APPENDIX J

Noise Impact Report
NOISE IMPACT REPORT
Eucalyptus Booster Station
Moreno Valley, California

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APPENDIX A – ACOUSTICAL TERMINOLOGY

APPENDIX B – MORENO VALLEY NOISE ORDINANCE
1.0 INTRODUCTION

This noise impact analysis was prepared for the Eucalyptus Booster Station project. Potential noise impacts were evaluated at surrounding future and existing residential and commercial receptors along Eucalyptus Avenue (Figure 1). The selected receptors are adjacent to the proposed booster station within line-of-sight and within a 300-foot radius. The booster station noise sources were modeled as both point sources and area sources using information provided by Brown and Caldwell, DHK’s extensive acoustical library, and general assumptions.

The Moreno Valley Municipal Code, Title 11: Peace, Morals, and Safety, Chapter 11.80 Noise Regulation (Ordinance) were used as the analysis criteria for the maximum permissible noise levels for day and night. The Ordinance exempts emergency work/activity required to protect persons or property such as operation of the emergency generator to maintain pump operation; however, EMWD follows a “good-neighbor” policy and attempts to mitigate noise issues related to their operations. Only permanent stationary noise sources were evaluated. Temporary mobile and construction noise sources related to the upgrade were not evaluated.

1.1 OBJECTIVE AND METHODOLOGY

The objectives of the analysis were to:

1. Evaluate potential noise impacts at residential zoned receptors from permanent, stationary industrial noise sources associated with the proposed booster station operation; and
2. Determine if mitigative measures proposed in the design package such as acoustical walls, improved materials of construction and acoustical features, and/or design enhancements will be effective or if additional abatement is warranted.

The methodology used in the analysis was as follows:

1. Identify regulatory noise impact goals at residential and commercial receptors in the area surrounding the proposed booster station.
2. Determine the noise impacts associated with the indoor pumps, evaporative cooler, roof fan, and emergency generator using acoustical simulation computer modeling in accordance with industrial stationary source standards.
3. Compare the incremental increase to the ambient noise survey conducted as part of this study, regulatory noise ordinance, and industry-standard decibel requirements.

1.2 SITE AND PROJECT DESCRIPTION

The proposed Eucalyptus Booster Station (EBS) is located at 27551 Eucalyptus Avenue in the city of Moreno Valley. The proposed location is surrounded by two-story single-family residential homes to the immediate south, southwest, and west, and commercial buildings to the north and east (see Figure 1 and photographs 1 through 6). The proposed booster station site is approximately 70 feet wide by 140 feet deep. The proposed site is presently surrounded by a Walmart on the east and new homes on the south and west. Located directly to the north is automobile dealerships and Route 60. The neighborhood noise is heavily influenced by local traffic, interstate traffic noise from I-60 and delivery operations at the adjacent Walmart Store. The EBS is located in the north eastern portion of Moreno Valley.

The operational mechanical design configuration of interest consists of a three (3) operational indoor 75-hp vertical turbine pumps and a 10-ton outdoor evaporative cooler. The emergency configuration consists of a 350-kW emergency generator, roof-top critical exhaust silencer and 1.9-hp supply air fan.
1.3 Photographs

Photograph 1: Middle of site looking north-northeast. LA Fitness is in the background. I-60 is just beyond LA Fitness.

Photograph 2: Looking west-northwest across the Booster Station property from adjacent Walmart property. Adjacent residences 5, 6, 7, and 8 area visible (see Figure 1).

Photograph 3: Looking southeast from new home looking at proposed location of Booster Station driveway. Residences 1, 2, 3 and 4 are visible (see Figure 1).

Photograph 4: Southwest corner of site looking north. Walmart in background.
Figure 1: Site Map
2.0 NOISE CRITERIA AND AMBIENT NOISE ASSESSMENT

An acoustics primer is provided in this section followed by a description of nuisance noise criteria. Ambient noise monitoring results from on-site monitoring conducted on February 28 and March 1, 2019 are also provided in this section.

2.1 NOISE CRITERIA

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

The decibel (dB) scale is used to quantify sound intensity. Because sound pressure levels can vary by over one million times within the range of human hearing, a logarithmic loudness scale (similar to the Richter Scale used for earthquake intensity) is used to keep sound intensity numbers at a convenient and manageable level. Since the human ear is not equally sensitive to all sound frequencies within the entire spectrum, noise measurements are weighted more heavily within those frequencies of maximum human sensitivity (middle A and its higher harmonics) in a process called "A-weighting," written as dB(A). Table 2-1 illustrates the typical A-weighted sound level of representative noise sources. Acoustical terminology definitions are provided in Appendix A.

Table 2-1: Typical Noise Source Levels in dB(A)

<table>
<thead>
<tr>
<th>Noise Source</th>
<th>dB(A)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Noise at ear level from rustling leaves</td>
<td>20</td>
</tr>
<tr>
<td>Room in a quiet dwelling at midnight</td>
<td>32</td>
</tr>
<tr>
<td>Soft whisper at five feet</td>
<td>34</td>
</tr>
<tr>
<td>Large Department Store</td>
<td>50 to 65</td>
</tr>
<tr>
<td>Room with window air conditioner</td>
<td>55</td>
</tr>
<tr>
<td>Conversational Speech</td>
<td>60 to 75</td>
</tr>
<tr>
<td>Passenger Car at 50 ft.</td>
<td>69</td>
</tr>
<tr>
<td>Vacuum cleaner in private home at 10 feet</td>
<td>69</td>
</tr>
<tr>
<td>Bulldozer at 50 ft.</td>
<td>87</td>
</tr>
<tr>
<td>Heavy city traffic</td>
<td>90</td>
</tr>
<tr>
<td>Home lawn mower</td>
<td>98</td>
</tr>
<tr>
<td>Jet aircraft at 500 feet overhead</td>
<td>115</td>
</tr>
<tr>
<td>Human pain threshold</td>
<td>120</td>
</tr>
</tbody>
</table>

Reference: Noise Control Reference Handbook, Industrial Acoustics Company

2.2 NOISE CRITERION

Noise level impacts were evaluated at the nearest receptors and in a 300-foot radius around the booster station noise sources. The Moreno Valley noise ordinance regulates noise levels 200 feet from individual sources. Noise level impacts were evaluated at the residential and commercial property lines and adjacent receptors using the noise criteria cited in Table 11.80.030-2 of the Ordinance and are listed in the table below.
Table 2-2: Maximum Sound Levels in dBA for Specific Land Uses

<table>
<thead>
<tr>
<th>RESIDENTIAL</th>
<th>COMMERICAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>DAYTIME</td>
<td>NIGHTTIME</td>
</tr>
<tr>
<td>60</td>
<td>55</td>
</tr>
</tbody>
</table>

Ref: City of Moreno Valley Municipal Code, Title 11, Chapter 11.80, Noise Regulation.

