

ADVANCED CIVIL
DESIGN SERVICES P/L

ACN 052 200 852 All Correspondence to
PO Box 2697
Bowral NSW 2576

ENGINEERING CONSULTANTS
TEL 0403372982

2nd October 2013

Reference No.
Our Reference. 013 20

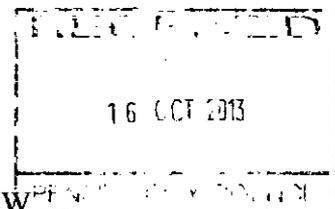
SMARTSLAB PTY LTD
64 Ascot Road
Bowral NSW 2576
PH: (02) 48615541, FAX: (02) 48615548

CERTIFICATION

For: Rawson Homes

Project: At: Unit ½ Lot 1161 Sydney Smith Drive Thornton NSW

Scope : Suspended Concrete First Floor: SMARTSLAB
Floor Live Load: .1.5 kPa



Subject to specifications, reports & other correspondence to this project, the Smartslab suspended concrete first floor and steel structure support at the above address has been designed to satisfy all requirements of:

AS1170.1 Dead and live loads and load combinations
AS3600 Concrete structures
AS4100 Steel structures
AS/NZS4600 Cold-formed steel structures, and the
Building Code of Australia.

This certification does not relieve other parties of their responsibilities.
For and on behalf of Advanced Civil Design Services P/L,

Nelson Semaan
MIEAust CPEng NPER-3.

MANAGING DIRECTORS
MATTHEW PALAVIDIS
VICTOR FATTORETTO

DIRECTOR
MATTHEW SHIELDS

**ACOUSTIC
LOGIC**



20110021.1/1901A/R4/JG

19/01/2011

Smart slab P/L
PO Box 2697
Bowral NSW 2576

Email: Sales @smartslab.com

Smartslab Acoustic Opinion

1 INTRODUCTION

This letter provides our opinion regarding the impact and airborne sound insulation for Smartslab floor/ceiling system.

2 SMARTSLAB PREDICTED ACOUSTIC PERFORMANCE

2.1 AIRBORNE NOISE

Predictions for the acoustic performance for the Smartslab floor and ceiling system consisting of *13mm plasterboard direct fixed to underside of 250mm high joists on 600mm centres (250mm airgap) to 70mm thick, 2200 kg/m³ density concrete slab, with 75mm thick 11.8kg/m³ density glasswool in the ceiling cavity* indicate this system will comply with the airborne rating of $R_w + C_{tr} \geq 50$.

2.2 IMPACT NOISE

Impact noise transmission from hard floors, such as tiled and timber flooring, would typically be treated by using a resilient underlay installed on the concrete floor surface prior to installation of the finished floor material. The Smartslab system as specified and incorporating carpet, or a suitable resilient underlay under hard floors, would indicatively comply with the impact rating required by the BCA, $L_{ntw} + C \leq 62$.

SYDNEY
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SYDNEY MELBOURNE BRISBANE CANBERRA
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2.3 RECOMMENDATIONS

The actual rating of the floor/ceiling will depend on the number and type of light fittings used, whether open return air grilles are used into the ceiling, etc.

In the case of the proposed floor/ceiling system, the expected performance is at or marginally better than the BCA requirement, so the performance reduction from ceiling penetrations must be kept small.

2.4 SYSTEM DESIGN

As with all floor/ceiling systems factors other than direct transmission through the floor/ceiling elements can influence the in-field performance.

Small penetrations, such as those for non-gimble down light fitting, generally result in a minor reduction in the performance of the system.

Larger penetrations, such as those for open return air grilles will require detailed assessment. Typical treatment may comprise sheet metal plenum boxes with acoustic flexible ducts transferring air into the ceiling void.

Some additional design and coordination would be needed to integrate the floor/ceiling performance with the services, address any potential flanking paths to ensure that the required floor/ceiling performance is maintained, and also to address any noise generated by in-ceiling services such as waste pipes and air conditioning units.

It is noted that in-field performance will depend on a number of factors and where a guarantee of minimum field performance is required, specific project advice should be sought from a specialist acoustics consultant to determine whether the systems and installation methods are applicable or suitable.

3 CONCLUSION

We trust this information is satisfactory. Please contact us should you have any further queries.

