PL2022-54
PL202200054

TOMMY CAR WASH SYSTEMS

581 Ottawa Ave Suite 300 • Holland MI 49423 • tommycarwash.com

CHANGE ORDER

DATE: 11.08.22

Wash Info	
Wash Name	Tommy's Express Car Wash P3280 MN408
Address Line 1	200 W Old Shakopee Rd
Address Line 2	Bloomington MN 55420
Project #	P3280
Quote #	12141
Version #	1

Billing Info	
Name	Premier Wash Systems.Christianson Companies
Address Line 1	4265 45th St. S. Suite 200
Address Line 2	Fargo ND 58104

Order # 102180

QTY	ITEM	DESCRIPTION	UNIT	EXTENDED	
1	CCS-VAC20-10-A	Vacuum 2.0 For 10 Vacuum Components 480v	19700	19,700.00	
			Total Change to Order # 102180		$19,700.00

Order # 102242

QTY	ITEM	DESCRIPTION	UNIT	EXTENDED	
-10	E-VAC-220 : E-VAC-220-FV	Tommy Vacuum 13" Dual Motor 208v	$2,713.39	-27,133.90	
10	P-VAC-335-K	Vacuum noise reducing muffler kit. (10-15dB reduction)	$388.00	3,880.00	
10	E-VAC-234-A	Tommy Vacuum 2.0 Producer and Canister assembly 480V	$4,950.00	49,500.00	
			Total Change to Order # 102242		$26,246.10

Order # 102234

QTY	ITEM	DESCRIPTION	UNIT	EXTENDED	
-9	E-RBP : E-RBP-Bk-CCW-NFL-BST	Black 10 HP CCW Flangeless Blower w/ Blast Gate and	$5,760.00	-51,840.00	
-9	E-RBP : E-RBP-Bk-CW-NFL-BST	Black 10 HP CW Flangeless Blower w/ Blast Gate and	$5,760.00	-51,840.00	
9	E-RBP : E-RBP-Bk-CCW-NFL-INT	Black 10 HP CCW Flangeless Blower w/ Intake Screen and	$5,367.00	48,303.00	
9	E-RBP : E-RBP-Bk-CW-NFL-INT	Black 10 HP CW Flangeless Blower w/ Intake Screen and	$5,367.00	48,303.00	
			Total Change to Order # 102234		-$7,074.00

Order # 102235

QTY	ITEM	DESCRIPTION	UNIT	EXTENDED	
-1	GCS2-TX130-480	TX 2020 MCP2 - 130' - 480v	$48,430.00	-48,430.00	
1	GCS2-TX130-480-BLVFD	TX 2020 MCP2 - 130' - 480v - (Blower VFD's) Included	$88,100.00	88,100.00	
			Total Change to Order # 102235		$39,670.00

Order # 102245

QTY	ITEM	DESCRIPTION	UNIT	EXTENDED	
-1	P-SE-2039-A	SMC Blast Gate Panel Assembly	$0.00	0.00	
			Total Change to Order # 102245		$0.00

The requested change(s) above results in an overall change in the signed contract of **$78,542.10**

Summary of Change(s)

Disclaimer: Tax adjustment will be included within final invoice.

CUSTOMER APPROVAL

Signature	Kyle Freier
Name (Printed)	Kyle Freier
Date	Nov 9, 2022

TCWS APPROVAL

Signature	
Name (Printed)	
Date	

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TCWS Muffler Report

Introduction: Vacuum mufflers were tested at TX Hudsonville for 2 weeks' time. The goal of this test, was to test three types of mufflers on site to attempt to reduce the noise output of the vacuums without loss of performance.

