SUPERFORM POLY BLOCK MANUAL

BRANZ Appraised
Certificate No 362

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June 2009

RAFEL™ International Ltd

INDEX

SECTION C: SUPERFORM POLY BLOCK FIRE RATED SYSTEM

SECTION D: CONSTRUCTION INFORMATION

SECTION D: CONSTRUCTION DETAILS

SHEET REVISIONS

June 2009

SF5: Minimum ground clearance changed to 150mm.
SF6: Minimum ground clearance changed to 150mm.
SF15: 7.5mm minimum reveal liner gap added.
Air seal over PEF rod 7 foam note added.
10mm minimum flashing cover to joinery note added.
SF16: 7.5mm minimum reveal liner gap added.
Air seal over PEF rod 7 foam note added.
10mm minimum flashing cover to joinery note added.
Protecto tape around entire opening note added.
SF22: 12mm minimum gap added.
SF26: Ribbon plate upsized to 75x50mm.
SF27: 35 & 50mm minimum overlap of flashing to cladding dimension added.
SF29: Refer to NZBC E2/AS1 Paragraph 9.9.10.2 for the performance of the waterproofing membrane note added.
Liquid membrane to carry 200mm under metal cap & 50mm onto wall.
SF30: Flashing overlap to roofing note added.
Upstand and cladding clearance to roof flashing dimensions added.
SF31: Minimum flange size dimension added.
SF43: New sheet added.
SF44: New sheet added.
SF45: New sheet added.

INTRODUCTION

DESCRIPTION AND STRUCTURE OF THIS MANUAL

This manual, when used in conjunction with the New Zealand Building Code, (NZBC), sets down the construction requirements for Superform **POLY** Block structures.

The first part of the manual outlines the Superform **POLY** Block system, the Superform **POLY** Block fire rated system and gives the Superform **POLY** Block product information. The scope and structural design information is also described.

Section A of the manual gives specific requirements and properties of the different components that make up the Superform **POLY** Block system. When used with the exterior wall claddings and internal linings stated as approved in this section, the Superform **POLY** Block system will satisfy the performance requirements of the NZBC.

Section B of the manual covers the requirements for buildings which are not subject to specific design. This section has been included to provide sufficient information to permit a building to be constructed without the need for specific design.

Section C of the manual covers a description of the Superform **POLY** Block Fire Rated System including BRANZ Fire Resistance Rating and specific requirements.

Section D of the manual covers construction issues and requirements when using the Superform **POLY** Block system. This section covers details used in the construction of non-specifically designed Superform **POLY** Block buildings.

Appendix A - BRANZ Appraisal.

SUPERFORM POLY BLOCK SYSTEM

The Superform **POLY** Block blockwall system represents an exciting engineering development in New Zealand. It has been designed to conform to, and comply with, New Zealand building codes, practices and construction methods, and offers excellent insulation properties for a wide range of projects. Previous uses have included housing, in-ground basements, swimming pools, multi-storey buildings, motel units and hotels.

The inherent ability to act as permanent formwork makes the Superform **POLY** Block system a cost effective, energy efficient and versatile building solution, providing scope for

the designer to incorporate features such as curved profiles for archways and circular window openings.

The Superform **POLY** Block system consists of factory produced, expanded polystyrene (EPS) modules which snap together on site to form hollow interlocking blocks.

Thermo Plastic PP spacer ties are inserted into each E.P.S. face shell and the interlocking blocks are stacked and filled with reinforced concrete to form solid core, permanently insulated concrete foundations, walls or other structures.

An exterior cladding system and interior lining system is then installed to complete the system. The exterior claddings and interior linings must comply with the relevant clauses of the NZBC. Approved systems are given in Section A of this manual.

SUPERFORM POLY BLOCK FIRE RATED SYSTEM

The Superform **POLY** Block Fire Rated system consists of the Superform **POLY** Block system but also includes a specific proprietary product for both the exterior finish and interior lining, thereby allowing it to be used in applications where a demonstrated fire performance is required. The fire rated system can also be used as a complete and finished wall system in its own right.

ADVANTAGES OF THE SUPERFORM POLY BLOCK SYSTEM

• **Excellent insulation**	- both sound and thermal insulation properties provided by the polystyrene blocks are superb and exceed those provided by most other cladding systems.
• **Positive interlocking**	- provides added stability.
• **Non modular construction is easy**	- design does not have to be set out to modular sizes.
• **Environmentally friendly**	- No CFC's.
• **Mechanical fixing**	- screw fixing directly into Thermo Plastic PP spacer ties.
• **Flat polystyrene sheets**	- save storage space. E.g. $10m^2$ wall = $1m^3$ only of materials. Freight costs are more than halved using this assembled on site system.
• **Thermo Plastic PP ties** (inserted during installation)	- avoid the inconvenience of lifting blocks over vertical steel bars. - eliminate unsightly rust stains.

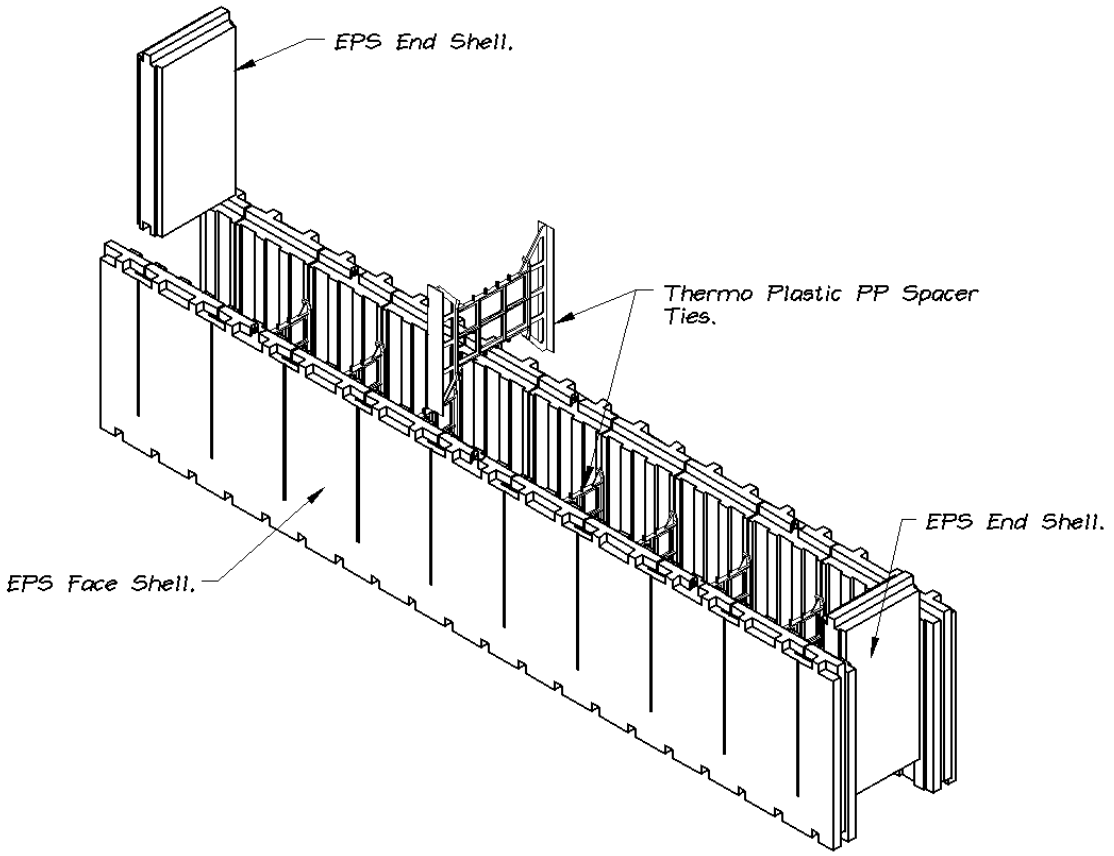
PRODUCT INFORMATION

COMPOSITION

The Superform **POLY** Block system is based on EPS (Expanded Polystyrene) blocks, injection moulded from fire retardant polystyrene beads. The formed blocks are Grade H EPS, manufactured to a finished density of 24-26 kg/m^3. Manufacturing Quality Control ensures each block is visually checked for fill, fusion and cooling completion.

The blocks are connected by a continuous series of interlocking grooves and ribs.

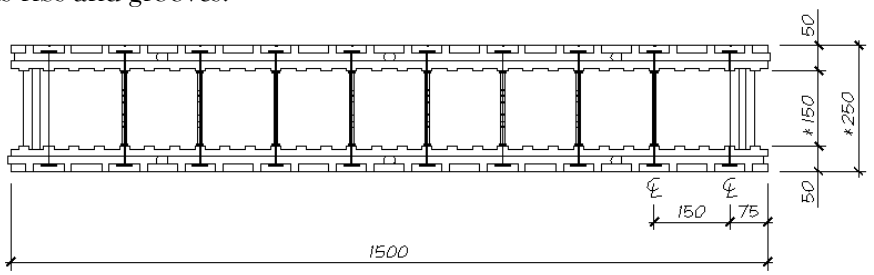
Superform **POLY** Blocks are intended for use in the construction of reinforced concrete walls, as permanent formwork. This innovative building system provides excellent thermal and acoustic insulation properties.



THE TYPICAL SUPERFORM POLY BLOCK

DIMENSIONS POLY BLOCK

The standard polystyrene face shell gives a wall coverage of 1500mm long and 300mm high. Thermo Plastic PP spacer ties are inserted into each polystyrene face shell to form block modules. Each block is connected to the previous course by the interlocking of continuous ribs and grooves.



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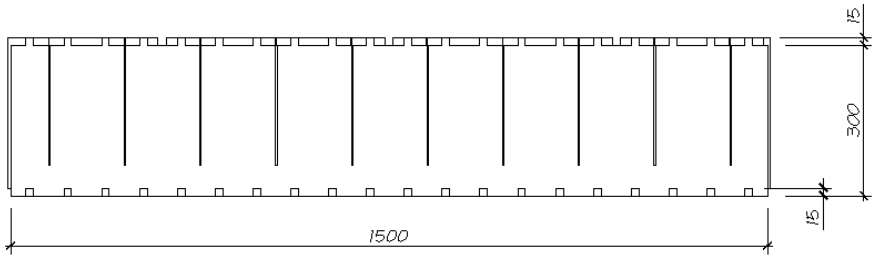

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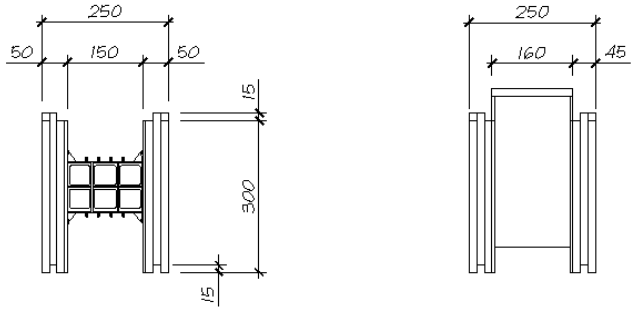


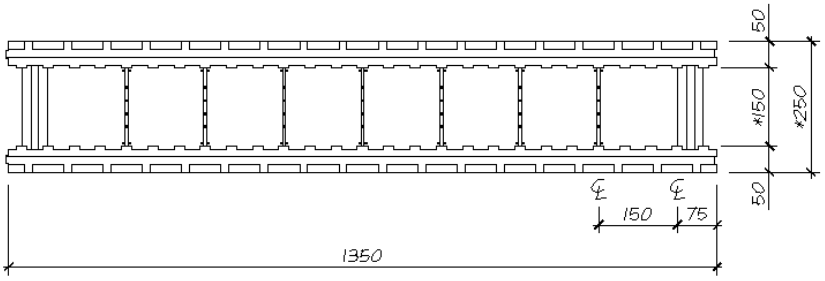
END ELEVATIONS

THE TYPICAL SUPERFORM POLY BLOCK

*** Note:** Typical block shown is 150mm concrete infill (250mm wide). Also available are infill sizes varying from 100mm (200mm wide) to 300mm (400mm wide) in thickness.

DIMENSIONS MOULDED BLOCK

The standard polystyrene face shell gives a wall coverage of 1350mm long and 300mm high. Thermo Plastic PP spacer ties are moulded into each polystyrene face shell to form block modules. Each block is connected to the previous course by the interlocking of continuous ribs and grooves.



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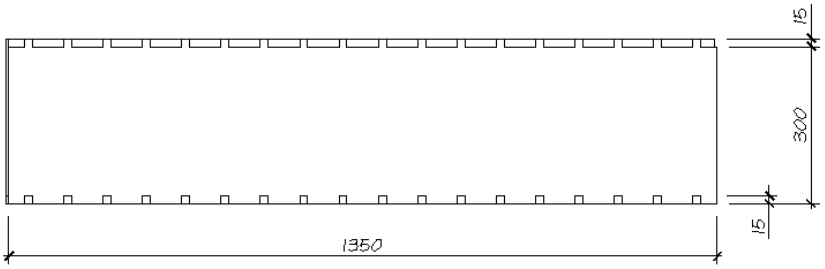

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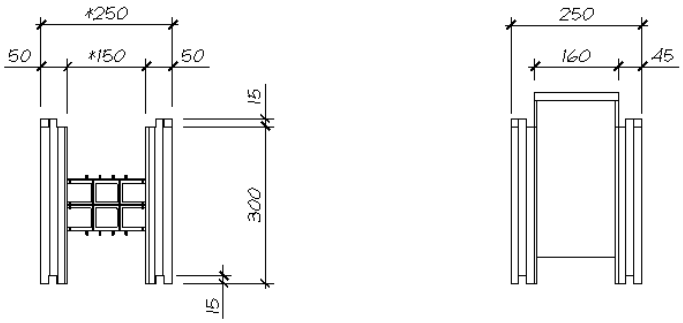


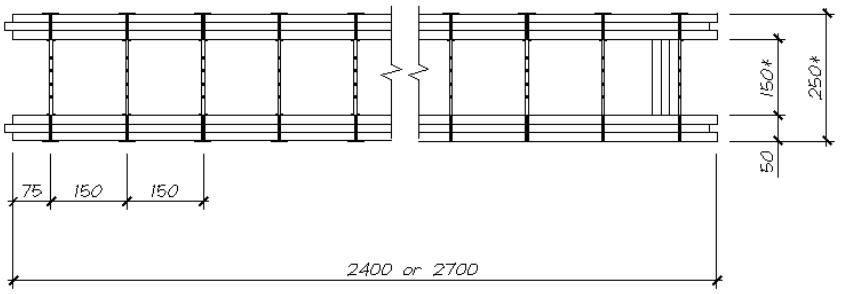
END ELEVATIONS

THE TYPICAL SUPERFORM MOULDED BLOCK

*** Note:** Moulded block available in 150mm concrete infill only (250mm wide).

DIMENSIONS PANEL BLOCK

The standard polystyrene face shell gives a wall coverage of 2400mm or 2700mm long and 300mm high. Thermo Plastic PP spacer ties are inserted into each polystyrene face shell to form block modules. Each block is connected to the previous course by the interlocking of continuous ribs and grooves.



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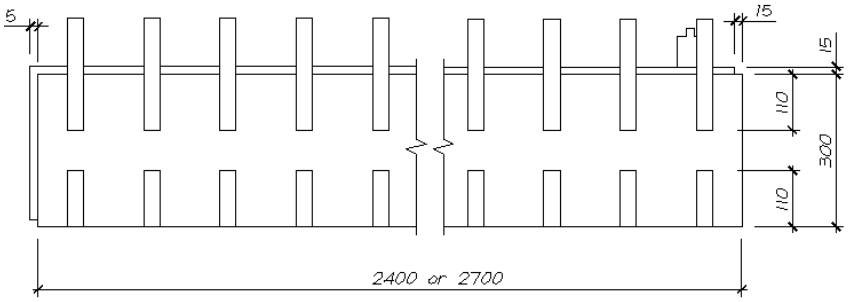

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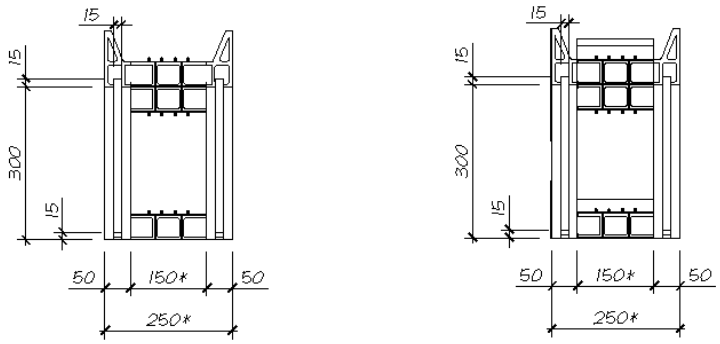


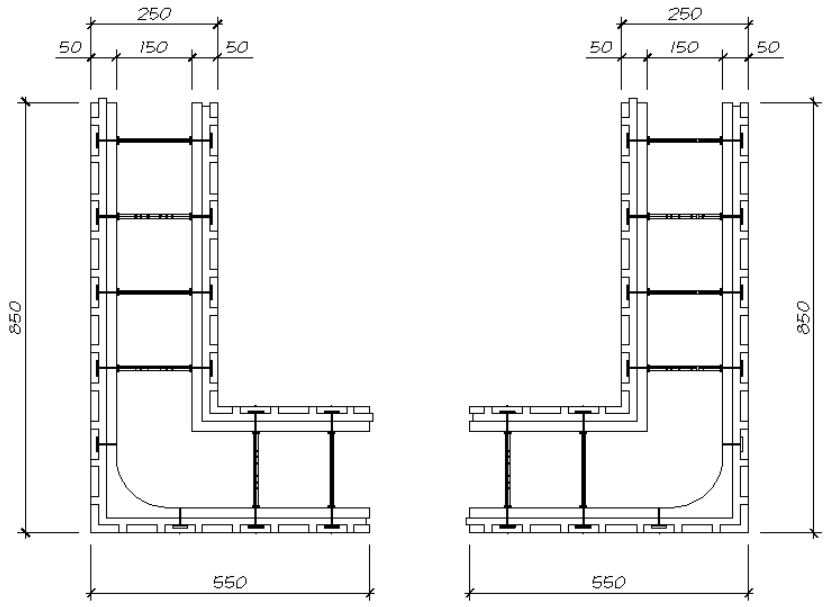
END ELEVATIONS

THE TYPICAL SUPERFORM PANEL BLOCK

*** Note:** Typical block shown is 150mm concrete infill (250mm wide). Also available are infill sizes varying from 100mm (200mm wide) to 300mm (400mm wide) in thickness.