Yours faithfully,



Acoustic Logic Consultancy Pty Ltd
James Galloway



Our Ref: FCO-2050/CO3785
GEC:gec

Smartslab
Level 14, 122 Arthur Street
North Sydney NSW 2060

Attention: Brad Golledge

SMARTSLAB FLOOR SYSTEM
Assessment Number FCO-2050
Your meeting with Garry Collins 4 August.

INTRODUCTION

We have re-examined the information referenced by you on your floor system to determine the likely performance if it was tested in accordance with AS 1530.4-1997. The information included

- Australian Standard 2327 Composite structures, Part 1: Simply supported beams - 1996;
- test data on the insulation performance of various layers of plasterboard insulation; and
- preliminary design tables.

We have retained these documents and information.

ANALYSIS

Equation 10.4(1) of Section 10 of AS 2327.1-1996 specifies the determination of the limiting temperature of the composite steel beams as

$$T_l = 905 - 690r_f$$

where r_f is the maximum value along the length of the beam of the ratio of the design bending moment, under the design load for fire, to the design moment capacity at room temperature.

Subsequently, in equation 10.6(1), AS 2327.1 defines the equation for determining the time at which this limiting temperature will be reached for an unprotected steel section.

THIS ASSESSMENT SUPERSEDES FCO-2050 DATED 7 JANUARY 2002.

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This time is to be determined as

$$t = -5.2 + 0.0221T + \left(\frac{0.433T}{k_{sm}} \right)$$

where

t = time from the start of the test, in minutes
 T = Steel temperature °C
 k_{sm} = exposed surface to mass ratio

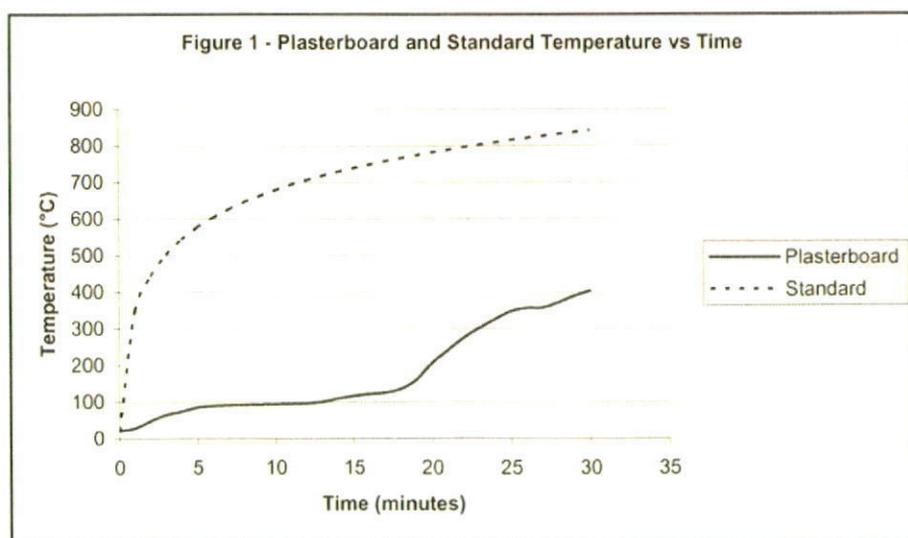
Based on these equations, the specified dead load (2.3 kPa) and live load (1.5 kPa) and the Design Load for Fire (1.1G + $\psi_c Q$ – AS 1170.1) you have produced two tables predicting the fire resistance of your Smartslab systems. For the purpose of this assessment three configurations are highlighted ie.

B20050-16 spanning 3000 mm with joists at 600-mm centres;
 B20050-20 spanning 3500 mm with joists at 600-mm centres; and
 B25050-20 spanning 5500 mm with joists at 600-mm centres.

The calculated structural adequacy period for fire (minutes) for these systems was 20.82, 20.80 and 18.32 respectively. The propose floor/ceiling systems are the stipulated beams supporting a 70-mm thick concrete slab and sheeted on the underside with 13-mm thick standard grade CSR, Boral or Pioneer plasterboard.

Structural Adequacy

Figure 1, below, show the typical temperature on the unexposed face on one layer of standard grade plasterboard as compared to that of the standard fire that would be directly applied to the underside of your floor system.



The graph is an idealised output for the plasterboard as it assumes that the sheeting will remain intact for up to 30 minutes. Experience has shown that this is not the case and that the sheeting will fall way between 10 and 15 minutes after initial exposure. Once this fall off has occurred the steel joists would be exposed to the full temperature of the furnace and the normal structural response would primarily be initiated from this point in time.

