APPENDIX A

CHRISTOPHER JEAN & ASSOCIATES, INC.
ACOUSTICAL CONSULTING SERVICES

September 29, 2010

REVISED ACOUSTICAL ANALYSIS

INDOOR SHOOTING RANGE

14542 BEACH BOULEVARD

CITY OF WESTMINSTER

Prepared by:

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CHRISTOPHER JEAN & ASSOCIATES, INC.
ACOUSTICAL CONSULTING SERVICES

SUMMARY

This revised analysis has been completed to determine the exterior and interior noise exposure and the necessary mitigation measures for the proposed Indoor Shooting Range project located at 14542 Beach Boulevard in the City of Westminster. A list of requirements and recommendations is given in the following summary. Details are discussed in the body of the report.

A. REQUIRED NOISE MITIGATION

The project can be made to comply with the City's Noise Ordinance impact corrected daytime exterior and interior noise limits as long as the following mitigation measures are incorporated into the proposed building improvements:

(1) All exterior access doors shall be special door assemblies (door and frame) laboratory sound rated at least STC 58.

(2) The existing roof shall be closed up using minimum 5/8" plywood and built-up roofing.

(3) The project shall specify rooftop mechanical equipment with source noise levels no higher than 80 dBA at a distance of 10 feet.

(4) Acoustical screen walls at least six feet high shall be erected around each rooftop mechanical unit. Such walls shall be constructed of solid panels of minimum 3/4" plywood, 18 gauge corrugated steel, stucco on frame or any material with a surface weight of at least 3.5 pounds per square foot.

(5 The project shall not operate after 10 PM or prior to 7 AM.

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B. PROJECT DISCLOSURE

The City's Noise Ordinance limits represent minimal acceptable standards. Strict compliance with the Noise Ordinance limits does not guarantee or even imply that project noise sources will be mitigated to inaudibility. Compliance with an exterior noise limit of 55 dBA L25 means that project noise will remain clearly audible at the nearest residential properties. Compliance with an interior noise limit of 50 dBA L08 means that project noise will remain audible on the interior of the nearest residential buildings.

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

TABLE 1

APPLICABLE NOISE ORDINANCE CRITERIA (1)

		ALLOWED NOISE LIMITS			
		EXTERIOR		INTERIOR	
DURATION	SYMBOL	DAY	NIGHT	DAY	NIGHT
30 minutes in hour	L50	55 dBA	55 dBA	--	--
15 minutes in hour	L25	60 dBA	60 dBA	--	--
5 minutes in hour	L08	65 dBA	65 dBA	55 dBA	45 dBA
1 minute in hour	L02	70 dBA	70 dBA	60 dBA	50 dBA
Anytime in hour	Lmax	75 dBA	75 dBA	65 dBA	55 dBA

In addition to the Table 1 base noise limits, the Noise Ordinance specifies that the allowed noise limits be reduced 5 dBA whenever the offending noise source contains impact noise. Additionally, the Noise Ordinance specifies that whenever the existing ambient noise environment exceeds the Table 1 noise limits, then the ambient noise levels/durations become the allowed limits.

The project does not propose to operate prior to 7 AM or after 10 PM so only the daytime noise limits apply.

3.0 EXISTING AMBIENT NOISE LEVELS

An ambient noise measurement was performed mid-morning at the east property line of the site. The measurement record is attached as Exhibit 4. Measurements are conducted using a Bruel & Kjaer Model 2209 Precision Sound Level Meter, a Bruel & Kjaer Model 2306 Portable Level Recorder, and a Larson-Davis Model 700 Integrating Sound Level Meter. The existing daytime noise levels reported from the measurement are listed in Table 2 on the following page.

TABLE 2

MEASURED DAYTIME AMBIENT NOISE LEVELS AT THE EAST PROPERTY LINE OF THE PROJECT SITE

DURATION	SYMBOL	MEASURED	ALLOWED
30 minutes in hour	L50	49 dBA	55 dBA
15 minutes in hour	L25	51 dBA	60 dBA
5 minutes in hour	L08	52 dBA	65 dBA
1 minute in hour	L02	55 dBA	70 dBA
Anytime in hour	Lmax	62 dBA	75 dBA

Table 2 shows that none of the measured ambient noise levels exceeded the allowed exterior noise limits. Thus, ambient noise level corrections are not appropriate for this project.

4.0 DESIGN NOISE LEVELS

4.1 GUNSHOTS

The dominant project noise source will be gunfire inside the shooting range. The project floor plan shown on Exhibit 5 shows that there will be 14 target lanes available. A worst case scenario would assume that all 14 lanes are occupied simultaneously throughout a single hour. Assuming each shooter discharges 200 rounds in an hour, a total of 2,800 rounds would be spent in that hour. Assuming each discharge produces sound for a quarter of a second, 2,800 consecutive discharges would create 11.7 minutes of noise in the hour. Thus, the project will need to comply with the L25 (15 minute) impact corrected exterior noise limit of L25 = 55 dBA.

Field noise level measurements were performed using a Larson-Davis Model 700 integrating sound level meter just outside the building at the Firing-Line indoor shooting range located at 17921 Jamestown Lane in the City of Huntington Beach. These measurements recorded the maximum noise levels created by a single 357 Magnum pistol. This weapon was found to produced maximum noise levels of 52 dBA just outside a blank concrete wall (no doors or windows) and 75 dBA just outside a steel swing door and a steel roll-up door. Assuming all 14 lanes of the proposed project are occupied with shooters using similar weapons and expending 2,800 consecutive rounds in one hour, the resulting cumulative noise levels would be 52 dBA L25 just outside the blank concrete wall and 75 dBA L25 just outside the access doors.

