VEENSTRA & KIMM INC.
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Bolingbrook, Illinois 60440

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www.v-k.net

TECHNICAL MEMORANDUM

To: Jet Brite Services, Inc.
590 Kildeer Drive
Bolingbrook, IL 604400

From: Clay Shipley, P.E.
Veenstra & Kimm, Inc.

Date: August 14, 2023

Subject: Noise Study
Jet Brite Car Wash Development
IL 59 and 83rd Street
Naperville, IL

Introduction

Veenstra & Kimm, Inc. (V&K) prepared a noise study for the subject car wash development. This development will provide a single car wash tunnel with three pay stations, queuing lanes, vehicle prep, vacuum, and employee parking stalls.

The site is located on the NE quadrant of IL 59 and 83rd Street and is currently vacant. Nearby land uses include commercial on the SE and SW quadrants, a vacant portion of Calvary Christian School on the NW quadrant. Land uses immediately adjacent to the site on the same quadrant of IL 59 and 83rd Street include one commercial parcel to the north and six single family residential parcels to the east.

The purpose of this study is to evaluate potential noise impacts from the proposed car wash development on adjacent properties. An aerial location of the proposed site is provided as **Exhibit 1** and the car wash development site plan is provided as **Exhibit 2**.

Key Findings

Existing noise levels along the east property line of the subject site (rear residential property lines along Aero Drive) average 64.2 dB(A), a level noticeably higher than typical residential noise levels due to noise generated from traffic on IL 59, an IDOT/CMAP Strategic Regional Arterial, and from traffic on 83rd Street, a Major Collector. The City's residential noise ordinance-based standard is 55 dB(A) at daytime and 50 dB(A) at nighttime.

Construction of a 12 foot high sound wall along the entire east property line of the site will reduce the noise to less than City Code standards and less than the 64.2 dB(A) currently experienced by residential homes along Aero Drive once the car wash is developed and operational.

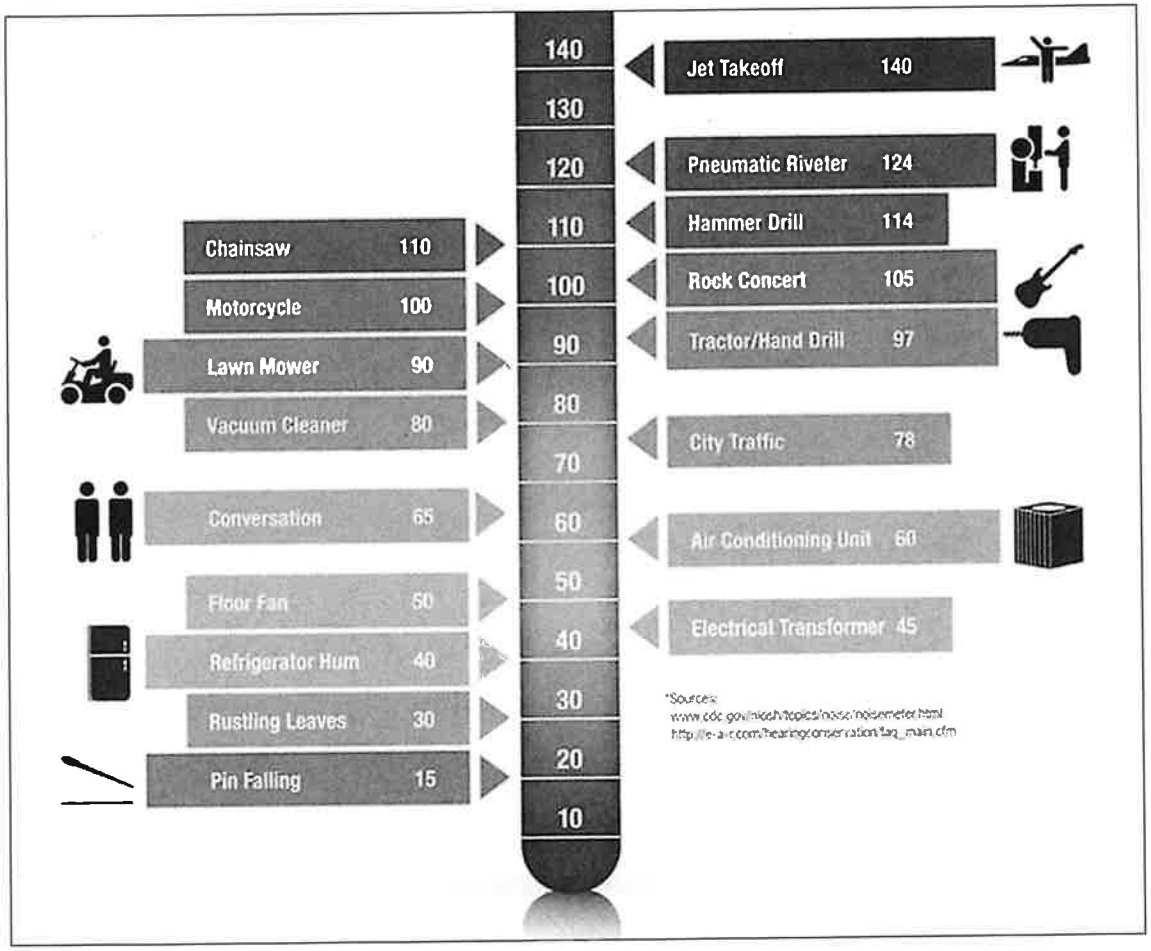
Noise Criteria

Section 6-14-4.1 of the Naperville Zoning Code details noise standards in all Naperville zoning districts. The decibels generated from a land use may not exceed the exterior noise thresholds set forth in **Table 1** as measured at the property line of the parcel from which the noise is generated. To illustrate this, common sound levels for everyday noise are shown in **Figure 1**.

Table 1: Exterior Noise Thresholds

Land Use	7:00 am to 7:00 pm	7:00 pm to 7:00 am
Residential	55 dB(A)	50 dB(A)
Commercial	62 dB(A)	55 dB(A)
Light industrial	70 dB(A)	70 dB(A)
Industrial	80 dB(A)	80 dB(A)

Figure 1: Common sound levels dB(A) scale



Noise Sources and Levels

Noise levels generated by car wash developments are primarily due to the equipment noise from within the car wash tunnel and central vacuum systems. Equipment noise emanating from the tunnel openings spread in all directions, diminishing in intensity with distance and by tunnel entrance/exit wall shielding. Industrial blowers are used at the exit of the car wash tunnel and are the most significant source of noise on site. Blower equipment sound levels can measure as much as 90 dB(A) from ten feet away.

Exhibit 3 illustrates sound propagation from the car wash blowers located at the exit tunnel. When directly facing the tunnel, the anticipated sound levels will reduce to 79 dB(A) from 50 feet away. Sound levels from the car wash exit will be reduced when facing the tunnel exit, for example, at 90-degrees or 45-degrees due to the intervening building structure. Note that a rapid roll door will be located at the tunnel exit. This will help to reduce noise when vehicles are not exiting the tunnel. The car wash tunnel entrance is also considered a noise source. However, there are no blowers at the car wash entrance, and noise levels are significantly less when compared to the tunnel exit.

The car wash will also have a total of 39 vacuum stalls powered by seven Industravac Series E central vacuuming turbines that control a central vacuum motor and separator system. These will be located along the west building exterior. **Exhibit 4** provides manufacturer details for the central vacuuming turbines, which account for the most significant source of noise from the vacuuming systems. The manufacturer specifications list the average sound level from the central vacuum motor and separator system at 84 dB(A) at 3 feet away. The hoses located at individual vacuum stalls do not account for a significant source of noise. Two vacuum turbines will be located on the inside of each "vac enclosure" (two total) shown in **Exhibit 2**.

Noise Modeling

To project the potential noise levels from the proposed car wash, the Noise Mapping (Sound Level Modeling) tool developed by MAS Environmental Ltd was utilized. This tool incorporates point sources of noise, barriers, and buildings, to accurately predicted sound levels. The model develops noise contours from point sources and reliably estimates sound levels at specific receiver points. The model complies with ISO 9613, the international standard that describes a method for calculating the attenuation of sound during travelling outdoors in order to predict the levels of environmental noise at a distance from a variety of sources. The Noise Mapping tool adjusts for overlapping sources of noise at one time and how noise reflects off of hard surfaces such as walls and buildings.

Point source noise generators were added to the model to represent the sound generated from the car wash tunnel exit, car wash tunnel entrance, and the two central vacuuming systems located outdoors in the parking lot. A point source measuring 96 dB(A) (8-ft above ground) was input at the immediate exit of the car wash tunnel to represent the noise from drying blowers and other equipment. The model assumes the car wash roll door being in the open position. An additional point source measuring 79 dB(A) (8-ft above ground) was added to represent equipment noise from the car wash tunnel entrance. This noise level was estimated based on previous noise analyses of other similar type car wash facilities. Four separate point sources (two in each vac enclosure) measuring 84 dB(A) (4-ft above ground) were added to represent the outdoor central vacuuming turbines.

Buildings and barriers located on the property were incorporated into the model to measure how sound would be reflected and blocked as it travels to each property line and onto adjacent properties. The proposed car wash tunnel structure was also incorporated into the model. Barriers added to the model are identified in the site plan included as **Exhibit 2** and the noise contour maps included as **Exhibit 5**. Note that a 12-foot high sound wall is being located along the entire east side of the site ***and*** a 10-foot high sound wall is being located along the east side of the car wash tunnel exit. Several noise contour maps are included to provide clarity on various point source, barrier, and receiver notes. Noise contours are the same on all maps. For comparison, a noise contour map with the sound walls turned off is provided as **Exhibit 6**.

To measure the noise effects on surrounding properties, individual receiver points were added to measure resulting noise levels. These receivers were placed at sensitive receptor locations such as residential and commercial properties at critical locations at or near property lines. Sound levels are then projected to locations near building entrances or areas of outdoor use. Each sensitive receptor location (point) is shown in **Exhibit 5** for the properties identified in **Table 2**.

Table 2: Noise Model Sensitive Receptors

Receptor	Address	Land Use
Green State Credit Union	1903 Springbrook Square Drive	Commercial
Oxford Bank	2920 83rd Street	Commercial
US Bank Branch	4455 Montgomery Road	Commercial
Keep It Clean	9s301 IL Route 59	Commercial
Single family home	9S310 Aero Drive	Residential
Single family home	9S324 Aero Drive	Residential
Single family home	9S336 Aero Drive	Residential
Single family home	9S350 Aero Drive	Residential
Single family home	9S362 Aero Drive	Residential
Single family home	9S374 Aero Drive	Residential

Findings

The noise contour map attached as **Exhibit 5** illustrates the noise model results. The noise contours shown on the exhibit are at 5 dB(A) intervals, ranging from 30 dB(A) to 80+ dB(A). The decibel level contours illustrate how noise propagates from each of the major noise sources located on the car wash development. Sound energy spreads with distance, resulting in reduced sound levels with increased distance. In general, sound sources reduce by approximately 6 dB(A) with every doubling of distance over a hard surface and reduces even more over pervious surfaces. **Table 3** and **Table 4** list the A-weighted decibel levels measured at each of the sensitive receptor locations near the proposed development and at critical locations on the car wash property.

Table 3: Noise Model Results at Sensitive Receptors

Receptor	Address	Land Use	Noise Level dB(A)
Green State Credit Union	1903 Springbrook Square Drive	Commercial	35.9
Oxford Bank	2920 83rd Street	Commercial	39.9
US Bank Branch	4455 Montgomery Road	Commercial	35.5
Keep It Clean	9s301 IL Route 59	Commercial	36.6
Single family home	9S310 Aero Drive	Residential	32.5
Single family home	9S324 Aero Drive	Residential	33.4
Single family home	9S336 Aero Drive	Residential	34.4
Single family home	9S350 Aero Drive	Residential	34.8
Single family home	9S362 Aero Drive	Residential	33.2
Single family home	9S374 Aero Drive	Residential	35.2

Table 4: Noise Model Results at Property Lines, Critical Locations

Property Line Location	Noise Level dB(A)
Northwest-1	52.8
Northwest-2	42.0
Northcentral	39.8
Northeast	43.5
East-1	34.7
East-2	35.2
Southeast	33.5

Property Line Location	Noise Level dB(A)
Southcentral-1	33.4
Southcentral-2	33.3
Southcentral-3	33.9
Southwest	41.3
West-1	43.7
West-2	53.7

Existing Background Noise

The noise modeling accounts for noise generators on the proposed car wash site but does not account for the background noise that currently exists at the site today. **Appendix A** provides noise data collected at the site on August 9, 2023, around 12:15pm. These sound readings confirm that background noise intensities present today exceed both applicable Code standards and modeled noise intensities that will result from the proposed car wash at the key locations around the perimeter.

It is important to note that existing noise levels along the east property line of the site (rear residential property lines along Aero Drive) average 64.2 dB(A), a level noticeably higher than typical residential noise levels due to noise generated from traffic on IL 59, an IDOT/CMAP Strategic Regional Arterial, and from traffic on 83rd Street, a Major Collector. **Appendix A** shows existing sound data readings collected at a point referred to as tree tag 197. The City's residential noise ordinance-based standard is 55 dB(A) at daytime and 50 dB(A) at nighttime. **Table 5** summarizes the data collected that is referenced in discussion below.

A 12 foot high noise wall is also planned along the east property line of the site to further reduce noise generated by the car wash for the benefit of the adjacent residential properties along Aero Drive.

Table 5: Existing Sound Readings at Tree Tag 197

Property Line Location	Noise Level dB(A)
Reading in Photo 2	64.3
Reading in Photo 3	64.1
Reading in Photo 4	64.4
Reading in Photo 5	64.0
Average	**64.2**

Constructed Sound Wall Review

To adequately assess the mitigating effects of a 12-foot high sound wall, as proposed along the entire east side of the proposed Naperville car wash site, a review of noise conditions on the Jet Brite Car Wash site at 600 East Boughton Road in Bolingbrook was conducted. The 600 East Boughton Road site has a similar 12-foot-high noise wall that abates noise generated by the car wash as it sits adjacent to residential homes. Refer to **Appendix B** for the technical memorandum. In summary, noise readings at the 600 East Boughton Road site indicate that the 12 foot high noise wall reduces intensities an average of 21.7 dB(A) – see Table 1, Appendix B.

Different built sites have varying background noise profiles and onsite point source noise generators. However, the data in **Appendix B** shows that the mitigating effects of a sound wall are substantial. A 12 foot high sound wall constructed along the entire east property line together with the 10 foot high sound wall along the east side of the car wash tunnel exit, will result in less noise along the east property line (abutting the residential homes along Aero Drive) than exists today.

Conclusion

The primary source of noise from the proposed development will be the car wash tunnel exit. The other sources of noise include the tunnel entrance and central vacuum systems. Given the orientation of the car wash tunnel and the location of the tunnel exit to IL 59 and 83rd Street, the fact that the vacuum turbines are enclosed, and the distance from point source noise generators to sensitive receptors and property lines – the City's ordinance-based standards for exterior noise will be met when the proposed development is complete and operational.

Existing background noise from adjacent major roadways is intense and will exceed noise generated from the car wash development. In fact, with the construction of a 12 foot high sound wall along the east property line of the site, noise that is currently experienced by the residential homes along Aero Drive will be reduced as a result of the proposed development.

