APPENDIX 3D – ACOUSTIC AND NOISE CONTROL MEASURES

ACOUSTIC AND NOISE CONTROL MEASURES

1. Definitions
    a. "dBA" is a weighted sound pressure level within a space adjusted based on human hearing systems (e.g. less sensitive to low frequencies);
    b. "Leq" is a time weighted equivalent sound level
    c. "NC" means: Noise Criteria. NC is a single number rating that is sensitive to the relative loudness within a given space at different frequencies;
    d. "NIC" stands for Noise Isolation Class. NIC is the single-number rating of the noise reduction that is measured between adjacent spaces. It is related to the STC of the partition separating the adjacent spaces, but does not require correction for partition area or the sound absorption capacity of the receiving room. NIC is then simpler to measure in the field than STC and is the most direct measure of sound insulation between rooms.
    e. "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, 500 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;
    f. "PI" means Privacy Index. The privacy index is a way of measuring how intelligible speech is across a given space as defined in ASTM 1130;
    g. "RT_{60}" stands for reverberation time. RT_{60} is the time (in seconds) taken for the sound level in a room to decrease by 60 decibels following the abrupt termination of the source of sound. RT_{60} is the primary measure of 'acoustic liveness' of a space. A short RT_{60} (i.e. less than 0.9 seconds) favours speech intelligibility while a long RT_{60} (i.e. greater than 1.5 seconds) favours music.
    h. "STC" means: (Laboratory) Sound Transmission Class. STC is a single number that is an indication of a partition'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 intelligible through an STC 60 wall.
    i. STI means Speech Transmission Index. Speech Transmission Index is a measure of speech transmission quality.
2. General Requirements
    a. Design and construct the Facility in consultation with a Consulting Engineer specializing in Acoustics and Noise Control.
    b. Design and construct the Facility to comply, at a minimum, with the requirements described within this Statement of Requirements. Refer also to Schedule 2 Part 6.18 Control of Vibration and Part 6.19 Control of Noise during construction.
    c. Provide acoustic and noise control measures necessary to create a healing environment for patients, a safe and comfortable environment for staff and confidentiality where it is required.
    d. Acoustics and noise control measures shall include, but not be limited to, the following:
        i. Attenuation of sound within public, patient and staff environments;
        ii. Sound isolation between the exterior and interior spaces;
        iii. Sound isolation between interior spaces within the building at both horizontal and vertical separations;

iv. Sound and vibration isolation of building service system noise and sound isolation of building service rooms;

v. Sound isolation as required for specialty rooms such as LDR Patient Rooms, NICU Bassinette Rooms, Mental Health Secure Rooms, and rooms with video-conferencing capabilities (Team Conference/Teaching Rooms and Team Conference/Family Education Rooms)

vi. Control of noise from equipment within rooms;

vii. Electronic sound masking system; and.

viii. Noise isolation of Pneumatic Tube system

e. Optimum sound isolation requires that the integrity of gypsum board partitions and ceilings (mass) never be violated by vent or grille cut-outs or by recessed cabinets, light fixtures, etc.

~~f.~~ Where penetrations are necessary:

i. Stagger electrical boxes and medical gas outlets by at least one insulated stud space.

ii. Provide mineral fiber insulation and a non-hardening mastic caulking compound to seal joints around all cut-outs such as electrical, TV and telephone outlets, plumbing escutcheons and recessed cabinets.

g. Minimize constructions such as ducts, rigid conduits, etc., that act as tubes to transmit sound from one area to another. At common supply and return ducts, provide sound attenuation liners at the diffuser and/or grill to maintain the acoustical requirements described below. Seal around conduits.

h. Isolate structure-borne vibrations and sound with resilient mountings on vibrating equipment to minimize sound transfer to structural materials. Provide ducts, pipes, and conduits with resilient, non-rigid boots or flexible couplings where they leave vibrating equipment; isolate from the structure with resilient gaskets and sealant where they pass through walls, floors, ceilings, or other building surfaces.

i. Use acoustic screens, vibration isolators, and carefully selected exterior equipment to prevent exterior noise (i.e. in compliance with local noise bylaws) that neighbours may find offensive as well as to reduce the chance for re-entrant noise.

