Eilar Associates, Inc.
*Acoustical and Environmental Consulting Services*

# Acoustical Analysis Report for Arrow Plaza

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**Job # S220104**

**June 6, 2022**

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# 1.0 Executive Summary

The proposed project, known as Arrow Plaza, consists of the construction of a five-story hotel, fast food restaurant with drive-through, convenience store, and gas station on a 2.71-acre lot. The project site is located at 18497 Valley Boulevard in the unincorporated community of Bloomington, County of San Bernardino, California.

Noise impacts from the anticipated HVAC and drive-through intercom equipment has been calculated to determine noise levels at off-site receivers. Calculations show that noise levels from the mechanical equipment will be in compliance with the County of San Bernardino noise regulations for both daytime and nighttime hours found within the Municipal Code. No project design features are deemed necessary to control project-generated noise levels from project operations. Project-generated traffic noise is also expected to be less than significant.

Although construction noise is exempt from the noise limits of the County of San Bernardino Municipal Code, noise levels from temporary construction activities associated with this project are expected to comply with the generally accepted construction noise limits at all surrounding property lines, with activity limited to the daytime hours of 7 a.m. to 7 p.m. during all phases of construction. Construction is prohibited between the hours of 7 p.m. and 7 a.m. and on Sundays or federal holidays. Though it is not required by regulations, the general good practice construction noise control methods listed herein should be followed, as a courtesy to surrounding properties.

The proposed project is not expected to result in any potentially significant noise impacts by the standards of the California Environmental Quality Act (CEQA). Noise impacts are summarized in Section 5.3.

# 2.0 Introduction

This acoustical analysis report is submitted to satisfy the noise requirements of the County of San Bernardino. Its purpose is to assess noise levels from potential project-related noise sources, such as mechanical equipment and project-generated traffic, as well as temporary construction noise. This analysis aims to determine if additional project design features are necessary and feasible to reduce these noise levels to comply with the applicable noise regulations of the County of San Bernardino Municipal Code. Potential noise impacts will also be assessed for significance per the California Environmental Quality Act (CEQA).

All noise level or sound level values presented herein are expressed in terms of decibels (dB), with A-weighting, abbreviated "dBA," to approximate the hearing sensitivity of humans. Time-averaged noise levels are expressed by the symbol "$L_{EQ}$." Unless a different time period is specified, "$L_{EQ}$" implies a period of one hour.

Sound pressure is the actual noise experienced by a human or registered by a sound level instrument. When sound pressure is used to describe a noise source, the distance from the noise source must be specified in order to provide complete information. Sound power, on the other hand, is a specialized analytical metric to provide information without the distance requirement, but it may be used to calculate the sound pressure at any desired distance.

## 2.1 Project Description

The proposed project, known as Arrow Plaza, consists of the construction of a five-story hotel, fast food restaurant with drive-through, convenience store, and gas station on a 2.71-acre lot. The convenience store is anticipated to be 2,400 square feet, and the fast food restaurant will be 2,500 square feet. The hotel footprint will be 12,517 square feet, and the building will contain 86 guest rooms. The hours of operation of the various

uses on site are currently unknown but are assumed to be 24 hours a day for a worst-case analysis of noise impacts. For additional project details, please refer to the project plans provided in Appendix A.

The project site is surrounded by commercial uses to the north (across Valley Boulevard), south, and east (across Linden Avenue). The parcel located immediately to the west of the site is vacant, with single-family residential uses beyond the vacant parcel. The vacant parcel to the west is zoned VC/BE (Valley Corridor Bloomington Enterprise) and as such has been evaluated as a commercial land use.

### 2.2 Project Location

The project site is located at 18497 Valley Boulevard in the unincorporated community of Bloomington, County of San Bernardino, California. The Assessor's Parcel Numbers (APNs) are 0252-161-43 and 0252-161-45. The site is currently vacant. For a graphical representation of the site, please refer to the Vicinity Map, Assessor's Parcel Map, Satellite Aerial Photograph, and Topographic Map, provided as Figures 1 through 4, respectively.

### 2.3 Applicable Noise Regulations

This acoustical report is submitted to satisfy the acoustical requirements of the County of San Bernardino Municipal Code. The Municipal Code regulates noise generated by the project to the receiving land uses.

The County of San Bernardino Municipal Code, Section 83.01.080, specifies noise limits based on the land use of the properties in question. Noise levels have been evaluated at the nearest noise-sensitive receivers beyond adjacent roadways and sidewalks. The Municipal Code states that noise standards for residential properties are 45 dBA between the hours of 10 p.m. and 7 a.m. and 55 dBA between the hours of 7 a.m. and 10 p.m. Noise standards for professional services and other commercial properties are 55 dBA and 60 dBA at all times, respectively. As the proposed hours of operation are currently unknown, it is assumed that the site will operate 24 hours a day, and as such, the site would be required to meet the nighttime noise limits at residential properties.

The County of San Bernardino Municipal Code also contains general requirements for temporary construction noise impacts. The County of San Bernardino prohibits construction activity after 7 p.m. and before 7 a.m. and on Sundays and federal holidays. During permissible hours of operation, the County of San Bernardino does not have a noise limit with which construction noise must comply; however, an eight-hour average noise level of 75 dBA is a commonly used construction noise threshold that was applied to this project.

Pertinent sections of the County of San Bernardino Municipal Code are provided as Appendix B.

## 3.0 Environmental Setting

### 3.1 Existing Noise Environment

An on-site inspection and long-term noise measurement were made beginning the afternoon of Thursday, January 20, 2022 and running through the afternoon of Friday, January 21, 2022. The purpose of the measurements was to obtain noise information for the site. The noise measurement performed is expected to be representative of the typical noise exposure at the site and encompasses the primary source of noise, which is traffic noise. The noise meter was placed near the northeast corner of the project site at approximately 100 feet south of the Valley Boulevard centerline and approximately 65 feet east of the Linden Avenue centerline; the meter was at a height of approximately four feet above ground level, where it was placed in a bush for security purposes. Noise data obtained on site is shown in Table 1, and the measurement location is shown graphically in Figure 3.

| Table 1. Long-Term Measured Noise Levels on Site | | |
|---|---|---|
| **Date** | **Time** | **Hourly Average Noise Level (dBA $L_{EQ}$)** |
| January 20, 2022 | 2 p.m. – 3 p.m. | 70.8 |
| | 3 p.m. – 4 p.m. | 68.9 |
| | 4 p.m. – 5 p.m. | 70.0 |
| | 5 p.m. – 6 p.m. | 68.8 |
| | 6 p.m. – 7 p.m. | 68.4 |
| | 7 p.m. – 8 p.m. | 66.6 |
| | 8 p.m. – 9 p.m. | 68.4 |
| | 9 p.m. – 10 p.m. | 69.5 |
| | 10 p.m. – 11 p.m. | 65.8 |
| | 11 p.m. – 12 a.m. | 65.9 |
| January 21, 2022 | 12 a.m. – 1 a.m. | 63.6 |
| | 1 a.m. – 2 a.m. | 66.1 |
| | 2 a.m. – 3 a.m. | 65.2 |
| | 3 a.m. – 4 a.m. | 66.5 |
| | 4 a.m. – 5 a.m. | 67.3 |
| | 5 a.m. – 6 a.m. | 69.2 |
| | 6 a.m. – 7 a.m. | 69.5 |
| | 7 a.m. – 8 a.m. | 69.2 |
| | 8 a.m. – 9 a.m. | 67.4 |
| | 9 a.m. – 10 a.m. | 68.3 |
| | 10 a.m. – 11 a.m. | 67.6 |
| | 11 a.m. – 12 p.m. | 67.5 |
| | 12 p.m. – 1 p.m. | 68.9 |
| | 1 p.m. – 2 p.m. | 68.9 |

Measured noise levels were observed to range from a minimum of 63.6 dBA between the hours of 12 a.m. and 1 a.m. on January 21, 2022 to a maximum of 70.8 dBA between 2 p.m. and 3 p.m. on January 20, 2022.

## 3.2 Future Noise Environment

### 3.2.1 Operational Noise Sources

The future noise environment in the vicinity of the project site will be primarily a result of the same ambient noise sources, as well as the noise generated by activity on the project site. The primary sources of noise associated with the project site will be the proposed drive-through intercom equipment, rooftop HVAC equipment on both buildings, and wall-mounted PTAC units at the hotel.

The proposed drive-through intercom is expected to be equivalent or similar to a model manufactured by HME. The HME Intercom System is documented to have a maximum noise level of 84 dBA at one foot from the speaker post.

Commercial HVAC units will be another source of noise at the site. Although exact equipment has not been selected at this time, it is assumed that two 5-ton packaged HVAC units will be roof-mounted on the convenience store/restaurant building and five 5-ton units will be roof-mounted on the hotel building. Equipment is assumed to be similar to the Carrier 48GC06. The sound power level for the unit is shown to be 79 dBA.

It is assumed that hotel rooms on site will be serviced by wall-mounted PTAC units. The 85 PTAC units were evaluated as Amana units, which produce a sound power level of 61.2 dBA. Units were placed around the perimeter of the hotel building on each floor.

For manufacturer data sheets for evaluated equipment, please refer to Appendix C.

### 3.2.2 Project-Generated Traffic

A Traffic Analysis conducted by Mizuta Traffic Consulting shows traffic volumes generated by the proposed project and the distribution of these trips on surrounding roadways. The impacts of project-generated traffic noise have been assessed using these trip generation values and the existing traffic volumes for surrounding roadways. Project traffic volumes and the analysis of project-generated traffic noise is provided in Section 5.1.2.

### 3.2.3 Temporary Construction Equipment

In order to evaluate anticipated temporary construction noise levels, typical assumptions have been made regarding stages of construction and equipment to be used. The equipment listed in Table 2 is typical of what is expected to be used on site based on information provided and professional experience. Unless otherwise noted, all noise levels have been provided by the UK Department for Environment, Food and Rural Affairs (DEFRA) (see reference). Duty cycle information was taken from the Federal Highway Administration.

| Table 2. Anticipated Construction Stages and Equipment Noise Levels | | | |
|---|---|---|---|
| **Construction Stage** | **Equipment** | **Duty Cycle (%)** | **Noise Level, at 50 feet (dBA)** |
| Utilities and Grading | Excavator[1] | 40 | 75 |
| | Backhoe[1] | 40 | 74 |
| | Water Truck[1] | 40 | 77 |
| | Skip Loader | 40 | 72 |
| Foundation | Concrete Mixer Truck | 40 | 76 |
| | Concrete Pump Truck | 20 | 74 |
| Paving | Paver | 50 | 71 |
| | Roller | 20 | 69 |
| | Dump Truck | 40 | 74 |
| Framing | Crane | 16 | 66 |
| | Telescopic Forklift[1] | 40 | 74 |
| | Skip Loader | 40 | 72 |

[1]Source: Noise measurements made by Eilar Associates on 3/25/2010 for Brutoco Engineering & Construction, Inc. for the Orange Line Extension Project, Metro Contract #C0943, City of Los Angeles.

These noise levels have been incorporated into the temporary construction noise analysis for the site, provided in Section 5.2.

# 4.0 Methodology and Equipment

## 4.1 Methodology

### 4.1.1 CadnaA Noise Modeling Software

Modeling of the outdoor noise environment is accomplished using CadnaA Version 2021, which is a model-based computer program developed by DataKustik for predicting noise levels in a wide variety of conditions. CadnaA (Computer Aided Noise Abatement) assists in the calculation, presentation, assessment, and alleviation of noise exposure. It allows for the input of project information such as noise source data, barriers, structures, and topography to create a detailed model and uses the most up-to-date calculation standards to predict outdoor noise levels. Noise standards used by CadnaA that are particularly relevant to this analysis include ISO 9613 (Attenuation of sound during propagation outdoors). CadnaA provides results that are in line with basic acoustical calculations for distance attenuation and barrier insertion loss.

### 4.1.2 Formulas and Calculations

*Decibel Addition*

To determine the combined logarithmic noise level of two known noise source levels, the values are converted to the base values, added together, and then converted back to the final logarithmic value, using the following formula:

$$L_C = 10\log(10^{L1/10} + 10^{L2/10} + 10^{LN/10})$$

where $L_C$ = the combined noise level (dB), and
$L_N$ = the individual noise sources (dB).

This procedure is also valid when used successively for each added noise source beyond the first two. The reverse procedure can be used to estimate the contribution of one source when the contribution of another concurrent source is known and the combined noise level is known. These methods can be used for $L_{EQ}$ or other metrics (such as $L_{DN}$ or CNEL), as long as the same metric is used for all components.

*Project-Generated Traffic Noise Impacts*

Changes in traffic noise levels can be predicted by inputting the ratio of the two scenarios into the following logarithmic equation:

$$\Delta = 10\log(V2/V1)$$

where: Δ= Change in sound energy,
V1 = original or existing traffic volume, and
V2 = future or cumulative traffic volume.

*Construction Vibration Calculations*

The construction vibration assessment contained herein is evaluated using calculations of peak particle velocity (PPV). PPV at receivers is calculated as follows:

$$PPV_{equip} = PPV_{ref} \times (25/D)^{1.5}$$

where $PPV_{equip}$ is the peak particle velocity (in inches per second) of the equipment, adjusted for distance, $PPV_{ref}$ is the reference vibration level (in inches per second) at a distance of 25 feet from the equipment, and D is the distance from the equipment to the receiver.

## 4.2 Measurement Equipment

Some or all of the following equipment was used at the site to measure existing noise levels:

- Soft dB Model Piccolo II Type 2 Sound Level Meter, Serial # P0220043008
- Larson Davis Model CA200 Type 1 Calibrator, Serial # 16454

The sound level meter was field-calibrated immediately prior to the noise measurement and checked afterward to ensure accuracy. All sound level measurements presented in this report, in accordance with the regulations, were conducted using a sound level meter that conforms to the American National Standards Institute

specifications for sound level meters (ANSI S1.4). All instruments are maintained with National Institute of Standards and Technology (NIST) traceable calibration, per the manufacturers' standards.

# 5.0 Noise Levels

## 5.1 Permanent Project-Related Noise Levels

### 5.1.1 Operational Noise Impacts

Noise levels of the proposed drive-through intercom, rooftop HVAC equipment, and PTAC units were calculated using CadnaA at the nearest surrounding property lines around the project site. The vacant property to the west was evaluated as a commercial site with professional services, for a worst-case analysis. All other noise-sensitive receivers are located at a further distance from the equipment, and therefore are expected to have lower noise levels, due to distance attenuation and shielding from intervening structures. As per industry standard, the receivers were calculated at a height of five feet above project grade to represent the height of an average individual's ears above ground level.

This calculation also makes conservative assumptions in that it was assumed that the intercom equipment would be in constant operation, with no breaks between orders, while in actuality, it will only operate for a fraction of an hour, thereby resulting in lower average hourly noise impacts than what have been calculated. Additionally, rooftop HVAC equipment and PTAC units were modeled as running constantly, though all are expected to cycle on and off throughout the day. This analysis considers noise shielding provided by the proposed on-site buildings. Results of the analysis are shown in Table 3. Noise contours showing equipment noise levels and receiver locations are shown in Figure 5. Additional information can be found in Appendix D: CadnaA Analysis Data and Results.

**Table 3. Project-Related Operational Noise Levels**

| Receiver | Description | Noise Limit (dBA) | Noise Level (dBA) |
|---|---|---|---|
| R1 | North Property Line | 60 | 39.4 |
| R2 | South Property Line | 60 | 48.1 |
| R3 | East Property Line | 60 | 35.7 |
| R4 | West Property Line (North) | 55 | 38.1 |
| R5 | West Property Line (South) | 55 | 36.1 |
| R6 | West Residential (North) | 45 | 35.2 |
| R7 | West Residential (South) | 45 | 32.9 |

As shown above, noise levels at adjacent property lines are anticipated to comply with the applicable noise limits of the County of San Bernardino with the project as currently designed. For these reasons, no additional project design features are deemed necessary to reduce noise levels from operational noise sources.

### 5.1.2 Project-Generated Traffic Noise

As detailed in Section 3.2.2, average daily project-generated traffic impacts were evaluated to determine whether noise impacts from the project site would be significant. Calculations were performed to determine the approximate change in daily noise exposure at off-site receivers adjacent to roadways that serve the project site. A significant direct impact occurs when project traffic combines with existing traffic and causes a doubling of sound energy, which is an increase of 3 dB. Direct impacts were assessed by comparing existing traffic volumes to existing plus project traffic volumes using the calculation methodology shown in Section 4.1.2. Project-generated traffic noise increases are shown in Table 4.

**Table 4. Anticipated Traffic Noise Increases with Project-Generated Traffic**

| Roadway | Traffic Volume (ADT) | | | Sound Level Increase (dB) |
|---|---|---|---|---|
| | Existing | Project | Existing Plus Project | |
| Valley Boulevard | 17,429 | 475 | 17,904 | 0.1 |
| Linden Avenue | 2,468 | 68 | 2,536 | 0.1 |

As shown in Table 4, the noise level increase from project-generated traffic is expected to be less than 3 dB at all off-site receivers adjacent to roadways that serve the project site. For this reason, project-generated traffic noise levels are expected to be less than significant.

## 5.2 Temporary Construction Noise Levels

The County of San Bernardino Municipal Code also contains general requirements for temporary construction noise impacts. The County of San Bernardino prohibits construction activity after 7 p.m. and before 7 a.m. and on Sundays and federal holidays. During permissible hours of operation, the County of San Bernardino does not have a noise limit with which construction noise must comply; however, an eight-hour average noise level of 75 dBA is a commonly used construction noise threshold that was applied to this project.

Noise levels were calculated at occupied receivers to the north, south, east, and west. Any other off-site receivers are located at a greater distance from the project site and therefore would be exposed to lesser noise levels. All construction noise sources were evaluated as point sources moving around an area to account for average noise levels at off-site receivers as equipment moves around the property. Equipment noise calculations consider typical duty cycles of equipment to account for periods of activity and inactivity on the site.

Calculated noise levels for construction equipment are shown in Table 5. Graphical representations of noise contour and receiver locations are shown in Figures 6 through 9. Please refer to Appendix D for additional information.

| Table 5. Temporary Construction Noise Levels at Neighboring Properties | | |
|---|---|---|
| **Stage** | **Receiver Location** | **8-Hour Average Noise Level (dBA)** |
| Utilities and Grading | R8 (North Property Line) | 61.6 |
| | R9 (South Property Line) | 70.1 |
| | R10 (East Property Line) | 63.9 |
| | R11 (West Residential) | 62.8 |
| Foundation | R8 (North Property Line) | 53.8 |
| | R9 (South Property Line) | 62.4 |
| | R10 (East Property Line) | 56.1 |
| | R11 (West Residential) | 55.0 |
| Paving | R8 (North Property Line) | 57.3 |
| | R9 (South Property Line) | 65.9 |
| | R10 (East Property Line) | 59.7 |
| | R11 (West Residential) | 58.6 |
| Framing | R8 (North Property Line) | 57.4 |
| | R9 (South Property Line) | 65.9 |
| | R10 (East Property Line) | 59.7 |
| | R11 (West Residential) | 58.6 |

As shown in Table 5, based on the typical noise levels and duty cycles of construction equipment, average noise levels of construction equipment are anticipated to remain below an eight-hour average of 75 dBA at all surrounding occupied property lines. Any other residential or commercial properties are located at a greater distance from on-site activity and therefore would be exposed to lesser noise levels.

Despite the fact that noise levels are expected to remain in compliance with generally accepted construction noise limits, the following "good practice" measures should still be practiced as a courtesy to residential neighbors, wherever feasible:

1. Staging areas should be placed as far as possible from residential receivers.

2. Locate stationary equipment in locations as far as feasible from nearby sensitive receivers.

3. Turn off equipment when not in use.

4. Limit the use of enunciators or public address systems, except for emergency notifications.

5. Equipment used in construction should be maintained in proper operating condition, and all loads should be properly secured, to prevent rattling and banging.

6. Schedule work to avoid simultaneous construction activities that both generate high noise levels.

7. Use equipment with effective mufflers.

8. Minimize the use of backup alarms.

With operating hours limited to those permitted by the County of San Bernardino, temporary construction noise levels are expected to be less than significant at surrounding properties.

## 5.3 CEQA Significance Determination

Noise impacts from the project site are summarized below and classified per the noise portion of the CEQA Environmental Checklist form. This list summarizes conclusions made within the report and classifies the level of significance as: Potentially Significant Impact, Less than Significant with Mitigation Incorporated, Less than Significant Impact, or No Impact. *Italics* are used to denote language from the CEQA Environmental Checklist form.

*XII. NOISE—Would the project result in:*

*a) Generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?*

**Less Than Significant Impact.** Operational noise impacts calculated in Section 5.1.1 are not expected to generate a substantial permanent increase in ambient noise levels in the vicinity of the project site and would comply with the noise limits of the County of San Bernardino Municipal Code. The impact of permanent project-related noise sources would therefore be less than significant.

Additionally, as demonstrated in Section 5.1.2 of this report, noise impacts from project-generated traffic are not expected to cause a significant direct increase on any surrounding roadway. This impact is also considered to be less than significant.

As shown in Section 5.2 of this report, noise from temporary construction is expected to be less than significant considering a typical construction schedule. Noise impacts from anticipated construction activity are expected to remain below generally accepted construction noise limits. Additionally, no construction activity will take place during the more sensitive nighttime hours when ambient noise levels tend to be lower, as per County of San Bernardino requirements. For these reasons, this impact is deemed to be less than significant.

As demonstrated above, the project is not expected to cause a substantial permanent or temporary increase in ambient noise levels, and therefore, this impact can be classified as less than significant.

*b) Generation of excessive groundborne vibration or groundborne noise levels?*

**Less Than Significant Impact.** The paving stage of construction has the potential to generate the highest vibration levels of the phases, as paving activities would take place closest to commercial receivers and may consist of the use of a vibratory roller. According to the Federal Transit Administration Transit Noise and Vibration Assessment Manual (see reference), a vibratory roller generates a peak particle velocity (PPV) of approximately 0.210 inches/second at a distance of 25 feet from equipment. The evaluation of an impact's significance can be determined by reviewing both the likelihood of annoyance to individuals as well as the

potential for damage to existing structures. According to the Caltrans Transportation and Construction Vibration Guidance Manual (see reference), the appropriate threshold for damage to modern industrial or commercial structures is a PPV of 0.5 inches/second.

It is estimated that the nearest location to an existing structure would be approximately 25 feet from the nearest commercial structure, when the roller is used at the southern boundary of the site. At this distance, the PPV would be approximately 0.210 inches/second. This level of vibration falls below the building damage PPV criteria of 0.5 inches/second. It is the opinion of the undersigned that temporary construction vibration impacts would not be "excessive" and therefore are less than significant.

*c) For a project located within the vicinity of a private airstrip or an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels?*

**No Impact.** The project site is not located within an airport land use plan nor is it located within two miles of a private airstrip, public airport, or public use airport. Therefore, the proposed project would not expose people working or residing in the project area to excessive noise levels from such uses.

## 6.0 Conclusion

Noise impacts from the anticipated HVAC and drive-through intercom equipment has been calculated to determine noise levels at off-site receivers. Calculations show that noise levels from the mechanical equipment will be in compliance with the County of San Bernardino noise regulations for both daytime and nighttime hours found within the Municipal Code. No project design features are deemed necessary to control project-generated noise levels from project operations. Project-generated traffic noise is also expected to be less than significant.

Although construction noise is exempt from the noise limits of the County of San Bernardino Municipal Code, noise levels from temporary construction activities associated with this project are expected to comply with the generally accepted construction noise limits at all surrounding property lines, with activity limited to the daytime hours of 7 a.m. to 7 p.m. during all phases of construction. Construction is prohibited between the hours of 7 p.m. and 7 a.m. and on Sundays or federal holidays. Though it is not required by regulations, the general good practice construction noise control methods listed herein should be followed, as a courtesy to surrounding properties.

