ACOUSTICS AND NOISE CONTROL

Unless otherwise noted, acoustic criteria indicated in Tables 1-4 will meet the requirements stipulated in the FGI Guidelines (2010) and the 2010 Sound and Vibration Guidelines for Healthcare Facilities as referenced in the LEED 2009 documentation.

1.0 General Guidelines

The Design-Builder will design and construct the Facility by applying the following overriding principles:

1. Provide room shapes, workstation configurations and sound absorptive materials and finishes appropriate to the interior acoustic and reverberation requirements for the intended use of the room or space.
2. Provide the required degree of sound insulation between the exterior and interior, as well as between interior spaces within the Facility through space planning and building material.
3. Provide finishes that dampen footfall and building services vibration so that the function of vibration-sensitive equipment, uses and spaces are not disturbed by the effect.
4. Provide control of building services noise through space planning to address the adjacency/proximity of mechanical and electrical spaces to minimize their effect on noise sensitive areas.
5. Provide wall, roof, and floor assemblies with acoustic performance that comply with the minimum requirements listed in this Appendix.
6. Where possible, provide buffer zones (e.g. corridors) between noise sensitive areas (e.g. video-conferencing, meeting rooms and offices) and noisy areas (e.g. service areas and lounges).
7. Where possible, avoid vertical adjacencies between noisy and noise sensitive areas.
8. Design and construct interior assemblies to the STC rating criteria stipulated in this Appendix as well as in the Room Data Sheets.
9. Provide room finishes that absorb sound for all occupied spaces throughout the Facility.

2.0 Noise Isolation Requirements

1. Provide wall and floor assemblies with STC ratings in accordance with Table 1 'STC Ratings of Demising Walls and Floor/Ceiling Assemblies'. Refer also to the Room Data Sheets for additional requirements as Table 1 may not cover all areas. The highest STC Rating for any room governs in terms of party walls. Non-occupied rooms, such as storage rooms, do not have specific STC requirements.
2. In order to achieve the required level of speech privacy (speech privacy for confidentiality is critical), extend the STC rated assembly full-height from floor to the underside of structure above for all walls and partitions that require an STC rating of 45 or higher per Table 1 below. If such a wall or partition cannot extend full height, provide an alternate system and provide an acoustic consultant's report verifying that the same level of speech privacy will be achieved with the proposed design.
3. The sound isolation ratings in Table 1 are considered the laboratory STC ratings except where noted.
    a. Details such as the ceiling plenum conditions, windows, doors, penetrations through the constructions, etc. will be addressed to optimize the field performance sound isolation rating.
    b. Table 1 provides normal speech privacy (except at corridor walls with doors), assuming a background sound level of at least 35 **dBA**.
4. Provide demountable partitions where requested that are **STC** 45 minimum; and

5. Provide moveable partitions (where identified) that are **STC** 45 minimum.

Table 1 – STC Ratings of Demising Walls and Floor/Ceiling Assemblies

Adjacency Combination		STC – Walls	STC – Floors/Ceilings
Client Room	Client Room	50	50
Client Room	Corridor	35 [1,2,3,6]	50
Client Room	Public Space/Administrative Space	50	50
Client Room	Service Area	60 [5]	
Meeting Room, Breakout Rooms, Classrooms and similar	Corridor	35 [1,2,3,6]	50
Meeting Rooms, Breakout Rooms, Classrooms, Multi-Purpose Rooms and similar	Similar Spaces, Public Space, Admin. Space	50	50
Meeting Room, Breakout Rooms, Classrooms, Multi-Purpose Rooms and similar	Service Areas	50	50
Meeting Room, Breakout Rooms, Classrooms and similar	Meeting Room, Breakout Rooms, Classrooms and similar	50	50
Interview Room, Psychiatry Rooms, Consultation Rooms, Medical Rooms, First Aid Rooms, Secure Rooms,	Corridor	FGI 2010/LEED 2009 – 35 [1,2,3,6]	50
Interview Room, Psychiatry Rooms, Consultation Rooms, Medical Rooms, First Aid Rooms, Secure Rooms	Similar Spaces, Public Space, Admin. Space	55	50
Interview Room, Observation Rooms, Consultation Rooms, Medical Rooms, First Aid Rooms, Secure Rooms	Service Areas	55	50
Consultation Room	Client Room	50	
Interview Room, Psychiatry Rooms Consultation Rooms, Medical Rooms, First Aid Rooms, Secure Rooms,	Interview Room, Psychiatry Rooms, Exam Rooms, Secure Rooms	55	50