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

i. 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;

ii. Provide the required degree of sound insulation between the exterior and interior, as well as between interior spaces within the facilities through space planning and building material;

iii. 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; refer also to section 5.6.8 Vibration Limitations in Schedule 3.

iv. 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;

v. Provide wall, roof, and floor assemblies with acoustic performance in accordance with the minimum requirements listed on the following pages;

vi. 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, waiting areas and lounges);

vii. Avoid vertical adjacencies between noisy and noise sensitive areas;

viii. Design and construct interior assemblies to the STC/NIC rating criteria stipulated in this Section and as outlined within the ASTC testing methods for field testing.

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

3. Noise Isolation Requirements

a. Provide wall and floor assemblies with STC/NIC ratings in accordance with Table 1 below. Where there are discrepancies between STC values in Appendix 3C Room Data Sheets and Table 1, the most stringent requirement shall govern. Any post construction testing used to assess in-situ performance in terms of the ASTC rating must be within 5 points of the most stringent STC rating for the adjacency. Where the room dimensions are not in compliance with the ASTM standard for ASTC testing, NIC tests can be performed and must meet the most stringent NIC rating for the adjacency.

b. Extend the STC/NIC rated assembly full-height from floor to the underside of structure above for all walls and partitions requiring an STC/NIC 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 and other requirements will be achieved with the proposed design;

c. The sound isolation ratings in Table 1 are considered the laboratory STC ratings except where noted. The NIC ratings shown in Table 1 are the field rated targets to be verified by post construction testing.

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

ii. Table 1 will provide Normal speech privacy (except at corridor walls with doors), assuming a background sound level of at least 35 dBA. Achieving the NIC ratings in Table 1 will provide Normal speech privacy between adjacent spaces (except for corridor walls with standard, non-acoustically-rated doors), assuming a background sound level of at least 35 dBA (NC 30).

iii. If testing is required, the measurement parameter will be the current version of ASTM test method E336 Standard Test Method for Measurement of Airborne Sound Attenuation between Rooms in Buildings. The results shall be within 5 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 ASTC testing.

iv.

Table 1 – STC (Laboratory Test #'s)/NIC (Field Rated Targets) Ratings of Demising Walls and Floor/Ceiling Assemblies

APPENDIX 3D – ACOUSTIC AND NOISE CONTROL MEASURES

Adjacency Combination		NIC- Walls	STC – Walls	NIC- Floor/ Ceiling	STC – Floors/ Ceilings
All Patient Rooms including patient bedrooms, Triage/Observation Exam Rooms and similar	All Patient Rooms including patient bedrooms, Triage/Observation Exam and similar	47	55	47	50
All Patient Rooms including patient bedrooms, Triage/Observation Exam Rooms and similar	Corridor	30	(35) [1,2,3]	47	50
All Patient Rooms including patient bedrooms, Triage/Observation Exam Rooms and similar	Public Space/Administrative Space (no doors)	47	55	47	50
Consult/Interview Room, Interview Room/Low Stimulation Room, Family Education/Counseling Room and similar	Consult/Interview Room, Interview Room/Low Stimulation Room, Family Education/Counseling Room and similar	45	50	47	50
Consult/Interview Room, Interview Room/Low Stimulation Room, Family Education /Counseling Room and similar	Corridor	30	35 [1,2,3]	47	50
Consult/Interview Room, Interview Room/Low Stimulation Room, Family Education /Counseling Room and similar	Public Space/Administrative Space	50	55	47	50
Consult/Interview Room, Interview Room/Low Stimulation Room, Family Education /Counseling Room and similar	Service Areas	60	65	47	50
Consult/Interview Room, Interview Room/Low Stimulation Room, Family Education /Counseling Room and similar	Meeting Room	50	55	47	50
Consult/Interview Room, Interview Room/Low Stimulation Room, Family Education /Counseling Room and similar	Staff Lounges	50	55	47	50
Room with Video- Conferencing Capability/ Telehealth Capable Rooms (Team Conference/Teaching Rooms and Team Conference/Family Education Rooms)	Any Space	50	55 [1,4]	47	50

