BOLLARD ACOUSTICAL CONSULTANTS, INC.
Acoustics ▸ Vibration ▸ Noise Control Engineering

January 23, 2006

Mr. Art Lucas
Lars Andersen & Associates, Inc.
4630 W. Jacquelyn Ave, Suite 119
Fresno, CA 93722

Subject: **Comparison of Compaction Grouting and Stone Column construction methods at Huntington Beach Home Depot Store.**

Dear Mr. Lucas:

Pursuant to the request from the City of Huntington Beach, this letter has been prepared to provide additional descriptions of the Compaction Grouting and Stone Column construction methods. This letter was developed with input from the project Geotechnical Engineer (The Twining Laboratories, Inc.), and on research conducted by Bollard Acoustical Consultants.

The following descriptions have been provided to summarize the equipment and procedures for two (2) alternative methods being considered for deep ground improvement to reduce the potential impacts from liquefaction related settlements for the proposed Home Depot structure at the subject site. In addition, a summary of the potential vibration and noise impacts to adjacent properties is discussed. It is our understanding the following descriptions will be used by the Home Depot design team to evaluate which method of ground improvement would result in the least impact to adjacent properties.

General Description of Equipment and Procedures used for Compaction Grouting Techniques for Liquefaction Mitigation

In brief, compaction grouting involves the injection of cement grout under high pressures at individual locations over an evenly spaced grid pattern across the entire building area and beyond. The purpose of the grout injection is to laterally densify the loose soils which are susceptible to seismic settlement and thereby decrease the liquefaction and seismic settlement potential of the densified layers. For liquefaction mitigation, this process typically involves construction of compaction grout locations on a uniform square-grid pattern of about 6 to 10 feet on center. This treatment is conducted to a depth necessary to densify the soils that are subject to liquefaction over a plan area that includes the entire building footprint and areas of adjacent appurtenances. For this project, the treatment area is anticipated to be about 150,000 square feet.

Compaction grout involves installation of a grout pipe into the subsurface soils. The grout pipe is generally installed by a combination of drilling and driving a steel casing into the ground. The casing is then used as a conduit for the grout pipe to inject grout from the bottom of the casing at high pressures up to the top of the soil layer to be densified. The grout pipe is slowly raised from the ground as the grout is injected, so that the pressure used to force the grout into the ground induces lateral compaction effort to the subsurface soils. At the completion of an individual compaction grout column, subsequent columns are constructed throughout the process until all columns are installed and the required densification is obtained.

The equipment used to extend the grout pipe into the ground is a specialized unit that typically has the appearance of a crane or a bull dozer with a frame attachment used to mechanically or hydraulically advance the grout pipe and / or casing. For the purposes of this letter, this equipment is referred to as the injection rig. Heavier injection rigs are generally required as the depth of ground improvement increases. Due to the depth of the ground improvement required for this site, the injection rig equipment demands will be high. In order to pump the grout at the high pressures required, a large air compressor is generally used.

Based on the total volume of grout anticipated for this project, the grout will be mixed in an onsite batch plant, which will include silos of cement and stockpiles of aggregate (sand and gravel) and water supply. The batch plant will mix the cement grout, which consists of water, cement and aggregate. Equipment such as a front end loader and cement mixing equipment are used for proportioning and mixing the cement grout. The cement grout will then be pumped through hoses to the location of the injection rig, through the grout pipe and into the ground. Supporting equipment often includes a generator, drill rig, tractor-trailers, air supply tank and air compressors.

General Description of Equipment and Procedures used for Stone Columns Installation for Liquefaction Mitigation

The Stone Column technique for soil densification consists of compaction of aggregate (i.e, sand and gravel) into underlying site soil strata. Compaction of the aggregate results in densification of the surrounding soil strata using specially designed equipment. For liquefaction mitigation, this process typically involves construction of stone columns on a uniform, square-grid pattern of about 8 to 10 feet on center.

The Stone Column equipment consists of a base machine which includes a low frequency vibratory hammer, aggregate hopper, casing pipe, and lifting bucket, that is fed aggregate by a front end loader. The base machine looks similar in appearance to a crane such as those used for pile driving. Additional equipment includes a generator, air supply tank, and air compressor that are usually mounted to the base machine.

The operating procedure consists of positioning the base machine in the location of the proposed column, inserting the casing pipe below the ground surface to the required depth, and starting construction of the stone column. The casing pipe is then loaded with aggregate, the casing pipe is inserted below the ground surface to the desired depth, and the aggregate is released through the bottom of the casing pipe into the ground by using compressed air. The casing pipe is then vertically

raised approximately ten (10) feet, allowing the aggregate to drop into the resulting void space. The casing pipe is then vibrated and pushed into the newly placed aggregate, thereby compacting the aggregate and densifying the surrounding soil. This process is repeated until the column is constructed throughout the treatment depth. Upon completion of one column, subsequent columns are installed until all columns are completed and the desired densification is obtained.

Summary of Noise and Vibration Impacts

The intent of the following summary is to discuss the potential for noise and vibration impacts to adjacent properties for further evaluation by a specialist in this field. The impacts discussed herein are not intended to address impacts caused to workmen within the limits of the subject property. It is our understanding the proposed Home Depot property is bordered by a mix of residential and commercial property. Based on information provided by the project civil engineers (Lars Andersen), the proposed Home Depot structure is located about 160 feet from the adjacent Blockbuster retail store and about 60 feet from the property line bordering a residential development. It is our understanding no structures are located within about 75 feet of the proposed Home Depot (LA to confirm). Based on the limits of the deep ground improvement recommended in the geotechnical report, the source of the machinery generating the highest noise and/or ground vibrations is not anticipated to be closer than 50 feet from the nearest property line during production. The following summary of potential noise and vibration impacts has been prepared based on this understanding.

As with any construction activity, noise is generated during activities such as compaction grouting and stone column installation. The noise levels are generally attributed to the actual equipment type rather than the ground improvement method (i.e., depending on the equipment used, compaction grouting may be noisier, or stone column installation may be noisier). As a result of the variables surrounding both construction types, it is difficult to project which process will be louder. In addition, although one method may generate lower noise emissions than another, the quieter method may require a greater duration to complete, thereby extending the duration of the construction noise generation.

Based on the December 2004 report "Update of Noise Database for Prediction of Noise on Construction and Open Sites" from DEFRA (Department for Environment Food and Rural Affairs), the noise level of the stone column construction method was measured to be 84 dB at 20 feet. Moore and Taber, soil grouting and ground improvement specialists, report that compaction grouting activities were measured to be 88 dB at 20 feet from the operating equipment. Assuming that these activities will occur about 60+ feet from the nearest residential property line, noise generation of these methods would range from approximately 70-75 dB,at the adjacent properties. These data indicate that there is not a substantial acoustic difference between the two construction types.

During the compaction grouting and stone column installation, ground vibrations are induced when the casing is driven and / or pushed into the ground and ground vibrations in areas adjacent to air compressors occur. Comparatively, ground vibrations are also induced during compaction of the stone columns. In our experience, the ground vibrations generated at the source from compaction grouting are less than when compared with conventional stone column techniques. However, vibration levels reduce with increased distance from the source of the vibration. Given the distance of the work area from the property line, the perceptible vibration levels from typical equipment used to install stone columns may not be greater than typical equipment used for compaction grouting.

Summary

The acoustic literature cited indicates that there is not an appreciable acoustic difference between the two types of construction being considered for this project, with noise levels predicted to be approximately 70 - 75 dB at the nearest residences to the west while the construction activities are at their closest positions to those residences. These levels are within the range normally associated with construction activities (i.e. earthmoving equipment, demolition equipment, etc.). Finally, vibration levels associated with either of these construction types are anticipated to be well below the range required for damage to structures.

Respectfully Submitted,

Paul Bollard

Paul Bollard, President

Bollard Acoustical Consultants

BOLLARD ACOUSTICAL CONSULTANTS, INC.
Acoustics ▸ Vibration ▸ Noise Control Engineering

January 23, 2006

Mr. Art Lucas
Lars Andersen & Associates, Inc.
4630 W. Jacquelyn Ave, Suite 119
Fresno, CA 93722

Subject: **Nighttime compliance of rear parking area activities at Huntington Beach Home Depot Store.**

Dear Mr. Lucas:

In reviewing the most recent correspondence for this project, it was noted that nighttime parking activities could exceed the City's noise ordnance. This statement was developed from the noise analysis prepared by our company for this project (last paragraph on page 16 of our report dated October 28, 2005).

