Fairgrounds Speedway
Nashville, Tennessee

Environmental Sound Modeling

WRIGHTSON | JOHNSON | HADDON | WILLIAMS
3424 Midcourt Rd, Suite 124 | Carrollton, TX, 75006 | 972.934.3700

Revised Nov 21, 2022

WJHW WRIGHTSON | JOHNSON | HADDON | WILLIAMS

Jack Wrightson:

- **43 years** of experience in the field of acoustics
- Extensive experience in sports and public assembly work
  - 100+ sports & entertainment community noise mitigation studies
  - Local projects include: Nissan Stadium, Bridgestone Arena, First Horizon Park and the Nashville SC Stadium
- Oversees WJHW's work on noise control and the environmental noise impact of outdoor events.
- WJHW has been an industry leader for **30 years**.
- Jack has also served as Adjunct Professor of Acoustics at the University of Texas – Arlington School of Architecture

Executive Summary

Proposed Noise Mitigation Measures

Administrative

- Limit to a total of 10 race weekends per year
- Limit to one NASCAR weekend per year as part of the total of 10
- Curfews on event start and stop times

Noise Control Construction/Restrictions

- Barriers created by:
  - New grandstand building, Track buildings and Sound Wall
  - New Expo building and MLS Stadium
  - Muffler use mandated and enforced for all non-NASCAR racing

Calculated Sound Level Reductions, Compared to 2019 All American 400

- 7+ dBA of reduction in all areas, close to a halving or more in loudness
- -6 to +3 dBA of level change for NASCAR event
- Of the 10 annual race events, nine would have a reduced sound perception of about 50 percent, and one race would be unchanged from current conditions

Figure 1
Environmental Noise Measurement Sites
Nashville Fairgrounds Speedway
November 2-3, 2019

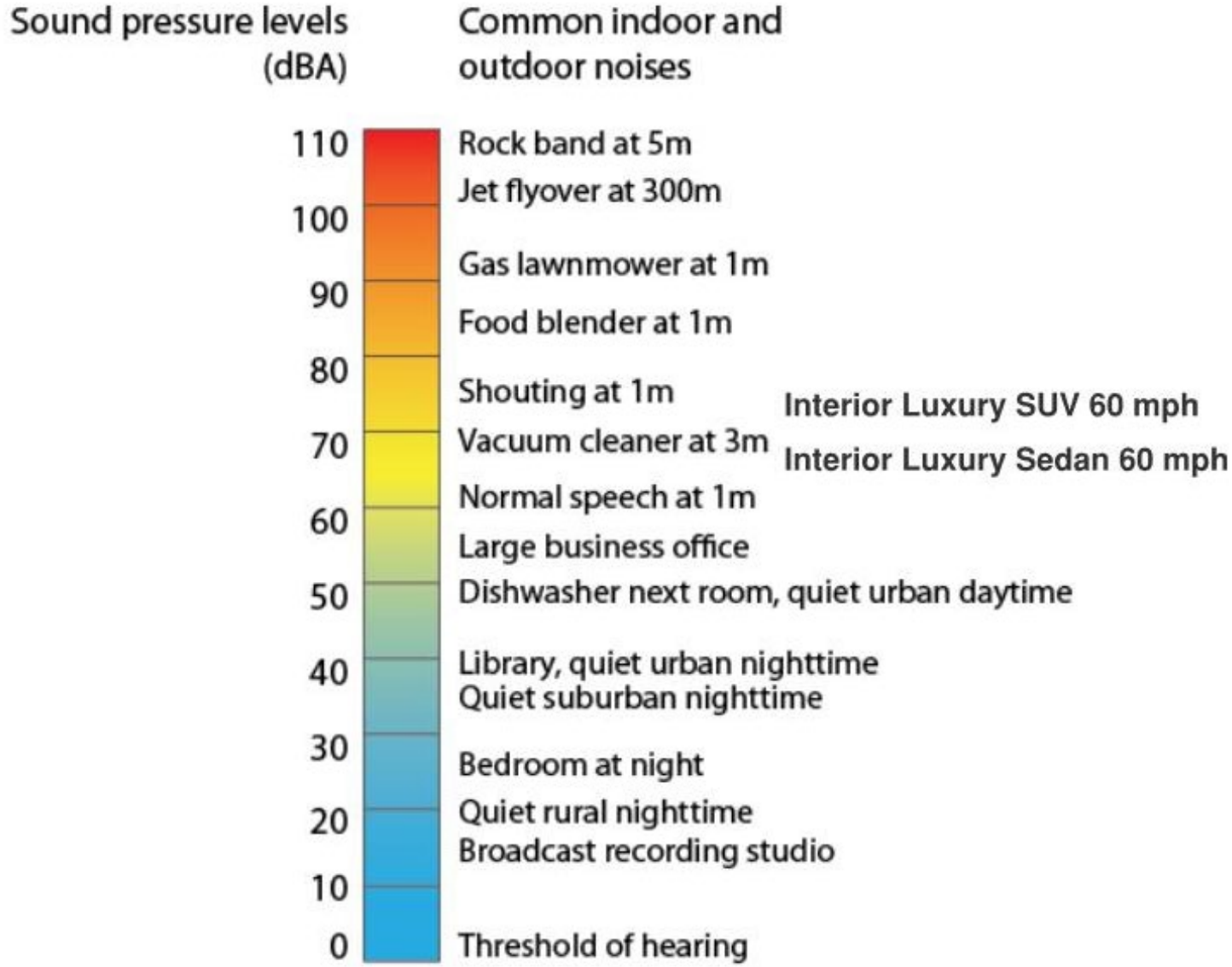
Measurement Sites
48-Hour (November 2-3, 2019)
#1 500B Southgate Ave. (Front Porch, Single-Family Residence)
#2 1716 Carvell Ave. (Backyard, Single-Family Residence)
#3 622 Benton Ave. (Backyard, Single-Family Residence)
#4 516 Southern Turf Dr. (Backyard, Single-Family Residence)
#5 2209 Kline Ave. (Backyard, Single-Family Residence)
#6 107 Sadler Ct. (Backyard, Single-Family Residence)

COMMUNITY SOUND COMPARISONS dB(a)