DIMENSIONS CORNER BLOCK

The standard polystyrene face shell gives a wall coverage of 850mm long and 300mm high. Thermo Plastic PP spacer ties are inserted into each polystyrene face shell to form block modules. Each block is connected to the previous course by the interlocking of continuous ribs and grooves.



PLAN

THE TYPICAL SUPERFORM CORNER BLOCK

*** Note:** Typical block shown is 150mm concrete infill (250mm wide) made from the outer and the inner corner block shells. The outer shell of the block is also available to form infill sizes varying from 100mm (200mm wide) to 300mm (400mm wide) in thickness, the standard Poly block is used to form the inside walls.

A range of spacer `ties' are available to provide an innovative solution to the construction of different wall thicknesses, using the same standard polystyrene face shell. The reinforced concrete solid wall formed is constructed to three wall thicknesses: 100mm,150mm and 200mm.

MASS

The Superform **POLY** Block system with cladding and lining, (i.e., EPS blocks, concrete infill, and assuming an external plaster finish and 9.5 mm plasterboard internal lining) weighs: 290kg/m^2 for 100mm concrete infill,
420kg/m^2 for 150mm concrete infill, and
540kg/m^2 for 200mm concrete infill.
Note: These weights are calculated using a concrete density of 2440kg/m^3.

DESIGN INFORMATION

DESIGN CODES REFERENCED

This manual references the following design guides. Abbreviations made by this manual are listed below:

Design Code	Abbreviation used by this manual	Code Description
NZS 3604 : 1999	NZS 3604	Timber Framed Buildings
AS/NZS 1170 : 2002	AS/NZS 1170	Structural Design Actions
NZS 3109 : 1997	NZS 3109	Specification for Concrete Construction
NZS 3101: 1995	NZS 3101	Concrete Structures Standard
NZS 4218 : 2004	NZS 4218	Energy efficiency-small building envelope

SCOPE

This manual provides structural design information, detailing and construction practices which can be used for designing Superform **POLY** Block wall systems for buildings within the following limitations:

a) Non-specific designed buildings:

Single-Storey Buildings:

Walls, ground floor connections and roof connections are constructed in accordance with the non-specific design details in the Superform **POLY** Block Manual. Ground floor slab, timber walls and roof framing is constructed in accordance with NZS 3604. Non Specific structural data is given in Section B.

Two-Storey Buildings:

The first floor is timber frame construction in accordance with NZS 3604. The upper storey walls may be either Superform **POLY** Block walls, built in accordance with the non-specific design details in the Superform **POLY** Block Manual, or light timber frame walls, constructed in accordance with NZS 3604. Lower storey walls, floor connections and roof connections are constructed in accordance with the non-specific design details in the Superform **POLY** Block Manual and the ground floor slab and roof framing is constructed in accordance with NZS 3604. Non Specific structural data is given in Section B.

b) Part non-specific designed buildings:

Two-storey buildings where a concrete suspended first floor is constructed to a specific design, but where remaining building elements are subject to the non-specific design details in the Superform **POLY** Block Manual.

Conditions Applying to a) and b)

i) A maximum inter-storey height of 3.0m.

ii) A maximum height from ground to the highest point on roof of 10.0m.

iii) A maximum roof plane slope of 45° to the horizontal.

iv) Buildings are to be category 2 buildings as described in table 3.1 of AS/NZS 1170.0.

v) A maximum design windspeed (V's) for the building of VH (very high), as defined in section 5.2 of NZS 3604.

vi) A maximum snow load as specified in AS/NZS 1170.3 of 0.5kPa.

vii) Suspended concrete floors are to have a maximum mass of 490kg/m^2

viii) Suspended timber floors and roof shall be of light timber construction complying with the relevant requirements of NZS 3604.

ix) Maximum suspended floor imposed live load of 1.5kPa or a concentrated live load of 1.8 kN. (No allowance has been made for floor loads greater than 1.5kPa such as balconies)

x) Site requirements as per NZS 3604 Section 3.

xi) Each part of the building or structure shall be within the limitations stated by the relevant section or tables of this manual.

c) Non Specific Designed Retaining wall structures.

These are detailed in Section B along with the design assumptions and scope.

d) Specific Designed Structures.

Superform **POLY** Block walls can be used in structures which are subject to specific design, including multi-storey buildings, swimming pools, fire places, chimneys or barbeques. The cladding system and weather tightness details relating to specifically designed structures also require specific design.

For specific structural design this manual should be used in conjunction with AS/NZS 1170 and NZS 3101.

CONCRETE REQUIREMENTS

All concrete work shall comply with the provisions of NZS 3109, "Specification for Concrete Construction."

Concrete must be Special or High grade, have a minimum compressive strength of 20 MPa at 28 days and a slump of 100mm - 150mm with a maximum aggregate size of 13mm. Expansive admixtures must not be used.

REINFORCING REQUIREMENTS

All reinforcing shall comply with the provisions of NZS 3109, "Specification for Concrete Construction." Reinforcement shall be either Grade 300E or 500E as appropriate.

SECTION A: SUPERFORM POLY BLOCK SYSTEM

GENERAL

The Superform **POLY** Block system consists of the hollow interlocking Superform EPS blocks filled with reinforced concrete to form solid core, permanently insulated concrete foundations, walls or other structures. Suitable claddings, linings and detailing as specified in this manual complete the system.

PROTECTION OF SUPERFORM POLY BLOCKS

Superform **POLY** Blocks must be protected from sunlight, mechanical damage, water and weathering, by an approved external cladding system and internal lining system, (see below), within three months of installation.

The EPS must not be exposed to tar, organic solvents, or saturated hydrocarbons.

External claddings and internal linings shall be as specified under the External claddings and Internal linings headings of Section A.

Solvent based products, (e.g. solvent based adhesives), must not be used on the EPS blocks.

DURABILITY

When used and installed in accordance with the limitations and instructions of this manual, the various components of the Superform EPS Block system can be expected to meet the New Zealand Building Code (NZBC) Durability requirement B2.3.1(a), of 50 years provided the Superform EPS Block Shell is lined or clad as detailed in this manual, within three months of blocks being exposed and all protective linings, coating systems and seals are correctly maintained.

EPS does not rot and does not embrittle with age except that exposure to UV radiation results in a yellowing and embrittlement of the surface. If this occurs, loose material must be removed by sanding. The surface must then be washed down thoroughly prior to the finishing surface being applied.

MAINTENANCE

External cladding systems must be maintained in accordance with the respective manufacturer's instructions and all damage repaired promptly to ensure the ongoing weathertight properties of the cladding system and performance of the block system. In addition to these system specific requirements, the following general maintenance procedures must also be implemented.

Any dirt accumulation or organic growth that may occur should be regularly removed from the external surface by cleaning with warm water and detergent and a soft bristled broom.

Solvent based cleaners must not be used.

The external cladding system should be checked yearly for damage to the system itself, deterioration of seals and possible water entry at junctions and joints. Any damage which does occur must be repaired in accordance with the manufacturer's instructions. Where exterior plaster finish systems are used, it may be necessary to recoat the Rockcote texture with Armourglaze in accordance with the manufacturer's instructions after 8 - 15 years to restore the visual appearance.

FIRE

General Properties
If the EPS is exposed to excessive heat, it will shrink and melt away from the heat source.

Although the EPS used contains a fire retardant it will still burn if exposed to a source of heat such as flues, wall ovens and heaters. In such situations adequate shielding must be provided so that the E.P.S. block is not subjected to temperatures above 50°C and the Superform **POLY** Block lined to prevent direct exposure.

Fire Walls
Superform **POLY** Block walls when clad and lined as detailed in Section C of the manual, can be used as fire walls in residential, commercial and industrial applications.

The Superform **POLY** Block Fire Rated System can provide a FRR (Fire Resistance Rating) of up to 240/240/240.

Spread Of Fire
The exterior cladding system must comply with NZBC C3 for the required application, in addition to the other relevant sections of the NZBC, e.g., B1, B2, C1, E2 and F2.

The FRR of Superform **POLY** Block walls lined both sides with 9.5mm Standard Gib® remains unchanged when the walls are constructed in accordance with the details contained in the Marshall Day Acoustics Report No.'s 98210 A1, 98210 A2, or 98210 A3, provided that the additional lining fixings required for a FRR are met.

The Superform **POLY** Block Fire Rated System described in Section C using the Rockcote Insulating Wall Cladding System finished with Rockcote Primer/Sealer and Rockcote Armourglaze provides the following AS 1530:3 indices:

Ignitability	0
Spread of flame	0
Heat evolved	0
Smoke developed	5

(see NZBC definitions C2, C3, C4)

For a full description of the system and an opinion provided by BRANZ, please refer to Section C.

EXTERNAL CLADDINGS

The Superform **POLY** Block system relies on the external finish to protect the polystyrene blocks from weathering and mechanical damage, and to prevent the entry of external moisture into the building.

Claddings approved for use are the Rockcote Literock solid plaster system, Rockcote insulating wall cladding system and brick veneers. Stone veneers can be used but will require specific engineering design and detailing.

Alternative exterior cladding and finishing systems must be fit for purpose and must comply with the relevant provisions of the New Zealand Building Code, (sections B1, B2, C1, C3, E2, F2). Demonstration that a cladding is suitable for use over the Superform **POLY** Block system can be by an appraisal from a reputable organisation.

In all cases the manufacturer's installation, application and maintenance instructions must be followed with particular attention given to the following areas:

- Fixing, weathering, flashing and sealing systems at door and window openings, junctions with other materials and any other penetrations of the exterior envelope. uPVC or aluminium flashings are required at all door and window openings. These may need to be in place prior to filling blocks with concrete. Sealant details at flat sills must not be used. The need for head flashings will depend on the configuration and design of the detail but are strongly recommended in all circumstances.
- The ground/ foundation/ floor/ wall interface. Particular care needs to be given to ensure that minimum distances between ground and floor level, as stated in NZS 3604 are met.

- External plaster systems are installed and cured within the temperature limitations, climatic and curing conditions set by the manufacturer. For polymer-modified, fibreglass-reinforced, cement-based plasters the temperature range will typically be between 10°C and 30°C.
- The finished external plaster system is sealed and protected from the weather with a coating system which must not form a vapour barrier.

Superform **POLY** Blocks forming basement walls below grade must be protected from ground moisture by a damp proof membrane (DPM). It is critical that the DPM is sealed in accordance with the manufacturer's instructions for tanking applications and that the resulting installation forms a continuous barrier to water or moisture penetration. A suitable means of preventing damage to the membrane such as a fibre - cement sheet must be placed, prior to backfilling. Subsoil drainage must be supplied behind all basement and retaining walls.

INTERNAL LININGS

The Superform **POLY** Block system relies on the internal lining to protect the polystyrene blocks from mechanical damage, enclose services and to provide the desired interior aesthetic effect.

Linings approved for use are standard Gib® plasterboardand and Gib® Fyreline. Gib® Aqualine wet area systems can be used in wet areas.

Internal linings must be fit for purpose and must comply with the relevant provisions of the New Zealand Building Code, (sections B1, B2, C1, C3, E3, F2). Demonstration that a lining is suitable for use over the Superform **POLY** Block system can be by an appraisal from a reputable organisation.

In all cases the manufacturer's installation, application and maintenance instructions must be followed with particular attention given to the suitability of the glue for fixing to EPS. See the "Fixing" section of this manual.

FIXING

Internal sheet linings must be screw and adhesive fixed in place. Sheet linings are fixed to the Thermo Plastic PP spacer ties using Gypsum dry wall, 32mm x 6 gauge coarse threaded screws. Adhesives must be fit for purpose and compatible with the EPS such as FOSROC Panelbond or Selleys Liquid Nails.

Where a FRR is not required, screws must be spaced a maximum of 750mm horizontally and 600mm vertically. Perimeter screws must be no closer than 12mm and no further than 150mm from lining sheet edges.

Where a FRR is required, screws must be spaced at maximum 300mm centres around the lining sheet perimeter edges and at maximum 450mm centres within the body of the sheet - See Section C for the full lining and fixing details.

The adhesive must be applied in accordance with the adhesive manufacturer's instructions or to a maximum of 250mm centres horizontally and vertically either as daubs approximately 25mm diameter and 10mm thick, or as 10mm diameter beads 50mm long.

ADHESIVES

Adhesives used for the fixing of internal linings must be suitable for use on EPS blocks.

Solvent based adhesives must not be used on EPS blocks.

THERMAL PROPERTIES

The Superform **POLY** Block system using a gib board internal lining and Rockcote external cladding has a thermal resistance of approximately 2.7m^2 °C/W as calculated using NZS 4218.

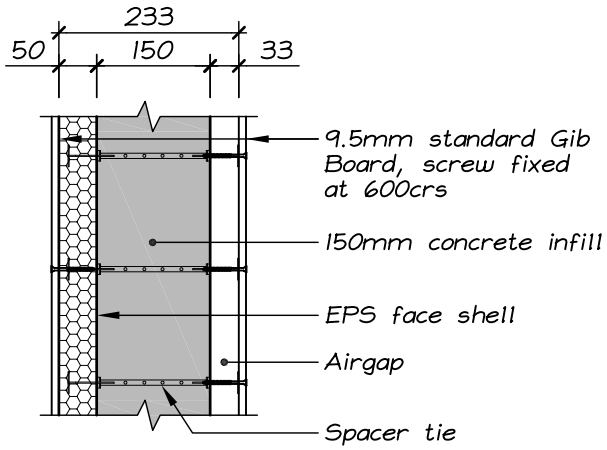
Internal Moisture
The excellent thermal insulation properties of the Superform **POLY** Block system ensures that when used with both an adequate level of ventilation and an appropriate level of ceiling / roof insulation, the Superform **POLY** Block system will satisfy the internal moisture provisions of NZBC Clause E3.3.1. Appropriate or adequate levels of ventilation and insulation are provided in the NZBC Acceptable Solution E3/AS1. (External cladding and finish systems must not form a vapour barrier.)

Energy Efficiency
Buildings constructed using the Superform **POLY** Block system are able to meet the performance requirements for energy efficiency as required by NZBC Clause H 1.3.1 and H1.3.2. It should be noted that compliance with NZBC H1 will also include a large number of other factors resulting from the design of the building, all of which have an effect on the energy efficiency of a building.

ACOUSTICS

The Superform **POLY** Block system provides excellent sound insulation and meets the performance requirements of NZBC G6.3.1 for intertenancy walls. This approved acoustic system easily achieves the Minimum Sound Transmission Class 55 when constructed in accordance with the details contained in the Marshall Day Acoustics Report Numbers 98210A1, 98210A2 or 98210A3. These reports are available from Rafel International Limited on request. Sound rated wall systems ranging from low STC values to in excess of STC62 are available. Examples of typical STC ratings achievable for various methods of wall construction as tested are shown on the following page.

WALL SECTION STC RATINGS FOR VARIOUS METHODS OF CONSTRUCTION



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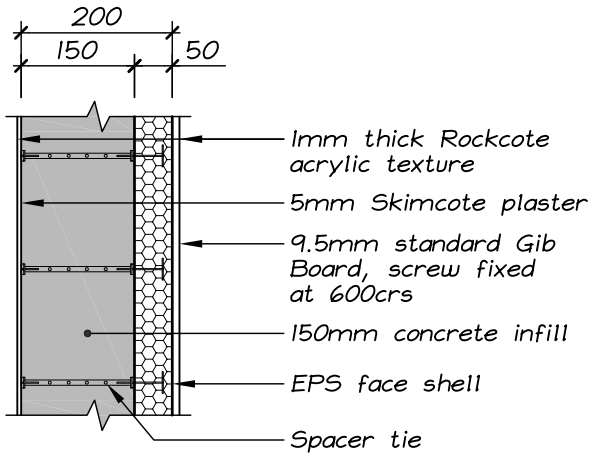

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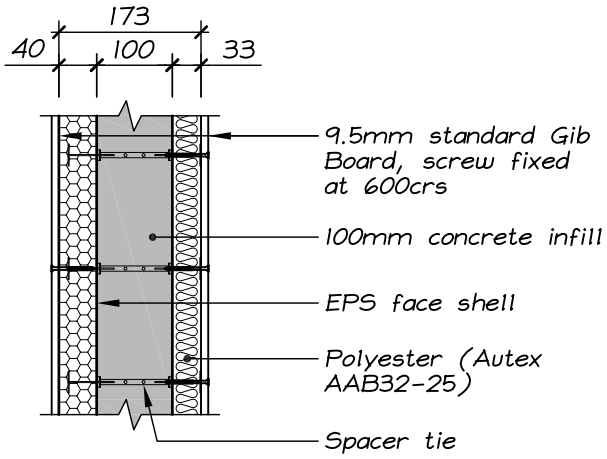
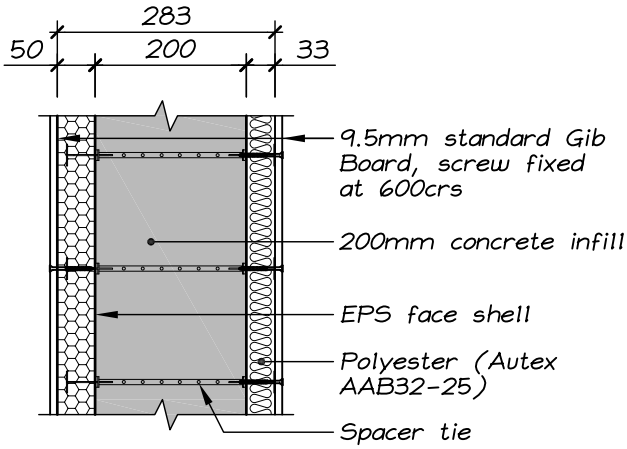
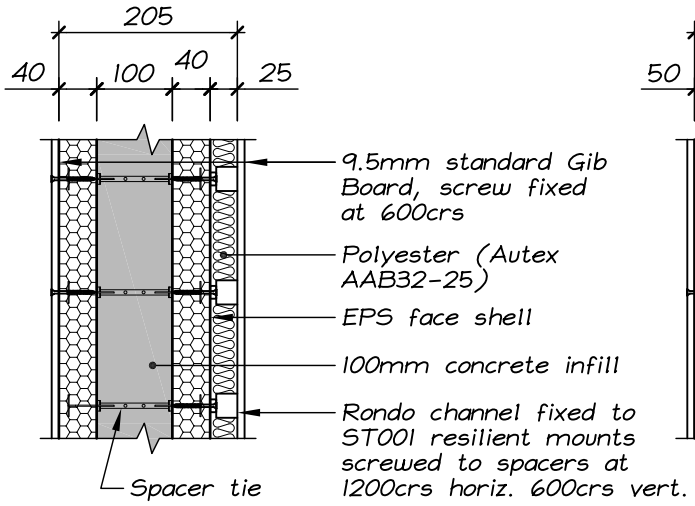


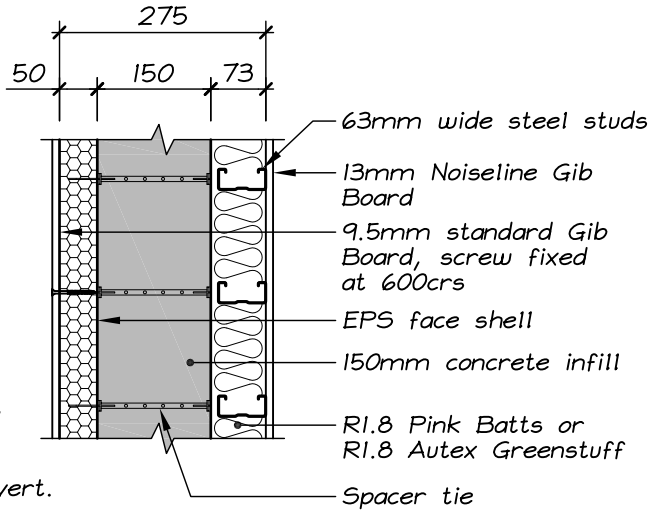
STC 55



STC 58



STC 62



STC 68

NOTES:

- Actual STC ratings achieved may vary from that shown above due to other influencing factors such as ceiling and floor construction
- Soundseal sealant is used at all edges and the Gib Board is to be stopped in accordance with normal trade practices.

