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ACOUSTICAL CONSULTING SERVICES

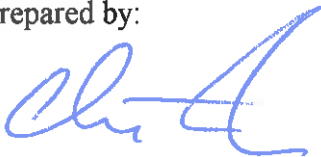
December 9, 2015

ACOUSTICAL ANALYSIS

TRACTOR SUPPLY COMPANY

CITY OF PALMDALE

Prepared by:



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Prepared for: MR. BRAD SOBEL
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SUMMARY

This analysis has been completed to determine the potential exterior and interior noise impacts and the necessary mitigation measures for the proposed Tractor Supply Company project located on Palmdale Boulevard at 40th 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 barriers at least six feet (6') high must be constructed along the entire length of the west property line and along the westernmost 50 feet of the north property line of the project. Rooftop parapet walls at least three feet (3') high must be constructed around the perimeter of the project building.

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.

The analysis also assumes that no exterior bells or loudspeakers will be installed and that communication between areas of the project site shall be accomplished using two-way radios and/or cellular telephones.

C. INTERIOR NOISE CONTROL

The adjacent residential structures will produce 20 dBA of exterior to interior noise reduction with windows and doors closed. Since project noise levels are not expected to exceed 63 dBA CNEL outside the residential structures, an interior noise level of 43 dBA CNEL results when windows and doors are closed. This complies with the City Noise Element residential interior noise limit of 45 dBA CNEL. No additional interior mitigation is necessary.

D. PROJECT DISCLOSURE

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

Do not misrepresent the degree of exterior to interior 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.

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1.0 INTRODUCTION

This report presents the results of a noise impact and design study of the proposed Tractor Supply Company project located on Palmdale Boulevard at 40th Street East in the City of Palmdale. This report includes a discussion of the existing exterior community noise environment and the recommendations for control of project noise at the nearest existing and potential future residential land uses.

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 an automotive sales and repair facility.

2.0 APPLICABLE NOISE CRITERIA

The City of Palmdale does not have a noise ordinance beyond a nuisance ordinance. However, the City's Noise Element of the General Plan recommends exterior and interior noise limits for new residential developments. In the absence of specific noise limits usually found in a noise ordinance, the City's noise limits for new residential developments will be employed for design purposes. The City's Noise Element recommends that 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

- (1) Please see Noise Rating Methods (Appendix 1) for an explanation of the commonly applicable acoustical terminology.

In this case, the residential development noise limits will be used to define the potential noise impacts of the proposed project upon the nearest residential uses which, in this case, are one-story single family homes located immediately west of the project site..

Many years of actual field measurements have demonstrated that typical Uniform Building Code compliant residential construction will produce at least 20 dBA of outside to inside noise reduction with windows and doors closed. Thus, compliance with the 65 dBA CNEL exterior noise limit outside a residential building will also provide compliance with the 45 dBA CNEL interior noise limit (65 dBA CNEL - 20 dBA = 45 dBA CNEL).

The City's Municipal Code, Section 8.28.030 prohibits construction noise anytime on Sundays, prior to 6:30 AM and after 8:00 PM on weekdays and Saturdays. Project construction noise will essentially be exempt from noise limit compliance if restricted to these hours.

Additionally, Chapter 9, Article 92.11.B.15 of the City's Zoning Ordinance requires that "noise from bells or loudspeakers shall not be audible beyond the property line at any time." Since such distinct sources could be audible more than 10 dBA below the existing ambient noise environment, compliance for such sources would be impossible to guarantee. For that reason, no exterior bells or loudspeakers shall be installed and communication between areas of the project site shall be accomplished using two-way radios and/or cellular telephones.

3.0 EXISTING NOISE LEVELS

3.1 ROADWAYS

The existing ambient noise environment at the project site is dominated by the noise from Palmdale Boulevard. The existing noise contribution of Palmdale Boulevard was calculated using published CALTRANS data for the existing daily traffic volume, percentage of truck traffic and the distribution by time of day. The input data is listed in Table 2 on the following page.

TABLE 2TRAFFIC INPUT DATA – PALMDALE BLVD

	<u>% DAY</u>	<u>% EVENING</u>	<u>% NIGHT</u>	<u>% VOLUME</u>
Autos	73.00	8.60	18.40	92.9
Medium Trucks	73.00	8.60	18.40	1.4
Heavy Trucks	69.10	6.70	24.20	5.7
Volume	=	18,100 ADT		
Speed	=	50 MPH (posted)		

The calculations contained in Appendix 2 show that the existing exterior noise levels due to Palmdale Boulevard range from 57 dBA CNEL near the north boundary of the project site to up 72 dBA CNEL 100 feet from the centerline of Palmdale Boulevard. Existing noise levels are at or below 65 dBA CNEL from a point 300 feet north of the centerline of Palmdale Boulevard. This means that most of the residential uses directly adjacent to the project site are exposed to roadway noise levels less than 65 dBA CNEL.

