

**Acoustical Society of America  
Technical Committee on Architectural Acoustics  
and  
National Council of Acoustical Consultants**

**January 2003**

**STUDENT DESIGN COMPETITION - 2003**

**GENERAL INFORMATION**

The Technical Committee on Architectural Acoustics of the Acoustical Society of America and the National Council of Acoustical Consultants are sponsoring a Student Design Competition that will be professionally judged at the 145th meeting of the Acoustical Society of America being held in Nashville, Tennessee from April 28 through May 2, 2003.

The purpose of this design competition is to encourage students enrolled in architecture, architectural engineering, and other university curriculums that involve building design and/or acoustics to express their knowledge of architectural acoustics and building noise control in the schematic design of a building where acoustical considerations are of primary importance. This competition is open to undergraduate and graduate students from all nations.

The submitted designs will be displayed at the Nashville ASA meeting, and they will be judged by a panel of professional architects and acoustical consultants. Five entries will be selected for awards, one "First Honors" award and four "Commendation" awards. An award of \$1,000 will be given to the entry judged "First Honors". An award of \$500 will be given to each of the four entries judged "Commendation".

Entries may be submitted by individual students or teams of students with a maximum of three team members. Building schematic designs and related information shall be presented on two poster or foam core boards each with maximum dimensions of 30 by 42 inches (76 by 107 cm). The boards shall be suitable for wall display. The names, addresses, phone numbers, e-mail addresses, and school affiliation along with the name of any sponsoring or advising faculty member shall be placed in a visually opaque envelope and attached to the back of each display board. Display boards shall be wrapped in opaque paper that will not be removed until the boards are delivered to the Nashville ASA meeting and ready for display and judging. Entries must be received at the address that follows no later than April 23, 2003. Please package display boards securely and properly to prevent damage during shipment.

Prof. Robert C. Coffeen  
School of Architecture and Urban Design  
Marvin Hall  
University of Kansas  
Lawrence KS 66045

Additional information may be obtained by contacting Bob Coffeen, Lily Wang, or Robin Glosemeyer by phone, facsimile, or E-mail as follows:

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Information can also be found on the ASA website: [asa.aip.org](http://asa.aip.org)

Students intending to enter this competition must make their intentions known by sending e-mail to Bob Coffeen on or before April 4, 2003. Please indicate your name(s), school, faculty advisor, and e-mail address.

Design competition entries should emphasize the general building acoustics design (room acoustics and architectural noise control) and its interaction with the overall interior architectural design, with such interior design included for the Lecture Halls, Classrooms, and Lobby. It is not necessary to prepare architectural exterior building elevations. The drawings should present comprehensive solutions to the acoustical design in schematic design format. In addition to plans and sections, the poster boards may display acoustical calculations, acoustical criteria, and details of construction relating to acoustics and noise control as necessary to describe and support the design. If an acoustic analysis computer program(s) is used in the design, graphics and data from this program(s) may be displayed.

While the design of the building mechanical and electrical systems is very important to the acoustical success of a project of this type, it is not necessary for this particular design problem to indicate in detail the mechanical and electrical system noise control procedures that are required. However, the presenter(s) may wish to indicate noise criteria, and general noise and vibration control procedures relating to air handling, electrical power transformers, lighting dimmers, etc. Also, the presenter(s) should indicate physical facilities (locations) for video and slide projection and for electro-acoustic sound reinforcement systems loudspeakers, but the design of these systems is not a part of this competition.

A useful reference for classrooms and lecture halls is the new standard "ANSI S12.60-2002 American National Standard Acoustical Performance Criteria, Design Requirements, and Guidelines for Schools". This standard is available from the ASA website (click on Standards Store). Another reference is the ASA booklet "Classroom Acoustics – a resource for creating learning environments with desirable listening conditions". This booklet can be downloaded without cost from the ASA website (click on Publications and then on Download Classroom Acoustics Booklet). Additional resources are texts on architectural acoustics including "Architectural Acoustics - Principles and Design" by Madan Mehta, Jim Johnson, and Jorge Rocafort; "Architectural Acoustics" by M. David Egan; "Architectural Acoustics - Principles and Practice" edited by William Cavanaugh and Joseph Wilkes; and "Acoustics: Architecture Engineering The Environment" by Charles M. Salter.

## **DESIGN SCENARIO**

A college of moderate size intends to construct an education building, which is to contain a large lecture hall with approximately 800 seats, a smaller lecture hall with approximately 250 seats, two general-purpose classrooms, a multipurpose lobby, and a mechanical equipment room. Although the lecture halls are to primarily support lectures with multimedia presentations, the college music department does not have a suitable recital hall. Thus, the 300 seat lecture hall will be used occasionally for solo voice and instrumental recitals and for presentations by small instrumental and choral groups.