POWELL FENWICK CONSULTANTS LIMITED Your quality engineering partner.	SUPERFORM POLY BLOCK SOUND TRANSMISSION CLASS (STC)	© 2005 RAPEL International Ltd	ACOUSTIC 1

STRUCTURE

Superform **POLY** Blocks are able to withstand the pressure of a continuous concrete pour in lifts of 900mm to a maximum pour height of 3000mm.

The blocks are laid in a stretcher bond pattern.

The interlocking EPS blocks act as permanent formwork for concrete interior and exterior walling, resulting in an insulated load bearing, or non-load bearing reinforced concrete wall.

Loads from other parts of the building structure and fixtures must be transferred directly to the reinforced concrete walls without imposing loads on the polystyrene shell.

Structural connections for roofs and floors and lateral support of the tops of walls must be designed appropriately to resist the imposed loads. Walls are to be adequately anchored to floors, roofs, columns, pilasters, buttresses and intersecting walls.

SECTION B: NON SPECIFIC DESIGN STRUCTURAL DATA

DEFINITIONS

Light roof : A roof and ceiling (cladding, lining, insulation, services) having a mass not exceeding 20 kg/m^2.

Heavy roof : A roof and ceiling (cladding, lining, insulation, services) having a mass not exceeding 60 kg/m^2.

Light wall cladding : An external wall having a mass not exceeding 50 kg/m^2.

Internal timber frame partitions : An internal partition having a mass not exceeding 30 kg/m^2.

Lintel or floor beam span : Span of opening between concrete supports.

Suspended Concrete Floor: A specifically designed concrete floor system including super-imposed dead loads with a mass not exceeding 490kg/m^2.

Tanking : Tanking as labeled in the Superform **POLY** Block construction details shall consist of a waterproofing membrane (DPM) against the EPS block with a suitable protection sheet over, (i.e. polystyrene or proofex sheet). DPM's must meet the performance requirements of NZBC E2/AS1, clause 12.2.

Sealants : Sealants approved for use in Superform **POLY** Block construction must meet the requirements of Section A.

GENERAL

Single-storey buildings designed using the non-specific design section of the Superform **POLY** Block Manual shall consist of:

1. Foundations as specified in details shown in Section D SF4-SF13 (pages 9-18).

2. Ground floor must be concrete slab on grade constructed in accordance with Clause 7.5.8 of NZS 3604, except the minimum thickness shall be 100mm. The ground floor slab shall be connected to the walls as shown in details shown in Section D SF4-SF13 (pages 9-18).

3. External walls shall be either 200, 250 or 300mm thick Superform **POLY** Block walls constructed in accordance with the Superform **POLY** Block Manual. The bottom storey of two-storey buildings must have a minimum thickness of 250mm. Upper walls shall be no thicker than the wall below.

4. Internal walls shall be either Superform **POLY** Block walls or timber walls constructed in accordance with NZS 3604. Internal to External wall connections shall be in accordance with details shown in Section D SF34 and SF36 (pages 39 and 41).

5. The roof shall be timber framed and constructed in accordance with NZS 3604. The connection of the roof to Superform **POLY** Block walls shall be in accordance with details shown in Section D SF27, SF28, SF32 and SF33.

Two-storey buildings shall consist of the above clauses 1 to 5 plus the following:

6. Suspended first floors shall be either concrete to specific design or timber floors in accordance with NZS 3604.

   The connections of suspended floors to Superform **POLY** Block walls must comply with details shown in Section D SF23-SF25 (pages 28-30).

7. First-floor walls shall be either Superform **POLY** Block walls, no thicker than the wall below or timber walls in accordance with NZS 3604.

   First floor internal Superform **POLY** Block walls must be directly supported by Superform **POLY** Block walls below. Suspended first floors supporting Superform **POLY** Block or load bearing walls must be specifically designed.

8. Ground floor walls of two-storey buildings with specifically designed suspended concrete floors that are required to retain soil shall be in accordance with sheets shown in Section B Ret 3 and Ret 3a (pages 8-9).

9. Building lateral stability shall be checked in accordance with NZS 3604 except that bracing units required under earthquake shall be obtained from Section B Bracing 1-8a (pages 17-29). Bracing units provided by Superform **POLY** Block walls are given on Section B pages 31-32.

10. Bond beams shall be constructed within the walls as detailed on pages 39-40.

MINIMUM REINFORCEMENT

Unless otherwise stated, the tables and details shown in this manual, suitable for use in non specific design applications, are all based on the following minimum reinforcement requirements:

Main Wall Reinforcing:

100mm Thick Concrete Infill

	Grade 300 Reinforcing	Grade 500 Reinforcing
Vertical	D10 at 300 crs	H10 at 300crs
Horizontal	D10 at 300 crs	H10 at 300crs

150mm Thick Concrete Infill

	Grade 300 Reinforcing	Grade 500 Reinforcing
Vertical	D10 at 200 crs	H10 at 300 crs
Horizontal	D12 at 300 crs	H12 at 300 crs

200mm Thick Concrete Infill

	Grade 300 Reinforcing	Grade 500 Reinforcing
Vertical	D12 at 200 crs	H12 at 300 crs
Horizontal	D16 at 300 crs	H16 at 300 crs

- Minimum reinforcing bar lap distances are: 60dB for H bars
  35dB for D bars

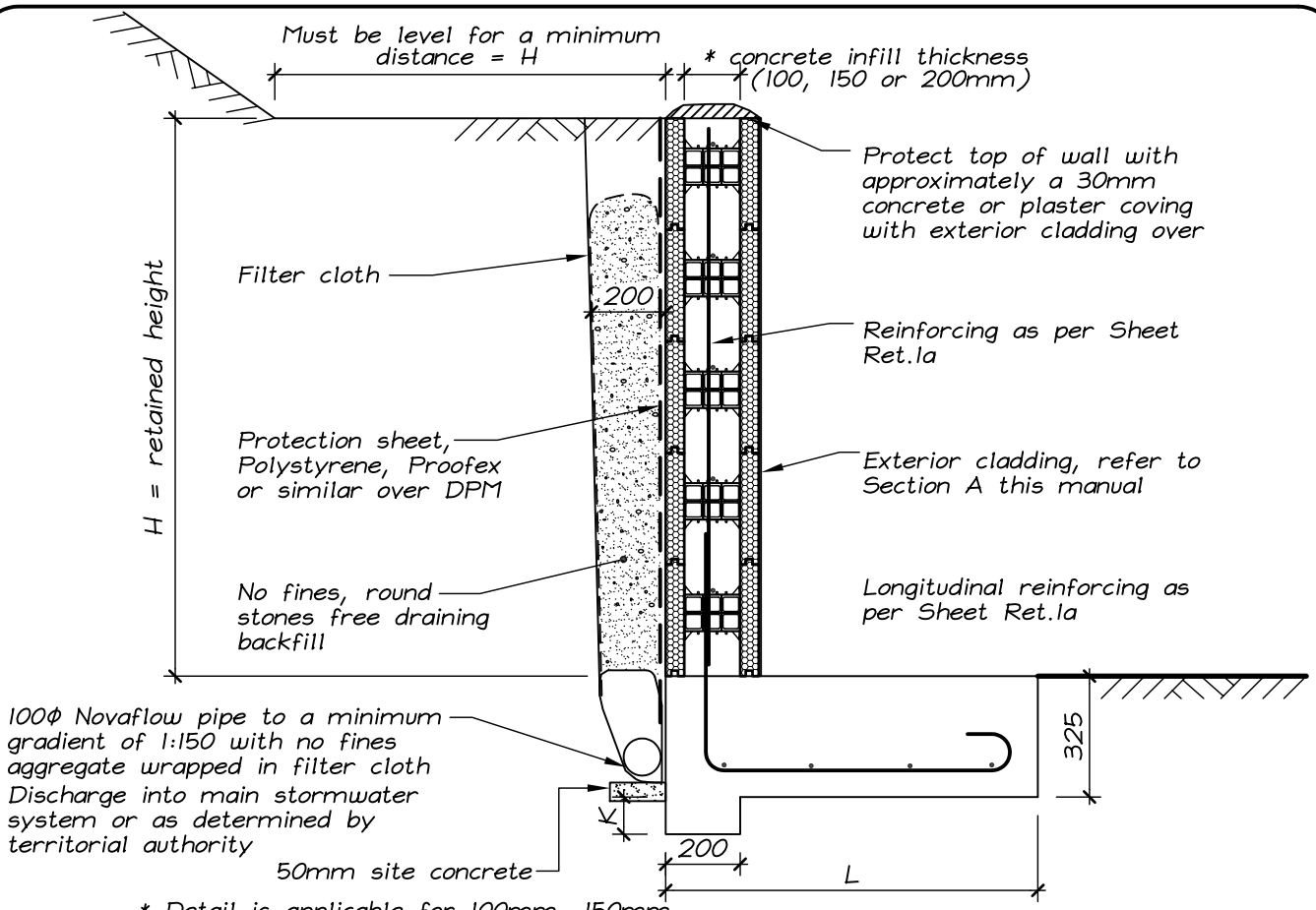
TRIMMER BARS

All openings are to have trimmer bars extending 1000mm past the corners of the openings as follows:

100mm Thick Concrete Infill 1 D or H16
150mm Thick Concrete Infill 2 D or H16
200mm Thick Concrete Infill 2 D or H16

NZS 3109 Concrete Construction

Covers, reinforcement hooks and bends, reinforcement material specifications shall be in accordance with NZS 3109.



* Detail is applicable for 100mm, 150mm, 200mm concrete infill Superform POLY Blocks

TYPE 1

1:20

DESIGN ASSUMPTIONS

- **Site requirements**
  Site requirements are to be in accordance with NZS 3604
- **Safety from Falling**
  The safety from falling requirements must comply with the NZBC
- **Connections to the Wall**
  Connections to the wall will require specific design and must meet the relevant performance requirements of the New Zealand Building Code
- **Surcharges**
  If loads from structures or vehicles occur within distance (H) of the wall or on top of the wall specific design will be required
- **Load Case**
  This design assumes that the cantilevered retaining wall is subjected to active earth pressures (ie retaining wall moves away the soil retained)
- No allowance has been made for seismic soil loads

MATERIALS

- **Soil types**
  Retaining walls have been designed assuming a cohesionless soil with an angle of internal friction equal to 25° and a unit weight of 18kN/m_3
- **Concrete Footings**
  Concrete shall comply with NZS 3109 for concrete having a minimum compressive strength of 20MPa at 28 days.
- **Foundation Bearing Pressure**
  Ultimate foundation bearing pressure to be a minimum of 300kPa.

CONSTRUCTION

- **Compaction**
  Compaction forces from machinery are not included in the design.
- **Reinforcing**
  Vertical reinforcing bars are to be placed in the centre of the Superform POLY Blocks ¢ tied to starter ¢ horizontal bars. Lap distances shall be 35 times bar diameter for D bars, 60 times bar diameter for H bars.
- **Control Joints**
  Provide control joints in the same position as the exterior cladding control joints. Refer to approved proprietary control joint detail. Lap horizontal bars 600mm. Wrap bars on one side of the control joint with Denso tape.

POWELL FENWICK CONSULTANTS LIMITED Your quality engineering partner.	SUPERFORM POLY BLOCK TYPE 1 RETAINING WALL (See also Sheet RET.1a)	RAFEL™ International Ltd	RET.1

TYPE 1.

RETAINING WALL TABLE FOR 100mm CONC. INFILL					
H (mm)	L (mm)	K (mm)	Vertical Reinforcing.	Horizontal Reinforcing.	Longitudinal Found. steel
up to 900	500	0	H10–@300crs	H10–@300crs	3/H12
900–1200	750	0	H10–@300crs	H10–@300crs	3/H12
1200–1500	1000	100	H12–@300crs	H10–@300crs	4/H12
1500–1800 1800–2100 2100–2400	Requires specific engineering design				

RETAINING WALL TABLE FOR 150mm CONC. INFILL					
H (mm)	L (mm)	K (mm)	Vertical Reinforcing.	Horizontal Reinforcing.	Longitudinal Found. steel
up to 900	500	0	H10–@300crs	H12–@300crs	3/H12
900–1200	600	0	H10–@300crs	H12–@300crs	3/H12
1200–1500	850	50	H10–@300crs	H12–@300crs	3/H12
1500–1800	1100	200	H12–@300crs	H12–@300crs	4/H12
1800–2100	1400	325	H12–@200crs	H12–@300crs	5/H12
2100–2400	Requires specific engineering design				

RETAINING WALL TABLE FOR 200mm CONC. INFILL					
H (mm)	L (mm)	K (mm)	Vertical Reinforcing.	Horizontal Reinforcing.	Longitudinal Found. steel
up to 900	500	0	H12–@300crs	H16–@300crs	3/H12
900–1200	500	0	H12–@300crs	H16–@300crs	3/H12
1200–1500	700	0	H12–@300crs	H16–@300crs	3/H12
1500–1800	950	150	H12–@300crs	H16–@300crs	4/H12
1800–2100	1200	275	H12–@250crs	H16–@300crs	5/H12
2100–2400	1500	400	H16–@300crs	H16–@300crs	6/H12

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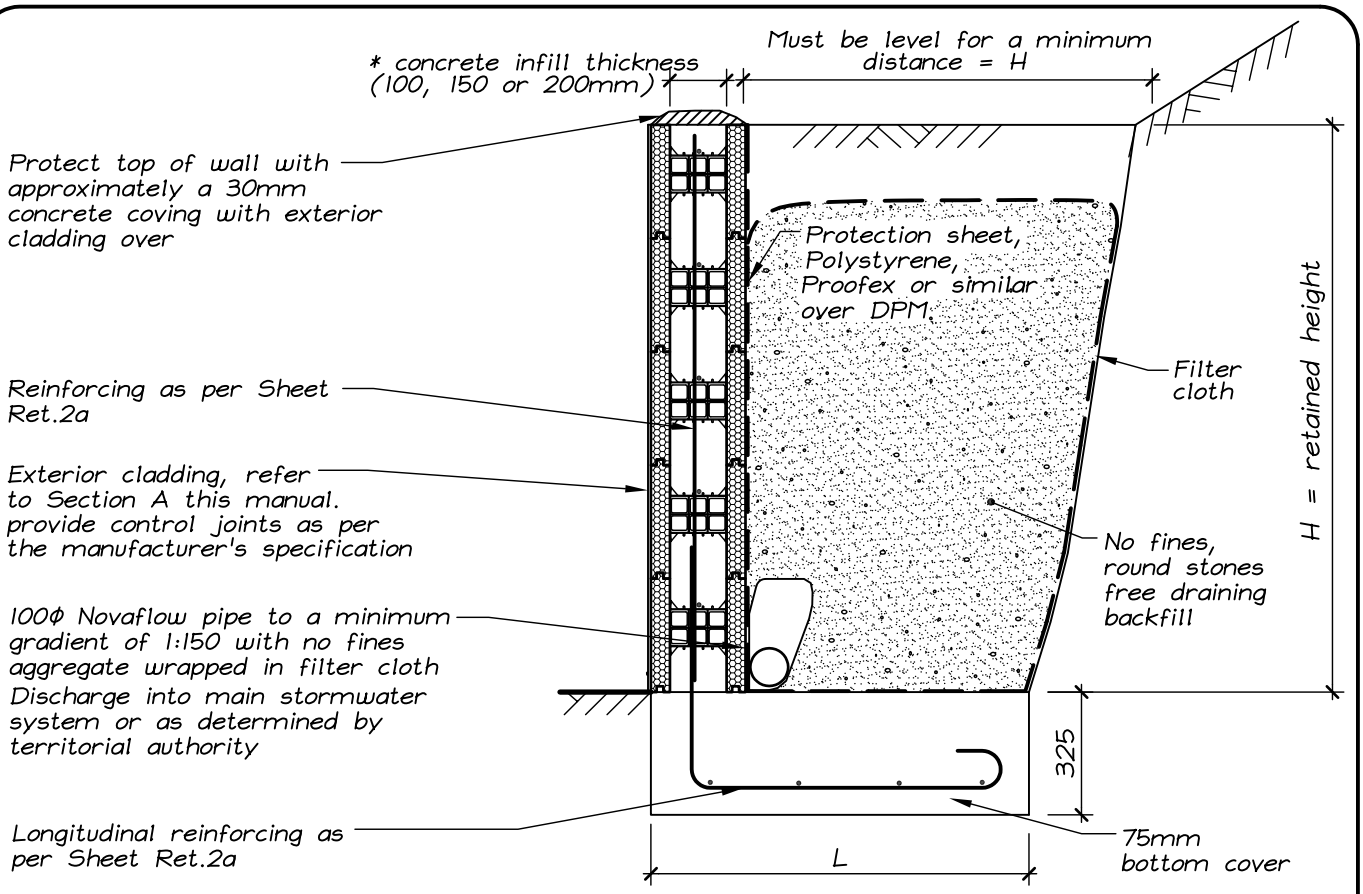
SUPERFORM POLY BLOCK
TYPE 1 RETAINING WALL
(See also Sheet RET.1)

RAFEL™ International Ltd

RET.1a



* Detail is applicable for 100mm, 150mm, 200mm concrete infill Superform POLY Blocks

TYPE 2

1:20

DESIGN ASSUMPTIONS

- **Site requirements**
  Site requirements are to be in accordance with NZS 3604
- **Safety from Falling**
  The safety from falling requirements must comply with the NZBC
- **Connections to the Wall**
  Connections to the wall will require specific design and must meet the relevant performance requirements of the New Zealand Building Code
- **Surcharges**
  If loads from structures or vehicles occur with in distance (H) of the wall or on top of the wall specific design will be required
- **Load Case**
  This design assumes that the cantilevered retaining wall is subjected to active earth pressures (ie retaining wall moves away the soil retained)
- No allowance has been made for seismic soil

MATERIALS

- **Soil types**
  Retaining walls have been designed assuming a cohesionless soil with an angle of internal friction equal to 25° and a unit weight of 18kN/m^3
- **Concrete Footings**
  Concrete shall comply with NZS 3109 for concrete having a minimum compressive strength of 20MPa at 28 days.
- **Foundation Bearing Pressure**
  Ultimate foundation bearing pressure to be a minimum of 300kPa.

