

December 20, 2024

Mr. Nick Spallone
Car Wash Pro Designers (CWPD)
6400 N Northwest Hwy, Unit 4
Chicago, IL 60631

Subject: 12411 E 104th AVE – Noise Impact Study – Commerce City, CO

Dear Mr. Spallone:

MD Acoustics, LLC (MD) has completed a noise assessment for the proposed car wash located at 12411 E 104th Avenue in Commerce City, Colorado. This assessment reviews the projected car wash operational noise levels and compares them to the local noise ordinances. The project proposes a new car wash with approximately 22 vacuum stations and a 120-foot covered tunnel on approximately 1.08 acres. The car wash will operate no earlier than 7 AM and no later than 9 PM.

1.0 Assessment Overview

This assessment evaluates the projections of operational noise and compares them to the City, State, and County noise ordinances for informational purposes. The project location map is shown in Exhibit A. The site plan utilized for the project is indicated in Exhibit B. Appendix A contains field sheets for the measured noise level at the project site and reference sound data for the proposed car wash equipment. Appendix B contains the SoundPLAN model inputs and outputs.

2.0 Local Acoustical Requirements

The Commerce City Municipal Code does not provide quantitative standards with regard to stationary noise sources. Thus, MD compared the project noise levels to State and County codes. Section 4-16-03 of the Adams County Development Standards and Regulations states the following:

Adams County Section 04-16-03 NOISE

The maximum permissible sound pressure levels of any continuous source of sound are established for a time period within each zone district listed. Sound pressure levels shall be measured at the property line or boundary of a public right-of-way, at a height of at least four (4) feet above the immediate surrounding surface, on a sound level meter of standard design and operated on the “A” weighting network.

Table 1: Adams County Development Standards and Regulations, Section 4-16-03

Zone Districts	Day (dBA, 7 a.m. – 10 p.m.)	Night (dBA, 7 a.m. – 10 p.m.)
Residential	55	50
Commercial	60	55
Agricultural	80	75
Other Overlay Zones	-	-
Aviation; Denver Int. Airport	None	None

The State of Colorado Revised Statutes section 25-12-103 defines the following allowable noise levels for variously zoned properties:

Colorado Revised Statutes Section 25-12-103

(1) Every activity to which this article is applicable shall be conducted in a manner so that any noise produced is not objectionable due to intermittence, beat frequency, or shrillness. Sound levels of noise radiating from a property line at a distance of twenty-five feet or more therefrom in excess of the db(A) established for the following time periods and zones shall constitute prima facie evidence that such noise is a public nuisance:

Table 2: State of Colorado Revised Statutes Section 25-12-103

Zone	7:00 a.m. to next 7:00 p.m.	7:00 p.m. to next 7:00 a.m.
Residential	55 db(A)	50 db(A)
Commercial	60 db(A)	55 db(A)
Light Industrial	70 db(A)	65 db(A)
Industrial	80 db(A)	75 db(A)

For residential and commercial zoned neighboring properties, the nighttime allowable noise levels are 50 and 55 dBA, respectively. The hours defining nighttime are different, with the state defining 7pm as the start of night and the county defining it as 10pm. Thus, MD compared the project noise levels to a nighttime noise level limit of 50 dBA as a worst-case assumption.

3.0 Study Method and Procedure

SoundPLAN Acoustic Model

SoundPLAN (SP) acoustical modeling software was utilized to model future worst-case stationary noise impacts to the adjacent land uses. SP is capable of evaluating multiple stationary noise source impacts at various receiver locations. SP's software utilizes algorithms (based on the inverse square law and reference equipment noise level data) to calculate noise level projections. The software allows the user to input specific noise sources, spectral content, sound barriers, building placement, topography, and sensitive receptor locations.

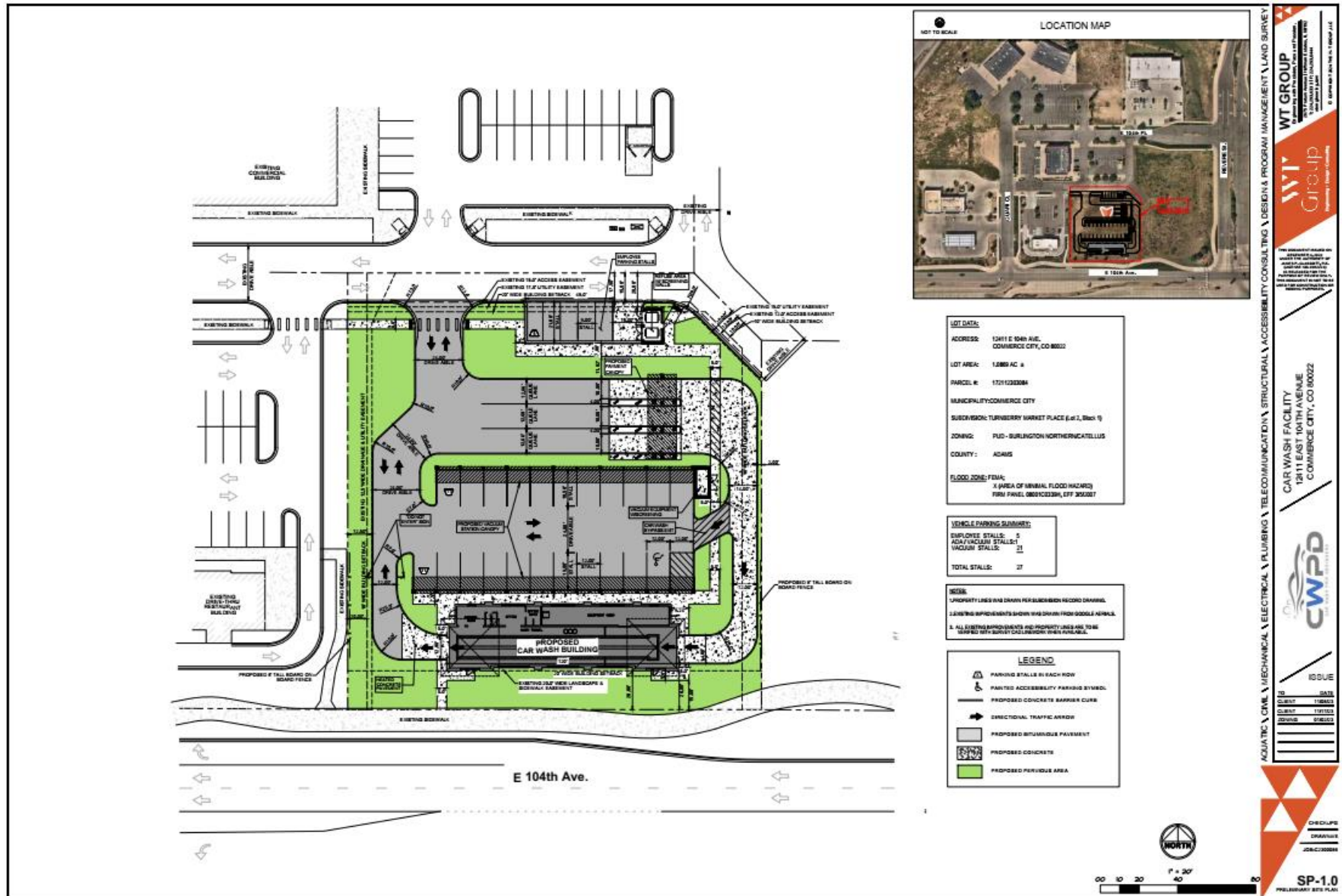
The model assumes that the car wash tunnel has a 10-foot-tall by 10-foot-wide exit opening and is covered by a solid roof. The blowers (60 HP IDC Stealth Predator running at 50Hz or equivalent) were modeled at 7 to 10 feet high as point sources. The blowers are modeled at approximately 5 feet inside the exit of the tunnel. The model also assumes that the last 15 feet of the tunnel is lined with absorptive material with an NRC rating of 1.0. The reference equipment sound level data is provided in Appendix C.

The SP model assumes a total of 22 vacuum blowers and the dryer system are operating simultaneously (worst-case scenario) when in actuality the noise will be intermittent and lower in noise level. The vacuum turbine motor is enclosed. The project proposes to house all other equipment inside the equipment rooms of the car wash building.

Exhibit A
Location Map



4



The reference vacuum equipment sound level data is provided in Appendix C. The model assumes a full queue of idling cars.

The SP model also assumes the addition of an 8-foot wall at the east and west property lines, shown in red on the noise contour plot in Exhibit C.

All other noise-producing equipment (e.g., compressors, pumps) will be housed within mechanical equipment rooms.

The following outlines the project design features:

- 1. The project will incorporate a 60 HP IDC Predator blower system running at 50 Hz to meet these acoustical benchmarks.
- 2. An acoustic liner (1.0 NRC minimum) will line the 15 feet of the exit.
- 3. 8-foot walls will line portions of the east and west property lines, as shown in Exhibit C.

4.0 Findings and Recommendations

Existing Noise Environment

MD conducted a site noise survey on December 12, 2024. A total of four (4) 15-minute noise measurements were taken at the locations indicated in Exhibit A. In Appendix A the full measurement results, photos, and other details are given. Table 3, below, gives a summary of the measurement results.

Table 3: 12-12-2024 Measurement Result Summary

Measurement Location ^{1,2}	Start Time	End Time	Average Noise Level (dBA, Leq) ³	Maximum Noise Level(dBA, LMax) ³	Minimum Noise Level(dBA, LMin) ³
NM-1	5:23 PM	5:37 PM	66.1	76.5	51.4
NM-2	5:45 PM	6:01 PM	67.4	77.1	52.3
NM-3	6:04 PM	6:21 PM	61.1	73.5	50.9
NM-4	7:12 PM	7:32 PM	64.1	80.6	47.9
Notes: ¹ Measurement locations are indicated in Exhibit A. ² Locations 1 through 4 represent commercial property lines. ³ See Appendix A for full measurement results and details.					

For this evaluation, MD has utilized the measured ambient noise levels of 61 to 67 dBA Leq for the surrounding land uses.

Future Exterior Noise Levels due to Stationary Sources

A total of seven (7) receptors were modeled in SoundPlan to accurately evaluate the future operational noise levels near the project site. A yellow dot denotes a receptor. Receptors 1 through 4 represent the noise level at the neighboring commercial property lines. Receptors 5 and 7 represent the noise level at commercial uses further to the south and east. Receptor 6 shows the noise level at the neighboring drive-thru window. See Appendix B for the SoundPLAN model inputs and outputs.

Table 4 presents the project-only operational noise level projections and the project plus ambient noise level projections.

Table 4: Worst-Case Predicted Operational Noise Levels (dBA)¹

Receptor ^{1,2}	Measured Ambient Noise Level (dBA, Leq) ³	Modeled Project Noise Level (dBA, Leq) ³	Colorado Nighttime Noise Limit (dBA, Leq) ⁴	Total Combined Noise Level (dBA, Leq)	Change in Noise Level as Result of Project (dBA)
1	64	46	50	64	0
2	67	48	50	67	0
3	61	41	50	61	0
4	61	48	50	61	0
5	64	39	50	64	0
6	64	40	50	64	0
7	67	35	50	67	0

Notes:

¹ Receptor locations are indicated in Exhibit C.

² Receptors 1 through 7 represent commercial zoned properties

³ See Exhibit C for the operational noise level projections at said receptors.

⁴ See Section 2.0, above.

Exhibit C shows the future noise level projections and contours based on the proposed project design. The project-only noise levels at the various adjacent uses will range between 41 and 48 dBA Leq. The project-only noise levels thus meet the State of Colorado nighttime noise limit of 50 dBA Leq.

The ambient noise level will have a 0 dB increase as a result of the project. Table 5 provides the characteristics associated with changes in noise levels.

Table 5: Change in Noise Level Characteristics¹

Changes in Intensity Level, dBA	Changes in Apparent Loudness
1	Not perceptible
3	Just perceptible
5	Clearly noticeable
10	Twice (or half) as loud

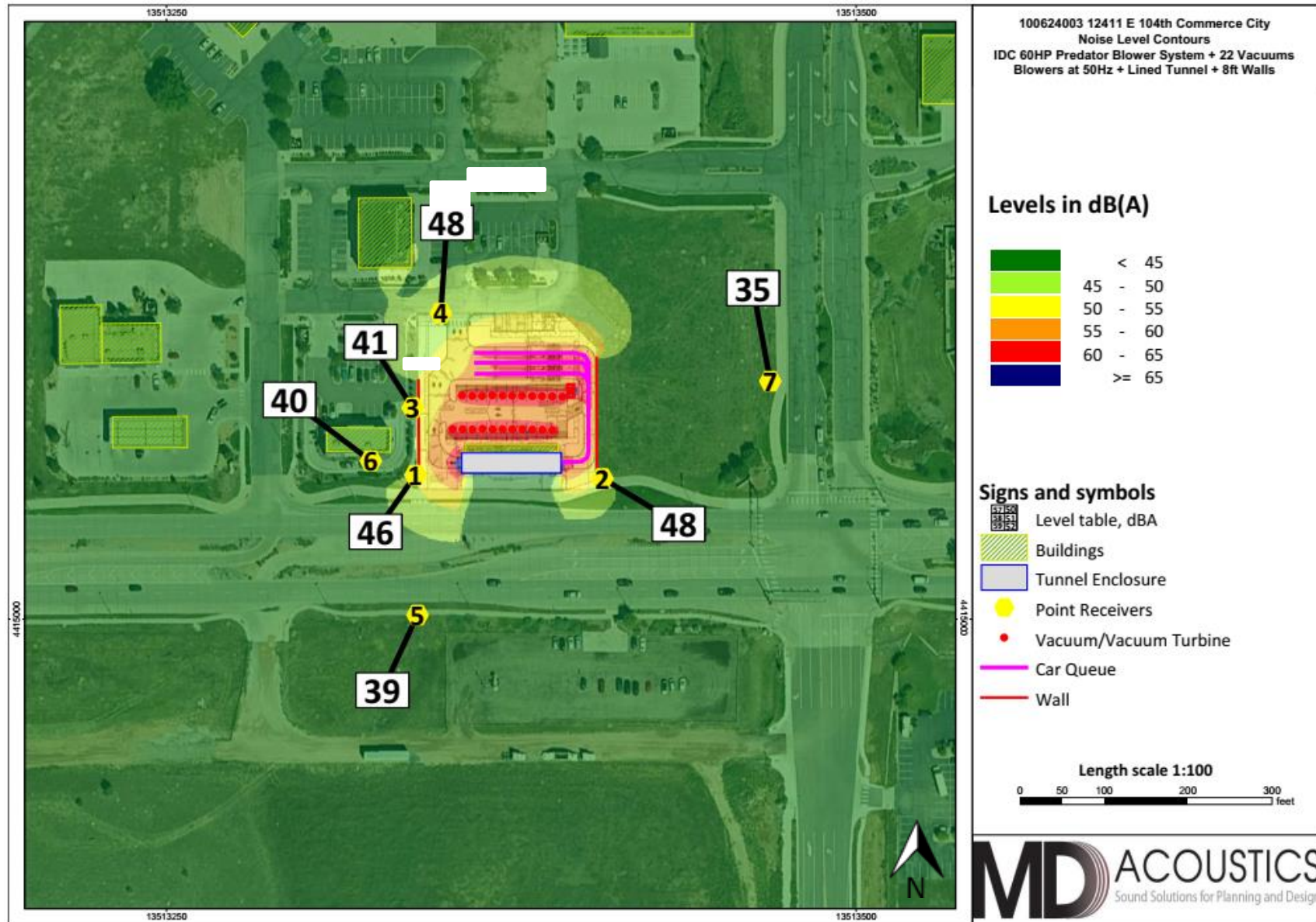
1. https://www.fhwa.dot.gov/environMent/noise/regulations_and_guidance/polguide/polguide02.cfm

The noise level increase due to the project would fall within the “not perceptible” noise level characteristic at the various receptors.

