APPENDIX D1

Noise Assessment Study

EDWARD L. PACK ASSOCIATES. INC.

1975 HAMILTON AVENUE
SUITE 26
SAN JOSE, CA 95125

Acoustical Consultants

TEL: 408-371-1195
FAX: 408-371-1196
www.packassociates.com

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Project No 50-024

Ms. Angie Galatolo
El Camino Real 76, LLC
4350 El Camino Real
Los Altos, CA 94022

Subject: Noise Assessment Study for the Planned Multi-Family Development, 4350 El Camino Real, Los Altos

Dear Ms. Galatolo:

This report presents the results of a noise assessment study for the planned multi-family development at 4350 El Camino Real in Los Altos, as shown on the Conceptual Site Plan, Ref. (a). The noise exposures at the site were evaluated against the standards of the City of Los Altos Natural Environment and Hazards Element, Ref. (b), and the State of California Code of Regulations, Title 24, Ref. (c), which applies to all new multi-family housing. The analysis of the on-site sound level measurements indicates that the existing noise environment is due primarily to traffic sources on El Camino Real. Traffic noise from Los Altos Avenue is within the limits of the standards and does not significantly impact the project. The results of the study indicate that the exterior and interior noise exposures at the site exceed the limits of the standards. Mitigation measures will be required. Project-generated noise from construction on the site is also included in this study. However, project-generated noise from traffic and mechanical equipment associated with the project could not be analyzed as the necessary data and information are not available.

Sections I and II of this report contain a summary of our findings and recommendations, respectively. Subsequent sections contain the site, traffic, and project descriptions, analyses, and evaluations. Attached hereto are Appendices A, B, and C, which include the list of references, descriptions of the applicable standards, definitions of the terminology, descriptions of the acoustical instrumentation used for the field survey, general building shell controls and the on-site noise measurement data and calculation tables.

I. Summary of Findings

City of Los Altos General Plan

The noise assessment results presented in the findings were evaluated against the standards of the noise section of the City of Los Altos Natural Environment and Hazards Element (NEHE) of the General Plan, which use the Community Noise Equivalent Level (CNEL) descriptor. The NEHE contains policies regarding the maximum allowable noise levels for new construction of noise sensitive uses in an existing noise environment.

Policy 7.2 requires the following maximum noise levels (exposures):
60 dB CNEL for outdoor noise for single-family residential areas,

65 dB CNEL for outdoor noise for multi-family residential areas,

70 dB CNEL for outdoor noise for schools, libraries, churches hospitals, nursing homes, parks, commercial and recreation areas.

Policy 7.3 state to work to achieve indoor noise levels not exceeding 45 dB CNEL.

State of California, Title 24

The Title 24 standards also use the CNEL descriptor and specify an interior noise exposure limit of 45 dB CNEL.

The Title 24 standards also specify minimum sound insulation ratings for common partitions separating different dwelling units and dwelling units from interior common spaces, such as corridors and retail spaces. The standards specify that common walls and floor/ceiling assemblies must have a design Sound Transmission Class (STC) rating of 50 or higher. In addition, common floor/ceiling assemblies must have a design Impact Insulation Class (IIC) rating of 50 or higher. As design details for the interior partitions of the project were not available at the time of this study, an evaluation of the interior partitions has not been made.

Noise exposure limits of 65 dB CNEL for the balconies and common area and 45 dB CNEL for the interior living spaces are applicable to this project.

The noise levels shown below are without the application of mitigation measures and represent the noise environment for the site and project conditions.

A. **Exterior Noise Exposures**

- The existing exterior noise exposure at the most impacted planned patios, balconies and minimum building setback from El Camino Real (85 ft. from the centerline) is 71 dB CNEL. Under future traffic conditions, the noise exposure is expected to remain at 71 dB CNEL. Thus, the noise exposures will be up to 6 dB in excess of the City of Los Altos Natural Environment and Hazards Element standard.

- The existing exterior noise exposure at the most impacted planned patios, balconies and minimum building setback from Los Altos Avenue (46 ft. from the centerline) is 56 dB CNEL due to Los Altos Avenue traffic alone. Under future traffic conditions, the noise exposure is expected to increase to 57 dB CNEL. Thus, the noise exposures from Los Altos Avenue traffic will be within the City of Los Altos Natural Environment and Hazards Element standard. However, traffic noise from El Camino Real will impact the westerly façade of the building. The exterior noise exposure at the southwesterly corner of the project due to El Camino Real traffic will be as low as 62 dB CNEL under existing and future traffic conditions. When combined with Los Altos Avenue traffic noise, the exterior noise exposures at the westerly façade of the building will be 63 to 70 dB CNEL under existing and future traffic conditions.

- The existing exterior noise exposure in the exterior common area of the project, 155 ft. from the centerline of El Camino Real, will be up to 64 dB CNEL. Under future traffic conditions, the noise exposure is expected to remain at 64 dB CNEL. Thus, the noise exposures will be within the 65 dB CNEL limit of the City of Los Altos Natural Environment and Hazards Element standard.

B. **Interior Noise Exposures**

- The interior noise exposure in the most impacted living spaces closest to El Camino Real will be up to 56 dB CNEL under existing and future traffic conditions. Thus, the noise exposure will be up to 11 dB in excess of the City of Los Altos NEHE and Title 24 standards.

- The interior noise exposures in the most impacted living spaces closest to Los Altos Avenue will range from 48 to 55 dB CNEL under existing and future traffic conditions from the southwesterly corner to the northwesterly corner of the building. Thus, the noise exposures will range from 3 to 10 dB in excess of the City of Los Altos NEHE and Title 24 standards.

As shown above, the exterior and interior noise exposures will exceed the limits of the standards. Mitigation measures will be required. The recommended measures are described in Section II of this report.

C. Construction Phase Noise and Vibration Impacts

Short-term noise and vibration impacts may be created during demolition of the existing structures on the site and construction of the project. Demolition and construction equipment are typically similar, with the exception of paving equipment and pile drivers (impact hammers). However, pile driving is not expected on this project. The noise levels generated by the two phases will be similar over the course of the entire process.

A chart from the EPA providing standard construction equipment noise levels at a distance of 50 ft. is provided in Figure 1 on page 6. From the information provided in the Table, demolition/construction equipment noise levels range from 68 to 96 dBA at a 50 ft. distance from the source.

The residences to the south of the site are as close as 4 ft. from the project and the residences to the east are as close as 14 ft. from the project.

Table I on page 7 provides the analysis of construction noise levels at each of the closest residential receptors to the project structures. The Table shows the typical expected types of equipment, their average sound level at a 50 ft. distance, an adjustment factor for the approximate amount of time used on the site, the closest and farthest distances from the receptor to the equipment, the sound levels at the range of distances, the average (L_{eq}) sound level over the site and the distances the various items of equipment need to stay away from the property lines in order to comply with the Los Altos Noise Ordinance.

The hourly average noise levels at the residences to the south of the project will range from 84 to 101 dBA L_{eq}. The hourly average noise levels at the residences to the east will range from 73 to 90 dBA L_{eq}.

The noise exposures are likely to be up to 94 dB CNEL and 85 dB CNEL at the residences to the south and east, respectively, on the noisiest days. Typical noise exposures from construction will be 74 to 91 dB CNEL at the residences to the south and 65 to 83 dB CNEL at the residences to the east.