CONSTRUCTION

- **Compaction**
  Compaction forces from machinery are not included in the design.
- **Reinforcing**
  Vertical reinforcing bars are to be placed in the centre of the Superform POLY Block ¢ tied to starter ¢ horizontal bars. Lap distances shall be 35 times bar diameter for D bars, 60 times bar diameter for H bars.
- **Control Joints**
  Provide control joints in the same position as the exterior cladding control joints. Refer to approved proprietary control joint detail. Lap horizontal bars 600mm. Wrap bars on one side of the control joint with Denso tape.

POWELL FENWICK CONSULTANTS LIMITED Your quality engineering partner.	SUPERFORM POLY BLOCK TYPE 2 RETAINING WALL (See also Sheet RET.2a)	RAFEL™ International Ltd	RET.2

TYPE 2.

RETAINING WALL TABLE FOR 100mm CONC. INFILL				
H (mm)	L (mm)	Vertical Reinforcing.	Horizontal Reinforcing.	Longitudinal Found. steel
up to 900	500	H10–@300crs	H10–@300crs	3/H12
900–1200	650	H10–@300crs	H10–@300crs	3/H12
1200–1500	850	H12–@300crs	H10–@300crs	3/H12
1500–1800 1800–2100 2100–2400	Requires specific engineering design			

RETAINING WALL TABLE FOR 150mm CONC. INFILL				
H (mm)	L (mm)	Vertical Reinforcing.	Horizontal Reinforcing.	Longitudinal Found. steel
up to 900	500	H10–@300crs	H12–@300crs	3/H12
900–1200	700	H10–@300crs	H12–@300crs	3/H12
1200–1500	900	H10–@300crs	H12–@300crs	4/H12
1500–1800	1150	H12–@300crs	H12–@300crs	4/H12
1800–2100	1400	H12–@200crs	H12–@300crs	5/H12
2100–2400	1700	H16–@200crs	H12–@300crs	6/H12

RETAINING WALL TABLE FOR 200mm CONC. INFILL				
H (mm)	L (mm)	Vertical Reinforcing.	Horizontal Reinforcing.	Longitudinal Found. steel
up to 900	550	H12–@300crs	H16–@300crs	3/H12
900–1200	750	H12–@300crs	H16–@300crs	3/H12
1200–1500	950	H12–@300crs	H16–@300crs	4/H12
1500–1800	1200	H12–@300crs	H16–@300crs	5/H12
1800–2100	1500	H12–@250crs	H16–@300crs	6/H12
2100–2400	1850	H16–@200crs	H16–@300crs	7/H12

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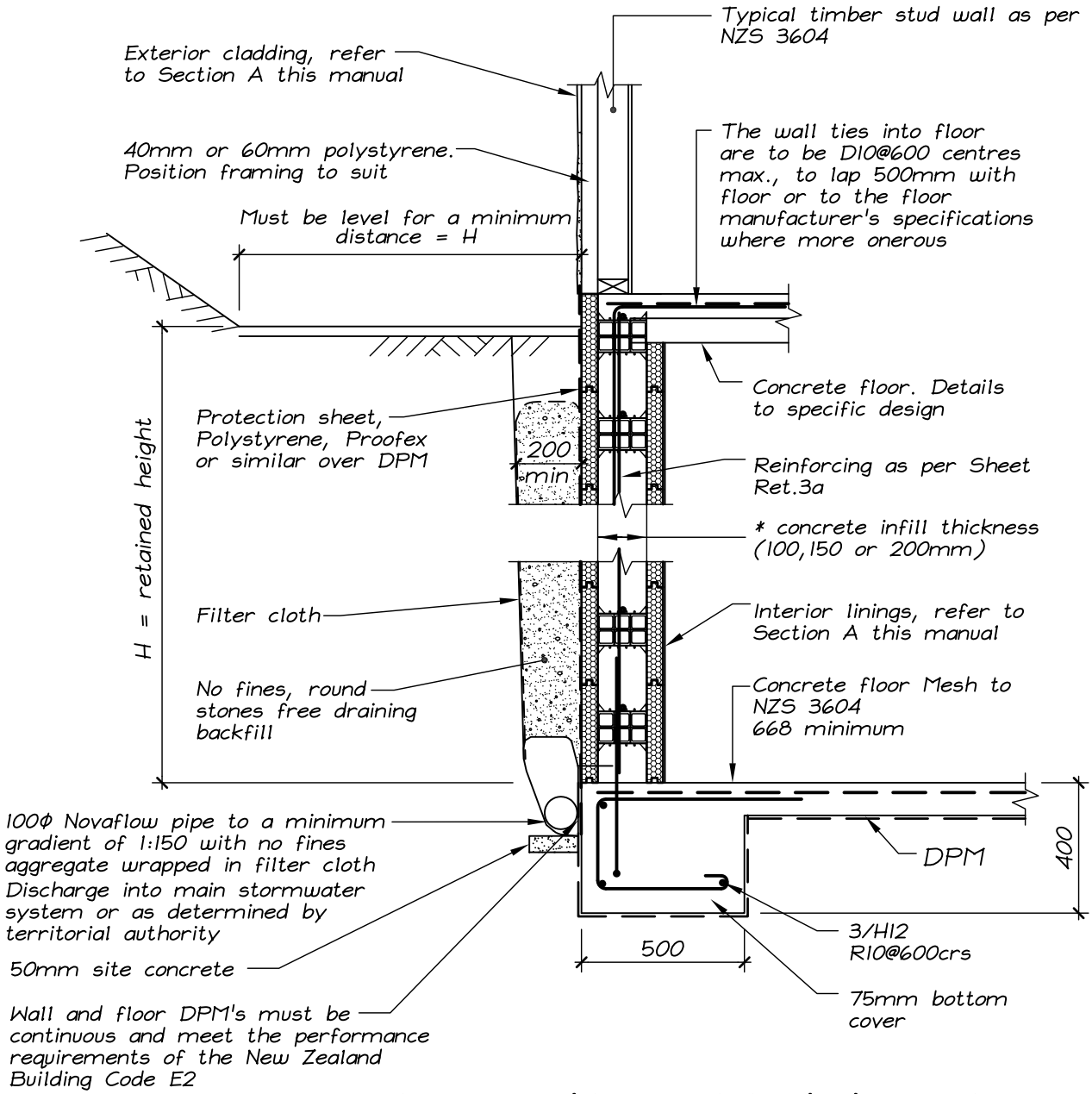
SUPERFORM POLY BLOCK
TYPE 2 RETAINING WALL
(See also Sheet RET.2)

RAFEL™ International Ltd

RET.2a



BASEMENT RETAINING WALL

1:20

DESIGN ASSUMPTIONS

Refer to Ret. 1

- **Load Case**
  This design assumes that the cantilevered retaining wall is subjected to at rest earth pressures

ADDITIONAL REQUIREMENTS:
- Maximum span of roof = 12.0m.
- Maximum tributary width of concrete floor = 3.0m
- Maximum wall height above basement = 3.0m (single storey)

MATERIALS

Refer to Ret. 1

CONSTRUCTION

Refer to Ret. 1

POWELL FENWICK CONSULTANTS LIMITED Your quality engineering partner.	SUPERFORM POLY BLOCK TYPE 2 RETAINING WALL (See also Sheet RET.3a)	RAFEL™ International Ltd	RET.3

DESIGN ASSUMPTIONS

CONSTRUCTION

- **Compaction :**
  Compaction forces from machinery are not included in the design.
- **Reinforcing :**
  Vertical reinforcing bars are to be placed in the centre of the Superform POLY Block & tied to starter & horizontal bars, this may be done as shown on details SF40–SF41. Lap distances shall be 35 times bar diameter for D bars, 60 times bar diameter for H bars.

BASEMENT RETAINING WALL

TYPICAL BASEMENT RETAINING WALL FOR 100mm CONCRETE INFILL WITH CONCRETE FLOOR ABOVE

Wall Height (mm)	Height Retained (mm)	Vertical Reinforcing.	Horizontal Reinforcing.
2400	2100	H12–@200crs.	H10–@300crs.
2400	1800	H12–@300crs.	H10–@300crs.
2400	1500	H10–@300crs.	H10–@300crs.
2400	1200	H10–@300crs.	H10–@300crs.

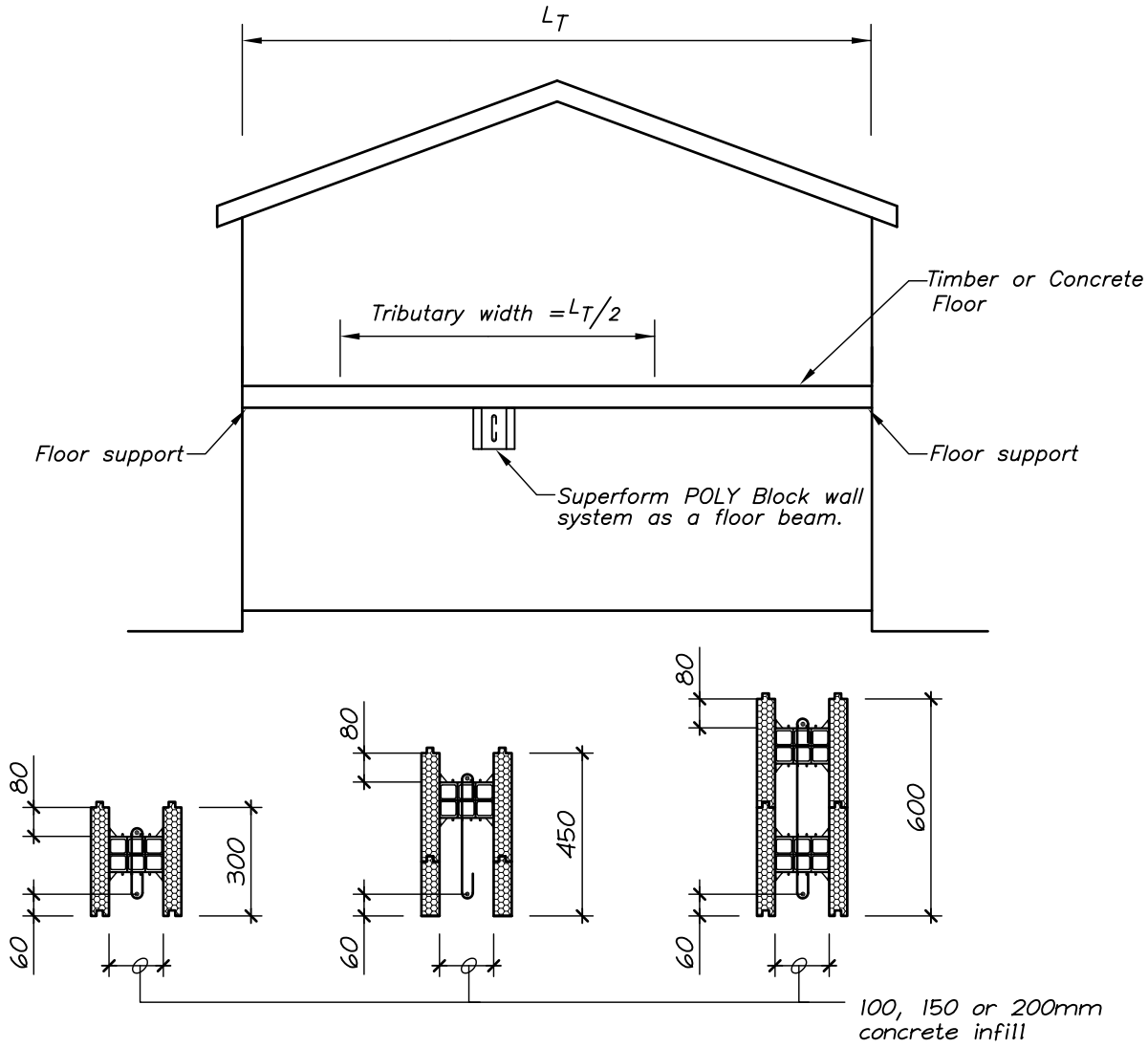
TYPICAL BASEMENT RETAINING WALL FOR 150mm CONCRETE INFILL WITH CONCRETE FLOOR ABOVE

Wall Height (mm)	Height Retained (mm)	Vertical Reinforcing.	Horizontal Reinforcing.
2400	2400	H12–@200crs.	H12–@300crs.
2400	2100	H12–@300crs.	H12–@300crs.
2400	1800	H10–@300crs.	H12–@300crs.
2400	1500	H10–@300crs.	H12–@300crs.
2400	1200	H10–@300crs.	H12–@300crs.

TYPICAL BASEMENT RETAINING WALL FOR 200mm CONCRETE INFILL WITH CONCRETE FLOOR ABOVE

Wall Height (mm)	Height Retained (mm)	Vertical Reinforcing.	Horizontal Reinforcing.
2400	2400	H12–@300crs.	H16–@300crs.
2400	2100	H10–@250crs.	H16–@300crs.
2400	1800	H10–@300crs.	H16–@300crs.
2400	1500	H10–@300crs.	H16–@300crs.
2400	1200	H10–@300crs.	H16–@300crs.

LINTEL 1 : SUPERFORM POLY BLOCK SYSTEM AS FLOOR BEAMS



CROSS SECTION THROUGH TYPICAL SUPERFORM POLY BLOCK BEAMS (SEE LINTELS 2 & 3)

DESIGN ASSUMPTIONS

1. Where non uniform loads occur, or where uniform loads exceed 1.5kPa, on a floor beam specific engineering design is required.
2. Where floor systems cantilever over a floor beam specific engineering design is required.
3. Where roof loads act on a floor beam through a load bearing wall specific engineering design is required.
4. Suspended concrete floor defines a concrete floor having a mass not exceeding 490kg/m².
5. Timber floor in accordance with NZS 3604. Concrete floor must be subject to specific design.

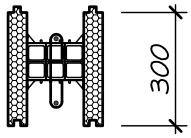
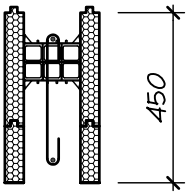
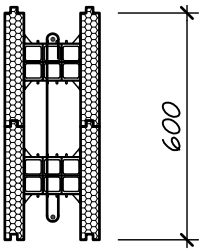
CONSTRUCTION

- Full soffit support and falsework propping is required during construction.
- Main longitudinal bars are to extend a minimum of 35 times the bar diameter past the wall opening for D bars, and 60 times the bar diameter for H bars.