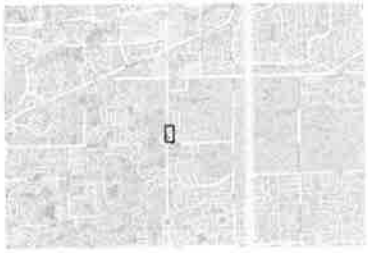
End Tech Memo

Exhibit 1 – Aerial Site Location


et Brite Car Wash Site
59 and 83rd Street, Naperville
Calvary Christian School
Accent Reduction by Accent Pros
59
Proposed Site
Aero Dr
36
Naper Aero Club Airport
Illinois Rte 59 & 83rd St
83rd St
West Naperville Kindercare
U.S. Bank Branch
59
The Goddard School of Naperville (83rd Street)
Rayito de Sol Spanish Immersion Early
600 ft
N
oogle Earth

Exhibit 1

Exhibit 2 – Car Wash Site Plan

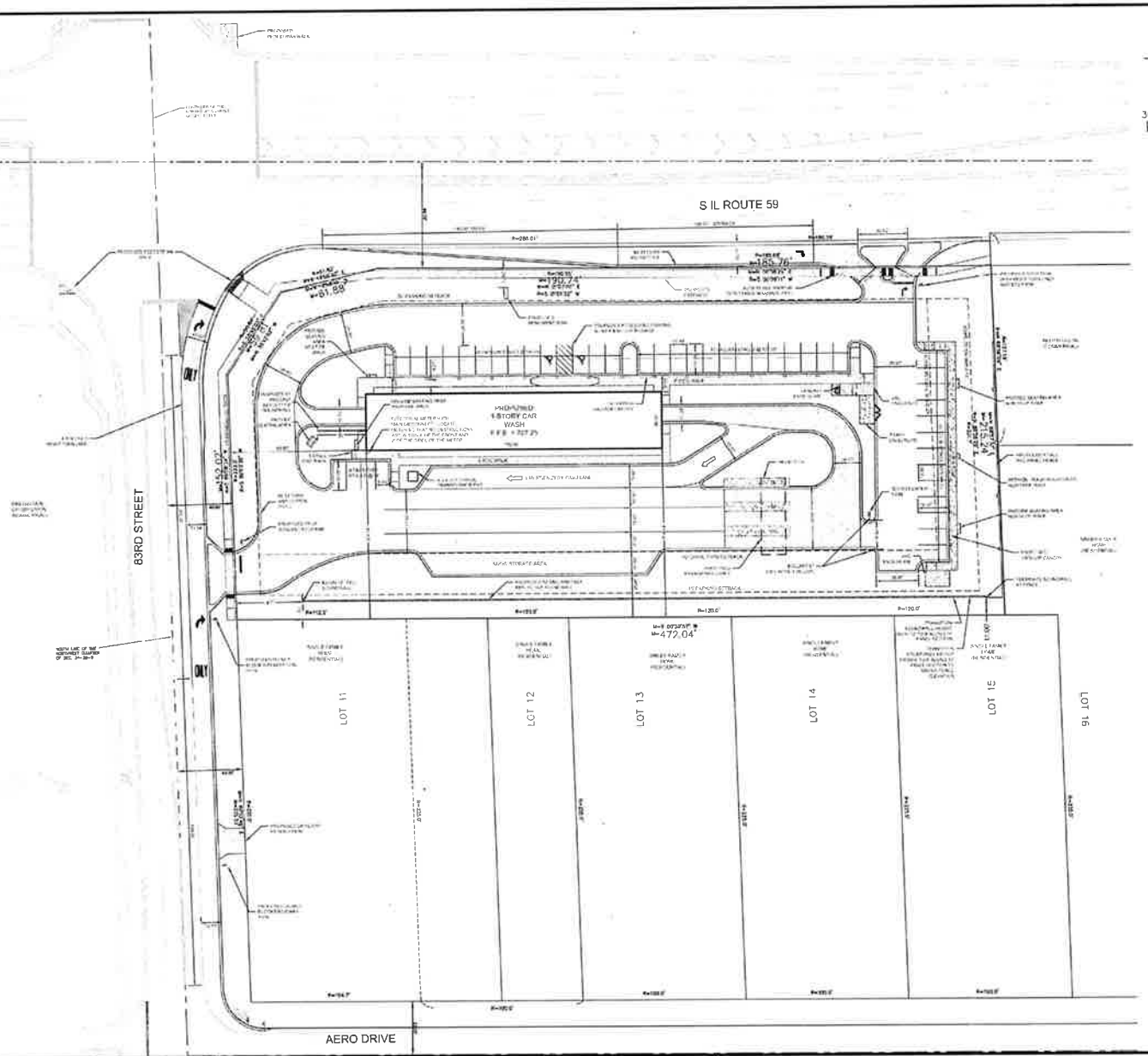


LOCATION MAP

SITE DATA

EXISTING ZONING	RESIDENTIAL
PROPOSED ZONING	B2 (PUD)
TOTAL LOT AREA	84,408 S.F. (1.938 AC)
LANDSCAPE AREA	21,911 S.F. (0.503 AC)
OPEN SPACE AREA PERCENT	31.5%
EXISTING IMPERVIOUS AREA	18 S.F.
PROPOSED IMPERVIOUS AREA	64,660 S.F.
REQUIRED STORMWATER DETENTION	4,399 CF (1.01 AC-FT)
PROVIDED STORMWATER DETENTION	4,400 CF (1.01 AC-FT)
BUILDING AREA	4,378 S.F.
ACCESSORY STRUCTURE AREA	459 S.F.
FAR ALLOWABLE	0.325
FAR PROPOSED	0.058
REQUIRED PARKING	29 (4.5 SPACES/ 1000 GROSS SFT)
PROPOSED PARKING	43 SPACES (TOTAL INCLUDING ACCESSIBLE PARKING)
REQUIRED STACKING	10 ENTERING WASH 2 EXITING WASH
PROVIDED STACKING	42
BICYCLE PARKING PROVIDED	5 SPACES

NOTES:
1. PROPOSED EMERGENCY BY-PASS EXIT. BOLLARDS WITH CHAIN CROSSING AND SIGNAGE TO BE PROVIDED TO RESTRICT GENERAL ACCESS. IN THE EVENT OF AN EMERGENCY, ONSITE STAFF WILL ASSIST WITH VACATING THE PAY BOOTH AND WASH DRIVE AREA.



DATE	REVISIONS		
12/19/22	REVISED PER CITY REVIEW 12/5/22	SCALE	AS NOTED
1/13/23	REVISED PER CITY REVIEW 1/11/23	DRAWN	CAB
8/21/23	ADDED RIGHT TURN LANE & SOUND WALL	CHECKED	LDK
		APPROVED	
		DATE	11/4/22
		ISSUED FOR	PERMIT SET

VEENSTRA & KIMM INC.

JET BRITE CAR WASH
IL 59 AND 83RD STREET NAPERVILLE, IL

552 W. Boughton Road • Bolingbrook, IL 60440
630.755.0293 • 866-600-2004

SITE PLAN

DWG. NO.
Exhibit 2
PROJECT #6852

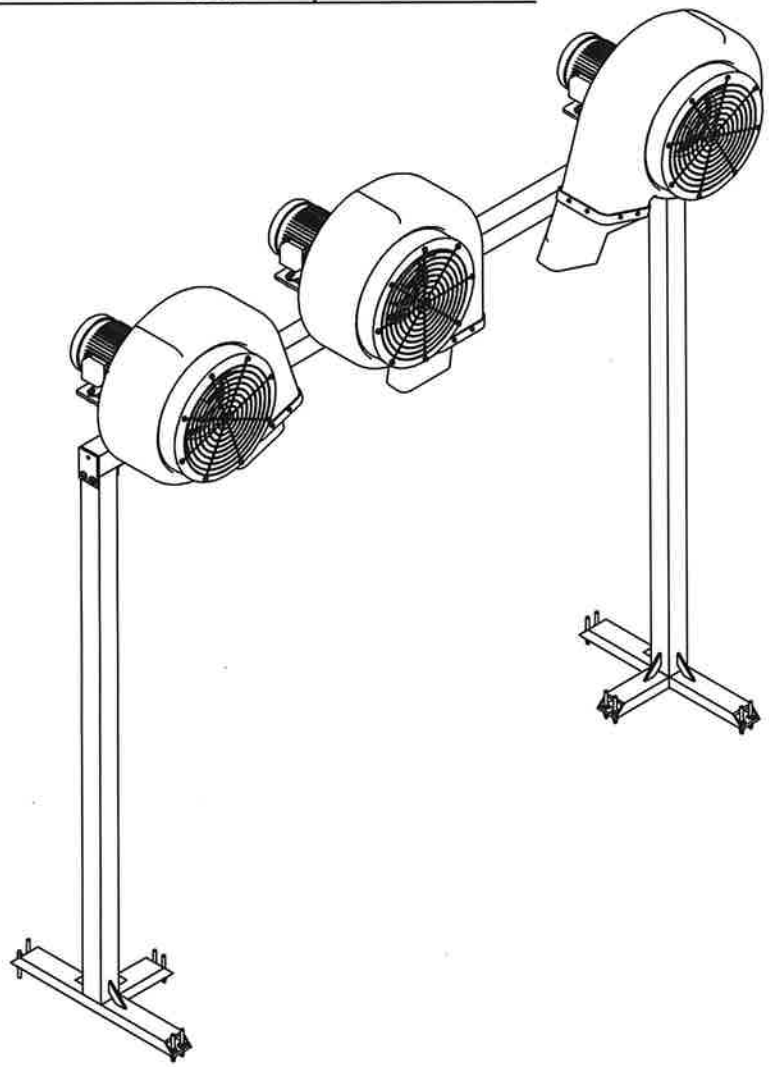
JOB NO. 6852 VEENSTRA & KIMM, INC., DESIGN FIRM REGISTRATION NUMBER 184.001939

PLOTTED: Monday, August 14, 2023 2:36:39 PM

FILE PATH: S:\PROJECTS\2022\6852 JET BRITE NAPERVILLE CAR WASH\CAD\DRAWINGS\DESIGN DEVELOPMENT\CIVIL\6852_SITE

Exhibit 3 – Blower Sound Illustration

Enviromental Noise with Drayer OFF: 70 dba



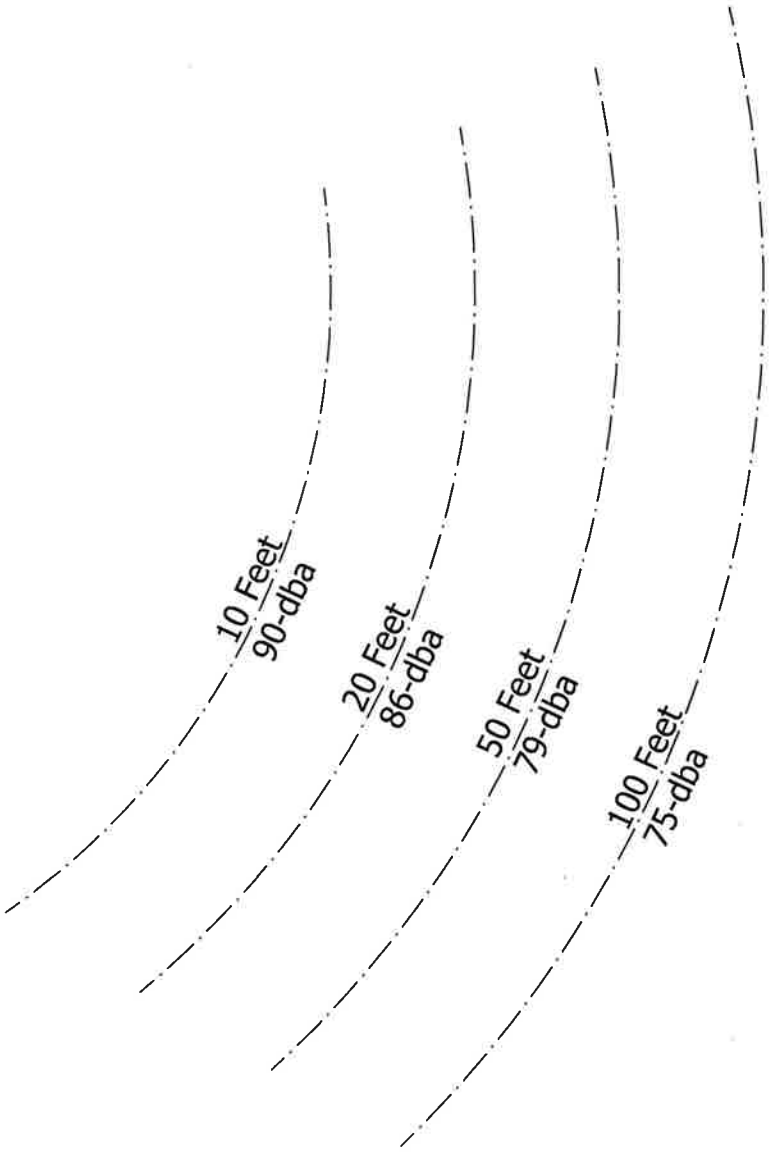


Exhibit 3

THIRD ANGLE PROJECTION BREAK ALL SHARP CORNERS. PART TO BE FREE OF BURRS. UNLESS OTHERWISE SPECIFIED, ALL DIMENSIONS ARE IN INCHES	MACHINING TOLERANCES FRACTION± 1/16" .XX DECIMAL ± 0.030 .XXX DECIMAL ± 0.005 ANGULARITY ± 2° FINISH 125	DRAWN L Verdecia 8/26/2011 APPROVED CATEGORY BLOWER	**SONNY'S ENTERPRISES** **THE CARWASH FACTORY** DESCRIPTION BLOWER ASSEMBLY, ONE ARCH 45HP PART NUMBER BL1-45HP-1	
MATERIAL			SHEET 2 OF 2	SIZE A / SCALE N.T.S.

Exhibit 4 – Vacuum Turbine Details

Industravac® Series E
Component Models

Vacuum Producer | Separator | Interconnecting Kit

Industravac® Series E Vacuum Producer and Separator components interconnected with piping. (Note: Components ship in (3) pieces.)

Number of Operators

Catalog Number	Numbers of Operators*	Motor HP
SE410-C	4	10
SE415-C	6	15
SE420-C	8	20
SE510-C	3	10
SE515-C	5	15
SE520-C	7	20
SE525-C	8	25
SE615-C	4	15
SE620-C	5	20
SE625-C	7	25

Performance based on 70 °F inlet temperature at sea level.
*Based on 100 SCFM/Operator with 1½" diameter x 15 feet hose.

Materials of Construction

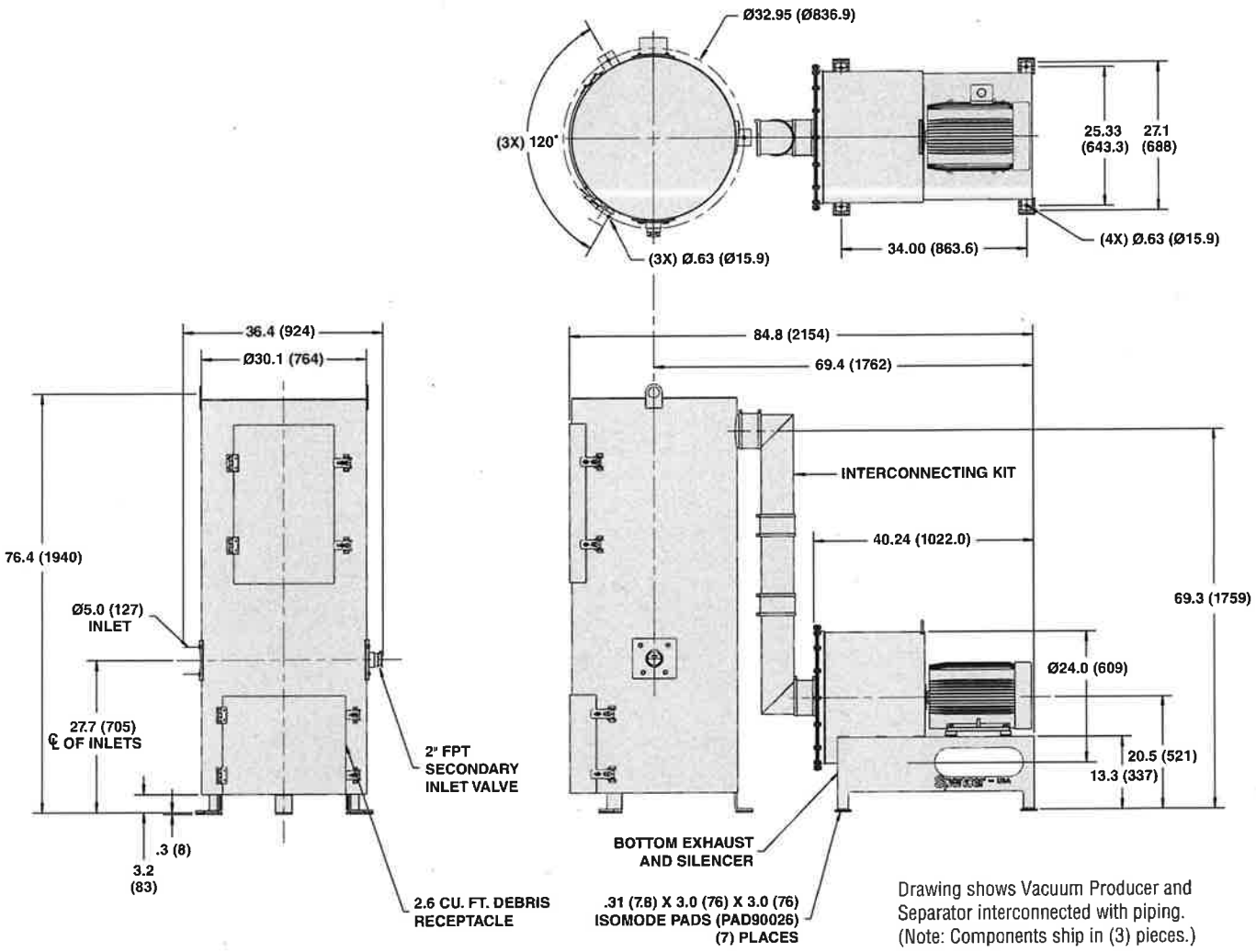
- Casing, separator, base: ASTM A1011 hot-rolled steel
- Impellers: 5052-H34 aluminum
- Shaft: AISI-1045 hot-rolled bar steel
- Removable debris receptacle: High density polyethylene
- Finish: Epoxy primer with Spencer blue urethane topcoat

Product Features

Vacuum Producer
Multistage centrifugal
Standard overhung direct drive
Bottom exhaust with silencer (Patent No. 4,874,410)
Average sound level from 84 dBA at 3 feet
Factory performance tested
Motor
10, 15, 20 or 25 HP, 3500 rpm
200-230/460 or 575 volt, three phase, 60 Hz
TEFC
Bearing life: 100,000 hours (L-10)
Separator
Tubular bag separator, shaker type: 30" diameter
Multiple-inverted filter bags: Quantity 12
Filter bag area: 56.5 sq. ft
Filter bag material: cotton sateen (P/N BVA90051)
Filter bag diameter: 6" (Cat. No. 6445-N)
Internal manual bag shaker
Large, hinged inspection door (accepts padlock)
Removable debris receptacle, capacity: 2.6 cu. ft. (small hinged access door accepts padlock)
Average filtration efficiency: 99.9% at 3 microns
Axial inlets with target plate: primary inlet – 5" tubing with sleeve secondary inlet – inlet valve (P/N VLV90083) for 1½" diameter hose
Interconnecting kit (P/N KIO90021): (2) 90° mitered elbows (P/N ELT90689) and (3) rubber sleeve/clamp kits (P/N KAC90062)
Available Options
Explosion-proof and premium efficiency motors
NEMA 4, 7 and 9 starter enclosures
Grounded filter bags
Other filter bag materials
Inlet valve (P/N VLV90100) for 2" diameter hose
Island adapter kit (P/N PLT90023)
Bottom discharge conversion adapter to change to 6" tube horizontal on motor end (P/N KAC90267)

Exhibit 4

▶ **Dimensions:** Shown in inches / (mm)



Drawing shows Vacuum Producer and Separator interconnected with piping. (Note: Components ship in (3) pieces.)