5.0 Conclusions

MD has reviewed the applicable noise ordinances and modeled the noise levels for the proposed car wash based on real world measurements of similar car washes and based on real world measurements of the proposed blower and vacuum equipment used at this project. MD has provided ambient noise measurements taken at the proposed project site. The proposed car wash will meet the nighttime noise level limit of 50 dBA Leq at surrounding uses. Furthermore, the proposed project will not increase the existing ambient noise level, and the impact will be less than significant.

Exhibit C Operational Noise Levels



The reference vacuum equipment sound level data is provided in Appendix C. The model assumes a full queue of idling cars.

The SP model also assumes the additi

The following outlines the project design features:

1. The project will incorporate a 60 HP IDC Predator blower system running at 50 Hz to meet these acoustical benchmarks.
2. An acoustic liner (1.0 NRC minimum) will line the 15 feet of the exit.
3. 8-foot walls will line portions of the east and west property lines, as shown in Exhibit C.

MD is pleased to provide this noise review for the 104th Avenue car wash project. If you have any questions regarding this analysis, please call our office at (602) 774-1950.

Sincerely,
MD Acoustics, LLC



Brandon Skinner
Acoustical Consultant



Rachel Edelman
Acoustical Consultant

Appendix A
Measurement Field Sheets

15-Minute Continuous Noise Measurement Datasheet - NM-1, NM-2, NM-3, NM-4

Project Name:	12411 E 104th Commerce City	Site Observations:
Project: #/Name:	1006-2024-003	Main source of noise from 104th Avenue. Light/moderate evening traffic. Noise from parking areas and drive thru did not compare to the roadway noise.
Site Address/Location:	12411 E 104th Ave	
Date:	12/12/2024	
Field Tech/Engineer:	Brandon Skinner	
Sound Meter:	Piccolo-II, SoftdB	SN: PO222040502
Settings:	A-weighted, slow, 1-sec, 15-minute interval	
Site Id:	NM-1, NM-2, NM-3, NM-4	



15-Minute Continuous Noise Measurement Datasheet - Cont. - NM-1, NM-2, NM-3, NM-4

Project Name: 12411 E 104th Commerce City

Calibrator:

Site Address/Location: 12411 E 104th Ave

Cal Check: Pre-test: **Post Test:**

Site Id: NM-1, NM-2, NM-3, NM-4

Figure 1: NM-1 and NM-4

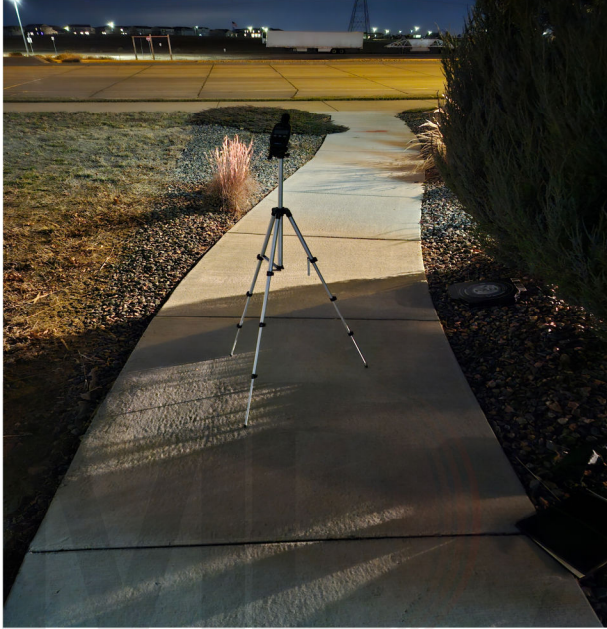


Figure 2: NM-2



Figure 3: NM-3

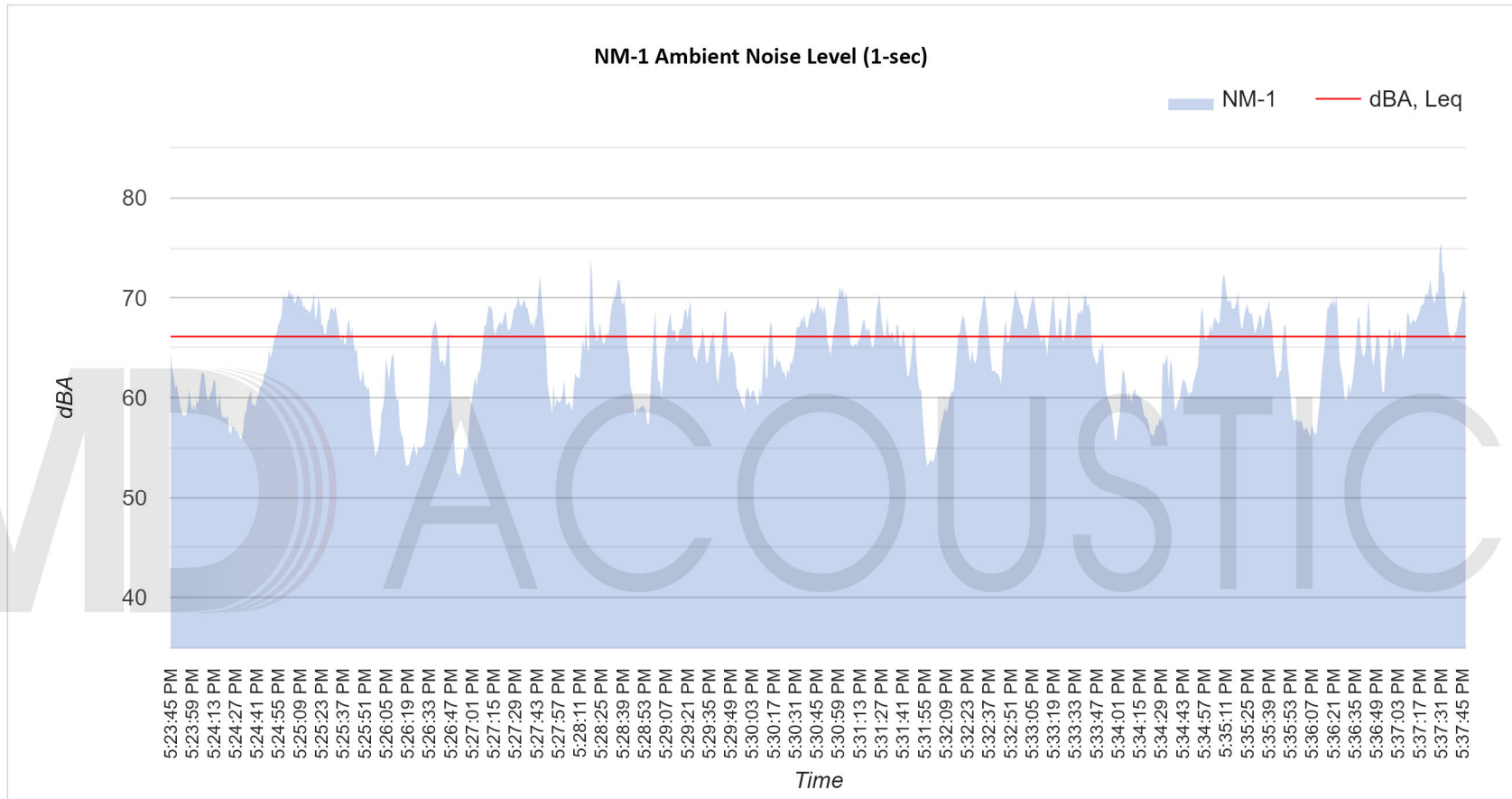


Table 1: Baseline Noise Measurement Summary

Location	Start	Stop	Leq	Lmax	Lmin	L2	L8	L25	L50	L90
NM-1	5:23 PM	5:37 PM	66.1	76.5	51.4	70.9	69.8	67.7	65.1	57.7
NM-2	5:45 PM	6:01 PM	67.4	77.1	52.3	72.4	70.8	69.1	66.9	57.1
NM-3	6:04 PM	6:21 PM	61.1	73.5	50.9	65.4	64.1	62.5	60.2	55.1
NM-4	7:12 PM	7:32 PM	64.1	80.6	47.9	70.1	68.1	65.3	61.3	53.9

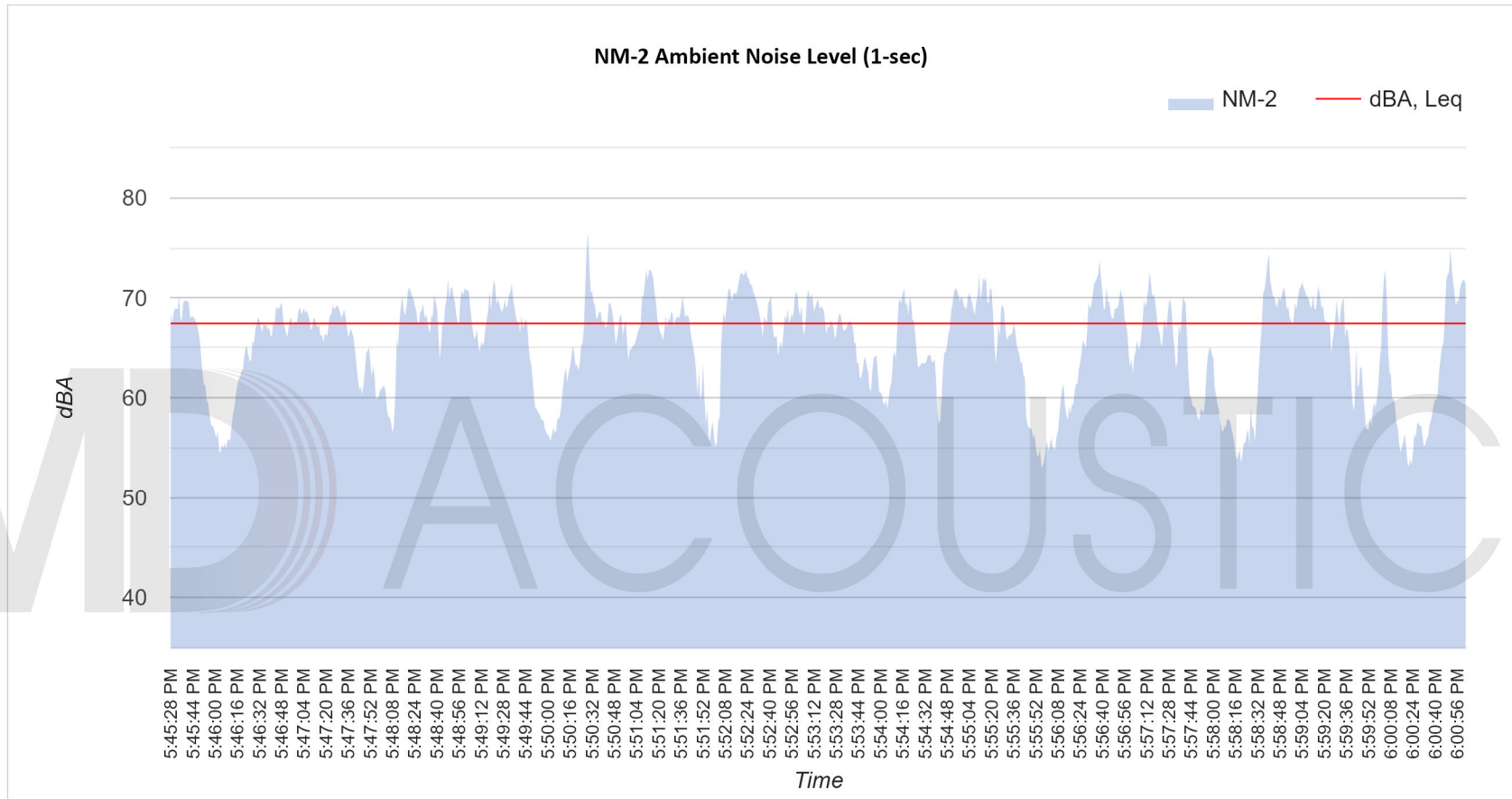
15-Minute Continuous Noise Measurement Datasheet - Cont. - NM-1

Project Name:	12411 E 104th Commerce City	Site Topo:	flat	Noise Source(s) w/ Distance:
Site Address/Location:	12411 E 104th Ave	Meteorological Cond.:	low wind	104th Street @ 70 feet to center of nearest thru lane
Site Id:	NM-1	Ground Type:	dirt/paved	



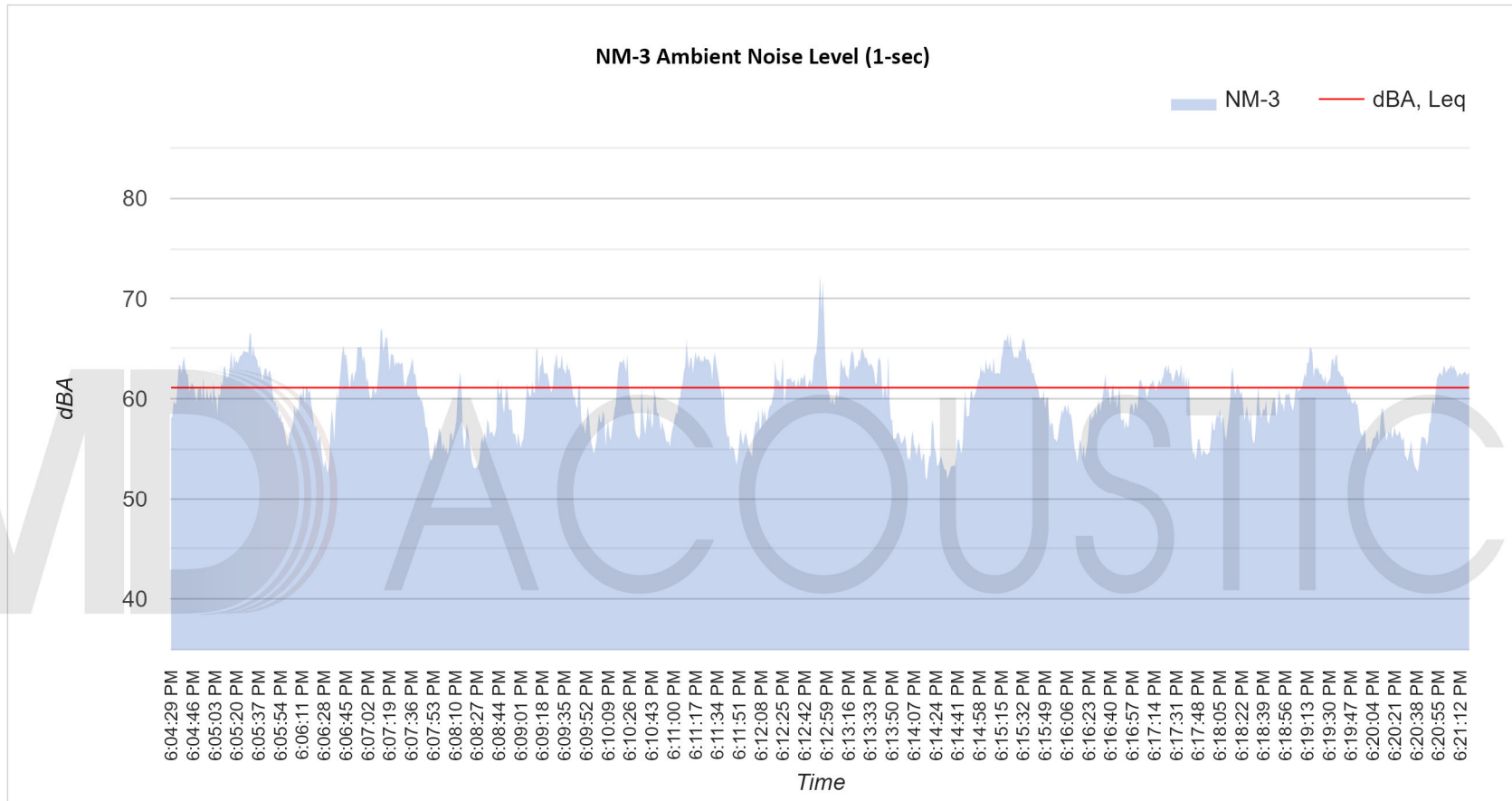
15-Minute Continuous Noise Measurement Datasheet - Cont. - NM-2