The proposed project is not expected to result in any potentially significant noise impacts by the standards of the California Environmental Quality Act (CEQA). Noise impacts are summarized in Section 5.3.

## 7.0 Certification

All recommendations for noise control are based on the best information available at the time our consulting services are provided. However, as there are many factors involved in sound transmission, and Eilar Associates has no control over the construction, workmanship or materials, Eilar Associates is specifically not liable for final results of any recommendations or implementation of the recommendations.

This report is based on the related project information received and measured noise levels and represents a true and factual analysis of the acoustical impact issues associated with the Arrow Plaza project, to be located in the unincorporated community of Bloomington, County of San Bernardino, California. This report was prepared by Rachael Cowell and Amy Hool.

Rachael S. Cowell, INCE
Acoustical Consultant

Amy Hool, INCE
President/CEO

## 8.0 References

County of San Bernardino Municipal Code, Section 83.01.080: Noise.

California Environmental Quality Act (CEQA), Statute and Guidelines, 2018.

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California Department of Transportation (Caltrans), Transportation and Construction Vibration Guidance Manual, September 2013.

Eilar Associates, Inc.
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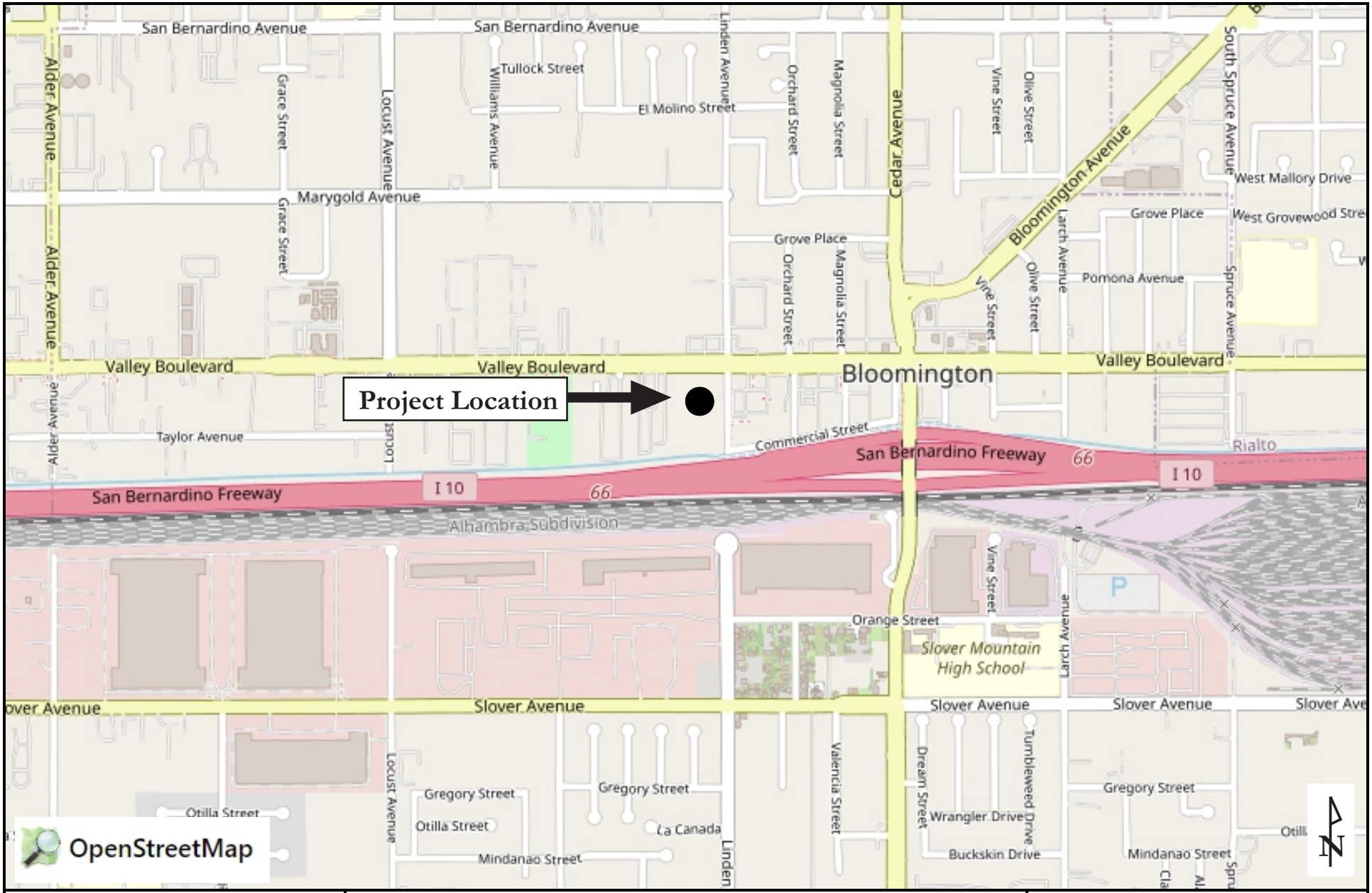
# Figures

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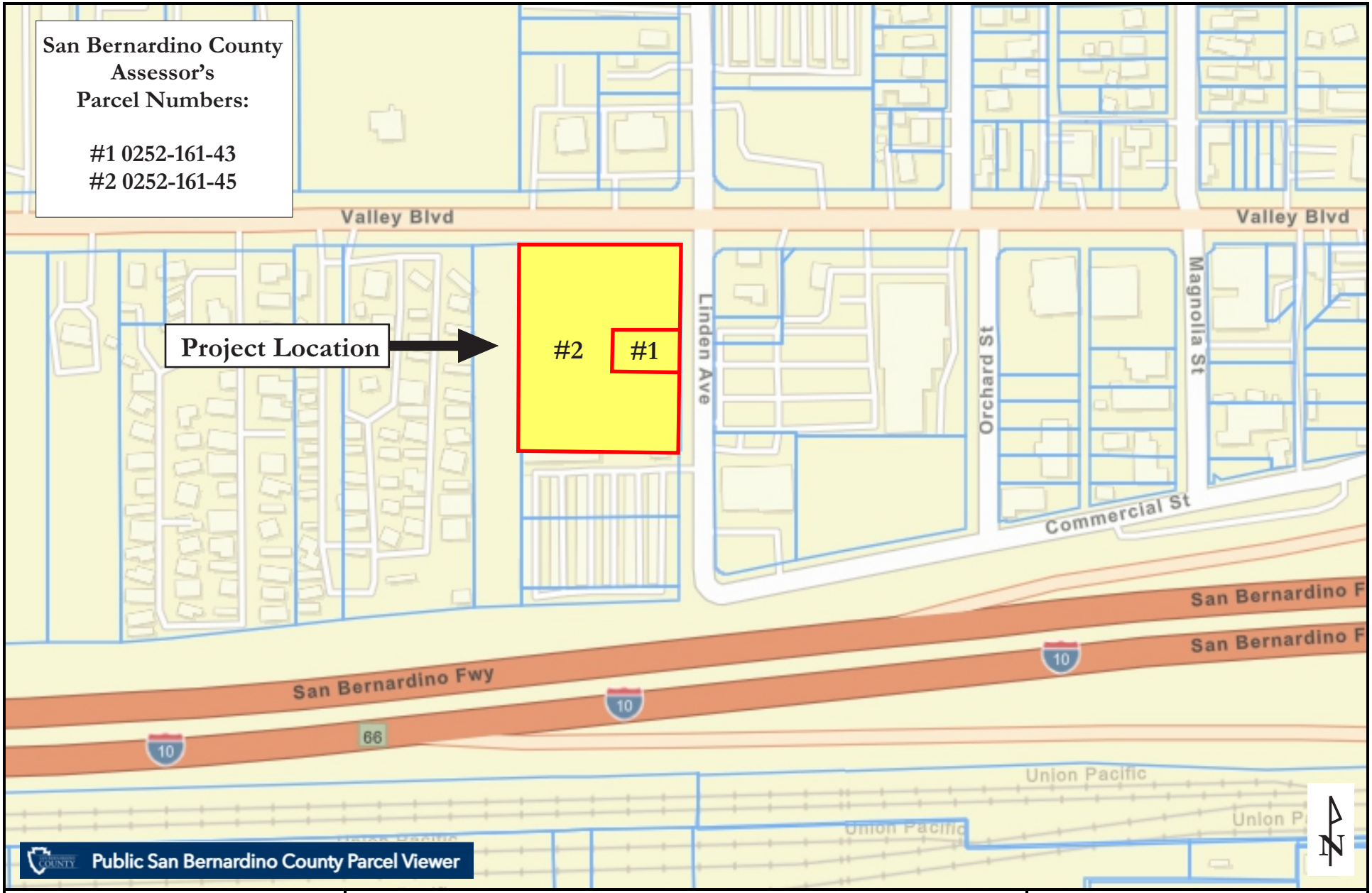
**Vicinity Map**
**Job # S220104**

**Figure 1**

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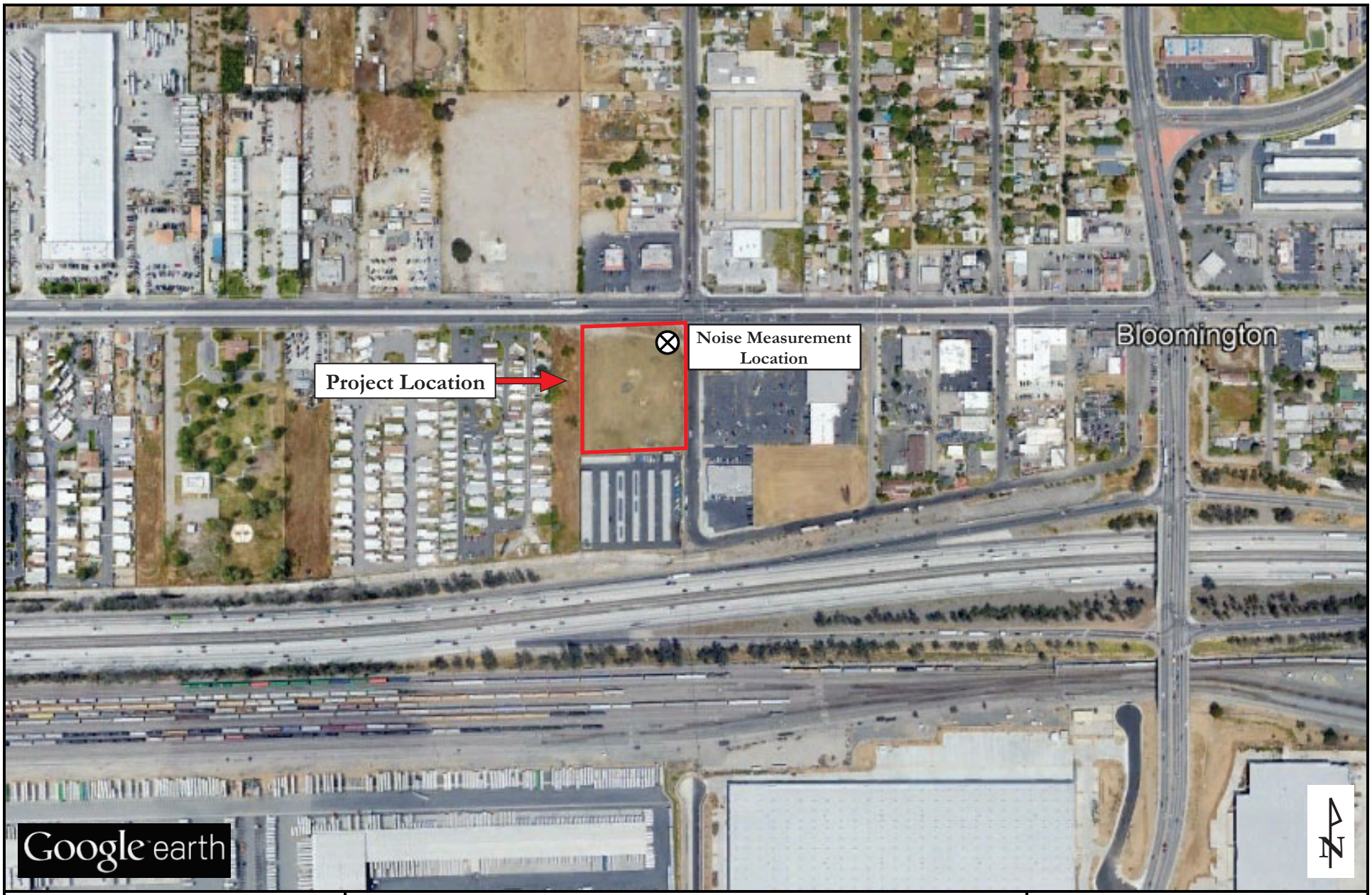
**Assessor's Parcel Map**
**Job # S220104**

**Figure 2**

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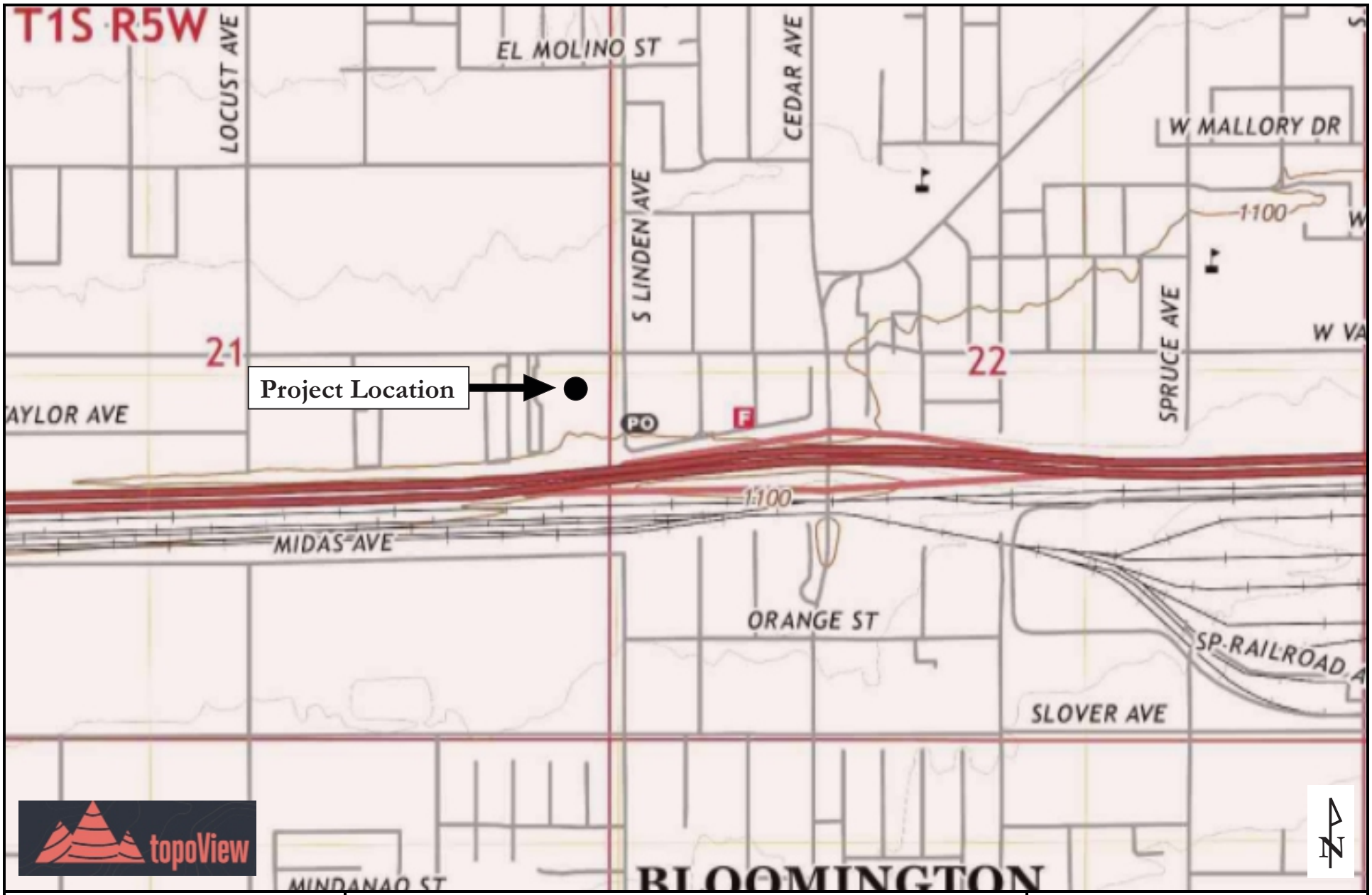
**Satellite Aerial Photograph Showing Noise Measurement Location**
**Job # S220104**

**Figure 3**

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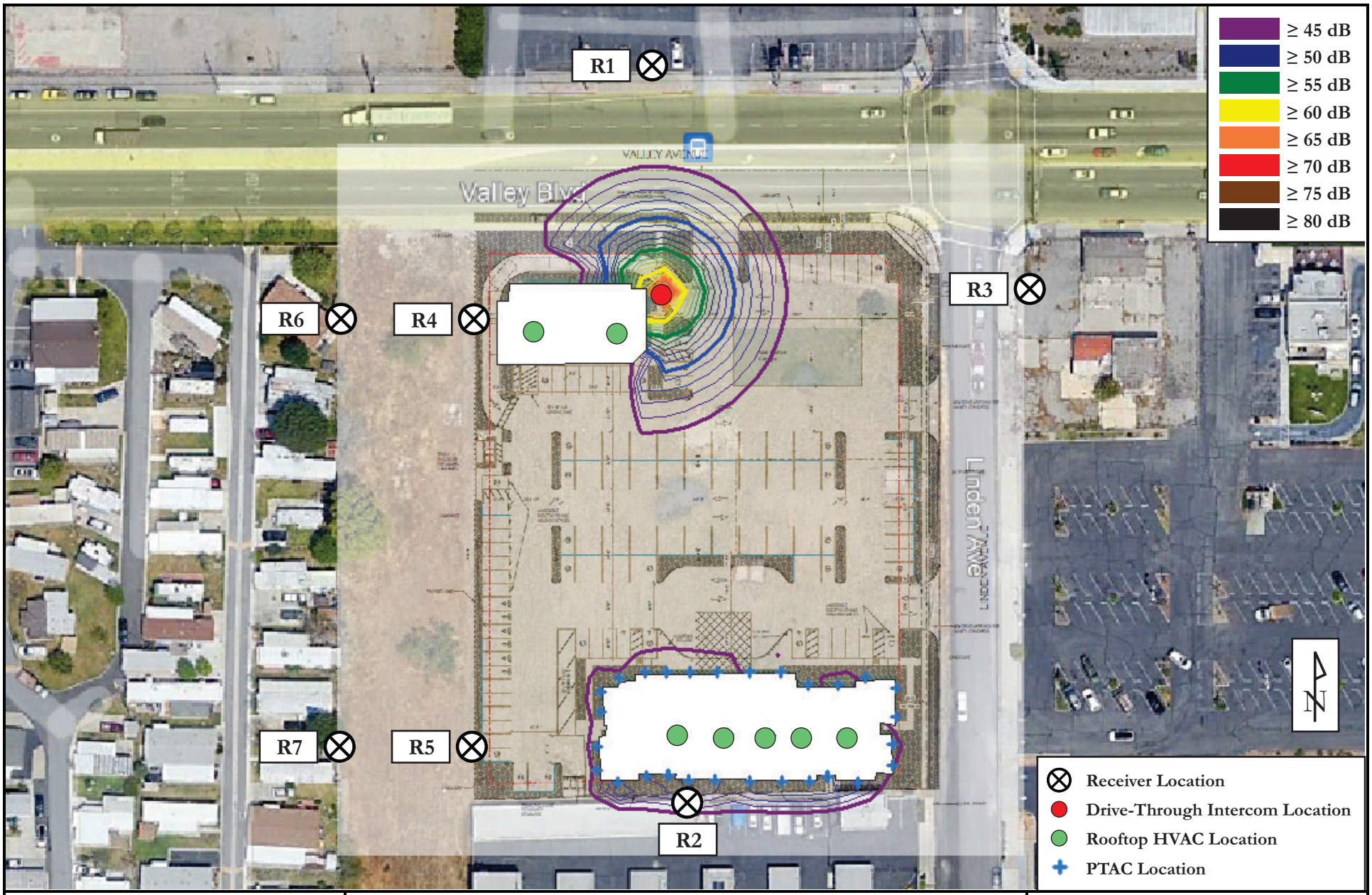
**Topographic Map**
**Job # S220104**

**Figure 4**

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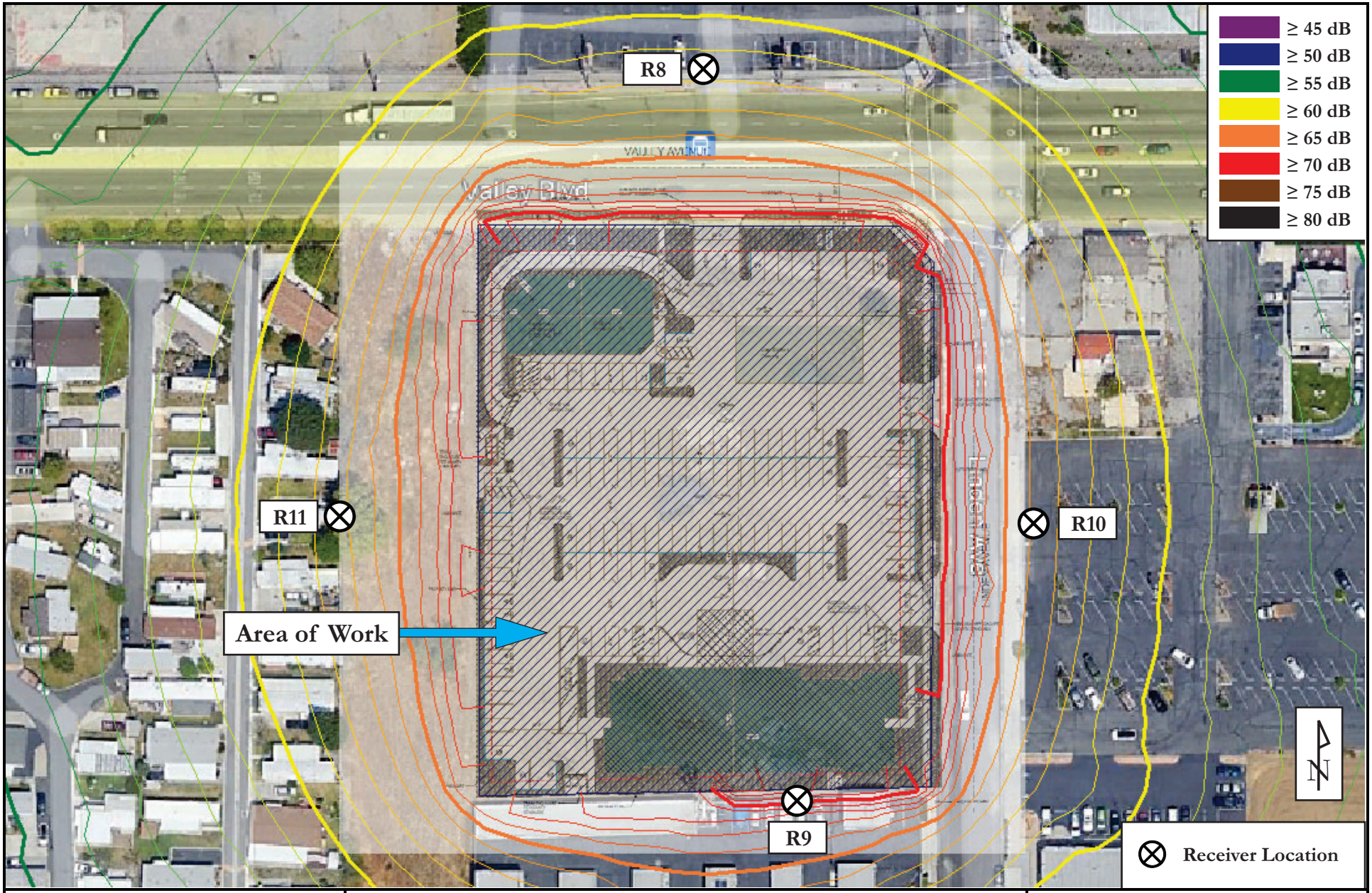
**Satellite Aerial Photograph Showing Operational Noise Contours and Receiver Locations**
**Job # S220104**

