

MEMORANDUM

DATE: July 23, 2025

To: Jeff Fazio, Fazio Consulting, LLC

FROM: Jason Lui, Associate/Senior Noise Specialist

SUBJECT: Operational Noise Analysis for the Conklin Car Wash Project at 14145 South Military Trail in Delray Beach, Florida

INTRODUCTION

This operational noise analysis has been prepared to evaluate the potential noise impacts and noise reduction measures associated with the proposed Conklin Car Wash Project (project) at 14145 South Military Trail in Delray Beach, Florida. This memorandum is intended to satisfy the requirements of the City of Delray Beach (City) for a project-specific operational noise impact analysis by examining the impacts from the proposed uses on the project site and evaluating the noise reduction measures the project requires.

PROJECT LOCATION

The proposed project is located at 14145 South Military Trail in Delray Beach, Florida, at the southwest corner of Conklin Drive and South Military Trail. The project location and vicinity are shown in Figure 1 (all figures are provided in Attachment A).

PROJECT DESCRIPTION

The proposed project would construct a car wash with 19 parking spaces with vacuums on a 43,109-square-foot (sf) site. The proposed car wash building would be 4,237 sf and would include up to 10 Sonny's Car Wash 15-horsepower (hp) dryer blowers with silencers. In addition, the project would include two Sonny's Car Wash 30 hp vacuum producers and an air system blower surrounded by a 6-foot-high block wall. Also, the project would include an 8-foot-high block wall along the southern and western project boundary, 8-foot-high block walls just north and south of the car wash tunnel exit, a 6-foot-high wall at the car wash tunnel exit near the eastern project boundary, and a 4-foot-high block wall along the northern project boundary. The proposed project would operate daily from 7:00 a.m. to 9:00 p.m. The project site is currently vacant. Figure 2 shows the project site plan.

REGULATORY SETTING

Local Regulations

City of Delray Beach

Municipal Code. Section 99.03(A)(7) of the City's Municipal Code limits noise generated from mechanical equipment (e.g., pumps, motors, fans, compressors, powered tools or similar devices, air conditioning or air-handling systems, and cooling towers) to 60 A-weighted decibels (dBA) when measured at any point on neighboring property line.

EXISTING SETTING

Overview of the Existing Noise Environment

Transportation facilities are the primary existing noise sources in the project area. Traffic noise in the project area includes South Military Trail, Conklin Drive, and other local roadways in the project vicinity. Also, activities from the tire shop north of the project site contribute to the noise environment in the project area.

Land Uses in the Project Vicinity

Land uses surrounding the project site include commercial uses to the north, single-family residences to the northwest and west, and multifamily residences to the south and east.

Ambient Noise Measurements

Four long-term (24-hour) noise level measurements were conducted from April 1 to April 2, 2025, using Larson Davis Spark 706RC dosimeters to document the existing noise environment within the project area. Table A summarizes the results of the long-term noise level measurements along with a description of the measurement locations and noise sources that occurred during the measurements. As shown in Table H, the daytime noise levels ranged from 52.6 to 69.5 dBA equivalent continuous sound level (L_{eq}) and nighttime average noise levels ranged from 47.4 to 67.4 dBA L_{eq} . The lowest ambient noise level during the project's hours of operation (7:00 a.m. to 9:00 p.m.) ranged from 52.6 to 67.0 dBA L_{eq} . The long-term noise level measurement survey sheets, along with the hourly L_{eq} , L_{max} , and L_{min} results, are provided in Attachment B. Figure 3 shows the long-term monitoring locations.

Table A: Long-Term Ambient Noise Monitoring Results

Monitoring No.	Location	Noise Level (dBA L _{eq})		Noise Source
		Daytime ¹	Nighttime ²	
LT-1	14115 South Military Trail, Delray Beach, Florida. Southern edge of property, on a tree. Approximately 155 ft from Military Trail centerline.	64.0–69.1 (65.4) ¹	53.2–67.2	Traffic on Military Trail and noise from parking lot and body shop activities.
LT-2	5260 Northwest 3rd Street, Delray Beach, Florida. Near the northwest corner of the building, on a palm tree. Approximately 120 ft from Military Trail centerline.	65.9–69.5 (67.0) ¹	54.2–67.4	Traffic on Military Trail, occasional vehicles on Conklin Drive, and birds chirping.
LT-3	5020 North La Sedona Circle, Delray, Florida. Northeast corner of the property, on a palm tree.	57.2–62.0 (58.2) ¹	51.3–59.4	Traffic on Military Trail and occasional vehicles on La Sedona Circle.
LT-4	5098 Conklin Drive, Delray Beach, Florida. Southeast corner of the property, on a utility pole.	52.6–56.1 (52.6) ¹	47.4–53.7	Traffic on Military Trail and occasional vehicles on La Sedona Circle.

Source: Compiled by LSA (2025).

Note: The long-term (24-hour) noise level measurements were conducted from April 1 to April 2, 2025.

¹ Daytime hours are from 7:00 a.m. to 10:00 p.m.

² Nighttime hours are from 10:00 p.m. to 7:00 a.m.

³ Lowest ambient noise level between 7:00 a.m. and 9:00 p.m. (project's hours of operation).

dBA = A-weighted decibels

L_{eq} = equivalent continuous sound level

ft = foot/feet

OPERATIONAL NOISE ANALYSIS

Mobile Noise (Traffic)

The project is estimated to generate 166 daily trips based on the 14145 South Military Trail Concurrency Traffic Statement.¹ The existing ADT volume on South Military Trail used to access the project site would be higher than 166 based on the existing uses along this roadway and project-related traffic would not increase noise levels by 3 dBA. A noise level increase of less than 3 dBA would not be perceptible to the human ear in an outdoor environment. Therefore, traffic noise from project-related traffic on off-site sensitive receptors would not be perceptible to the human ear in an outdoor environment.

Stationary Noise (Car Wash Operations)

Below is a discussion of each stationary noise source from the proposed car wash operations and their reference noise levels.

¹ PTC Transportation Consultants. 2024. *14145 S. Military Trail - #PTC24-095 Concurrency Traffic Statement*. October 29.

