

ACOUSTICAL ANALYSIS REPORT
for
Oak Hills Market Place
Yucaipa, California

Prepared For:

City of Yucaipa
34272 Yucaipa Boulevard
Yucaipa, CA 92339

Contact: Mr. Paul Toomey

Prepared by:

Michael Brandman Associates
621 East Carnegie Drive, Suite #100
San Bernardino, CA 92408
909.884.2255

Contact: Michael Hendrix
Project Manager



February 7, 2007

TABLE OF CONTENTS

Section 1: Introduction and Setting	1
1.1 - Purpose of Report and Study Objectives	1
1.2 - Project Description and Setting	1
1.2.1 - Site Location	1
1.2.2 - Development Description	1
1.3 - Existing Noise Levels	6
Section 2: Definition of Terms	7
2.1 - Noise Terminology	7
Section 3: Analytical Methodology and Model Parameters	9
3.1 - Noise Standards	9
3.2 - Noise Model and Noise Model Input	10
3.2.1 - Affected Roadways	10
3.2.2 - Speed and Traffic Mix	10
3.2.3 - Site Parameters/Terrain	10
3.2.4 - Sensitive Receptors	10
Section 4: Findings And Recommendations	11
4.1 - Construction Noise Impacts	11
4.2 - Long-Term Vehicular Noise Impacts	12
4.3 - Recommendations	14
Section 5: References	16

APPENDICES

Appendix A: FHWA-RD-77-108 Noise Model Worksheets

LIST OF TABLES

Table 1 – Sound Levels of Typical Noise Sources and Noise Environments	8
Table 2 – City of Yucaipa Noise Standards	9
Table 3 – Noise Associated with Typical Construction Equipment	11
Table 4 – Existing and Future Year 2009 Noise Impacts	13

LIST OF EXHIBITS

Exhibit 1 – Regional Location Map	2
Exhibit 2 – Local Vicinity USGS Map	3
Exhibit 3 – Local Vicinity Aerial Map	4
Exhibit 4 – Conceptual Site Plan	5

SECTION 1: INTRODUCTION AND SETTING

1.1 - Purpose of Report and Study Objectives

This noise study was prepared to address the potential for significant effects related to noise. The objectives of this study include the following:

- Determine if City of Yucaipa land use compatibility standards would be exceeded;
- Discuss analytical methodology and parameters used for noise modeling and evaluate the noise level results; and
- Determine necessary mitigation measures that would maintain required noise levels.