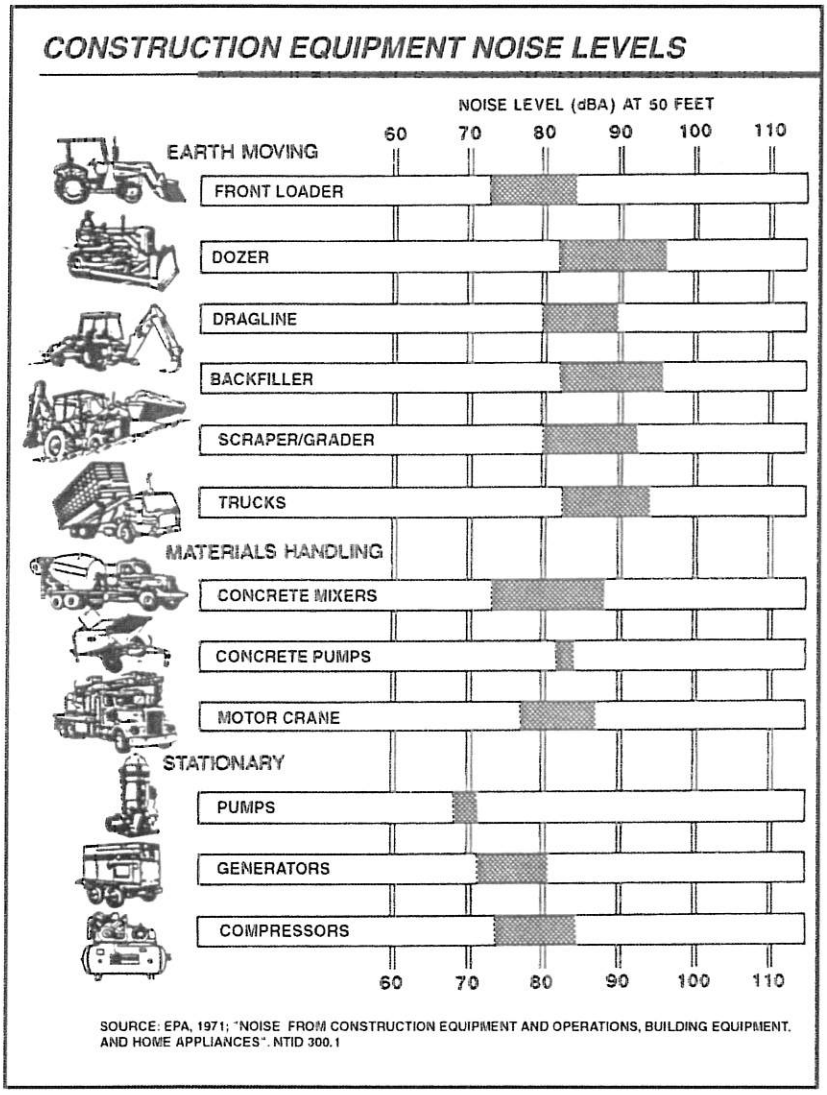


FIGURE 1 – Environmental Protection Agency Equipment Noise Levels

TABLE I

Construction Noise Analysis

Equipment	Reference		Usage	Receptor to South					Receptor to East					Dist to
	Level	Dist., ft.	Adj	Distance, ft. Near	Distance, ft. Far	Sound Level Near	Sound Level Far	Sound Level (Leq)	Distance, ft. Near	Distance, ft. Far	Sound Level, dBA Near	Sound Level, dBA Far	Sound Level, dBA (Leq)	80 dBA
Foklift	75	50	-6	4	174	91	58	88	14	185	80	58	77	28
Graders	83	50	-3	4	174	102	69	99	14	185	91	69	88	71
Wheel Loader	80	50	-8	4	174	94	61	91	14	185	83	61	80	50
Tractor	82	50	-3	4	174	101	68	98	14	185	90	68	87	63
Backhoe	85	50	-3	4	174	104	71	101	14	185	93	71	90	89
Bulldozer	85	50	-4	4	174	103	70	100	14	185	92	70	89	89
Haul Trucks	84	50	-6	4	174	100	67	97	14	185	89	67	86	79
Crane	82	50	-8	4	174	96	63	93	14	185	85	63	82	63
Excavator	85	50	-3	4	174	104	71	101	14	185	93	71	90	89
Air Compressor	79	50	0	4	174	101	68	98	14	185	90	68	87	45
Generator	75	50	-1	4	174	96	63	93	14	185	85	63	82	28
Paving Equip.	78	50	-6	4	174	94	61	91	14	185	83	61	80	40
Roller	71	50	-6	4	174	87	54	84	14	185	76	54	73	18

Demolition and construction activities can produce varying amounts of ground-borne vibration, which depend on the type of equipment used and various methods. Vibration is produced by the equipment operation and the vibrational waves travel through the ground/soil that diminish over distance. It is rare that construction vibration is intense enough to cause damage to existing structures. However, due to the close proximity of the neighbors to the south and east, a quantitative analysis of vibration is warranted.

Ground-borne vibration is typically reported in terms of "peak particle velocity" or PPV, and sometimes reported in terms of decibels of vibration, notated as VdB, which is a level of vibration (L_v). The use of PPV is more common for construction equipment and methods. Table II, below, provides building damage criteria from construction vibration established by the Federal Transit Administration, Ref. (g).

TABLE II		
Construction Vibration Damage Criteria		
Building Category	PPV (in/sec)	Approx. L_v (VdB)
I. Reinforced-concrete, steel or timber (no plaster)	0.50	102
II. Engineered concrete and masonry (no plaster)	0.30	98
III. Non-engineered timber and masonry buildings	0.20	94
IV. Buildings extremely susceptible to vibration damage	0.12	90
** RMS velocity in decibels (VdB) re: 1 micro-inch/second		

The adjacent residential buildings are primarily lightweight, wood framed standard residential construction. The siding is mostly stucco. The foundation type is slab on grade. These structures fall into Building Category III where the vibration limit is 0.20 in/sec PPV. There are no buildings adjacent to or near the site that would fall under Categories I, II or IV.

The contractors used for the demolition of the site and construction of the project have not yet been selected, nor has a construction schedule and list of equipment been developed. Table III on the following page provides a list of typical construction equipment, some of which will likely not be used on this project, such as pile driving, their vibration levels at 25 ft. and 100 ft. reference distances, the vibration levels at the building setback of the closest residence to the south and the closest residence to the east. Also shown are the distances each item of equipment must stay away from the respective adjacent structures to limit the vibration levels to no more than 0.20 in/sec at the buildings. As shown in Table III, some of the equipment expected to be used on this project will generate ground-borne vibration levels in excess of the 0.20 in/sec criterion.

Significant, but temporary noise and vibration excesses are likely to occur at the homes that are adjacent to the site to the south and east during some of the demolition and construction, due to the close proximity of these homes to the site.

Noise mitigation measures are recommended to minimize potential noise and vibration impacts from demolition and construction associated with the project.

