

Columbia Commons Baseball Stadium

Environmental Noise Study

Sound System

Environmental Impact Overview

- Predict loudspeaker sound levels at the surrounding community from the new baseball stadium
- Provide comparison to the City of Columbia, South Carolina Noise Ordinance

Firm Overview: WJHW

- 20+ years experience in offering state-of-the-art design services and consulting in audio, visual, video & scoring displays, acoustics, and other technology services
- Sound System Design: Texas Rangers Ballpark, Wrigley Field Renovations, Durham Bulls Athletic Park, Nashville Sounds Ballpark, Autozone Park in Memphis, among many

Acoustics Terminology

- Sound Power Level – total sound energy created by a sound source; measured in decibels (dB)
- Sound Pressure Level – rapid pressure fluctuations which the ear interprets as sound; measured in decibels (dB)
- Decibel (dB) – measure of sound pressure or sound power levels; calculated as a logarithmic ratio to a base sound pressure/power (often, the threshold of hearing)
- dBA – A-weighted sound pressure level; closely related to the human hearing sensitivity to various sound frequencies

Acoustics Terminology

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Sound Source	dBA
Average Home Interior	50-55
Talking, 3 ft	60-65
Freeway Traffic	70-80
Lawnmower	85-95
Woodshop Equipment	95-105

Acoustics Terminology

- L_{eq} – Equivalent Continuous Sound Level – single sound level value equivalent to the same energy as fluctuating sound levels over a period of time, can be considered a type of “average” sound level. Output of the environmental noise model.

Environmental Noise Model

Sound System Design

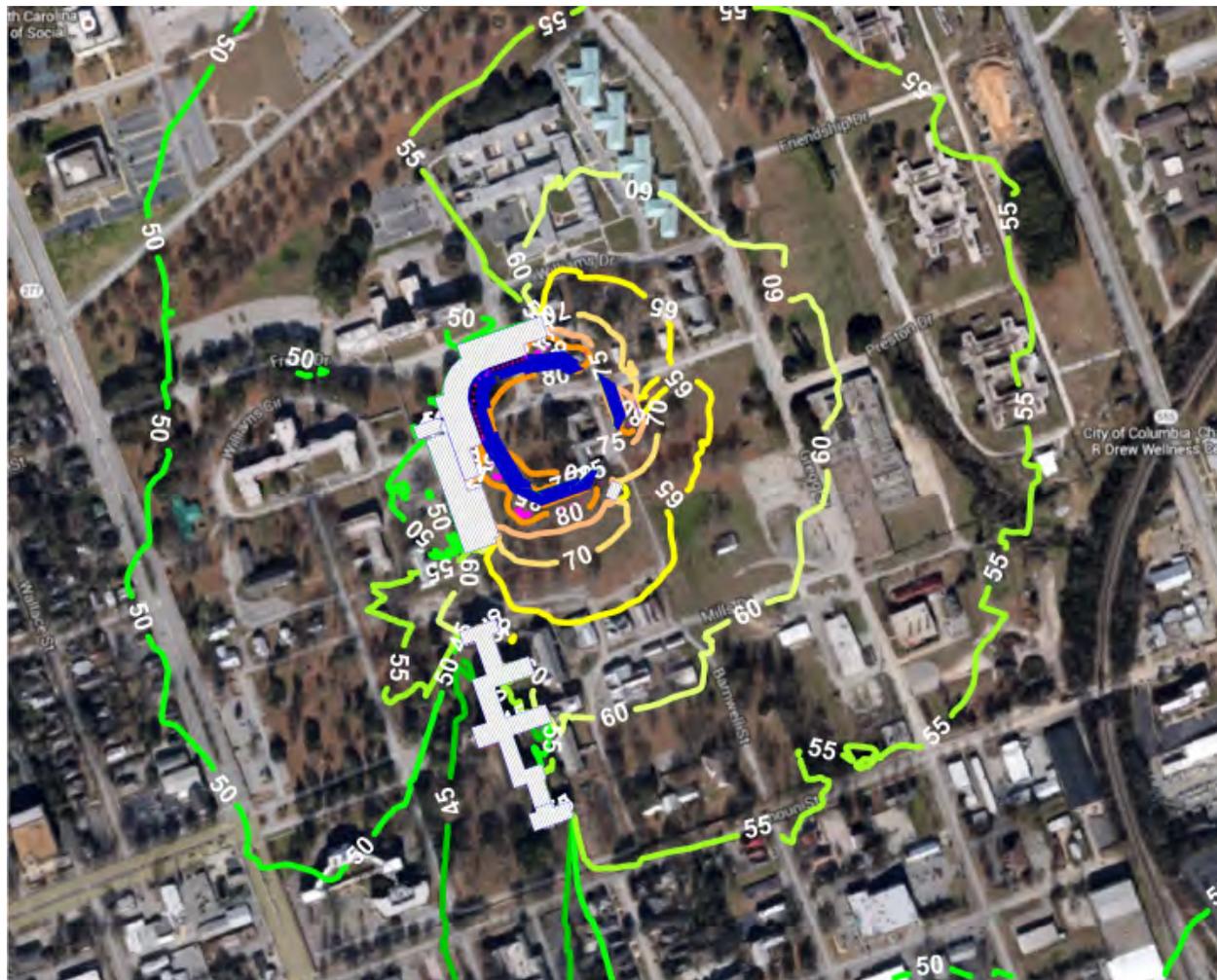
- Distributed speaker system consisting of 10 speakers in outfield, additional speakers mounted under the canopy.
- Outfield speakers on poles approximately 50 ft high
- Speakers selected and aimed to just cover seating
- Allows system to be operated at lower level with higher quality
- Sound system noise levels modeled 83-85 dBA in seating