Performance Data	Motor Data	Separator Filter Data
Number of Operators	HP RPM	Area: 56.5 sq. ft.
Catalog No.	Voltage	Bag Quantity: 12
Discharge Pressure (PSIA)	Phase Hz	Bag Catalog No.: 6445-N
Inlet Temperature (°F)	Enclosure	Bag Material:

▶ Spencer may make improvements and dimensional changes to equipment designs based on market trends and requirements.

For product selection assistance, please email marketing@spencer-air.com or visit our website at www.spencerturbine.com to locate the Spencer representative in your area.

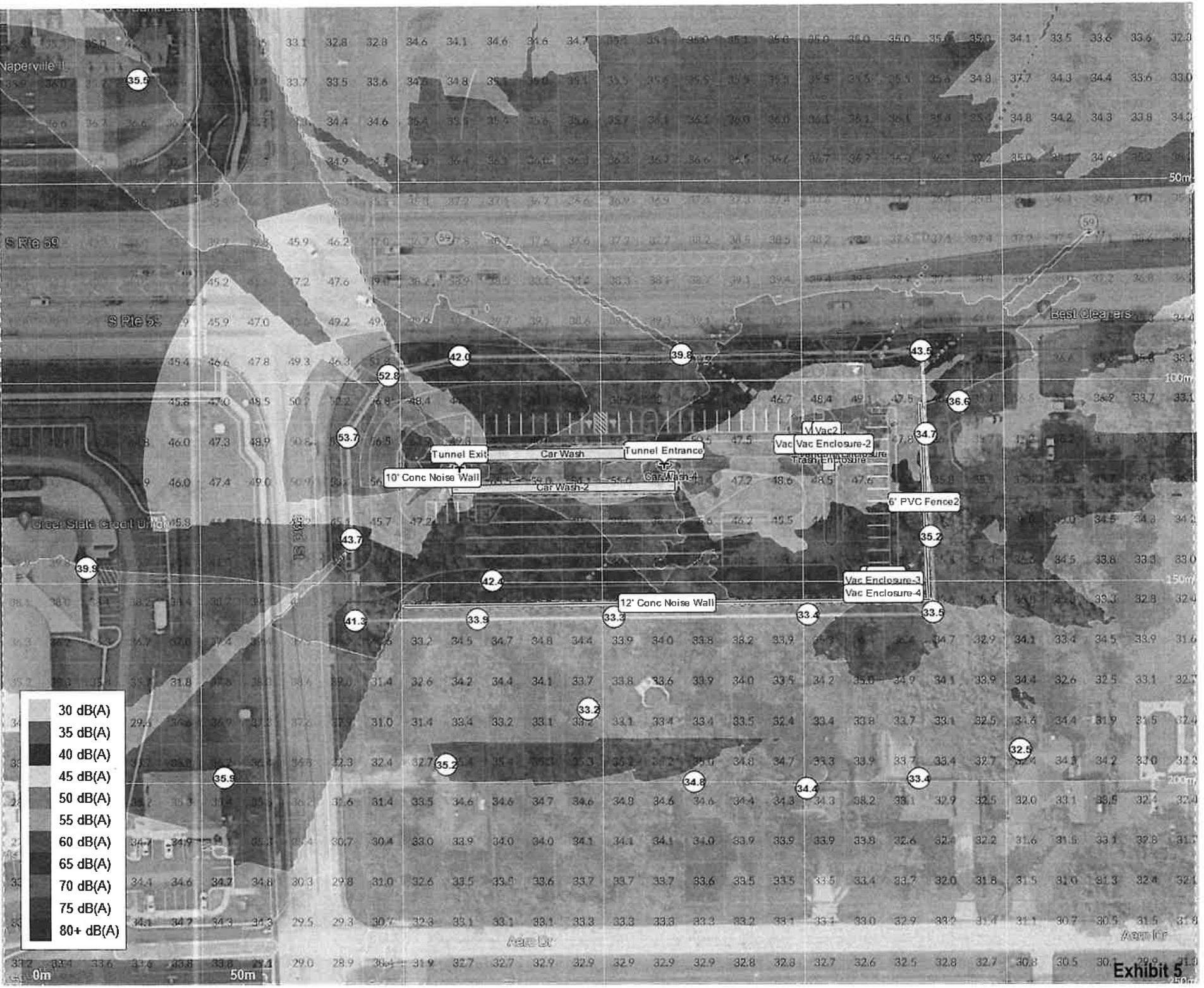
Car Care Vacuum Systems with an Engineering Edge

The Spencer Turbine Company, 600 Day Hill Road, Windsor, CT 06095 USA
TEL 800.232.4321 ◆ 860.688.8361 ◆ FAX 860.688.0098 ◆ www.spencerturbine.com

TDS_299 Printed in USA 042817KBA

Exhibit 4

Exhibit 5 – Noise Contour Map


Tunnel Exit
Car Wash
Tunnel Entrance
10' Conc Noise Wall
Car Wash-2
Car Wash-4
Vac Enclosure-2
6' PVC Fence2
Vac Enclosure-3
Vac Enclosure-4
12' Conc Noise Wall
30 dB(A)
35 dB(A)
40 dB(A)
45 dB(A)
50 dB(A)
55 dB(A)
60 dB(A)
65 dB(A)
70 dB(A)
75 dB(A)
80+ dB(A)
0m
50m
50m
100m
150m
200m
Exhibit 5

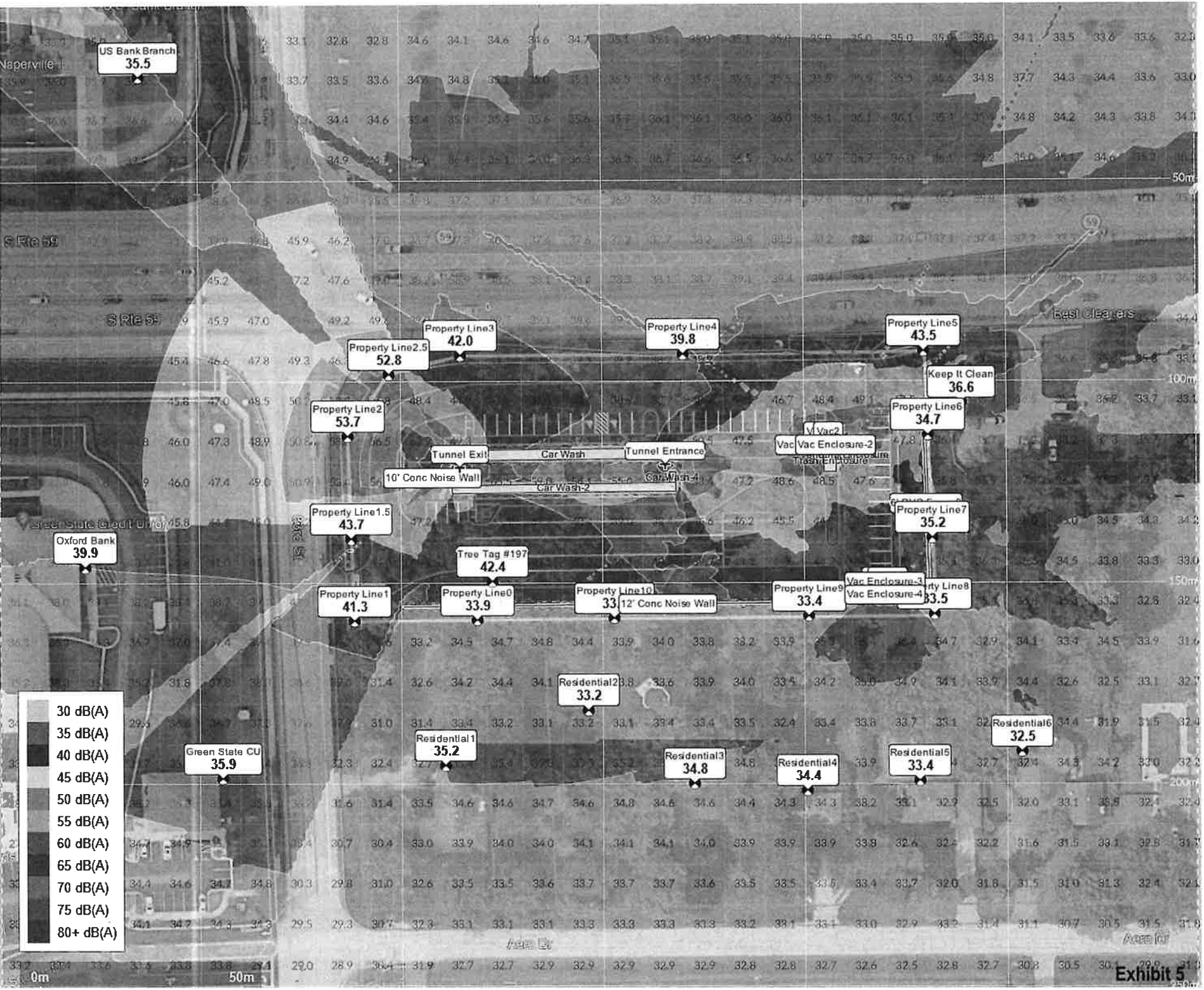
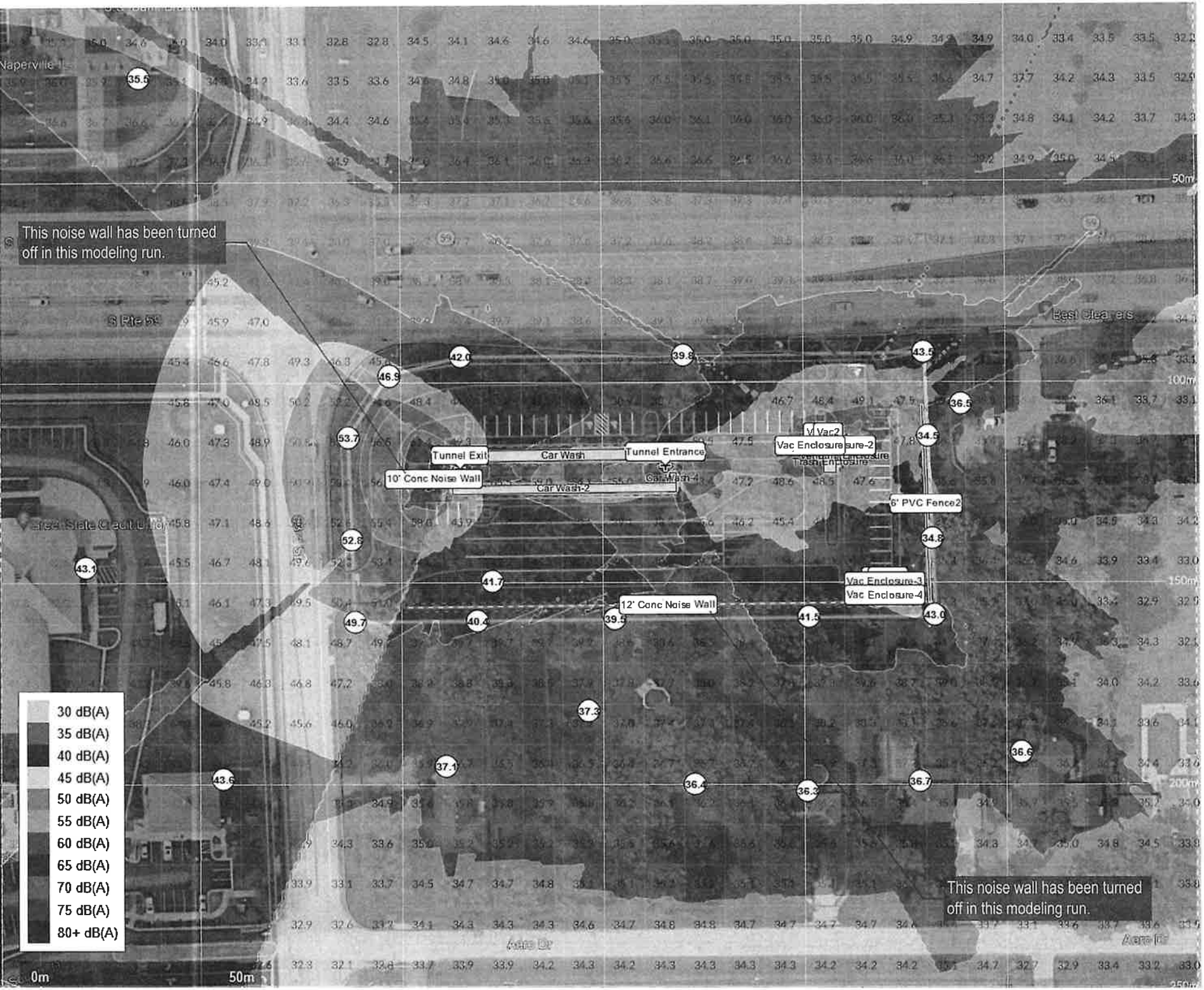
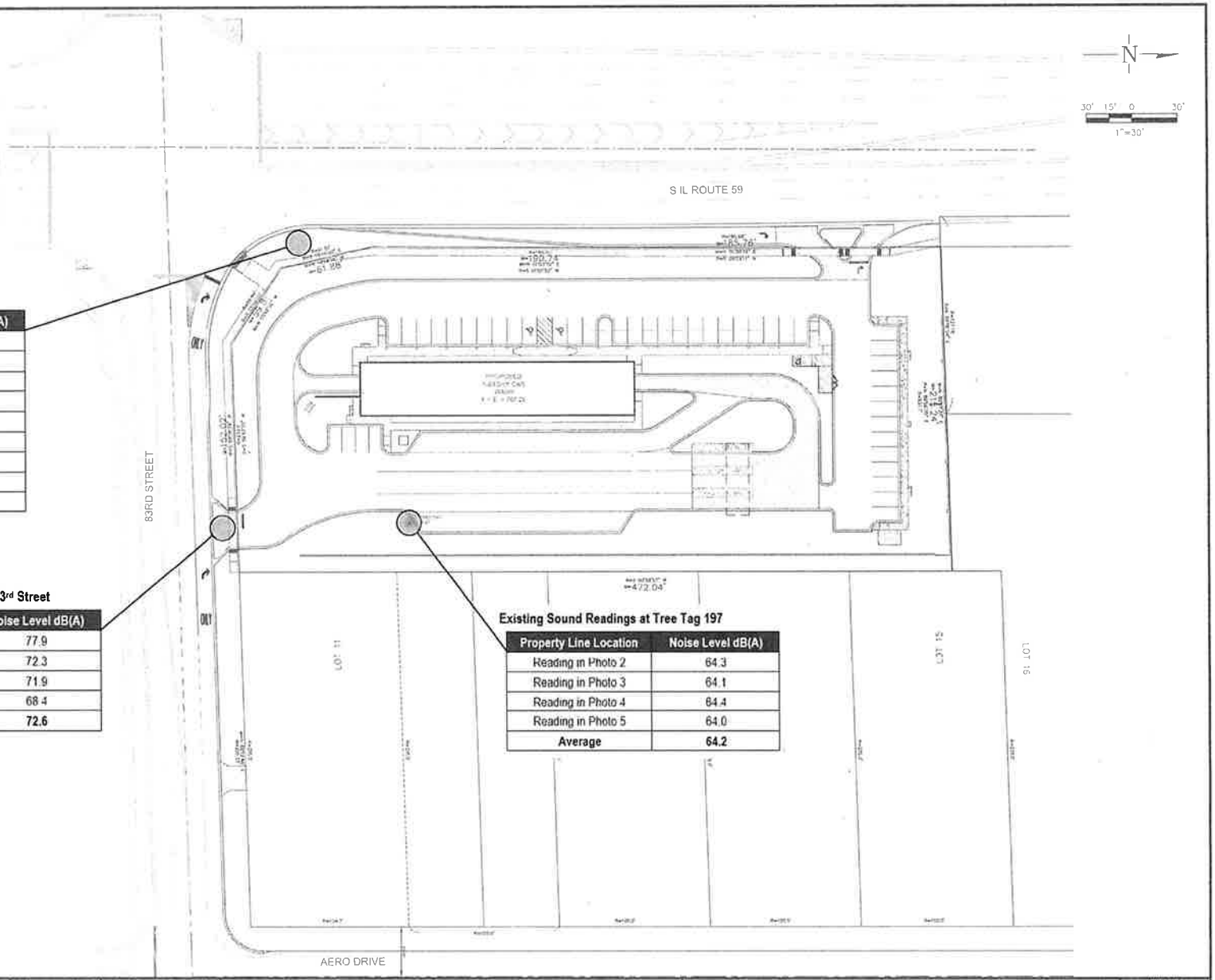

