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Internal Acoustics Assessment Report

Upgrades to Orange Grove Primary School
2-8 Perry Street, Lilyfield, NSW

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Prepared For:
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Attention: Mr Frank Princi



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1.0 CONSULTING BRIEF

This Internal Acoustics Design Report has been prepared to accompany a Review of Environmental Factors (REF) for an activity proposed by the Department of Education under Part 5 of the *Environmental Planning and Assessment Act 1979* (EP&A Act) and *State Environmental Planning Policy (Transport and Infrastructure) 2021* (SEPP TI).

Day Design Pty Ltd was engaged by School Infrastructure to carry out an internal acoustic assessment for the proposed new building, Building J, at Orange Grove Public School, 2-8 Perry Street, Lilyfield, NSW.

The scope of work is as follows:

- Review the architectural drawings
- Recommend minimum acoustic requirements for wall and floor partitions
- Design internal walls and floors to meet the recommended sound isolation ratings
- Recommend minimum requirements for reverberation times
- Design internal wall treatments to achieve the recommended reverberation times
- Provide recommendations to control noise from mechanical plant
- Prepare an Internal Acoustics Assessment Report.

This document has been prepared in accordance with the *Guidelines for Division 5.1 assessments* (the Guidelines) by the Department of Planning, Housing and Infrastructure.

This report examines and takes into account the relevant environmental factors in the Guidelines and *Environmental Planning and Assessment Regulations 2021* under Section 171(1) of the EP&A Regulation as outlined in Table 1.



Table 1 Part 5 Guidelines

EP&A Regulation Section 171(1) Guidelines for Division 5.1 Assessment Section			
	Requirement	Response	Report Section
<u>r) other relevant environmental factors</u>	(r1) health and safety risk to children, visitors, patients or staff of the development (r7) any other relevant impacts	The internal acoustic design of the proposed Building J has been considered to ensure the acoustic amenity of the students and staff is upheld. Recommendations have been provided throughout Sections 4.0 and 5.0 to ensure that EFSG and Green Star requirements are achieved.	Mechanical Plant design and noise intrusion – Section 4.0 Noise Controls Recommendations – Section 5.0



2.0 PROJECT DESCRIPTION

Orange Grove Public School is a co-educational primary school located at 2-8 Perry Street, Lilyfield. The site has street frontage to Perry Street, Balmain Road, Emmerick Street and Rayner Street. The site comprises 15 allotments with a total area of 17,956m² including:

- Lots 21 & 22 Deposited Plan (DP) 3796;
- Lots 1 & 5 DP 114899;
- Lot 1 DP 122488;
- Lot 1 DP 169451;
- Lots 1 – 3 DP 312710;
- Lot 1 DP 449967;
- Lots 1 & 2 DP 925435;
- Lot 1 DP 931891;
- Lot 1 DP 1037366; and
- Lot 102 DP 1160224.

The existing permanent buildings on the site include:

- **Building A:** Two-storey, neo-Georgian, inter-war brick building built in 1928 containing administration and staff areas, along with 7 homebases/classrooms;
- **Building B:** Single storey, pre-WW1 brick structure containing 4 homebases;
- **Building C:** Single storey brick building containing library and music rooms;
- **Building D:** Single storey 'L' shaped building (c. 1894) containing 6 homebases;
- **Building E:** Single storey pre-school building facing Balmain Road;
- **Building G:** Amenities building;
- **Building H:** Canteen; and
- **Building I:** Storage Shed.

Demountable classrooms are located in the north-eastern and north-western corners of the school site. A Covered Outdoor Learning Area (COLA) is located centrally within the site. The COLA links Buildings A, B and C. Playing areas are located on the northern, western and eastern boundaries of the site.

OGPS is comprised of four school buildings containing general learning spaces (GLSs), amenities, library, staff and administration areas, outdoor playing areas and car park.

OGPS caters for up to 585 students from preschool to Year 6. Following the proposed upgrades to *OGPS*, the school will be able to cater for up to 611 students.



The proposed activity is for upgrades to Orange Grove Public Primary School and comprises the following:

- **Demolition of** Building C;
- **Removal of** ancillary structures – paths, fencing
- **Removal of** posts on sports courts (to be undertaken in consultation with the school);
- **Removal of** existing assembly Covered Outdoor Learning Area (COLA) south of Building C;
- **Removal of** portable classroom buildings;
- **Removal of** one (1) tree;
- **Construction of** a three-storey building (Building J);
- **Construction of** a COLA south of Building J;
- **Use of** a portable buildings for the purpose of a library during construction works;
- Associated works including stormwater drainage works, services works including installation of a substation, installation of an onsite detention tank, waste storage facilities, landscaping and fencing.

The various room types provided throughout the new buildings will require different levels of acoustic treatment to the internal acoustic design, taking into account sound isolation between different areas within the buildings and also room reverberation. Reverberation times in critical rooms require design of sound absorption to create an acoustic environment where speech clarity is required.

Clarity of speech and speech privacy is important within various areas of the school buildings. An ideal acoustic environment is where speech at normal voice level is easy to comprehend and where sound from other rooms of the building do not interfere with the activities inside each room. The recommendations in this report provide methods to reduce room reverberation and keep sound transmission from one room to another, to a minimum.

Large areas of hard reflective surfaces such as floor tiles, blockwork, plasterboard and glass allow sound to echo and reverberate, making speech difficult to understand. Large areas of sound absorptive surfaces such as carpet, acoustic ceilings and absorptive wall panels reduce room reverberation and make speech more intelligible, however too much sound absorption makes speech less audible from one end to the other end of a room.

Good acoustics is achieved by a strategic balance between hard reflective surfaces that will distribute sound evenly throughout the room, and soft absorptive surfaces that will eliminate echoes and allow clear communication.



3.0 INTERNAL SOUND ISOLATION

A glossary of architectural acoustical terms may be found in the attached datasheet AC116.

3.1 Sound Isolation Descriptors

The weighted sound reduction index (R_w) provides an acoustic rating for the sound insulation of partitions subject to airborne sounds having a spectrum similar to that of the human voice, which is typically of a mid-to-high frequency character.

Sound insulation varies with frequency and is dependent on the type of material and construction. However, the R_w provides a convenient method of rating sound insulation using a single number. The higher the R_w rating the better the sound insulation provided by the partition.

The impact sound insulation performance of a system is denoted by a single value descriptor, the weighted impact sound insulation $L_{nT,w}$. The single value descriptor allows for easy comparisons between different systems. The lower the number, the better the impact sound insulation performance.

3.2 Educational Facilities Standards and Guidelines

The NSW Department of Education (DoE) document Educational Facilities Standards and Guidelines (EFSG) provides information to assist in the design of school facilities. As of 30 March 2023, the EFSG v2.0 is required to be met for all new-builds and refurbishments in NSW school. The Design Checklist (0001c Design Checklist – Acoustics) of the EFSG v2.0 provides guidance on the acoustic performance requirements of the various areas and spaces within a school to encourage and foster an environment conducive to learning.

3.2.1 Prescriptive Constructions

Section 0.06 of 0001c Design Checklist – Acoustics, 'Room to Room Noise Control', specifies the following 'Prescriptive Constructions' requirements:

- Operable walls (between general learning areas, all schools): R_w 45.
- Entry doors to occupied teaching, music, drama and sports spaces: Solid core, minimum 35 mm thick with acoustic weather (where external) seals on all rebated closing faces. Gap at floor to be minimized.
- Internal glazed sections in walls and vision panels in or adjacent to internal doors: minimum 10.38 mm laminated glass. In some situations, acoustic windows may be needed for satisfactory noise separation.
- Construction separating wastewater pipework from occupied spaces: R_w 40.
- Where adjacent to an occupied space (and not serving that space), hydraulic supply pipework and wastewater pipework shall be separated from the adjacent occupied space. Construction between the adjacent spaces in this instance shall be a 'staggered stud' arrangement or otherwise discontinuous.



3.2.2 Design Guide Note – Sliding Glazed Doors & Wall Specifications

Design Guide Note DGN003 of the EFSG v2.0 provides a guideline for determining the appropriate acoustic performance of operable glazed partitions separating learning spaces. DGN003 outlines the following acoustic requirements for operable glazed partitions, and states that project specific circumstances require this guideline to be reviewed by each project team to confirm appropriateness:

‘Glazed sliding doors between Teaching Spaces or Learning Commons are to achieve:

- *A tested $32R_w$ min acoustic rating (subject to holistic acoustic review of the spaces by an acoustic consultant).’*

3.2.3 Internal Noise & Reverberation Levels

Table 01 of 0001c Design Checklist – Acoustics provides a list of recommended design sound levels for different areas of occupancy in school buildings. The noise intrusion from the following noise sources should not exceed the levels shown in Table 2 within the proposed rooms of *OGPS*:

- Steady-state (consistent) noise intrusion from external sources:
 - Road (and in some cases, rail) traffic noise;
 - Industry; and
 - General environmental noise including external school activity.
- Intermittent (occasional) noise intrusion from external sources:
 - Individual rail pass-bys;
 - Aircraft flyovers; and
 - Rain noise.
- Steady-state (consistent) noise contribution of internal sources:
 - Mechanical equipment; and
 - Air conditioning.
- Intermittent (occasional) noise intrusion from internal sources:
 - Hydraulic services.



Table 01 of 0001c Design Checklist – Acoustics also provides a list of recommended design reverberation times for rooms within a school building with different usages. From the intended usage of the room, we recommend that the design reverberation times across the audible sound spectrum be as listed in Table 2.

Table 2 Guideline on Internal Noise Levels and Reverberation Times

Room	Internal noise level (dB L_{Aeq})	Reverberation time, s RT ₆₀ (Av 500Hz and 1000Hz)
Corridors and lobbies	45	Minimise
Interview/counselling rooms	35	<0.6
Medical rooms (First aid)	40	<0.8
Office areas	40	<0.7
Open plan teaching areas	40	<0.8
Professional and administrative offices	35	<0.8
Staff common rooms	40	<0.6
Teaching spaces – Primary schools	35	<0.5
Toilet/change/showers	50	n/a

Note 1: The appropriate reverberation time shall be influenced by the internal volume and intended use of the space. Guidance from an acoustical engineer shall be sought. Also refer to AS/NZS2107:2016 Figure A1 for guidance values.

Reverberation Time curves from Australian Standard AS2107:2016 “Acoustics – Recommended design sound levels and reverberation times for building interiors” can be seen in the attached Appendix A.



3.2.4 Sound Insulation of Internal Floors and Walls

To adequately reduce noise from one room to another, it is necessary to design the internal floors, walls, doors and glazing for the appropriate sound insulation.

Table 02 of 0001c Design Checklist – Acoustics provides typical noise generation, noise tolerance and recommendations of minimum impact insulation ratings ($L_{nT,w}$) for various types of school occupancies. The typical noise generation, noise tolerance and recommendations of minimum impact insulation ratings have been extracted from Table 02 of 0001c Design Checklist – Acoustics and is presented below in Table 3.

Table 3 Recommended Noise Generation & Tolerance, & Impact Sound Insulation

Room	Source Room Activity Noise	Receiving Room Activity Noise Tolerance	Impact Sound Insulation Rating ($L_{nT,w}$)
Corridors and lobbies	Average	High	65
Interview/counselling rooms	Average	Low	55
Medical rooms (First Aid)	Average	Low	60
Office areas	Low	Low	55
Open plan teaching areas	Average	Medium	55
Professional and administrative offices	Low	Low	60
Staff common rooms	Average	Medium	60
Teaching spaces – Primary schools	Average	Low	55
Toilet/change/shower	Average	High	-

Note: The $L_{nT,w}$ rating in Table 2 refers to the floor/ceiling construction between the relevant room in Table 2 and the room above.



Table 03 of 0001c Design Checklist – Acoustics provides a matrix for determining the required R_w of a common partition based on the receiving room's tolerance to noise and the source room's activity noise. Table 03 of 0001c Design Checklist – Acoustics is extracted below in Table 3.

Table 4 Recommended Minimum Design R_w

Receiving Room Activity Noise Tolerance	Activity Noise in Source Room			
	Low	Average	High	Very High
High	30	35	45	55
Medium	35	40	50	55
Low	40	45	55	55
Very Low	45	50	55	60

Using Table 3 and Table 4 for the various proposed and refurbished room types of *OGPS*, the minimum R_w of the common partitions can be determined. Table 5 below shows the recommended minimum Weighted Sound Reduction Index (R_w) for the dividing walls, doors and glazing. The higher the R_w rating the better the sound insulation provided by the partition.

The recommended minimum R_w of the common partitions are incorporated in the marked up architectural drawings attached as Appendix B. The drawings in Appendix B show the most stringent R_w applicable to each partition, based on the values in Table 5 and the requirements outlined in Section 3.3 of this report.

Table 5 Recommended Room to Room Insulation Criteria

Source Room	Receiving Room	Min R_w
<i>Building J – Ground Floor</i>		
AC Services	Corridor	R_w 45
STF ACC WC/STU ACC WC/ Girls WC/Boys WC	Corridor/Circulation/Other WC	R_w 35
STF ACC WC/STU ACC WC/ Girls WC/Boys WC	Staff Lounge	R_w 40
Pump Room	Corridor	R_w 40
Staff Lounge/Clerical/Sick Bay/ Circulation/Deputy Principal/ Principal/Interview	Staff Lounge/Clerical/Sick Bay/ Circulation/Deputy Principal/ Principal/Interview	R_w 45
Pump Room	Staff Lounge	R_w 50 ¹
Lift	Staff Lounge	R_w 50 ¹

¹ Wall to be of discontinuous construction.



Table 5 Recommended Room to Room Insulation Criteria - Continued

Source Room	Receiving Room	Min R_w
<i>Building J – First Floor</i>		
AC Services	Corridor	R_w 45
STF ACC WC/STU ACC WC/ Girls WC/Boys WC	Corridor/Other WC	R_w 35
BCR/CDS	Corridor	R_w 40
Girls WC/Boys WC/BCR	GLS	R_w 45
GLS/SLS	GLS/SLS	R_w 32 ²
Lift	GLS	R_w 50 ³
<i>Building J – Second Floor</i>		
AC Services	Corridor	R_w 45
STF ACC WC/STU ACC WC/ Girls WC/Boys WC	Corridor/Other WC	R_w 35
BCR/CDS	Corridor	R_w 40
Girls WC/Boys WC/BCR	GLS	R_w 45
GLS/SLS	GLS/SLS	R_w 32 ²
Lift	GLS	R_w 50 ³

***Note:** Where hydraulic supply pipework or wastewater pipework is located adjacent to an occupied space, and does not serve that space, the construction of the separating partition shall be a 'staggered stud' arrangement, or otherwise discontinuous.

