



AMERICAN UNIVERSITY
WASHINGTON, DC

AUNP Facilities Planning Working Group Meeting

August 10th, 2022

Agenda Overview:

- Welcome and Confirm Agenda
- Reeves Field Scoreboard
- Jacobs Field Sound Wall
- Closing Comments and Adjourn



Ground Rules:

- **Respect the Process**
- **Be Present and Engaged**
- **Follow the Facilitators' Directions**
- **Allow Every Voice to be Heard**
- **Speak Courteously and Respectfully to Others**
- **Maintain Zero Tolerance for Any Comment (Verbal or Written) that is Meant to Attack or Intimidate Another Person, or is Obscene**

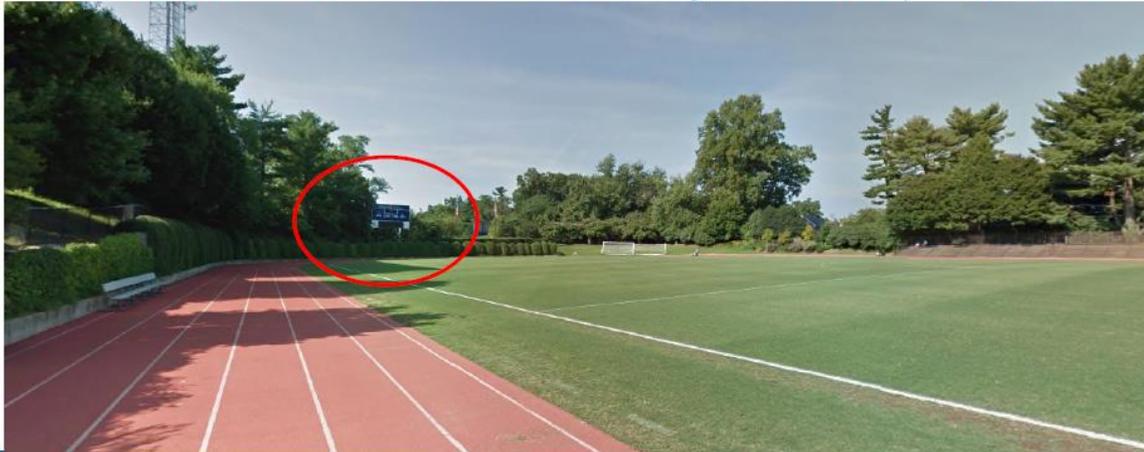


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Reeves Field Scoreboard

Subtitle X Section 101.2: Noise

- In response to a question regarding the orientation of the proposed scoreboard at Reeves Field, the new scoreboard would remain in the same location as the existing scoreboard.
- The new scoreboard would include a no-sound video component.
- The only sound that would be generated by the proposed scoreboard would be for clock starts and stops, substitutions, and end of half (e.g., only sounds that are required for competition by the NCAA).
- The scoreboard location does not face the neighborhood, as pictured below.



- The new scoreboard will be the same size and at the same elevation as the existing scoreboard.
- The new scoreboard will use the existing structural steel.
- The scoreboard will not face the neighborhood.
- As is the case with the existing Reeves Field scoreboard, the only sound that will be generated by the new scoreboard will be for clock starts and stops, substitutions, and end of half.
- The new scoreboard will have similar video capability as the Jacobs Field scoreboard.