US Bank Branch
35.5
Property Line3
42.0
Property Line4
39.8
Property Line5
43.5
Property Line2.5
52.8
Keep It Clean
36.6
Property Line2
53.7
Property Line6
34.7
Tunnel Exit
Car Wash
Tunnel Entrance
Vac Enclosure-2
10' Conc Noise Wall
Car Wash-4
Car Wash-2
Property Line1.5
43.7
Property Line7
35.2
Oxford Bank
39.9
Tree Tag #197
42.4
Property Line1
41.3
Property Line0
33.9
Property Line10
33
12' Conc Noise Wall
Property Line9
33.4
Vac Enclosure-3
Vac Enclosure-4
Property Line8
33.5
Residential2
33.2
Residential6
32.5
Residential1
35.2
Green State CU
35.9
Residential3
34.8
Residential4
34.4
Residential5
33.4
30 dB(A)
35 dB(A)
40 dB(A)
45 dB(A)
50 dB(A)
55 dB(A)
60 dB(A)
65 dB(A)
70 dB(A)
75 dB(A)
80+ dB(A)
0m
50m
Exhibit 5

Exhibit 6 – Noise Contour Map (No Noise Walls)


This noise wall has been turned off in this modeling run.
Tunnel Exit
Car Wash
Tunnel Entrance
10' Conc Noise Wall
Car Wash-2
Car Wash-4
Vac Enclosure-2
6' PVC Fence2
Vac Enclosure-3
Vac Enclosure-4
12' Conc Noise Wall
This noise wall has been turned off in this modeling run.
30 dB(A)
35 dB(A)
40 dB(A)
45 dB(A)
50 dB(A)
55 dB(A)
60 dB(A)
65 dB(A)
70 dB(A)
75 dB(A)
80+ dB(A)
0m
50m

Appendix A – Existing Site Background Noise

LOCATION MAP



Existing Sound Readings along IL 59

Property Line Location	Noise Level dB(A)
Reading in Photo 10	86.2
Reading in Photo 11	85.3
Reading in Photo 12	86.1
Reading in Photo 13	85.9
Reading in Photo 14	84.9
Reading in Photo 15	85.6
Reading in Photo 16	89.1
Reading in Photo 17	84.0
Average	**85.9**

Existing Sound Readings along 83rd Street

Property Line Location	Noise Level dB(A)
Reading in Photo 2	77.9
Reading in Photo 3	72.3
Reading in Photo 4	71.9
Reading in Photo 5	68.4
Average	**72.6**

Existing Sound Readings at Tree Tag 197

Property Line Location	Noise Level dB(A)
Reading in Photo 2	64.3
Reading in Photo 3	64.1
Reading in Photo 4	64.4
Reading in Photo 5	64.0
Average	**64.2**

DATE	REVISIONS

VEENSTRA & KIMM INC.

JET BRITE CAR WASH
IL 59 AND 83RD STREET NAPERVILLE, IL

552 W. Boughton Road • Bolingbrook, IL 60440
630.759.0292 • 866.620.2034

EXISTING SITE NOISE LEVELS - AUGUST 9, 2023

DWG. NO.
EXHIBIT
1 OF 1
PROJECT 6662

JOB NO. 6662 VEENSTRA & KIMM, INC., DESIGN FIRM REGISTRATION NUMBER: 184.001939

Photo 1

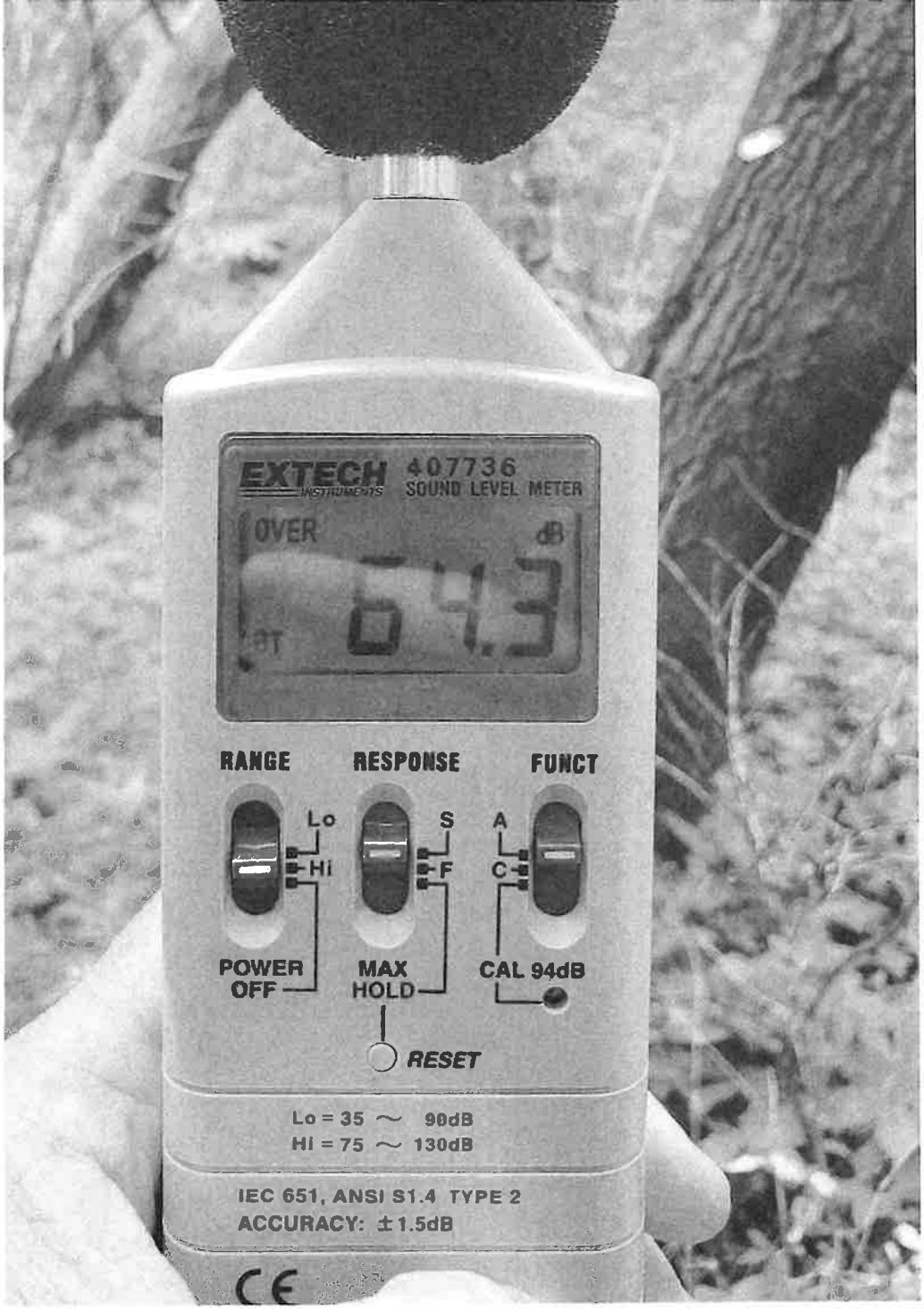

EXTECH
407736
SOUND LEVEL METER
OVER
dB
64.3
RANGE
RESPONSE
FUNCT
Lo
Hi
S
F
A
C
POWER OFF
MAX HOLD
CAL 94dB
RESET
Lo = 35 ~ 90dB
Hi = 75 ~ 130dB
IEC 651, ANSI S1.4 TYPE 2
ACCURACY: ±1.5dB
CE

Photo 2

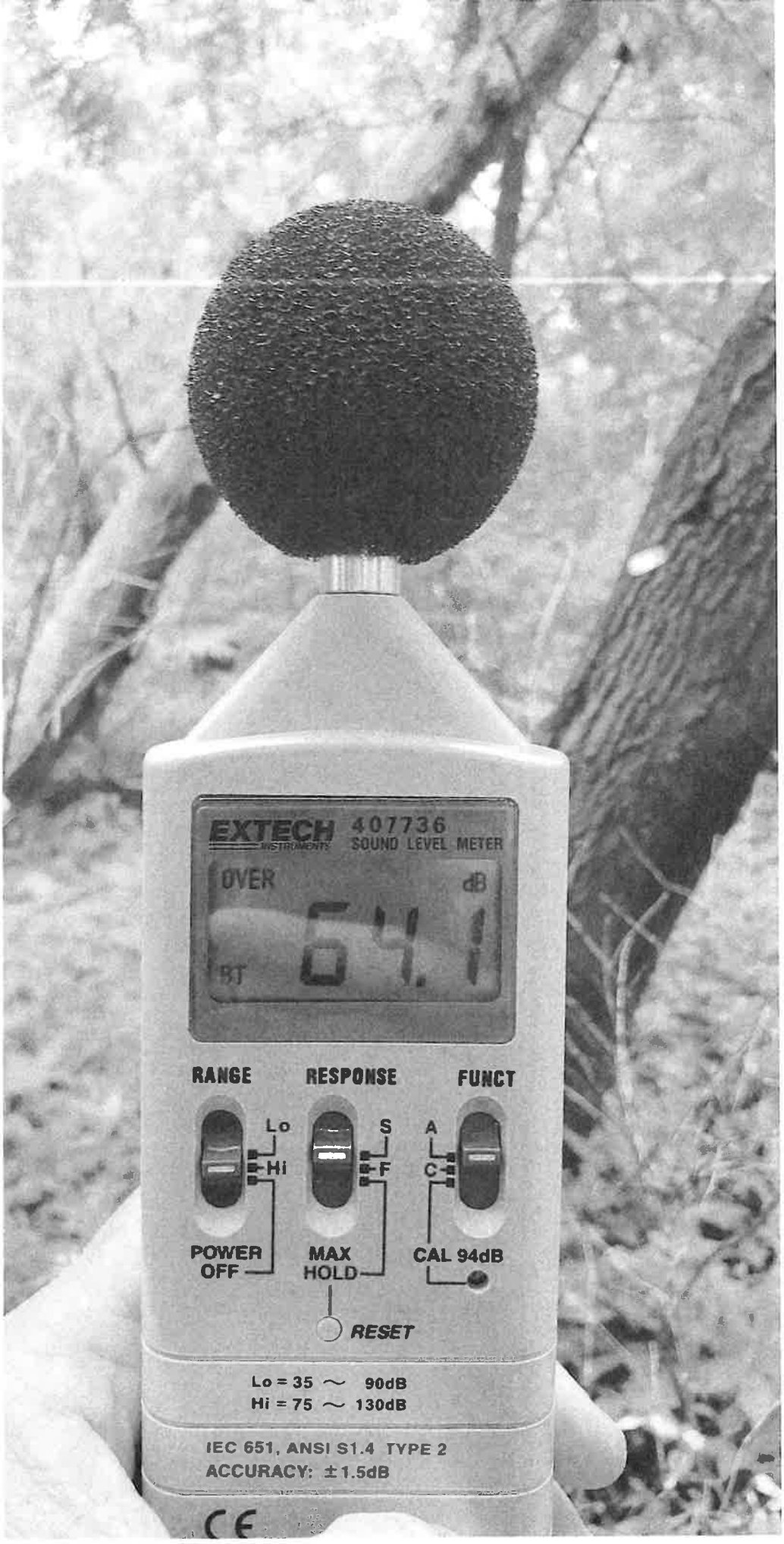

EXTECH
407736
SOUND LEVEL METER
OVER
dB
BT
64.1
RANGE
RESPONSE
FUNCT
Lo
Hi
S
F
A
C
POWER
OFF
MAX
HOLD
CAL 94dB
RESET
Lo = 35 ~ 90dB
Hi = 75 ~ 130dB
IEC 651, ANSI S1.4 TYPE 2
ACCURACY: ±1.5dB
CE

Photo 3

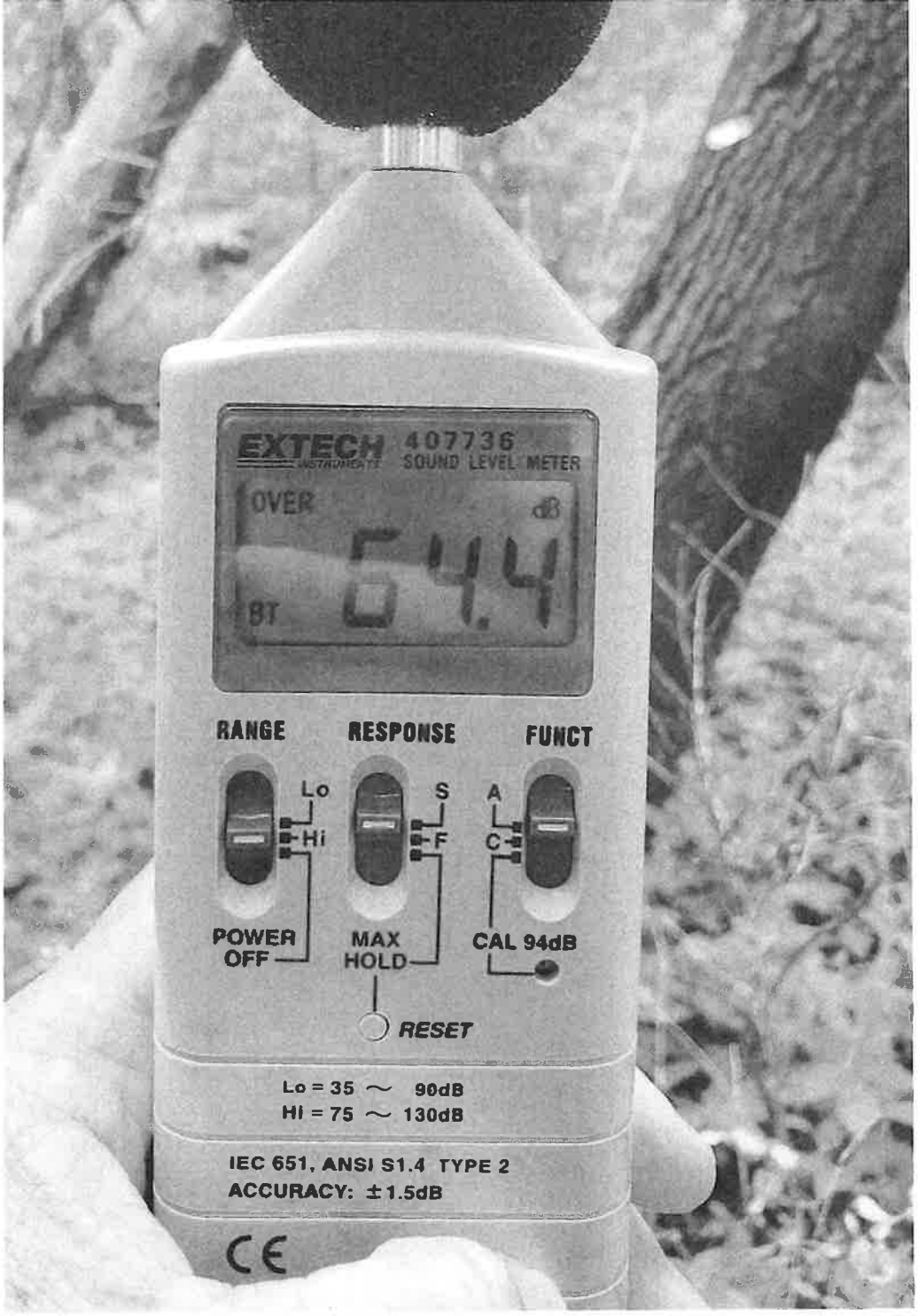

EXTECH
407736
SOUND LEVEL METER
OVER
dB
64.4
BT
RANGE
RESPONSE
FUNCT
Lo
Hi
S
F
A
C
POWER
OFF
MAX
HOLD
CAL 94dB
RESET
Lo = 35 ~ 90dB
Hi = 75 ~ 130dB
IEC 651, ANSI S1.4 TYPE 2
ACCURACY: ±1.5dB
CE

