APPENDIX 8.5
Noise Impact Analysis

February 16, 2016

EPD Solutions, Inc.
Attn: Rafik Albert
2030 Main Street, Suite 1200
Irvine, CA 92714

Re: 929 Baker Street, Costa Mesa
Our Reference Number P16-X04

As per your request, we have evaluated the possible noise constraint created by adjacent mechanical equipment relative to the proposed development of this property into 56 residential units. The school district property directly east of this site operates a refrigeration condenser unit and fan approximately 5-10 feet from the property line. The condenser appears to be an older model without modern noise reduction features, which results in high noise levels while it is operating. The adjacent building, a school district food preparation facility, has an elevated system of ventilation louvers along much of the building façade facing the 929 Baker Street property. As compared with the refrigeration condenser unit noise, the ventilation noise is lower in decibel levels, but substantially above ground level. The louvers' location precludes the use of typical physical shielding for noise reduction, such as a wall.

In addition to mechanical equipment noise, the proposed residences closest to Baker Street experience traffic noise. Specifically, those units are the back yards of Units 1-4 and the side yard of Unit 56. These buildings, plus increases roadway set-back, will shield the remainder of the proposed project from traffic noise.

The General Plan Circulation Element predicts a build-out traffic volume of 39,000 ADT. The posted speed limit is 40 mph. However, because of traffic signals at Bear and Milbro and traffic volumes, all traffic does not travel at the posted limit. An average speed of 35 mph has been conservatively assumed. For 39,000 ADT, typical arterial auto/truck and day/night mixes at 35 mph, the FHWA Traffic Noise Prediction Model (77-108) calculates a CNEL level of 71 dB at 50 feet from the Baker Street centerline. In the recreation space of Units 1-4 and 56, the traffic noise level would be 70 dB CNEL. At the second story facades facing Baker Street, the design noise level would be 69 dB CNEL.

The City of Costa Mesa Noise Ordinance regulates the allowable noise level crossing a shared property line for exterior areas (Section 13-280) and interior (Section 13-281) for residential uses. Other sensitive receptors for which noise levels are limited by ordinance are schools, hospitals, and churches. There is no applicable numerical performance standard for commercial uses within the city, including the current self-storage use of the property. The noise ordinance is expressed as a level not to be exceeded for more than 30 minutes per hour with some allowable excursions above the baseline. The basic standards are as follows for single family dwellings:

Time	Exterior*	Interior
7 a.m. to 11 p.m.	55 dB	55 dB
11 p.m. to 7 a.m.	50 dB	45 dB

*private yards or balconies deeper than 6 feet

The school district property's refrigeration condenser unit operates and generates noise for more than 30 minutes and can run for several hours in a row; therefore, the basic standards above apply without considering any allowable deviations. A 22-hour noise measurement was conducted at the property line closest to the condenser unit and in proximity to the vents. The 30-minute levels and the instantaneous maxima exceed the allowable exterior noise standard for almost every hour monitored as shown in the following table:

Time Interval	Average Level (dB)	Max (dB)
12:00-13:00	76	76
13:00-14:00	76	76
14:00-15:00	76	76
15:00-16:00	76	76
16:00-17:00	76	77
17:00-18:00	76	77
18:00-19:00	76	77
19:00-20:00	61	77
20:00-21:00	76	77
21:00-22:00	61	77
22:00-23:00	60	77
23:00-24:00	60	77
0:00-1:00	59	77
1:00-2:00	60	77
2:00-3:00	52	67
3:00-4:00	50	60
4:00-5:00	59	77
5:00:6:00	62	77
6:00-7:00	64	78
7:00-8:00	77	77
8:00-9:00	76	78
9:00-10:00	76	77

Shaded Area = Nocturnal Hours

Daytime Average Standard = 55
Daytime Max = 75

Nocturnal Average Standard = 50
Nocturnal Max = 70

Units exposed to above-standard noise levels are indicated on the enclosed Site Plan (Exhibit A) and include Units 1-4 and 56, located along Baker Street, and Units 41-48, located near the noise-producing equipment on the school district property.