In that analysis, we noted that noise from those rear parking spaces could reach 53 dB L50 and 73 dB Lmax at the property line of the adjacent residences to the west if each parking stall behind the store were to empty and fill during a worst-case nighttime hour. Although this situation was considered to be unlikely, the levels indicated that such an event could result in exceedance of the 50 dB L50 and 70 dB Lmax nighttime noise level limits at the adjacent residences.

The conclusion that the nighttime standards may be exceeded by 3 dB included shielding provided by an existing 6-foot tall wall. However, the project mitigation calls for increasing the height of the property line wall to 8 feet.

Using our noise barrier insertion loss program, we determined how effective the 8-foot wall would be in reducing parking lot noise levels in the nearest back yards. Because noise barrier effectiveness is a function of the proximity of the receiver to the barrier, we conducted an iterative barrier analysis to determine the worst case location in the back yard (i.e. the location where the combination of distance and barrier shielding would yield the highest parking lot noise levels anywhere on the adjacent residential property). Our analysis indicates that, with the proposed 8-foot tall wall, the highest noise level received anywhere within the adjacent residential properties to the west would occur with the receiver at a distance of 5 feet west of the wall. At this position, parking lot noise is predicted to be attenuated by the 8-foot tall barrier to 45 dB L50 and 55 dB Lmax (attachment).

The predicted levels with the 8-foot tall barrier are in compliance with the nighttime noise level limit during nighttime parking activities in the rear parking lot. Therefore, no additional parking lot noise mitigation measures would be required for this project.

Respectfully Submitted,

Paul Bollard

Paul Bollard, President

Bollard Acoustical Consultants

Attachement A

Barrier Insertion Loss Calculation

Project Information:

Job Number: 2004-279
Project Name: Huntinton Beach Home Depot
Location(s): Rear Parking Area

Noise Level Data:

Source Description: Parking Lot Noise
Source Noise Level, dBA: 55
Source Frequency (Hz): 500
Source Height (ft): 5

Site Geometry:

Receiver Description: Nearest Property Lines
Source to Barrier Distance (C_1): 9
Barrier to Receiver Distance (C_2): 5

Pad/Ground Elevation at Receiver: 0
Receiver Elevation[1]: 5
Base of Barrier Elevation: 0
Starting Barrier Height 0

Barrier Effectiveness:

Top of Barrier Elevation (ft)	Barrier Height (ft)	Insertion Loss, dB	Noise Level, dB	Barrier Breaks Line of Site to Source?
0	0	0.0	55.0	No
1	1	0.0	55.0	No
2	2	0.0	55.0	No
3	3	-0.4	54.6	No
4	4	-2.9	52.1	No
5	5	-5.0	50.0	No
6	6	-6.2	48.8	Yes
7	7	-8.6	46.4	Yes
8	8	-10.5	44.5	Yes
9	9	-12.3	42.7	Yes
10	10	-13.5	41.5	Yes

Notes: 1.Standard receiver elevation is five feet above grade/pad elevations at the receiver location(s)

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January 19, 2006

Mr. Art Lucas
Lars Andersen & Associates, Inc.
4630 W. Jacquelyn Ave, Suite 119
Fresno, CA 93722

Subject: **Nighttime compliance of rear parking area activities at Huntington Beach Home Depot Store.**

Dear Mr. Lucas:

In reviewing the most recent correspondence for this project, it was noted that nighttime parking activities could exceed the City's noise ordnance. This statement was developed from the noise analysis prepared by our company for this project (last paragraph on page 16 of our report dated October 28, 2005).

In that analysis, we noted that noise from those rear parking spaces could reach 53 dB L50 and 73 dB Lmax at the property line of the adjacent residences to the west if each parking stall behind the store were to empty and fill during a worst-case nighttime hour. Although this situation was considered to be unlikely, the levels indicated that such an event could result in exceedance of the 50 dB L50 and 70 dB Lmax nighttime noise level limits at the adjacent residences.

The conclusion that the nighttime standards may be exceeded by 3 dB included shielding provided by an existing 6-foot tall wall. However, the project mitigation calls for increasing the height of tha property line wall to 8 feet. Due to the close position of the parking spaces to the noise barrier, the additional 2 feet of wall height is predicted to reduce parking lot noise by an additional 4 dB (see attached worksheet). As a result, the increased wall height would result in rear parking area noise levels of 59 dB L50, and 69 dB Lmax. These levels are in compliance with the nighttime noise level limit during nighttime parking activities in the rear parking lot. Therefore, no additional parking lot noise mitigation measures would be required for this project.

Respectfully Submitted,

Paul Bollard

Paul Bollard, President

Bollard Acoustical Consultants

Attachement A

Barrier Insertion Loss Calculation

Project Information:

Job Number: 2004-279
Project Name: Huntinton Beach Home Depot
Location(s): Rear Parking Area

Noise Level Data:

Source Description: Parking Lot Noise
Source Noise Level, dBA: 59
Source Frequency (Hz): 500
Source Height (ft): 5

Site Geometry:

Receiver Description: Nearest Property Lines
Source to Barrier Distance (C_1): 9
Barrier to Receiver Distance (C_2): 10

Pad/Ground Elevation at Receiver: 0
Receiver Elevation[1]: 5
Base of Barrier Elevation: 0
Starting Barrier Height 0

Barrier Effectiveness:

Top of Barrier Elevation (ft)	Barrier Height (ft)	Insertion Loss, dB	Noise Level, dB	Barrier Breaks Line of Site to Source?
0	0	0.0	59.0	No
1	1	0.0	59.0	No
2	2	-0.3	58.7	No
3	3	-0.7	58.3	No
4	4	-3.6	55.4	No
5	5	-5.0	54.0	No
6	6	-5.9	53.1	Yes
7	7	-7.8	51.2	Yes
8	8	-9.7	49.3	Yes
9	9	-11.1	47.9	Yes
10	10	-12.6	46.4	Yes

Notes: 1.Standard receiver elevation is five feet above grade/pad elevations at the receiver location(s)

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Acoustical Consultants

NOISE IMPACTS

Letter from Bollard Acoustical Consultants, Inc.

City of Huntington Beach

JAN 17 2006

BOLLARD ACOUSTICAL CONSULTANTS, INC.
Acoustics ▸ Vibration ▸ Noise Control Engineering

January 12, 2006

Mr. Art Lucas
Lars Andersen & Associates, Inc.
4630 W. Jacquelyn Ave, Suite 119
Fresno, CA 93722

Subject: **Nighttime compliance of HVAC system noise at Huntington Beach Home Depot Store.**

Dear Mr. Lucas:

In reviewing the MND for the above referenced project, it was noted that "mechanical equipment noise will comply with the City's noise ordnance (assuming rooftop parapets are in place) but that nighttime standards could be exceeded." This statement was developed from the noise analysis prepared by our company for this project.

Based on additional information provided by the project's mechanical engineer (see attached sheet fr 5 ton convertible units), we determined that the reference noise level data we used in our HVAC assessment was approximately 8 dB louder than the manufactures test data for the proposed units. Specifically, BAC utilized a reference level of 52 dB at a distance of 100 feet (92 dB PWL), whereas the reference sound level data for a 5 ton unit computes to 44 dB (84 dB PWL). As a result, the predicted noise levels contained in our report are extremely conservative, and actual levels are expected to be 8 dB lower than the level of 51 dB L50 (at the nearest residential property line to the west) contained in our report.

Based on the updated HVAC noise emission data, the predicted level of 43 dB L50 at the property line of the nearest residences would satisfy both the daytime and nighttime noise ordinance standards of the City of Huntington Beach. However, during nighttime hours, the project mechanical engineer reports that the system is programmed to "nighttime setting" due to the lower air conditioning demands during the hours of 10 pm to 7 am. The nighttime setting would operate the HVAC equipment at 25% capacity, thereby further reducing the overall system noise output by approximately 6 dB. In conclusion, nighttime noise levels at the nearest residences are predicted to be approximately 37 dB L50, which is 13 dB below the City's nighttime noise level limit. Therefore, no additional HVAC noise mitigation measures would be required for this project.