2.3 **Ambient Noise Assessment**

To determine the existing noise levels at the project site prior to development, noise monitoring was conducted at the proposed project site. The proposed Eucalyptus Booster Station (EBS) site is located along Eucalyptus Avenue in a combination commercial and future residential area in the City of Moreno Valley. The proposed pump station site is approximately 70 feet wide by 140 feet deep. The neighborhood noise is heavily influenced by local traffic, interstate traffic noise from I-60 and delivery operations at the adjacent Walmart Store.

2.3.1 **Instrumentation**

The noise measurements were conducted using a calibrated Quest 2900 (Serial Number CE8080002) and Calibrator Quest QC-10 (Serial Number QI008143). The sound level meter met the current American National Standards Institute (ANSI) standard for a Type 2. Appendix A provides further noise terminology and definitions.

2.3.2 **Ambient Noise Assessment Methodology**

Noise monitoring was conducted at the EBS in the middle of the site footprint. Noise measurements were measured at various times of the day and night to characterize existing ambient noise conditions. New residential homes are currently in partial occupancy to the final construction phase. The area is a mixed-use blend of residential and commercial properties. Major highway traffic and the mixed-use activities all contribute to the ambient noise conditions.

The ambient noise monitoring was competed February 28 and March 1, 2019. Day measurements were recorded from 12:00-13:30 on February 28, 2019. Evening measurements were recorded February 28th 21:00-22:00. Night measurements were recorded from 04:30-05:30 on March 1st. Morning measurements were measured 08:00-08:45 on March 1, 2019. The sound measurements were conducted at a height of 1.5 meters (5 feet) above the ground. The table below summarizes the ambient noise readings.
Table 2-3: Ambient Noise Measurements

<table>
<thead>
<tr>
<th>Noise Parameter (1)</th>
<th>Noise Level in dB(A) during Event</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>DAT (12:00-13:30)</td>
</tr>
<tr>
<td>$L_{log}$</td>
<td>56.8</td>
</tr>
<tr>
<td>$L_{ave}$</td>
<td>58.4</td>
</tr>
<tr>
<td>$L_{max}$</td>
<td>74.6</td>
</tr>
<tr>
<td>$L_{min}$</td>
<td>47.4</td>
</tr>
<tr>
<td>$L_5$</td>
<td>63.3</td>
</tr>
<tr>
<td>$L_{10}$</td>
<td>61.5</td>
</tr>
<tr>
<td>$L_{50}$</td>
<td>57.2</td>
</tr>
<tr>
<td>$L_{90}$</td>
<td>53.3</td>
</tr>
</tbody>
</table>

Notes:
(1) See Appendix A for definitions
(2) Traffic noise, construction noise from adjacent new homes, fire truck, aircraft
(3) Walmart delivery trucks idling*, back-up horns from delivery trucks, cruising cars/loud music on local road
(4) Freeway noise, local traffic, Walmart deliveries
(5) Local traffic, nearby construction, Walmart deliveries

3.0 NOISE MODELING METHODOLOGY

Prediction of future noise impacts within a region requires a series of very complex calculations to determine the areas and extent of potential acoustical problems. Computer-aided simulation programs have been developed to assist in the calculation process and properly assess complex systems of multiple noise sources, receptors, and environmental factors. Due to several noise generating sources, potential low background ambient noise levels, and project specific environmental features (e.g., elevated terrain), a computer simulation program was selected to assist with this project. The results will assist in the determination of potential noise impacts to nearby receptors from the proposed noise sources.

3.1 NOISE SIMULATION MODEL

SoundPLAN Wins, developed by Braunstein +Berndt GmbH, was selected as the most appropriate modeling program for the noise impact assessment. The selection was based on recent experience on similar projects and the program’s ability to calculate multiple sources with various degrees of abatement, multiple receptors, and elevated terrain features.

SoundPLAN’s main objective is to calculate noise emitted from industrial sources and assess the influence upon receivers. The model data are generated in compliance with standards selected by the user and the results are presented in tabular and/or graphic form. SoundPLAN was developed as a composite noise simulation program for traffic, industrial, rail and airport simulations. The program includes the following modules: Geo-Database, Industrial Noise Propagation, Cartography, Calculation, and Graphics.

3.1.1 Industrial Propagation

SoundPLAN provides six industrial propagation calculation choices. Each calculation method is internationally recognized and offers unique computer simulation techniques. ISO 9613 was used for the simulations. ISO 9613 is a general-purpose standard for outdoor noise propagation and calculates the sound pressure for a frequency using the following formula:
\[ L_s = [L_w + D_1 + K_0] - [D_s + \Sigma D] \]

Where:
- \( L_s \): sound pressure for a single frequency
- \( L_w \): sound power
- \( D_1 \): directivity of the source
- \( K_0 \): spherical model
- \( D_s \): spreading
- \( \Sigma D \): different contributing factors
  - a. air absorption
  - b. ground absorption
  - c. volume type absorption
  - d. screening

3.1.2 Geo-Database Modules

The Geo-Database module allows for site specific development of the source, receptor and environmental features of the project. The Geo-Data files allow for layering of various files including source and receptor location \((x,y,z)\) coordinates, buildings, acoustical characteristics (absorptive or reflective), and special features (terrain, ground cover, landscape abatement). Each file can be combined to form various combinations of “Scenarios.”

