



Wall and Ceiling Grid Technical Manual

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Introduction

Ecoplus steel framing for ceilings and non-load bearing walls complies with the New Zealand Building Code, as verified by appropriate appraisals and tests in the appendices to this document.

In addition, Ecoplus steel framing used in conjunction with Gib Fire Rated Systems will deliver fire-rated ceilings and walls that satisfy fire rating performance standards.

Tests and Appraisals

Ecoplus wall and ceiling grid systems have been submitted to building product testing and verification organisations BRANZ and BEAL, to assess and confirm compliance with the New Zealand Building Code, in accordance with relevant Australian and New Zealand standards.

In addition, Ecoplus operates in accordance with its Ecoplus Plasterboard Grid System Building Product Quality Plan, which requires the plan to be revalidated by BEAL on an annual basis.

The full tests and appraisals are attached as appendices.

1.) BEAL Appraisal Certificate No IN1006 [2019] (Appendix 1)

This certificate concludes:

“In the opinion of BEAL, the Ecoplus Plasterboard Grid System is fit for purpose and will comply with the NZBC to the extent specified provided that it is used, designed, installed and maintained as set out in this Appraisal Certificate. The Appraisal Certificate is issued only to Ecoplus Systems Ltd, and is valid until further notification, subject to the conditions of this appraisal.”

In addition:

- The ECOPLUS Plasterboard Grid System can be used in GIB® fire rated floor/ceiling systems with the following conditions:
- The ECOPLUS Plasterboard Grid System is installed by trained and approved ceiling installers in accordance with the ECOPLUS Plasterboard Grid System technical literature, and;
- The plasterboard is installed as per the GIB® Fire Rated Systems Specification and Installation Manual – CBI 5113, October 2018.

BEAL carried out this appraisal with reference to:

- AS1791:1986 Chromate conversion coatings
- AS2946:1991 Suspended Ceilings, recessed luminaires and air diffusers— Interface requirements for physical compatibility
- AS 4600:1996 Cold form steel structure code
- AS 468-:2006 Hot dipped galvanised (zinc) coatings on fabricated ferrous materials.
- AS/NZS 1170:2002 Structural design actions
- AS/NZS 1397:2001 Steel sheet and strip– Hot dip zinc coated or aluminium/zinc– coated
- AS/NZS 1530.3:1999 Simultaneous determination of ignitability, flame propagation, heat release and smoke release
- AS/NZS 2589.1&2:1997 Gypsum linings– Application and finishing
- AS/NZS 2785:2000 Suspended Ceilings
- AS/NZS 3101:2006 Concrete structures standard
- AS/NZS 4534:2006 Zinc and zinc/aluminium alloy coatings in steel wire
- NZS 3602:2003 Timber and wood-based products for use in building.
- NZS 3603:1993 Timber structures standard
- NZS 3604:1999 Timber framed Buildings
- New Zealand Building Code Handbook and Approved Documents, Building industry Authority, 1992.
- The Building Regulations 1992, up to, and including October 2004 Amendment.

- BRANZ Fire Technical Opinion, FC11076-001, 13 March 2019

2.) BEAL TRI191214 [2017] (Appendix 2)

This document describes BEAL's product strength test, establishing that the Ecoplus ceiling system is fit for purpose.

BEAL carried out in-situ loading tests of the Ecoplus 2-way suspended ceiling grid system.

Starting at a weight of 6.8kg/m² the grid system was loaded with additional ceiling tiles up to a total weight of 27.2kg/m². No deflection (measured by laser) was noted.

In the second test, a single layer of three sheets of 10mm Gib Fyrelite was installed, weighing 7kg/m². Two additional layers of Fyrelite were installed resulting in a weight of 21kg/m². Deflection was measured and again, no deflection was noted.

3.) BRANZ Fire Technical Opinion FC11076-001 (Appendix 3)

This opinion relates to the fire rating performance of Gib plasterboard when mounted on the Ecoplus Plasterboard Grid System.

Floor/ceiling systems

The report concluded the Ecoplus suspended ceiling steel framing system would not be detrimental to the fire resistance of the following Winstone Wallboards Ltd suspended ceiling systems, when tested in accordance with AS 1530.4:2014.

GBSC 30

GBUC 30

GBSC 60a

GBUC 60

Non-loadbearing walls

BRANZ also considered that the following GIB® fire rated non-load bearing steel framed plasterboard wall systems with Ecoplus framing would achieve the stated fire resistance if tested in accordance with AS 1530.4:2014.

GBS30

GBSA30b

GBS60

GBSA90c

4.) BRANZ Technical Opinion Summary FC11076-001 (Appendix 4)

Further to the Fire Technical Opinion above, Branz published Technical Opinion Summary FC11076-001, which provided a table of assessed results for the fire rating performance of different Gib system floor/ceiling (exposure from underside), and non-loadbearing walls (exposure from either side) when installed on Ecoplus grids designed to meet ambient structural criteria.

The assessed fire ratings were unchanged from those achieved with comparable steel grid framing systems.

5.) Fire and smoke protection and floor and ceiling junctions

Managing the fire and smoke separation performance of the different Gib wall and ceiling systems is resolved by installation in accordance with the junction details for fire and smoke separations as detailed in the Gib publication 'Gib Fire Rated Systems'.

Engineered Installation Methodology

KCL Engineering Services

To ensure the highest levels of performance for non-load bearing framing, Ecoplus has contracted KCL Engineering Services and one of New Zealand's most respected engineering consultants in the field of seismic performance, Alistair Knowles, to provide the installation best practice outlined in this guide.

See Accurate Ceilings/Ecoplus Typical Details (Appendix 5)

Overview

Quality	<p>The Ecoplus system has been appraised and tested by BEAL (Building Element Assessment Laboratory Limited) and BRANZ in accordance with relevant Australian and New Zealand standards to ensure compliance with the New Zealand Building Code. The Ecoplus system has been appraised as being compatible with GIB® fire rated floor/ceiling systems when installed in accordance with the GIB® Fire Rated Systems Specification and Installation Manual (Reports and specific findings are attached.)</p>
Assurance	<p>The installation tables for non-load bearing applications have been designed to comply with AS/NZS 4600:1996 for cold-formed steel structures.</p> <p>Ecoplus wall and ceiling systems have a minimum life of 15 years in dry, corrosion-free conditions. They are backed by the Ecoplus guarantee when installed in accordance with this guide.</p>
Technical guidance	<p>The engineering design required to deliver maximum performance of non-load bearing partitions has been fully described, with options, in this guide, enabling efficient design, construction and approval.</p>

Appendices

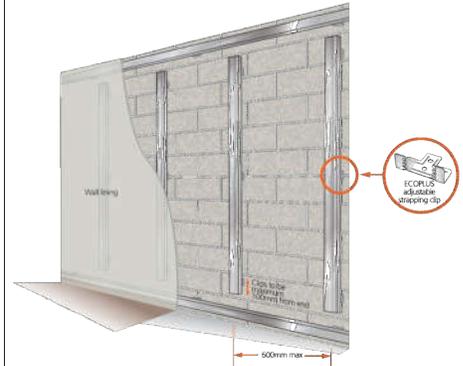
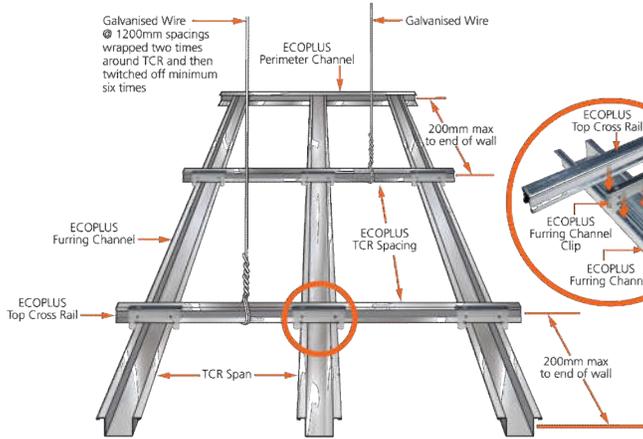
1. BEAL Appraisal Certificate No IN1006 [2019]
2. BEAL TRI191214 [2017]
3. BRANZ Fire Technical Opinion FC11076-001
4. BRANZ Technical Opinion Summary FC11076-001
5. Installation Design – Accurate Ceilings Ecoplus Typical Details



EXPIRY DATE: 1 MAY 2020

BEAL Appraisal

ECOPLUS Plasterboard Grid System



Product

- 1.1 The ECOPLUS Plasterboard Grid System is a suspended flush ceiling grid system designed to be used as a suspended ceiling system for internal use in both commercial and residential type buildings.
- 1.2 The ECOPLUS Plasterboard Grid System is also a Masonry wall batten system designed to be used over masonry walls for internal use in both commercial and residential type buildings.
- 1.3 The system consists of cold rolled sections (top cross rail, furring channel, perimeter channel, furring channel clip, strapping clip) manufactured from light gauge galvanized steel. The suspended flush ceiling grid is suspended at no less than 150mm from the floor or roof above by hangers and finished with Plasterboard to form a soffit. The masonry wall batten system is used for battening out irregular walls, enabling the installation of Plasterboard.

Building Regulations

- 2.1 In the opinion of BEAL, the ECOPLUS Plasterboard Grid System, if designed, installed and maintained in accordance with the statements and conditions of this Appraisal Certificate, will meet the following provisions of the NZBC.
- 2.2 Clause B1 STRUCTURE
Performance B1.3.1, B1.3.2 and B1.3.4. The ECOPLUS Plasterboard Grid System meets the requirements for loads arising from self weight, earthquake, wind, impact and creep [i.e. B1.3.3 (a), (f), (h), (j) and (q)]. See paragraphs 9.1-9.9
- 2.3 Clause B2 DURABILITY
Performance B2.3.1 (b), 15 years, B2.3.1 (c), 5 years, and B2.3.2. The ECOPLUS Plasterboard Grid System meets this requirement. See paragraphs 10.1-10.4
- 2.4 Clause F2 HAZARDOUS BUILDING MATERIALS
Performance F2.3.1. The ECOPLUS Plasterboard Grid Ceiling System meets this requirement and will not present a health hazard to people.

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The most up to date version of this BEAL Appraisal Certificate can be viewed at www.beal.co.nz



2.5 The ECOPLUS Plasterboard Grid System has been appraised as an **Alternative Solution** in terms of the New Zealand Building Code Compliance.

Scope and Limitations

3.1 The ECOPLUS Plasterboard Grid System has been appraised for use as a suspended ceiling system for internal use in both commercial and residential type buildings within the following scope;

- Concrete structure/floors designed and constructed to comply with the NZBC (e.g NZS 3101)
- Constructed with timber framing complying with the NZBC; and,
- Constructed with steel framing complying with the NZBC;

3.2 Shall be designed and installed in accordance with AS/NZS 2785:2000

3.3 The ECOPLUS Plasterboard Grid system has also been appraised for use as a masonry wall batten system for internal use in both commercial and residential type buildings within the following scope;

- Concrete masonry structures designed and constructed to comply with the NZBC (e.g. NZS 4230).

3.4 Installation of components and accessories supplied by ECOPLUS Systems Ltd and contractors, must be carried out by competent ceiling and/or wall installers experienced in the installation of suspended ceiling systems and/or wall batten systems.

3.5 The ECOPLUS Plasterboard Grid suspended ceilings system is a non-trafficable ceiling.

Technical Literature

4.1 Refer to the ECOPLUS Plasterboard Grid System current technical literature Ver 1.0 dated Dec 2010. The Technical Literature must be read in conjunction with this Appraisal Certificate. All aspects of design, use, installation and maintenance contained within the Technical Literature and scope of this Appraisal must be followed.

4.2 For a copy of this Technical Literature and any subsequent updates please refer to:
www.ecoplus-systems.com

Technical Specification

5.1 System components and accessories used in the ECOPLUS Plasterboard Grid system supplied or specified by ECOPLUS Systems Ltd are as follows:

Grid Components

- ECOPLUS Top Cross Rail (TCR) – 21mm x 25mm (.75mm thick) cold rolled section manufactured from hot dipped, zinc coated galvanised steel AS/NZS 1397.
- ECOPLUS Furring Channel - 38mm x 28mm (0.5mm thick) cold rolled section manufactured from hot dipped, zinc coated galvanised steel AS/NZS 1397.
- ECOPLUS Furring Channel- 38mm x 16mm (0.5mm thick) cold rolled section manufactured from hot dipped, zinc coated galvanised steel AS/NZS 1397.

