APPENDIX 3D

ACOUSTICS AND NOISE CONTROL

APPENDIX 3D

ACOUSTICS AND NOISE CONTROL

1.1. Definitions and Acronyms

1.1.1. **"Confidential Privacy"** rating is a level of speech privacy and is be defined as follows:

1.1.1.1. The sum of the composite STC and the A-weighted background noise level shall be at least 75; OR

1.1.1.2. rated 0.0 – 0.005 on the Speech Transmission Index (STI) scale, OR

1.1.1.3. rated 95-100 on the Privacy Index (PI) scale.

1.1.2. **"dBA"** means decibel with A-weighting. dBA is a weighted sound pressure level within a space adjusted based on human hearing systems (e.g. less sensitive to low frequencies);

1.1.3. **"NC"** means Noise Criteria. NC is a single number rating that is sensitive to the relative loudness within a given space at different frequencies;

1.1.4. **"NRC"** means Noise Reduction Coefficient. NRC is a single number rating of the sound absorbing properties of a material – derived by arithmetically averaging the Sabine absorption coefficients at 250 Hz, 1000 Hz, 2000 Hz and 4000 Hz. An NRC of 0.00 indicates zero absorption while; an NRC of 1.00 indicates 100% absorption;

1.1.5. **"PI"** means Privacy Index. The PI is a way of measuring how intelligible speech is across a given space as defined in ASTM 1130;

1.1.6. **"STC"** means: (Laboratory) Sound Transmission Class. STC is a single number that is an indication of an assembly's ability to block sound (i.e. in the speech frequencies). The higher the STC rating, the higher is the sound transmission loss. For instance: loud speech can be understood fairly well through an STC 30 wall but should not be audible through an STC 60 wall; and

1.1.7. **"STI"** means Speech Transmission Index. STI is a measure of speech transmission quality.

1.2. General Guidelines

1.2.1. Project Co shall design the Facility applying the following overriding principles:

1.2.1.1. 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;

1.2.1.2. 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;

1.2.1.3. provide finishes that dampen footfall and building services vibration so that, along with other measures taken by Project Co, the function of vibration-sensitive equipment uses and spaces are not disturbed by the effect;

1.2.1.4. 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;

1.2.1.5. provide wall, roof, and floor assemblies with acoustic performance in accordance with the minimum requirements described in Appendix 3D;

1.2.1.6. where possible, provide buffer zones (e.g. corridors) between noise sensitive areas (e.g. video-conferencing, meeting rooms, on-call rooms and offices) and noisy areas (e.g. service areas and lounges);

1.2.1.7. where possible, avoid vertical adjacencies between noisy and noise sensitive areas; and

1.2.1.8. design and construct interior assemblies to the STC rating criteria stipulated in Appendix 3D.

1.2.2. Room finishes that absorb sound shall be considered for all occupied spaces throughout the Facility.

1.3. Noise Isolation Requirements

1.3.1. Provide wall and floor assemblies with STC ratings in accordance with Table 1 .

1.3.2. Extend the STC rated assembly full-height from floor to the underside of structure above for all walls and partitions requiring an STC rating in Table 1. If such a wall or partition cannot extend full height, provide an alternate system and provide an acoustic consultant's report verifying that the required level of speech privacy, sound isolation and other requirements will be achieved with the proposed design;

1.3.3. The STC ratings in Table 1 are considered the laboratory STC ratings unless otherwise noted.

1.3.3.1. Details such as the ceiling plenum conditions, windows, doors, penetrations through the constructions, etc. shall be addressed to optimize field performance sound isolation ratings.

1.3.3.2. Table 1 will provide normal speech privacy (except at corridor walls with doors), assuming a background sound level of at least 30 dBA.

1.3.4. Demountable partitions will have an STC rating of 45 minimum.

1.3.5. Moveable partitions will have an STC rating of 45 minimum.

1.3.6. If testing is required, the measurement parameter will be ASTC test method as outlined in the applicable ASTM standard .The results shall be within 8 points of the stated STC requirement for acceptability. NIC measurement parameters shall be used only where rooms being tested are too small to meet the ASTM requirements for room size.

