FACTS:

. 12,000 sq ft. Ballroom space

. Original Ballroom built in 1962


. Facility is multi-purpose, housing events such as dinners, concerts, career fairs, and lectures.

. The SUB Ballroom is used yearly for the Lionel Hampton Jazz Festival.

BUILDING DESCRIPTION.

The SUB Ballroom is located on the University of Idaho campus in the Student Union Building. The SUB building is bordered by Deakin Street on the east side, as well as being across the street from the University Book Store. The SUB is bordered to the south and east by Greek housing, and to the north by a small parking lot.
SUB BALLROOM DESCRIPTION.

The SUB Ballroom is located on the second floor of the University of Idaho’s Student Union Building. The dimensions of the ballroom are approximately 108 ft x 114 ft, with a total floor area of 12,312 sq ft. The drop ceiling is approximately 20’ above floor level, giving the room an overall volume of about 246,240 ft³.

ACOUSTIC ZONING.

The SUB Ballroom is bordered by service spaces, service stairs, the upper lobby for the ballroom, and the Borah Theater, which is slightly removed from the upper lobby. The upper lobby space is easily the loudest of the neighboring spaces. The service spaces and stairways have potential for some noise from service oriented activities. The Borah Theater has little sound contribution, but could draw additional patrons to the upper lobby, therefore contributing to the noise in that space.
MATERIAL INDEX.

In the SUB Ballroom’s current design there is an ample amount of sound absorbing materials. There are acoustic panels on all 4 walls as well as panels incorporated into the ceiling design. The users of the space also contribute a significant amount of absorbency.

NOTE: Calculations based on Banquet program occupancy

REFLECTIVE

Wood Flooring
- Sq Ft = 8003 ft²
- Absorbency = 0.07
- Total Absorbency = 560.21

Wood Wall Panels
- Sq Ft = 5670 ft²
- Absorbency = 0.04
- Total Absorbency = 226.8

Drywall
- Sq Ft = 4925 ft²
- Absorbency = 0.03
- Total Absorbency = 147.75

ABSORBITIVE

Acoustic Panels
- Sq Ft = 2640 ft²
- Absorbency = 0.8
- Total Absorbency = 2112

Sound Absorbing Ceiling Panels
- Sq Ft = 7387 ft²
- Absorbency = 0.76
- Total Absorbency = 5614

Audience in Upholstered Seats
- Sq Ft = 4300 ft²
- Absorbency = 0.96
- Total Absorbency = 4128

TOTAL ABSORPTION: 12788.76 Sabins
REVERBERATION TIME: 0.94! Seconds

TR=0.049 (V/A)
ROOM VOLUME: 246,240 ft³

ARMSTRONG RESULTS.

The Armstrong results are very similar to what we arrived at through the Inside Out calculation methods and MEEB tables. Armstrong projects an existing TR of approximately 0.87 seconds at 1000 hertz. Armstrong further suggests a recommended TR of 1.5 sec for a multi-purpose facility.

NOTE: Calculations based on Banquet program occupancy
The SUB Ballroom is located directly in between being designated too live or too dead on the Room Liveness Graph. However, our calculated reverberation time of 0.94 seconds is too short to be appropriate for multi-purpose auditoriums, which have a recommended reverberation time of approximately 1.6 to 1.8 seconds.

Note: Calculations based on Banquet program occupancy

1. Remove Acoustic Panels

The SUB Ballroom currently incorporates a significant amount of sound absorptive materials that contribute to the space having a low reverberation time. By removing the acoustic panels located on the North and South walls, the reverberation time is increased to 0.995 seconds.

2. Wood Ceiling Panels

The absorptive ceiling panel strips significantly decrease the reverberation time of the space. By replacing these with wood slat panels, the reverberation time is increased to 1.68 seconds! The wood slats have the capacity to also disperse the reflected sounds more than the current panel system.

3. Electronic System

By incorporating an electronic system on the east, south, and west walls, the SUB Ballroom can increase its adaptability to varied events. By using both speakers and sound cancellation devices, the level of sound in the space can be amplified or diminished electronically.

NOTE: Calculations based on Banquet program occupancy
**REFLECTIVE**

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<thead>
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<th>Material</th>
<th>Sq Ft</th>
<th>Absorbency</th>
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**ABSORBTIVE**

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<tbody>
<tr>
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<td>Audience in Upholstered Seats</td>
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**Drywall**

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</tbody>
</table>

**Total Absorption:** 7170.79 Sabins  
**Reverberation Time:** 1.68 Seconds

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**MATERIAL INDEX AFTER REDESIGN.**

By doing something as simple as changing 2 material applications in the SUB Ballroom, the room can reach an ideal reverberation time of 1.68 seconds for a multi-purpose auditorium space.

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**NOTE:** Calculations based on Banquet program occupancy

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**ROOM LIVENESS GRAPH**

The SUB Ballroom is still located directly in between being designated too live or too dead on the Room Liveness Graph. However, after our simple changes in the rooms overall design, the space's reverberation time is ideal for a multi-purpose auditorium.

**NOTE:** Calculations based on Banquet program occupancy
CONCLUSION.

In conclusion, the SUB Ballroom's current design lacks the appropriate reverberation time for a multi-purpose auditorium space. By simply removing approximately one third of the sound absorbing panels in the space and modifying the ceiling panel system to incorporate sound reflecting wood paneling, the space easily reaches the goal for a multi-purpose auditorium space with a reverberation time of 1.68 seconds. By incorporating an electronic speaker system with noise cancellation ability, the overall acoustic flexibility of the space is increased to accommodate its multiple programmatic uses.