Existing Scoreboard



New Scoreboard

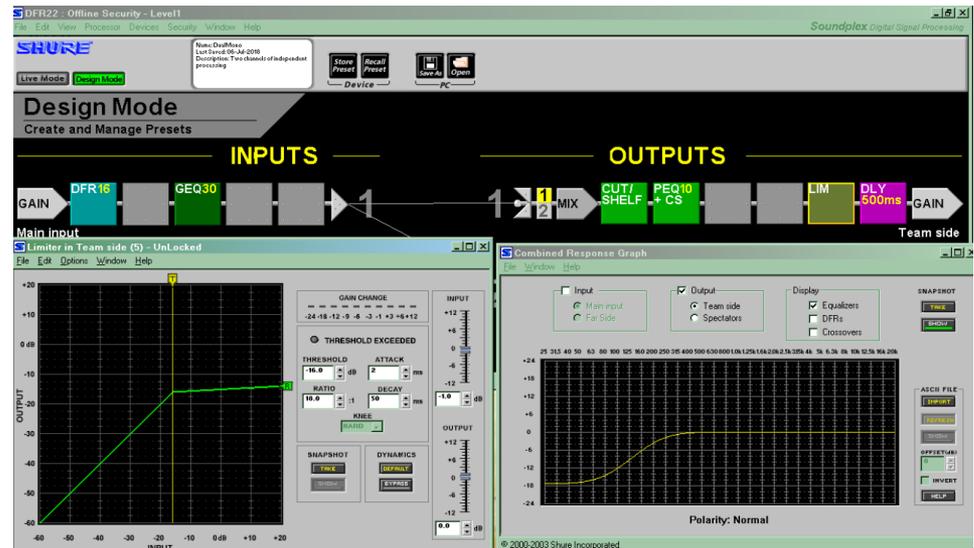




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Jacobs Sound Wall

"...(d)The sound system shall have a built-in limiter to limit the overall signal level to the speakers...." - Z.C. Order No. 20-31, Condition #20





- Horn sounds will now be generated through the sound system and controlled by the limiter.
- A reference diagram for Athletics has been developed to ensure proper speaker placement.
- The “rolling off” of frequencies has been implemented.
- New semi-enclosed player benches have been purchased.

- Data collected by AU consultants shared (Condition #19).**
- Sound wall design documents shared (Condition #19).**
- Modeling data supporting wall design shared (Condition #19).**
- System settings in place to reduce impact (Condition #24).**
- Speaker locations and positioning determined (Condition #24).**
- Monitor amplified noise from Jacobs Field (Condition #25).**
- Apply for further processing (Condition #20).**
- Perform post-completion testing of wall (Condition #23).**



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We specialize in the following:

- Interior Acoustics
- Acoustical Isolation
- Mechanical Noise Control
- Environmental Acoustics
- Audiovisual System Design
- Vibration Analysis
- Occupational Noise Analysis

Acoustics Basics

Sound: Variation of Air Pressure

- Variations in air pressure vibrate our ear drums which is perceived as sound.
- Low frequency sound can “feel” like vibration.

