BUILDING PERFORMANCE FOR HEARING IMPAIRED PEOPLE

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People compensate for hearing loss by relying on other senses, particularly that of sight. Visual elements and the quality of light are therefore important factors in the enhancement of visual information. Equally important is the acoustical environment. For persons using hearing aids it is essential to reduce background noises and to control reverberation in order to ensure speech intelligibility. Since hearing loss is limited to particular frequency ranges, the control of frequencies is important as well as the reduction of noise interference in environmental planning.

Our built environment must create settings for living, learning, working and recreation to be enjoyed through the senses of vision, touch, smell and taste but little or no hearing.

Deaf and hard of hearing people cannot rely on sound or spoken signals for orientation and wayfinding. Aural signals must be complemented by visual and other sensory signals. The success of communication depends on whether or not meaningful sound can be distinguished from background noise. Some ambient noise is useful for orientation and to provide the "feel" of space but, for people with hearing impairment, there are special requirements for loudness level, reverberation times, masking noise, background noise and, for those who use hearing aids, electro-magnetic interference with telecoil receivers. Noise levels of 47-50 dB can seriously interfere with the communication ability of hearing impaired persons without affecting those who hear normally. A speech-to-noise ratio of approximately 4.5 dB is about the lowest level acceptable (A.H. Suter, U.S. Dept. of Labor, Washington). According to research done in Arizona State University (Leshowitz, Dept. of Psychology), the ratio of speech to background noise level for hearing impaired persons must be increased by 10 dB over that measured for normal hearing persons. Most open concept office spaces will not accommodate this.

On entering a building, a hearing impaired person may not hear the sound of a door latch-release nor a message from an intercom or electronic signal to indicate the door operation; graphic instructions; closed circuit TV to communicate with someone inside the building; redundant signage and visual cues for orientation and wayfinding inside the building. Tactile information such as carpeting, floor textures, handrails may also be used.

The lobbies of public buildings, hotels and apartment buildings are generally designed for marketing considerations, aesthetics and ease of maintenance. Glass, polished stone and other hard surface materials are commonly used. Acoustical qualities are often ignored. The sounds of clicking heels, moving carts, motors and voices in these spaces can be more than somewhat disconcerting for people with minimal or even no hearing loss. Glare from building materials can cause disorientation and distract from he available visual information intended for wayfinding purposes.

Elevator lobbies need light signals to identify elevator car locations and the direction of car movements. Audible in-car signals need supplementary visual signals. Telephones in elevators as well as in public areas should have volume controls and be compatible with the telecoil mode of hearing aids. Some public telephones are installed with fluorescent lights just above the receiver and the ballast causes enough interference to make it impossible for a hearing aid user to decipher speech.

There is now great progress in evaluation techniques for the acoustical performance of rooms. This results in rooms that are more appropriately designed for speech intelligibility or fidelity in the perception of sounds of mechanical or instrumental origin. Often, however, the room shape or size and the distance of the receiver from the point of sound origin are still barriers to good communication. Fixed or movable deflectors, baffles, reverberation panels and absorption planes may be added to alter the design. Audio amplification systems may also be required.

Where practical, carpeting on floors may be used to control sound reverberation. A carpet with 5 to 15 mm pile and no underpad contributes to noise reduction and permits wheelchair access. Absorption panels on walls are best located between 750 and 2000 mm above the floor.

Sound transmission control requires an isolation of airborne sound to the greatest extent possible and this means: sealed baffles above partitions that stop at suspended ceilings; door and window assemblies installed in careful precaution to eliminate acoustical leaks; double glazing; walls and partitions insulated against sound transmission; enclosed self-contained stairways.

Special communication devices are required for deaf and hard of hearing persons. These may include: telephone-coupled teletype devices; flashing colour-coded lights activated by door bells, voices; closed circuit TV systems as visual intercoms; vibratory devices for beds, chairs or pagers; sound amplification systems including hardwire, induction loops, AM and FM radio frequency and infrared systems. Hearing aids amplify sounds, including sounds one does not want to hear. "Nuisance" sounds emit from ballasts in fluorescent lights, transformers, rheostats, motorized valves, solenoids, motorized appliances, computer or other electronic installations, magnetic fields around improperly shielded wires, and even induction currents such as that used in the audio loop itself. Where audio amplification systems are used these have the same problems as hearing aids and a few extra problems. Electro-magnetic interference is the main source of these problems. In New York City, where selected frequency bands are so numerous, there is sometimes overlap and one may pick up police calls in a session at the United Nations Building. The infrared system requires a direct beam from transmitter to receiver. Direct sunlight or an incandescent light source will cancel out the signal transmitted.

Could the building construction provide better shielding to prevent this? Could the transmitter or receiver be modified? Should there be stricter regulations? More stringent controls? International controls? The causes of interference from the building itself in audio amplification systems and from the installations and equipment in it need to be more clearly defined and documented so that appropriate alternative solutions can be examined.