3.2 RAILROAD

There are no railroad noise sources in the vicinity of the project site. Railroad noise does not impact the site.

3.3 AIRCRAFT

Exhibit 4 shows the project site to lie well outside the 65 dBA CNEL contour line of the Palmdale Airport/Plant 42 complex. Though frequently audible, aircraft noise does not impact the area around the project site.

4.0 PROJECT NOISE LEVELS

4.1 VEHICLES

The proposed tractor supply sales facility will produce noise from automobiles moving on the project site, plus heavy trucks delivering tractors, tractor parts and other

agricultural machinery. Project vehicles will enter and exit the site via Palmdale Boulevard. Most automobiles will maneuver in and out of the main parking lot located on the south half of the project site. Heavy trucks will enter and exit along either side of the project site continuing to a loading area on the noise side of the project building. This means that virtually all heavy trucks accessing the site will pass along the west driveway adjacent to the residential uses either upon entry to or exit from the site. A 20-foot wide setback along the west property line will keep heavy trucks from approaching closer than about 25 feet from the residential uses.

An outdoor display area is planned along the east side of the project building. It is likely that tractors and machinery displayed in this area could be operated for customer demonstrations. The residential uses will be shielded from much of the potential demonstration noise sources by the project building itself. However, operating machinery near the north or south ends of the display area could be audible at the residential uses.

Typical vehicle noise levels based on actual field measurements are given in Table 3.

TABLE 3

PROJECT VEHICLE NOISE LEVELS AND DURATIONS

<u>SOURCE</u>	<u>DBA @ 10'</u>	<u>DURATION</u>
Car door slam	77	4 seconds
Car engine start	76	2 seconds
Car engine idle	62	1 minute
Moving car (under 10 mph)	68	30 seconds
Radio (windows open)	60	1 minute
Car horn/alarm	92	1 second
Brake squeal	78	1 second
Truck door slam	81	2 seconds
Truck engine start	87	2 seconds
Truck engine idle	73	30 minutes
Truck moving (under 10 mph)	78	30 seconds
Truck horn	100	1 second
Truck air brakes	95	6 seconds
Loading/unloading impacts	88	2 minutes

For purposes of analysis, a worst-case scenario will be assumed. If the automobile noise levels are assumed to be continuous throughout an hour, an average level of 75 dBA Leq at 10 feet results. Assuming this condition is also continuous from 7:00 AM through 10:00 PM each day, a 24-hour noise level of 75 dBA CNEL at 10 feet results. Projecting this level out to the nearest possible future residential land use at a rate of -6 dBA per doubling of distance results in a 24-hour level of 67 dBA CNEL at 25 feet.

Appendix 3 contains a letter describing the truck delivery activity for a typical Tractor Supply Company store. This letter describes as many as 6 weekly deliveries by heavy trucks plus daily deliveries by UPS and FedEx. Since the analysis must examine a worst-case scenario, it will be assumed that all of the weekly deliveries occur on a single day, one each hour including the daily deliveries by UPS and FedEx. Such a scenario results in a worst-case average noise level of 76 dBA Leq at 10 feet. Assuming all deliveries occur in daylight hours, this condition also results in a 24-hour noise level of 75 dBA CNEL at 10 feet. Projecting this level out to the nearest possible future residential land use results in a 24-hour level of 67 dBA CNEL at 25 feet.

Display area noise levels could be as high as those for heavy trucks. Using the same 24 hour heavy truck source reference noise level of 76 dBA at 10 feet with continuous operations from 7:00 AM through 10:00 PM each day, projecting worst-case display area noise levels out to the nearest residential uses results in a 24-hour level of 49 dBA CNEL.

4.2 ROOFTOP MECHANICAL NOISE

The building will be equipped with rooftop mounted HVAC units. Each unit will be assumed to have a sound rating of 9.0 bels (90 dBA SPL). As a worst-case assumption, all four units will be assumed to be located in a tight cluster near the west edge of the roof and about 90 feet from the west property line. Four rooftop mechanical units will produce a source noise level of 96 dBA SPL. A worst-case assumption will be that the rooftop mechanical units operate 24 hours per day. This results in a source noise level of 103 dBA CNEL at 1 foot. Projecting this level out to the nearest residential land uses results in a 24-hour level of 64 dBA CNEL.