POWELL FENWICK CONSULTANTS LIMITED Your quality engineering partner.	SUPERFORM POLY BLOCK BEAM TABLE FOR SUPPORTING TIMBER & CONCRETE FLOOR (See also Sheets LINTEL 2 & LINTEL 3)	RAPEL International Ltd	LINTEL 1

LINTEL 2 : SUPERFORM POLY BLOCK WALL SYSTEM AS FLOOR BEAMS

TIMBER FLOOR : Maximum tributary width of loading (L_T)= 4.5m

			
Span	**100mm CONCRETE INFILL**		
1m	2–H10 R10–@150crs	2–H10 R10–@150crs	2–H10 R10–@150crs
2m	2–H10 R10–@150crs	2–H10 R10–@150crs	2–H10 R10–@150crs
3m	2–H16 R10–@150crs	2–H12 R10–@150crs	2–H10 R10–@150crs
4m	—	2–H16 R10–@150crs	2–H16 R10–@150crs

Span	**150mm CONCRETE INFILL**		
1m	2–H10 R10–@150crs	2–H10 R10–@150crs	2–H12 R10–@150crs
2m	2–H10 R10–@150crs	2–H10 R10–@150crs	2–H12 R10–@150crs
3m	2–H16 R10–@150crs	2–H12 R10–@150crs	2–H12 R10–@150crs
4m	2–H25 R10–@150crs	2–H16 R10–@150crs	2–H16 R10–@150crs

Span	**200mm CONCRETE INFILL**		
1m	2–H10 R10–@150crs	2–H12 R10–@150crs	2–H12 R10–@150crs
2m	2–H10 R10–@150crs	2–H12 R10–@150crs	2–H12 R10–@150crs
3m	2–H16 R10–@150crs	2–H12 R10–@150crs	2–H12 R10–@150crs
4m	2–H25 R10–@150crs	2–H16 R10–@150crs	2–H16 R10–@150crs

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SUPERFORM POLY BLOCK BEAM TABLE
FOR
SUPPORTING TIMBER FLOOR ONLY
(See also Sheet LINTEL 1)

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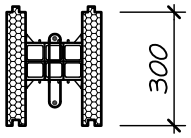
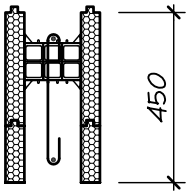
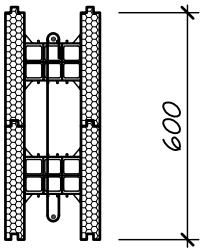
LINTEL 2

LINTEL 3 : SUPERFORM POLY BLOCK WALL SYSTEM AS FLOOR BEAMS

CONCRETE FLOOR : Maximum tributary width of loading (L_T)= 3.0m

			
Span	**100mm CONCRETE INFILL**		
1m	2–H10 R10–@150crs	2–H10 R10–@150crs	2–H12 R10–@150crs
2m	2–H16 R10–@150crs	2–H12 R10–@150crs	2–H12 R10–@150crs
3m	—	2–H16 R10–@150crs	2–H16 R10–@150crs
4m	—	—	2–H20 R10–@150crs

Span	**150mm CONCRETE INFILL**		
1m	2–H10 R10–@150crs	2–H10 R10–@150crs	2–H12 R10–@150crs
2m	2–H16 R10–@150crs	2–H12 R10–@150crs	2–H12 R10–@150crs
3m	2–H25 R10–@150crs	2–H16 R10–@150crs	2–H16 R10–@150crs
4m	—	2–H25 R10–@150crs	2–H20 R10–@150crs

Span	**200mm CONCRETE INFILL**		
1m	2–H10 R10–@150crs	2–H12 R10–@150crs	2–H12 R10–@150crs
2m	2–H16 R10–@150crs	2–H12 R10–@150crs	2–H12 R10–@150crs
3m	2–H25 R10–@150crs	2–H16 R10–@150crs	2–H16 R10–@150crs
4m	—	2–H25 R10–@150crs	2–H20 R10–@150crs

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SUPERFORM POLY BLOCK BEAM TABLE
FOR
SUPPORTING CONCRETE FLOOR ONLY
(See also Sheet LINTEL 1)

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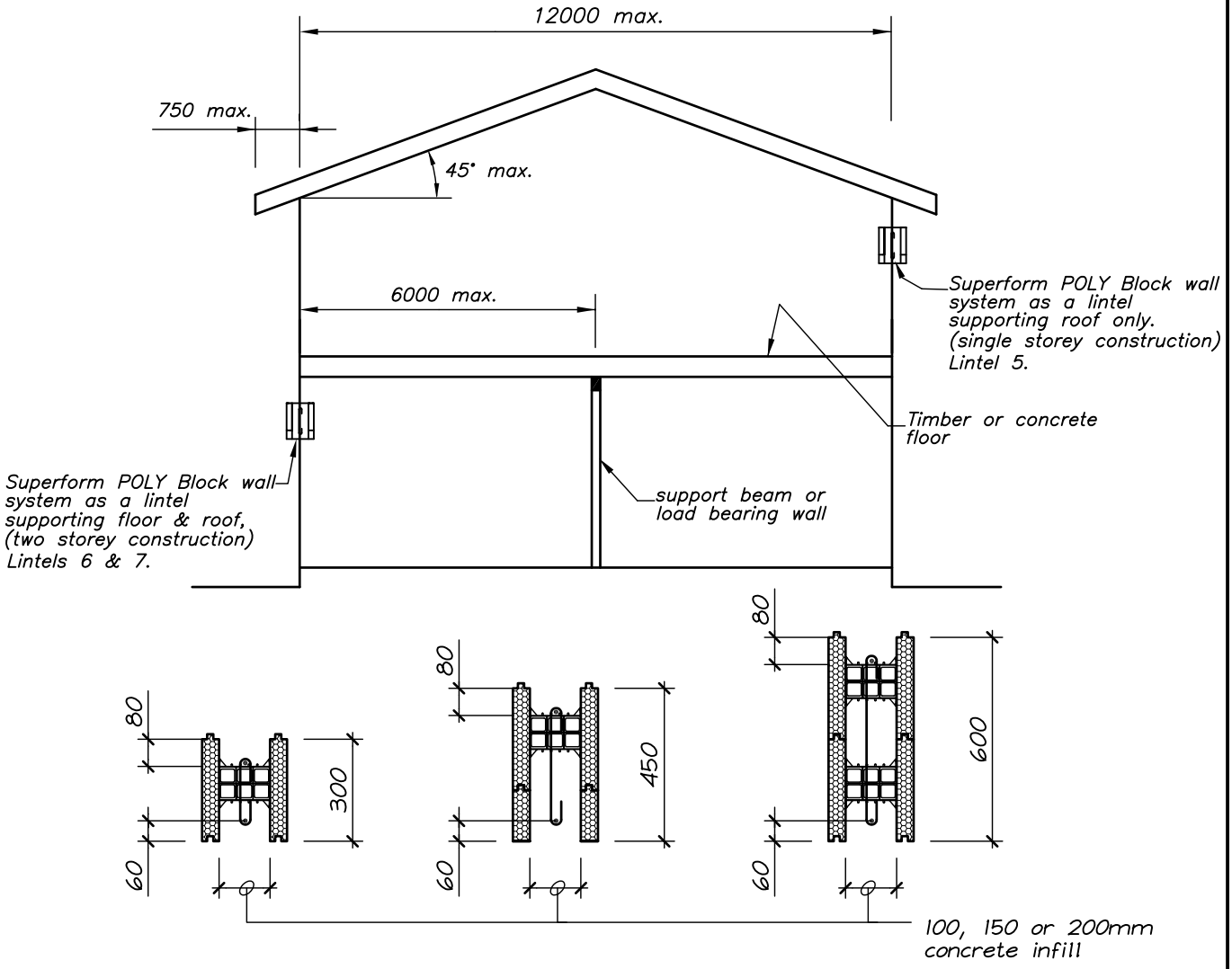
LINTEL 3

LINTEL 4 : SUPERFORM POLY BLOCK SYSTEM AS LINTELS



CROSS SECTION THROUGH TYPICAL SUPERFORM POLY BLOCK LINTELS (SEE LINTELS 5, 6 & 7)

DESIGN ASSUMPTIONS

① · Where non uniform loads occur, or where uniform loads exceed 1.5kPa on a lintel specific engineering design is required.

② · Where floor systems cantilever over a lintel specific engineering design is required.

③ · 3000mm maximum wall height above two storey lintel.

④ · Maximum wall thickness above two storey lintels is 150mm infill.

⑤ · Suspended concrete floor defines a concrete floor having a mass not exceeding 490kg/m²

⑥ · Timber floor in accordance with NZS 3604. Concrete floors must be subject to specific design

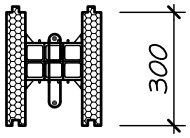
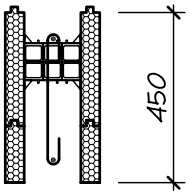
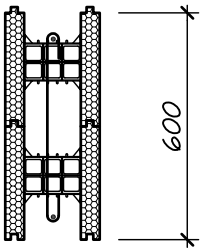
CONSTRUCTION

- Full soffit support and falsework propping is required during construction.
- Main longitudinal bars are to extend a minimum of 35 times the bar diameter past the wall opening for D bars, and 60 times the bar diameter for H bars.

POWELL FENWICK CONSULTANTS LIMITED Your quality engineering partner.	SUPERFORM POLY BLOCK LINTEL TABLE FOR SUPPORTING TIMBER / CONCRETE FLOOR & ROOF (See also Sheets LINTEL 5 to LINTEL 10)	© 2005 RAPEL International Ltd	LINTEL 4

LINTEL 5 : SUPERFORM POLY BLOCK SYSTEM AS LINTELS

SINGLE STOREY CONSTRUCTION – LIGHT ROOF

			
Span	**100mm CONCRETE INFILL**		
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1.6	2–H10 R10–@150crs	2–H10 R10–@150crs	2–H12 R10–@150crs
2.0	2–H10 R10–@150crs	2–H10 R10–@150crs	2–H12 R10–@150crs
2.4	2–H12 R10–@150crs	2–H10 R10–@150crs	2–H12 R10–@150crs
3.0	2–H16 R10–@150crs	2–H12 R10–@150crs	2–H12 R10–@150crs
3.6	2–H20 R10–@150crs	2–H16 R10–@150crs	2–H12 R10–@150crs

Span	**150mm CONCRETE INFILL**		
1.2	2–H10 R10–@150crs	2–H10 R10–@150crs	2–H12 R10–@150crs
1.6	2–H10 R10–@150crs	2–H10 R10–@150crs	2–H12 R10–@150crs
2.0	2–H10 R10–@150crs	2–H10 R10–@150crs	2–H12 R10–@150crs
2.4	2–H12 R10–@150crs	2–H10 R10–@150crs	2–H12 R10–@150crs
3.0	2–H16 R10–@150crs	2–H12 R10–@150crs	2–H12 R10–@150crs
3.6	2–H20 R10–@150crs	2–H16 R10–@150crs	2–H16 R10–@150crs

Span	**200mm CONCRETE INFILL**		
1.2	2–H10 R10–@150crs	2–H10 R10–@150crs	2–H12 R10–@150crs
1.6	2–H10 R10–@150crs	2–H10 R10–@150crs	2–H12 R10–@150crs
2.0	2–H10 R10–@150crs	2–H10 R10–@150crs	2–H12 R10–@150crs
2.4	2–H16 R10–@150crs	2–H10 R10–@150crs	2–H12 R10–@150crs
3.0	2–H16 R10–@150crs	2–H16 R10–@150crs	2–H12 R10–@150crs
3.6	2–H20 R10–@150crs	2–H16 R10–@150crs	2–H16 R10–@150crs

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SUPERFORM POLY BLOCK LINTEL TABLE
FOR
SUPPORTING ROOF ONLY
SINGLE STOREY CONSTRUCTION

(See also Sheet LINTEL 4)

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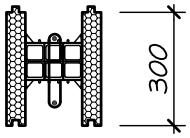
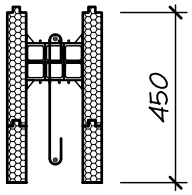
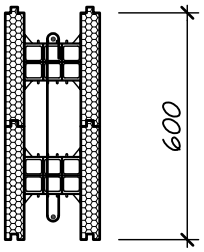
LINTEL 5

LINTEL 6 : SUPERFORM POLY BLOCK SYSTEM AS LINTELS

SINGLE STOREY CONSTRUCTION – HEAVY ROOF

			
Span	**100mm CONCRETE INFILL**		
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1.6	2–H10 R10–@150crs	2–H10 R10–@150crs	2–H12 R10–@150crs
2.0	2–H12 R10–@150crs	2–H10 R10–@150crs	2–H12 R10–@150crs
2.4	2–H16 R10–@150crs	2–H16 R10–@150crs	2–H12 R10–@150crs
3.0	2–H20 R10–@150crs	2–H16 R10–@150crs	2–H12 R10–@150crs
3.6	—	2–H20 R10–@150crs	2–H16 R10–@150crs

Span	**150mm CONCRETE INFILL**		
1.2	2–H10 R10–@150crs	2–H10 R10–@150crs	2–H12 R10–@150crs
1.6	2–H10 R10–@150crs	2–H10 R10–@150crs	2–H12 R10–@150crs
2.0	2–H12 R10–@150crs	2–H10 R10–@150crs	2–H12 R10–@150crs
2.4	2–H16 R10–@150crs	2–H12 R10–@150crs	2–H12 R10–@150crs
3.0	2–H20 R10–@150crs	2–H16 R10–@150crs	2–H12 R10–@150crs
3.6	—	2–H20 R10–@150crs	2–H16 R10–@150crs

Span	**200mm CONCRETE INFILL**		
1.2	2–H10 R10–@150crs	2–H10 R10–@150crs	2–H12 R10–@150crs
1.6	2–H10 R10–@150crs	2–H10 R10–@150crs	2–H12 R10–@150crs
2.0	2–H12 R10–@150crs	2–H10 R10–@150crs	2–H12 R10–@150crs
2.4	2–H16 R10–@150crs	2–H12 R10–@150crs	2–H12 R10–@150crs
3.0	2–H20 R10–@150crs	2–H16 R10–@150crs	2–H16 R10–@150crs
3.6	2–H25 R10–@150crs	2–H20 R10–@150crs	2–H16 R10–@150crs

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SUPERFORM POLY BLOCK LINTEL TABLE
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(See also Sheet LINTEL 4)

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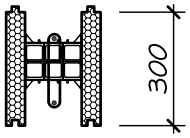
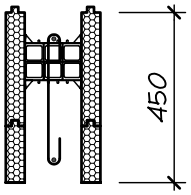
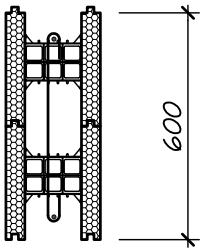
LINTEL 6

LINTEL 7 : SUPERFORM POLY BLOCK SYSTEM AS LINTELS

TWO STOREY CONSTRUCTION – LIGHT ROOF

			
Span	**100mm CONCRETE INFILL**		
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1.6	2–H16 R10–@100crs	2–H12 R10–@150crs	2–H12 R10–@150crs
2.0	—	2–H16 R10–@150crs	2–H12 R10–@150crs
2.4	—	2–H16 R10–@150crs	2–H16 R10–@150crs
3.0	—	2–H25 R10–@100crs	2–H20 R10–@150crs
3.6	—	—	2–H20 R10–@150crs

Span	**150mm CONCRETE INFILL**		
1.2	2–H12 R10–@150crs	2–H10 R10–@150crs	2–H12 R10–@150crs
1.6	2–H16 R10–@100crs	2–H12 R10–@150crs	2–H12 R10–@150crs
2.0	2–H20 R10–@100crs	2–H16 R10–@150crs	2–H12 R10–@150crs
2.4	—	2–H20 R10–@150crs	2–H16 R10–@150crs
3.0	—	2–H25 R10–@100crs	2–H20 R10–@150crs
3.6	—	—	2–H25 R10–@150crs

Span	**200mm CONCRETE INFILL**		
1.2	2–H12 R10–@150crs	2–H10 R10–@150crs	2–H12 R10–@150crs
1.6	2–H16 R10–@100crs	2–H12 R10–@150crs	2–H12 R10–@150crs
2.0	—	2–H16 R10–@150crs	2–H12 R10–@150crs
2.4	—	2–H20 R10–@150crs	2–H16 R10–@150crs
3.0	—	2–H25 R10–@100crs	2–H20 R10–@150crs
3.6	—	—	2–H25 R10–@100crs

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SUPERFORM POLY BLOCK LINTEL TABLE
FOR
SUPPORTING CONCRETE FLOOR & ROOF
TWO STOREY CONSTRUCTION

(See also Sheet LINTEL 4)

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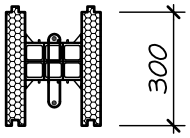
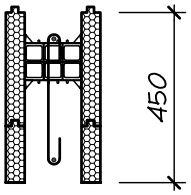
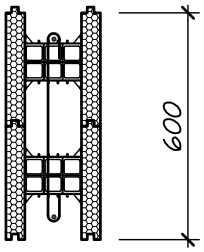
LINTEL 7

LINTEL 8 : SUPERFORM POLY BLOCK SYSTEM AS LINTELS

TWO STOREY CONSTRUCTION – HEAVY ROOF

			
Span	**100mm CONCRETE INFILL**		
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1.6	2–H16 R10–@150crs	2–H12 R10–@150crs	2–H12 R10–@150crs
2.0	2–H20 R10–@100crs	2–H16 R10–@150crs	2–H16 R10–@150crs
2.4	—	2–H20 R10–@150crs	2–H16 R10–@150crs
3.0	—	—	2–H20 R10–@150crs
3.6	—	—	—

Span	150mm CONCRETE INFILL		
1.2	2–H12 R10–@150crs	2–H10 R10–@150crs	2–H12 R10–@150crs
1.6	2–H16 R10–@150crs	2–H12 R10–@150crs	2–H12 R10–@150crs
2.0	2–H20 R10–@100crs	2–H16 R10–@150crs	2–H16 R10–@150crs
2.4	—	2–H20 R10–@100crs	2–H16 R10–@150crs
3.0	—	2–H25 R10–@100crs	2–H20 R10–@100crs
3.6	—	—	2–H25 R10–@100crs

Span	200mm CONCRETE INFILL		
1.2	2–H12 R10–@150crs	2–H10 R10–@150crs	2–H12 R10–@150crs
1.6	2–H16 R10–@100crs	2–H12 R10–@150crs	2–H12 R10–@150crs
2.0	2–H20 R10–@100crs	2–H16 R10–@150crs	2–H16 R10–@150crs
2.4	—	2–H20 R10–@100crs	2–H16 R10–@150crs
3.0	—	2–H25 R10–@100crs	2–H20 R10–@100crs
3.6	—	—	2–H25 R10–@100crs

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SUPERFORM POLY BLOCK LINTEL TABLE
FOR
SUPPORTING CONCRETE FLOOR & ROOF
TWO STOREY CONSTRUCTION

(See also Sheet LINTEL 4)

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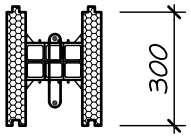
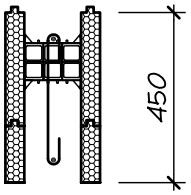
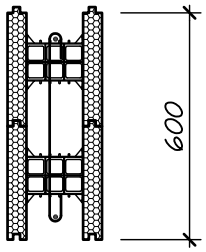
LINTEL 8

LINTEL 9 : SUPERFORM POLY BLOCK SYSTEM AS LINTELS

TWO STOREY CONSTRUCTION – LIGHT ROOF

			
Span	**100mm CONCRETE INFILL**		
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1.6	2–H12 R10–@150crs	2–H10 R10–@150crs	2–H12 R10–@150crs
2.0	2–H16 R10–@150crs	2–H12 R10–@150crs	2–H12 R10–@150crs
2.4	2–H20 R10–@150crs	2–H12 R10–@150crs	2–H12 R10–@150crs
3.0	—	2–H16 R10–@150crs	2–H16 R10–@150crs
3.6	—	2–H20 R10–@150crs	2–H16 R10–@150crs