Methodology: Performance of the mufflers were tested with 4 criteria

1. Noise reduction (dB)
2. Additional Maintenance necessary / clogging (Yes or No)
3. Suction loss (kPa and % loss)
4. Aesthetics (Great, Good, Fair, Poor)

Results: Test results based on Methodology

1. BASELINE RESULTS (No mufflers attached)
    a. Noise
        i. Ambient (no vacs running): 65.7 dB (See figure 1.1)
        ii. Running Vac with no muffler: 88.1 dB (See Figure 1.2
    b. Additional Maintenance necessary / clogging: NO
    c. Suction: 50 kPa/ 0%
    d. Aesthetics: Great

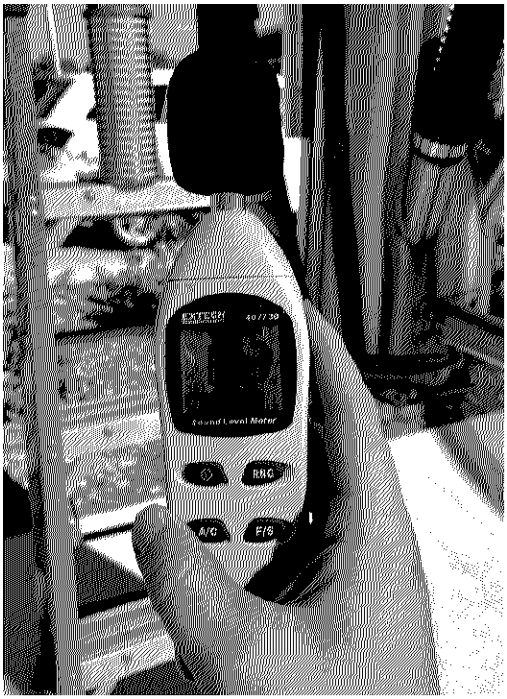

FIGURE 1.1

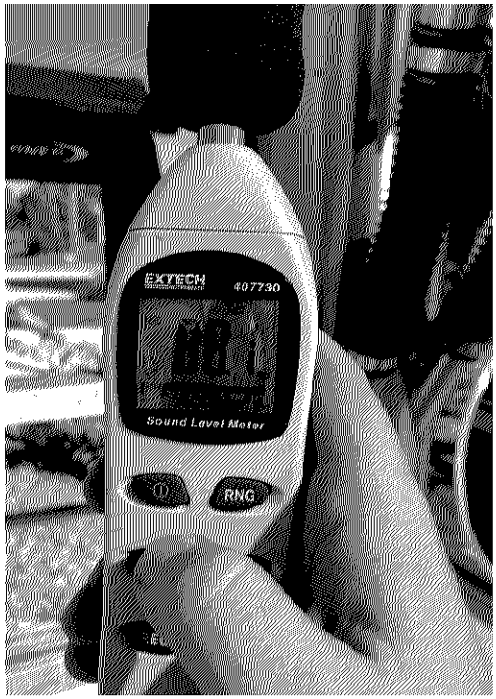

FIGURE 1.2

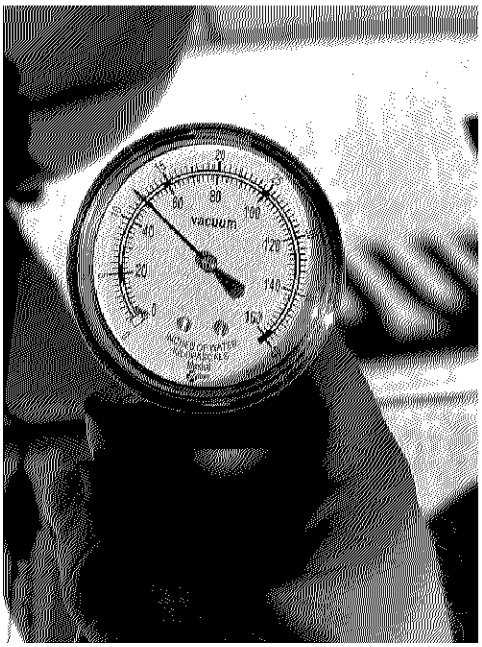

FIGURE 1.3

2. P-VAC-334 RESULTS

a. Noise reduction (dB):
    i. Reading: 77.6 dB (See Figure 2.1)
    ii. Reduction: 10.5 dB
b. Additional Maintenance necessary / clogging
    i. Yes: Minor (additional maintenance and clogging)
        1. Reverse pulse vacs to help with this
        2. Wash Mufflers to help with this
c. Suction loss (KPa and %)
    i. Reading: 40kPa (see Figure 2.2)
    ii. Loss: 10kPa – 20% loss in suction
d. Aesthetics
    i. Good (See Figure 2.3)