- ECOPLUS Perimeter Channel – 30mm x 28mm x 20mm cold rolled section manufactured from hot dipped, zinc-coated galvanised steel AS/NZS 1397.
- ECOPLUS Furring Channel Clip – cold rolled clip manufactured from hot dipped, zinc-coated galvanised steel.
- ECOPLUS Strapping Clip – cold rolled clip manufactured from hot dipped, zinc-coated galvanised steel AS/NZS 1397 (*Masonry wall batten system only*)

Accessories

- Suspension Tie Wire (hanger)- 2.5mm galvanised wire complying with AS4534 (coating min. 125g/m²) supplied in standard lengths with elongation on 250mm not less than 15%.
- Fasteners for Perimeter Wall Angle—8g x 32mm GIB® Grabber® Wafer head needle tip screw or ECOPLUS approved alternative for use with both timber and steel framing.
- 14g x 100mm hot dipped galvanized AS 4680 self drilling timber screw eyes for use with timber structures. (*Suspended ceiling system only*)
- Ramset™ 31mm x 8mm M6 Zinc plated to AS1791 Dynabolt™ Tie wire bolt (or ECOPLUS approved equivalent) for use with concrete structures. (*suspended ceiling system only*)
- Fasteners for 9.5mm Plasterboard - #6mm x 25mm GIB® Grabber Scavenger Head needle point fine or ECOPLUS approved alternative, or coarse thread drywall screws.
- Fasteners for 12.5mm Plasterboard - #6 x 32 GIB® Grabber Scavenger Head needle point fine or coarse thread drywall screws, or ECOPLUS approved alternative.
- Plasterboard Lining - Plasterboard is a paper bound gypsum-plaster core sheet lining material supplied in varying thicknesses and sheet sizes. Please refer to plasterboard manufacturer's Technical Literature for further details and installation.

Handling and Storage

6.1 Handling and storage of all the materials supplied by ECOPLUS Systems Ltd, both on and off site are the responsibility of the ceiling/wall installer/contractor (competent and experienced in the installation of suspended ceiling systems and /or wall battens systems).

6.2 ECOPLUS System components must be protected from scratches or physical damage of any kind by/to other trades.

6.3 Handling of the ECOPLUS Plasterboard Grid System's Components requires care and should be handled in a manner that will prevent distortion or physical damage.

6.4 All Accessories must be kept dry and protected from scratches or physical damage.

6.5 Plasterboards should be treated as a finishing material and protected from damage. Sheets must be stacked flat and kept dry at all times. Sheets must be carried on edge and not dragged. For further information please refer to the manufacturer's instructions.

Design Information

General

Suspended Flush Ceiling Grid System

7.1 ECOPLUS Plasterboard Grid Suspended Ceiling System is for use in the interior of both commercial (e.g. offices) and residential type buildings where a suspended ceiling finish (flush finish) is required.

7.2 ECOPLUS Plasterboard Grid Suspended Ceiling System is a suspended flush ceiling system finished with Plasterboard. The ceiling shall be suspended with a cavity no less than 150mm from the supporting structure.

7.3 Ceiling layout and design should be planned prior to installation to determine grid configuration, direction, material quantities etc in accordance with AS/NZS 2785 and the Technical Literature.

7.4 The ECOPLUS Plasterboard Grid Suspended Ceiling System is designed for plasterboard with a mass no greater than 25kg/m². Refer to table 2.0

7.5 For buildings that are permeable (i.e. doors, windows), consideration should be given to wind pressures which may occur. Where this is the case the appropriate design loading must be determined by the designer in accordance with AS/NZS 2785 clauses 3.3.5 (b) or (c). This is the responsibility of the designer and is outside the scope of this Appraisal certificate.

7.6 The ECOPLUS Plasterboard Grid Suspended Ceiling System must be designed to comply with seismic performance AS/NZS 1170.5.

7.7 The deflection of the Plasterboard Grid Suspended Ceiling System shall be controlled by a limit for the calculated deflection of the element chosen appropriate to the structure and its intended use. The value chosen shall not be less than the table (1.0) below as per AS/NZS 2785 Clause 3.4.4.

Table 1.0 Deflection Limits

Ceiling Type	Level of finish required				
	1	2	3	4	5
Flush or sheeted ceiling	L/300	L/300	L/360	L/450	L/600

Note:

- Above table is only a partial representation of AS/NZS 2785 table 3.4.4 showing relevant information only.
- Level 1 applies to flush or sheeted ceilings only
- Level 2 Min standard of finish—to be used in non critical areas such as store rooms, high ceiling areas such as warehouses and department store and the like.
- Level 3 Normal Standard of finish . Areas such as offices, shops and the like.
- Levels 4 and 5 apply to flush or sheeted ceilings only
- ECOPLUS Plasterboard Grid System may be specified to these levels of finish or to the requirements of AS/NZS 2589.1

Masonry Wall Batten System

8.1 ECOPLUS Plasterboard Grid Masonry Wall Batten System is a wall batten system for use in the interior of both commercial and residential type buildings over concrete masonry walls allowing for the installation of plasterboard lining.

8.2 Plasterboard lining shall be finished in accordance with AS/NZS 2589.1

Structure - Clause B1

9.1 Supporting structure of the building for the support of the ECOPLUS Plasterboard Grid System must comprise of the following:

Timber Framing

9.2 Timber framing shall be treated as required by NZS 3602.

9.3 Timber framing must comply with NZS 3604 for both buildings or parts of buildings within the scope limitations of NZS 3604. Where buildings or parts of buildings are outside the scope of NZS 3604 then they must be to specific design in accordance with NZS 3603 and AS/NZS 1170. Where specific design is required, the framing must be of at least the equivalent stiffness to the framing provisions of NZS 3604.

9.4 Timber framing must have a maximum moisture content of 16% at the time of ceiling installation.

Steel Framing

9.5 Steel framing must be to a specific design meeting the requirements of the NZBC.

Concrete Structure

9.6 Concrete structure/floors designed and constructed in accordance to comply with the NZBC (NZS 3101)

9.7 Concrete masonry structures shall be designed and constructed in accordance with NZBC (NZS 4230).

Impact Resistance:

9.8 The ECOPLUS Plasterboard Grid System finished with Plasterboard provides adequate resistance to soft body impact, based upon experience of use in domestic and commercial applications.

Control Joints

9.9 Where control joints are required, the joints must be specifically designed to maintain the integrity of the desired finish. Refer to plasterboard manufacturer's Technical Literature for further information.

Durability- Clause B2

10.1 The ECOPLUS Plasterboard Grid System when used in accordance with this Appraisal Certificate and subjected to normal conditions of environment and use will meet the performance requirements of NZBC B2.3.1 (b), with a serviceable life of at least 15years.

10.2 This is dependent on the system remaining dry in service, and being maintained in accordance with this Appraisal Certificate.

Maintenance

10.3 Lining systems must be protected from internal and external moisture in accordance with NZBC E2 and E3. Regular maintenance is essential to ensure the performance requirements of the NZBC are met and to ensure the maximum serviceability of the ECOPLUS Plasterboard Grid System.

10.4 Refer to the plasterboard manufacturer's Technical Literature for any maintenance requirements.

Spread of Fire - Clause C3

11.1 Plasterboards are to comply with the requirements of Performance Clause C3.4 (a) for use as internal surface linings.

11.2 The ECOPLUS Plasterboard Grid System can be used in GIB® fire rated floor/ceiling systems with the following conditions:

- The ECOPLUS Plasterboard Grid System is installed by trained and approved ceiling installers in accordance with the ECOPLUS Plasterboard Grid System technical literature, and;
- The plasterboard is installed as per the GIB® Fire Rated Systems Specification and Installation Manual – CBI 5113, October 2018.

11.3 The ECOPLUS Plasterboard Grid System installed with fire rated GIB® systems has been assessed by BRANZ to provide the following FRRs:

GIB® Fire Rated Floor / Ceiling Systems	
GIB® Specification Number	FRR
GBSC 30	30/30/30
GBSC 60a	60/60/60
GBUC 60	

(Table from BRANZ Fire Technical Opinion, FC11076-001, 13 March 2019)

Internal Moisture - Clause E3

12.1 The ECOPLUS Plasterboard Grid System must be used in dry, non corrosive internal situations, and must not be used where it is likely to be exposed to water or where extended exposure above 90% RH is expected.

Electrical (safety) - Clause G9

13.1 Electrical wiring to be in accordance with the NZBC.

Installation Information

Installation Skill Level Requirement

14.1 Installation and finishing of the components and accessories supplied by ECOPLUS Systems Ltd shall be carried out by competent ceiling and/or wall installers experienced in the installation of suspended ceiling systems and/or wall batten systems.

General

System Installation

15.1 Internal ceiling installation/batten system shall not proceed until the building is effectively weathertight and the work of wet trades has been completed and dried. Suspended ceilings shall only be installed upon the completion of construction above the ceiling.

15.2 The ECOPLUS Plasterboard Grid Suspended ceiling system shall not be suspended from, and shall be kept clear of any building services such as ducts, unless specifically designed otherwise.

15.3 Mechanical and electrical ductwork above the suspension system shall be completed before installation of the suspended ceiling system.

15.4 Partitions shall be fixed to the primary members of the suspended ceiling grid. The design of the connection shall be the responsibility of the designer and is outside the scope of this Appraisal certificate.

15.5 The ECOPLUS Plasterboard Grid suspended ceiling system must be suspended with a cavity no less

than 150mm from the supporting structure.

15.6 ECOPLUS Systems Ltd and the ceiling installer/contractor (competent and experienced in the installation of suspended ceiling systems) shall ensure the installation of the completed ceiling/s comply with the following;

- The contract specifications
- Manufacturer's installation specification
- AS/NZS 2785

Grid System: Suspended Ceiling

16.1 All components must be designed and installed in accordance with the ECOPLUS Plasterboard Grid Technical Literature.

16.2 The ECOPLUS Perimeter Channel is fixed at 600mm centres max. using 8g x 32mm GIB® Grabber wafer head needle tip screws, or ECOPLUS approved alternative, to framing. Perimeter Channels are butt-jointed at connections.

16.3 ECOPLUS Top Cross Rails (TCR) are to be positioned within 200mm of abutting wall. TCR are then centred according to weight as per Table 2.0. Top Cross Rails are connected to one another by placing a 400mm off cut of TCR on top of the butt-joint (200mm each side) and fixed in place using 'self tapping wafer button screws' approx 100mm either side of the butt-joint.

Table 2.0 ECOPLUS TCR SPACING

Plasterboard weight	ECOPLUS TCR Spacing
≤ 13kg/m ²	1200mm max.
≤ 25kg/m ²	900mm max.

16.4 The ECOPLUS Furring Channel is secured to the ECOPLUS TCR at maximum 600mm apart, via the ECOPLUS Furring Channel Clip. A "click-clack" sound ensures a positive connection. Lengths of ECOPLUS Furring Channels are joined with one another by expanding one end of a channel and sliding the other joining length into the expanded channel, ensuring an overlap of at least 200mm.

16.5 2.5mm diameter straightened galvanized suspension tie wire (hanger) is used to support ECOPLUS Top Cross Rail (TCR) at a maximum of 1200mm centres (creating a max. 1200mm x 1200mm grid pattern). The wire is wrapped around the TCR two times then twitched off a minimum of 6 times.

16.6 Where the position of the suspension tie wire is altered due to load requirements this shall be the responsibility of the designer and is outside the scope of the Appraisal certificate.

Masonry Wall Batten System

17.1 ECOPLUS Strapping Clips fixed at maximum 1200mm spacings and fixed in accordance with the Technical Literature. Clips must be fixed at no more than 100mm away from the end of Furring Channel lengths.

17.2 ECOPLUS Furring Channels are securely fitted into the ECOPLUS Strapping Clips using a side to side rolling action. ECOPLUS Furring Channels are spaced at 600mm centres max. Furring Channels must be cut to ensure a 25mm gap is achieved at both the top and bottom of each length.

Lining

18.1 Plasterboard sheets shall be fixed across the ECOPLUS Furring Channel in accordance with the



ECOPLUS Plasterboard Grid System Technical Literature and plasterboard manufacturer's Technical Literature.

18.2 Sheets are fixed at 200mm centres across the ECOPLUS Furring Channel commencing from the centre of the sheet. Sheet fixings must be no closer than 12mm to sheet edges.

18.3 Where sheet end butt-joints are made on the ECOPLUS Furring Channels, the ends shall be fixed at 200mm centres. End joints must be staggered - i.e. occur on different Furring Channels.

18.4 The lining shall be finished to either Table 1.0 or AS/NZS 2589.1&2.

Fasteners

19.1 Fixing of the Suspension Tie Wire to the structure above with proprietary fasteners shall be installed in accordance with the manufacturers recommendations and be suitable for the structure material. Such fasteners shall have a design ultimate strength the greater of 50kg (0.5kN) minimum, or load requirements of AS/NZS 2785 Clause 3.2.2(c).