Photo 4

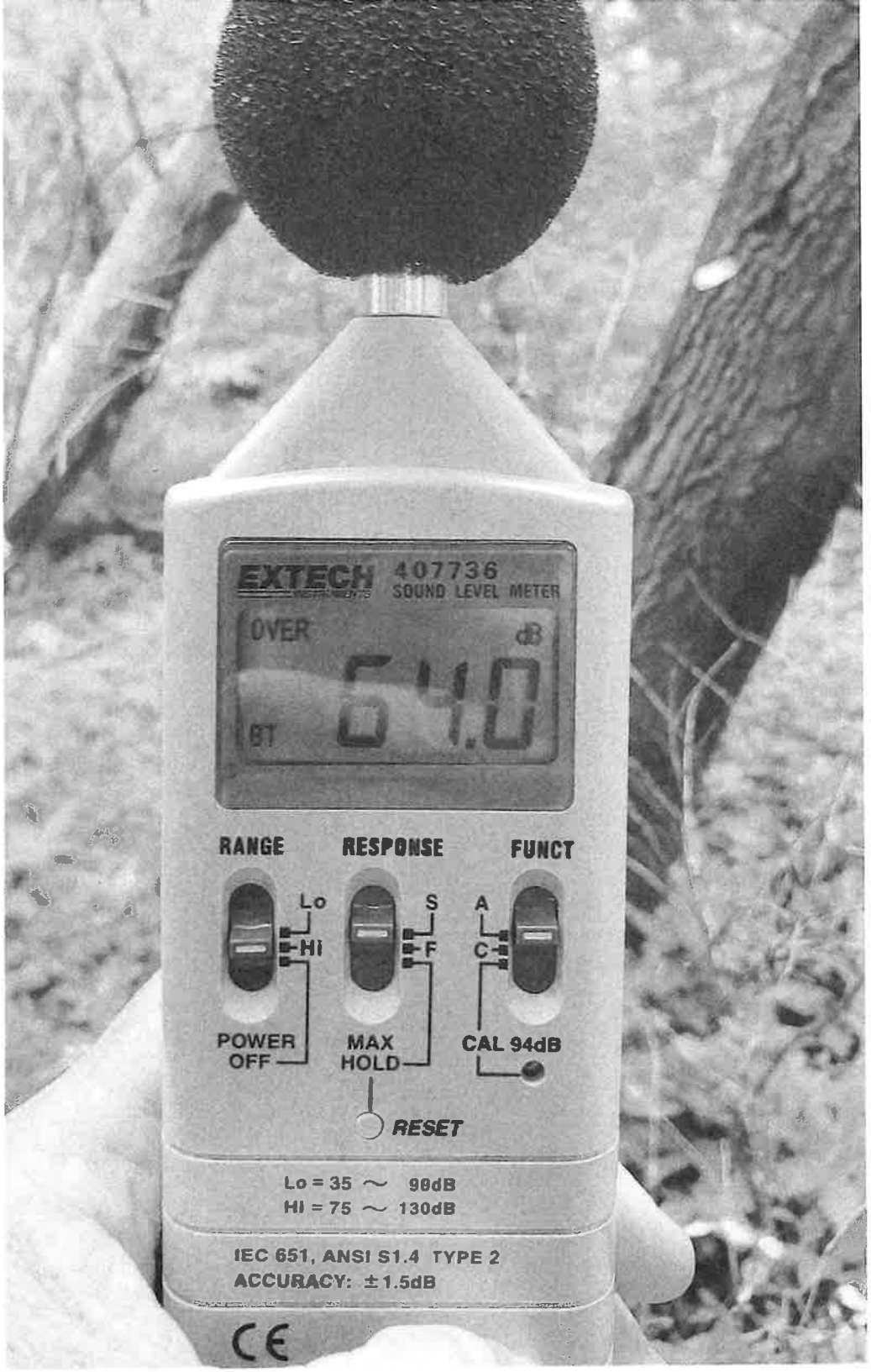

EXTECH
407736
SOUND LEVEL METER
OVER
dB
BT
64.0
RANGE
RESPONSE
FUNCT
Lo
Hi
S
F
A
C
POWER
OFF
MAX
HOLD
CAL 94dB
RESET
Lo = 35 ~ 90dB
HI = 75 ~ 130dB
IEC 651, ANSI S1.4 TYPE 2
ACCURACY: ±1.5dB
CE

Photo 5

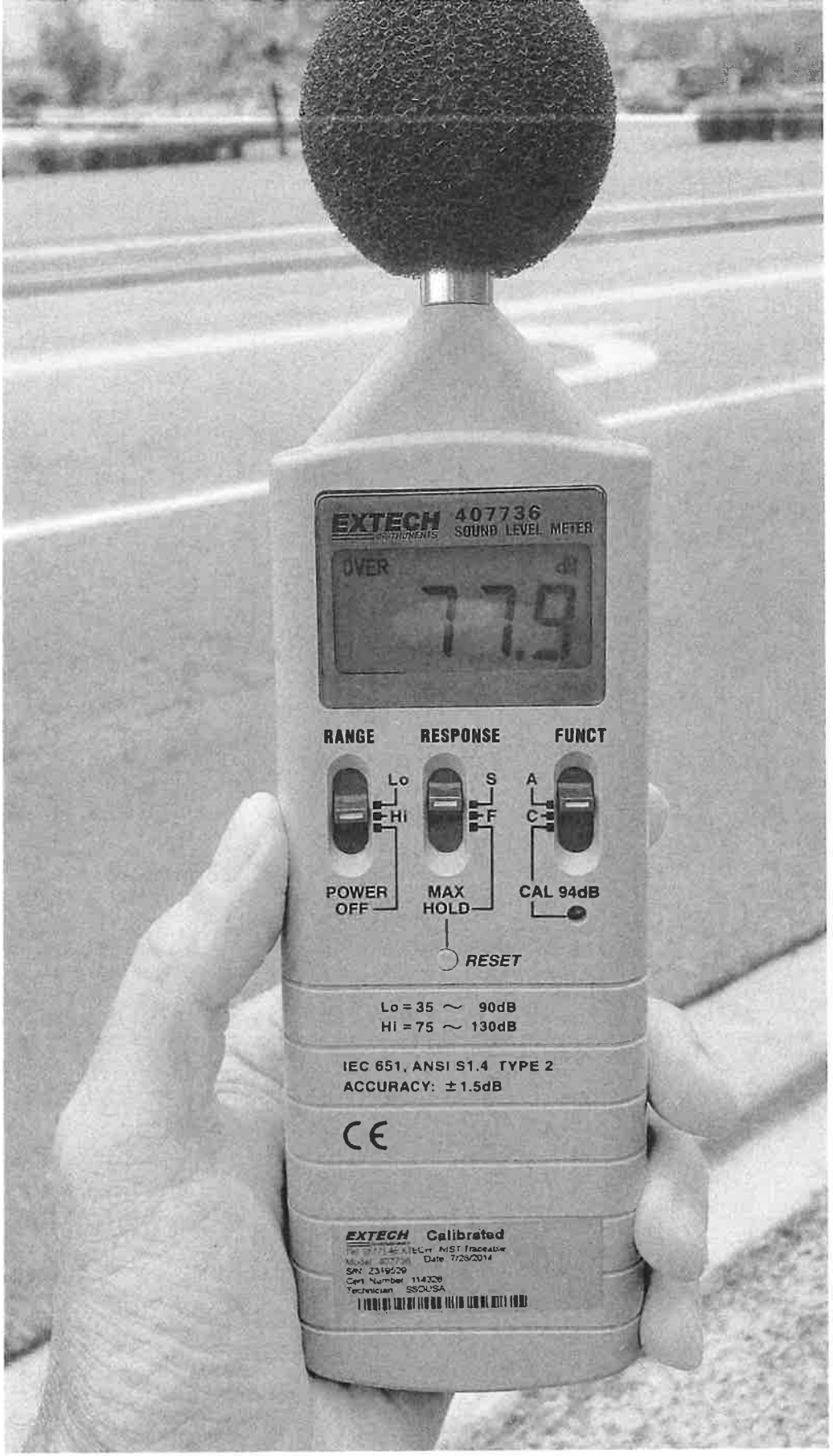

EXTECH 407736
SOUND LEVEL METER
OVER
dB
77.9
RANGE
RESPONSE
FUNCT
Lo
Hi
S
F
A
C
POWER OFF
MAX HOLD
CAL 94dB
RESET
Lo = 35 ~ 90dB
Hi = 75 ~ 130dB
IEC 651, ANSI S1.4 TYPE 2
ACCURACY: ±1.5dB
CE
EXTECH Calibrated
Date 7/28/2014
SN: Z319529
Cert Number 114308
Technician SSOUSA

Photo 6

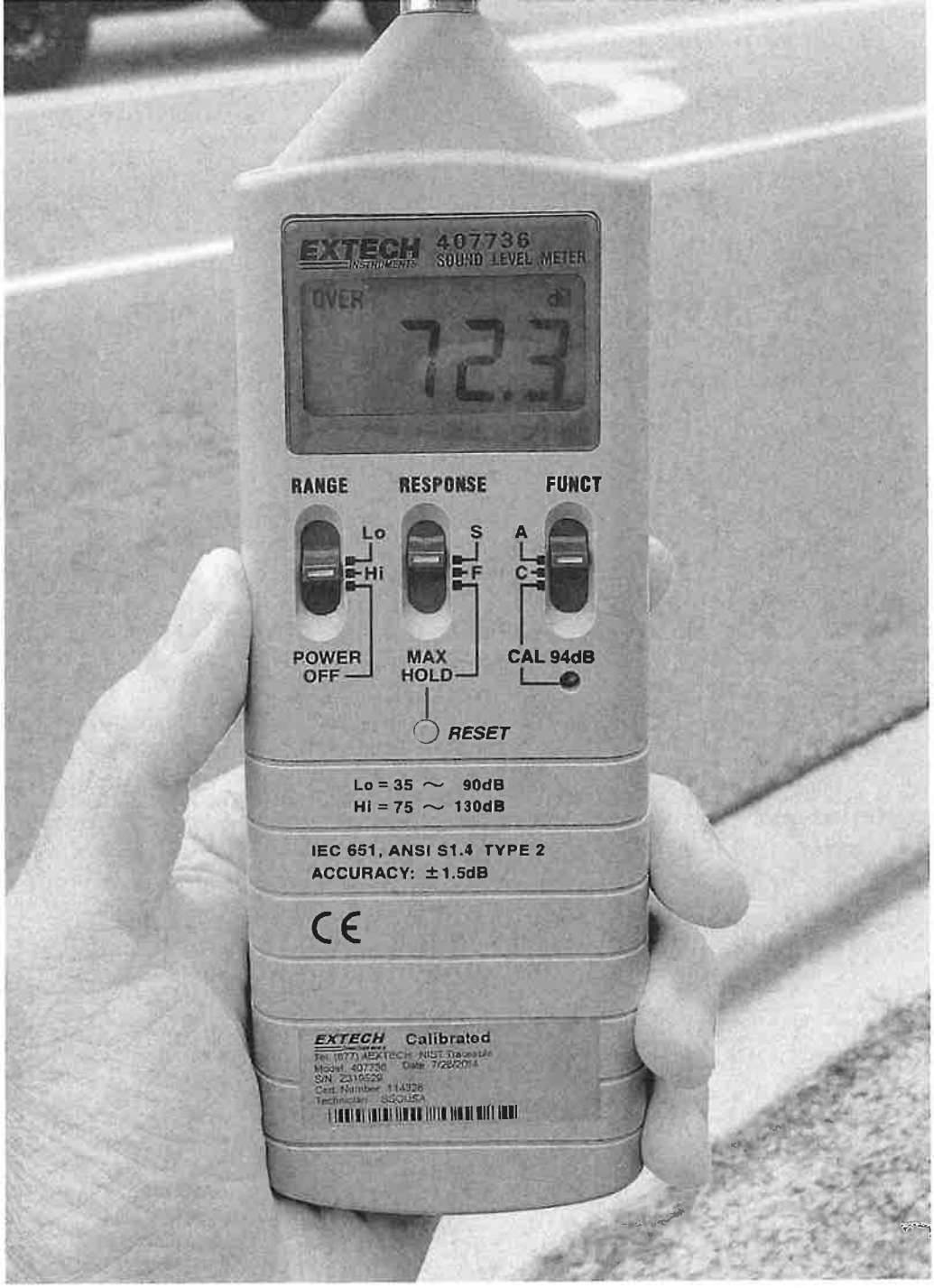

EXTECH
407736
SOUND LEVEL METER
OVER
dB
72.3
RANGE
RESPONSE
FUNCT
Lo
Hi
S
F
A
C
POWER OFF
MAX HOLD
CAL 94dB
RESET
Lo = 35 ~ 90dB
Hi = 75 ~ 130dB
IEC 651, ANSI S1.4 TYPE 2
ACCURACY: ±1.5dB
CE
EXTECH Calibrated

Photo 7


EXTECH
407736
SOUND LEVEL METER
OVER
dB
71.9
RANGE
RESPONSE
FUNCT
Lo
Hi
S
F
A
C
POWER
OFF
MAX
HOLD
CAL 94dB
RESET
Lo = 35 ~ 90dB
Hi = 75 ~ 130dB
IEC 651, ANSI S1.4 TYPE 2
ACCURACY: ±1.5dB
CE
EXTECH Calibrated

Photo 8

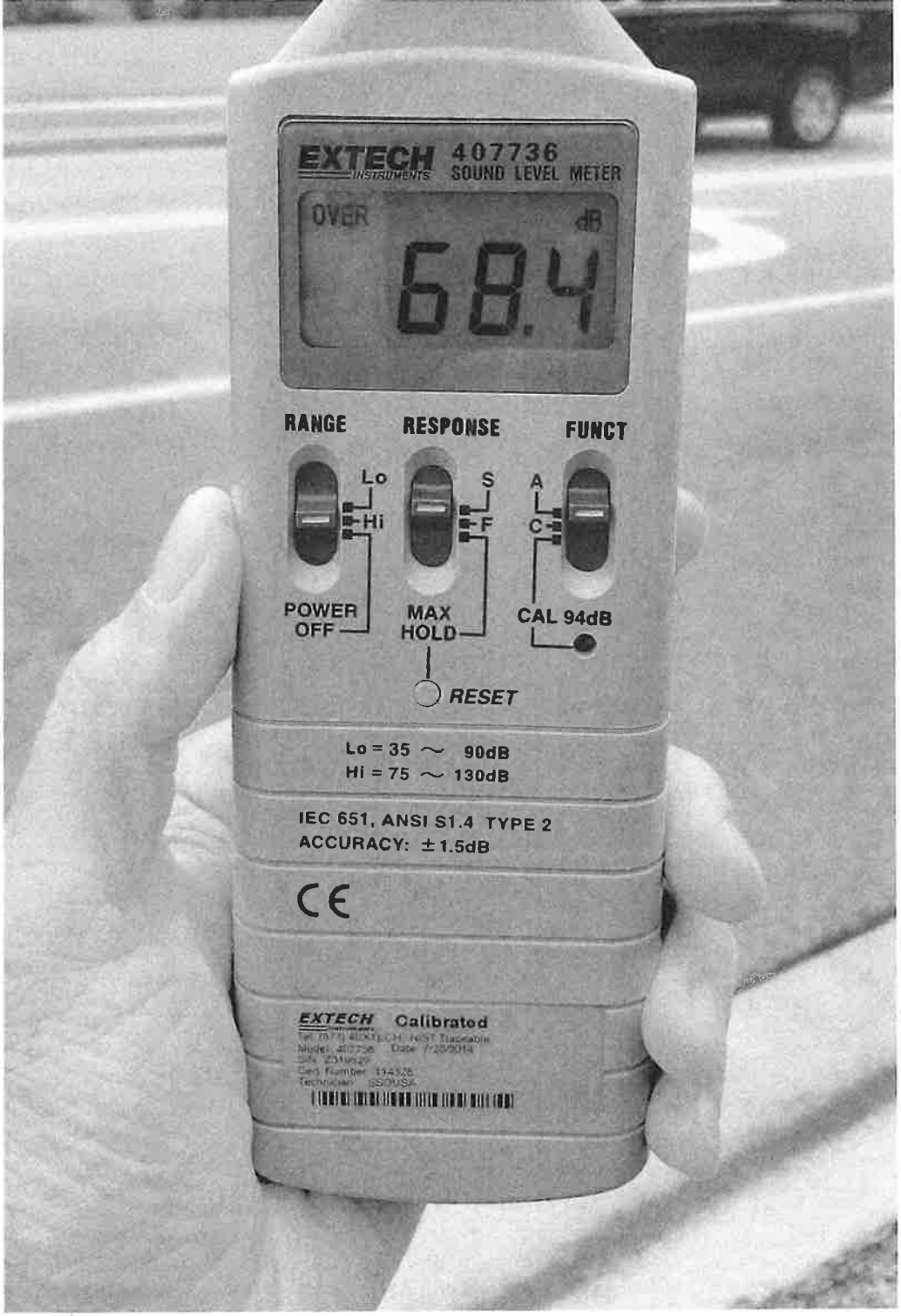

EXTECH
407736
SOUND LEVEL METER
OVER
dB
68.4
RANGE
RESPONSE
FUNCT
Lo
Hi
S
F
A
C
POWER
OFF
MAX
HOLD
CAL 94dB
RESET
Lo = 35 ~ 90dB
Hi = 75 ~ 130dB
IEC 651, ANSI S1.4 TYPE 2
ACCURACY: ±1.5dB
CE
EXTECH Calibrated