APPENDIX 3D – ACOUSTIC AND NOISE CONTROL MEASURES

Adjacency Combination		NIC- Walls	STC – Walls	NIC- Floor/ Ceiling	STC – Floors/ Ceilings
Room with Video- Conferencing Capability/ Telehealth Capable Rooms (Team Conference/Teaching Rooms and Team Conference/Family Education Rooms)	Corridor	45	50[1,4]	47	50
Quiet Room	All Occupied rooms	45	50	47	50
Quiet Room	Corridor	30	35[1,2,3]	47	50
Education/Meeting Room, Assessment/Interview Room, Home Assessment Room	Corridor	30	35 [1,2,3]	47	50
Education/Meeting Room, Assessment/Interview Room, Home Assessment Room	Public Space	50	55	47	50
Education/Meeting Room, Assessment/Interview Room, Home Assessment Room	Staff Lounge	50	55	47	50
Washroom	Any Space	40	45	47	50
Patient/Visitor Waiting Room and Quiet Room	Any occupied space	45	50	47	50
Patient/Visitor Waiting Room and Quiet Room	Corridor	30	35 [1,2,3]	47	50
Public Space	Staff Lounges	47	50	47	50
Offices (Private/Shared, Open Office Areas)	Office	42	45	47	50
Offices (Private/Shared, Open Office Areas)	Corridor	30	35 [1,2,3]	47	50
All Staff Workrooms	Any occupied space	47	50	47	50
Staff/Physician Lounges and breakrooms	All occupied spaces	47	50	47	50
Staff/Physician Lounges and breakrooms	Corridor	30	35 [1,2,3]	47	50
Service Rooms, MCC, BCC	Any occupied space	60	65[4]	55	60
Medication Room	All occupied rooms	45	50	47	50
Locker Area/Room, Locker/Change Room, Food Servery and similar non-critical spaces	All occupied rooms	45	50	47	50
Activity Room and Exercise Room	All occupied rooms	45	55	47	50

APPENDIX 3D – ACOUSTIC AND NOISE CONTROL MEASURES

Adjacency Combination		NIC-Walls	STC – Walls	NIC-Floor/ Ceiling	STC – Floors/ Ceilings
Laundry (Personal Clothing)	All occupied rooms	50	55	47	50
Care Team Stations and Unit Clerk Workstations (if enclosed)	All occupied rooms	45	50	47	50
Snoezelen Room	Any Space	50	55	47	50
All NICU Rooms including Bassinette Rooms, Isolation Rooms Enclosed	All NICU Rooms including Bassinette Rooms, Isolation Rooms Enclosed	45	50	47	50
All NICU Rooms including Bassinette Rooms, Isolation Rooms Enclosed	Corridor	30	35[1,2,3]	47	50
Secure Room	Any occupied space (except secure room anteroom)	70	75	55	60
Secure Room	Secure room ante room	27	35[1,2,3]	47	50
Secure Room Ante Room	Corridor	35	40[1,2,3]	47	50
Operating Rooms	All occupied rooms	50	55	47	50
Gift Shop	All occupied rooms.	40	45	47	50

Table 1 – Notes:

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

b. "Service Rooms" include elevators, elevator machine rooms, garages, maintenance rooms, mechanical and boiler rooms and similar spaces; also rooms with noisy medical equipment. They do not include on-floor electrical rooms, electrical panel rooms, IT rooms which generate less noise. For these areas; provide NIC Walls – 50, STC Walls – 55, NIC Floors/Ceilings – 47 and STC Floors/Ceilings – 50. Mechanical duct shafts shall be STC 55/NIC 50 where adjacent to an occupied space.

