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June 19, 2020  
Project No. 52-025

Mr. Brandon Miller  
BM Consulting Services  
955 Terminal Way  
San Carlos, CA 94070

Subject: Noise Assessment Study for the “Iron Ox” Agricultural Facility,  
450 Lena Avenue, Santa Clara County

Dear Mr. Miller:

This report presents the results of a noise assessment study for the Iron Ox agricultural facility at 450 Lena Avenue in Santa Clara County as shown on the Drainage (Site) Plan, Ref. (a). The project-generated noise levels were evaluated against the Santa Clara County Noise Ordinance, Ref. (b). The purpose of this study is to determine the levels of noise generated by refrigeration container on the site, the existing greenhouse exhaust fans and the exhaust fans in the proposed greenhouse building. The results of the study reveal that the project-generated noise levels will be within the limits of the Santa Clara County Noise Ordinance at the most impacted east and northerly property lines. The property to the south is State Route 101 and the property to the west is adequately shielded from noise by the existing and proposed structures.

Sections I and II of this report contain descriptions of the noise standards and site and project descriptions, respectively. Section III contains the descriptions of the analytical methodologies. Appendices A and B, attached, contain the list of references, definitions of the acoustical terminology and descriptions of the acoustical instrumentation.

**I. Noise Standards**

**The Santa Clara County Noise Ordinance**

The noise levels presented herein were evaluated against the standards of the County of Santa Clara Noise Ordinance which limits noise by the time of occurrence, duration, noise type and the receiving land use. The Santa Clara County Noise Ordinance specifies a basic standard for constant (more than 30 minutes per hour of occurrence) noise, with level limit adjustments depending on the actual duration of the source.

The noise limits can be described using the “L exceedance” values, which are percentages of time over which a noise level is exceeded. For instance, an L<sub>50</sub> of 60 dBA means that 60 decibels of noise was exceeded for 50% of the time (30 minutes out of the hour). The County of Santa Clara Noise Ordinance standards for some zoning districts are shown in Table I. The project site and the land uses to the north and east are in the RR-5ac zones. However, the property adjacent to the east is a commercial landscape materials facility with no residential structure or use. Therefore, we are applying the commercial noise limits to that property. In addition, the Noise Ordinance allows a 5 dB upward adjustment to the noise level limits for zoning district boundaries. As the noise generating equipment associated with the project can operate for more than 30 minutes out of any given hour, the baseline (L<sub>50</sub>) noise limits are the most stringent and are used herein for evaluation purposes.

<b>TABLE I</b>					
<b>Santa Clara County Noise Ordinance Standards</b>					
Adjustments for Duration	L <sub>n</sub> Value	Noise Limits, dBA			
		Rural Residential		Commercial	
		Daytime	Nighttime	Daytime	Nighttime
<b>more than 30 min./hr. (baseline)</b>	<b>L<sub>50</sub></b>	<b>55</b>	<b>45</b>	<b>70</b>	<b>60</b>
+5 dB more than 15 min./hr.	L <sub>25</sub>	60	50	75	65
+10 dB more than 5 min./hr.	L <sub>8</sub>	65	55	80	70
+15 dB more than 1 min./hr.	L <sub>2</sub>	70	60	85	75
+ 20 dB any time	L <sub>max</sub>	75	65	90	80

## II. Site and Project Descriptions

The planned project site is the existing Iron Ox agricultural facility with an administration building near the front of the site and a greenhouse behind it to the south. The refrigeration container is located in front of the greenhouse along the driveway into the site. The site is relatively flat and at-grade with the surrounding roadways and land uses. The surrounding land uses include State Routh 101 adjacent to the south, an agricultural field adjacent to the west, single-family (rural) residential across Lena Avenue to the north and the Grass Farm Garden Accents landscaping materials facility adjacent to the east. An overview of the existing site with the most impacted property line locations, noise measurement locations and identification of the noise sources are shown on Figure 1, below.



**FIGURE 1 – Site Overview**

The planned project includes the permitting of the refrigeration container and the construction of a 19,313 sq. ft. building that will serve as a greenhouse. The refrigeration container is planned to remain in its current location. The refrigeration container is a Carrier Thinline model. The compressor and cooling fan are situated at the south end of the container approximately 2.5 ft. above the ground as shown on Figure 1.

The existing greenhouse will remain. The make, model and performance specifications of the existing greenhouse fans are unknown.

The new greenhouse will have 9 exhaust fans on the east side of the building similar to the existing greenhouse. The new fans will be Acme DC54 WS wall mount, propeller type exhaust fans. These fans are similar to the existing greenhouse fans.

Other aspects of the project are not germane to the noise environment.

Although the refrigeration container and the greenhouse exhaust operate upon demand for cooling, both systems can operate for more than 30 minutes in any given hour. The equipment may also operate at night. Information on the Iron Ox facility operations was provided by the project sponsor, Ref. (c).

The Drainage (Site) Plan is shown on Figure 2 on page 5.

