Appendix C:
Noise Assessment Study

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NOISE ASSESSMENT STUDY
FOR THE PLANNED

PACIFIC SURFACING ASPHALT PAVING COMPANY
1436 STATE STREET, SAN JOSE

Prepared for
Pacific Surfacing

Prepared by
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June 13, 2019
Project No. 51-007

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I. Executive Summary

This report presents the results of a noise assessment study, in compliance with the California Environmental Quality Act, for the proposed relocation of the Pacific Surfacing asphalt paving company from Fremont to 1436 State Street in San Jose. This study includes an analysis of on-site equipment and vehicle operational noise impacts to the residential land uses along State Street to the south of the site.

The plans for the new facility include improvements to the interior of the existing building, repaving and striping of the site, the installation of new storage equipment, new landscaping, reconfiguring of the entry gates and rebuilding an existing utility building.

The following report includes background information on acoustics, noise standards applicable to the project and the project-generated noise impacts. Noise impacts from the project are evaluated against the City of San Jose noise limits established in the Envision San Jose 2040 General Plan and in the City of San Jose Zoning Ordinance. For purposes of environmental review under CEQA, conformance to General Plan policies reduces any potential noise impacts from a project to a less than significant level.

The results of this study reveal that the project-generated noise exposure impacts from the project operations will be within the limits of the City of San Jose General Plan Goals and Policies, including CEQA. However, noise from vehicles entering and exiting the site, and only while on the site, will exceed the limits of the City of San Jose Zoning Ordinance.

In terms of the CEQA compliance checklist, the project results in the following:

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?	Significant
b) Exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels?	No impact
c) A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project?	Less Than Significant
d) A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project?	Less Than Significant
e) For a project located within 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?	No impact
f) For a project within the vicinity of a private airstrip, would the project expose people residing or working in the project area to excessive noise levels?	No impact

II. Background Information on Acoustics

Noise is defined as unwanted sound. Airborne sound is a rapid fluctuation of air pressure above and below atmospheric pressure. Sound levels are usually measured and expressed in decibels (dB) with 0 dB corresponding roughly to the threshold of hearing.

Most of the sounds which we hear in our normal environment do not consist of a single frequency, but rather a broad range of frequencies. As humans do not have perfect hearing, environmental sound measuring instruments have an electrical filter built in so that the instrument's detector replicates human hearing. This filter is called the "A-weighting" network and filters out low and very high frequencies. All environmental noise is reported in terms of A-weighted decibels, notated as “dBA”. All sound levels used in this report are A-weighted unless otherwise noted. Table I on page 4 shows the typical human response and noise sources for A-weighted noise levels.

Although the A-weighted noise level may adequately indicate the level of noise at any instant in time, community noise levels vary continuously. Most environmental noise includes a mixture of noise from distant sources that create a relatively steady background noise from which no particular source is identifiable. To describe the time-varying character of environmental noise, the statistical noise descriptors, L_1, L_{10}, L_{50} and L_{90} are often used. They are the A-weighted noise levels exceeded for 1%, 10%, 50% and 90% of a stated time period. The continuous equivalent-energy level (L_{eq}) is that level of a steady state noise which has the same sound energy as a time-varying noise. It is often considered the average noise level and is used to calculate the Day-Night Levels (DNL) and the Community Noise Equivalent Level (CNEL) described below.

TABLE I

The A-Weighted Decibel Scale, Human Response, and Common Noise Sources

Noise Level, dBA	Human Response	Noise Source
120-150+	Painfully Loud	Sonic Boom (140 dBA)
100-120	Physical Discomfort	Motorcycle at 20 ft. (110 dBA) Nightclub Music (105 dBA)
70-100	Annoying	Diesel Pump at 100 ft. (95 dBA) Freight Train at 50 ft. (90 dBA) Food Blender (90 dBA) Jet Plane at 1000 ft. (85 dBA) Freeway at 50 ft. (80 dBA) Alarm Clock (80 dBA)
50-70	Intrusive	Average Traffic at 100 ft. (70 dBA) Pass. Car, 30 mph @ 25 ft. (65 dBA) Vacuum Cleaner (60 dBA) Suburban Background (55 dBA)
0-50	Quiet	Normal Conversation (50 dBA) Light Traffic at 100 ft. (45 dBA) Refrigerator (45 dBA) Desktop Computer (40 dBA) Whispering (35 dBA) Leaves Rustling (20 dBA) Threshold of Hearing (0 dBA)

In determining the daily level of environmental noise, it is important to account for the difference in response of people to daytime and nighttime noises. During the nighttime, exterior background noises are generally lower than the daytime levels. However, most household noise also decreases at night and exterior noise becomes very noticeable. Further, most people sleep at night and are very sensitive to noise intrusion. To account for human sensitivity to nighttime noise levels, the Day-Night Level (DNL) noise descriptor was developed. The DNL is also called the L_{dn}. Either is acceptable, however, DNL is more popular worldwide. The DNL divides the 24-hour day into the daytime period of 7:00 a.m. to 10:00 p.m. and the nighttime period of 10:00 p.m. to 7:00 a.m. The nighttime noise levels are penalized by 10 dB to account for the greater sensitivity to noise at night. The Community Noise Equivalent Level (CNEL) is another 24-hour average which includes a 5 dB evening (7:00 p.m. - 10:00 p.m.) penalty and a 10 dB nighttime penalty. Both the DNL and the CNEL average the daytime, evening and nighttime noise levels over a 24-hour period to attain a single digit *noise exposure*. The proper notations for the Day-Night Level and the Community Noise Equivalent Level are dB DNL and dB CNEL, respectively, as they can only be calculated using A-weighted decibels. It is, therefore, considered redundant to notate dB(A) DNL or dB(A) CNEL.

