

**CHRISTOPHER JEAN & ASSOCIATES, INC.**  
ACOUSTICAL CONSULTING SERVICES

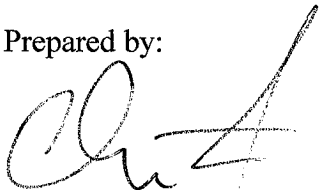
January 20, 2021

ACOUSTICAL ANALYSIS

PALMDALE TERRACE APARTMENTS

CITY OF PALMDALE

Prepared by:



Christopher Jean, INCE

Prepared for:

MR. ALVARO GONZALEZ  
META HOUSING CORPORATION  
11150 West Olympic Blvd., Suite 620  
Los Angeles, California 90064

**CHRISTOPHER JEAN & ASSOCIATES, INC.**  
ACOUSTICAL CONSULTING SERVICES

SUMMARY

This analysis has been completed to determine the exterior and interior noise exposure and the necessary mitigation measures for the proposed Palmdale Terrace Apartments project located at Avenue Q-12 and 25th Street East in the City of Palmdale. A list of requirements and recommendations is given in the following summary. Details are discussed in the body of the report.

A. EXTERIOR NOISE CONTROL

Sound walls at least six feet (6') high must be constructed around the perimeters of all first floor patios with any view to 25th Street East and within 200 feet of the centerline of 25th Street East. Sound walls at least five and a half feet (5.5') high must be constructed around the perimeters of all second floor balconies with any view to 25th Street East and within 200 feet of the centerline of 25th Street East. Sound walls at least five feet (5') high must be constructed around the perimeters of all third floor balconies with any view to 25th Street East and within 200 feet of the centerline of 25th Street East.

B. NOISE CONTROL BARRIER CONSTRUCTION MATERIALS

The required noise control barriers may be constructed using any of the following materials:

- (1) Masonry block
- (2) Stucco on wood frame
- (3) 3/4" plywood
- (4) 1/4" tempered glass or 1/2" Lexan

- (5) Earthen berm
- (6) Any combination of the above materials or any material with a surface weight of at least 3.5 pounds per square foot.

Each completed noise control barrier must present a solid face from top-to-bottom and end-to-end. Cutouts are not permitted except for drain holes.

#### C. INTERIOR NOISE CONTROL

The buildings shall be constructed, as a minimum, in accordance with the outline of Table 6 found in the body of the report. This will be adequate for all units with the following exceptions:

- (1) Add STC 34 glazing to all Living Rooms with any view to 25th Street East and within 200 feet of the centerline of 25th Street East,
- (2) Add STC 32 glazing to all bedrooms with any view to 25th Street East and within 200 feet of the centerline of 25th Street East,
- (3) Add STC 28 glazing to all remaining rooms facing Avenue Q-12.

#### D. VENTILATION

This analysis assumed that all windows and doors are kept closed. If the allowable interior noise levels are met by requiring that windows and doors be kept closed, then the design of the structure must also specify a ventilation or air conditioning system to provide a habitable interior environment. The ventilation system must not compromise the dwelling or guest room noise reduction.

#### E. UNIT-TO-UNIT NOISE CONTROL

Common floor/ceiling assemblies between units are subject to Title 24 Sound Transmission Class (STC) and Impact Insulation Class (IIC) requirements. The plan set provided for this analysis did not include common floor/ceiling assembly details. It is highly recommended that one of the following widely used common floor/ceiling assemblies, all of which rate at least STC 50, be incorporated into the building plans:

- (1) 8" concrete slab (Riverbank Acoustical Labs, TL 76-77, 1977, 16f, for Pre-stressed Concrete Institute, STC 58 – IIC 71 with carpet, IIC 34 for bare floor)

- (2) 1 1/2" lightweight concrete, plywood sub-floor, 3 1/2" thick fiberglass insulation, resilient channels, drywall ceiling (Geiger and Hamme CCA-14MT, CCA-15MT, 1972, 16f, for Cellular Concrete Association, STC 60 – IIC 73 with carpet, IIC 47 with vinyl tile)
- (3) 1 3/8" Gyp-Crete, plywood sub-floor, 2" by 10" wood joists, 3 1/2" thick fiberglass insulation, resilient channels, 1/2" drywall ceiling (Riverbank Acoustical Labs TL 81-16, for Gyp-Crete Corporation, 1981, STC 60 – Riverbank Acoustical Labs IN 81-14, for Gyp-Crete Corporation, 1981, IIC 51 with sheet vinyl)