Photo 9

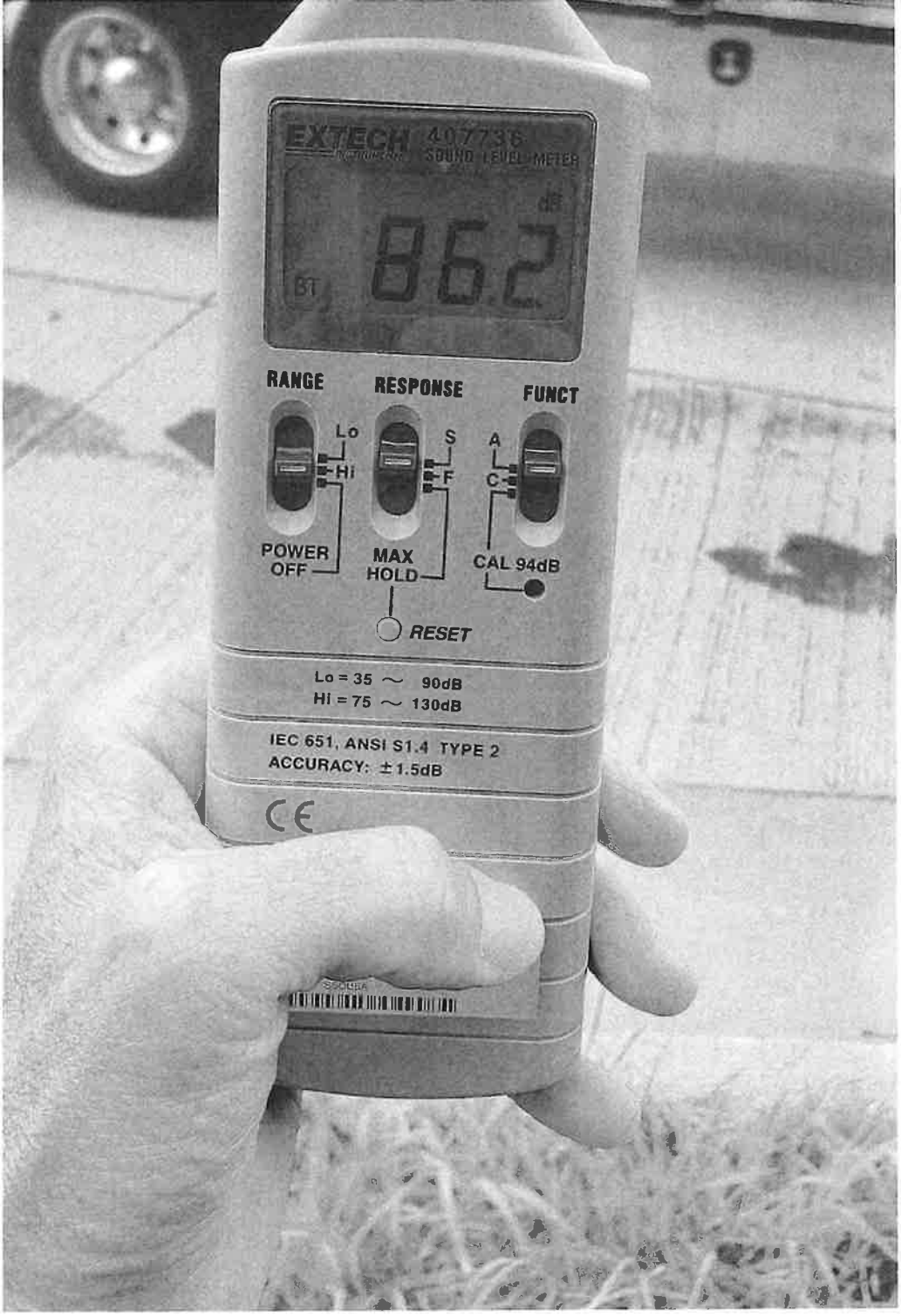

EXTECH 407736
SOUND LEVEL METER
dB
86.2
RANGE
RESPONSE
FUNCT
Lo
Hi
S
F
A
C
POWER OFF
MAX HOLD
CAL 94dB
RESET
Lo = 35 ~ 90dB
Hi = 75 ~ 130dB
IEC 651, ANSI S1.4 TYPE 2
ACCURACY: ±1.5dB
CE

Photo 10

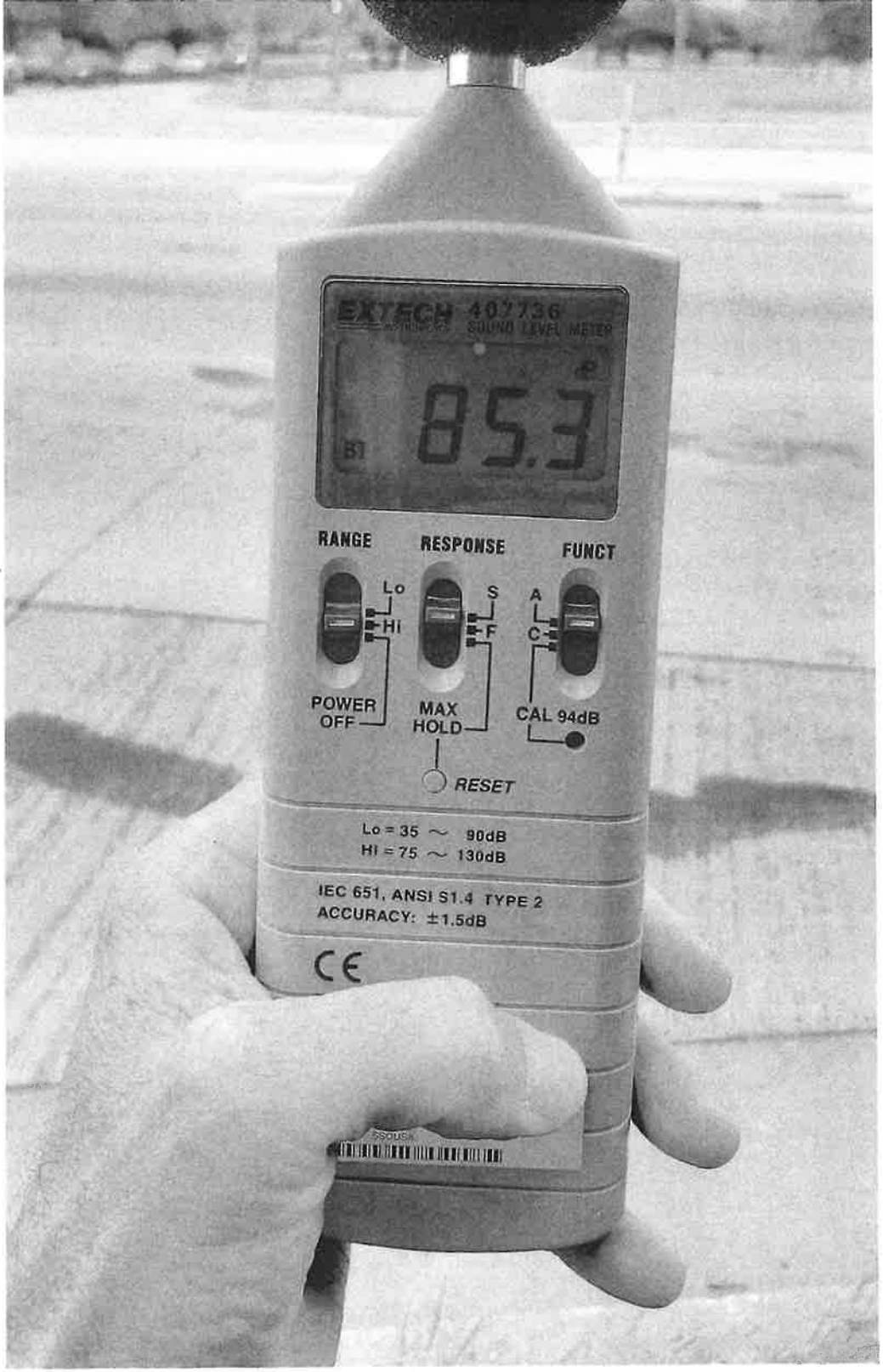

EXTECH 407736
SOUND LEVEL METER
85.3
RANGE
RESPONSE
FUNCT
Lo
Hi
S
F
A
C
POWER OFF
MAX HOLD
CAL 94dB
RESET
Lo = 35 ~ 90dB
Hi = 75 ~ 130dB
IEC 651, ANSI S1.4 TYPE 2
ACCURACY: ±1.5dB
CE

Photo 11

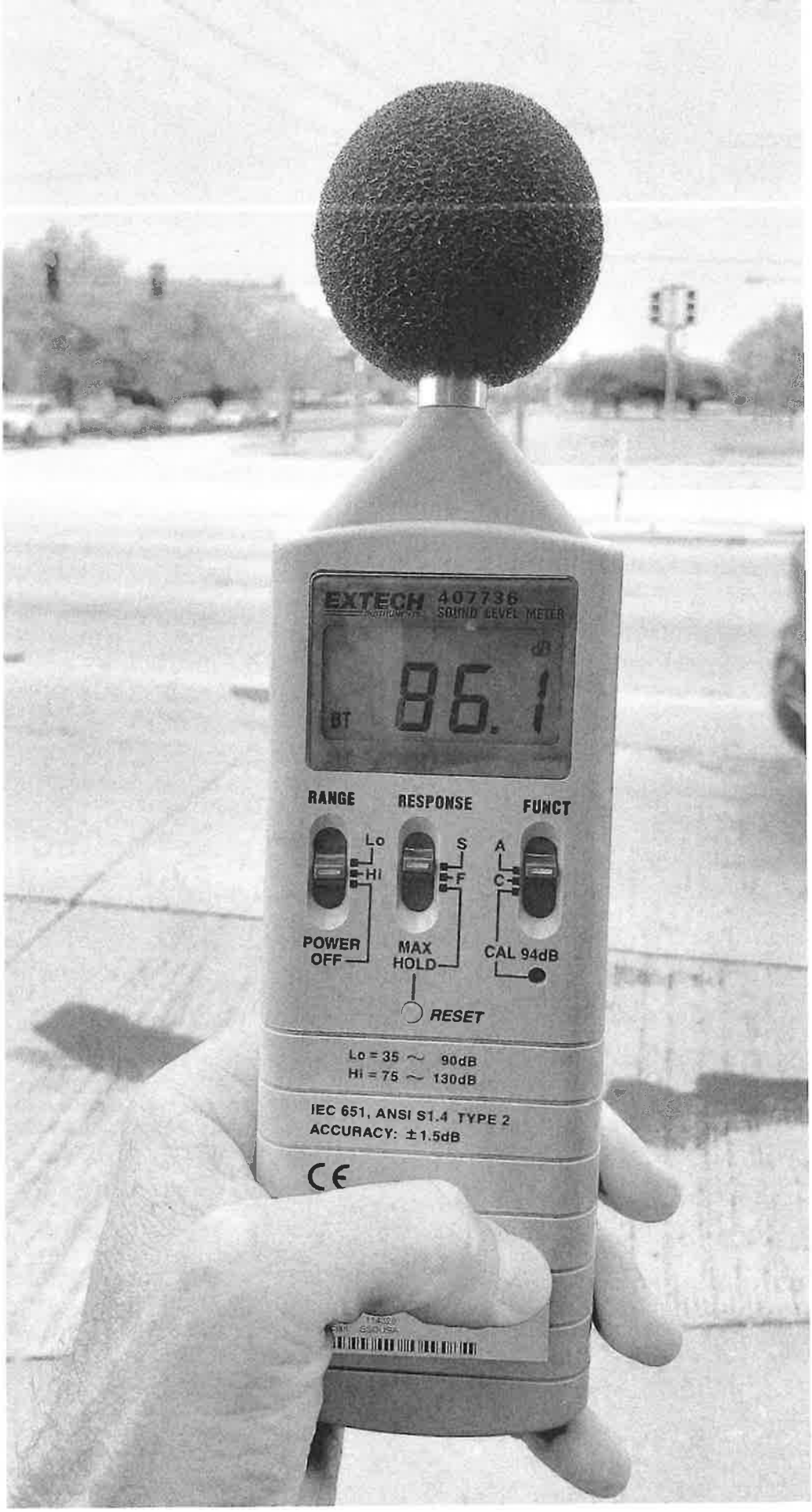

EXTECH 407736
SOUND LEVEL METER
dB
BT 86.1
RANGE
RESPONSE
FUNCT
Lo
Hi
S
F
A
C
POWER OFF
MAX HOLD
CAL 94dB
RESET
Lo = 35 ~ 90dB
Hi = 75 ~ 130dB
IEC 651, ANSI S1.4 TYPE 2
ACCURACY: ±1.5dB
CE

Photo 12

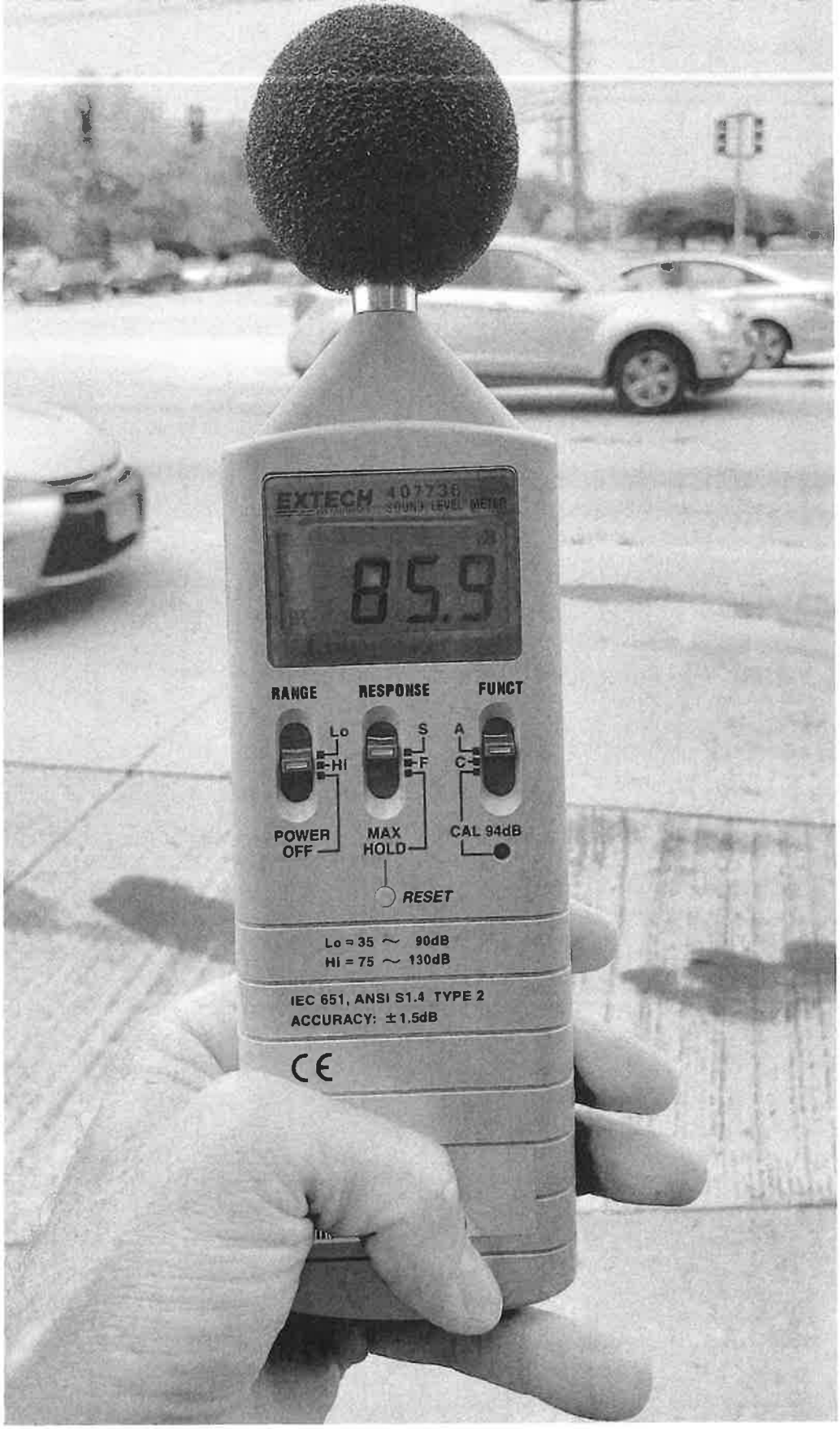

EXTECH 407736
SOUND LEVEL METER
85.9
RANGE
RESPONSE
FUNCT
Lo
Hi
S
F
A
C
POWER OFF
MAX HOLD
CAL 94dB
RESET
Lo = 35 ~ 90dB
Hi = 75 ~ 130dB
IEC 651, ANSI S1.4 TYPE 2
ACCURACY: ±1.5dB
CE