Sonny's Car Wash Dryer Blowers

The proposed project would include up to 10 Sonny's Car Wash 15 hp dryer blowers with silencers. Measured reference noise levels of 11 Sonny's Car Wash 15 hp dryer blowers were conducted by LSA for the Mr. Car Wash at 8501 Springbrook Drive in Coon Rapids, Minnesota, which are provided in Attachment C. The car wash tunnel exit reference noise level of 86.6 dBA at 25 feet from the exit door without silencers was adjusted down to 86.2 dBA to account for one less blower, from 11 to 10 blowers. Also, the car wash tunnel entrance reference noise level of 79.7 dBA at 25 feet from the entrance door without silencers was adjusted down to 79.3 dBA to account for one less blower, from 11 to 10 blowers. Installing silencers would provide an additional average reduction of 4.1 dBA and 1.2 dBA at the car wash tunnel exit and entrance, respectively, based on measured reference noise levels of Sonny's Car Wash dryer blowers conducted by WSP for the Prestige Car Wash at 4921 North University Drive in Lauderhill, Florida, which is provided in Attachment D.

Vacuum Stations

As mentioned above, the proposed project would include 19 vacuum stations. Reference noise levels for the vacuum stations were obtained from noise measurements conducted by MD Acoustics for Quick Quack Car Wash at 1555 West Warner Road in Gilbert, Arizona, which is provided in Attachment E. The measured noise level of one unholstered vacuum was 81 dBA at 1.5 feet. The project would have a total of 38 vacuum hoses for 19 vacuum stations (one vacuum hose on each side of the vehicle). The analysis assumed 19 unholstered vacuum hoses in operation.

Vacuum Producers and Air System Blower

The proposed project would include two 30 hp vacuum producers and one 15 hp air system blower. One vacuum producer would be located in a fully enclosed room within the building south of the car wash tunnel. Noise levels generated from this vacuum producer were not modeled in SoundPLAN because exterior noise would be minimal to negligible due to noise attenuation from the building. The second vacuum producer and the air system blower would be surrounded by a 6-foot-high block wall near the entrance of the car wash tunnel. The reference noise levels for the vacuum producer and air system blower were obtained from the AutoVac Industrial Vacuum & Air Systems Equipment Decibel Certification, which is provided in Attachment F. The reference noise level for one 30 hp vacuum producer is 74 dBA at 15 feet. The reference noise level for one 15 hp air system blower is 72 dBA at 15 feet.

Operational Noise Analysis Summary

SoundPLAN was used to calculate operational noise levels at receptors adjacent to the project site. Table B shows the calculated operational noise levels using SoundPLAN. As shown in Table B, noise levels at all 11 receptors (Receptor Nos. R-1 through R-9b) would not exceed the City's exterior noise standard of 60 dBA L_{eq} . The SoundPLAN printout is provided in Attachment G. In addition, the SoundPLAN printout in Attachment G shows that the 60 dBA L_{eq} noise contour line does not cross the property line of adjacent land uses surrounding the project site.

Table B: Car Wash Operational Noise Levels

Receptor No.	Operational Noise Level (dBA L_{eq})	Noise Standard (dBA L_{eq})	Exceed?
R-1	53.4	60	No
R-2	54.3	60	No
R-3	54.8	60	No
R-4	57.2	60	No
R-5	54.4	60	No
R-5b	59.4	60	No
R-6	54.2	60	No
R-7	55.4	60	No
R-8	54.6	60	No
R-9	54.7	60	No
R-9b	56.4	60	No

Source: Compiled by LSA (2025).

dBA = A-weighted decibels

L_{eq} = equivalent continuous sound level

Attachments: A: Figures
 B: Noise Survey Sheets
 C: Car Wash Dryer Blower Reference Noise Level
 D: Car Wash With Silencers Reference Noise Level
 E: Vacuum Reference Noise Level
 F: Vacuum Producer and Air System Blower Reference Noise Level
 G: SoundPLAN Operational Noise Level Exhibit