4.3 COMBINED NOISE LEVELS

The worst-case automobile, delivery truck, display area and rooftop mechanical noise levels will combine to create a worst-case total project noise level. The various project source noise levels are added in Table 4 on the following page.

TABLE 4

COMBINED WORST-CASE PROJECT NOISE LEVELS

<u>SOURCE</u>	<u>CNEL AT NEAREST RESIDENTIAL USE</u>
Vehicle (automobiles and trucks)	70 dBA CNEL
Display area demonstrations	49 dBA CNEL
Rooftop Mechanical Units	<u>64 dBA CNEL</u>
Total Noise Level = 71 dBA CNEL	

Note that the Table 3 worst-case combined noise level exceeds the 65 dBA CNEL exterior noise limit at the nearest residential land uses.

5.0 MITIGATION MEASURES

5.1 EXTERIOR

The mitigation of exterior noise would require sound barriers along the west property line and the western half of the north property line as well as rooftop parapet walls to shield the rooftop mechanical equipment. For purposes of analysis, the barrier height calculations assume that the barriers are located at the top of any slope between the project noise source and the residential building pads, and are only intended to reduce exterior noise to 65 dBA CNEL at the first floor level. The assumptions for the barrier height calculations are listed in Table 5 on the following page.

TABLE 5

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' to 10'	Height above pad for ground level receivers: 5'
Distance behind individual patio and balcony barriers: 1' to 3'	Height above pad for second level receivers: 14'
<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 4. These calculations show that sound barriers at least six feet (6') high erected along the entire west property line and along the westernmost 50 feet of the north property line will reduce project vehicle and display area noise levels to no more than 62.1 dBA CNEL. The calculations also show that rooftop parapet walls at least three feet (3') high will reduce rooftop mechanical noise levels to no more than 57.2 dBA CNEL. The resulting total mitigation noise level will be 63 dBA CNEL at the nearest residential uses. This level complies with the City's Noise Element recommended residential exterior noise limit of 65 dBA CNEL.

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.