4.2 ROOFTOP MECHANICAL UNITS

The project will install two rooftop HVAC units and two exhaust fans on the roof of the existing building. As the system design is still in flux, system noise levels are not known at this time. However, typical rooftop mechanical units don't often produce noise levels exceeding 80 dBA at a distance of 10 feet. The air handling units will be installed above the firing lines toward the west end of the shooting range. The exhaust fans will be installed above the targets at the east end of the building. The rooftop units will be assumed to be located at least 10 feet from the north and east edges of the building roof. Assuming four rooftop units, all producing 80 dBA at 10 feet and positioned as described above, the worst case noise levels at the nearest residential uses will be 77 dBA to the north, 74 dBA to the east, and 62 dBA to the south. As these units could operate continuously throughout an hour, and part of the project noise will consist of impact sounds, the rooftop mechanical noise must comply with the impact corrected 50 dBA L50 noise limit at the nearest residential uses.

5.0 STRUCTURE NOISE REDUCTION

The project building consists of 8 1/2" thick tilt-up concrete walls, steel doors and a built-up roof over plywood sheathing. This is similar to the building housing the Firing-Line shooting range except that the project building exterior walls are 8.5 inches thick versus the six inch thick walls of the Firing-Line building. Thus, the project building would be expected to produce noise reduction levels at least as high as the Firing-Line building. This means that the project building would also be expected to reduce worst case shooting noise to 52 dBA L25 just outside the blank north wall and 75 dBA L25 just outside the east and south walls where access doors occur.

6.0 MITIGATION

6.1 INTERIOR TO EXTERIOR NOISE REDUCTION

The existing building structure will produce sufficient interior to exterior noise reduction to meet the impact corrected exterior noise limits on the north side of the building (52 dBA L25) and at the nearest residential uses south of the site (54 dBA L25). However, project noise at the east property line could be as high as 70 dBA L25 due to the acoustical leakage through the various access doors. An additional 25 dBA of interior to exterior noise reduction will be needed at the east property line. Laboratory testing has shown that the existing concrete walls should produce a Sound Transmission Class (STC) rating of 58. Thus, replacing the various existing access doors with door assemblies (door and frame) sound rated at least STC 58 will reduce project noise levels at the east property line to below the impact corrected daytime limit of 55 dBA L25. Such doors are available from Industrial Acoustics and others. If the opening with the existing roll-up

door is retained, the roll-up door may have to be replaced by some type of swinging door in order to get the required STC 58 rating. The sound rated door manufacturer should be consulted regarding the available door types.

The existing project building includes two air vents in the middle of the roof structure. These will need to be closed up in order to maintain maximum interior to exterior noise reduction through the existing roof assembly.

6.2 ROOFTOP MECHANICAL UNITS

Rooftop mechanical noise will be as much as 27 dBA over the impact corrected 50 dBA L50 daytime noise limit to the north, 24 dBA over the limit to the east and 12 dBA over to the south. Significant noise reduction will be necessary. The short parapet around the edge of the roof will provide some level of shielding of the rooftop equipment to the north and east. Roof parapet shielding calculations contained in Appendix 1 show that the roof edge and short parapet will provide at least 15 dBA of noise reduction to the north and at least 8 dBA of reduction to the east but no noise reduction to the south. In addition to the existing rooftop parapet, acoustical screen walls can be erected around each rooftop unit to further shield the various residential uses. Wall height calculations are attached in Appendix 2 show that screen walls at least six feet high will provide as much as 17 dBA of additional reduction to the north, 15 dBA to the east and 12 dBA to the south. The combination of the rooftop parapet and screen wall at least six feet high around each rooftop mechanical unit will reduce the combined rooftop mechanical noise to no more than 47 dBA L50 to the north, 50 dBA L50 to the east and 50 dBA L50 to the south. All of the mitigated rooftop mechanical noise levels will comply with the impact corrected 50 dBA L50 daytime noise limit.