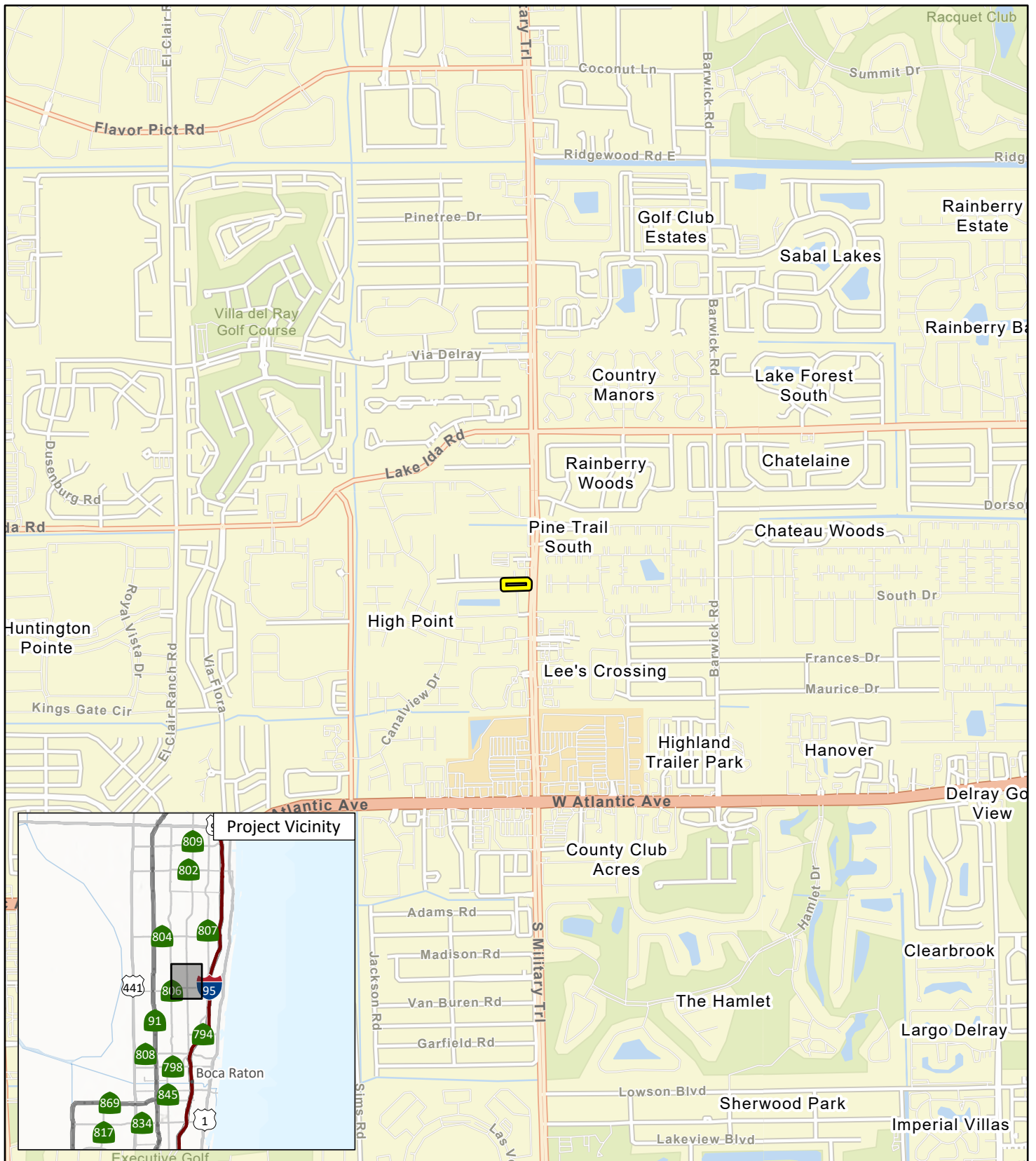
ATTACHMENT A

FIGURES

Figure 1: Project Location

Figure 2: Site Plan

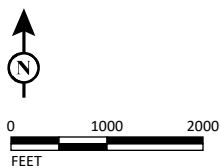
Figure 3: Noise Monitoring Locations



LSA

 Project Location

FIGURE 1



SOURCE: Esri Streets (2025)

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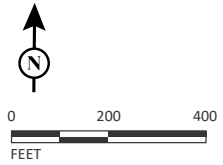
Conklin Car Wash Project
Project Location

Conklin Car Wash Project
Site Plan



LSA

- LEGEND
- Project Site Boundary
 - LT-1 Long-term Noise Monitoring Location



SOURCE: Google Earth 2025
I:\2024\20242069\G\Noise_Locs.ai (4/4/2025)

FIGURE 3

Conklin Car Wash Project
Noise Monitoring Locations

ATTACHMENT B

NOISE SURVEY SHEETS

Noise Measurement Survey – 24 HR

Project Number: 20242069

Test Personnel: Corey Knips

Project Name: Conklin Car Wash

Equipment: LD Spark 706RC (SN: 17814)

Site Number: LT-1 Start Date: 4/1/2025 Time: From 10:00 a.m. To 10:00 a.m.

Site Location: Tire Kingdom, 14115 South Military Trail, Delray Beach, FL. On a tree on the south edge of the property, approximately 155 ft from South Military Trail centerline. North of the project site across Conklin Drive.

Primary Noise Sources: Traffic on South Military Trail, occasional vehicles on Conklin Drive, and activity at the body shop and the parking lot.

Comments: _____

Photo:



Long-Term (24-Hour) Noise Level Measurement Results at LT-1

Start Time	Date	Noise Level (dBA)		
		L _{eq}	L _{max}	L _{min}
10:00 AM	4/1/2025	67.4	83.6	56.3
11:00 AM	4/1/2025	67.2	78.1	53.2
12:00 PM	4/1/2025	66.8	74.5	53.8
1:00 PM	4/1/2025	67.0	78.6	54.1
2:00 PM	4/1/2025	67.2	82.3	53.0
3:00 PM	4/1/2025	67.2	84.3	54.2
4:00 PM	4/1/2025	67.4	80.4	51.1
5:00 PM	4/1/2025	68.0	88.5	51.0
6:00 PM	4/1/2025	67.1	76.3	51.4
7:00 PM	4/1/2025	65.9	81.7	48.5
8:00 PM	4/1/2025	65.4	81.5	48.6
9:00 PM	4/1/2025	64.0	75.4	46.7
10:00 PM	4/1/2025	62.7	75.4	46.0
11:00 PM	4/1/2025	60.3	80.9	44.4
12:00 AM	4/2/2025	57.4	69.8	43.4
1:00 AM	4/2/2025	54.9	68.7	43.6
2:00 AM	4/2/2025	53.2	68.7	43.3
3:00 AM	4/2/2025	53.9	70.0	43.6
4:00 AM	4/2/2025	58.3	71.5	43.5
5:00 AM	4/2/2025	62.2	75.2	44.4
6:00 AM	4/2/2025	67.2	89.7	47.3
7:00 AM	4/2/2025	68.8	82.5	50.0
8:00 AM	4/2/2025	69.1	82.5	54.3
9:00 AM	4/2/2025	68.7	89.1	52.8

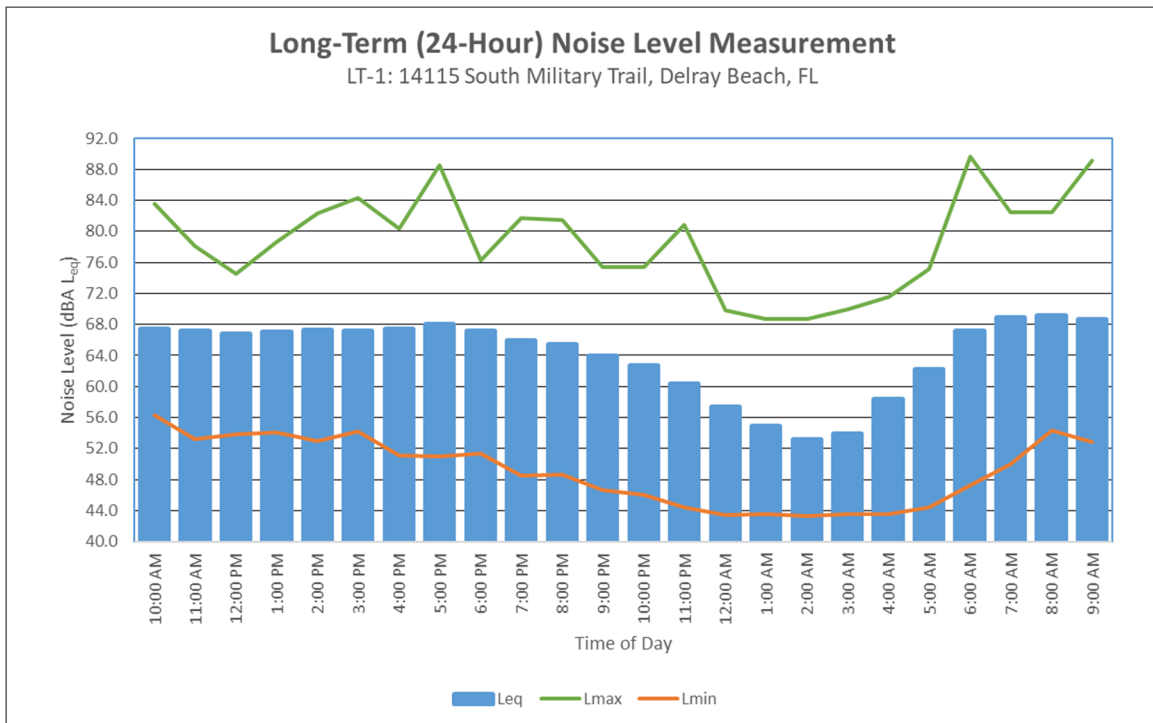
Source: Compiled by LSA Associates, Inc. (2025).