As can be seen by the above list, some of the recommended assemblies cannot meet the IIC 50 minimum requirement without carpet. Uncarpeted areas above other living units will require some form of proprietary isolation product included in the assembly to achieve the required rating. Such products include Enkasonic, Acousti-Mat, Regupol and others. Such products are designed to be installed atop the bare sub-floor and topped with either lightweight concrete/Gyp-Crete pour or additional layers of plywood. Each product has its own specific installation requirements. These products can produce both design and field IIC compliance with sheet vinyl or wood flooring. While various lab tests have shown these same products to produce design IIC compliance when used with ceramic tile, field testing experience has proven that actual ceramic tile installations are marginal. The use of ceramic tile or marble is not recommended, regardless of the installation method.

The plan set provided for this analysis did not include common wall assembly details. It is highly recommended that one of the following widely used common wall assemblies, all of which rate at least STC 50, be incorporated into the building plans:

- (1) Two layers of 1/2" direct nailed drywall, 2" by 6" plate, 2" by 4" staggered studs, 3 1/2" thick fiberglass insulation, two layers 1/2" direct nailed drywall (Owens/Corning Fiberglas, OCF W-55-69, 1969, 16f, for Owens/Corning Fiberglas, STC 54)
- (2) Two layers of 5/8" direct nailed drywall, 2" by 6" plate, 2" by 4" staggered studs, 3 1/2" thick fiberglass insulation, two layers 5/8" direct nailed drywall (National Gypsum Company NGC 2376, 1970, 16f, STC 53)
- (3) 5/8" direct nailed drywall, 2" by 4" plate with 2" by 4" studs, 3 1/2" thick fiberglass insulation, 1" clear air space at plate, 2" by 4" plate with 2" by 4" studs, 5/8" direct nailed drywall (Owens/Corning Fiberglas OCF 448, 1967, 16f, STC 56)
- (4) Same as #3 but with two layers of 3 1/2" thick fiberglass insulation (Riverbank Acoustical Labs TL 75-83, 1975, 16f, for U. S. Department of Agriculture, STC 57)
- (5) Two layers 5/8" direct nailed drywall, 2" by 4" plate with 2" by 4" studs, 3 1/2" thick fiberglass insulation, 1" clear air space at plate, 2" by 4" plate with 2" by 4" studs, two layers 5/8" direct nailed drywall (National Gypsum Company, NGC 3056, 1970, 16f, for Gypsum Association, STC 58)
- (6) Same as #5 but with two layers of 3 1/2" thick fiberglass insulation (Riverbank Acoustical Labs TL 75-82, 1975, 16f, for U. S. Department of Agriculture, STC 63)

All wall assemblies between any common space and a living unit must be an STC 50 minimum rated assembly. All plumbing, mechanical and electrical installations shall be installed per the instructions and details contained in Appendix 5. Add all appropriate details to the project plans.

#### F. PROJECT DISCLOSURE

The acoustical code requirements represent minimal acceptable standards. Compliance with the Building Department acoustical criteria does not require, guarantee or even imply that local sound sources will be mitigated to inaudibility. Compliance with an exterior noise limit of 65 dBA CNEL means that exterior noise will remain clearly audible within the mitigated exterior space. Compliance with an interior noise limit of 45 dBA CNEL means that exterior noise sources will remain audible on the interior of a building.

Due to quality control and other field related problems, the code minimum laboratory ratings of STC/IIC 50 for common assemblies does not guarantee that all common assemblies will pass a field test. In fact, there is a 50 percent chance that half of all common assemblies rated at the STC/IIC minimum could fail field tests. An STC 50 rated assembly will produce around 45 dBA of voice reduction in the field. This means that normal conversation in adjoining units will be audible a certain percentage of the time.

Do not misrepresent the degree of exterior to interior or unit-to-unit acoustical isolation as anything more than meeting code during any phase of this project. Never, ever, use any form of the term "Soundproof" to describe any portion of this project.

# CHRISTOPHER JEAN & ASSOCIATES, INC.

## ACOUSTICAL CONSULTING SERVICES

### 1.0 INTRODUCTION

This report presents the results of a noise impact and design study of the proposed Palmdale Terrace Apartments project located at Avenue Q-12 and 25th Street East in the City of Palmdale. This report includes a discussion of the expected exterior community noise environment and the recommendations for control of noise in the exterior and interior living spaces.

A vicinity map showing the general location of the project site is presented in Exhibit 1 – Site Location Map. An aerial photograph of the existing project site and its surroundings is shown on Exhibit 2. The project site plan is shown on Exhibit 3. The project consists of multi-family apartment housing.