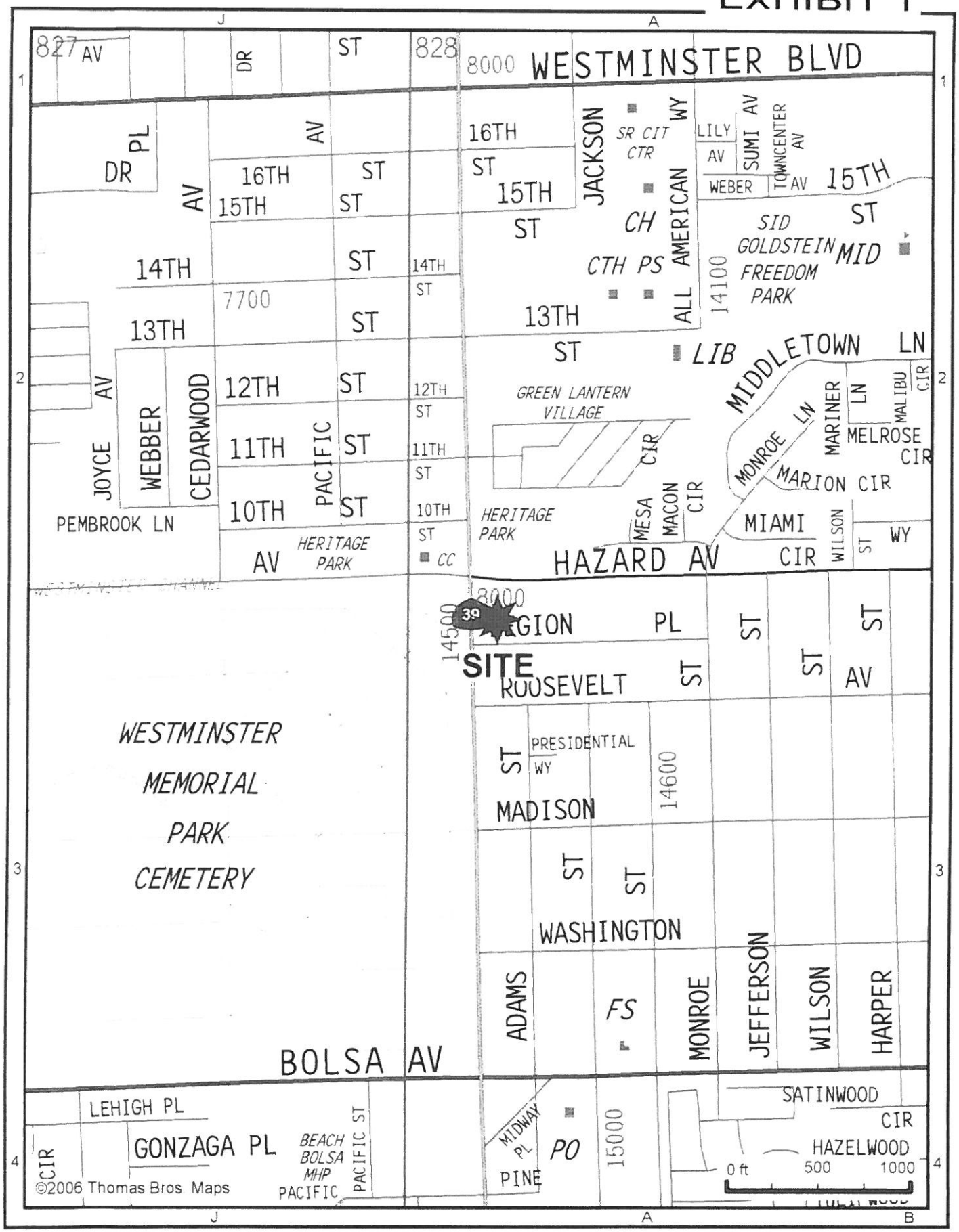
The required acoustical screen walls shall be constructed of solid panels of minimum 3/4" plywood, 18 gauge corrugated steel, stucco on frame or any material with a surface weight of at least 3.5 pounds per square foot.

7.0 PROJECT DISCLOSURE

The City's Noise Ordinance limits represent minimal acceptable standards. Strict compliance with the Noise Ordinance limits does not guarantee or even imply that project noise sources will be mitigated to inaudibility. Compliance with an exterior noise limit of 55 dBA L25 means that project noise will remain clearly audible at the nearest residential properties. Compliance with an interior noise limit of 50 dBA L08 means that project noise will remain audible on the interior of the nearest residential buildings.

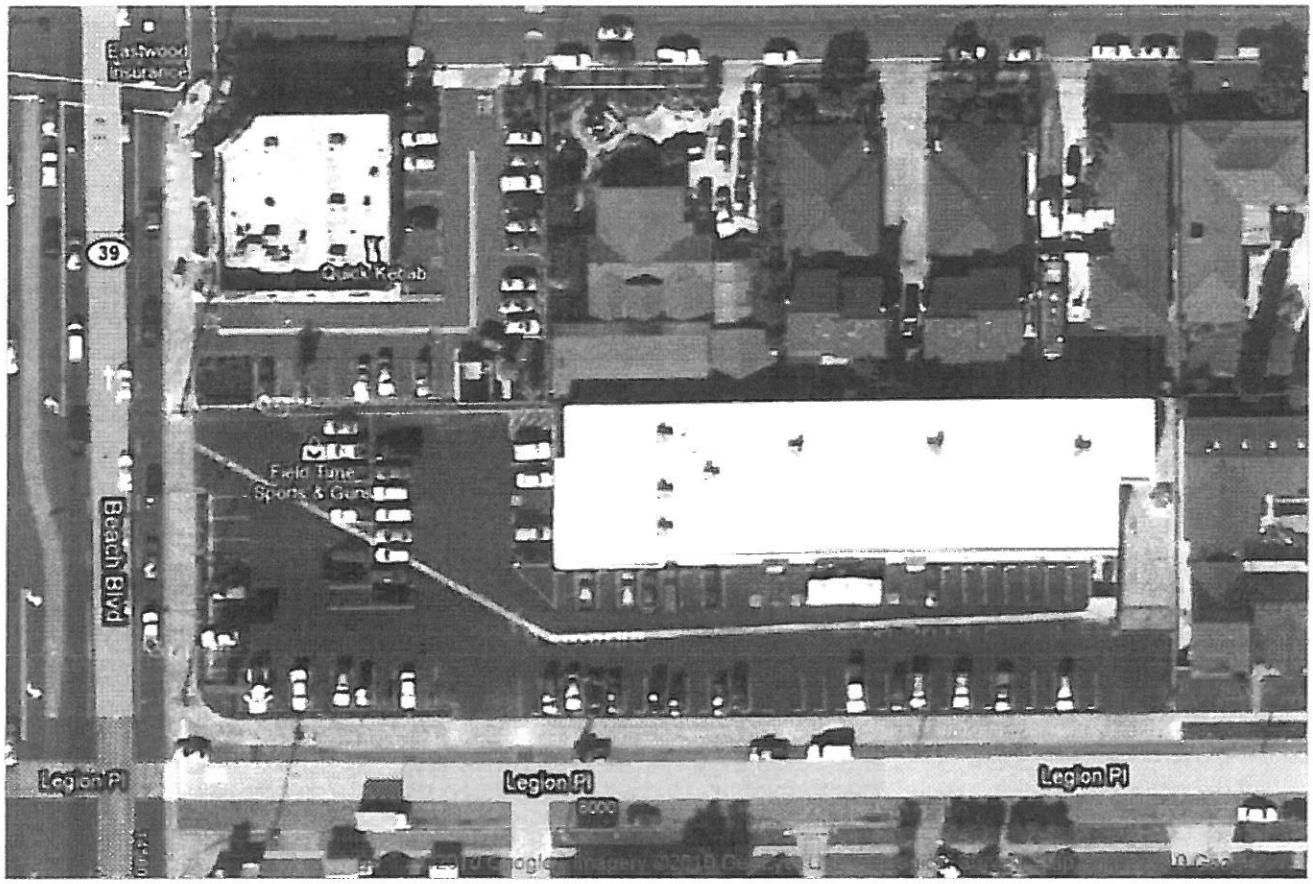
Do not misrepresent the degree of project noise isolation as anything more than simply meeting City code during any phase of this project. Never, ever, use any form of the term "Soundproof" to describe any portion of this project.