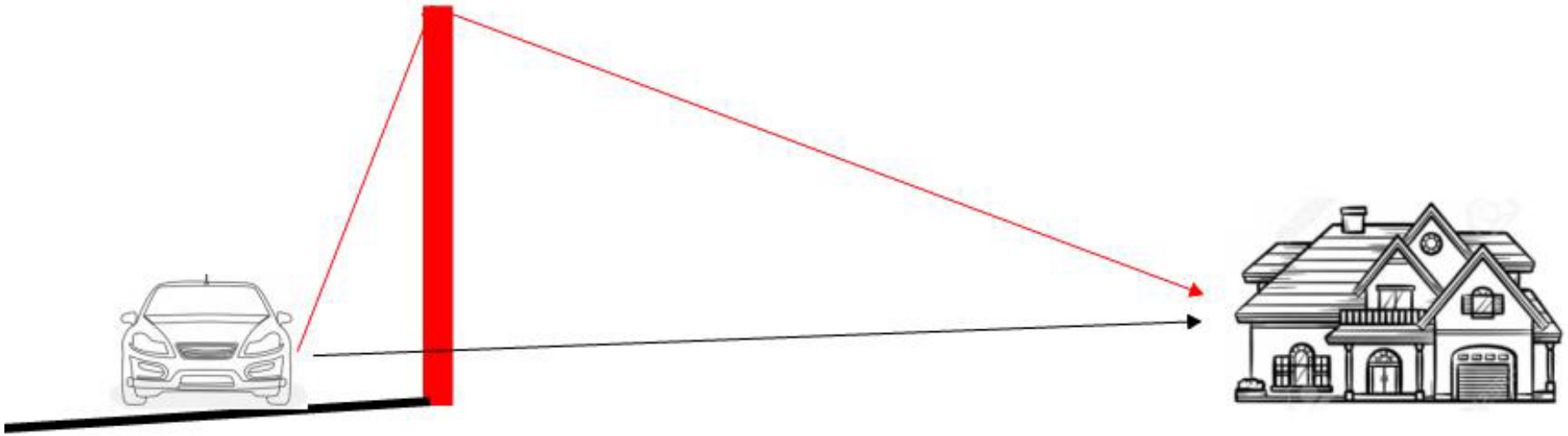
Location	Approximate Distance from Track	AA 400 PLM Measured Leq, 2019	20 ft. Sound Wall Predicted NASCAR Leq, 2021	Afternoon, no race, average sound levesls Leq	Afternoon, No Race Ambient Sound Levels Lmax
1	1600 ft.	74	75-80	55	84
2	1420 ft.	75	70-75	56	82
3	2200 ft.	65	65-70	52	73
4	815 ft.	77	80-85	48	68
5	2600 ft.	54	70-7	50	75
6	4500 ft.	59	65-70	52	77
		(note 1)	(note 2)		
Notes:	1 - average sound level measurement over race duration, including cautions and restarts				
	2 - average sound level measurement over 15 minutes of green flag racing				

CAR SOURCE SOUND LEVEL COMPARISONS

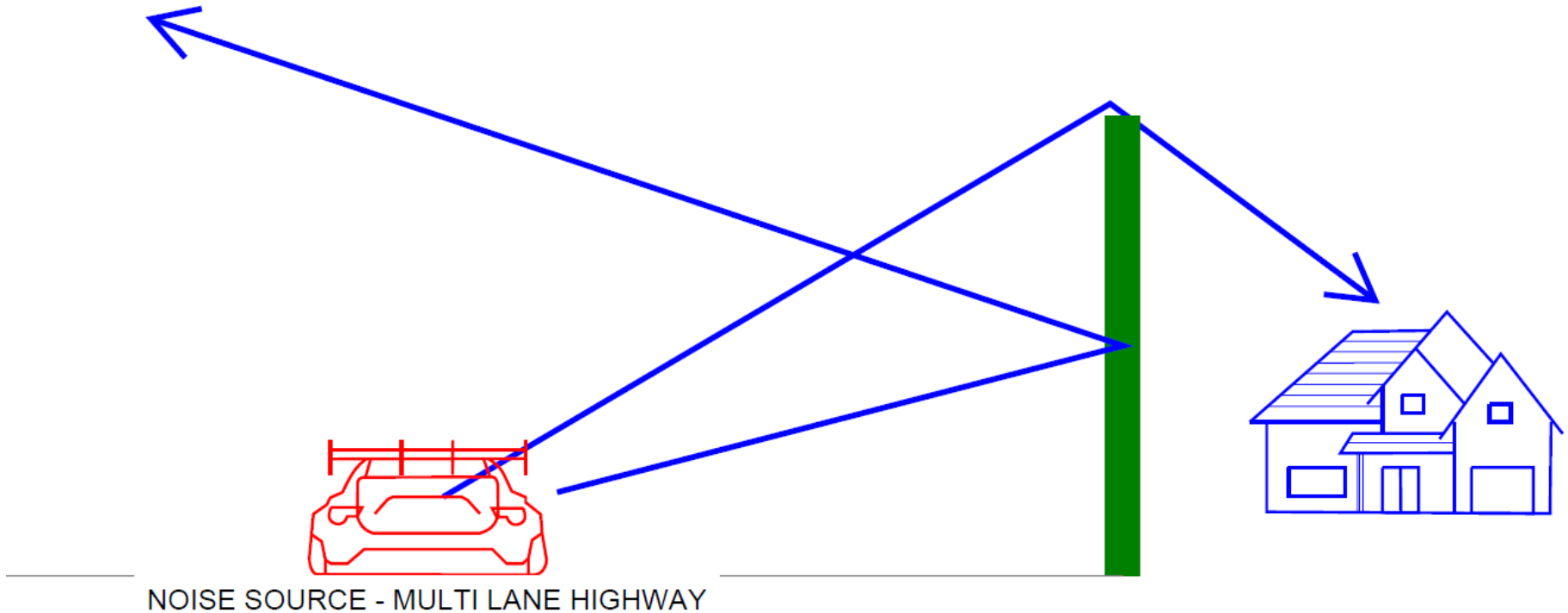
Car Type	Measurement Source	Measurement Type	Measured Levels	Normalized Levels
2019 Pro Late Model, Practice	Measured at Nashville, 2019	Lmax, slow (10 min)	107 dBA at 105'	107 dBA at 100'
Pro Late Model Regulations	From Email with Nashville		97 dBA at 100'	97 dBA at 100'
NASCAR at COTA, Single Car, Straight	Measured at COTA, 2021	Lmax, slow (5 sec)	112 dBA at 95'	112 dBA at 100'
NASCAR at COTA, Single Car, Turn	Measured at COTA, 2021	Lmax, slow (5 sec)	98 dBA at 88'	99 dBA at 100'