**Figure 5**

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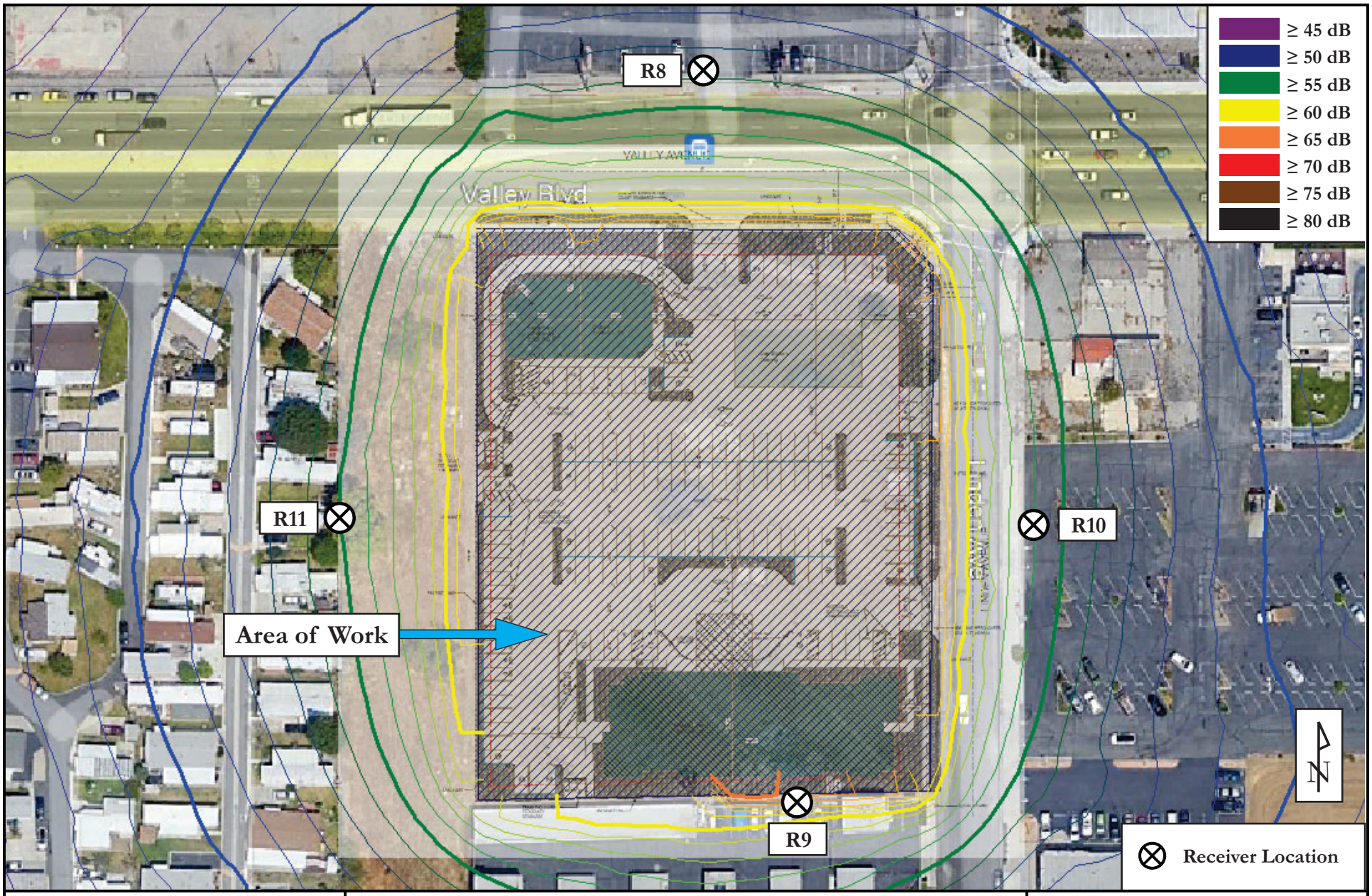
760-738-5570

**Satellite Aerial Photograph Showing Construction**
**Noise Contours and Receiver Locations - Utilities/Grading**
**Job # S220104**

**Figure 6**

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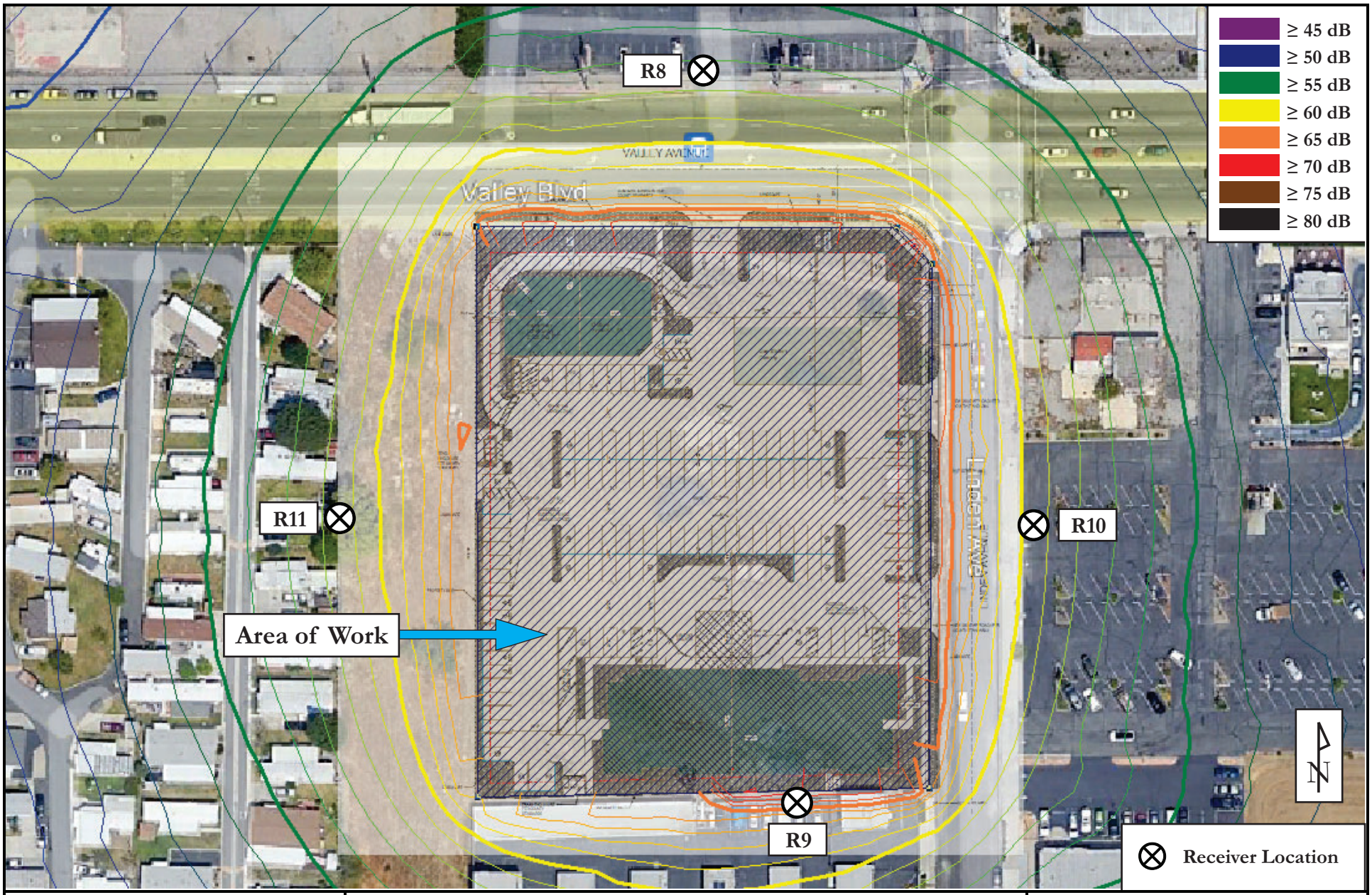
760-738-5570

**Satellite Aerial Photograph Showing Construction Noise Contours and Receiver Locations - Foundations**
**Job # S220104**

**Figure 7**

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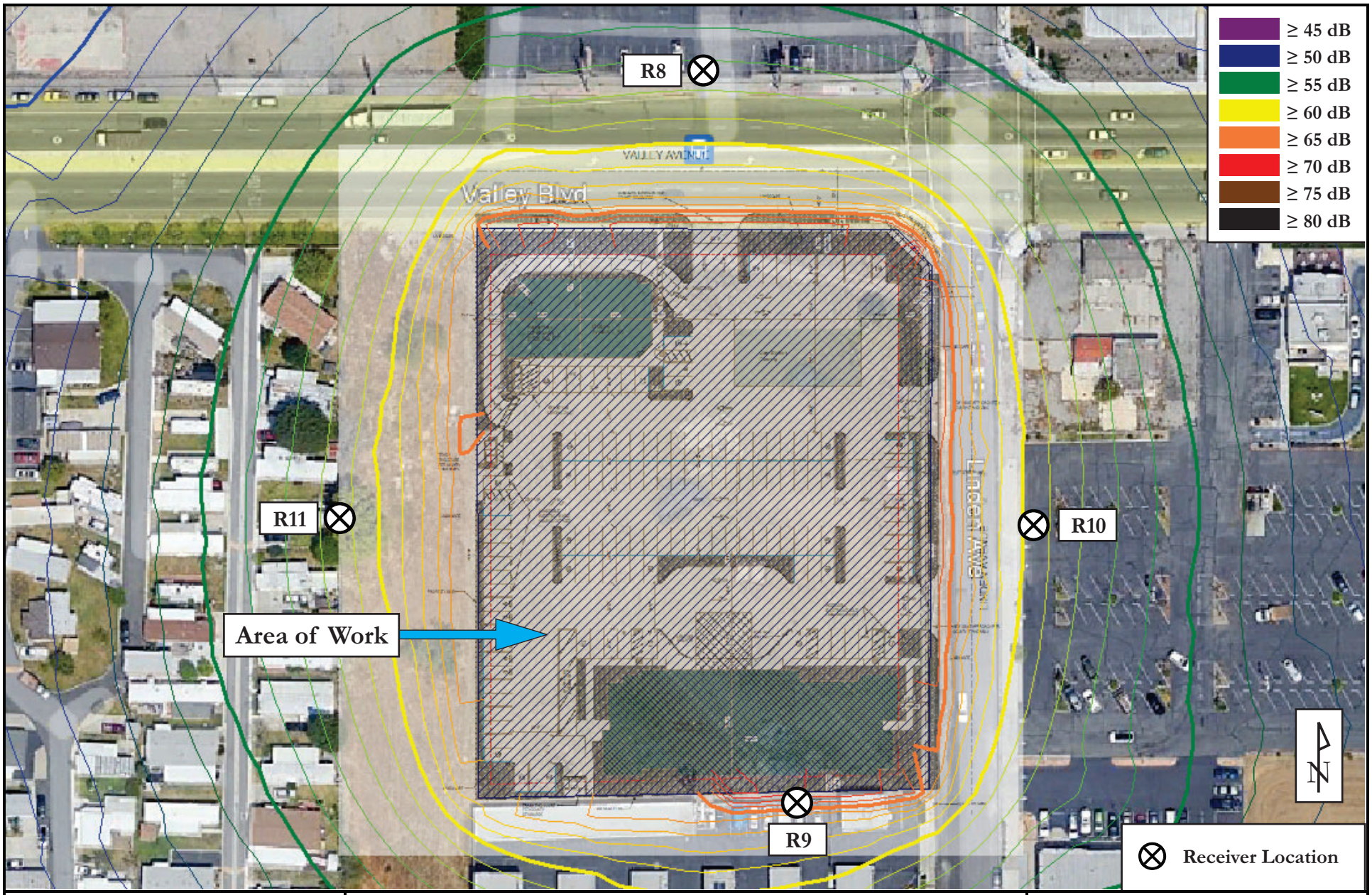
760-738-5570

**Satellite Aerial Photograph Showing Construction Noise Contours and Receiver Locations - Paving**
**Job # S220104**

**Figure 8**

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760-738-5570

**Satellite Aerial Photograph Showing Construction Noise Contours and Receiver Locations - Framing**
**Job # S220104**

**Figure 9**

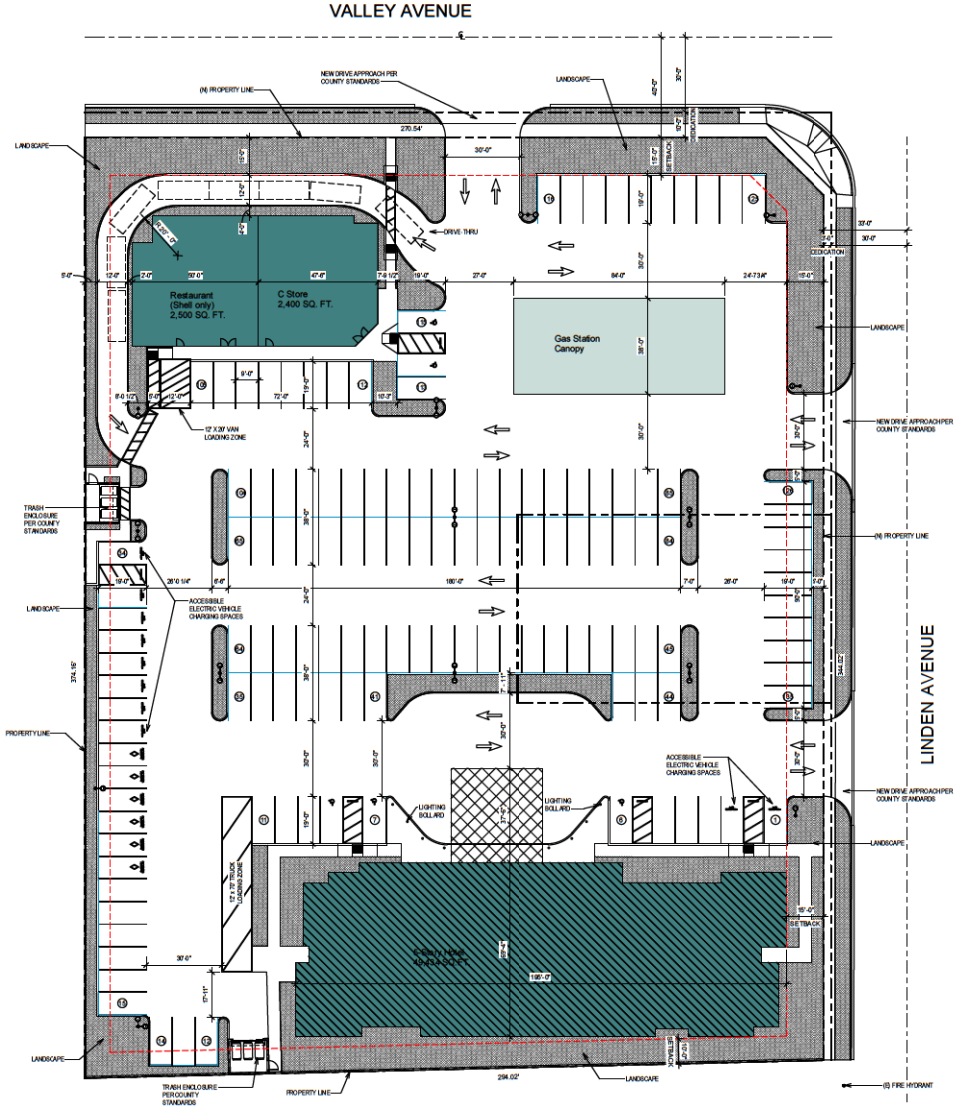
Eilar Associates, Inc.
Acoustical and Environmental Consulting Services

# Appendix A
Project Plans

*Proposed Hotel and Gas Station For:*

# *Arrow Plaza LLC*

*18497 Valley Blvd, Bloomington, CA 92316*




## *Site Plan*

*1" = 20'-0"*


ANDRESEN ARCHITECTURE INC.
17087 ORANGE WAY, FONTANA, CA 92335 (909) 355-6688


| | |
|---|---|
| **OWNER:** | ARROW PLAZA LLC |
| CONTACT: | SABER AWAD<br>saberawad3345@gmail.com<br>(909)519-3346 |
| **PROJECT ADDRESS:** | 18497 VALLEY BLVD,<br>BLOOMINGTON, CA 92316 |
| **ARCHITECT:** | ANDRESEN ARCHITECTURE INC.<br>17087 ORANGE WAY<br>FONTANA, CA 92335 |
| CONTACT: | (909) 355-6688<br>doug.andresen@aaifirm.com |
| **CIVIL:** | HP ENGINEERING, INC.<br>1465 CRESTVIEW ROAD<br>REDLANDS, CA 92374 |
| CONTACT: | HENRY POQUIZ<br>(909)335-8239<br>hcpoquiz@aol.com |
| **SOILS:**<br>CONTACT: | |
| **LANSCAPING:**<br>CONTACT: | |
| **APN:** | 0252-161-43,45 |
| **ZONING:** | VALLEY CORRIDOR COMMERCIAL DISTRICT (VC/COM) |
| **OCCUPANCY:** | HOTEL: A-2, R-1<br>RESTAURANT: A-2 |
| **CONSTRUCTION:** | TYPE V-A |
| **FIRE SPRINKLERS:** | REQUIRED |
| ***PROJECT DESCRIPTION:*** | CONSTRUCT 5-STORY HOTEL, FAST FOOD RESTAURANT WITH DRIVE-THRU, C-STORE AND GAS STATION ON VACANT LOT |

| | |
|---|---|
| **TOTAL LOT AREA:** | |
| APN: 0252-161-43 | 0.21 AC |
| APN: 0252-161-45 | 2.56 AC |
| GROSS LOT AREA: | 2.71 AC = 108,868 SQ. FT. |
| HOTEL FOOTPRINT AREA | 12,517 SQ. FT. |
| C- STORE FOOTPRINT AREA: | 2,400 SQ. FT. |
| RESTAURANT FOOTPRINT AREA: | 2,500 SQ. FT. |
| TOTAL FOOTPRINT AREA: | 17,417 SQ. FT. |
| NET LOT AREA: | 91,291 SQ. FT. |
| LOT COVERAGE: | 18.9% |
| FLOOR AREA RATIO: (2,400+2,500=49,434+54,334 SQ. FT.) | 0.50 |
| LANDSCAPE AREA | 17,737 SQ. FT. (16.3%) |
| HARDSCAPE AREA | 73,514 SQ. FT. (83.7%) |
| BUILDING HEIGHT: | 60 FEET / 5 STORIES |
| **HOTEL FLOOR AREA:** | |
| HOTEL GROSS LOT AREA | 49,434 SQ. FT. |
| FIRST FLOOR: | 12,517 SQ. FT. (10 ROOMS) |
| SECOND FLOOR: | 11,298 SQ. FT. (24 ROOMS) |
| THIRD FLOOR: | 11,298 SQ. FT. (24 ROOMS) |
| FOURTH FLOOR: | 11,298 SQ. FT. (24 ROOMS) |
| FIFTH FLOOR: | 3,038 SQ. FT. (4 SUITES) |
| **PARKING REQUIRED:** | |
| HOTEL (94 ROOMS X 1) | 94 STALLS |
| EMPLOYEES (10/01) | 15 STALLS |
| TOTAL HOTEL PARKING | 99 STALLS |
| RESTAURANT (2,500/100) | 25 STALLS |
| C-STORE @ 400/200 | 10 STALLS |
| TOTAL REQUIRED | 134 STALLS |
| TOTAL PARKING PROVIDED INCLUDING: | 135 STALLS<br>5 HANDICAP ACCESSIBLE SPACES<br>6 CLEAN AIR / VANPOOL / EV SPACES<br>10 EV CHARGING SPACES |

*Proposed Hotel and Gas Station For:*
*Arrow Plaza LLC*
*18497 Valley Blvd, Bloomington, CA 92316*

| | |
|---|---|
| *7 Jan. 2022* | |
| *21-4377* | |

LICENSED ARCHITECT — DOUG ANDRESEN — C-14504 — 6-30-23 — RENEWAL DATE — STATE OF CALIFORNIA

# *Site Plan*

**PL1**

Eilar Associates, Inc.
Acoustical and Environmental Consulting Services

# Appendix B

Applicable Noise Regulations

## § 83.01.080 Noise.

This Section establishes standards concerning acceptable noise levels for both noise-sensitive land uses and for noise-generating land uses.

(a) *Noise Measurement.* Noise shall be measured:

(1) At the property line of the nearest site that is occupied by, and/or zoned or designated to allow the development of noise-sensitive land uses;

(2) With a sound level meter that meets the standards of the American National Standards Institute (ANSI § SI4 1979, Type 1 or Type 2);

(3) Using the "A" weighted sound pressure level scale in decibels (ref. pressure = 20 micronewtons per meter squared). The unit of measure shall be designated as dB(A).

(b) *Noise Impacted Areas.* Areas within the County shall be designated as "noise-impacted" if exposed to existing or projected future exterior noise levels from mobile or stationary sources exceeding the standards listed in Subdivision (d) (Noise Standards for Stationary Noise Sources) and Subdivision (e) (Noise Standards for Adjacent Mobile Noise Sources), below. New development of residential or other noise-sensitive land uses shall not be allowed in noise-impacted areas unless effective mitigation measures are incorporated into the project design to reduce noise levels to these standards. Noise-sensitive land uses shall include residential uses, schools, hospitals, nursing homes, religious institutions, libraries, and similar uses.

(c) *Noise Standards for Stationary Noise Sources.*

(1) *Noise Standards.* Table 83-2 (Noise Standards for Stationary Noise Sources) describes the noise standard for emanations from a stationary noise source, as it affects adjacent properties:

***Table 83-2***

***Noise Standards for Stationary Noise Sources***

| ***Affected Land Uses (Receiving Noise)*** | ***7:00 a.m. - 10:00 p.m. Leq*** | ***10:00 p.m. - 7:00 a.m. Leq*** |
|---|---|---|
| Residential | 55 dB(A) | 45 dB(A) |
| Professional Services | 55 dB(A) | 55 dB(A) |
| Other Commercial | 60 dB(A) | 60 dB(A) |
| Industrial | 70 dB(A) | 70 dB(A) |

Leq = (Equivalent Energy Level). The sound level corresponding to a steady-state sound level containing the same total energy as a time-varying signal over a given sample period, typically one, eight or 24 hours.

dB(A) = (A-weighted Sound Pressure Level). The sound pressure level, in decibels, as measured on a sound level meter using the A-weighting filter network. The A-weighting filter de-emphasizes the very low and very high frequency components of the sound, placing greater emphasis on those frequencies within the sensitivity range of the human ear.

Ldn = (Day-Night Noise Level). The average equivalent A-weighted sound level during a 24-hour day obtained by adding 10 decibels to the hourly noise levels measured during the night (from 10:00 p.m. to 7:00 a.m.). In this way Ldn takes into account the lower tolerance of people for noise during nighttime periods.

(2) *Noise Limit Categories.* No person shall operate or cause to be operated a source of sound at a location or allow the creation of noise on property owned, leased, occupied, or otherwise controlled by the person, which causes the noise level, when measured on another property, either incorporated or unincorporated, to exceed any one of the following:

(A) The noise standard for the receiving land use as specified in Subdivision (b) (Noise-Impacted Areas), above, for a cumulative period of more than 30 minutes in any hour.

(B) The noise standard plus five dB(A) for a cumulative period of more than 15 minutes in any hour.