EXHIBIT 1



SITE 14542 Beach Blvd, Westminster,CA 92683, 828 - A.

EXHIBIT 2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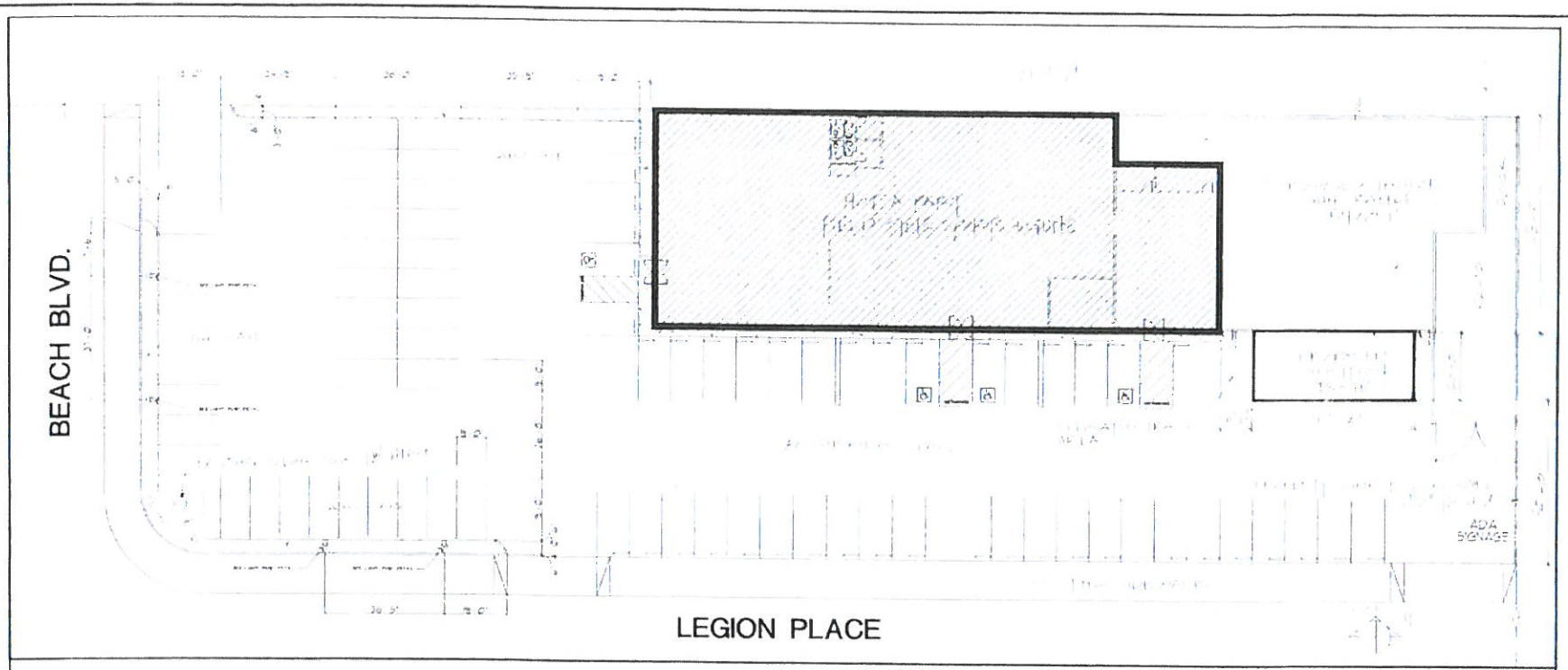
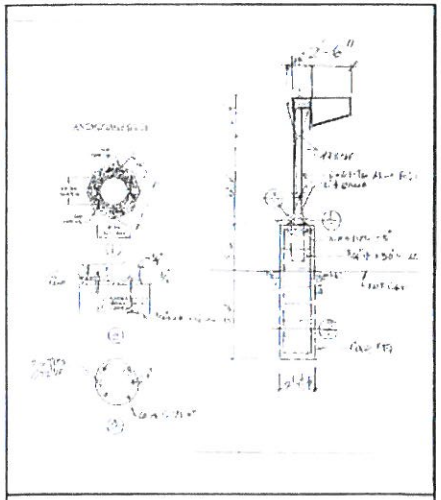
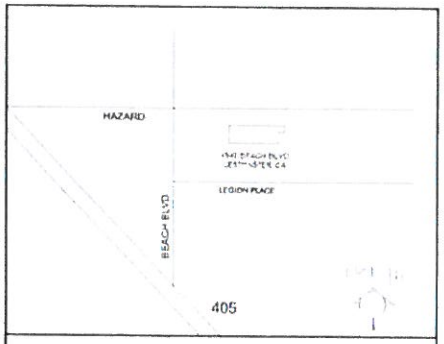
Quick Kebab
Field Tune
Sports & Guns
Beach Blvd
Legion Pl
Legion Pl
Legion Pl