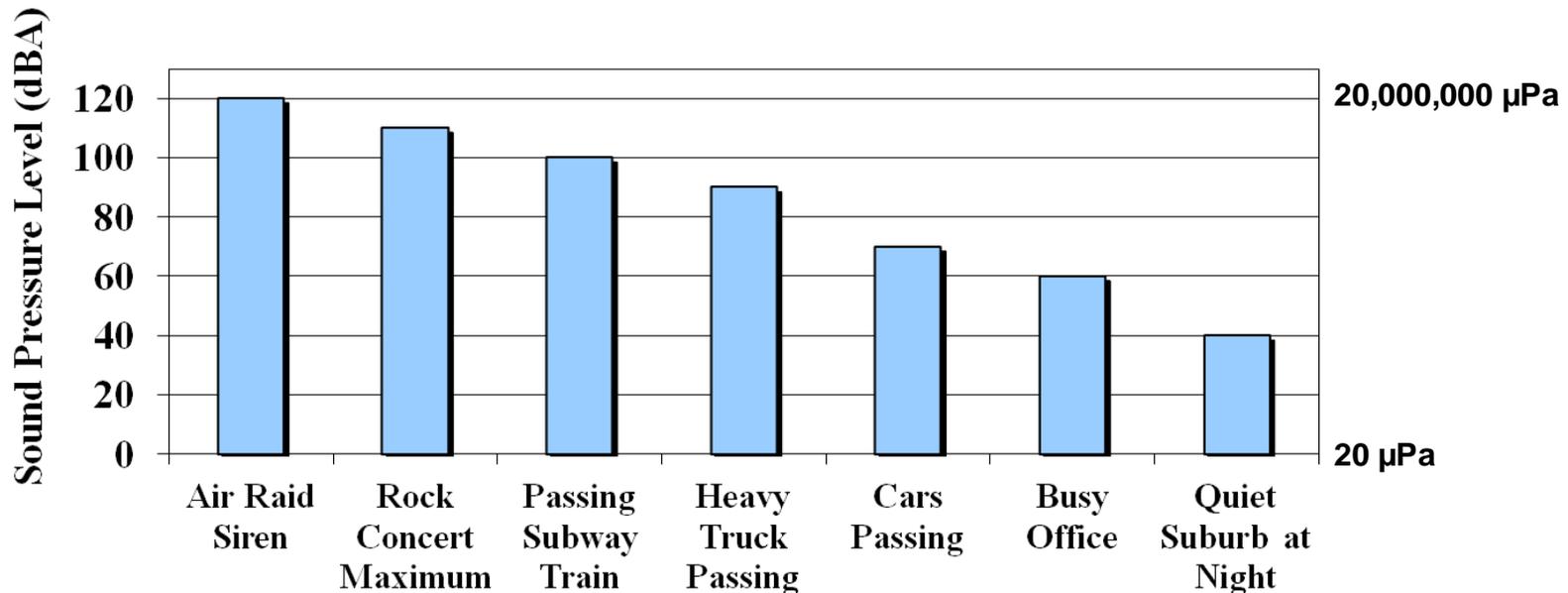
Vibration: Oscillations within a Solid

- Like sound, but in a different medium.
- Movement can be “felt” or perceived by touch

Human Hearing Covers a Very Wide Range of Pressure

- The wide range is compressed using the decibel scale which is logarithmic.
- Sound Pressure (dB) $L_p = 20 \log(p/p_{ref})$; $p_{ref} = 20 \mu\text{Pa}$
- Sometimes expressed as Sound Power (dB) $L_w = 20 \log(W/W_{ref})$; $W_{ref} = 1 \text{ pW}$

Some Typical Sound Levels



A Common Unit to Describe Human Reaction to Sound is the “A” Weighted Decibel Scale

- For dBA measurements, electronic filters are used which function similarly to how bass and treble controls roll off the low and high frequencies to simulate the ear’s response.

Relative Loudness and the Decibel Scale

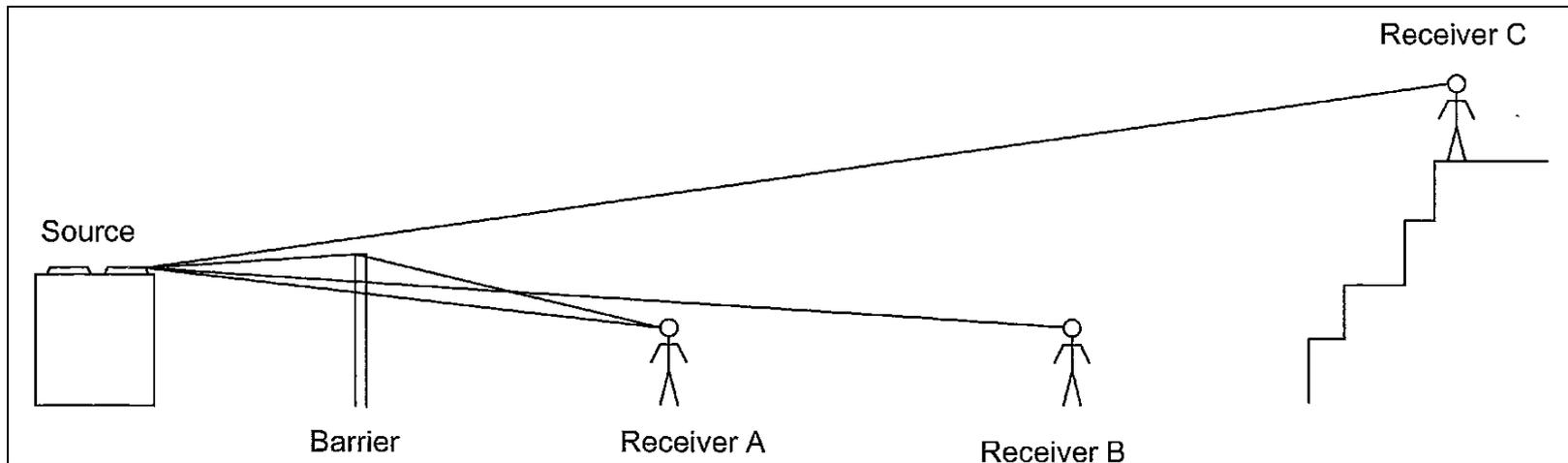
- A 3 dB increase (or decrease) in sound level is a just perceptible difference.
- A 5 dB increase (or decrease) in sound level is a clearly noticeable difference.
- A 10 dB increase (or decrease) is generally perceived to be twice (or one half) as loud.
- Normal indoor conversation is 60-65 dBA at a distance of 3 feet.