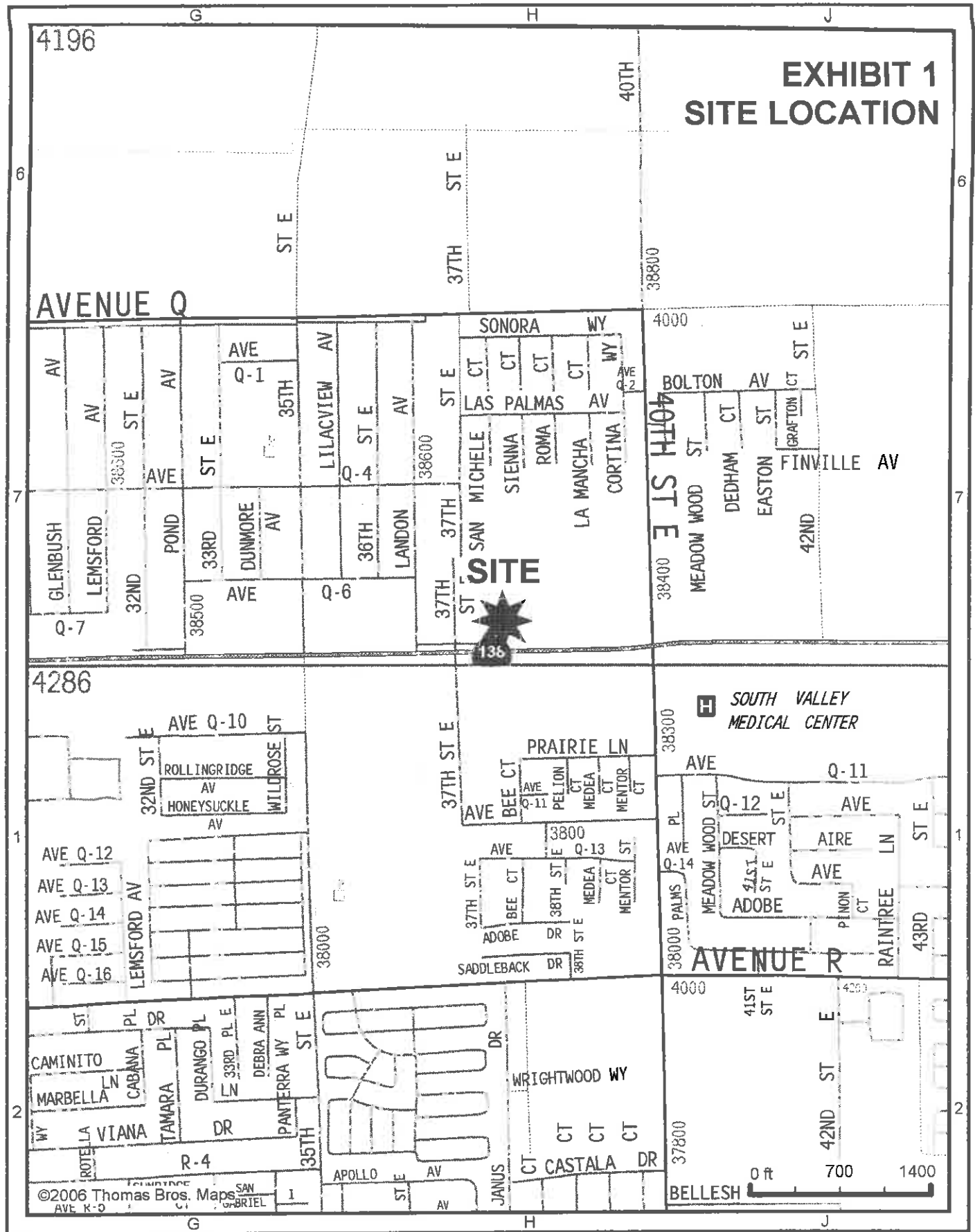
5.2 INTERIOR

The City's Noise Element recommended interior noise limit for new residential construction is 45 dBA CNEL. Typical California construction will provide at least 20 dBA of exterior to interior noise reduction with windows and doors closed. Since project noise levels will be mitigated to 63 dBA CNEL on the exterior of the nearest residential structures, an interior noise level of no more than 43 dBA CNEL is achieved with windows and doors closed. Thus, the interior noise limit of 45 dBA CNEL can be met with the existing residential construction. No additional interior noise mitigation is required.

5.3 PROJECT DISCLOSURE

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

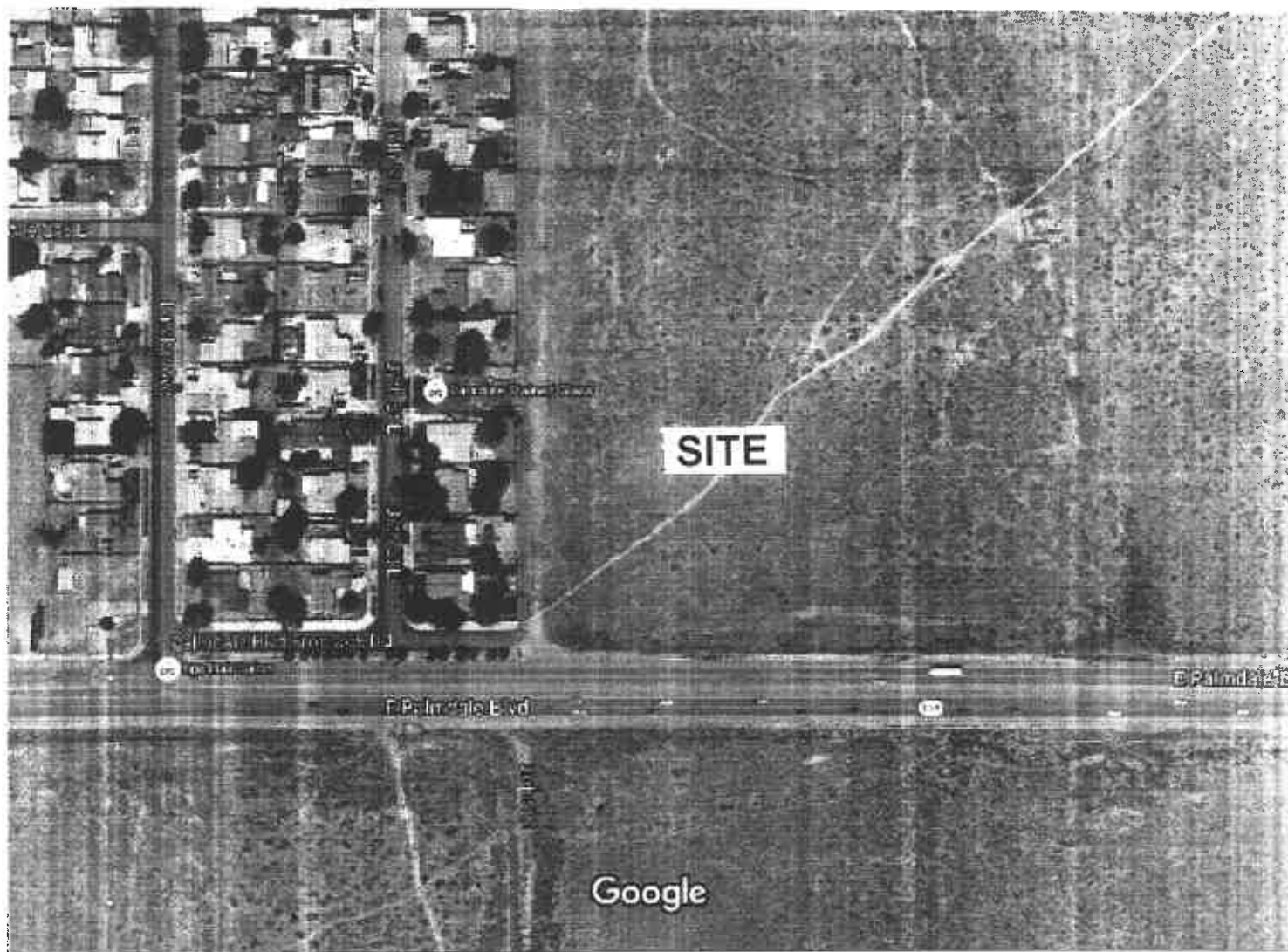
Do not misrepresent the degree of exterior to interior acoustical isolation as anything more than meeting code during any phase of this project. Never, ever, use any form of the term "Soundproof" to describe any portion of this project.



