

ON THE ACOUSTICS OF SACRED SPACES

No doubt, many of us in the ACNA have had to leave our previous church homes in search of new ones. Some have built new church buildings, some are in the process of doing so, and some dream of new construction. Others have found a new home by occupying a former church's building or even a store front. Whatever the situation, the Lord has provided an opportunity for worshipping Him together and for furthering His Kingdom of earth. As we are stewards of these spaces, one very important consideration in their design or refit is the matter of acoustics. In broad terms, the study of acoustics is both a science and an art looking into the reflection of sound in an enclosed space and the effects this has open the listener.

Sadly, acoustics are usually the last thing thought of critically in a building project and the first thing criticized when occupying the building. The combination of reflective and non-reflective surfaces as well as sounds from air conditioning machinery and air conditioning vents impair the ability of the congregation to hear the spoken word and the sung word with beauty, clarity, and holiness.

Worship space acoustics usually come in two varieties. Generally, for the non-liturgical church with stage band in front and congregation listening or singing along, a theater approach to acoustics is what is usually used. That is as much deadening material in the room is employed as possible so that all sounds sources from the front can be mic'd and controlled within a sound system. This is also true in a theater, either a movie theater or a live theater.

In a liturgical church, the liturgy is the work of the people and therefore the people need to hear one another when they sing, recite creeds, prayers, etc. so that there is a corporate experience in worship. Also, with the use of traditional acoustic instruments such as organ, piano, flute, violin, solo voice and choirs there is a desire for the room giving back and bringing the sounds in worship into a cohesive whole. This has been case in effective liturgical worship spaces since the first Jewish temples, through the construction of stone churches across England and Europe, and continued in the US when knowledgeable heads have prevailed.

The acoustical standard for reflected sound, differentiated from echo, is 3 seconds within an empty room and 2.5 seconds in a room normally filled. This will allow both spoken word and sung word to be experienced in an effective manner and allow instrumentalists to experience the room giving back in their offerings. It also creates a sense of holiness in the room and creates a better sense of community in the prayers and singing of the people.

Included in these writings is an essay titled "The Holiness of Acoustics". It was written for the book *Worship Space Acoustics: 3 Decades of Design* and is worth checking out. (see below)

Fine Acoustical Engineering Firms experienced with Sacred Spaces:

Mr. Scott Pieffer at Threshold Acoustics of Chicago. His firm is currently working on such projects as Jones Symphony Hall in Houston, the new opera house at Rice University, and the Rothko Chapel and has performed acoustical studies of dozens of churches around the country.

Also, Kirkegaard Associates of Chicago. Another prominent and well-established acoustical firm that regularly deals with church and sacred space acoustical studies.

THE HOLINESS OF ACOUSTICS

Mark K. Williams

From the Preface of *Worship Space Acoustics: 3 Decades of Design*.
Springer; 1st edition 2016, NYC, NY.

In 1975, I led my first worship service at the organ...I was fifteen. Nine churches, 46 years later, and happily married to a professional classical singer I have sung in, preached in, directed orchestras and choirs in, recorded in, and toured in my share of acoustical spaces. I am fond of saying, "If the bell in the steeple pealing out the start of worship is the voice of a church building to the surrounding neighborhood, then the acoustics of its rooms are its lungs, providing life or death to the sound making within." Composer and church music lecturer Alice Parker once shared with me, "Mark, what the floor is to the dancer, acoustics are to the musician." Former organ voicer and designer Larry Phelps shared, "Eighty percent of an organ's sound is the room in which it is located. Even a bad organ can sound pretty good in a live acoustic."

Each summer my Youth Handbell Choir tours. We have rung in some 70 churches over our many years touring and even my teenage musicians can walk into a space and know instinctively how hard or how easy it will be for them to make music together on a particular night's. Dead room, means not being able to hear from one side of the choir to the other; tempos will be off, beats won't fall together, they will struggle simply to stay together. Gone will be musical nuance and the joy of making music as a team as they interact aurally within the room's acoustic. Furthermore, the fruits of their many hours of rehearsal will often be relegated to the base fundamentals of just trying to maintain the beat together while performing.