The site for the center is relatively flat and it is located approximately 200 feet (61 m) from a major 6-lane highway. The campus is approximately 3 statute miles from the airport that serves the geographical area, and it is approximately in line with an extension of one runway, which is frequently used for departing commercial jet aircraft. Typically, the departing aircraft will be 5,500 feet (1,678 m) overhead when passing over the building site. Departing aircraft have been found to create noise levels at the site that are higher than the levels created by arriving aircraft.

Following is the architectural program statement for this education building that defines the building (for the purposes of this design competition) as desired by the college.

## **PROJECT REQUIREMENTS**

### Large Lecture Hall

Seating: Approximately 800 permanently installed chairs with tablet arms.

Presentation Area: Floor area at front of room with depth of approximately 20 feet (13 m). This presentation area may be at the same level as the front row seating, or a 2 foot (0.6 m) high lecture platform may be provided.

Audio-Visual/Video Facilities:

Visual Presentations: Visual presentations will be via video and/or slide projection. Chalk or marker boards and overhead transparency projectors will not be used. Projection may be front screen, rear screen, or both front and rear screen. Video and slide projectors shall be permanently installed. It shall be possible to project three images simultaneously with any combination of video and slide images.

Audio: The sound reinforcement system shall accommodate speech reinforcement and recorded speech and music reproduction from multimedia sources. Loudspeakers shall be in fixed locations and be visually concealed where possible.

*(Please note that, for the purposes of this design competition and as previously mentioned, the design of audio-visual/video facilities is not part of the competition except that the hall design should include physical locations for projection screens, projectors, and loudspeakers.)*

Lecture Hall Uses: The hall shall be designed for lecture with multimedia presentations. It will not be used for live musical or theatrical performances.

Small Lecture Hall

Seating: Approximately 250 permanently installed chairs with tablet arms.

Presentation Area: Floor area at front of room with depth of approximately 16 feet (5 m). A platform is not required.

Audio-Visual/Video Facilities:

Visual Presentations: Visual presentations will be via video, slide, and overhead transparency projection. Video and slide projectors shall be permanently installed. Chalk or marker boards will not be used. Projection shall be front screen with permanently installed screens, and it shall be possible to project two images simultaneously with any combination of video, slide, and overhead transparency. A projection room at the rear of the hall shall be provided.

Audio: The sound reinforcement system shall accommodate speech reinforcement and recorded speech and music reproduction from multimedia sources. Loudspeakers shall be in fixed locations and be visually concealed where possible.

*(Please note that, for the purposes of this design competition and as previously mentioned, the design of audio-visual/video facilities is not part of the competition except that the hall design should include physical locations for projection screens, projectors, and loudspeakers.)*

Lecture Hall Uses: The hall will primarily be used for lecture with multimedia presentations. However, it shall also accommodate occasional use by the music department for solo voice and instrumental recitals and for presentations by small instrumental and choral groups.

Multipurpose Classrooms - two required

Seating: Approximately 40 portable chairs with tablet arms.

Audio-Visual/Video Facilities: Front marker boards shall be provided as part of the building construction, but visual projection and audio equipment and related facilities will be provided by the College after building construction is complete.

*(Please note that, for the purposes of this competition, it is not necessary to consider audio-visual/video facilities for the multipurpose classrooms.)*

Lobby

The lobby shall serve as the entrance space to the Lecture Halls. In addition to serving as a typical lobby, it will be used on occasion for meetings, luncheons and dinners, and receptions.

Mechanical Equipment Room (MER)

The MER will primarily house air handlers. Chilled water and steam are available from a nearby college building. It is estimated that area required by the MER will be a minimum of 1,200 ft<sup>2</sup> (111 m<sup>2</sup>).

**SITE NOISE**

Measured aircraft flyover and highway traffic noise levels in octave frequency bands are tabulated below:

| OCTAVE FREQ. BAND, CENTER<br>FREQ. - Hz | SOUND PRESSURE LEVEL - dB re 20µ Pa |       |       |       |       |       |       |
|---|-------------------------------------|-------|-------|-------|-------|-------|-------|
|   | 63                                  | 125   | 250   | 500   | 1000  | 2000  | 4000  |
| DEPARTING COMMERCIAL JET<br>AIRCRAFT*   | 68/77                               | 73/87 | 71/87 | 71/86 | 65/82 | 58/75 | 55/62 |
| ROADWAY VEHICULAR<br>TRAFFIC**          | 63/68                               | 66/70 | 59/61 | 60/61 | 60/63 | 54/57 | 44    |

\* Each set of levels represents the maximum levels observed in each octave frequency band for the loudest and the quietest flyovers during a one hour period when aircraft departures were frequent.

\*\* Each set of levels represents the range of levels observed in each octave frequency band for a 20 minute period during heavy, late afternoon traffic.

Levels indicated are believed to represent realistic "worst case" environmental sound levels at the site. Measurements were made at the edge of the site that is closest to the highway.