CONSIDERATIONS FOR ACOUSTICAL PRIVACY WITHIN COMMERCIAL TENANT SPACE FIT-OUTS

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1 Introduction and Background

Acoustical privacy is often overlooked in the design of commercial space fit-outs. This may be due to a number of factors, including designers being unaware that acoustical privacy might be needed, or of special design considerations to be considered to address such needs. For typical commercial and institutional spaces, there are generally no laws or governing bodies (in Ontario) which prescribe acoustic privacy. However, in many cases, acoustic privacy may be desired by the users of the space (i.e., between and around board rooms, executive offices, medical exam and treatment rooms, etc.). Recent projects and inquires confirm that in many cases, such acoustical privacy is not being properly addressed or implemented, or in some cases, not even considered in design. This article discusses some examples of such cases and presents some common design and field issues which lead to poor acoustic privacy, and modifications to standard designs which can be considered.

1.1 Criteria for Privacy of Personal Information

There are some laws and acts which address privacy of personal information, and under these Acts, there is an obligation for commercial and institutional spaces where personal private information may be discussed to ensure that measures are implemented to maintain privacy of the information. In Canada, the governing Act is the PIPEDA [1]. In Ontario, this is supplemented by the PHIPA [2]. In the United States, the governing document is the HIPAA [3]. The Ontario and United States Acts specifically reference health information, but the Canadian Act references personal information in general. This information may include such personal information and personal health information or financial information, as discussed in health care spaces, banking areas, or legal offices.

Further, these Acts discuss privacy of recorded information (e.g., paper or digital files), but in some cases, it is not clear whether or how these Acts apply to speech privacy. While this should be addressed where private information may be discussed and overheard, there is no specific reference in any of the documents regarding acoustic privacy, and no such limits are set in the Acts.

1.2 Standards for Design of Health Care Facilities

In Alberta, the Infrastructure department of the provincial government has a published document on Technical Design Requirements for Health Care Facilities [4], which contains an acoustics section covering various aspects of noise / vibration control, including sound isolation. This section discusses minimum STC requirements for walls between sensitive areas, and other guidelines relating to details addressing leakage and flanking paths.

There are also standards in Canada and the United States, which address design considerations for health care facilities. These include the CSA/CAN Z8000–11 and the US FGI's design and construction guideline for health care facilities. These are discussed in the paper in reference 5.

2 Common Issues Seen in Existing Facilities

HGC Engineering often receives inquiries from existing facilities, where noise transmission between sensitive spaces has become a concern. In some cases, these inquiries come from facilities which may fall under these health privacy categories due to the nature of the discussions which may occur (i.e., mental health centres, psychology offices, medical clinics, pharmaceutical call centres, etc.). In other cases, there may not be a concern directly related to health information or personal information privacy (i.e., court rooms), but there may still be other confidentiality requirements or concerns. Through various projects, HGC Engineering has had the opportunity to investigate many of these spaces, and there are a number of common issues which generally contribute to a lack of acoustical privacy.

2.1 Low Background Sound

One common issue noted is a low background sound. This can increase the audibility of even low levels of noise transmission. In one particular project, sound transmission measurements were conducted between various areas within a commercial office, and AI calculations were performed to evaluate speech privacy. Following some upgrades, the measurements were repeated and the NIC rating between a meeting room and private office across the hall increased by about 3 points. However, the AI value increased from 0.05 to 0.17 (worse speech privacy), due to a lower background sound during the second visit. Calculations with the upgraded noise reduction values were applied to the previous background sound level, indicating a confidential AI rating of 0.04 by re-introducing masking noise.

In another project, similar measurements were conducted between private offices and other adjacent private offices. In this case the background sound was in the range of 39 to 42 dBA, and AI ratings were calculated to range from 0.07 to 0.42. Calculations applying the measured noise reduction values to a typical sound masking spectrum with a level of 47 dBA reduced the AI levels to 0.02 or lower (confidential privacy), except the worst one, which was reduced to 0.07 (normal privacy). This improvement was confirmed when measurements were conducted again once a

sound masking system was implemented, demonstrating that a significant improvement in speech privacy can, in some cases, be obtained simply by increasing or optimizing the masking sound levels. Note that this approach is limited; masking levels above 48 dBA may be considered disruptive.