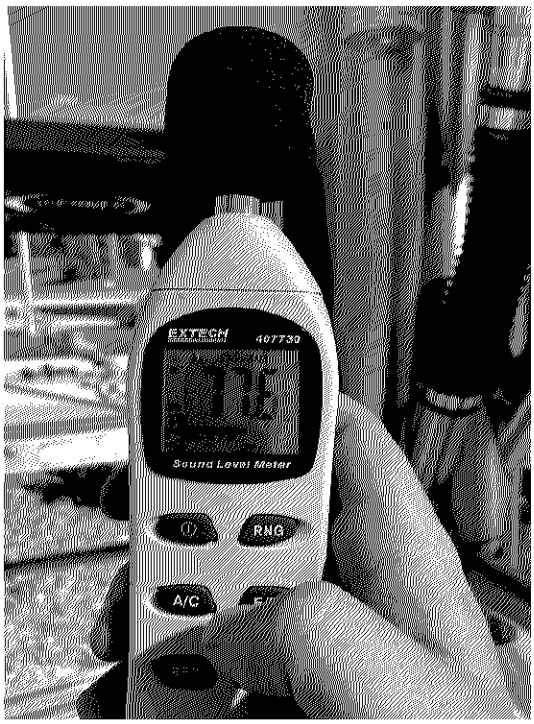

Figure 2.1

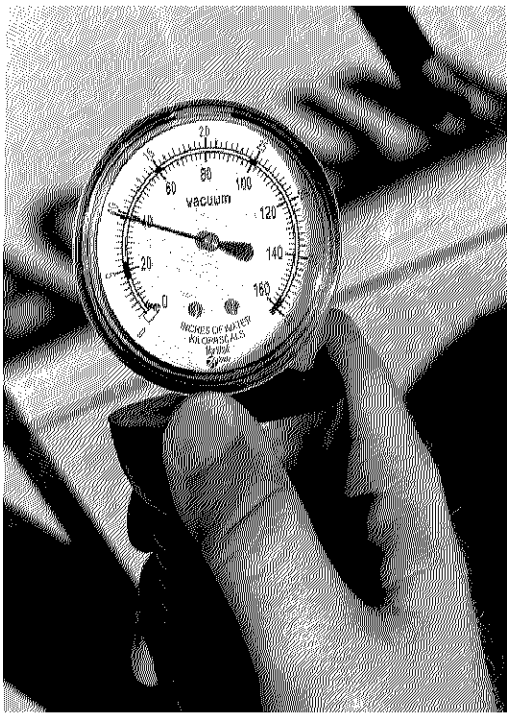

Figure 2.2

Figure 2.3: P-VAC-334

1. P-VAC-335 RESULTS

a. Noise reduction (dB):
    i. Reading: 79.1 dB (See Figure 3.1)
    ii. Reduction: 9 dB
b. Additional Maintenance necessary / clogging
    1. Yes: Minimal (additional maintenance, no clogging)
        a. Eventually replace filter of muffler.
c. Suction loss (KPa and %)
    i. Reading: 50kPa (see Figure 3.2)
    ii. Loss: 0kPa – 0% loss in suction
d. Aesthetics
    i. Fair (See Figure 3.3)

