

STUDENT DESIGN COMPETITION 2004

TCAA
TECHNICAL COMMITTEE ON
ARCHITECTURAL ACOUSTICS



NCAC
NATIONAL COUNCIL OF
ACOUSTICAL CONSULTANTS

The Acoustical Society of America's Technical Committee on Architectural Acoustics and the National Council of Acoustical Consultants is sponsoring a student design competition to be judged and displayed at the 147th meeting of Acoustical Society of America in New York City, New York, May 24 through May 28, 2004.

The Student Design Competition is intended to encourage students in the disciplines of Architecture, Engineering, Physics and other curriculums that involve building design and/or acoustics to express their knowledge of architectural acoustics and noise control in a schematic design of a facility in which acoustical considerations are of primary importance.

The submitted designs will be judged by a panel of professional architects and acoustical consultants. An award of \$1,000 will be made to the entry chosen as "First Honors". Four awards of \$500 each will be made to entries judged "Commendation".

GENERAL INFORMATION

Entries may be submitted by individual students or by teams of a maximum of three students. Submissions shall be presented on up to two (2) boards with maximum dimensions of 24x36 in. (60x90 cm.) per board. Further design details, calculations or documentation may not be attached to the boards - all pertinent information must be contained on the boards. Submission boards shall be suitable for wall or easel display. The name, address, phone, email address, school affiliation and advisor/sponsor (if applicable) of all participating team members shall be placed in an opaque envelope and attached to the back of each submission board. Submissions shall be wrapped in opaque paper that will not be removed until the submissions are displayed for the competition. Please package display boards securely to prevent damage during shipping. Send entries to the following:

Student Design Competition 2004
Attn: Robin Glosemeyer
Jaffe Holden Acoustics
114A Washington Street
Norwalk, CT 60854

Entries must be received no later than May 10, 2004.

Additional information may be found at the ASA website (<http://asa.aip.org>) or by contacting any of the competition organizers:

Bob Coffeen
The University of Kansas
Phone: 785.864.4376
Fax: 785.864.5185
Email: coffeen@ku.edu

Lily Wang
The University of Nebraska
Phone: 402.554.2065
Fax: 402.554.2080
Email: lwang4@unl.edu

Robin Glosemeyer
Jaffe Holden Acoustics
Phone: 310.458.9334
Fax: 310.458.9394
Email: rglosemeyer@jhacoustics.com

Students intending to enter must make their intentions known by sending an email to Bob Coffeen on or before April 1, 2004. Please indicate your name(s), school, faculty advisor and email address.

SUBMISSION REQUIREMENTS/JUDGING CRITERIA

Design competition entries should emphasize the general building acoustics design (room acoustics and architectural noise control) and its interaction with the overall architectural design, with such design included for the facility, support spaces, etc. 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 computer programs are used in the design, graphics and data from the programs may be displayed.

While the design of the building mechanical and electrical systems is very important to the acoustical success of a project, 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, theatrical lighting dimmers, etc. It is also not necessary, for this particular design problem, to indicate special stage equipment such as stage rigging, side and rear slip stages, traps, etc. As indicated below, the facility will require an electro-acoustic sound reinforcement system for distribution of sound to the open lawn seating areas (areas not under the roof). It is not necessary to design this system as part of the overall design except that open lawn coverage loudspeaker locations are to be provided and indicated.

Useful references for opera hall design include *Concert and Opera Halls, How They Sound* by Leo Beranek; and *Halls for Music Performance: Two Decades of Experience, 1962-1982*. These references are available from the Acoustical Society of America, 500 Sunnyside Blvd., Woodbury NY 11797 USA, Phone 516-576-2360, Fax 516-576-2377, e-mail elaine@aip.org.