In some recent cases, open office designs were preferred by the tenants, including some banks, where personal financial information will be discussed. The open offices generally result in poor acoustic privacy. While these open concept systems will not likely achieve confidential acoustic privacy, sound masking systems can also be used in these cases, in conjunction with interior acoustic design considerations (optimally designed reflective and absorptive surfaces) to increase the acoustic privacy somewhat, without the use of physical barriers.

2.2 Common Ceiling Plenum

One of the most common issues identified in commercial or institutional spaces with noise transmission concerns is a common ceiling plenum. In many cases, there is a drop ceiling throughout the tenant space, and the demising assemblies between offices, board rooms, etc. only extend up to the underside of this ceiling. This creates several issues with respect to sound transmission and acoustical privacy. There can be flanking across the common ceiling, sound leakage through the gap at the top of the demising wall, and transmission through the common ceiling plenum. One example from a recent investigation is shown on the left side of Figure 1. On the right side is an example where the demising wall extends slightly above the common ceiling, addressing the first two concerns, but not the latter.

The common ceiling cavity should be avoided if possible. If this is not possible, upgraded performance can be achieved by increasing the mass of the ceilings, minimizing penetrations, and including acoustical absorption in the cavity. This is addressed in the Alberta Infrastructure document, which reiterates good practices such as including full-height wall constructions or drywall ceilings in rooms with higher STC requirements, and where this may not be possible, suggesting that the partitions should be extended slightly above the ceiling, return air openings should be well separated, and ceiling boards with high CAC ratings and NRC ratings should be used [4].

Figure 1: Demising wall shown to extend only to the underside of the ceiling (left), and slightly above the ceiling (right).

2.3 Other Sound Leakage Paths

Even when the ceilings do extend to the underside of the structure above, this junction and any penetrations through the demising wall, should still be sealed with acoustic caulking, particularly if there are no ceilings. Figure 2 shows two examples from recent projects (between adjacent commercial uses, not within tenant spaces). On the left, the penetrations and junction are well sealed, and on the right, the openings in the structure at the junction have been filled with insulation, but not sealed, allowing sound leakage.

Figure 2: Junction between demising wall and ceiling deck, and penetrations shown sealed (left), and filled but not sealed (right).

Other sound leakage paths should also be addressed. For example, air transfer ducts should be avoided without acoustically lined elbows. Additionally, in many instances, the doors are not taken into account, and there are large gaps around their perimeters, particularly at the bottom. For acoustically sensitive spaces, doors should be selected to provide high sound transmission losses, and should be well-sealed. In one recent project, ASTC testing was conducted between a privacy booth and the adjacent court room, and an improvement of 6 points was achieved by properly adjusting the bottom sweep on the door and including a threshold instead of carpet, where it could not achieve a full seal. In another recent project, a 3-point improvement in NIC was achieved by adding jamb seals to a hotel room door, and a 6 point improvement was achieved by adding jamb seals and a (poorly fitted) door sweep.

3 Discussion and Conclusion

While there are some documents and regulations regarding personal privacy, many of these do not specifically address acoustical privacy. Guidelines for health care facilities should also be considered for other commercial spaces where private health, financial, or other issues may be discussed. Some common issues have been outlined above, based on observations and measurements conducted at various office spaces where acoustical privacy has been a concern. These items among others, and their relative priorities, should be taken into consideration by the design team, as deemed appropriate.

References

[1] Government of Canada. Personal Information Protection and Electronic Documents Act. S.C. 2000, c. 5.

[2] Government of Ontario. Personal Health Information Protection Act. S.O. 2004, c. 3, Sched. A.

[3] United States Congress. Health Insurance Portability and Accountability Act of 1996, Public Law 104-191.

[4] Government of Alberta, Infrastructure. Technical Design Requirements for Health Care Facilities. “The Blue Book”, Third Edition, 2009

[5] J. Swallow and M. Wesolowsky, Acoustic Design Considerations in Modern Health Care Facility Design. *Canadian Acoustics* Vol. 42 No. 3, 2014.