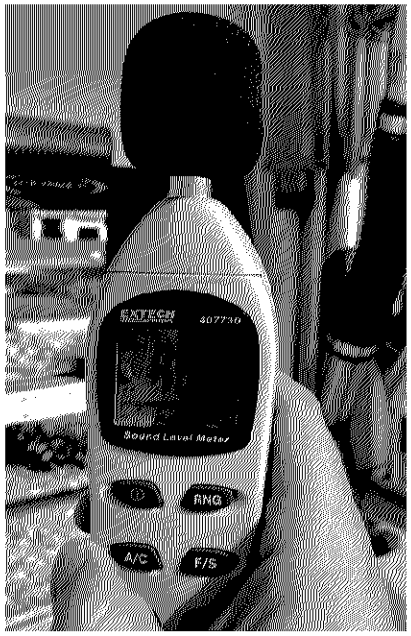

FIGURE 3.1

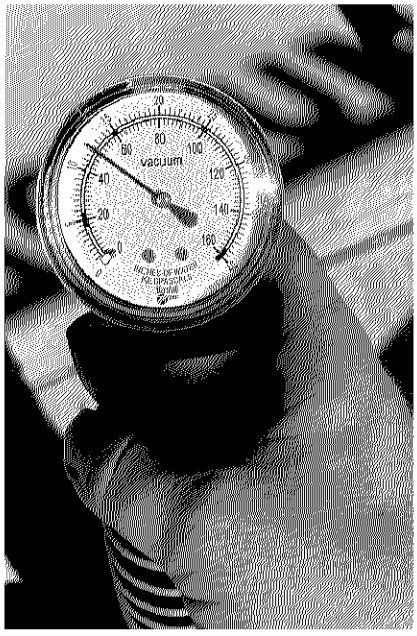

FIGURE 3.2

FIGURE 3.3 (P-VAC-335)

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Sound Level Testing – Hudsonville 5/18/21

Introduction

Measurements of sound levels were collected on site to record noise levels generated by the standard 18 blower motor configuration at the wash exit. Measurements were taken between 10:00pm and 12:00am on May 18th at the Hudsonville Location.

Instrumentation & Procedure

Measurements were recorded using an Extech Instruments Model 407730 Sound Level Meter. This meter is calibrated and meets the standards of the National Institute of Standards and Technology and conforms with ISO 10012 and ANSI Z540-1-1994. Sound levels were recorded both at ground level as well as at a height of 5 feet off the surface. Measurements were recorded as an average of a 5 second period at each point. Samples were recorded with minimum possible ambient noise pollution when applicable and with the standard blower motor configuration. Procedure was repeated with blower motor frequency adjusted in 10Hz increments from 60Hz to 10Hz.

Atmospheric & Ambient Conditions

Atmospheric data is taken from the weather station at Gerald R. Ford International Airport and is shown in Table 1. Ambient sound levels were recorded at the maximum distance from the tunnel exit with all wash functions turned off. Ambient sound levels ranged from a minimum of 50dB to a maximum of 60dB. It should be noted that while efforts were made to prevent contamination of data from ambient conditions, some noise pollution from the environment was unavoidable.

Table 1: Environmental Conditions During Test Period

Time & Date	Average Temp (F)	Avg. Relative Humidity	Wind Direction	Avg. Wind Speed (MPH)	Precipitation (in)	Ambient Sound Level (dB)
10:00pm-12:00am May 18th, 2021	67	64.5%	E	4.6mph	0	50-60dB

Results

Recorded data for each position at ground level is shown below in Table 2. This data is displayed in Figure 1. Recorded data for each position at 5ft height is shown below in Table 3. This data is displayed in Figure 2.