² Based on the guidance provided in Design Guide Note DGN003 of the EFSG v2.0 for operable glazed partitions.

³ Wall to be of discontinuous construction.



3.3 Green Star 5 Star Rating – Acoustic Comfort

The new buildings within *OGPS* are to be designed to achieve a Green Star 5 Star Rating under the Green Star – Design and As Built v1.3 rating tool. Three Green Star credit points are targeted as outlined below.

'Aim of Credit

To reward projects that provide appropriate and comfortable acoustic conditions for occupants.

Credit Criteria

- | | |
|-----------------------------------|---|
| 10.1 Internal Noise Levels | 1 point is available where internal ambient noise levels in the nominated area are suitable and relevant to the activity type in the room. This includes all sound generated by the building systems and any external noise ingress. |
| 10.2 Reverberation | 1 point is available where the nominated area has been built to reduce the persistence of sound to a level suitable to the activities in the space. |
| 10.3 Acoustic Separation | 1 point is available where the nominated enclosed spaces have been built to minimise crosstalk between rooms, and between rooms and open areas. |

Compliance Requirements

10.1 Internal Noise Levels

- **One (1) point** is awarded where project teams demonstrate that internal ambient noise levels in the nominated area are no more than 5 dB(A) above the lower figure in the range recommended in Table 1 of AS/NZS2107:2016 || **R2.10.01**

10.2 Reverberation

- **One (1) point** is awarded where the reverberation time in the nominated area is below the maximum stated in the 'Recommended Reverberation Time' provided in Table 1 of AS/NZS 2107:2016. Reverberation refers to the persistent prolonged reflections of sound in a space. A technical definition is provided in AS/NZS 2107:2016. For residential projects, this criterion is 'Not Applicable'.

Where note 3 of Table 1 AS/NZ 2107:2016 applies and requires that reverberation times be minimised as far as practical, acoustic absorption should be installed in the noise sensitive space. Acoustic absorption should be applied in locations appropriate to the function of the space, and located to maximise the acoustic performance of materials selected.

The resulting performance of the installed acoustic absorption, irrespective of quantity or location installed, must result in a reverberation time equivalent to or lower than the reverberation time predicted for treating at least 50% of the combined floor and ceiling area with a material having noise reduction coefficient (NRC) of at least 0.5.



Alternatively, compliance may be demonstrated by treating 50% of the combined floor and ceiling area with a material having an NRC of at least 0.5.

Dedicated teaching space must have reverberation times in the lower half of the range specified in Table 1 of AS/NZS 2107:2016.

10.3 Acoustic Separation

- **One (1) point** is awarded where the project addresses noise transmission in enclosed spaces within the nominated area. Enclosed space is defined as meeting rooms, private offices, classrooms, residential apartments (bounding apartment construction), and any other similar space where it is expected that noise should carry over from one space to the next. For this specific criterion, where the delivery method of the project is core and shell, then the criteria may be considered 'Not Applicable'.

10.3A Sound Reduction

- The partition between the spaces should be constructed to achieve a weighted sound reduction index (R_w) of:
 - At least 45; for all partitions which are:
 - Fixed without a door; and/or
 - Glazed partitions without a door*.
 - At least 35; for all partition types that contain a door.

**The Acoustic Consultant can use their discretion to determine whether an R_w of 35 or 45 is more applicable when using glazed partitions. The selected Weighted Sound Reduction index must be justified in terms of adjoining space use, required levels of noise sensitivity between spaces and any other aspects which would help to achieve acoustic separation.*
// R2.10.04.'

A Green Star Technical Question was responded to by the Green Building Council Australia on 11 February 2021 (Request R-14412), with regard to the sound reduction index required for glazed operable walls. The following was detailed within this response:

'The GS-6039DA – NSW Department of Education v1.3 Umbrella project may target one (1) point under credit criterion 10.3 Acoustic Separation from Green Star – Design & As Built v1.3 by demonstrating sound reduction index (R_w) from 30 to 35 for glazed operable walls between enclosed spaces only.

The approval is on the basis that the sound reduction index (R_w) of 30 for a glazed operable wall meets the functional requirements of the space.'

The requirements of the Green Star credit points outlined above are incorporated in the marked up architectural drawings attached as Appendix B. The drawings in Appendix B show the most stringent R_w applicable to each partition, based on the values outlined in this section and in Table 5 of this report.



4.0 MECHANICAL PLANT NOISE INTRUSION

The mechanical plant design, prepared by NYD and issued 18 November 2024, outlines the plant proposed to serve the new building, and includes up to three outdoor condenser units on each level of Building J. Various fan coil units, supply air fans and exhaust fans are also proposed to serve the new Building J.

Consideration is given to noise intrusion into occupied spaces though the installation of new ducting, supply and return air grilles or ceiling cassette air conditioning units or ducted air conditioning units.

Once the detailed design mechanical services have been finalised the internal noise levels specified within Table 2 should be achieved. Day Design will review the mechanical services drawings, and provide recommendations to be incorporated into the mechanical services drawings. Common recommendations for limiting internal noise from mechanical services include limiting duct or grille velocities, selecting units with lower sound power levels or vibration isolating items of mechanical plant.

The following Sections are provided as general recommendations.

4.1 Air Conditioning Noise Level Recommendations

We recommend that any ducted air conditioning proposed to be installed have the following maximum sound pressure level:

Interview/Counselling Rooms, Administration Areas (Principal, Deputy, etc) and GLSs

- 35 dBA at 1 metre.

Open plan learning areas, General Office Areas, Medical Rooms (First Aid), Staff Rooms

- 40 dBA at 1 metre.

Corridors, Lobbies and Reception Areas

- 45 dBA at 1 metre.

Toilets/showers

- 50 dBA at 1 metre.



4.1.1 Fan Coil Units Above Critical Areas

For all FCUs providing conditioned air to learning areas or offices, the supply and return air ducts shall incorporate 2 m of 50 mm thick glasswool insulation (density 32 kg/m³), faced with a minimum of 20% open area perforated steel or foil.

We recommend that where an FCU is located in the ceiling void above learning areas and office areas, the ceiling should be constructed with set plasterboard.

In the event set plasterboard construction is not used, an enclosure with an access door/panel for servicing may be constructed around the FCU as follows:

- acoustically wrapped with 50 mm thick glasswool insulation (density 32 kg/m³) and loaded vinyl (8 kg/m²). Overlap joints in the loaded vinyl by at least 50 mm and tape the joints with aluminium tape; or
- enclosed using 1.2 mm steel, 9 mm fibre cement sheets, 18 mm MDF board or 19 mm thick Yellow Tongue particleboard with 75 mm thick glasswool or polyester insulation (density 32 kg/m³) installed between the fan coil unit and the enclosure. The enclosure should extend over the flexible joints and acoustically sealed access panels should be provided for maintenance as required.

The access door or panel must be firmly fixed so as to overlap the frame or rebate of the frame by not less than 10 mm, be fitted with a sealing gasket along all edges and constructed of:

- (i) wood, particleboard or blockboard not less than 33 mm thick; or
- (ii) compressed fibre reinforced cement sheeting not less than 9 mm thick; or
- (iii) other suitable material with a mass per unit area not less than 24.4 kg/m².

Alternatively, the access panels can be propriety R_w 30 or R_w + C_{tr} 25 access panels (available from Access Panels Australia Ph (02) 9755 5337, or Trafalgar Products Ph (02) 9728 7168, or Bowmans Access Panels Ph (02) 9833 9404.

4.2 Penetration of Air Conditioning Ducts Through Acoustically Rated Wall

We recommend that where the air conditioning ducts penetrate acoustically rated walls a clearance of 10-15 mm between the full perimeter of the duct and the wall be provided, with the gap then sealed with a polyurethane or silicone mastic.

The internal duct lining should consist of 50 mm thick glasswool insulation, with minimum density 32 kg/m³ such as CSR Bradford Supertel. The glasswool insulation may be faced with perforated foil (minimum 20% open area).

To reduce duct breakout/break-in, we recommend the following:



4.2.1 Duct Penetrations above Grid Tile or Perforated/Slotted Plasterboard Ceilings

Note: this section only refers to duct penetrations above **non-set plasterboard ceilings**.

4.2.1.1 Duct Penetration – Walls Rated R_w 35

- Walls rated R_w 35 - incorporate an acoustically lined steel duct for a length of at least 0.5 metres each side of the wall.

4.2.1.2 Duct Penetration – Walls Rated R_w 40

- Walls rated R_w 40 - incorporate an acoustically lined steel duct for a length of at least 1 metre each side of the wall.

4.2.1.3 Duct Penetration – Walls Rated R_w 45 – R_w 50

- Walls rated R_w 45 or greater - incorporating an acoustically lined steel duct for a length of at least 1 metre each side of the wall and also an acoustically lined 90° bend on each side of the wall – total length is equal to 3 metres.

4.2.2 Duct Penetrations above Set Plasterboard Ceilings

- Walls rated R_w 35 or greater - incorporating an acoustically lined steel duct for a length of at least 0.5 metres each side of the wall.

4.2.3 Duct Penetrations above Combination of Set & Non-Set Plasterboard Ceilings

- Walls rated R_w 35 or greater - incorporating an acoustically lined steel duct for a length of at least 0.5 metres above the set plasterboard side of the wall; and
- Walls rated R_w 35 or greater - see Sections 4.3.1.1 to 4.3.1.3 for recommended duct length above non-set plasterboard side of wall.

4.2.4 Air Transfer Ducts

- Air transfer ducts above set plasterboard ceilings and through R_w 45 or greater walls, may be of square bend construction (ie no line of site through duct).
- The transfer ducts should be rated to maintain R_w 45 through the wall.

4.2.5 Flexible Duct Penetrations

- Flexible duct should be run through a sheet metal sleeve where it passes through an acoustically rated wall above a set plasterboard ceiling. The sheet metal sleeve should be a length of at least 0.5 metres each side of the wall. Any gaps at the periphery of the sheet metal sleeve should be sealed with a polyurethane or silicone mastic.



4.3 General Specifications

4.3.1 HVAC Refrigerant Pipes

Where a refrigerant pipe penetrates an acoustically rated wall a clearance of 10-15 mm between the full perimeter of the pipe and the wall may be provided, with the gap then sealed with a polyurethane or silicone mastic.

4.3.2 Vibration Isolation

We recommend that all mechanical plant including the fan coil units, supply fans, exhaust fans and condensing units be vibration isolated from the building structure.

The vibration isolators should achieve a minimum static deflection as follows:

- Small axial fans (< 450 mm diameter) – 5 mm;
- Fan Coil Units – 2-3 mm; and
- Condensing units – 2-3 mm.



5.0 NOISE CONTROL RECOMMENDATIONS

5.1 Recommended Wall Constructions

In order to achieve the recommended minimum R_w of the common internal partitions, we recommend the following constructions. For recommendations concerning external wall constructions for this project, please refer to the Noise Intrusion Assessment prepared by Day Design Pty Ltd (report ref: 7572-2.2R).

For wall types required to be R_w 45 or greater, we recommend that the wall be constructed full height from slab to slab or slab to underside of the roof.

All gaps/peripheries of acoustically rated walls are to be acoustically sealed with a polyurethane or silicone mastic.

5.1.1 Masonry Walls

5.1.1.1 R_w 40 – R_w 45 Masonry Wall

In order to achieve an R_w 40 or R_w 45 rating, using a single brick or concrete block wall we recommend:

Option 1:

- 110 mm thick single brick wall with:
 - (i) 13 mm render on both sides of a 110 mm single brick wall; **or**
 - (ii) 13 mm fire rated plasterboard direct fixed on both side of a single brick wall.

Option 2:

- 140 mm thick concrete block wall with:
 - (i) 13 mm plasterboard direct fixed or 13 mm render on both sides of the wall.

Option 3 (Impact Resistant):

- 110 mm single brick wall with:
 - (i) 64 mm steel studs at 600 mm centres built a minimum 20 mm from the inside face of the wall; **and**
 - (ii) one layer 13 mm standard plasterboard to the outside of the studs; **and**
 - (iii) 75 mm thick glasswool insulation (density 14 kg/m³) between the studs.

Option 4 (Impact Resistant):

- 140 mm thick concrete block wall with:
 - (i) 64 mm steel studs at 600 mm centres built a minimum 20 mm from the inside face of the wall; **and**
 - (ii) one layer 13 mm standard plasterboard to the outside of the studs; **and**
 - (iii) 75 mm thick glasswool insulation (density 14 kg/m³) between the studs.



5.1.1.2 R_w 50 Masonry Wall

In order to achieve an R_w 50 rating using a masonry wall we recommend one of the following options:

Option 1:

- 150 mm single brick wall with:
 - (i) 13 mm fire-rated plasterboard direct fixed to both sides of the 150 mm thick brick wall or 13 mm render on both sides of the 150 mm brick wall.

Option 2:

- 190 mm thick concrete block wall with:
 - (i) Furring channels installed on one sides of the wall, providing minimum 30 mm cavity; **and**
 - (ii) one layer 13 mm standard plasterboard to the outside of the furring channels; **and**
 - (iii) one side of concrete block left bare.

5.1.2 Stud Frame Walls

5.1.2.1 R_w 35 Stud Wall

In order to achieve an R_w 35 rating, we recommend 64 or 92 mm steel studs with:

- (i) 13 mm plasterboard or 6 mm fibre cement fixed to both sides of the studs.

5.1.2.2 R_w 40 Stud Wall

In order to achieve an R_w 40 rating, we recommend 64 mm steel studs with:

Option 1:

- (i) 13 mm plasterboard or 6 mm fibre cement fixed to both sides of the studs; **and**
- (ii) 75 mm thick glasswool insulation (min. density 14 kg/m³) installed between the studs.

Option 2 (Impact Resistant):

- 2 rows of 64 mm steel studs separated by 20 mm air gap with:
 - (i) 1 layer of 13 mm plasterboard or 6 mm fibre cement direct fixed to external sides of both studs; **and**
 - (ii) 75 mm thick glasswool insulation (density 14 kg/m³) installed between one row of studs.



5.1.2.3 R_w 45 Stud Wall

In order to achieve an R_w 45 rating, we recommend 64 mm steel studs with:

Option 1:

- (i) 13 mm fire/sound rated plasterboard or 9 mm fibre cement fixed to both sides of the studs; **and**
- (ii) 75 mm thick glasswool insulation (min. density 14 kg/m³) installed between the studs.