TABLE III

Construction Equipment Vibration Levels, in/sec PPV

Residential Receptors	Dist to Res. To South, ft.	4			
	Dist to Res. To East, ft.	14			
EQUIPMENT d =	Reference Vibration at d, ft. 25	Reference Vibration at d, ft. 100	Vibration Level @ Res. To South	Vibration Level @ Res. To East	Dist for 0.2 PPV limit
Excavator	0.089	0.011	1.4	0.2	13
Vibratory Roller	0.21	0.026	3.3	0.5	23
Hoe Ram	0.089	0.011	1.4	0.2	13
Large Bulldozer	0.089	0.011	1.4	0.2	13
Loaded Trucks	0.076	0.010	1.2	0.2	12
Jackhammer	0.035	0.004	0.5	0.1	7
Small Bulldozer	0.003	0.000	0.0	0.0	1.5
Backhoe	0.088	0.011	1.4	0.2	15
Compactor	0.240	0.030	3.8	0.6	25
concrete Mixer	0.080	0.010	1.3	0.2	12
Concrete Pump	0.080	0.010	1.3	0.2	12
Crane	0.008	0.001	0.1	0.0	3
Dump Truck	0.080	0.010	1.3	0.2	12
Front End Loader	0.088	0.011	1.4	0.2	13
Grader	0.088	0.011	1.4	0.2	13
Hydra Break Ram*	0.400	0.050	6.3	1.0	35
Impact Pile Driver*	1.600	0.200	25.0	3.8	87
Soil Sampling Rig	0.088	0.011	1.4	0.2	13
Paver	0.080	0.010	1.3	0.2	12
Pickup Truck	0.080	0.010	1.3	0.2	12
Slurry Trenching	0.016	0.002	0.3	0.0	5
Tractor	0.080	0.010	1.3	0.2	12
Tunnel Boring rock	0.046	0.006	0.7	0.1	9
Tunnel Boring soil	0.024	0.003	0.4	0.1	7
Vibratory Pile Driver	1.120	0.140	17.5	2.7	68
Vibratory Roller (lge)	0.472	0.059	7.4	1.1	39
Vibratory Roller (sm)	0.176	0.022	2.8	0.4	20
Blasting*	6.000	0.750	93.8	14.3	209
Clam Shovel*	0.208	0.026	3.3	0.5	23
Rock Drill	0.088	0.011	1.4	0.2	13
* Transient vibration levels					

II. Recommendations

To achieve compliance with the 65 dB CNEL limit of the City of Los Altos Natural Environmental and Hazards Element standard, noise control patio fences and balcony railings will be required. The recommended measures are described below.

A. Exterior Noise Control

- Construct 6 ft. high acoustically-effective patio fences at all patios on the north and east sides of the project and all patios on the west side of the project that are within 175 ft. of the centerline of El Camino Real, with the exception of patios that view into the common area. The fence height is in reference to the nearest patio pad elevation.

- Construct 42" high acoustically-effective balcony railings at all balconies on the north and east sides of the project and all balconies on the west side of the project that are within 175 ft. of the centerline of El Camino Real, with the exception of balconies that view into the common area, regardless of elevation. The railing height is in reference to the nearest balcony floor elevation.

Please see Figure 2 for the location of the recommended noise control barriers.

To achieve an acoustically-effective balcony railing or patio fence, they must be constructed air-tight, i.e., without cracks, gaps or other openings, and must provide for long term durability including the balcony floor. The fences and railings can be constructed of wood, stucco, masonry, metal or a combination thereof, and must have a minimum surface weight of 1.5 lbs./sq. ft. for the balcony railings and 2.5 lbs./sq. ft. for the patio fences. If wood or metal railings are used, homogeneous sheet materials are preferable over conventional open railings. Glass, Lexan, Plexiglas or other translucent materials may be incorporated into the balcony railings to provide light and views, however, these materials must have a minimum thickness of 3/16" to meet the minimum surface weight requirement. Downspouts and scuppers are preferable over sheet draining. Drainage openings shall be kept to a minimum size and should face away from the noise source. All connections with posts, pilasters or the building shells must be sealed air-tight. No openings are permitted between the upper railing components and the balcony floor.

The implementation of the above recommended measures will reduce the noise exposures at the noise impacted patios and balconies to 65 dB CNEL or lower.

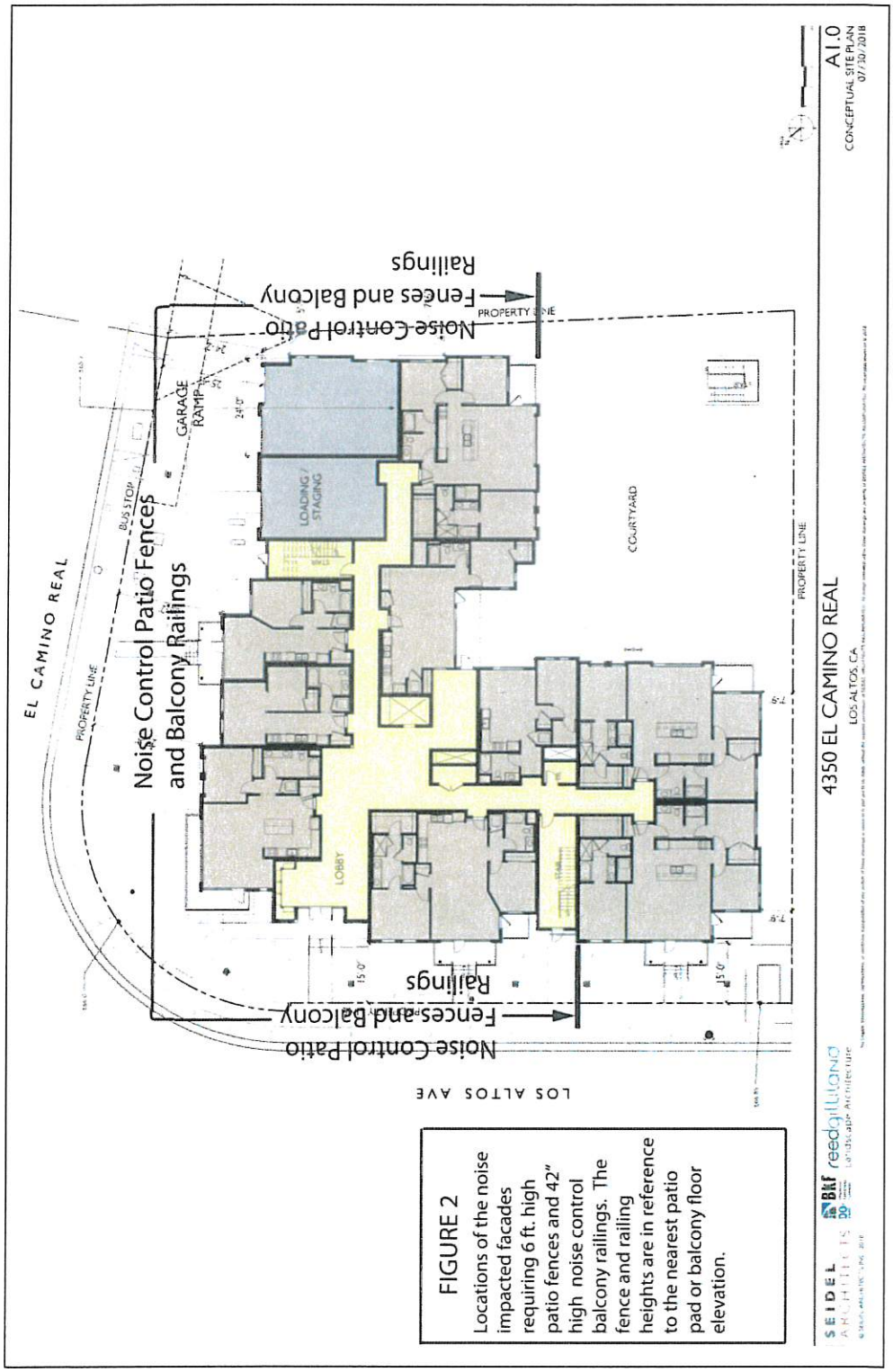


FIGURE 2
Locations of the noise impacted facades requiring 6 ft. high patio fences and 42" high noise control balcony railings. The fence and railing heights are in reference to the nearest patio pad or balcony floor elevation.