The degree of "excess" noise varied somewhat but for any part of any hour for which the condenser ran (it ran for part of an hour for every hour except 2 to 4 a.m.), the noise ordinance performance standard would be exceeded if the proposed project site were residential. Noise levels can be reduced by three ways, including:

- Use quieter equipment
- Relocate the source to a greater distance away from the sensitive use
- Install a barrier between the source and receiver

Assuming relocation is not an option, replacement of the noise-producing equipment and erection of a noise wall are sufficient mitigation measures to reduce the noise to acceptable levels. A total of 22 dB of reduction is needed. Modern large condenser fans are 14 dB quieter than the existing unit. Construction of an 8-foot high perimeter wall at the rear of Units 41 and 42 would additionally reduce noise levels in the proposed backyards by 8 dB. The combination of providing and installing a condensing unit with a sound power rating of 7.6 or less for the school district property (see for example, Trane Split System Cooling Product Data, Pub No 22-1752-07, 5 ton unit), plus the 8-foot high solid wall, would meet the City noise ordinance for this source as shown below.

The measured property line noise level during brief breaks in condenser operation was 66 dB resulting from the district building ventilation system. That source would cause the noise ordinance standard to be exceeded by 11 dB during the day and by 16 dB at night. Replacement of the existing simple slatted louvers by aluminum acoustic louvers could substantially reduce the level of excess noise. The rated transmission loss of acoustical louvers within the spectrum of heaviest noise generation (250-1,000 cycles) is typically 10-15 dB. That reduction may not be quite adequate to meet the City standard. However, an 8-foot high wall would provide additional noise screening within the rear yards. Such a louver system would be designed to work with the existing ventilation system as to not require bigger fans while creating an acceptable noise exposure for residents of Units 43-48 relative to building ventilation noise as shown below.

With the proposed noise abatement features (new condenser and acoustic louvers), the upstairs building rear façade noise loading for Units 41-48 would be around 47 dB. The interior standard is 45 dB at night. Structural noise attenuation of modern construction with open windows is 10 dB. No additional upstairs bedroom noise protection is required to meet the City's noise ordinance interior limit. However, there is a clear change in noise levels when the condenser or building ventilation fan cycles on and off many times an hour, which could pose an annoyance to future residents even if the absolute decibel level did not exceed the 45 dB standard. Therefore, we recommend to reduce the potential annoyance to future residents that occupants in Units 41-48 be provided the option to close dual-paned windows (dual-paned is required by code) to abate any on/off clicking noise. Modern energy-conserving construction practice with closed dual paned windows is capable of 25 dB of noise reduction without any substantially upgraded acoustical features.

When window closure is needed for noise control as is the case here, the CBC requires provision of supplemental ventilation with a specified fraction of fresh make-up air. The standard solution is to install a fresh air duct capable of providing 30 CFM of air with the duct opening oriented away from the primary noise source.

For roadway noise, the interior standard of 45 dB CNEL (slightly different from the noise ordinance 50th percentile standard) will be met at Units 1-4 and Unit 56 with 24 dB of acoustical protection. As noted above, closed dual-paned windows and supplemental ventilation will meet this requirement. Downstairs rear/side yard traffic noise at these units will be 70 dB CNEL. The rear yard standard of 65 dB CNEL will be met by a 6-foot CMU privacy wall at the rear of Units 1-4 and the side of Unit 56.

Please call me with any questions.

Hans D. Giroux

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Attached: Noise Mitigation Summary

Noise Mitigation Summary (dBA)

Units 41-42 (L_{50})	**Existing**	**Replace Condenser**	**8-Foot Wall**	**Net**	**Standard**
Downstairs P.L.	77	-15	-12	50	55D/50N
Upstairs Facade	68	-15	-6	47	55D/50N
Units 43-48 (L_{50})	**Existing**	**Upgraded Louvers**	**8-Foot Wall**	**Net**	**Standard**
Downstairs P.L.	66	-10	-6	50	55D/50N
Upstairs Facade	57	-10	0	47	55D/50N
Units 1-4, 56 (CNEL)	**Existing**	**-**	**6-Foot Wall**	**Net**	**Standard**
Backyard	70	-	-6	64	65 Ext.
Upstairs Facade	69	-	-	69	45 Int.*

*requires 24 dB of structural reduction via closed dual-paned windows and supplemental ventilation of 30 CFM of fresh air