3.1.3 Point and Area Noise Sources

The locations of noise sources and receptors, dimensions and building shape, equipment location and landscape elevation contours are critical to the model results. Aerial photographs and design drawings were used to prepare the overall basemap. Engineering drawings, equipment cut sheets and Draft Technical Memorandum, Preliminary Design Refinement (Brown and Caldwell, 2010 and 2011) were used to determine the type, noise signatures and locations of the mechanical equipment and building footprints as well as booster station materials of construction.

3.1.4 Calculation/Graphics

The computer simulation program operates in types of “Scenarios.” Prior to the execution of the program, each scenario is set-up with the appropriate selection of geo-data files, calculation standard and calculation parameters. The calculation parameters are selected to determine the overall area, distances between points, acoustical scale (A-weighted), specific receptor, and graphical parameters. Each Scenario is evaluated at each single point sound (SPS) location and using a grid map with noise isopleth contours. The predicted noise levels presented are based on these calculations.

3.2 Parameters and Physical Assumptions

The analysis requires establishing values for physical parameters such as the noise profiles for the pumps, rooftop fans, emergency generator, evaporative cooler and critical silencer attached to the emergency generator exhaust. Key physical assumptions are described below.

3.2.1 Project Model Parameters

The project and adjacent areas were analyzed for zones with the greatest potential for noise conflict. Since noise impact is greatly determined by proximity of sources to receptors, the project site and adjacent land was selected as the relatively small (600’x600’) study area. The location of sensitive receptors, analysis of elevated terrain and preliminary layout assisted in the determination of the project study area. Geo-Data files were developed and completed to include terrain associated ground cover, acoustical enclosures, walls, equipment and specific receptors. Noise absorption and reflective properties are provided for each geo-data file.
3.2.2 Noise Profiles of the Mechanical System

Several initial and three final scenarios were modeled. Scenario 1 consisted of the operational configuration “worst case” and included all three indoor 75-hp pumps running and the outdoor 10-ton evaporative cooler all running 24/7. Scenario 2 consisted of the emergency configuration which included all of the Scenario 1 sources and the 350-kW emergency generator, and roof-top critical exhaust silencer and 1.9-hp supply air fan. Scenario 3 expanded the building footprint to provide space to install louver silencers on the GENSET room intake and exhaust louvers. Initial scenarios evaluated industrial vs critical silencers and various acoustical louvers. The noise sources are summarized in the table below.

Table 3-1: Industrial Noise Sources and Abatement used in Noise Simulations

<table>
<thead>
<tr>
<th>Noise Source/Abatement Description</th>
<th>Scenario</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pumps #1, #2, and #3: indoor 75-hp vertical turbine pumps with exhaust louvers on east wall.</td>
<td>1, 2, 3</td>
</tr>
<tr>
<td>Evaporative cooler: 10-ton, outdoor, pad-mounted</td>
<td>1, 2, 3</td>
</tr>
<tr>
<td>Emergency generator: 350 kW with intake and exhaust louvers on west and north exterior walls</td>
<td>2</td>
</tr>
<tr>
<td>Emergency generator: 350 kW with modified intake and exhaust louvers on west and north exterior walls</td>
<td>3</td>
</tr>
<tr>
<td>Critical silencer: roof-top attached to exhaust of generator</td>
<td>2</td>
</tr>
<tr>
<td>Critical silencer: North side wall attached to exhaust of generator</td>
<td>3</td>
</tr>
<tr>
<td>Supply air fan: 1.9-hp, 21,000 cfm roof-mounted</td>
<td>2, 3</td>
</tr>
<tr>
<td>Expanded building footprint to provide adequate room for the GENSET room louver silencers</td>
<td>3</td>
</tr>
</tbody>
</table>

Notes:

3.2.3 Grid Map Selection

A noise calculation area approximately 600 feet by 600 feet was selected for the project area. A height of 5 feet above ground was used for the grid map noise calculations. The calculation grid provides detailed 3-dimensional identification of the areas of impact within grid area.

4.0 NOISE SIMULATION RESULTS

Results of the noise modeling are presented in this section. A graphical representation of predicted noise isopleths by the SoundPLAN model are illustrated on Figures 2, 3 and 4 for Scenarios 1, 2 and 3, respectively. Second floor receptors are considered the critical receptor for all multi-story structures in this assessment. All residential structures are two-story. The following table provides predicted results at discrete points along the façades at selected residential receptors. Two-story homes are measured at the ground level and second floor at 5’ above the floor.

Table 4-1: Modeled Sound Results at Selected Receptors in dB(A), Day-night Equivalent