dBA = A-weighted decibel

L_{eq} = equivalent continuous sound level

L_{max} = maximum instantaneous noise level

L_{min} = minimum measured sound level



Noise Measurement Survey – 24 HR

Project Number: 20242069

Project Name: Conklin Car Wash

Test Personnel: Corey Knips

Equipment: LD Spark 706RC (SN: 17206)

Site Number: LT-2 Start Date: 4/1/2025 Time: From 10:00 a.m. To 10:00 a.m.

Site Location: 5260 NW 3rd Street, Delray Beach, FL. On a palm tree near the northwest corner of the building and approximately 120 feet from the Military Trail centerline. East of the project site across South Military Trail.

Primary Noise Sources: Traffic on South Military Trail and bird noise.

Comments: _____

Photo:



Long-Term (24-Hour) Noise Level Measurement Results at LT-2

Start Time	Date	Noise Level (dBA)		
		L _{eq}	L _{max}	L _{min}
10:00 AM	4/1/2025	68.1	76.2	51.3
11:00 AM	4/1/2025	68.4	78.0	47.5
12:00 PM	4/1/2025	67.9	77.0	49.2
1:00 PM	4/1/2025	68.1	79.9	50.9
2:00 PM	4/1/2025	68.2	86.6	50.5
3:00 PM	4/1/2025	68.6	87.9	48.6
4:00 PM	4/1/2025	68.9	81.9	45.1
5:00 PM	4/1/2025	69.4	85.1	49.0
6:00 PM	4/1/2025	68.8	83.5	50.7
7:00 PM	4/1/2025	67.4	76.9	47.7
8:00 PM	4/1/2025	67.0	79.9	47.0
9:00 PM	4/1/2025	65.9	83.6	44.6
10:00 PM	4/1/2025	64.5	77.6	44.8
11:00 PM	4/1/2025	61.9	81.4	42.1
12:00 AM	4/2/2025	59.0	72.5	40.4
1:00 AM	4/2/2025	56.3	70.4	39.2
2:00 AM	4/2/2025	54.2	71.6	39.1
3:00 AM	4/2/2025	54.7	70.0	38.9
4:00 AM	4/2/2025	58.9	73.1	39.4
5:00 AM	4/2/2025	62.7	73.8	40.4
6:00 AM	4/2/2025	67.4	89.1	46.0
7:00 AM	4/2/2025	69.5	79.9	47.4
8:00 AM	4/2/2025	69.5	79.1	51.5
9:00 AM	4/2/2025	68.3	82.1	46.7

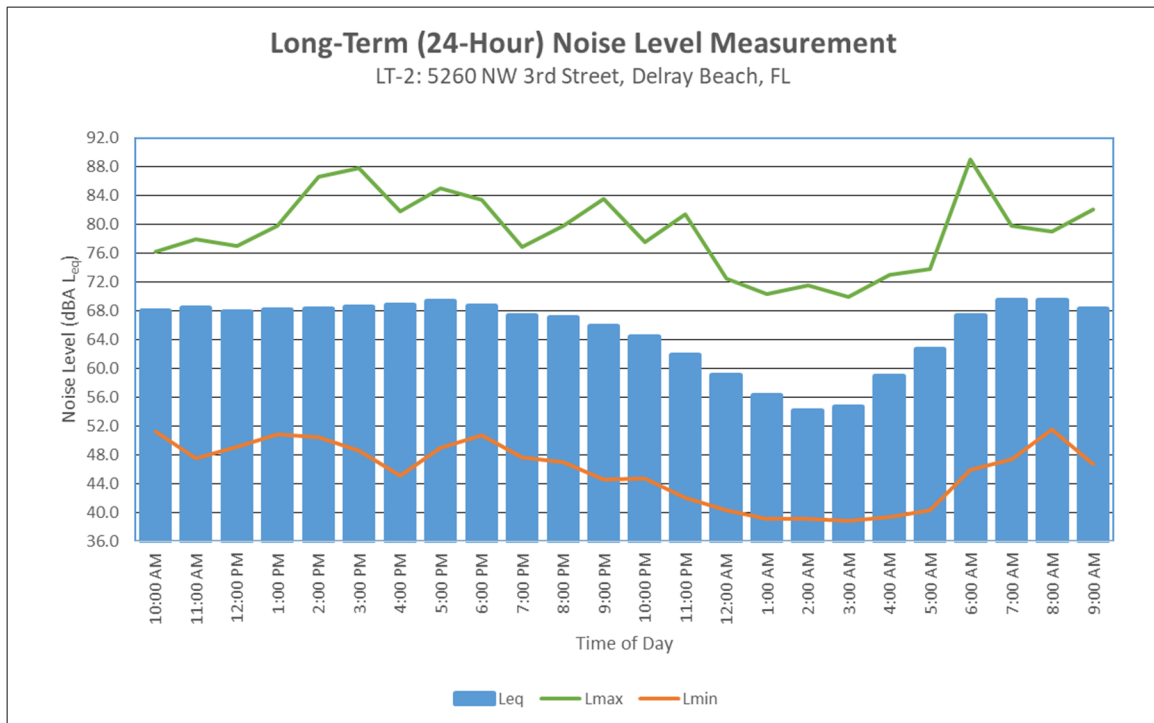
Source: Compiled by LSA Associates, Inc. (2025).

dBA = A-weighted decibel

L_{eq} = equivalent continuous sound level

L_{max} = maximum instantaneous noise level

L_{min} = minimum measured sound level



Noise Measurement Survey – 24 HR

Project Number: 20242069

Test Personnel: Corey Knips

Project Name: Conklin Car Wash

Equipment: LD Spark 706RC (SN: 17637)

Site Number: LT-3 Start Date: 4/1/2025 Time: From 10:00 a.m. To 10:00 a.m.

Site Location: 5020 North La Sedona Circle, Delray, FL on a palm tree near the northeast corner of the property. Approximately 195 feet from the Military Trail centerline. South of the project site.

Primary Noise Sources: Traffic on South Military Trail and occasional vehicles on La Sedona Circle.