B. Interior Noise Controls

To achieve acceptable interior noise exposures for compliance with the 45 dB CNEL limits of the City of Los Altos NEHE and Title 24, the following window controls are required. In addition, general building shell controls are also recommended, as described in Appendix B

- Maintain closed at all times all windows and glass doors of living spaces with a direct of side view of El Camino Real, i.e., those on the west, north or east facades on the outer periphery of the building. Noise controls are not required for the windows and glass doors of living spaces viewing directly into the common area. Provide some type of mechanical ventilation for all living spaces with a closed window requirement.

- Install windows and glass doors rated minimum Sound Transmission Class (STC) 35 at the living spaces within 120 ft. of the centerline of El Camino Real and with a direct or side view of the roadway.

- Install windows and glass doors rated minimum Sound Transmission Class (STC) 32 at the living spaces between 85 ft. and 260 ft. of the centerline of El Camino Real and with a direct or side view of the roadway.

Please see Figure 3 for the locations of the recommended Sound Transmission Class ratings.

The remaining windows and glass door of the development including bathroom windows may be fitted with any type of glass and may be kept open as desired with the exception of bathroom windows that are an integral part of a living space and not separated by a closeable door.

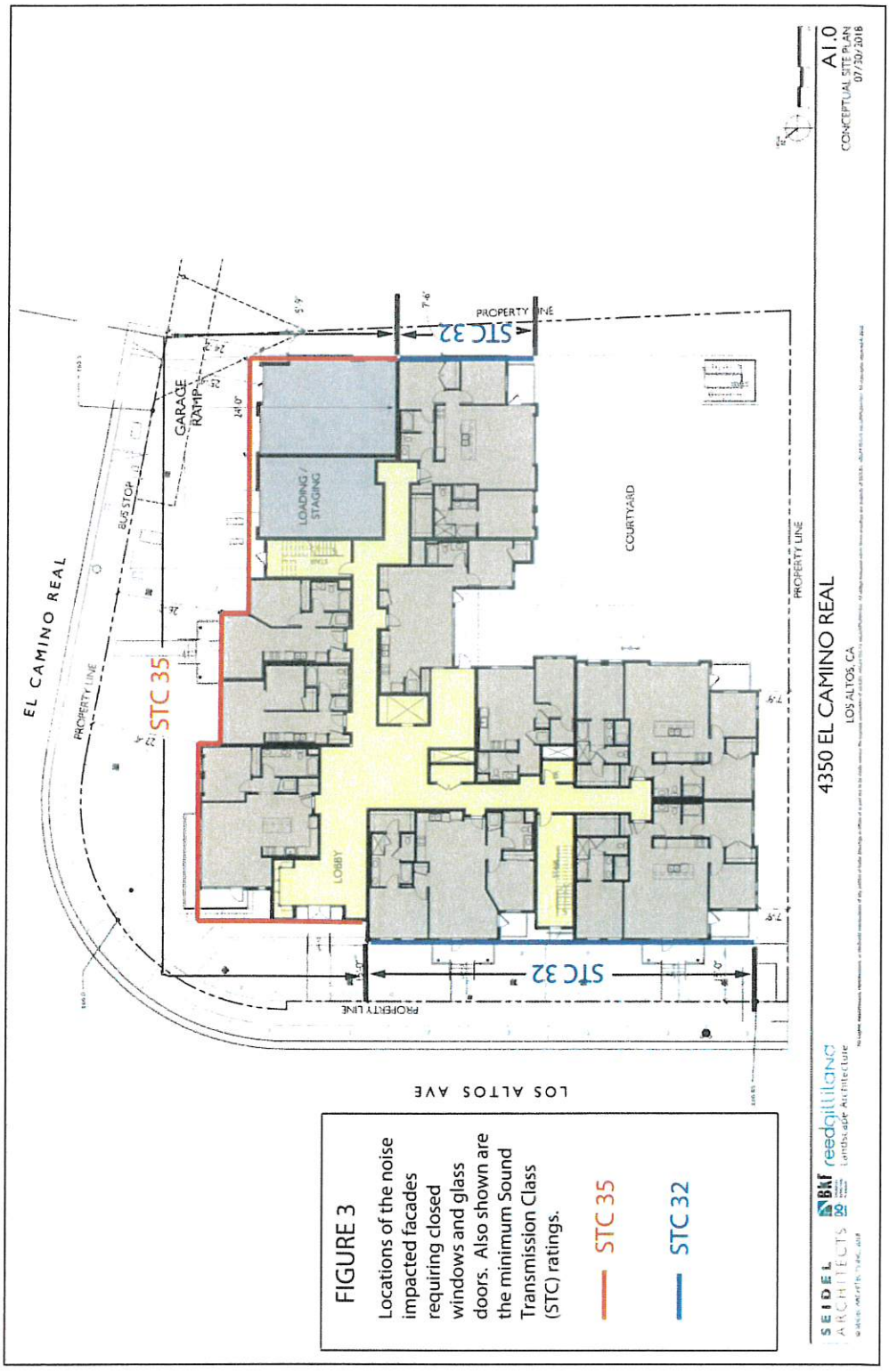


FIGURE 3

Locations of the noise impacted facades requiring closed windows and glass doors. Also shown are the minimum Sound Transmission Class (STC) ratings.

— STC 35

— STC 32

When windows are maintained closed for noise control, they are to be operable, as the requirement does not imply a "fixed" condition. Also, under the closed window requirement, some type of mechanical ventilation must be provided to assure a habitable environment, as specified by the Uniform Building Code (UBC).

All windows and doors of the impacted units should be of good quality and provide tight seals to prevent sound infiltration. The window and door frames must be sealed air-tight to the wall opening with a non-hardening caulk or acoustical sealant. Do not use expandable foams.

Please be aware that many dual-pane window and glass door assemblies have inherent noise reduction problems in the traffic noise frequency spectrum due to resonance that occurs within the air space between the glass lites, and the noise reduction capabilities vary from manufacturer to manufacturer. Therefore, the acoustical test report of all sound rated windows and glass doors should be reviewed be a qualified acoustician to ensure that the chosen windows and glass doors will adequately reduce traffic noise to acceptable levels.

The use of the above recommended windows and doors will reduce interior noise exposures to 45 dB CNEL or lower for compliance with the City of Los Altos Natural Environment and Hazards Element.