c. The STC/NIC ratings for walls noted in Table No. 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 or resilient clips (where practical), double stud or staggered stud walls, use of proprietary enhancing materials that maintain the equivalent STC/ASTC ratings. CMU is also an alternative in some areas such as around mechanical and electrical rooms.

d. Walls between adjacent Secure Rooms, and between Secure rooms and other occupied spaces (except Secure Room Ante Rooms), shall be double wall assemblies; the Secure Room side of which shall be minimum 150 mm (6") cast-in-place concrete, filled concrete block or similar construction, while the other side shall be a free-standing steel stud and gypsum board/plywood assembly. The cavity between the two shall be fully insulated. It is assumed that there will be no doors or windows in such walls.

e. Note[1]: This is a composite rating including 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.
Note[4]: Acoustically rated purpose-built door systems; STC 45 or STC 50 applies to the following rooms (except those with 1050 mm (i.e. 3'6") leaf and 450 mm (i.e. 1'6") leaf:

- Rooms with video conferencing capability/telehealth capable rooms including Team conference/Teaching Room or Team Conference/Family Education Room
- Service room, MCC, BCC
- LDR Triage Area
- NICU Private Rooms/Isolation Rooms
- Assessment/Interview Rooms
- Interview Rooms/Low Stimulation Rooms
- Quiet Rooms

4. Background Noise – Interior Spaces
    a. The Design-Builder shall:
        i. In undertaking the design of the Facility, evaluate the expected noise from all mechanical and other systems in the Facility; and
        ii. Design and construct the Facility so that noise from the mechanical and other 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/RC(N)	dBA
Patient Rooms including On-call rooms	30-35	37-42
Operating Rooms	30-35	37-42
Exam/Treatment Rooms and Consult/Interview Rooms	30-35	37-42
Multiple occupant patient care areas	35-40	42-47
Corridors and public spaces	35-40	42-47
Team Care Stations	30-35	37-42
Offices	30-35	37-42
Reception Desk, Receptionist Workstation, Unit Clerk Workstation, Patient/Visitor Waiting Room	35-40	42-47
Meeting rooms	25-35	32-42
Exercise Rooms/Locker Rooms	40-45	47-52
NICU (all private Bassinette Rooms, all Bassinette Bays)	25-30	32-37

5. Noise Control – Exterior
    a. The interior noise levels (15 minute Leq) due to exterior sources shall not exceed the specified room dBA level noted in Table 2 above.
    b. For infrequent, short duration transient events such as emergency vehicle noise that occur less than 3 times per day or 2 times per week during the nighttime (between 10pm and 7am) the following limits apply:

1) For the most sensitive spaces (NICU, patient rooms, ORs, and similar), Project Co shall meet the following criteria: 50 dBA 15 min Leq and 65 dBALmax
2) For all other occupied spaces, Project Co shall meet the following criteria: 55 dBA 15 min Leq and 70 dBALmax

c. Noise levels created in routinely occupied outdoor amenity spaces/locations including mental health outdoor activity area, public outdoor spaces and staff outdoor spaces by the operation of any mechanical and other building services systems (including electrical substations/transformers) shall not exceed 55 dBA.

d. Noise levels created in routinely occupied outdoor amenity spaces/locations including mental health outdoor activity area, public outdoor spaces and staff outdoor spaces by the operation of emergency power generator system shall not exceed 60 dBA.

e. Where it will not result in the exceedance of the outdoor amenity space noise limit in Clause 'b' of this section, noise levels created by operation of mechanical or other building systems (including electrical substation/transformers) shall not exceed 50 dBA at a distance of 10M from the Facility.

f. Where it will not result in the exceedance of the outdoor amenity space noise limit in Clause 'd' of this section, noise levels created by operation of the emergency power generator system shall not exceed 55 dBA at a distance of 10M from the Facility.