19.2 ECOPLUS Strapping Clips are fixed to masonry using appropriate fixings. E.g. 'knock-in anchor' or plug and screw (for a masonry wall) by an appropriately qualified contractor experienced in wall installations.

Fittings

20.1 Where luminaries are installed into the ceiling they shall comply with AS 2946. The design and installation of luminaries or similar fittings are the responsibility of the designer and is outside the scope of this Appraisal Certificate.

20.2 Ancillary services such as electrical cables and air conditioning ducts shall not be suspended from the ceiling hangers unless specifically designed for that purpose. Other services such as fire sprinklers and the like shall be independently supported from the ECOPLUS Plasterboard Grid System.

Cutting

21.1 ECOPLUS grid components are cut using tin snips.

Health and Safety

22.1 When cutting or drilling the ECOPLUS Plasterboard Grid System grid components appropriate personal safety equipment shall be used e.g. gloves and eye protection.

22.2 All aspects of cutting and drilling must comply with the latest regulations of the occupational safety and health division of the labour department.

22.3 Refer to the Technical Literature from the relevant manufacturer for the safe use and handling of the accessories that make up the ECOPLUS Plasterboard Grid System.

Basis of Appraisal

BEAL use the compliance verification procedure to demonstrate compliance with the relevant clauses of the NZBC based on a risk analysis procedure.

The following is a summary of the technical investigations carried out

Tests

23.1 The following testing of the ECOPLUS Plasterboard Grid System and its respective components has been undertaken by BEAL unless otherwise noted:

- Testing conducted by SGS laboratories included
 - Thickness measurements of grid components
 - Tensile strength and elongation of Top Cross Rail, Furring channel and Strapping Clip.
 - Tensile strength of the 2.5mm galvanised wire

Other Investigations

24.1 BEAL opinion on NZBC Clause B1 code compliance was based on testing of the components and in service history.

24.2 BEAL opinion on NZBC Clause B2 code compliance was based on testing of the components and in-service history

24.3 Wind loadings, self weight, seismic loadings, shear force, fastener pull through testing and calculations for the ECOPLUS Plasterboard Grid System were determined by an independent Chartered Engineer in respect to the requirements of compliance document B1 structure. Structural and durability opinions were provided.

24.4 Ease of application has been assessed

24.5 The Technical Literature for the ECOPLUS Plasterboard Grid System has been examined by BEAL and found to be satisfactory.

Quality

25.1 The manufacture of the ECOPLUS Plasterboard Grid System components has been assessed by BEAL and found to be satisfactory.

25.2 The quality of materials, components and accessories supplied by ECOPLUS systems Ltd is managed through the use of a Building Product Quality Plan.

25.3 The ECOPLUS Systems Ltd Building Product Quality Plan ensures continuous conformance with the quality requirements from purchase to supply of components.

25.4 ECOPLUS Building Product Quality Plan is reviewed at least annually by BEAL.

25.5 Designers are responsible for the building design and building contractors are responsible for the quality of installation of the perimeter channel, grid system components and plasterboard in accordance with the instructions of ECOPLUS Plasterboard Grid System Technical Literature Ver 1.0 dated Dec 2010 and this Appraisal Certificate.

25.6 For a copy of this Technical Literature and any subsequent updates please refer to:

www.ecoplus-systems.com





25.7 Building owners are responsible for the maintenance of the ECOPLUS Plasterboard Grid System in accordance with the instructions of ECOPLUS Systems Ltd and this Appraisal Certificate.

Sources of Information

- AS1791:1986 Chromate conversion coatings
- AS2946:1991 Suspended Ceilings, recessed luminaires and air diffusers—Interface requirements for physical compatibility
- AS 4600:1996 Cold form steel structure code
- AS 468-:2006 Hot dipped galvanised (zinc) coatings on fabricated ferrous materials.
- AS/NZS 1170:2002 Structural design actions
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- AS/NZS 1530.3:1999 Simultaneous determination of ignitability, flame propagation, heat release and smoke release
- AS/NZS 2589.1&2:1997 Gypsum linings— Application and finishing
- AS/NZS 2785:2000 Suspended Ceilings
- AS/NZS 3101:2006 Concrete structures standard
- AS/NZS 4534:2006 Zinc and zinc/aluminum alloy coatings in steel wire
- NZS 3602:2003 Timber and wood-based products for use in building.
- NZS 3603:1993 Timber structures standard
- NZS 3604:1999 Timber framed Buildings
- New Zealand Building Code Handbook and Approved Documents, Building industry Authority, 1992.
- The Building Regulations 1992, up to, and including October 2004 Amendment.
- BRANZ Fire Technical Opinion, FC11076-001, 13 March 2019

Concluding Statement

26.1 In the opinion of BEAL, the ECOPLUS Plasterboard Grid System is fit for purpose and will comply with the NZBC to the extent specified provided that it is used, designed, installed and maintained as set out in this Appraisal Certificate.

The Appraisal Certificate is issued only to ECOPLUS Systems Ltd, and is valid until further notification, subject to the conditions of this Appraisal.

Conditions of Appraisal

1. This Appraisal Certificate :
 - A) Relates only to the ECOPLUS Plasterboard Grid system as described herein;
 - B) Must be read, considered and used in full together with the Technical Literature
 - C) Does not address any legislation, regulations, codes or standards, not specifically named herein;
 - D) Is copyright of BEAL

2. The Appraisal Certificate holder continues to meet the quality requirements of the ECOPLUS Plasterboard Grid System Building Product Quality Plan and has the plan revalidated by BEAL on an annual basis.

3. ECOPLUS Systems Ltd, shall notify BEAL and obtain approval of any changes to product specification or quality assurance prior to product being marketed including any trade literature, website info or the like.

4. BEAL makes no representation as to:
 - A) The nature of individual examples of, batches of, or individual installations of the product, including methods and workmanship;
 - B) The presence or absence of any patent or similar rights subsisting in the product or any other product;
 - C) Any guarantee or warranty offered by the Appraisal Certificate holder

5. BEAL's verification of the building product or system complying with one or more above-mentioned criteria is given on the basis that the criteria used were those that were appropriate to demonstrate compliance with the NZBC at the date of this Appraisal Certificate. In the event that the criteria is withdrawn or amended at a later date, this Appraisal may no longer remain valid.

6. Any reference in this Appraisal Certificate to any other publication shall be read as a reference to the version of publication specified in this Appraisal Certificate.

Authorised signatory

C R Prouse—Director



Version notes:

V 12, 2019: Fire clause C3 updated to include fire ratings

Ecoplus Systems LTD

BEAL TR191214

In-situ loading tests of the EcoPlus 2-Way Suspended Ceiling Grid System and the EcoPlus 16mm Plasterboard Grid System

1. Objective

- 1.1.** Beal Testing Services were asked by Ecoplus Systems LTD to witness new loading tests on their 2-Way Suspended Ceiling Grid System (Fastlock 2-Way Grid System) and their 16mm Plasterboard Grid System. Both systems are suspended ceiling systems.

2. Methodology

- 2.1.** This was an ad-hoc test. The ceiling systems were installed in accordance with the manufacturer's specifications and loadings. A laser was setup to enable the measurement of deflection and view any undulations in the ceiling systems. The no-load readings were used as reference points. It was intended to load the ceiling systems up to 4 times their current allowed weight rating and the deflection measured again.

3. Criteria

- 3.1.** Test results are to be subject to review by a suitably qualified engineer.

4. Procedure and Results

4.1. Suspended Ceiling 2-Way Grid System Assessment

The laser was set to 38 mm from the surface of the ceiling rails (not the tiles).

The weight per square meter of the installed GIB Tone tiles in this ceiling system was **6.8 kg/m²**.

A 2 x 3 tile area of the installed ceiling was selected and displacement measurements were taken across the selected area and adjacent areas to confirm that there were no existing undulations in the ceiling.

The selected 2x3 grid area of the ceiling were then loaded in stages.

Firstly, all 6 grids (sections) in the selected area were loaded with 4 (four) tiles each creating a total weight of **27.2 kg/m²**.

Deflection measurements were taken at this point – no deflection was noted.

Secondly, 2 of the 6 grids (sections) had all their tiles removed except for the last tile. Again, deflection measurements were taken and no deflection was noted.

Finally, 2 more grid sections in the selected area had their tiles removed except for one. So only two of the 6 grid sections had 4 tiles in them while the remaining 4 only held one tile each. Deflection measurements were taken at this point – no deflection was noted.

Support wire centres: 1200 x 1200 mm grids did not show undue deformation when under the new loads.

4.2 Plasterboard Grid System Assessment

Support wire centres: 1200 x 1200 mm grid

The laser was altered for each layer – reference points were taken from the first sheet of GIB.
10 mm GIB Fyreline panels were used on this test. The installed weight of this product was **7 kg/m²**.

First, a single layer of 3 sheets of GIB Fyreline were installed across the ceiling system, deflection was measured – no deflection was noted.

Second, an additional 2 sheets of GIB Fyreline were installed over the previous sheets for a total area of 2400 x 2400 mm. Again, deflection was measured – no deflection was noted.

Finally, a third layer of sheets were installed directly over the previous layer. The 2400 x 2400 area of the ceiling system was now loaded with 3 layers of GIB Fyreline resulting in a weight of **21 kg/m²**. Deflection was measured once more – no deflection was noted.

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Figure 1: Ecoplus Fastlock System - Installed ceiling



Figure 2: Ecoplus Fastlock System - Overloaded grid tiles



Figure 3: Ecoplus Fastlock System - Example of measurement for deflection



Figure 4: 16mm Plasterboard Grid System - Installed ceiling (part)



Figure 5: 16mm Plasterboard Grid System - Installation of third layer of GIB



Figure 6: 16mm Plasterboard Grid System - Reference measurement for final deflection check



Figure 7: 16mm Plasterboard Grid System - Deflection measurement (1) for three layers of GIB



Figure 8: 16mm Plasterboard Grid System - Deflection measurement (2) for three layers of GIB



Figure 9: 16mm Plasterboard Grid System - Deflection measurement (3) for three layers of GIB



FIRE TECHNICAL OPINION

FC11076-001

FIRE RESISTANCE OF GIB FIRE RATED SUSPENDED CEILINGS AND NON-LOADBEARING WALLS WITH ECOPLUS FRAMING

CLIENT

Ecoplus Systems Limited
Level 4 Mastercard House
136 Customs Street West
Auckland City 1010
New Zealand



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ASSESSMENT OBJECTIVE

To assess the fire resistance of the Winstone Wallboards Ltd fire rated systems with Ecoplus framing as follows:

- Floor/ceiling system specification GBSC 30, GBSC 60a and GBUC 60 constructed using the Ecoplus suspended ceiling framing system lined with 13 mm GIB Fyrelite® plasterboard.
- Non-loadbearing wall specification GBS30, GBSA30b, GBS90 and GBSA90c lined with GIB® plasterboard.

CONCLUSION

Floor/ceiling systems

It is considered that the following Ecoplus suspended ceiling steel framing system would not be detrimental to the fire resistance of the following Winstone Wallboards Ltd suspended ceiling systems, when tested in accordance with AS 1530.4:2014:

- GBSC 30 with a ceiling lining of one layer of 13 mm GIB Fyrelite® plasterboard; or
- GBSC 60a with ceiling lining of two layers of 13 mm GIB Fyrelite® plasterboard; or
- GBUC 60 with ceiling lining of two layers of 13 mm GIB Fyrelite® plasterboard,

provided that the fixing of the lining and support spacings are in accordance with these published specifications and the Ecoplus grid is designed to meet ambient structural criteria for strength and serviceability under dead and live loads.

Non-loadbearing walls

It is considered that the following GIB® fire rated non-loadbearing steel framed plasterboard wall systems with Ecoplus framing would achieve the stated fire resistance if tested in accordance with AS 1530.4:2014 as follows:

GIB® system	Ecoplus stud size(depth/BMT)	Stud spacing	Maximum wall height	Expansion at top of studs
GBS30	92/0.75 mm 92/1.15 mm	600 mm	3,200 mm	15 mm
			3,600 mm	20 mm*
GBSA30b	92/0.75 mm 92/1.15 mm	600 mm	3,200 mm	15 mm
			3,600 mm	20 mm*
GBS60	92/0.75 mm 92/1.15 mm	600 mm	3,200 mm	15 mm
			3,600 mm	20 mm*
GBS90	92/0.75 mm	600 mm	2,930 mm	15 mm
		400 mm	3,350 mm	15 mm
	92/1.15 mm	600 mm	3,350 mm	15 mm
		400 mm	3,600 mm	20 mm*
GBSA90c	92/0.75 mm 92/1.15 mm	600 mm	3,200 mm	15 mm
			3,600 mm	20 mm*

* Use a minimum 50 mm deep head channel



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LIMITATION

This report is subject to the accuracy and completeness of the information supplied.