Project Name:	12411 E 104th Commerce City	Site Topo:	flat	Noise Source(s) w/ Distance:
Site Address/Location:	12411 E 104th Ave	Meteorological Cond.:	calm cold	104th St. @ 50 feet to center of nearest lane
Site Id:	NM-2	Ground Type:	dirt/paved	



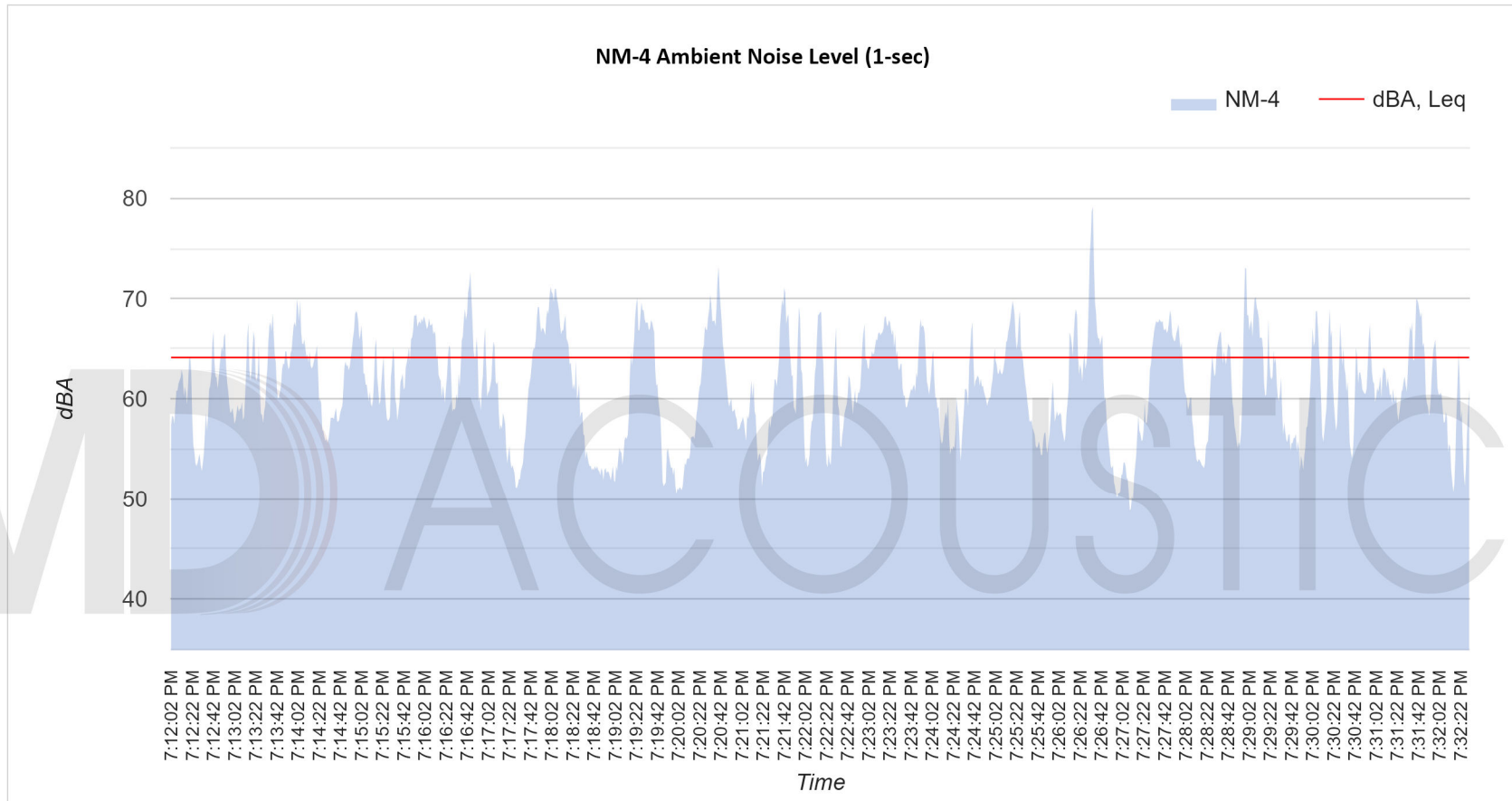
15-Minute Continuous Noise Measurement Datasheet - Cont. - NM-3

Project Name:	12411 E 104th Commerce City	Site Topo:	flat	Noise Source(s) w/ Distance:
Site Address/Location:	12411 E 104th Ave	Meteorological Cond.:	calm cold	104th St. @ 215 ft to center of nearest thru lane
Site Id:	NM-3	Ground Type:	dirt/paved	

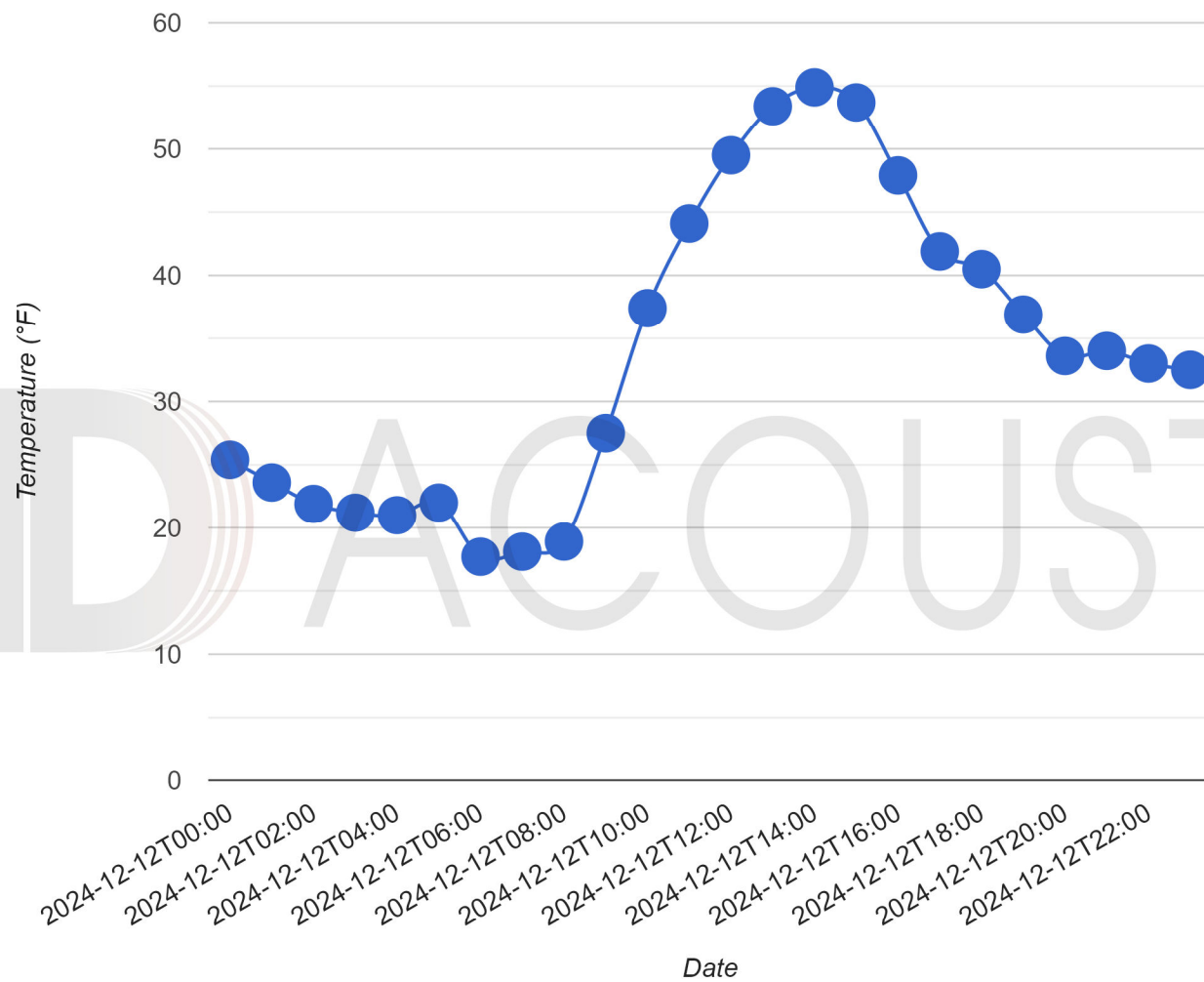


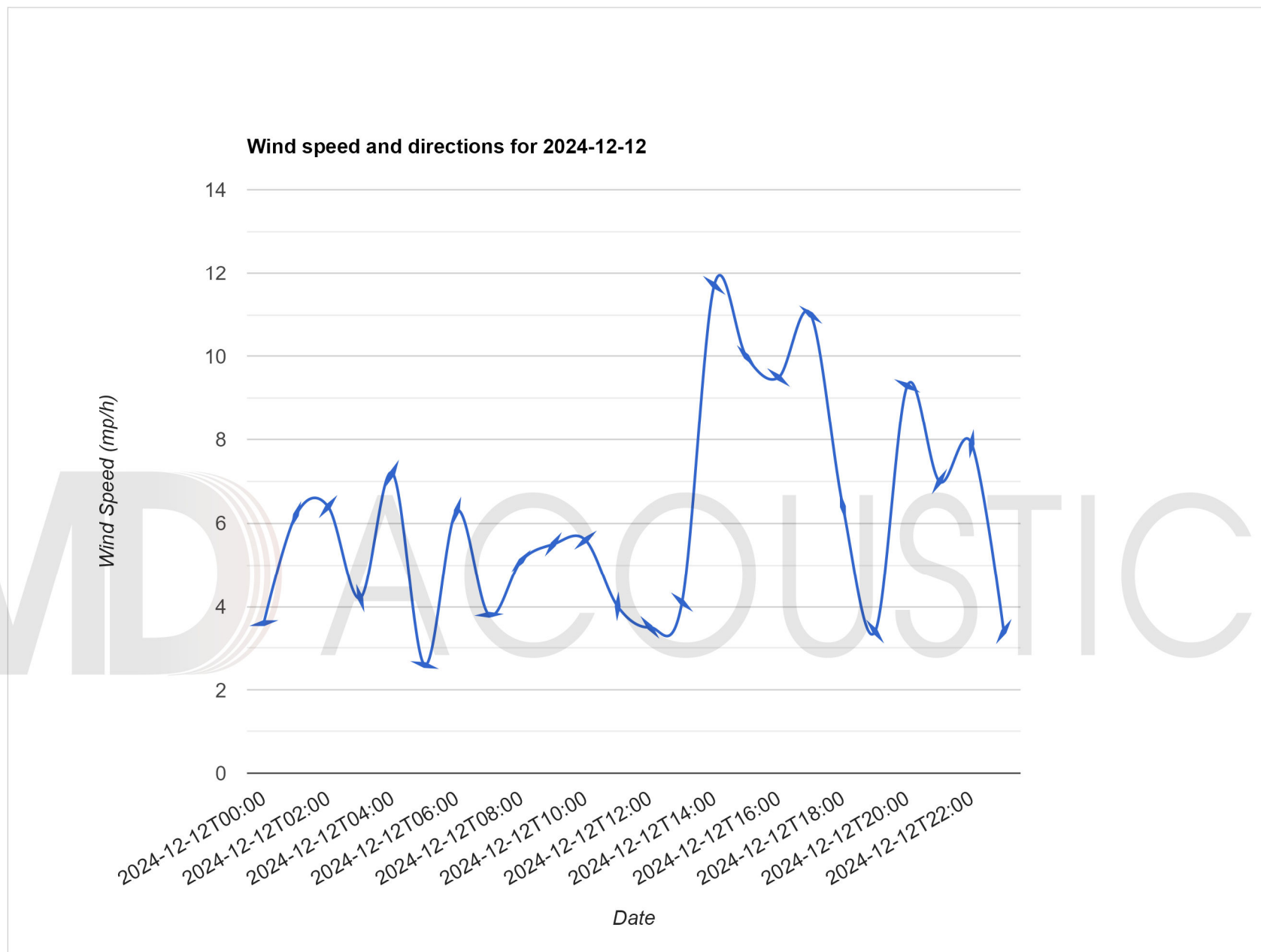
15-Minute Continuous Noise Measurement Datasheet - Cont. - NM-4

Project Name:	12411 E 104th Commerce City	Site Topo:	equivalent to NM-1	Noise Source(s) w/ Distance:
Site Address/Location:	12411 E 104th Ave	Meteorological Cond.:	equivalent to NM-1	equivalent to NM-1
Site Id:	NM-4	Ground Type:	equivalent to NM-1	



Weather forecast for 2024-12-12





Source: Global Forecast System (GFS) weather forecast model

Appendix B
SoundPLAN Inputs/Outputs

Commerce City CO

Contribution spectra - Situation 6 - IDC 60HP 50Hz Predator

Source	Sum	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	
	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	
Receiver 1 FI G Lr,lim dB(A) Leq,d 46.0 dB(A) Sigma(Leq,d) 0.0 dB(A)									
Vacuum Turbine	11.7	0.0	5.2	-1.6	-7.0	-3.2	1.9	7.0	
Vacuum	12.7	5.0	6.2	8.6	2.0	-1.8	-0.8	-2.5	
Vacuum	27.6	16.2	20.1	23.5	18.7	17.0	17.0	13.3	
Vacuum	23.5	12.5	16.1	19.3	14.4	13.0	13.6	9.5	
Vacuum	23.1	12.0	15.7	18.8	13.9	12.7	13.4	9.3	
Vacuum	27.1	14.6	18.3	23.4	18.7	16.4	17.0	13.1	
Vacuum	12.2	4.5	5.7	8.1	1.5	-2.3	-1.4	-3.3	
Vacuum	14.3	6.3	7.4	9.7	3.3	1.0	3.1	2.1	
Vacuum	15.1	7.0	8.1	10.4	3.9	1.6	5.0	2.8	
Vacuum	15.8	7.8	9.0	11.2	4.6	2.2	5.6	3.5	
Vacuum	13.5	5.6	6.7	9.1	2.4	-1.3	1.6	1.1	
Vacuum	11.7	4.1	5.2	7.6	1.1	-2.7	-2.0	-3.9	
Vacuum	29.8	18.6	22.3	26.1	21.0	18.6	18.5	14.8	
Vacuum	24.4	13.3	17.0	20.4	15.4	13.6	14.0	9.7	
Vacuum	25.0	13.8	17.5	21.0	16.0	14.0	14.6	10.5	
Vacuum	26.4	14.3	17.9	22.4	18.2	16.0	16.6	12.7	
Vacuum	24.0	12.9	16.6	19.8	14.9	13.3	13.8	9.8	
Vacuum	29.1	17.9	21.6	25.3	20.2	18.0	18.0	14.2	
Vacuum	13.7	4.7	6.1	8.5	2.1	1.3	6.0	2.6	
Vacuum	19.9	7.8	11.4	16.2	11.1	8.6	10.3	6.2	
Vacuum	22.7	11.5	15.3	18.3	13.4	12.4	13.3	9.2	
Vacuum	13.1	4.3	5.7	8.1	1.7	0.7	5.1	1.4	
Vacuum	28.4	17.1	20.9	24.5	19.5	17.5	17.6	13.8	
Industrial building, room 1-Transmissive area 01	45.2		30.0	39.1	40.2	38.4	37.4	29.7	
Industrial building, room 1-Transmissive area 01	17.3		5.7	15.1	11.9	3.3	-9.0	-26.3	
Industrial building, room 1-Roof 01	-3.6		-12.7	-4.9	-12.0	-25.3			
Industrial building, room 1-Facade 04	-0.8		-9.8	-2.8	-7.3	-17.9	-23.4		
Industrial building, room 1-Facade 03	-15.3		-21.6	-16.9	-25.9				
Industrial building, room 1-Facade 02	-24.5			-24.5					
Industrial building, room 1-Facade 01	1.0		-7.1	-1.0	-6.0	-16.7	-22.4		
Car Queue	25.9	16.9	15.2	15.1	18.7	19.1	19.5	13.2	
Car Queue	26.2	16.5	14.8	15.3	19.2	19.5	20.2	14.0	
Car Queue	27.0	17.3	15.2	15.6	19.9	20.2	21.1	15.2	
Receiver 2 FI G Lr,lim dB(A) Leq,d 47.8 dB(A) Sigma(Leq,d) 0.0 dB(A)									
Vacuum Turbine	22.6	9.7	15.5	9.3	5.1	10.4	14.5	17.1	
Vacuum	27.6	14.7	18.5	21.0	16.6	16.4	21.8	19.6	
Vacuum	17.1	9.0	11.3	12.6	6.4	4.2	4.1	0.6	
Vacuum	27.6	13.4	17.6	21.0	17.1	17.7	21.5	20.3	
Vacuum	27.9	13.9	18.1	21.6	17.6	17.9	21.5	20.1	
Vacuum	20.3	9.1	12.2	13.4	7.6	7.1	12.6	14.3	
Vacuum	34.8	19.5	24.2	27.3	24.3	25.8	28.9	27.7	
Vacuum	23.5	11.8	14.5	15.9	9.8	8.5	17.7	17.4	
Vacuum	19.0	10.6	13.2	14.5	8.1	6.6	6.5	3.0	
Vacuum	17.9	9.8	12.1	13.4	7.2	5.2	5.1	1.6	
Vacuum	24.9	13.1	16.3	18.0	12.4	11.4	18.6	18.2	
Vacuum	32.8	18.3	22.6	26.6	22.8	22.8	26.5	24.9	
Vacuum	14.6	6.9	8.6	9.6	4.8	2.3	2.1	-1.6	
Vacuum	25.1	11.3	15.3	17.4	13.7	15.6	19.0	18.6	
Vacuum	22.8	10.7	14.4	16.1	11.5	12.2	15.5	15.9	
Vacuum	21.4	9.9	13.3	14.8	9.4	9.3	13.7	14.9	
Vacuum	29.6	15.0	19.5	21.1	18.3	20.9	23.8	22.8	
Vacuum	15.1	7.4	9.1	10.1	5.0	2.6	2.5	-1.1	

