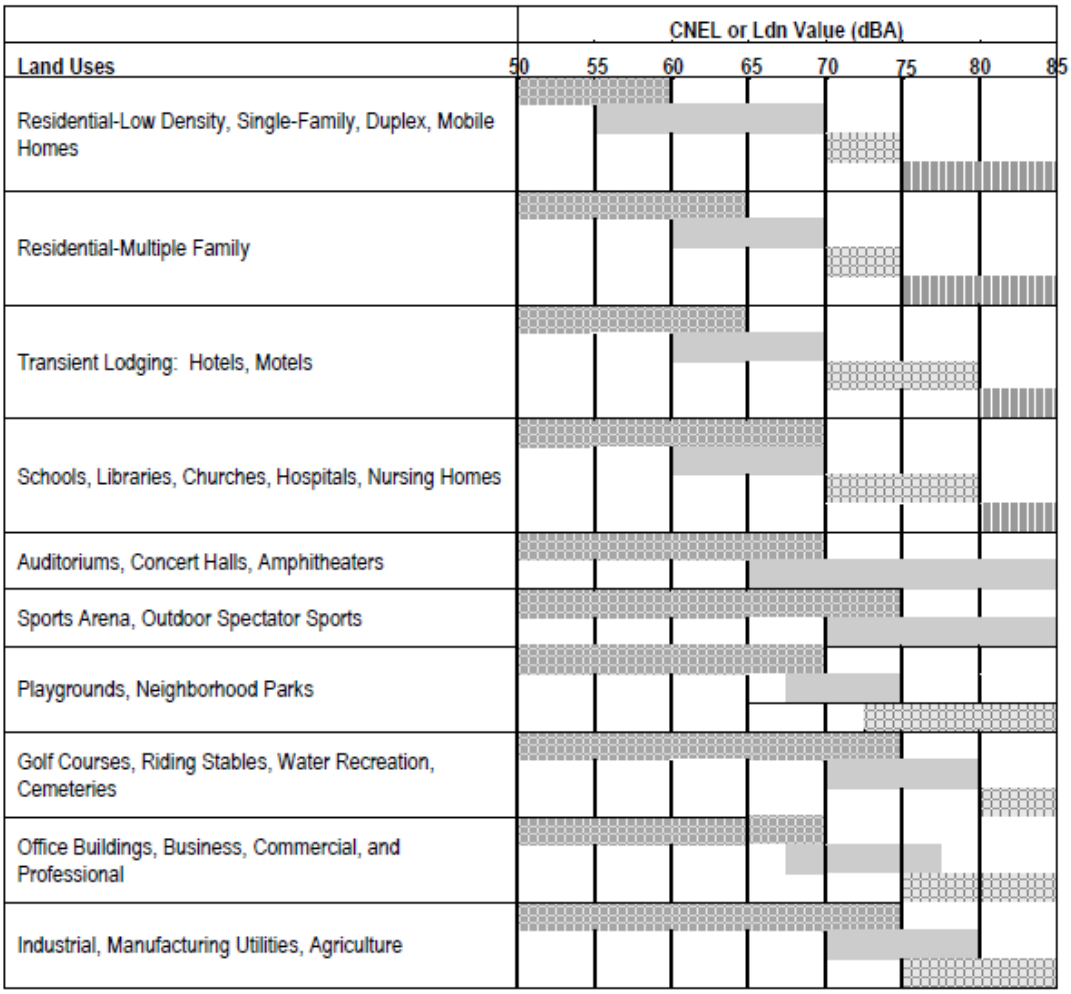
The City of Seal Beach has established guidelines for acceptable community noise levels that are based upon the CNEL rating scale to insure that noise exposure is considered in any development. CNEL-based standards apply to noise sources whose noise generation is preempted from local control (such as from on-road vehicles, trains, airplanes, etc.) and are used to make land use decisions as to the suitability of a given site for its intended use. These CNEL-based standards are articulated in the Noise Element of the General Plan.

Figure 1 shows the noise compatibility guidelines for various uses. These guidelines would apply in usable outdoor space such as patios, yards, spas, etc. The guidelines indicate that an exterior noise level of 60 dB CNEL is considered to be a "normally acceptable" noise level for single family, duplex and mobile homes involving normal conventional construction, without any special noise insulation requirements. Exterior noise levels up to 65 dB CNEL are typically considered "conditionally acceptable", and residential construction should only occur after a detailed analysis of the noise reduction requirements is made and needed noise attenuation features are included in the project design. Exterior noise attenuation features include, but are not limited to, setbacks to place structures outside the conditionally acceptable noise contour, orienting structures so no windows open to the noise source, and /or installing noise barriers such as berms or solid walls.