<table>
<thead>
<tr>
<th>Receptor Map ID</th>
<th>Level or Floor</th>
<th>Modeled Scenario Sound Level Results in dB(A), L_{dn} (1)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Operational Configuration</td>
<td>Emergency Configuration</td>
</tr>
<tr>
<td>RESIDENCE 01</td>
<td>1</td>
<td>37.5</td>
</tr>
<tr>
<td>RESIDENCE 01</td>
<td>2</td>
<td>35.8</td>
</tr>
<tr>
<td>RESIDENCE 02</td>
<td>1</td>
<td>35.2</td>
</tr>
<tr>
<td>RESIDENCE 02</td>
<td>2</td>
<td>33.9</td>
</tr>
<tr>
<td>RESIDENCE 03</td>
<td>1</td>
<td>30.6</td>
</tr>
<tr>
<td>RESIDENCE 03</td>
<td>2</td>
<td>33.0</td>
</tr>
<tr>
<td>Receptor Map ID</td>
<td>Level or Floor</td>
<td>Modeled Scenario Sound Level Results in dB(A), $L_{dn}^{(1)}$</td>
</tr>
<tr>
<td>-----------------</td>
<td>---------------</td>
<td>----------------------------------------------------------</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Scenario 1 Operational Configuration</td>
</tr>
<tr>
<td>RESIDENCE 04</td>
<td>1</td>
<td>30.2</td>
</tr>
<tr>
<td>RESIDENCE 04</td>
<td>2</td>
<td>32.6</td>
</tr>
<tr>
<td>RESIDENCE 05</td>
<td>1</td>
<td>40.2</td>
</tr>
<tr>
<td>RESIDENCE 05</td>
<td>2</td>
<td>43.8</td>
</tr>
<tr>
<td>RESIDENCE 06</td>
<td>1</td>
<td>38.5</td>
</tr>
<tr>
<td>RESIDENCE 06</td>
<td>2</td>
<td>41.8</td>
</tr>
<tr>
<td>RESIDENCE 07</td>
<td>1</td>
<td>38.6</td>
</tr>
<tr>
<td>RESIDENCE 07</td>
<td>2</td>
<td>40.7</td>
</tr>
<tr>
<td>RESIDENCE 08</td>
<td>1</td>
<td>38.2</td>
</tr>
<tr>
<td>RESIDENCE 08</td>
<td>2</td>
<td>38.8</td>
</tr>
<tr>
<td>RESIDENCE 09</td>
<td>1</td>
<td>30.6</td>
</tr>
<tr>
<td>RESIDENCE 09</td>
<td>2</td>
<td>33.6</td>
</tr>
<tr>
<td>RESIDENCE 10</td>
<td>1</td>
<td>32.4</td>
</tr>
<tr>
<td>RESIDENCE 10</td>
<td>2</td>
<td>32.6</td>
</tr>
<tr>
<td>RESIDENCE 11</td>
<td>1</td>
<td>23.9</td>
</tr>
<tr>
<td>RESIDENCE 11</td>
<td>2</td>
<td>29.6</td>
</tr>
<tr>
<td>RESIDENCE 12</td>
<td>1</td>
<td>17.6</td>
</tr>
<tr>
<td>RESIDENCE 12</td>
<td>2</td>
<td>18.6</td>
</tr>
<tr>
<td>SPS PERIMETER EAST</td>
<td>GND</td>
<td>34.8</td>
</tr>
<tr>
<td>SPS PL SOUTH</td>
<td>GND</td>
<td>32.8</td>
</tr>
<tr>
<td>SPS PL SW</td>
<td>GND</td>
<td>41.0</td>
</tr>
<tr>
<td>SPS PL WEST</td>
<td>GND</td>
<td>54.4</td>
</tr>
</tbody>
</table>

Notes:
(1) See Appendix A for definitions
EUCALYPTUS

PUMP STATION

COMMERCIAL

EUCALYPTUS BOOSTER STATION

SCENARIO 1 NOISE ISOPLETH MAP

APRIL 2019

PREDICTED NOISE LEVEL, $L_{eq}$

<table>
<thead>
<tr>
<th>dB(A)</th>
<th>Noise Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;= 30</td>
<td>Very Low</td>
</tr>
<tr>
<td>30 - 35</td>
<td>Low</td>
</tr>
<tr>
<td>35 - 40</td>
<td>Moderate</td>
</tr>
<tr>
<td>40 - 45</td>
<td>High</td>
</tr>
<tr>
<td>45 - 50</td>
<td>Very High</td>
</tr>
<tr>
<td>50 - 55</td>
<td>Extreme</td>
</tr>
<tr>
<td>55 - 60</td>
<td>Hazard</td>
</tr>
<tr>
<td>60 - 65</td>
<td>Critical</td>
</tr>
<tr>
<td>65 - 70</td>
<td>Emergency</td>
</tr>
<tr>
<td>70 - 75</td>
<td>Disaster</td>
</tr>
<tr>
<td>75 - 80</td>
<td>Catastrophic</td>
</tr>
<tr>
<td>80 - 85</td>
<td>Catastrophic</td>
</tr>
<tr>
<td>&gt; 85</td>
<td>Catastrophic</td>
</tr>
</tbody>
</table>

SCALE 1:64

NOTES:
NOISE SOURCES:
3x indoor 75-HP pump motors
10-ton evaporative cooler

BOOSTER STATION CONSTRUCTION:
8" CMU block wall
Acoustical steel doors
Acoustical louvers
6'-8"-high CMU block perimeter wall

FIGURE 2
EUCALYPTUS BOOSTER STATION
SCENARIO 1 NOISE ISOPLETH MAP

EASTERN MUNICIPAL WATER DISTRICT

APRIL 2019
FIGURE 3
SCENARIO 2 NOISE ISOPLETH MAP
EMERGENCY CONFIGURATION WITH MITIGATION
APRIL 2019

PREDICTED NOISE LEVEL, $L_{eq}$

$\text{dB(A)}$

$\leq 30$

$30 - 35$

$35 - 40$

$40 - 45$

$45 - 50$

$50 - 55$

$55 - 60$

$60 - 65$

$65 - 70$

$70 - 75$

$75 - 80$

$80 - 85$

$> 90$

NOTES:

NOISE SOURCES:

- 3 indoor 75-HP pump motors
- 10-ton evaporative cooler
- 150 kW generator
- Critical silencer - roof
- 1.9-HP roof-top fan

BOOSTER STATION CONSTRUCTION:

- 8" CMU block wall
- Acoustical steel doors
- Acoustical louvers
- 6' - 8" high CMU block perimeter wall
FIGURE 4
SCENARIO 3 NOISE ISOPLETH MAP
EMERGENCY CONFIGURATION WITH EXPANDED BUILDING & FULL MITIGATION
APRIL 2019

PREDICTED NOISE LEVEL, $L_{eq}$

<table>
<thead>
<tr>
<th>dB(A)</th>
<th>0</th>
<th>15</th>
<th>30</th>
<th>60</th>
<th>90</th>
<th>120</th>
<th>150</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;= 30</td>
<td>30</td>
<td>35</td>
<td>40</td>
<td>45</td>
<td>50</td>
<td>55</td>
<td>60</td>
</tr>
<tr>
<td>60</td>
<td>65</td>
<td>70</td>
<td>75</td>
<td>80</td>
<td>85</td>
<td>90</td>
<td></td>
</tr>
<tr>
<td>&gt; 90</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

NOTES:

NOISE SOURCES:
3x indoor 7.5-HP pump motors
10-ton evaporative cooler
350 kW generator
Critical silencer - exterior north wall
1.9-HP roof-top fan

BOOSTER STATION CONSTRUCTION:
8" CMU block wall with expanded footprint
Acoustical steel doors
Acoustical louvers with silencers

6"-8" high CMU block perimeter wall

LEGEND
- RECEPTOR BUILDING
- AUXILIARY BUILDING
- ELEVATION CONTOUR
- BUILDING NOISE SOURCE
- SENSITIVE RECEIVER
- WALL
5.0 CONCLUSIONS AND RECOMMENDATIONS

The following conclusions and recommendations are derived from evaluation and comparison of the noise modeling results with the noise criteria established for this project.