Commerce City CO

Contribution spectra - Situation 6 - IDC 60HP 50Hz Predator

Source	Sum	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	
	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	
Vacuum	28.3	15.2	19.2	22.9	18.4	16.7	21.8	19.5	
Vacuum	26.9	14.8	18.9	22.5	18.2	17.1	17.7	14.0	
Vacuum	27.9	14.4	18.6	22.1	18.0	17.6	21.2	19.7	
Vacuum	28.6	15.4	19.4	23.2	18.6	16.6	22.1	19.9	
Vacuum	16.3	8.3	10.4	11.8	5.6	3.3	3.1	-0.4	
Industrial building, room 1-Transmissive area 01	22.4		11.3	17.9	16.8	13.9	12.3	9.5	
Industrial building, room 1-Transmissive area 01	44.2		28.8	40.7	40.5	33.8	22.7	7.1	
Industrial building, room 1-Roof 01	-1.1		-11.0	-2.5	-8.9	-21.9	-29.6		
Industrial building, room 1-Facade 04	-20.6		-27.3	-22.4	-29.4				
Industrial building, room 1-Facade 03	-7.8		-14.5	-9.6	-17.2				
Industrial building, room 1-Facade 02	-0.2		-11.7	-1.5	-7.4	-23.3			
Industrial building, room 1-Facade 01	1.8		-6.5	-0.2	-5.3	-16.1	-21.8		
Car Queue	29.7	19.3	17.9	17.4	21.2	22.7	24.7	20.5	
Car Queue	28.5	18.8	17.2	17.0	20.6	21.4	22.7	18.6	
Car Queue	42.9	29.5	28.7	29.7	34.6	36.6	38.1	34.1	
Receiver 3 FI G Lr,lim dB(A) Leq,d 41.0 dB(A) Sigma(Leq,d) 0.0 dB(A)									
Vacuum Turbine	14.7	2.3	7.7	1.7	-2.5	2.4	6.9	9.5	
Vacuum	23.2	9.5	13.1	20.1	15.0	12.0	12.7	8.7	
Vacuum	25.5	13.9	17.6	22.1	16.9	14.0	14.2	10.3	
Vacuum	22.8	11.2	14.8	19.4	14.2	10.8	11.2	7.9	
Vacuum	22.0	10.4	14.0	18.6	13.4	10.0	11.1	7.4	
Vacuum	28.4	16.9	20.6	25.0	19.8	16.7	16.3	12.9	
Vacuum	22.6	8.8	12.4	19.5	14.3	11.4	12.4	8.4	
Vacuum	24.5	11.0	14.7	21.5	16.4	13.4	13.8	9.7	
Vacuum	25.5	11.9	16.8	22.3	17.2	14.2	14.4	10.5	
Vacuum	26.3	12.8	17.7	23.2	18.0	15.0	15.2	11.3	
Vacuum	23.8	10.2	13.8	20.8	15.6	12.7	13.2	9.1	
Vacuum	21.7	8.2	11.8	18.1	13.7	10.8	12.4	8.0	
Vacuum	29.6	18.0	21.8	26.2	21.0	18.1	17.8	14.2	
Vacuum	24.6	13.0	16.7	21.2	16.0	12.8	12.7	9.4	
Vacuum	25.7	14.2	17.9	22.3	17.1	14.0	13.8	10.4	
Vacuum	26.9	15.4	19.1	23.6	18.3	15.2	15.0	11.5	
Vacuum	23.6	12.0	15.7	20.2	15.0	11.7	11.9	8.5	
Vacuum	28.0	16.4	20.2	24.6	19.4	16.5	16.3	12.6	
Vacuum	21.1	8.3	11.9	17.0	13.7	11.2	11.6	7.3	
Vacuum	21.6	8.9	12.5	17.6	14.1	11.2	12.1	8.0	
Vacuum	21.3	9.6	13.2	17.9	12.6	9.5	10.6	6.9	
Vacuum	21.5	7.7	11.2	17.8	14.5	10.9	11.5	7.1	
Vacuum	26.7	15.1	18.8	23.3	18.1	15.2	15.2	11.4	
Industrial building, room 1-Transmissive area 01	36.4		22.7	32.1	31.9	28.3	24.7	15.0	
Industrial building, room 1-Transmissive area 01	12.2		0.7	10.1	6.5	-1.8	-9.5	-27.2	
Industrial building, room 1-Roof 01	-11.2		-19.3	-12.6	-20.7				
Industrial building, room 1-Facade 04	-9.2		-18.1	-10.7	-16.9	-29.1			
Industrial building, room 1-Facade 03	-14.4		-22.1	-15.9	-23.6				
Industrial building, room 1-Facade 02									
Industrial building, room 1-Facade 01	-17.9		-24.1	-19.6	-28.3				
Car Queue	25.1	16.7	15.1	15.9	18.8	17.7	17.1	10.9	
Car Queue	25.0	16.8	15.1	15.7	18.6	17.5	17.0	10.9	
Car Queue	26.6	17.8	16.0	16.7	20.7	19.5	19.1	12.8	
Receiver 4 FI G Lr,lim dB(A) Leq,d 47.6 dB(A) Sigma(Leq,d) 0.0 dB(A)									
Vacuum Turbine	28.1	9.2	14.1	7.9	4.4	14.5	19.9	24.7	
Vacuum	29.9	13.8	19.0	21.4	18.7	21.6	24.5	23.1	
Vacuum	31.5	15.5	21.7	23.3	20.5	23.1	25.7	24.5	

Commerce City CO

Contribution spectra - Situation 6 - IDC 60HP 50Hz Predator

Source		Sum	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	
		dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	
	Vacuum	31.7	16.5	21.0	23.3	20.9	23.2	26.1	24.8	
	Vacuum	31.2	16.0	20.5	22.6	20.2	22.7	25.7	24.3	
	Vacuum	33.5	18.7	23.3	26.1	23.2	24.8	27.3	26.1	
	Vacuum	29.3	13.5	18.6	20.9	18.2	21.3	23.9	22.1	
	Vacuum	30.8	14.6	19.7	22.2	19.4	22.3	25.4	24.3	
	Vacuum	31.0	14.9	20.2	22.6	19.8	22.6	25.4	24.2	
	Vacuum	31.2	15.2	21.5	23.0	20.1	22.9	25.5	24.0	
	Vacuum	30.5	14.2	19.3	21.8	19.0	22.0	25.3	24.1	
	Vacuum	28.9	13.1	18.2	20.4	17.8	20.9	23.6	21.7	
	Vacuum	30.4	15.9	20.4	22.4	19.5	21.9	24.4	23.4	
	Vacuum	32.7	17.5	22.1	24.7	22.2	24.2	26.9	25.7	
	Vacuum	33.2	17.9	22.5	25.2	22.8	24.8	27.3	26.1	
	Vacuum	33.4	18.3	22.9	25.6	22.8	24.9	27.5	26.3	
	Vacuum	32.2	17.0	21.5	24.0	21.6	23.7	26.4	25.2	
	Vacuum	30.3	15.8	20.3	22.2	19.3	21.7	24.3	23.3	
	Vacuum	30.5	14.4	18.9	20.5	18.5	22.7	25.6	23.8	
	Vacuum	29.9	14.9	19.4	21.1	19.0	21.7	24.6	22.8	
	Vacuum	30.6	15.4	19.9	21.8	19.6	22.2	25.2	23.9	
	Vacuum	30.3	13.9	18.3	20.2	19.6	22.6	25.4	23.6	
	Vacuum	31.7	15.6	21.0	23.6	21.1	23.5	25.9	24.7	
	Industrial building, room 1-Transmissive area 01	37.7		22.4	28.9	31.8	32.5	31.6	23.9	
	Industrial building, room 1-Transmissive area 01	16.3		6.4	13.6	9.9	0.7	6.3	-11.1	
	Industrial building, room 1-Roof 01	-13.2		-21.7	-14.5	-22.4				
	Industrial building, room 1-Facade 04	-10.9		-18.6	-13.7	-16.7	-25.6			
	Industrial building, room 1-Facade 03	-16.5		-22.8	-18.6	-24.8				
	Industrial building, room 1-Facade 02	-27.0			-27.0					
	Industrial building, room 1-Facade 01	-20.1		-25.4	-21.6					
	Car Queue	37.3	23.4	22.7	21.4	27.1	31.1	33.3	29.0	
	Car Queue	38.0	24.2	23.5	22.5	28.1	31.8	33.8	29.6	
	Car Queue	39.6	25.7	25.0	23.9	29.6	33.4	35.5	31.3	
Receiver 5 Fl G Lr,lim dB(A) Leq,d 38.7 dB(A) Sigma(Leq,d) 0.0 dB(A)										
	Vacuum Turbine	8.5	-0.1	4.3	-3.4	-7.8	-6.1	-2.4	1.5	
	Vacuum	9.5	1.6	3.3	5.8	-1.5	-6.6	-5.7	-8.2	
	Vacuum	12.2	4.7	6.8	7.9	0.8	-2.6	-2.8	-6.0	
	Vacuum	13.9	4.0	6.0	8.5	1.6	-1.7	2.0	7.9	
	Vacuum	14.5	3.6	5.5	8.3	1.3	-2.1	1.7	10.5	
	Vacuum	22.5	5.8	10.0	14.7	12.0	12.6	17.5	16.2	
	Vacuum	15.3	1.6	3.2	5.6	-1.7	-6.7	9.0	12.2	
	Vacuum	10.0	2.0	3.8	6.3	-1.0	-5.9	-5.2	-7.7	
	Vacuum	10.3	2.5	4.3	6.5	-0.7	-5.4	-4.8	-7.4	
	Vacuum	10.9	3.2	5.1	6.9	-0.2	-4.6	-4.2	-7.0	
	Vacuum	9.8	1.7	3.5	6.0	-1.3	-6.3	-3.4	-4.8	
	Vacuum	16.4	1.7	3.2	5.4	-2.0	-6.7	12.1	12.6	
	Vacuum	26.0	7.1	11.6	16.6	13.9	15.4	21.7	20.4	
	Vacuum	13.9	5.9	8.4	9.7	3.1	0.0	-1.2	-5.9	
	Vacuum	17.3	7.1	10.5	11.6	6.8	8.1	8.9	4.6	
	Vacuum	22.5	5.7	10.0	14.6	11.9	12.5	17.6	16.1	
	Vacuum	13.9	4.8	6.8	8.9	2.0	-2.2	-3.5	7.4	
	Vacuum	24.7	7.1	11.6	16.5	13.7	16.1	19.9	17.8	
	Vacuum	15.2	3.0	4.9	7.8	0.8	-2.7	8.1	11.2	
	Vacuum	15.2	3.1	5.0	7.9	1.0	-2.6	8.0	10.9	
	Vacuum	14.5	3.3	5.2	8.1	1.1	-2.4	1.6	10.7	
	Vacuum	11.9	3.0	4.9	7.7	0.8	-3.9	3.3	-2.2	

Commerce City CO

Contribution spectra - Situation 6 - IDC 60HP 50Hz Predator

Source	Sum	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	
	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	
Vacuum	16.1	7.3	10.6	11.1	5.5	4.9	4.2	-0.4	
Industrial building, room 1-Transmissive area 01	37.3		19.3	28.4	31.4	32.1	31.1	23.5	
Industrial building, room 1-Transmissive area 01	17.3		6.9	15.0	11.6	3.0	-9.1	-28.2	
Industrial building, room 1-Roof 01	-6.6		-17.3	-8.1	-13.8	-25.7			
Industrial building, room 1-Facade 04	-11.5		-19.6	-14.2	-17.1	-26.1			
Industrial building, room 1-Facade 03	-18.7		-25.1	-20.4	-29.5				
Industrial building, room 1-Facade 02	-24.5			-24.5					
Industrial building, room 1-Facade 01	-7.4		-17.1	-9.4	-13.7	-23.5	-29.1		
Car Queue	19.0	10.8	7.9	6.7	9.2	10.8	13.3	11.2	
Car Queue	19.2	10.8	8.0	6.9	9.6	11.2	13.6	10.7	
Car Queue	25.7	14.2	11.8	10.8	15.6	18.1	21.9	17.4	
Receiver 6 FI G Lr,lim dB(A) Leq,d 40.3 dB(A) Sigma(Leq,d) 0.0 dB(A)									
Vacuum Turbine	18.6	0.6	6.0	-0.1	-5.8	5.9	12.3	15.3	
Vacuum	22.4	8.0	12.2	17.9	14.1	11.9	14.4	12.3	
Vacuum	24.9	10.9	15.2	20.6	16.6	14.3	17.1	13.9	
Vacuum	16.8	5.3	7.6	10.7	4.7	3.8	10.0	10.4	
Vacuum	22.5	8.0	12.2	17.9	14.1	12.2	14.9	12.8	
Vacuum	16.2	7.0	9.2	12.0	5.0	4.2	5.1	4.7	
Vacuum	21.9	7.5	11.7	17.4	13.6	11.4	14.1	12.0	
Vacuum	23.4	9.0	13.3	18.9	15.0	12.8	15.8	12.9	
Vacuum	23.9	9.6	13.9	19.5	15.5	13.3	16.1	13.2	
Vacuum	24.4	10.2	14.5	20.0	16.1	13.8	16.5	13.5	
Vacuum	22.8	8.5	12.7	18.4	14.5	12.3	14.7	12.6	
Vacuum	16.3	4.7	7.4	11.5	5.3	0.2	8.9	8.7	
Vacuum	26.5	13.2	17.4	22.6	18.3	15.8	17.3	13.7	
Vacuum	16.9	6.0	8.2	11.3	5.0	3.7	9.8	9.5	
Vacuum	17.3	6.3	8.6	11.6	5.1	3.6	11.4	8.8	
Vacuum	16.1	6.7	8.9	11.8	5.1	4.4	5.3	4.8	
Vacuum	16.8	5.6	7.9	11.0	4.9	3.8	9.8	9.8	
Vacuum	26.1	12.4	16.6	21.9	17.8	15.4	18.0	14.5	
Vacuum	21.6	6.7	10.9	16.4	12.9	11.0	15.0	12.4	
Vacuum	21.9	7.1	11.3	17.0	13.3	11.4	15.2	12.6	
Vacuum	22.2	7.5	11.7	17.5	13.7	11.8	14.9	12.7	
Vacuum	21.4	6.2	10.4	15.8	12.5	11.0	15.6	12.5	
Vacuum	25.5	11.6	15.9	21.3	17.2	14.9	17.4	14.2	
Industrial building, room 1-Transmissive area 01	37.8		22.6	32.3	33.1	30.7	29.2	20.8	
Industrial building, room 1-Transmissive area 01	11.9		0.9	9.8	6.2	-2.7	-14.0		
Industrial building, room 1-Roof 01	-6.1		-16.5	-7.6	-13.5	-25.6			
Industrial building, room 1-Facade 04	-8.9		-18.4	-10.7	-15.8	-26.6			
Industrial building, room 1-Facade 03	-13.7		-21.4	-15.4	-22.2				
Industrial building, room 1-Facade 02	-28.9			-28.9					
Industrial building, room 1-Facade 01	-11.5		-17.8	-13.5	-20.5				
Car Queue	21.8	11.0	8.5	8.5	12.3	13.5	18.0	13.1	
Car Queue	21.2	10.4	7.5	7.0	10.1	13.7	17.5	12.5	
Car Queue	24.8	13.1	10.4	10.4	16.6	17.1	20.8	15.4	
Receiver 7 FI G Lr,lim dB(A) Leq,d 34.6 dB(A) Sigma(Leq,d) 0.0 dB(A)									
Vacuum Turbine	20.7	5.1	12.4	10.6	6.6	8.6	12.7	16.2	
Vacuum	18.8	5.0	8.9	13.8	10.7	8.4	12.0	7.7	
Vacuum	19.4	4.0	7.6	12.5	11.7	10.4	13.9	10.2	
Vacuum	17.5	4.6	8.2	13.2	8.8	5.5	10.0	6.6	
Vacuum	17.5	4.8	8.4	13.4	8.5	5.0	9.8	5.6	
Vacuum	17.5	3.6	7.0	11.4	8.6	6.3	12.1	8.4	
Vacuum	18.9	5.2	9.1	14.3	10.8	8.4	11.8	7.5	