An interior CNEL of 45 dB is mandated by the State of California Noise Insulation Standards (CCR, Title 24, Part 6, Section T25-28) for multiple family dwellings and hotel and motel rooms. In 1988, the State Building Standards Commission expanded that standard to include all habitable rooms in residential use, included single-family dwelling units. Since normal noise attenuation within residential structures with closed windows is 20-30 dB, an exterior noise exposure of 65-75 dB CNEL allows the interior standard to be met without any specialized structural attenuation (dual paned windows, etc.), but with closed windows and fresh air supply systems or air conditioning in order to maintain a comfortable living environment.

The City of Seal Beach limits construction activities to between the hours of 7:00 a.m. and 8:00 p.m., Mondays through Friday, and the hours of 8:00 a.m. and 8:00 p.m. on Saturday and never on Sundays or city-observed federal holidays. Construction activities that occur during allowable hours are exempt from compliance with numerical noise standards.

Figure 1 Noise Compatibility Guidelines
(Seal Beach General Plan)



Legend:

Normally Acceptable: Specified land use as satisfactory based upon the assumption that any buildings involved are of normal environmental construction, without any special noise insulation requirements.

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

Normally Unacceptable: New construction or development should generally be discouraged. If new construction or development does proceed, a detailed analysis of the noise reduction requirements must be made with needed noise insulation features included in the design. Outdoor area must be shielded.

Clearly Unacceptable: New construction or development should generally not be undertaken. Construction costs to make the indoor environment acceptable would be prohibitive and the outdoor environment would not be usable.

NOISE ORDINANCE STANDARDS

Planning standards generally apply to land use decisions made in response to noise sources pre-empted from local control such as motor vehicles, aircraft, etc. Noises from "stationary" sources are amenable to regulation through the Municipal Code. Chapter 7.15 of the City's code governs noise from one property crossing the property line of an adjacent property. The City's noise ordinance limits are stated in terms of a 30-minute limit with allowable deviations from this 50^{th} percentile standard. The louder the level becomes, the shorter the time becomes that it is allowed to occur. For example, the L_{50} is the level exceeded 50% of the measurement period of thirty minutes in an hour. The larger the deviation, the shorter the allowed duration up to a never-to-exceed 20 dB increase above the 50^{th} percentile standard. The applicable Seal Beach requirement is a function of the time of day with a L_{50} daytime standard of 55 dB and L_{50} nighttime of 50 dB as follows:

55 dB (30 minutes)	7:00 a.m. - 10:00 p.m.
50 dB (30 minutes)	10:00 p.m. - 7:00 a.m.

Noise shall not exceed the following deviations from the above standards:

(a) For a cumulative period of more than thirty (30) minutes in any hour;

(b) Plus 5 dB for a cumulative period of more than fifteen (15) minutes in any hour;

(c) Plus 10 dB for a cumulative period of more than five (5) minutes in any hour;

(d) Plus 15 dB for a cumulative period of more than one (1) minute in any hour; or

(e) Plus 20 dB for any period of time.

In areas where residential uses abut commercial or recreational activities, noise impacts may be perceived as intrusive, especially during noise sensitive quiet hours. Complaints about noise from performance venues may occur. There are no intervening sound barriers that would provide protection for residences west of 10^{th} Street that back up to the project site. However, except for a set of steel doors which are to remain closed during performances, the Bay Theater would have no openings through which noise could be transmitted. With no opportunity for sound penetration, it is likely that the impacts would be minimal.

Because of the small lot sizes in much of Seal Beach, mechanical equipment on one parcel may be located very close to the property line of an adjacent residential parcel. Motor hum and on/off cycling noise can be judged as intrusive. In recognition of this occasional conflict, a separate section of the Municipal Code directly address "Heating, Venting and Air Conditioning Equipment" (7.15.035). Modern equipment is typically quieter and less prone to causing problems. Compliance with the standards in this section of the code is nevertheless an important consideration in preventing possible noise nuisance and ensures that HVAC noise will not create any noise exposure issues.

BASELINE NOISE LEVELS

A short-term noise reading was conducted by Giroux & Associates on Friday, April 7, 2017 with short term noise readings at the project site. The location of the noise meter is shown in Figure 1. The meter was in the rear alley and captures existing noise at the residences directly east of the site. The measurement results are shown below.

Short-Term Noise Measurements (dB[A])

Time	Leq	Lmax	Lmin	L_{10}	L_{33}	L_{50}	L_{90}
18:00-18:15	55	73	47	56	53	52	48

The observed noise level was 55 Leq. Monitoring experience has shown that 24-hour weighted CNELs are typically 2-3 dB higher than mid-afternoon Leq readings shown above which would translate to 57-58 dB CNEL. This is well within the recommended Seal Beach residential compatibility threshold.

Figure 1 Noise Meter Location

NOISE IMPACTS

NOISE SIGNIFICANCE CRITERIA

Noise impacts are considered significant if they result in:

a. Exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies.

b. Exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels.

c. A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project.