Sound pressure levels (dBA)
Common indoor and outdoor noises
110
Rock band at 5m
Jet flyover at 300m
100
Gas lawnmower at 1m
90
Food blender at 1m
80
Shouting at 1m
Interior Luxury SUV 60 mph
70
Vacuum cleaner at 3m
Interior Luxury Sedan 60 mph
Normal speech at 1m
60
Large business office
50
Dishwasher next room, quiet urban daytime
40
Library, quiet urban nighttime
Quiet suburban nighttime
30
Bedroom at night
20
Quiet rural nighttime
Broadcast recording studio
10
0
Threshold of hearing

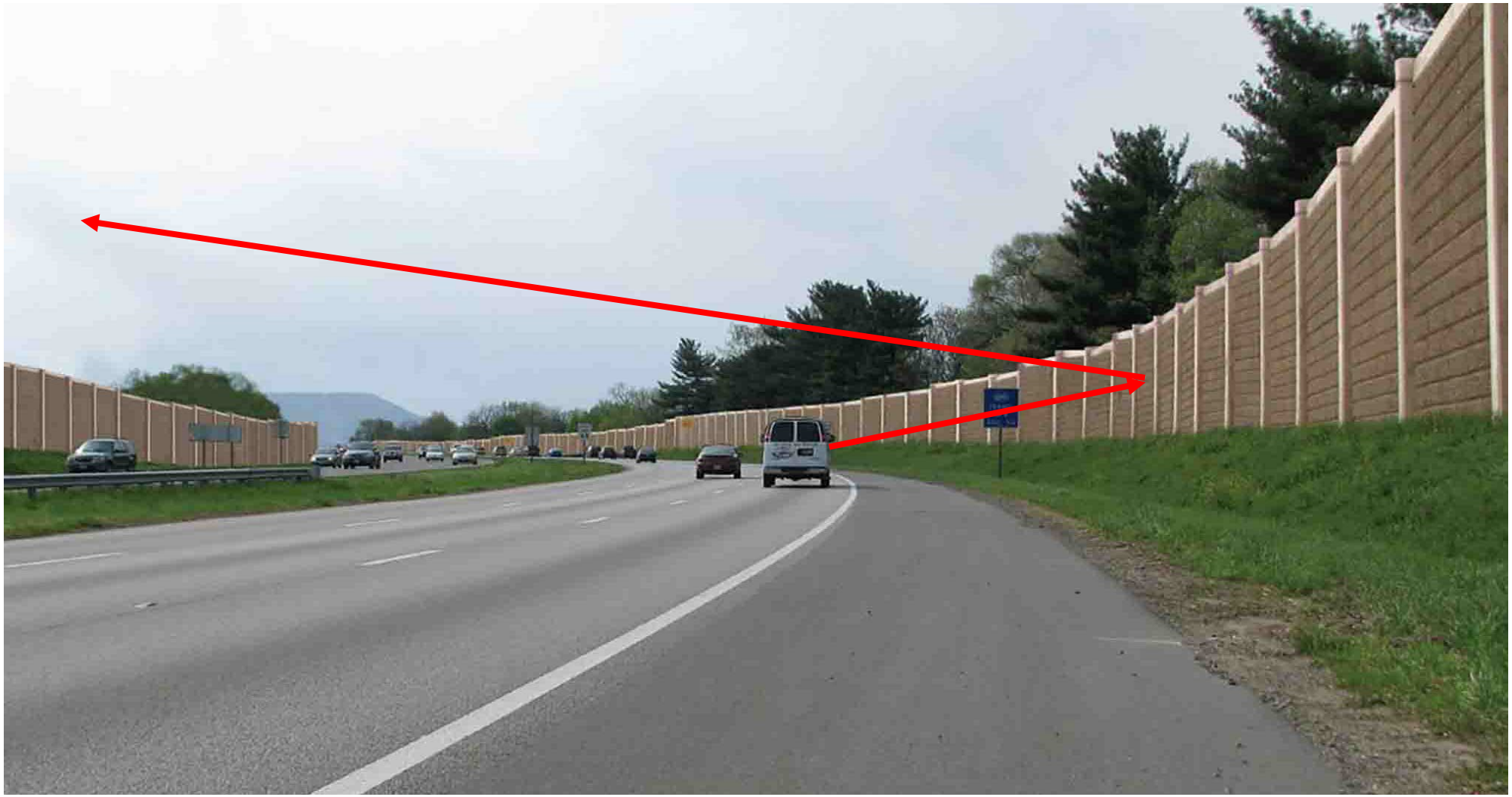
How a Sound Wall Works

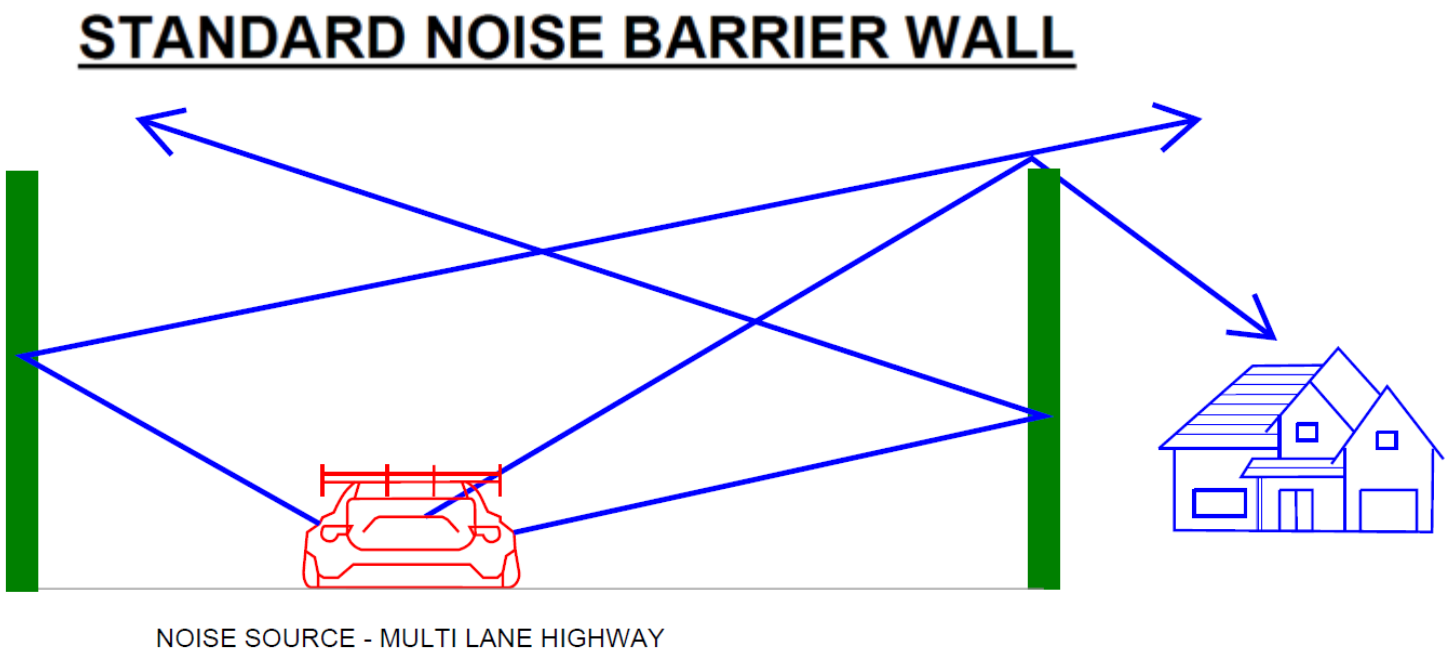


STANDARD NOISE BARRIER WALL



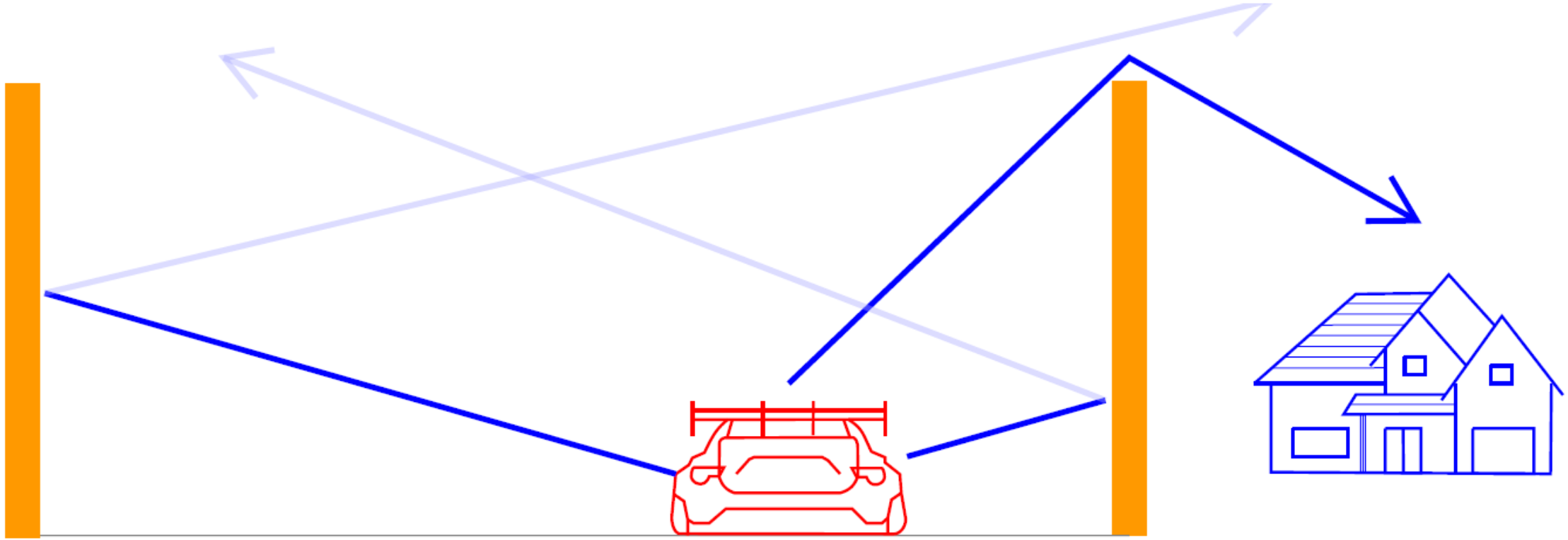
With a standard noise barrier, sound reflects off the hard surface and can increase the sound level opposite the barrier.