(C) The noise standard plus ten dB(A) for a cumulative period of more than five minutes in any hour.

(D) The noise standard plus 15 dB(A) for a cumulative period of more than one minute in any hour.

(E) The noise standard plus 20 dB(A) for any period of time.

(d) *Noise Standards for Adjacent Mobile Noise Sources.* Noise from mobile sources may affect adjacent properties adversely. When it does, the noise shall be mitigated for any new development to a level that shall not exceed the standards described in the following Table 83-3 (Noise Standards for Adjacent Mobile Noise Sources).

***Table 83-3***

***Noise Standards for Adjacent Mobile Noise Sources***

| ***Land Use*** | | ***Ldn (or CNEL) dB(A)*** | |
|---|---|---|---|
| ***Categories*** | ***Uses*** | ***Interior*** (1) | ***Exterior*** (2) |

***Table 83-3***

***Noise Standards for Adjacent Mobile Noise Sources***

| ***Land Use*** | | ***Ldn (or CNEL) dB(A)*** | |
|---|---|---|---|
| ***Categories*** | ***Uses*** | ***Interior*** (1) | ***Exterior*** (2) |
| Residential | Single and multi-family, duplex, mobile homes | 45 | 60(3) |
| Commercial | Hotel, motel, transient housing | 45 | 60(3) |
| | Commercial retail, bank, restaurant | 50 | N/A |
| | Office building, research and development, professional offices | 45 | 65 |
| | Amphitheater, concert hall, auditorium, movie theater | 45 | N/A |
| Institutional/Public | Hospital, nursing home, school classroom, religious institution, library | 45 | 65 |
| Open Space | Park | N/A | 65 |

**Notes:**

(1) The indoor environment shall exclude bathrooms, kitchens, toilets, closets and corridors.

(2) The outdoor environment shall be limited to:
- Hospital/office building patios
- Hotel and motel recreation areas
- Mobile home parks
- Multi-family private patios or balconies
- Park picnic areas
- Private yard of single-family dwellings
- School playgrounds

(3) An exterior noise level of up to 65 dB(A) (or CNEL) shall be allowed provided exterior noise levels have been substantially mitigated through a reasonable application of the best available noise reduction technology, and interior noise exposure does not exceed 45 dB(A) (or CNEL) with windows and doors closed. Requiring that windows and doors remain closed to achieve an acceptable interior noise level shall necessitate the use of air conditioning or mechanical ventilation.

CNEL = (Community Noise Equivalent Level). The average equivalent A-weighted sound level during a 24-hour day, obtained after addition of approximately five decibels to sound levels in the evening from 7:00 p.m. to 10:00 p.m. and ten decibels to sound levels in the night from 10:00 p.m. to 7:00 a.m.

(e) *Increases in Allowable Noise Levels.* If the measured ambient level exceeds any of the first four noise limit categories in Subdivision (d)(2), above, the allowable noise exposure standard shall be increased to reflect the ambient noise level. If the ambient noise level exceeds the fifth noise limit category in Subdivision (d)(2), above, the maximum allowable noise level under this category shall be increased to reflect the maximum ambient noise level.

(f) *Reductions in Allowable Noise Levels.* If the alleged offense consists entirely of impact noise or simple tone noise, each of the noise levels in Table 83-2 (Noise Standards for Stationary Noise Sources) shall be reduced by five dB(A).

(g) *Exempt Noise.* The following sources of noise shall be exempt from the regulations of this Section:

(1) Motor vehicles not under the control of the commercial or industrial use.

(2) Emergency equipment, vehicles, and devices.

(3) Temporary construction, maintenance, repair, or demolition activities between 7:00 a.m. and 7:00 p.m., except Sundays and Federal holidays.

(h) *Noise Standards for Other Structures.* All other structures shall be sound attenuated against the combined input of all present and projected exterior noise to not exceed the criteria.

| ***Table 83-4*** | |
|---|---|
| ***Noise Standards for Other Structures*** | |
| ***Typical Uses*** | ***12-Hour Equivalent Sound Level (Interior) in dBA Ldn*** |
| Educational, institutions, libraries, meeting facilities, etc. | 45 |
| General office, reception, etc. | 50 |
| Retail stores, restaurants, etc. | 55 |
| Other areas for manufacturing, assembly, testing, warehousing, etc. | 65 |

In addition, the average of the maximum levels on the loudest of intrusive sounds occurring during a 24-hour period shall not exceed 65 dBA interior.

(Ord. 4011, passed - -2007; Am. Ord. 4245, passed - -2014)

Eilar Associates, Inc.
Acoustical and Environmental Consulting Services

# Appendix C

Manufacturer Data Sheets

HME

Customer Driven

## Memo

**Re: Drive-Thru Sound Pressure Levels From the Menu Board or Speaker Post**

The sound pressure levels from the menu board or speaker post are as follows:

1. Sound pressure level (SPL) contours (A weighted) were measured on a typical HME SPP2 speaker post. The test condition was for pink noise set to 84 dBA at 1 foot in front of the speaker. All measurements were conducted outside with the speaker post placed 8 feet from a non-absorbing building wall and at an oblique angle to the wall. These measurements should not be construed to guarantee performance with any particular speaker post in any particular environment. They are typical results obtained under the conditions described above.

2. The SPL levels are presented for different distances from the speaker post:

| Distance from the Speaker (Feet) | SPL (dBA) |
|---|---|
| 1 foot | 84 dBA |
| 2 feet | 78 dBA |
| 4 feet | 72 dBA |
| 8 feet | 66 dBA |
| 16 feet | 60 dBA |
| 32 feet | 54 dBA |

3. The above levels are based on factory recommended operating levels, which are preset for HME components and represent the optimum level for drive-thru operations in the majority of the installations.

Also, HME incorporates automatic volume control (AVC) into many of our Systems. AVC will adjust the outbound volume based on the outdoor, ambient noise level. When ambient noise levels naturally decrease at night, AVC will reduce the outbound volume on the system. See below for example:

| Distance from Outside Speaker | Decibel Level of standard system with 45 dB of outside noise without AVC | Decibel level of standard system with 45 dB of outside noise with AVC active |
|---|---|---|
| 1 foot | 84 dBA | 60 dBA |
| 2 feet | 78 dBA | 54 dBA |
| 4 feet | 72 dBA | 48 dBA |
| 8 feet | 66 dBA | 42 dBA |
| 16 feet | 60 dBA | 36 dBA |

If there are any further questions regarding this issue please contact HME customer service at 1-800-848-4468.

Thank you for your interest in HME's products.

Carrier

Turn to the experts

# Product Data

# WeatherMaster® Single Packaged Rooftop

3 to 5 Nominal Tons

ecoblue™ technology


48/50GC**04, 05, 06

48GC: Single-Package Gas Heating/Electric Cooling Rooftop Units
50GC: Electric Cooling Rooftop Units with Optional Electric Heat
with Puron® Refrigerant (R-410A)

# Model number nomenclature

## 48GC MODEL NUMBER NOMENCLATURE

| Position: | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Example: | 4 | 8 | G | C | D | M | 0 | 4 | A | 2 | A | 5 | – | 0 | A | 0 | A | 0 |

**Unit Heat Type**
48 - Gas Heat Packaged Rooftop

**Model Series - WeatherMaster®**
GC - 16.1 SEER Efficiency

**Heat Options**
D = Low Gas Heat
E = Medium Gas Heat
F = High Gas Heat
L = Low NOx – Low Gas Heat*
S = Low Heat w/ Stainless Steel Exchanger
R = Medium Heat w/ Stainless Steel Exchanger
T = High Heat w/ Stainless Steel Exchanger
* Low NOx models include – Stainless Steel HX

**Refrig. Systems Options**
M = Two Stage Cooling
N = Two Stage Cooling with Humidi-MiZer® system (includes Low Ambient control)
P = Two Stage Cooling with Low Ambient control

**Cooling Tons**
04 - 3 ton
05 - 4 ton
06 - 5 ton

**Sensor Options**
A = None
B = RA (Return Air) Smoke Detector
C = SA (Supply Air) Smoke Detector
D = RA + SA Smoke Detector
E = $CO_2$
F = RA Smoke Detector and $CO_2$
G = SA Smoke Detector and $CO_2$
H = RA + SA Smoke Detector and $CO_2$
J = Condensate Overflow Switch (electro-mechanical controls only)
K = Condensate Overflow Switch and RA Smoke Detector
L = Condensate Overflow Switch and RA and SA Smoke Detectors
M = Condensate Overflow Switch and SA Smoke Detector

**Indoor Fan Options**
1 = Direct Drive EcoBlue™ - Standard Static
2 = Direct Drive EcoBlue - Medium Static
3 = Direct Drive EcoBlue - High Static

**Coil Options - Round Tube/Plate Fin Condenser Coil (Outdoor - Indoor - Hail Guard)**
A = Al/Cu - Al/Cu
B = Precoat Al/Cu - Al/Cu
C = E-coat Al/Cu - Al/Cu
D = E-coat Al/Cu - E-coat Al/Cu
E = Cu/Cu - Al/Cu
F = Cu/Cu - Cu/Cu
M = Al/Cu - Al/Cu — Louvered Hail Guard
N = Precoat Al/Cu - Al/Cu — Louvered Hail Guard
P = E-coat Al/Cu - Al/Cu — Louvered Hail Guard
Q = E-coat Al/Cu - E-coat Al/Cu — Louvered Hail Guard
R = Cu/Cu - Al/Cu — Louvered Hail Guard
S = Cu/Cu - Cu/Cu — Louvered Hail Guard

**Voltage**
1 = 575/3/60
3 = 208-230/1/60
5 = 208-230/3/60
6 = 460/3/60

**Design Revision**
– = Factory Design Revision

**Base Unit Controls**
0 = Electro-mechanical Controls - can be used with field-installed W7212 EconoMi$er® IV (Non-Fault Detection and Diagnostic)
2 = RTU Open Multi-Protocol Controller
3 = SystemVu™ Controls
6 = Electro-mechanical Controls - can be used with W7220 EconoMi$er X (with Fault Detection and Diagnostic)

**Intake / Exhaust Options**
A = None
B = Temperature Economizer w/ Barometric Relief
F = Enthalpy Economizer w/ Barometric Relief
U = Temperature Ultra Low Leak Economizer w/ Barometric Relief
W= Enthalpy Ultra Low Leak Economizer w/ Barometric Relief

**Service Options**
0 = None
1 = Unpowered Convenience Outlet
2 = Powered Convenience Outlet
3 = Hinged Access Panels
4 = Hinged Access Panels and Unpowered Convenience Outlet
5 = Hinged Panels and Powered Convenience Outlet
6 = MERV 8 Filters
C = Foil Faced Insulation

**Electrical Options**
A = None
B = HACR Breaker
C = Non-Fused Disconnect (NFD)
D = Thru-The-Base (TTB) Connections
F = Non-Fused Disconnect and TTB
N = Phase Monitor Protection
P = Phase Monitor and HACR
Q = Phase Monitor and NFD
R = Phase Monitor and TTB
S = Phase Monitor and HACR and TTB
T = Phase Monitor and NFD and TTB

**Factory Assigned**
0 = Standard
1 = LTL

**Note: On single phase (-3 voltage code) models, the following are not available as a factory-installed option:**
- Humidi-MiZer System
- Coated Coils or Cu Fin Coils
- Louvered Hail Guards
- Economizer
- Powered 115 Volt Convenience Outlet

# Capacity ratings (cont)

## SOUND RATINGS TABLE

| 48/50GC UNIT | COOLING STAGES | OUTDOOR SOUND (dB) AT 60 Hz | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | A-WEIGHTED | 63 | 125 | 250 | 500 | 1000 | 2000 | 4000 | 8000 |
| **M04** | 2 | 79 | 85.6 | 84.7 | 80.5 | 76.0 | 72.4 | 68.0 | 62.8 | 59.3 |
| **M05** | 2 | 79 | 85.6 | 84.7 | 80.5 | 76.0 | 72.4 | 68.0 | 62.8 | 59.3 |
| **M06** | 2 | 79 | 85.6 | 84.7 | 80.5 | 76.0 | 72.4 | 68.0 | 62.8 | 59.3 |

LEGEND

**dB** — Decibel

NOTES:

1. Outdoor sound data is measured in accordance with AHRI.
2. Measurements are expressed in terms of sound power. Do not compare these values to sound pressure values because sound pressure depends on specific environmental factors which normally do not match individual applications. Sound power values are independent of the environment and therefore more accurate.
3. A-weighted sound ratings filter out very high and very low frequencies, to better approximate the response of “average” human ear. A-weighted measurements for Carrier units are taken in accordance with AHRI.

Goodman
Air Conditioning & Heating

Heating & Air Conditioning
Amana®
LASTS AND LASTS AND LASTS.™

## Amana® Brand PTAC Sound Report

As a manufacturer of PTAC equipment we realize the importance of product acoustics and sound levels to overall customer satisfaction. As a long standing member of the American Heating and Refrigeration Institute (AHRI) it is our practice to utilize U.S. based, accredited third party acoustical laboratories to test our equipment and to validate our test results from our U.S. based engineering, test, and production facilities. We also believe that back-to-back testing with our and competitive products by these third party testing facilities provide the best, most unbiased product performance comparisons. This report will discuss the various definitions regarding sound, how it is measured and the methods by which we design and test our PTAC equipment to meet industry standards. We will also show comparative results from third party testing facilities of our Amana® brand and our competitor's PTAC products.

Acoustics is the branch of science dealing with the production, control, transmission, reception and effects of longitudinal pressure waves in a material medium (gas or liquid). Sound is the sensation perceived by the sense of hearing. What can be measured and how is it measured? The sensors available measure the amplitude of the longitude pressure waves, similar to the human ear. The amplitude of these pressure waves is the **Sound Pressure** in units of Pascals (Pa). What is a longitudinal wave? It is a compression and expansion wave. The air pressure on your ear (or a microphone) increases and decreases by a small amount which is then perceived as sound. **What is a decibel or dB?** Since Sound Pressure is non-linear with respect to the human ear, the standard unit of sound measurement is the decibel. The decibel is a logarithm unit based on the threshold of human hearing. Another unit of sound measurement is the Bel (typically used for sound power levels), named after Alexander Graham Bell. Decibels are 1/10th of a Bel. **What is dBA?** dBA is an A-weighted decibel. It is a frequency weighting of the sound signal and is another attempt to calculate sound magnitude in a way that follows the human ear. Since some frequencies are perceived to be louder than others, this weighting provides a way to account for that perception. To better understand sound pressure and sound power measurements is to think in terms of an electric light bulb. **Sound Pressure Level** = Brightness, which varies at different locations around the bulb. Sound Pressure level depends on a variety of factors including distance from the sound source (PTAC in motel room), the surroundings including floor coverings, hard or soft, walls, curtains, and articles in the room or space. On the other hand **Sound Power Level** = Bulb Wattage, which has only 1 value, i.e. 75 watts.

We design and manufacture our Amana brand PTAC products to meet the Sound Rating System and Industry Standard calling out the applicable test and rating for PTAC equipment. The independent, nationally accredited and certified acoustical laboratory tested both the Amana brand and competitive equipment in accordance to ASTM Standard E90 and calculated with E413 for the Sound Transmission Classification and E1332 for the Outdoor-Indoor Transmission Classification. The Outdoor/Indoor tests were conducted in accordance with ARI Standards 350 and 270 respectively. Breul & Kjaer instrumentation were used for acoustical data acquisition during all tests.

Goodman Company, L.P. • 5151 San Felipe, Suite 500 • Houston, TX 77056
Main: 713.861.2500 • Marketing Fax: 713.331.3275
www.goodmanmfg.com • www.amana-ptac.com

Each of these methods was developed for specific applications; not all methods are equally suitable for the rating of HVAC related sound in the variety of applications encountered. Several background sound rating methods are used to rate indoor sound:

Sound Transmission Class
Outdoor-Indoor Transmission Class
A-weighted sound power level (dBA or Bels)
A-weighted sound pressure level (dBA)
Noise Criteria (NC)

The A-weighted sound level is widely used to state acoustical design goals as a single number and is expressed as a number followed by dBA, for example 55 dBA. But usefulness is limited because it gives no information on the spectral content. Many different-sounding spectra can have the same numeric rating, but due to each individual's hearing capabilities, have quite different subjective qualities. Thus, **A-weighted levels** should be used with sounds that sound alike but are different in level. A-weighted sound levels correlate well with human judgments of relative loudness, but give no information on spectral balance. Thus, they do not necessarily correlate well with the potential annoyances caused by sound.

Both Sound Pressure and Sound Power are recorded and stated as dB, but when stating Sound Pressure you must also state the distance from the unit and volume of space in order to qualify the measurement.

A-weighted **sound pressure levels** are used extensively in outdoor environmental sound standards in situations with known measurement environmental factors.

A-weighted **sound power levels** are used extensively in outdoor environmental sound standards where measurement environment is a non-factor.

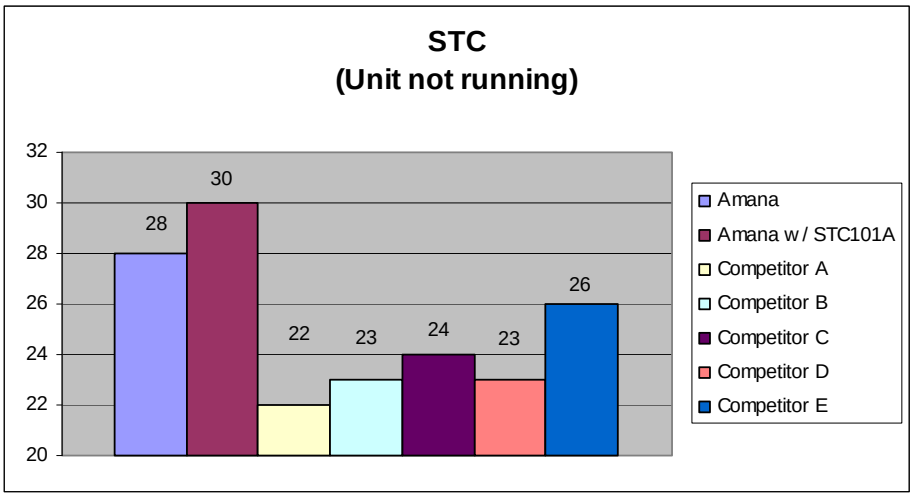
The laboratory also tested for **NC (Noise Criteria),** to provide spectral distribution of the sound using a single number. This rating has been popular in the HVAC industry for some time**.** NC ratings are used to calculate ratings for some HVAC components such as terminal units and diffusers.

For a given sound spectrum, the NC rating can be obtained by plotting its octave band levels on the set of NC curves. The sound spectrum is specified as having a NC rating same as the lowest NC curve which is not exceeded by the spectrum. NC puts more emphasis on the speech communication mid range frequencies.

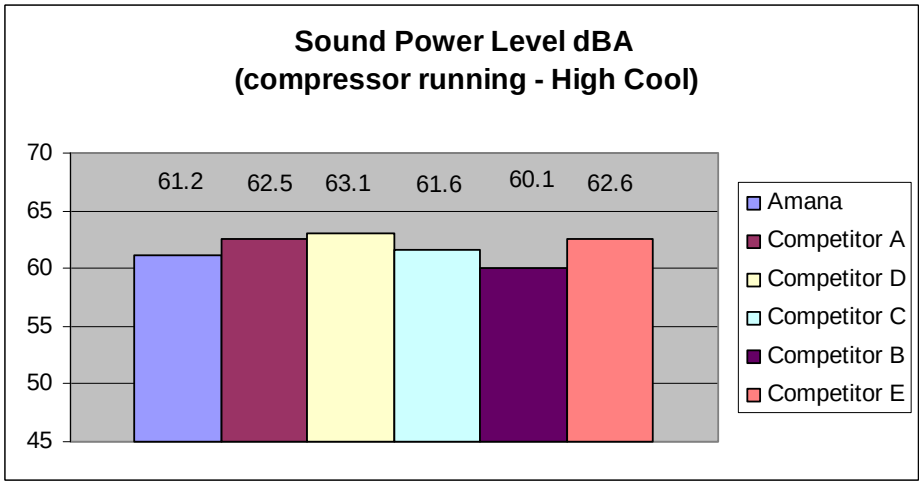
Tests were conducted to determine sound transmission loss as reported as **STC** (Sound Transmission Class) and **OITC** (Outdoor/Indoor Transmission Class). The purpose of the **STC** is to provide a single value rating that can be used to compare the sound insulating properties of partition elements for general building design purposes. The higher the **STC** rating is the greater (or better) the sound insulating properties of the tested partition. The units are not operating during the **STC** tests.

The **OITC** purpose is also to provide a single number rating that can be used for comparing building façade designs including exterior walls, doors, windows, air conditioning units and a combination thereof. This rating is designed to correlate with subjective impressions of the ability of building elements to reduce the overall loudness of ground and transportation sounds. It is intended to be used as a rank-ordering device. The higher the **OITC** rating is, the greater the sound insulating properties of the partition. The units also, are not operating during the **OITC** tests.

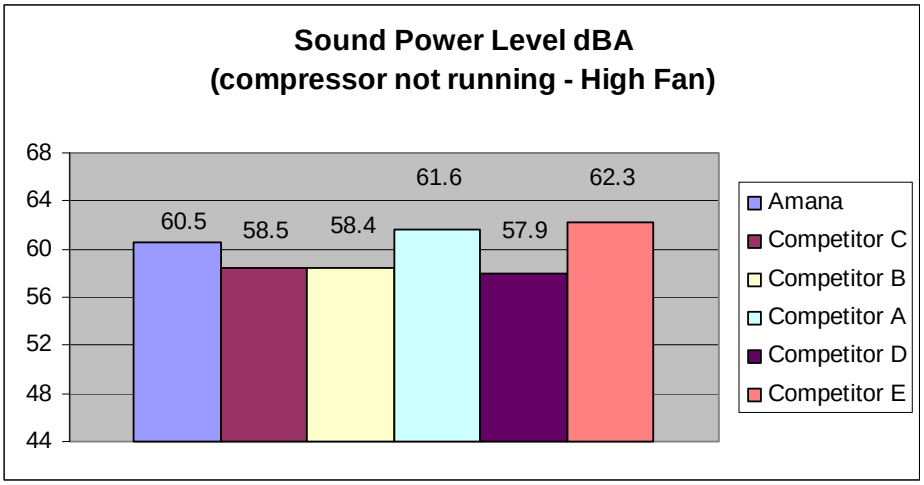
Below are the results of testing completed by our 3rd party, U.S. based accredited acoustical laboratory. The results are from testing our major competitors 12K PTAC units and our Amana 12K PTAC.