Commerce City CO

Contribution spectra - Situation 6 - IDC 60HP 50Hz Predator

Source	Sum	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	
	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	
Vacuum	18.5	4.6	8.3	13.0	10.3	8.3	12.0	8.5	
Vacuum	19.7	4.4	8.1	13.2	12.4	10.7	13.7	10.1	
Vacuum	19.5	4.2	7.8	12.9	12.0	10.6	13.7	10.2	
Vacuum	18.6	4.8	8.6	13.4	10.6	8.4	12.0	7.8	
Vacuum	18.9	5.4	9.3	14.7	10.8	8.2	11.0	6.3	
Vacuum	18.8	3.4	6.8	11.0	10.7	9.9	13.9	9.9	
Vacuum	17.4	4.2	7.8	12.4	8.9	6.0	10.3	7.5	
Vacuum	17.4	4.0	7.5	12.1	8.9	6.2	11.2	7.7	
Vacuum	17.5	3.8	7.3	11.7	8.8	6.3	11.7	7.9	
Vacuum	17.5	4.4	8.0	12.8	8.9	5.8	10.2	7.3	
Vacuum	19.0	3.6	7.0	11.3	11.0	10.1	14.1	10.2	
Vacuum	16.0	4.9	8.1	12.3	6.0	1.6	7.3	2.4	
Vacuum	16.8	5.0	8.4	13.2	7.4	3.3	8.4	4.0	
Vacuum	17.3	4.9	8.5	13.4	8.1	4.3	9.6	5.3	
Vacuum	14.3	3.9	6.3	9.7	2.6	0.4	7.5	2.4	
Vacuum	19.3	3.8	7.3	12.2	11.3	10.2	14.1	10.2	
Industrial building, room 1-Transmissive area 01	21.2		1.2	7.2	17.3	15.0	15.5	6.5	
Industrial building, room 1-Transmissive area 01	25.2		9.2	22.2	21.1	13.3	2.4	-15.5	
Industrial building, room 1-Roof 01	-14.3		-24.1	-15.7	-22.2				
Industrial building, room 1-Facade 04									
Industrial building, room 1-Facade 03	-21.5		-28.1	-23.5	-29.9				
Industrial building, room 1-Facade 02	-18.7			-19.6	-25.8				
Industrial building, room 1-Facade 01	-21.4		-26.9	-22.8					
Car Queue	22.8	12.8	10.8	11.2	15.6	15.3	17.9	11.0	
Car Queue	23.2	13.7	11.8	11.4	15.8	15.7	18.1	11.1	
Car Queue	26.8	16.7	15.1	14.4	18.7	20.0	22.0	15.7	

Commerce City CO
Assessed contribution level - Situation 6 - IDC 60HP 50Hz

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Source	Source type	Leq,d dB(A)	
Receiver 1 FI G Lr,lim dB(A) Leq,d 46.0 dB(A) Sigma(Leq,d) 0.0 dB(A)			
Vacuum Turbine	Point	11.7	
Vacuum	Point	12.7	
Vacuum	Point	27.6	
Vacuum	Point	23.5	
Vacuum	Point	23.1	
Vacuum	Point	27.1	
Vacuum	Point	12.2	
Vacuum	Point	14.3	
Vacuum	Point	15.1	
Vacuum	Point	15.8	
Vacuum	Point	13.5	
Vacuum	Point	11.7	
Vacuum	Point	29.8	
Vacuum	Point	24.4	
Vacuum	Point	25.0	
Vacuum	Point	26.4	
Vacuum	Point	24.0	
Vacuum	Point	29.1	
Vacuum	Point	13.7	
Vacuum	Point	19.9	
Vacuum	Point	22.7	
Vacuum	Point	13.1	
Vacuum	Point	28.4	
Industrial building, room 1-Transmissive area 01	Area	45.2	
Industrial building, room 1-Transmissive area 01	Area	17.3	
Industrial building, room 1-Roof 01	Area	-3.6	
Industrial building, room 1-Facade 04	Area	-0.8	
Industrial building, room 1-Facade 03	Area	-15.2	
Industrial building, room 1-Facade 02	Area	-23.3	
Industrial building, room 1-Facade 01	Area	1.0	
Car Queue	Line	25.9	
Car Queue	Line	26.2	
Car Queue	Line	27.0	
Receiver 2 FI G Lr,lim dB(A) Leq,d 47.8 dB(A) Sigma(Leq,d) 0.0 dB(A)			
Vacuum Turbine	Point	22.6	
Vacuum	Point	27.6	
Vacuum	Point	17.1	
Vacuum	Point	27.6	
Vacuum	Point	27.9	
Vacuum	Point	20.3	
Vacuum	Point	34.8	
Vacuum	Point	23.5	
Vacuum	Point	19.0	

MD Acoustics 1197 E Los Angeles Ave,Unit C 256 Simi Valley, CA 93065 USA

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Commerce City CO
Assessed contribution level - Situation 6 - IDC 60HP 50Hz

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Source	Source type	Leq,d dB(A)	
Vacuum	Point	17.9	
Vacuum	Point	24.9	
Vacuum	Point	32.8	
Vacuum	Point	14.6	
Vacuum	Point	25.1	
Vacuum	Point	22.8	
Vacuum	Point	21.4	
Vacuum	Point	29.6	
Vacuum	Point	15.1	
Vacuum	Point	28.3	
Vacuum	Point	26.9	
Vacuum	Point	27.9	
Vacuum	Point	28.6	
Vacuum	Point	16.3	
Industrial building, room 1-Transmissive area 01	Area	22.4	
Industrial building, room 1-Transmissive area 01	Area	44.2	
Industrial building, room 1-Roof 01	Area	-1.1	
Industrial building, room 1-Facade 04	Area	-20.5	
Industrial building, room 1-Facade 03	Area	-7.8	
Industrial building, room 1-Facade 02	Area	-0.2	
Industrial building, room 1-Facade 01	Area	1.8	
Car Queue	Line	29.7	
Car Queue	Line	28.5	
Car Queue	Line	42.9	
Receiver 3 Fl G Lr,lim dB(A) Leq,d 41.0 dB(A) Sigma(Leq,d) 0.0 dB(A)			
Vacuum Turbine	Point	14.7	
Vacuum	Point	23.2	
Vacuum	Point	25.5	
Vacuum	Point	22.8	
Vacuum	Point	22.0	
Vacuum	Point	28.4	
Vacuum	Point	22.6	
Vacuum	Point	24.6	
Vacuum	Point	25.5	
Vacuum	Point	26.3	
Vacuum	Point	23.8	
Vacuum	Point	21.7	
Vacuum	Point	29.6	
Vacuum	Point	24.6	
Vacuum	Point	25.7	
Vacuum	Point	26.9	
Vacuum	Point	23.6	
Vacuum	Point	28.0	
Vacuum	Point	21.1	
Vacuum	Point	21.6	

MD Acoustics 1197 E Los Angeles Ave,Unit C 256 Simi Valley, CA 93065 USA

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Commerce City CO
Assessed contribution level - Situation 6 - IDC 60HP 50Hz

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Source	Source type	Leq,d dB(A)	
Vacuum	Point	21.3	
Vacuum	Point	21.5	
Vacuum	Point	26.7	
Industrial building, room 1-Transmissive area 01	Area	36.4	
Industrial building, room 1-Transmissive area 01	Area	12.2	
Industrial building, room 1-Roof 01	Area	-11.2	
Industrial building, room 1-Facade 04	Area	-9.1	
Industrial building, room 1-Facade 03	Area	-14.4	
Industrial building, room 1-Facade 02	Area	-29.3	
Industrial building, room 1-Facade 01	Area	-17.8	
Car Queue	Line	25.1	
Car Queue	Line	25.0	
Car Queue	Line	26.6	
Receiver 4 FI G Lr,lim dB(A) Leq,d 47.6 dB(A) Sigma(Leq,d) 0.0 dB(A)			
Vacuum Turbine	Point	28.1	
Vacuum	Point	29.9	
Vacuum	Point	31.5	
Vacuum	Point	31.7	
Vacuum	Point	31.2	
Vacuum	Point	33.5	
Vacuum	Point	29.3	
Vacuum	Point	30.8	
Vacuum	Point	31.0	
Vacuum	Point	31.2	
Vacuum	Point	30.5	
Vacuum	Point	28.9	
Vacuum	Point	30.4	
Vacuum	Point	32.7	
Vacuum	Point	33.2	
Vacuum	Point	33.4	
Vacuum	Point	32.2	
Vacuum	Point	30.3	
Vacuum	Point	30.5	
Vacuum	Point	29.9	
Vacuum	Point	30.6	
Vacuum	Point	30.3	
Vacuum	Point	31.7	
Industrial building, room 1-Transmissive area 01	Area	37.7	
Industrial building, room 1-Transmissive area 01	Area	16.3	
Industrial building, room 1-Roof 01	Area	-13.2	
Industrial building, room 1-Facade 04	Area	-10.9	
Industrial building, room 1-Facade 03	Area	-16.5	
Industrial building, room 1-Facade 02	Area	-25.6	
Industrial building, room 1-Facade 01	Area	-19.7	
Car Queue	Line	37.3	

MD Acoustics 1197 E Los Angeles Ave,Unit C 256 Simi Valley, CA 93065 USA

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Commerce City CO
Assessed contribution level - Situation 6 - IDC 60HP 50Hz

9

Source	Source type	Leq,d dB(A)	
Car Queue	Line	38.0	
Car Queue	Line	39.6	
Receiver 5 Fl G Lr,lim dB(A) Leq,d 38.7 dB(A) Sigma(Leq,d) 0.0 dB(A)			
Vacuum Turbine	Point	8.5	
Vacuum	Point	9.5	
Vacuum	Point	12.2	
Vacuum	Point	13.9	
Vacuum	Point	14.5	
Vacuum	Point	22.5	
Vacuum	Point	15.3	
Vacuum	Point	10.0	
Vacuum	Point	10.3	
Vacuum	Point	10.9	
Vacuum	Point	9.8	
Vacuum	Point	16.4	
Vacuum	Point	26.0	
Vacuum	Point	13.9	
Vacuum	Point	17.3	
Vacuum	Point	22.5	
Vacuum	Point	13.9	
Vacuum	Point	24.7	
Vacuum	Point	15.2	
Vacuum	Point	15.2	
Vacuum	Point	14.5	
Vacuum	Point	11.9	
Vacuum	Point	16.1	
Industrial building, room 1-Transmissive area 01	Area	37.3	
Industrial building, room 1-Transmissive area 01	Area	17.3	
Industrial building, room 1-Roof 01	Area	-6.6	
Industrial building, room 1-Facade 04	Area	-11.5	
Industrial building, room 1-Facade 03	Area	-18.7	
Industrial building, room 1-Facade 02	Area	-23.3	
Industrial building, room 1-Facade 01	Area	-7.4	
Car Queue	Line	19.0	
Car Queue	Line	19.2	
Car Queue	Line	25.7	
Receiver 6 Fl G Lr,lim dB(A) Leq,d 40.3 dB(A) Sigma(Leq,d) 0.0 dB(A)			
Vacuum Turbine	Point	18.6	
Vacuum	Point	22.4	
Vacuum	Point	24.9	
Vacuum	Point	16.8	
Vacuum	Point	22.5	
Vacuum	Point	16.2	
Vacuum	Point	21.9	

MD Acoustics 1197 E Los Angeles Ave,Unit C 256 Simi Valley, CA 93065 USA

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Commerce City CO
Assessed contribution level - Situation 6 - IDC 60HP 50Hz

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Source	Source type	Leq,d dB(A)	
Vacuum	Point	23.4	
Vacuum	Point	23.9	
Vacuum	Point	24.4	
Vacuum	Point	22.8	
Vacuum	Point	16.3	
Vacuum	Point	26.5	
Vacuum	Point	16.9	
Vacuum	Point	17.3	
Vacuum	Point	16.1	
Vacuum	Point	16.8	
Vacuum	Point	26.1	
Vacuum	Point	21.6	
Vacuum	Point	21.9	
Vacuum	Point	22.2	
Vacuum	Point	21.4	
Vacuum	Point	25.5	
Industrial building, room 1-Transmissive area 01	Area	37.8	
Industrial building, room 1-Transmissive area 01	Area	11.9	
Industrial building, room 1-Roof 01	Area	-6.1	
Industrial building, room 1-Facade 04	Area	-8.9	
Industrial building, room 1-Facade 03	Area	-13.7	
Industrial building, room 1-Facade 02	Area	-27.9	
Industrial building, room 1-Facade 01	Area	-11.5	
Car Queue	Line	21.8	
Car Queue	Line	21.2	
Car Queue	Line	24.8	
Receiver 7 Fl G Lr,lim dB(A) Leq,d 34.6 dB(A) Sigma(Leq,d) 0.0 dB(A)			
Vacuum Turbine	Point	20.7	
Vacuum	Point	18.8	
Vacuum	Point	19.4	
Vacuum	Point	17.5	
Vacuum	Point	17.5	
Vacuum	Point	17.5	
Vacuum	Point	18.9	
Vacuum	Point	18.5	
Vacuum	Point	19.7	
Vacuum	Point	19.5	
Vacuum	Point	18.6	
Vacuum	Point	18.9	
Vacuum	Point	18.8	
Vacuum	Point	17.4	
Vacuum	Point	17.4	
Vacuum	Point	17.5	
Vacuum	Point	17.5	
Vacuum	Point	19.0	

