

Churches should be mindful of sound control from above

Sound reinforcement and enhancement of ceilings are important to the acoustics of a worship space.

The ceiling of a worship facility can both enhance and detract from the church experience. The result is determined by both the acoustical properties of the materials and the acoustical needs of the space.

A church moving from a traditional service to high energy praise and worship in an older building will usually need additional sound absorption, while a traditional service, with limited or

Ceiling shape can be changed to increase congregation (audience) coverage without requiring enhanced electronic sound reinforcement. While reducing flutter, a sloped ceiling can increase coverage of useful reflections (those less than 30ms. from same direction) by creating multiple paths for the sound to reach the listener.

Reduce reflection

Room-to-room noise transmission is often the result of sound “flanking” over the partitions dividing a large space, when those partitions do not extend to the deck above. A standard absorptive ceiling tile will reduce reflection within a room but not stop penetration into the plenum above. Choir practice will get over the wall to the nursery and vice versa. This can be reduced by extending the partition to the overhead floor slab with a blocking material such as sheet lead, barrier blankets or the now commonly used mass loaded vinyl.

Tiles can be made to block sound by adding either gypsum or mass-loaded vinyl as a backer. Having the backer as part of the tile prevents shifting of the barrier material when the plenum must be accessed for maintenance.

In either case the grid should go to the partition and the partition must extend beyond the ceiling line. If the ceiling was installed first over a large area, and partition walls added that stop at the ceiling, sound will slip through the gap. If air or light, can escape, sound will get through as well.

Enhance and reinforce

While today’s acoustical control usually focuses on blocking the unwanted (noise) and reducing the desirable (sound), sometimes it is necessary to enhance and reinforce. Most often when an older church has moved to a high-energy praise and worship service, the sound overloads the room and must be substantially weakened.

Conversely, when the church tradition is congregational singing, without any instrumental accompaniment, a newly designed facility may exhibit the opposite acoustical needs and require sound enhancement. This can be especially true when the >>



Photos courtesy of Acoustics First Corporation, Richmond, VA.

Acoustics First, Cloudscape Baffles hanging from ceiling.

no instrumental music and little electronic sound reinforcement in a new building, will often benefit from adding back reflections for ambience enhancement. Both styles of service will still require some isolation from noise within and outside of the church.

In the sanctuary, the flutter, variations in pitch between the floor and ceiling will be prominent if the floor and ceiling are smooth, level and highly reflective. To avoid this, a smooth ceiling should not be parallel to the floor.

By Nick Colleran

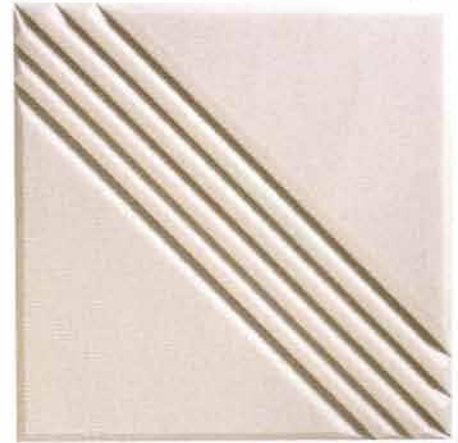


Acoustics First Model C Art Diffuser on ceiling.

church expands to a larger building and the experience goes from uncomfortably full, to seemingly empty, with the same attendance.

In this situation sound diffusion can

be the answer. Diffusion spreads the sound throughout the space, reducing its intensity without eliminating it, and providing a more uniform and comfortable performing environment. Replacing absorptive



Cloudscape ceiling tile.

ceiling tiles with now readily available sound diffusers will bring back the sound of a traditional space that is necessary to a comfortable performance, without requiring a redesign of the recently built room.

The worship leaders can now afford the big guitar amplifiers they always wanted to use. While this provides one more experience to draw people into the worship service, it also produces a challenge to the acoustics of a traditional space. A sanctuary designed with a natural reverberation to enhance singing and add to the fullness of the pipe organ will usually require some added acoustical control. Voice and acoustical instruments lose most of their sonic energy before reaching the room boundaries. Electronic reinforcement produces sound waves that go the distance and reflect back (often several times) as well.

High energy control

The easiest, affordable, and most effective place to start reducing reverberation is the ceiling. Spray-on materials are effective, and reasonably easy to install, during construction. Afterwards, when the excess reverberation has become evident and annoying, this treatment becomes a bit too messy for a retrofit.

An alternate approach is ceiling baffles, barrier that reduces sound energy. These absorb sound from all sides and their edges, making them highly efficient. If the ceiling structure remains an open frame, baffles can be installed with >>

minimum labor required. A “cherry picker” or other movable platform makes the installation go quickly.

If the ceiling is finished as a standard drop-tile grid, many options are available. The typical commercial ceiling tile will have an absorption rating of NRC=0.50 (Noise Reduction Coefficient). Moving up to a material that promotes acoustical absorption such as fiberglass or acoustical Melamine will yield close to NRC=1.00. Using standard building insulation above the drop ceiling will increase absorption while improving thermal properties for heating and cooling.

If the space requires extra low frequency absorption, venting the ceiling plenum — space above or below ceilings and floors — by eliminating a few tiles will allow the space to become a bass trap. Absorption goes up as sound is exposed to the hidden side of the ceiling. The opening should be partially closed with an open grate backed by a thin membrane barrier material (transparent to low frequencies) to prevent falling insulation particles.

In any auditorium space, it is necessary to know the type of performance that the room will accommodate in order to correctly recommend acoustical treatment. In a church, the type of service is equally important information for the acoustical consultant. Considering the acoustics first will allow the sound and the service to work together.

Nick Colleran is a founding principal of Acoustics First Corporation, Richmond, VA, a manufacturer and distributor of acoustical materials. [www.acousticsfirst.com]