Insulation

Table 5.5.1 of AS 3600 – 2001 stipulates that an effective thickness of 60 mm of concrete is required to provide 30 minute. The proposed floor system has 70 mm of concrete with additional insulation to be provided by a single layer of 13-mm thick plasterboard sheeting.

OPINION/CONCLUSION

Based on the factors detailed above it is the opinion of the Division that the Smartslab floor systems, comprising a 70 mm concrete slab supported by

B20050-16 spanning up to 3000 mm with joists at 600-mm centres;
B20050-20 spanning up to 3500 mm with joists at 600-mm centres; or
B25050-20 spanning up to 5500 mm with joists at 600-mm centres.

sheeted on the underside as specified by the manufacture by one layer of 13-mm thick CSR, Boral or Pioneer standard grade plasterboard and supporting a maximum dead load of 2.3 kPa and a maximum live load of 1.5 kPa would be capable of achieving fire-resistance levels of 30/30/30 if tested in accordance with AS 1530.4-1997.

TERM OF VALIDITY

This assessment report will lapse on 31 August 2014. Should you wish us to re-examine this assessment with a view to the possible extension of its term of validity, would you please apply to us three to four months before the date of expiry. This Division reserves the right at any time to amend or withdraw this report in the light of new knowledge.

Yours faithfully,



Garry E Collins
Manager, Fire Testing and Assessments.

11 August 2009



Our Ref: FCO-1797/CO3785
GEC:gec

Smartslab
Level 14, 122 Arthur Street
North Sydney NSW 2060

Attention: Brad Golledge

PLASTERBOARD PROTECTION SYSTEMS
Assessment Number FCO-1797
Your meeting with Garry Collins 4 August.

INTRODUCTION

We have re-examined the information referenced by you on the likely fire performance of plasterboard protection systems to be used in your Class 2 Type A buildings. The information included

- data from numerous fire tests on your various sheeting configurations;
- your letter of 13 March 2001 stating that Smartfloor will now be marketed under the name Smartslab, which is in fact the same product, and also notifying us of a change of company name to Smartslab; and
- your sketches of the proposed wall and ceiling systems.

We have retained these documents.

ANALYSIS

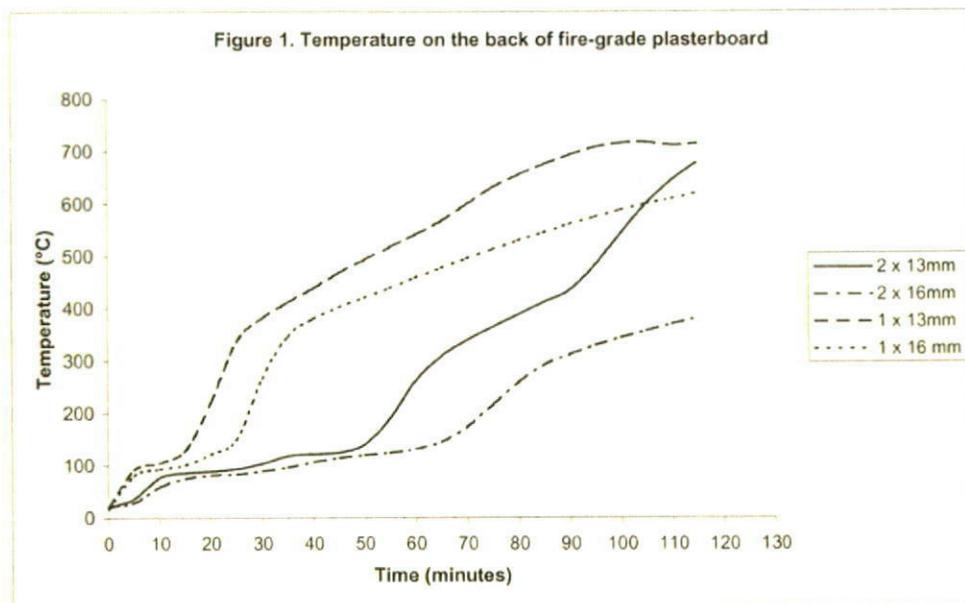
As stated in your letter of 18 January 2000, you are proposing plasterboard protection systems to be utilised in Class 2 Type A buildings, which require fire-resistance levels (FRL) of 90/90/90. The basis of the proposal is the utilisation of the "Smartslab" floor system supported by steel columns that are to be built into the internal and external timber-stud wall systems and beams within the ceiling system.