Option 2 (Impact Resistant):

- 2 rows of 64 mm steel studs separated by 20 mm air gap with:
 - (i) 1 layer of 13 mm fire/sound rated plasterboard or 9 mm fibre cement direct fixed to external sides of both studs; **and**
 - (ii) 75 mm thick glasswool insulation (density 14 kg/m³) installed between one row of studs.

Option 3 (Staggered Stud Arrangement):

- 64 mm staggered steel studs in a 92 mm deep track with:
 - (i) 1 layer of 13 mm fire/sound rated plasterboard or 9 mm fibre cement direct fixed to external sides of both studs; **and**
 - (ii) 75 mm thick glasswool insulation (density 14 kg/m³) installed between one row of studs.

5.1.2.4 R_w 50 Stud Wall

In order to achieve an R_w 50 rating, we recommend one of the following:

Option 1 (Impact Resistant):

- 2 rows of 64 mm metal studs with a 20 mm gap at 600 mm centres with:
 - (i) one layer 13 mm fire/sound rated plasterboard or one layer of 9 mm fibre cement fixed to the outside of the studs; **and**
 - (ii) 75 mm thick glasswool insulation (density 14 kg/m³) between the studs.

Option 2:

- 1 row of 92 mm metal studs with:
 - (i) two layers 13 mm fire rated plasterboard or two layers of 9 mm fibre cement (or any combination) fixed to the outside of the studs, with joints staggered; **and**
 - (ii) 75 mm thick glasswool insulation (density 14 kg/m³) between the studs.



5.2 Recommended Common Floor Construction

The minimum $L_{nT,w}$ in Table 3 ranges between $L_{nT,w}$ 55 and $L_{nT,w}$ 65 for critical rooms within the proposal. In order to achieve the recommended minimum $L_{nT,w}$ of the common floor/ceiling construction, we recommend the following constructions.

These recommendations have been made according to the preferred finishes schedule provided by PTW Architects (see Appendix C).

Note: the recommended impact sound insulation rating ($L_{nT,w}$) in Table 3 refers to the floor/ceiling above the relevant room.

5.2.1 Carpet Floor Construction

The following carpet floor construction is recommended to be installed on top of a ≥ 150 mm concrete slab as per manufacturer's instructions. This construction will an $L_{nT,w}$ of 55 or lower, and will be acceptable throughout the learning areas of Building J:

- (i) Carpet tile;
- (ii) 150 mm (or greater) concrete slab;
- (iii) Ceiling as specified by the architect.

5.2.2 $L_{nT,w}$ 55 – Linoleum Floor Construction

In order to achieve an $L_{nT,w}$ of 55 or lower, we recommend linoleum flooring be installed on top of a ≥ 150 mm concrete slab as per manufacturer's instructions:

- (i) Resilient linoleum flooring with built-in acoustic underlay;
- (ii) 150 mm (or greater) concrete slab;
- (iii) 75 mm thick glasswool or polyester insulation (density 14 kg/m³) installed within the ceiling cavity; **and**
- (iv) 13 mm plasterboard ceiling.

5.2.3 $L_{nT,w}$ 60 – Linoleum Floor Construction

In order to achieve an $L_{nT,w}$ of 60 or lower, we recommend linoleum flooring be installed on top of a minimum 150 mm concrete slab as per manufacturer's instructions:

- (i) Resilient linoleum flooring with built-in acoustic underlay;
- (ii) 150 mm (or greater) concrete slab;
- (iii) Ceiling as specified by the architect.



5.2.4 Tile on Top of Screed Floor Construction

Based on the architectural drawings provided by PTW Architects, tiled flooring is only proposed above toilets, which do not have an $L_{nT,w}$ requirement. As such, the following construction is acceptable: of 60 or lower, we recommend tile on top of screed flooring be installed with the following:

- (i) Ceramic tiles installed on concrete screed;
- (ii) 150 mm (or greater) concrete slab;
- (iii) Ceiling as specified by the architect.

5.3 Recommended Roof/Ceiling Design

5.3.1 Roof/Ceiling Design General Requirements

Ceiling and roof systems have been recommended for Building J in the Noise Intrusion Assessment prepared by Day Design Pty Ltd (report ref: 7572-4.2R). This recommended system will also reduce the level of noise associated with rainfall to acceptable levels, and are reproduced here as follows:

For Building J Level 2 GLSs and SLS:

- All roofs may be of metal deck construction;
- Thermal insulation and a heavy-duty sarking vapour barrier laid below the roof;
- Ceiling under the roof is to comprise of one layer of 13 mm thick fire or sound rated plasterboard; and
- 160 mm thick (or R3.0) bulk insulation batts (min 11 kg/m³ density) are to be placed between the ceiling joists.



5.4 Non-glazed Operable Walls

Operable walls separating spaces and not containing glazing are recommended to achieve a minimum sound reduction index of R_w 45. While there are no partitions of this style currently shown in the architectural drawings, the following is provided as general information in the event that this changes.

Available suppliers achieving R_w 45 for operable wall include:

- Hufcor (02) 9707 0700;
- Lotus 1300 023 747;
- Modernfold (02) 6260 1822; and
- Dorma 1800 675 411.

Operable walls would require acoustic treatment above in the ceiling space/bulkhead to ensure the acoustic performance is maintained. The partition above an operable wall should be designed to achieve a minimum sound reduction index of R_w 45 (see attached datasheet AC1290-1).

Retractable acoustic seals are to be installed at all joints including the head and sill.

5.5 Glazed Operable Partitions – Sliding/Stacking

Any operable glazed partitions separating spaces are recommended to achieve a minimum sound reduction index of R_w 32 (as per Design Guide Note DGN003 of the EFSG v2.0).

The suppliers listed in Section 5.4 above may also provide products to meet the recommended R_w 32 for operable partitions.

Where possible, acoustic seals are to be installed at all joints including the head and sill.

5.6 Window Types

5.6.1 Internal Windows

As per the 'Prescriptive Constructions' in Section 0.06 of 0001c Design Checklist – Acoustics of the EFSG v2.0, the internal glazed sections in walls and vision panels in or adjacent to internal doors is required to be minimum 10.38 mm thick laminated glass.

We recommend that the internal glazed sections in walls and vision panels in or adjacent to internal doors be constructed, as follows:

Glazing R_w 35

Fixed single glazed window system consisting of:

- 10.38 mm laminated glass.



5.6.2 External Windows

We have been informed that double glazed window systems will be utilised for external window systems. To reduce the level of intrusive noise associated with aircraft and road traffic noise levels, the Noise Intrusion Assessment prepared by Day Design Pty Ltd (report ref: 7572-4.2R) should be referred to.

5.7 Access Doors

As per the 'Prescriptive Constructions' in Section 0.06 of 0001c Design Checklist – Acoustics of the EFSG v2.0, the entry doors to all learning spaces should be constructed as follows:

R_w 30

- 35 mm thick solid core door with full perimeter acoustic seals.

In addition, we recommend that the doors accessing toilets (adjacent to a habitable space), administrative offices, seminar, interview rooms, BCR rooms (adjacent to a habitable space), and COMMS rooms (adjacent to a habitable space) also be constructed with the detail above.

All acoustically rated doors should have the following acoustic seals installed:

- Raven RP10Si for the perimeter;
- Raven RP99Si for the drop seal along the bottom.

5.8 Recommended Reverberation Controls

In order to achieve the reverberation times specified in Table 1, we recommend the following be incorporated into the final design of the internal surfaces treatment. Proposed ceiling treatments have already been indicated on the reflected ceiling plan prepared by PTW Architects, attached as Appendix C

Floors

Where applicable, carpet tiles should have a minimum NRC 0.25.



Walls

Where recommended, acoustic sound absorptive panels may be constructed as follows:

- 25 mm deep timber battens fixed horizontally to the wall at 600 mm centres;
- Glasswool insulation, 25 mm thick, minimum density 96 kg/m³, should be fitted in between the battens;
- A breathable acoustically transparent fabric should be fixed across the face of the glasswool to protect the glasswool from fibre migration.

Alternatively, the following pre-fabricated panels may be used with a minimum NRC 0.80 or greater:

- Autex Quietspace 25 mm thick polyester panels;
- Ecooustic 25 mm thick polyester panels;
- Sontext 25 mm thick Serenity panels;
- dECO Quiet Panel 25 mm thick; or
- A similar acoustic panel product achieving NRC 0.80 or greater.

Ceilings

Where recommended, absorptive acoustic ceilings may be constructed as follows:

- Knauf Quadril Q2F perforated plasterboard (11.6% open area) with 75 mm thick EarthWool insulation (density 11 kg/m³) laid above the ceiling – NRC 0.70; **or**
- Acoustic grid tile ceiling - Armstrong “Dune Max” - NRC 0.70 or greater; **or**
- A similar acoustic ceiling product achieving NRC 0.70 or greater.

Table 6 shows the recommended areas, locations and amounts of absorptive treatment to be incorporated into the final design for the internal surfaces of specific rooms throughout *OGPS*.

Table 6 Recommended Reverberation Control

Room Description	Floor Treatment	Wall Treatment	Ceiling Treatment
<i>Building J – Ground Floor</i>			
Staff Study	Yes - carpet to 100% of floor	Yes - cover a minimum 6 m ² on eastern and western walls, 2 m ² on northern and southern walls	Yes (as per Appendix C)
Deputy Principal	Yes - carpet to 100% of floor	Yes - cover a minimum 6 m ² on two adjacent walls	Yes (as per Appendix C)



Table 6 Recommended Reverberation Control - Continued

Room Description	Floor Treatment	Wall Treatment	Ceiling Treatment
<i>Building J – Ground Floor</i>			
Principal	Yes - carpet to 100% of floor	Yes - cover a minimum 2 m ² on two adjacent walls	Yes (as per Appendix C)
Interviews	Yes - carpet to 100% of floor	Yes - cover a minimum 3 m ² on two adjacent walls	Yes (as per Appendix C)
Clerical/Printing	Yes - carpet to 100% of floor	Yes - cover a minimum 3 m ² on two adjacent walls	Yes (as per Appendix C)
Sick Bay	No (vinyl flooring proposed)	No (Potential sanitary/health concerns)	Yes 100% of ceiling ⁴
<i>Building J – First Floor & Second Floor</i>			
GLSs	Yes - carpet to 100% of floor	Yes - cover a minimum 5 m ² on two adjacent walls	Yes (as per Appendix C)
SLs	Yes - carpet to 100% of floor	Yes - cover a minimum 4 m ² on two adjacent walls	Yes (as per Appendix C)

⁴ Ceiling treatment will be required to minimise reverberation within this space as a result of excluding floor and wall treatment. While ceiling treatment will assist in minimising reverberation within this space, the required reverberation time may not be achieved in this area as a result of excluding floor and wall treatment.



5.9 Waste Water Pipes

We recommend water or services pipes in the ceiling space be lagged with acoustic lagging such as 'Nuwrap 5' or 'Soundlagg 4525C' or 'GreenLag' pipe lagging.

5.10 Plasterboard Ceiling, Bulkhead or Riser Concealing Service Piping and/or Ducts

We recommend the ceilings, bulkheads or exhaust risers achieve no less than **R_w 40**.

To achieve **R_w 40** rating the following construction may be used. Clearance of minimum 100 mm should exist between the service piping or duct and the ceiling, bulkhead or riser wall.

Plasterboard Ceiling, Bulkhead or Riser Concealing Service Piping and/or Ducts

- Option 1 comprising:
 - (i) 1 layer of 13 mm thick plasterboard or 7.5 mm thick fibre cement sheet ceiling, bulkhead or riser; **and**
 - (ii) 75 mm thick glasswool or polyester insulation (min density 8 kg/m³) between studs/joists; **and**
 - (iii) Nuwrap 5 or Soundlagg 4525C or GreenLag pipe lagging.

Refer **Datasheet AC1311-1**

- Option 2 comprising:
 - (i) 2 layers of 13 mm thick plasterboard ceiling, bulkhead or riser; **and**
 - (ii) Nuwrap 5 or Soundlagg 4525C or GreenLag pipe lagging.

Refer **Datasheet AC1311-3**

5.11 Ceiling Access Panels

We recommend access doors or panels must be firmly fixed so as to overlap the frame or rebate of the frame by not less than 10 mm, be fitted with a sealing gasket along all edges and constructed of:

- (i) wood, particleboard or blockboard not less than 33 mm thick; or
- (ii) compressed fibre reinforced cement sheeting not less than 9 mm thick; or
- (iii) other suitable material with a mass per unit area not less than 24.4 kg/m².

Alternatively, the access panels can be propriety R_w 30 or R_w + C_{tr} 25 access panels (available from Access Panels Australia Ph (02) 9755 5337, or Trafalgar Products Ph (02) 9728 7168, or Bowmans Access Panels Ph (02) 9833 9404.



5.12 Electrical Outlets

Electrical outlets required to be installed in an acoustically rated walls detailed in this report must be offset from each other:

- in masonry or concrete block walling, not less than 100 mm; **and**
- in timber or steel frames walling, not less than 300 mm.

Where offsetting the electrical outlets is not feasible, the electrical outlets should be installed within an acoustically rated wall box.

5.13 Construction Disclaimer

Recommendations made in this report are intended to resolve acoustical problems only. We make no claim of expertise in other areas and draw your attention to the possibility that our recommendations may not meet the structural, fire, thermal or other aspects of building construction.

We encourage clients to check with us before using materials or equipment that are alternative to those specified in our Acoustical Report.

The integrity of acoustic structures is very dependent on installation techniques. For example, a small crack between the top of a wall and a ceiling can reduce the effective sound transmission loss of a wall from R_w 50 to R_w 40. Therefore the use of contractors that are experienced in acoustic construction is encouraged. Furthermore, two insulation products may have the same thermal R rating but the sound absorption of one may be entirely deficient, therefore the use of materials and equipment that are supported by acoustic laboratory test data is encouraged.



5.14 Summary

Table 7 Mitigation Measures

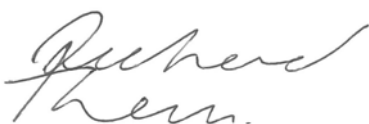
ID	MM Name	Mitigation Measure	Timing
NV3	Operational Noise	A suitably qualified acoustic engineer must demonstrate that noise associated with the operation of mechanical plant or machinery installed does not exceed the relevant project noise trigger levels	Prior to commencement of Operations
NV4*	Acoustic Compliance	Compliance with the recommendations of the Environmental Noise Assessment prepared by Day Design Pty Ltd, dated March 2026	Design
NV5*	Acoustic Compliance	Compliance with the recommendations of the Internal Acoustics Assessment Report prepared by Day Design Pty Ltd, dated March 2026	Design



6.0 ACOUSTIC DESIGN STATEMENT

Day Design Pty Ltd was engaged by School Infrastructure to carry out an internal acoustic assessment for the two proposed new building, Building J, at Orange Grove Public School, 2-8 Perry Street, Lilyfield, NSW.