C. Construction Noise/Vibration Control

Reduction of the demolition/construction phase noise at the site can be accomplished by using quiet or "new technology" equipment. The greatest potential for noise abatement of current equipment should be the quieting of exhaust noises by use of improved mufflers. It is recommended that all internal combustion engines used at the project site be equipped with a type of muffler recommended by the vehicle manufacturer. In addition, all equipment should be in good mechanical condition so as to minimize noise created by faulty or poorly maintained engine, drive-train and other components. Demolition and construction noise can also be mitigated by the following:

OPERATIONAL AND SITUATIONAL CONTROLS

- All work on site shall be restricted to 7:00 AM to 7:00 PM weekdays, 9:00 AM to 6:00 PM, Saturdays and no work allowed on Sundays and City observed holidays. (Ord. 6.16.070)
- Mobile and stationary equipment are limited to 80 dBA at the residential property lines. (Ord. 6.06.070)
- All construction noise control measures currently imposed on the project shall be maintained unless the measures outlined herein are more restrictive.
- All exterior stationary equipment shall be kept at the appropriate distance from the residential property lines identified in Table I to comply with the City of Los Altos Noise Ordinance.
- No material deliveries are allowed on Sundays or Federal Holidays.
- Cranes shall be located at least 100 ft. from any neighboring residential property line with the exception of cranes or lifts necessary to dismantle scaffolding.
- Minimize material movement along the south and east sides of the site.
- Locate stockpiles adjacent to residential neighbors as much as possible to help shield residences from on-site noise generation.
- Driveways and other vehicle travel paths shall be graded smooth to minimize vibration and "bangs" from vehicles traveling over rough surfaces.
- Music shall not be audible off site.
- Dirt berming and stockpiling materials whenever possible can also help reduce noise to sensitive receptor locations.

- Place long-term stationary equipment as far away from the residential areas as possible.

- Keep mobile equipment (haul trucks, concrete trucks, etc.) off of local streets near residences as much as possible.

- Keep vehicle paths graded smooth as rough roads and paths can cause significant noise and vibration from trucks (particularly empty trucks) rolling over rough surfaces. Loud bangs and ground-borne vibration can occur.

INTERIOR WORK

- For interior work, the windows of the interior spaces facing neighboring residences where work is being performed shall be kept closed while work is proceeding.

- Noise generating equipment indoors should be located within the building to utilize building elements as noise screens.

EQUIPMENT

- Earth Removal: Use scrapers as much as possible for earth removal, rather than the noisier loaders and hauling trucks.

- Backfilling: Use a backhoe for backfilling, as it is less costly and quieter than either dozers or loaders.

- Ground Preparation: Use a motor grader rather than a bulldozer for final grading. Wheeled heavy equipment is less noisy than track equipment. Utilize wheeled equipment rather than track equipment whenever possible.

- Building Construction: Nail guns should be used where possible as they are less noisy than manual hammering.

- Generators and Compressors: Use generators, compressors and pumps that are housed in acoustical enclosures rather than weather enclosures or none at all.

- Utilize temporary power service from the utility company in lieu of generators wherever possible.

- All stationary equipment shall be rated no higher than 85 dBA @ 25 ft. under the equipment's most noisy condition.

- Circular saws, miter/chop saws and radial arm saws shall be used no closer than 50 ft. from any residential property line unless the saw is screened from view by any and all residences using an air-tight screen material of at least 2.0 lbs./sq. ft. surface weight, such as ¾" plywood.

- Use electrically powered tools rather than pneumatic tools whenever possible.

- Mitigation of the construction phase noise at the site can be accomplished by using quiet or "new technology" equipment.

- The greatest potential for noise abatement of current equipment should be the quieting of exhaust noises by use of improved mufflers.

- It is recommended that all internal combustion engines used at the project site be equipped with a type of muffler recommended by the vehicle manufacturer.

- All equipment should be in good mechanical condition so as to minimize noise created by faulty or poorly maintained engines, drive-trains and other components. Worn, loose or unbalanced parts or components shall be maintained or replaced to minimize noise and vibration.

- Utilize wheeled equipment rather than tracked equipment whenever possible.
- Diesel vibrating compaction equipment shall not be used within 40 ft. of a residential structure.
- Limit the use of vibration-generating equipment to the distances to the residential buildings for the 0.2 ppv limits shown in Table III. For instance, a skid steer or Bobcat shall be used to grade the site within 13 ft. of a property line.

NOISE COMPLAINT MANAGEMENT

- Designate a noise complaint officer. The officer shall be available at all times during construction hours via both telephone and email. Signs shall be posted at site entries. A sample is shown below.

NOISE COMPLAINTS

FOR CONCERNS REGARDING CONSTRUCTION NOISE PLEASE CONTACT:

"CONSTRUCTION OFFICER"
Conoff@jobsite.com
OPERATIONS MANAGEMENT ENGINEER

- Notify, in writing, all residents within 300 ft. of the project sites of construction. The notification shall contain the name, phone number and email address of the noise complaint officer. A flyer may be placed at the doors of the residences.
- A log of all complaints shall be maintained. The logs shall contain the name and address of the complainant, the date and time of the complaint, the nature/description of the noise source, a description of the remediation attempt or the reason remediation could not be attempted.

III. Site, Traffic and Project Descriptions

The planned development site is located at 4350 El Camino Real at Los Altos Avenue in Los Altos. The site is relatively flat and at-grade with El Camino Real, Los Altos Avenue and the surrounding land uses. The site currently contains a 76 service station. Surrounding land uses include a three-story condominium development adjacent to the east and south, the Country Inn Motel across El Camino Real to the north and a Courtyard by Marriott hotel and strip mall across Los Altos Avenue to the west.

The primary source of noise at the site is traffic on El Camino Real. The latest (2001) traffic volume datum for El Camino Real is an Average Daily Traffic (ADT) volume of 49,700 vehicles, as reported in the City of Los Altos General Plan. The extrapolated 2018 traffic volume was calculated to be 54,084. CalTrans, however, reports a 2016 traffic volume of 43,000 vehicles ADT, Ref. (d). According to the City of Los Altos General Plan, Los Altos Avenue carried an ADT of 5,204 in 2001. The 2018 traffic volume was calculated to be 6,571 ADT. Note that the City of Los Altos traffic volumes appear to be high for the associated noise data.

The planned project includes the construction of 45 condominium units in one 5-story building. The project will also contain a common area at the southeasterly corner of the site at ground level. The will be two floors of subterranean parking. Ingress and egress to the project will be by way of a driveway off of El Camino Real. The Conceptual Site Plan is shown on Figure 4 on page 22.

FIGURE 4 – Conceptual Site Plan

IV. Analysis of the Noise Levels

A. Existing Noise Levels

To determine the existing noise environment at the site, continuous recordings of the sound levels were made at two locations near the site. Note that site access was not available. Location 1 was 54 ft. from the centerline of El Camino Real and at an elevation of 12 ft. above the ground. Location 2 was across Los Altos Avenue from the site, 21 ft. from the centerline of the road and at an elevation of 13 ft. above the ground. These locations were chosen for security of the sound measuring instruments. The measurement locations are shown on Figure 3 on page 11. The measurements were made on July 23-24, 2018 for a continuous period of 24 hours. The noise level data were acquired using Larson-Davis LDL 812 Precision Integrating Sound Level Meters. The meter yield by direct readout a series of descriptors of the sound levels versus time which are commonly used to describe community noise, as described in Appendix B. The results of the measurements are shown in the data table in Appendix C. The measured descriptors include the L_1, L_{10}, L_{50}, and L_{90}, i.e., those levels exceeded 1%, 10%, 50% and 90% of the time. Also measured were the maximum and minimum levels and the continuous equivalent-energy levels (L_{eq}), which are used to calculate the CNEL.