Respectfully Submitted,

City of Huntington Beach
JAN 17 2006

Paul Bollard

Paul Bollard, President
Bollard Acoustical Consultants

TRANE

General Data

(3 - 4 Tons) High Efficiency

Table GD-5 — General Data — 3-4 Tons

	3 Ton Convertible Units T/YHC036A1, A3, A4, AW	4 Ton Convertible Units T/YHC048A1, A3, A4, AW
Cooling Performance[1]		
Gross Cooling Capacity	38,000	49,800
SEER[2]	12.50	12.0
Nominal CFM / ARI Rated CFM	1,200 / 1,200	1,600/1,600
ARI Net Cooling Capacity	36,600	47,500
System Power (KW)	3.33	4.48
Compressor		
No./Type	1/Scroll	1/Scroll
Outdoor Sound Rating (dB)[5]	83	85
Outdoor Coil -Type	Lanced	Lanced
Tube Size (in.) OD	0.3125	0.3125
Face Area (sq ft)	7.19	9.59
Rows/FPI	2/17	3/17
Indoor Coil -Type	Lanced	Lanced
Tube Size (in.)	0.3125	0.3125
Face Area (sq ft)	6.68	6.68
Rows/FPI	3/16	4/16
Refrigerant Control	Short Orifice	Short Orifice
Drain Connection No./Size (in.)	1/¾ NPT	1/¾ NPT
Outdoor Fan -Type	Propeller	Propeller
No. Used/Diameter (in.)	1/22	1/22
DriveType/No. Speeds	Direct/1[14]	Direct/1[14]
CFM	2,550	3,050
No. Motors/HP	1/0.20	1/0.33
Motor RPM	1,075	1,075
Direct Drive Indoor Fan -Type	FC Centrifugal	FC Centrifugal
No. Used/Diameter (in.)	1/10 x 10	1/11 x 11
DriveType/No. Speeds	Direct/2	Direct/2
No. Motors	1	1
Motor HP (Standard/Oversized)	0.33/0.50	0.60/0.80
Motor RPM (Standard/Oversized)	950/1,100[9]	930/1,000[9]
Motor Frame Size (Standard/Oversized)	48/48	48/48
Belt Drive Indoor Fan -Type	FC Centrifugal	FC Centrifugal
No. Used/Diameter (in.)	1/11 x 11	1/11 x 11
DriveType/No. Speeds	Belt/Variable Sheave [12]	Belt/Variable Sheave [12]
No. Motors	1	1
Motor HP (Standard/Oversized)	1.00/—	1.00/—
Motor RPM (Standard/Oversized)	1,750/—	1,750/—
Motor Frame Size (Standard/Oversized)	56/—	56/—
Filters -Type Furnished [13]	Throwaway	Throwaway
(No.) Size Recommended	(2) 20 x 25 x 1[10]	(2) 20 x 25 x 1[10]
Optional Hot Gas Reheat Coil -Type[15]	Lanced	Lanced
Tube Size (in.)OD	0.375	0.375
Face Area (sq. ft.)	2.22	2.22
Rows/FPI	1/16	1/16

Notes:
1. Cooling Performance is rated at 95 F ambient, 80 F entering dry bulb, 67 F entering wet bulb. Gross capacity does not include the effect of fan motor heat. ARI capacity is net and includes the effect of fan motor heat. Units are suitable for operation to ±20% of nominal cfm. Certified in accordance with the Unitary Air-Conditioner Equipment certification program, which is based on ARI Standard 210/240.
2. SEER are rated at ARI conditions and in accordance with DOE test procedures.
3. Heating Performance limit settings and rating data were established and approved under laboratory test conditions using American National Standards Institute standards. Ratings shown are for elevations up to 2000 feet. For elevations above 2000 feet, ratings should be reduced at the rate of 4% for each 1000 feet above sea level.
4. AFUE and Steady State Efficiency is rated in accordance with DOE test procedures.
5. Outdoor Sound Rating shown is tested in accordance with ARI Standard 270. For additional information refer to Table PD-128.
6. Refrigerant charge is an approximate value. For a more precise value, see unit nameplate and service instructions.
7. YHC036A1 and YHC048A1 Heating Output (Btu) is Low 47,000, Medium 63,000, High 95,000.
8. YHC036A1 and YHC048A1 AFUE (%) and Steady State (%) is Low, Medium and High 80.0.
9. Motor RPM shown is low speed. High speed Motor RPM is : YHC036A1,060/1,145, YHC048A1,000/1,100.
10. Filter size shown is for low and medium heat models. High heat model filter size recommended is 20 x 30 x 1.
11. Refrigerant charge shown is for three phase. YHC036A1 Refrigerant Charge is 4.5, YHC048A1 refrigerant charge is 8.1.
12. Belt Drive motor is not available for YHC036A1, YHC048A1
13. Optional 2" pleated filters also available.
14. With Dehumidification (Hot Gas Reheat) option: Direct/2.
15. Available on three-phase only.

GD-5 continued on next page

EVAP'S LESS

WORSE CASE

General Data

(5 - 6 Tons) High Efficiency

Table GD-6 — General Data — 5-6 Tons

	5 Ton Convertible Units		6 Ton Convertible Units
	T/YHC060A1	T/YHC060A3, A4, AW	T/YHC072A3, A4, AW
Cooling Performance[1]			
Gross Cooling Capacity	62,100	62,400	73,000
SEER / EER[2]	11.8 / —	12.0/ —	— /11.5[10]
Nominal CFM / ARI Rated CFM	2,000 / 2,000	2,000/2,000	2,400/2,100
ARI Net Cooling Capacity	59,000	59,500	70,000
System Power (KW)	5.73	5.56	6.09[10]
Compressor			
No./Type	1/Scroll	1/Scroll	1/Scroll
Outdoor Sound Rating (dB)[6]	84	84	89
Outdoor Coil -Type	Lanced	Lanced	Lanced
Tube Size (in.) OD	0.3125	0.3125	0.3125
Face Area (sq ft)	10.96	10.96	17.00
Rows/FPI	3/17	3/17	3/17
Indoor Coil -Type	Lanced	Lanced	Lanced
Tube Size (in.)	0.3125	0.3125	0.3125
Face Area (sq ft)	7.71	7.71	9.89
Rows/FPI	4/16	4/16	3/16
Refrigerant Control	Short Orifice	Short Orifice[14]	Short Orifice
Drain Connection No./Size (in.)	1/¾ NPT	1/¾ NPT	1/¾ NPT
Outdoor Fan -Type	Propeller	Propeller	Propeller
No. Used/Diameter (in.)	1/22	1/22	1/26
DriveType/No. Speeds	Direct/1	Direct/1[13]	Direct/1
CFM	3,170	3,370	6100
No. Motors/HP	1/0.33	1/0.33	1/0.70
Motor RPM	1,075	1,075	1,075
Direct Drive Indoor Fan -Type	FC Centrifugal	FC Centrifugal	—
No. Used/Diameter (in.)	1/11 x 11[8]	1/11 x 11[8]	—
DriveType/No. Speeds	Direct/2	Direct/2	—
No. Motors	1	1	—
Motor HP (Standard/Oversized)	0.90/1.00	0.90/1.00	—
Motor RPM (Standard/Oversized)	985/1,080[9]	985/1,080[9]	—
Motor Frame Size (Standard/Oversized)	48/48	48/48	—
Belt Drive Indoor Fan -Type	FC Centrifugal	FC Centrifugal	FC Centrifugal
No. Used/Diameter (in.)	1/11 x 11	1/11 x 11	1/12 x 12
DriveType/No. Speeds	Belt/Variable Sheave [11]	Belt/Variable Sheave[11]	Belt/Variable Sheave
No. Motors	1	1	1
Motor HP (Standard/Oversized)	1.00/—	1.00/—	1.00/2.00
Motor RPM (Standard/Oversized)	1,750/—	1,750/—	1750,1750
Motor Frame Size (Standard/Oversized)	56/—	56/—	56/56
Filters -Type Furnished	Throwaway	Throwaway	Throwaway
(No.) Size Recommended	(2)20 x 30 x 1[12]	(2) 20 x 30 x 1[12]	(4) 16 x 25 x 2[12]
Optional Hot Gas Reheat Coil -Type[15]	—	Lanced	—
Tube Size (in.)OD	—	0.375	—
Face Area (sq. ft.)	—	2.22	—
Rows/FPI	—	2/16	—

Notes:

1. Cooling Performance is rated at 95 F ambient, 80 F entering dry bulb, 67 F entering wet bulb. Gross capacity does not include the effect of fan motor heat. ARI capacity is net and includes the effect of fan motor heat. Units are suitable for operation to ±20% of nominal cfm. Units are certified in accordance with the Unitary Air-Conditioner Equipment certification program, which is based on ARI Standard 210/240.
2. EER and/or SEER are rated at ARI conditions and in accordance with DOE test procedures.
3. Integrated Part Load Value is rated in accordance with ARI Standard 210/240 or 360. Units are rated at 80° F ambient, 60° F entering dry bulb, and 67° F entering wet bulb at ARI rated cfm.
4. Heating Performance limit settings and rating data were established and approved under laboratory test conditions using American National Standards Institute standards. Ratings shown are for elevations up to 2000 feet. For elevations above 2000 feet, ratings should be reduced at the rate of 4% for each 1000 feet above sea level.
5. AFUE is rated in accordance with DOE test procedures.
6. Outdoor Sound Rating shown is tested in accordance with ARI Standard 270. For additional information refer to Table PD-12B.
7. Refrigerant charge is an approximate value. For a more precise value, see unit nameplate and service instructions.
8. YHC060A Oversized Motor Fan Diameter is 12 x 11.
9. Motor RPM shown is low speed. High speed Motor RPM is 1,100/1,135.
10. YHC072A when applied in a horizontal configuration has an 11.3 EER and 6.2 System Power (kW).
11. Belt Drive Motor is not available for YHC060A1.
12. 2" pleated filters is a factory installed option. 2" pleated filters is standard with the Dehumidification (Hot Gas Reheat) option.
13. With Dehumidification (Hot Gas Reheat) option: Direct/2.
14. TXV is supplied from the factory as standard with the Dehumidification (Hot Gas Reheat) option.
15. Available on three-phase only.

GD-6 continued on next page

Santos, Ron

From: Paul Bollard [paulb@bacnoise.com]
Sent: Friday, December 16, 2005 10:02 AM
To: alucas@larsandersen.com; rsantos@surfcity-hb.org
Subject: RE: Home Depot Huntington Beach - Noise Issues

Good Morning Ron and Art...

As we discussed yesterday Ron, the City of Huntington Beach has remaining concerns with two aspects of the noise analysis we prepared for the project. I appreciate the opportunity to provide additional information as to the logic behind our approach to these issues.

Parking Lot Impulsive Noise Issue:

As you know, in our professional opinion the impulsive sounds of car doors opening and closing and vehicles being loaded did not warrant the application of the -5 dB offset to the City's noise standards because those impacts were not the predominant sounds within the parking lot area. More specifically, parking lot noise generation consists of vehicle arriving and departing, engines starting and stopping, people talking, and shopping carts rolling, in addition to car doors opening and closing. The sound generation of a parking lot is a blend of all of these noise sources, with the impulsive sound of car doors opening and closing or vehicles being loaded (lumber being dropped into the back of a truck for example) making up only a part of the overall parking lot noise generation.

The -5 dB offset to the City's noise standard is intended to account for the higher level of annoyance people receive from noise sources which are impulsive versus non-impulsive noise sources. Were parking lot activities only made up of impulsive sounds, we would have appropriately applied the -5 dB offset in our assessment. However, because the impulsive nature of the parking lot is substantially masked by all of the other parking lot noise sources, the conditions which would lead to the greater annoyance are no longer present. As a result, we did not believe it appropriate to apply the impulsive offset to parking lot noise.

Assessment of Noise Impact at the Property Line of the Commercial Use to the South:

As we agreed yesterday, the property line between the project site and the existing commercial uses to the south is not considered noise sensitive. I understand the City's position that the noise standards are to be applied at the property line of neighboring uses, but I cannot envision that the intent of the standards was to mitigate noise levels at parking areas of neighboring commercial uses. In our analysis, we considered it a reasonable interpretation of City noise policy to assess noise impacts of the project inside the commercial uses to the south, which is where the real noise sensitivity exists. In my 18 years of analyzing noise, I have never seen a noise ordinance or noise element interpreted so as to require consideration of a parking area between similar uses noise-sensitive.

Please consider the dangerous precedent which would be set by literally interpreting the Noise Ordinance in considering the property lines between neighboring commercial uses as being noise-sensitive. In effect, it would require noise walls between virtually every commercial use in the City which are separated by parking areas. Because the Municipal Code applies to existing projects as well as new projects, it could be argued that if the code is interpreted in this fashion for the Home Depot project, that it would require enforcement uniformly throughout the City. In our professional opinion, it would be unreasonable to so interpret the noise ordinance in that fashion, as it is highly doubtful the drafters of the ordinance intended for these parking lot spaces to be considered

noise-sensitive.

Please let me know if you have any questions regarding our thoughts on these issues, and thank you again for allowing us to present them to you.

Sincerely,

Paul Bollard, President
Bollard Acoustical Consultants, Inc.

Environmental Noise Assessment

Home Depot - Huntington Beach

Huntington Beach, California

Bollard & Brennan Job # 2004-279

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Revised December 15, 2005

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EXECUTIVE SUMMARY

This report contains an assessment of noise impacts and mitigation measures for the Huntington Beach Home Depot Project, and includes revisions made to the August 26th version of this report to respond to City of Huntington Beach comments. The project consists of the construction and operation of a Home Depot store as a replacement structure to the former K-Mart structure of approximately 100,000 square feet which is currently located on the project site.

For this assessment, noise impacts related to on-site truck movements, parking lot activities, mechanical equipment, construction, off-site traffic, lumber off-loading activities (including forklift usage), trash collection, garden area noise sources, will-call, and loading dock activities were evaluated. The evaluation was conducted relative to City of Huntington Beach Noise Element and Noise Ordinance standards at both interior and exterior areas of the adjacent commercial and residential uses during both day and nighttime hours.

This analysis concludes that, with the mitigation proposed by the project applicant, and the additional noise mitigation proposed herein, this project will comply with applicable City of Huntington Beach noise standards and not result in significant noise impacts. The specific noise mitigation measures recommended in this analysis include the following:

1. The existing property line noise barrier along the south side of the site should be increased in height to 8 feet.

2. The rooftop parapet should be of sufficient height to block line of sight between rooftop HVAC equipment and the residences located immediately west of the project site.

3. The Garden Area P/A system should be designed and tested so as not to exceed the Table 1 standards at any location within the adjacent residential properties to the west.

4. All truck movements and unloading in areas on the west and south side of the store should be limited to daytime hours.

5. Activities at the will-call area and building materials storage area should be limited to daytime hours.

INTRODUCTION

The proposed Home Depot project is located on the southwest corner of Magnolia Street and Garfield Avenue in the City of Huntington Beach, California. The project site, which formerly housed a K-Mart Store, is located adjacent to existing commercial uses to the south, and existing single-family residential uses to the west. The site is bordered to the north and east by Garfield Avenue and Magnolia Street, respectively, beyond which are additional residential and commercial uses. Please refer to Figure 1 for locations of the project site and nearest noise-sensitive receivers.

Due to the proximity of the existing residential uses to the project site, an acoustical analysis has been requested for this project to quantify noise levels associated with on-site truck circulation, loading dock operations, parking lot noise, lumber unloading, and mechanical equipment at these nearest noise-sensitive uses. Where project-related noise generation is predicted to exceed applicable City of Huntington Beach noise standards, noise mitigation measures are proposed.