We are of the opinion that the acoustical treatment as recommended in Sections 4.0 and 5.0, will reduce room reverberation, isolate undue noise transfer between rooms and provide an acceptable acoustic environment in accordance with the Green Star Rating *system and Educational Facilities Standards and Guidelines* for the proposed new buildings at Orange Grove Public School.



Ricky Thom, BA, BE(Mech)Hons, MEnvScMgt, MIEAust
Acoustical Engineer
for and on behalf of Day Design Pty Ltd

AAAC MEMBERSHIP

Day Design Pty Ltd is a member company of the Association of Australasian Acoustical Consultants, and the work herein reported has been performed in accordance with the terms of membership.

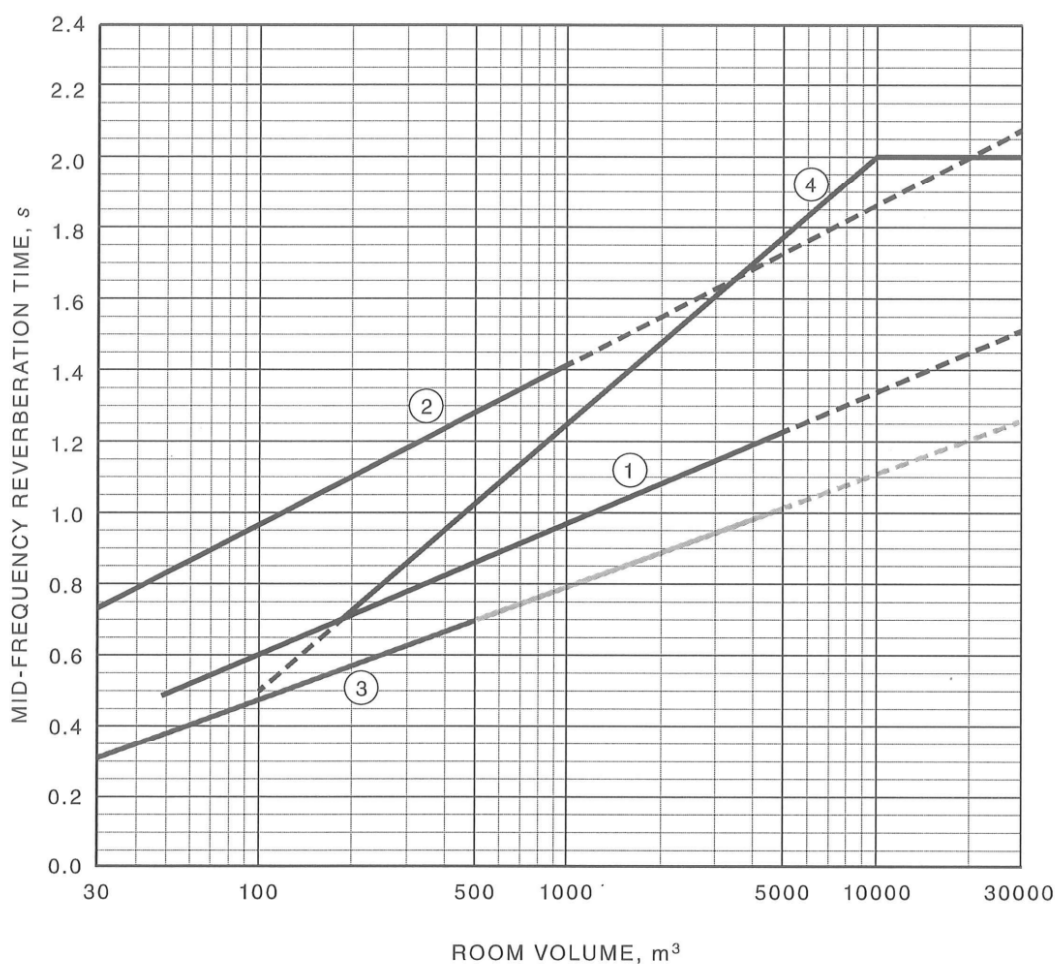
Attachments:

- Appendix A – AS2107:2016 Reverberation Times for Selected Spaces
- Appendix B – Proposed Floor Plans (Wall Rating Markup)
- Appendix C – Reflected Ceiling Plan and Finishes Schedule dated 16 December 2024
- AC116 – Glossary of Acoustical Terms – Architectural Acoustics
- AC1290-1 – Operable Wall Head Construction Detail
- AC1311-1 – Separating Services from Habitable Rooms
- AC1311-3 – Separating Services from Habitable Rooms



APPENDIX A
REVERBERATION TIMES FOR SELECTED SPACES
(Informative)

The curves in Figure A1 represent mean reverberation times of spaces which are considered to possess good acoustic qualities. They are intended only as guides since the scatter about these mean curves is large.



LEGEND:
Curve 1 = Speech/Lecture
Curve 2 = Music
Curve 3 = Teaching/Communication
Curve 4 = Sport

NOTE: The graphic in Figure A1 is based on DIN 18041.

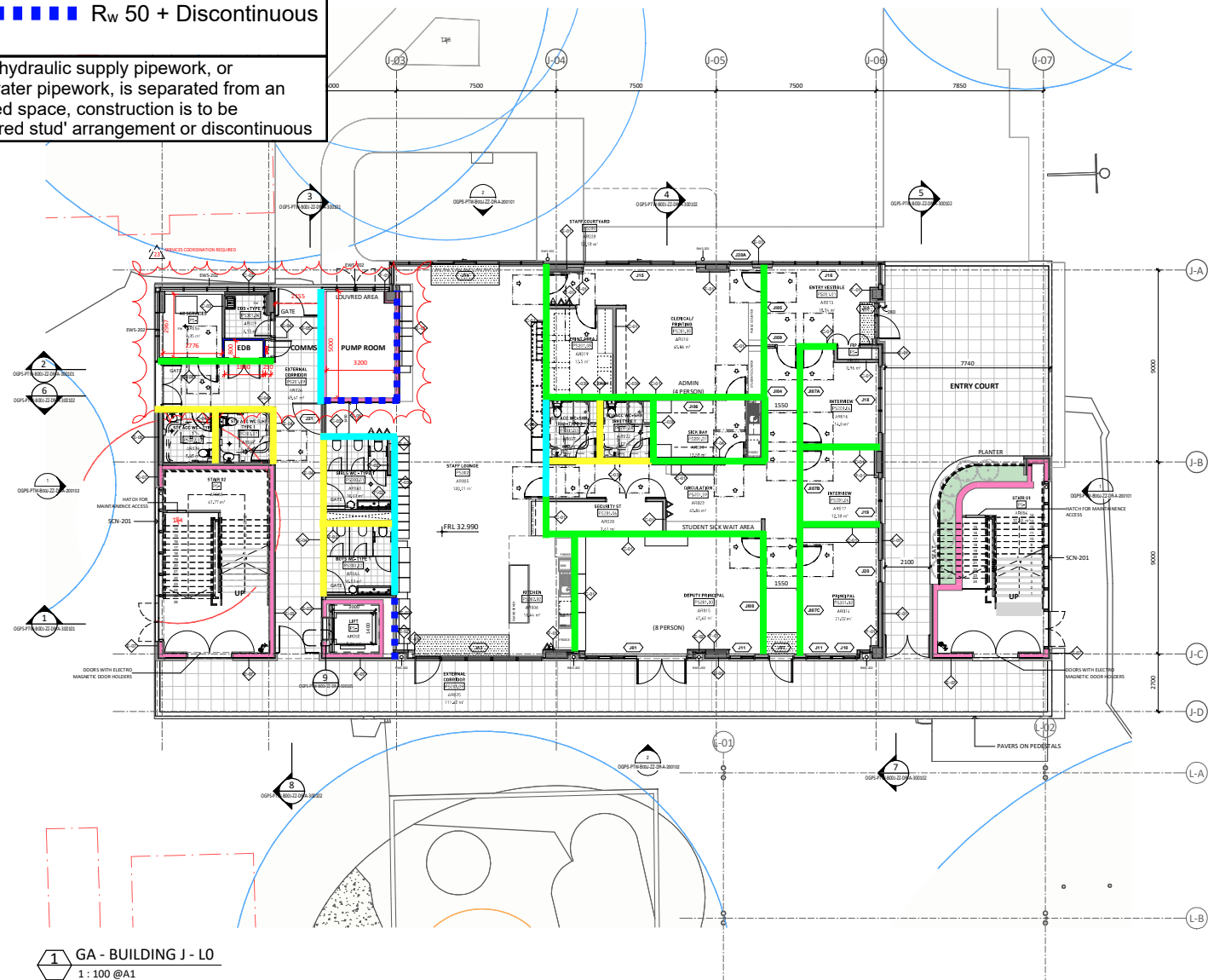
FIGURE A1 MEAN REVERBERATION TIMES



Key:

- R_w 35
- R_w 40
- R_w 45
- R_w 50
- R_w 50 + Discontinuous

Where hydraulic supply pipework, or wastewater pipework, is separated from an occupied space, construction is to be 'staggered stud' arrangement or discontinuous



1 GA - BUILDING J - LO
1:100 @A1

LEGEND - WALL FIRE RATING	
	60/60/60
	120/120/120
	180/180
	240/240

REFER TO SHEET
OGPS-PTW-ZZ-XX-DR-A-400101
FOR WALL TYPES

LEGEND - TREES

- TREE PROTECTION ZONE (TPZ)
- STRUCTURAL ROOT ZONE (SRZ)
- Tx TREE NUMBER

Key Plan:



Drawing Disclaimer:

Do not scale from drawings.
Verify all dimensions on site before commencing work.
Copying or reproduction of this drawing is strictly prohibited without the consent of PTW Architects.

Note:

PTW takes no responsibility for external building elements. Anything connected with any design, materials selection, construction or installation of any cladding, facade or external building element must be checked by and remains the responsibility of others, including suitably qualified experts as may be required.

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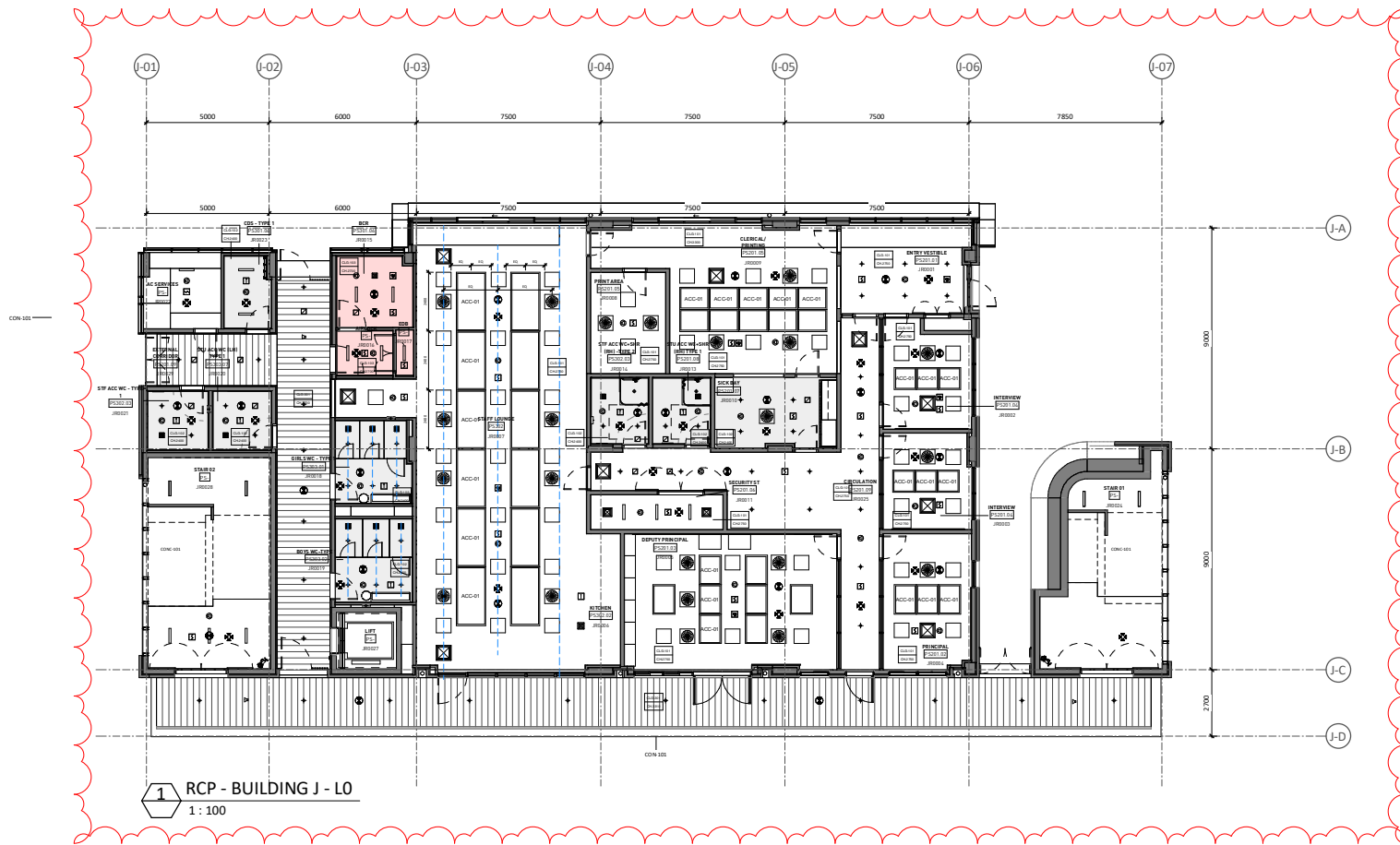
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Orange Grove Public School
Perry St, Lilyfield NSW 2040

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
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LEGEND

CEILING TYPES

- ACC-001 THERMAL INSULATION GLASS SOFFIT BOUND TO CONCRETE ROOF/WY TERRACE
- ACC-002 ACUSTIC CEILING PANEL (each acoustic panel is not tagged in plan)
- CLG-001
- CLG-002 WET AREA
- CLG-003 FIRE RATED 120/120/30
- CLG-004
- CLG-005 ON VERTICAL FACE OF RAKED SOFFIT

MECHANICAL

- SUPPLY AIR GRILLE
- RETURN AIR GRILLE 600X600
- RETURN AIR GRILLE
- EXHAUST EGG CRATE GRILLE (TOILETS)
- MAKE UP AIR TRANSFER GRILLE
- ACCESS PANEL

ELECTRICAL

- PANEL LUMINAIRE
- RECESSED LED DOWNLIGHT
- EMERGENCY LUMINAIRE
- SURFACE MOUNTED BATTERY
- SURFACE MOUNTED BATTERY WITH EMERGENCY LIGHT
- CEILING FAN
- EXIT SIGN
- MOTION SENSOR
- DRY FIRE
- SMOKE DETECTOR
- SPEAKER
- AUDIBLE ALARM DEVICE

ICT

- WIRELESS ACCESS POINT

ICT

- ACOUSTIC PANEL (ACC-001) (NOT ALL PANELS ARE TAGGED)

- ASSUMPTIONS**
- Metal deck roof slope: 3deg: EFGS departure. Roof depth 720mm (360 mm UB + 200mm Parvic + 110mm spacer + 50mm roof sheeting) additional 50mm insulation considered above lower ceiling.
 - FCU (size considered 550mm + 50mm top and bottom total 650mm zone) to sit between the UB's. UB depth considered is 360mm. Zone for services between beams is 650mm.
 - Concrete roof: Slab depth 225mm at the lowest point. Waterproofing and layers above slab to be worked out.