### 2.0 APPLICABLE NOISE CRITERIA

The City of Palmdale and the California Green Building Standards (CalGreen) require all residential projects to conform to the requirements of Table 1.

TABLE 1

APPLICABLE NOISE CRITERIA (1)

Exterior	65 dBA CNEL
Interior	45 dBA CNEL*
Unit-to-Unit	STC 50/IIC 50

- (1) Please see Noise Rating Methods (Appendix 1) for an explanation of the commonly applicable acoustical terminology. \*Non-residential portions of this project must conform to an interior noise limit of 50 dBA Leq(1 hour). It should be noted that compliance with the more strict limit of 45 dBA CNEL will automatically produce compliance with the 50 dBA Leq(1hour) limit.

### 3.0 DESIGN NOISE LEVELS

#### 3.1 ROADWAYS

The expected future roadway noise impact was projected using the Federal Highway Administration's Highway Noise Prediction Model (FHWA RD-77-108) together with several roadway and site parameters that determine the projected impact of vehicular traffic noise. These include the roadway cross-section (e.g. number of lanes), the roadway active width, the average daily traffic (ADT), the vehicle travel speed, the percentage of auto and truck traffic, the roadway grade, the angle of view, the site conditions ("hard" or "soft" site), and the percentage of average daily traffic that flows each hour throughout a 24 hour period.

The forecast traffic volume for 25th Street East was obtained from the Palmdale Circulation Element. Since future traffic volumes for 27th Street East and Avenue Q-12 are not given in the Circulation Element, these streets are assumed to be local collector streets with volumes of no more than 10,000 ADT. The percentage of truck traffic was taken from a standard arterial mix. The same source was used to project the distribution by time of day. The input data is listed in Table 2.

TABLE 2

TRAFFIC INPUT DATA

	<u>% DAY</u>	<u>% EVENING</u>	<u>% NIGHT</u>	<u>% VOLUME</u>
Autos	75.51	12.57	9.34	100.0
Medium Trucks	1.56	0.09	0.19	100.0
Heavy Trucks	0.64	0.02	0.08	100.0
Volume	=	29,000 ADT on 25th Street East		
Speed	=	50 MPH (posted)		

The calculations are contained in Appendix 2. The calculations yield a design noise level of 71 dBA CNEL at 100 feet from the centerline of 25th Street East.

#### 3.2 RAILROAD

There are no railroad operations in the vicinity of the project site. Railroad noise will not impact the site.

### 3.3 AIRCRAFT

The City's General Plan Airport Noise Contours are shown on Exhibit 4. Exhibit 4 shows the site to lie well outside the 60 dBA CNEL noise contour. Aircraft noise, though audible, will not impact the site as defined by City and CalGreen standards.

## 4.0 MITIGATION MEASURES

### 4.1 EXTERIOR

The mitigation of exterior noise would require individual sound barriers for all private patios and balconies along 25th Street East. For purposes of analysis, the barrier height calculations assume that the barriers are only intended to reduce exterior noise to 65 dBA CNEL using a "seated" receiver height. The assumptions for the barrier height calculations are listed in Table 3 on the following page.



TABLE 3

BARRIER ANALYSIS GENERAL ASSUMPTIONS  
FOR RECEIVER AND SOURCE GEOMETRY

<u>RECEIVER ASSUMPTIONS</u>	
<u>HORIZONTAL GEOMETRY</u>	<u>VERTICAL GEOMETRY</u>
Distance behind top-of-roadways barrier: 5'	Height above pad for ground level receivers: 3'
Distance behind individual patio and balcony barriers: 5'	Height above pad for second level receivers: 13'
<u>SOURCE ASSUMPTIONS</u>	
<u>HORIZONTAL GEOMETRY *</u>	<u>VERTICAL GEOMETRY</u>
For roadways with grades no greater than 2%, all vehicles were located at the single lane equivalent acoustic center of the full roadway. For roadways with over 2% grade, vehicle count was divided in half and located at the single lane equivalent acoustic center for each side of the roadway.	Automobiles: 0' above center of road grade
	Medium Trucks: 2.3' above center of road grade
	Heavy Trucks: 8' above center of road grade

\* = Single Lane Equivalent (SLE) location.