Photo 13

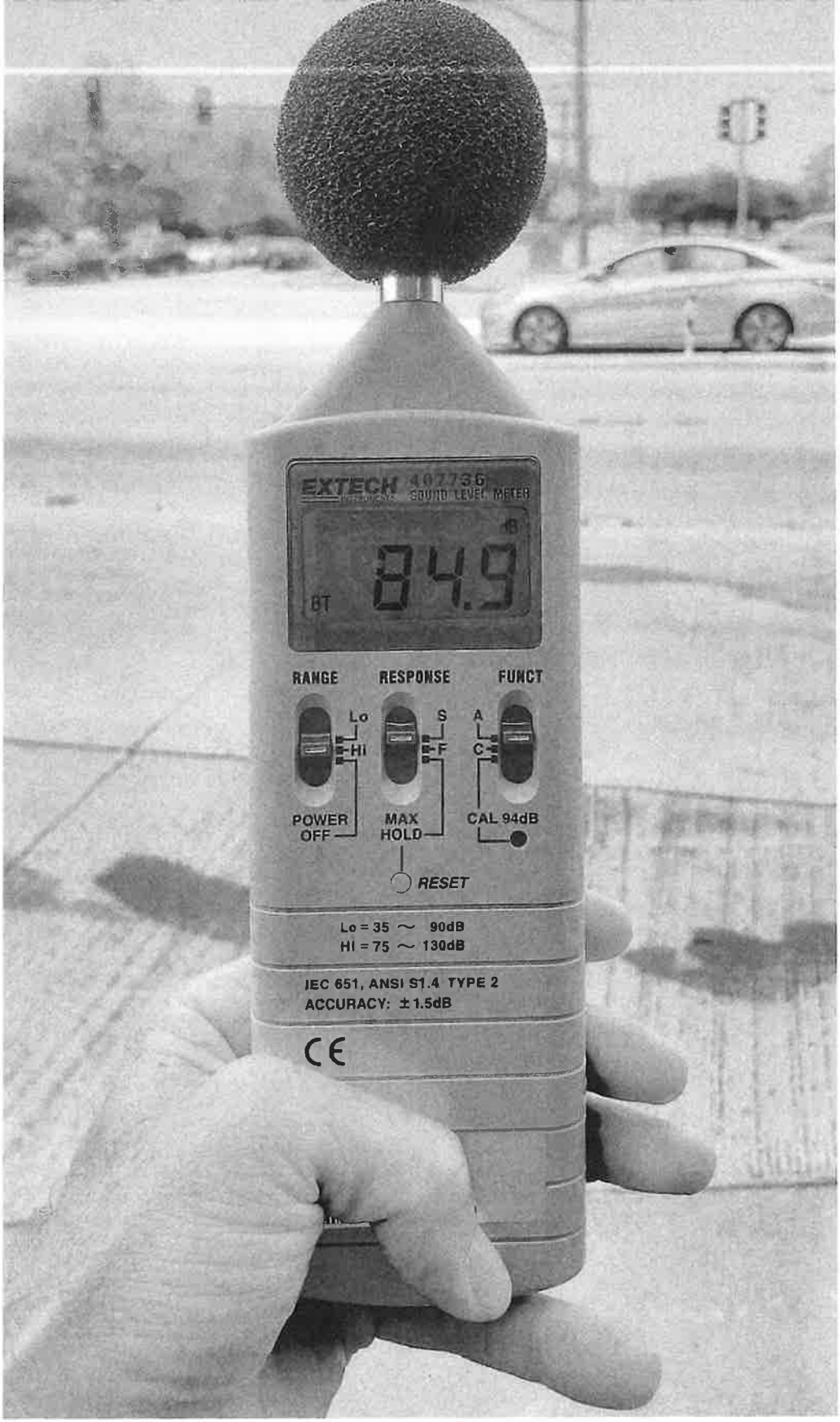

EXTECH 407736
SOUND LEVEL METER
dB
84.9
BT
RANGE
RESPONSE
FUNCT
Lo
Hi
S
F
A
C
POWER OFF
MAX HOLD
CAL 94dB
RESET
Lo = 35 ~ 90dB
Hi = 75 ~ 130dB
IEC 651, ANSI S1.4 TYPE 2
ACCURACY: ±1.5dB
CE

Photo 14

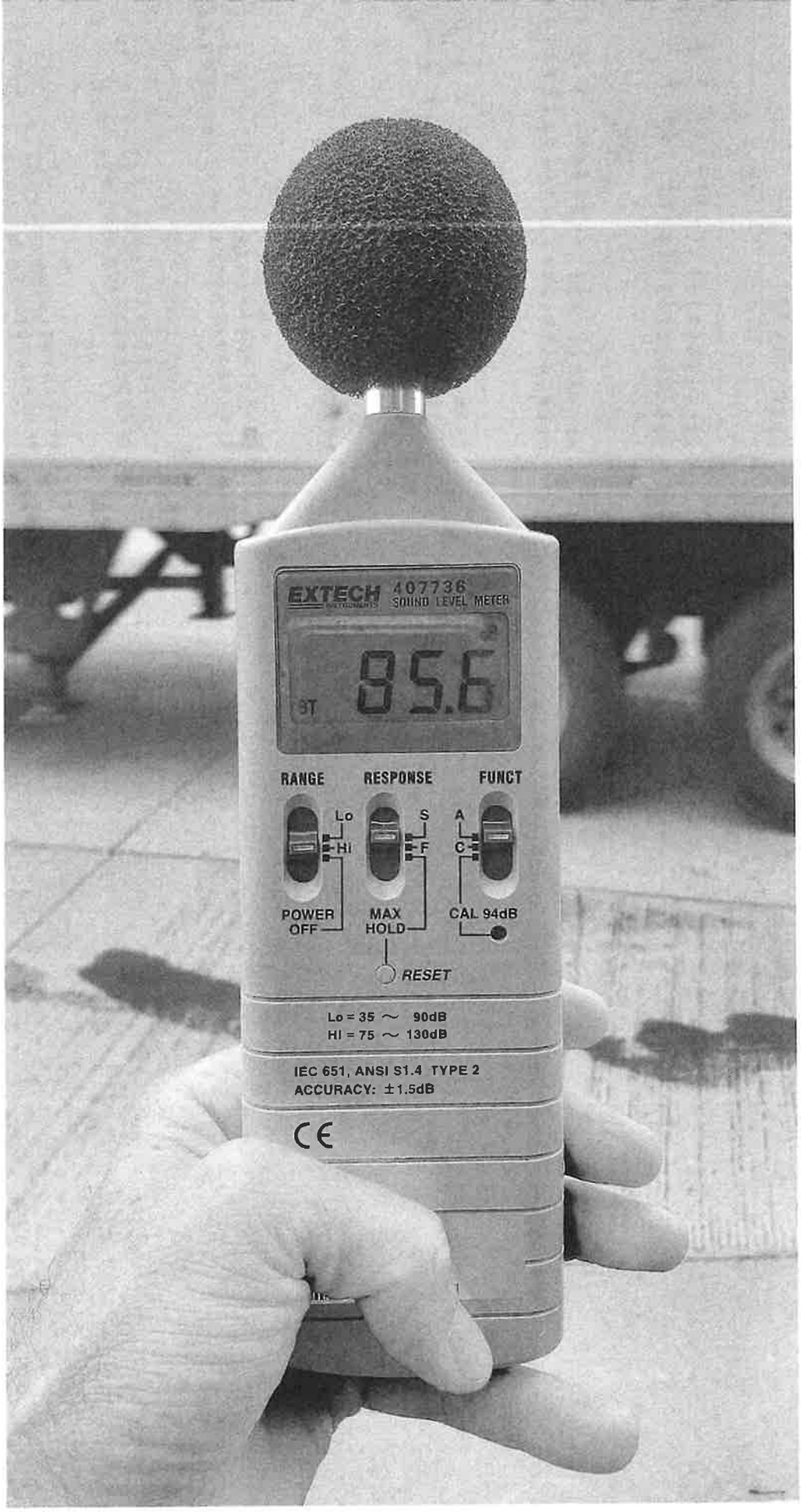

EXTECH
407736
SOUND LEVEL METER
85.6
RANGE
RESPONSE
FUNCT
Lo
Hi
S
F
A
C
POWER OFF
MAX HOLD
CAL 94dB
RESET
Lo = 35 ~ 90dB
HI = 75 ~ 130dB
IEC 651, ANSI S1.4 TYPE 2
ACCURACY: ±1.5dB
CE

Photo 15

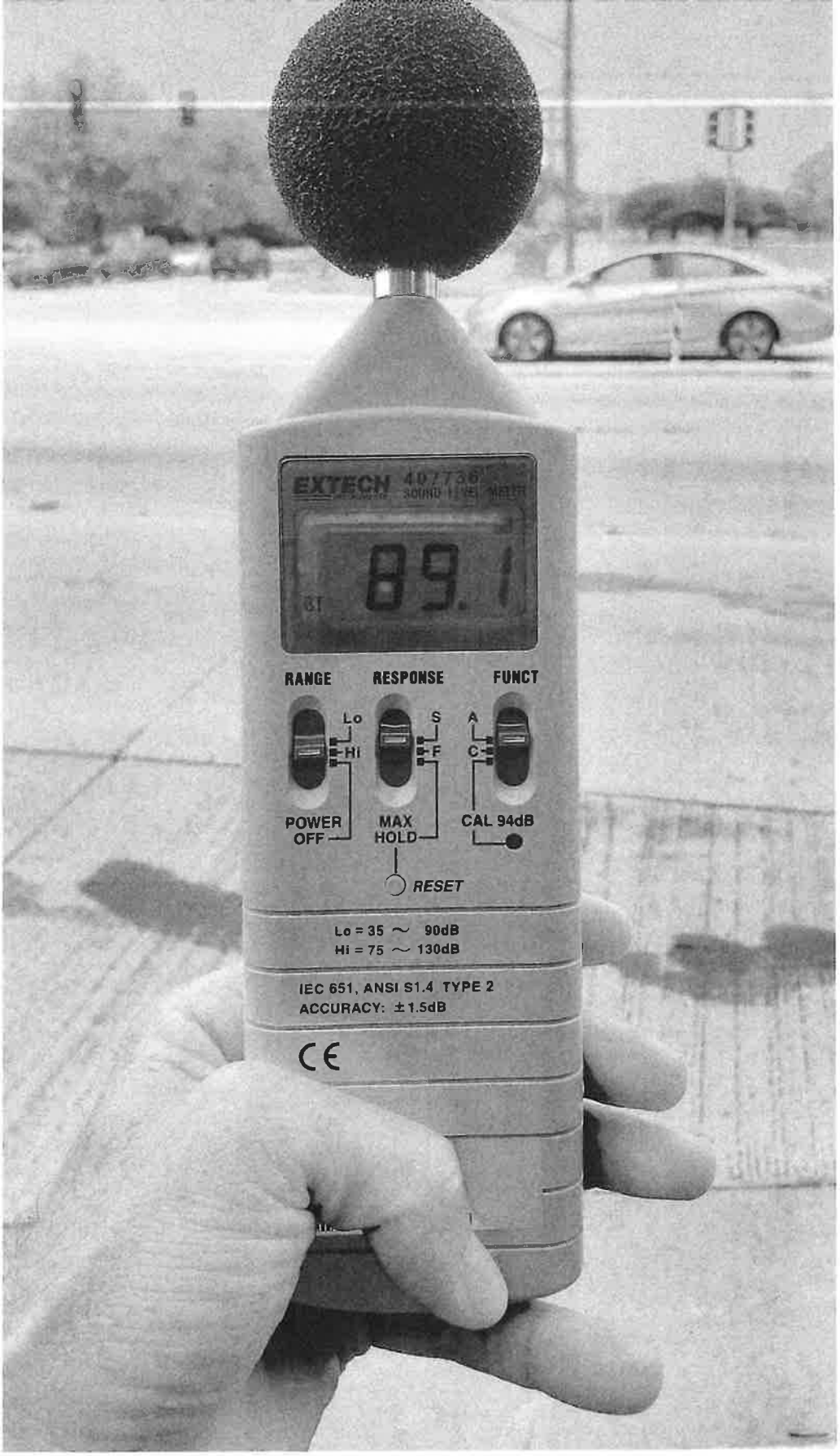

EXTECH
89.1
RANGE
RESPONSE
FUNCT
Lo
Hi
S
F
A
C
POWER OFF
MAX HOLD
CAL 94dB
RESET
Lo = 35 ~ 90dB
Hi = 75 ~ 130dB
IEC 651, ANSI S1.4 TYPE 2
ACCURACY: ±1.5dB
CE

Photo 16

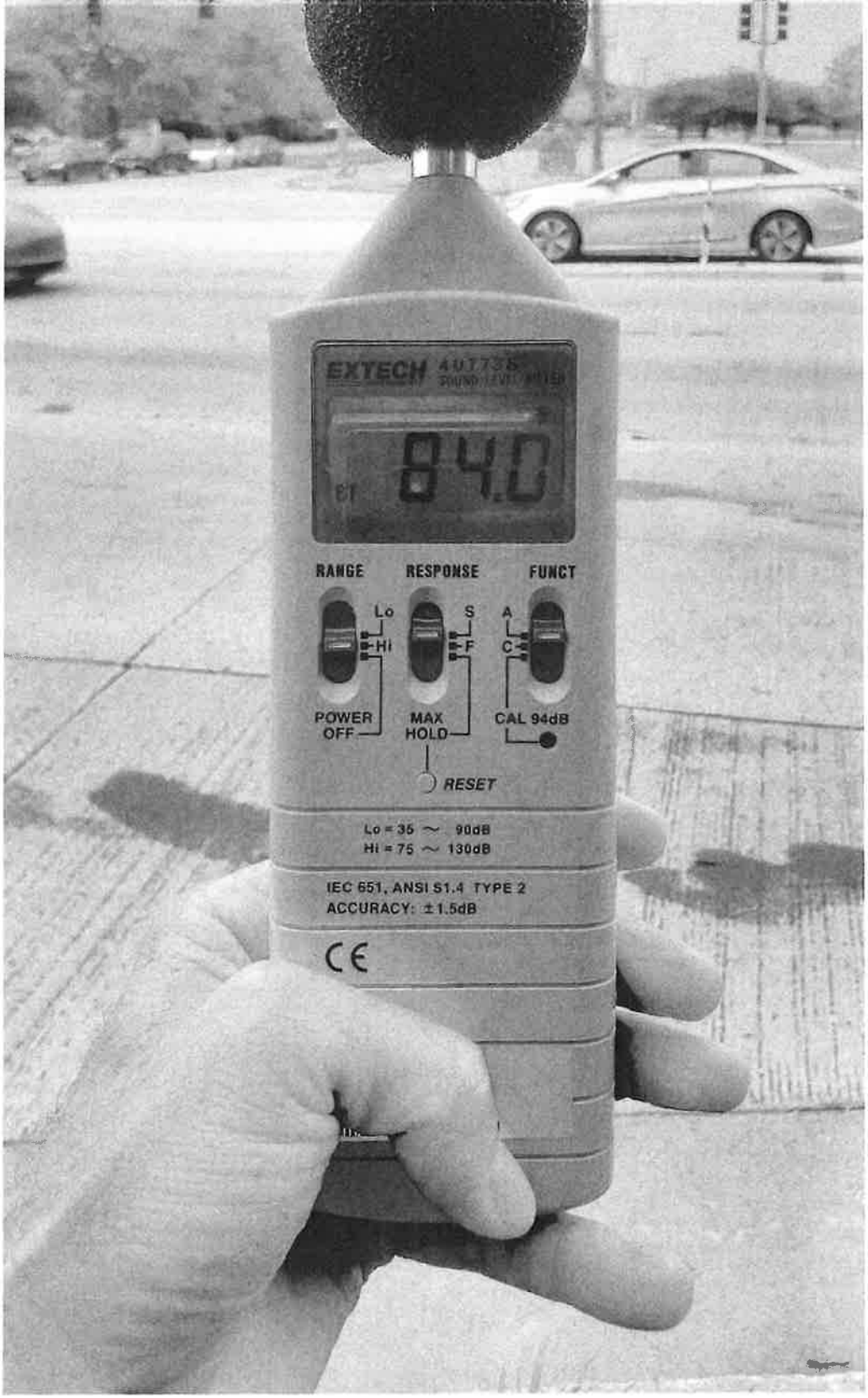

EXTECH
84.0
RANGE
RESPONSE
FUNCT
Lo
Hi
S
F
A
C
POWER OFF
MAX HOLD
CAL 94dB
RESET
Lo = 35 ~ 90dB
Hi = 75 ~ 130dB
IEC 651, ANSI S1.4 TYPE 2
ACCURACY: ±1.5dB
CE

Photo 17

Appendix B – Constructed Sound Wall Review

TECHNICAL MEMORANDUM

To: Jet Brite Services, Inc.
590 Kildeer Drive
Bolingbrook, IL 604400

From: Clay Shipley, P.E.
Veenstra & Kimm, Inc.