Comments: _____

Photo:



Long-Term (24-Hour) Noise Level Measurement Results at LT-3

Start Time	Date	Noise Level (dBA)		
		L_{eq}	L_{max}	L_{min}
10:00 AM	4/1/2025	58.8	72.2	47.7
11:00 AM	4/1/2025	59.4	76.7	47.7
12:00 PM	4/1/2025	59.4	70.9	49.8
1:00 PM	4/1/2025	59.5	70.8	50.3
2:00 PM	4/1/2025	59.6	72.9	47.6
3:00 PM	4/1/2025	59.5	74.8	49.3
4:00 PM	4/1/2025	60.6	71.8	46.6
5:00 PM	4/1/2025	60.6	73.3	48.6
6:00 PM	4/1/2025	59.7	70.4	48.1
7:00 PM	4/1/2025	58.7	73.5	46.5
8:00 PM	4/1/2025	58.2	71.3	46.6
9:00 PM	4/1/2025	57.2	74.4	48.8
10:00 PM	4/1/2025	56.2	67.5	49.1
11:00 PM	4/1/2025	54.6	72.2	48.9
12:00 AM	4/2/2025	53.1	60.4	48.6
1:00 AM	4/2/2025	52.0	60.1	48.1
2:00 AM	4/2/2025	51.3	62.0	47.7
3:00 AM	4/2/2025	51.4	63.4	47.6
4:00 AM	4/2/2025	53.3	63.6	48.2
5:00 AM	4/2/2025	55.8	66.1	48.2
6:00 AM	4/2/2025	59.4	79.0	47.5
7:00 AM	4/2/2025	61.4	72.9	48.4
8:00 AM	4/2/2025	62.0	78.4	49.1
9:00 AM	4/2/2025	61.3	76.2	48.6

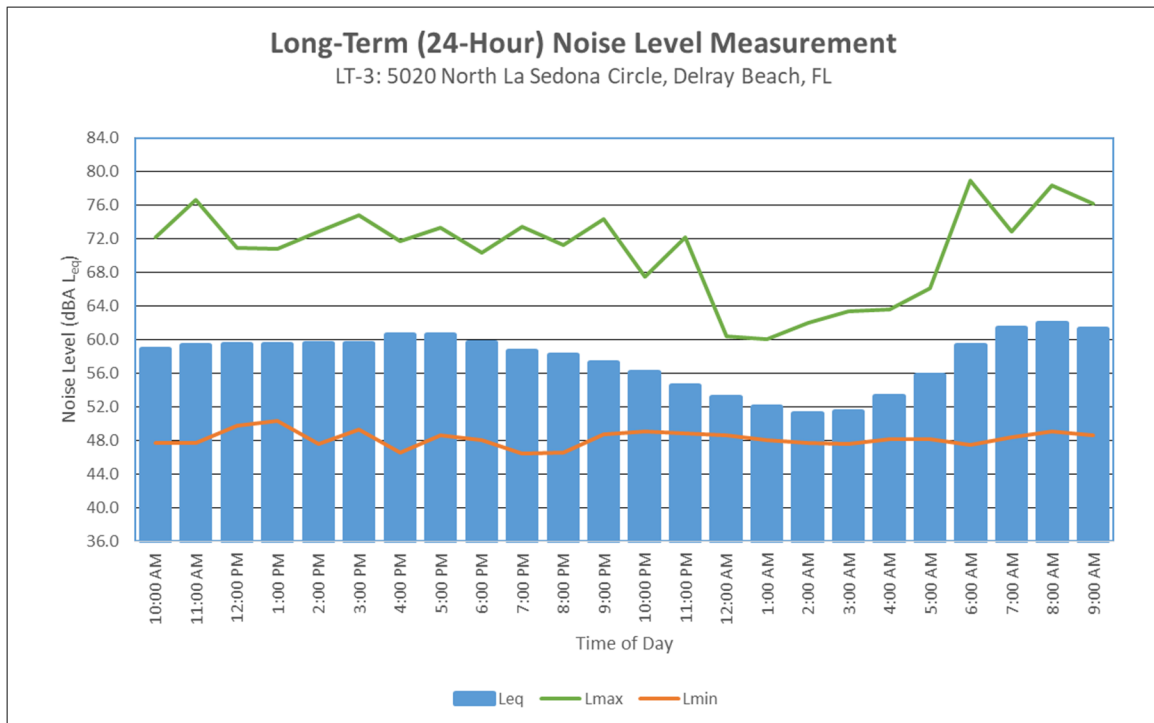
Source: Compiled by LSA Associates, Inc. (2025).

dBA = A-weighted decibel

L_{eq} = equivalent continuous sound level

L_{max} = maximum instantaneous noise level

L_{min} = minimum measured sound level



Noise Measurement Survey – 24 HR

Project Number: 20242069

Project Name: Delray Car Wash

Test Personnel: Corey Knips

Equipment: LD Spark 706RC (SN: 18571)

Site Number: LT-4 Start Date: 4/1/2025 Time: From 10:00 a.m. To 10:00 a.m.

Site Location: Near the southeast corner of 5098 Conklin Drive, Delray Beach, FL. On a utility pole at the fence line, approximately 440 feet from the Military Trail centerline. Near the southwest corner of the project site.

Primary Noise Sources: Traffic on South Military Trail and occasional vehicles on La Sedona Circle.

Comments: _____

Photo:



Long-Term (24-Hour) Noise Level Measurement Results at LT-4

Start Time	Date	Noise Level (dBA)		
		L_{eq}	L_{max}	L_{min}
10:00 AM	4/1/2025	52.6	68.0	42.1
11:00 AM	4/1/2025	53.7	66.6	44.2
12:00 PM	4/1/2025	53.8	67.3	45.3
1:00 PM	4/1/2025	53.9	65.1	48.2
2:00 PM	4/1/2025	53.7	66.1	45.9
3:00 PM	4/1/2025	54.0	69.3	46.1
4:00 PM	4/1/2025	54.9	70.1	47.3
5:00 PM	4/1/2025	55.2	69.2	48.5
6:00 PM	4/1/2025	55.4	70.1	46.8
7:00 PM	4/1/2025	53.3	68.2	45.1
8:00 PM	4/1/2025	53.9	71.5	46.4
9:00 PM	4/1/2025	52.7	65.4	46.9
10:00 PM	4/1/2025	51.1	63.5	46.5
11:00 PM	4/1/2025	49.7	62.6	45.4
12:00 AM	4/2/2025	48.3	55.5	44.5
1:00 AM	4/2/2025	47.6	54.2	43.5
2:00 AM	4/2/2025	47.6	56.4	44.1
3:00 AM	4/2/2025	47.5	55.9	43.9
4:00 AM	4/2/2025	47.4	58.4	42.9
5:00 AM	4/2/2025	49.6	59.1	42.7
6:00 AM	4/2/2025	53.7	75.1	45.0
7:00 AM	4/2/2025	55.9	69.1	45.7
8:00 AM	4/2/2025	56.1	76.1	47.1
9:00 AM	4/2/2025	55.3	70.9	45.3