The barrier calculations are contained in Appendix 3. These calculations show that sound walls at least six feet (6') high must be constructed around the perimeters of all first floor patios with any view to 25th Street East and within 200 feet of the centerline of 25th Street East. Sound walls at least five and a half feet (5.5') high must be constructed around the perimeters of all second floor balconies with any view to 25th Street East and within 200 feet of the centerline of 25th Street East. Sound walls at least five feet (5') high must be constructed around the perimeters of all third floor balconies with any view to 25th Street East and within 200 feet of the centerline of 25th Street East.

The required noise control barriers may be constructed using any of the following materials:

- (1) Masonry block
- (2) Stucco on wood frame
- (3) 3/4" plywood

- (4) 1/4" tempered glass or 1/2" Lexan
- (5) Earthen berm
- (6) Any combination of the above materials or any material with a surface weight of at least 3.5 pounds per square foot.

Each completed noise control barrier must present a solid face from top-to-bottom. Cutouts and/or openings are not permitted except for drain holes.

#### 4.2 INTERIOR

The City's exposure criteria for new residential construction require that the interior noise environment, attributable to outside noise sources, be limited to 45 dBA CNEL. Analysis and recommendations for control of outdoor-to-indoor noise intrusion are presented in this section.

The exterior-to-interior noise reduction expected for the planned construction was based on a detailed analysis of sample rooms and units planned for the development. Calculations of the expected typical noise reduction performance were performed for sample rooms. The analysis was based on the typical spectra expected for the primary sources of community noise impact, the typical octave-band transmission loss for each element in the planned building shell, the relative square footage of each element of the planned building shell, the expected typical interior surface treatment, and the acoustical absorption coefficient for each interior surface treatment. Corrections for the "A" Weighted room absorption factors are also included.

Each component of the building shell (e.g. exterior wall, windows, doors, etc.) provides a different amount of transmission loss for each "A" Weighted octave-band of community noise. With the knowledge of the building shell components and their individual octave band transmission loss values for the noise sources, calculations of the composite building shell transmission loss can be made for each room.

The characteristics of the basic building shell are listed in Table 4 on the following page.

TABLE 4BASIC BUILDING SHELL CHARACTERISTICS

<u>PANEL</u>	<u>CONSTRUCTION</u>
Exterior Wall	Siding or stucco, 2" X 4" studs, R-13 fiberglass insulation, 1/2" drywall
Windows	Double pane
Sliding Glass Door	Double pane
Roof	Shingle over 1/2" plywood, fiberglass insulation, 5/8" drywall, vented
Floor	Carpeted except kitchen and baths

Table 4 construction minimums will provide around 20 dBA of interior noise reduction. However, exterior noise levels as high as 72 dBA will occur outside the units nearest to 25th Street East meaning that interior noise reduction levels as high as 27 dBA will be required. Since Table 4 construction will yield only around 20 dBA, specific room calculations were carried out to determine whether additional mitigation is needed.

The calculations are contained in Appendix 4, and the results are given in Table 5.

TABLE 5ROOM NOISE REDUCTION VALUES

<u>PLAN</u>	<u>ROOM</u>	<u>NOISE REDUCTION VS. GLAZING STC</u>					
		<u>24</u>	<u>26</u>	<u>28</u>	<u>30</u>	<u>32</u>	<u>34</u>
All	Living Room	20	21	23	25	26	27
	Bedroom	21	23	25	26	27	28

The results of Table 5 show that Table 4 construction should be adequate for all units with the following exceptions:

- (1) Add STC 34 glazing to all Living Rooms with any view to 25th Street East and within 200 feet of the centerline of 25th Street East,
- (2) Add STC 32 glazing to all bedrooms with any view to 25th Street East and within 200 feet of the centerline of 25th Street East,
- (3) Add STC 28 glazing to all remaining rooms facing Avenue Q-12.

#### 4.3 VENTILATION

If interior allowable noise levels are met by requiring that windows be unopenable or remain closed, then the design of the structure must also specify a ventilation or air conditioning system to provide a habitable interior environment. The ventilation system must not compromise the dwelling unit or guest room noise reduction.