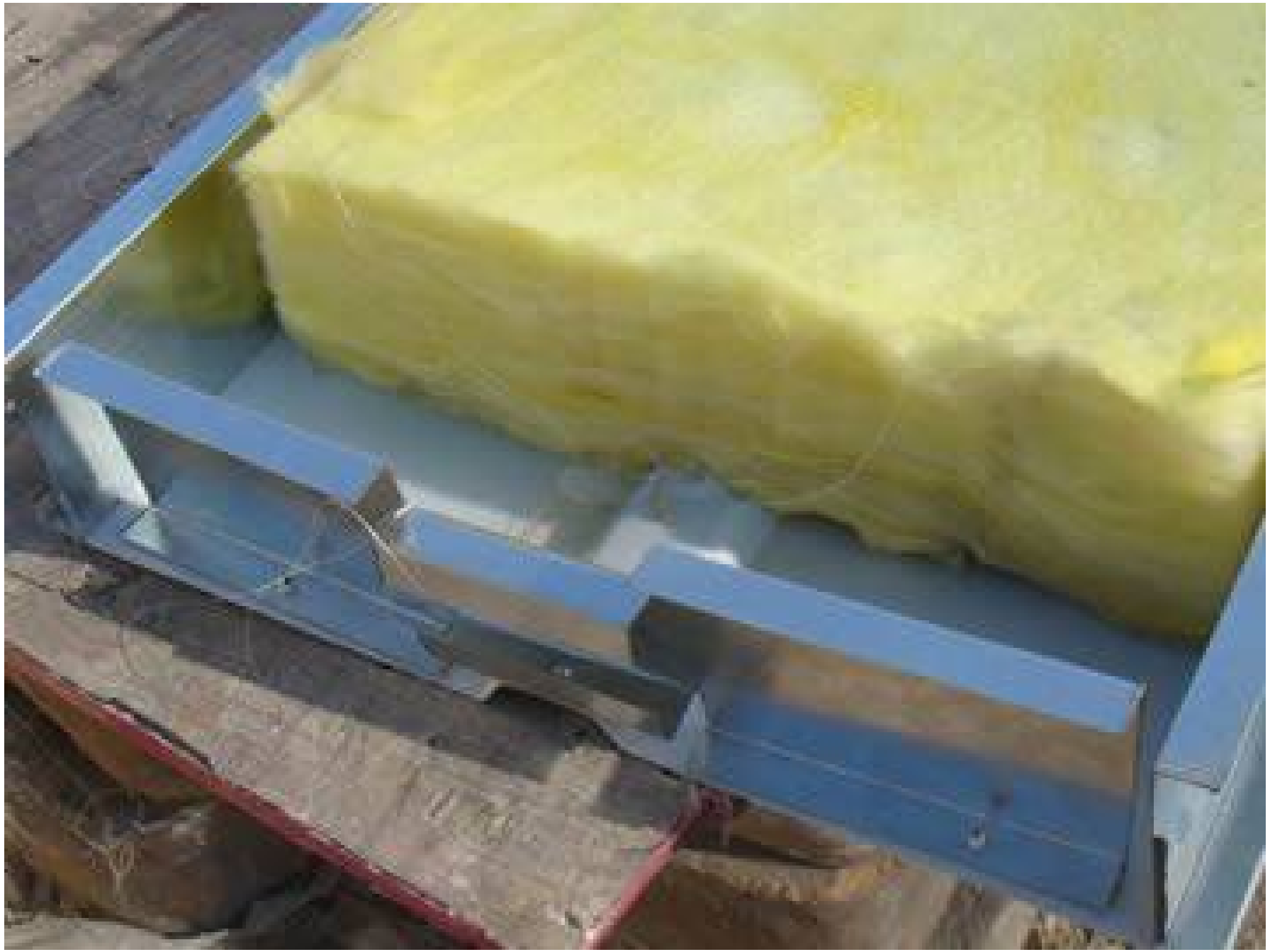
Parallel walls can make the noise created by reflections worse

ABSORPTIVE NOISE BARRIER WALL



NOISE SOURCE - TRACK

Absorptive sound barriers can reduce the reflected sound energy by about 80% (A-weighted) and maintains the effectiveness of the single noise barrier. In addition, at the track the sound barriers are closer to the cars, making them more effective at blocking line of sight near the track than a highway noise barrier



Comparison of Sound Levels
Future Construction to Existing Conditions

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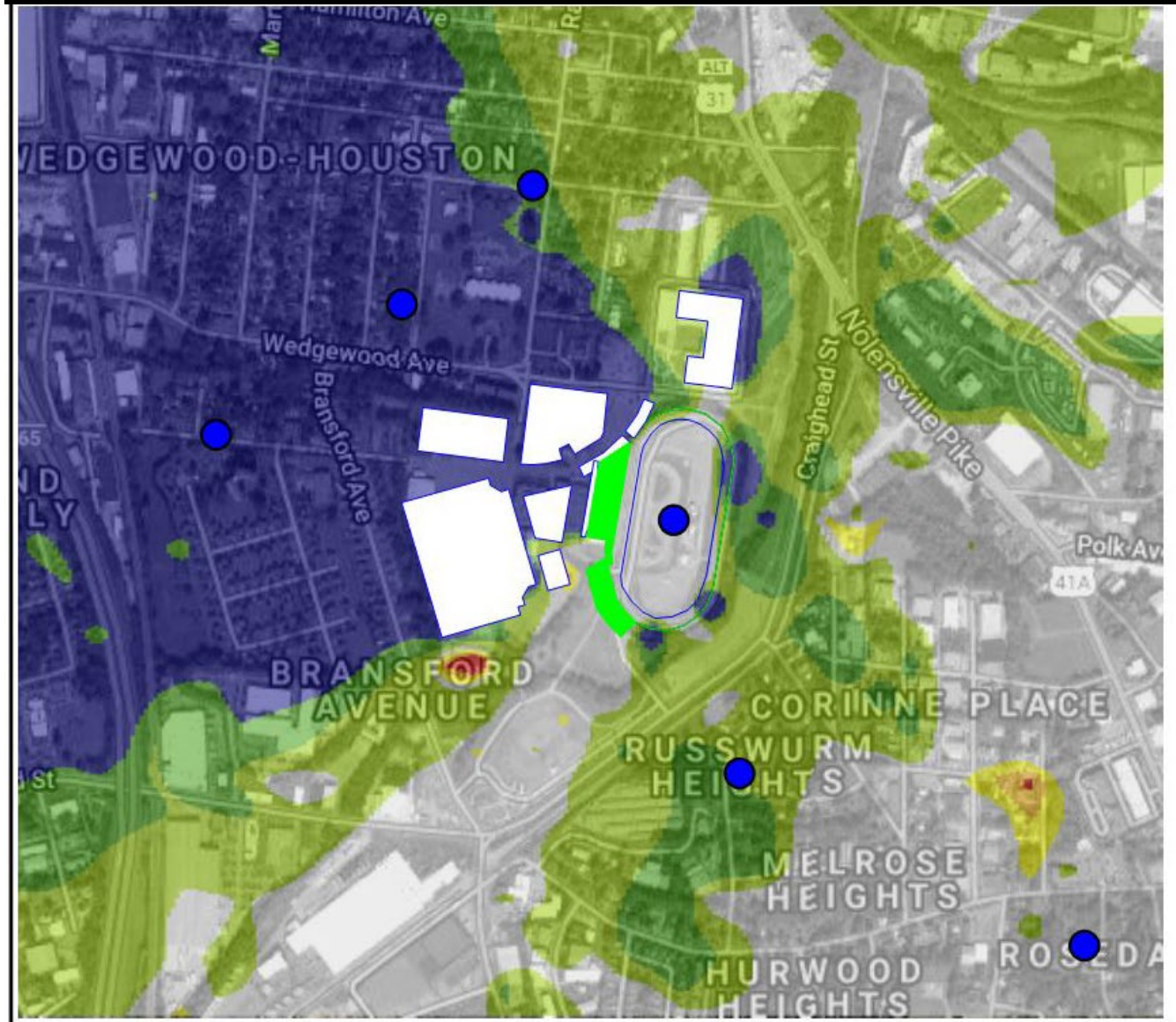
Average Sound Levels
2019 Pro Late Model Cars without Mufflers, Renovated Speedway & 20'H Sound Wall
compared to 2019 Pro Late Model Cars with Existing Speedway