Span	150mm CONCRETE INFILL		
1.2	2–H10 R10–@150crs	2–H10 R10–@150crs	2–H12 R10–@150crs
1.6	2–H12 R10–@150crs	2–H10 R10–@150crs	2–H12 R10–@150crs
2.0	2–H16 R10–@150crs	2–H12 R10–@150crs	2–H12 R10–@150crs
2.4	2–H20 R10–@150crs	2–H16 R10–@150crs	2–H12 R10–@150crs
3.0	—	2–H20 R10–@150crs	2–H16 R10–@150crs
3.6	—	2–H25 R10–@150crs	2–H20 R10–@150crs

Span	200mm CONCRETE INFILL		
1.2	2–H10 R10–@150crs	2–H10 R10–@150crs	2–H12 R10–@150crs
1.6	2–H16 R10–@150crs	2–H10 R10–@150crs	2–H12 R10–@150crs
2.0	2–H16 R10–@150crs	2–H12 R10–@150crs	2–H12 R10–@150crs
2.4	2–H20 R10–@100crs	2–H16 R10–@150crs	2–H12 R10–@150crs
3.0	—	2–H20 R10–@150crs	2–H16 R10–@150crs
3.6	—	2–H25 R10–@150crs	2–H20 R10–@150crs

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SUPERFORM POLY BLOCK LINTEL TABLE
FOR
SUPPORTING TIMBER FLOOR & ROOF
TWO STOREY CONSTRUCTION

(See also Sheet LINTEL 4)

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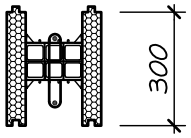
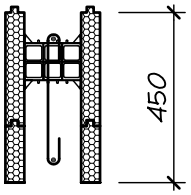
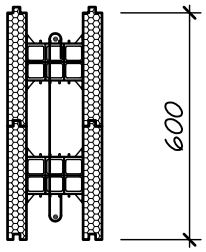
LINTEL 9

LINTEL 10 : SUPERFORM POLY BLOCK SYSTEM AS LINTELS

TWO STOREY CONSTRUCTION – HEAVY ROOF

			
Span	**100mm CONCRETE INFILL**		
1.2	2–H10 R10–@150crs	2–H10 R10–@150crs	2–H12 R10–@150crs
1.6	2–H12 R10–@150crs	2–H10 R10–@150crs	2–H12 R10–@150crs
2.0	2–H16 R10–@150crs	2–H12 R10–@150crs	2–H12 R10–@150crs
2.4	2–H20 R10–@150crs	2–H16 R10–@150crs	2–H16 R10–@150crs
3.0	—	2–H20 R10–@150crs	2–H16 R10–@150crs
3.6	—	—	2–H20 R10–@150crs

Span	150mm CONCRETE INFILL		
1.2	2–H10 R10–@150crs	2–H10 R10–@150crs	2–H12 R10–@150crs
1.6	2–H16 R10–@150crs	2–H10 R10–@150crs	2–H12 R10–@150crs
2.0	2–H16 R10–@150crs	2–H16 R10–@150crs	2–H12 R10–@150crs
2.4	2–H20 R10–@150crs	2–H16 R10–@150crs	2–H16 R10–@150crs
3.0	—	2–H20 R10–@150crs	2–H20 R10–@150crs
3.6	—	2–H25 R10–@100crs	2–H25 R10–@150crs

Span	200mm CONCRETE INFILL		
1.2	2–H10 R10–@150crs	2–H10 R10–@150crs	2–H12 R10–@150crs
1.6	2–H16 R10–@150crs	2–H12 R10–@150crs	2–H12 R10–@150crs
2.0	2–H20 R10–@150crs	2–H16 R10–@150crs	2–H12 R10–@150crs
2.4	2–H25 R10–@150crs	2–H20 R10–@150crs	2–H16 R10–@150crs
3.0	—	2–H25 R10–@100crs	2–H20 R10–@150crs
3.6	—	—	—

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SUPERFORM POLY BLOCK LINTEL TABLE
FOR
SUPPORTING TIMBER FLOOR & ROOF
TWO STOREY CONSTRUCTION

(See also Sheet LINTEL 4)

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LINTEL 10

BRACING DESIGN ASSUMPTIONS AND PHILOSOPHY

To simplify this section of the manual we have assumed an approximately even distribution of bracing walls at 6.0 metre centres each way. Buildings which are heavily braced on one side and lightly on the other side can suffer damage through torsional movement under wind or earthquake forces. Bracing walls should be located as close as possible to the outside corners of the building. If there is any doubt as to the lateral stability of the structure a structural engineer should be consulted. The bracing demand for wind loads shall be determined from NZS 3604 as applicable for your region.

Structural Diaphragms
For bracing line systems as defined by NZS 3604 Superform **POLY** Block walls must be connected to a structural diaphragm. The structural diaphragm provides part of the system for spanning lateral earthquake and wind loads to adjacent supporting systems. The structural diaphragm must comply with NZS 3604, floor diaphragms in accordance with clause 7.3 and ceiling diaphragms in accordance with clause 13.5 except that nail fixing of the structural diaphragm sheet material to wall stringers shall be 3.55mm diameter nails at 100mm centres. Connections shall be in accordance with details shown in Section D SF22 and SF23 (pages 27 and 28). Specifically designed concrete floors may also be used as structural diaphragms.

Bond Beams
All Superform **POLY** Block walls shall be constructed with bond beams at floor and roof diaphragm level to provide part of the system for spanning lateral earthquake and wind loads to adjacent supporting systems. For bond beams spanning further than the tabulated values specific engineering design is required.

For low wind to high wind zones as specified by NZS 3604 a seismic hazard factor "Z" of 0.2 for designing bond beams is suitable. For very high wind zones a seismic hazard factor "Z" of 0.26 shall be used to design bond beams. For wind speeds greater than very high specific design is required.

Where suspended concrete floors are used as structural diaphragms, greater distances can be spanned between adjacent supporting systems. Specific engineering design is required where spans are greater than the tabulated values.

BRACING CALCULATION – WORKED EXAMPLE

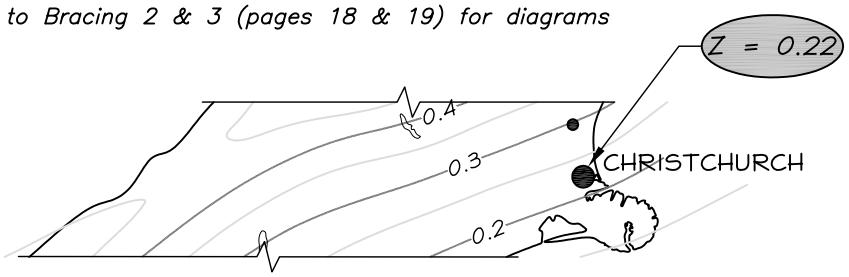
Situation

single storey building
light roof
25° max roof slope
internal timber frame partitions
located in Christchurch

From BRACING REQUIREMENT TABLE

Roof Type	Location of Storey	Maximum slope of Roof	Infill Thickness	Minimum number of bracing units per square metre of floor area (B_z) (Internal timber frame partitions)	(Internal Superform POLY Block walls)
LIGHT ROOF	Single Storey	25°	100mm	60	90
			150mm	75	120
			200mm	90	155
		45°	100mm	60	95
			150mm	80	125
			200mm	95	160

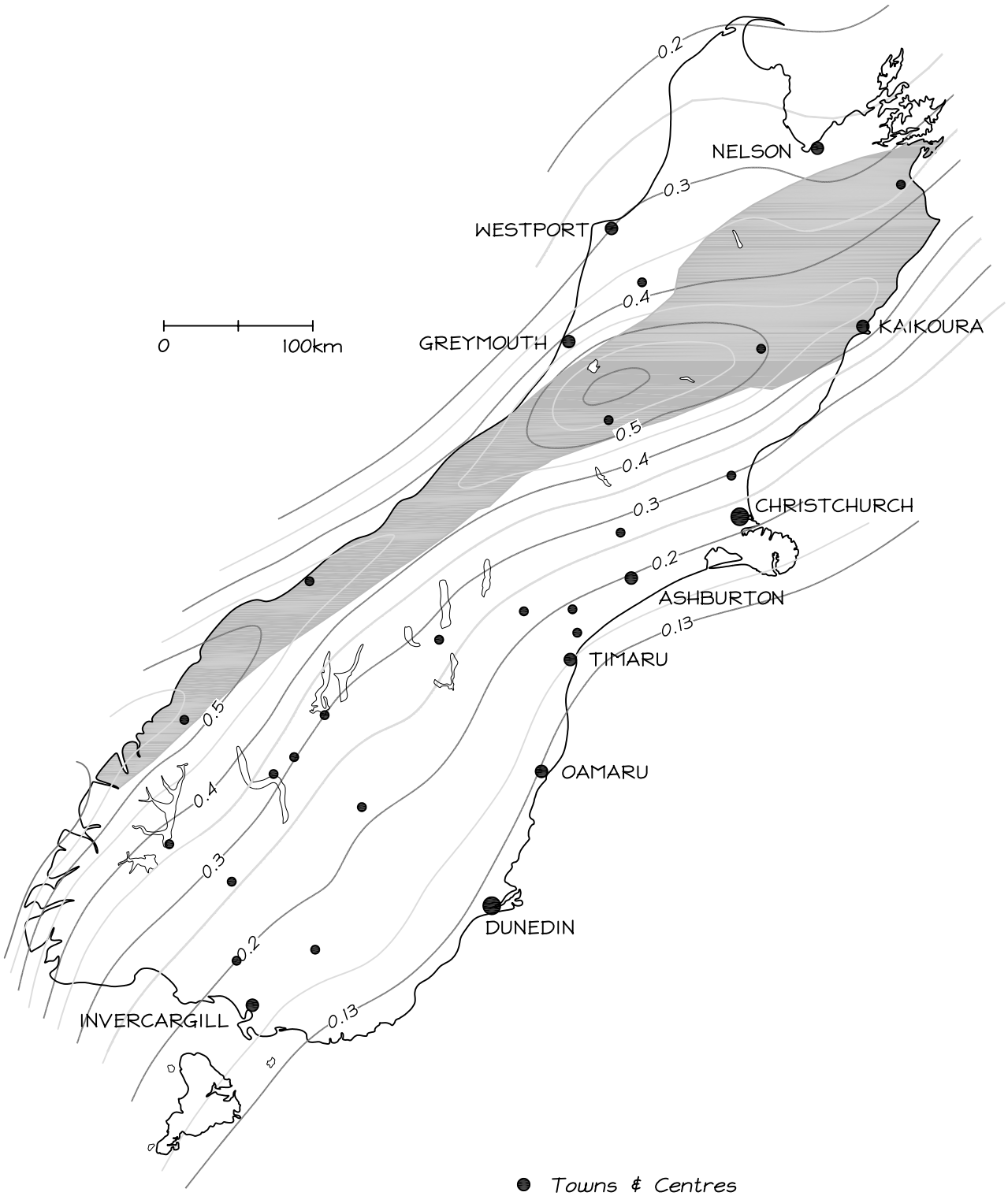
From HAZARD FACTOR DIAGRAM
refer to Bracing 2 & 3 (pages 18 & 19) for diagrams



Bracing Units required = B_z x Z

From BRACING REQUIREMENT TABLE B_z = 75
From HAZARD FACTOR DIAGRAM Z = 0.22

Earthquake Bracing Units required = 75 x 0.22
= 16.5 Bracing Units / m²



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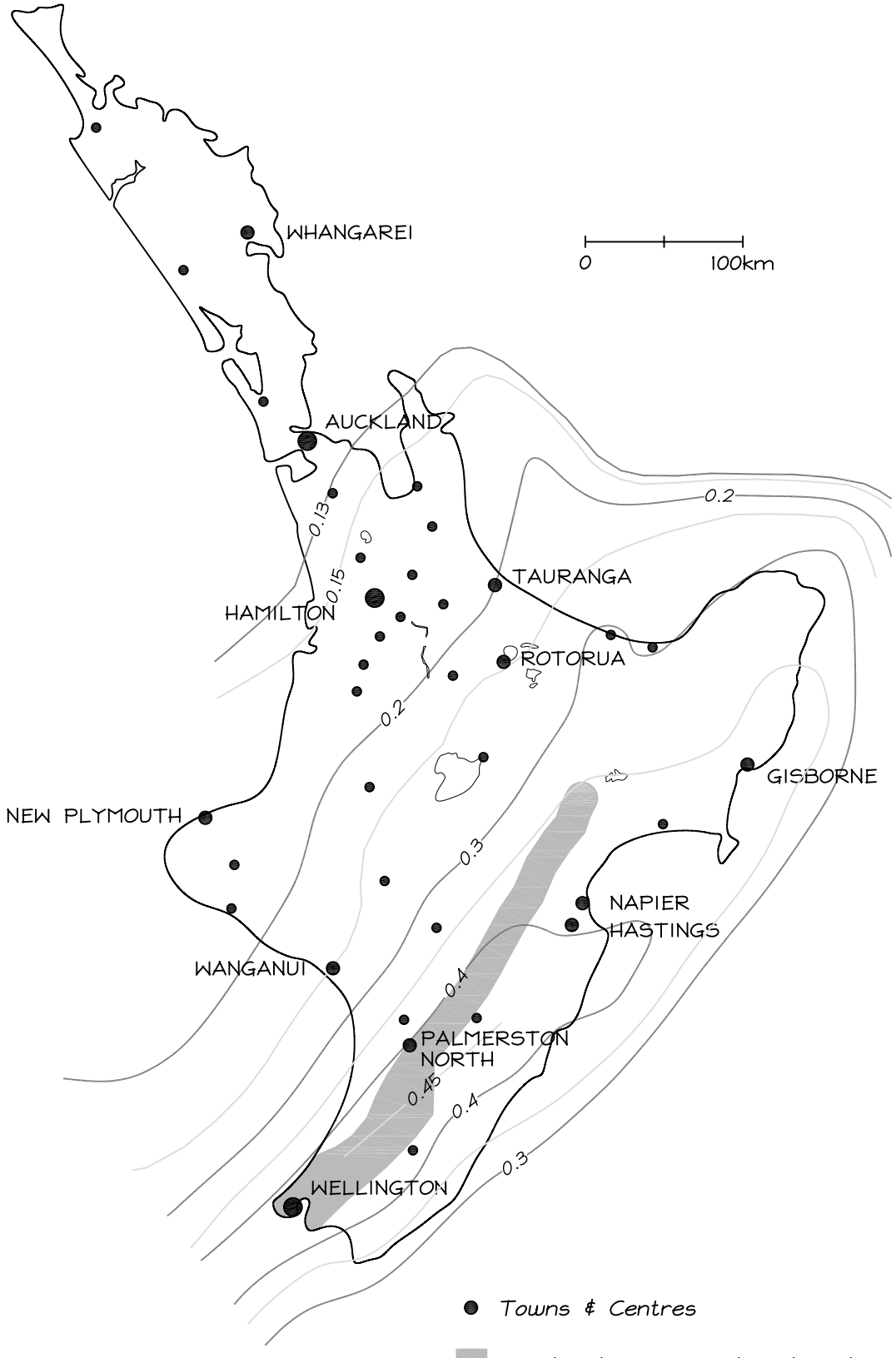
HAZARD FACTOR DIAGRAM SOUTH ISLAND

RAPEL™ International Ltd

BRACING 2



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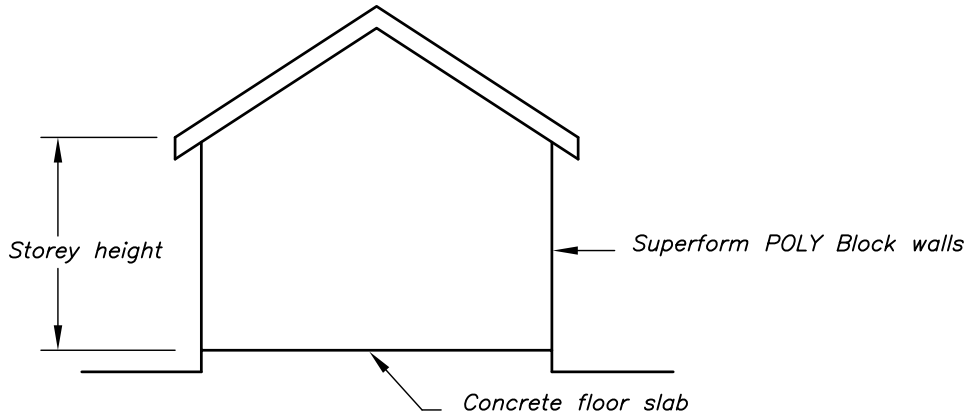
HAZARD FACTOR DIAGRAM
NORTH ISLAND

RAPEL™ International Ltd

BRACING
3

BRACING 1 : MINIMUM BRACING UNIT REQUIREMENTS FOR EARTHQUAKE

The tabulated figures are for a storey height of 2.4m.
Where storey heights exceed 2.4m, the minimum bracing units per square metre of floor area are to be multiplied by the following values:
storey height 2.8m 1.1
storey height 3.0m 1.2



SINGLE STOREY BUILDING

* ***These tables are to be used in conjunction with NZS 3604 – Bracing approach***

DESIGN ASSUMPTIONS

① • *In an earthquake the ground motion can be in any direction. It is the same building weight which gets rocked around, therefore the bracing units requirements are the same in both the along and across directions.*

② • *In the case of a heavy roof the roof plan area must be used in determining the total bracing units required.*

③ • *Superform POLY Block walls with heavy, (brick or stone) veneers require specific design.*

POWELL FENWICK CONSULTANTS LIMITED Your quality engineering partner.	BRACING UNITS TABLE *FOR* SINGLE STOREY BUILDING (See also Sheet BRACING 4a)	RAPEL™ International Ltd	BRACING 4