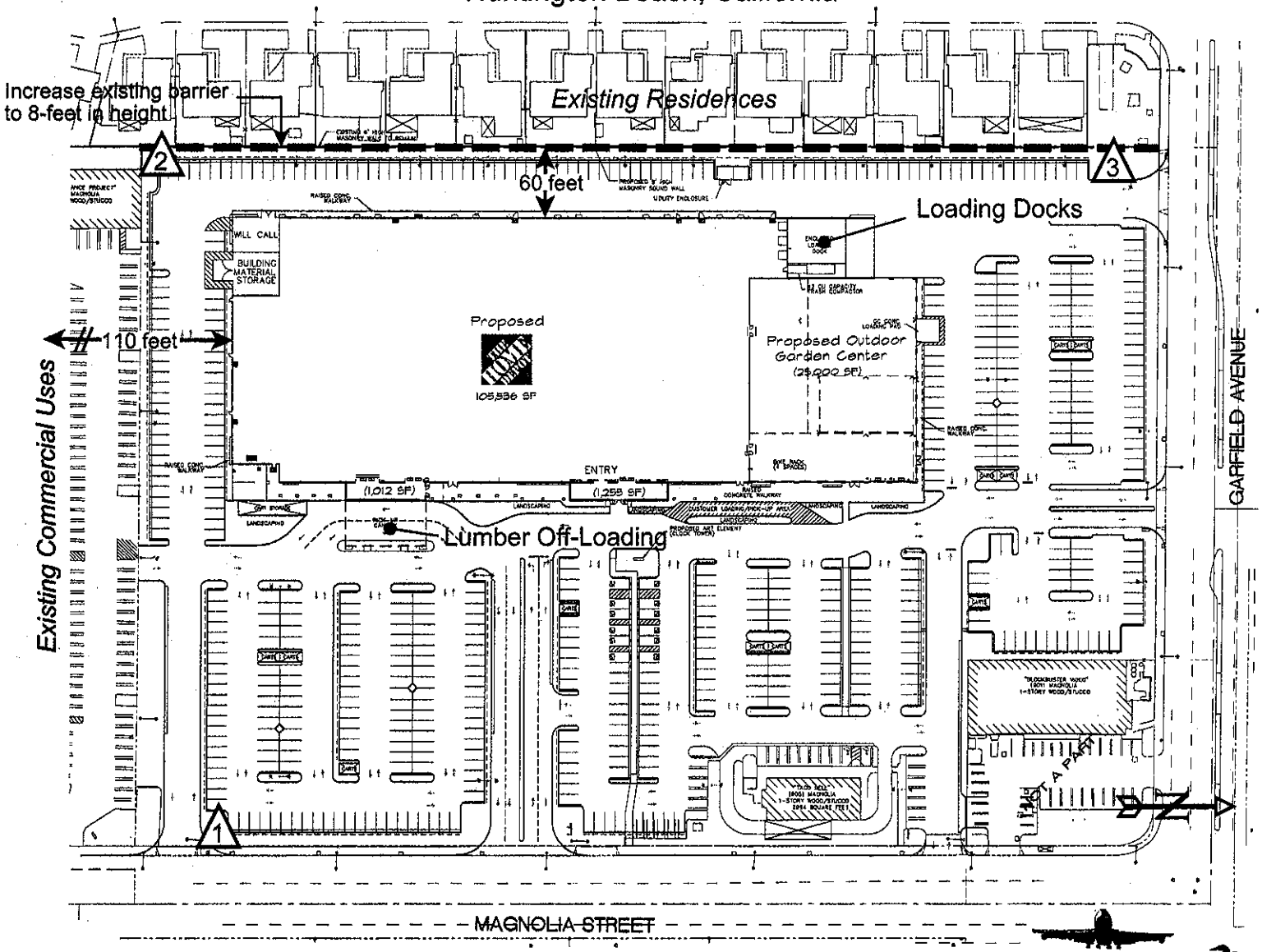
ACOUSTICAL TERMINOLOGY

Noise is often described as unwanted sound. Sound is defined as any pressure variation in air that the human ear can detect. If the pressure variations occur frequently enough (at least 20 times per second), they can be heard, and are designated as sound. The number of pressure variations per second is called the frequency of sound, and is expressed as cycles per second, or Hertz (Hz).

Measuring sound directly in terms of pressure would require a very large and awkward range of numbers. To avoid this, the decibel scale was devised. The decibel scale uses the hearing threshold (20 micropascals of pressure) as a point of reference, defined as 0 dB. Other sound pressures are then compared to the reference pressure, and the logarithm is taken to keep the numbers in a practical range. The decibel scale allows a million-fold increase in pressure to be expressed as 120 dB. Another useful aspect of the decibel scale is that changes in decibel levels correspond closely to human perception of relative loudness.

Figure 2 illustrates common noise levels associated with various sources. The perceived loudness of sounds is dependent upon many factors, including sound pressure level and frequency content. However, within the usual range of environmental noise levels, perception of loudness is relatively predictable, and can be approximated by filtering the frequency response of a sound level meter by means of the standardized A-weighting network. There is a strong correlation between A-weighted sound levels (expressed as dBA) and community response to noise. For this reason, the A-weighted sound level has become the standard tool of environmental noise assessment. All noise levels reported in this section are in terms of A-weighted levels.

Figure 1
Home Depot
Huntington Beach, California



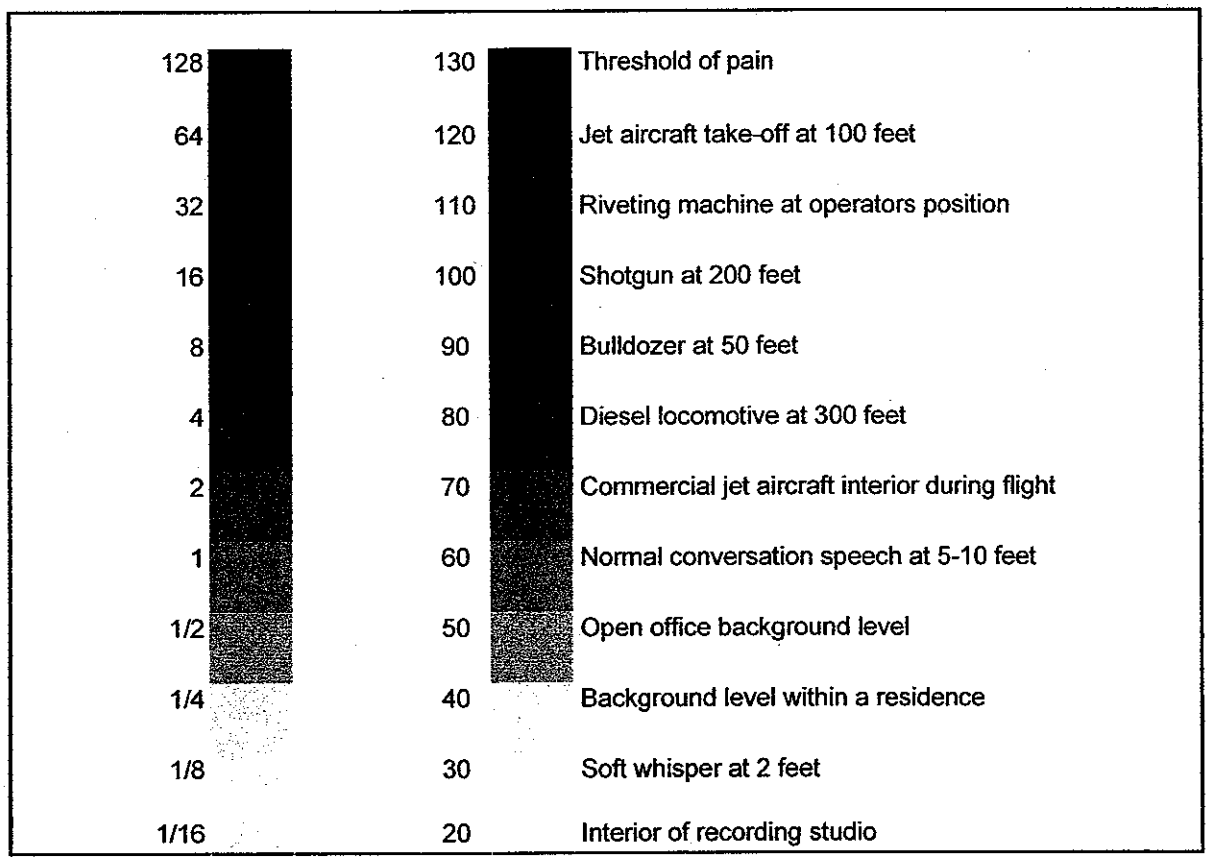
Bollard & Brennan, Inc.

(#) : Noise Measurement Locations

Community noise is commonly described in terms of the "ambient" noise level, which is defined as the all-encompassing noise level associated with a given noise environment. A common statistical tool to measure the ambient noise level is the average, or equivalent, sound level (L_{eq}). Additional information regarding acoustical terminology is attached in Appendix A.

Figure 2

Typical A-Weighted Sound Levels of Common Noise Sources



CRITERIA FOR ACCEPTABLE NOISE EXPOSURE

City of Huntington Beach Noise Element Criteria:

The City of Huntington Beach General Plan Noise Element states that residential developments are considered acceptable in exterior noise environments up to 60 dB Ldn for outdoor living areas and 45 dB Ldn for indoor spaces. The City Noise Element does not contain hourly performance standards.