Noise levels dBA

	<=	-5
-5 <	<=	-3
-3 <	<=	-1
-1 <	<=	1
1 <	<=	3
3 <	<=	5
5 <		

Legend
- Buildings
- Racing Line
- Grandstands
- Wall
- Measurement Location

Length Scale 1:918

0 200 400 800 1200 1600 feet

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Average Sound Levels
2019 Pro Late Model Cars (with Mufflers) with Renovated Speedway & 20'H Sound Wall
compared to 2019 Pro Late Model Cars with Existing Speedway

Noise levels dBA

	<=	-9
-9 <	<=	-7
-7 <	<=	-5
-5 <	<=	-3
-3 <	<=	-1
-1 <	<=	1
1 <		

Legend
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Length Scale 1:918

0 200 400 800 1200 1600 feet

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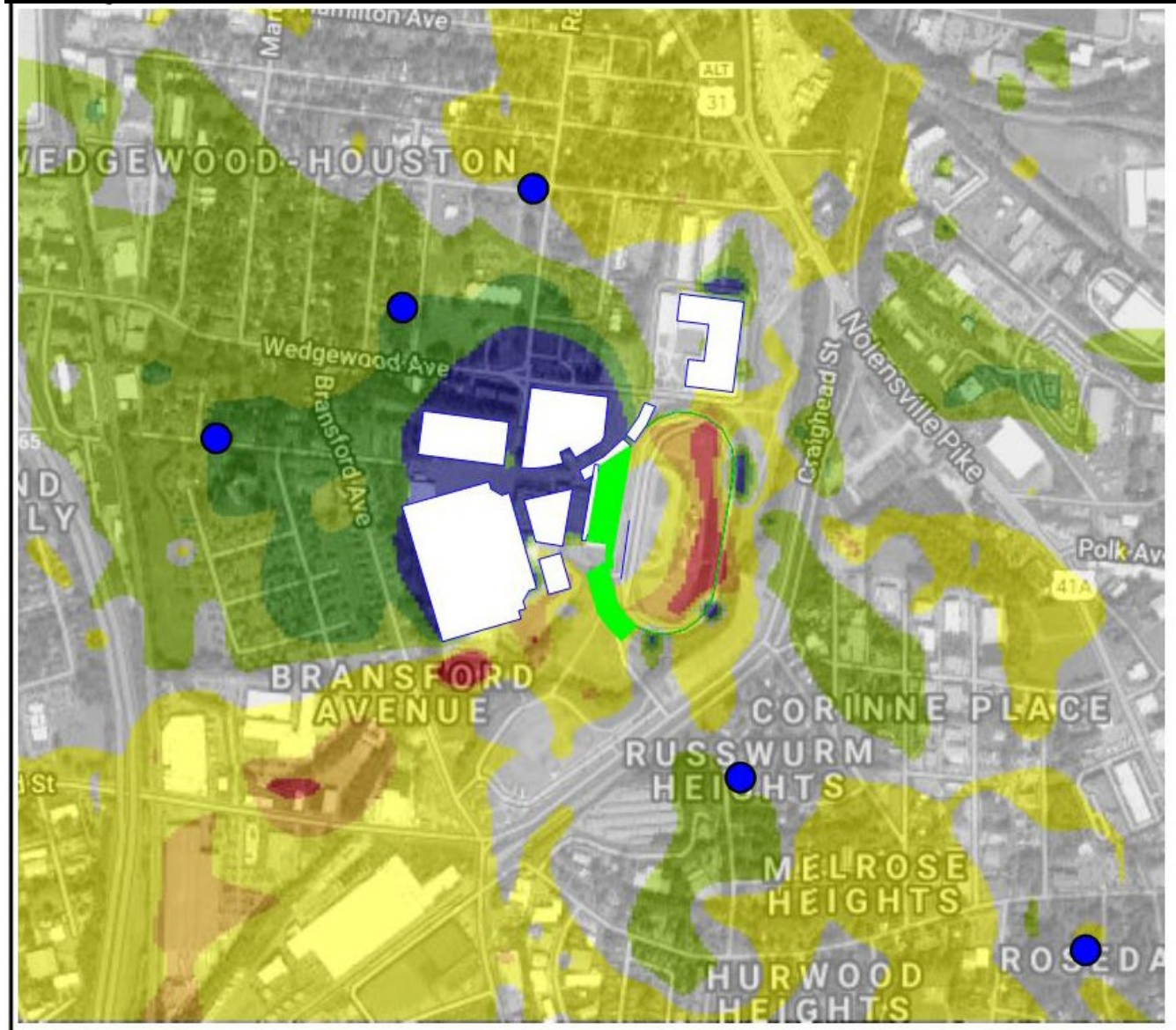
Average Sound Levels
NASCAR with Renovated Speedway & 20'H Sound Wall
compared to 2019 Pro Late Model Cars with Existing Speedway