The results of the field survey reveal that the L_{eq}'s at measurement Location 1, 54 ft. from the centerline of El Camino Real, ranged from 70.4 to 72.5 dBA during the daytime, from 69.2 to 72.7 dBA during the evening and from 57.0 to 68.6 dBA at night.

The L_{eq}'s at measurement Location 2, 21 ft. from the centerline of Los Altos Avenue, ranged from 61.8 to 64.9 dBA during the daytime, from 58.6 to 61.5 dBA during the evening and from 47.6 to 58.9 dBA at night.

Traffic noise dissipates at the rate of 3 to 6 dB for each doubling of the distance from the source (centerline of the roadway) to the receiver. Thus, other locations on the site at greater distances from El Camino Real or Los Altos Avenue will have lower noise levels. Additional acoustical shielding will be provided by interposed portions of the building.

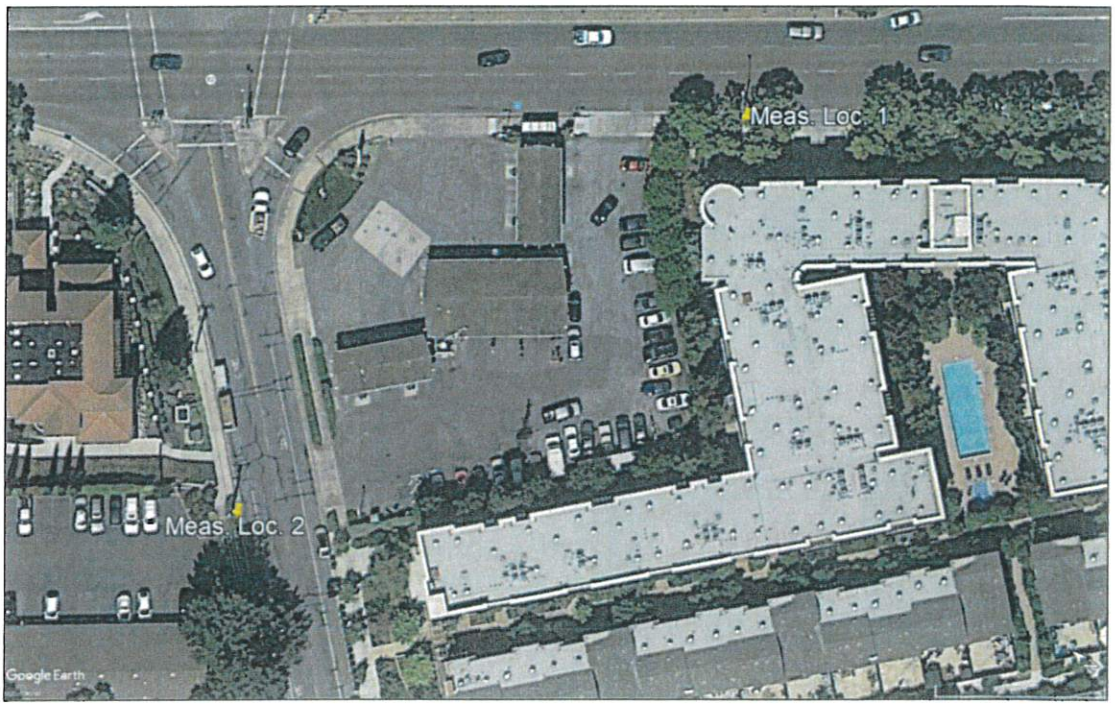


FIGURE 5 – Noise Measurement Locations

Vehicular traffic noise contains a wide spectrum of frequency components (from 100 to 10,000 Hertz), which are associated with engine, tire, drive-train, exhaust and other sources. The frequency components are centered primarily in the 250 and 500 Hz octave bands and were used in determining the noise control measures recommended for this project.

B. Future Noise Levels

Future traffic volume data for El Camino Real were not available from the City of Los Altos or CalTrans. Thus, a review of historical data was performed. The 2001 traffic volume for El Camino Real was reported in the General Plan to have been 49,700 and the future 2025 projected volume is 56,000 ADT. The annual average growth rate was calculated to be 0.5% per year. Thus, the 2018 traffic volume was interpolated to be 54,084 vehicles ADT. Using the same annual growth rate, the 2038 future traffic volume was calculated to be 59,757 vehicles ADT. This increase in traffic volume yields a less than 0.5 dB in the traffic noise levels, which is negligible.

CalTrans reports a 2016 traffic volume of 43,000 and a 1996 traffic volume of 47,000 vehicles ADT, Ref. (e). Thus, CalTrans data indicate a drop in traffic volume over the past 20 years.

Using either the City of Los Altos traffic data or CalTrans traffic data, the future traffic noise environment is expected to be similar to current levels.

The City of Los Altos General Plan reports a 2001 traffic volume for Los Altos Avenue to have been 5,240 vehicles ADT and a 2025 volume to be 7,220 vehicles ADT. The annual average growth rate was calculated to be 1.34% per year. The interpolated 2018 traffic volume was calculated to be 6,571 vehicles ADT. Apply this growth rate to the future 20 years, the 2038 traffic volume was calculated to be 8,575 vehicles ADT. This increase in traffic volume yields a 1 dB increase in the Los Altos Avenue traffic noise levels.

V. Evaluations of the Noise Exposures

A. Exterior Noise Exposures

To evaluate the on-site noise exposures against the City of Los Altos standards, the CNEL's for the survey locations were calculated by decibel averaging of the L_{eq}'s as they apply to the daily time periods of the CNEL index. The CNEL is a 24-hour noise descriptor that uses the measured L_{eq} values to calculate a 24-hour time-weighted average noise exposure that includes a 5 decibel penalty for noise created during the evening hours and a 10 decibel penalty for noise created during the nighttime hours. The formula used to calculate the CNEL is described in Appendix B. Adjustments were made to the measured noise levels to account for the increased distance from the measurement locations to the building setbacks used methods established by the Highway Research Board, Ref. (f).

The noise exposure at measurement Location 1, 54 ft. from the centerline of El Camino Real, was calculated to be 74 dB CNEL. At the planned minimum building setback and most impacted patios and balconies, 85 ft. from the centerline of El Camino Real, the noise exposure was calculated to be 71 dB CNEL. Under future traffic conditions, the exterior noise exposure is expected to remain at 71dB CNEL. Thus, the noise exposures will be up to 6 dB in excess of the standards of the City of Los Altos Natural Environment and Hazards Element.

The noise exposure at measurement Location 2, 21 ft. from the centerline of Los Altos Avenue, was calculated to be 64 dB CNEL. Of this 64 dB, 62 dB is due to El Camino Real traffic and 61 dB is due to Los Altos Avenue traffic. At the planned minimum building setback, 46 ft. from the centerline (240 ft. from the centerline of El Camino Real), the Los Altos Avenue traffic noise exposure was calculated to be 56 dB CNEL. Under future traffic conditions, the Los Altos Avenue traffic noise exposure is expected to increase to 57 dB CNEL. Although the noise exposures at the westerly façade from Los Altos Avenue traffic sources are within the limits of the standards, this facade remains to be noise impacted due to El Camino Real traffic.