SITE: 4000 Palmdale Blvd, Palmdale, CA 93552, 4196 - H7

EXHIBIT 2 AERIAL PHOTO

Google Maps



Imagery ©2015 DigitalGlobe, U.S. Geological Survey, USDA Farm Service Agency, Map data ©2015 Google 100 ft

EXHIBIT 3 SITE PLAN

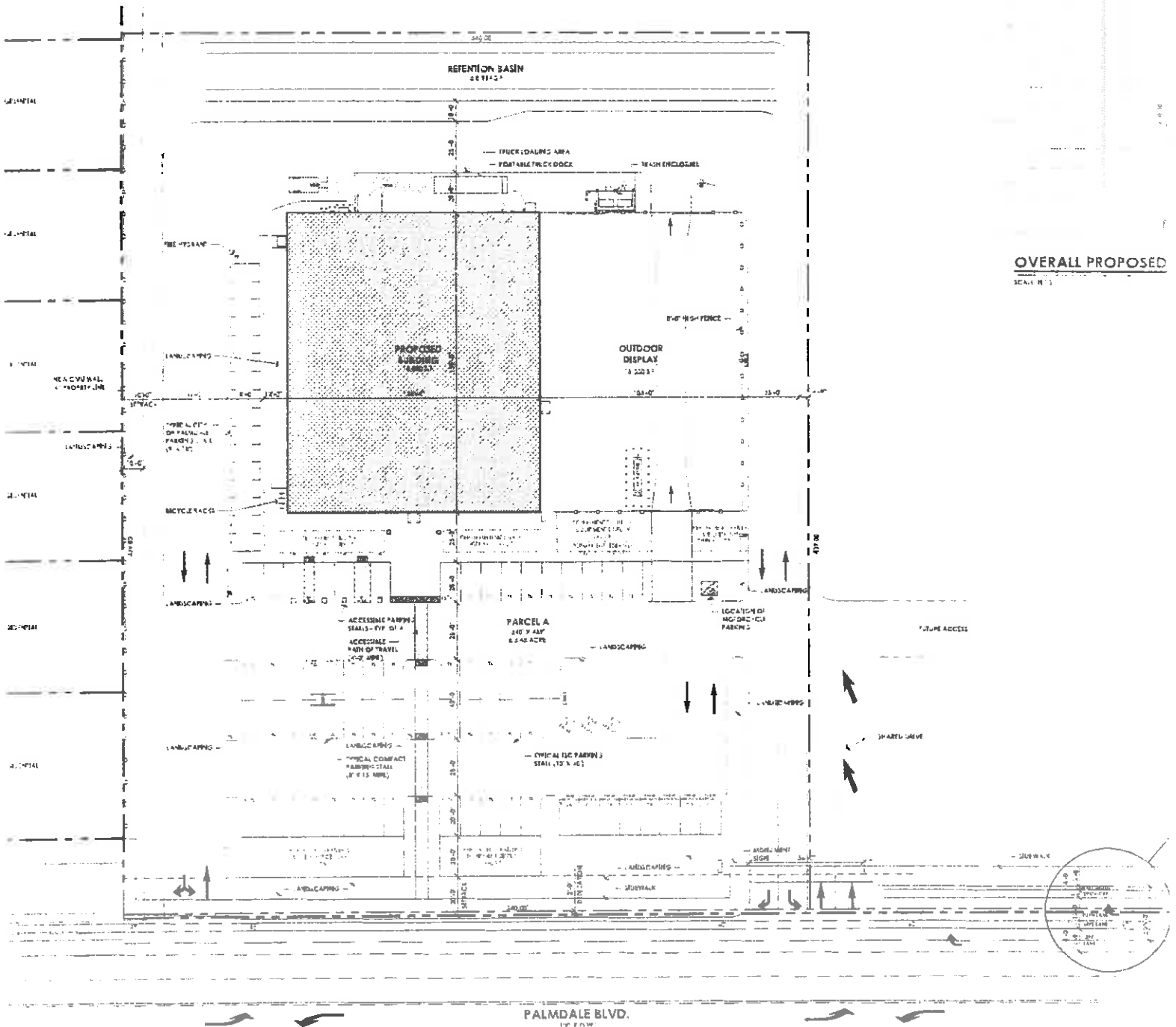
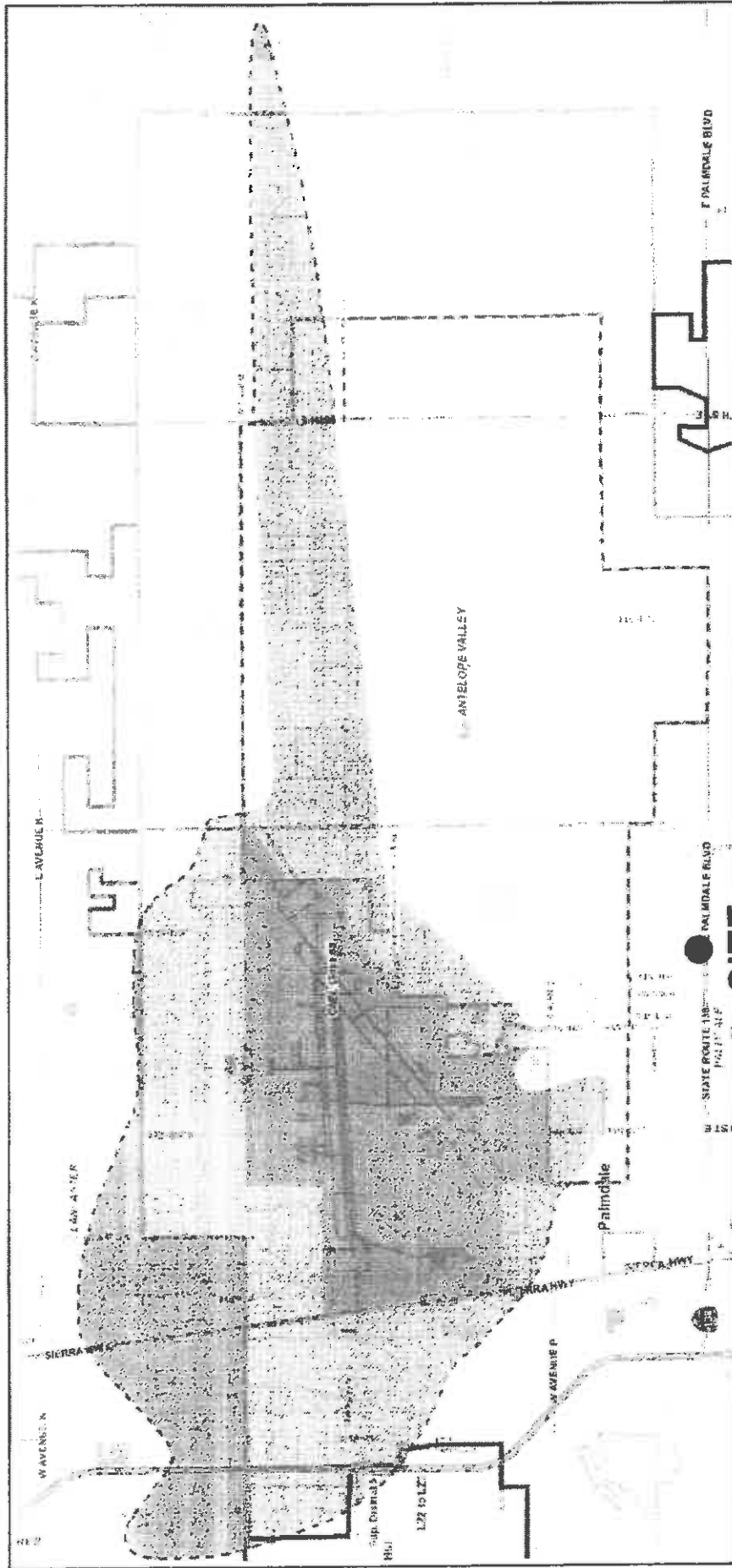


EXHIBIT 4 PLANT 42 NOISE CONTOUR



SITE
Created in GIS-NET3

Printed: Sep 30, 2014



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APPENDIX 1

NOISE RATING METHODOLOGY

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NOISE RATING METHODOLOGY

The A-weighted decibel (dBA) or "A" scale on a sound level meter is typically used for environmental noise measurements because the weighting characteristics of the "A" scale approximate the subjective response of the human ear to a broad frequency band noise source by discriminating against the very low and very high frequencies of the audible sound spectrum.