1. The measured ambient noise levels exceed the Moreno Valley Noise Ordinance nighttime threshold of 55 dB(A) for residential and 60 dB(A) for commercial properties. Local traffic and commercial activities were the primary contributors to ambient noise levels.

2. Modeled results indicate that, as designed, the operational configuration (Scenario 1) is well below the ordinance threshold and will not impact adjacent receptors.

3. The modeled emergency configurations (scenarios 2 and 3) exceed the night-time 55 dB(A) threshold for several receptors. The noise values are equivalent or slightly less than measured ambient noise.

4. The expanded footprint configuration in Scenario 3 did not reduce overall generator noise to levels warranting the additional construction cost.

5. Periodic testing of the emergency engine is planned for daytime periods.

6.0 REFERENCES


Fairbanks Morse, Pump Curve and Acoustical Data

Greenheck, RBCS-3H42-20 Supply Fan, Acoustical Data

IAQ - Quiet Duct Silencer


Lau- Evaporative Cooler- 10 ton-Acoustical Information

APPENDIX A

ACOUSTICAL TERMINOLOGY
Acoustical Terminology:

Ambient Noise: The sound pressure levels associated with a given environment. Ambient noise is a composite of sounds from near and far sources none of which are particularly dominant.

Background Noise: The sound pressure levels in a given environment from all sources excluding a specific sound source being investigated or measured.

Decibel “A” Scale: Sound level weighting which approximately represents the frequency response of the human ear, which is less sensitive to low frequency than to high frequency sound.

Far Field Noise: Noise acting in accordance to the inverse law. Double the distance - reduce the dB(A) by “6”.

Noise measurement metrics:

- Equivalent sound level ($L_{eq}$), the average sound level calculated from instantaneous measurements recorded over a specific period of time.
- Maximum sound level ($L_{max}$) reached during a sampling period. The $L_{max}$ value is the peak noise level that occurred during the measurement period.
- Minimum sound level ($L_{min}$) reached during a sampling period. The $L_{min}$ value obtained for a particular monitoring location typically reflects ambient conditions.
- Percentile sound levels ($L_{90}$, $L_{50}$, and $L_{10}$) are sound levels that exceed the percentile value during the measurement period.
- Community Noise Equivalent (CNEL): the average of the daytime measurement, evening measurement +5 dB(A), and the night measurement +10 dB(A).
- Single Event Level (SEL): Used for blasting events that are less than a minute in duration, when energy average noise values do not provide accurate depiction of the maximum noise levels produced by the single event.
- Peak Noise Level ($P_{K15}$): Un-weighted peak sound levels or maximum sound levels that assess maximum noise levels during single-noise events. This is necessary when the DNL (average) noise measurements might understate the severity of a single-noise event. Sometimes annoying noise peaks can be “averaged out.” Un-weighted peak measurements, with no time averaging, are a good predictor of complaints.
- Day Night Level ($L_{dn}$): The day-night sound level (DNL) evaluator is recommended by the Environmental Protection Agency and used by most federal agencies as a land-use planning tool. It describes the average daily acoustic energy over the period of one year—meaning that moments of quiet are averaged together with moments where loud noises can be heard. The Department of Defense (DoD) uses DNL because it incorporates a “penalty” for nighttime noise (normally 10:00 p.m. to 7:00 a.m.) when loud sounds are typically more annoying.

Noise Control: Usually involves three elements including 1) A noise source, 2) a receiver of noise and 3) various paths noise can travel between the source and receiver.

Sound Absorption Coefficient: The dimensionless ratio of the sound energy absorbed by a given surface to that incident upon the surface.

Sound Receiver: One or more observations points at which sound is evaluated or measured. The effect of sound on an individual receiver is usually evaluated near the ear or close to the body.

Speed of Sound in Air: 1,129 feet per second.
APPENDIX B

MORENO VALLEY NOISE ORDINANCE
Chapter 11.80 NOISE REGULATION
11.80.010 Legislative findings.

It is found and declared that:

A. Excessive sound within the limits of the city is a condition which has existed for some time, and the amount and intensity of such sound is increasing.

B. Such excessive sound is a detriment to the public health, safety, and welfare and quality of life of the residents of the city.

C. The necessity in the public interest for the provisions and prohibitions hereinafter contained and enacted is declared as a matter of legislative determination and public policy, and it is further declared that the provisions and prohibitions hereinafter contained and enacted are in pursuance of and for the purpose of securing and promoting the public health, safety, welfare and quality of life of the city and its inhabitants. (Ord. 740 § 1.2, 2007)

11.80.020 Definitions.

For purposes of this chapter, certain words and phrases used herein are defined as follows:

“A-weighted sound level” means the sound pressure level in decibels as measured with a sound level meter using the A-weighting network. The unit of measurement is the dB(A).

“Commercial” means all uses of land not otherwise classified as residential, as defined in this section.

“Construction” means any site preparation, and/or any assembly, erection, repair, or alteration, excluding demolition, of any structure, or improvements to real property.

“Continuous airborne sound” means sound that is measured by the slow-response setting of a meter manufactured to the specifications of ANSI Section 1.4-1983 (R2006) “Specification for Sound Level Meters,” or its successor.

“Daytime” means eight a.m. to ten p.m. the same day.

“Decibel” (dB) means a unit for measuring the amplitude of sound, equal to twenty (20) times the logarithm to the base ten (10) of the ratio of the pressure of the sound measured to the reference pressure, which is twenty (20) microPascals (twenty (20) microNewtons per square meter.)

“Demolition” means any dismantling, intentional destruction or removal of structures or other improvements to real property.

“Disturb” means to interrupt, interfere with, or hinder the enjoyment of peace or quiet or the normal listening activities or the sleep, rest or mental concentration of the hearer.
“Emergency” means any occurrence or set of circumstances involving actual or imminent physical trauma or significant property damage which necessitates immediate action. Economic loss alone shall not constitute an emergency. It shall be the burden of an alleged violator to prove an “emergency.”

