IV. ACOUSTICS BREADTH

i. Acoustics Breadth Introduction

The fifth floor of the Duncan Center houses The Outlook Center, an elaborate reception and ballroom space available for rent to the public. As the ballroom is positioned directly above office space available for rent, this space must be specifically designed for acoustics both for the ballroom space itself and also its effect on adjacent spaces. Therefore, an acoustical comparison of the sound transmission class of the floor system and reverberation time in the ballroom between the two systems will be performed.

ii. Sound Transmission Class Comparison

Sound transmission classes (STCs) were determined using "Architectural Acoustics" by David Egan. As the proposed concrete structural system has an increased concrete slab thickness it has a higher STC and performs better than the existing steel structural system, as show in the tables below.

Existing Structural Steel System Sound Transmission Class		
Floor System	Floors	STC Rating
5" Concrete on 2" Composite Steel Deck	All	
3" Reinforced Concrete Slab	All	39
Proposed Concrete Structural System Sound Transmission Class		
Floor System	Floors	STC Rating
12" Reinforced Concrete Slab	1st-4th, 6th	88
14" Reinforced Concrete Slab	5th	99

For calculations, other assumptions, and sound transmission class data; see Appendix B: pg.124-125.

iii. Reverberation Time Comparison

Reverberation times were determined using "Architectural Acoustics" by David Egan. The proposed concrete structural system performed marginally better than the existing system with the change of the masonry block walls to rough concrete and ½" gypsum wall board ceiling beneath the sixth floor to rough concrete. However, the system was found to perform much better if a ½" gypsum suspension system versus the existing ¾" acoustical board suspension system is used, as included in proposed system calculations. Therefore, the proposed concrete structural system performs much better across all the frequencies compared to the existing, as can be see from the tables below.

Existing Steel Structural System Reverberation Time-Half Occupancy		
Frequency	Desired Reverberation Time	Actual Reverberation Time
125 Hz	1.43	0.55
500 Hz	1.10	0.58
4000 Hz	0.85	0.36
Existing Steel Structural System Reverberation Time-Full Occupancy		
Frequency	Desired Reverberation Time	Actual Reverberation Time
125 Hz	1.43	0.54
500 Hz	1.10	0.55
4000 Hz	0.85	0.35
Proposed Concrete Structural System Reverberation Time-Half Occupancy		
Frequency	Desired Reverberation Time	Actual Reverberation Time
125 Hz	1.43	1.55
500 Hz	1.10	2.11
4000 Hz	0.85	0.73
Proposed Concrete Structural System Reverberation Time-Full Occupancy		
Frequency	Desired Reverberation Time	Actual Reverberation Time
125 Hz	1.43	1.46
500 Hz	1.10	1.77
4000 Hz	0.85	0.68

For calculations, other assumptions, and sound absorption data; see Appendix B: pg.124, 126-131.

iv. Acoustics Breadth Conclusion

Acoustically, the proposed concrete structural system performs much better than the existing steel structural system for both sound transmission class and reverberation time. Therefore, the proposed concrete structural system is recommended for acoustic performance.