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

STANDARDS OF SIGNIFICANCE

Noise impacts are considered significant if they expose persons to levels in excess of noise standards established in the noise ordinances. The exterior noise standard for the City of Seal Beach residential uses is 55 dB L_{50}. If required, attenuation through perimeter barriers and building soundproofing is anticipated to be used to reduce nuisance noise to the goal. However, an inability to achieve this goal through the application of reasonably available mitigation measures would be considered a significant impact. For this project, as shown later in this report, mitigation is not required to reduce impacts to below significance.

Impacts may also be significant if they create either a substantial permanent or temporary increase. The term "substantial" is not quantified in CEQA guidelines. In most environmental analyses, "substantial" is taken to mean a level that is clearly perceptible to humans. In practice, this is at least a +3 dB increase. Some agencies, such as Caltrans, require substantial increases to be +10 dB or more if noise standards are not exceeded by the increase. For purposes of this analysis, a +3 dB increase is considered a substantial increase. The following noise impacts due to project-related traffic would be considered significant:

1. If construction activities were to audibly intrude into adjacent uses surrounding the site.

2. If project traffic noise were to cause an increase by a perceptible amount (+3 dB CNEL) or expose receivers to levels exceeding city compatibility noise standards.

3. If future build-out noise levels were to expose Seal Beach sensitive receivers to levels exceeding compatibility standards of 65 dB CNEL exterior at any outdoor uses or 45 dB CNEL interior noise levels in any habitable space.

CONSTRUCTION NOISE SIGNIFICANCE

The Seal Beach Noise Ordinance regulates construction noise by a prohibition against making "unnecessary" noise from construction during noise-sensitive weekday hours and all day on Sundays.

CONSTRUCTION NOISE IMPACTS

The project involves interior renovations. There will be no heavy equipment on site (e.g. dozers, graders, cranes) which would create a noise nuisance. Interior noise will be muffled by the structure itself. Only hand tools are intended for use.

PROJECT-RELATED VEHICULAR NOISE IMPACTS

Long-term noise concerns from the development of residential uses at the project site center primarily on mobile source emissions on project area roadways. These concerns were addressed using the California specific vehicle noise curves (CALVENO) in the federal roadway noise model (the FHWA Highway Traffic Noise Prediction Model, FHWA-RD-77-108). The model calculates the Leq noise level for a particular reference set of input conditions, and then makes a series of adjustments for site-specific traffic volumes, distances, roadway speeds, or noise barriers. The typical day-night travel percentages and auto-truck vehicle mixes is then applied to convert one-hour Leq levels to a weighted 24-hour CNEL.

Table 1 summarizes the calculated 24-hour CNEL level at 50 feet from the roadway centerline along ten project adjacent roadway segments. Three time frames were evaluated; existing conditions "with and without project", opening year (2017) "with and without project", and future year "with and without project". The noise analysis utilized data from the project traffic analysis prepared by Kunzman Associates for this project. Travel speeds were also obtained from data reported in the traffic study.

As shown in Table 2, the project itself will not cause any roadway segment to have more than a 0.5 dB impact. This impact is anticipated to occur on Bolsa Avenue, between PCH and Silver Shoals Avenue. Because traffic volumes are already high and because the project does not result in many trips relative to existing traffic volumes, there is no discernible impact along any analyzed roadway segment.

Cumulative impacts compare the "future with project" noise levels with the "existing no project" scenario. The largest cumulative impact is +1.4 dB CNEL, again on Bolsa Avenue north of PCH. There are no cumulative traffic noise increases that exceed the +3 dB CNEL threshold. Therefore, both project only traffic noise impacts and cumulative traffic noise impacts are considered to be less-than-significant.

Table 1
Near-Term Traffic Noise Impact Analysis
(CNEL in dBA at 50 feet from Centerline)

Roadway Segment		*Existing*	*Existing + Project*	*2017*	*2017 + Project*	*Future*	*Future + Project*
Main St/	S of PCH	60.2	60.3	60.3	60.4	61.2	61.3
	N of Electric	60.2	60.3	60.3	60.4	61.2	61.3
	S of Electric	57.7	57.7	57.7	57.7	58.7	58.7
PCH/	Marina-Main/Bolsa	71.0	71.1	71.1	71.1	72.0	72.1
	Main/Bolsa-10th St	71.0	71.1	71.1	71.1	72.0	72.0
Electric Ave/	W of Main	57.1	57.1	57.1	57.1	58.1	58.1
	E of Main	57.1	57.2	57.1	57.2	58.1	58.2
Bolsa/	PCH-Silver Shoals	59.5	60.0	59.5	60.1	60.4	60.9
	N of Silver Shoals	59.3	59.4	59.4	59.5	60.3	60.4
Silver Shoals/	N of Bolsa	51.8	51.8	51.8	51.8	52.7	52.7