Noise levels dBA

	<=	-5
-5 <	<=	-3
-3 <	<=	-1
-1 <	<=	1
1 <	<=	3
3 <	<=	5
5 <		

Legend
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Length Scale 1:918

0 200 400 800 1200 1600 feet

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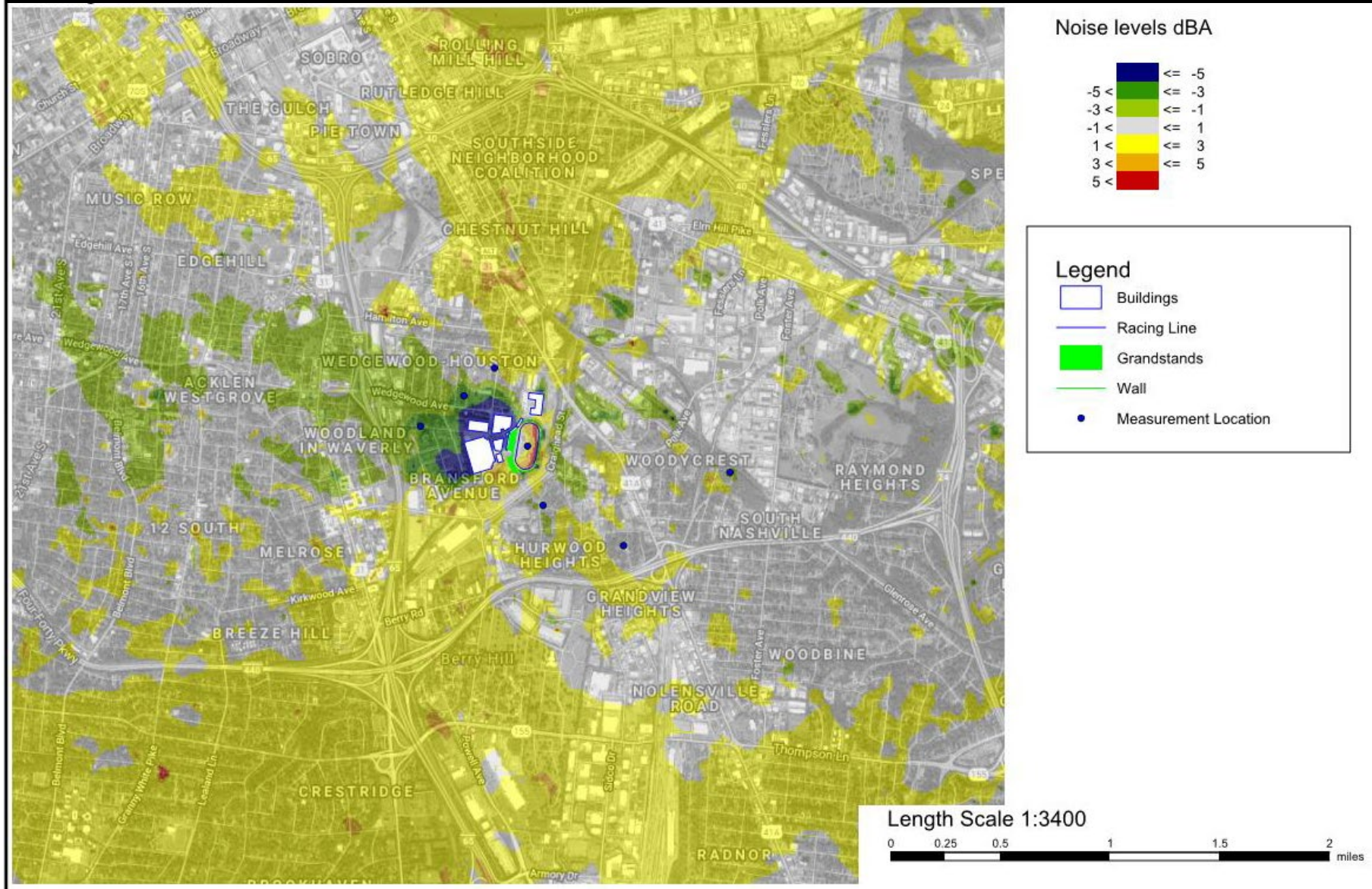

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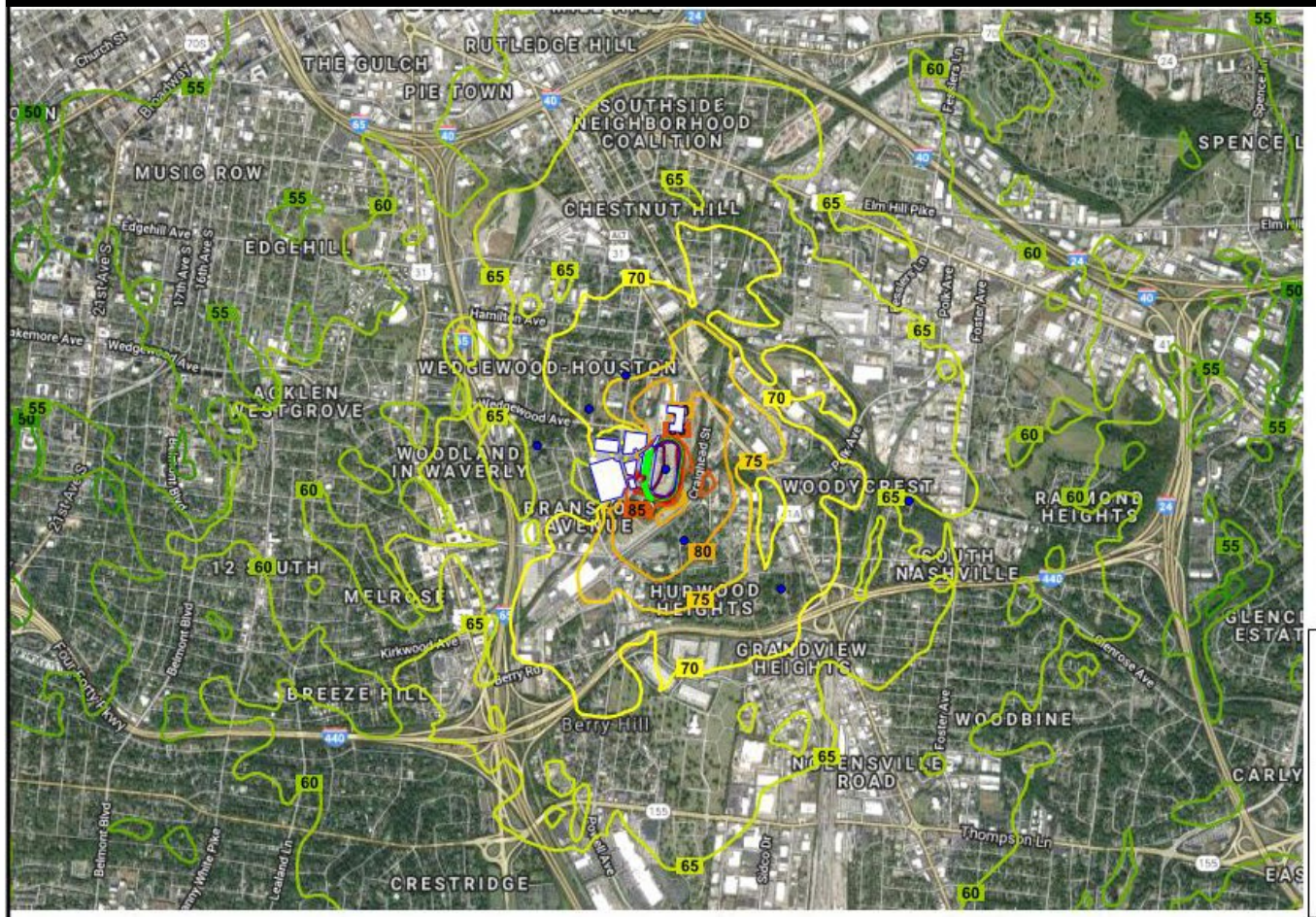
Predicted Average Sound Levels
NASCAR (no cautions) with Renovated Speedway & 20'H Sound Wall