SITE PLAN



LIGHT / POST DETAIL



SITE LOCATION

PROJECT SUMMARY

542 BEACH BLVD.
VESTMINSTER, CA

EXHIBIT 3

DATE: 9/21/10

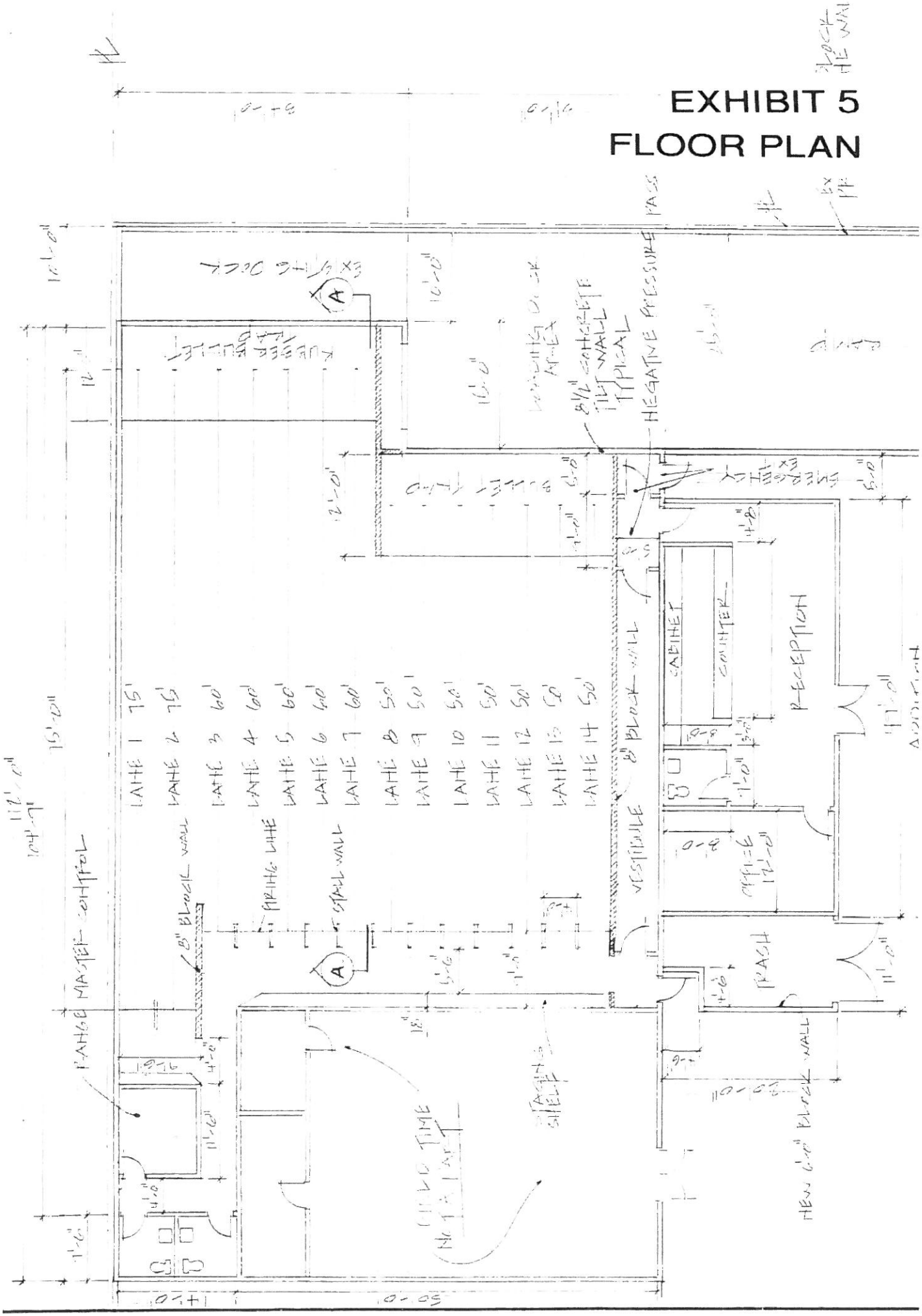
EXHIBIT 4

CHART SPEED: .3 mm/sec

WEIGHTING: "A"