“Emergency work” means any work made necessary to restore property to a safe condition following an emergency, or to protect persons or property threatened by an imminent emergency, to the extent such work is, in fact, necessary to protect persons or property from exposure to imminent danger or damage.

“Frequency” means the number of complete oscillation cycles per unit of time.

“Impulsive sound” means sound of short duration, usually less than one second, with an abrupt onset and rapid decay. Examples of sources of impulsive sound include explosions, drop forge impacts, and discharge of firearms.

“Nighttime” means 10:01 p.m. to 7:59 a.m. the following day.

“Noise disturbance” means any sound which:

1. Disturbs a reasonable person of normal sensitivities;

2. Exceeds the sound level limits set forth in this chapter; or

3. Is plainly audible as defined in this section. Where no specific distance is set forth for the determination of audibility, references to noise disturbance shall be deemed to mean plainly audible at a distance of two hundred (200) feet from the real property line of the source of the sound, if the sound occurs on privately owned property, or from the source of the sound, if the sound occurs on public right of way, public space or other publicly owned property.

“Person” means any person, person’s firm, association, copartnership, joint venture, corporation, or any entity public or private in nature.

“Plainly audible” means that the sound or noise produced or reproduced by any particular source, can be clearly distinguished from ambient noise by a person using his/her normal hearing faculties.

“Public right-of-way” means any street, avenue, boulevard, sidewalk, bike path or alley, or similar place normally accessible to the public which is owned or controlled by a governmental entity.

“Public space” means any park, recreational or community facility, or lot which contains at least one building that is open to the general public during its hours of operation.

“Residential” means all uses of land primarily for dwelling units, as well as hospitals, schools, colleges and universities, and places of religious assembly.
“Sound” means an oscillation in pressure, particle displacement, particle velocity or other physical parameter, in a medium with internal forces that causes compression and rarefaction of that medium capable of producing an auditory impression. The description of sound may include any characteristic of such sound, including duration, intensity and frequency.

“Sound level” means the weighted sound pressure level as measured in dB(A) by a sound level meter and as specified in American National Standards Institute (ANSI) specifications for sound-level meters (ANSI Section 1.4-1971 (R1976)). If the frequency weighting employed is not indicated, the A-weighting shall apply.

“Sound level meter” means an instrument, demonstrably capable of accurately measuring sound levels as defined above.

All technical definitions not defined above shall be in accordance with applicable publications and standards of the American National Standards Institute (ANSI). (Ord. 740 § 1.2, 2007)

11.80.030 Prohibited acts.

A. General Prohibition. It is unlawful and a violation of this chapter to maintain, make, cause, or allow the making of any sound that causes a noise disturbance, as defined in Section 11.80.020.

B. Sound causing permanent hearing loss.

1. Sound level limits. Based on statistics from the Center for Disease Control and Prevention and the National Institute for Occupational Safety and Health, Table 1 and Table 1-A specify sound level limits which, if exceeded, will have a high probability of producing permanent hearing loss in anyone in the area where the sound levels are being exceeded. No sound shall be permitted within the city which exceeds the parameters set forth in Tables 11.80.030-1 and 11.80.030-1-A of this chapter:
### Table 11.80.030-1

**MAXIMUM CONTINUOUS SOUND LEVELS**

<table>
<thead>
<tr>
<th>Duration per Day</th>
<th>Sound level [db(A)]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Continuous Hours</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>90</td>
</tr>
<tr>
<td>6</td>
<td>92</td>
</tr>
<tr>
<td>4</td>
<td>95</td>
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<td>3</td>
<td>97</td>
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<td>2</td>
<td>100</td>
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<tr>
<td>1.5</td>
<td>102</td>
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<tr>
<td>1</td>
<td>105</td>
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<tr>
<td>0.5</td>
<td>110</td>
</tr>
<tr>
<td>0.25</td>
<td>115</td>
</tr>
</tbody>
</table>

*When the daily sound exposure is composed of two or more periods of sound exposure at different levels, the combined effect of all such periods shall constitute a violation of this section if the sum of the percent of allowed period of sound exposure at each level exceeds 100 percent.*

### Table 11.80.030-1A

**MAXIMUM IMPULSIVE SOUND LEVELS**

<table>
<thead>
<tr>
<th>Number of Repetitions per 24-Hour Period</th>
<th>Sound level [dB(A)]</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>145</td>
</tr>
<tr>
<td>10</td>
<td>135</td>
</tr>
<tr>
<td>100</td>
<td>125</td>
</tr>
</tbody>
</table>

2. Exemptions. No violation shall exist if the only persons exposed to sound levels in excess of those listed in Tables 11.80.030-1 and 11.80.030-1A are exposed as a result of:

a. Trespass;

b. Invitation upon private property by the person causing or permitting the sound; or

c. Employment by the person or a contractor of the person causing or permitting the sound.
C. Nonimpulsive Sound Decibel Limits. No person shall maintain, create, operate or cause to be operated on private property any source of sound in such a manner as to create any nonimpulsive sound which exceeds the limits set forth for the source land use category (as defined in Section 11.80.020) in Table 11.80.030-2 when measured at a distance of two hundred (200) feet or more from the real property line of the source of the sound, if the sound occurs on privately owned property, or from the source of the sound, if the sound occurs on public right-of-way, public space or other publicly owned property. Any source of sound in violation of this subsection shall be deemed prima facie to be a noise disturbance.

Table 11.80.030-2

MAXIMUM SOUND LEVELS (IN dB(A)) FOR SOURCE LAND USES

<table>
<thead>
<tr>
<th>Residential</th>
<th>Commercial</th>
</tr>
</thead>
<tbody>
<tr>
<td>Daytime</td>
<td>Nighttime</td>
</tr>
<tr>
<td>60</td>
<td>55</td>
</tr>
</tbody>
</table>

D. Specific Prohibitions. In addition to the general prohibitions set out in subsection A of this section, and unless otherwise exempted by this chapter, the following specific acts, or the causing or permitting thereof, are regulated as follows:

1. Motor Vehicles. No person shall operate or cause to be operated a public or private motor vehicle, or combination of vehicles towed by a motor vehicle, that creates a sound exceeding the sound level limits in Table 11.80.030-2 when the vehicle(s) are not otherwise subject to noise regulations provided for by the California Vehicle Code.