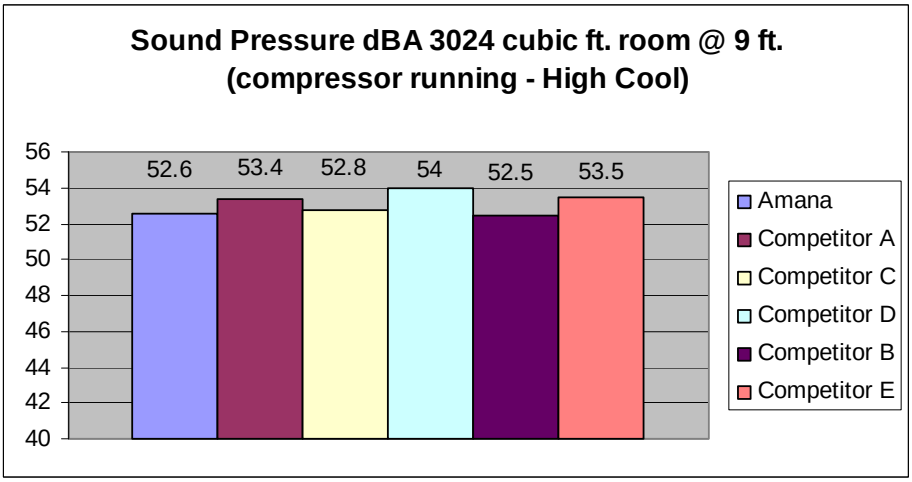

*The higher the STC number the better the sound insulation of the PTAC partition.*



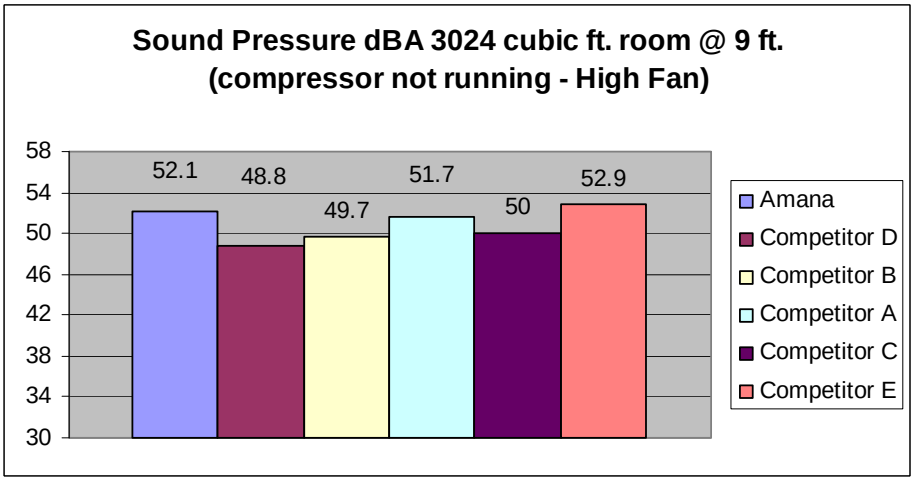

*The lower the Sound Power number the less sound is generated during operation.*



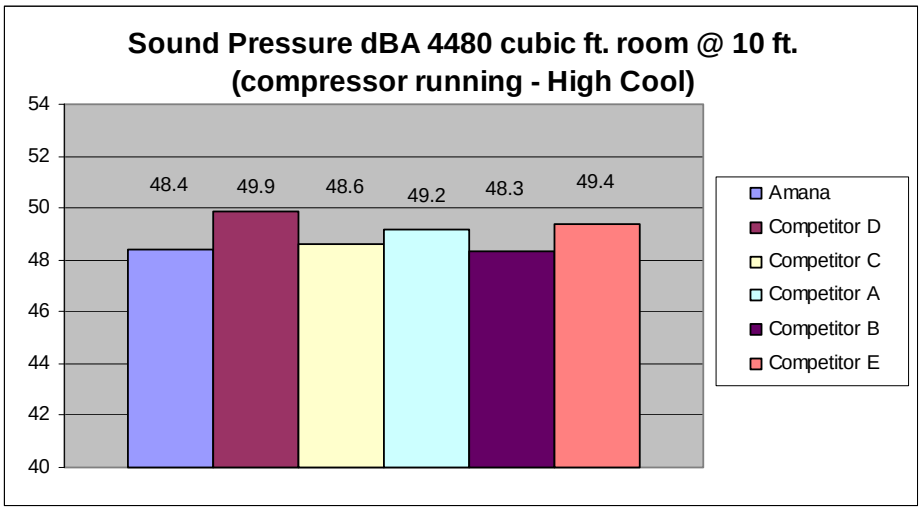

*The lower the Sound Power number the less sound is generated during operation.*



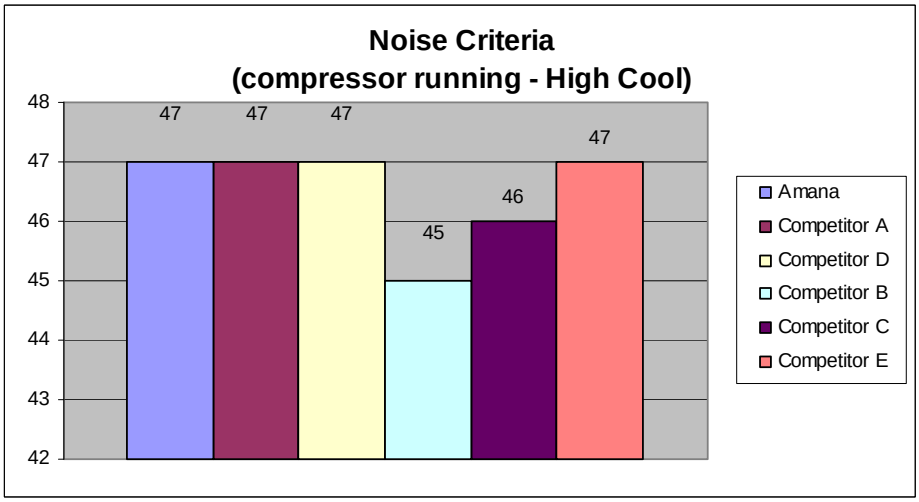

*The lower the Sound Pressure number the less sound is generated during operation.*

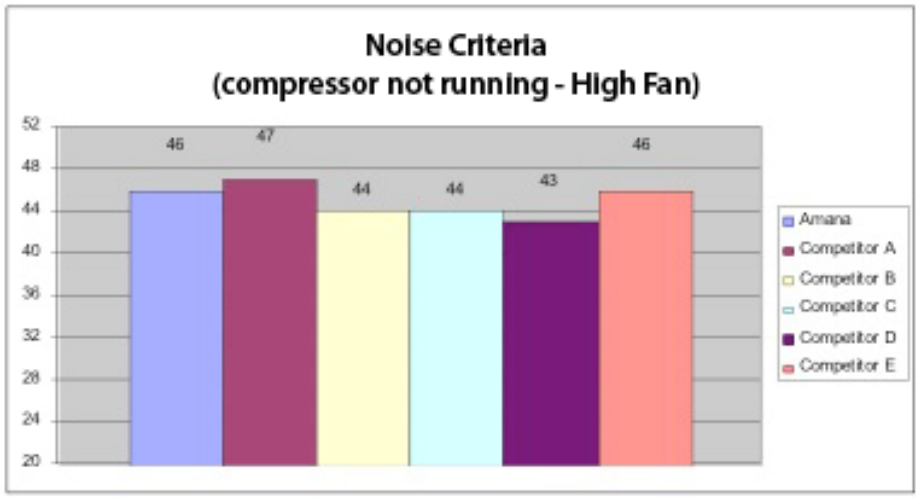



*The lower the Sound Pressure number the less sound is generated during operation.*




*The lower the Sound Pressure number the less sound is generated during operation.*

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Main: 713.861.2500 • Marketing Fax: 713-861-0772
www.goodmanmfg.com •www.amana-ptac.com

| | Amana / Amana w/ STC101A kit | Competitor A | Competitor B | Competitor C | Competitor D | Competitor E |
|---|---|---|---|---|---|---|
| **STC (unit off)** | **28/30** | **22** | **23** | **24** | **23** | **26** |
| | | | | | | |
| **Sound Power Level dBA (compressor running - High Cool)** | **61.2** | **62.5** | **60.1** | **61.6** | **63.1** | **62.6** |
| **Sound Power Level dBA (Compressor off- High Fan)** | **60.5** | **61.6** | **58.4** | **58.5** | **57.9** | **62.3** |
| | | | | | | |
| **Sound Pressure dBA 3024 cubic ft room @ 9 ft (compressor running - High Cool)** | **52.6** | **53.4** | **52.5** | **52.8** | **54** | **53.5** |
| **Sound Pressure dBA 3024 cubic ft room @ 9 ft (compressor off - High Fan)** | **52.1** | **51.7** | **49.7** | **50** | **48.8** | **52.9** |
| **Sound Pressure dBA 4480 cubic ft room @ 10 ft (compressor running - High Cool)** | **48.4** | **49.2** | **48.3** | **48.6** | **49.9** | **49.4** |
| | | | | | | |
| **NC - compressor running (High Cool)** | **47** | **47** | **45** | **46** | **47** | **47** |
| **NC - compressor off (High Fan)** | **46** | **47** | **44** | **44** | **43** | **46** |

*Test Methods:*
*The laboratory method used in conducting these tests is in accordance with ARI 300-2000 "Sound Rating and Sound Transmission Loss of Packaged Terminal Equipment". The air conditioner was mounted in the wall of a 16,640 cu. Ft. reverberation room. The wall was constructed to minimize any wall vibration effects. Indoor/outdoor tests were conducted in accordance with ARI Standard 350 and 270 respectively. During cooling and heating tests temperature and humidity conditions in the outdoor and indoor rooms were in accordance with the standards and were held steady for one-half hour prior to and during the test.*

*The Bruel & Kjaer Type 4204 reference sound source (RSS) was used to obtain the sound power level data. The sound pressure levels were obtained on a Bruel & Kjaer Digital Frequency Analyzer Model 2131, analyzed on a Compaq Prolinea 4/33 Computer and printed using an Epson LQ-850 printer.*

We believe that as a domestic manufacturer of PTAC equipment, we must strive to meet or exceed the demands of our customers. We strive to produce products that provide long-life and economical operation at a competitive price. The accredited, third party test data provided above validates that our Amana® brand PTAC products rank among the best in sound testing in the industry. As a long standing member of AHRI, we will continue to develop new products and drive continuous improvements to meet the needs of our customers in all areas of performance including sound and efficiency and impartially 3rd party test to standards as prescribed by AHRI and the American Society of Heating, Refrigeration and Air-conditioning Engineers.

Eilar Associates, Inc.
Acoustical and Environmental Consulting Services

# Appendix D

CadnaA Analysis Data and Results

**Eilar Associates, Inc.**
210 South Juniper Street, Suite 100
Escondido, California 92025-4230
Phone: (760) 738-5570
Date: 03 Feb 2022

## Calculation Configuration

| Configuration | |
|---|---|
| Parameter | Value |
| General | |
| Country | (user defined) |
| Max. Error (dB) | 0.00 |
| Max. Search Radius (#(Unit,LEN)) | 2000.00 |
| Min. Dist Src to Rcvr | 0.00 |
| Partition | |
| Raster Factor | 0.50 |
| Max. Length of Section (#(Unit,LEN)) | 1000.00 |
| Min. Length of Section (#(Unit,LEN)) | 1.00 |
| Min. Length of Section (%) | 0.00 |
| Proj. Line Sources | On |
| Proj. Area Sources | On |
| Ref. Time | |
| Reference Time Day (min) | 960.00 |
| Reference Time Night (min) | 480.00 |
| Daytime Penalty (dB) | 0.00 |
| Recr. Time Penalty (dB) | 6.00 |
| Night-time Penalty (dB) | 10.00 |
| DTM | |
| Standard Height (m) | 0.00 |
| Model of Terrain | Triangulation |
| Reflection | |
| max. Order of Reflection | 0 |
| Search Radius Src | 100.00 |
| Search Radius Rcvr | 100.00 |
| Max. Distance Source - Rcvr | 1000.00 1000.00 |
| Min. Distance Rvcr - Reflector | 1.00 1.00 |
| Min. Distance Source - Reflector | 0.10 |
| Industrial (ISO 9613) | |
| Lateral Diffraction | some Obj |
| Obst. within Area Src do not shield | On |
| Screening | Excl. Ground Att. over Barrier |
| | Dz with limit (20/25) |
| Barrier Coefficients C1,2,3 | 3.0 20.0 0.0 |
| Temperature (#(Unit,TEMP)) | 10 |
| rel. Humidity (%) | 70 |
| Ground Absorption G | 0.50 |
| Wind Speed for Dir. (#(Unit,SPEED)) | 3.0 |
| Roads (TNM) | |
| Railways (Schall 03 (1990)) | |
| Strictly acc. to Schall 03 / Schall-Transrapid | |
| Aircraft (???) | |
| Strictly acc. to AzB | |

## Receivers

| Name | M. | ID | Level Lr | | Limit. Value | | Land Use | | | Height | | Coordinates | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Day | Night | Day | Night | Type | Auto | Noise Type | | | X | Y | Z |
| | | | (dBA) | (dBA) | (dBA) | (dBA) | | | | (ft) | | (ft) | (ft) | (ft) |
| North | | R1 | 39.4 | 39.4 | 0.0 | 0.0 | | x | Total | 5.00 | r | 877.20 | 1034.13 | 1114.37 |
| South | | R2 | 48.1 | 48.1 | 0.0 | 0.0 | | x | Total | 5.00 | r | 901.18 | 552.68 | 1107.47 |
| East | | R3 | 35.7 | 35.7 | 0.0 | 0.0 | | x | Total | 5.00 | r | 1125.92 | 886.98 | 1112.35 |
| West 1 | | R4 | 38.1 | 38.1 | 0.0 | 0.0 | | x | Total | 5.00 | r | 759.36 | 864.83 | 1112.92 |
| West 2 | | R5 | 36.1 | 36.1 | 0.0 | 0.0 | | x | Total | 5.00 | r | 758.54 | 581.82 | 1108.63 |
| West 3 | | R6 | 35.2 | 35.2 | 0.0 | 0.0 | | x | Total | 5.00 | r | 671.04 | 866.94 | 1113.29 |
| West 4 | | R7 | 32.9 | 32.9 | 0.0 | 0.0 | | x | Total | 5.00 | r | 671.04 | 585.02 | 1108.16 |

## Point Sources

| Name | M. | ID | Result. PWL | | | Lw / Li | | | Correction | | | Sound Reduction | | Attenuation | Operating Time | | | K0 | Freq. | Direct. | Height | | Coordinates | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Day | Evening | Night | Type | Value | norm. | Day | Evening | Night | R | Area | | Day | Special | Night | | | | | | X | Y | Z |
| | | | (dBA) | (dBA) | (dBA) | | | dB(A) | dB(A) | dB(A) | dB(A) | | (ft²) | | (min) | (min) | (min) | (dB) | (Hz) | | (ft) | | (ft) | (ft) | (ft) |
| Intercom | | | 84.5 | 84.5 | 84.5 | Lw | DT | | 0.0 | 0.0 | 0.0 | | | | | | | 0.0 | 500 | (none) | 4.00 | r | 880.75 | 883.34 | 1111.70 |
| HVAC 1 | | | 78.5 | 78.5 | 78.5 | Lw | S4 | | 0.0 | 0.0 | 0.0 | | | | | | | 0.0 | | (none) | 16.00 | r | 798.88 | 857.52 | 1123.85 |
| HVAC 2 | | | 78.5 | 78.5 | 78.5 | Lw | S4 | | 0.0 | 0.0 | 0.0 | | | | | | | 0.0 | | (none) | 16.00 | r | 853.15 | 857.09 | 1123.60 |
| HVAC 3 | | | 78.5 | 78.5 | 78.5 | Lw | S4 | | 0.0 | 0.0 | 0.0 | | | | | | | 0.0 | | (none) | 59.00 | r | 894.16 | 593.79 | 1162.02 |
| HVAC 4 | | | 78.5 | 78.5 | 78.5 | Lw | S4 | | 0.0 | 0.0 | 0.0 | | | | | | | 0.0 | | (none) | 59.00 | r | 926.15 | 592.97 | 1162.02 |
| HVAC 5 | | | 78.5 | 78.5 | 78.5 | Lw | S4 | | 0.0 | 0.0 | 0.0 | | | | | | | 0.0 | | (none) | 59.00 | r | 954.04 | 592.15 | 1162.04 |
| HVAC 6 | | | 78.5 | 78.5 | 78.5 | Lw | S4 | | 0.0 | 0.0 | 0.0 | | | | | | | 0.0 | | (none) | 59.00 | r | 975.37 | 591.33 | 1162.01 |
| HVAC 7 | | | 78.5 | 78.5 | 78.5 | Lw | S4 | | 0.0 | 0.0 | 0.0 | | | | | | | 0.0 | | (none) | 59.00 | r | 1004.07 | 590.51 | 1161.97 |
| PTAC | | | 61.2 | 61.2 | 61.2 | Lw | S5 | | 0.0 | 0.0 | 0.0 | | | | | | | 0.0 | | (none) | 5.00 | r | 854.01 | 560.93 | 1107.85 |
| PTAC | | | 61.2 | 61.2 | 61.2 | Lw | S5 | | 0.0 | 0.0 | 0.0 | | | | | | | 0.0 | | (none) | 15.00 | r | 854.01 | 560.93 | 1117.85 |
| PTAC | | | 61.2 | 61.2 | 61.2 | Lw | S5 | | 0.0 | 0.0 | 0.0 | | | | | | | 0.0 | | (none) | 25.00 | r | 854.01 | 560.93 | 1127.85 |
| PTAC | | | 61.2 | 61.2 | 61.2 | Lw | S5 | | 0.0 | 0.0 | 0.0 | | | | | | | 0.0 | | (none) | 35.00 | r | 854.01 | 560.93 | 1137.85 |
| PTAC | | | 61.2 | 61.2 | 61.2 | Lw | S5 | | 0.0 | 0.0 | 0.0 | | | | | | | 0.0 | | (none) | 5.00 | r | 872.88 | 565.03 | 1107.83 |
| PTAC | | | 61.2 | 61.2 | 61.2 | Lw | S5 | | 0.0 | 0.0 | 0.0 | | | | | | | 0.0 | | (none) | 15.00 | r | 872.88 | 565.03 | 1117.83 |
| PTAC | | | 61.2 | 61.2 | 61.2 | Lw | S5 | | 0.0 | 0.0 | 0.0 | | | | | | | 0.0 | | (none) | 25.00 | r | 872.88 | 565.03 | 1127.83 |
| PTAC | | | 61.2 | 61.2 | 61.2 | Lw | S5 | | 0.0 | 0.0 | 0.0 | | | | | | | 0.0 | | (none) | 35.00 | r | 872.88 | 565.03 | 1137.83 |
| PTAC | | | 61.2 | 61.2 | 61.2 | Lw | S5 | | 0.0 | 0.0 | 0.0 | | | | | | | 0.0 | | (none) | 5.00 | r | 887.65 | 565.44 | 1107.73 |
| PTAC | | | 61.2 | 61.2 | 61.2 | Lw | S5 | | 0.0 | 0.0 | 0.0 | | | | | | | 0.0 | | (none) | 15.00 | r | 887.65 | 565.44 | 1117.73 |
| PTAC | | | 61.2 | 61.2 | 61.2 | Lw | S5 | | 0.0 | 0.0 | 0.0 | | | | | | | 0.0 | | (none) | 25.00 | r | 887.65 | 565.44 | 1127.73 |
| PTAC | | | 61.2 | 61.2 | 61.2 | Lw | S5 | | 0.0 | 0.0 | 0.0 | | | | | | | 0.0 | | (none) | 35.00 | r | 887.65 | 565.44 | 1137.73 |
| PTAC | | | 61.2 | 61.2 | 61.2 | Lw | S5 | | 0.0 | 0.0 | 0.0 | | | | | | | 0.0 | | (none) | 5.00 | r | 901.18 | 562.16 | 1107.59 |
| PTAC | | | 61.2 | 61.2 | 61.2 | Lw | S5 | | 0.0 | 0.0 | 0.0 | | | | | | | 0.0 | | (none) | 15.00 | r | 901.18 | 562.16 | 1117.59 |
| PTAC | | | 61.2 | 61.2 | 61.2 | Lw | S5 | | 0.0 | 0.0 | 0.0 | | | | | | | 0.0 | | (none) | 25.00 | r | 901.18 | 562.16 | 1127.59 |
| PTAC | | | 61.2 | 61.2 | 61.2 | Lw | S5 | | 0.0 | 0.0 | 0.0 | | | | | | | 0.0 | | (none) | 35.00 | r | 901.18 | 562.16 | 1137.59 |
| PTAC | | | 61.2 | 61.2 | 61.2 | Lw | S5 | | 0.0 | 0.0 | 0.0 | | | | | | | 0.0 | | (none) | 5.00 | r | 918.00 | 562.57 | 1107.59 |
| PTAC | | | 61.2 | 61.2 | 61.2 | Lw | S5 | | 0.0 | 0.0 | 0.0 | | | | | | | 0.0 | | (none) | 15.00 | r | 918.00 | 562.57 | 1117.59 |
| PTAC | | | 61.2 | 61.2 | 61.2 | Lw | S5 | | 0.0 | 0.0 | 0.0 | | | | | | | 0.0 | | (none) | 25.00 | r | 918.00 | 562.57 | 1127.59 |
| PTAC | | | 61.2 | 61.2 | 61.2 | Lw | S5 | | 0.0 | 0.0 | 0.0 | | | | | | | 0.0 | | (none) | 35.00 | r | 918.00 | 562.57 | 1137.59 |
| PTAC | | | 61.2 | 61.2 | 61.2 | Lw | S5 | | 0.0 | 0.0 | 0.0 | | | | | | | 0.0 | | (none) | 5.00 | r | 941.38 | 561.75 | 1107.59 |
| PTAC | | | 61.2 | 61.2 | 61.2 | Lw | S5 | | 0.0 | 0.0 | 0.0 | | | | | | | 0.0 | | (none) | 15.00 | r | 941.38 | 561.75 | 1117.59 |
| PTAC | | | 61.2 | 61.2 | 61.2 | Lw | S5 | | 0.0 | 0.0 | 0.0 | | | | | | | 0.0 | | (none) | 25.00 | r | 941.38 | 561.75 | 1127.59 |
| PTAC | | | 61.2 | 61.2 | 61.2 | Lw | S5 | | 0.0 | 0.0 | 0.0 | | | | | | | 0.0 | | (none) | 35.00 | r | 941.38 | 561.75 | 1137.59 |
| PTAC | | | 61.2 | 61.2 | 61.2 | Lw | S5 | | 0.0 | 0.0 | 0.0 | | | | | | | 0.0 | | (none) | 5.00 | r | 962.29 | 561.75 | 1107.59 |
| PTAC | | | 61.2 | 61.2 | 61.2 | Lw | S5 | | 0.0 | 0.0 | 0.0 | | | | | | | 0.0 | | (none) | 15.00 | r | 962.29 | 561.75 | 1117.59 |
| PTAC | | | 61.2 | 61.2 | 61.2 | Lw | S5 | | 0.0 | 0.0 | 0.0 | | | | | | | 0.0 | | (none) | 25.00 | r | 962.29 | 561.75 | 1127.59 |
| PTAC | | | 61.2 | 61.2 | 61.2 | Lw | S5 | | 0.0 | 0.0 | 0.0 | | | | | | | 0.0 | | (none) | 35.00 | r | 962.29 | 561.75 | 1137.59 |
| PTAC | | | 61.2 | 61.2 | 61.2 | Lw | S5 | | 0.0 | 0.0 | 0.0 | | | | | | | 0.0 | | (none) | 5.00 | r | 980.75 | 561.34 | 1107.54 |
| PTAC | | | 61.2 | 61.2 | 61.2 | Lw | S5 | | 0.0 | 0.0 | 0.0 | | | | | | | 0.0 | | (none) | 15.00 | r | 980.75 | 561.34 | 1117.54 |
| PTAC | | | 61.2 | 61.2 | 61.2 | Lw | S5 | | 0.0 | 0.0 | 0.0 | | | | | | | 0.0 | | (none) | 25.00 | r | 980.75 | 561.34 | 1127.54 |
| PTAC | | | 61.2 | 61.2 | 61.2 | Lw | S5 | | 0.0 | 0.0 | 0.0 | | | | | | | 0.0 | | (none) | 35.00 | r | 980.75 | 561.34 | 1137.54 |
| PTAC | | | 61.2 | 61.2 | 61.2 | Lw | S5 | | 0.0 | 0.0 | 0.0 | | | | | | | 0.0 | | (none) | 5.00 | r | 992.24 | 564.62 | 1107.56 |
| PTAC | | | 61.2 | 61.2 | 61.2 | Lw | S5 | | 0.0 | 0.0 | 0.0 | | | | | | | 0.0 | | (none) | 15.00 | r | 992.24 | 564.62 | 1117.56 |
| PTAC | | | 61.2 | 61.2 | 61.2 | Lw | S5 | | 0.0 | 0.0 | 0.0 | | | | | | | 0.0 | | (none) | 25.00 | r | 992.24 | 564.62 | 1127.56 |
| PTAC | | | 61.2 | 61.2 | 61.2 | Lw | S5 | | 0.0 | 0.0 | 0.0 | | | | | | | 0.0 | | (none) | 35.00 | r | 992.24 | 564.62 | 1137.56 |
| PTAC | | | 61.2 | 61.2 | 61.2 | Lw | S5 | | 0.0 | 0.0 | 0.0 | | | | | | | 0.0 | | (none) | 5.00 | r | 1012.33 | 560.93 | 1107.48 |
| PTAC | | | 61.2 | 61.2 | 61.2 | Lw | S5 | | 0.0 | 0.0 | 0.0 | | | | | | | 0.0 | | (none) | 15.00 | r | 1012.33 | 560.93 | 1117.48 |
| PTAC | | | 61.2 | 61.2 | 61.2 | Lw | S5 | | 0.0 | 0.0 | 0.0 | | | | | | | 0.0 | | (none) | 25.00 | r | 1012.33 | 560.93 | 1127.48 |
| PTAC | | | 61.2 | 61.2 | 61.2 | Lw | S5 | | 0.0 | 0.0 | 0.0 | | | | | | | 0.0 | | (none) | 35.00 | r | 1012.33 | 560.93 | 1137.48 |
| PTAC | | | 61.2 | 61.2 | 61.2 | Lw | S5 | | 0.0 | 0.0 | 0.0 | | | | | | | 0.0 | | (none) | 15.00 | r | 842.53 | 620.40 | 1119.00 |
| PTAC | | | 61.2 | 61.2 | 61.2 | Lw | S5 | | 0.0 | 0.0 | 0.0 | | | | | | | 0.0 | | (none) | 25.00 | r | 842.53 | 620.40 | 1129.00 |
| PTAC | | | 61.2 | 61.2 | 61.2 | Lw | S5 | | 0.0 | 0.0 | 0.0 | | | | | | | 0.0 | | (none) | 35.00 | r | 842.53 | 620.40 | 1139.00 |