Adjacency Combination		STC – Walls	STC – Floors/Ceilings
Conference Rooms, Boardrooms and any rooms used for video-conferencing	Any Space	55[1,2,3,6]	50
Conference Rooms, Boardrooms and any rooms used for video-conferencing	Corridors	45[1,2,3,6]	50
Standard Offices, social worker and trainer	Standard Offices, social worker and trainer	45	50
Standard Offices, social worker and trainer	Corridors	30	
Director's Offices and similar	Director's Offices and similar	50	50
Director's Offices and similar	corridors	35 [1,2,3,6]	
Music Room	Any space	55	55
Music Room	Corridor	45[1,2,3,6]	
Recording Booth	Any space	55	55
Recording Booth	Corridor	45[1,2,3,6]	
Wood/Metal Shops areas	Key low noise spaces	55	55
Gymnasium/ Fitness Room/Exercise Room	Key low noise spaces	55	55
Recreation Room/Dining Room	Any space	50	50
Living rooms	Any space	50	50
Record Reading Area/Concentration Room	Any space	50	50
Assessment Rooms and similar	Any space	50	50
Assessment Rooms and similar	Corridor	35 [1,2,3,6]	
TV/Games Rooms	Any Space	50	50

Adjacency Combination		STC – Walls	STC – Floors/Ceilings
Washroom/Ensuite	Any Space (no requirements for doors)	45	50
Washroom/Change Rooms	Public Space (no requirements for doors)	45	50
Service Rooms	Any occupied space	55	50

Table 1 – Notes:

a. In this Appendix, "Public Space" includes lobbies, waiting rooms, reception areas, and similar spaces.

b. In this Appendix, "Service Areas" include elevators, elevator machine rooms, laundries, garages, maintenance rooms, mechanical and boiler rooms and similar spaces.

c. The **STC** ratings for party walls noted in this Table 1 are based on 25 gauge studs at 600 mm o.c. If stiffer studs are required, develop alternate designs to achieve the **STC** ratings noted, such as the use of larger studs (i.e. 152 mm vs. 89 mm. at 25 gauge), resilient channel (where practical), double stud walls, staggered studs, proprietary gwb such as Quiet Rock (and equals), etc. CMU is also an alternative in some areas such as around mechanical and electrical rooms.

d. Note 1: This is a composite STCc rating including the door, glazing (if required) and wall.

e. Note 2: The results assume a closed door.

f. Note 3: Where sliding doors are required, the acoustic rating does not apply.

g. Note 4: Requires an acoustically rated door system.

h. Note 5: STC 60 ratings should be relaxed if compliance with room noise requirements is achieved with lower performance constructions. See Table 2.

i. Note 6: Refer to section 3: Door Requirements.

j. Refer to Schedule 1 for more information.

3. Door Requirements

1. In addition to the STC requirements for walls and for floor/ceiling systems as set out in Table 1, the Design-Builder will comply with the specific composite STCc requirements for door/wall systems. To meet the STCc requirements the Design-Builder will, as its acoustic consultant determines is necessary, provide solid core wood or filled metal doors, or upgraded door slabs, plus full perimeter acoustic seals as well as an automatic threshold closer or in some cases acoustically rated door slabs.

    a. D1 (standard solid core wood door with acoustic seals, rated STC 28-33) for upgraded acoustic privacy as required to meet the composite STC ratings noted in Table 1.

    b. D2 (acoustically rated doors with full acoustic seals, rated STC 40-42) for 'high privacy' rooms as required to meet the composite STC ratings noted in Table 1.

    c. D3 (purpose-built acoustically rated STC 45 doors) for the music room and recording booth and other areas as required to meet the composite STC ratings noted in Table 1.

4. Background Noise – Interior Spaces

The Design-Builder will:

1. In undertaking the Design of the Facility, evaluate the expected noise from all mechanical systems in the Facility.

2. Design and construct the Facility so that noise from the mechanical systems does not exceed the noise level specified in Table 2 below within the room or space identified.

Table 2 – Noise Criteria - Rating Within Various Spaces

Room Type	NC	dBA
Video-Conference Rooms, Recording Rooms	25 max	30-35
Conference Rooms, Boardrooms	25-35	30-40
Music Rooms	25-30	30-35
Secure Rooms	25-30	30-35
Consulting Rooms, Interview Room, Psychiatrist Offices, Classrooms,	30-35	35-40
Client Rooms	30-35	35-40
Multiple Occupant Client Care Areas	FGI 2010/LEED 2009 – 35-45	FGI 2010/LEED 2009 - 40 - 50
Meeting Rooms, Breakout Rooms, Offices, Multi-Purpose Rooms, First Aide, Exam/Treatment Rooms	30-35 FGI 2010 – 30 - 40	35-40 FGI 2010 – 35 - 45
Lounge Areas, Waiting Rooms, Reception, Open Plan Areas	35-40	40-45
Art Classrooms, Labs	35-40	40-45
Recreation Room, TV Room, Dining Area	35-40	40-45
Kitchen	35-40	40-45
Corridors and Public Spaces	35-40	40-45
Gymnasium	40-45	45-50
Woodworking Shops, Maintenance Shops	40-45	45-50
Change Rooms, Fitness Room	40-45	45-50

5. Noise Control – Exterior

1. Ensure that the interior noise levels (15 minute Leq) due to exterior sources will not exceed the specified room dBA as per Table 2.
2. Ensure that noise impacts to the community due to equipment and operations of the Facility will not exceed the City of Coquitlam's Noise Bylaw requirements.
3. Comply with the 2010 FGI Guidelines for the following noise sources:
    a. Generators
    b. Mechanical equipment

c. Building services

4. Design the building envelope composite STC rating based on the 2010 FGI Guidelines, Categorization of Health Care Facility Sites by Exterior Ambient Sound, and show conformance with requirements.