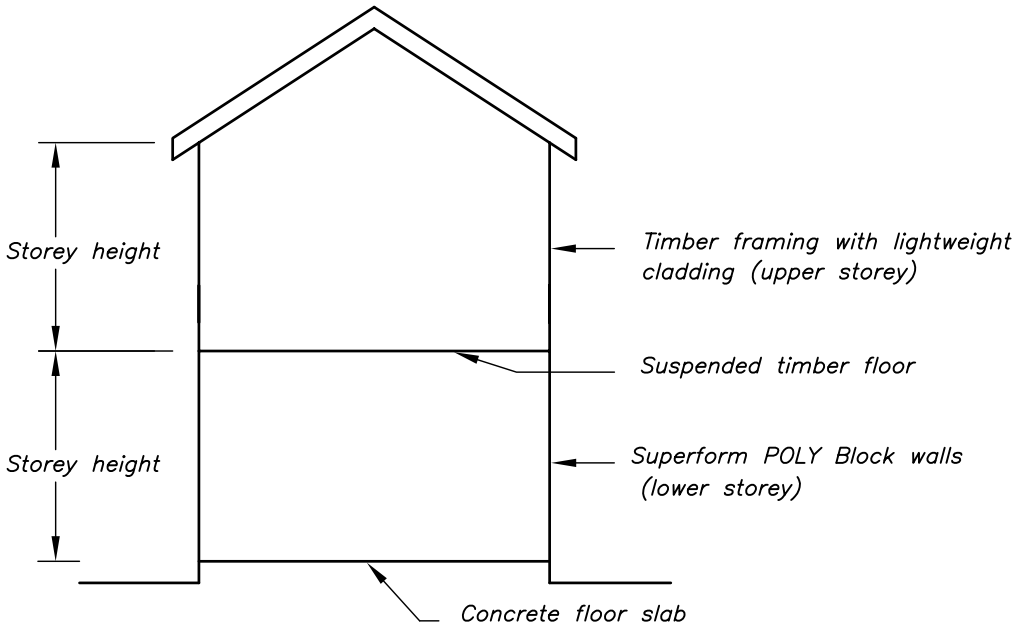
BRACING 1a : MINIMUM BRACING UNIT REQUIREMENTS FOR EARTHQUAKE

* *These tables are to be used in conjunction with NZS 3604 – Bracing approach*

Roof Type	Location of Storey	Maximum slope of Roof		Minimum number of bracing units per square metre of floor area (B_z)	
LIGHT ROOF	Single Storey		Infill Thickness	(Internal timber frame partitions)	(Internal Superform POLY Block walls)
		25°	100mm	80	130
			150mm	105	175
			200mm	125	225
		45°	100mm	85	135
			150mm	105	180
			200mm	130	225
HEAVY ROOF	Single Storey		Infill Thickness	(Internal timber frame partitions)	(Internal Superform POLY Block walls)
		25°	100mm	110	160
			150mm	135	205
			200mm	155	255
		45°	100mm	125	170
			150mm	145	220
			200mm	170	265

BRACING 2 : MINIMUM BRACING UNIT REQUIREMENTS FOR EARTHQUAKE

The tabulated figures are for a storey height of 2.4m.
Where storey heights exceed 2.4m, the minimum bracing units per square metre of floor area are to be multiplied by the following values:
storey height 2.8m 1.1
storey height 3.0m 1.2



TWO STOREY BUILDING
SUSPENDED TIMBER FLOOR
TOP STOREY OF LIGHT WEIGHT CONSTRUCTION

✸ ***These tables are to be used in conjunction with NZS 3604 – Bracing approach***

DESIGN ASSUMPTIONS

① • *In an earthquake the ground motion can be in any direction. It is the same building weight which gets rocked around, therefore the bracing units requirements are the same in both the along and across directions.*

② • *In the case of a heavy roof the roof plan area must be used in determining the total bracing units required.*

③ • *Superform POLY Block walls with heavy, (brick or stone) veneers require specific design.*

④ • *Upper level brcing is to be designed to NZS 3604.*

⑤ • *Upper level bracing is to be designed to single storey bracing demand.*

POWELL FENWICK CONSULTANTS LIMITED Your quality engineering partner.	BRACING UNITS TABLE FOR TWO STOREY BUILDING SUSPENDED TIMBER FLOOR TOP STOREY OF LIGHT WEIGHT CLADDING (See also Sheet BRACING 2a)	RAPEL™ International Ltd	BRACING 5

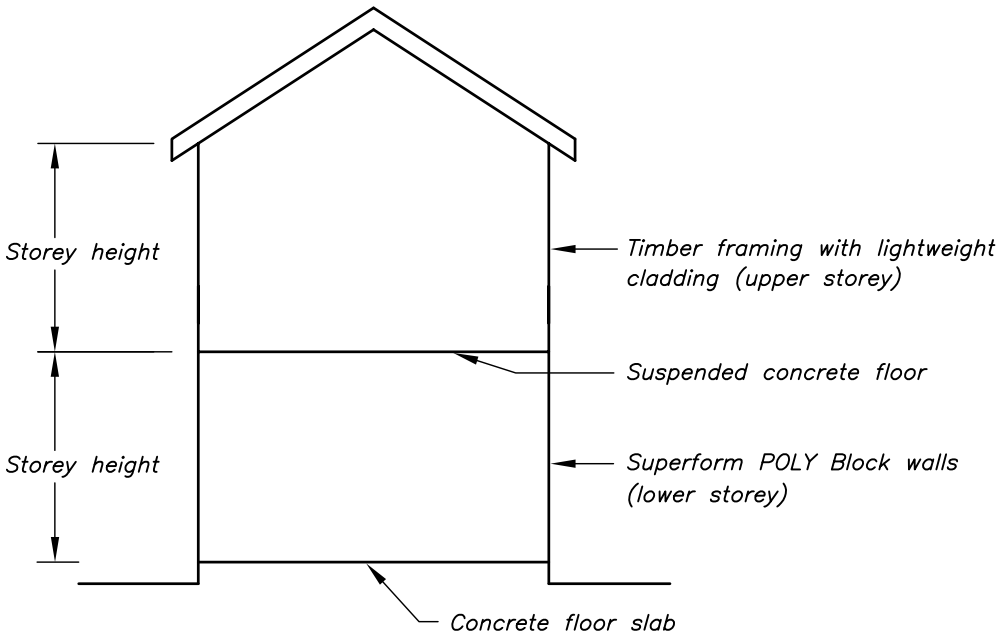
BRACING 2a : MINIMUM BRACING UNIT REQUIREMENTS FOR EARTHQUAKE

* *These tables are to be used in conjunction with NZS 3604 – Bracing approach*

Roof Type	Location of Storey	Maximum slope of Roof		Minimum number of bracing units per square metre of floor area (B_z)	
LIGHT ROOF	Lower Storey	25°	100mm conc infill	(Internal timber frame partitions) 140	(Internal Superform POLY Block walls lower storey only) 190
			150mm conc infill	165	240
			200mm conc infill	190	285
		45°	100mm conc infill	145	195
			150mm conc infill	170	245
			200mm conc infill	195	290
HEAVY ROOF	Lower Storey	25°	100mm conc infill	(Internal timber frame partitions) 175	(Internal Superform POLY Block walls lower storey only) 220
			150mm conc infill	195	270
			200mm conc infill	220	315
		45°	100mm conc infill	185	235
			150mm conc infill	210	280
			200mm conc infill	235	330

BRACING 3 : MINIMUM BRACING UNIT REQUIREMENTS FOR EARTHQUAKE

The tabulated figures are for a storey height of 2.4m.
Where storey heights exceed 2.4m, the minimum bracing units per square metre of floor area are to be multiplied by the following values:
storey height 2.8m 1.1
storey height 3.0m 1.2



TWO STOREY BUILDING
SUSPENDED CONCRETE FLOOR
TOP STOREY OF LIGHT WEIGHT CONSTRUCTION

✱ ***These tables are to be used in conjunction with NZS 3604 – Bracing approach***

DESIGN ASSUMPTIONS

① • *In an earthquake the ground motion can be in any direction. It is the same building weight which gets rocked around, therefore the bracing units requirements are the same in both the along and across directions.*

② • *In the case of a heavy roof the roof plan area must be used in determining the total bracing units required.*

③ • *Suspended Concrete Floor defines a concrete floor having a mass not exceeding 490kg/m²*

④ • *Superform POLY Block walls with heavy, (brick or stone) veneers require specific design.*

⑤ • *Upper level brcing is to be designed to NZS 3604*

POWELL FENWICK CONSULTANTS LIMITED Your quality engineering partner.	BRACING UNITS TABLE FOR TWO STOREY BUILDING SUSPENDED CONCRETE FLOOR TOP STOREY OF LIGHT WEIGHT CLADDING (See also Sheet BRACING 6a)	RAPEL™ International Ltd	BRACING 6

BRACING 3a : MINIMUM BRACING UNIT REQUIREMENTS FOR EARTHQUAKE

* *These tables are to be used in conjunction with NZS 3604 – Bracing approach*

Roof Type	Location of Storey	Maximum slope of Roof		Minimum number of bracing units per square metre of floor area (B_z)	
LIGHT ROOF	Lower Storey	25°	100mm conc infill	(Internal timber frame partitions) 285	(Internal Superform POLY Block walls lower storey only) 330
			150mm conc infill	305	380
			200mm conc infill	330	425
		45°	100mm conc infill	285	335
			150mm conc infill	310	385
			200mm conc infill	335	430
HEAVY ROOF	Lower Storey	25°	100mm conc infill	(Internal timber frame partitions) 315	(Internal Superform POLY Block walls lower storey only) 365
			150mm conc infill	340	410
			200mm conc infill	360	460
		45°	100mm conc infill	325	375
			150mm conc infill	350	425
			200mm conc infill	375	470

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BRACING UNITS TABLE
FOR
TWO STOREY BUILDING
SUSPENDED CONCRETE FLOOR
TOP STOREY OF LIGHT WEIGHT CLADDING

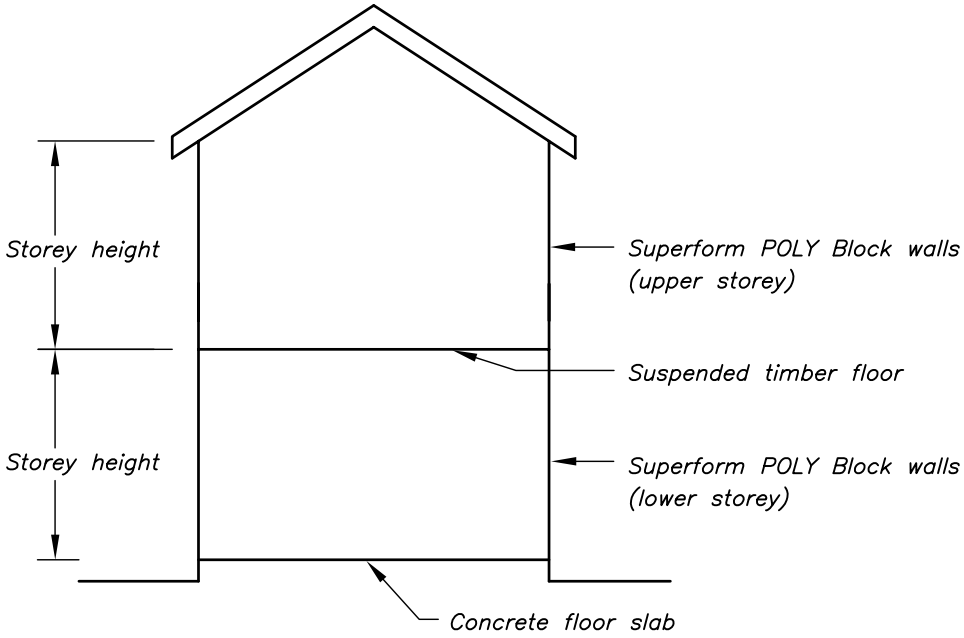
(See also Sheet BRACING 6)

RAFEL International Ltd

BRACING 6a

BRACING 4 : MINIMUM BRACING UNIT REQUIREMENTS FOR EARTHQUAKE

The tabulated figures are for a storey height of 2.4m.
Where storey heights exceed 2.4m, the minimum bracing units per square metre of floor area are to be multiplied by the following values:
storey height 2.8m 1.1
storey height 3.0m 1.2



TWO STOREY BUILDING
SUSPENDED TIMBER FLOOR
TOP STOREY OF EXTERNAL SUPERFORM POLY BLOCK WALLS

✹ ***These tables are to be used in conjunction with NZS 3604 – Bracing approach***

DESIGN ASSUMPTIONS

① • *In an earthquake the ground motion can be in any direction. It is the same building weight which gets rocked around, therefore the bracing units requirements are the same in both the along and across directions.*

② • *In the case of a heavy roof the roof plan area must be used in determining the total bracing units required.*

③ • *Superform POLY Block walls with heavy, (brick or stone) veneers require specific design.*

POWELL FENWICK CONSULTANTS LIMITED Your quality engineering partner.	BRACING UNITS TABLE FOR TWO STOREY BUILDING SUSPENDED TIMBER FLOOR TOP STOREY OF EXTERNAL SUPERFORM POLY BLOCK WALLS (See also Sheet BRACING 7a)	RAPEL™ International Ltd	BRACING 7

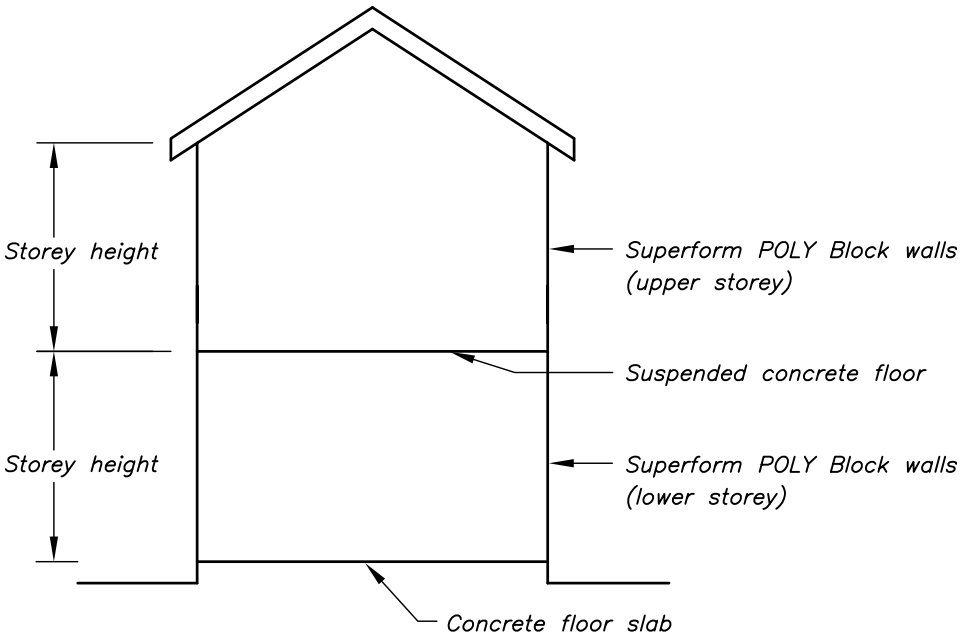
BRACING 4a : MINIMUM BRACING UNIT REQUIREMENTS FOR EARTHQUAKE

* *These tables are to be used in conjunction with NZS 3604 – Bracing approach*

Roof Type	Location of Storey	Maximum slope of Roof		Minimum number of bracing units per square metre of floor area (B_z)	
LIGHT ROOF	Lower Storey	25°	100mm conc infill	(Internal timber frame partitions) 240	(Internal Superform POLY Block walls lower storey only) 390
			150mm conc infill	310	530
			200mm conc infill	380	670
		45°	100mm conc infill	245	390
			150mm conc infill	315	535
			200mm conc infill	385	675
HEAVY ROOF	Lower Storey	25°	100mm conc infill	(Internal timber frame partitions) 270	(Internal Superform POLY Block walls lower storey only) 420
			150mm conc infill	340	560
			200mm conc infill	415	700
		45°	100mm conc infill	285	430
			150mm conc infill	355	575
			200mm conc infill	425	715

BRACING 5 : MINIMUM BRACING UNIT REQUIREMENTS FOR EARTHQUAKE

The tabulated figures are for a storey height of 2.4m.
Where storey heights exceed 2.4m, the minimum bracing units per square metre of floor area are to be multiplied by the following values:
storey height 2.8m 1.1
storey height 3.0m 1.2



TWO STOREY BUILDING
SUSPENDED CONCRETE FLOOR
TOP STOREY OF EXTERNAL SUPERFORM POLY BLOCK WALLS

✸ ***These tables are to be used in conjunction with NZS 3604 – Bracing approach***

DESIGN ASSUMPTIONS

① • *In an earthquake the ground motion can be in any direction. It is the same building weight which gets rocked around, therefore the bracing units requirements are the same in both the along and across directions.*

② • *In the case of a heavy roof the roof plan area must be used in determining the total bracing units required.*

③ • *Suspended Concrete Floor defines a concrete floor having a mass not exceeding 490kg/m²*

④ • *Superform POLY Block walls with heavy, (brick or stone) veneers require specific design.*

BRACING 5a : MINIMUM BRACING UNIT REQUIREMENTS FOR EARTHQUAKE

* *These tables are to be used in conjunction with NZS 3604 – Bracing approach*

Roof Type	Location of Storey	Maximum slope of Roof		Minimum number of bracing units per square metre of floor area (B_z)	
				(Internal timber frame partitions)	(Internal Superform POLY Block walls lower storey only)
LIGHT ROOF	Lower Storey	25°	100mm conc infill	380	530
			150mm conc infill	450	670
			200mm conc infill	525	815
		45°	100mm conc infill	385	535
			150mm conc infill	455	675
			200mm conc infill	525	815
HEAVY ROOF				(Internal timber frame partitions)	(Internal Superform POLY Block walls lower storey only)
	Lower Storey	25°	100mm conc infill	410	560
			150mm conc infill	485	700
			200mm conc infill	555	845
		45°	100mm conc infill	425	575
			150mm conc infill	495	715
			200mm conc infill	565	855

BRACING VALUES PROVIDED BY SUPERFORM POLY BLOCK WALLS (BU'S)

For bracing walls connected to structural diaphragms with M12 bolts at 900mm centres.