City of Huntington Beach Noise Ordinance Criteria:

The City of Huntington Beach Noise Ordinance (Chapter 8.40 of the Municipal Code "Noise Control") establishes acceptable noise level criteria for non-transportation noise sources (i.e. stationary noise sources) such as on-site delivery truck circulation, parking lots, loading dock operations, and mechanical equipment which are associated with projects such as a Home Depot store. Table 1 shows the hourly noise level performance criteria contained with the Huntington Beach Noise Ordinance.

Table 1
City of Huntington Beach Noise Ordinance Standards Applicable to Residential Uses (Section 8.40.050 of Municipal Code)

Land Use	Noise Descriptor	Daytime (7 a.m. - 10 p.m.)	Nighttime (10 p.m. - 7 a.m.)
Residential (Exterior)	L50 – 30 min/hr	55	50
	L25 – 15 min/hr	60	55
	L08 – 5 min/hr	65	60
	L02 – 1 min/hr	70	65
	Lmax – any period	75	70
Residential (Interior)	L08 – 5 min/hr	55	45
	L02 – 1 min/hr	60	50
	Lmax – any period	65	55
Commercial (Exterior)	L50 – 30 min/hr	55	55
	L25 – 15 min/hr	60	60
	L08 – 5 min/hr	65	65
	L02 – 1 min/hr	70	70
	Lmax – any period	75	75
Commercial (Interior)	L08 – 5 min/hr	55	55
	L02 – 1 min/hr	60	60
	Lmax – any period	65	65

In the event the ambient noise level exceeds the exterior noise level limits shown above, those limits shall be increased to the ambient level.

In the event the offensive noise consists *entirely* of impact noise, simple note noise, speech, music, or any combination thereof, each of the noise level limits shown above shall be reduced by 5 dB.

Section 8.40.090 (d) of the Municipal Code (Special Provisions), states that noise sources associated with construction, repair, remodeling, or grading of any real property shall be exempt from the provisions of the Municipal Code Noise Ordinance provided a permit has been obtained from the City and provided said activities do not take place between the hours of 8 pm and 7 am on weekdays, including Saturday, or any time on Sunday or a federal holiday.

EXISTING NOISE ENVIRONMENT IN THE PROJECT VICINITY

The ambient noise environment in the immediate project vicinity is defined primarily by noise from Garfield Avenue and Magnolia Street. To generally quantify existing ambient noise levels in the project vicinity, a short term (15-minute) ambient noise survey was conducted by Bollard and Brennan, Inc. on October 20, 2004 at the locations shown in Figure 1.

A Larson Davis Laboratories (LDL) Model 820 precision integrating sound level meter equipped with a LDL 2560 ½" microphone was used for the ambient survey. The meter was calibrated before use with an LDL Model CA200 acoustical calibrator to ensure the accuracy of the measurements. The equipment used meets all pertinent specifications of the American National Standards Institute for Type 1 (precision) sound level meters (ANSI S1.4). The results of these short-term measurements are presented in Table 2.

Table 2
Summary of Measured Ambient Noise Levels
Vicinity of Proposed Home Depot Site – Huntington Beach, California

Site*	Time	Measured Noise Levels (dB)		
		L50	L_{max}	Est. Ldn
1	1:00 p.m.	60	69	65
2	1:30 p.m.	48	58	55
3	2:00 p.m.	57	71	65

* See Figure 1 for noise measurement locations.

The Table 2 data indicate that measured midday ambient noise levels were below the City's 55 dB L50 daytime noise level standard at site 2, but over that standard at Sites 1 & 3. As a result, satisfaction of the City's noise level standards shown in Table 1 would ensure that project-related noise emissions do not significantly exceed existing ambient noise conditions in the immediate project vicinity.

PROJECT-RELATED NOISE SOURCES

The major noise-producing components of this project identified as potentially significant by Home Depot and Bollard and Brennan, Inc. consist of on-site truck movements, parking lot activities, mechanical equipment, construction, off-site traffic, lumber off-loading activities (including forklift usage), trash collection, garden area noise sources, and loading dock activities. For this project, the lumber off-loading area is located at the front of the store under the lumber canopy. The majority of the on-site parking lot is located on the east side of the store (and therefore shielded from the nearest residences to the west by the building itself), but parking lot activities are assessed in this report at the request of the City of Huntington Beach.

As a means of assessing the noise impacts associated with the proposed project, Bollard & Brennan, Inc. utilized noise level data collected at Home Depot stores and other similar commercial uses in California in recent years. The reference noise level measurements which are most applicable to this store are provided in Table 3.

Table 3
Summary of Noise Measurement Data For Home Depot Store Activities

Noise Source	Distance (feet)	Duration	Descriptor	Level, dBA
Truck Pass-bys	50'	-	Lmax L02	75 70
Lumber Off-Loading (ncluding forklift)	50'	1 Hour	Lmax L02 L08 L25 L50	86 72 67 61 56
Loading Dock*	50'	1 hour	Lmax L02 L08 L25 L50	85 75 70 65 60
Parking Lot Movements	50'	-	SEL Lmax	70 65
Rooftop Mechanical Equipment (mechanical equipment noise generation is steady-state while turned on)	100'	1 - hour	Lmax L02 L08 L25 L50	52 52 52 52 52

On-Site Home Depot Truck Traffic Pass-By Noise

According to Home Depot representatives, file data for other Home Depot stores indicate that daily truck activity at the proposed Home Depot will conservatively consist of 10-15 light duty or semi-trailer trucks per day for delivery of materials. For this analysis, it was assumed that up to 5 such events could occur in a given hour.

Based on evaluation of the project site plan, delivery trucks will likely enter the site From Magnolia Street (southeast corner) and exit the site at Garfield Avenue (northwest corner). The trucks will be closest to the noise-sensitive receivers during passages directly behind the store. Specifically, truck pass-bys will be approximately 30 feet from the closest point of the nearest residential backyards to the west. It should be noted that there is an existing masonry wall located along the western site boundary. The wall is nominally 6 feet in height but at some residences it has been increased in height.

Using the operations data described above, the reference noise level data presented in Table 3, and an offset accounting for spherical spreading loss (attenuation with distance), the noise exposure at the nearest receivers to the south and west were computed and the results shown in Table 4. Because the 5 truck passages in a worst case hour would occur for less than a minute each, the total noise exposure due to truck passages would be more than 1 minute per hour, but less than 5 minutes per hour. Therefore, the Lmax and L02 standards shown in Table 3 would apply to this source.

Table 4
Predicted Truck Circulation Noise Levels
Home Depot – Huntington Beach, California

Location	Predicted Noise Levels	
	Descriptor	Level, dBA
EXTERIOR AREAS		
Residential property lines to the west – 30 ft.	Lmax	72
	L02	67
Commercial facades to the south – 110 ft.	Lmax	70
	L02	65
INTERIOR AREAS		
Residences to the west – 40ft.	Lmax	55
	L02	50
Commercial uses to the south – 110 ft.	Lmax	55
	L02	50

Source: Bollard & Brennan, Inc.

Note: These levels include a -6 dB offset at the residential uses for shielding provided by the existing noise barrier at the western property line.

Interior noise levels were computed with a conservative estimate of 15 noise reduction provided by the residential and commercial building facades.

Based on the predicted noise levels presented in Table 4, truck traffic pass-by noise levels will comply with the City of Huntington Beach Noise Ordinance exterior and interior noise standards during both day and nighttime hours at the commercial uses to the south. However, the City's exterior nighttime noise level standards would be exceeded at the residences to the west during nighttime truck passages. As a result, nighttime truck passages behind the store should be prohibited.

Off-Site Traffic Noise

The proposed project will add traffic to the local roadway system. Using the existing and future, project versus no-project traffic volumes reported in the project traffic study, the project-related traffic noise level increase on Garfield Avenue and Magnolia Street were predicted. Those traffic noise levels are shown below in Table 5.