BRANZ reserves the right to amend or withdraw this assessment if information becomes available which indicates the stated fire performance may not be achieved.

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The results reported here relate only to the item/s described in this report.



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1. INTRODUCTION

This report gives BRANZ's assessment of the fire resistance of Winstone Wallboards Ltd fire rated with Ecoplus framing as follows:

- Floor/ceiling system specification GBSC 30, GBSC 60a and GBUC 60 constructed using the Ecoplus suspended ceiling framing system lined with 13 mm GIB Fyrelite® plasterboard.
- Non-loadbearing wall specification GBS30, GBSA30b, GBS90 and GBSA90c lined with GIB® plasterboard.

2. BACKGROUND

2.1 BRANZ fire resistance test FR 6073

In BRANZ fire resistance test FR 6073 the test specimen consisted of a loadbearing floor/ceiling system nominally 3,000 mm wide and with a 4,000 mm span. The floor/ceiling system was constructed with timber joists. To the underside of the joists Rondo clips and battens were used to suspend a ceiling consisting of a double layer of 13 mm GIB Fyrelite® plasterboard. Nominally 20 mm thick tongue and groove wood-based flooring was fixed to the top of the joists. The floor cavity included R1.8 (75 mm) Pink® Batts® glass wool insulation.

The loaded floor/ceiling system was tested in accordance with AS 1530.4:2014 and exceeded the requirements for a fire resistance rating (FRR) of 60/60/60.

2.2 BRANZ fire resistance test FR 1572

In BRANZ fire resistance test FR 1572 the test specimen consisted of a loadbearing floor/ceiling system nominally 3,000 mm wide and with a 4,000 mm span using Twinaplate joists, with a ceiling of nominally 13 mm GIB Fyrelite® plasterboard.

The loaded floor/ceiling system was tested in accordance with AS 1530.4-1990 and exceeded the requirements for an FRR of 30/30/30.

2.3 Non-loadbearing steel stud testing

On behalf of Winstone Wallboards Limited BRANZ has undertaken a number of fire resistance tests on non-loadbearing steel framed plasterboard wall systems in accordance with AS 1530.4 in support of the Winstone Wallboards Ltd GIB® Fire Rated Systems Specification and installation manual (October 2018).

3. DISCUSSION

3.1 Comparison between test standards

3.1.1 General

In the fire resistance test FR 1572 described in 2.2 above the specimen was tested in accordance with fire resistance test standard AS 1530.4-1990. This assessment considers the fire resistance of the floor/ceiling in accordance with the current version of the test standard AS 1530.4:2014.



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In respect to a floor/ceiling test the only significant differences between the 1990 and 2014 versions of the AS 1530.4 test standard is the furnace temperature, the criteria for Structural Adequacy and the additional requirement to use a cotton pad test for integrity failure.

3.1.2 Furnace temperature

The 1990 version of the test standard defined the furnace temperature as $T_1 - T_0 = 345 \log_{10}(8t+1)$ whereas from 2005 on the furnace temperature is defined as $T = 345 \log_{10}(8t+1) + 20$ where T_1 and T are the furnace temperature, T_0 is the ambient temperature and t is the time in minutes of the test duration. For ambient temperatures in the normal range experienced at BRANZ the difference in area under the average furnace temperature curve is less than 1% for periods up to 60 minutes. This is within the tolerance defined by the test standard.

3.1.3 Cotton pad test

To test for passage of hot gases from the exposed to unexposed face of the test specimen the 2014 version of the test standard requires that a cotton pad test be applied to any gaps which develop in the specimen during the fire exposure. This test applies up until the surface of the specimen adjacent to the gap being tested exceeds 300°C. This was not a requirement for tests to the earlier versions of the AS test standard. When the cotton pad test is no longer applicable the 6 mm x 150 mm and 25 mm gap criteria are used.

In BRANZ fire resistance test FR 1572 there was no reported gap or fissure development during the test and hence there was no need for the application of a cotton pad for the duration of the test.

3.1.4 Structural Adequacy failure criteria

In the 1990 version of the test standard the failure in relation to Structural Adequacy is determined to occur when the deflection exceeds $L/20$ where L is the clear span of the floor, whereas for the 2014 version of the test standard the deflection limit is $L^2/400$ or, in both standards, the rate of deflection exceeds $L^2/9000d$ where d is the depth of the floor joist. In fire resistance test FR 1572 the specimen failed the Structural Adequacy criterion well beyond the stated FRR.

It is therefore considered that the FR 1572 floor/ceiling tested in accordance with the 1990 version of the test standard is likely to achieve a similar fire resistance when tested in accordance with the current test standard AS 1530.4:2014.

3.2 Fire rated floor/ceiling systems

3.2.1 GBSC60a and GBUC 60/60/60

Winstone Wallboards Ltd specification GBSC 60a (GIB® Fire Rated Systems, 2018) consist of a structural timber floor frame from which is suspended a steel framework to carry the plasterboard lining. A strand board or particle board flooring is fixed to the upper surface of the timber frame. This system has been tested and exceeded the requirements for an FRR of 60/60/60 with two layers of 13 mm GIB Fyrelite® plasterboard as the ceiling lining.

During fire resistance test FR 6073 temperature data was collected on the upper surface of the two layers of 13 mm GIB Fyrelite® plasterboard. Based on this temperature data and an

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examination of the Ecoplus steel suspension system, it is considered that GBSC 60a, would achieve an FRR of 60/60/60 when tested in accordance with AS 1530.4:2014. All other details must be in accordance with the published specification.

It is also considered the Ecoplus steel suspension system can be used with the Winstone Wallboards Ltd specification GBUC 60 (GIB® Fire Rated Systems, 2018) which permits lining support framing designed to meet ambient structural criteria for strength and serviceability under dead and live loads.

3.2.2 GBSC30 30/30/30

Winstone Wallboards Ltd specification GBSC 30 (GIB® Fire Rated Systems, 2018) consist of a structural timber floor frame from which is suspended a steel framework to carry the plasterboard lining. Wood-based flooring is fixed to the upper surface of the timber frame. This system has been determined to achieve an FRR of 30/30/30 with one layer of 13 mm GIB Fyrelite® plasterboard.

During fire resistance test FR 1572 temperature data was collected on the upper surface of the nominally 13 mm GIB Fyrelite® ceiling lining. Based this temperature data, and an examination of the Ecoplus steel suspension system, it is considered that GBSC 30, with the Ecoplus suspension system, would achieve an FRR of 30/30/30. when tested in accordance with AS 1530.4:2014. All other details must be in accordance with the published specification.

3.3 Non-loadbearing wall systems

Winstone Wallboards Ltd have undertaken a number of fire resistance tests on non-loadbearing steel framed plasterboard walls and achieved the fire resistance ratings as stated in the Winstone Wallboards Ltd specification GBUC 60 (GIB® Fire Rated Systems, 2018) with a given stud size. When changing the framing the stud properties need to be considered and compared against what was tested to ensure the framing offers no less flexural rigidity than what was tested.

The flexural rigidity of the wall with alternative framing has been considered using an empirical formula derived from BRANZ research based on the length and flexural rigidity of the studs. Without considering the influence of the lining, which is assumed to be significantly weakened in the fire exposure, in order to maintain an equivalent fire performance the stud numbers (spacing) and/or height are required to be revised to accommodate different stud properties.

From BRANZ research into the fire resistance of non-loadbearing steel framed walls the relationship, in terms of stud depth and height maintains structural similarity when considering formed steel sections of similar shapes. Where shapes differ widely, as in the case of non-similar shapes or composite structures such as stud walls, the 'second moment of area' for the stud (I) better describes the relationship from a flexural rigidity perspective such that height may be increased proportionately with the 3rd root of I_{xx} .

Based on the above BRANZ research and the information from the reports referenced above, it is considered the Ecoplus framing would not compromise the FRR of the GIB® fire rated walls as given in Table 1.

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Table 1: GIB® Systems and heights with EcoPlus framing

GIB® system	EcoPlus stud size(depth/BMT)	Stud spacing	Maximum wall height	Expansion at top of studs
GBS30	92/0.75 mm 92/1.15 mm	600 mm	3,200 mm	15 mm
			3,600 mm	20 mm*
GBSA30b	92/0.75 mm 92/1.15 mm	600 mm	3,200 mm	15 mm
			3,600 mm	20 mm*
GBS60	92/0.75 mm 92/1.15 mm	600 mm	3,200 mm	15 mm
			3,600 mm	20 mm*
GBS90	92/0.75 mm	600 mm	2,930 mm	15 mm
		400 mm	3,350 mm	15 mm
	92/1.15 mm	600 mm	3,350 mm	15 mm
		400 mm	3,600 mm	20 mm*
GBSA90c	92/0.75 mm 92/1.15 mm	600 mm	3,200 mm	15 mm
			3,600 mm	20 mm*

* Use a minimum 50 mm deep head channel



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4. CONCLUSION

4.1 Suspended ceiling systems

It is considered that the following Ecoplus suspended ceiling steel framing system would not be detrimental to the fire resistance of the following Winstone Wallboards Ltd suspended ceiling systems, when tested in accordance with AS 1530.4:2014:

- GBSC 30 with a ceiling lining of one layer of 13 mm GIB Fyrelite® plasterboard; or
- GBSC 60a with ceiling lining of two layers of 13 mm GIB Fyrelite® plasterboard; or
- GBUC 60 with ceiling lining of two layers of 13 mm GIB Fyrelite® plasterboard,

provided that the fixing of the lining and support spacings are in accordance with these published specifications and the Ecoplus grid is designed to meet ambient structural criteria for strength and serviceability under dead and live loads.

4.2 Non-loadbearing wall systems

It is considered that the following GIB® fire rated non-loadbearing steel framed plasterboard wall systems with Ecoplus framing would achieve the stated fire resistance if tested in accordance with AS 1530.4:2014 as follows:

GIB® system	Ecoplus stud size(depth/BMT)	Stud spacing	Maximum wall height	Expansion at top of studs
GBS30	92/0.75 mm 92/1.15 mm	600 mm	3,200 mm	15 mm
			3,600 mm	20 mm*
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GBS90	92/0.75 mm	600 mm	2,930 mm	15 mm
		400 mm	3,350 mm	15 mm
	92/1.15 mm	600 mm	3,350 mm	15 mm
		400 mm	3,600 mm	20 mm*
GBSA90c	92/0.75 mm 92/1.15 mm	600 mm	3,200 mm	15 mm
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Technical Opinion Summary



This is to certify that the specimen described below has been examined by BRANZ on behalf of the sponsor.

Sponsor

Ecoplus Systems Limited
Level 4 Mastercard House
136 Customs Street West
Auckland 1010
New Zealand

Reference BRANZ Reports FC11076-001

Referenced Standard AS1530.4:2014

Specimen Name: GIB® Fire Rated Systems (CB15113, October 2018) with Ecoplus steel framing

Specimen Description: Winstone Wallboards Limited suspended floor/ceiling systems and non-loadbearing walls as follows incorporating the Ecoplus steel framing:

- Floor/ceiling systems GBSC 30, GBSC 60a and GBUC 60

provided that the fixing of the lining and support spacings are in accordance with these published specifications and the Ecoplus grid is designed to meet ambient structural criteria for strength and serviceability under dead and live loads.

- Non-loadbearing steel stud wall systems

GIB® system#	Ecoplus stud size(depth/BMT)	Stud spacing	Maximum wall height	Expansion at top of studs
GBS30, GBSA30b, GBS60 & GBSA90c	92/0.75 mm	600 mm	3,200 mm	15 mm
	92/1.15 mm		3,600 mm	20 mm*
GBS90	92/0.75 mm	600 mm	2,930 mm	15 mm
		400 mm	3,350 mm	15 mm
	92/1.15 mm	600 mm	3,350 mm	15 mm
		400 mm	3,600 mm	20 mm*

* Use a minimum 50 mm deep head channel

#All other details as per GIB® Fire Rated Systems Specification and installation manual (CB15113, October 2018)

Orientation: Floor/ceiling - Exposure from the underside
Non-loadbearing walls – Exposure from either face

The assessed results were as follows

Floor/ceiling systems		Non-loadbearing wall systems	
GIB® system	FRR	GIB® system	FRR
GBSC 30	30/30/30	GBS30	-/30/30
		GBSA30b	
GBSC 60a GBUC 60	60/60/60	GBS60	-/60/60
		GBS90	-/90/90
		GBSA90c	

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Reviewed by


E. Soja
Senior Fire Safety Engineer
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- Floor/ceiling systems GBSC 30, GBSC 60a and GBUC 60

provided that the fixing of the lining and support spacings are in accordance with these published specifications and the Ecoplus grid is designed to meet ambient structural criteria for strength and serviceability under dead and live loads.