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Commerce City CO
Assessed contribution level - Situation 6 - IDC 60HP 50Hz

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Source	Source type	Leq,d dB(A)	
Vacuum	Point	16.0	
Vacuum	Point	16.8	
Vacuum	Point	17.3	
Vacuum	Point	14.3	
Vacuum	Point	19.3	
Industrial building, room 1-Transmissive area 01	Area	21.2	
Industrial building, room 1-Transmissive area 01	Area	25.2	
Industrial building, room 1-Roof 01	Area	-14.3	
Industrial building, room 1-Facade 04	Area	-29.1	
Industrial building, room 1-Facade 03	Area	-21.5	
Industrial building, room 1-Facade 02	Area	-18.4	
Industrial building, room 1-Facade 01	Area	-20.9	
Car Queue	Line	22.8	
Car Queue	Line	23.2	
Car Queue	Line	26.8	

MD Acoustics 1197 E Los Angeles Ave,Unit C 256 Simi Valley, CA 93065 USA

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Commerce City CO

3rd octave spectra of the sources in dB(A) - Situation 6 - IDC 60HP 50Hz Predator Lined - Outdoor

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Name	I or A m,m²	Li dB(A)	Rw dB	L'w dB(A)	Lw dB(A)	25Hz dB(A)	31.5Hz dB(A)	40Hz dB(A)	50Hz dB(A)	63Hz dB(A)	80Hz dB(A)	100Hz dB(A)	125Hz dB(A)	160Hz dB(A)	200Hz dB(A)	250Hz dB(A)	315Hz dB(A)	400Hz dB(A)	500Hz dB(A)	630Hz dB(A)	800Hz dB(A)	1kHz dB(A)	1.25kHz dB(A)	1.6kHz dB(A)	2kHz dB(A)	2.5kHz dB(A)	3.15kHz dB(A)	4kHz dB(A)	5kHz dB(A)	6.3kHz dB(A)	8kHz dB(A)	10kHz dB(A)
Car Queue	43.35			62.8	79.2	52.5	35.6	41.6	57	57.5	59.5	57.6	61.5	58.5	64.5	59.6	61.5	65.5	65.6	69.5	67.6	67.5	68.5	66.6	69.5	70.6	67.5	65.6	62.6	59.6	57.5	54.5
Car Queue	44.60			62.8	79.3	52.7	35.7	41.7	57	57.7	59.7	57.7	61.7	58.6	64.6	59.7	61.7	65.7	65.7	69.7	67.7	67.7	68.7	66.7	69.7	70.7	67.7	65.7	62.7	59.7	57.7	54.6
Car Queue	87.31			62.8	82.2	55.6	38.6	44.6	60	60.6	62.6	60.6	64.6	61.5	67.5	62.6	64.6	68.6	68.6	72.6	70.6	70.6	71.6	69.6	72.6	73.6	70.6	68.6	65.6	62.6	60.6	57.6
Industrial building, room 1-Facade 01	144.00	67.4	57.0	18.3	39.8								29.6			38.4			32.4			20.0			14.1			4.7				
Industrial building, room 1-Facade 02	20.20	67.5	57.0	19.5	32.5								19.7			31.4			24.8			7.9			-7.6			-25.7				
Industrial building, room 1-Facade 03	144.00	67.4	57.0	18.3	39.8								29.6			38.3			32.4			20.0			14.1			4.7				
Industrial building, room 1-Facade 04	20.20	71.6	57.0	21.5	34.5								23.8			32.7			28.1			16.8			11.3			1.9				
Industrial building, room 1-Roof 01	262.80	68.6	57.0	19.3	43.5								32.6			42.0			36.4			23.9			17.8			8.2				
Industrial building, room 1-Transmissive area 01	9.00	72.5	0.0	72.5	82.0								64.7			76.0			77.5			75.1			73.7			67.3				
Industrial building, room 1-Transmissive area 01	9.00	67.3	0.0	67.3	76.9								60.0			73.9			73.0			65.0			53.6			38.4				
Vacuum				75.0	75.0	33.4	36.4	43.4	47	50.4	54.4	56.4	57.4	60.4	65.4	66.4	62.4	60.4	64.4	58.4	60.4	61.4	59.4	62.4	62.4	62.4	62.4	62.4	60.4	59.4	56.4	53.4
Vacuum				75.0	75.0	33.4	36.4	43.4	47	50.4	54.4	56.4	57.4	60.4	65.4	66.4	62.4	60.4	64.4	58.4	60.4	61.4	59.4	62.4	62.4	62.4	62.4	62.4	60.4	59.4	56.4	53.4
Vacuum				75.0	75.0	33.4	36.4	43.4	47	50.4	54.4	56.4	57.4	60.4	65.4	66.4	62.4	60.4	64.4	58.4	60.4	61.4	59.4	62.4	62.4	62.4	62.4	62.4	60.4	59.4	56.4	53.4
Vacuum				75.0	75.0	33.4	36.4	43.4	47	50.4	54.4	56.4	57.4	60.4	65.4	66.4	62.4	60.4	64.4	58.4	60.4	61.4	59.4	62.4	62.4	62.4	62.4	62.4	60.4	59.4	56.4	53.4
Vacuum				75.0	75.0	33.4	36.4	43.4	47	50.4	54.4	56.4	57.4	60.4	65.4	66.4	62.4	60.4	64.4	58.4	60.4	61.4	59.4	62.4	62.4	62.4	62.4	62.4	60.4	59.4	56.4	53.4
Vacuum				75.0	75.0	33.4	36.4	43.4	47	50.4	54.4	56.4	57.4	60.4	65.4	66.4	62.4	60.4	64.4	58.4	60.4	61.4	59.4	62.4	62.4	62.4	62.4	62.4	60.4	59.4	56.4	53.4
Vacuum				75.0	75.0	33.4	36.4	43.4	47	50.4	54.4	56.4	57.4	60.4	65.4	66.4	62.4	60.4	64.4	58.4	60.4	61.4	59.4	62.4	62.4	62.4	62.4	62.4	60.4	59.4	56.4	53.4
Vacuum				75.0	75.0	33.4	36.4	43.4	47	50.4	54.4	56.4	57.4	60.4	65.4	66.4	62.4	60.4	64.4	58.4	60.4	61.4	59.4	62.4	62.4	62.4	62.4	62.4	60.4	59.4	56.4	53.4
Vacuum				75.0	75.0	33.4	36.4	43.4	47	50.4	54.4	56.4	57.4	60.4	65.4	66.4	62.4	60.4	64.4	58.4	60.4	61.4	59.4	62.4	62.4	62.4	62.4	62.4	60.4	59.4	56.4	53.4
Vacuum				75.0	75.0	33.4	36.4	43.4	47	50.4	54.4	56.4	57.4	60.4	65.4	66.4	62.4	60.4	64.4	58.4	60.4	61.4	59.4	62.4	62.4	62.4	62.4	62.4	60.4	59.4	56.4	53.4

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Commerce City CO
3rd octave spectra of the sources in dB(A) - Situation 6 - IDC 60HP 50Hz Predator Lined - Outdoor

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Name	I or A m,m²	Li dB(A)	Rw dB	L'w dB(A)	Lw dB(A)	25Hz dB(A)	31.5Hz dB(A)	40Hz dB(A)	50Hz dB(A)	63Hz dB(A)	80Hz dB(A)	100Hz dB(A)	125Hz dB(A)	160Hz dB(A)	200Hz dB(A)	250Hz dB(A)	315Hz dB(A)	400Hz dB(A)	500Hz dB(A)	630Hz dB(A)	800Hz dB(A)	1kHz dB(A)	1.25kHz dB(A)	1.6kHz dB(A)	2kHz dB(A)	2.5kHz dB(A)	3.15kHz dB(A)	4kHz dB(A)	5kHz dB(A)	6.3kHz dB(A)	8kHz dB(A)	10kHz dB(A)
Vacuum				75.0	75.0	33.4	36.4	43.4	47	50.4	54.4	56.4	57.4	60.4	65.4	66.4	62.4	60.4	64.4	58.4	60.4	61.4	59.4	62.4	62.4	62.4	62.4	62.4	60.4	59.4	56.4	53.4
Vacuum				75.0	75.0	33.4	36.4	43.4	47	50.4	54.4	56.4	57.4	60.4	65.4	66.4	62.4	60.4	64.4	58.4	60.4	61.4	59.4	62.4	62.4	62.4	62.4	62.4	60.4	59.4	56.4	53.4
Vacuum				75.0	75.0	33.4	36.4	43.4	47	50.4	54.4	56.4	57.4	60.4	65.4	66.4	62.4	60.4	64.4	58.4	60.4	61.4	59.4	62.4	62.4	62.4	62.4	62.4	60.4	59.4	56.4	53.4
Vacuum				75.0	75.0	33.4	36.4	43.4	47	50.4	54.4	56.4	57.4	60.4	65.4	66.4	62.4	60.4	64.4	58.4	60.4	61.4	59.4	62.4	62.4	62.4	62.4	62.4	60.4	59.4	56.4	53.4
Vacuum				75.0	75.0	33.4	36.4	43.4	47	50.4	54.4	56.4	57.4	60.4	65.4	66.4	62.4	60.4	64.4	58.4	60.4	61.4	59.4	62.4	62.4	62.4	62.4	62.4	60.4	59.4	56.4	53.4
Vacuum				75.0	75.0	33.4	36.4	43.4	47	50.4	54.4	56.4	57.4	60.4	65.4	66.4	62.4	60.4	64.4	58.4	60.4	61.4	59.4	62.4	62.4	62.4	62.4	62.4	60.4	59.4	56.4	53.4
Vacuum				75.0	75.0	33.4	36.4	43.4	47	50.4	54.4	56.4	57.4	60.4	65.4	66.4	62.4	60.4	64.4	58.4	60.4	61.4	59.4	62.4	62.4	62.4	62.4	62.4	60.4	59.4	56.4	53.4
Vacuum				75.0	75.0	33.4	36.4	43.4	47	50.4	54.4	56.4	57.4	60.4	65.4	66.4	62.4	60.4	64.4	58.4	60.4	61.4	59.4	62.4	62.4	62.4	62.4	62.4	60.4	59.4	56.4	53.4
Vacuum				75.0	75.0	33.4	36.4	43.4	47	50.4	54.4	56.4	57.4	60.4	65.4	66.4	62.4	60.4	64.4	58.4	60.4	61.4	59.4	62.4	62.4	62.4	62.4	62.4	60.4	59.4	56.4	53.4
Vacuum				75.0	75.0	33.4	36.4	43.4	47	50.4	54.4	56.4	57.4	60.4	65.4	66.4	62.4	60.4	64.4	58.4	60.4	61.4	59.4	62.4	62.4	62.4	62.4	62.4	60.4	59.4	56.4	53.4
Vacuum				75.0	75.0	33.4	36.4	43.4	47	50.4	54.4	56.4	57.4	60.4	65.4	66.4	62.4	60.4	64.4	58.4	60.4	61.4	59.4	62.4	62.4	62.4	62.4	62.4	60.4	59.4	56.4	53.4
Vacuum				75.0	75.0	33.4	36.4	43.4	47	50.4	54.4	56.4	57.4	60.4	65.4	66.4	62.4	60.4	64.4	58.4	60.4	61.4	59.4	62.4	62.4	62.4	62.4	62.4	60.4	59.4	56.4	53.4
Vacuum Turbine				81.0	81.0				40	47.6	54.8	58.4	61.4	62.7	58.6	58.0	57.6	55.6	54.2	56.4	56.8	58.1	61.7	63.0	63.8	62.4	67.9	69.9	70.9	72.7	73.9	72.0

MD Acoustics 1197 E Los Angeles Ave,Unit C 256 Simi Valley, CA 93065 USA

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Appendix C

Reference Data

General Information:

Customer:	IDC
Customer Project:	Predator Airgate
Date Measured:	4/13/2023 - 4/25/2023
Contact MD Acoustics:	Drew Gibson
Subsidiary:	IDC
MD Acoustics Job Number:	0615-2023-003

Setup Characteristics:

Motor Size:	10	hp
Attached Equipment:	Side Column	
Mounting Position:	Horizontal	
Location:	Inside	

Impeller Data:

Airflow Direction:	V (impeller -> motor)
Design:	ZA
Nb of Blades:	9
Blade Setting:	Black Inserts
Blade Material:	Aluminum
Hub Cover:	Yes
Rotation:	CCW



Technical Data:

(Field verified by MD Acoustics subject to final measurement)

Test Frequency:	60			Hz
Silencer:	Standard Predator	Airgate Predator		
Testing Condition:	--	Airgate Open	Airgate Closed	
Airflow (Average of Outlets):	891	890	156	CFM
Velocity (Average of Outlets):	110	110	19	MPH
Amperage:	27.4	27.4	25.7	Amp.
Indoor Sound Level @ 5 feet:	87	87	88	dB LAeq

Delta Standard Predator to Airgate Predator:

Airflow/Velocity:	0%
Amperage:	0 Amp.
Indoor Sound Level @ 5 feet:	0 dB

Delta Airgate Open to Airgate Closed:

Airflow/Velocity:	82% Reduction
Amperage:	1.6 Amp. Decrease
Indoor Sound Level @ 5 feet:	1 dB Increase

Sound Power Levels:

Standard Predator:

Frequency:	63	125	250	500	1000	2000	4000	8000	Lweq	Hz
Sound Power:	74.8	76.4	87.3	91.4	87.0	83.2	76.9	64.2	94.4	dBa

Airgate Predator-Airgate Open:

Frequency:	63	125	250	500	1000	2000	4000	8000	Lweq	Hz
Sound Power:	76.2	78.2	88.6	92.5	88.1	84.4	78.1	65.3	95.5	dBa

Airgate Predator-Airgate Closed:

Frequency:	63	125	250	500	1000	2000	4000	8000	Lweq	Hz
Sound Power:	72.3	74.9	83.3	89.5	87.0	86.9	81.1	68.2	93.6	dBa

Technical Data (cont.):

(Field verified by MD Acoustics subject to final measurement)

Test Frequency:	55	Hz		
Silencer:	Standard Predator	Airgate Predator		
Testing Condition:	--	Airgate Open	Airgate Closed	
Airflow (Average of Outlets):	822	813	145	CFM
Velocity (Average of Outlets):	102	101	18	MPH
Amperage:	21.2	21.9	20.6	Amp.
Indoor Sound Level @ 5 feet:	85	85	86	dB LAeq

Delta Standard Predator to Airgate Predator:

Airflow/Velocity:	1% Reduction
Amperage:	0.7 Amp. Increase
Indoor Sound Level @ 5 feet:	0 dB

Delta Airgate Open to Airgate Closed:

Airflow/Velocity:	82% Reduction
Amperage:	1.3 Amp. Decrease
Indoor Sound Level @ 5 feet:	1 dB Decrease

Sound Power Levels:

Standard Predator:

Frequency:	63	125	250	500	1000	2000	4000	8000	Lweq	Hz
Sound Power:	75.0	75.6	86.5	89.0	84.5	80.7	76.0	63.3	92.4	dBa

Airgate Predator-Airgate Open:

Frequency:	63	125	250	500	1000	2000	4000	8000	Lweq	Hz
Sound Power:	73.9	75.7	86.7	89.7	85.1	81.7	76.5	63.3	93.0	dBa

Airgate Predator-Airgate Closed:

Frequency:	63	125	250	500	1000	2000	4000	8000	Lweq	Hz
Sound Power:	70.3	73.8	82.7	90.0	86.2	85.1	79.8	66.3	93.1	dBa

Test Frequency:	50	Hz		
Silencer:	Standard Predator	Airgate Predator		
Testing Condition:	--	Airgate Open	Airgate Closed	
Airflow (Average of Outlets):	735	738	136	CFM
Velocity (Average of Outlets):	91	91	17	MPH
Amperage:	17.9	18.0	17.2	Amp.
Indoor Sound Level @ 5 feet:	83	83	85	dB LAeq