Table 5
Predicted Off-Site Traffic Noise Level Increases

Roadway	Segment	Project Related Noise Level Increase (dBA)
Existing Plus Project Conditions Compared to Existing No Project Conditions		
Garfield Avenue	East of Magnolia St	0.4
	West of Magnolia St	0.1
Magnolia Street	North of Garfield Ave	0.2
	South of Garfield Ave	0.2
Cumulative Plus Project Conditions Compared to Cumulative No Project Conditions		
Garfield Avenue	East of Magnolia St	0.1
	West of Magnolia St	0.1
Magnolia Street	North of Garfield Ave	0.2
	South of Garfield Ave	0.2
Source: Bollard and Brennan, Inc. with traffic volumes provided by Associated Transportation Engineers		

Loading Dock Noise

The loading dock area is located near the northwest corner of the proposed Home Depot Store, as indicated on Figure 1. Based on this configuration, the nearest bay in the loading dock area is located approximately 60 feet from the nearest point of the residential backyards to the west. The proposed loading dock at this location would be completely enclosed (as would the trash compactor located within the enclosed loading dock area and garbage pickup), with a roll-up door at the entrance to the dock. This enclosure would provide dramatic shielding of loading dock noise at the residences to the west.

The primary noise source associated with the Home Depot loading dock area is the heavy trucks stopping (air brakes), backing into the loading areas as necessary (backup beepers), and pulling out of the loading docks (revving engines). If the heavy truck engines idle while the trucks are being unloaded, then this would be an additional source of noise at those locations.

Noise exposure from the loading dock area at the closest noise-sensitive receivers was calculated using the reference noise level data presented in Table 3 and a spreading loss component (attenuation with distance) as described for the truck movement calculations above (the formulas shown on Page 7 using a 20 Log multiplier for the loading dock distance correction rather than the 15 log multiplier for moving trucks). Calculation results are presented in Table 6.

Table 6
Predicted Loading Dock Area Noise Levels
Home Depot – Huntington Beach, California

Location	Predicted Noise Levels	
	Descriptor	Level, dBA
Residential property lines to the West – 60 ft. – Exterior Areas	Lmax	73
	L02	63
	L08	58
	L25	53
	L50	48
Residences to the West – 70 ft. – Interior Areas	Lmax	55
	L02	45
	L08	40

Source: Bollard & Brennan, Inc.

Note that Loading Dock noise levels were reduced by a conservative estimate of 10 dB to account for the loading dock enclosure.

Interior noise levels were computed using the same formulae with a conservative estimate of 15 noise reduction provided by the residential building facades.

Based on the predicted noise levels shown in Table 6, loading dock activity noise levels will comply with the City of Huntington Beach Noise Ordinance standards at the nearest residences during daytime hours, both at outdoor and indoor locations. However, because loading dock activities may exceed City standards during nighttime hours, such activities should be limited to daytime hours.

Home Depot Mechanical Equipment Noise

Based on information provided by the project architect, the primary cooling for the large store space will be produced by roof-top evaporative coolers. The coolers will likely be evenly distributed across the roof of the building, with the closest units to the nearest residences approximately 30 feet in from the edges of the roof. The noise impacts associated with this mechanical equipment are assessed relative to the City of Huntington Beach's daytime noise level criteria for residential and commercial land uses. If mechanical equipment is to operate past 10 p.m., then the City's nighttime criteria would apply to this source as well, however, extensive usage of the mechanical equipment during nighttime hours is not anticipated.

The roof-top evaporative coolers are predicted to produce approximately 52 dB at a reference distance of 100 feet (per unit). Mechanical equipment noise exposure was calculated assuming approximately 30 total rooftop coolers (operating simultaneously) and standard spherical spreading loss (-6 dB per each doubling of distance from the source. For example, a level of 52 dB at 100 feet would be reduced to 46 dB at 200 feet, and 40 dB at 400 feet). The distance used to assess noise impacts from the HVAC equipment to the nearest residences is 90 feet for this study (30 feet from equipment to parapet plus 60 feet to residential property lines).

The HVAC noise levels were computed to be approximately 51 dB L50 at the closest residences and slightly lower at the nearest commercial uses to the south based on the above described distribution/locations of the rooftop units. The predicted levels include shielding which will be provided by rooftop parapets. As with the previous assessments of interior noise levels, HVAC noise levels within the nearest residences and commercial uses are conservatively predicted to be 15 dB lower than exterior noise levels, or approximately 36 dB L50 or less. The predicted levels would satisfy the City's daytime noise exposure criteria, but could exceed the nighttime criteria. As a result, no additional noise mitigation measures would be required for the proposed Home Depot mechanical equipment during daytime usage. Because nighttime usage would be far less than daytime usage (if at all), HVAC system noise generation would be lower during nighttime hours, thereby complying with the nighttime standards of the City of Huntington Beach as well.

Home Depot Lumber Unloading Area Noise

According to Home Depot representatives, file data for other Home Depot stores indicate that daily truck activity at the proposed Home Depot will conservatively consist of 2-3 flatbed trucks for lumber deliveries per day.

Home Depot representatives and the project site plans have indicated that the lumber unloading activities will be take place under the lumber canopy at the front of the store outside of normal store hours. Therefore, the nearest point of the lumber off-loading area will be approximately 320 feet from the nearest residential property lines to the west, and approximately 110 feet to nearest commercial buildings to the south. It should be noted that the nearest residences to the west would be shielded from noise generated by lumber off-loading activities by the proposed Home Depot building, and as noted previously, there is an existing 6-foot tall masonry wall located along the western project property line. Using the operations data described above, the reference noise level data presented in Table 3, the hourly noise exposure was determined for the lumber unloading area during a worst-case hour of lumber unloading activities. The results of these calculations are presented in Table 7.

Table 7
Predicted Lumber Unloading Noise Levels
Home Depot – Huntington Beach, California

Location	Predicted Noise Levels (dB)	
	Descriptor	Level, dBA
EXTERIOR AREAS		
Residential property lines to the west – 320 ft.	Lmax	55
	L02	41
	L08	36
	L25	30
	L50	25
Commercial buildings to the south – 220 ft,	Lmax	73
	L02	59
	L08	54
	L25	48
	L50	42
INTERIOR AREAS		
Residences to the west – 330 ft.	Lmax	40
	L02	26
	L08	21
Commercial buildings to the south – 220 ft.	Lmax	58
	L02	44
	L08	39

Note: A -15 dB offset has been applied to the Table 7 data to account for noise reduction provided by the existing property line noise barrier and the Home Depot building facade. Interior noise levels were computed based on the conservative assumption that building facades would provide a 15 dB noise reduction.
Source: Bollard & Brennan, Inc.

Based on the predicted noise levels shown in Table 7, lumber unloading noise levels are predicted to comply with both the daytime and nighttime City of Huntington Beach Noise Ordinance standards at the closest residential property lines to the west and at the closest commercial buildings to the south.. The predicted levels include noise from backup beepers and forklifts operating in the lumber off-loading areas, in addition to the arrival and departure of flatbed lumber trucks. As a result, no additional noise mitigation measures would be required for lumber off-loading operations.

Parking Lot Noise

The majority of the on-site parking for the proposed Home Depot Store will be located on the east side of the store, well removed from the residences to the west. Nonetheless, there is a smaller parking area just north of the Garden Center and a row of parking spaces located along the western site boundary, as indicated in Figure 1.

Assuming all of the approximately 100 stalls in the area north of the Garden Center filled and emptied in one hour, a total of 200 parking lot events would occur in that area during a very busy hour. The nearest stalls of that parking area would be approximately 100 feet from the residential property line to the west. At that nearest property line, the predicted median hourly and maximum noise levels were computed to be 45 dB L50 and 53 dB Lmax. Interior levels within these residences would be at least 15 dB lower, or approximately 30 dB L50 and 38 dB Lmax. Because parking lot activities would occur for more than 30 minutes out of the hour, they are appropriate assessed relative to the City's L50 and Lmax standards. The predicted levels, which include a -6 dB offset to account for the existing property line noise barrier, would satisfy the day and nighttime, exterior and interior, noise level standards shown in Table 1 for this parking area, even with those standards reduced by 5 dB to account for the impulsive nature of the car doors opening and closing. As a result, no additional noise mitigation measures are warranted for this parking area.