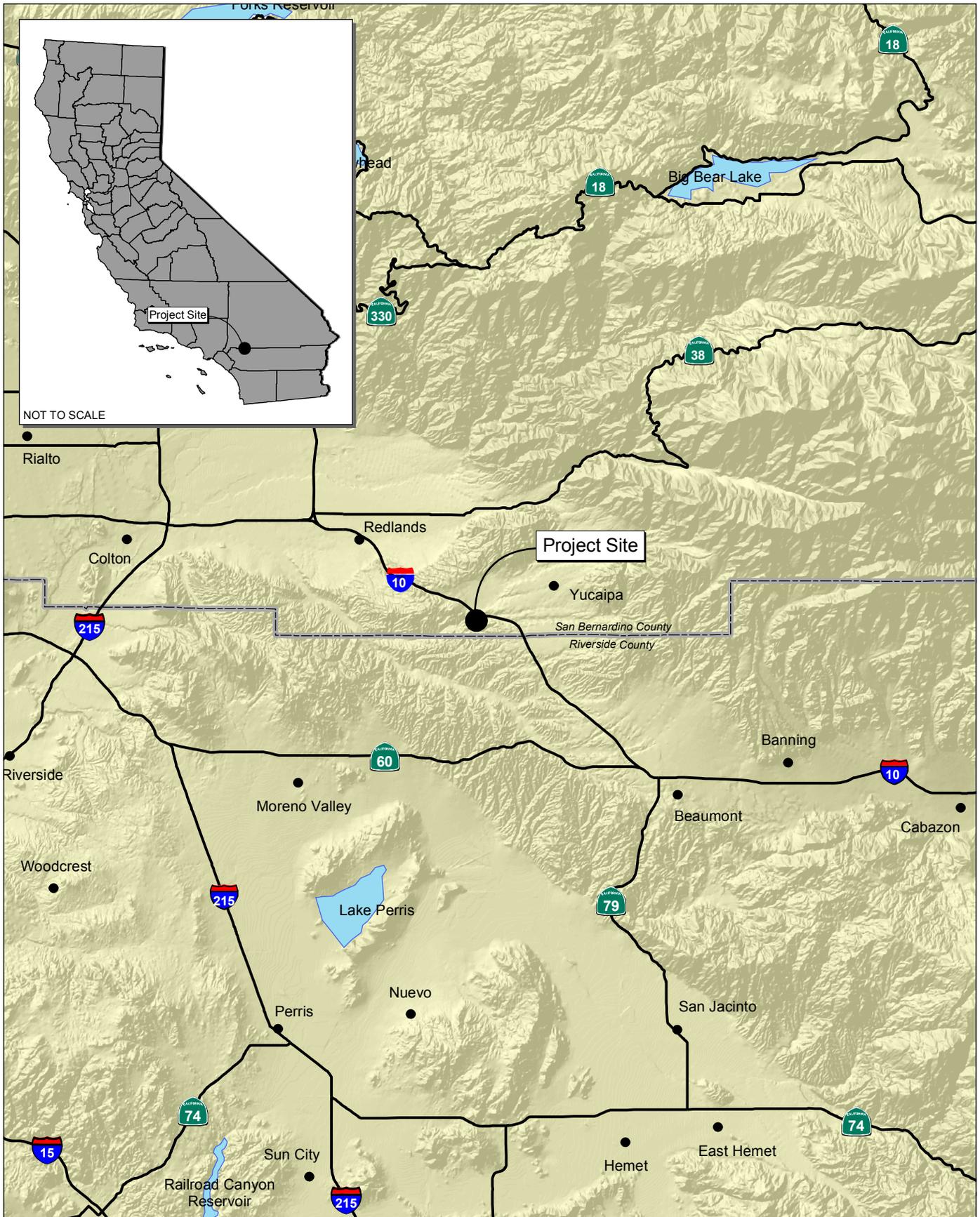
1.2 - Project Description and Setting

1.2.1 - Site Location

The proposed Oak Hills Market Place project site is a currently used for agricultural uses, including a Christmas tree farm, a pumpkin patch, and a petting farm. The site occupied approximately 64-acres at the southeastern corner of Interstate 10 and Live Oak Canyon Road in the City of Yucaipa, San Bernardino County, California (Exhibits 1 and 2). The site is bound on the east by Live Oak Canyon Road and Interstate 10 on the north. No roads are adjacent to the site to the east or south. The project site is relatively flat, with a gentle slope towards the west and moderately steep slopes ascending to the south. Wildwood creek and adjacent hillsides define the sites southern boundary. Surrounding land uses include rural residential areas to the east and south, and commercial, industrial, and residential uses northwest of the site beyond Interstate 10 (I-10). The areas immediately east and south of the site are currently vacant, with the Oak Hills along the southern boundary. The nearest residences occur approximately 1,000 feet east of the project site (Exhibit 3).