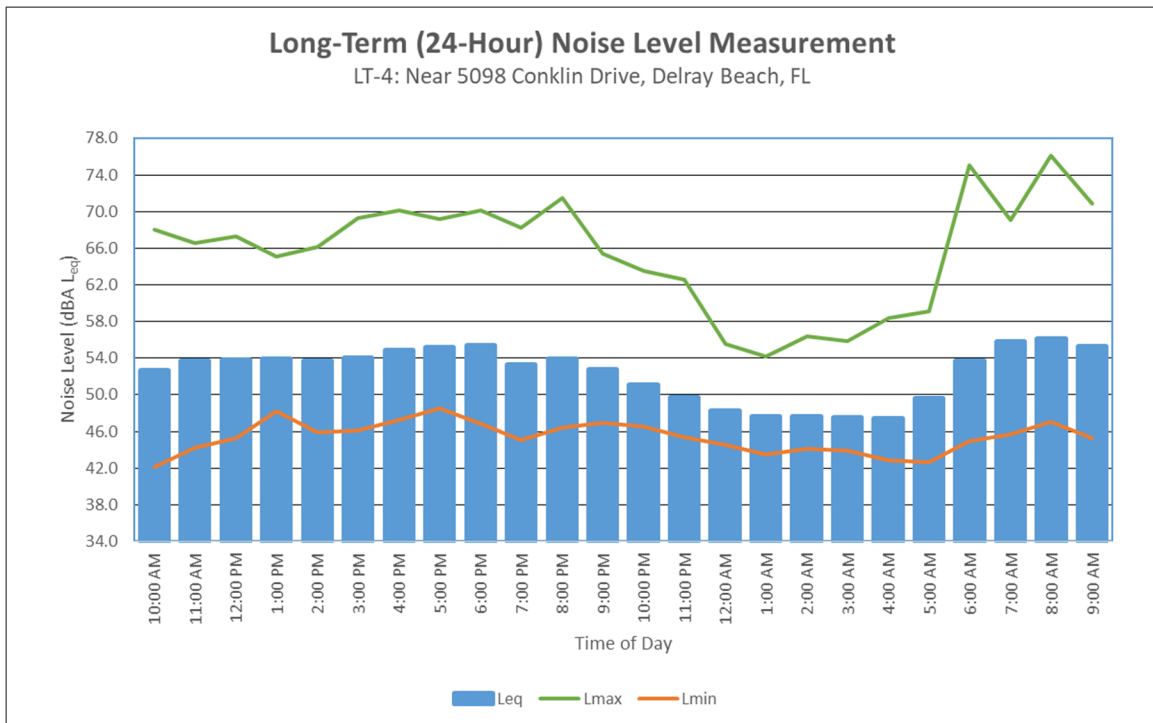
Source: Compiled by LSA Associates, Inc. (2025).

dBA = A-weighted decibel

L_{eq} = equivalent continuous sound level

L_{max} = maximum instantaneous noise level

L_{min} = minimum measured sound level



ATTACHMENT C

CAR WASH DRYER BLOWER REFERENCE NOISE LEVEL

Noise Measurement Survey

Project Number: 20252186
 Project Name: MCW Springbrook

Test Personnel: Moe Abushanab
 Equipment: Larson Davis Lxt SE

Site Number: 1-50 Date: 2/12/25 Time: From 9:00 am To 10:45 am

Site Location: Mr. Car Wash at 8501 Springbrook Drive in Coon Rapids, Minnesota

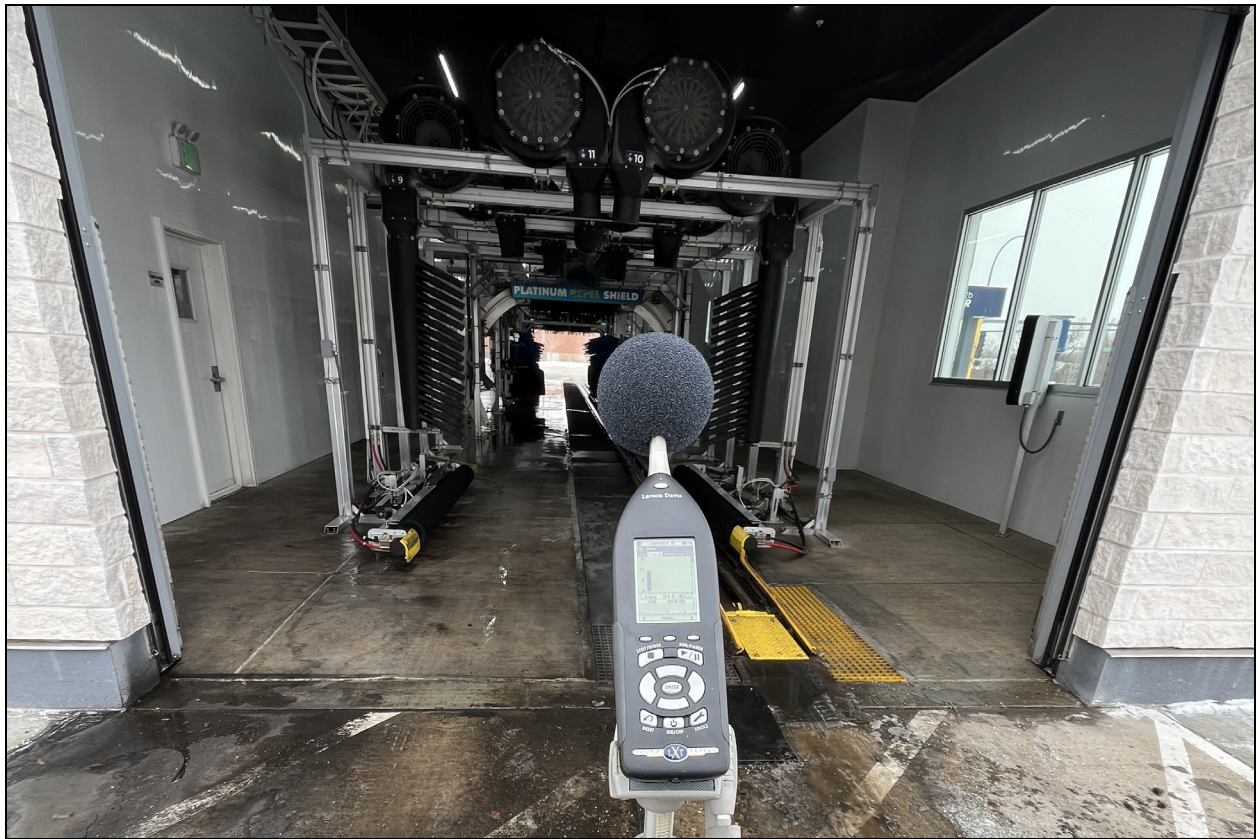
Primary Noise Sources: Car wash tunnel blowers at entrance and exit.