- Non-loadbearing steel stud wall systems

GIB® system#	Ecoplus stud size(depth/BMT)	Stud spacing	Maximum wall height	Expansion at top of studs
GBS30, GBSA30b, GBS60 & GBSA90c	92/0.75 mm	600 mm	3,200 mm	15 mm
	92/1.15 mm		3,600 mm	20 mm*
GBS90	92/0.75 mm	600 mm	2,930 mm	15 mm
		400 mm	3,350 mm	15 mm
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		400 mm	3,600 mm	20 mm*

* Use a minimum 50 mm deep head channel

#All other details as per GIB® Fire Rated Systems Specification and installation manual (CB15113, October 2018)

Orientation: Floor/ceiling - Exposure from the underside
Non-loadbearing walls – Exposure from either face

The assessed results were as follows

Floor/ceiling systems		Non-loadbearing wall systems	
GIB® system	FRR	GIB® system	FRR
GBSC 30	30/30/30	GBS30	-/30/30
		GBSA30b	
GBSC 60a GBUC 60	60/60/60	GBS60	-/60/60
		GBS90	-/90/90
		GBSA90c	

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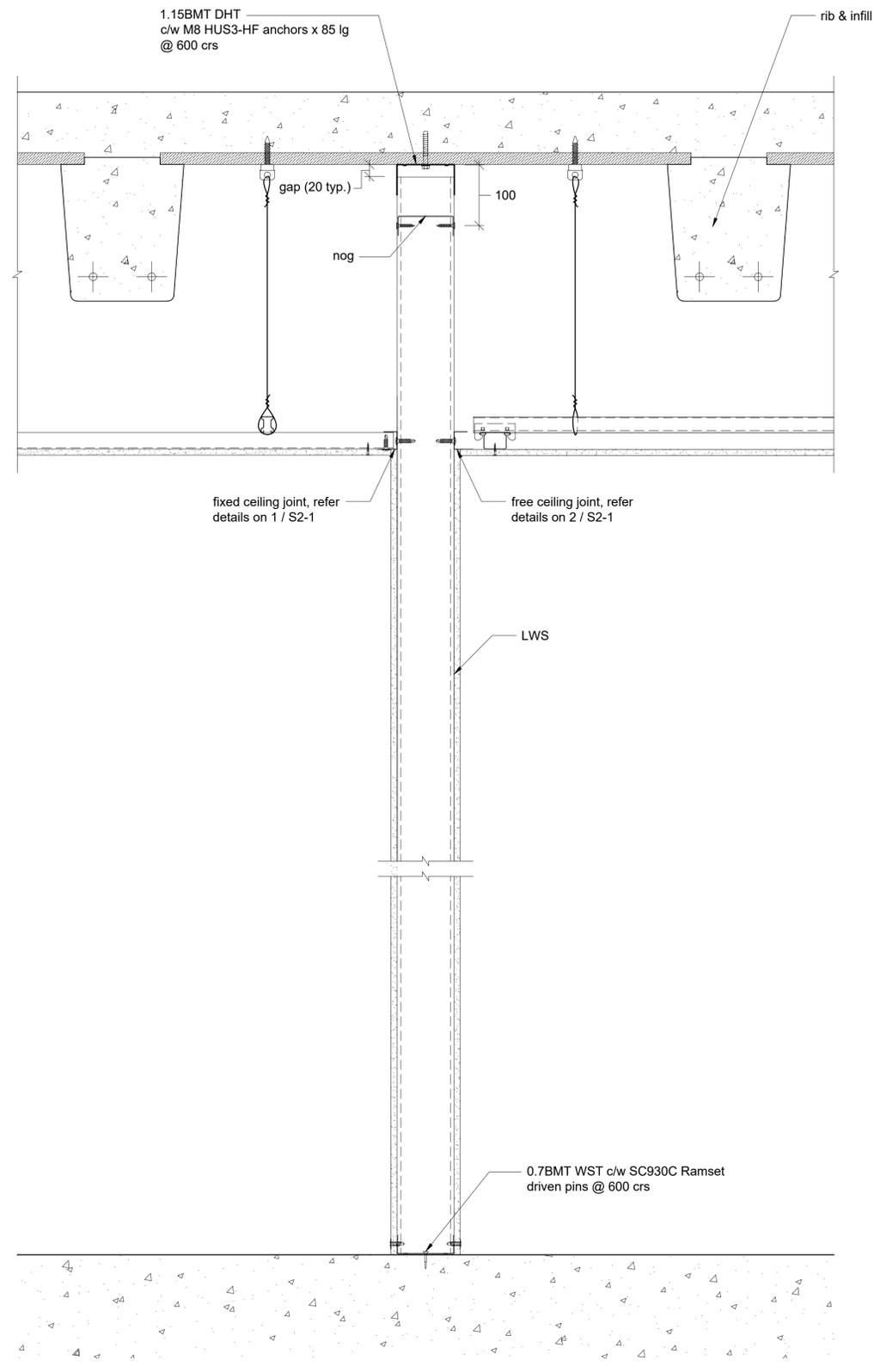
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18830

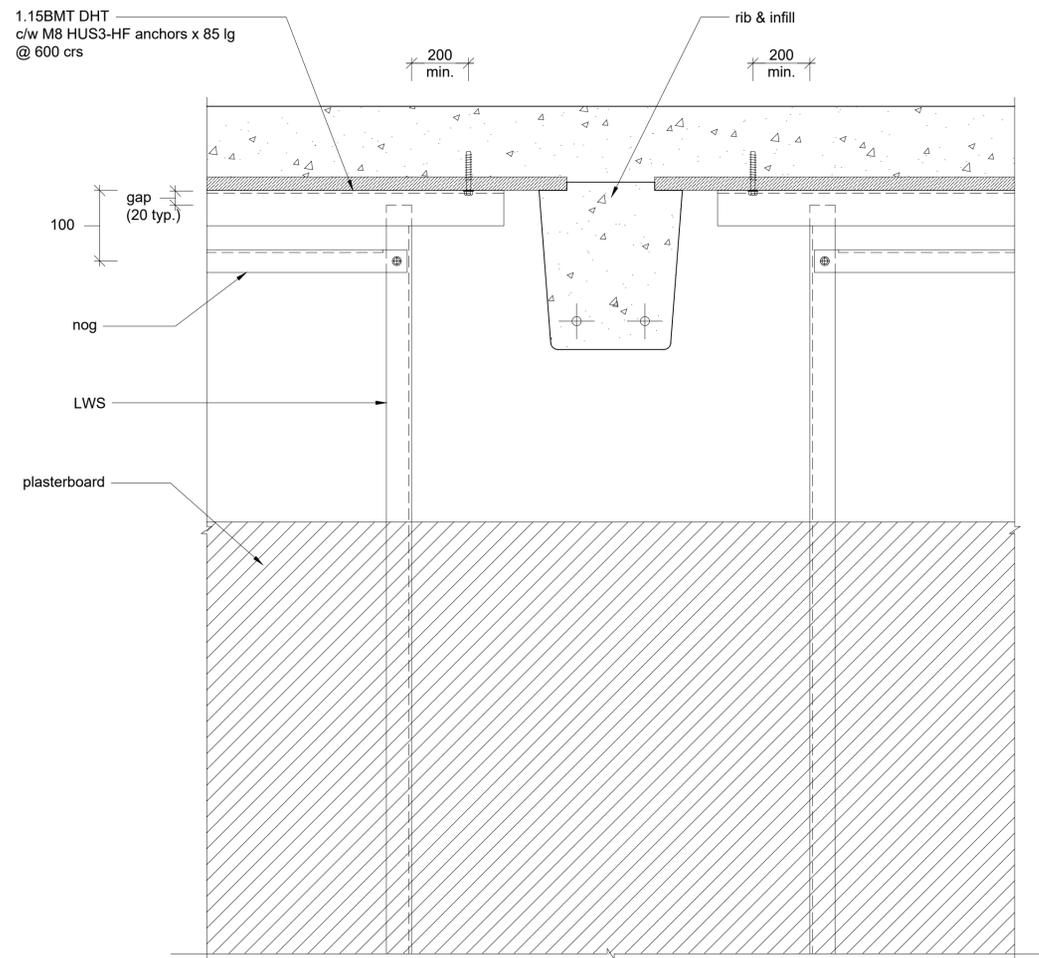
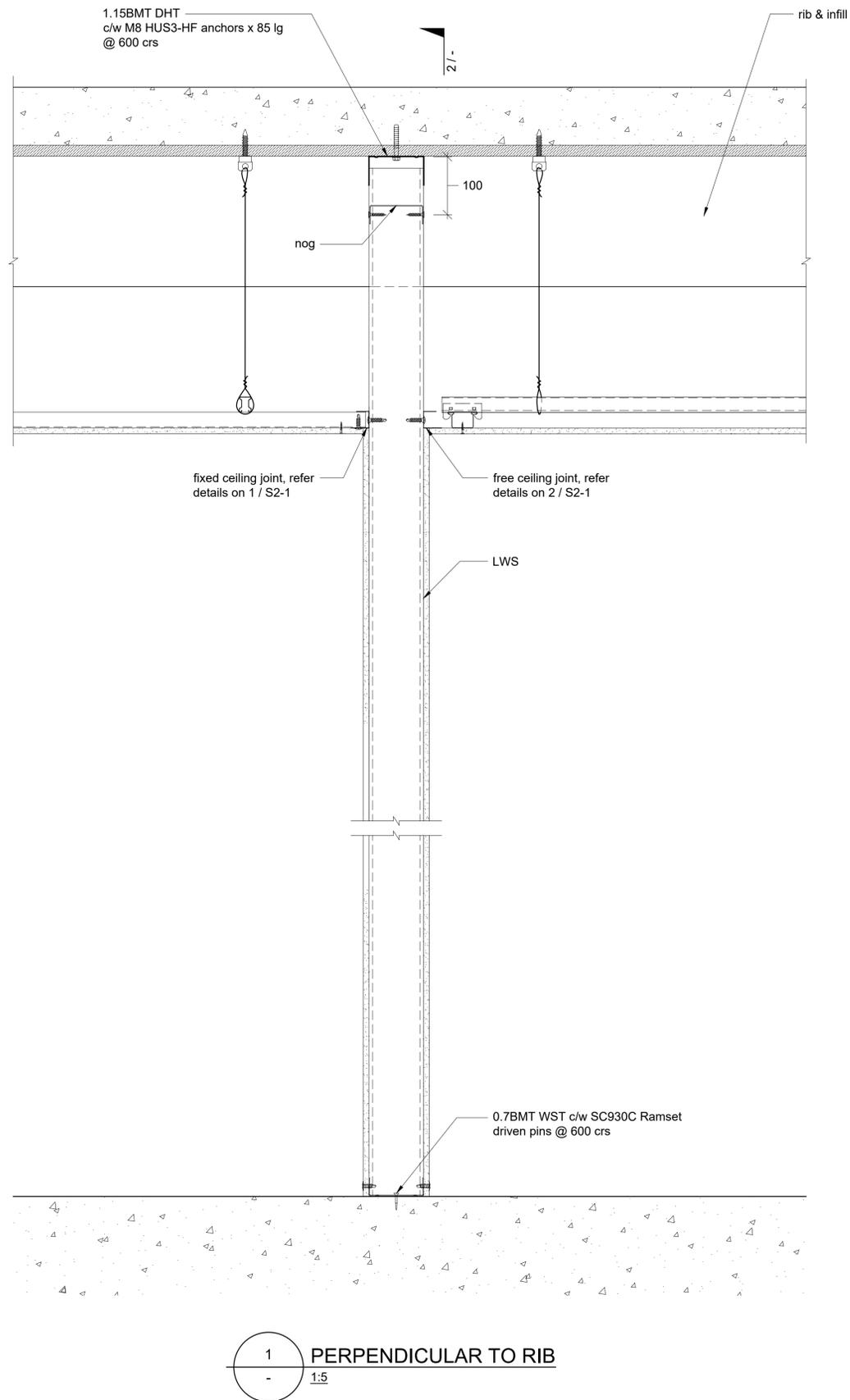


PARTITION WALL

1 PARALLEL TO RIB
- 1:5

J:\18830 - Accurate Ceilings Ecoplus eng support\05 Drawings\18830_Details.dwg 07/11/2019 9:28:11 AM

Scale (A1): 1:5			
Scale (A3): 1:10	A	FOR INFORMATION	AC 10.07.19
Dwn By: AC	No.	Revision	By Date
Engineer: AK	18830	S1-1	A