1.2.2 - Development Description

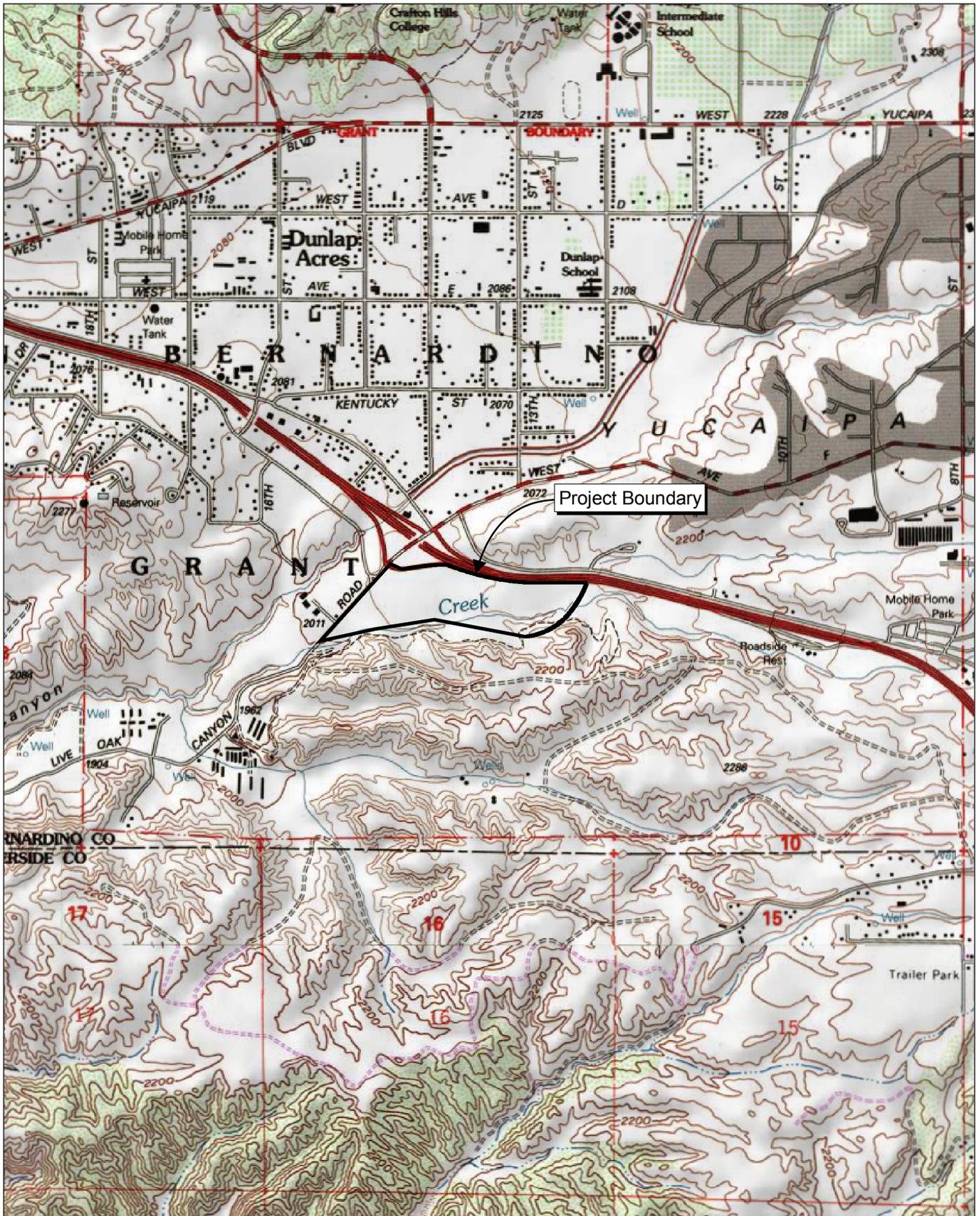
The Oak Hills Marketplace project consists of approximately 61.33 acres of commercial development and an additional 2.34 acres of right of way road dedication. Oak Hills Marketplace is proposed as a commercial development of approximately 665,376 square feet of building area. The site is designated as Planned Development (PD) in the City of Yucaipa General Plan. The Planned Development includes approximately 50.73 acres of commercial use on the eastern portion of the site, and approximately 10.60 acres of entertainment/lifestyle oriented commercial use on the western portion. A landscaped, dedicated public parkway will divide these two commercial areas and will act as a connector road for future developments to the south of the project site.



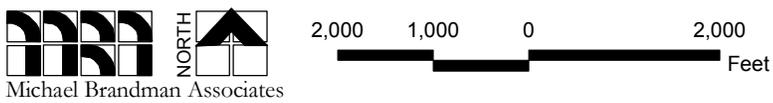
Source: Census 2000 Data, The CaSIL, MBA GIS 2005.



Exhibit 1 Regional Location Map



Source: TOPO! USGS Yucaipa (1996) 7.5' DRG.