Noise Mitigation Techniques

- Reduce the noise at the source.
- Add berms, barriers, and/or other solid objects to block direct sound path.
- Increase distance between source and receiver.
- Vegetation and Landscaping?
 - Short distances of trees and bushes do not provide much noise attenuation since not solid.
 - A large distance of forest (nominal min. 300 feet) can provide noise mitigation due to shielding and good ground absorption.
 - Can provide visual screening. (Out of sight, out of mind.)
- A qualified consultant can calculate anticipated noise levels from known sources at noise sensitive locations and develop mitigation options, where necessary.

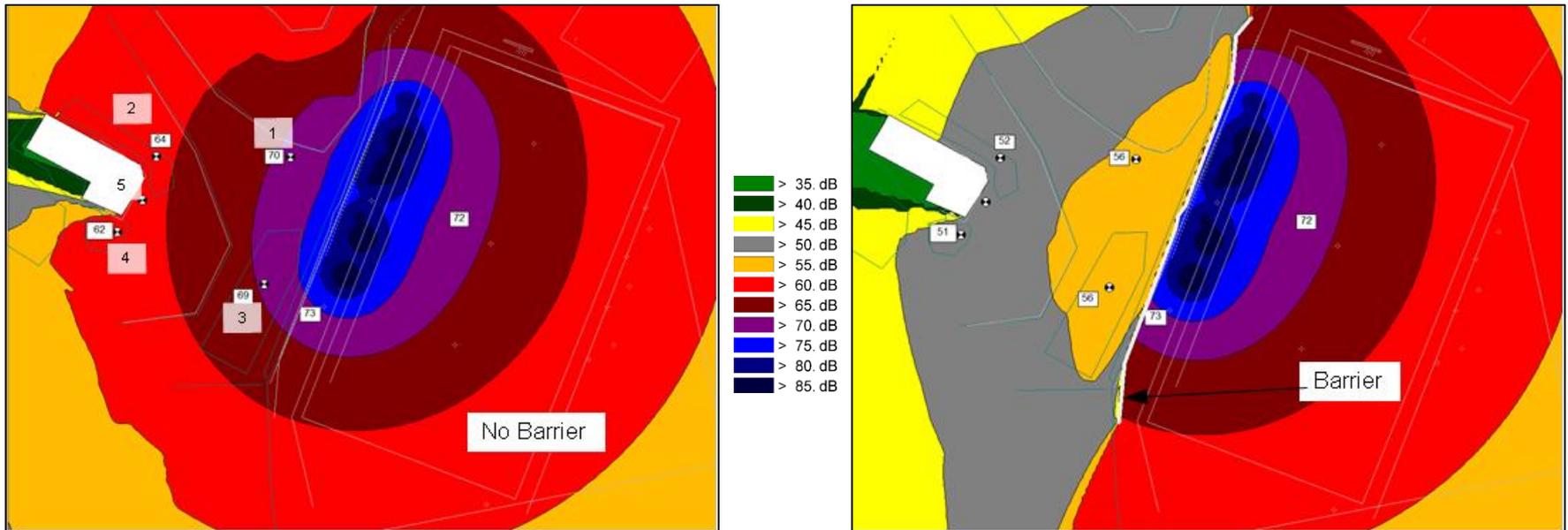
Barrier Sound Shielding

- Barrier effectiveness increases as actual noise path becomes greater than direct noise path.
- Barrier attenuation is better for higher frequency sounds than low frequency.