Measurement Results:

No.	Tunnel Entrance Noise Level (dBA Leq)	No.	Tunnel Exit Noise Level (dBA Leq)	Diagram
1	78.5	26	87.9	
2	86.6	27	93.1	
3	87.9	28	94.8	
4	87.0	29	94.0	
5	80.1	30	88.6	
6	81.3	31	87.8	
7	85.0	32	91.1	
8	86.1	33	92.1	
9	83.4	34	91.5	
10	80.4	35	88.1	
11	78.7	36	86.9	
12	83.8	37	88.6	
13	83.3	38	89.6	
14	82.3	39	89.1	
15	80.3	40	86.3	
16	80.8	41	84.6	
17	80.6	42	87.6	
18	81.5	43	88.5	
19	80.8	44	88.1	
20	78.5	45	85.6	
21	77.4	46	83.8	
22	79.1	47	85.7	
23	79.7	48	86.6	
24	80.0	49	86.0	
25	78.8	50	83.7	

¹ Reference noise level measurements were conducted starting at a distance of 5 feet from the building and 5 feet apart from each location.

Location Photo:



ATTACHMENT D

CAR WASH WITH SILENCERS REFERENCE NOISE LEVEL



Project Description

This report presents the results of a second round of acoustical tests performed on Sonny's Car Wash dryer blowers and client-designed and installed prototype silencers. The first round of acoustical tests was described in a previous report, *Sonny's Car Wash Dryer Blowers Noise Assessment*, dated 2/16/18.

In this round of tests, the silencers were installed on the dryer blowers at Prestige Car Wash located at 4921 N. University Drive, Lauderhill, Florida. As shown in **Photos 1 and 2**, Prestige is an active car wash in commercial operation. The noise tests were performed after operating hours on 10/3/18 to minimize noise sources in the car wash not attributable to the blowers.



Photo 1. Prestige Car Wash Entry Portal



Photo 2. Prestige Car Wash Exit Portal

Noise Measurement Procedure

The procedure followed in this second round of acoustical tests involved performing calibrated A-weighted broadband and third-octave band noise measurements both with and without the prototype silencers attached to the dryer blowers. As shown in **Figure 1**, noise measurements were performed at nine measurement positions (M0 thru M8) inside, outside and in the vicinity of Prestige Car Wash. The nine positions can be described as follows:



Figure 1. Noise Measurement Positions

- M0 - Inside tunnel towards exit
- M1 - Tunnel exit portal (east)
- M2 - Outside tunnel in direct line from exit
- M3 - Outside tunnel in direct line from exit
- M4 - Tunnel entrance portal (west)
- M5 - Building facade property to south
- M6 - Northern property line
- M7 - Outside tunnel in line from entrance
- M8 - Inside office/waiting room area

The noise measurement instrumentation consisted of a Svantek Model 971 Sound Level Analyzer using a Svantek 7052E Precision Microphone covered with a 3½-inch windscreen. The SVAN-971 was programmed to measure and store L_{eq} noise data in 1-minute samples using an RMS 'slow' time response. The SVAN-971 computed broadband sound levels in unweighted (dBZ) and A-weighted (dBA) decibels, and computed the unweighted third-octave band L_{eq} levels from 20 Hz to 20 kHz. The noise measurement system was calibrated with a Larson Davis Model 150 Calibrator, and complies with ANSI Standard S1.4 for Type 1 quality and accuracy.

Data reduction and post-processing consisted of comparing the broadband A-weighted and third-octave band results measured with and without the silencers at each measurement position. The noise reduction (dBNR) is the difference in decibels between the two measured noise levels. Attempts were made to maintain consistency with as many variables as possible between the two noise measurements; however, background traffic noise did contribute slightly to some of the outdoor readings.

As shown in **Photo 3**, the dryer blowers are typical backward centrifugal air fans. The impellers spin at 3,600 RPM, and each fan has one impeller with 11 blades. Barring other effects, this would lead to expected higher noise emission levels in the 60 Hz, 120 Hz, 180 Hz, 630 Hz and 1,250 Hz third-octave frequency bands. As shown in **Photo 4**, the prototype silencers consisted of acoustically lined cylindrical covers attached to the air intake-side of the blowers. No noise control modifications were performed on the air exhaust-side of the blowers.