DESIGN SCENARIO

A city orchestra wishes to construct a music pavilion, with covered and lawn seating, to serve as its summer home. The orchestra would only occupy such a facility for ¼ of the useable days during a summer season. Therefore, the orchestra has formed an alliance with the local opera,

ballet and theater companies who will use the facility for an additional $\frac{1}{2}$ of the usable days. The anticipated pull of audience members for the orchestra is 10,000 people. The ballet, theater and opera expect 7,000 patrons. With $\frac{1}{4}$ of the schedule still open, and the need to bring in significantly more funds to maintain the facility, the managers of the pavilion will need to schedule popular acts such as rock and jazz to fill the remainder of the schedule. During these popular performances, audiences of up to 25,000 are expected.

The pavilion shall be sized to accommodate 5,000 seated audience members under a roof. An open lawn shall be capable of holding up to 20,000 audience members.

The orchestra, opera and ballet desire a natural acoustic facility for those audience members under the roof. However, with the lawn seating, it will be necessary to provide an electro-acoustic sound reinforcement system to reach those audience members. Most touring acts will bring their own sound systems, but some may opt to use the system provided by the facility to cover the open lawn seating areas.

Support space will be required; some will be acoustically sensitive. The orchestra will need a rehearsal room. The ballet, opera and theater will require a room for rehearsal as well. Resident companies and facility staff will need offices. Dressing rooms for the soloist and chorus members are also required.

The site that has been purchased has a natural slope and provides several different location and orientation options. Location and orientation should be considered. The site is surrounded by a river at the north, a state highway on the south and state roads on the east and west. There is a major, 6-lane interstate located 200 feet to the east of the site. Sound levels measured from the interstate have been provided and must be taken into consideration. Please see the attached site plan.

Parking for patron and performers will be required.

PROJECT REQUIREMENTS

Following is the architectural program statement for the pavilion which defines the building (for the purposes of this design competition) as desired by the orchestra.

Pavilion:

- Audience Seating: Approximately 5000 seats. Orchestra (main floor) seating arrangement may be traditional or continental. A balcony may be used if desired.
- Stage: Approximately 6,000 ft² (560 m²) with depth of approximately 60 ft (18 m). Easy access to the loading dock for scenery and other materials being transported in and out.
- Stage Proscenium: Minimum dimensions of 50 ft (15 m) wide and 30 ft (9 m) high.
- Stage House: Height from stage floor to gridiron approximately 3 times height of proscenium.
- Orchestra Pit: To accommodate orchestra of approximately 70 members. At least one pit lift with at least three positions...pit level, audience level, and stage level.

Rehearsal Rooms:

- Orchestra Rehearsal: To accommodate up to 100 orchestra members.
- Movement Rehearsal: A multipurpose room to accommodate rehearsal as well as a warm up for the ballet, theater, chorus and opera.

Dressing Rooms:

- Two chorus dressing rooms, approximately 600 ft² (56 m²) each.
- Eight solo dressing rooms, approximately 70 ft² (6.5 m²) each. Dressing rooms may also be used as music practice rooms.

Green Room:

- One multipurpose Green Room, approximately 500 ft² (46.5 m²). This room may be used occasionally for meetings and perhaps as a music rehearsal room.

Office Space:

- Three offices for the facility's technical staff approximately 120 sq.ft.
- Two offices for the resident company's staff approximately 100 sq.ft.

Mechanical Equipment Room (MER)