6. Room Acoustics

1. Provide acoustic treatment in the Facility to ensure acceptable speech intelligibility as well as overall noise control.

2. The Design-Builder will comply with the maximum reverberation times for specific rooms provided in Table 3. Refer also to the Room Data Sheets for requirements for areas that may not be included in Table 3.

Table 3 – Maximum reverberation times, RT_{60}, for general room types

Room Type	$\bar{\alpha}$ Design (LEED 2009/FGI,2010)	Maximum RT_{60} (Mid frequency Ave, Seconds)
Music Rooms and Recording Rooms		0.3-0.4
Rooms with video-conferencing		0.45- 0.55
Secure Rooms		0.6-0.7
Classrooms/Breakout Rooms and similar		0.7
Offices	0.15	0.7
Meeting Rooms/Conference Rooms, Exam/Treatment Rooms and similar	0.15	0.7
Client Rooms	0.15	0.7
Labs		0.8-0.9
Reception, Lobby Areas, Waiting	0.25	0.9-1.0
Shops Areas		1.0
Open Plan Office Areas		1.0
Exercise Room		1.0
Gymnasium		1.7-1.9
Atrium	0.1	

3. Except where otherwise indicated, ensure acoustic ceilings provide minimum NRC 0.7 and CAC 35 ratings.

4. In addition to the Table 3 requirements, provide acoustic treatment to the walls in the music room, recording room and any rooms used for video conferencing. For meeting rooms greater than 15m^2, provide a sound absorptive materials on a minimum of 20% of the walls.

6.0 Acoustics for Privacy/Confidentiality Enhancement

1. There is a requirement to maintain a certain level of speech privacy for some of the key areas of the Facility. Design and construct the following spaces with increased sound proofing to fall into the confidential privacy rating (as described in Section 7.1 below).

Table 4 – Confidentiality Ratings

Rating	Confidentiality Rating
Consult Rooms	Confidential Privacy
Interview Rooms	Confidential Privacy
Interview/ Psychiatry Office	Confidential Privacy
Meeting Rooms which may also be used as treatment spaces	Confidential Privacy
Secure Rooms	Confidential Privacy

2. The Design-Builder acknowledges that the Owner may measure the Table 4 spaces post Construction to ensure they fall into this category.

3. Speech privacy is based on the level of speech, the acoustical properties of the partition systems, the level of acoustic finishes in a space and the background noise in the receiving space. The Design-Builder will evaluate the speech privacy of the above spaces and where sufficient ambient noise cannot be provided by the HVAC system to ensure that the privacy requirements are met, the Design Builder will include an electronic background sound masking system.

7. Enclosed Room Speech Privacy Design Guidance

1. The Design-Builder may achieve confidential privacy through the use of proper space planning, partitions, room finishes or effective use of sound masking systems, or a combination thereof, in its discretion (subject to meeting any relevant requirements set out in this Appendix).

2. To achieve confidential privacy, ensure the sum of the composite STC and the A-weighted background noise level in the receiving space will be at least 75.

3. Alternatively, the Design-Builder may evaluate confidential privacy using one of the processes set out below.

   a. Speech Transmission Index (STI) is measured on a scale of 0-1. Low value of STI means high speech intelligibility.

Rating	Subjective Environment
≤ 0.12	Confidential privacy

   This measurement scale is also used to determine the level of speech that is transmitted outside a given room into another area which, in healthcare and especially mental health, is generally our concern when trying to maintain privacy/confidentiality from others.

   b. Privacy Index (PI) as indicated in the following Table:

Rating	Subjective Environment
≥ 95%	Confidential privacy

References:
2010 FGI Guidelines and 2010 Sound and Vibration Guidelines for Healthcare Facilities as referenced by LEED V4 requirements.

8. Sound Masking

1. Provide a digital centralized, dual networked sound masking system in all spaces requiring confidential speech privacy, in addition to the spaces set out in Section 6.3. The system will be as approved by the Owner.

2. The sound masking system will include the following:
   a. strategically located speaker assemblies installed above conventional suspended acoustic tile ceiling; and
   b. speaker assemblies generating unique, diffuse and unobtrusive sound with spatial and temporal uniformity, and having a spectrum shape designed to mask speech and low level unwanted noise.

3. The Design-Builder will consult with the Owner to determine the details and locations for the sound masking system.