The effects of noise on people can be listed in three general categories:

- subjective effects of annoyance, nuisance, dissatisfaction;
- interference with activities such as speech, sleep, learning, relaxing;
- physiological effects such as startling, hearing loss.

The levels associated with environmental noise, in almost every case, produce effects only in the first two categories. Workers in industrial plants, airports, etc., can experience noise in the last category. Unfortunately, there is, as yet, no completely satisfactory way to measure the subjective effects of noise, or of the corresponding reactions of annoyance and dissatisfaction. This is primarily due to the wide variation in individual thresholds of annoyance and differing individual past experiences with noise. Thus, an important way to determine a person's subjective reaction to a new noise is to compare it to the existing environment to which one has adapted, i.e., the "ambient". In general, the more a new noise exceeds the previously existing ambient noise level, the less acceptable the new noise will be judged by the receivers.

With regard to increases in A-weighted noise levels, the Environmental Protection Agency has determined the following relationships that will be helpful in understanding this report.

- Except in carefully controlled laboratory experiments, a change of 1 dB cannot be perceived.
- Outside of the laboratory, a 3 dB change is considered a just-perceptible difference.
- A change in level of at least 5 dB is required before any noticeable change in community response would be expected.
- A 10 dB change is subjectively heard as approximately a doubling in loudness, and would almost certainly cause an adverse change in community response.

The adding or subtracting of sound levels is not simply arithmetic. The sound levels, in decibels, must be converted to Bels, the anti-log's of which are then calculated. The manipulation is then performed (arithmetic addition or subtraction), the logarithm of the sum or difference is calculated. The final number is then multiplied by 10 to convert Bels to decibels. The formula for adding decibels is as follows:

$$\text{Sum} = 10\log(10^{SL/10} + 10^{SL/10}) \qquad \text{where, SL is the Sound Level in decibels.}$$

For example, 60 dB + 60 dB = 63 dB, and 60 dB + 50 dB = 60 dB. Two sound sources of the same level are barely noisier than just one of the sources by itself. When one source is 10 dB higher than the other, the less noisy source does not add to the noisier source.

III. Noise Standards, Goals & Policies

A. City of San Jose General Plan

The noise assessment results presented in the findings were evaluated against the City of San Jose Goals and Policies of the General Plan standards, Ref. (a), which utilize the Day-Night Level (DNL) 24-hour noise descriptor.

Policy EC-1 regarding noise impacts to a site does not apply to industrial land uses.

The Goals and Policies quantify substantial noise increases for the determination of significant noise impacts related to CEQA. In GP Policy EC-1.2, the General Plan increases allowed are: less than 5 dB where the noise exposure remains within the Normally Acceptable (60 dB DNL) limit and less than 3 dB where the noise exposure equals or exceeds the Normally Acceptable level.

Per GP Policy EC-1.3, new non-residential land use project-generated noise exposures are limited to 55 dB DNL at the property line when adjacent to noise sensitive residential or public land uses.

B. California Environmental Quality Act (CEQA)

The project-generated noise exposures were evaluated against the guidelines of the California Environmental Quality Act (CEQA). CEQA does not limit noise levels or noise exposures nor does it quantify noise exposure or noise level increases over the ambient to define noise impacts. CEQA evaluates a project as a significant noise impact if it "...caused a substantial increases in the ambient noise levels...". The quantification of the threshold of significance is left up to the local jurisdiction. The City of San Jose Goals and Policies provides thresholds of significance in the General Plan. The thresholds of significance shall be applied at the existing residential area to the east, north and west of the site.

The City of San Jose General Plan Policy EC-1.2 state that significant noise impacts would occur if a project would:

- Cause the DNL at noise sensitive receptors to increase by five dB DNL or more where the noise levels would remain "Normally Acceptable"; or

- Cause the DNL at noise sensitive receptors to increase by three dB DNL or more where the noise levels equal or exceed the "Normally Acceptable" level.

If the project causes either of the above criteria to occur, the project will be considered a significant noise impact to the areas where it occurs and mitigation measures will be required. Table II summarizes the quantitative noise limits applied on the residential side of the property lines at the first floor elevations. For instance, the ambient + 2 dB is considered acceptable, whereas the ambient + 3 dB is considered a noise impact. Thus, the values in the Table represent the noise limit of acceptability on the project before a noise impact occurs.