The strip of parking stalls which extends along the western site boundary are reserved for carpool/vanpool use, and general use. These stalls are approximately 9 feet from the residential property line to the West. Given the distance from these stalls to the store entrance, it is likely that the intensity of usage of these stalls will be relatively low. Since there are approximately 7 stalls adjacent to each residence, a conservative approach to the prediction of parking lot noise levels at the adjacent residential property lines would be to assume 14 parking lot events in a given hour for a given residence (each site filling and emptying). Based on this approach, the predicted parking lot noise levels at the adjacent residences from these closest parking spaces was computed to be approximately 53 dB L50 and 73 dB Lmax. Interior levels within these residences would be at least 15 dB lower, or approximately 38 dB L50 and 58 dB Lmax. These levels, which include a -6 dB

offset to account for the existing property line noise barrier, would satisfy the daytime, exterior and interior, noise level standards shown in Table 1 for these nearest parking spaces, but could exceed the nighttime noise level standards. Because these spaces are not anticipated to be used during nighttime hours, so no additional noise mitigation measures would be warranted for these nearest parking spaces.

Trash Compaction and Removal Noise

For this project, the trash compactor is located inside the proposed loading dock enclosure, and therefore, completely shielded from view of nearby residences. Because loading dock activities, which would occur slightly closer to the residences to the west than trash compaction and removal activities (the trash compaction equipment is to be located on the far easterly side of the enclosed loading dock), were found to be well within compliance with City Noise Ordinance standards, trash compaction and removal activities are predicted to similarly be well within compliance with City standards. It should be noted that both trash compaction and removal will occur within the shielded loading dock area.

Garden Center Noise

The proposed Garden Center is located on the north-central portion of the proposed Home Depot Store. There is a small concrete pad to be used for the unloading of materials for sale at the Garden Center. Using the same reference noise level data for the lumber offloading area (which also includes forklifts), noise levels associated with Garden Center loading pad activities were computed at the nearest residential property line to the west (150 feet). The resulting levels are 42 dB L50 and 70 dB Lmax.

Interior levels within the nearest residences to the garden area would be at least 15 dB lower, or approximately 27 dB L50 and 55 dB Lmax. These levels, which include a -6 dB offset to account for the existing property line noise barrier, would satisfy the day and nighttime, exterior and interior, noise level standards shown in Table 1. As a result, no additional noise mitigation measures are warranted for the unloading area of the Garden Center.

The public address (P/A) system at the Garden Center is anticipated to generate lower noise levels than the garden area truck unloading activities, provided that the speakers used face down and into the Garden Center and away from the nearest residences to the west. As a result, no additional noise mitigation measures appear to be warranted for the Garden Center area.

Building Material Storage and Will Call

According to project representatives, this portion of the store, which is located at the southwest corner of the building, will be used to store building materials for contractor pickup. A forklift will be the primary noise source at this location, and hours of activity are reported to be daytime only. Because these activities will be sporadic and limited to daytime hours, and because a single light-duty forklift will be utilized for moving pallets in this area, the noise generation of this aspect of the project is predicted to be less than that of the loading dock and lumber off-loading areas. However, because activities at the will call area generate noise levels in excess of nighttime noise level limits, and create brief periods of elevated noise levels during forklift usage in this area, it is recommended that noise mitigation be incorporated for this area. A discussion of such measures follows in a later section of this report.

Construction Noise

During the construction phases of the project, noise from construction activities would add to the noise environment in the immediate project vicinity. Activities involved in construction would temporarily generate maximum noise levels, as indicated in Table 8, ranging from 85 to 90 dB at a distance of 50 feet. Therefore, all equipment should be equipped with factory matching mufflers and in good working order. In addition, construction activities should be restricted to the daytime hours.

Table 8
Construction Equipment Noise

Type of Equipment	Maximum Level, dB at 50 feet
Bulldozers	90
Heavy Trucks	88
Backhoe & Portable Concrete Plant	85
Pneumatic Tools	85

Source: *Environmental Noise Pollution*, Patrick R. Cunniff, 1977.

Because construction activities will be limited to daytime hours, the noise generation of construction-related activities will be exempt from the local noise level standards of the City of Huntington Beach.

Cumulative Noise Exposure from all Represented Noise Sources

Due to the layout of the proposed store, project-generated noise sources which affect a certain portions of the nearby residences or commercial uses may not have an appreciable affect on others. An example is lumber offloading will be conducted in an area opposite from the loading dock, so the noise generation of these activities will not be additive. As a result, the cumulative contribution of all of the project noise sources at a given location may not be much greater than the contribution of the nearest source.

The cumulative noise exposure from all sources is predicted to be highest at the commercial uses located immediately south of the lumber offloading area, as that is the loudest identified noise source associated with this project. Noise levels predicted at the closest commercial buildings from all of the noise sources described above during a worst-case noise hour were calculated to be approximately 57 dB L50 and 79 dB Lmax, respectively.

These levels would comply with the City's Noise Ordinance standards as presented in Table 1 during daytime hours, but not during nighttime hours. As a result, noise mitigation measures will be necessary for this project. Such measures are specified in the following section of this report.

NOISE MITIGATION MEASURES

As noted above, activities associated with certain aspects of the proposed project, specifically truck passages behind the store, may generate noise levels in excess of the City of Huntington Beach noise level standards. To reduce the noise impacts identified for lumber unloading and on-site truck circulation activities at the nearest residences, the following noise mitigation measures are recommended:

1. At the property line along the west side of the project site either;
    a. the existing 6-foot tall property line noise wall should be increased in height from 6 feet to 8 feet, or
    b. a new wall 8 feet in height should be constructed in front of the existing 6-foot wall, or
    c. the existing 6-foot noise wall should be removed and a new wall 8 feet in height should be constructed along the property line.

2. The rooftop parapet should be of sufficient height to block line of sight between rooftop HVAC equipment and the residences located immediately west of the project site.

3. The Garden Area P/A system should be designed and tested so as not to exceed the Table 1 standards at any location within the adjacent residential properties to the west.

4. All truck movements and unloading in areas on the west and south side of the store should be limited to daytime hours.

5. Activities at the will-call area and building materials storage area should be limited to daytime hours.

CONCLUSIONS

With the exception of noise generated by on-site truck circulation, calculated noise exposure from the proposed project is predicted to satisfy the City of Huntington Beach Noise standards at the nearest residences and commercial uses during both day and nighttime periods without additional mitigation. The noise mitigation measures described in the previous section should be implemented to ensure that noise from the project truck passages is reduced to acceptable levels at the nearest residences.

The conclusions and recommendations contained in this report are based on the site plan presented in Figure 1, and on operational information and noise level data contained herein. Deviation from this plan, assumptions, or data could cause actual noise levels to vary relative to those predicted in this report.

Appendix A

Acoustical Terminology

Acoustics	The science of sound.
Ambient Noise	The distinctive acoustical characteristics of a given space consisting of all noise sources audible at that location. In many cases, the term ambient is used to describe an existing or pre-project condition such as the setting in an environmental noise study.
Attenuation	The reduction of an acoustic signal.
A-Weighting	A frequency-response adjustment of a sound level meter that conditions the output signal to approximate human response.
Decibel or dB	Fundamental unit of sound, A Bell is defined as the logarithm of the ratio of the sound pressure squared over the reference pressure squared. A Decibel is one-tenth of a Bell.
CNEL	Community Noise Equivalent Level. Defined as the 24-hour average noise level with noise occurring during evening hours (7 - 10 p.m.) weighted by a factor of three and nighttime hours weighted by a factor of 10 prior to averaging.
Frequency	The measure of the rapidity of alterations of a periodic signal, expressed in cycles per second or hertz.
L_{dn}	Day/Night Average Sound Level. Similar to CNEL but with no evening weighting.
L_{eq}	Equivalent or energy-averaged sound level.
L_{max}	The highest root-mean-square (RMS) sound level measured over a given period of time.
Loudness	A subjective term for the sensation of the magnitude of sound.
Masking	The amount (or the process) by which the threshold of audibility is for one sound is raised by the presence of another (masking) sound.
Noise	Unwanted sound.
Peak Noise	The level corresponding to the highest (not RMS) sound pressure measured over a given period of time. This term is often confused with the "Maximum" level, which is the highest RMS level.
RT_{60}	The time it takes reverberant sound to decay by 60 dB once the source has been removed.
Sabin	The unit of sound absorption. One square foot of material absorbing 100% of incident sound has an absorption of 1 sabin.
Threshold of Hearing	The lowest sound that can be perceived by the human auditory system, generally considered to be 0 dB for persons with perfect hearing.
Threshold of Pain	Approximately 120 dB above the threshold of hearing.