#### 4.4 UNIT-TO-UNIT NOISE CONTROL

Common floor/ceiling assemblies between units are subject to Title 24 Sound Transmission Class(STC) and Impact Insulation Class (IIC) requirements. The plan set provided for this analysis did not include common floor/ceiling assembly details. It is highly recommended that one of the following widely used common floor/ceiling assemblies, all of which rate at least STC 50, be incorporated into the building plans:

- (1) 8" concrete slab (Riverbank Acoustical Labs, TL 76-77, 1977, 16f, Pre-stressed Concrete Institute, STC 58 -- IIC 71 with carpet, IIC 34 for bare floor)
- (2) 1 1/2" lightweight concrete, sub-floor, R-11 insulation, resilient channel, drywall ceiling (Geiger and Hamme CCA-14MT, CCA-15MT, 1972, 16f, Cellular Concrete Associates, STC 60 --IIC 73 with carpet, IIC 47 with vinyl tile)
- (3) 1 3/8" Gyp-Crete, sub-floor, 2" by 10" joists, R-11 insulation, resilient channel, 1/2" drywall ceiling (Riverbank Acoustical Labs TL 81-16, Gyp-Crete Corp., 1981, STC 60 -- Riverbank Acoustical Labs IN 81-14, Gyp-Crete Corp., 1981, IIC 51 with sheet vinyl)

As can be seen by the above list, some of the recommended assemblies cannot meet the IIC 50 minimum requirement without carpet. Uncarpeted areas above other living units will require some form of proprietary isolation product under the floor to achieve the required rating. Such products include Enkasonic, Acousti-Mat, Monsanto SC50, and others. Such products are designed to be installed atop the bare sub-floor and topped with either a LWC/Gyp-Crete pour or additional layers of plywood. Each product has its own specific installation requirements. These products can produce both design and field IIC compliance with sheet vinyl or wood flooring. While various lab tests have shown these same products to produce design IIC compliance when used with ceramic tile, field testing experience has proven that actual ceramic tile installations are marginal. The use of ceramic tile or marble flooring is not recommended, regardless of the installation method.

The plan set provided for this analysis did not include common wall assembly details. It is highly recommended that one of the following widely used common wall assemblies, all of which rate at least STC 50, be incorporated into the building plans:

- (1) Two layers 1/2" direct nailed drywall, 2" by 6" plate, 2" by 4" staggered studs, fiberglass insulation, two layers 1/2" direct nailed drywall (Owens/Corning Fiberglas, OCF W-55-69, 1969, 16f, Owens/Corning Fiberglas, STC 54)
- (2) Two layers 5/8" direct nailed drywall, 2" by 6" plate, 2" by 4" staggered studs, R-11 insulation, two layers 5/8" direct nailed drywall (National Gypsum Co. NGC 2376, 1970, 16f, STC 53)
- (3) 5/8" direct nailed drywall, 2" by 4" plate with 2" by 4" studs, R-11 insulation, 1" airspace at plate, 2" by 4" plate with 2" by 4" studs, 5/8" direct nailed drywall (Owens/Corning Fiberglas OCF 448, 1967, 16f, STC 56)
- (4) Same as #3 with two layers of R-11 insulation (Riverbank Acoustical Labs TL75-83, 1975, 16f, U.S. Department of Agriculture, STC 57)
- (5) Two layers 5/8" drywall direct nailed, 2" by 4" plate with 2" x 4" studs, 1" air space, 2" by 4" plate with 2" by 4" studs, R-11 insulation, two layers 5/8" drywall (National Gypsum Co. NGC 3056, 1970, 16f, Gypsum Association, STC 58)
- (6) Same as #5 with two layers of R-11 insulation (Riverbank Acoustical Labs TL 75-82, 1975, 16f, U.S. Department of Agriculture, STC 63)

All wall assemblies between any common space and a living unit must be an STC 50 minimum rated assembly. All Plumbing and electrical installations shall be installed per the instructions contained in Appendix 5. Put all details onto Plans.