Another way to look at this is:

(Ambient) + (Ambient -2) = (Ambient + 2) = Acceptable Limit
(Ambient) + (Ambient -1) = (Ambient + 3) = Impact

TABLE II	
Project-Generated Noise Limits	
Goals and Policies EC-1.3	55 dB DNL
Goals and Policies EC-1.2 (based on ambient +2)	60 dB DNL @ Property Line of State Street Residences
Zoning Ordinance	55 dBA

The project-generated noise increase limit was determined from the lowest measured ambient noise exposure of 62 dB DNL at the residential property line across State Street from the site. As the existing ambient is 62 dB DNL, the ambient + project noise exposure is limited to 64 dB DNL (ambient + 2 dB). In order for the project not to cause a substantial increase of 3 dB, the project noise limit is 60 dB.

60 dB + 62 dB = 64 dB or;
$10\log_{10}(10^{60/10}+10^{62/10}) = 64$.

A project-generated noise exposure of 55 dB DNL, per Policy EC-1.3, is the most stringent acceptable noise exposure limit.

B. City of San Jose Zoning Ordinance

The project-generated short-term noise levels were evaluated against the standards of Title 20 of the City of San Jose Municipal Code Zoning Ordinance, "Performance Standards", Ref. (b), which limits project-generated short-term noise levels to 55 dBA at residential properties.

The short-term noise level limit of 55 dBA is the most stringent standard of the Zoning Ordinance.

IV. Acoustical Setting

A. Site and Noise Source Descriptions

The planned project site is located at 1436 State Street in San Jose. The site is relatively flat and at-grade with the surrounding roadways and land uses and currently contains an industrial warehouse, storage and recycling facility. Surrounding land uses include a storage facility adjacent to the west, heavy equipment storage adjacent to the north, construction materials storage adjacent to the east and single-family residential across State Street to the south.

The primary sources of noise at the site are traffic on State Street and aircraft operations at Mineta/San Jose International Airport. The current use on the site was gated and locked during the site visits. Thus, the levels of noise generated by the existing use are unknown. Whatever noise was generated by the existing use and other uses in the vicinity are included in the ambient noise data.

B. Project Description

The planned project, as shown on the Site Plan, Ref. (c), includes interior improvements of the existing building on the site, repaving and striping the site, rebuilding an existing utility building, a new exterior storage equipment area and the reconfiguration of the gates. The seal coat emulsion tank, propane tank, trash enclosure, restroom and utility room will be located along the easterly property line.

The Pacific Surfacing facility operates from 6:00 AM to 7:00 PM weekdays. Only staff vehicles enter the site and some equipment vehicles are fueled between 6:00 and 7:00 AM. Noise generating activity commences at 7:00 AM and continues through the hour until the necessary items of equipment have been loaded and leave the site. Three times per week during a six month warm season, the seal coat tank is refilled. This operation usually occurs during the mid-day. All vehicles and equipment return to the site between 4:00 – 7:00 PM. Heavy trucks will not be allowed to travel west on State Street. The site plan is shown on Figure 1 on page 11. Information on project operations provided by Pacific Surfacing, Ref. (d).