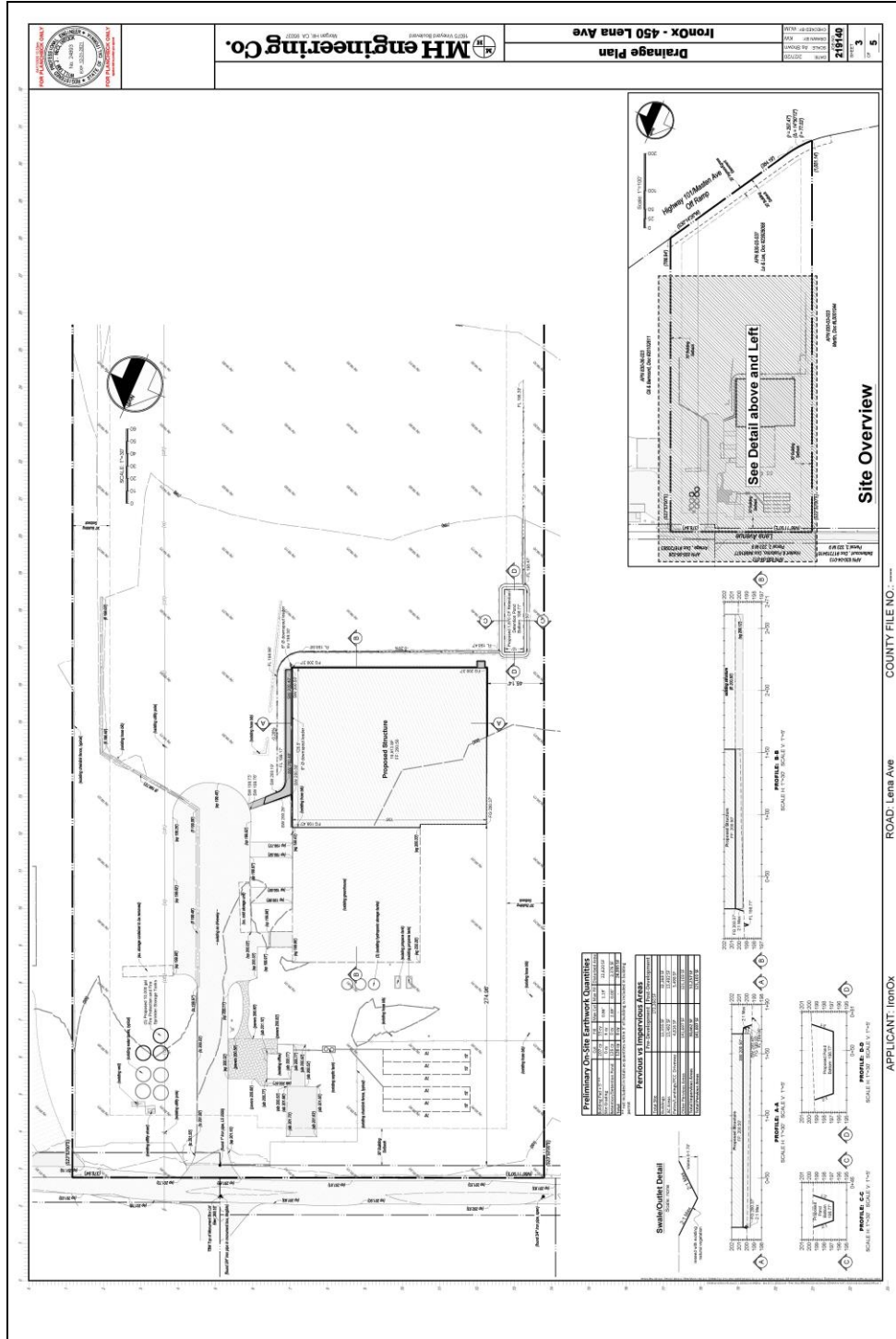


FIGURE 2 – Drainage (Site) Plan

### **III. Analysis of the Project-Generated Noise Levels**

To determine the levels of noise generated by the refrigeration container and the existing greenhouse fans for evaluations against the most stringent 60 dBA nighttime noise limit for commercial uses and the 45 dBA nighttime noise limit for residential land uses, on-site noise level measurements were made at the Iron Ox facility on June 12, 2020. Measurement location 1 was 4 ft. from the center of the refrigeration unit at the south end of the container. Measurement location 2 was 3 ft. from the center of one of the exhaust fans at the bottom of the fan unit to prevent fan air from blowing across the sound meter microphone. Both measurement locations were made up close as traffic noise from State Route 101 is significant at the site, which prevented accurate measurements at any farther distances.

The noise level data were recorded and processed using a Larson-Davis Model 831 Precision Integrating Sound Level Meter. The yields, by direct read-out, a series of descriptors of the sound levels versus time, as described in Appendix B. The measured descriptors include the  $L_2$ ,  $L_8$ ,  $L_{25}$ , and  $L_{50}$ , i.e., those levels exceeded for 2% (5 min./hr.), 8% (10 min./hr.), 25% (15 min./hr.), and 50% (30 min./hr.) of the time. Also measured were the maximum and minimum levels and the continuous equivalent-energy levels ( $L_{eq}$ ). Because the refrigeration unit and the exhaust fan run continuously, the maximum, minimum,  $L_{eq}$  and the  $L_n$  values are nearly identical.