2. Radios, Televisions, Electronic Audio Equipment, Musical Instruments or Similar Devices from a Stationary Source. No person shall operate, play or permit the operation or playing of any radio, tape player, television, electronic audio equipment, musical instrument, sound amplifier or other mechanical or electronic sound making device that produces, reproduces or amplifies sound in such a manner as to create a noise disturbance. However, this subsection shall not apply to any use or activity exempted in subsection E of this section and any use or activity for which a special permit has been issued pursuant to Section 11.80.040.

3. Radios, Electronic Audio Equipment, or Similar Devices from a Mobile Source Such as a Motor Vehicle. Sound amplification or reproduction equipment on or in a motor vehicle is subject to regulation in accordance with the California Vehicle Code when upon the public right-of-way. When upon public space or publicly owned property other than the public right-of-way or upon private property open to the public, sound amplification or reproduction equipment shall not be operated in such a manner that it is plainly audible at a distance of fifty (50) feet in any direction from the vehicle.

4. Portable, Hand-Held Music or Sound Amplification or Reproduction Equipment. Such equipment shall not be operated on a public right-of-way, public space or other publicly owned property in such a manner as to be plainly audible at a distance of fifty (50) feet in any direction from the operator.

5. Loudspeakers and Public Address Systems.
a. Except as permitted by Section 11.80.040, no person shall operate, or permit the operation of, any loudspeaker, public address system or similar device, for any commercial purpose:

1. Which produces, reproduces or amplifies sound in such a manner as to create a noise disturbance; or

2. During nighttime hours on a public right-of-way, public space or other publicly owned property.

b. No person shall operate, or permit the operation of, any loudspeaker, public address system or similar device, for any noncommercial purpose, during nighttime hours in such a manner as to create a noise disturbance.

6. Animals. No person shall own, possess or harbor an animal or bird that howls, barks, meows, squawks, or makes other sounds that:

a. Create a noise disturbance;

b. Are of frequent or continued duration for ten (10) or more consecutive minutes and are plainly audible at a distance of fifty (50) feet from the real property line of the source of the sound; or

c. Are intermittent for a period of thirty (30) or more minutes and are plainly audible at a distance of fifty (50) feet from the real property line of the source of the sound.

7. Construction and Demolition. No person shall operate or cause the operation of any tools or equipment used in construction, drilling, repair, alteration or demolition work between the hours of eight p.m. and seven a.m. the following day such that the sound there from creates a noise disturbance, except for emergency work by public service utilities or for other work approved by the city manager or designee. This section shall not apply to the use of power tools as provided in subsection (D)(9) of this section.

8. Emergency Signaling Devices. No person shall intentionally sound or permit the sounding outdoors of any fire, burglar or civil defense alarm, siren or whistle, or similar stationary emergency signaling device, except for emergency purposes or for testing as follows:

a. Testing of a stationary emergency signaling device shall not occur between seven p.m. and seven a.m. the following day;

b. Testing of a stationary emergency signaling device shall use only the minimum cycle test time, in no case to exceed sixty (60) seconds;

c. Testing of a complete emergency signaling system, including the functioning of the signaling device and the personnel response to the signaling device, shall not occur more than once in each calendar month. Such testing shall only occur only on weekdays between seven a.m. and seven p.m. and shall be exempt from the time limit specified in subsection (D)(8)(2) of this section.
9. Power Tools. No person shall operate or permit the operation of any mechanically, electrically or gasoline motor-driven tool during nighttime hours so as to cause a noise disturbance across a residential real property boundary.

10. Pumps, Air Conditioners, Air-Handling Equipment and Other Continuously Operating Equipment. Notwithstanding the general prohibitions of subsection a of this section, no person shall operate or permit the operation of any pump, air conditioning, air-handling or other continuously operating motorized equipment in a state of disrepair or in a manner which otherwise creates a noise disturbance distinguishable from normal operating sounds.

E. Exemptions. The following uses and activities shall be exempt from the sound level regulations except the maximum sound levels provided in Tables 11.80.030-1 and 11.80.030-1A:

1. Sounds resulting from any authorized emergency vehicle when responding to an emergency call or acting in time of an emergency.

2. Sounds resulting from emergency work as defined in Section 11.80.020

3. Any aircraft operated in conformity with, or pursuant to, federal law, federal air regulations and air traffic control instruction used pursuant to and within the duly adopted federal air regulations; and any aircraft operating under technical difficulties in any kind of distress, under emergency orders of air traffic control, or being operated pursuant to and subsequent to the declaration of an emergency under federal air regulations.

4. All sounds coming from the normal operations of interstate motor and rail carriers, to the extent that local regulation of sound levels of such vehicles has been preempted by the Noise Control Act of 1972 (42 U.S.C. § 4901 et seq.) or other applicable federal laws or regulations

5. Sounds from the operation of motor vehicles, to the extent they are regulated by the California Vehicle Code.

6. Any constitutionally protected noncommercial speech or expression conducted within or upon a any public right-of-way, public space or other publicly owned property constituting an open or a designated public forum in compliance with any applicable reasonable time, place and manner restrictions on such speech or expression or otherwise pursuant to legal authority.

7. Sounds produced at otherwise lawful and permitted city-sponsored events, organized sporting events, school assemblies, school playground activities, by permitted fireworks, and by permitted parades on public right-of-way, public space or other publicly owned property.

8. An event for which a temporary use permit or special event permit has been issued under other provisions of this code, where the provisions of Section 11.80.040 are met, the permit granted expressly grants an exemption from specific standards contained in this chapter, and the permittee and all persons under the permittee’s reasonable control actually
comply with all conditions of such permit. Violation of any condition of such a permit related to sound or sound equipment shall be a violation of this chapter and punishable as such.