Since community noise is seldom constant, varying from moment to moment and throughout the day, the "A" weighted noise level needs to be further described to provide meaningful data. The Environmental Protection Agency, the Federal Department of Transportation, several foreign countries and many private consultants are now using three time-exceeded percentile figures to describe noise, which are:

- (1) L_{90} is the noise level that is exceeded 90 percent of any sample measurement period (such as 24 hours) and is often used to describe the background or ambient noise level.
- (2) L_{50} is the noise level that is exceeded 50 percent of any sample measurement period. It is generally considered to represent the median noise level.
- (3) L_{10} is the noise level that is exceeded 10 percent of any sample measurement period. It is a good descriptor of fluctuating noise sources such as vehicular traffic. It indicates the near-maximum noise levels that occur for groups of single noise events. Being related to the subjective annoyance to community noise, the L_{10} is a good design tool in the planning of acoustical barriers.

More recent noise assessment methods are based on the equivalent energy concept where $Leq(x)$ represents the average energy content of a fluctuating noise source over a sample measurement period. The subscript (x) represents the period over which the energy is computed and/or measured. Current practice references the time quantity to either one (1) hour, eight (8) hours, or twenty-four (24) hours. When referenced to one (1) hour, Leq is also called the HNL (Hourly Noise Level).

Since Leq is the summation of the functional products of noise level and duration, many different combinations of noise levels, duration times and time histories can produce similar Leq values. Thus a value of $Leq(24)$ equals 50 means only that the average noise level is 50 dB. During that 24-hour period, there can be times when the noise level is higher than 50 dB and times when it is lower than 50 dB.

If the period of the measurement is only a single event, the energy content is not averaged. The energy expression for a single event is simply the sum of the functional product of the noise level and duration time of the event. This term is called the Le or SENEL (Single Event Noise Exposure Level). The summation of Le values averaged over one hour is $Leq(1)$, over eight hours is $Leq(8)$, over 24 hours is $Leq(24)$, etc.

Leq is further refined into Ldn (Level Day-Night) and $CNEL$ (Community Noise Equivalent Level), where noise that occurs during certain hours of the day are weighted (or penalized) in an attempt to compensate for the general perception that such noise is more annoying during these time periods (typically evening and nighttime hours).

- (1) Ldn is the sound level in dBA that corresponds to the average energy content of the noise being measured over a 24-hour period but includes a ten (10) dBA weighting penalty for noise that occurs during the nighttime hours between 10:00 PM and 7:00 AM. The Ldn is a noise rating method recommended by the Environmental Protection Agency because it takes into account those subjectively more annoying noise events that occur during normal sleeping hours.
- (2) $CNEL$ is the sound level in dBA that corresponds to the average energy content of the noise being measured over a 24-hour period but includes a five (5) dBA penalty for noise that occurs during the evening hours between 7:00 PM and 10:00 PM, and a ten (10) dBA penalty for noise that occurs during the nighttime hours between 10:00 PM and 7:00 AM. For typical highway vehicular traffic situations, computer analysis has shown that the Ldn and $CNEL$ values correlate within 0.5 dBA.

The percentile figures L_{10} , L_{50} and L_{90} can be directly scaled from a graphical recording of the measured noise sample over a particular time period. These figures can also be measured directly using modern automatic noise measuring equipment. Measurement of the parameters Le , Leq , Ldn and $CNEL$ requires even more sophisticated and correspondingly expensive noise measuring equipment. As a result, engineers have devised ways of estimating Leq (and hence, Ldn) using standard instrumentation and methods.