The existing exterior noise exposure in the common area of the project, which is as close as 155 ft. from the centerline of El Camino Real, is 64 dB CNEL, which includes a 3 dB reduction factor due to the noise shielding provided by the project structure and the adjacent condominium building. Under future traffic conditions, the noise exposure is expected to remain at 64 dB CNEL. Thus, the noise exposures will be within the 65 dB CNEL limit of the City of Los Alto Natural Environment and Hazards Element.

B. Interior Noise Exposures

To evaluate the interior noise exposures in project living spaces, a 15 dB reduction was applied to the exterior noise exposure to represent the attenuation provided by the building shell under *annual-average* conditions. The *annual-average* condition assumes that windows have standard dual-pane thermal insulating windows that are kept open up to 50 % of the time for natural ventilation. Thus, the interior noise exposures in living spaces closest to El Camino Real will be up to 56 dB CNEL under existing and future traffic conditions. The noise exposures will be up to 11 dB in excess of the limits of the City of Los Altos Natural Environment and Hazards Element.

The interior noise exposures in the most impacted living spaces facing Los Altos Avenue will be up to 41 and 42 dB CNEL under existing and future traffic conditions, respectively, from traffic sources on Los Altos Avenue. However, El Camino Real traffic noise will impact the interior living spaces facing Los Altos Avenue. The interior noise exposures in living spaces facing Los Altos Avenue will range from 48 dB DNL at the southwesterly corner of the building to 55 dB CNEL at the northwesterly corner of the building under existing and future traffic conditions.

As shown by the above evaluations, exterior and interior noise exposures will occur and mitigation measured will be required. The recommended measures are described in Section II of this report.

This report presents the results of a noise assessment study for the planned multi-family development at 4350 El Camino Real in Los Altos. The study findings for current conditions are based on field measurements and other data and are correct to the best of our knowledge. Future noise level predictions were based upon information provided by CalTrans. However, significant changes in future traffic volumes, speed limits, motor vehicle technology, noise regulations, or other changes beyond our control may produce long-range noise results different from our estimates.

If you need any additional information or would like an elaboration on this report, please call me.

Sincerely,

EDWARD L. PACK ASSOC., INC.

Jeffrey K. Pack
President

Attachments: Appendices A, B, and C

APPENDIX A

References

(a) Conceptual Site Plan, 4350 El Camino Real, by Seidel Architects, Inc., July 30, 2018

(b) City of Los Altos General Plan 2002-2020, Natural Environment and Hazards Element, November 2002

(c) California Code of Regulations, Title 24, Part 2, Volume 1, Section 1207 "Sound Transmission", Subsection 1207.4 (Allowable Interior Noise Levels), Revised 2016

(d) State of California Department of Transportation, Division of Traffic Operations, http://www.dot.ca.gov/hq/traffops/saferesr/trafdata/2016all/Route82-86.html

(e) 1996 Traffic Volumes on the California State Highway System, State of California Department of Transportation, Division of Traffic Operations, June 1997

(f) Highway Research Board, "Highway Noise – A Design Guide for Highway Engineers", Report 117, 197

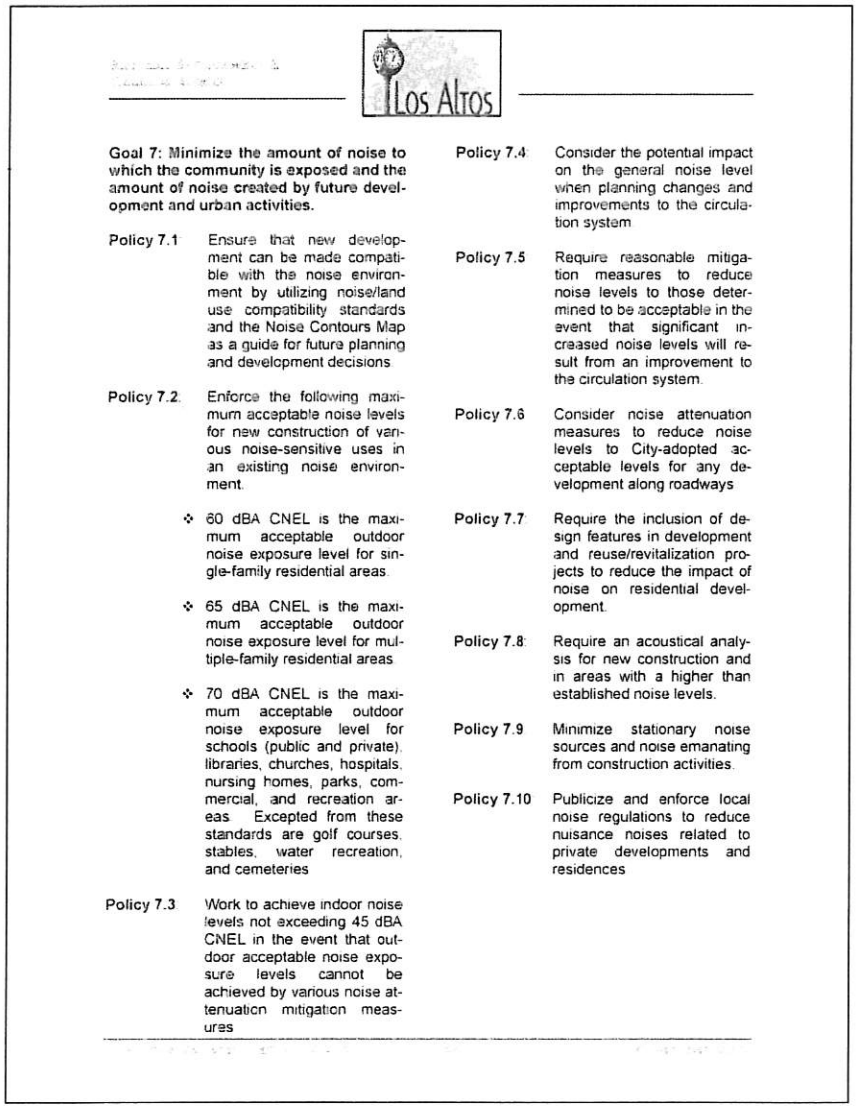
APPENDIX B

Noise Standards, Terminology and Instrumentation

1. Noise Standards

A. City of Los Altos Natural Environment and Hazards Element

The City of Los Altos General Plan 2002-2020, adopted November 2002, contains noise policies as part of the Natural Environment and Hazards Element.



Los Altos

Goal 7: Minimize the amount of noise to which the community is exposed and the amount of noise created by future development and urban activities.

Policy 7.1 Ensure that new development can be made compatible with the noise environment by utilizing noise/land use compatibility standards and the Noise Contours Map as a guide for future planning and development decisions.

Policy 7.2 Enforce the following maximum acceptable noise levels for new construction of various noise-sensitive uses in an existing noise environment.

- 60 dBA CNEL is the maximum acceptable outdoor noise exposure level for single-family residential areas.
- 65 dBA CNEL is the maximum acceptable outdoor noise exposure level for multiple-family residential areas.
- 70 dBA CNEL is the maximum acceptable outdoor noise exposure level for schools (public and private), libraries, churches, hospitals, nursing homes, parks, commercial, and recreation areas. Excepted from these standards are golf courses, stables, water recreation, and cemeteries.

Policy 7.3 Work to achieve indoor noise levels not exceeding 45 dBA CNEL in the event that outdoor acceptable noise exposure levels cannot be achieved by various noise attenuation mitigation measures.

