

## PROJECT PROFILE: CHAPEL



**PROJECT:** Carroll College Chapel  
Helena, Montana

Carroll College chose to renovate Old North Gym into a campus Chapel. Big Sky Acoustics was selected to complete the acoustical design to control reverberation, overall noise levels and mechanical system noise in the Nave.

**BSA's SERVICES AND SOLUTIONS:**

- The goal of the analysis was to determine proper type and amount of sound-absorbing and sound-reflecting material to balance the acoustical needs for music and spoken word intelligibility during Mass.
- BSA developed a computer model of the Nave based on the 95% Construction Documents, to determine the changes in the room acoustics due to proposed acoustical modifications.
- The volume of the space was predetermined by the size of the existing building footprint. However, BSA calculated that the volume per seat ratio was approximately double the recommended volume. The high volume enhances the musical portions of Mass, but results in poor speech intelligibility unless acoustical modifications are made.

**Critical components of the acoustical design included:**

- Recommendations for the proposed wood ceiling to enhance congregational responses and singing.
- Recommendations for the wall behind the Alter to naturally diffuse sound.
- Using impact-resistant acoustical wall panels on the side and curved rear walls to absorb reflected sounds.
- Installing pews with cushioned seats and backs to balance the acoustics throughout the space, whether or not the Chapel is fully occupied.
- Developing audio demonstrations so the Architect and College could "hear" what spoken words in the Nave would sound like, if wood vs. cushioned pews were selected.
- Specifying highly directional loudspeakers to focus sound into the seating area, providing a high degree of speech intelligibility.
- Using a computer program to predict the mechanical system noise, and develop noise control measures, including attenuators, plenum liner board and duct liner.