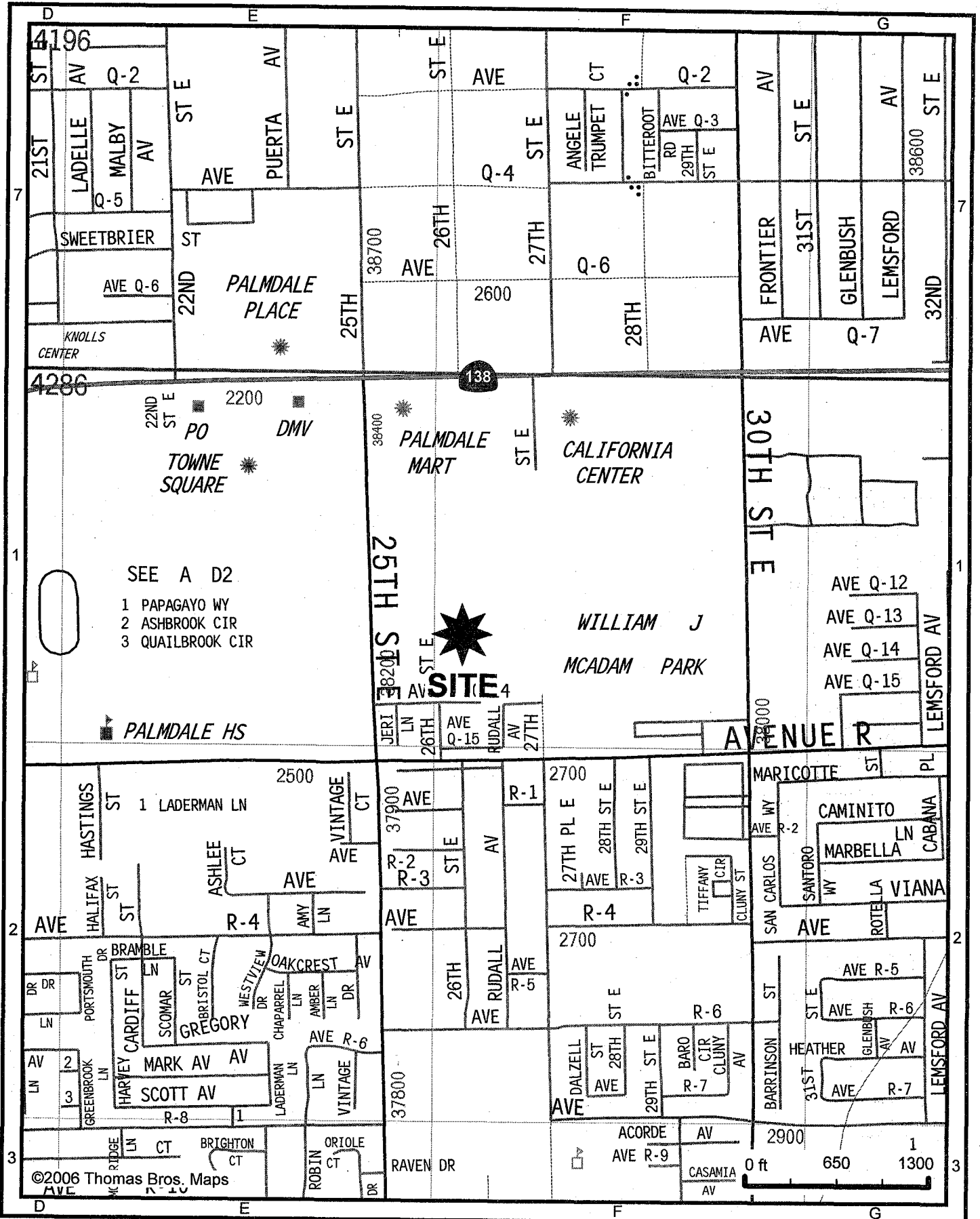
## 5.5 PROJECT DISCLOSURE

The acoustical code requirements are minimal acceptable standards. Compliance with Building Department acoustical criteria does not require, guarantee or even imply that local sound sources will be mitigated to inaudibility. Compliance with an exterior noise limit of 65 dBA CNEL means that exterior noise will remain clearly audible within the mitigated exterior space. Compliance with an interior noise limit of 45 dBA CNEL means that exterior noise sources will remain audible on the interior of a structure.

Due to quality control and other field related problems, the code minimum laboratory rating of STC/IIC 50 for common assemblies does not guarantee that all common assemblies will pass a field test. In fact, there is a 50% chance that half of all laboratory rated STC/IIC 50 common assemblies could fail field tests. An STC 50 rated assembly will produce around 45 dBA of voice reduction in the field. This means that normal conversation in adjoining units will be audible a certain percentage of the time.

Do not misrepresent the degree of exterior to interior or unit to unit acoustical isolation as anything more than meeting code during any phase of this project. Never, ever, use any form of the term "Soundproof" to describe any portion of this project.