LOCATION: EAST PROPERTY LINE OF SITE

EXHIBIT 5
FLOOR PLAN



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APPENDIX 1

ROOF EDGE PARAPET

SHIELDING CALCULATIONS

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POINT SOURCE BARRIER REDUCTION, WALL HEIGHT VARIABLE

50 FT. SOURCE REFERENCE LEVEL.....= 66

PROJECT.....INDOOR SHOOTING RANGE
DESCRIPTION..ROOF PARAPET SHIELDING
SOURCE HEIGHT..... 3
SOURCE ELEVATION..... 15
RECEIVER ELEVATION..... 0
BARRIER ELEVATION..... 15
RECEIVER HEIGHT..... 5
DISTANCE TO SOURCE..... 10
DISTANCE TO RECEIVER... 5
NOISE LEVEL AT RECEIVER W/O BARRIER..... 76.5

WALL HEIGHT		INL	TIL
1.0	61.7	41.7	14.8
FN	2.4306		

POINT SOURCE BARRIER REDUCTION, WALL HEIGHT VARIABLE

---

50 FT. SOURCE REFERENCE LEVEL.....= 66

PROJECT.....INDOOR SHOOTING RANGE
DESCRIPTION..ROOF PARAPET SHIELDING
SOURCE HEIGHT..... 3
SOURCE ELEVATION..... 15
RECEIVER ELEVATION..... 0
BARRIER ELEVATION..... 15
RECEIVER HEIGHT..... 5
DISTANCE TO SOURCE..... 10
DISTANCE TO RECEIVER... 20
NOISE LEVEL AT RECEIVER W/O BARRIER..... 70.4

WALL HEIGHT		INL	TIL
1.0	62.1	62.1	8.4
FN	0.3274		

POINT SOURCE BARRIER REDUCTION, WALL HEIGHT VARIABLE

---

50 FT. SOURCE REFERENCE LEVEL.....= 54

PROJECT.....INDOOR SHOOTING RANGE
DESCRIPTION..ROOF PARAPET SHIELDING
SOURCE HEIGHT..... 3
SOURCE ELEVATION..... 15
RECEIVER ELEVATION..... 0
BARRIER ELEVATION..... 15
RECEIVER HEIGHT..... 5
DISTANCE TO SOURCE..... 10
DISTANCE TO RECEIVER... 125
NOISE LEVEL AT RECEIVER W/O BARRIER..... 57.4

WALL HEIGHT		TNL	TIL
1.0	57.4	57.4	0.0
FN	0.0000		

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APPENDIX 2

ROOFTOP MECHANICAL UNIT ACOUSTICAL SCREEN WALL

SHIELDING CALCULATIONS

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POINT SOURCE BARRIER REDUCTION, WALL HEIGHT VARIABLE

---

50 FT. SOURCE REFERENCE LEVEL.....= 66.02

PROJECT.....INDOOR SHOOTING RANGE
DESCRIPTION..ROOFTOP EQUIPMENT SCREEN WALLS
SOURCE HEIGHT..... 3
SOURCE ELEVATION..... 15
RECEIVER ELEVATION..... 0
BARRIER ELEVATION..... 15
RECEIVER HEIGHT..... 5
DISTANCE TO SOURCE..... 5
DISTANCE TO RECEIVER... 15
NOISE LEVEL AT RECEIVER W/O BARRIER..... 74.0

WALL HEIGHT		TNL	TIL
0.0	68.9	68.9	5.1
FN	0.0049		
1.0	67.1	67.1	6.8
FN	0.1323		
2.0	64.8	64.8	9.2
FN	0.4542		
3.0	62.4	62.4	11.6
FN	0.9951		
4.0	60.4	60.4	13.6
FN	1.7627		
5.0	58.8	58.8	15.2
FN	2.7437		
6.0	57.5	57.5	16.5
FN	3.9078		
7.0	56.4	56.4	17.6
FN	5.2198		
8.0	55.5	55.5	18.5
FN	6.6468		
9.0	54.7	54.7	19.2
FN	8.1626		
10.0	54.1	54.1	19.9
FN	9.7472		

POINT SOURCE BARRIER REDUCTION, WALL HEIGHT VARIABLE

---

50 FT. SOURCE REFERENCE LEVEL.....= 66.02

PROJECT.....INDOOR SHOOTING RANGE
DESCRIPTION..ROOFTOP EQUIPMENT SCREEN WALLS
SOURCE HEIGHT..... 3
SOURCE ELEVATION..... 15
RECEIVER ELEVATION..... 0
BARRIER ELEVATION..... 15
RECEIVER HEIGHT..... 5
DISTANCE TO SOURCE..... 5
DISTANCE TO RECEIVER... 30
NOISE LEVEL AT RECEIVER W/O BARRIER..... 69.1

WALL HEIGHT		TNL	TIL
0.0	69.1	69.1	0.0
FN	0.0000		
1.0	69.1	69.1	0.0
FN	0.0000		
2.0	62.9	62.9	6.2
FN	0.0735		
3.0	60.6	60.6	8.6
FN	0.3588		
4.0	58.0	58.0	11.1
FN	0.8680		
5.0	55.9	55.9	13.2
FN	1.5891		
6.0	54.3	54.3	14.9
FN	2.4937		
7.0	53.0	53.0	16.2
FN	3.5476		
8.0	51.9	51.9	17.2
FN	4.7192		
9.0	51.0	51.0	18.1
FN	5.9832		
10.0	50.3	50.3	18.8
FN	7.3201		

POINT SOURCE BARRIER REDUCTION, WALL HEIGHT VARIABLE

---

50 FT. SOURCE REFERENCE LEVEL.....= 66.02

PROJECT.....INDOOR SHOOTING RANGE
DESCRIPTION..ROOFTOP EQUIPMENT SCREEN WALLS
SOURCE HEIGHT..... 3
SOURCE ELEVATION..... 15
RECEIVER ELEVATION..... 0
BARRIER ELEVATION..... 15
RECEIVER HEIGHT..... 5
DISTANCE TO SOURCE..... 5
DISTANCE TO RECEIVER... 45
NOISE LEVEL AT RECEIVER W/O BARRIER..... 66.0