Delta Standard Predator to Airgate Predator:

Airflow/Velocity:	0%
Amperage:	0.1 Amp. Increase
Indoor Sound Level @ 5 feet:	0 dB

Delta Airgate Open to Airgate Closed:

Airflow/Velocity:	82% Reduction
Amperage:	0.8 Amp. Decrease
Indoor Sound Level @ 5 feet:	2 dB Increase

Sound Power Levels:

Standard Predator:

Frequency:	63	125	250	500	1000	2000	4000	8000	Lweq	Hz
Sound Power:	70.7	72.9	85.2	86.2	81.4	78.0	73.9	60.5	90.0	dBa

Airgate Predator-Airgate Open:

Frequency:	63	125	250	500	1000	2000	4000	8000	Lweq	Hz
Sound Power:	72.4	74.3	85.9	87.2	82.2	79.0	74.9	61.5	90.9	dBa

Airgate Predator-Airgate Closed:

Frequency:	63	125	250	500	1000	2000	4000	8000	Lweq	Hz
Sound Power:	63.4	70.8	80.8	88.4	83.7	82.5	77.9	64.3	91.2	dBa

General Information:

Customer:	IDC
Customer Project:	Predator Airgate
Date Measured:	4/13/2023 - 4/25/2023
Contact MD Acoustics:	Drew Gibson
Subsidiary:	IDC
MD Acoustics Job Number:	0615-2023-003

Setup Characteristics:

Motor Size:	10	hp
Attached Equipment:	Hogger	
Mounting Position:	Horizontal	
Location:	Inside	

Impeller Data:

Airflow Direction:	V (impeller -> motor)
Design:	ZA
Nb of Blades:	9
Blade Setting:	Black Inserts
Blade Material:	Aluminum
Hub Cover:	Yes
Rotation:	CCW



Technical Data:

(Field verified by MD Acoustics subject to final measurement)

Test Frequency:	60			Hz
Silencer:	Standard Predator	Airgate Predator		
Testing Condition:	--	Airgate Open	Airgate Closed	
Airflow (Outlet Average):	4886	4876	767	CFM
Velocity (Outlet Average):	106	106	17	MPH
Amperage:	28.2	28.7	26.1	Amp.
Indoor Sound Level @ 5 feet:	93	93	92	dB LAeq

Delta Standard Predator to Airgate Predator:

Airflow/Velocity:	0%
Amperage:	0.5 Amp. Increase
Indoor Sound Level @ 5 feet:	0 dB

Delta Airgate Open to Airgate Closed:

Airflow/Velocity:	84% Reduction
Amperage:	2.6 Amp. Decrease
Indoor Sound Level @ 5 feet:	1 dB Decrease

Sound Power Levels:

Standard Predator:

Frequency:	63	125	250	500	1000	2000	4000	8000	Lweq	Hz
Sound Power:	75.5	81.3	92.3	95.3	90.1	85.9	79.4	66.6	98.3	dBA

Airgate Predator-Airgate Open:

Frequency:	63	125	250	500	1000	2000	4000	8000	Lweq	Hz
Sound Power:	74.4	81.8	93.0	95.8	89.8	85.5	79.2	66.4	98.7	dBA

Airgate Predator-Airgate Closed:

Frequency:	63	125	250	500	1000	2000	4000	8000	Lweq	Hz
Sound Power:	71.7	84.5	92.9	95.5	89.6	87.2	81.7	68.1	98.7	dBA

Technical Data (cont.):

(Field verified by MD Acoustics subject to final measurement)

Test Frequency:	55	Hz		
Silencer:	Standard Predator	Airgate Predator		
Testing Condition:	--	Airgate Open	Airgate Closed	
Airflow (Outlet Average):	4551	4448	751	CFM
Velocity (Outlet Average):	99	97	16	MPH
Amperage:	22.1	22.5	20.6	Amp.
Indoor Sound Level @ 5 feet:	91	91	90	dB LAeq

Delta Standard Predator to Airgate Predator:

Airflow/Velocity:	2% Reduction
Amperage:	0.4 Amp. Increase
Indoor Sound Level @ 5 feet:	0 dB

Delta Airgate Open to Airgate Closed:

Airflow/Velocity:	83% Reduction
Amperage:	1.9 Amp. Decrease
Indoor Sound Level @ 5 feet:	1 dB Decrease

Sound Power Levels:

Standard Predator:

Frequency:	63	125	250	500	1000	2000	4000	8000	Lweq	Hz
Sound Power:	72.8	80.0	92.9	92.2	87.6	83.9	77.5	64.5	96.6	dBA

Airgate Predator-Airgate Open:

Frequency:	63	125	250	500	1000	2000	4000	8000	Lweq	Hz
Sound Power:	74.9	80.9	92.6	94.3	88.3	83.7	77.9	64.7	97.5	dBA

Airgate Predator-Airgate Closed:

Frequency:	63	125	250	500	1000	2000	4000	8000	Lweq	Hz
Sound Power:	71.7	84.0	91.6	94.8	88.2	85.6	80.1	66.6	97.7	dBA

Test Frequency:	50	Hz		
Silencer:	Standard Predator	Airgate Predator		
Testing Condition:	--	Airgate Open	Airgate Closed	
Airflow (Outlet Average):	4108	4029	686	CFM
Velocity (Outlet Average):	89	88	15	MPH
Amperage:	18.5	19.0	17.4	Amp.
Indoor Sound Level @ 5 feet:	89	89	90	dB LAeq

Delta Standard Predator to Airgate Predator:

Airflow/Velocity:	2% Reduction
Amperage:	0.5 Amp. Increase
Indoor Sound Level @ 5 feet:	0 dB

Delta Airgate Open to Airgate Closed:

Airflow/Velocity:	83% Reduction
Amperage:	1.6 Amp. Decrease
Indoor Sound Level @ 5 feet:	1 dB Increase

Sound Power Levels:

Standard Predator:

Frequency:	63	125	250	500	1000	2000	4000	8000	Lweq	Hz
Sound Power:	71.0	78.1	90.3	89.7	85.0	81.6	75.3	62.2	94.1	dBA

Airgate Predator-Airgate Open:

Frequency:	63	125	250	500	1000	2000	4000	8000	Lweq	Hz
Sound Power:	72.0	78.9	91.7	91.9	85.8	81.3	76.3	62.9	95.6	dBA

Airgate Predator-Airgate Closed:

Frequency:	63	125	250	500	1000	2000	4000	8000	Lweq	Hz
Sound Power:	67.4	81.2	89.5	92.6	85.6	83.1	78.1	64.6	95.4	dBA

General Information:

Customer:	IDC
Customer Project:	Predator Airgate
Date Measured:	4/13/2023 - 4/25/2023
Contact MD Acoustics:	Drew Gibson
Subsidiary:	IDC
MD Acoustics Job Number:	0615-2023-003

Setup Characteristics:

Motor Size:	15	hp
Attached Equipment:	Side Column	
Mounting Position:	Horizontal	
Location:	Inside	

Impeller Data:

Airflow Direction:	V (impeller -> motor)
Design:	ZA
Nb of Blades:	9
Blade Setting:	Green Inserts
Blade Material:	Aluminum
Hub Cover:	Yes
Rotation:	CCW



Technical Data:

(Field verified by MD Acoustics subject to final measurement)

Test Frequency:	60			Hz
Silencer:	Standard Predator	Airgate Predator		
Testing Condition:	--	Airgate Open	Airgate Closed	
Airflow (Average of Outlets):	843	833	157	CFM
Velocity (Average of Outlets):	104	103	19	MPH
Amperage:	29	29.7	32.9	Amp.
Indoor Sound Level @ 5 feet:	88	88	92	dB LAeq

Delta Standard Predator to Airgate Predator:

Airflow/Velocity:	1% Reduction
Amperage:	0.7 Amp. Increase
Indoor Sound Level @ 5 feet:	0 dB

Delta Airgate Open to Airgate Closed:

Airflow/Velocity:	81% Reduction
Amperage:	3.2 Amp. Increase
Indoor Sound Level @ 5 feet:	4 dB Increase

Sound Power Levels:

Standard Predator:

Frequency:	63	125	250	500	1000	2000	4000	8000	Lweq	Hz
Sound Power:	69.2	73.7	85.1	88.1	85.1	82.5	75.7	63.2	91.9	dBA

Airgate Predator-Airgate Open:

Frequency:	63	125	250	500	1000	2000	4000	8000	Lweq	Hz
Sound Power:	73.2	77.2	86.4	88.4	84.5	82.7	76.3	63.9	92.4	dBA

Airgate Predator-Airgate Closed:

Frequency:	63	125	250	500	1000	2000	4000	8000	Lweq	Hz
Sound Power:	61.8	71.7	81.3	88.2	87.4	87.9	82.2	68.6	93.3	dBA

Technical Data (cont.):

(Field verified by MD Acoustics subject to final measurement)

Test Frequency:	55	Hz		
Silencer:	Standard Predator	Airgate Predator		
Testing Condition:	--	Airgate Open	Airgate Closed	
Airflow (Average of Outlets):	770	767	147	CFM
Velocity (Average of Outlets):	95	95	18	MPH
Amperage:	23.4	24.0	25.5	Amp.
Indoor Sound Level @ 5 feet:	86	86	88	dB LAeq

Delta Standard Predator to Airgate Predator:

Airflow/Velocity:	0%
Amperage:	0.6 Amp. Increase
Indoor Sound Level @ 5 feet:	0 dB

Delta Airgate Open to Airgate Closed:

Airflow/Velocity:	81% Reduction
Amperage:	1.5 Amp. Increase
Indoor Sound Level @ 5 feet:	2 dB Increase

Sound Power Levels:

Standard Predator:

Frequency:	63	125	250	500	1000	2000	4000	8000	Lweq	Hz
Sound Power:	67.2	72.3	83.7	85.6	82.4	80.2	74.0	61.7	89.7	dBA

Airgate Predator-Airgate Open:

Frequency:	63	125	250	500	1000	2000	4000	8000	Lweq	Hz
Sound Power:	73.5	76.0	85.4	86.6	82.6	81.0	75.4	62.7	90.8	dBA

Airgate Predator-Airgate Closed:

Frequency:	63	125	250	500	1000	2000	4000	8000	Lweq	Hz
Sound Power:	59.5	70.1	79.7	86.7	85.2	85.1	78.9	65.5	91.2	dBA

Test Frequency:	50	Hz		
Silencer:	Standard Predator	Airgate Predator		
Testing Condition:	--	Airgate Open	Airgate Closed	
Airflow (Average of Outlets):	702	696	135	CFM
Velocity (Average of Outlets):	87	86	17	MPH
Amperage:	20	20.2	21.3	Amp.
Indoor Sound Level @ 5 feet:	85	85	90	dB LAeq

Delta Standard Predator to Airgate Predator:

Airflow/Velocity:	1% Reduction
Amperage:	0.2 Amp. Increase
Indoor Sound Level @ 5 feet:	0 dB

Delta Airgate Open to Airgate Closed:

Airflow/Velocity:	81% Reduction
Amperage:	1.1 Amp. Increase
Indoor Sound Level @ 5 feet:	5 dB Increase

Sound Power Levels:

Standard Predator:

Frequency:	63	125	250	500	1000	2000	4000	8000	Lweq	Hz
Sound Power:	65.7	71.6	82.3	84.6	80.9	78.0	71.9	59.6	88.3	dBA

Airgate Predator-Airgate Open:

Frequency:	63	125	250	500	1000	2000	4000	8000	Lweq	Hz
Sound Power:	71.2	74.1	83.3	84.6	81.0	78.7	73.0	60.4	88.8	dBA

Airgate Predator-Airgate Closed:

Frequency:	63	125	250	500	1000	2000	4000	8000	Lweq	Hz
Sound Power:	60.8	69.3	79.8	87.8	83.8	83.2	77.8	64.2	90.8	dBA

General Information:

Customer:	IDC
Customer Project:	Predator Airgate
Date Measured:	4/13/2023 - 4/25/2023
Contact MD Acoustics:	Drew Gibson
Subsidiary:	IDC
MD Acoustics Job Number:	0615-2023-003

Setup Characteristics:

Motor Size:	15	hp
Attached Equipment:	Hogger	
Mounting Position:	Horizontal	
Location:	Inside	

Impeller Data:

Airflow Direction:	V (impeller -> motor)
Design:	ZA
Nb of Blades:	9
Blade Setting:	Green Inserts
Blade Material:	Aluminum
Hub Cover:	Yes
Rotation:	CCW



Technical Data:

(Field verified by MD Acoustics subject to final measurement)

Test Frequency:	60			Hz
Silencer:	Standard Predator	Airgate Predator		
Testing Condition:	--	Airgate Open	Airgate Closed	
Airflow (Outlet Average):	4508	4545	689	CFM
Velocity (Outlet Average):	98	99	15	MPH
Amperage:	30.4	30.5	32.2	Amp.
Indoor Sound Level @ 5 feet:	94	95	95	dB LAeq

Delta Standard Predator to Airgate Predator:

Airflow/Velocity:	1% Increase
Amperage:	0.1 Amp. Increase
Indoor Sound Level @ 5 feet:	1 dB Increase

Delta Airgate Open to Airgate Closed:

Airflow/Velocity:	85% Reduction
Amperage:	1.7 Amp. Decrease
Indoor Sound Level @ 5 feet:	0 dB

Sound Power Levels:

Standard Predator:

Frequency:	63	125	250	500	1000	2000	4000	8000	Lweq	Hz
Sound Power:	75.5	83.1	96.0	95.3	90.2	86.4	79.5	66.9	99.6	dBA

Airgate Predator-Airgate Open:

Frequency:	63	125	250	500	1000	2000	4000	8000	Lweq	Hz
Sound Power:	73.7	80.8	93.5	92.9	87.8	84.6	77.9	65.5	97.2	dBA

Airgate Predator-Airgate Closed:

Frequency:	63	125	250	500	1000	2000	4000	8000	Lweq	Hz
Sound Power:	66.0	79.5	90.6	92.0	89.2	87.6	81.9	68.4	96.5	dBA

Technical Data (cont.):

(Field verified by MD Acoustics subject to final measurement)

Test Frequency:	55	Hz		
Silencer:	Standard Predator	Airgate Predator		
Testing Condition:	--	Airgate Open	Airgate Closed	
Airflow (Outlet Average):	4168	4124	703	CFM
Velocity (Outlet Average):	91	90	15	MPH
Amperage:	23.9	24.5	25.3	Amp.
Indoor Sound Level @ 5 feet:	92	93	94	dB LAeq

Delta Standard Predator to Airgate Predator:

Airflow/Velocity:	1% Reduction
Amperage:	0.6 Amp. Increase
Indoor Sound Level @ 5 feet:	1 dB Increase

Delta Airgate Open to Airgate Closed:

Airflow/Velocity:	83% Reduction
Amperage:	0.8 Amp. Increase
Indoor Sound Level @ 5 feet:	1 dB Increase

Sound Power Levels:

Standard Predator:

Frequency:	63	125	250	500	1000	2000	4000	8000	Lweq	Hz
Sound Power:	72.8	80.0	92.9	92.2	87.6	83.9	77.5	64.5	96.6	dBA

Airgate Predator-Airgate Open:

Frequency:	63	125	250	500	1000	2000	4000	8000	Lweq	Hz
Sound Power:	70.6	79.0	92.2	90.8	85.5	82.2	75.8	63.6	95.4	dBA

Airgate Predator-Airgate Closed:

Frequency:	63	125	250	500	1000	2000	4000	8000	Lweq	Hz
Sound Power:	65.4	77.7	88.7	90.3	87.4	85.5	79.7	66.2	94.6	dBA

Test Frequency:	50	Hz		
Silencer:	Standard Predator	Airgate Predator		
Testing Condition:	--	Airgate Open	Airgate Closed	
Airflow (Outlet Average):	3792	3745	639	CFM
Velocity (Outlet Average):	83	82	14	MPH
Amperage:	20.1	20.6	21.3	Amp.
Indoor Sound Level @ 5 feet:	89	89	92	dB LAeq

Delta Standard Predator to Airgate Predator:

Airflow/Velocity:	1% Reduction
Amperage:	0.5 Amp. Increase
Indoor Sound Level @ 5 feet:	0 dB

Delta Airgate Open to Airgate Closed:

Airflow/Velocity:	83% Reduction
Amperage:	0.7 Amp. Decrease
Indoor Sound Level @ 5 feet:	3 dB Increase

Sound Power Levels:

Standard Predator:

Frequency:	63	125	250	500	1000	2000	4000	8000	Lweq	Hz
Sound Power:	71.0	78.1	90.3	89.7	85.0	81.6	75.3	62.2	94.1	dBA

Airgate Predator-Airgate Open:

Frequency:	63	125	250	500	1000	2000	4000	8000	Lweq	Hz
Sound Power:	70.7	76.4	88.1	87.2	82.6	79.8	74.1	61.0	91.9	dBA

Airgate Predator-Airgate Closed:

Frequency:	63	125	250	500	1000	2000	4000	8000	Lweq	Hz
Sound Power:	63.4	76.2	86.8	89.6	85.3	82.9	77.4	63.8	93.1	dBA



SOUND LEVEL METER READINGS

MODEL: FT-DD-T340HP4 (40hp VACSTAR TURBINE VACUUM PRODUCER)

READING ONE: 73 DB-A, 3 FEET FROM TURBINE @ 45° ANGLE
AND NO BACKGROUND NOISE OR OUTSIDE INTERFERENCE.