Figure 1, below, shows graphically the typical temperature recorded on the back of one and two layers 13-mm thick fire-grade plasterboard and one and two layers of 16-mm thick fire-grade plasterboard orientated vertically and subjected to the standard fire exposure. Provided that the plasterboard remains in place, then it is conservative to assume that the steel temperature of the columns and joists is also at this temperature at the specified times. This assumption ignores the time lag that would occur as the steel mass absorbs the heat energy.

As can be seen from Figure 1, the steel temperature after 90 minutes exposure would be approximately 434°C when protected by two layers of 13-mm plasterboard and approximately 311°C when protected by two layers of 16-mm plasterboard. At these temperatures the yield stress of the steel would be approximately 68% and 86%, respectively, of the ambient temperature yield stress. Structural design methods would normally keep the steel stress below these levels.

THIS ASSESSMENT SUPERSEDES FCO-1797 DATED 16 MARCH 2001.

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Additionally, Figure 1 shows that at 60 minutes the temperature on the back of one layer of 13-mm thick fire-grade plasterboard is approximately 540°C and 458°C on the back of a layer of 16-mm thick fire-grade plasterboard. At these temperatures the yield strength of the steel has dropped to approximately 53% and 65% of the ambient value, respectively.

For the external walls, the additional insulation provided by the 110-mm brickwork would upgrade the timber-stud framed-wall system to 90/90/90 provide that the brickwork is tied to the frame in the normal way to reinforce the structural stability of the masonry.

OPINION/CONCLUSION

Based on the factors detailed above it is the opinion of the Division that the following systems would be capable of achieving the designated fire-resistance levels if designed in accordance with the relevant structural design codes and subjected to the standard fire exposure of AS 1530.4-1997.

System	Conditions	FRL
Smartslab system supported by steel beams with two layers of 16-mm thick CSR, Boral or Pioneer fire-grade plasterboard direct fixed to the underside of the beams and joists.	The plasterboard is to be fixed as detailed in the CSR, Boral or Pioneers ceiling systems specifications.	90/90/90
Steel columns protected by two layers of 16-mm mm thick CSR, Boral or Pioneer fire-grade plasterboard and integral with an internal non-rated wall system.	The plasterboard is to be mechanically fixed to the columns with overlapping corners.	90/90/90
Steel columns protected by two layers of 13-mm thick CSR, Boral or Pioneer fire-grade plasterboard and integral with an internal non-rated wall system.	Structural analysis is to verify that the stress imposed on the columns is less that 68% of their ultimate yield strength. The plasterboard is to be mechanically fixed to the columns with overlapping corners.	90/90/90

System (cont'd)	Conditions	FRL
Steel columns positioned in the cavity of the brick veneer external wall with the exposed internal face sheeted with two layers of 16-mm thick CSR, Boral or Pioneer fire-grade plasterboard	The plasterboard is to be fixed as detailed in the CSR, Boral or Pioneers wall systems specifications	90/90/90
Steel columns positioned in the cavity of the brick veneer external wall with the exposed internal face sheeted with two layers of 13-mm thick CSR, Boral or Pioneer fire-grade plasterboard	Structural analysis is to verify that the stress imposed on the columns is less than 68% of their ultimate yield strength. The plasterboard is to be fixed as detailed in the CSR, Boral or Pioneers wall systems specifications	90/90/90
Smartslab system supported by steel beams with one layer of 16-mm thick CSR, Boral or Pioneer fire-grade plasterboard direct fixed to the underside of the beams and joists.	Structural analysis is to verify that the stress imposed on the beams and joists is less than 65% of their ultimate yield strength. The plasterboard is to be fixed as detailed in the CSR, Boral or Pioneers ceiling systems specifications.	60/60/60
Steel columns positioned in the cavity of the brick veneer external wall with the exposed internal face sheeted with one layer of 16-mm thick CSR, Boral or Pioneer fire-grade plasterboard or steel columns protected by one layer of 16-mm thick CSR, Boral or Pioneer fire-grade plasterboard and integral with an internal non-rated wall system.	Structural analysis is to verify that the stress imposed on the columns is less than 65% of their ultimate yield strength. The plasterboard is to be fixed as detailed in the CSR, Boral or Pioneers wall systems specifications	60/60/60