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

Adjacency Combination		STC – Walls	STC – Floors/Ceilings
All Patient Rooms	Patient Room	50	50
All Patient Rooms	Corridor	35 [1,2,3]	50
All Patient Rooms	Public Space/Administrative Space/Therapy Room	50	50
NICU Patient Rooms	Corridor	35 [1,2,3]	50
NICU Patient Rooms	Procedure Room	50	50
NICU Patient Rooms	NICU Patient Rooms	50	50
Child Play Areas	Any occupied space	50	50
Child Play Areas	Corridors	35 [1,2,3]	50
Exam, Consultation or Interview Room /Clinical Skills Room	Exam, Consultation or Interview Room /Clinical Skills Room	50	50
Exam, Consultation or Interview Room	Corridor	35 [1,2,3]	50
Exam, Consultation or Interview Room	Public Space, administrative space	50	50
Exam, Consultation or Interview Room	Service Areas	50	50
Exam, Consultation or Interview Room	Meeting Room	50	50
Exam, Consultation or Interview Room	Staff Lounges	55	50
Procedure Room	Corridor	45	50
Procedure Room	Procedure Room	50	50
Procedure Room	Patient Care Areas, Administrative Areas, public space	50	50
Meeting/Conference Rooms	Corridor	35 [1,2,3]	50
Meeting/Conference Rooms	Public Space	50	50
Meeting/Conference Rooms	Meeting/Conference Rooms	50	50
Education Rooms	Public Space	50	50
Education Rooms	Education Rooms	50	50
Education Rooms	Corridor	35 [1,2,3]	50
Washroom	Any Space	45	50
Quiet Rooms	Any occupied space	50	50

Quiet Rooms	Corridor	35 [1,2,3]	50
Room with Video-Conferencing Capability/Telehealth Capable Rooms	Any Space	55[4]	50
Public Space	Staff Lounges	45	50
Offices/ shared offices	Office	45	50
Offices/ shared offices	Corridor	35 [1,2,3]	50
All Staff Workrooms	Any occupied space	50	50
All Staff Workrooms	Corridors	35 [1,2,3]	50
Staff Lounges	Public Space	50	50
Staff Lounges	Corridor	35 [1,2,3]	50
Locker Rooms	Public Space	45	50
Locker Rooms	Corridor	35 [1,2,3]	50
On Call Rooms	Public Space	50	50
On Call Rooms	Meeting Rooms	50	50
On Call Rooms	Corridor	35 [1,2,3]	50
Service Rooms/Areas including MDR[b]	Any occupied space	55	50
Rooms with MRI's	Any occupied space	55+	50
Rooms with MRI's	Corridor	45-50[4]	50
Labour Delivery Rooms/ High Dependency Unit	Any occupied space	55	50
Anesthetic care units and post anesthetic care units	Any occupied space	55	50

Table 1 – Notes:

a. "Public Space" includes lobbies, waiting/pause areas, reception areas, and similar spaces.

b. "Service Rooms/Areas" include elevators, elevator machine rooms, laundries, garages, maintenance rooms, mechanical rooms, boiler rooms and similar spaces; also rooms with noisy medical equipment.

c. The STC ratings for walls noted in Table 1 are based on 25 ga. steel studs at 600 mm o.c. If stiffer studs are required alternate designs must be developed to achieve the STC ratings noted. That is, consideration should be given to use of larger studs (i.e. 152 mm vs. 89 mm, etc. at 25 ga.), resilient channel (where practical), double stud walls, use of priority materials 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 rating including the doors, glazing and wall.
Note[2]: The results assume a closed door.
Note[3]: Where sliding doors are required, the acoustic rating does not apply at the door.
Note[4]: Acoustically rated door systems; STC 45 or STC 50 as required

1.4. Background Noise – Interior Spaces

1.4.1. Project Co will:

1.4.1.1. In undertaking the design of the Facility, evaluate the expected noise from all mechanical systems in the Facility; and

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

1.4.1.3. Electrical equipment noise and vibration induced noise shall not exceed the Noise Criteria specified in Table 2.