Michael Brandman Associates

18900005 • 02/2007 | 2_topography.mxd

Exhibit 2 Topography Map

OAK HILLS MARKETPLACE • CITY OF YUCAIPA



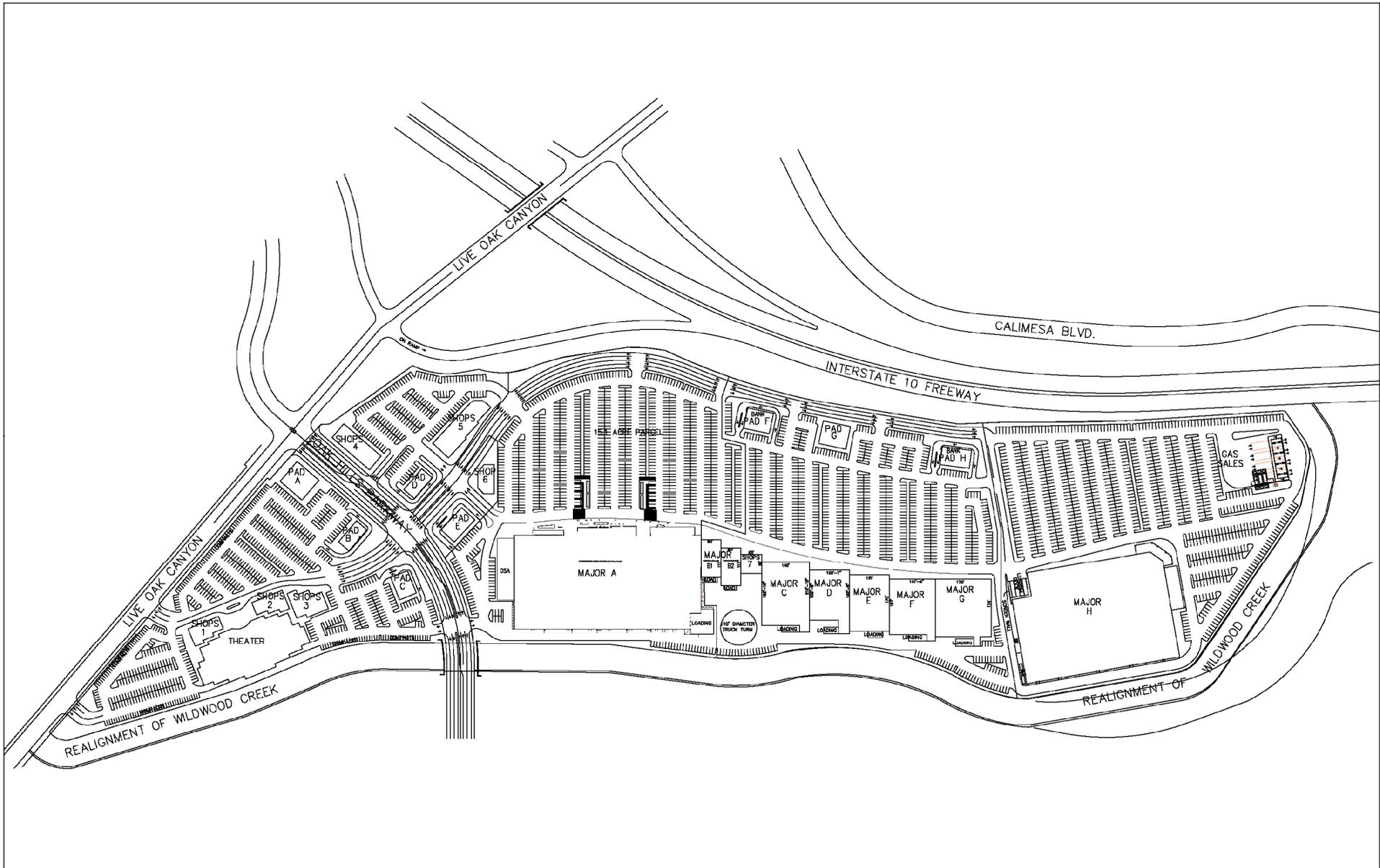
Source: Google Earth Pro.



Michael Brandman Associates



Exhibit 3 Aerial Map



Source: Nadel Retail Architects, LLP.



Exhibit 4
 Conceptual Site Plan

1.3 - Existing Noise Levels

The project site is currently used for agricultural purposes. Onsite noise sources are primarily associated to motor vehicles visiting the site, most of which occurs during the fall and winter seasons when customers come to purchase pumpkins and Christmas trees. Additional noises include small farm equipment being used onsite (i.e., tractors, etc.). Surrounding noise sources are predominantly associated with motor vehicle activity on the nearby roadways (I-10 and Live Oak Canyon Road). Surrounding land uses are generally rural residences, and do not generate significant noise on their own, especially considering the distances from the project site.

Air traffic is also a noise source at the project site; however the nearest airport is the Redlands Municipal Airport, located approximately five and a half miles to the northwest. The San Bernardino International Airport is approximately nine miles northwest of the project site. The project site is outside of the 60 dBA CNEL noise contour for both airports and the designated aircraft landing and take-off paths are not over the proposed site. Therefore, aircraft noise onsite is minimal.