WALL HEIGHT		TNL	TIL
0.0	66.0	66.0	0.0
FN	0.0000		
1.0	66.0	66.0	0.0
FN	0.0000		
2.0	60.9	60.9	5.2
FN	0.0091		
3.0	58.8	58.8	7.2
FN	0.1775		
4.0	56.2	56.2	9.8
FN	0.5636		
5.0	53.9	53.9	12.1
FN	1.1562		
6.0	52.1	52.1	13.9
FN	1.9275		
7.0	50.7	50.7	15.3
FN	2.8438		
8.0	49.5	49.5	16.5
FN	3.8740		
9.0	48.6	48.6	17.4
FN	4.9933		
10.0	47.8	47.8	18.2
FN	6.1828		

POINT SOURCE BARRIER REDUCTION, WALL HEIGHT VARIABLE

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50 FT. SOURCE REFERENCE LEVEL.....= 66.02

PROJECT.....INDOOR SHOOTING RANGE
DESCRIPTION..ROOFTOP EQUIPMENT SCREEN WALLS
SOURCE HEIGHT..... 3
SOURCE ELEVATION..... 15
RECEIVER ELEVATION..... 0
BARRIER ELEVATION..... 15
RECEIVER HEIGHT..... 5
DISTANCE TO SOURCE..... 5
DISTANCE TO RECEIVER... 60
NOISE LEVEL AT RECEIVER W/O BARRIER..... 63.7

WALL HEIGHT		TNL	TIL
0.0	63.7	63.7	0.0
FN	0.0000		
1.0	63.7	63.7	0.0
FN	0.0000		
2.0	63.7	63.7	0.0
FN	0.0000		
3.0	57.1	57.1	6.6
FN	0.1047		
4.0	54.8	54.8	9.0
FN	0.4230		
5.0	52.3	52.3	11.4
FN	0.9438		
6.0	50.4	50.4	13.3
FN	1.6396		
7.0	48.9	48.9	14.8
FN	2.4767		
8.0	47.7	47.7	16.0
FN	3.4245		
9.0	46.7	46.7	17.0
FN	4.4582		
10.0	45.9	45.9	17.8
FN	5.5592		

POINT SOURCE BARRIER REDUCTION, WALL HEIGHT VARIABLE

---

50 FT. SOURCE REFERENCE LEVEL.....= 66.02

PROJECT.....INDOOR SHOOTING RANGE
DESCRIPTION..ROOFTOP EQUIPMENT SCREEN WALLS
SOURCE HEIGHT..... 3
SOURCE ELEVATION..... 15
RECEIVER ELEVATION..... 0
BARRIER ELEVATION..... 15
RECEIVER HEIGHT..... 5
DISTANCE TO SOURCE..... 5
DISTANCE TO RECEIVER... 75
NOISE LEVEL AT RECEIVER W/O BARRIER..... 61.9

WALL HEIGHT		TNL	TIL
0.0	61.9	61.9	-0.0
FN	0.0000		
1.0	61.9	61.9	-0.0
FN	0.0000		
2.0	61.9	61.9	-0.0
FN	0.0000		
3.0	55.8	55.8	6.1
FN	0.0688		
4.0	53.5	53.5	8.5
FN	0.3447		
5.0	51.0	51.0	10.9
FN	0.8205		
6.0	49.0	49.0	12.9
FN	1.4685		
7.0	47.4	47.4	14.5
FN	2.2553		
8.0	46.2	46.2	15.7
FN	3.1503		
9.0	45.2	45.2	16.7
FN	4.1289		
10.0	44.4	44.4	17.6
FN	5.1724		

POINT SOURCE BARRIER REDUCTION, WALL HEIGHT VARIABLE

---

50 FT. SOURCE REFERENCE LEVEL.....= 66.02

PROJECT.....INDOOR SHOOTING RANGE
DESCRIPTION..ROOFTOP EQUIPMENT SCREEN WALLS
SOURCE HEIGHT..... 3
SOURCE ELEVATION..... 15
RECEIVER ELEVATION..... 0
BARRIER ELEVATION..... 15
RECEIVER HEIGHT..... 5
DISTANCE TO SOURCE..... 5
DISTANCE TO RECEIVER... 90
NOISE LEVEL AT RECEIVER W/O BARRIER..... 60.4

WALL HEIGHT		INL	TIL
0.0	60.4	60.4	0.0
FN	0.0000		
1.0	60.4	60.4	0.0
FN	0.0000		
2.0	60.4	60.4	0.0
FN	0.0000		
3.0	54.6	54.6	5.8
FN	0.0485		
4.0	52.3	52.3	8.1
FN	0.2957		
5.0	49.8	49.8	10.6
FN	0.7407		
6.0	47.8	47.8	12.7
FN	1.3560		
7.0	46.2	46.2	14.3
FN	2.1083		
8.0	44.9	44.9	15.5
FN	2.9670		
9.0	43.9	43.9	16.5
FN	3.9073		
10.0	43.1	43.1	17.4
FN	4.9110		