PARTITION WALL

2 SECTION
1:5

1 PERPENDICULAR TO RIB
1:5

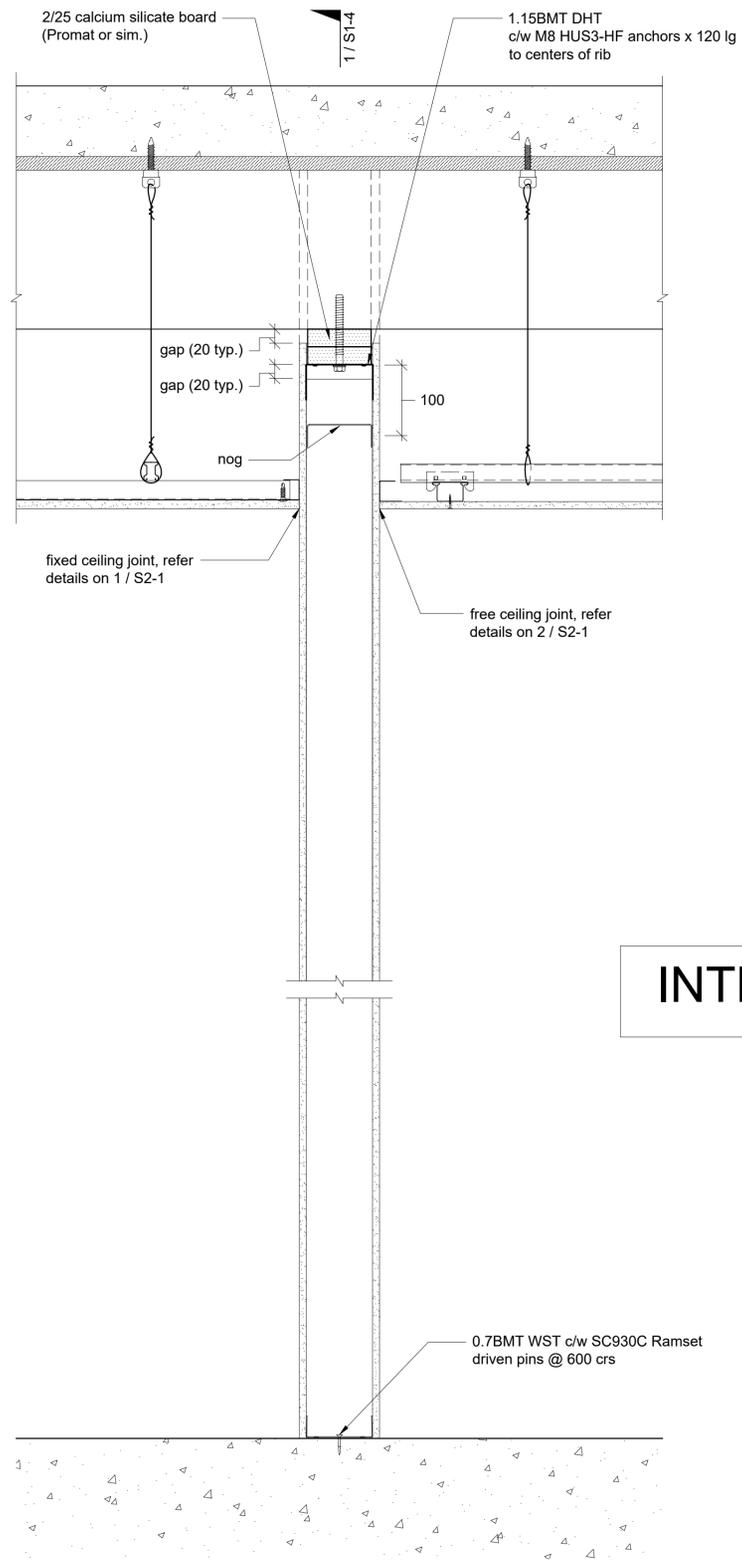


Client:
ACCURATE INTERIORS LTD.

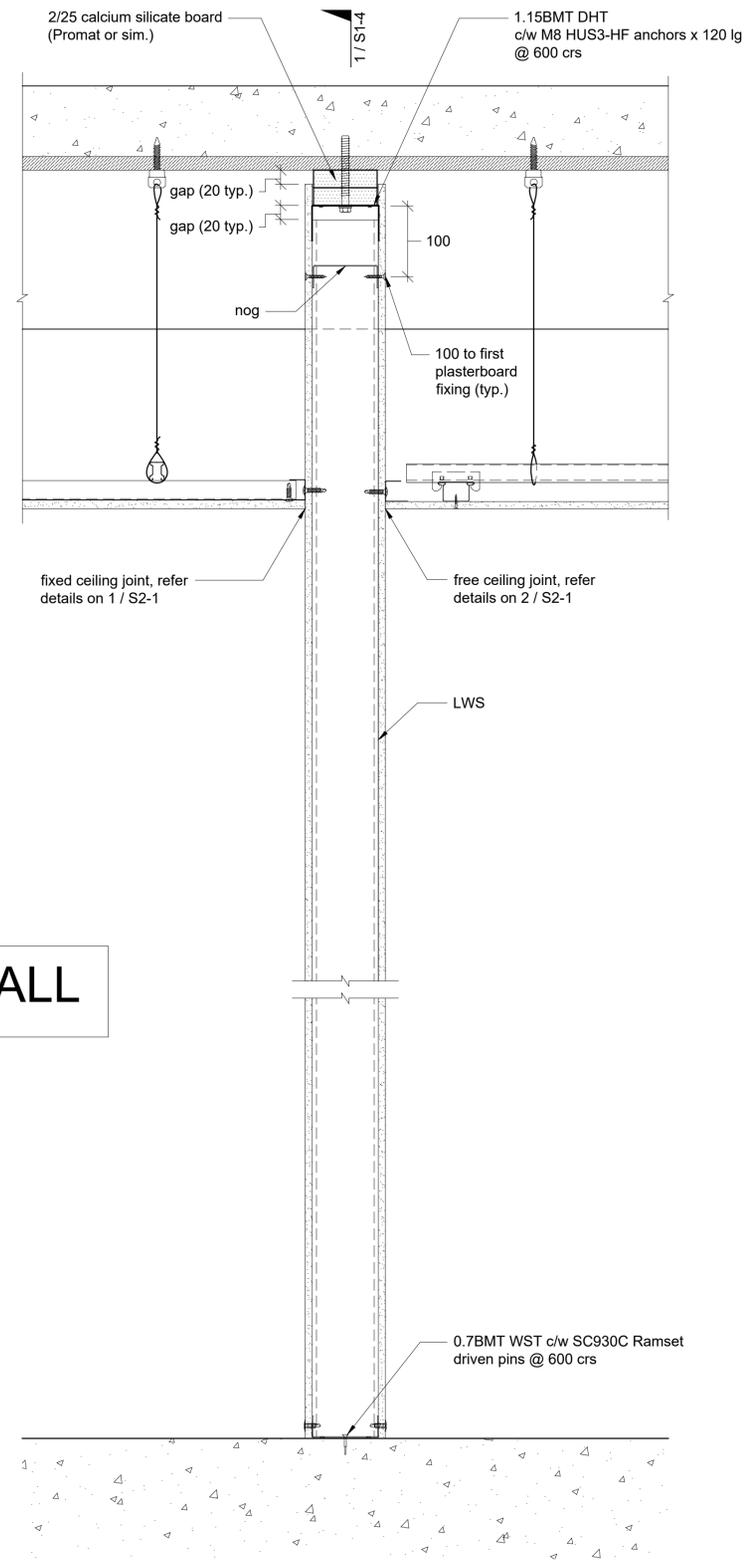
Project:
**ACCURATE CEILINGS ECOPLUS
TYPICAL DETAIL**

Drawing Title:
PERPENDICULAR TO RIB DETAILS

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Dwn By: AC	No.	Revision	By Date
Engineer: AK	18830	S1-2	A