SECTION 2: DEFINITION OF TERMS

2.1 - Noise Terminology

Noise is defined as unwanted or objectionable sound. The effects of noise on people can include general annoyance, interference with speech communication, sleep disturbance and, in the extreme, hearing impairment. The unit of measurement used to describe a noise level is the decibel (dB). The human ear is not equally sensitive to all frequencies within the sound spectrum. Therefore, the “A-weighted” noise scale, which weights the frequencies to which humans are sensitive, is used for measurements. Noise levels using A-weighted measurements are written dB(A) or dBA. Decibels are measured on a logarithmic scale, which quantifies sound intensity in a manner similar to the Richter scale used for earthquake magnitudes. Thus, a doubling of the energy of a noise source, such as doubling a traffic volume, would increase the noise level by 3 dBA; a halving of the energy would result in a 3 dBA decrease. Table 1 shows the relationship of various noise levels to commonly experienced noise events.

Average noise levels over a period of minutes or hours are usually expressed as dB L_{eq} , or the equivalent noise level for that period of time. For example, $L_{eq(3)}$ would represent a 3-hour average. When no period is specified, a one hour average is assumed. Noise standards for land use compatibility, which are addressed in the Riverside County General Plan Noise Element, are stated in terms of the Community Noise Equivalent Level (CNEL) and the Day-Night Average Noise Level (Ldn). CNEL is a 24-hour weighted average measure of community noise. The computation of CNEL adds 5 dBA to the average hourly noise levels between 7 p.m. and 10 p.m. (evening hours), and 10 dBA to the average hourly noise levels between 10 p.m. and 7:00 a.m. (nighttime hours). This weighting accounts for the increased human sensitivity to noise in the evening and nighttime hours. Ldn is a very similar 24-hour weighted average which weights only the nighttime hours and not the evening hours.

It is widely accepted that the average healthy ear can barely perceive changes of 3 dBA, increases or decreases; that a change of 5 dBA is readily perceptible, and that an increase (decrease) of 10 dBA sounds twice (half) as loud (Caltrans 1998).

Table 1 – Sound Levels of Typical Noise Sources and Noise Environments

Noise Source (at a Given Distance)	Scale of A-Weighted Sound Level in Decibels	Noise Environment	Human Judgment of Noise Loudness (Relative to a Reference Loudness of 70 Decibels*)
Military Jet Take-off with After-burner (50 ft) Civil Defense Siren (100 ft)	130	Carrier Flight Deck	
Commercial Jet Take-off (200 ft)	120	Airport Runway	<u>Threshold of Pain</u> *32 times as loud
Pile Driver (50 ft)	110	Rock Music Concert	*16 times as loud
Ambulance Siren (100 ft) Newspaper Press (5 ft) Power Lawn Mower (3 ft) Motorcycle (25 ft) Propeller Plane Flyover (1,000 ft)	100 90	Boiler Room Printing Press Plant	<u>Very Loud</u> *8 times as loud *4 times as loud
Diesel Truck, 40 mph (50 ft) Garbage Disposal (3 ft)	80	High Urban Ambient Sound	*2 times as loud
Passenger Car, 65 mph (25 ft) Living Room Stereo (15 ft) Vacuum Cleaner (3 ft) Electronic Typewriter (10 ft)	70	Busy Shopping Mall Indoor Sports Park	<u>Moderately Loud</u> *70 dB (Reference Loudness)
Normal Conversation (5 ft) Air Conditioning Unit (100 ft)	60	Data Processing Center Department Store	*1/2 as loud
Light Traffic (100 ft)	50	Private Business Office	*1/4 as loud
Bird Calls (distant)	40	Lower Limit of Urban Ambient Sound	<u>Quiet</u> *1/8 as loud
Soft Whisper (5 ft)	30 20 10	Rural Residential Area Quiet Bedroom	<u>Just Audible</u> <u>Threshold of Hearing</u>

SECTION 3: ANALYTICAL METHODOLOGY AND MODEL PARAMETERS

3.1 - Noise Standards

The City of Yucaipa General Plan Noise Element establishes goals and policies related to noise control. The City of Yucaipa has adopted the noise standards shown in Table 2 (from the General Plan Noise Element).