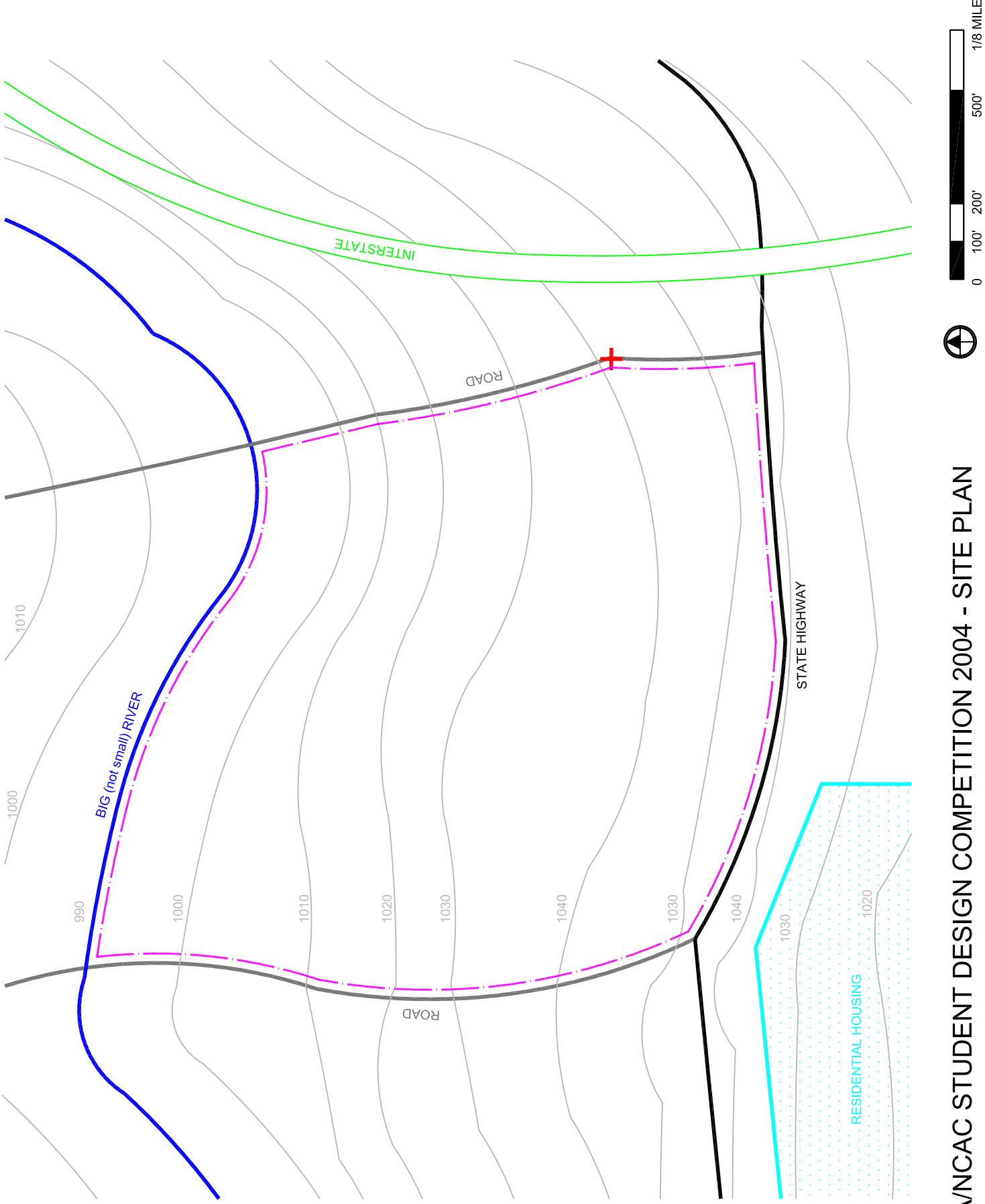
- The MER will primarily house air handlers and a scroll type chiller to serve the back stage support and rehearsal spaces. It is estimated that area required by the MER will be a minimum of 800 ft² (75 m²).

SITE NOISE

Measured highway traffic noise levels at the edge of the site closest to the highway in octave frequency bands are tabulated below:

OCTAVE FREQ. BAND, CENTER FREQ. - Hz	SOUND PRESSURE LEVEL - dB re 20 μ Pa						
	63	125	250	500	1000	2000	4000
ROADWAY VEHICULAR TRAFFIC*	63/68	66/70	59/61	60/61	60/63	54/57	44

- * 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.



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