Table 2 – Noise Criteria – Rating Within Various Spaces

Room Type	NC	dBA
Exam room/Interview Room	30-35	35-40
Multiple occupant patient care areas	35-40	40-45
Procedure rooms	30-35	35-40
Corridors and public spaces	35-40	40-45
Testing lab, minimal speech	40-45	45-50
Team Care Stations	30-35	35-40
Group teaching spaces	35-40	40-45
Offices	30-35	35-45
Conference/meeting rooms	25-35	30-40
Video conferencing rooms	25-30	30-35
Patient rooms	30-35	35-40
NICU rooms	25-30	30-35
On Call rooms	30-35	35-40

1.5. Noise Control – Exterior

1.5.1. The interior noise levels (15 minute Leq) due to exterior sources should not exceed the specified room NC in Table 2.

1.6. Acoustics for Privacy/Confidentiality Enhancement

1.6.1. There is a requirement to maintain Confidential Privacy (a level of speech privacy) for some of the key areas of the Project.

1.6.2. The following spaces in the Facility will be designed with increased sound proofing in order to achieve Confidential Privacy rating:

Rating	Confidentiality Rating
Treatment rooms	• Confidential Privacy
Exam rooms	• Confidential Privacy
Interview rooms	• Confidential Privacy
Consult rooms	• Confidential Privacy
Meeting rooms which may also be used as consult spaces	• Confidential Privacy
Physician offices	• Confidential Privacy
Seclusion rooms	• Confidential Privacy
Trauma rooms	• Confidential Privacy

CNC/ CRN/CNL/private/manager offices	• Confidential Privacy
Telehealth Capable Rooms	• Confidential Privacy

- These spaces may be measured post construction to ensure they fall into this category at the Authority's request.

1.6.3. 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. This will need to be evaluated and where sufficient ambient noise is not provided by the HVAC system, consideration must be given to the use of an electronic background sound masking system (refer to Section 1.8).

1.7. Enclosed Room Speech Privacy Design Guidance

1.7.1. Speech privacy can be achieved with proper space planning, partitions, room finishes and effective use of sound masking systems.

1.8. Sound Masking

1.8.1. Provide a digital centralized, dual networked sound masking system in all spaces requiring Confidential Privacy and which is not reasonably obtainable by sound proofing and adequate background noise from the building services systems. The system will be as approved by the Authority.

1.8.2. The sound masking system will include the following:

1.8.2.1. strategically located speaker assemblies installed above conventional suspended acoustic tile ceiling; and

1.8.2.2. 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.

1.8.3. Sound masking system details and locations will reviewed by the Authority.

1.9. Acoustical Finishes

1.9.1. Acoustical room finishes, defined as room finishes with an NRC of greater than 0.65, will be used in all occupied spaces except where prohibited by code requirements. These spaces include, but are not limited to, the following:

1.9.1.1. Patient Rooms

1.9.1.2. Corridors

1.9.1.3. Team Care Stations

1.9.1.4. Pause/Reception areas

1.9.1.5. Atria

1.9.1.6. Physician Offices

1.9.1.7. Treatment/Exam/Interview/Consult Rooms

1.9.1.8. Meeting/Conference Rooms and Classrooms

1.9.2. NICU spaces will have an NRC of 0.85, minimum, excluding only NICU patient rooms which will have a NRC of 0.75, minimum.

1.9.3. The extent of acoustical finishes in the spaces listed in 1.9.1and 1.9.2 shall be determined by the project acoustical consultant. However, the area of acoustical finishes shall not be less than the floor plan area, unless high NRC finishes are used.

1.9.4. Specific details for the NICU spaces will be reviewed by the project acoustical consultant.

1.10. MRI Rooms

1.10.1. Special care will be required in the design of any rooms containing MRI equipment; consider the following strategies at a minimum:

1.10.1.1. provision of vibration isolation for MRI equipment as recommended by the manufacturer and approved by the acoustical consultant;

1.10.1.2. provision of room finishes that will be help to reduce noise; and

1.10.1.3. structural design features that reduce vibration.

1.10.2. For rooms containing MRI equipment, noise and vibration control design features shall be determined by the project acoustical consultant.