| Name | M. | ID | Result. PWL | | | Lw / Li | | | Correction | | | Sound Reduction | | Attenuation | Operating Time | | | K0 | Freq. | Direct. | Height | | Coordinates | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Day | Evening | Night | Type | Value | norm. | Day | Evening | Night | R | Area | | Day | Special | Night | | | | | | X | Y | Z |
| | | | (dBA) | (dBA) | (dBA) | | | dB(A) | dB(A) | dB(A) | dB(A) | | (ft²) | | (min) | (min) | (min) | (dB) | (Hz) | | (ft) | | (ft) | (ft) | (ft) |
| PTAC | | | 61.2 | 61.2 | 61.2 | Lw | S5 | | 0.0 | 0.0 | 0.0 | | | | | | | 0.0 | | (none) | 15.00 | r | 842.53 | 607.28 | 1118.77 |
| PTAC | | | 61.2 | 61.2 | 61.2 | Lw | S5 | | 0.0 | 0.0 | 0.0 | | | | | | | 0.0 | | (none) | 25.00 | r | 842.53 | 607.28 | 1128.77 |
| PTAC | | | 61.2 | 61.2 | 61.2 | Lw | S5 | | 0.0 | 0.0 | 0.0 | | | | | | | 0.0 | | (none) | 35.00 | r | 842.53 | 607.28 | 1138.77 |
| PTAC | | | 61.2 | 61.2 | 61.2 | Lw | S5 | | 0.0 | 0.0 | 0.0 | | | | | | | 0.0 | | (none) | 15.00 | r | 840.07 | 584.31 | 1118.38 |
| PTAC | | | 61.2 | 61.2 | 61.2 | Lw | S5 | | 0.0 | 0.0 | 0.0 | | | | | | | 0.0 | | (none) | 25.00 | r | 840.07 | 584.31 | 1128.38 |
| PTAC | | | 61.2 | 61.2 | 61.2 | Lw | S5 | | 0.0 | 0.0 | 0.0 | | | | | | | 0.0 | | (none) | 35.00 | r | 840.07 | 584.31 | 1138.38 |
| PTAC | | | 61.2 | 61.2 | 61.2 | Lw | S5 | | 0.0 | 0.0 | 0.0 | | | | | | | 0.0 | | (none) | 15.00 | r | 840.07 | 569.13 | 1118.11 |
| PTAC | | | 61.2 | 61.2 | 61.2 | Lw | S5 | | 0.0 | 0.0 | 0.0 | | | | | | | 0.0 | | (none) | 25.00 | r | 840.07 | 569.13 | 1128.11 |
| PTAC | | | 61.2 | 61.2 | 61.2 | Lw | S5 | | 0.0 | 0.0 | 0.0 | | | | | | | 0.0 | | (none) | 35.00 | r | 840.07 | 569.13 | 1138.11 |
| PTAC | | | 61.2 | 61.2 | 61.2 | Lw | S5 | | 0.0 | 0.0 | 0.0 | | | | | | | 0.0 | | (none) | 15.00 | r | 1035.58 | 572.02 | 1117.59 |
| PTAC | | | 61.2 | 61.2 | 61.2 | Lw | S5 | | 0.0 | 0.0 | 0.0 | | | | | | | 0.0 | | (none) | 25.00 | r | 1035.58 | 572.02 | 1127.59 |
| PTAC | | | 61.2 | 61.2 | 61.2 | Lw | S5 | | 0.0 | 0.0 | 0.0 | | | | | | | 0.0 | | (none) | 35.00 | r | 1035.58 | 572.02 | 1137.59 |
| PTAC | | | 61.2 | 61.2 | 61.2 | Lw | S5 | | 0.0 | 0.0 | 0.0 | | | | | | | 0.0 | | (none) | 15.00 | r | 1035.09 | 586.18 | 1117.85 |
| PTAC | | | 61.2 | 61.2 | 61.2 | Lw | S5 | | 0.0 | 0.0 | 0.0 | | | | | | | 0.0 | | (none) | 25.00 | r | 1035.09 | 586.18 | 1127.85 |
| PTAC | | | 61.2 | 61.2 | 61.2 | Lw | S5 | | 0.0 | 0.0 | 0.0 | | | | | | | 0.0 | | (none) | 35.00 | r | 1035.09 | 586.18 | 1137.85 |
| PTAC | | | 61.2 | 61.2 | 61.2 | Lw | S5 | | 0.0 | 0.0 | 0.0 | | | | | | | 0.0 | | (none) | 15.00 | r | 1037.86 | 604.73 | 1118.12 |
| PTAC | | | 61.2 | 61.2 | 61.2 | Lw | S5 | | 0.0 | 0.0 | 0.0 | | | | | | | 0.0 | | (none) | 25.00 | r | 1037.86 | 604.73 | 1128.12 |
| PTAC | | | 61.2 | 61.2 | 61.2 | Lw | S5 | | 0.0 | 0.0 | 0.0 | | | | | | | 0.0 | | (none) | 35.00 | r | 1037.86 | 604.73 | 1138.12 |
| PTAC | | | 61.2 | 61.2 | 61.2 | Lw | S5 | | 0.0 | 0.0 | 0.0 | | | | | | | 0.0 | | (none) | 15.00 | r | 1037.53 | 623.45 | 1118.38 |
| PTAC | | | 61.2 | 61.2 | 61.2 | Lw | S5 | | 0.0 | 0.0 | 0.0 | | | | | | | 0.0 | | (none) | 25.00 | r | 1037.53 | 623.45 | 1128.38 |
| PTAC | | | 61.2 | 61.2 | 61.2 | Lw | S5 | | 0.0 | 0.0 | 0.0 | | | | | | | 0.0 | | (none) | 15.00 | r | 1037.53 | 623.45 | 1118.38 |
| PTAC | | | 61.2 | 61.2 | 61.2 | Lw | S5 | | 0.0 | 0.0 | 0.0 | | | | | | | 0.0 | | (none) | 25.00 | r | 1037.53 | 623.45 | 1128.38 |
| PTAC | | | 61.2 | 61.2 | 61.2 | Lw | S5 | | 0.0 | 0.0 | 0.0 | | | | | | | 0.0 | | (none) | 35.00 | r | 1037.53 | 623.45 | 1138.38 |
| PTAC | | | 61.2 | 61.2 | 61.2 | Lw | S5 | | 0.0 | 0.0 | 0.0 | | | | | | | 0.0 | | (none) | 15.00 | r | 855.13 | 630.04 | 1119.10 |
| PTAC | | | 61.2 | 61.2 | 61.2 | Lw | S5 | | 0.0 | 0.0 | 0.0 | | | | | | | 0.0 | | (none) | 25.00 | r | 855.13 | 630.04 | 1129.10 |
| PTAC | | | 61.2 | 61.2 | 61.2 | Lw | S5 | | 0.0 | 0.0 | 0.0 | | | | | | | 0.0 | | (none) | 35.00 | r | 855.13 | 630.04 | 1139.10 |
| PTAC | | | 61.2 | 61.2 | 61.2 | Lw | S5 | | 0.0 | 0.0 | 0.0 | | | | | | | 0.0 | | (none) | 15.00 | r | 872.18 | 633.65 | 1119.04 |
| PTAC | | | 61.2 | 61.2 | 61.2 | Lw | S5 | | 0.0 | 0.0 | 0.0 | | | | | | | 0.0 | | (none) | 25.00 | r | 872.18 | 633.65 | 1129.04 |
| PTAC | | | 61.2 | 61.2 | 61.2 | Lw | S5 | | 0.0 | 0.0 | 0.0 | | | | | | | 0.0 | | (none) | 35.00 | r | 872.18 | 633.65 | 1139.04 |
| PTAC | | | 61.2 | 61.2 | 61.2 | Lw | S5 | | 0.0 | 0.0 | 0.0 | | | | | | | 0.0 | | (none) | 15.00 | r | 885.88 | 633.91 | 1118.94 |
| PTAC | | | 61.2 | 61.2 | 61.2 | Lw | S5 | | 0.0 | 0.0 | 0.0 | | | | | | | 0.0 | | (none) | 25.00 | r | 885.88 | 633.91 | 1128.94 |
| PTAC | | | 61.2 | 61.2 | 61.2 | Lw | S5 | | 0.0 | 0.0 | 0.0 | | | | | | | 0.0 | | (none) | 35.00 | r | 885.88 | 633.91 | 1138.94 |
| PTAC | | | 61.2 | 61.2 | 61.2 | Lw | S5 | | 0.0 | 0.0 | 0.0 | | | | | | | 0.0 | | (none) | 15.00 | r | 901.64 | 633.65 | 1118.83 |
| PTAC | | | 61.2 | 61.2 | 61.2 | Lw | S5 | | 0.0 | 0.0 | 0.0 | | | | | | | 0.0 | | (none) | 25.00 | r | 901.64 | 633.65 | 1128.83 |
| PTAC | | | 61.2 | 61.2 | 61.2 | Lw | S5 | | 0.0 | 0.0 | 0.0 | | | | | | | 0.0 | | (none) | 35.00 | r | 901.64 | 633.65 | 1138.83 |
| PTAC | | | 61.2 | 61.2 | 61.2 | Lw | S5 | | 0.0 | 0.0 | 0.0 | | | | | | | 0.0 | | (none) | 15.00 | r | 919.73 | 633.91 | 1118.78 |
| PTAC | | | 61.2 | 61.2 | 61.2 | Lw | S5 | | 0.0 | 0.0 | 0.0 | | | | | | | 0.0 | | (none) | 25.00 | r | 919.73 | 633.91 | 1128.78 |
| PTAC | | | 61.2 | 61.2 | 61.2 | Lw | S5 | | 0.0 | 0.0 | 0.0 | | | | | | | 0.0 | | (none) | 35.00 | r | 919.73 | 633.91 | 1138.78 |
| PTAC | | | 61.2 | 61.2 | 61.2 | Lw | S5 | | 0.0 | 0.0 | 0.0 | | | | | | | 0.0 | | (none) | 15.00 | r | 941.43 | 634.17 | 1118.70 |
| PTAC | | | 61.2 | 61.2 | 61.2 | Lw | S5 | | 0.0 | 0.0 | 0.0 | | | | | | | 0.0 | | (none) | 25.00 | r | 941.43 | 634.17 | 1128.70 |
| PTAC | | | 61.2 | 61.2 | 61.2 | Lw | S5 | | 0.0 | 0.0 | 0.0 | | | | | | | 0.0 | | (none) | 35.00 | r | 941.43 | 634.17 | 1138.70 |
| PTAC | | | 61.2 | 61.2 | 61.2 | Lw | S5 | | 0.0 | 0.0 | 0.0 | | | | | | | 0.0 | | (none) | 15.00 | r | 961.84 | 633.91 | 1118.58 |
| PTAC | | | 61.2 | 61.2 | 61.2 | Lw | S5 | | 0.0 | 0.0 | 0.0 | | | | | | | 0.0 | | (none) | 25.00 | r | 961.84 | 633.91 | 1128.58 |
| PTAC | | | 61.2 | 61.2 | 61.2 | Lw | S5 | | 0.0 | 0.0 | 0.0 | | | | | | | 0.0 | | (none) | 35.00 | r | 961.84 | 633.91 | 1138.58 |
| PTAC | | | 61.2 | 61.2 | 61.2 | Lw | S5 | | 0.0 | 0.0 | 0.0 | | | | | | | 0.0 | | (none) | 15.00 | r | 979.67 | 625.64 | 1118.47 |
| PTAC | | | 61.2 | 61.2 | 61.2 | Lw | S5 | | 0.0 | 0.0 | 0.0 | | | | | | | 0.0 | | (none) | 25.00 | r | 979.67 | 625.64 | 1128.47 |
| PTAC | | | 61.2 | 61.2 | 61.2 | Lw | S5 | | 0.0 | 0.0 | 0.0 | | | | | | | 0.0 | | (none) | 35.00 | r | 979.67 | 625.64 | 1138.47 |
| PTAC | | | 61.2 | 61.2 | 61.2 | Lw | S5 | | 0.0 | 0.0 | 0.0 | | | | | | | 0.0 | | (none) | 15.00 | r | 999.31 | 625.77 | 1118.49 |
| PTAC | | | 61.2 | 61.2 | 61.2 | Lw | S5 | | 0.0 | 0.0 | 0.0 | | | | | | | 0.0 | | (none) | 25.00 | r | 999.31 | 625.77 | 1128.49 |
| PTAC | | | 61.2 | 61.2 | 61.2 | Lw | S5 | | 0.0 | 0.0 | 0.0 | | | | | | | 0.0 | | (none) | 35.00 | r | 999.31 | 625.77 | 1138.49 |
| PTAC | | | 61.2 | 61.2 | 61.2 | Lw | S5 | | 0.0 | 0.0 | 0.0 | | | | | | | 0.0 | | (none) | 15.00 | r | 1017.14 | 630.30 | 1118.54 |
| PTAC | | | 61.2 | 61.2 | 61.2 | Lw | S5 | | 0.0 | 0.0 | 0.0 | | | | | | | 0.0 | | (none) | 25.00 | r | 1017.14 | 630.30 | 1128.54 |
| PTAC | | | 61.2 | 61.2 | 61.2 | Lw | S5 | | 0.0 | 0.0 | 0.0 | | | | | | | 0.0 | | (none) | 35.00 | r | 1017.14 | 630.30 | 1138.54 |

| Name | M. | ID | Result. PWL | | | Lw / Li | | | Correction | | | Sound Reduction | | Attenuation | Operating Time | | | K0 | Freq. | Direct. | Height | | Coordinates | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Day | Evening | Night | Type | Value | norm. | Day | Evening | Night | R | Area | | Day | Special | Night | | | | | | X | Y | Z |
| | | | (dBA) | (dBA) | (dBA) | | | dB(A) | dB(A) | dB(A) | dB(A) | | (ft²) | | (min) | (min) | (min) | (dB) | (Hz) | | (ft) | | (ft) | (ft) | (ft) |
| PTAC | | | 61.2 | 61.2 | 61.2 | Lw | S5 | | 0.0 | 0.0 | 0.0 | | | | | | | 0.0 | | (none) | 45.00 | r | 887.01 | 565.68 | 1147.74 |
| PTAC | | | 61.2 | 61.2 | 61.2 | Lw | S5 | | 0.0 | 0.0 | 0.0 | | | | | | | 0.0 | | (none) | 45.00 | r | 941.15 | 561.58 | 1147.59 |
| PTAC | | | 61.2 | 61.2 | 61.2 | Lw | S5 | | 0.0 | 0.0 | 0.0 | | | | | | | 0.0 | | (none) | 45.00 | r | 992.42 | 564.86 | 1147.56 |

## Buildings

| Name | M. | ID | RB | Residents | Absorption | Height | |
|---|---|---|---|---|---|---|---|
| | | | | | | Begin | |
| | | | | | | (ft) | |
| CS/Restaurant | | B1 | x | 0 | | 12.00 | r |
| Hotel | | B2 | x | 0 | | 55.00 | r |

## Geometry - Buildings

| Name | M. | ID | RB | Residents | Absorption | Height | | Coordinates | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Begin | | x | y | z | Ground |
| | | | | | | (ft) | | (ft) | (ft) | (ft) | (ft) |
| CS/Restaurant | | B1 | x | 0 | | 12.00 | r | 774.86 | 878.34 | 1120.19 | 1108.19 |
| | | | | | | | | 774.45 | 836.91 | 1120.19 | 1107.40 |
| | | | | | | | | 864.07 | 837.12 | 1120.19 | 1107.34 |
| | | | | | | | | 872.89 | 846.14 | 1120.19 | 1107.40 |
| | | | | | | | | 872.68 | 886.75 | 1120.19 | 1107.82 |
| | | | | | | | | 863.05 | 886.95 | 1120.19 | 1107.89 |
| | | | | | | | | 862.84 | 889.82 | 1120.19 | 1107.92 |
| | | | | | | | | 782.86 | 889.62 | 1120.19 | 1108.45 |
| | | | | | | | | 782.24 | 878.13 | 1120.19 | 1108.21 |
| Hotel | | B2 | x | 0 | | 55.00 | r | 844.29 | 624.05 | 1159.05 | 1104.05 |
| | | | | | | | | 844.94 | 598.33 | 1159.05 | 1103.59 |
| | | | | | | | | 846.89 | 598.66 | 1159.05 | 1103.58 |
| | | | | | | | | 846.24 | 592.15 | 1159.05 | 1103.47 |
| | | | | | | | | 841.68 | 591.50 | 1159.05 | 1103.50 |
| | | | | | | | | 842.66 | 562.85 | 1159.05 | 1102.98 |
| | | | | | | | | 867.73 | 562.20 | 1159.05 | 1102.79 |
| | | | | | | | | 868.05 | 566.43 | 1159.05 | 1102.86 |
| | | | | | | | | 892.47 | 566.43 | 1159.05 | 1102.70 |
| | | | | | | | | 891.49 | 563.50 | 1159.05 | 1102.68 |
| | | | | | | | | 985.58 | 562.20 | 1159.05 | 1102.54 |
| | | | | | | | | 985.58 | 566.10 | 1159.05 | 1102.59 |
| | | | | | | | | 997.95 | 565.78 | 1159.05 | 1102.57 |
| | | | | | | | | 997.62 | 562.85 | 1159.05 | 1102.53 |
| | | | | | | | | 1023.99 | 562.85 | 1159.05 | 1102.50 |
| | | | | | | | | 1024.64 | 567.41 | 1159.05 | 1102.57 |
| | | | | | | | | 1035.06 | 566.43 | 1159.05 | 1102.49 |
| | | | | | | | | 1034.41 | 593.13 | 1159.05 | 1102.98 |
| | | | | | | | | 1027.25 | 592.80 | 1159.05 | 1102.98 |
| | | | | | | | | 1026.92 | 599.96 | 1159.05 | 1103.09 |
| | | | | | | | | 1037.01 | 598.99 | 1159.05 | 1103.05 |
| | | | | | | | | 1036.69 | 628.61 | 1159.05 | 1103.46 |
| | | | | | | | | 1010.64 | 628.28 | 1159.05 | 1103.52 |
| | | | | | | | | 1010.97 | 624.38 | 1159.05 | 1103.46 |
| | | | | | | | | 971.90 | 624.05 | 1159.05 | 1103.43 |
| | | | | | | | | 971.25 | 632.84 | 1159.05 | 1103.53 |
| | | | | | | | | 865.77 | 631.87 | 1159.05 | 1104.05 |

| Name | M. | ID | RB | Residents | Absorption | Height | Coordinates | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Begin | x | y | z | Ground |
| | | | | | | (ft) | (ft) | (ft) | (ft) | (ft) |
| | | | | | | | 865.77 | 627.96 | 1159.05 | 1103.97 |
| | | | | | | | 854.38 | 627.31 | 1159.05 | 1104.05 |
| | | | | | | | 854.05 | 624.38 | 1159.05 | 1103.99 |