Table 2
Project Impact
(CNEL in dBA at 50 feet from Centerline)

Roadway Segment		*Existing*	*2017*	*Future*	*Cumulative*
Main St/	S of PCH	0.1	0.1	0.1	1.1
	N of Electric	0.1	0.1	0.1	1.1
	S of Electric	0.0	0.0	0.0	1.0
PCH/	Marina-Main/Bolsa	0.0	0.0	0.0	1.0
	Main/Bolsa-10th St	0.0	0.0	0.0	1.0
Electric Ave/	W of Main	0.0	0.0	0.0	1.0
	E of Main	0.1	0.1	0.1	1.1
Bolsa/	PCH-Silver Shoals	0.5	0.5	0.4	1.4
	N of Silver Shoals	0.1	0.1	0.1	1.1
Silver Shoals/	N of Bolsa	0.0	0.0	0.0	0.9

ON-SITE NOISE GENERATION

The entertainment at the Bay Theater will include in-house, themed movies, and live entertainment. The movie element will provide for holiday themed movies and community event movies. Representative candidate movies subjects could include Christmas, Fourth of July, Veterans and Memorial Day, Thanksgiving and Valentine's Day. Community events could include the Vintage Car Show, the Annual Christmas Parade and the "Run Seal Beach" annual events. Live performance entertainment may serve local school groups, community theater, and selective professional entertainers. The Bay Theater would be available to host a variety of live entertainment acts on a selective basis, predicated on compatibility with the Seal Beach community. The hours of operation will range between the hours of 10:00am until 12:00am dependent upon the event. Parking for Theater events will be provided primarily on an off-site basis.

As previously noted, the noise ordinance L_{50} standard for music or voice is 55 dB before 10 p.m. and 50 dB from 10 p.m. to 7 a.m. The ability to achieve 55 dB L_{50} or less at the eastern property line was evaluated by using data obtained by Giroux & Associates for a Wahoos Restaurant in Huntington Beach in February of 2013. The restaurant was seeking approval to host a live entertainment venue.

Giroux & Associates improvised a concert simulation at the eatery using a speaker array on the stage area pointed toward the audience. Noise levels were set at levels that could be reasonably expected from a loud band playing live music. The levels at 20 feet from the stage were 86 dB L_{50} on average. A level of 85 dB is the threshold where a hearing protection program (earmuffs and periodic testing) is required in occupational settings. The on-set of hearing damage is 90 dB for sustained exposure. The test simulation was therefore representative of a live entertainment scenario. One of the employees setting out tables and chairs grimaced at the test noise level.

Measurements directly outside the closed rear steel door were 48 dB L_{50} with the music level very faintly audible, farther away in the parking lot the test music noise became completely inaudible. The music noise within a few feet of the building was less than 45 dB $L_{50.}$

The Bay Theater has a rear door that faces the adjacent residences. Comparable noise measurements at a similar live-music venue of 48 dB close to the rear door suggests that interior performance activity noise will be substantially less than ambient levels in the rear alley behind the theater. Beneficial re-use of the Bay Theater property for performance events will have no significant noise impacts to the nearest adjacent residences.

HVAC EQUIPMENT

Section 7.15.035 of the Municipal Code contains the following HVAC noise restrictions:

> A. No building permit shall be issued for the installation of heating, venting and air conditioning ("HVAC") equipment in or adjacent to residential areas if the noise produced by the HVAC equipment exceeds an A-weighted exterior sound pressure level of 50 db(A). The method of computation used shall be that specified in the "Application of Sound Rating Levels of Outdoor Unitary Equipment," Standard 275, Air-Conditioning and Refrigeration Institute, 1997 ed. or the latest revision thereof.
>
> B. Notwithstanding subsection A of this section, a building permit may be issued for the installation if:
>
> 1. HVAC equipment containing a timing device deactivating the HVAC equipment between the hours of 10:00 p.m. and 7:00 a.m. provided the noise produced by the HVAC equipment does not exceed an A-weighted exterior sound pressure level of 55 db(A).
> 2. HVAC equipment generating noise that does not exceed an A-weighted exterior sound pressure level of 65 db(A), provided that the applicant obtains the prior written consent of the owner of each property where the exterior sound pressure level would exceed 55 db(A). (Ord. 1551; Ord. 1515).

Any upgrades to the HVAC equipment for the Bay Theater must meet these noise thresholds at the nearest property line.

CONCLUSION

With the rear door tightly closed and not opened during any live entertainment event except for emergency purposes, city noise standards will be readily met. It is highly improbable that the closest residents would be aware that any such entertainment was in progress. No additional mitigation except the presence of security to ensure that the subject door remains closed at all times is necessary.