Table 2 – City of Yucaipa Noise Standards

Land Uses		Ldn (or CNEL) dB	
Categories	Uses	Interior ¹	Exterior ²
Residential	Single Family, Duplex Units	45	60 ³
	Mobile Home	45	60 ³
Commercial	Hotel, Motel, Transient Lodging	45	60 ³
	Commercial Retail, Bank and Restaurants	50	--
	Office Building, R & D, Offices	45	65
	Amphitheater, Hall, Auditorium, Theater	45	--
Institutional	Hospital, School, Church, Library	45	65
Open Space	Park	--	65
1. Interior living environment excluding bathrooms, kitchens, toilets, closets, and corridors. 2. Outdoor environment limited to private yards of single-family dwellings, multi-family private patios or balconies, mobile home parks, hospital/office building patios, park picnic areas, school playgrounds and hotel and motel recreation areas. 3. An exterior noise level of up to 65 dB Ldn (or CNEL) will be allowed, provided exterior noise levels have been substantially mitigated through a reasonable application of the best available noise reduction technology, and interior noise exposures does not exceed 45 dB Ldn (or CNEL) with windows and doors closed. Requiring that windows and doors remain closed will necessitate the use of air conditioning or mechanical ventilation. Source: Yucaipa General Plan Noise Element, 2004.			

The most stringent noise standards are associated to residential land uses. As shown in Table 2, the Yucaipa General Plan limits exterior noise levels to 60 dBA CNEL and interior noise levels to 45 dBA CNEL. Note that the General Plan allows exterior noise levels ranging up to 65 dBA CNEL at residences where noise levels have been substantially mitigated using reasonable application of the best available noise reduction technology and interior noise levels do not exceed 45 dBA CNEL. Because the local residences are already established, it may not be feasible to ensure that the interior noise is 45 dBA CNEL or less if the exterior noise at the residence is 65 dBA CNEL. For this reason, the 60 dBA CNEL standard for exterior noise levels at residences will be used in this analysis. The nearest residences are approximately 1,000 feet to the west of the project site. Commercial developments such as the proposed project do not have an exterior noise standard, however, the interior noise standard is 50 dBA CNEL.

3.2 - Noise Model and Noise Model Input

Future peak hour traffic noise levels were modeled using the Federal Highway Administration Noise Prediction Model (FHWA-RD-77-108). The model can calculate noise levels for varying traffic volumes, mix and speeds. Output sheets from this model are included as Appendix A.

3.2.1 - Affected Roadways

Existing and proposed residential units may be affected by traffic noise generated on adjacent roadways. Traffic volumes were entered into the noise model for each of the roadways. The affected roadways include:

- Outer Highway 10 from 16th Street to Live Oak Canyon Road (1SE);
- Live Oak Canyon Road northeast from Outer Highway 10 (2NW);
- Interstate 10 east from Live Oak Canyon Road (3E);
- Interstate 10 west from Oak Glen Road (4W);
- Calimesa east from Oak Glen Road (5E);
- Oak Glen Road southwest past Interstate 10 (5SW); and
- Oak Glen Road southwest from Colorado Street to Calimesa Road (6SW).

3.2.2 - Speed and Traffic Mix

The model used a speed of 45 miles per hour (mph) for Oak Glen and Live Oak Canyon Roads, and 14th Street. A speed of 65mph was used for I-10 and a speed of 55mph was used for both Outer Highway 10 and Calimesa Road. The traffic mix of 95 percent automobiles, 4 percent medium trucks, and 1 percent heavy-duty trucks was used in the analysis to reflect the typical traffic mix on the local roadways.

3.2.3 - Site Parameters/Terrain

The area was modeled as an all pavement “hard” site to predict worst-case impacts.

3.2.4 - Sensitive Receptors

Sensitive receptors are activities or land uses that may be subject to the stress of significant interference from noise. Land uses associated with sensitive receptors often include residential dwellings, mobile homes, hotels, motels, hospitals, nursing homes, education facilities, and libraries. The only sensitive receptors in the vicinity of the project site include residences to the west, north and south of the project site. The nearest residence is approximately 1,000 feet west of the project site. Sensitive receptors south of the project site are approximately ½ mile from the site, and are separated from the site by a hill.