g. Subject to the requirements of Clauses b, c, d, e and f of this section, noise levels created at the facade of the Facility by operation of emergency power generator system shall not exceed 75 dBA.

h. Subject to the requirements of Clauses a, b, c, d, e and f of this section, noise levels created at the facade of the Facility by operation of mechanical or other building systems (including electrical substations/transformers) shall not exceed 70 dBA

6. Acoustics for Privacy/Confidentiality Enhancement

a. There is a requirement to maintain Confidential Privacy (a level of speech privacy) for some of the key areas of the Facility. Confidential Privacy rating is defined as follows:

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

ii. Rated 0.0 – 0.12 on the Speech Transmission Index (STI) scale, OR

iii. Rated 95-100 on the Privacy Index (PI) scale.

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

Rating	Subjective Environment
0.00 – 0.12	Confidential privacy

0.12 - 0.20	Normal privacy
0.20 – 0.35	Marginal privacy
0.35 – 0.50	Fair communication
0.50 – 0.65	Good communication
0.65 – 1.00	Excellent communication

c. 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, is generally our concern when trying to maintain privacy/confidentiality from others.

d. Another means to measure privacy is via the Privacy Index (PI) as indicated in the following table:

Rating	**Subjective Environment**
95 -100	Confidential privacy
80 - 95	Normal privacy
60 – 80	Marginal / poor privacy
less than 60	No privacy

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

Rooms	**Confidentiality Rating**
All Exam/Treatment Rooms	Confidential Privacy
Consult/Interview rooms	Confidential Privacy
Meeting rooms which may also be used as consult spaces	Confidential Privacy
Offices	Confidential Privacy
Telehealth Capable Rooms	Confidential Privacy
Staff Lounge	Normal Privacy

These spaces must be measured post construction to ensure they fall into this category.

f. Enclosed Room Speech Privacy Design Guidance

i. 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 Subsection 7 following).

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

7. Sound Masking

a. Provide a digital centralized, dual networked sound masking system in all spaces requiring Confidential speech privacy and which is not reasonably obtainable by sound proofing and adequate background noise from the building services systems. The system is subject to the Authority approval.

b. The sound masking system shall include the following:

i. Strategically located speaker assemblies installed above or flush to a conventional suspended acoustic tile ceiling; and

ii. 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.

c. Sound masking system details and locations shall be reviewed by the Authority.

8. Pneumatic Tube (PT) System

Consider all aspects of potential noise from the Pneumatic Tube system. As a minimum:

a. Review and obtain the quietest version of the PT system available

b. Meet the background noise requirements of Table 2 allowing for intermittent noise as well as impact noise at the send/receive stations.

c. Avoid placing send/receive stations in acoustically sensitive areas

d. Locate PT horizontal and vertical runs away from acoustically sensitive areas

e. Install PT runs over acoustic tile or gwb ceilings in acoustically sensitive areas

f. Consider acoustic wrap of horizontal tubes, if required for noise control

9. Acoustical Finishes

a. Acoustical room finishes, defined as room finishes with an NRC of greater than 0.5, shall be used in all occupied spaces except where prohibited by code requirements. These spaces include, but are not limited to, the following (refer also to the Room Data Sheets):

i. All Patient Rooms (e.g. Exam/Treatment Rooms)

ii. All NICU Rooms

iii. Corridors

iv. Staff Room and Lounges

v. Team Care Stations

vi. Waiting areas

vii. Atria/Lobby and Circulation spaces

viii. Offices

ix. Consult Rooms/Assessment/Interview/Meeting and Education Rooms

x. Quiet Rooms

xi. Meeting Rooms and rooms with video conferencing

xii. Dining Area

b. The extent of acoustical finishes in the spaces listed in Appendix 3A Clinical Specifications and Functional Space Requirements 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.

c. Sound absorbing materials shall be incorporated into the design of rooms so that the Reverberation Times (RT_{60}s) of the rooms do not exceed the values listed in Table 3; or as outlined in the room data sheets.

d. Where achieving the RT_{60}s in Table 3 appears to challenging because of limited scope for use of conventional sound absorbing materials due to safety/security concerns best efforts shall be made and alternative approaches explored with the Authority.