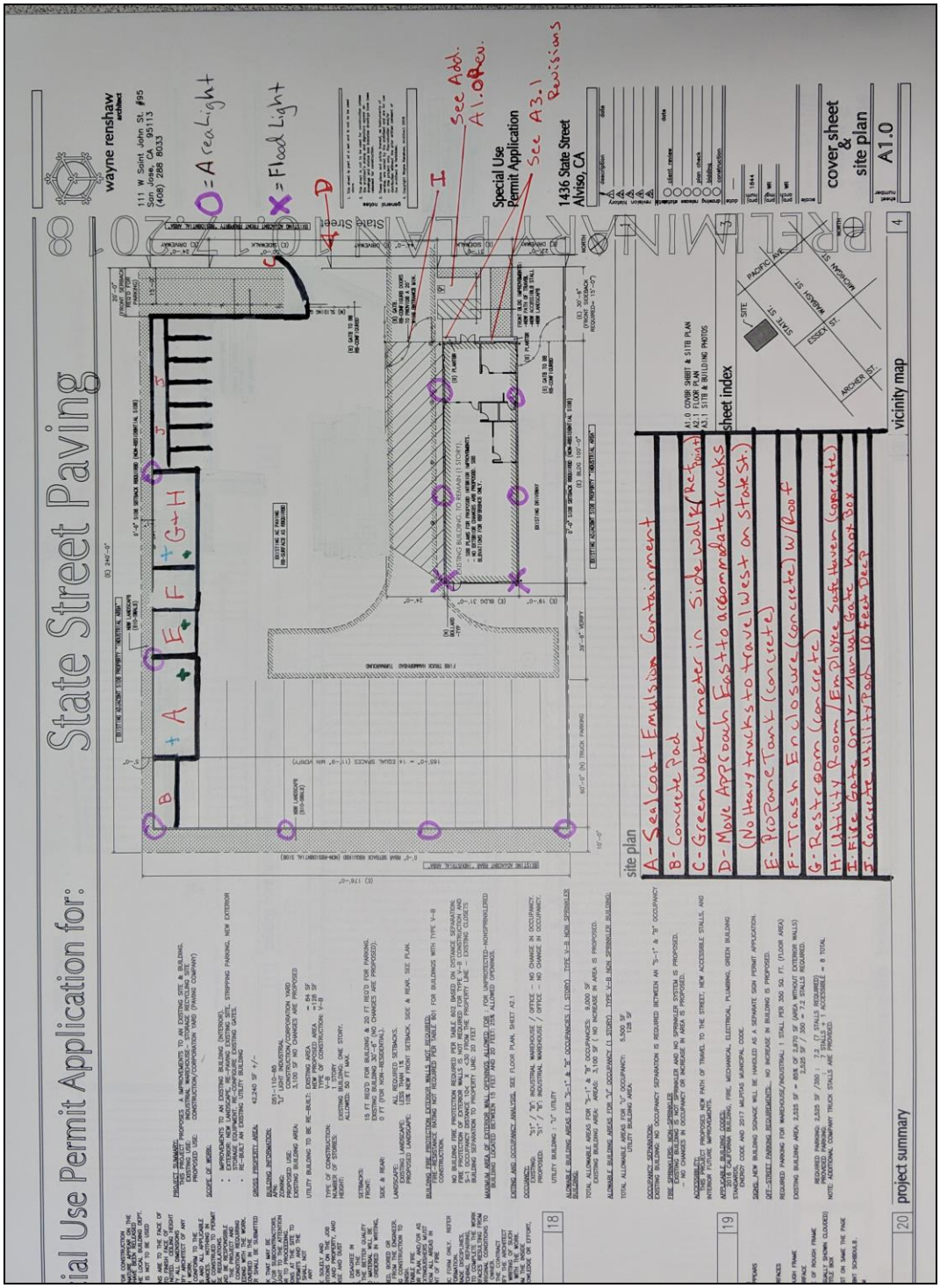

FIGURE 1 – Site Plan

V. Existing Noise Environments

A. Existing Noise Levels

To determine the existing ambient noise environment at the residential receptor location to establish the baseline for the Policy EC-1.2/CEQA evaluation, continuous recordings of the sound levels were made at a location on the south side of State Street at the residential property line directly across the street from the site. The measurement location is shown on Figure 2 on page 13. The measurements were made on February 11-12, 2019 for a continuous period of 24 hours and included measurements during the daytime and nighttime periods of the DNL index during a typical weekday. The sound levels were recorded and processed using a Larson-Davis Model 812 Precision Integrating Sound Level Meter. The meter yields, by direct readout, a series of descriptors of the sound levels versus time, which include the L_1, L_{10}, L_{50}, and L_{90}, i.e., those levels that are exceeded 1%, 10%, 50%, and 90% of the time. The meter also yields the maximum and minimum levels, and the continuous equivalent-energy levels (L_{eq}), which are used to calculate the DNL. The measured L_{eq}'s are shown in the data tables in Appendix C.

The L_{eq}'s at the measurement location across State Street from the site ranged from 55.6 to 64.3 dBA during the daytime and from 44.0 to 60.1 dBA at night.

FIGURE 2 – Ambient Noise Measurement Location

B. Existing Noise Exposures

To determine the existing ambient noise exposures at the nearest residential receptor, the DNL for the survey location was calculated by decibel averaging of the L_{eq}'s as they apply to the daily time periods of the DNL index. A 10 decibel nighttime weighting factor was applied and the DNL was calculated using the formula shown in Appendix B. The measured L_{eq}'s and DNL calculations are shown in the data tables in Appendix C.

The results of the calculations indicate that the existing ambient noise exposure at the measurement location along State Street is 62 dB DNL. This ambient noise exposure was used as the basis for determining the City of San Jose Goals and Policies Policy EC-1.2/CEQA noise increase limit, as shown in Table II on page 8 of this report.

VI. Noise Impacts

A. Impacts to the Project

The City of San Jose General Plan contains no standards for evaluating noise impacts to an industrial use. Thus, there are no noise impacts to the project.

B. Project-Generated Noise Levels

To determine the project-generated short term noise levels for the evaluations against the City of San Jose Zoning Ordinance and the longer term noise exposures for the evaluations against the City of San Jose General Plan Goals and Policies/CEQA, on-site sound level measurements were made of the Pacific Surfacing equipment and operations at the existing facility at 2066 Warm Springs Court in Fremont. The sound level measurements were made on March 4 and May 28, 2019 using a Larson Davis 831 Precision Integrating Sound Level Meter. The meter conforms to ANSI S1.4 and IEC 61672-1:2002 for Type 1 and Class 1 instruments, respectively. Due to scheduling, the noise levels of the asphalt paver being loaded onto a trailer, the truck and trailer driving off of the site, driving onto the site and the paver being unloaded from the truck were made on May 28th. All other measurements were made on March 4th.

Table III on page 15 provides the list of equipment and the operation of the equipment measured at the Fremont facility, the measurement distance, the sound level of the equipment and its operation, the distance from equipment/operation to the residential receptor property line at the State Street facility and the sound level of the equipment/operation at the residential receptor location. The sound levels at the residential receptor location were evaluated against the City of San Jose Zoning Ordinance standard of 55 dBA. Equipment and/or operational sound levels exceeding the 55 dBA standard are shown in bold. The time frames shown in the left column were not the times of the measurements, but are the expected times of occurrence at the new site and are shown to correspond with Table IV.