SECTION 4: FINDINGS AND RECOMMENDATIONS

4.1 - Construction Noise Impacts

Development of the project would require site preparation (i.e., land clearing, grading, excavation and trenching) and construction of the buildings and infrastructure. These activities typically involve the use of heavy equipment, such as graders, backhoes, and cranes. Trucks would be used to deliver equipment and building materials, and to haul away waste materials. Smaller equipment, such as air compressors, pneumatic tools, plate compactors, and concrete vibrators would also be used throughout the site during its development. This equipment would generate noise that would be heard both on and off the Project site. Table 3 lists typical construction equipment noise levels for equipment that would be used during construction of the proposed project. Construction activities are carried out in discrete steps, each of which has its own mix of equipment, and consequently its own noise characteristics. These various sequential phases would change the character of the noise levels surrounding the construction site as work progresses. Despite the variety in the type and size of construction equipment, similarities in the dominant noise sources and patterns of operation allow noise ranges to be categorized by work phase.

Table 3 – Noise Associated with Typical Construction Equipment

Type of Equipment	Maximum Noise Levels Measured (dBA at 50 feet)
Grader	89
Backhoe	90
Pneumatic Tools	88
Air Compressor	86
Crane	83
Plate Compactor	89
Concrete Vibrator	85
Trucks	87
Source: Noise from Construction Equipment and Operations, Building Equipment, and Home Appliances, BBN 1971.	

The grading and site preparation phase tends to create the highest noise levels, because the noisiest construction equipment is found in the earthmoving equipment category. This category includes excavating machinery (backhoes) and earthmoving and compacting equipment (graders compactors

etc.). Typical operating cycles may involve 1 or 2 minutes of full power operation producing noise levels similar to those shown in Table 3, followed by 3 or 4 minutes of lower power settings. Combined instantaneous noise levels at 50 feet from earthmoving equipment range from 73 to 96 dBA while combined Leq noise levels range up to about 89 dBA.

The nearest residential area that is subject to potential construction noise impacts is a rural home associated with existing agricultural activities approximately 1,000 feet west of the project site. Maximum 1-minute construction noise is estimated to reach 71 dBA Leq at the fence line of the nearest sensitive noise receptor when grading equipment is closest to this sensitive receptor. Noise levels would be 30 to 40 dBA lower during the majority of the construction period due to lower power settings. Maximum 1-hour construction noise is estimated to reach 65.1 dBA Leq. Attenuation due to distance will occur as construction activities move away from the perimeters closest to the residential land use.

The City of Yucaipa (Municipal Code §18-63) restricts the time construction activities are allowed to occur between the hours of 7 a.m. to 6 p.m. weekdays. Construction activities cannot occur on the weekend, Holidays or at night (6 p.m. to 7 a.m.).

The City of Yucaipa does not include a noise standard associated to construction noise. With construction activities limited to the daytime hours as described in the City of Yucaipa Municipal Code Section 18-63, and mitigation requiring the use of appropriate mufflers and /or other sound suppression devices, construction noise is not anticipated to create adverse impacts.

Another potential noise impact resulting from construction of the proposed project is groundborne vibrations. Perceptible groundborne vibrations are typically associated with blasting operations and potentially the use of pile drivers, neither of which will be used during construction of the proposed project. As such, no excessive groundborne vibration would be created by the proposed project, and therefore, impacts due to project generated groundborne vibrations are less than significant.

4.2 - Long-Term Vehicular Noise Impacts

Outdoor Noise Levels. In reviewing project impacts, future noise levels will be compared with the City standards for residential uses since these are the sensitive receptors in the project area and have the most restrictive noise standards. The City of Yucaipa residential outdoor noise levels must not exceed 60 dBA CNEL. Future evening peak hour traffic noise levels were modeled and converted to CNEL to address potential exceedances of the 60 dB CNEL standard using a day/evening/night traffic split of 75/10/15.

Project related impacts are predominantly associated to motor vehicle traffic coming to and leaving the project site. These concerns were analyzed using the FHWA Model. The results are shown in Table 4 below.