## Terrain Contours

| Name | M. | ID | OnlyPts | Height | | Coordinates | | |
|---|---|---|---|---|---|---|---|---|
| | | | | Begin | End | x | y | z |
| | | | | (ft) | (ft) | (ft) | (ft) | (ft) |
| 1109 | | | | 1109.00 | | 595.22 | 919.18 | 1109.00 |
| | | | | | | 672.73 | 929.52 | 1109.00 |
| | | | | | | 684.62 | 927.45 | 1109.00 |
| | | | | | | 716.14 | 899.55 | 1109.00 |
| | | | | | | 724.92 | 897.48 | 1109.00 |
| | | | | | | 735.26 | 904.20 | 1109.00 |
| | | | | | | 755.93 | 918.15 | 1109.00 |
| | | | | | | 814.84 | 927.45 | 1109.00 |
| | | | | | | 883.31 | 932.36 | 1109.00 |
| | | | | | | 957.98 | 939.08 | 1109.00 |
| | | | | | | 1014.04 | 937.01 | 1109.00 |
| | | | | | | 1029.80 | 937.53 | 1109.00 |
| | | | | | | 1049.70 | 929.78 | 1109.00 |
| | | | | | | 1057.71 | 921.51 | 1109.00 |
| | | | | | | 1061.84 | 926.42 | 1109.00 |
| | | | | | | 1059.78 | 937.27 | 1109.00 |
| | | | | | | 1062.10 | 939.60 | 1109.00 |
| | | | | | | 1065.46 | 933.39 | 1109.00 |
| | | | | | | 1085.61 | 933.14 | 1109.00 |
| | | | | | | 1095.95 | 929.26 | 1109.00 |
| | | | | | | 1132.45 | 942.80 | 1109.00 |
| | | | | | | 1160.75 | 1040.00 | 1109.00 |
| 1108 | | | | 1108.00 | | 285.88 | 823.10 | 1108.00 |
| | | | | | | 676.10 | 842.69 | 1108.00 |
| | | | | | | 713.83 | 843.51 | 1108.00 |
| | | | | | | 726.96 | 845.97 | 1108.00 |
| | | | | | | 747.88 | 864.42 | 1108.00 |
| | | | | | | 761.82 | 870.99 | 1108.00 |
| | | | | | | 802.42 | 866.07 | 1108.00 |
| | | | | | | 813.91 | 872.63 | 1108.00 |
| | | | | | | 843.03 | 892.72 | 1108.00 |
| | | | | | | 861.49 | 896.83 | 1108.00 |
| | | | | | | 891.84 | 918.56 | 1108.00 |
| | | | | | | 915.21 | 923.90 | 1108.00 |
| | | | | | | 950.08 | 928.41 | 1108.00 |
| | | | | | | 971.81 | 928.00 | 1108.00 |
| | | | | | | 987.40 | 923.90 | 1108.00 |
| | | | | | | 1021.85 | 926.36 | 1108.00 |
| | | | | | | 1035.39 | 928.00 | 1108.00 |
| | | | | | | 1054.25 | 916.10 | 1108.00 |
| | | | | | | 1076.81 | 875.09 | 1108.00 |
| | | | | | | 1086.24 | 868.94 | 1108.00 |
| | | | | | | 1095.68 | 880.83 | 1108.00 |
| | | | | | | 1107.98 | 900.93 | 1108.00 |

| Name | M. | ID | OnlyPts | Height | | Coordinates | | |
|---|---|---|---|---|---|---|---|---|
| | | | | Begin | End | x | y | z |
| | | | | (ft) | (ft) | (ft) | (ft) | (ft) |
| | | | | | | 1137.92 | 917.33 | 1108.00 |
| | | | | | | 1327.83 | 1145.38 | 1108.00 |
| 1107 | | | | 1107.00 | | 274.99 | 754.01 | 1107.00 |
| | | | | | | 681.54 | 772.37 | 1107.00 |
| | | | | | | 728.30 | 783.44 | 1107.00 |
| | | | | | | 739.78 | 796.16 | 1107.00 |
| | | | | | | 750.44 | 810.10 | 1107.00 |
| | | | | | | 770.54 | 815.43 | 1107.00 |
| | | | | | | 789.82 | 801.49 | 1107.00 |
| | | | | | | 795.97 | 797.39 | 1107.00 |
| | | | | | | 817.30 | 798.62 | 1107.00 |
| | | | | | | 877.18 | 810.10 | 1107.00 |
| | | | | | | 920.65 | 832.25 | 1107.00 |
| | | | | | | 942.39 | 849.47 | 1107.00 |
| | | | | | | 945.26 | 857.27 | 1107.00 |
| | | | | | | 935.01 | 870.39 | 1107.00 |
| | | | | | | 931.32 | 882.70 | 1107.00 |
| | | | | | | 939.11 | 885.57 | 1107.00 |
| | | | | | | 949.77 | 876.13 | 1107.00 |
| | | | | | | 963.72 | 874.49 | 1107.00 |
| | | | | | | 981.77 | 890.08 | 1107.00 |
| | | | | | | 1009.25 | 910.18 | 1107.00 |
| | | | | | | 1016.22 | 920.02 | 1107.00 |
| | | | | | | 1036.73 | 920.84 | 1107.00 |
| | | | | | | 1052.72 | 908.95 | 1107.00 |
| | | | | | | 1062.56 | 868.34 | 1107.00 |
| | | | | | | 1068.31 | 852.76 | 1107.00 |
| | | | | | | 1089.63 | 845.37 | 1107.00 |
| | | | | | | 1106.86 | 862.60 | 1107.00 |
| | | | | | | 1176.99 | 906.48 | 1107.00 |
| | | | | | | 1356.64 | 1138.22 | 1107.00 |
| 1106 | | | | 1106.00 | | 301.14 | 684.76 | 1106.00 |
| | | | | | | 670.06 | 728.07 | 1106.00 |
| | | | | | | 732.40 | 745.71 | 1106.00 |
| | | | | | | 772.59 | 734.63 | 1106.00 |
| | | | | | | 857.90 | 732.99 | 1106.00 |
| | | | | | | 890.71 | 728.89 | 1106.00 |
| | | | | | | 909.17 | 732.58 | 1106.00 |
| | | | | | | 940.75 | 752.27 | 1106.00 |
| | | | | | | 952.65 | 784.67 | 1106.00 |
| | | | | | | 973.97 | 796.98 | 1106.00 |
| | | | | | | 1003.91 | 824.87 | 1106.00 |
| | | | | | | 1020.73 | 865.06 | 1106.00 |
| | | | | | | 1039.19 | 869.16 | 1106.00 |
| | | | | | | 1060.10 | 851.53 | 1106.00 |
| | | | | | | 1080.20 | 808.46 | 1106.00 |

| Name | M. | ID | OnlyPts | Height | | Coordinates | | |
|---|---|---|---|---|---|---|---|---|
| | | | | Begin | End | x | y | z |
| | | | | (ft) | (ft) | (ft) | (ft) | (ft) |
| | | | | | | 1084.71 | 806.41 | 1106.00 |
| | | | | | | 1107.68 | 836.35 | 1106.00 |
| | | | | | | 1242.62 | 913.05 | 1106.00 |
| | | | | | | 1380.02 | 1127.97 | 1106.00 |
| 1105 | | | | 1105.00 | | 308.23 | 607.90 | 1105.00 |
| | | | | | | 655.70 | 681.31 | 1105.00 |
| | | | | | | 673.34 | 687.88 | 1105.00 |
| | | | | | | 700.82 | 682.96 | 1105.00 |
| | | | | | | 711.07 | 678.03 | 1105.00 |
| | | | | | | 720.09 | 687.88 | 1105.00 |
| | | | | | | 738.96 | 698.54 | 1105.00 |
| | | | | | | 759.06 | 695.67 | 1105.00 |
| | | | | | | 811.97 | 672.70 | 1105.00 |
| | | | | | | 845.60 | 670.65 | 1105.00 |
| | | | | | | 914.50 | 686.65 | 1105.00 |
| | | | | | | 987.92 | 736.68 | 1105.00 |
| | | | | | | 1037.96 | 736.27 | 1105.00 |
| | | | | | | 1056.82 | 755.55 | 1105.00 |
| | | | | | | 1063.79 | 794.52 | 1105.00 |
| | | | | | | 1065.44 | 800.26 | 1105.00 |
| | | | | | | 1071.18 | 782.21 | 1105.00 |
| | | | | | | 1076.10 | 741.20 | 1105.00 |
| | | | | | | 1080.20 | 739.56 | 1105.00 |
| | | | | | | 1087.99 | 744.48 | 1105.00 |
| | | | | | | 1092.92 | 761.70 | 1105.00 |
| | | | | | | 1095.38 | 780.98 | 1105.00 |
| | | | | | | 1098.66 | 788.36 | 1105.00 |
| | | | | | | 1610.53 | 1097.21 | 1105.00 |
| 1104 | | | | 1104.00 | | 338.98 | 540.41 | 1104.00 |
| | | | | | | 675.33 | 631.27 | 1104.00 |
| | | | | | | 729.37 | 612.39 | 1104.00 |
| | | | | | | 764.53 | 598.06 | 1104.00 |
| | | | | | | 789.92 | 600.02 | 1104.00 |
| | | | | | | 847.21 | 622.15 | 1104.00 |
| | | | | | | 879.51 | 634.55 | 1104.00 |
| | | | | | | 914.39 | 645.92 | 1104.00 |
| | | | | | | 975.88 | 671.50 | 1104.00 |
| | | | | | | 990.87 | 674.86 | 1104.00 |
| | | | | | | 1024.20 | 661.94 | 1104.00 |
| | | | | | | 1046.16 | 675.64 | 1104.00 |
| | | | | | | 1050.29 | 684.42 | 1104.00 |
| | | | | | | 1058.30 | 710.26 | 1104.00 |
| | | | | | | 1062.70 | 736.61 | 1104.00 |
| | | | | | | 1066.39 | 766.96 | 1104.00 |
| | | | | | | 1067.82 | 767.17 | 1104.00 |
| | | | | | | 1068.85 | 757.32 | 1104.00 |

| Name | M. | ID | OnlyPts | Height | | Coordinates | | |
|---|---|---|---|---|---|---|---|---|
| | | | | Begin | End | x | y | z |
| | | | | (ft) | (ft) | (ft) | (ft) | (ft) |
| | | | | | | 1071.72 | 697.24 | 1104.00 |
| | | | | | | 1076.23 | 680.22 | 1104.00 |
| | | | | | | 1082.18 | 672.83 | 1104.00 |
| | | | | | | 1086.08 | 671.81 | 1104.00 |
| | | | | | | 1098.59 | 690.06 | 1104.00 |
| | | | | | | 1106.38 | 740.30 | 1104.00 |
| | | | | | | 1128.12 | 764.50 | 1104.00 |
| | | | | | | 1652.30 | 1072.94 | 1104.00 |
| 1103 | | | | 1103.00 | | 369.94 | 442.04 | 1103.00 |
| | | | | | | 678.79 | 578.21 | 1103.00 |
| | | | | | | 708.32 | 589.69 | 1103.00 |
| | | | | | | 728.01 | 579.85 | 1103.00 |
| | | | | | | 744.41 | 555.65 | 1103.00 |
| | | | | | | 771.89 | 546.63 | 1103.00 |
| | | | | | | 830.14 | 558.52 | 1103.00 |
| | | | | | | 867.87 | 575.34 | 1103.00 |
| | | | | | | 895.76 | 593.38 | 1103.00 |
| | | | | | | 960.57 | 589.69 | 1103.00 |
| | | | | | | 1034.80 | 594.20 | 1103.00 |
| | | | | | | 1053.26 | 603.23 | 1103.00 |
| | | | | | | 1057.77 | 657.37 | 1103.00 |
| | | | | | | 1062.69 | 675.83 | 1103.00 |
| | | | | | | 1067.62 | 670.90 | 1103.00 |
| | | | | | | 1072.95 | 630.71 | 1103.00 |
| | | | | | | 1082.38 | 605.69 | 1103.00 |
| | | | | | | 1089.76 | 603.23 | 1103.00 |
| | | | | | | 1106.17 | 652.04 | 1103.00 |
| | | | | | | 1159.49 | 704.54 | 1103.00 |
| | | | | | | 1705.00 | 1001.49 | 1103.00 |
| 1102 | | | | 1102.00 | | 392.38 | 381.44 | 1102.00 |
| | | | | | | 680.93 | 526.83 | 1102.00 |
| | | | | | | 721.30 | 532.04 | 1102.00 |
| | | | | | | 772.08 | 525.53 | 1102.00 |
| | | | | | | 807.24 | 517.07 | 1102.00 |
| | | | | | | 843.05 | 510.56 | 1102.00 |
| | | | | | | 902.30 | 516.42 | 1102.00 |
| | | | | | | 913.37 | 520.97 | 1102.00 |
| | | | | | | 959.59 | 521.62 | 1102.00 |
| | | | | | | 973.27 | 521.62 | 1102.00 |
| | | | | | | 1023.40 | 532.04 | 1102.00 |
| | | | | | | 1057.91 | 534.65 | 1102.00 |
| | | | | | | 1060.51 | 543.76 | 1102.00 |
| | | | | | | 1063.79 | 558.32 | 1102.00 |
| | | | | | | 1065.64 | 566.73 | 1102.00 |
| | | | | | | 1072.82 | 556.27 | 1102.00 |
| | | | | | | 1085.33 | 549.71 | 1102.00 |

| Name | M. | ID | OnlyPts | Height | | Coordinates | | |
|---|---|---|---|---|---|---|---|---|
| | | | | Begin | End | x | y | z |
| | | | | (ft) | (ft) | (ft) | (ft) | (ft) |
| | | | | | | 1091.07 | 551.35 | 1102.00 |
| | | | | | | 1106.04 | 576.16 | 1102.00 |
| | | | | | | 1111.99 | 593.80 | 1102.00 |
| | | | | | | 1150.54 | 642.61 | 1102.00 |
| | | | | | | 1737.89 | 968.69 | 1102.00 |
| north | | | | | | 284.60 | 871.45 | 1113.00 |
| | | | | | | 327.26 | 1045.36 | 1112.00 |
| | | | | | | 488.04 | 1056.84 | 1111.00 |
| | | | | | | 758.75 | 1053.56 | 1112.00 |
| | | | | | | 914.61 | 1058.48 | 1109.00 |
| | | | | | | 1109.84 | 1055.20 | 1109.00 |
| | | | | | | 1239.45 | 1073.25 | 1107.00 |
| south | | | | | | 446.36 | 325.12 | 1103.00 |
| | | | | | | 772.03 | 293.95 | 1098.00 |
| | | | | | | 887.69 | 293.13 | 1099.00 |
| | | | | | | 973.83 | 294.77 | 1099.00 |
| | | | | | | 1137.07 | 325.12 | 1098.00 |
| | | | | | | 1541.40 | 422.13 | 1102.00 |
| | | | | | | 1607.81 | 579.05 | 1103.00 |
| south | | | | | | 232.11 | 45.31 | 1100.00 |
| | | | | | | 783.36 | 97.81 | 1099.00 |
| | | | | | | 1367.43 | 165.08 | 1095.00 |
| | | | | | | 1835.02 | 207.73 | 1092.00 |
| north | | | | 1115.00 | | 253.86 | 1345.81 | 1115.00 |
| | | | | | | 1599.53 | 1337.54 | 1115.00 |
| south | | | | 1090.00 | | 46.43 | -186.20 | 1090.00 |
| | | | | | | 1877.30 | -160.15 | 1090.00 |

## Sound Level Spectra

| Name | ID | Type | 1/3 Oktave Spectrum (dB) | | | | | | | | | | | Source |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Weight. | 63 | 125 | 250 | 500 | 1000 | 2000 | 4000 | 8000 | A | lin | |
| Drive-Through Intercom | DT | Lw (c) | A | | | | 84.5 | | | | | 84.5 | 87.7 | Mfr |
| Carrier 48M06 | S4 | Lw | | 85.6 | 84.7 | 80.5 | 76.0 | 72.4 | 68.0 | 62.8 | 59.3 | 78.5 | 89.2 | Mfr |
| Amana PTAC | S5 | Lw | A | | 39.0 | 49.0 | 52.0 | 56.0 | 56.0 | 53.0 | 48.0 | 61.2 | 63.4 | Mfr |

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Date: 03 Feb 2022

## Calculation Configuration

| Configuration | |
|---|---|
| Parameter | Value |
| General | |
| Country | (user defined) |
| Max. Error (dB) | 0.00 |
| Max. Search Radius (#(Unit,LEN)) | 2000.00 |
| Min. Dist Src to Rcvr | 0.00 |
| Partition | |
| Raster Factor | 0.50 |
| Max. Length of Section (#(Unit,LEN)) | 1000.00 |
| Min. Length of Section (#(Unit,LEN)) | 1.00 |
| Min. Length of Section (%) | 0.00 |
| Proj. Line Sources | On |
| Proj. Area Sources | On |
| Ref. Time | |
| Reference Time Day (min) | 960.00 |
| Reference Time Night (min) | 480.00 |
| Daytime Penalty (dB) | 0.00 |
| Recr. Time Penalty (dB) | 6.00 |
| Night-time Penalty (dB) | 10.00 |
| DTM | |
| Standard Height (m) | 0.00 |
| Model of Terrain | Triangulation |
| Reflection | |
| max. Order of Reflection | 0 |
| Search Radius Src | 100.00 |
| Search Radius Rcvr | 100.00 |
| Max. Distance Source - Rcvr | 1000.00 1000.00 |
| Min. Distance Rvcr - Reflector | 1.00 1.00 |
| Min. Distance Source - Reflector | 0.10 |
| Industrial (ISO 9613) | |
| Lateral Diffraction | some Obj |
| Obst. within Area Src do not shield | On |
| Screening | Excl. Ground Att. over Barrier |
| | Dz with limit (20/25) |
| Barrier Coefficients C1,2,3 | 3.0 20.0 0.0 |
| Temperature (#(Unit,TEMP)) | 10 |
| rel. Humidity (%) | 70 |
| Ground Absorption G | 0.50 |
| Wind Speed for Dir. (#(Unit,SPEED)) | 3.0 |
| Roads (TNM) | |
| Railways (Schall 03 (1990)) | |
| Strictly acc. to Schall 03 / Schall-Transrapid | |
| Aircraft (???) | |
| Strictly acc. to AzB | |

## Receivers

| Name | M. | ID | Level Lr | | Limit. Value | | Land Use | | | Height | | Coordinates | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Day | Night | Day | Night | Type | Auto | Noise Type | | | X | Y | Z |
| | | | (dBA) | (dBA) | (dBA) | (dBA) | | | | (ft) | | (ft) | (ft) | (ft) |
| North | | R8 | 61.6 | -80.2 | 0.0 | 0.0 | | x | Total | 5.00 | r | 908.45 | 1030.22 | 1114.00 |
| South | | R9 | 70.1 | -80.2 | 0.0 | 0.0 | | x | Total | 5.00 | r | 972.55 | 550.46 | 1107.41 |
| East | | R10 | 63.9 | -80.2 | 0.0 | 0.0 | | x | Total | 5.00 | r | 1125.92 | 730.72 | 1108.67 |
| West | | R11 | 62.8 | -80.2 | 0.0 | 0.0 | | x | Total | 5.00 | r | 671.55 | 735.91 | 1111.18 |

## Area Sources

| Name | M. | ID | Result. PWL | | | Result. PWL" | | | Lw / Li | | | Correction | | | Sound Reduction | | Attenuation | Operating Time | | | K0 | Freq. | Direct. | Moving Pt. Src | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Day | Evening | Night | Day | Evening | Night | Type | Value | norm. | Day | Evening | Night | R | Area | | Day | Special | Night | | | | Number | | |
| | | | (dBA) | (dBA) | (dBA) | (dBA) | (dBA) | (dBA) | | | dB(A) | dB(A) | dB(A) | dB(A) | | (ft²) | | (min) | (min) | (min) | (dB) | (Hz) | | Day | Evening | Night |
| Excavator | + | | 109.3 | 109.3 | 109.3 | 69.2 | 69.2 | 69.2 | Lw | S1 | | 0.0 | 0.0 | 0.0 | | | | 24.00 | 0.00 | 0.00 | 0.0 | | (none) | | | |
| Backhoe | + | | 107.1 | 107.1 | 107.1 | 67.0 | 67.0 | 67.0 | Lw | S2 | | 0.0 | 0.0 | 0.0 | | | | 24.00 | 0.00 | 0.00 | 0.0 | | (none) | | | |
| Water Truck | + | | 111.8 | 111.8 | 111.8 | 71.7 | 71.7 | 71.7 | Lw | S3 | | 0.0 | 0.0 | 0.0 | | | | 24.00 | 0.00 | 0.00 | 0.0 | | (none) | | | |
| Skip Loader | + | | 106.5 | 106.5 | 106.5 | 66.4 | 66.4 | 66.4 | Lw | S4 | | 0.0 | 0.0 | 0.0 | | | | 24.00 | 0.00 | 0.00 | 0.0 | | (none) | | | |

## Geometry - Area Sources

| Name | Height | | | | Coordinates | | | |
|---|---|---|---|---|---|---|---|---|
| | Begin | | End | | x | y | z | Ground |
| | (ft) | | (ft) | | (ft) | (ft) | (ft) | (ft) |
| Excavator | 5.00 | r | | | 760.67 | 927.58 | 1114.19 | 1109.19 |
| | | | | | 1038.69 | 926.55 | 1113.06 | 1108.06 |
| | | | | | 1061.43 | 902.77 | 1112.97 | 1107.97 |
| | | | | | 1059.36 | 557.58 | 1107.04 | 1102.04 |
| | | | | | 762.22 | 551.89 | 1108.04 | 1103.04 |
| Backhoe | 5.00 | r | | | 760.67 | 927.58 | 1114.19 | 1109.19 |
| | | | | | 1038.69 | 926.55 | 1113.06 | 1108.06 |
| | | | | | 1061.43 | 902.77 | 1112.97 | 1107.97 |
| | | | | | 1059.36 | 557.58 | 1107.04 | 1102.04 |
| | | | | | 762.22 | 551.89 | 1108.04 | 1103.04 |
| Water Truck | 5.00 | r | | | 760.67 | 927.58 | 1114.19 | 1109.19 |
| | | | | | 1038.69 | 926.55 | 1113.06 | 1108.06 |
| | | | | | 1061.43 | 902.77 | 1112.97 | 1107.97 |
| | | | | | 1059.36 | 557.58 | 1107.04 | 1102.04 |
| | | | | | 762.22 | 551.89 | 1108.04 | 1103.04 |
| Skip Loader | 5.00 | r | | | 760.67 | 927.58 | 1114.19 | 1109.19 |
| | | | | | 1038.69 | 926.55 | 1113.06 | 1108.06 |
| | | | | | 1061.43 | 902.77 | 1112.97 | 1107.97 |
| | | | | | 1059.36 | 557.58 | 1107.04 | 1102.04 |
| | | | | | 762.22 | 551.89 | 1108.04 | 1103.04 |

## Sound Level Spectra

| Name | ID | Type | 1/3 Oktave Spectrum (dB) | | | | | | | | | | | Source |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Weight. | 63 | 125 | 250 | 500 | 1000 | 2000 | 4000 | 8000 | A | lin | |
| Excavator | S1 | Lw (c) | | 99.4 | 107.6 | 109.9 | 105.2 | 104.7 | 101.5 | 96.6 | 92.6 | 109.3 | 113.9 | Brutoco Measurements |
| Backhoe | S2 | Lw (c) | | 97.6 | 107.5 | 100.0 | 105.7 | 102.3 | 98.8 | 94.6 | 89.4 | 107.1 | 111.3 | Brutoco Measurement |
| Water Truck | S3 | Lw (c) | | 121.0 | 104.1 | 101.2 | 100.4 | 107.1 | 107.7 | 99.4 | 92.8 | 111.8 | 121.5 | Brutoco Measurements |
| Skip Loader | S4 | Lw (c) | | 113.0 | 113.0 | 102.0 | 104.0 | 100.0 | 98.0 | 97.0 | 89.0 | 106.5 | 116.6 | DEFRA |
| Concrete Mixer | S5 | Lw (c) | | 110.0 | 111.0 | 104.0 | 103.0 | 100.0 | 99.0 | 90.0 | 84.0 | 105.8 | 114.6 | Defra |
| Concrete Pump | S6 | Lw (c) | | 115.0 | 106.0 | 102.0 | 101.0 | 101.0 | 100.0 | 92.0 | 83.0 | 105.8 | 116.1 | Defra |
| Paver | S7 | Lw (c) | | 109.0 | 108.0 | 103.0 | 103.0 | 102.0 | 100.0 | 93.0 | 87.0 | 106.6 | 113.2 | Defra |
| Roller | S8 | Lw (c) | | 121.0 | 113.0 | 104.0 | 103.0 | 101.0 | 96.0 | 90.0 | 85.0 | 106.0 | 121.8 | Defra |
| Dump Truck | S9 | Lw (c) | | 108.0 | 108.0 | 107.0 | 103.0 | 102.0 | 100.0 | 95.0 | 85.0 | 107.1 | 113.5 | Defra |
| Crane | S10 | Lw (c) | | 112.0 | 108.0 | 100.0 | 98.0 | 93.0 | 91.0 | 92.0 | 82.0 | 100.8 | 113.8 | Defra |
| Telescopic Forklift | S11 | Lw (c) | | 108.7 | 105.0 | 105.2 | 102.5 | 105.1 | 102.7 | 97.5 | 91.5 | 109.0 | 113.4 | Brutoco Measurements |

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Date: 03 Feb 2022

## Calculation Configuration

| Configuration | |
|---|---|
| Parameter | Value |
| General | |
| Country | (user defined) |
| Max. Error (dB) | 0.00 |
| Max. Search Radius (#(Unit,LEN)) | 2000.00 |
| Min. Dist Src to Rcvr | 0.00 |
| Partition | |
| Raster Factor | 0.50 |
| Max. Length of Section (#(Unit,LEN)) | 1000.00 |
| Min. Length of Section (#(Unit,LEN)) | 1.00 |
| Min. Length of Section (%) | 0.00 |
| Proj. Line Sources | On |
| Proj. Area Sources | On |
| Ref. Time | |
| Reference Time Day (min) | 960.00 |
| Reference Time Night (min) | 480.00 |
| Daytime Penalty (dB) | 0.00 |
| Recr. Time Penalty (dB) | 6.00 |
| Night-time Penalty (dB) | 10.00 |
| DTM | |
| Standard Height (m) | 0.00 |
| Model of Terrain | Triangulation |
| Reflection | |
| max. Order of Reflection | 0 |
| Search Radius Src | 100.00 |
| Search Radius Rcvr | 100.00 |
| Max. Distance Source - Rcvr | 1000.00 1000.00 |
| Min. Distance Rvcr - Reflector | 1.00 1.00 |
| Min. Distance Source - Reflector | 0.10 |
| Industrial (ISO 9613) | |
| Lateral Diffraction | some Obj |
| Obst. within Area Src do not shield | On |
| Screening | Excl. Ground Att. over Barrier |
| | Dz with limit (20/25) |
| Barrier Coefficients C1,2,3 | 3.0 20.0 0.0 |
| Temperature (#(Unit,TEMP)) | 10 |
| rel. Humidity (%) | 70 |
| Ground Absorption G | 0.50 |
| Wind Speed for Dir. (#(Unit,SPEED)) | 3.0 |
| Roads (TNM) | |
| Railways (Schall 03 (1990)) | |
| Strictly acc. to Schall 03 / Schall-Transrapid | |
| Aircraft (???) | |
| Strictly acc. to AzB | |