Key Plan:

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Rev	Amendment	By	Chk	Date
05	100% SD SUBMISSION	PC	DJ	24/12/16
01	70% SD SUBMISSION	PC	DJ	24/10/08

***Registered Architect**

DW	DIANE H JONES	NSW Arch-4778
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Peddie Thorpe & Walker P/L NSW Nominated Architects
ABN 23 000 454 624 5 Persons Architect No.6098
Trading as PTW Architects D Jones Architect No.4778

Project PAD30519

Orange Grove Public School
Perry St, Lilyfield NSW 2040

Title

13 - REFLECTED CEILING PLANS
RCP - BUILDING J - LO

Drawing Number

OGPS-PTW-8001-LO-DR-A-130101

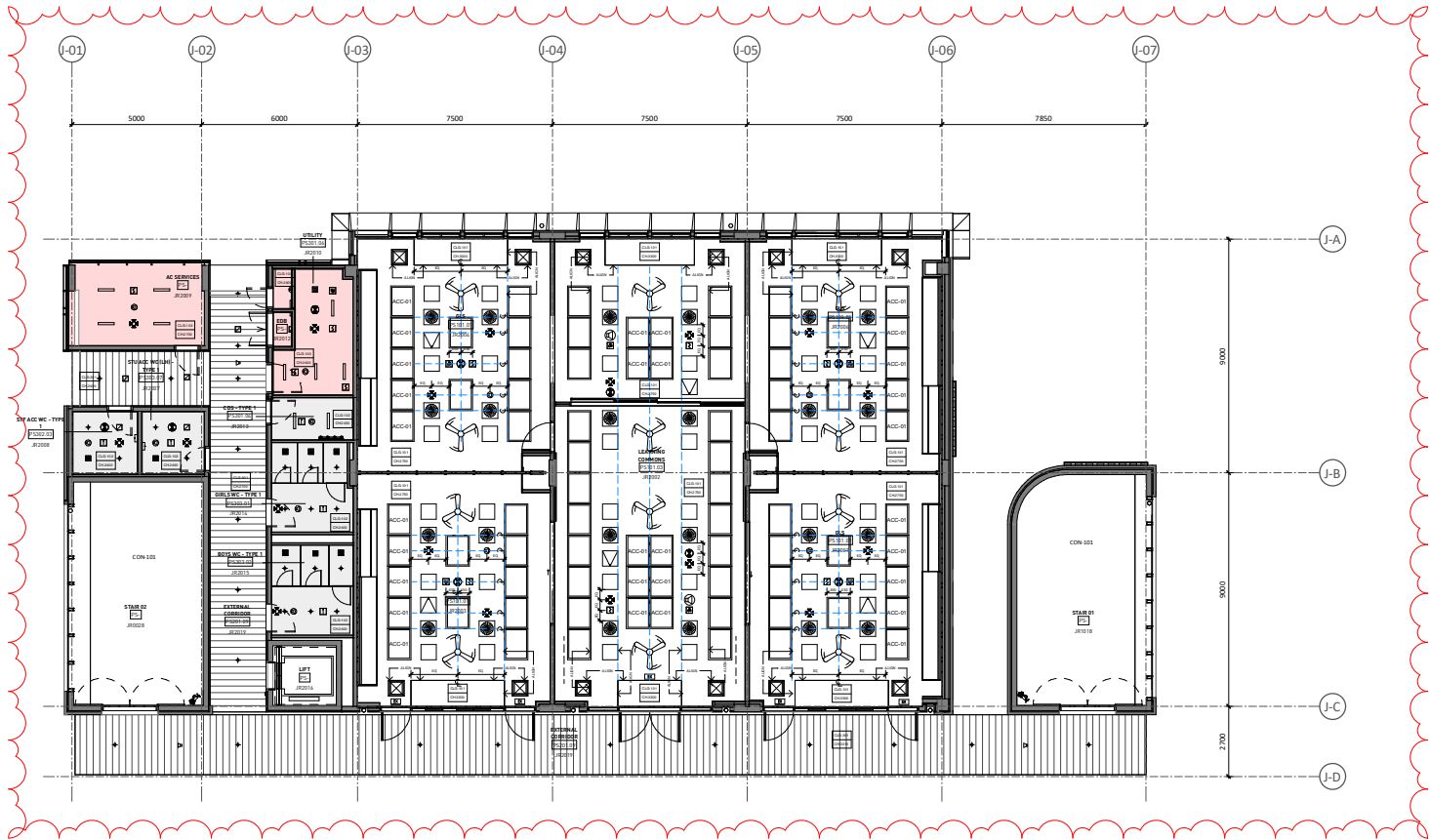
Revision

05

Status

CONCEPT DESIGN

17/02/2024 4:40:53 PM



2.1.1
ADDITIONAL SERVICES
CONSIDERATION REQUIRED:
ACoustic treatment to be assessed
WATERTIGHT AND SQUARE SHAFTS
2.1.2
CONSIDERATION OF ACCESS PANELS AND
ICT SERVICES IS INDICATIVE AND
REQUIRES SERVICE INPUT
2.1.3
ACoustic TREATMENT TBC

LEGEND

CEILING TYPES

- ACC-01 100% SD SUBMISSION
- ACC-02 70% SD SUBMISSION
- ACC-03 100% SD SUBMISSION
- ACC-04 70% SD SUBMISSION
- ACC-05 100% SD SUBMISSION
- ACC-06 70% SD SUBMISSION
- ACC-07 100% SD SUBMISSION
- ACC-08 70% SD SUBMISSION
- ACC-09 100% SD SUBMISSION
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- ACC-99 100% SD SUBMISSION
- ACC-100 70% SD SUBMISSION

MECHANICAL

- SUPPLY AIR GRILLE
- RETURN AIR GRILLE 600X600
- RETURN AIR GRILLE
- EXHAUST AIR GRILLE
- EXHAUST EGG CRATE GRILLE (TOILETS)
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- EXIT SIGN
- MOTION SENSOR

DRY FIRE

- SMOKE DETECTOR
- SPEAKER
- AUDIBLE ALARM DEVICE

ICT

- WIRELESS ACCESS POINT
- ACoustic PANEL (ACC-01) (NOT ALL PANELS ARE TAGGED)

1 RCP - BUILDING J - L2
1:100

- ASSUMPTIONS**
- Metal deck roof slope: 3deg: 150G departure. Roof depth 720mm (360 mm UB + 200mm Parvic + 110mm spacer + 50mm roof sheeting) additional 50mm insulation considered above lower ceiling.
 - FCU (size considered 550mm x 50mm top and bottom total 650mm zone) to sit between the UB's. UB depth considered is 360mm. Zone for services between beams is 650mm.
 - Concrete roof Slab depth 225mm at the lowest point. Waterproofing and layers above slab to be worked out.

Key Plan:

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Rev	Amendment	By	Chk	Date
05	100% SD SUBMISSION	PC	DJ	24/12/16
01	70% SD SUBMISSION	PC	DJ	24/10/08

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Perry St, Lilyfield NSW 2040

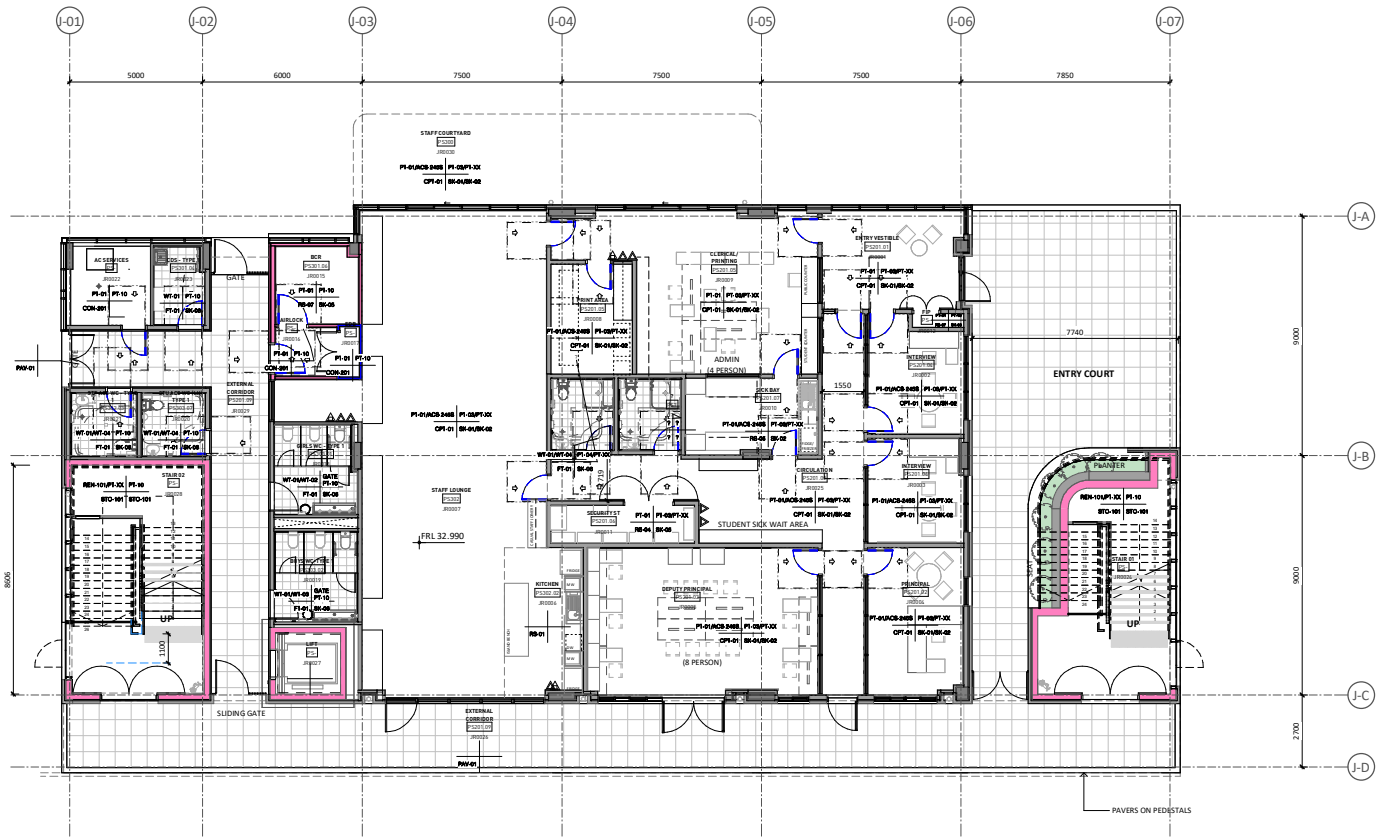
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13 - REFLECTED CEILING PLANS
RCP - BUILDING J - L2

Drawing Number
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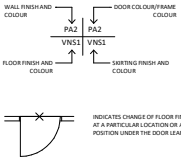
Revision
05

Status
CONCEPT DESIGN

1 FINISHES - BUILDING J - L0
1 : 100 @A1



LEGEND



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Rev	Amendment	By	Chk	Date
05	100% SD SUBMISSION	PC	DJ	24/12/16

*Registered Architect
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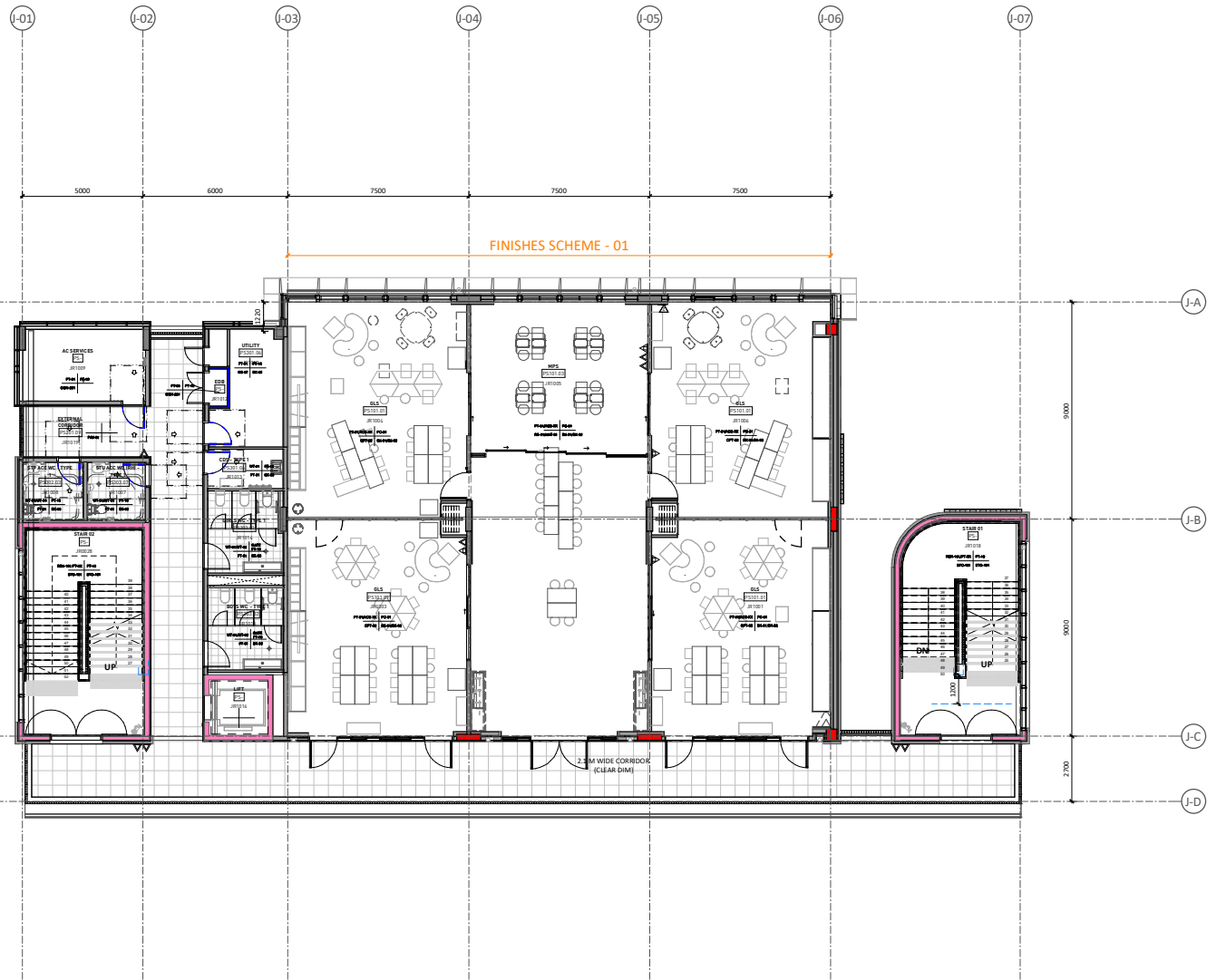
Peddie Thorp & Walker P/L NSW Nominated Architects
ABN 23 020 454 424 S Parsons Architect No.6098
Trading as PTW Architects O James Architect No. 4778

