Census Bureau Headquarters – LEED Silver: Washington, DC

LEED v3 and Acoustics

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The LEED rating system, and its recent incarnation in v3, touches on nearly every aspect of a building, and so affects acoustics. Conversely, acoustic design affects many areas addressed by LEED. Yet, despite the inter-relatedness of acoustics to sustainable design, LEED contains very few specific references to acoustics:

- LEED v3 does not mention acoustics in its Rating Systems for New Construction and Major Renovations. Commercial Interiors, Retail, or Homes.

- The Rating Systems for Existing Buildings gives 1 point for IEQ Credit 2.1 if a survey of building occupants is done that includes responses about acoustic comfort. No specific guidelines are established as remediation goals, but insofar as ASHRAE standards are referenced as the basis for LEED certification, the ASHRAE guidelines for appropriate background sound levels in occupied spaces (2007 ASHRAE Handbook – HVAC Applications, Chapter 47) could be applied.

- The new Healthcare Rating System is in preparation. The way it will address acoustics is still under discussion, but it is anticipated that specifications will be implemented to require compliance with the patient privacy goals of the Health Information Portability and Accountability Act (HIPAA) and provide building occupants with an indoor healing environment free of disruptive levels of sound.

- The most comprehensive treatment of acoustics in LEED occurs in the Rating System for Schools: New Construction and Renovation. As noted in the Performance/Intent Equivalent Alternative

Compliance Path (PIEACP) for IEQ Prerequisite 3, every LEED for Schools certified project must meet the requirements for reverberation time, interior background noise level and sound transmission. There a number of compliance paths from which to choose, as described in the PIEACP document. In general, the rating system requires compliance with ANSI Standard 12.60, Acoustical Performance Criteria, Design Requirements & Guidelines for Schools

Beyond these specific citations, there are numerous ways in which acoustics relates to the goals defined in the LEED rating system. Let's discuss these relationships through each of the LEED categories, with a few illustrative examples.

Sustainable Sites

A building's site affects interior noise levels (e.g. a train passing near to a school building). A building can also affect noise level in the environment, sometimes adversely (e.g. rooftop mechanical equipment in a residential neighborhood). Fortunately, noise pollution, unlike other forms of pollution, disappears instantly when the source ceases. Noise is, nevertheless, pollution. Some jurisdictions (e.g. NYC) require construction activity noise mitigation as well as environmental noise control related to building noise sources. Perhaps the Construction Activity Pollution Prevention Prerequisite will be revised in the future to require control of construction site noise.

The Sustainable Sites section also contains a discussion of green roofs, which can be applied towards several credits. Green roofs also offer acoustic benefits. They can help dampen the sound of rain noise that would otherwise be audible within a building, and their mass can help improve sound isolation from outdoor noise sources (e.g. aircraft). Future opportunities for further recognition by LEED of the acoustical benefit of green roofs as they contribute toward indoor environmental quality in specialized buildings also exist.

Stormwater control design can also affect acoustics, as drain and associated piping routed through noise sensitive spaces may result in undesirable intrusive noise during heavy downpours.

Water Efficiency

There is limited interaction between WE and acoustics, though strategies for waste water removal and the related sound of flushing fixtures affect acoustics in noise-sensitive spaces like church sanctuaries and auditoria.

Energy & Atmosphere

Mechanical and electrical equipment noise is a prime concern in architectural acoustics. This equipment can produce noise and vibration both in the surrounding environment, and within the interior of a building. These attributes require the establishment of appropriate criteria, and the design and construction of noise control measures.

Some measures for reducing mechanical noise, such as longer duct runs, may increase energy consumption—a conflict with LEED that requires thoughtful design. On the other hand, some more environmentally friendly approaches to indoor air quality (such as passive ventilation) create opportunities for creative synergy between environmental and acoustic design. At the same time, naturally ventilated buildings are prone to increased sound transmission from outdoor noise sources; consideration of building siting and planning of openings in the building envelope at early stages of the design are needed to appropriately manage these challenges.

Materials & Resources

Materials affect acoustics by blocking, absorbing, transmitting and scattering sound. Some "acoustical" materials (such as acoustical tile) have a high percentage of recycled material. This offers another opportunity for synergy which requires knowledge of both LEED and acoustics to exploit.

Indoor Environmental Quality

LEED v3 IEQ credits focus on indoor air quality, thermal comfort, and daylighting. While not explicitly referenced, background noise, speech privacy, and reverberation also affect indoor environmental quality in any occupied building. In addition, design choices which affect achievement of IEQ prerequisites and credits affect the acoustic environment.

The requirements for indoor environmental quality vary with a building's program, and among spaces within a building. Design choices focused on obtaining LEED credits may have unintended acoustic consequences. For example, controlling emissions from flooring by using low-emitting wood flooring in place of non-complaint carpet may result in an IEQ credit, but may result in excessive impact sound transmission to spaces below.

Measures to improve indoor environmental quality by increasing daylight and/or ventilation pose challenges for controlling noise from the outdoor environment. The appropriate design choices require knowledge of available products, how their characteristics affect both LEED compliance and the acoustic environments, and expertise in and a sense of how acoustics fits in with all the other requirements of a building's program.

Innovation in Design

The sort of innovative thinking that is rewarded by the Innovation in Design credit is crucial in the collaborative design field of architectural acoustics. Acoustics interacts with every aspect of a building's design, including (but not limited to) LEED requirements. Acoustics must integrate respectfully with every other aspect of a design—even in buildings or spaces where acoustics is a focus of the program. The necessary collaboration requires creativity, flexibility, and constant awareness of every other aspect of design—including LEED requirements.

Where the acoustic environment is enhanced, application can be made to obtain ID credits. These enhancements might relate to room acoustics (e.g. reverberation time), sound isolation between spaces, background or intrusive noise control, speech privacy levels, or other attributes that are associated with significant benefits in occupant comfort, satisfaction, or performance.

Other issues

It is worth considering that many important architectural and acoustic issues are not addressed at all in LEED. It is entirely possible, for instance, to build a theater building that achieves an excellent LEED rating, but has poor acoustics for performance. LEED may contribute, but design is still paramount.

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