Noise levels dBA

=	45
=	50
=	55
=	60
=	65
=	70
=	75
=	80
=	85
=	90
=	95
=	100
=	105
=	110

Legend

- Buildings
- Racing Line
- Grandstands
- Wall
- Measurement Location

Length Scale 1:3616

0 750 1500 3000 4500 6000 feet

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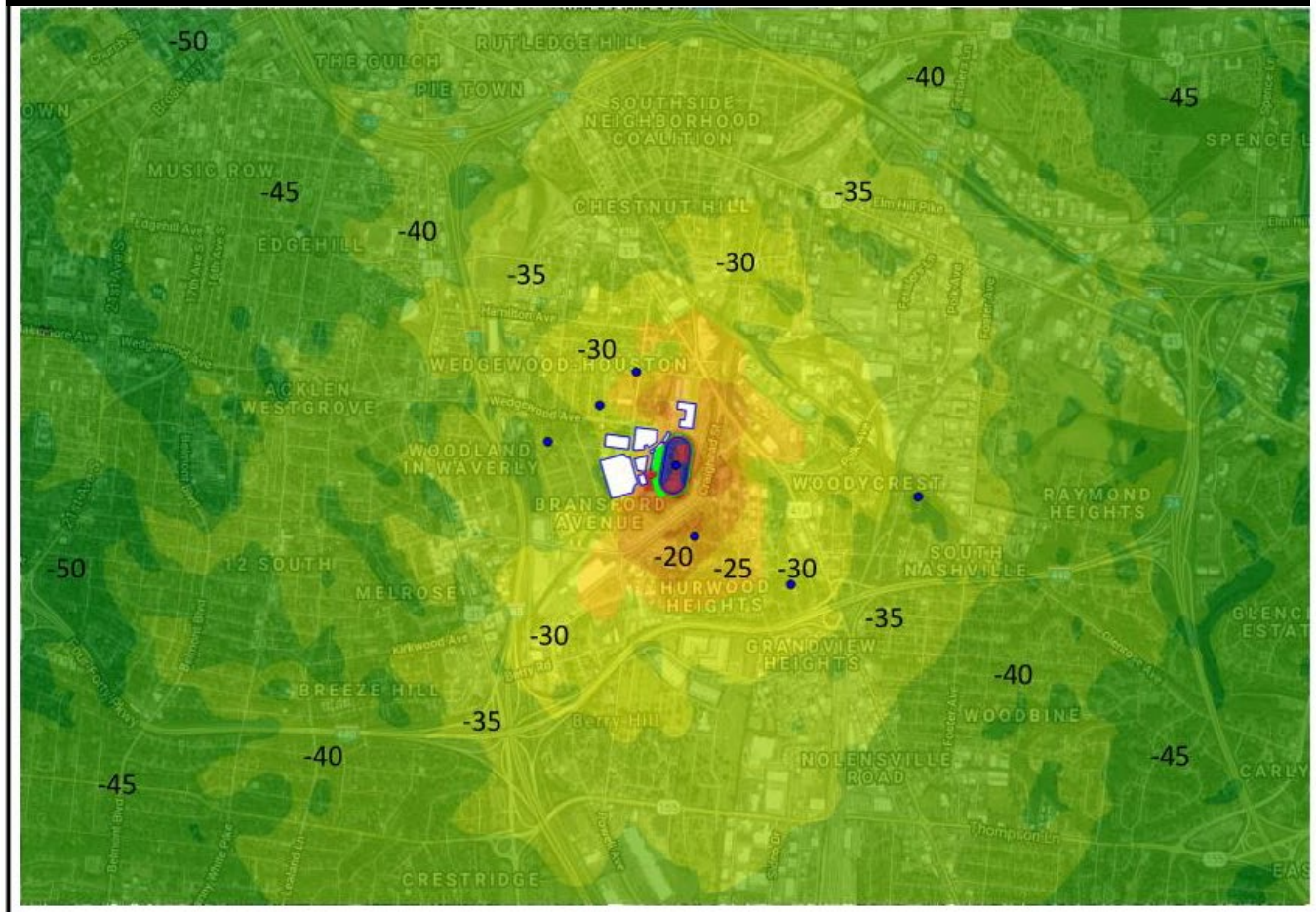
Predicted Average Sound Levels
NASCAR (no cautions) with Renovated Speedway & 20'H Sound Wall
Sound Level Reduction from Infield



Noise Level Reduction From Infield (dBA)

	<	-50
-50 <=	<	-45
-45 <=	<	-40
-40 <=	<	-35
-35 <=	<	-30
-30 <=	<	-25
-25 <=	<	-20
-20 <=	<	-15
-15 <=	<	-10
-10 <=	<	-5
-5 <=	<	0
0 <=		

Legend

- Buildings
- Racing Line
- Grandstands
- Wall
- Measurement Location

Length Scale 1:3616

0 750 1500 3000 4500 6000 feet

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Executive Summary
Proposed Noise Mitigation Measures

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Administrative
- Limit to a total of 10 race weekends per year
- Reduction in practice days
- Curfews on event start and stop times

Noise Control Construction/Restrictions
- Barriers created by:
  - Adding engineered sound absorbing wall
  - New grandstand building, Track buildings
  - Expo building and MLS Stadium
  - Mandated muffler use and enforcement for all non-NASCAR racing

Calculated Sound Level Reductions, Compared to 2019 All American 400
- -7 dBA in all areas for local/regional events – nearing a 50% reduction in perceived loudness.
- No appreciable difference between 2019 All American 400 and predicted NASCAR event.
- Of the 10 annual race events, nine would have a reduced sound perception of about 50 percent, and one race would be unchanged from current conditions

Calculated Sound Level Reductions at Fall-Hamilton Elementary
- Predicted non-NASCAR event mitigated sound levels to be consistent with current ambient levels.