TABLE III

Equipment Activity and Operations Noise Level Analysis

Time	Equipment	Operation	Measurement Distance, ft.	Operational Sound Level, dBA	Distance to Receptor, ft.	Sound Level @ Receptor, dBA
7:00 AM	Front End Loader	OntoTrailer	15	73	225	50
7:00 AM	Utility Truck w/Small Trailer	Exit Site	67	54	50	**57**
7:00 AM	Paver	Onto Trailer	40	69	225	54
7:00 AM	Large Trucks 1 w/Paver Trailer	Exit Site	40	77	50	**75**
7:00 AM	Flatbed Truck	Exit Site	67	74	50	**77**
7:00 AM	Utility Truck w/Large Trailer	Exit Site	67	56	50	**58**
9:00 AM	Asphalt Tanker	Enter Site	67	59	50	**62**
9:00 AM	Asphalt Tanker	Exit Site	67	68	50	**70**
11:00 AM	Seal Coat Tanker	Enter Site	67	64	50	**66**
11:00 AM	Seal Coat Tank Prep	Fill	25	72	225	53
12:00 PM	Seal Coat Tanker Truck	Fill	15	76	225	52
12:00 PM	Seal Coat Tanker	Exit Site	67	64	50	**67**
4:00 PM	Utility Truck w/Small Trailer	Enter Site	67	55	50	**58**
4:00 PM	Large Truck w/Paver Trailer	Enter site	40	59	50	**57**
5:00 PM	Flatbed Truck	Enter Site	67	68	50	70
5:00 PM	Paver	Off Trailer	40	65	225	50
6:00 PM	Utility Truck w/Large Trailer	Enter Site	67	58	50	**60**
6:00 PM	Front End Loader	Off Trailer	15	73	225	50

Important Note: All of the noise excesses shown in Table III are due to vehicles entering or exiting the site at the driveway when they are on the site but closest to the residential receptor across State Street. Nearly all situations of trucks or other large or heavy vehicles that enter or exit a property where commercial or residential uses are across the street will experience these types of noise excesses. Because of the need for access between the street and the property, noise control measures, such as barriers, are not feasible. This circumstance is common as it currently occurs at the site and along many of the other commercial or industrial facilities along State Street.

Measures to resolve the short term noise excesses are provided in Section VII of this report.

C. Project-Generated Noise Exposures

To calculate the project-generated noise exposures for evaluations against Policies EC-1.2 and EC-1.3 of the City of San Jose General Plan Goals and Policies, the noise levels of each item of equipment and operation at the residential property boundary, as shown in Table III, were averaged over each operational hour of the day. During the equipment measurements at the Fremont facility, each operation was timed for duration. The number of operations of each item in each hour was provided by Pacific Surfacing, Ref. (d). The hourly average noise level ($L_{eq(h)}$) for each hour was calculated and are shown in the last column.

The operations during the 7:00 AM hour are consistent day to day. The seal coat tank fill occurs 3 times per week and could occur anytime during the day. The return of vehicles and equipment from jobsites during the 4:00 PM to 7:00 PM hours are also consistent on a day-to-day basis. When vehicles exit or enter the facility site, they are mobile so that the durations of noise occurrence while they are on the site are very short; a few to several seconds (fractions of a minute) before they enter the street or are far enough into the site where the sound levels drop to insignificance. Although the operational sound level of a vehicle entering or existing the site can be high in the short term (Table III), the averaging of these sound levels over longer periods of time result in substantially lower levels.

The project-generated hourly average noise levels were then used to calculate the project-generated noise exposure, in terms of dB DNL, for the evaluations against the standards of the City of San Jose General Plan Goals and Policies. Table V, below, provides the project-generated noise exposure calculation for the residential receptor property boundary location across State Street from the planned project site. Because of the calculation method of the DNL, all noise generated during the daytime hours of 7:00 AM to 10:00 PM are averaged. Thus, it is irrelevant exactly when during the daytime hours the noise source occurs.

TABLE V

Project-Generated Noise Exposure Calculations
Residential Propertly Line Across State Street

TIME	Leq	10^Leq/10		
7:00 AM	59.0	791170.3		
8:00 AM		1.0		
9:00 AM	46.8	47470.7		
10:00 AM		1.0		
11:00 AM	46.2	41426.3		
12:00 PM	52.6	182292.9		
1:00 PM		1.0		
2:00 PM		1.0		
3:00 PM		1.0		
4:00 PM	40.6	11354.0		
5:00 PM	51.5	141197.3		
6:00 PM	46.8	47652.0		
7:00 PM		1.0		
8:00 PM		1.0		
9:00 PM		1.0	SUM=	1262571.6
10:00 PM		1.0	Ld=	61.0
11:00 PM		1.0		
12:00 AM		1.0		
1:00 AM		1.0		
2:00 AM		1.0		
3:00 AM		1.0		
4:00 AM		1.0		
5:00 AM		1.0		
6:00 AM		1.0	SUM=	9.0
			Ln=	9.5

Daytime Level=	61.0
Nighttime Level=	19.5
DNL=	**47**
24-Hour Leq=	47.2

As shown in Table V, the project-generated noise exposure at the most impacted residential receptor location will be 47 dB DNL on the busiest days and will be within the 55 dB DNL limit of the City of San Jose General Plan Goals and Policies, Policy EC-1.3.