READING TWO: 69 DB-A, 10 FEET FROM TURBINE @ 45° ANGLE
AND NO BACKGROUND NOISE OR OUTSIDE INTERFERENCE.

READING THREE: 54 DB-A, 20 FEET FROM TURBINE @ 45° ANGLE
AND NO BACKGROUND NOISE OR OUTSIDE INTERFERENCE.

READING FOUR: 38 DB-A, 30 FEET FROM TURBINE @ 45° ANGLE
AND NO BACKGROUND NOISE OR OUTSIDE INTERFERENCE.

NOTE: THESE READINGS WERE TAKEN OUTSIDE IN THE OPEN ON A CONCRETE SLAB.

SOUND LEVEL METER USED:

SIMPSON MODEL #40003 – MSHA APPROVED.
MEETS OSHA & WALSH-HEALY REQUIREMENTS FOR NOISE CONTROL.
CONFORMS TO ANSI S1.4-1983, IEC 651 SPECS FOR METER TYPE.

Vacutech
1350 Hi-Tech Drive, Sheridan WY, 82801
PHONE: (800) 917-9444 FAX: (303) 675-1988
EMAIL: info@vacutechllc
WEB SITE: vacutechllc.com

Project:	SuperStar Car Wash Chula Vista
Site Location:	1555 W Warner Rd, Gilbert, AZ 85233
Date:	4/5/2018
Field Tech/Engineer:	Robert Pearson
Source/System:	Vacutec System

Location: Vac Bay 1
Sound Meter: NTi XL2 **SN:** A2A-05967-E0
Settings: A-weighted, slow, 1-sec, 10-sec duration
Meteorological Cond.: 80 degrees F, 2 mph wind

Site Observations:

Clear sky, measurements were performed within 1.5ft of source. Measurements were performed while the vacuum was positioned at three (3) different positions. Holstered, unholstered and inside a car. This data is utilized for acoustic modeling purposes and represents an average sound level at a vacuum station.

Table 1: Summary Measurement Data

Source	System	Overall dB(A)	3rd Octave Band Data (dBA)																														
			20	25	31.5	40	50	63	80	100	125	160	200	250	315	400	500	630	800	1K	1.25K	1.6K	2K	2.5K	3.15K	4K	5K	6.3K	8K	10K	12.5K	16K	20K
Vacutech (Holstered)	Vacuum	63.3	9	17	22	29	31	35	40	41	44	43	46	48	47	49	51	51	52	53	52	52	50	52	53	50	47	47	48	45	39	30	
Vacutech (Unholstered)	Vacuum	80.7	6	19	22	28	34	37	40	43	47	46	48	48	48	49	54	55	58	58	62	65	68	70	74	75	73	69	67	65	63	60	55
Vacutech (Inside Car)	Vacuum	69.6	16	28	31	38	42	45	49	51	52	55	60	61	57	55	59	53	55	56	54	57	57	57	57	55	54	51	48	46	42	36	
Average Level*	Vacuum	76.3	13	24	28	34	38	41	45	47	49	51	56	57	53	52	56	54	56	56	59	61	64	66	69	70	68	64	62	60	58	55	50

* Refers to the logarithmic average of all measurements. This measurement represents an average of the multiple vacuum positions.

Figure 1: Example Measurement Position

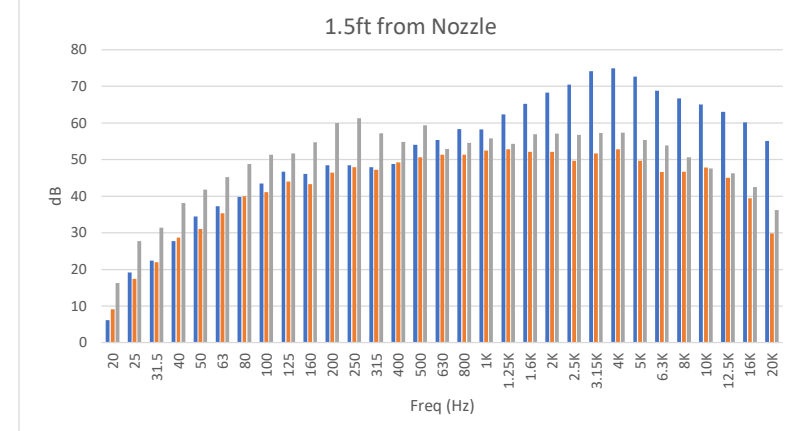
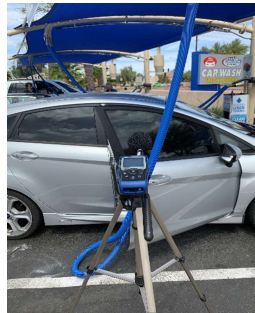
Figure 1: Holstered



Figure 2: Unholstered



Figure 3: Inside Car



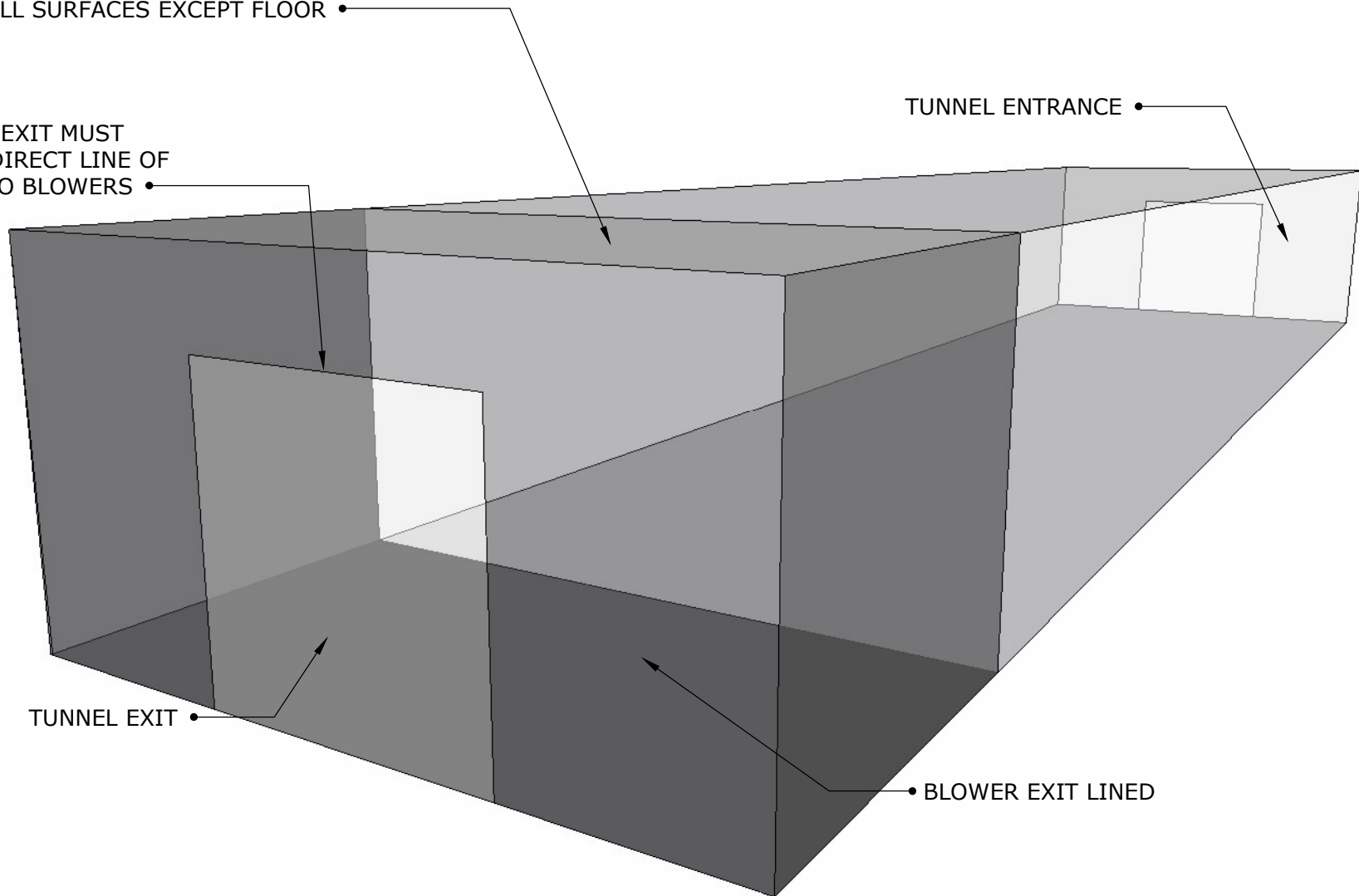
LINE EXIT INTERIOR SECTION
OF BLOWER ROOM W/ 2" THICK ACOUSTIC
MATERIAL W/ NRC 1.0 OR EQUIVALENT.
LINER NEEDS TO BE ADDED
TO ALL SURFACES EXCEPT FLOOR

TUNNEL EXIT MUST
BLOCK DIRECT LINE OF
SIGHT TO BLOWERS

TUNNEL ENTRANCE

TUNNEL EXIT

BLOWER EXIT LINED



Appendix I

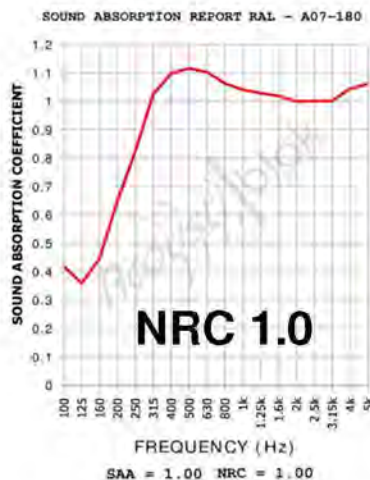


MADE IN
USA



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sales@acoustiblok.com

Industrial Model All Weather Sound Panel™ (Pat. Pend) Technical Data



Acoustiblok All Weather Sound Panels™ achieve high STC and NRC ratings. They have been specifically designed to withstand outdoor exposure in full sunlight, extreme weather conditions, and harsh industrial environments. (NRC of 1.0 is the highest sound absorption rating possible)

All Weather Sound Panels include an internal layer of U.L. classified Acoustiblok sound isolation material plus a specifically engineered 2" thick weather proof sound absorbing material.

Specifications:		
NRC (Noise Reduction Coefficient):	1.00 *	Gross dimensions: up to 48" x 120" x 2.423", $\pm 0.125"$ custom sizes available on special order.
STC (Sound Transmission Class):	29 *	Frame construction: 0.125" welded corrosion resistant 6063-T5 aluminum, mill finish, eyelets: 0.375" (18 ea.)
Weight: (8' panel)	104 lbs	Front face: 0.040 corrosion resistant 5052-H32 aluminum alloy, 3/32" round holes staggered on 5/32" centers.
UL Std 723 fire resistance: Flame spread 0, smoke developed 0.		Back face: 0.032 corrosion resistant 5052-H32 aluminum alloy, mill finish.
UV tolerant, animal resistant, washable, does not support mold growth.		

* Independent Testing by accredited NVLAP testing facility in compliance with ASTM E90, E 413, and other applicable industry standards.

Subject to change without notice, contact Acoustiblok for details.

Product Name

QuietFiber® Hydrophobic Noise Absorption Material – QF2

For Manufacturer Info:

Contact:

Acoustiblok, Inc.
6900 Interbay Boulevard
Tampa, FL 33616
Call - (813) 980-1400
Fax - (813)849-6347
Email - sales@acoustiblok.com
www.acoustiblok.com

Product Description

Basic Use

QuietFiber hydrophobic noise absorption material is an easily installed solution to many noise problems. It is engineered specifically for maximum noise absorption and is used extensively for industrial and commercial applications and is now being successfully introduced into non-industrial environments where reverberant sound and echo is a problem.

QuietFiber® QF2

QuietFiber is rated at the highest noise reduction level – NRC 1.00. Areas of high noise levels including sound reverberation can be resolved easily and economically by introducing QuietFiber into as much of the area as possible. The amount of noise reduction in highly reflective rooms will be directly relative to how much of the QuietFiber material can be installed into the room.

Unlike other fibrous materials which do not have the same high NRC ratings, QuietFiber is hydrophobic, meaning it will not absorb nor combine with water. Marine noise reduction applications are endless.



QuietFiber® QF2

- Highest noise absorption rating of NRC 1.00
- Non Silica
- Virtually fireproof – Class A fire rating
 - o 0 Smoke + 0 Flame Development
- Hydrophobic – will not combine with water
- Will not support mold or mildew growth
- Available in plain, black or white face
- Full outdoor weather and U.V. tolerant
- Significant sound benefit v. fiberglass
- Install on top of acoustical ceiling tiles
- High temperature capable
- Comprised of up to 90% recycled material
- 100% recyclable

Product Name

QuietFiber® Hydrophobic Noise Absorption Material – QF2

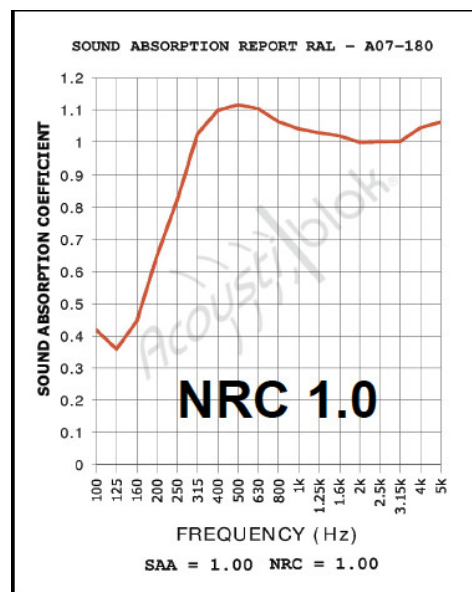
NRC 1.0 Rated	125hz	250hz	500hz	1000hz	2000hz	4000hz
	0.36	0.79	1.15	1.04	1.01	1.04

Technical Data:

- ASTM C 423 – NRC 1.00
- ASTM E 84 – Class 1, 0 Flame 0 Smoke
- ASTM C 518 – R 4.2 per inch
- ASTM C 518 – 0.24 @ 75°F (24°C)

Standards Compliance:

- ASTM C 665 Non-Corrosive Type I
- ASTM C 612 1A, 1B, II, III
- ASTM E 136 Rated Non-combustible per NFPA Standard 220
- ASTM C 1104 Absorption less than 1% by volume
- ASTM C 356 Linear shrinkage <2% @ 1200°F (650°C)



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