TERM OF VALIDITY

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Yours faithfully,

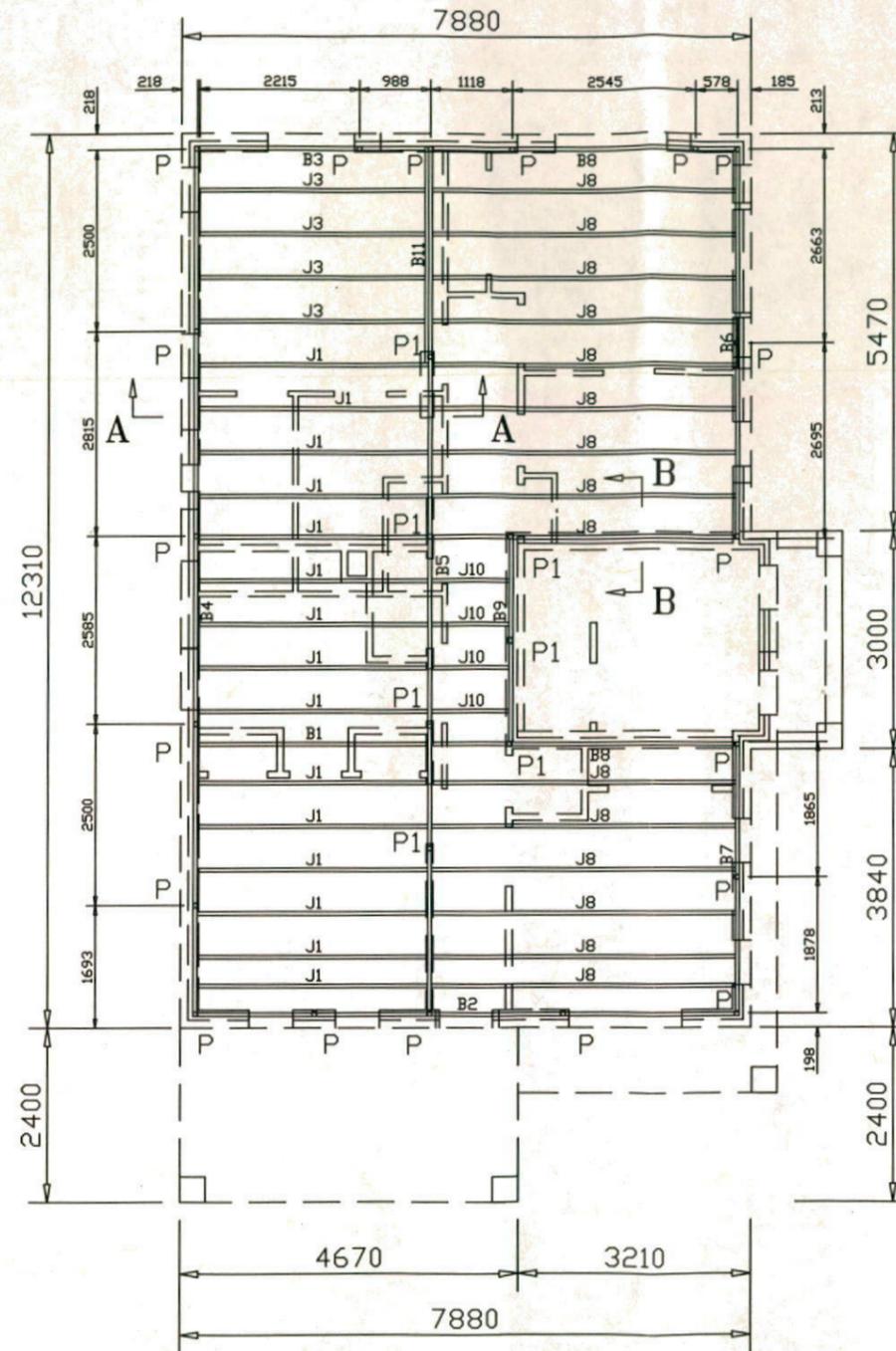

Garry Collins

Manager, Fire Testing and Assessments.