Project PAD30519
Orange Grove Public School
Perry St, Lilyfield NSW 2040

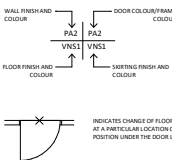
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15 - FINISHES
FINISHES - BUILDING J - L0

Drawing Number	Revision
OGPS-PTW-8001-L0-DR-A-150101	05

Status
FOR INFORMATION ONLY



LEGEND



1 FINISHES - BUILDING J - L1
1 : 100 @A1

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Rev	Amendment	By	Chk*	Date
05	100% SD SUBMISSION	PC	DJ	24/12/16

*Registered Architect

DW	DIANE H JONES	NSW Arch-4778
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Orange Grove Public School
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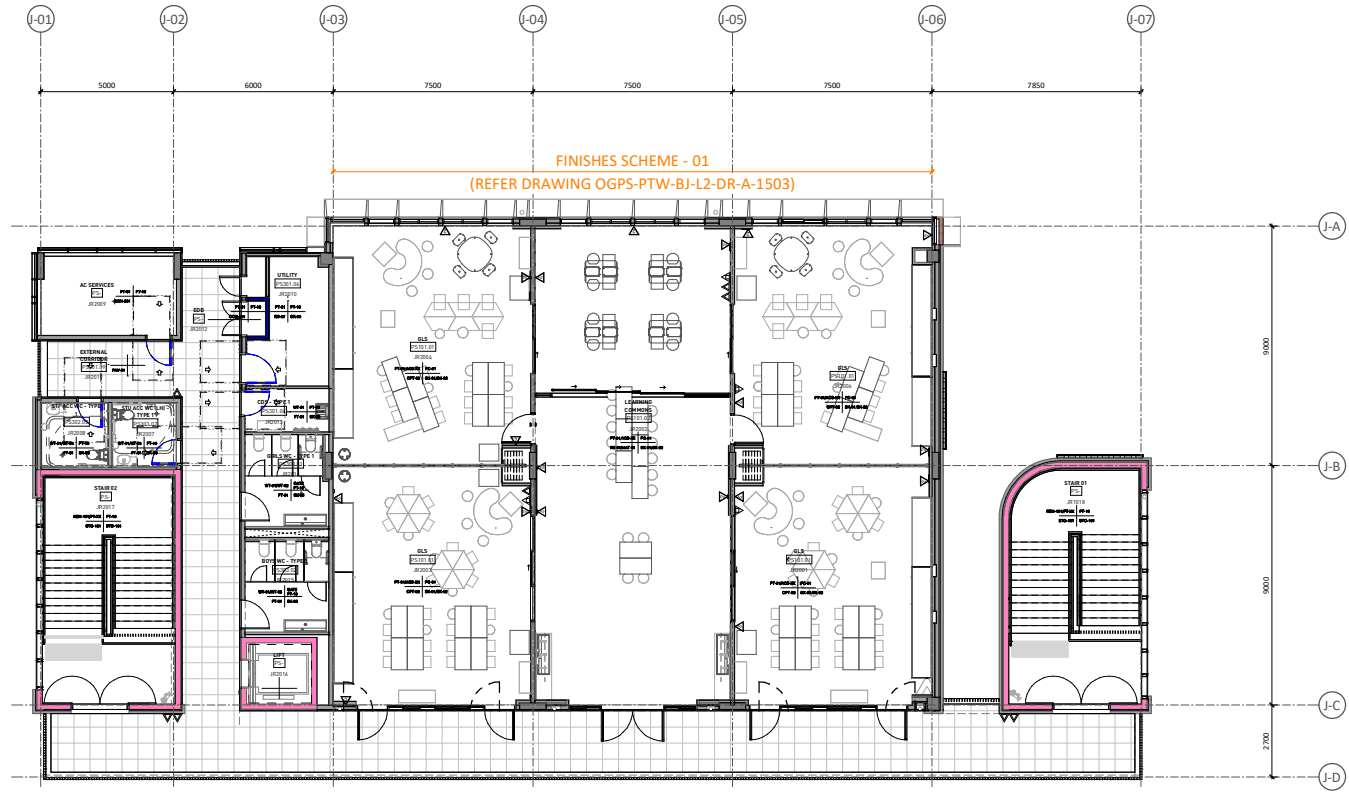
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FINISHES - BUILDING J - L1

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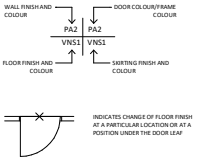
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Revision
05

Status
FOR INFORMATION ONLY



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1 FINISHES - BUILDING J - L2
1 : 100 @A1

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Rev	Amendment	By	Chk*	Date
05	100% SD SUBMISSION	PC	DJ	24/12/16

*Registered Architect

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PTW

Project: PAD30519
Orange Grove Public School
Perry St, Lilyfield NSW 2040

Title
15 - FINISHES
FINISHES - BUILDING J - L2

Drawing Number	Revision
OGPS-PTW-B001-L2-DR-A-150103	05

Status
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D Jones Architect NSW ARB 4778
Neša Marojević NSW ARB 11274

OGPS-PTW-ZZ-ZZ-SH-A-90002
SCHEDULE OF INTERNAL FINISHES

Project: Orange Grove Public School

Project Manager: **RPS**
Project No: 222.PA030519

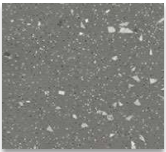
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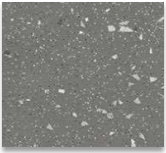
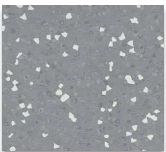
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2	100% SD	16.12.2024

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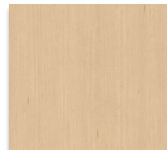
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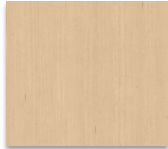
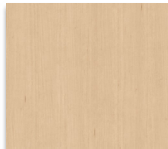
CODE	ITEM	PRODUCT CODE	SPECIFICATION	SUPPLIER	IMAGE	COMMENTS	LOCATION	REVISION
FLOORS								
Flooring: Carpet								
CPT-01	Carpet Tile	Speckled Ground Cinder 2539033	Collection: Speckled Ground 2539 Colour: Cinder 003 Tile Size: 500 x 500mm Carpet tiles (with acoustic backing) Construction: Tufted Textured Loop Yarn System: 100% Solution Dyed Nylon Pile thickness: 2.5mm +/-0.5mm Glasbac thickness: 3mm Cushionbac thickness Total Thickness: 6mm +/-0.5mm Area of Use: Commercial Extra Heavy Duty Lifetime Antimicrobial: Intersept Soil/ Stain Protection: Protekt Installation: Non Directional	Interface Luke Coghlan Email:Luke.Coghlan@interface.com T: +61 (02) 8332 2409 P: +61 (0) 437 397 352 Address: 101 Chalmers St, Surry Hills NSW 2010, Australia		EFSG Departure	Building J Level 1 Administration and Staff	1
CPT-02	Carpet Tile	Speckled Ground Peacock 2539017	Collection: Speckled Ground Colour: Peacock 017 Tile Size: 500 x 500mm Carpet tiles (with acoustic backing) Construction: Tufted Textured Loop Yarn System: 100% Solution Dyed Nylon Pile thickness: 2.5mm +/-0.5mm Total Thickness: 6mm +/-0.5mm Cushionbac thickness: 3mm Area of Use: Commercial Extra Heavy Duty Lifetime Antimicrobial: Intersept Soil/ Stain Protection: Protekt Installation: Non Directional	Interface Luke Coghlan Email:Luke.Coghlan@interface.com T: +61 (02) 8332 2409 P: +61 (0) 437 397 352 Address: 101 Chalmers St, Surry Hills NSW 2010, Australia		EFSG Departure	Building J Level 2 and 3 GLS Existing Buildings Building A -refurbished classrooms Building B -All rooms Building D -refurbished classrooms	1
Flooring: Resilient								

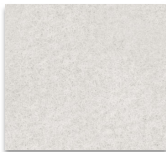
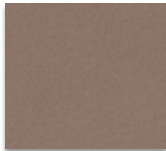
CODE	ITEM	PRODUCT CODE	SPECIFICATION	SUPPLIER	IMAGE	COMMENTS	LOCATION	REVISION
RS-01	Resilient Flooring, Linoleum, Standard	t5230 White Wash	Marmoleum Modular Marmoleum with Corkment Acoustic Underlay Thickness: 2.5 mm Length x width: 1000mm x 250mm Corkment Thickness: 2mm (18db) NCS S 2010-Y30R LRV 49% Slip Rating: P2/ R10 Colour: t5230 White Wash	Forbo Richard Medrano Email: Richard.Medrano@forbo.com P: 0419 415 963		Acoustical impact sound reduction - ≤ 5 dB Reaction to fire: CRF: 6.5kW/m ² , Smoke development: 266%.min Bacteriostatic properties: s natural bacteriostatic properties, which are confirmed by independent laboratories, even against the bacteria MRSA	Building J - Learning Commons, Staff room Building K - Hall-Circulation	1
RS-02	Resilient Flooring, Linoleum, Standard	3582	Marmoleum Solid Marmoleum with Corkment Acoustic Underlay Thickness: 2.5 mm / 3.5mm Length x width: 1000mm x 200mm Corkment Thickness: 2mm (18db) NCS S 3502-B LRV 33% Slip Rating: P3/ R10 Colour: 3582 early grey chocolate	Forbo Richard Medrano Email: Richard.Medrano@forbo.com P: 0419 415 963		Acoustical impact sound reduction - ≤ 18 dB Reaction to fire: CRF: 4.5kW/m ² , Smoke development: <750%.min Bacteriostatic properties: s natural bacteriostatic properties, which are confirmed by independent laboratories, even against the bacteria MRSA	In all existing Buildings	1
RS-04	Resilient Flooring, Vinyl, Safety, coved	171952 elephant	Surestep Original Thickness 2 mm Wear layer thickness 0.7 mm Length Width 25 m x 200 cm NCS S 6000-N LRV 19% Coved skirting 150mm High Slip Rating: P4/ R10 Colour: Elephant	Forbo Richard Medrano Email: Richard.Medrano@forbo.com P: 0419 415 963			Security Store Sound Cupboard Chair Performance Store OSCH Office	1

CODE	ITEM	PRODUCT CODE	SPECIFICATION	SUPPLIER	IMAGE	COMMENTS	LOCATION	REVISION
RS-05	Resilient Flooring, Vinyl, Safety, coved	174952 elephant	Safestep R11 Thickness 2 mm Wear layer thickness 0.7 mm Length Width 25 m x 200 cm LRV 19% Coved skirting 150mm High Slip Rating: P5/ R11 Colour: Elephant	Forbo Richard Medrano Email: Richard.Medrano@forbo.com P: 0419 415 963			Cleaner's Room Sports/ PE Store Sick Bay	1
RS-06	Resilient Flooring, Vinyl, Non slip; Safety, coved	175952 elephant	SafeStep R12 Thickness: 2 mm Width: 2m Wear layer thickness 0.7 mm Length Width 25 m x 200 cm Coved skirting 150mm High Slip Rating: P5/ R12 Colour: Elephant	Forbo Richard Medrano Email: Richard.Medrano@forbo.com P: 0419 415 963			OSCH Store	1
RS-07	Resilient Flooring, Vinyl, Antistatic; coved	SD 550005 dark neutral grey	Sphera SD Thickness 2 mm Length Width 26 m x 200 cm LRV 27% Slip Rating: P3/ R10 Colour: Dark Neutral Grey	Forbo Richard Medrano Email: Richard.Medrano@forbo.com P: 0419 415 963			Comms Rooms	1
RS-08	Resilient Flooring, Vinyl, Safety, Insert to sink areas	174032 smoke	Safestep R11 (with acoustic underlay) Thickness 2 mm Wear layer thickness 0.7 mm Length Width 25 m x 200 cm LRV 19% Coved skirting 150mm High Slip Rating: P5/ R11 With Sarlibase Acoustic underlay Colour: Smoke	Forbo Richard Medrano Email: Richard.Medrano@forbo.com P: 0419 415 963			Insert to sink areas - Learning Commons, Staff Room Sick Bay All sink areas in existing buildings	1