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APPENDIX 2

EXISTING RTRAFFIC NOISE CALCULATIONS

FHWA RD-77-108 HIGHWAY NOISE PREDICTION MODEL

PROJECT NAME :TRACTOR SUPPLY COMPANY
 SITE LOCATION :PALMDALE
 DESCRIPTION :PALMDALE BLVD
 SITE TYPE :SOFT

INPUT DATA	AUTO	MEDIUM TRUCK	HEAVY TRUCK
SPEED	50	50	50
% DAY	73	73	69.1
% EVENING	8.60	8.60	6.70
% NIGHT	18.4	18.4	24.2
% VOLUME	92.9	1.4	5.7
VOLUME	18100		

----AVERAGE HOURLY NOISE LEVELS AT 50 FEET----

	DAY	EVENING	NIGHT	24 HOUR	CNEL
AUTO	69.07	65.81	64.34	67.43	71.94
MEDIUM TRK.	60.89	57.62	56.15	59.24	63.76
HEAVY TRK.	70.98	66.87	67.68	69.58	74.78
TOTAL	73.39	69.66	69.53	71.89	76.82

NOISE LEVEL AT SPECIFIED DISTANCES

DISTANCE	CNEL
50	76.82
75	74.18
100	72.30
125	70.85
150	69.66
175	68.66
200	67.79
225	67.02
250	66.33
275	65.71
300	65.15
325	64.63
350	64.14
375	63.69
400	63.27
450	62.51
500	61.82
550	61.20
600	60.63
650	60.11
700	59.63
750	59.18
800	58.76

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APPENDIX 3

TRUCK DELIVERY FREQUENCY LETTER

February 23, 2013

TO WHOM IT MAY CONCERN

Listed below is truck delivery activity for a typical Tractor Supply Company store.

A typical TSC store receives the following deliveries:

Two trucks from one of TSC's Distribution Centers each week, one delivering general merchandise and the other delivering feed. Trucks deliver during normal business hours. Typically each truck takes approximately two hours to complete the delivery. Most of the deliveries will be made on semi-van trailers, but some will utilize flatbed trailers.

Three to four deliveries will be made each week by vendor direct ships or on common carriers. Truck types will vary depending on the load. These deliveries will normally be made between 8AM and 6PM. They typically last 15- 30 minutes.

UPS/Fedex type deliveries will be made daily at varying times.

If additional information is required, please contact me at (806) 352-0498.

Sincerely,
Tim Hoelscher
Director of Real Estate
2738 S. Georgia
Amarillo, TX 79109
Phone: 806 352 0498
Fax: 615-484-4429
E-Mail: thoelscher@tractorsupply.com

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APPENDIX 4

SOUND BARRIER HEIGHT CALCULATIONS

POINT SOURCE BARRIER REDUCTION, WALL HEIGHT VARIABLE

 50 FT. SOURCE REFERENCE LEVEL.....= 64

PROJECT.....TRACTOR SUPPLY COMPANY
 DESCRIPTION..WEST & NORTH PROPERTY LINE SOUND WALLS
 SOURCE HEIGHT..... 8
 SOURCE ELEVATION..... 0
 RECEIVER ELEVATION..... 0
 BARRIER ELEVATION..... 0
 RECEIVER HEIGHT..... 5
 DISTANCE TO SOURCE..... 25
 DISTANCE TO RECEIVER... 10
 NOISE LEVEL AT RECEIVER W/O BARRIER..... 67.1

WALL HEIGHT		TNL	TIL
4.0	67.1	67.1	0.0
FN	0.0000		
5.0	67.1	67.1	0.0
FN	0.0000		
6.0	62.1	62.1	5.0
FN	0.0014		
7.0	60.7	60.7	6.4
FN	0.0894		
8.0	58.9	58.9	8.2
FN	0.3115		
9.0	56.8	56.8	10.3
FN	0.6613		
10.0	55.1	55.1	12.0
FN	1.1310		
11.0	53.6	53.6	13.5
FN	1.7118		
12.0	52.4	52.4	14.7
FN	2.3949		

POINT SOURCE BARRIER REDUCTION, WALL HEIGHT VARIABLE

 50 FT. SOURCE REFERENCE LEVEL.....= 69

PROJECT.....TRACTOR SUPPLY COMPANY
 DESCRIPTION..ROOFTOP PARAPET SOUND WALLS
 SOURCE HEIGHT..... 4
 SOURCE ELEVATION..... 20
 RECEIVER ELEVATION..... 0
 BARRIER ELEVATION..... 20
 RECEIVER HEIGHT..... 5
 DISTANCE TO SOURCE..... 10
 DISTANCE TO RECEIVER... 90
 NOISE LEVEL AT RECEIVER W/O BARRIER..... 63.0

WALL HEIGHT		TNL	TIL
0.0	63.0	63.0	-0.0
FN	0.0000		
1.0	63.0	63.0	-0.0
FN	0.0000		
2.0	63.0	63.0	-0.0
FN	0.0000		
3.0	57.2	57.2	5.7
FN	0.0430		
4.0	55.6	55.6	7.4
FN	0.1943		
5.0	53.8	53.8	9.2
FN	0.4557		
6.0	52.0	52.0	11.0
FN	0.8257		