11 August 2009

Floor Member Summary

B1	B25050-20	3210	
B2	B25050-20	7480	
B3	B25050-20	3160	
B4	B25050-20	11960	
B5	B25050-20	11910	
B6	B25050-20	5380	
B7	B25050-20	3720	
B8	B25050-20	4160	2
B9	B25050-20	2790	
B11	B25050-20	2965	
J1	B25050-20	3210	15
J3	B25050-20	3160	4
J8	B25050-20	4160	15
J10	B25050-20	1030	4
Hash Total		68295	49



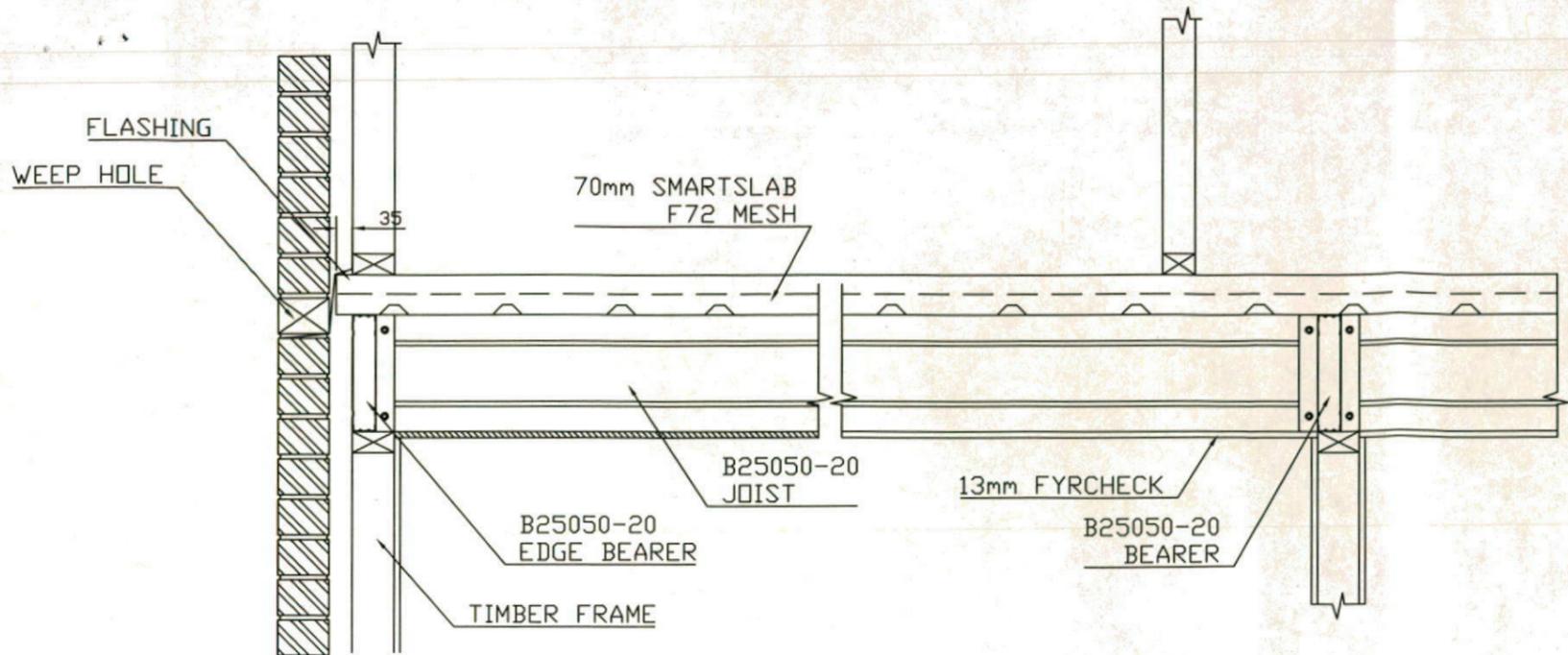
UNIT 1/2: 84 SQM

P: 75 X 75 X 2.5 SHS