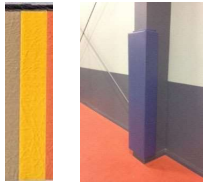
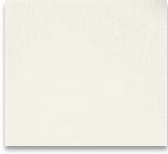
CODE	ITEM	PRODUCT CODE	SPECIFICATION	SUPPLIER	IMAGE	COMMENTS	LOCATION	REVISION
Flooring: Tiled								
FT-01	Ceramic Tile	Sicodur Scuro	Sicodur Scuro Format: 300x300x12mm Slip Rating: P5/ R12 Grout Colour : Ardex Epoxy Grout 504 Neutral	Metz Specialty Ceramic Tiles Louise Mychel Email: louise@metztiles.com.au P: 0425 314 845		In accessible bathrooms tile joints to be flush	Sanitary Facilities Cleaner's Room Canteen and OSCH Kitchenette	1
Flooring: Sprung Floor								
TMB-01	Sprung floor	Flexity sprung floor	Composition: Moisture membrane Rubber pads 16-17mm 2x layers of 12mm plywood Blackbutt Strip Flooring 63mm x 20.5mm Finish: 3 coats of tung oil	Maxwood Technology		ALTERNATE TO MEET EFSG REQUIREMENTS	Building K Communal Hall, Ramp, Stairs and Stage	1
Flooring: Miscellaneous								
EPO-01	Epoxy finish	Hycrete PU-TC-SOLAR	Cove up walls 150 high - Epoxy finish to go up wall by 150mm. Steel trowelled concrete Heavy Duty non-slip, semi-gloss finish	Hychem 30 Bluett Drive, Smeaton grange, NSW, 2567 T: 02 4646 1660 Zach Chapman T: 0403 348 155 E: zach@hychem.com.au		Coved skirting to 150 AFFL	Stores	1
CON-201	Concrete Sealer					Refer to Schedule of Products and Materials and Arch Specification Refer to Finishes Plans for locations	Building J - AC Service Rooms BCR, Airlock and EDB	1

CODE	ITEM	PRODUCT CODE	SPECIFICATION	SUPPLIER	IMAGE	COMMENTS	LOCATION	REVISION
ACS-01A	Acoustic Wall Panelling	Upper Wall 3600 -varies AFFL	Perforated Acoustic Panelling (Custom Perforation) Décor Style FR MDF Substrate Finish: Bord Products Ironbark Natural Veneer Crown Cut AbsoluteGrain Finish Substrate: 12mm FR MDF Joint: Square Edging: to match face finish BioPanel Zap-X to be applied. Installation using DecorMount BJ2 System for walls and DSB Installation system for ceilings. Panels to be Fire Group 1 per BCA Specification C1.10 clause 4. BJ2 concealed fix, allow 7mm + the panel of 12mm Custom Perforations- Connecting with Country	DecorSystems James Lloyd Martin Email: james.lloyd-martin@decorsystems.com.au P: +61 0411 945 600		As per extent on RLS	Hall Communal	1
ACS-01B	Acoustic Wall Panelling	Soffit at 3600	Perforated Acoustic Panelling Décor Style FR MDF Substrate Finish: Laminex Victorian Ash TrueScale 2622 AbsoluteGrain Finish Substrate: 12mm FR MDF Joint: Square Edging: to match face finish BioPanel Zap-X to be applied. Installation using DecorMount BJ2 System for walls and DSB Installation system for ceilings. Panels to be Fire Group 1 per BCA Specification C1.10 clause 4. BJ2 concealed fix, allow 7mm + the panel of 12mm	DecorSystems James Lloyd Martin Email: james.lloyd-martin@decorsystems.com.au P: +61 0411 945 600		As per extent on RLS	Hall Communal	1

CODE	ITEM	PRODUCT CODE	SPECIFICATION	SUPPLIER	IMAGE	COMMENTS	LOCATION	REVISION
ACS-01C	Acoustic Wall Panelling	Lower Wall 100- 3600 AFFL	Perforated Acoustic Panelling (Custom Perforation) Décor Zen FR MDF Substrate Profile: Custom Perforations (AP125/S/70 (12mm-16mm) to achieve NRC 0.8) Finish: Laminex Victorian Ash TrueScale 2622 AbsoluteGrain Finish Substrate: FR MDF Joint: Square Edging: to match face finish DecorZen panels shall be supplied with DecorSorb Integrated Acoustic Backing. Panels to include 2 x layers 50mm DecorInsul behind the panels to achieve 0.8NRC. BioPanel Zap-X to be applied. Installation using DecorMount BJ2 System for walls and DSB Installation system for ceilings. Panels to be Fire Group 1 per BCA Specification C1.10 clause 4. Custom Perforations- Connecting with Country	DecorSystems James Lloyd Martin Email: james.lloyd-martin@decorsystems.com.au P: +61 0411 945 600		As per extent on RLS	Hall Communal	1
ACS-02	Acoustic Wall Panelling		Perforated Acoustic Panelling (Custom Perforation) Décor Zen FR MDF Substrate Profile: Custom Perforations (AP125/S/70 (12mm-16mm) to achieve NRC 0.8) Finish: Laminex Victorian Ash TrueScale 2622 AbsoluteGrain Finish Substrate: FR MDF Joint: Square Edging: to match face finish DecorZen panels shall be supplied with DecorSorb Integrated Acoustic Backing. Panels to include 2 x layers 50mm DecorInsul behind the panels to achieve 0.8NRC. BioPanel Zap-X to be applied. Installation using DecorMount BJ2 System for walls and DSB Installation system for ceilings. Panels to be Fire Group 2 per BCA Specification C1.10 clause 4. Custom Perforations	DecorSystems James Lloyd Martin Email: james.lloyd-martin@decorsystems.com.au P: +61 0411 945 600		As per extent on RLS	Building J _Learning Commons Sick Bay	

CODE	ITEM	PRODUCT CODE	SPECIFICATION	SUPPLIER	IMAGE	COMMENTS	LOCATION	REVISION
ACS-240V	Acoustic, Wall Panelling	Autex Acoustics Quietspace	25mm Quiet Space White and Vertiface Thickness: 25mm Panel Size: 1200mm x 2400mm NRC 0.85 Thermal R.06 Microbial resistance: ASTM G21-15 Growth rating: 0 (No growth) Quietspace Panel does not promote the growth of moulds and mildew. Trims: Autex Proprietary Clear Alum- to all surrounds and panel joints Finish: Velour - velcro receptive, pinnable Colour: Savoye	Autex Acoustics Clarissa Paludo PH: 0474 214 685 E: ClarissaP@autex.com.au Address: Suite 8.03, 89 York Street, Sydney, NSW 2000, Australia			Building J _GLS Hub Existing Buildings Building A -refurbished classrooms Building B -All rooms Building D -refurbished classrooms	1
ACS-240S			As per above but with the following face finish: Finish: Smooth - pinnable					1
ACS-241V	Acoustic, Wall Panelling	Autex Acoustics Quietspace	25mm Quiet Space White and Vertiface Thickness: 25mm Panel Size: 1200mm x 2400mm NRC 0.85 Thermal R.06 Microbial resistance: ASTM G21-15 Growth rating: 0 (No growth) Quietspace Panel does not promote the growth of moulds and mildew. Trims: Autex Proprietary Clear Alum- to all surrounds and panel joints Finish: Velour - velcro receptive, pinnable Colour: Terrace	Autex Acoustics Clarissa Paludo PH: 0474 214 685 E: ClarissaP@autex.com.au Address: Suite 8.03, 89 York Street, Sydney, NSW 2000, Australia			Building J _GLS Hub Existing Buildings Building A -refurbished classrooms Building B -All rooms Building D -refurbished classrooms	1
ACS-241S	Acoustic, Wall Panelling		As per above but with the following face finish: Finish: Smooth - pinnable					1
ACS-242V	Acoustic, Wall Panelling	Autex Acoustics Quietspace	25mm Quiet Space White and Vertiface Thickness: 25mm Panel Size: 1200mm x 2400mm NRC 0.85 Thermal R.06 Trims: Autex Proprietary Clear Alum- to all surrounds and panel joints Finish: Velour -velcro receptive, pinnable Colour: Porcelain	Autex Acoustics Clarissa Paludo PH: 0474 214 685 E: ClarissaP@autex.com.au Address: Suite 8.03, 89 York Street, Sydney, NSW 2000, Australia			Building J _GLS Hub Existing Buildings Building A -refurbished classrooms Building B -All rooms Building D -refurbished classrooms	1
ACS-242S	Acoustic, Wall Panelling		As per above but with the following face finish: Finish: Smooth - pinnable					1

CODE	ITEM	PRODUCT CODE	SPECIFICATION	SUPPLIER	IMAGE	COMMENTS	LOCATION	REVISION
ACS-243V	Acoustic, Wall Panelling	Autex Acoustics Quietspace	25mm Quiet Space White and Vertiface Thickness: 25mm Panel Size: 1200mm x 2400mm NRC 0.85 Thermal R.06 Trims: Autex Proprietary Clear Alum- to all surrounds and panel joints Finish: Velour -velcro receptive, pinnable Colour: Calypso	Autex Acoustics Clarissa Paludo PH: 0474 214 685 E: ClarissaP@autex.com.au Address: Suite 8.03, 89 York Street, Sydney, NSW 2000, Australia			Building J _GLS Hub Existing Buildings Building A -refurbished classrooms Building B -All rooms Building D -refurbished classrooms	1
ACS-243S	Acoustic, Wall Panelling		As per above but with the following face finish: Finish: Smooth - pinnable					1
ACS-244	Acoustic, Wall Panelling	Autex Acoustics Cube	24mm Cube Acoustic Panel Thickness: 24mm Panel Size: 1200mm x 2440mm NRC 0.70 Thermal R 0.82 Trims: Autex Proprietary Clear Alum- to all surrounds and panel joints Finish: Smooth - pinnable Colour: Rosada				Building J _GLS Hub Existing Buildings Building A -refurbished classrooms Building B -All rooms Building D -refurbished classrooms	1
ACS-246S - ACS-249S	Acoustic, Wall Panelling	Autex Acoustics Quietspace	25mm Quiet Space White and Vertiface Thickness: 25mm Panel Size: 1200mm x 2400mm NRC 0.85 Thermal R.06 Trims: Autex Proprietary Clear Alum- to all surrounds and panel joints Finish: Smooth - velcro receptive, pinnable Colour: XX	Autex Acoustics Clarissa Paludo PH: 0474 214 685 E: ClarissaP@autex.com.au Address: Suite 8.03, 89 York Street, Sydney, NSW 2000, Australia		Allow for various colours (up to 4)	Building J _Admin	1
Wall: Film to Glass								
FG-01	Graphic Film		Custom graphic film on glass Size: 75mm High, Centreline 1000 from FFL			Allow sample to be provided for approval	General Glazed Panels	1
FG-02	Graphic Film		Custom graphic film on glass Size: 1200mm High, 600 from FFL; with compliant 75mm high vision strip			Allow sample to be provided for approval Allow for Custom Graphic	General Glazed Panels	1
Wall: Protection								

CODE	ITEM	PRODUCT CODE	SPECIFICATION	SUPPLIER	IMAGE	COMMENTS	LOCATION	REVISION
WP-01	Safety Padding	WPRSJ	Column padding is made from 50mm closed cell foam covered in a Rip, Fire and Mould Resistant vinyl attached to an O S D board for simple attachment. Height:3600 High Colour	HiTech Sports Pty Ltd			Building K Hall - Renlita door enclosures	1
CEILING								
Ceiling: Paint								
PT-10	Paint, Ceilings, General	N96-006-099	Finish: Flat XX Mouldefender, Anti bacterial Low xx	Resene Rachael Devine 2/87 Reserve Rd, Artarmon NSW 2064 Ph: 9460 9988			General Ceilings	1
PT-11	Paint, Ceilings, Wet Areas	N96-006-099	Alabaster Finish: Flat Wet Area Finish: SpaceCote Mouldefender, Anti bacterial Low Sheen for wet areas	Resene Rachael Devine 2/87 Reserve Rd, Artarmon NSW 2064 Ph: 9460 9988			General Wet Areas Ceilings	1
Ceiling: Acoustic Treatment								
ACC-01	Acoustic Panel Ceiling	Supacoustic NCK	SP1/80 with backing strips with SW600 decal fixing Perforation diameter: 8mm 7% open area Group 1 FR Finish: SUPAFINISH White SF NRC: 0.7 NEEDS TO BE NRC 0.8 OR GREATER TO BE INSTALLED TO BE RECESSED AND FLUSH WITH ADJACENT SET PLASTERBOARD	Supawood Richard Hardwick Email: Richard@supawood.com.au P: +61 427 573 024 Address: Level 6, 10 Herb Elliott Avenue Sydney Olympic Park NSW 2127		Refer to the Schedule of Product Materials	Building J - GLS Learning Commons Staff and Administration Areas	1

CODE	ITEM	PRODUCT CODE	SPECIFICATION	SUPPLIER	IMAGE	COMMENTS	LOCATION	REVISION
ACC-02	Ceiling, Acoustic panel	Décor Cewood	Cewood Thickness Panel: 25mm with 70mm airgap to achieve NRC 0.9. Strand Structure to be S — Super Fine, 1 mm Edge Profile to be PO – Panel without Chamfer Panels to be coloured to be Natural Insulation 30mm glasswool insulation to be supplied with the panels to achieve NRC 0.9 NEEDS TO BE NRC 0.8 OR GREATER Installation with matching 45mm screws to be supplied by Décor Systems. Panels to be Fire Group 1 per BCA Specification C1.10 clause 4.	DecorSystems James Lloyd Martin Email: james.lloyd-martin@decorsystems.com.au P: +61 0411 945 600		Refer to the Schedule of Product Materials	Building K - Communal Hall	1
ACC-10	Ceiling, Suspended Acoustic 3D Panels	Zintra Clouds Stratus	Zintra Clouds Stratus Stratus: Sloping cloud-shaped acoustic grid, with one end higher than the other end. Dimensions: 711mm W x1398mmL x290mm H Composition: 12mm Zintra Acoustic Panel - 100% Solution Dyed (Colour Through) Polyester NRC Rating: with 610mm Air Gap: Up to 1.00 Colour: Zintra Standard Colour Range TBC	Baresque			Building D - PAA Spaces (allow for #4 units across the two spaces)	1
ACC-11	Ceiling, Suspended Acoustic 3D Panels	Zintra Clouds Long Dome Convex	Zintra Clouds Long Dome Convex Long Dome Convex: Convex oval-shaped acoustic grid, resembling a capsule. Dimensions: 1077mm W x2476mmL x300mm H Composition: 12mm Zintra Acoustic Panel - 100% Solution Dyed (Colour Through) Polyester NRC Rating: with 610mm Air Gap: Up to 1.00 Colour: Zintra Standard Colour Range TBC				Building B - Main Library Space (allow for #2 units)	1
ACC-12	Ceiling, Suspended Acoustic 3D Panels	Zintra Clouds Long Concave	Zintra Long Dome Concave Long Dome Concave: Concave oval-shaped acoustic grid, resembling a capsule Dimensions: 1077mm W x2476mmL x300mm H Composition: 12mm Zintra Acoustic Panel - 100% Solution Dyed (Colour Through) Polyester NRC Rating: with 610mm Air Gap: Up to 1.00 Colour: Zintra Standard Colour Range TBC				Building B - Main Library Space (allow for #2 units)	1
JOINERY								

DECIBEL – The human ear has a vast sound-sensitivity range of over a thousand billion to one. The decibel is a logarithmic unit that allows this same range to be compressed into a somewhat more comprehensible range of 0 to 120 dB. The decibel is ten times the logarithm of the ratio of a sound level to a reference sound level. See also Sound Pressure Level and Sound Power Level.