POINT SOURCE BARRIER REDUCTION, WALL HEIGHT VARIABLE

---

50 FT. SOURCE REFERENCE LEVEL.....= 66.02

PROJECT.....INDOOR SHOOTING RANGE
DESCRIPTION..ROOFTOP EQUIPMENT SCREEN WALLS
SOURCE HEIGHT..... 3
SOURCE ELEVATION..... 15
RECEIVER ELEVATION..... 0
BARRIER ELEVATION..... 15
RECEIVER HEIGHT..... 5
DISTANCE TO SOURCE..... 5
DISTANCE TO RECEIVER... 105
NOISE LEVEL AT RECEIVER W/O BARRIER..... 59.2

WALL HEIGHT		TNL	TIL
0.0	59.2	59.2	0.0
FN	0.0000		
1.0	59.2	59.2	0.0
FN	0.0000		
2.0	59.2	59.2	0.0
FN	0.0000		
3.0	53.5	53.5	5.6
FN	0.0360		
4.0	51.3	51.3	7.9
FN	0.2624		
5.0	48.8	48.8	10.4
FN	0.6851		
6.0	46.7	46.7	12.4
FN	1.2767		
7.0	45.1	45.1	14.1
FN	2.0040		
8.0	43.8	43.8	15.3
FN	2.8361		
9.0	42.8	42.8	16.4
FN	3.7487		
10.0	42.0	42.0	17.2
FN	4.7232		

POINT SOURCE BARRIER REDUCTION, WALL HEIGHT VARIABLE

---

50 FT. SOURCE REFERENCE LEVEL.....= 66.02

PROJECT.....INDOOR SHOOTING RANGE
DESCRIPTION..ROOFTOP EQUIPMENT SCREEN WALLS
SOURCE HEIGHT..... 3
SOURCE ELEVATION..... 15
RECEIVER ELEVATION..... 0
BARRIER ELEVATION..... 15
RECEIVER HEIGHT..... 5
DISTANCE TO SOURCE..... 5
DISTANCE TO RECEIVER... 120
NOISE LEVEL AT RECEIVER W/O BARRIER..... 58.1

WALL HEIGHT		TNL	TIL
0.0	58.1	58.1	0.0
FN	0.0000		
1.0	58.1	58.1	0.0
FN	0.0000		
2.0	58.1	58.1	0.0
FN	0.0000		
3.0	52.6	52.6	5.5
FN	0.0278		
4.0	50.4	50.4	7.7
FN	0.2384		
5.0	47.9	47.9	10.2
FN	0.6443		
6.0	45.8	45.8	12.3
FN	1.2180		
7.0	44.1	44.1	13.9
FN	1.9262		
8.0	42.9	42.9	15.2
FN	2.7383		
9.0	41.8	41.8	16.2
FN	3.6297		
10.0	41.0	41.0	17.1
FN	4.5820		

POINT SOURCE BARRIER REDUCTION, WALL HEIGHT VARIABLE

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50 FT. SOURCE REFERENCE LEVEL.....= 66.02

PROJECT.....INDOOR SHOOTING RANGE
DESCRIPTION..ROOFTOP EQUIPMENT SCREEN WALLS
SOURCE HEIGHT..... 3
SOURCE ELEVATION..... 15
RECEIVER ELEVATION..... 0
BARRIER ELEVATION..... 15
RECEIVER HEIGHT..... 5
DISTANCE TO SOURCE..... 5
DISTANCE TO RECEIVER... 135
NOISE LEVEL AT RECEIVER W/O BARRIER..... 57.1

WALL HEIGHT		TNL	TIL
0.0	57.1	57.1	0.0
FN	0.0000		
1.0	57.1	57.1	0.0
FN	0.0000		
2.0	57.1	57.1	0.0
FN	0.0000		
3.0	51.7	51.7	5.4
FN	0.0221		
4.0	49.5	49.5	7.6
FN	0.2204		
5.0	47.1	47.1	10.0
FN	0.6131		
6.0	44.9	44.9	12.1
FN	1.1728		
7.0	43.3	43.3	13.8
FN	1.8661		
8.0	42.0	42.0	15.1
FN	2.6624		
9.0	40.9	40.9	16.1
FN	3.5372		
10.0	40.1	40.1	17.0
FN	4.4721		

POINT SOURCE BARRIER REDUCTION, WALL HEIGHT VARIABLE

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50 FT. SOURCE REFERENCE LEVEL.....= 66.02

PROJECT.....INDOOR SHOOTING RANGE
DESCRIPTION..ROOFTOP EQUIPMENT SCREEN WALLS
SOURCE HEIGHT..... 3
SOURCE ELEVATION..... 15
RECEIVER ELEVATION..... 0
BARRIER ELEVATION..... 15
RECEIVER HEIGHT..... 5
DISTANCE TO SOURCE..... 5
DISTANCE TO RECEIVER... 150
NOISE LEVEL AT RECEIVER W/O BARRIER..... 56.2

WALL HEIGHT		TNL	TIL
0.0	56.2	56.2	0.0
FN	0.0000		
1.0	56.2	56.2	0.0
FN	0.0000		
2.0	56.2	56.2	0.0
FN	0.0000		
3.0	50.9	50.9	5.3
FN	0.0180		
4.0	48.7	48.7	7.4
FN	0.2064		
5.0	46.3	46.3	9.9
FN	0.5886		
6.0	44.2	44.2	12.0
FN	1.1369		
7.0	42.5	42.5	13.7
FN	1.8183		
8.0	41.2	41.2	15.0
FN	2.6019		
9.0	40.1	40.1	16.1
FN	3.4634		
10.0	39.3	39.3	16.9
FN	4.3842		