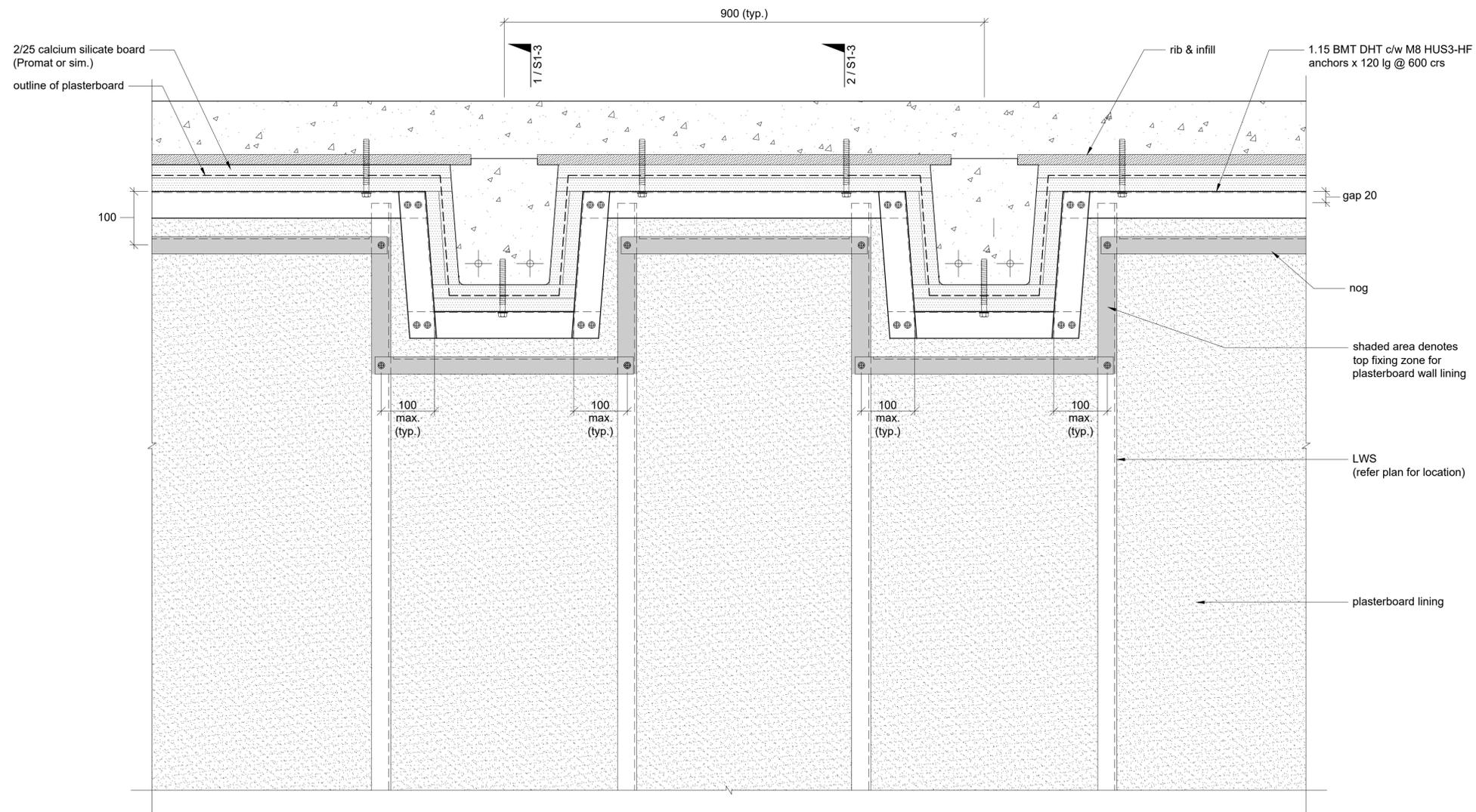


1 PERPENDICULAR TO RIB (AT RIB)
1:5



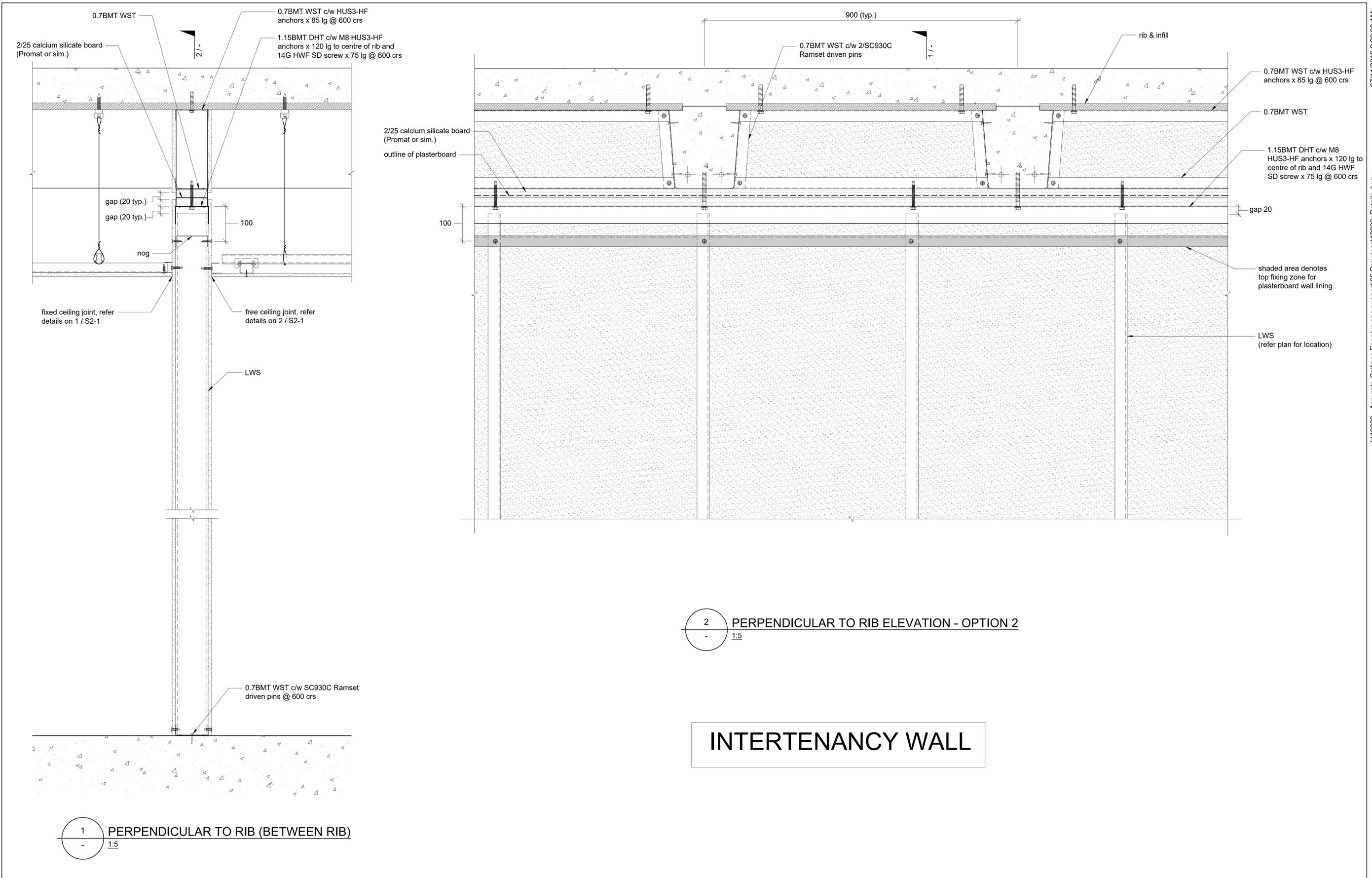
2 PERPENDICULAR TO RIB (BETWEEN RIB)
1:5

INTERTENANCY WALL



1 PERPENDICULAR TO RIB ELEVATION - OPTION 1
1:5

INTERTENANCY WALL

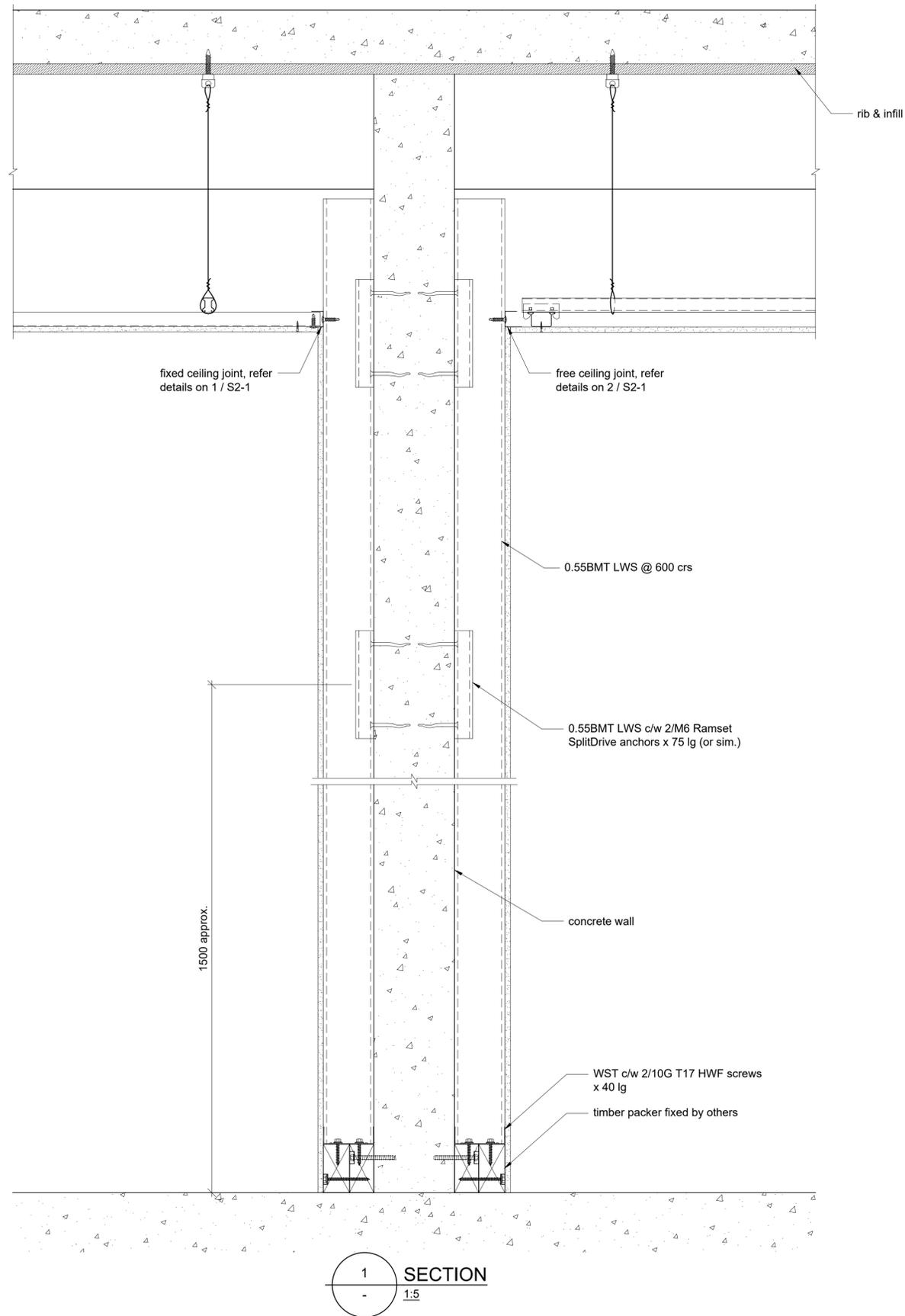


2 PERPENDICULAR TO RIB ELEVATION - OPTION 2
1:5

INTERTENANCY WALL

1 PERPENDICULAR TO RIB (BETWEEN RIB)
1:5

	Client:	ACCURATE INTERIORS LTD.	Project:	ACCURATE CEILINGS ECOPLUS TYPICAL DETAIL	Drawing Title:	PERPENDICULAR TO RIB DETAILS (OPTION 2)	Scale (A1): 1:5		
							Scale (A3): 1:10		
							Dwn By: AC	No. A	FOR INFORMATION
							Engineer: AK	Job No. 18830	Revision S1-5
									AC 10.07.19 By Date Revision A



INTERTENANCY WALL

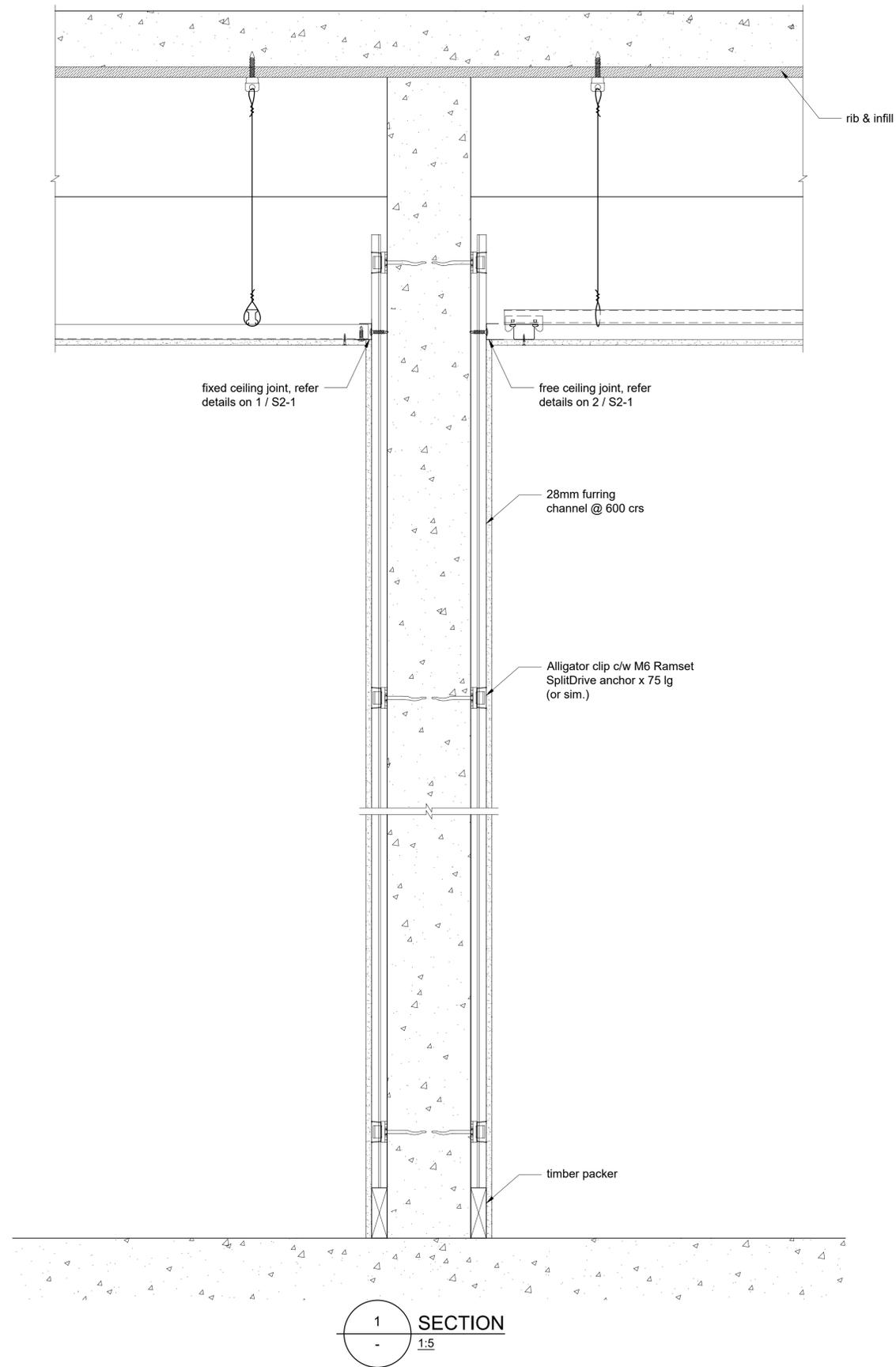


Client:
ACCURATE INTERIORS LTD.