Live room, means getting something back when they make sounds in the room, that the room "gives back" to the performers and allows them to hear the ensemble and to interact with it aurally. It means, happy night. (Admittedly, too live a room can create problems for a musical ensemble as well but this is rarely the situation we encounter. Nevertheless, moderation in all things.)

A couple of years back our church began meeting in a large historic church in downtown Savannah. I won't go into the details of why here, but suffice it to say we had to move out of an historic church nave with 45-foot high plaster ceilings and 3-foot thick plaster walls, hardwood floors, closed-cell foam pew cushions with reflective fabric on them and about 3 seconds of reverberation time when the room was empty. We also enjoyed a refit of the HVAC system to a low speed/high-air-volume system so that it was no longer audible to the naked ear. Thanks to the guidance of a fine acoustician, in this refit room the congregation sang, man did they sing as the live acoustics bolstered their confidence. They no longer felt like isolated singers in the pews. And when they prayed or read prayers or creeds together, it sounded as one voice being offered up to the Lord. Preaching could be heard clearly without the aid of a mic and there was a corporateness and unity in the worship so that no one felt alone because of the acoustics of the room.

Then when we moved into the temporary quarters of the large historic church in downtown Savannah-quite beautiful and shared with us by a very generous congregation I might add-we found that the sanctuary acoustics had a dramatic impact on the life of our worshiping congregation. With carpet under the pews, velvet covers on the pew cushions, a domed ceiling constructed of thin 1/4" wood, and an HVAC system that was clearly audible at all times, we found that the corporate nature of our worship was decidedly changed. Worshippers complained of not being able to hear even the persons next to them singing or participating in the liturgy, singing lost its former gusto, and all speaking elements of the service had to be mic'd. The sense of the family gathered for worship and their combined voices being offered as one voice to the Lord went away in this new acoustical environment. As thankful as we were for the use of a beautiful historic space, the air went out of the lungs of our worship and no matter what convolutions we came up with to overcome it, there was no fighting this foundational acoustical disorder.

Interestingly, when it came time to design our new building, (we also took into consideration acoustical design of the Fellowship Hall and the main music rehearsal space) a survey was taken of the congregation to obtain their top priorities for the new worship space. With over 250 members participating, at the end of the tally number one on the list turned out to be "excellent acoustics."

Clearly, in all this there is something about a relationship between acoustics and holiness. I walk into Salisbury Cathedral and my conversation ceases with my wife, as it does with everyone who walks in the door after us. Conversation turns to hushed whispers and there is a clear sense that you have entered a holy place and that occasional whispers and quiet comments are all that are allowed. Of course, in a beautiful cathedral one could attribute this to the grand size or to the beautiful aesthetic. And although I value beauty, as clearly God did not create beauty in vain, I believe that it has to do more with acoustics as I have found this same effect occurs in museums with a similar acoustical environment.

A couple of summers ago I visited the organ performance hall in the Shepherd School of Music at Rice University. The room is not enormous by large cathedral standards. It is

also not particularly ornate. However, it does have a grandness and a public building formality...and it has a holiness in its acoustic. I experienced the same hushed feel and expectation walking into the room as I did Salisbury Cathedral.

Given the needs for such things as adequate restrooms, good and flexible lighting, comfortable pews, and all of the other things architects and planning committees deal with in designing a church, somehow, the acoustics of the space seem even more fundamental to the need for qualified planning that will be inhabited by the worshiping community. Too often, worship space acoustics are the last thing thought of in any detail during design and construction or reviewed by an acoustician with liturgical space design experience, but poor acoustics is among the first thing complained about upon occupying a new building. Admittedly, it is far more cost effective to properly design in good acoustics from the get go than to attempt to rectify problems after construction has been completed.

Designers of effective liturgical spaces have known the power of acoustics from the early Jewish Temples to the cathedrals and stone parish churches of Europe. That is when we walk into these spaces our conversations are hushed and we know in our core that we have entered into a holy place set apart and designed to come before our Creator God who, is not us.

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