Photo 3. Dryer Blowers Without Silencers

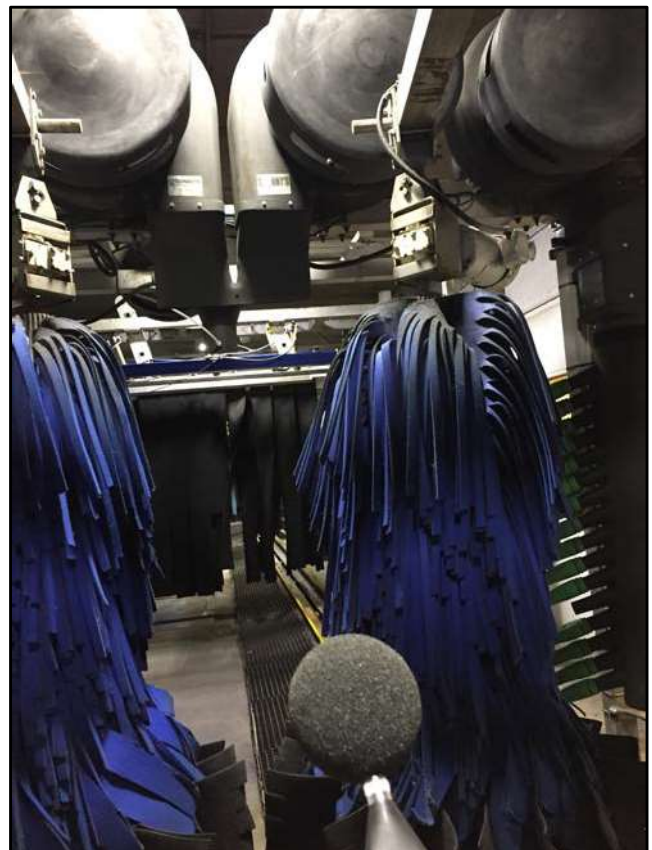


Photo 2. Dryer Blowers With Silencers



Noise Results and Findings

The results of the second round of acoustical tests of the dryer blower prototype silencers can be seen in **Table 1**. The magnitude of noise reduction attributable to the prototype silencers ranged from 1.1 to 4.5 dBNR depending on measurement position. The positions yielding the most noise reduction were those in line with the tunnel exit side of the blowers. The least noise reduction was found in line with the tunnel entrance side. This asymmetry could be attributable to the acoustical directivity of the blowers.

Figures 2 thru 10 show the A-weighted broadband and third-octave band results with and without the silencers for each measurement position. The noise reduction is the difference between the two plotted curves.

All results presented in the table and figures are shown in A-weighted decibels (dBA) so that visual results would correlate better with how humans would perceive the given sounds over the full audio spectrum. Presenting the results in A-weighted decibels also allows for easier identification of the louder frequency bands that would benefit the most from subsequent noise control efforts.

**Table 1. Sonny's Dryer Blower Silencers
Acoustical Test Results (Round 2)**

Sonny's Car Wash Blower and Silencer Noise Measurement Tests 10/3/18						
Prestige Car Wash - 4921 N. University Drive, Lauderhill, FL 33351						
Site No.	Distance to Blowers* (feet)	Noise Measurement Site Location	Traffic Noise Influence**	Noise Level No Silencers dBA Leq	Noise Level With Silencers dBA Leq	Approx. Noise Reduction dBNR
M0	8	Inside tunnel near blowers towards exit	No	99.7	96.9	2.8
M1	22	Tunnel exit portal (east)	No	96.3	92.8	3.6
M2	51	Outside tunnel in direct line from exit	Slightly	84.8	80.3	4.5
M3	95	Outside tunnel in direct line from exit	Yes	78.4	74.1	4.3
M4	68	Tunnel entrance portal (west)	No	88.3	87.1	1.1
M5	110	Building facade adjacent property to south	Yes	65.7	63.2	2.5
M6	83	Northern property line	Yes	69.7	66.7	3.1
M7	99	Outside tunnel in direct line from entrance	No	77.7	76.5	1.2
M8	10	Inside office/waiting room area	No	67.9	66.1	1.7
*Blowers are located approximately 22 feet inside the car wash tunnel exit and approximately 68 feet inside the tunnel entrance.						
**Traffic noise from N. University Drive NB & SB movements did have an impact on some noise measurements that were farther away from the blower noise.						

ATTACHMENT E

VACUUM REFERENCE NOISE LEVELS

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.

Measurement	Value	Unit
Temperature	25.0	°C
Pressure	101.3	kPa
Humidity	65.0	%
Wind Speed	1.2	m/s
Wind Direction	135	°
Cloud Cover	30	%
Soil Moisture	15.0	%
Light Intensity	1200	lux
Sound Level	45.0	dB
Air Quality Index	50	Index

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	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	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

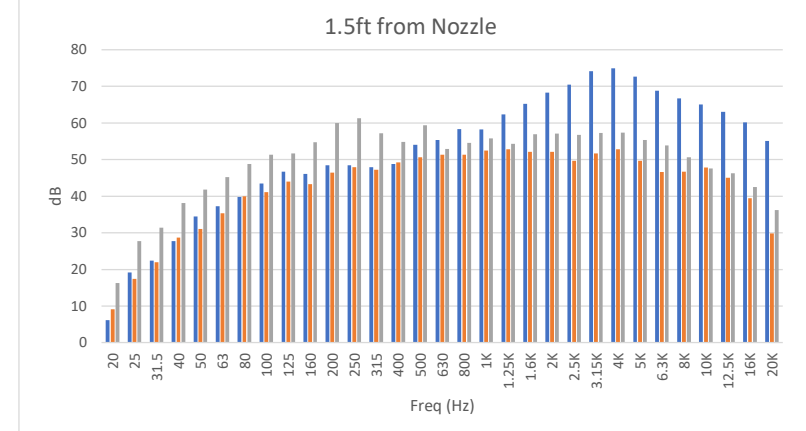
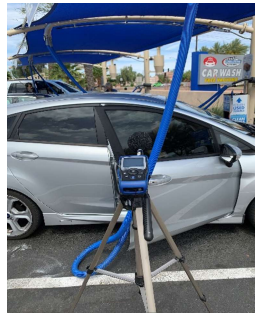
Figure 1: Holstered



Figure 2: Unholstered



Figure 3: Inside Car



ATTACHMENT F

VACUUM PRODUCER AND AIR SYSTEM BLOWER REFERENCE NOISE LEVELS



EQUIPMENT DECIBEL CERTIFICATION

This is to certify that the following AutoVAC equipment was measured with the following decibel levels of noise emission (+/- 2dB) in accordance with ISO 2151:2004. These ratings are taken at 15 feet from the machine with no background noise or outside interference in a 50 x 50ft interior room.

VACUUM PRODUCER					
HORESPOWER	STAGE	START/RUN dB WITH VFD	START dB NO VFD	SERIAL NO	PASS/FAIL
10	3	64	84		
15	4	66	88		
20	5	66	88		
25	6	72	92		
30	7	74	92		
40	8	76	95		

BLOWER				
HORESPOWER	START/RUN dB WITH VFD	START dB NO VFD	SERIAL NO	PASS/FAIL
15	72	85		

Equipment Used to measure decibel levels

EQUIPMENT	MANUFACTURER	MODEL NO	SERIAL NO
Sound Level Meter	Extech Instruments	407730	9848853

Certified By: Danny Stewart Date: 4/16/2025

This certificate does not claim product approval or endorsement by NVLAP, NIST or any agency of the Federal Government. If you have any further questions, please contact AutoVAC at our toll free number 888-628-8682.



ATTACHMENT G

SOUNDPLAN OPERATIONAL NOISE LEVEL EXHIBIT

Conklin Car Wash

Project No. 20242069

Project Operational Noise Levels