P1: 65 X 65 X 2.5 SHS

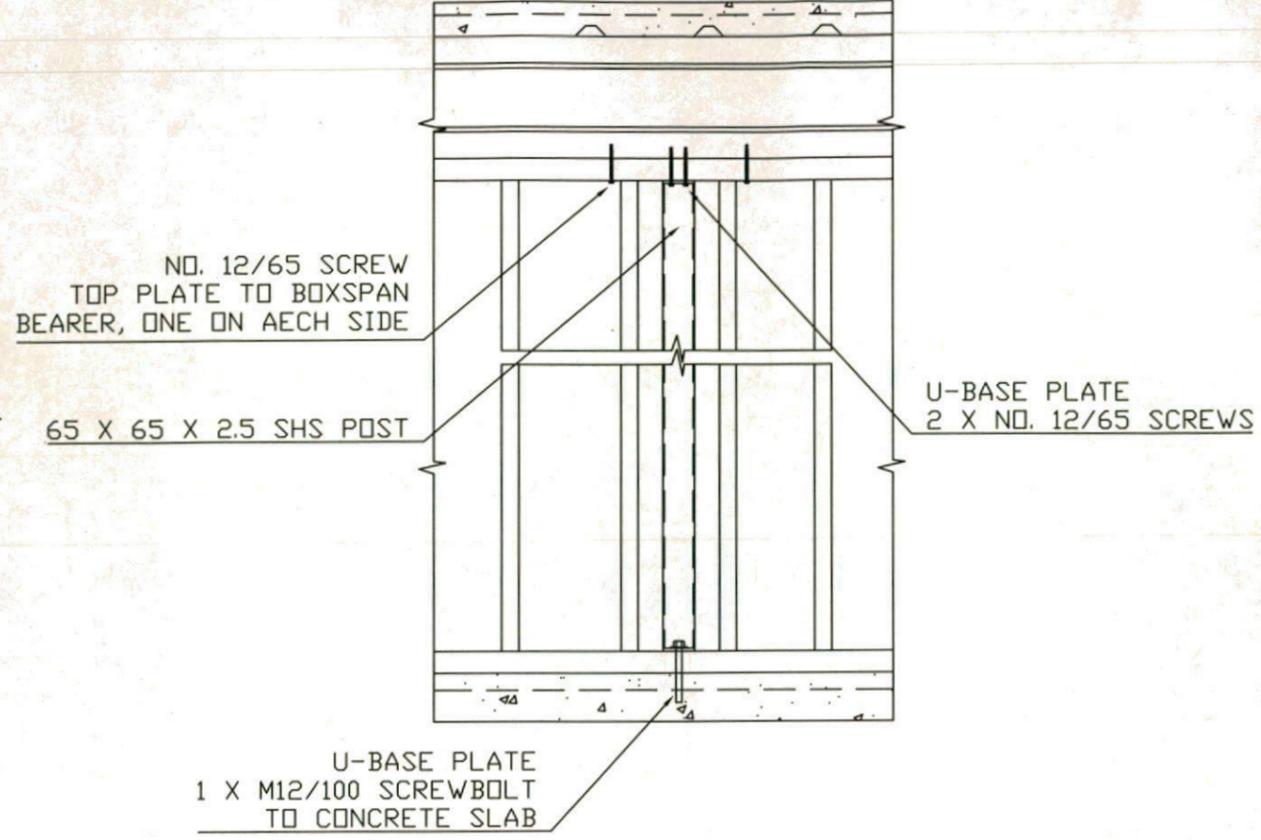
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IF IN DOUBT, ASK.

PRELIMINARY FLOOR FRAME LAYOUT

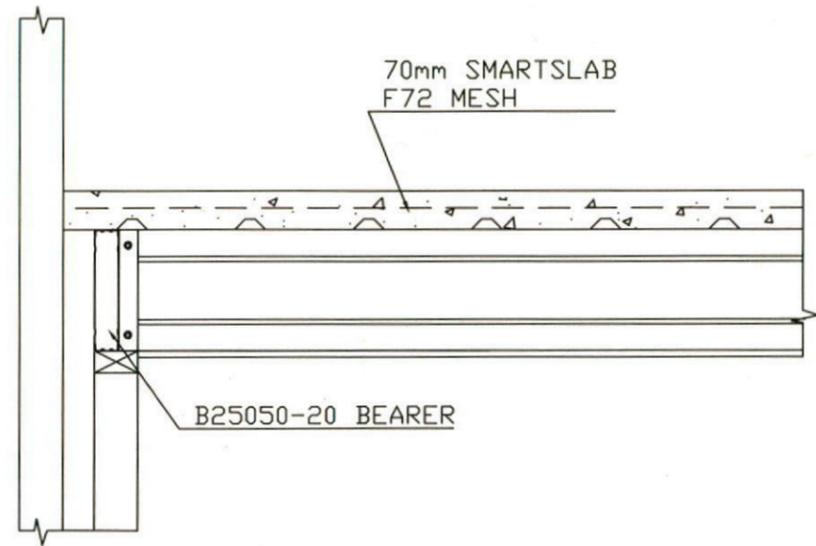
SMARTSLAB P/L		JOB DETAILS RAWSON HOMES LOT 1161 SYDNEY SMITH DRIVE TUPONTON NSW		JOB REFERENCE 1139-1	REVISION D
DRAWN P. MCGHEE	DATE DRAWN 10.06.2000	DWG FILE 11001	SCALE 1:100	VIEW NAME A	