Environmental Noise Model

SoundPlan Modeling Software Inputs:

- Noise levels in the stadium of 83-85 dBA. ***It should be noted these levels will be intermittent, typically lasting in intervals of no more than 30 seconds at a time during the game.***
- Stadium, First Base Building, Babcock, and Ensor Buildings geometry as provided by POPULOUS
- Terrain from the site topographical data
- Foliage, winds, other future buildings not included in model to provide conservative estimate
- Crowd noise not included in the model; not controlled by facility and consists of many individual sources so sound travels less far

Environmental Noise Model - Results



Noise levels dBA

45 <=	<	45
50 <=	<	50
55 <=	<	55
60 <=	<	60
65 <=	<	65
70 <=	<	70
75 <=	<	75
80 <=	<	80
85 <=	<	85
90 <=	<	90

Columbia, South Carolina Noise Ordinance

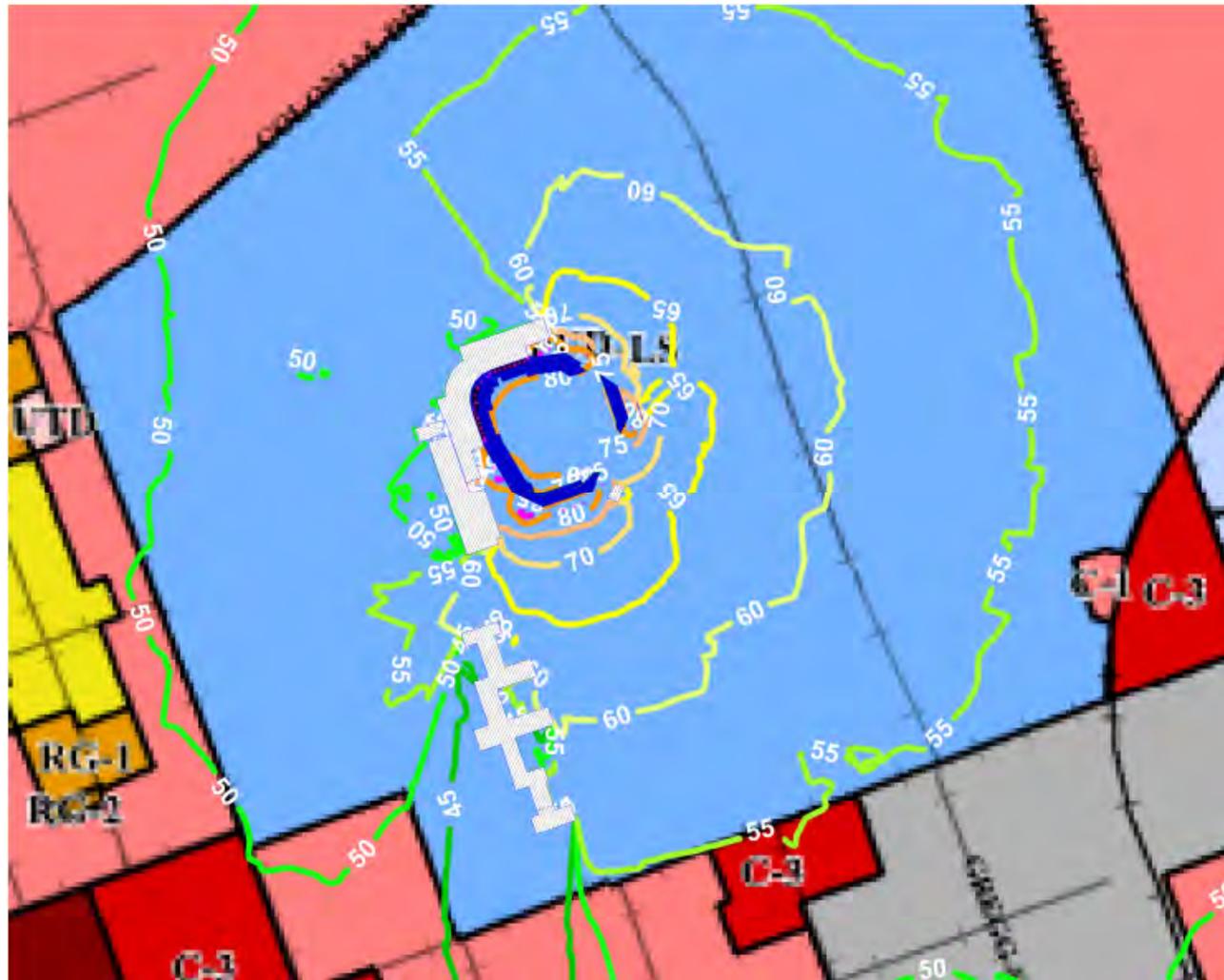
Prohibits any person from creating sound in excess of the sound pressure levels noted in the following table.

Octave Band (cycles per second)	Sound Pressure Level (decibels)	
	Residential	Commercial
0—75	65	79
75—149	60	74
150—299	55	66
300—599	55	59
600—1,199	45	53
1,200—2,399	45	47
2,400—4,799	40	41
4,800 and over	40	39

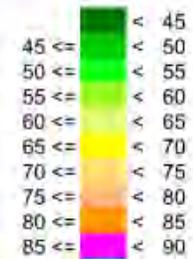
approx. 55 dBA

approx. 65 dBA

Environmental Noise Model - Results



Noise levels dBA



Discussion

- Noise levels from the sound systems for baseball use meet the applicable City of Columbia Noise Ordinance outside of the Planned Use Development
- As discussed previously, noise levels are for typical minor league baseball games, and are typically intermittent
- Typical ambient noise levels for an urban neighborhood are approximately 55 dBA
 - While the loudspeaker system could still be audible and noticeable because of the speech and musical content, typical stadium operations would not be louder than those ambient levels in an urban residential area

QUESTIONS?

Wrightson | Johnson | Haddon | Williams