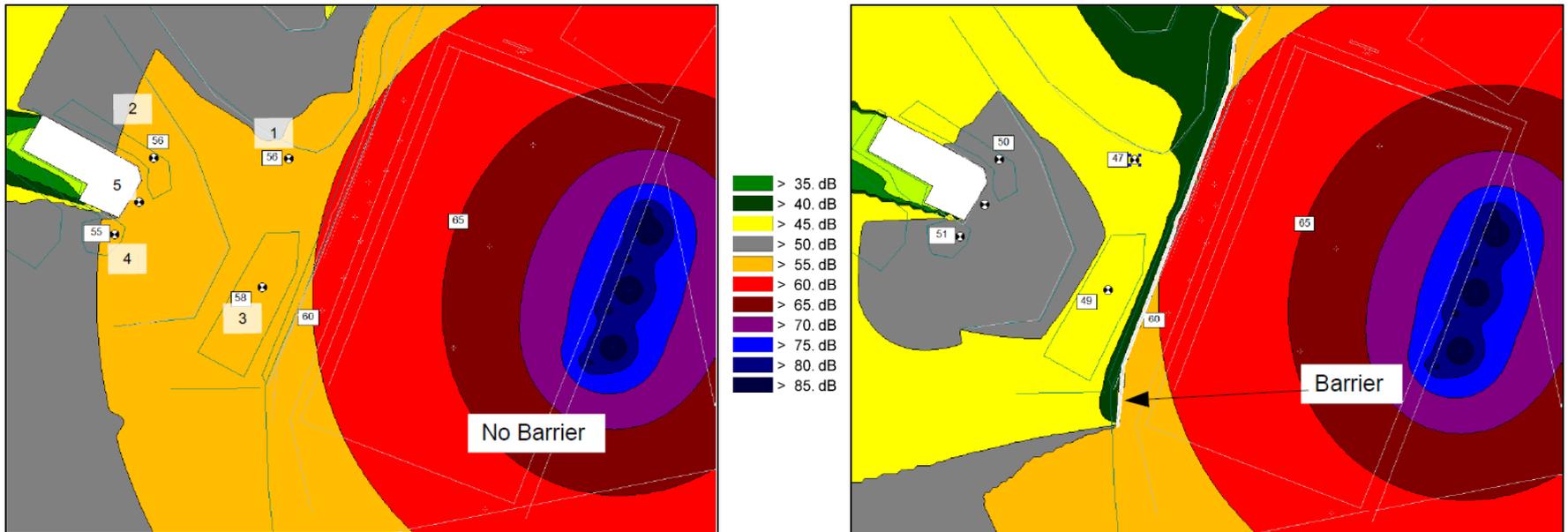
- Receiver A: Good barrier sound attenuation.
- Receiver B: Less barrier attenuation, but more reduction due to distance from source.
- Receiver C: Can see over barrier. No barrier attenuation.

Overview of Model (Case I)



Case 1: Team Side (West) sources	Sound Levels (dBA)		
	no barrier	with barrier	level reduction
Location			
1 Lower Driveway	71.1	56.1	15
2 NE Front of house	64.1	52	12.1
3 Lower Yard	70.7	57.4	13.3
4 Upper Yard	62.9	52	10.9
5 2nd floor window	64.6	54.4	10.2

Overview of Model (Case II)



Case 2: Spectator Side (East) sources		Sound Levels (dBA)		
Location	no barrier	with barrier	level reduction	
1 Lower Driveway	56	46.7	9.3	
2 NE Front of house	55.7	50.6	5.1	
3 Lower Yard	58.5	48.7	9.8	
4 Upper Yard	55.2	51.7	3.5	
5 2nd floor window	56.5	56	0.5	



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Closing Comments and Adjourn