Decibel noise levels cannot be added arithmetically since they are logarithmic numbers. If one machine is generating a noise level of 50 dBA, and another similar machine is placed beside it, the level will increase to 53 dBA, not 100 dBA. Ten similar machines placed side by side increase the sound level by 10 dBA, and one hundred machines increase the sound level by 20 dBA.

dBA – The human ear is less sensitive to low frequency sound than high frequency sound. We are most sensitive to high frequency sounds, such as a child's scream. Sound level meters have an inbuilt weighting network, termed the dBA scale, that approximates the human loudness response at quiet sound levels (roughly approximates the 40 phon equal loudness contour).

EQUIVALENT CONTINUOUS NOISE LEVEL, L_{Aeq} – Many noises, such as road traffic or construction noise, vary continually in level over a period of time. More sophisticated sound level meters have an integrating electronic device inbuilt, which average the A weighted sound pressure levels over a period of time and then display the energy average or L_{Aeq} sound level. Because the decibel scale is a logarithmic ratio the higher noise levels have far more sound energy, and therefore the L_{Aeq} level tends to indicate an average which is strongly influenced by short term, high level noise events. Many studies show that human reaction to level-varying sounds tends to relate closely to the L_{Aeq} noise level.

FREQUENCY – The number of oscillations or cycles of a wave motion per unit time, the SI unit being the Hertz, or one cycle per second.

IMPACT ISOLATION CLASS (IIC) – The American Society for Testing and Materials (ASTM) has specified that the IIC of a floor/ceiling system shall be determined by operating an ISO 140 Standard Tapping Machine on the floor and measuring the noise generated in the room below. The IIC is a number found by fitting a reference curve to the measured octave band levels and then deducting the sound pressure level at 500 Hz from 110 decibels. Thus the higher the IIC, the better the impact sound isolation.

IMPACT SOUND INSULATION ($L_{nT,w}$) – Australian Standard AS ISO 717.2-2004 has specified that the Impact Sound Insulation of a floor/ceiling system be quantified by operating an ISO 140 Standard Tapping Machine on the floor and measuring the noise generated in the room below. The Weighted Standardised Impact Sound Pressure Level ($L_{nT,w}$) is the sound pressure level at 500 Hz for a reference curve fitted to the measured octave band levels. Thus the lower $L_{nT,w}$ the better the impact sound insulation.

NOISE RATING NUMBERS – A set of empirically developed equal loudness curves has been adopted as Australian Standard AS1469-1983. These curves allow the loudness of a noise to be described with a single NR number. The Noise Rating number is that curve which touches the highest level on the measured spectrum of the subject noise. For broadband noise such as fans and engines, the NR number often equals the dBA level minus five.

NOISE – Noise is unwanted sound. Sound is wave motion within matter, be it gaseous, liquid or solid. "Noise includes sound and vibration".



NOISE REDUCTION COEFFICIENT – See: "Sound Absorption Coefficient".

PINK NOISE – Pink noise is a broadband noise with an equal amount of energy in each octave or third octave band width. Because of this, Pink Noise has more energy at the lower frequencies than White Noise and is used widely for Sound Transmission Loss testing.

REVERBERATION TIME, T_{60} – The time in seconds, after a sound signal has ceased, for the sound level inside a room to decay by 60 dB. The first 5 dB decay is often ignored, because of fluctuations that occur while reverberant sound conditions are being established in the room. The decay time for the next 30 dB is measured and the result doubled to determine the T_{60} . The Early Decay Time (EDT) is the slope of the decay curve in the first 10 dB normalised to 60 dB.

SOUND ABSORPTION COEFFICIENT, α – α Sound is absorbed in porous materials by the viscous conversion of sound energy to heat energy as the sound waves pass through it. Sound is similarly absorbed by the flexural bending of internally damped panels. The fraction of incident energy that is absorbed is termed the Sound Absorption Coefficient, α . An absorption coefficient of 0.9 indicates that 90 % of the incident sound energy is absorbed. The average α from 250 to 2000 Hz is termed the Noise Reduction Coefficient (NRC).

SOUND TRANSMISSION CLASS (STC) – An internationally standardised method of rating the sound transmission loss of partition walls to indicate the decibels of noise reduction of a human voice from one side to the other. (Refer: Australian Standard AS1276–1979)

SOUND TRANSMISSION LOSS – The amount in decibels by which a random sound is reduced as it passes through a sound barrier. A method for the measurement of airborne Sound Transmission Loss of a building partition is given in Australian Standard AS1191–2002.

STEADY NOISE – Noise, which varies in level by 6 dBA or less, over the period of interest with the time-weighting set to "Fast", is considered to be "steady". (Refer AS 1055.1–1997)

WEIGHTED SOUND REDUCTION INDEX, R_w – This is a single number rating of the airborne sound insulation of a wall, partition or ceiling. The sound reduction is normally measured over a frequency range of 100 to 3,150 Hertz and averaged in accordance with ISO standard weighting curves (Refer AS/NZS 1276.1–1999).

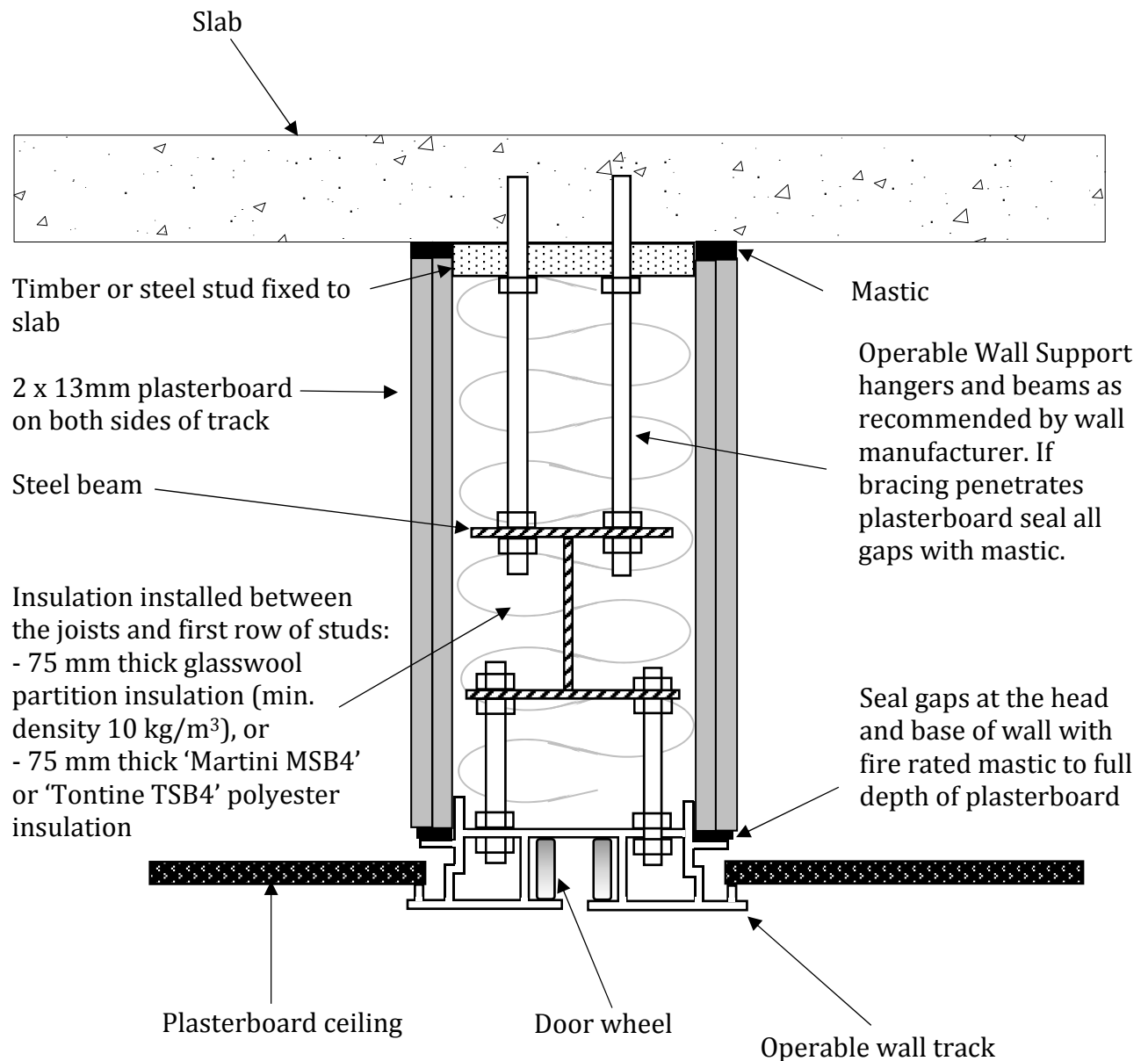
Internal partition wall $R_w + C$ ratings are frequency weighted to simulate insulation from human voice noise. The $R_w + C$ is always similar in value to the STC rating value. External walls, doors and windows may be $R_w + C_{tr}$ rated to simulate insulation from road traffic noise. This is normally a lower number than the STC rating value.

WHITE NOISE – White noise is broadband random noise whose spectral density is constant across its entire frequency range. The sound power is the same for equal bandwidths from low to high frequencies. Because the higher frequency octave bands cover a wider spectrum, white noise has more energy at the higher frequencies and sounds like a hiss.



Operable Wall Head Detail Construction – Sectional View

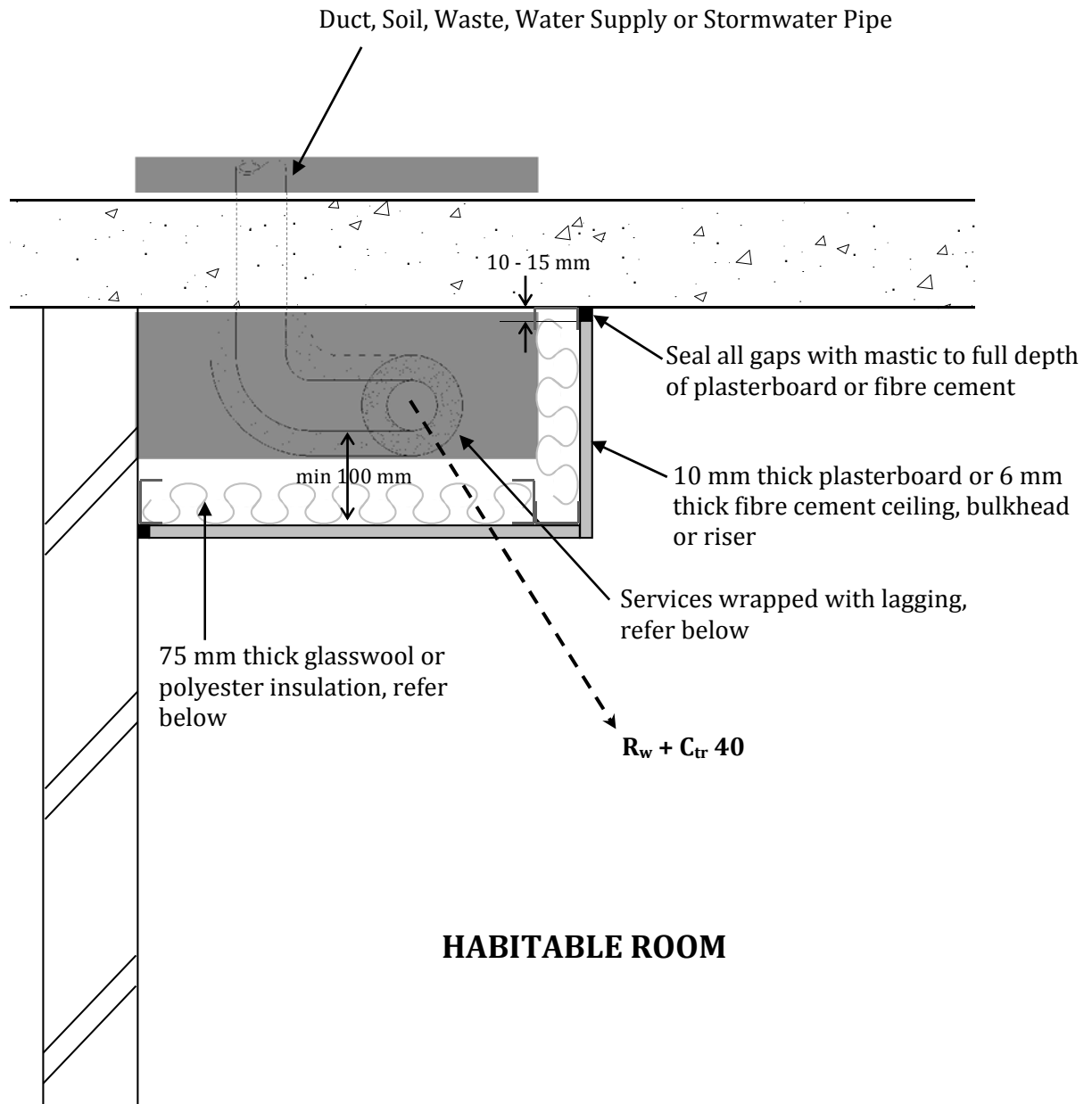
AC1290-1



Date: 11 / 03 / 2019

Drawn By: MB





Lagging such as Nuwrap 5 (by Thermotek, Ph 1300 727 083) **or** Soundlagg 4525C (by Pyrotek, Ph 9631 1333) **or** Acoustiflex PL5/15 (by Acoustica, Ph 1300 722 825). Hot water supply pipes with a temperature of up to 80°C can be lagged using these products.

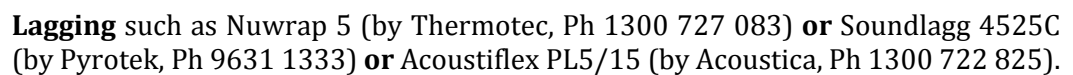
Insulation: 75 mm thick polyester insulation such as Tontine TSB4 (by Tontine Fibres, Ph 9725 1533) **or** Martini MSB4 (by Martini, Ph 9829 2299) **or** 75 mm thick glasswool partition batts (by CSR Bradford Insulation, Ph 9765 7000, or Tasman Insulation, Ph 9677 4444).

Date: 10.05.2012

Drawn By DK

Not to scale





Not to scale