The refrigeration unit was measured to be 81 dBA at 4 ft. from the unit.

The exhaust fan was measured to be 76 dBA at 3 ft. from the center of the fan.

The proposed greenhouse fans are sound rated by the manufacturer at 20 sones (loudness level), Ref. (d). Per AMCA Standard 301, the sone rating is determined from a sound level measurement at 5 ft. from the face of the fan in a hemispherical free field. The associated A-weighted sound pressure level is 71 dBA at 5 ft.

Table I, below, and Table II on the following page provide the analyses of the fan and refrigeration unit noise levels for the east property line and the residential property line across Lena Avenue to the north. The Tables include the fan number and location, the measured and manufacturer provided sound levels (SL) and distances (d), the distances to the most noise impacted points on the respective property lines (PL), and the calculated sound levels for each fan. The sum of all fans in operation are shown as the sub-total. The refrigeration unit sound level is also shown with the total combined sound level at the bottom of each chart.

The refrigeration unit noise and exhaust fan noise attenuate at a rate of  $20\log_{10}(r1/r2)$  for the property line to the east.

For the property line to the north, the refrigeration unit noise attenuates at a rate of  $24\log_{10}(r1/r2)$  due to the off-axis orientation from the source to the receiver. In addition, the container body provides 15 decibels of noise shielding. The exhaust fan noise also attenuate at the  $24\log_{10}(r1/r2)$  rate. However, there is no acoustical shielding of the fans.

<b>TABLE I</b>					
<b>Project-Generated Noise Levels, dBA</b>					
East Property Line (Commercial)					
	Fan	SL	d	d to PL	SL @ PL
Exist. Greenhouse	1	76	3	204	39
	2	76	3	192	40
	3	76	3	188	40
	4	76	3	180	40
	5	76	3	178	41
	6	76	3	176	41
Proposed Greenhouse	7	71	5	173	40
	8	71	5	177	40
	9	71	5	179	40
	10	71	5	183	40
	11	71	5	186	40
	12	71	5	190	39
	13	71	5	200	39
	14	71	5	204	39
	15	71	5	210	39
SUB-TOTAL					52
				Refrig	50
				<b>TOTAL</b>	<b>54</b>

<b>TABLE II</b>					
<b>Project-Generated Noise Levels, dBA</b>					
North Property Line (Rural Residential)					
	Fan	SL	d	d to PL	SL @ PL
Exist. Greenhouse	1	76	3	220	31
	2	76	3	240	30
	3	76	3	255	30
	4	76	3	272	29
	5	76	3	290	28
	6	76	3	305	28
Proposed Greenhouse	7	71	5	327	27
	8	71	5	346	27
	9	71	5	366	26
	0	71	5	376	26
	11	71	5	381	26
	12	71	5	338	27
	13	71	5	410	25
	14	71	5	425	25
	15	71	5	428	25
				SUB-TOTAL	40
				Refrig	22
				<b>TOTAL</b>	<b>40</b>

As shown in the Tables, the total operational noise level at the most noise impacted property line to the east under worst-case continual operations will be 54 dBA and will be within the most stringent 60 dBA nighttime limit of the Santa Clara County Noise Ordinance for commercial land uses.

The total operational noise level at the most noise impacted property line to the north across Lena Avenue under worst-case continual operations will be 40 dBA and will be within the most stringent 45 dBA nighttime limit of the Santa Clara County Noise Ordinance for residential land uses.

As the project-generated noise levels will be within the limits of the Santa Clara County Noise Ordinance standards, noise mitigation measures will not be required.



This report presents the results of a noise assessment study for the Iron Ox agricultural facility at 450 Lena Avenue Santa Clara County. The noise levels presented herein were from on-site noise level measurements, data provided by the equipment manufacturer, information provided by the project sponsor and other data and are correct to the best of our knowledge. However, significant changes in the Iron Ox operations, equipment, noise regulations, or other future changes beyond our control may produce long-range noise results different than those reported herein.

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

Sincerely,

EDWARD L. PACK ASSOC., INC.

A handwritten signature in blue ink, reading "Jeffrey K. Pack", is written over a horizontal line.

Jeffrey K. Pack  
President

Attachment: Appendix A

## APPENDIX A

### References:

- (a) Noise Ordinance of the County of Santa Clara, Chapter VII, Section B11-192, 1981
- (b) Drainage Plan, Iron Ox – 450 Lean Ave., by MH Engineering, February 27, 2020
- (c) Information on Iron Ox Proposed Operations Provided by Mr. Brandon Miller, BM Consulting Services, by Telephone to Edward L. Pack Associates, Inc., June 3, 2020
- (d) Belt Drive Propeller Wall Fans, Models DC, DCK, DCH and K Specification Sheets, Acme Engineering & Manufacturing Corporation

## **APPENDIX B**

### **Terminology, Instrumentation**

#### **1. 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. 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.

**2. 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. 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