F. Nothing in this chapter shall be construed to limit, modify or repeal any other regulation elsewhere in this code relating to the regulation of noise sources, nor shall any such other regulation be read to permit the emission of noise in violation of any provision of this chapter. (Ord. 740 § 1.2, 2007)

11.80.040 Special provisions for temporary use and special event permits.

The exemption by permit set forth in Section 11.80.030(E)(8) shall be subject to the following requirements and conditions:

A. The permit application shall include the name, address and telephone number of the permit applicant; the date, hours and location for which the permit is requested; and the nature of the event or activity. It shall also specify the types of sounds and/or sound equipment to be permitted, the proposed duration of such sound, the specific standards from which the sound is to be exempted, and the reasons for each requested exemption.

B. The permit shall be issued provided the proposed activity meets the requirements of this section and the issuing official determines that the sound to be emitted at the event as proposed would not be detrimental to the public health, safety or welfare, that the event cannot reasonably achieve its legitimate aims and purposes without the exemption and that the sound levels proposed will not unreasonably damage the peace and quiet enjoyment of the lawful users of surrounding properties, nor constitute a public nuisance.

C. The official issuing the permit may prescribe any reasonable conditions or requirements he/she deems necessary to minimize noise disturbances upon the community or the surrounding neighborhood, and/or to protect the health, safety or welfare of the public, including participants in the permitted event, including use of mufflers, screens or other sound-attenuating devices.

D. Any permit granted must be in writing and shall contain all conditions upon which the permit shall be effective.

E. No more than six events requiring a sound limit exemption may be held at any particular location upon privately owned or controlled property per calendar year, provided further that the number of events shall not exceed the number permitted under the regulations for the type of permit issued. For purposes of this subsection, “location” means a legal parcel of real property or a complete shopping or commercial center or mall sharing common parking and access even if comprised of multiple legal parcels.

F. The exemption from sound limits under such permit shall not exceed maximum period of four hours in one twenty-four (24) hour day.

G. The permit will only be granted for hours between nine a.m. and ten p.m. on all days other than Friday and Saturday; and, on Friday and Saturday, between the hours of nine a.m. and one a.m. of the following day, except in the following circumstances:
1. A permit may be granted for hours between nine a.m. on New Year’s Eve and one a.m. the following day (New Year’s Day).

2. A permit may be granted for hours between nine a.m. and two a.m. the following day if there are no residences, hospitals, or nursing homes within a 0.5 mile radius of the property where the function is taking place.

H. Functions for which the permits are issued shall be limited to a continuous airborne sound level not to exceed seventy (70) dB(A), as measured two hundred (200) feet from the real property boundary of the source property if on private property, or from the source if on public right of way, public space or other publicly owned property. (Ord. 740 § 1.2, 2007)

11.80.050 Measurement or assessment of sound.

A. Measurement With Sound Meter.

1. The measurement of sound shall be made with a sound level meter meeting the standards prescribed by ANSI Section 1.4-1983 (R2006). The instruments shall be maintained in calibration and good working order. A calibration check shall be made of the system at the time of any sound level measurement. Measurements recorded shall be taken so as to provide a proper representation of the source of the sound. The microphone during measurement shall be positioned so as not to create any unnatural enhancement or diminution of the measured sound. A windscreen for the microphone shall be used at all times. However, a violation of this chapter may occur without the occasion of the measurements being made as otherwise provided.

2. The slow meter response of the sound level meter shall be used in order to best determine the average amplitude.

3. The measurement shall be made at any point on the property into which the sound is being transmitted and shall be made at least three feet away from any ground, wall, floor, ceiling, roof and other plane surface.

4. In case of multiple occupancy of a property, the measurement may be made at any point inside the premises to which any complainant has right of legal private occupancy; provided that the measurement shall not be made within three feet of any ground, wall, floor, ceiling, roof or other plane surface.

5. All measurements of sound provided for in this chapter will be made by qualified officials of the city who are designated by the city manager or designee to operate the apparatus used to make the measurements.

B. Assessment Without Sound Level Meter. Any police officer, code enforcement officer, or other official designated by the city manager or designee who hears a noise or sound that is plainly audible, as defined in Section 11.80.020, in violation of this chapter, may enforce this chapter and shall assess the noise or sound according to the following standards:

1. The primary means of detection shall be by means of the official’s normal hearing faculties, not artificially enhanced.
2. The official shall first attempt to have a direct line of sight and hearing to the vehicle or real property from which the sound or noise emanates so that the official can readily identify the offending source of the sound or noise and the distance involved. If the official is unable to have a direct line of sight and hearing to the vehicle or real property from which the sound or noise emanates, then the official shall confirm the source of the sound or noise by approaching the suspected vehicle or real property until the official is able to obtain a direct line of sight and hearing, and confirm the source of the sound or noise that was heard at the place of the original assessment of the sound or noise.

3. The official need not be required to identify song titles, artists, or lyrics in order to establish a violation. (Ord. 740 § 1.2, 2007)

11.80.060 Violation.

A. Violation of Sound Level Limits. Any person violating any of the provisions of this chapter shall be deemed guilty of a misdemeanor, and upon conviction thereof shall be punishable by a fine not to exceed one thousand dollars ($1,000.00) and/or six months in the county jail, or both. Notwithstanding the foregoing, any violation of the provisions of this chapter may, in the discretion of the citing officer or the city attorney, be cited and/or prosecuted as an infraction or be subject to civil citation pursuant to Chapter 1.10.

B. Joint and Several Responsibility. In addition to the person causing the offending sound, the owner, tenant or lessee of property, or a manager, overseer or agent, or any other person lawfully entitled to possess the property from which the offending sound is emitted at the time the offending sound is emitted, shall be responsible for compliance with this chapter if the additionally responsible party knows or should have known of the offending noise disturbance. It shall not be a lawful defense to assert that some other person caused the sound. The lawful possessor or operator of the premises shall be responsible for operating or maintaining the premises in compliance with this chapter and may be cited regardless of whether or not the person actually causing the sound is also cited.

C. Violation May be Declared a Public Nuisance. The operation or maintenance of any device, equipment, instrument, vehicle or machinery in violation of any provisions of this chapter which endangers the public health, safety and quality of life of residents in the area is declared to be a public nuisance, and may be subject to abatement summarily or by a restraining order or injunction issued by a court of competent jurisdiction. (Ord. 824 § 1.2, 2011; Ord. 740 § 1.2, 2007)