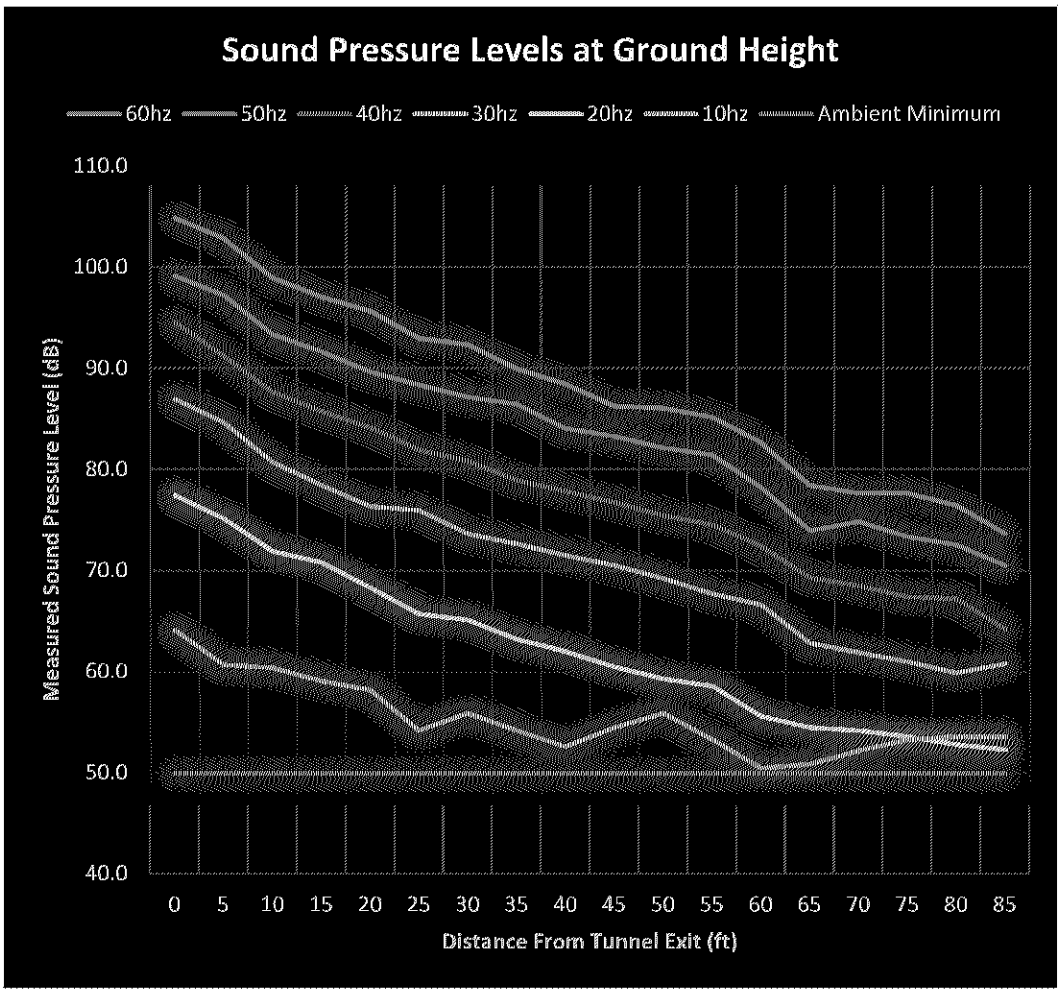

Figure 1: Measured Sound Pressure Levels at Ground Height

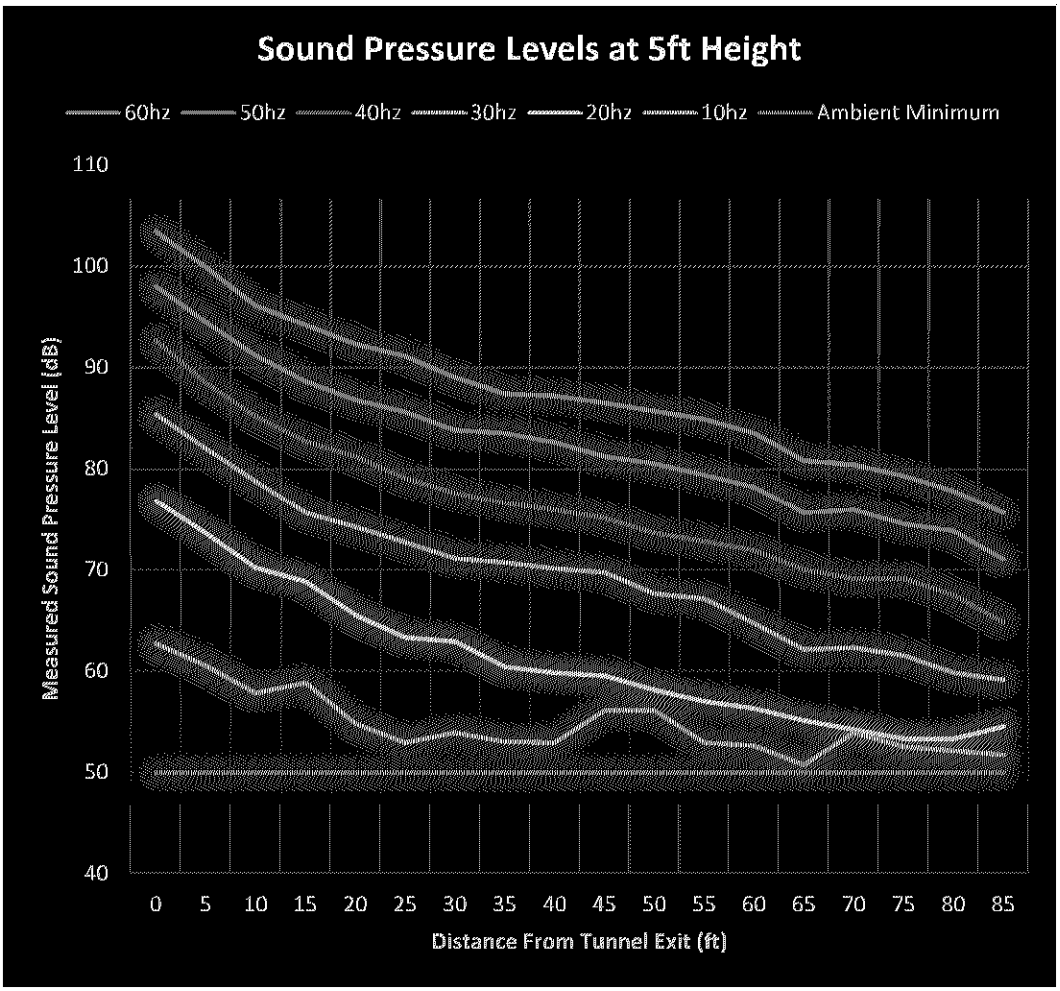

Figure 2: Measured Sound Pressure Levels at 5ft Height

Table 2: Measured Sound Levels at Ground Height						
Distance (ft)	**60hz**	**50hz**	**40hz**	**30hz**	**20hz**	**10hz**
0	104.8	99.1	94.5	86.9	77.4	64.1
5	102.8	97.2	91.2	84.6	75.1	60.7
10	98.9	93.3	87.6	80.7	71.9	60.4
15	97.0	91.6	85.7	78.4	70.8	59.1
20	95.6	89.6	84.1	76.3	68.3	58.2
25	92.9	88.3	81.9	75.9	65.7	54.2
30	92.3	87.1	80.8	73.6	65.1	55.9
35	89.9	86.4	78.9	72.6	63.2	54.2
40	88.4	84.0	77.8	71.5	62.0	52.6
45	86.2	83.2	76.7	70.5	60.5	54.5
50	86.0	82.1	75.4	69.2	59.3	55.9
55	85.1	81.4	74.5	67.7	58.6	53.3
60	82.6	78.2	72.4	66.6	55.6	50.5
65	78.4	73.9	69.3	62.8	54.5	50.9
70	77.6	74.8	68.5	61.9	54.2	52.2
75	77.6	73.3	67.4	61.0	53.6	53.3
80	76.4	72.5	67.2	59.9	52.8	53.6
85	73.6	70.5	64.2	60.8	52.3	53.6

Table 3: Measured Sound Levels at 5ft Height						