To evaluate the project-generated noise impacts against the standards of Policy EC-1.2 of the City of San Jose General Plan Goals and Policies, the project noise exposures were added to the background noise exposure and the sum was compared to the existing total noise exposure.

Ambient	Project	Ambient + Project	Δ dB
62 dB DNL	47 dB DNL	62 dB DNL	0 dB

or, $10\log_{10}(10^{(62/10)}) + (10^{(47/10)}) = 62$.

The project will not add to the existing noise environment is the vicinity of the site and will be within the Ambient + 2 dB limit of the City of San Jose General Plan Goals and Policies, Policy EC-1.2. This is a Less Than Significant Impact, per CEQA.

As the project-generated noise exposures will be in compliance and the applicable standards and policies, noise reduction measures will not be required for General Plan compliance.

VII. Recommendations

Although vehicles driving onto the site and existing the site will generate noise levels that will exceed the 55 dBA limit of the City of San Jose Zoning Ordinance, this is a regular and common occurrence where driveways exist along streets with noise sensitive receptors, whether residential or commercial, are on the opposing side. This is also an existing condition of the current use on the site and on many of the other industrial uses along State Street. Because of the driveway opening, noise barriers are not feasible.

The City of San Jose may, at their discretion, entertain acceptance of the project via a Conditional Use Permit

VIII. Conclusions

In conclusion, the project-generated noise levels will exceed the limits of the City of San Jose Zoning Ordinance. However, feasible noise reduction methods are not available for this normal noise occurrence. The project-generated noise exposures will be within the limits of the City of San Jose General Plan Goals and Policies. The project will not cause a significant increase in the existing noise environment at residences directly across State Street to the south of the site. Therefore, there is no significant impact under CEQA.

This report presents the results of a noise assessment study for the planned Pacific Surfacing facility at 1436 State Street in San Jose. The study findings for existing conditions are based on field measurements and other data and are correct to the best of our knowledge. Future noise projections are based on information provided by the project sponsor. However, significant deviations in the predicted vehicle or equipment operational scenarios or volumes, the equipment used on the site, times of operation, noise regulations or other future changes beyond our control may produce long-range noise results different from our estimates.

Report Prepared By:

EDWARD L. PACK ASSOC., INC.

Jeffrey K. Pack
President

APPENDIX A

References

(a) City of San Jose Envision San Jose 2040 General Plan, November 1, 2011

(b) City of San Jose Municipal Code, Title 20, "Zoning", Part 6, Performance Standards, October 24, 2017

(c) Site Plan, "State Street Paving", by Wayne Renshaw Architect, undated

(d) Information on Pacific Surfacing Activities and Operations Provided by Mr. Seth Martinez, Pacific Surfacing, by Personal Communication with Edward L. Pack Associates, Inc., March 4, 2019

APPENDIX B

Noise Standards, Terminology, Instrumentation,

1. Noise Standards

A. City of San Jose General Plan Goals and Policies

The City of San Jose General Plan "Envision San Jose 2040", adopted November 1, 2011, Chapter 3 "Environmental Leadership" contains noise environment goals and policies.

Goal EC-1 – Community Noise Levels and Land Use Compatibility

Minimize the impact of noise on people through noise reduction and suppression techniques, and through appropriate land use policies.

Policies – Community Noise Levels and Land Use Compatibility

EC-1.1 Locate new development in areas where noise levels are appropriate for the proposed uses. Consider federal, state and City noise standards and guidelines as a part of new development review. Applicable standards and guidelines for land uses in San José include:

Interior Noise Levels

The City's standard for interior noise levels in residences, hotels, motels, residential care facilities, and hospitals is 45 dBA DNL. Include appropriate site and building design, building construction and noise attenuation techniques in new development to meet this standard. For sites with exterior noise levels of 60 dBA DNL or more, an acoustical analysis following protocols in the City-adopted California Building Code is required to demonstrate that development projects can meet this standard.

The acoustical analysis shall base required noise attenuation techniques on expected *Envision General Plan* traffic volumes to ensure land use compatibility and General Plan consistency over the life of this plan.

Exterior Noise Levels

The City's acceptable exterior noise level objective is 60 dBA DNL or less for residential and most institutional land uses (Table EC-1). The acceptable exterior noise level objective is established for the City, except in the environs of the San José International Airport and the Downtown, as described below:

For new multi-family residential projects and for the residential component of mixed-use development, use a standard of 60 dBA DNL in usable outdoor activity areas, excluding balconies and residential stoops and porches facing existing roadways. Some common use areas that meet the 60 dBA DNL exterior standard will be available to all residents. Use noise attenuation techniques such as shielding by buildings and structures for outdoor common use areas. On sites subject to aircraft overflights or adjacent to elevated roadways, use noise attenuation techniques to achieve the 60 dBA DNL standard for noise from sources other than aircraft and elevated roadway segments.

For single family residential uses, use a standard of 60 dBA DNL for exterior noise in private usable outdoor activity areas, such as backyards.