Date: May 24, 2023

Subject: Jet Brite Car Wash
Constructed Sound Wall Review
600 East Boughton Road
Bolingbrook, IL 60440

Executive Summary

Veenstra & Kimm, Inc. (V&K) conducted a field review of existing noise conditions on May 23, 2023, at the Jet Brite car wash store at 600 East Boughton Road in the Village of Bolingbrook. The noise readings were taken around 1:30pm when the car wash was moderately busy. Car wash blowers and vacuums were running the entire time noise readings were taken. This review is focused on understanding the effectiveness of constructed sound walls in reducing noise generated by a car wash at the tunnel exit and along property lines with adjacent residential properties.

At the car wash tunnel exit, findings conclude that the addition of a sound wall (average 10 feet high) adjacent to the tunnel exit as shown in **Photo 1** significantly reduce noise levels from the car wash side of the wall to the immediate opposite side of the wall. The reduction in noise experienced as a result of the sound wall would be similar to one standing next to a lawn mower at full throttle (no sound wall)... compared to standing next to a running air conditioning unit or having a normal conversation with another person (with the sound wall as a buffer).

At property lines with adjacent residential properties, findings conclude that the addition of a sound wall (average 10 feet high) as shown in **Photo 5** and **Photo 6** significantly reduce noise levels from the car wash side of the wall to the immediate opposite (residential) side of the wall. The reduction in noise experienced as a result of the sound wall would be similar to one standing about 10 feet from a running vacuum cleaner (no sound wall)... compared to the background noise in a small office setting or standing near a floor fan running low to medium speed (with the sound wall as a buffer).

It is important to note that the existing sound wall along the property line on this site is approximately 62 feet from the tunnel entrance and nearest vacuum stall. On the opposite side of the sound wall the nearest residential home measures approximately 85 feet away. A sound wall alone can be an effective solution for mitigating noise, but so can distance. The noise readings on the immediate opposite (residential) side of the wall (see **Photo 6**) were noted as what one would experience with background noise in a small office setting or standing near a floor fan running low to medium speed. A basic noise attenuation calculator can be used to determine that the reduction in noise levels based on distance – coupled with the sound wall – would reduce noise levels at the nearest residential home 85 feet away to what one would experience in a setting slightly above a library, but less than a refrigerator.

The key takeaway is that the combination of a sound wall and distance, from the point source(s) to the sound wall and from the sound wall to the receptor(s), can be very effective in mitigating noise.

Field Noise Readings and Analysis – Car Wash Tunnel Exit

Noise reading were collected on both sides of the existing sound wall at the car wash tunnel exit shown in **Photo 1** to document its effectiveness in mitigating sound. The location the readings were taken are identified on the photo. Note that there is a commercial receptor immediately adjacent to the existing sound wall.

Photo 1: Sound wall – Car wash tunnel exit

Noise readings nearest the car wash tunnel exit and on the opposite side of the existing sound wall are provided in **Table 1**. Noise readings were taken using a calibrated EXTECH Digital Sound Level Meter, Model 407736. The meter settings were used as recommended by the manufacturer for "environmental measurements", which includes A-weighted decibel dB(A) readings. Refer to **Photo 2** and **Photo 3** for documentation of noise readings.

Table 1: Field noise readings – Car wash tunnel exit

Reading Number	Car Wash Side of Wall	Opposite Side of Wall
Reading 1	87.7 dB(A)	65.8 dB(A)
Reading 2	87.6 dB(A)	65.8 dB(A)
Reading 3	87.4 dB(A)	66.2 dB(A)
Average of Readings	87.6 dB(A)	65.9 dB(A)

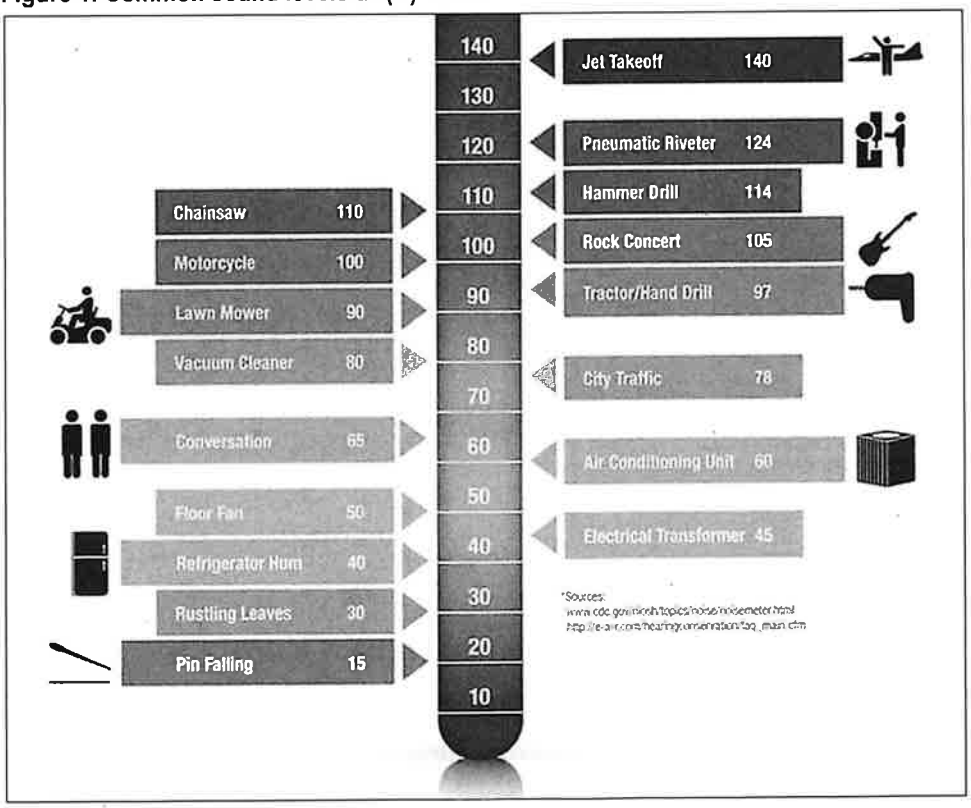
Decibel readings are a measure of relative loudness and are measured on a logarithmic scale. A-weighted decibels dB(A) are used for this noise measurement, which is a frequency-based adjustment to the decibel level that more closely reflects the absorption of noise by the human ear. To illustrate this, common sound levels for everyday noise are shown in **Figure 1**.

Photo 2: Noise readings – Car wash side of wall

Photo 3: Noise readings – Opposite side of wall

The average noise reading nearest the car wash tunnel exit is 87.6 dB(A), which resembles what one may experience standing near a lawn mower at full throttle. The average noise reading on the opposite side of the existing sound wall (with the wall as a buffer) is 65.9 dB(A), which resembles what one may experience having a normal conversation with another person.

Figure 1: Common sound levels dB(A) scale



To provide real life context to the average reading on the opposite side of the sound wall, readings were taken standing next to an air conditioning unit that can be seen in the background on the opposite side of the existing sound wall (further from the sound wall and car wash tunnel exit) that yielded 64.9 and 65.1 dB(A). See **Photo 4** for documentation of these noise readings. These readings are consistent with what should be measured (see **Figure 1**) and further support the validity of the noise meter and noise readings being collected.

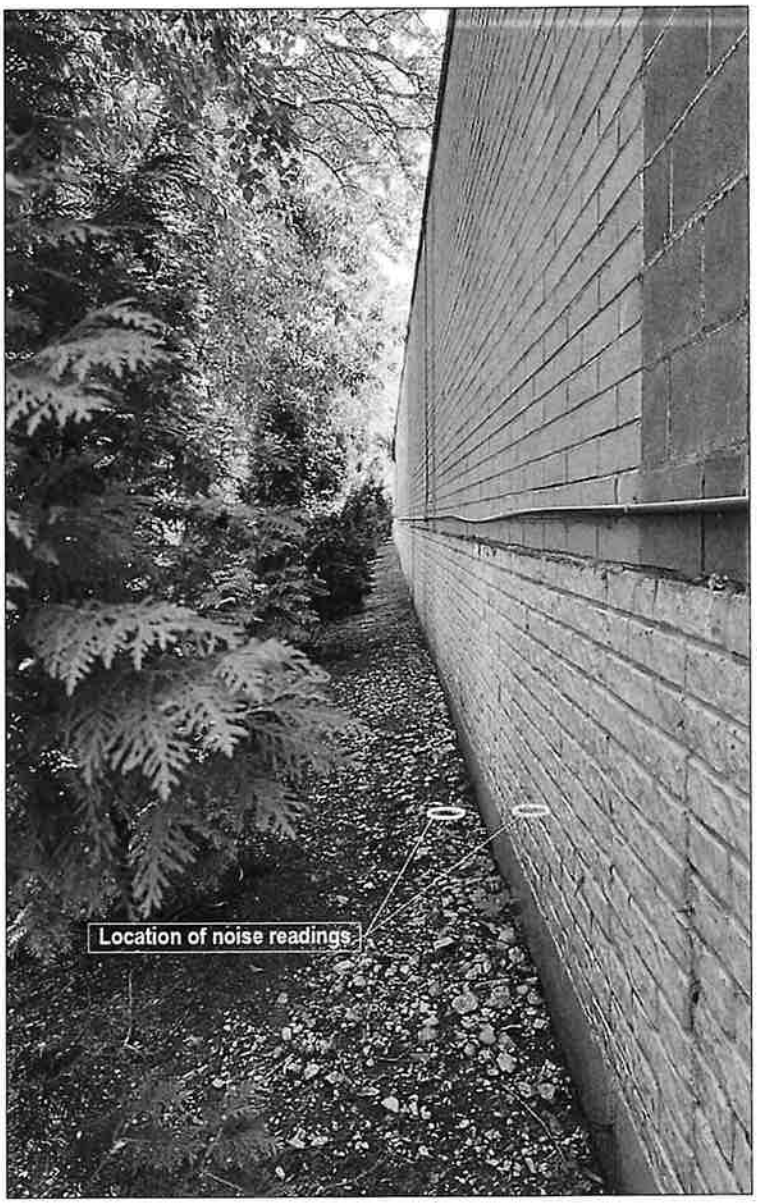
Photo 4: Noise readings next to an air conditioning unit

Field Noise Readings and Analysis – Property Line at Adjacent Properties

Noise reading were collected on both sides of the existing sound wall near the car wash tunnel entrance shown in **Photo 5** and **Photo 6** to document its effectiveness in mitigating sound. The location the readings were taken are identified on the photos. Note that the existing sound wall is approximately 62 feet from the tunnel entrance and nearest vacuum stall, and the nearest residential home on the opposite side of the wall is approximately 85 feet away.

Photo 5: Sound wall – Property line at adjacent properties (Car wash side)

Photo 6: Sound wall – Property line at adjacent properties (Residential side)



Noise readings on the car wash side and on the opposite (residential) side of the existing sound wall are provided in **Table 2**. Again, noise readings were taken using a calibrated EXTECH Digital Sound Level Meter, Model 407736. The meter settings were used as recommended by the manufacturer for "environmental measurements", which includes A-weighted decibel dB(A) readings. Refer to **Photo 7** and **Photo 8** for documentation of noise readings.

Table 2: Field noise readings – Property line at adjacent properties

Reading Number	Car Wash Side of Wall	Residential Side of Wall
Reading 1	71.1 dB(A)	51.5 dB(A)
Reading 2	73.3 dB(A)	50.7 dB(A)
Reading 3	71.4 dB(A)	49.5 dB(A)
Average of Readings	71.9 dB(A)	50.6 dB(A)

Refer again to **Figure 1**. The average noise reading on the car wash side is 71.9 dB(A), which resembles what one may experience standing about 10 feet from a running vacuum cleaner. The average noise reading on the opposite (residential) side of the existing sound wall (with the wall as a buffer) is 50.6 dB(A), which resembles background noise in a small office setting or standing near a floor fan running low to medium speed.

Photo 7: Noise readings – Car wash side of wall

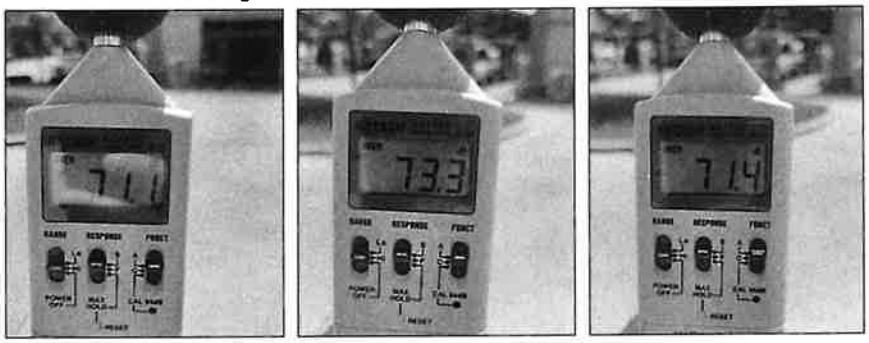
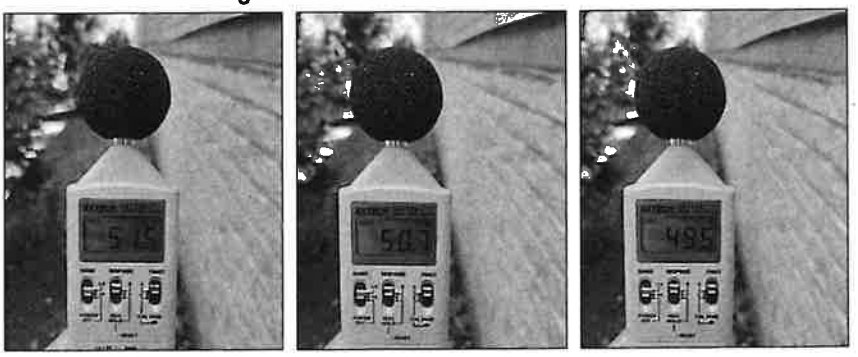


Photo 8: Noise readings – Residential side of wall



It is important to note that the existing sound wall along the property line on this site is approximately 62 feet from the tunnel entrance and nearest vacuum stall. On the opposite side of the sound wall the nearest residential home measures approximately 85 feet away. A sound wall alone can be an effective solution for mitigating noise, but so can distance. The noise readings on the immediate opposite (residential) side of the wall (with the wall as a buffer; see **Photo 6**) were noted as what one would experience with background noise in a small office setting or standing near a floor fan running low to medium speed. A basic noise attenuation calculator can be used to determine that the reduction in noise levels based on distance – coupled with the sound wall – would further reduce noise levels at the nearest residential home 85 feet away to what one would experience in a setting slightly above a library, but less than a refrigerator.

Conclusion

The addition of sound walls in a car wash setting can significantly reduce and adequately mitigate noise generated from point sources such as blowers at the car wash tunnel exit, vacuum turbines/stalls, vehicle traffic, and a combination of other noises generated from overall site operations and activities.

End Tech Memo