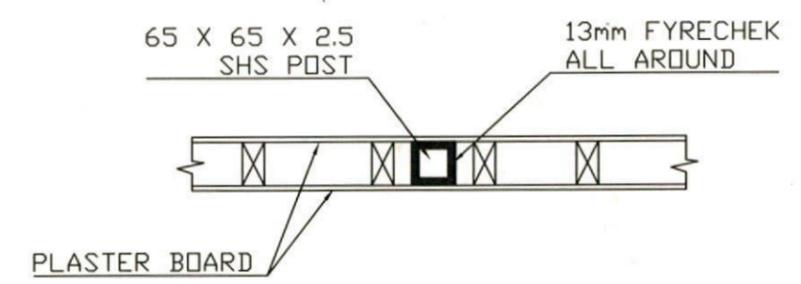
SECTION A-A TYPICAL EXTERNAL WALL DETAILS



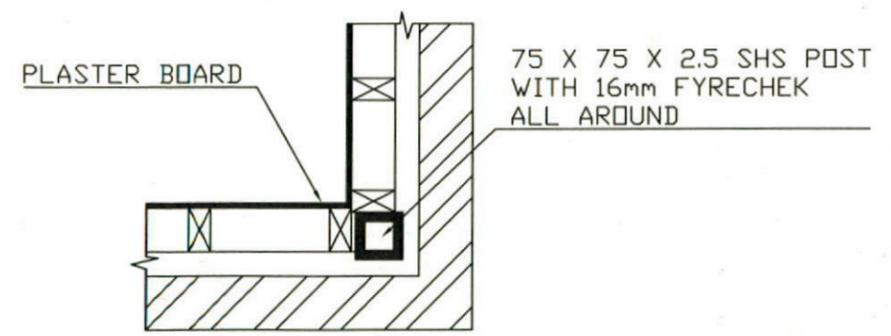
TYPICAL POST TO WALL PLATES DETAILS



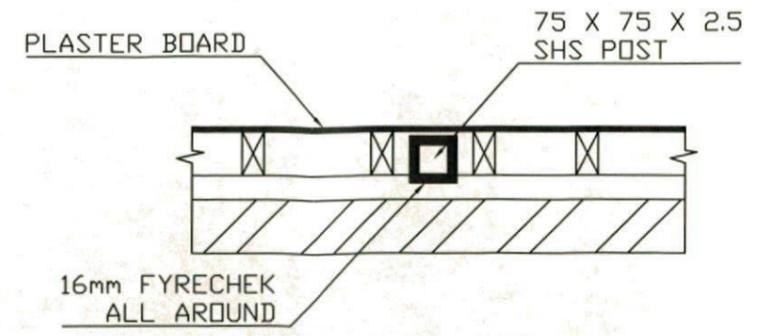
SECTION B-B



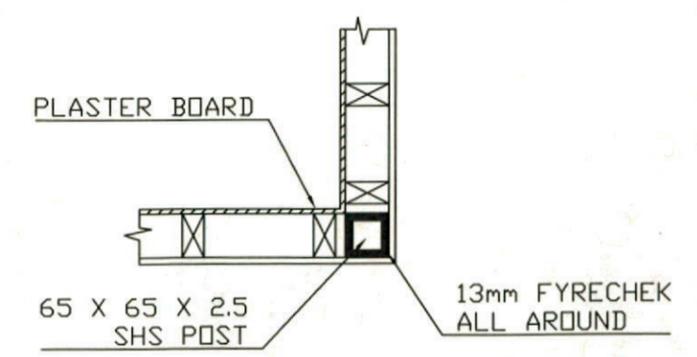
INTERNAL WALL



TYPICAL EXT. CORNER POST DETAILS



EXTERNAL WALL



INTERNAL CORNER

DO NOT SCALE.
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SMARTSLAB P/L				JOB DETAILS RAWSON HOMES UNIT 1/2, LOT 1161 SYDNEY SMITH DRIVE TUPONTON NSW			JOB REFERENCE 1139-2		REVISION B
DRAWN	DATE DRAWN	DWG FILE	SCALE	VIEW NAME					