Distance (ft)	**60hz**	**50hz**	**40hz**	**30hz**	**20hz**	**10hz**
0	103.4	98	92.7	85.4	76.8	62.7
5	99.9	94.5	88.5	82	73.6	60.5
10	96.1	91.2	85.2	78.8	70.2	57.8
15	94.2	88.6	82.7	75.6	68.8	58.8
20	92.3	86.8	81.2	74.2	65.5	54.8
25	91.1	85.6	79.1	72.7	63.3	52.9
30	89	83.8	77.6	71.1	62.9	53.9
35	87.4	83.5	76.6	70.7	60.4	53
40	87.2	82.6	75.9	70.1	59.8	52.9
45	86.5	81.2	75.1	69.7	59.5	56.1
50	85.7	80.5	73.6	67.6	58.1	56.1
55	84.9	79.4	72.8	67.1	57	52.9
60	83.5	78.2	71.9	64.7	56.3	52.6
65	80.8	75.6	70	62.1	55.1	50.7
70	80.4	75.9	69.1	62.3	54.2	53.9
75	79.3	74.5	69.1	61.5	53.3	52.5
80	77.8	73.8	67.5	59.8	53.3	52.1
85	75.6	71	64.8	59.1	54.5	51.7

Conclusions

By varying the frequency of the blower motor, it was possible to achieve sound pressure levels which did not exceed the ambient conditions at the maximum recorded distance. It was not possible to record the true sound level at these positions due to ambient sound conditions.