Table 3 – Maximum Room Reverberation Times

Room Type(s)	Reverberation Time (Seconds)
Lobby, Entry Vestibule/Atria	1.0
Patient Rooms (bedrooms)	0.8
Corridors and Public Spaces	1.0
Offices	0.8
Staff Lounges, Staff Workrooms	0.8
Team Care Stations, Medication Room	0.8
Dining/Multipurpose Rooms, Activity Rooms	0.8
Receptionist Workstation, Unit Clerk Workstation, Patient/Visitor Waiting Room rooms with televisions, Computer Alcoves	0.8
Counselling Rooms	0.6
Training Rooms, Staff Quiet Rooms, Sacred Space/Healing Room, Quiet Lounges,	0.6
Meeting Rooms, Conference Rooms	0.6
Multiple Occupant Clinical Spaces	0.6
Rooms with Video-conferencing capability	0.5

10. Operating Rooms with Imaging Equipment

a. Special care shall be given in the design of any rooms containing imaging equipment, such as the CT Scanners. Attention shall be paid to:

i. Vibration isolation of the imaging equipment; and

ii. Room finishes;

b. For rooms containing imaging equipment the extent of noise and vibration control detailing shall be determined by the project Acoustical Consultant in addition to meeting the requirements of Schedule 3.

11. Acoustic Testing and Verification

    a. Refer to Schedule 3 section 5.4.3.11 Acoustic Performance Testing for testing and verification requirements for acoustical performance.

12. Heliport

    In terms of the rooftop Heliport:

    a. Ensure that vibration levels from helipad operations do not exceed vibration levels specified in Table 5.6.8.3(4) of Schedule 3. This may require the inclusion of vibration isolation of the helipad from the structure. Ensure that the helipad and isolation system meet all structural requirements in terms of impact on the hospital and hospital functions.

    b. If helicopter operations are not expected to exceed an average of 3 flights per day and 2 flights per week during the nighttime (i.e., between 10:00 P.M. and 7:00 A.M.), then the design of the façade should be such that 95% of helicopter events do not exceed:
        i. 65 dBA Lmax (fast) in infant bed rooms and adult sleep areas;
        ii. 70 dBA Lmax (fast) in staff work and lounge areas, family areas, corridors, public spaces, and reception/waiting areas.

    c. If helicopter operations are expected to exceed 3 flights per day or 2 flights per week during the nighttime (i.e., between 10:00 P.M. and 7:00 A.M.), then the design of the façade should be such that 95% of helicopter events do not exceed the dBA ratings for each of the room types listed in Table 2 by more than 15 dB when measured as Lmax (fast). For example, patient rooms rated 37-42 dBA should not exceed 57 dBA Lmax (fast).

    d. It is expected that the wall and glazing construction requirements for meeting the targets in 12.b and 12.c will vary by proximity to the helicopter flight path. The targets in 12.b and 12.c shall be met with glazing that is rated OITC 33 which we deem to be a practical construction. Project Co will provide an acoustic modelling report and proposal based on OITC 33 glazing or for reduced glazing requirements for approval by the Authority that will identify:

        i. Locations where glazing requirements may be reduced while still meeting the requirements of 12.b. and 12.c., and;
        ii. Expected sound levels in spaces where the targets in 12.b and 12.c cannot be met with minimum OITC 33 glazing.

References:

1. *Lewitz, Joel. Understanding the sound and the silence: applications of sound masking in open and closed-plan environments, with possible HIPAA requirements, Sounds and Communications, Dec 2003*
2. *Hongistor, Valtteri et al. Prediction of speech transmission index in open-plan offices. Joint Baltic-Nordic Acoustics Meeting, June 2004*

END OF SECTION