Table 4 – Existing and Future Year 2009 Noise Impacts

Street-Segment (Distance to Nearest Residence)	Existing	Future Without Project	Future With Project	Project Contribution	Significant Impact?
Outer Hwy 10 from 16 th Street to Live Oak Canyon Road (370 feet)	52.6	43.0	53.6	10.6	No
Live Oak Canyon Road from Outer Hwy 10 to Dunlap Boulevard (620 feet)	49.5	52.9	54.1	2.8	No
I-10 from Live Oak Canyon Road to Wildwood Canyon Road (830 feet)	58.6	58.2	59.8	1.6	No
I-10 from Oak Glen Road to Hilltop Drive (850 feet)	58.4	58.1	59.6	1.7	No
Calimesa Boulevard from Oak Glen Road to Wildwood Canyon Road (190 feet)	62.7	42.5	54.8	12.3	No
Oak Glen Road from I-10 to Outer Highway 10 (740 feet)	49.8	46.8	48.5	1.7	No
Oak Glen Road from Colorado Street to Calimesa Boulevard (50 feet)	70.6	72.3	73.2	0.9	No
Oak Glen Road between Colorado and Avenue E (190feet)	61.9	63.6	64.5	0.9	No
Oak Glen Road between Arlington Road and Highway 10 (300 feet)	61.3	60.9	62.4	1.5	No
Note: Noise levels decrease at several locations in the future due to traffic being diverted to the new interchange to the east. Source: MBA 2006					

As shown in Table 4, in several cases, future noise, both with and without the project, shows a noticeable drop in noise levels. This unusual event is caused by taking into account the construction of a proposed road (Oak Hills Parkway) to be built from the project area and finally connecting to I-10 (a new freeway interchange). This new road will divert a large portion of the project area traffic.

Noise levels during the project build-out year (2009) with and without the project were compared to determine the project contribution to noise levels in the vicinity. As shown in Table 4, noise levels will be up to 73.2 dBA CNEL at nearby residences (at the Oak Glen Road from Colorado Street to Calimesa Boulevard road segment). Two other roadway segments are anticipated to exceed 60 dBA CNEL at the nearest residences to the segment (Oak Glen Road between Colorado and Avenue E-64.5 dBA CNEL and Oak Glen Road between Arlington Road and Interstate 10-62.4 dBA CNEL). The project's contribution along these roadway segments are all less than 5 dBA CNEL. The proposed project would result in noise increases exceeding 5 dBA CNEL along two roadway segments (Outer Highway 10 from 16th Street to Live Oak Canyon Road [10.6 dBA CNEL increase] and Calimesa Boulevard from Oak Glen Road to Wildwood Canyon Road [12.3 dBA CNEL increase]); however, the overall noise levels at these locations do not exceed the 60 dBA CNEL threshold.

Because the proposed project would not cause a readily perceptible increase (i.e., +5 dBA CNEL) in the noise level above the City's exterior noise threshold of 60 dBA CNEL, the proposed project would not create an adverse impact relative to long term noise levels.

Indoor Noise Levels. Predicted future outdoor noise levels at the project site are predicted to be at or below 60 dBA CNEL, which is well below the City's standard for commercial uses. Standard construction, as required by the Uniform Building Code will further reduce noise levels within the proposed commercial buildings. Therefore, indoor noise levels at the proposed shopping center are anticipated to be within the City's interior noise standard for commercial uses.

4.3 - Recommendations

A construction noise mitigation plan should be prepared and approved prior to the start of construction that contains the following:

- During all project site excavation and grading onsite, the construction contractors shall equip all construction equipment, fixed or mobile, with properly operating and maintained mufflers, consistent with the manufacturers' standards. The construction contractors shall place all stationary construction equipment so that emitted noise is directed away from the

noise sensitive receptors (residences) nearest the project site. This measure shall be implemented to the satisfaction of the City Planning Director.

- The construction contractor shall stage all construction-related activities as far away from nearby residences to the greatest extent practical. This measure shall be implemented to the satisfaction of the City Planning Director.

With this recommendation in place and adherence to the restrictions on construction activities in the City of Yucaipa “Municipal Code” impacts from construction noise are less than significant.

Predicted exterior and interior noise levels onsite will be within the City’s noise standards and no mitigation is necessary for long term noise impacts.

SECTION 5: REFERENCES

Federal Highway Administration (FHWA)

1979 FHWA Highway Noise Prediction Model. Report No. FHWA-RD-77-108.

California Department of Transportation (Caltrans)

1983 California Vehicle Emission Noise Levels (Calveno). Report No. FHWA/CA/TI-84/13. August 1983.

California Department of Transportation (Caltrans)

1998 Traffic Noise Analysis Protocol for New Highway and Reconstruction Projects, including Technical Noise Supplement. October 1998.

City of Yucaipa Planning Department

2004 City of Yucaipa Comprehensive General Plan, Noise Element. Adopted July 2004.

Appendix A: FHWA-RD-77-108 Noise Model Worksheets