Table EC-1: Land Use Compatibility Guidelines for Community Noise Level in San Jose

	EXTERIOR NOISE EXPOSURE (dB DNL)					
Land Use Category	55	60	65	70	75	80
Residential, Hotels and Motels, Hospitals and Residential Care						
Outdoor Sports and Recreation, Neighborhood Parks, Playgrounds						
Schools, Libraries, Museums, Meeting Halls, Churches						
Office Buildings, Business, Commercial and Professional						
Sports Arenas, Outdoor Spectator Sports						
Public and Quasi-Public Auditoriums, Concert Halls, Amphitheaters						

	Normally Acceptable
	Conditionally Acceptable
	Unacceptable

EC-1.2 Minimize the noise impacts of new development on land uses sensitive to increased noise levels (Categories 1, 2, 3 and 6) by limiting noise generation and by requiring use of noise attenuation measures such as acoustical enclosures and sound barriers, where feasible. The City considers significant noise impacts to occur if a project would:

- Cause the DNL at noise sensitive receptors to increase by five dBA DNL or more where the noise levels would remain "Normally Acceptable"; or

- Cause the DNL at noise sensitive receptors to increase by three dBA DNL or more where noise levels would equal or exceed the "Normally Acceptable" level.

EC-1.3 Mitigate noise generation of new nonresidential land uses to 55 dBA DNL at the property line when located adjacent to existing or planned noise sensitive residential and public/quasi-public land uses.

EC-1.4 Include appropriate noise attenuation techniques in the design of all new General Plan streets projected to adversely impact noise sensitive uses.

EC-1.5 Encourage the State Department of Transportation and County transportation agencies to provide visually pleasing sound attenuation devices on all new and existing freeways and expressways.

EC-1.6 Regulate the effects of operational noise from existing and new industrial and commercial development on adjacent uses through noise standards in the City's Municipal Code.

EC-1.7 Require construction operations within San José to use best available noise suppression devices and techniques and limit construction hours near residential uses per the City's Municipal Code. The City considers significant construction noise impacts to occur if a project located within 500 feet of residential uses or 200 feet of commercial or office uses would:

Involve substantial noise generating activities (such as building demolition, grading, excavation, pile driving, use of impact equipment, or building framing) continuing for more than 12 months.

For such large or complex projects, a construction noise logistics plan that specifies hours of construction, noise and vibration minimization measures, posting or notification of construction schedules, and designation of a noise disturbance coordinator who would respond to neighborhood complaints will be required to be in place prior to the start of construction and implemented during construction to reduce noise impacts on neighboring residents and other uses.

EC-1.8 Allow commercial drive-through uses only when consistency with the City's exterior noise level guidelines and compatibility with adjacent land uses can be demonstrated.

EC-1.9 Require noise studies for land use proposals where known or suspected loud intermittent noise sources occur which may impact adjacent existing or planned land uses. For new residential development affected by noise from heavy rail, light rail, BART or other single-event noise sources, implement mitigation so that recurring maximum instantaneous noise levels do not exceed 50 dBA L_{max} in bedrooms and 55 dBA L_{max} in other rooms.

EC-1.10 Monitor Federal legislative and administrative activity pertaining to aircraft noise for new possibilities for noise-reducing modifications to aircraft engines beyond existing Stage 3 requirements. Encourage the use of quieter aircraft at the San José International Airport.

EC-1.11 Require safe and compatible land uses within the Mineta International Airport noise zone (defined by the 65 CNEL contour as set forth in State law) and encourage aircraft operating procedures that minimize noise.

EC-1.12 Encourage the Federal Aviation Administration to enforce current cruise altitudes that minimize the impact of aircraft noise on land use.

Actions – Community Noise Levels and Land Use Compatibility

EC-1.13 Update noise limits and acoustical descriptors in the Zoning Code to clarify noise standards that apply to land uses throughout the City.

EC-1.14 Require acoustical analyses for proposed sensitive land uses in areas with exterior noise levels exceeding the City's noise and land use compatibility standards to base noise attenuation techniques on expected Envision General Plan traffic volumes to ensure land use compatibility and General Plan consistency.

Goal EC-2 - Vibration

Minimize vibration impacts on people, residences, and business operations.

Policies - Vibration

EC-2.1 Near light and heavy rail lines or other sources of ground-borne vibration, minimize vibration impacts on people, residences, and businesses through the use of setbacks and/or structural design features that reduce vibration to levels at or below the guidelines of the Federal Transit Administration. Require new development within 100 feet of rail lines to demonstrate prior to project approval that vibration experienced by residents and vibration sensitive uses would not exceed these guidelines.

EC-2.2 Require new sources of ground-borne vibration, such as transit along fixed rail systems or the operation of impulsive equipment, to minimize vibration impacts on existing sensitive land uses to levels at or below the guidelines of the Federal Transit Administration.

EC-2.3 Require new development to minimize vibration impacts to adjacent uses during demolition and construction. For sensitive historic structures, a vibration limit of 0.08 in/sec PPV (peak particle velocity) will be used to minimize the potential for cosmetic damage to a building. A vibration limit of 0.20 in/sec PPV will be used to minimize the potential for cosmetic damage at buildings of normal conventional construction.