Policy 7.4 Consider the potential impact on the general noise level when planning changes and improvements to the circulation system.

Policy 7.5 Require reasonable mitigation measures to reduce noise levels to those determined to be acceptable in the event that significant increased noise levels will result from an improvement to the circulation system.

Policy 7.6 Consider noise attenuation measures to reduce noise levels to City-adopted acceptable levels for any development along roadways.

Policy 7.7 Require the inclusion of design features in development and reuse/revitalization projects to reduce the impact of noise on residential development.

Policy 7.8 Require an acoustical analysis for new construction and in areas with a higher than established noise levels.

Policy 7.9 Minimize stationary noise sources and noise emanating from construction activities.

Policy 7.10 Publicize and enforce local noise regulations to reduce nuisance noises related to private developments and residences.

B. Title 24 Noise Standards

The California Code of Regulations, Title 24, Chapter 2, Section 1207, "Sound Transmission", applies to all new multi-family dwellings including condominiums, apartments, hotels, motels and dormitories. The standards, which utilize either the Day-Night Level (DNL) descriptor or the Community Noise Equivalent Level (CNEL), whichever is consistent with the local jurisdictional standards, specify that interior noise exposures from exterior sources shall not exceed 45 dB DNL/CNEL in any habitable room.

The Title 24 standards also establish minimum sound insulation requirements for interior partitions separating different dwelling units from each other and dwelling units from common spaces such as garages, corridors, equipment rooms, etc. The common interior walls and floor/ceiling assemblies regulated by the California Building Code (apartments, condominiums, hotels, etc.) must achieve a minimum Sound Transmission Class (STC) rating of 50 for airborne noise. Common floor/ceiling assemblies must achieve an Impact Insulation Class (IIC) rating of 50 for impact noise. These ratings are based on laboratory tested partitions. Field tested partitions must achieve ratings of NIC and FIIC 45. Attached dwellings regulated by the California Residential Code (townhouses under 3 stories in height) must achieve minimum STC 45 for the common partition.

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 Community Noise Analyzer. 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. Community Noise Equivalent Level (CNEL)

The CNEL is a measure of the cumulative noise exposure over a 24 hour period. The CNEL index divides the 24 hour day into three subperiods, i.e., the daytime (7:00 am to 7:00 pm), the evening period (7:00 pm to 10:00 pm), and the nighttime period (10:00 pm to 7:00 am). Also, weighting factors of 5 and 10 dBA are applied to the evening and nighttime periods, respectively, to account for the greater sensitivity of people to noise during those periods. The CNEL values are calculated from the measured L_{eq} values in accordance with the following mathematical formula:

$$\text{CNEL} = [[(10\log_{10}(10^{\Sigma Leq(7\text{-}7)})) \times 12] + [((10\log_{10}(10^{\Sigma Leq(7\text{-}10))}))+5) \times 3] + [((10\log_{10}(10^{\Sigma Leq(10\text{-}7))}))+10) \times 9]]/24$$

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 sound analyzers listed below. The 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 microphones extended to a height of 5 ft. above the ground unless otherwise noted. The "A" weighting network and the "Fast" response setting of the meters were used in conformance with the applicable ISO and IEC standards. The Larson-Davis 812 meters were factory modified to conform to the Type 1 performance standards of ANSI S1.4. All instrumentation meets Class 1 standards and were 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

4. Building Shell Controls

The following additional precautionary measures are required to assure the greatest potential for exterior-to-interior noise attenuation by the recommended mitigation measures. These measures apply at those units where closed windows are required:

- Unshielded entry doors having a direct or side orientation toward the primary noise source must be 1-5/8" or 1-3/4" thick, insulated metal or solid-core wood construction with effective weather seals around the full perimeter. Mail slots should not be used in these doors or in the wall of a living space, as a significant noise leakage can occur through them.

- If any penetrations in the building shell are required for vents, piping, conduit, etc., sound leakage around these penetrations can be controlled by sealing all cracks and clearance spaces with a non-hardening caulking compound.

- Ventilation devices shall not compromise the acoustical integrity of the building shell.

APPENDIX C

On-Site Noise Measurement Data and Calculation Tables

CNEL CALCULATIONS

CLIENT: ANGIE GALATOLO
FILE: 50-024
PROJECT: 76 EL CAMINO CONDOS
DATE: 7/23-24/2018
SOURCE: EL CAMINO REAL, LOS ALTOS AVE.

LOCATION 1	El Camino Real			
Dist. To Source	54 ft			
TIME	Leq	10^Leq/10		
7:00 AM	72.5	17782794.1		
8:00 AM	72.3	16982436.5		
9:00 AM	72.0	15848931.9		
10:00 AM	71.7	14791083.9		
11:00 AM	72.0	15848931.9		
12:00 PM	71.3	13489628.8		
1:00 PM	70.4	10964782.0		
2:00 PM	71.2	13182567.4		
3:00 PM	71.8	15135612.5		
4:00 PM	72.2	16595869.1		
5:00 PM	72.2	16595869.1		
6:00 PM	72.1	16218101.0	SUM=	183436608.1
7:00 PM	71.5	14125375.4	Ld=	82.6
8:00 PM	72.7	18620871.4		
9:00 PM	69.2	8317637.7	SUM=	41063884.5
10:00 PM	66.2	4168693.8	Le=	76.1
11:00 PM	64.6	2884031.5		
12:00 AM	61.8	1513561.2		
1:00 AM	58.9	776247.1		
2:00 AM	60.0	1000000.0		
3:00 AM	57.0	501187.2		
4:00 AM	63.9	2454708.9		
5:00 AM	63.8	2398832.9		
6:00 AM	68.6	7244359.6	SUM=	22941622.4
			Ln=	73.6
	Daytime Level=	82.6		
	Evening Level=	81.1		
	Nighttime Level=	83.6		
	CNEL=	**74**		
	24-Hour Leq=	70.1		

LOCATION 2	Los Altos Ave			
Dist. To Source	21 ft.			
TIME		10^Leq/10		
7:00 AM	62.1	1621810.1		
8:00 AM	63.4	2187761.6		
9:00 AM	63.0	1995262.3		
10:00 AM	64.8	3019951.7		
11:00 AM	63.7	2344228.8		
12:00 PM	63.1	2041737.9		
1:00 PM	62.3	1698243.7		
2:00 PM	61.8	1513561.2		
3:00 PM	62.5	1778279.4		
4:00 PM	62.9	1949844.6		
5:00 PM	63.2	2089296.1		
6:00 PM	64.9	3090295.4	SUM=	25330273.0
7:00 PM	61.5	1412537.5	Ld=	74.0
8:00 PM	61.1	1288249.6		
9:00 PM	58.6	724436.0	SUM=	3425223.1
10:00 PM	56.8	478630.1	Le=	65.3
11:00 PM	54.2	263026.8		
12:00 AM	51.1	128825.0		
1:00 AM	49.8	95499.3		
2:00 AM	49.4	87096.4		
3:00 AM	47.6	57544.0		
4:00 AM	51.7	147910.8		
5:00 AM	53.2	208929.6		
6:00 AM	58.9	776247.1	SUM=	2243709.0
			Ln=	63.5
	Daytime Level=	74.0		
	Evening Level=	70.3		
	Nighttime Level=	73.5		
	CNEL=	**64**		
	24-Hour Leq=	61.1		