## Receivers

| Name | M. | ID | Level Lr | | Limit. Value | | Land Use | | | Height | | Coordinates | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Day | Night | Day | Night | Type | Auto | Noise Type | | | X | Y | Z |
| | | | (dBA) | (dBA) | (dBA) | (dBA) | | | | (ft) | | (ft) | (ft) | (ft) |
| North | | R8 | 53.8 | -80.2 | 0.0 | 0.0 | | x | Total | 5.00 | r | 908.45 | 1030.22 | 1114.00 |
| South | | R9 | 62.4 | -80.2 | 0.0 | 0.0 | | x | Total | 5.00 | r | 972.55 | 550.46 | 1107.41 |
| East | | R10 | 56.1 | -80.2 | 0.0 | 0.0 | | x | Total | 5.00 | r | 1125.92 | 730.72 | 1108.67 |
| West | | R11 | 55.0 | -80.2 | 0.0 | 0.0 | | x | Total | 5.00 | r | 671.55 | 735.91 | 1111.18 |

## Area Sources

| Name | M. | ID | Result. PWL | | | Result. PWL" | | | Lw / Li | | | Correction | | | Sound Reduction | | Attenuation | Operating Time | | | K0 | Freq. | Direct. | Moving Pt. Src | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Day | Evening | Night | Day | Evening | Night | Type | Value | norm. | Day | Evening | Night | R | Area | | Day | Special | Night | | | | Number | | |
| | | | (dBA) | (dBA) | (dBA) | (dBA) | (dBA) | (dBA) | | | dB(A) | dB(A) | dB(A) | dB(A) | | (ft²) | | (min) | (min) | (min) | (dB) | (Hz) | | Day | Evening | Night |
| Concrete Mixer | + | | 105.8 | 105.8 | 105.8 | 65.7 | 65.7 | 65.7 | Lw | S5 | | 0.0 | 0.0 | 0.0 | | | | 24.00 | 0.00 | 0.00 | 0.0 | | (none) | | | |
| Concrete Pump | + | | 105.8 | 105.8 | 105.8 | 65.6 | 65.6 | 65.6 | Lw | S6 | | 0.0 | 0.0 | 0.0 | | | | 12.00 | 0.00 | 0.00 | 0.0 | | (none) | | | |

## Geometry - Area Sources

| Name | Height | | | | Coordinates | | | |
|---|---|---|---|---|---|---|---|---|
| | Begin | | End | | x | y | z | Ground |
| | (ft) | | (ft) | | (ft) | (ft) | (ft) | (ft) |
| Concrete Mixer | 5.00 | r | | | 760.67 | 927.58 | 1114.19 | 1109.19 |
| | | | | | 1038.69 | 926.55 | 1113.06 | 1108.06 |
| | | | | | 1061.43 | 902.77 | 1112.97 | 1107.97 |
| | | | | | 1059.36 | 557.58 | 1107.04 | 1102.04 |
| | | | | | 762.22 | 551.89 | 1108.04 | 1103.04 |
| Concrete Pump | 5.00 | r | | | 760.67 | 927.58 | 1114.19 | 1109.19 |
| | | | | | 1038.69 | 926.55 | 1113.06 | 1108.06 |
| | | | | | 1061.43 | 902.77 | 1112.97 | 1107.97 |
| | | | | | 1059.36 | 557.58 | 1107.04 | 1102.04 |
| | | | | | 762.22 | 551.89 | 1108.04 | 1103.04 |

## Sound Level Spectra

| Name | ID | Type | 1/3 Oktave Spectrum (dB) | | | | | | | | | | | Source |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Weight. | 63 | 125 | 250 | 500 | 1000 | 2000 | 4000 | 8000 | A | lin | |
| Excavator | S1 | Lw (c) | | 99.4 | 107.6 | 109.9 | 105.2 | 104.7 | 101.5 | 96.6 | 92.6 | 109.3 | 113.9 | Brutoco Measurements |
| Backhoe | S2 | Lw (c) | | 97.6 | 107.5 | 100.0 | 105.7 | 102.3 | 98.8 | 94.6 | 89.4 | 107.1 | 111.3 | Brutoco Measurement |
| Water Truck | S3 | Lw (c) | | 121.0 | 104.1 | 101.2 | 100.4 | 107.1 | 107.7 | 99.4 | 92.8 | 111.8 | 121.5 | Brutoco Measurements |
| Skip Loader | S4 | Lw (c) | | 113.0 | 113.0 | 102.0 | 104.0 | 100.0 | 98.0 | 97.0 | 89.0 | 106.5 | 116.6 | DEFRA |
| Concrete Mixer | S5 | Lw (c) | | 110.0 | 111.0 | 104.0 | 103.0 | 100.0 | 99.0 | 90.0 | 84.0 | 105.8 | 114.6 | Defra |
| Concrete Pump | S6 | Lw (c) | | 115.0 | 106.0 | 102.0 | 101.0 | 101.0 | 100.0 | 92.0 | 83.0 | 105.8 | 116.1 | Defra |
| Paver | S7 | Lw (c) | | 109.0 | 108.0 | 103.0 | 103.0 | 102.0 | 100.0 | 93.0 | 87.0 | 106.6 | 113.2 | Defra |
| Roller | S8 | Lw (c) | | 121.0 | 113.0 | 104.0 | 103.0 | 101.0 | 96.0 | 90.0 | 85.0 | 106.0 | 121.8 | Defra |
| Dump Truck | S9 | Lw (c) | | 108.0 | 108.0 | 107.0 | 103.0 | 102.0 | 100.0 | 95.0 | 85.0 | 107.1 | 113.5 | Defra |
| Crane | S10 | Lw (c) | | 112.0 | 108.0 | 100.0 | 98.0 | 93.0 | 91.0 | 92.0 | 82.0 | 100.8 | 113.8 | Defra |
| Telescopic Forklift | S11 | Lw (c) | | 108.7 | 105.0 | 105.2 | 102.5 | 105.1 | 102.7 | 97.5 | 91.5 | 109.0 | 113.4 | Brutoco Measurements |

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Date: 03 Feb 2022

## Calculation Configuration

| Configuration | |
|---|---|
| Parameter | Value |
| General | |
| Country | (user defined) |
| Max. Error (dB) | 0.00 |
| Max. Search Radius (#(Unit,LEN)) | 2000.00 |
| Min. Dist Src to Rcvr | 0.00 |
| Partition | |
| Raster Factor | 0.50 |
| Max. Length of Section (#(Unit,LEN)) | 1000.00 |
| Min. Length of Section (#(Unit,LEN)) | 1.00 |
| Min. Length of Section (%) | 0.00 |
| Proj. Line Sources | On |
| Proj. Area Sources | On |
| Ref. Time | |
| Reference Time Day (min) | 960.00 |
| Reference Time Night (min) | 480.00 |
| Daytime Penalty (dB) | 0.00 |
| Recr. Time Penalty (dB) | 6.00 |
| Night-time Penalty (dB) | 10.00 |
| DTM | |
| Standard Height (m) | 0.00 |
| Model of Terrain | Triangulation |
| Reflection | |
| max. Order of Reflection | 0 |
| Search Radius Src | 100.00 |
| Search Radius Rcvr | 100.00 |
| Max. Distance Source - Rcvr | 1000.00 1000.00 |
| Min. Distance Rvcr - Reflector | 1.00 1.00 |
| Min. Distance Source - Reflector | 0.10 |
| Industrial (ISO 9613) | |
| Lateral Diffraction | some Obj |
| Obst. within Area Src do not shield | On |
| Screening | Excl. Ground Att. over Barrier |
| | Dz with limit (20/25) |
| Barrier Coefficients C1,2,3 | 3.0 20.0 0.0 |
| Temperature (#(Unit,TEMP)) | 10 |
| rel. Humidity (%) | 70 |
| Ground Absorption G | 0.50 |
| Wind Speed for Dir. (#(Unit,SPEED)) | 3.0 |
| Roads (TNM) | |
| Railways (Schall 03 (1990)) | |
| Strictly acc. to Schall 03 / Schall-Transrapid | |
| Aircraft (???) | |
| Strictly acc. to AzB | |

## Receivers

| Name | M. | ID | Level Lr | | Limit. Value | | Land Use | | | Height | | Coordinates | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Day | Night | Day | Night | Type | Auto | Noise Type | | | X | Y | Z |
| | | | (dBA) | (dBA) | (dBA) | (dBA) | | | | (ft) | | (ft) | (ft) | (ft) |
| North | | R8 | 57.3 | -80.2 | 0.0 | 0.0 | | x | Total | 5.00 | r | 908.45 | 1030.22 | 1114.00 |
| South | | R9 | 65.9 | -80.2 | 0.0 | 0.0 | | x | Total | 5.00 | r | 972.55 | 550.46 | 1107.41 |
| East | | R10 | 59.7 | -80.2 | 0.0 | 0.0 | | x | Total | 5.00 | r | 1125.92 | 730.72 | 1108.67 |
| West | | R11 | 58.6 | -80.2 | 0.0 | 0.0 | | x | Total | 5.00 | r | 671.55 | 735.91 | 1111.18 |

## Area Sources

| Name | M. | ID | Result. PWL | | | Result. PWL" | | | Lw / Li | | | Correction | | | Sound Reduction | | Attenuation | Operating Time | | | K0 | Freq. | Direct. | Moving Pt. Src | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Day | Evening | Night | Day | Evening | Night | Type | Value | norm. | Day | Evening | Night | R | Area | | Day | Special | Night | | | | Number | | |
| | | | (dBA) | (dBA) | (dBA) | (dBA) | (dBA) | (dBA) | | | dB(A) | dB(A) | dB(A) | dB(A) | | (ft²) | | (min) | (min) | (min) | (dB) | (Hz) | | Day | Evening | Night |
| Paver | + | | 106.6 | 106.6 | 106.6 | 66.5 | 66.5 | 66.5 | Lw | S7 | | 0.0 | 0.0 | 0.0 | | | | 30.00 | 0.00 | 0.00 | 0.0 | | (none) | | | |
| Roller | + | | 106.0 | 106.0 | 106.0 | 65.9 | 65.9 | 65.9 | Lw | S8 | | 0.0 | 0.0 | 0.0 | | | | 12.00 | 0.00 | 0.00 | 0.0 | | (none) | | | |
| Dump Truck | + | | 107.1 | 107.1 | 107.1 | 67.0 | 67.0 | 67.0 | Lw | S9 | | 0.0 | 0.0 | 0.0 | | | | 24.00 | 0.00 | 0.00 | 0.0 | | (none) | | | |

## Geometry - Area Sources

| Name | Height | | | | Coordinates | | | |
|---|---|---|---|---|---|---|---|---|
| | Begin | | End | | x | y | z | Ground |
| | (ft) | | (ft) | | (ft) | (ft) | (ft) | (ft) |
| Paver | 5.00 | r | | | 760.67 | 927.58 | 1114.19 | 1109.19 |
| | | | | | 1038.69 | 926.55 | 1113.06 | 1108.06 |
| | | | | | 1061.43 | 902.77 | 1112.97 | 1107.97 |
| | | | | | 1059.36 | 557.58 | 1107.04 | 1102.04 |
| | | | | | 762.22 | 551.89 | 1108.04 | 1103.04 |
| Roller | 5.00 | r | | | 760.67 | 927.58 | 1114.19 | 1109.19 |
| | | | | | 1038.69 | 926.55 | 1113.06 | 1108.06 |
| | | | | | 1061.43 | 902.77 | 1112.97 | 1107.97 |
| | | | | | 1059.36 | 557.58 | 1107.04 | 1102.04 |
| | | | | | 762.22 | 551.89 | 1108.04 | 1103.04 |
| Dump Truck | 5.00 | r | | | 760.67 | 927.58 | 1114.19 | 1109.19 |
| | | | | | 1038.69 | 926.55 | 1113.06 | 1108.06 |
| | | | | | 1061.43 | 902.77 | 1112.97 | 1107.97 |
| | | | | | 1059.36 | 557.58 | 1107.04 | 1102.04 |
| | | | | | 762.22 | 551.89 | 1108.04 | 1103.04 |

## Sound Level Spectra

| Name | ID | Type | 1/3 Oktave Spectrum (dB) | | | | | | | | | | | Source |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Weight. | 63 | 125 | 250 | 500 | 1000 | 2000 | 4000 | 8000 | A | lin | |
| Excavator | S1 | Lw (c) | | 99.4 | 107.6 | 109.9 | 105.2 | 104.7 | 101.5 | 96.6 | 92.6 | 109.3 | 113.9 | Brutoco Measurements |
| Backhoe | S2 | Lw (c) | | 97.6 | 107.5 | 100.0 | 105.7 | 102.3 | 98.8 | 94.6 | 89.4 | 107.1 | 111.3 | Brutoco Measurement |
| Water Truck | S3 | Lw (c) | | 121.0 | 104.1 | 101.2 | 100.4 | 107.1 | 107.7 | 99.4 | 92.8 | 111.8 | 121.5 | Brutoco Measurements |
| Skip Loader | S4 | Lw (c) | | 113.0 | 113.0 | 102.0 | 104.0 | 100.0 | 98.0 | 97.0 | 89.0 | 106.5 | 116.6 | DEFRA |
| Concrete Mixer | S5 | Lw (c) | | 110.0 | 111.0 | 104.0 | 103.0 | 100.0 | 99.0 | 90.0 | 84.0 | 105.8 | 114.6 | Defra |
| Concrete Pump | S6 | Lw (c) | | 115.0 | 106.0 | 102.0 | 101.0 | 101.0 | 100.0 | 92.0 | 83.0 | 105.8 | 116.1 | Defra |
| Paver | S7 | Lw (c) | | 109.0 | 108.0 | 103.0 | 103.0 | 102.0 | 100.0 | 93.0 | 87.0 | 106.6 | 113.2 | Defra |
| Roller | S8 | Lw (c) | | 121.0 | 113.0 | 104.0 | 103.0 | 101.0 | 96.0 | 90.0 | 85.0 | 106.0 | 121.8 | Defra |
| Dump Truck | S9 | Lw (c) | | 108.0 | 108.0 | 107.0 | 103.0 | 102.0 | 100.0 | 95.0 | 85.0 | 107.1 | 113.5 | Defra |
| Crane | S10 | Lw (c) | | 112.0 | 108.0 | 100.0 | 98.0 | 93.0 | 91.0 | 92.0 | 82.0 | 100.8 | 113.8 | Defra |
| Telescopic Forklift | S11 | Lw (c) | | 108.7 | 105.0 | 105.2 | 102.5 | 105.1 | 102.7 | 97.5 | 91.5 | 109.0 | 113.4 | Brutoco Measurements |

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Date: 03 Feb 2022

## Calculation Configuration

| Configuration | |
|---|---|
| Parameter | Value |
| General | |
| Country | (user defined) |
| Max. Error (dB) | 0.00 |
| Max. Search Radius (#(Unit,LEN)) | 2000.00 |
| Min. Dist Src to Rcvr | 0.00 |
| Partition | |
| Raster Factor | 0.50 |
| Max. Length of Section (#(Unit,LEN)) | 1000.00 |
| Min. Length of Section (#(Unit,LEN)) | 1.00 |
| Min. Length of Section (%) | 0.00 |
| Proj. Line Sources | On |
| Proj. Area Sources | On |
| Ref. Time | |
| Reference Time Day (min) | 960.00 |
| Reference Time Night (min) | 480.00 |
| Daytime Penalty (dB) | 0.00 |
| Recr. Time Penalty (dB) | 6.00 |
| Night-time Penalty (dB) | 10.00 |
| DTM | |
| Standard Height (m) | 0.00 |
| Model of Terrain | Triangulation |
| Reflection | |
| max. Order of Reflection | 0 |
| Search Radius Src | 100.00 |
| Search Radius Rcvr | 100.00 |
| Max. Distance Source - Rcvr | 1000.00 1000.00 |
| Min. Distance Rvcr - Reflector | 1.00 1.00 |
| Min. Distance Source - Reflector | 0.10 |
| Industrial (ISO 9613) | |
| Lateral Diffraction | some Obj |
| Obst. within Area Src do not shield | On |
| Screening | Excl. Ground Att. over Barrier |
| | Dz with limit (20/25) |
| Barrier Coefficients C1,2,3 | 3.0 20.0 0.0 |
| Temperature (#(Unit,TEMP)) | 10 |
| rel. Humidity (%) | 70 |
| Ground Absorption G | 0.50 |
| Wind Speed for Dir. (#(Unit,SPEED)) | 3.0 |
| Roads (TNM) | |
| Railways (Schall 03 (1990)) | |
| Strictly acc. to Schall 03 / Schall-Transrapid | |
| Aircraft (???) | |
| Strictly acc. to AzB | |

## Receivers

| Name | M. | ID | Level Lr | | Limit. Value | | Land Use | | | Height | | Coordinates | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Day | Night | Day | Night | Type | Auto | Noise Type | | | X | Y | Z |
| | | | (dBA) | (dBA) | (dBA) | (dBA) | | | | (ft) | | (ft) | (ft) | (ft) |
| North | | R8 | 57.4 | -80.2 | 0.0 | 0.0 | | x | Total | 5.00 | r | 908.45 | 1030.22 | 1114.00 |
| South | | R9 | 65.9 | -80.2 | 0.0 | 0.0 | | x | Total | 5.00 | r | 972.55 | 550.46 | 1107.41 |
| East | | R10 | 59.7 | -80.2 | 0.0 | 0.0 | | x | Total | 5.00 | r | 1125.92 | 730.72 | 1108.67 |
| West | | R11 | 58.6 | -80.2 | 0.0 | 0.0 | | x | Total | 5.00 | r | 671.55 | 735.91 | 1111.18 |

## Area Sources

| Name | M. | ID | Result. PWL | | | Result. PWL" | | | Lw / Li | | | Correction | | | Sound Reduction | | Attenuation | Operating Time | | | K0 | Freq. | Direct. | Moving Pt. Src | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Day | Evening | Night | Day | Evening | Night | Type | Value | norm. | Day | Evening | Night | R | Area | | Day | Special | Night | | | | Number | | |
| | | | (dBA) | (dBA) | (dBA) | (dBA) | (dBA) | (dBA) | | | dB(A) | dB(A) | dB(A) | dB(A) | | (ft²) | | (min) | (min) | (min) | (dB) | (Hz) | | Day | Evening | Night |
| Crane | + | | 100.8 | 100.8 | 100.8 | 60.7 | 60.7 | 60.7 | Lw | S10 | | 0.0 | 0.0 | 0.0 | | | | 9.60 | 0.00 | 0.00 | 0.0 | | (none) | | | |
| Forklift | + | | 109.0 | 109.0 | 109.0 | 68.9 | 68.9 | 68.9 | Lw | S11 | | 0.0 | 0.0 | 0.0 | | | | 24.00 | 0.00 | 0.00 | 0.0 | | (none) | | | |
| Skip Loader | + | | 106.5 | 106.5 | 106.5 | 66.4 | 66.4 | 66.4 | Lw | S4 | | 0.0 | 0.0 | 0.0 | | | | 24.00 | 0.00 | 0.00 | 0.0 | | (none) | | | |

## Geometry - Area Sources

| Name | Height | | | | Coordinates | | | |
|---|---|---|---|---|---|---|---|---|
| | Begin | | End | | x | y | z | Ground |
| | (ft) | | (ft) | | (ft) | (ft) | (ft) | (ft) |
| Crane | 5.00 | r | | | 760.67 | 927.58 | 1114.19 | 1109.19 |
| | | | | | 1038.69 | 926.55 | 1113.06 | 1108.06 |
| | | | | | 1061.43 | 902.77 | 1112.97 | 1107.97 |
| | | | | | 1059.36 | 557.58 | 1107.04 | 1102.04 |
| | | | | | 762.22 | 551.89 | 1108.04 | 1103.04 |
| Forklift | 5.00 | r | | | 760.67 | 927.58 | 1114.19 | 1109.19 |
| | | | | | 1038.69 | 926.55 | 1113.06 | 1108.06 |
| | | | | | 1061.43 | 902.77 | 1112.97 | 1107.97 |
| | | | | | 1059.36 | 557.58 | 1107.04 | 1102.04 |
| | | | | | 762.22 | 551.89 | 1108.04 | 1103.04 |
| Skip Loader | 5.00 | r | | | 760.67 | 927.58 | 1114.19 | 1109.19 |
| | | | | | 1038.69 | 926.55 | 1113.06 | 1108.06 |
| | | | | | 1061.43 | 902.77 | 1112.97 | 1107.97 |
| | | | | | 1059.36 | 557.58 | 1107.04 | 1102.04 |
| | | | | | 762.22 | 551.89 | 1108.04 | 1103.04 |

## Sound Level Spectra

| Name | ID | Type | 1/3 Oktave Spectrum (dB) | | | | | | | | | | | Source |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Weight. | 63 | 125 | 250 | 500 | 1000 | 2000 | 4000 | 8000 | A | lin | |
| Excavator | S1 | Lw (c) | | 99.4 | 107.6 | 109.9 | 105.2 | 104.7 | 101.5 | 96.6 | 92.6 | 109.3 | 113.9 | Brutoco Measurements |
| Backhoe | S2 | Lw (c) | | 97.6 | 107.5 | 100.0 | 105.7 | 102.3 | 98.8 | 94.6 | 89.4 | 107.1 | 111.3 | Brutoco Measurement |
| Water Truck | S3 | Lw (c) | | 121.0 | 104.1 | 101.2 | 100.4 | 107.1 | 107.7 | 99.4 | 92.8 | 111.8 | 121.5 | Brutoco Measurements |
| Skip Loader | S4 | Lw (c) | | 113.0 | 113.0 | 102.0 | 104.0 | 100.0 | 98.0 | 97.0 | 89.0 | 106.5 | 116.6 | DEFRA |
| Concrete Mixer | S5 | Lw (c) | | 110.0 | 111.0 | 104.0 | 103.0 | 100.0 | 99.0 | 90.0 | 84.0 | 105.8 | 114.6 | Defra |
| Concrete Pump | S6 | Lw (c) | | 115.0 | 106.0 | 102.0 | 101.0 | 101.0 | 100.0 | 92.0 | 83.0 | 105.8 | 116.1 | Defra |
| Paver | S7 | Lw (c) | | 109.0 | 108.0 | 103.0 | 103.0 | 102.0 | 100.0 | 93.0 | 87.0 | 106.6 | 113.2 | Defra |
| Roller | S8 | Lw (c) | | 121.0 | 113.0 | 104.0 | 103.0 | 101.0 | 96.0 | 90.0 | 85.0 | 106.0 | 121.8 | Defra |
| Dump Truck | S9 | Lw (c) | | 108.0 | 108.0 | 107.0 | 103.0 | 102.0 | 100.0 | 95.0 | 85.0 | 107.1 | 113.5 | Defra |
| Crane | S10 | Lw (c) | | 112.0 | 108.0 | 100.0 | 98.0 | 93.0 | 91.0 | 92.0 | 82.0 | 100.8 | 113.8 | Defra |
| Telescopic Forklift | S11 | Lw (c) | | 108.7 | 105.0 | 105.2 | 102.5 | 105.1 | 102.7 | 97.5 | 91.5 | 109.0 | 113.4 | Brutoco Measurements |