EC-2.4 Consider the effects of ground-borne vibration in the analysis for potential Land Use / Transportation Diagram changes.

2. Terminology

A. Statistical Noise Levels

Due to the fluctuating character of urban traffic noise, statistical procedures are needed to provide an adequate description of the environment. A series of statistical descriptors have been developed which represent the noise levels exceeded a given percentage of the time. These descriptors are obtained by direct readout of the Sound Level Meters and Noise Analyzers. Some of the statistical levels used to describe community noise are defined as follows:

L_1 - A noise level exceeded for 1% of the time.

L_{10} - A noise level exceeded for 10% of the time, considered to be an "intrusive" level.

L_{50} - The noise level exceeded 50% of the time representing an "average" sound level.

L_{90} - The noise level exceeded 90 % of the time, designated as a "background" noise level.

L_{eq} - The continuous equivalent-energy level is that level of a steady-state noise having the same sound energy as a given time-varying noise. The L_{eq} represents the decibel level of the time-averaged value of sound energy or sound pressure squared and is used to calculate the DNL and CNEL.

B. Day-Night Level (DNL)

Noise levels utilized in the standards are described in terms of the Day-Night Level (DNL). The DNL rating is determined by the cumulative noise exposures occurring over a 24-hour day in terms of A-Weighted sound energy. The 24-hour day is divided into two subperiods for the DNL index, i.e., the daytime period from 7:00 a.m. to 10:00 p.m., and the nighttime period from 10:00 p.m. to 7:00 a.m. A 10 dB weighting factor is applied (added) to the noise levels occurring during the nighttime period to account for the greater sensitivity of people to noise during these hours. The DNL is calculated from the measured L_{eq} in accordance with the following mathematical formula:

$$DNL = \left[[(10\log_{10}(10^{\Sigma Leq(7\text{-}10)})) \times 15] + [((10\log_{10}(10^{\Sigma Leq(10\text{-}7)})) + 10) \times 9]\right]/24$$

Where:

L_d = L_{eq} for the daytime (7:00 a.m. to 10:00 p.m.)

L_n = L_{eq} for the nighttime (10:00 p.m. to 7:00 a.m.)

24 - indicates the 24-hour period

& - denotes decibel addition.

C. A-Weighted Sound Level

The decibel measure of the sound level utilizing the "A" weighted network of a sound level meter is referred to as "dBA". The "A" weighting is the accepted standard weighting system used when noise is measured and recorded for the purpose of determining total noise levels and conducting statistical analyses of the environment so that the output correlates well with the response of the human ear.

3. Instrumentation

The on-site field measurement data were acquired by the use of one or more of the precision acoustical instruments shown below. The acoustical instrumentation provides a direct readout of the L exceedance statistical levels including the equivalent-energy level (L_{eq}). Input to the meters was provided by a microphone extended to a height of 5 ft. above the ground. The meter conforms to ANSI S1.4 for Type 1 instruments and IEC 61672-1:2002 for Class 1 instruments. The "A" weighting network and the "Fast" response setting of the meter were used in conformance with the applicable ISO and IEC standards. All instrumentation was acoustically calibrated before and after field tests to assure accuracy.

Bruel & Kjaer 2231 Precision Integrating Sound Level Meter
Larson Davis LDL 812 Precision Integrating Sound Level Meter
Larson Davis 2900 Real Time Analyzer
Larson Davis 831 Precision Integrating Sound Level Meter

APPENDIX C

Ambient Noise Measurement Data and Calculation Tables

DNL CALCULATIONS

CLIENT: PACIFIC SURFACING
FILE: 51-007
PROJECT: NEW FACILITY
DATE: 2/11-12/2019
SOURCE: EXISTING AMBIENT

LOCATION 1	Across State St. From Site Residential Property Line			
TIME	Leq	10^Leq/10		
7:00 AM	61.8	1513561.2		
8:00 AM	61.6	1445439.8		
9:00 AM	55.6	363078.1		
10:00 AM	57.6	575439.9		
11:00 AM	59.3	851138.0		
12:00 PM	63.0	1995262.3		
1:00 PM	64.1	2570395.8		
2:00 PM	62.6	1819700.9		
3:00 PM	59.2	831763.8		
4:00 PM	60.4	1096478.2		
5:00 PM	59.7	933254.3		
6:00 PM	59.0	794328.2		
7:00 PM	58.2	660693.4		
8:00 PM	58.9	776247.1		
9:00 PM	64.3	2691534.8	SUM=	18918315.9
10:00 PM	53.1	204173.8	Ld=	72.8
11:00 PM	55.9	389045.1		
12:00 AM	47.2	52480.7		
1:00 AM	45.7	37153.5		
2:00 AM	44.0	25118.9		
3:00 AM	45.7	37153.5		
4:00 AM	48.6	72443.6		
5:00 AM	53.5	223872.1		
6:00 AM	60.1	1023293.0	SUM=	2064734.3
			Ln=	63.1
	Daytime Level=	72.8		
	Nighttime Level=	73.1		
	DNL=	**62**		
	24-Hour Leq=	59.4		