Project:
ACCURATE CEILINGS ECOPLUS
TYPICAL DETAIL

Drawing Title:
CONCRETE LINED WALLS
(OPTION 1)

Scale (A1): 1:5			
Scale (A3): 1:10	A	FOR INFORMATION	AC 10.07.19
Dwn By: AC	No.	Revision	By Date
Engineer: AK	Job No. 18830	Drawing No. S1-6	Revision A



INTERTENANCY WALL

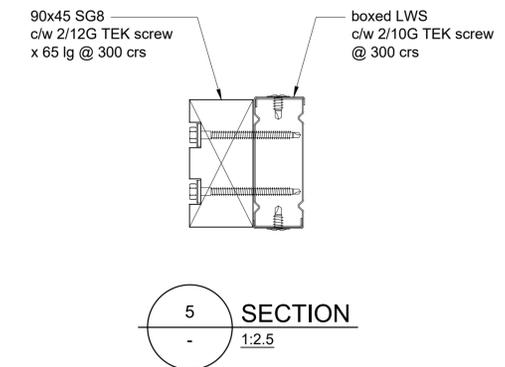
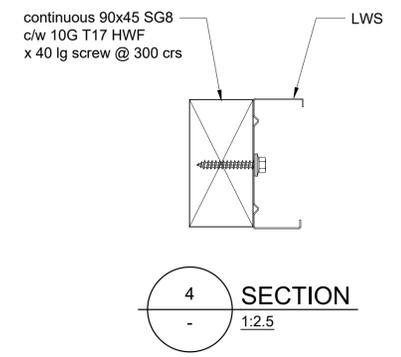
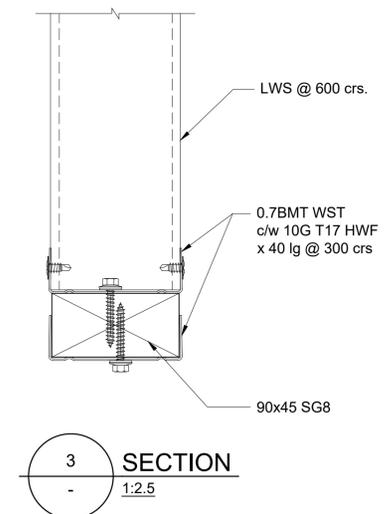
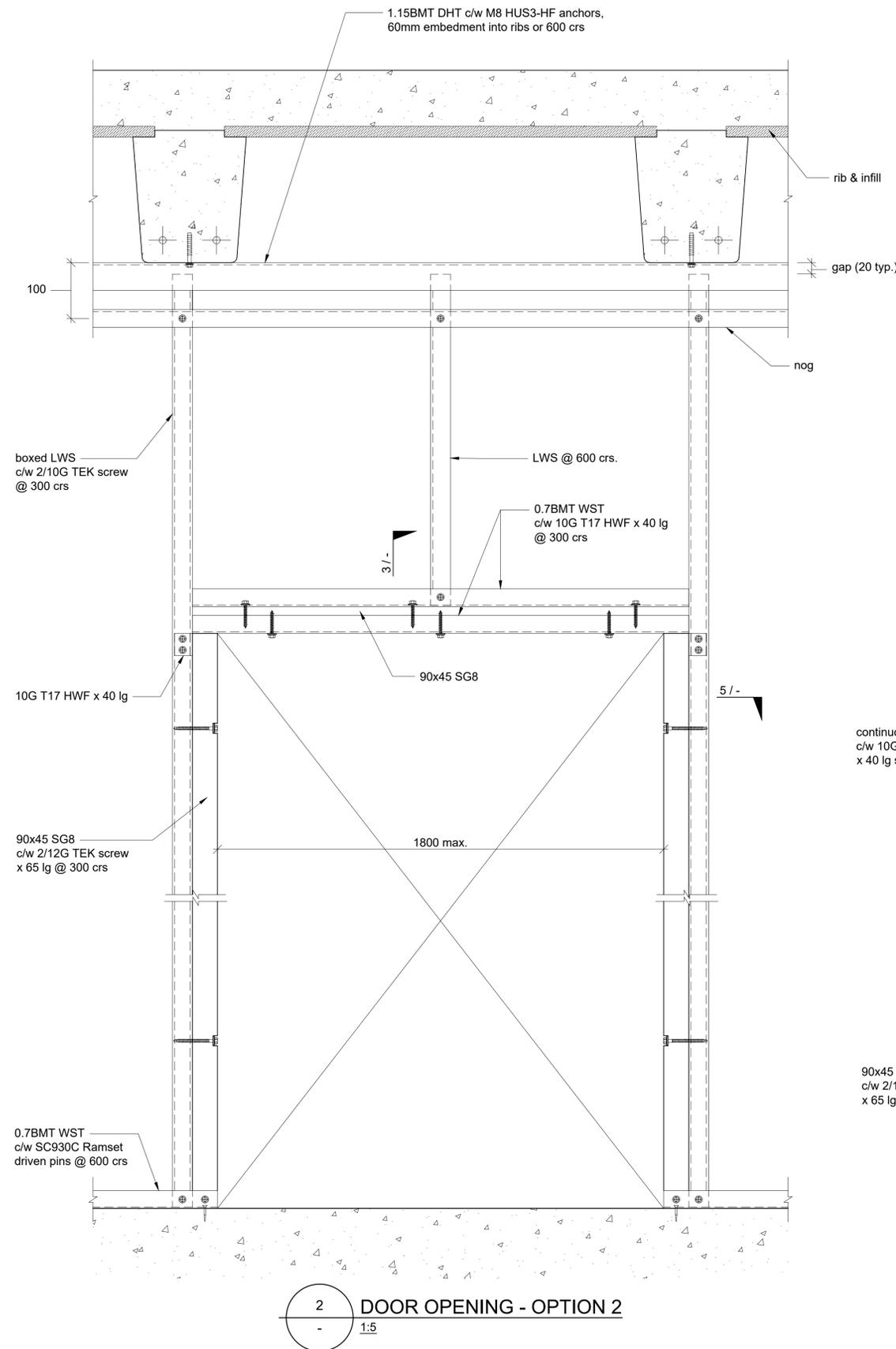
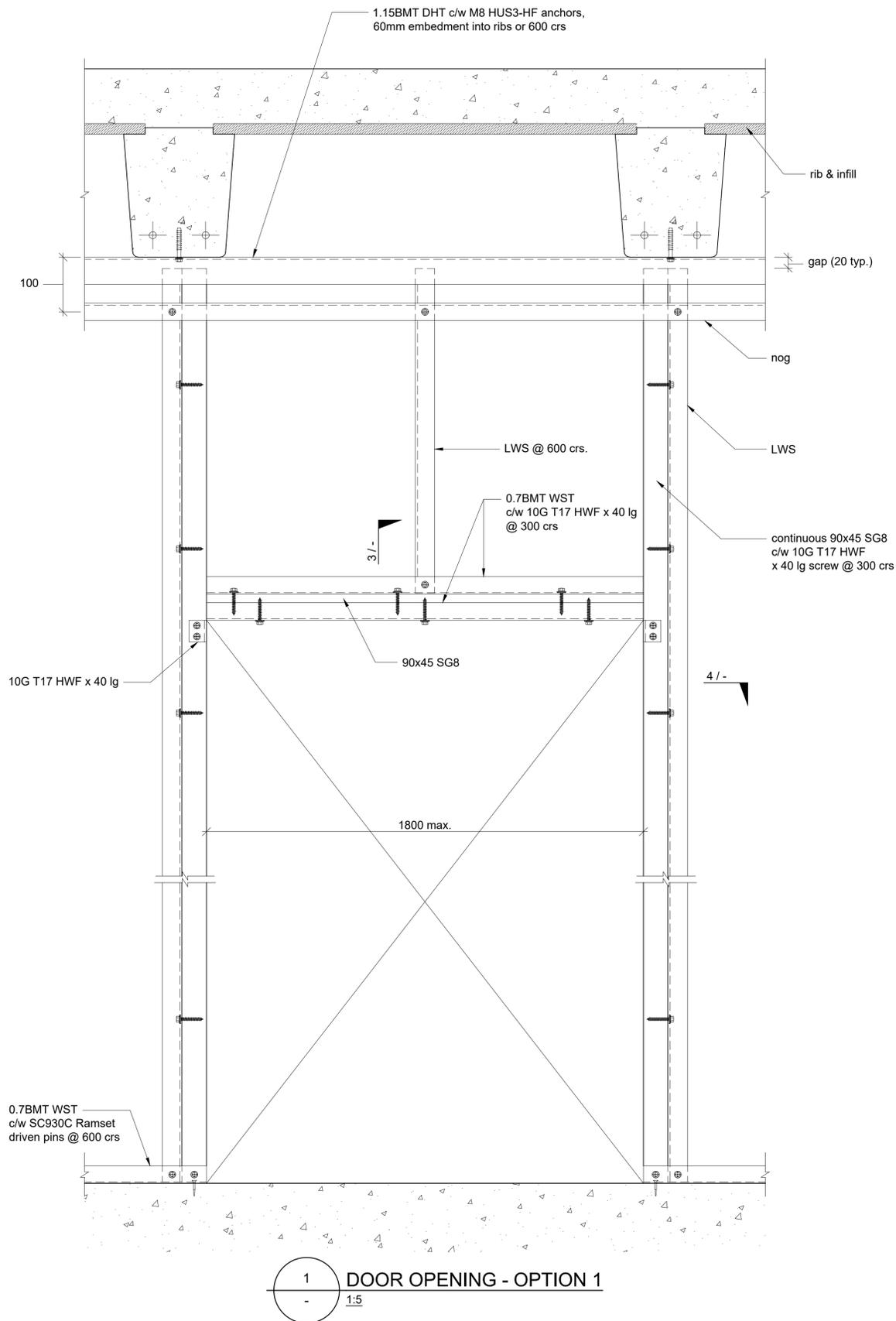


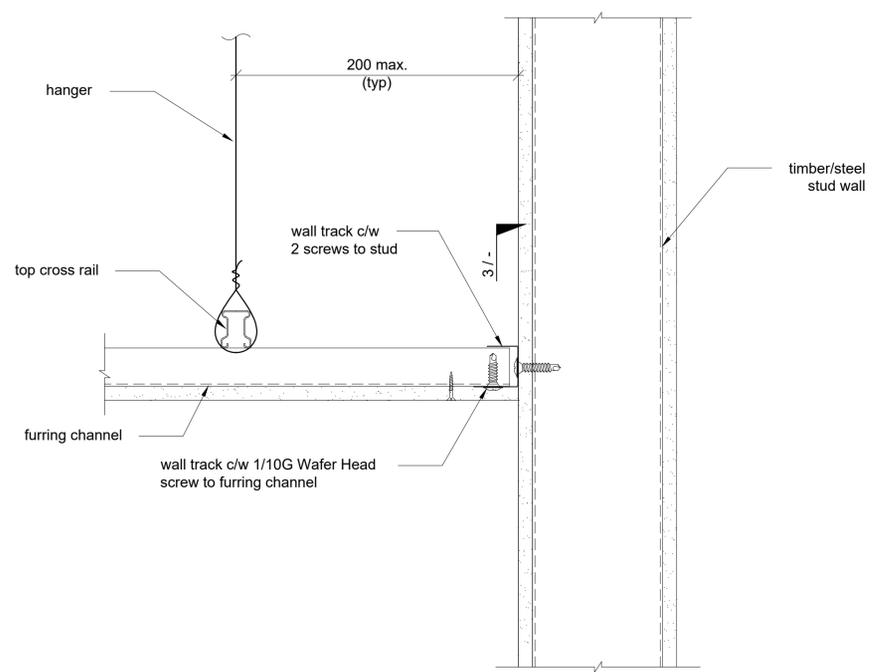
Client:
ACCURATE INTERIORS LTD.

Project:
**ACCURATE CEILINGS ECOPLUS
 TYPICAL DETAIL**

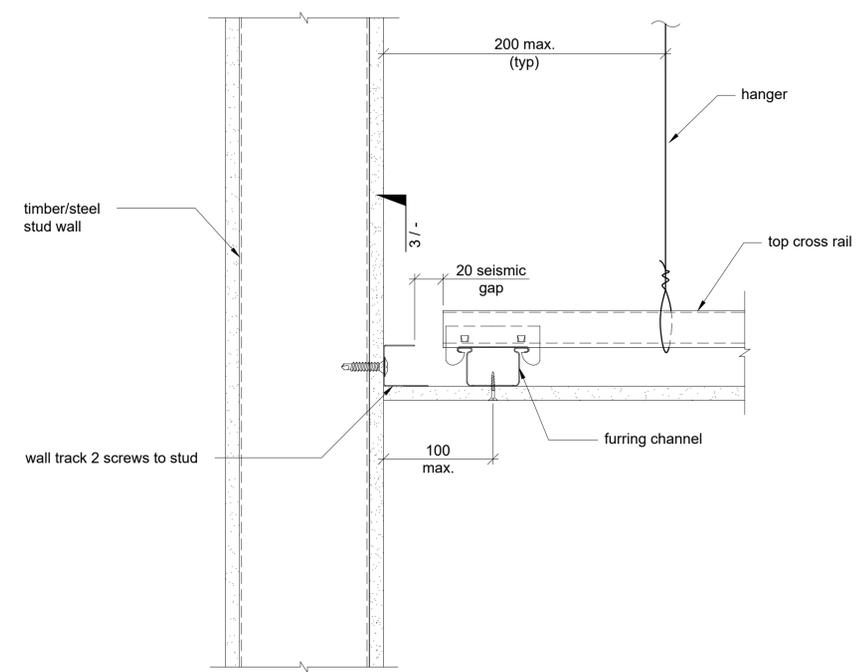
Drawing Title:
**CONCRETE LINED WALLS
 (OPTION 2)**

Scale (A1): 1:5			
Scale (A3): 1:10	A	FOR INFORMATION	AC 10.07.19
Dwn By: AC	No.	Revision	By Date
Engineer: AK	18830	S1-7	A





1 FIXED JOINT
1:2.5



2 FREE JOINT
1:2.5

