

## ACOUSTICAL DESIGN ELEMENTS FOR WORSHIP SPACES

**T**HE CONSULTING AND DESIGN EFFORT FOR WORSHIP SPACE ACOUSTICS MUST BE AN integral part of the entire planning and building process whether the project involves new construction or the renovation of an existing space. A thorough acoustical design effort extends from the programming phase, through the entire architectural design and specification process, and continues through construction and final performance verification. **MUSONICS** acoustical consulting and design services are comprehensive and include the four traditional elements of architectural acoustics.

### ROOM ACOUSTICS

The responsiveness of the worship environment must fulfill every aspect of the acoustical imperatives of the worship experience. It must allow the spoken liturgy to be clearly heard and understood and the music liturgy to be resounding and uplifting. At the same time, it must encourage the congregation to participate in praise and celebration. The ideal worship environment has acoustical qualities that will enhance both speech and music, and will support sounds from the worship center, music center, and congregation.

The Acoustical Consultant should be involved in a church building project from the very beginning. During the planning and programming phases, the Consultant must learn and clarify the needs of the Parish. In the process, he must discover the aural atmosphere the Parish seeks for the worship experience, identify and resolve conflicting priorities, and formulate preliminary architectural responses to fulfill the acoustical requirements.

To assist the Architect in providing the critical acoustical requirements and achieve the delicate balance necessary for speech and music to successfully coexist, **MUSONICS** will interact with the Architect from the earliest stages of design and provide the following:

- Attendance at all Masses and meetings with key parish staff members during a weekend visit.
- A comprehensive review and critique of the Architect's preliminary design.
- Design recommendations for room proportions, geometry, surface shaping, materials, etc., and for the music center, choir, organ console, choir rehearsal, etc.
- Architectural sketches to convey the necessary dimensions, shaping, and functional relationships among the various elements of the worship space including: Sanctuary and Altar platform, music center and choir, a pipe or electronic organ, sound system loudspeakers and control locations, mechanical room locations and provision for ductwork, ancillary spaces such as Narthex, cry rooms, choir rehearsal room, etc.
- Written *Preliminary Design Guidelines* for reverberation time, sound isolation requirements, optimum room volume and geometry, construction requirements for walls, floors and ceilings, etc.
- Design recommendations, architectural details and sketches throughout the entire design process including recommendations and specifications for finish materials.
- Drawing reviews at key points in the design process to insure that the Architect and other design team members have properly incorporated all necessary design requirements for optimum acoustics.

## MECHANICAL SYSTEM NOISE AND VIBRATION CONTROL

Mechanical systems in worship spaces are often excessively noisy creating distraction and interfering with speech intelligibility. Experience has shown that it is *not* sufficient to simply specify a noise level *design goal* for the mechanical engineer and leave it at that. The acoustics consultant *must* take a proactive role in the design process to control mechanical system noise.

To help assure quiet mechanical systems, the following services are provided:

- Written *Preliminary Mechanical System Design Guidelines* and sketches for the Architect and Mechanical Engineer to guide them in the selection of basic system design. These include mechanical system noise criteria and design goals.
- Comprehensive review of the Mechanical Engineer's preliminary design and subsequent design revisions.
- Mechanical system noise calculations using industry-standard computer software.
- Recommendations for the incorporation of silencers, duct lining, quieter equipment, re-routing of ductwork, etc., as required to meet the specified design criteria.

## SOUND ISOLATION

The requirements for sound isolation are inextricably linked to both Room Acoustics and Mechanical System Noise Control. In addition, the level of quiet rendered by proper sound isolation construction and techniques must be provided for all spaces within the building wherein silence, privacy, solemnity, and confidentiality are required for the special needs of prayer, meditation, and education.

To provide input to the Architect at an early enough stage of the design process so that proper sound isolation can be achieved cost-effectively, the following are provided:

- Guidelines for room adjacencies, sound isolation requirements and construction for exterior walls, roofs, interior partitions, etc., based on programmed uses of spaces.
- Architectural sketches and details for wall construction and specialty construction that will affect sound isolation.
- Reviews of the Architect's drawings periodically throughout the entire design process to verify that the necessary details have been incorporated.

## SOUND SYSTEM SPECIFICATION

A well-designed sound reinforcement system is a virtual necessity in all but the smallest worship environments. Its primary function is to provide clear, intelligible speech. Of greater significance is that a high quality sound system can provide speech clarity within an environment that is sufficiently reverberant to enhance the musical elements of the liturgy and encourage congregational singing.

To provide a cost-effective and optimally functional sound reinforcement system, the following process may be employed as an integral part of the acoustical design effort:

- A full *Functional Description of Sound System Requirements* should be developed in collaboration with input from the pastoral staff, parish committees, and Architect, to define the functional needs of a complete sound system for speech and music.
- When the Functional Description has been completed, a complete *Equipment Specification* can be prepared including customary one-line system diagrams. Conduit and box requirements will be provided to the project Architect and/or Electrical Engineer for inclusion in the contract documents.
- The Acoustics Consultant should collaborate with and assist the selected Sound Contractor with any questions, changes, alternates, problems, refinements, etc.
- Upon completion of the sound system installation, the Acoustics Consultant will conduct a complete checkout and measurements to verify compliance with specification requirements. This will include a demonstration of performance and operation by the Sound Contractor and in the presence of the Owner's Representative.

**MuSONICS** has over 25 years of experience and demonstrated success in the acoustical design of worship spaces. Because of this experience, **MuSONICS** strongly believes that this level of involvement and interaction with the Church, Architect, and other design team members is essential to insure that all the essential acoustical requirements for worship are properly designed and integrated as a natural element of the architecture.

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