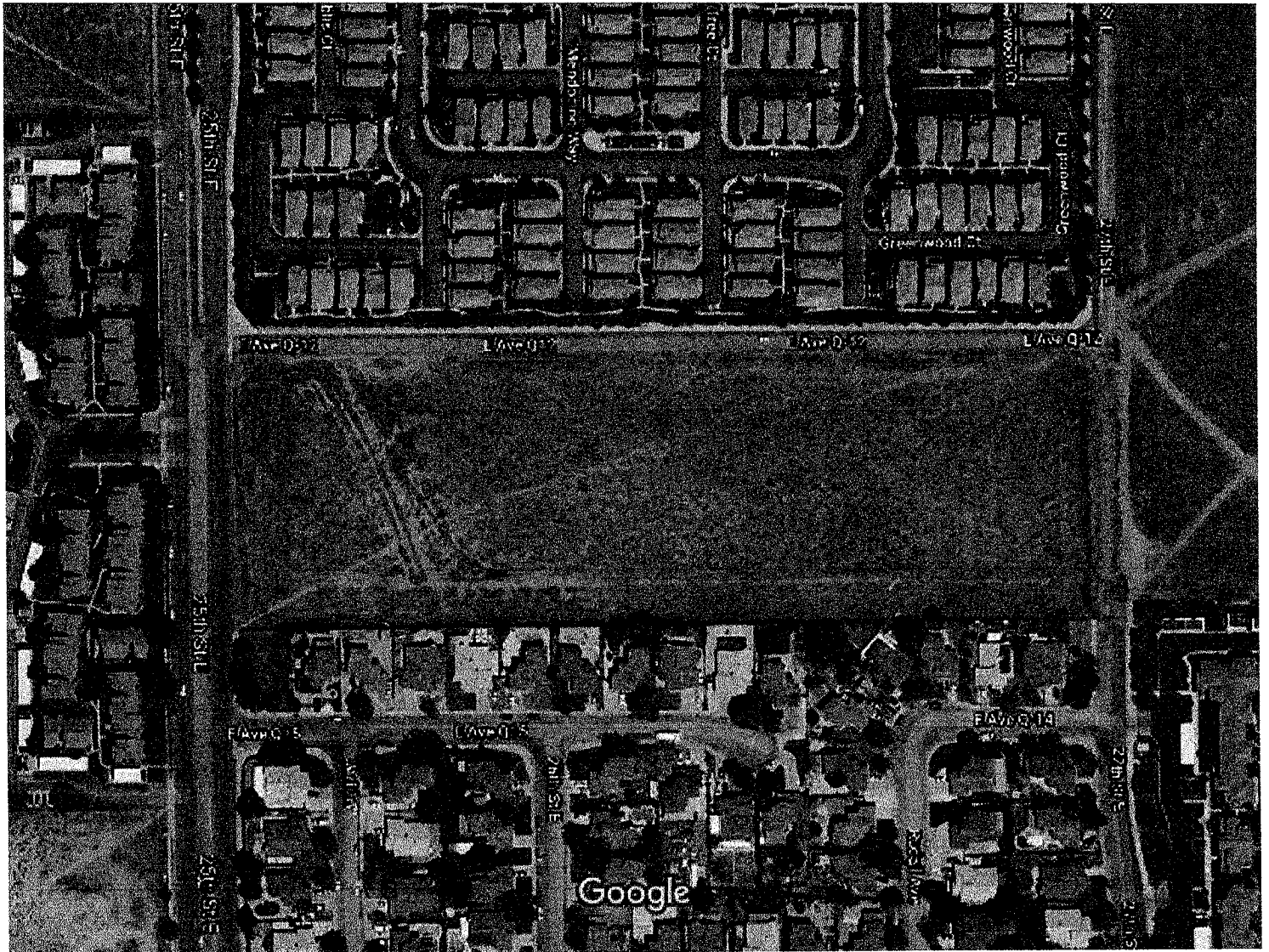
# EXHIBIT 1



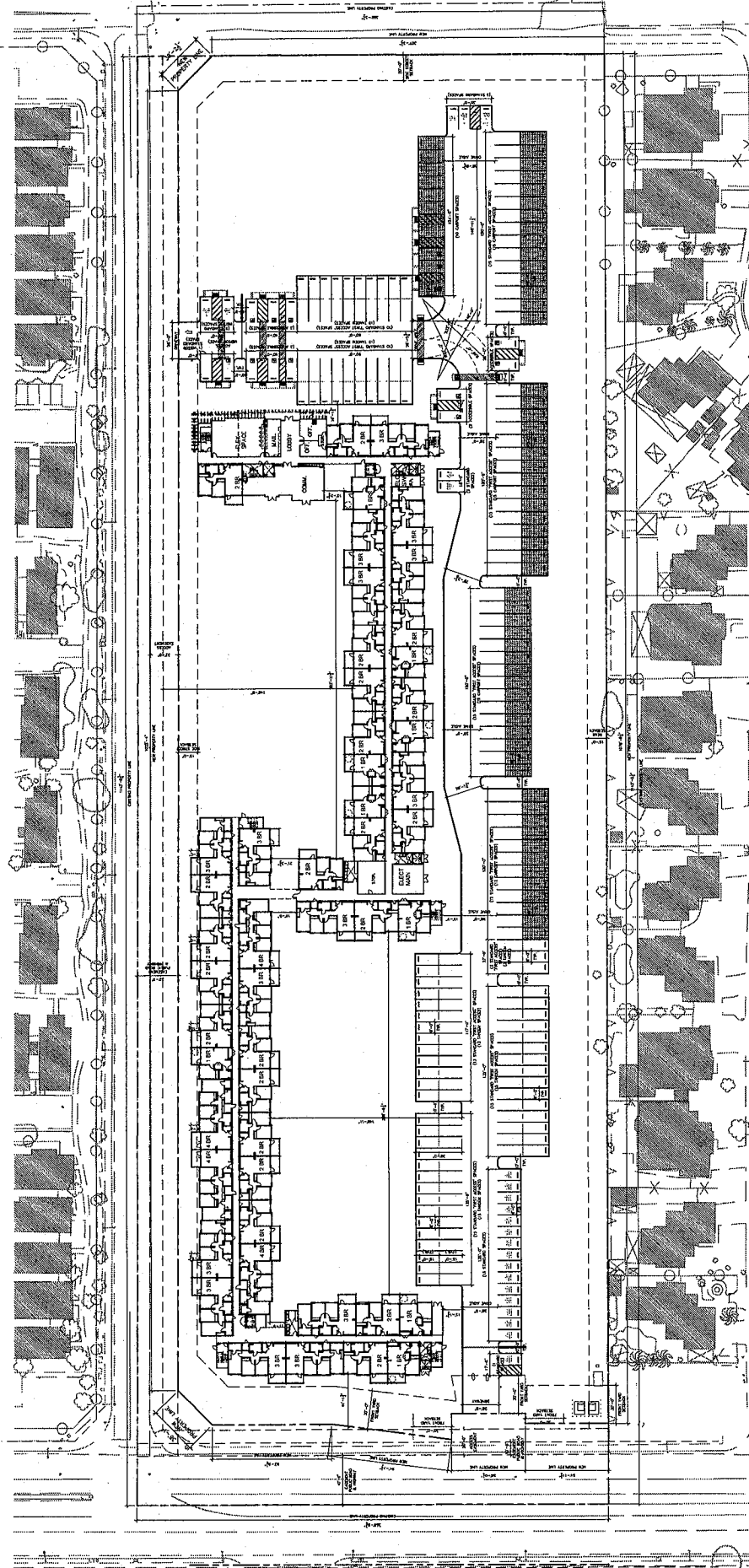
SITE: 1999 Avenue Q-12, Palmdale, CA 93550, 4286 - F1

# EXHIBIT 2 AERIAL PHOTO

Google Maps Palmdale



# EXHIBIT 3 SITE PLAN



- LEGEND:**
- 1 6.00' ALUMINUM TELESCOPIC SECURITY FENCE ACCESS TO THE SITE
  - 2 6.00' RISE STEEL SECURITY FENCE WITH 6.00' RISE CONCRETE PIER ALL SPACES SHALL BE FENCED
  - 3 FENCE WITH 6.00' RISE CONCRETE PIER
  - 4 FENCE WITH 6.00' RISE CONCRETE PIER AND PROPERTY WALL
  - 5 6.00' RISE TELESCOPIC SECURITY FENCE WITH 6.00' RISE CONCRETE PIER AND LANDSCAPE DRAINAGE
  - 6 6.00' RISE TELESCOPIC SECURITY FENCE WITH 6.00' RISE CONCRETE PIER AND LANDSCAPE DRAINAGE
  - 7 TRANSFORMER SCREENING ENCLOSURE
  - 8 BUILDING ENTRANCE
  - 9 INTERNATIONAL SYMBOL OF ACCESSIBILITY
  - 10 CLAM-HR AMPOULATORY PARKING SPACES
  - 11 CONCRET. WALKWAY, 3'-0" WIDE MINIMUM, UNLESS NOTED
  - 12 LOT - PARKING SAFETY SURFACE AND LANDSCAPE DRAINAGE
  - 13 FIRE LANE, 20'8" TO 30'0" WIDE
  - 14 POST MOUNTED IN-TERRAZZO SYSTEM
  - 15 SOLAR SHADING WITH PHOTOVOLTAIC PANELS - COPIED SUBMITTAL
  - 16 SEE SHEET 101 TO 103 WITH SEE SHEET 101 TO 103
  - 17 SEE SHEET 101 TO 103
  - 18 SEE SHEET 101 TO 103