Wall Infill Thickness 100mm to 200mm										
Wall Hgt (mm)	Length of Wall									
	0.8	1.2	1.6	2.0	2.4	2.8	3.2	3.6	4.0	4.4
800	110	220	220	330	330	440	440	560	560	560
1000	110	220	220	330	330	440	440	560	560	560
1200	110	220	220	330	330	440	440	560	560	560
1400	110	220	220	330	330	440	440	560	560	560
1600	110	220	220	330	330	440	440	560	560	560
1800	110	220	220	330	330	440	440	560	560	560
2000	110	220	220	330	330	440	440	560	560	560
2200	110	220	220	330	330	440	440	560	560	560
2400	110	220	220	330	330	440	440	560	560	560
2600	110	220	220	330	330	440	440	560	560	560
2800	110	220	220	330	330	440	440	560	560	560
3000	110	220	220	330	330	440	440	560	560	560

Wall Infill Thickness 100mm to 200mm									
Wall Hgt (mm)	Length of Wall								
	4.8	5.2	5.6	6.0	6.4	6.8	7.2	7.6	8.0
800	670	670	780	780	890	890	1010	1010	1010
1000	670	670	780	780	890	890	1010	1010	1010
1200	670	670	780	780	890	890	1010	1010	1010
1400	670	670	780	780	890	890	1010	1010	1010
1600	670	670	780	780	890	890	1010	1010	1010
1800	670	670	780	780	890	890	1010	1010	1010
2000	670	670	780	780	890	890	1010	1010	1010
2200	670	670	780	780	890	890	1010	1010	1010
2400	670	670	780	780	890	890	1010	1010	1010
2600	670	670	780	780	890	890	1010	1010	1010
2800	670	670	780	780	890	890	1010	1010	1010
3000	670	670	780	780	890	890	1010	1010	1010

BRACING VALUES PROVIDED BY SUPERFORM POLY BLOCK WALLS (BU'S)

For bracing walls connected to structural diaphragms with M12 bolts at 600mm centres.

Wall Infill Thickness 100mm to 200mm										
Wall Hgt (mm)	Length of Wall									
	0.8	1.2	1.6	2.0	2.4	2.8	3.2	3.6	4.0	4.4
800	220	330	330	440	560	560	670	780	780	890
1000	220	330	330	440	560	560	670	780	780	890
1200	220	330	330	440	560	560	670	780	780	890
1400	220	330	330	440	560	560	670	780	780	890
1600	220	330	330	440	560	560	670	780	780	890
1800	220	330	330	440	560	560	670	780	780	890
2000	220	330	330	440	560	560	670	780	780	890
2200	220	330	330	440	560	560	670	780	780	890
2400	200	330	330	440	560	560	670	780	780	890
2600	180	330	330	440	560	560	670	780	780	890
2800	170	330	330	440	560	560	670	780	780	890
3000	160	330	330	440	560	560	670	780	780	890

Wall Infill Thickness 100mm to 200mm									
Wall Hgt (mm)	Length of Wall								
	4.8	5.2	5.6	6.0	6.4	6.8	7.2	7.6	8.0
800	1010	1010	1120	1230	1230	1340	1460	1460	1570
1000	1010	1010	1120	1230	1230	1340	1460	1460	1570
1200	1010	1010	1120	1230	1230	1340	1460	1460	1570
1400	1010	1010	1120	1230	1230	1340	1460	1460	1570
1600	1010	1010	1120	1230	1230	1340	1460	1460	1570
1800	1010	1010	1120	1230	1230	1340	1460	1460	1570
2000	1010	1010	1120	1230	1230	1340	1460	1460	1570
2200	1010	1010	1120	1230	1230	1340	1460	1460	1570
2400	1010	1010	1120	1230	1230	1340	1460	1460	1570
2600	1010	1010	1120	1230	1230	1340	1460	1460	1570
2800	1010	1010	1120	1230	1230	1340	1460	1460	1570
3000	1010	1010	1120	1230	1230	1340	1460	1460	1570

BRACING VALUES PROVIDED BY SUPERFORM POLY BLOCK WALLS (BU'S)

For bracing walls connected to structural diaphragms with M12 bolts at 400mm centres.

Wall Infill Thickness 100mm to 200mm										
Wall Hgt (mm)	Length of Wall									
	0.8	1.2	1.6	2.0	2.4	2.8	3.2	3.6	4.0	4.4
800	330	440	560	670	750	890	1010	1120	1230	1340
1000	330	440	560	670	750	890	1010	1120	1230	1340
1200	330	440	560	670	750	890	1010	1120	1230	1340
1400	330	440	560	670	750	890	1010	1120	1230	1340
1600	330	440	560	670	750	890	1010	1120	1230	1340
1800	270	440	560	670	750	890	1010	1120	1230	1340
2000	240	440	560	670	750	890	1010	1120	1230	1340
2200	220	440	560	670	750	890	1010	1120	1230	1340
2400	200	440	560	670	750	890	1010	1120	1230	1340
2600	180	420	560	670	750	890	1010	1120	1230	1340
2800	170	390	560	670	750	890	1010	1120	1230	1340
3000	160	360	560	670	750	890	1010	1120	1230	1340

Wall Infill Thickness 100mm to 200mm									
Wall Hgt (mm)	Length of Wall								
	4.8	5.2	5.6	6.0	6.4	6.8	7.2	7.6	8.0
800	1460	1570	1680	1790	1900	2020	2130	2240	2350
1000	1460	1570	1680	1790	1900	2020	2130	2240	2350
1200	1460	1570	1680	1790	1900	2020	2130	2240	2350
1400	1460	1570	1680	1790	1900	2020	2130	2240	2350
1600	1460	1570	1680	1790	1900	2020	2130	2240	2350
1800	1460	1570	1680	1790	1900	2020	2130	2240	2350
2000	1460	1570	1680	1790	1900	2020	2130	2240	2350
2200	1460	1570	1680	1790	1900	2020	2130	2240	2350
2400	1460	1570	1680	1790	1900	2020	2130	2240	2350
2600	1460	1570	1680	1790	1900	2020	2130	2240	2350
2800	1460	1570	1680	1790	1900	2020	2130	2240	2350
3000	1460	1570	1680	1790	1900	2020	2130	2240	2350

BRACING VALUES PROVIDED BY SUPERFORM POLY BLOCK WALLS (BU'S)

For bracing walls connected to a concrete floor structural diaphragm with H12@600crs.

Wall Infill Thickness 100mm to 200mm										
Wall Hgt (mm)	Length of Wall 0.8	1.2	1.6	2.0	2.4	2.8	3.2	3.6	4.0	4.4
800	610	1190	1190	1580	1980	1980	2380	2770	2770	3170
1000	490	1100	1190	1580	1980	1980	2380	2770	2770	3170
1200	410	920	1190	1580	1980	1980	2380	2770	2770	3170
1400	350	790	1190	1580	1980	1980	2380	2770	2770	3170
1600	300	690	1190	1580	1980	1980	2380	2770	2770	3170
1800	570	610	1090	1580	1980	1980	2380	2770	2770	3170
2000	240	550	980	1540	1980	1980	2380	2770	2770	3170
2200	220	500	890	1400	1980	1980	2380	2770	2770	3170
2400	200	460	820	1280	1840	1980	2380	2770	2770	3170
2600	180	420	750	1180	1700	1980	2380	2770	2770	3170
2800	170	390	700	1100	1580	1980	2380	2770	2770	3170
3000	160	360	650	1020	1470	1980	2380	2770	2770	3170

Wall Infill Thickness 100mm to 200mm									
Wall Hgt (mm)	Length of Wall 4.8	5.2	5.6	6.0	6.4	6.8	7.2	7.6	8.0
800	3570	3570	3960	4360	4360	4760	5150	5150	5550
1000	3570	3570	3960	4360	4360	4760	5150	5150	5550
1200	3570	3570	3960	4360	4360	4760	5150	5150	5550
1400	3570	3570	3960	4360	4360	4760	5150	5150	5550
1600	3570	3570	3960	4360	4360	4760	5150	5150	5550
1800	3570	3570	3960	4360	4360	4760	5150	5150	5550
2000	3570	3570	3960	4360	4360	4760	5150	5150	5550
2200	3570	3570	3960	4360	4360	4760	5150	5150	5550
2400	3570	3570	3960	4360	4360	4760	5150	5150	5550
2600	3570	3570	3960	4360	4360	4760	5150	5150	5550
2800	3570	3570	3960	4360	4360	4760	5150	5150	5550
3000	3570	3570	3960	4360	4360	4760	5150	5150	5550

BRACING VALUES PROVIDED BY SUPERFORM POLY BLOCK WALLS (BU'S)

For bracing walls connected to a concrete floor structural diaphragm with H12@450crs.

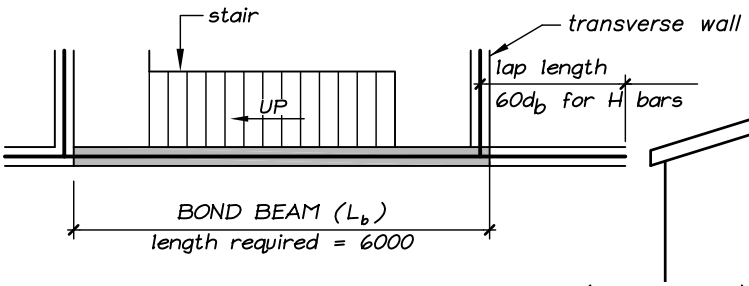
Wall Infill Thickness 100mm to 200mm										
Wall Hgt (mm)	Length of Wall									
	0.8	1.2	1.6	2.0	2.4	2.8	3.2	3.6	4.0	4.4
800	610	1190	1580	1980	2380	2770	3170	3570	3570	3960
1000	490	1100	1580	1980	2380	2770	3170	3570	3570	3960
1200	410	920	1580	1980	2380	2770	3170	3570	3570	3960
1400	350	790	1400	1980	2380	2770	3170	3570	3570	3960
1600	300	690	1230	1920	2380	2770	3170	3570	3570	3960
1800	270	610	1090	1710	2380	2770	3170	3570	3570	3960
2000	240	550	980	1540	2210	2770	3170	3570	3570	3960
2200	220	500	890	1400	2010	2740	3170	3570	3570	3960
2400	200	460	820	1280	1840	2510	3170	3570	3570	3960
2600	180	420	750	1180	1700	2320	3030	3570	3570	3960
2800	170	390	700	1100	1580	2150	2810	3560	3570	3960
3000	160	360	650	1020	1470	2010	2620	3320	3570	3960

Wall Infill Thickness 100mm to 200mm									
Wall Hgt (mm)	Length of Wall								
	4.8	5.2	5.6	6.0	6.4	6.8	7.2	7.6	8.0
800	4360	4760	5150	5550	5950	6350	6740	6740	7140
1000	4360	4760	5150	5550	5950	6350	6740	6740	7140
1200	4360	4760	5150	5550	5950	6350	6740	6740	7140
1400	4360	4760	5150	5550	5950	6350	6740	6740	7140
1600	4360	4760	5150	5550	5950	6350	6740	6740	7140
1800	4360	4760	5150	5550	5950	6350	6740	6740	7140
2000	4360	4760	5150	5550	5950	6350	6740	6740	7140
2200	4360	4760	5150	5550	5950	6350	6740	6740	7140
2400	4360	4760	5150	5550	5950	6350	6740	6740	7140
2600	4360	4760	5150	5550	5950	6350	6740	6740	7140
2800	4360	4760	5150	5550	5950	6350	6740	6740	7140
3000	4360	4760	5150	5550	5950	6350	6740	6740	7140

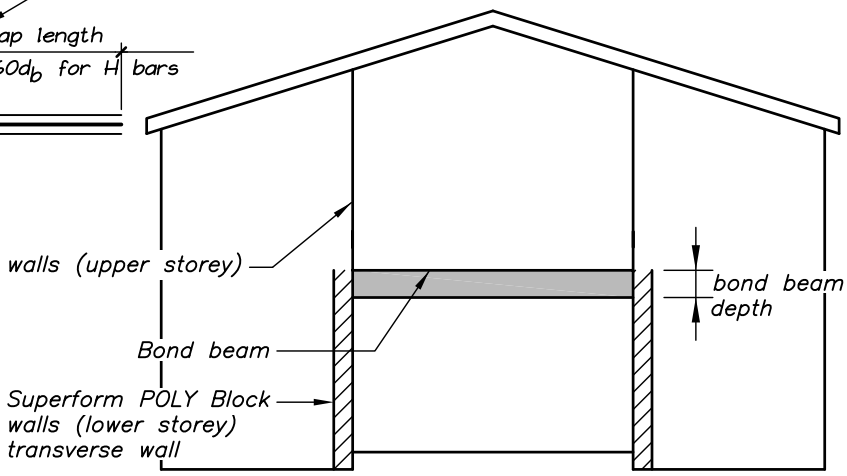
MAXIMUM BOND BEAM SPAN – WORKED EXAMPLE

Situation

150 concrete infill
450 deep bond beam
located in Christchurch
bond beam at first floor diaphragm level with Superform POLY Block walls above & below

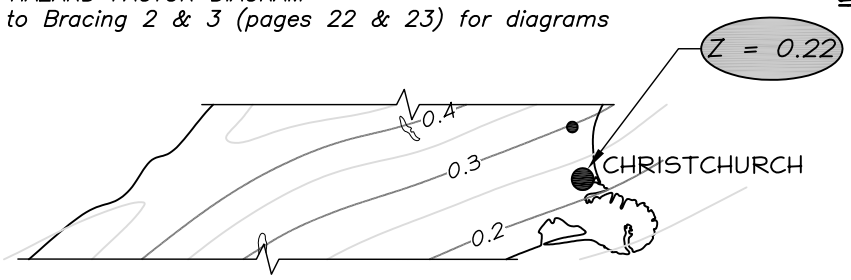


PLAN



ELEVATION

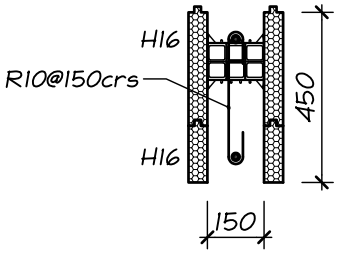
From HAZARD FACTOR DIAGRAM
refer to Bracing 2 & 3 (pages 22 & 23) for diagrams



From MAXIMUM BOND BEAM SPAN TABLE
refer to Bond Beam 1a (page 21) for table

BOND BEAM UNITS FOR 2.4m HEIGHT BETWEEN BOND BEAMS OR BETWEEN BOND BEAMS & FOUNDATION($L_b Z$)				
Type/Depth	Reinf. No. & size	Wall Infill Thickness		
		100mm	150mm	200mm
Inter/300	2–H12	1060	1140	1160
	2–H16	1290	1470	1550
Inter/450	2–H10	900	930	940
	2–H12	1080	1140	1150
	2–H16	1390	1510	1570
Inter/600	3–H10	1100	1150	1160
	3–H12	1310	1390	1420
	3–H16	1650	1820	1910

All ties to be R10@150crs



BOND BEAM

bond beam units required ($L_b Z$) = $L_b \times Z$

= 6000 x 0.22

= 1320

refer to Span table for values greater than $L_b Z$
This shows the 450 deep beam, 150 thick infill with 2–H16 bars would be the most economical option

MAXIMUM BOND BEAM SPANS

BOND BEAM UNITS FOR 2.4m HEIGHT BETWEEN BOND BEAMS OR BETWEEN BOND BEAMS & FOUNDATION ($L_b Z$)				
Type/Depth	Reinf. No. & size	Wall Infill Thickness		
		100mm	150mm	200mm
Top/300	2–H12	1300	1440	1510
	2–H16	1570	1850	2000
Top/450	2–H12	1320	1420	1480
	2–H16	1670	1880	1990
Top/600	3–H10	1330	1420	1470
	3–H12	1580	1720	1790
	3–H16	2070	2240	2380
Inter/300	2–H12	1060	1140	1160
	2–H16	1290	1470	1550
Inter/450	2–H10	900	930	940
	2–H12	1080	1140	1150
	2–H16	1390	1510	1570
Inter/600	3–H10	1100	1150	1160
	3–H12	1310	1390	1420
	3–H16	1650	1820	1910

Top: bond beam with Superform POLY Block wall below and timber framed wall or roof above.
Inter: bond beam at first floor diaphragm level with Superform POLY Block walls above and below.

NOTE:
The length of bond beam permitted is obtained by multiplying the actual length of the bond beam required 'L' by the HAZARD FACTOR 'Z' and comparing with larger values shown in the table above.
$L_b Z \geqslant LZ$

Allowances: For heights between bond beams or bond beams and foundations of 2.6m to 3.0m decrease the allowable span by 10%

SECTION C: SUPERFORM POLY BLOCK FIRE RATED SYSTEM

DESCRIPTION

The Superform **POLY** Block Fire Rated System is based on the concrete infill Superform **POLY** Block system as described in Section A and includes specific lining systems as specified below.

Linings are to be fixed as described under the external cladding and internal lining headings of this section.

FIRE RESISTANCE RATING

The external 150mm Superform **POLY** Block fire rated system has been tested by BRANZ in accordance with AS 1530:4 and will achieve the following fire resistance ratings, (FRR).

Superform POLY Block Wall Thickness	***Lining Description***	**FRR**
150mm concrete infill	13mm Gib® Fryreline to each face.	240/240/240
150mm concrete infill	10mm Gib® Fryreline to each face.	240/240/240
150mm concrete infill	10mm standard Gib® Fryreline to each face and Rockcote to other face. Fire exposure from either face.	240/240/240
150mm concrete infill	Rockcote to each face.	240/240/240
100mm concrete infill	13mm Gib® Fryreline to each face.	240/240/240
100mm concrete infill	10mm standard Gib® Fryreline to each face.	240/240/180
100mm concrete infill	10mm standard Gib® Fryreline to each face & Rockcote to other face. Fire exposure from either face.	240/240/180
100mm concrete infill	Rockcote to each face.	240/240/120

SPREAD OF FIRE

Superform **POLY** block walls may be used in buildings wherever the internal lining requirements of Table 6.2 and Table 6.3 and external cladding requirements of Table 7.5 of the NZBC C/AS1 are met.

The internal Surface Finish requirements as indicated in Table 6.2 of the NZBC C/AS1 are a function of the purpose group and location of the building element. The level of Protection from lgnition as indicated in Table 6.3 of the NZBC C/AS1 is a function of the purpose group and application of the building element.

The external finish requirements as indicated in Table 7.5 of the NZBC C/AS1 are a function of the surface finish type, building height, distance from the relevant boundary and the cladding properties.

The Rockcote Plaster system as described below, when installed on the Superform **POLY** Block system, gives the following AS 1530.3 fire indices:

Ignitability	0
Spread of flame	0
Heat evolved	0
Smoke developed	5

Any penetration passing through the fire rated wall must be fire stopped to a FRR of no less than that required for the building element to which it is installed. In multi storey buildings (more than two floors) fire stopping is required at each floor level at the junction of the floor and external wall.

EXTERNAL CLADDING

The Rockcote Plaster System has been appraised by BRANZ (Appraisal Certificate No 193B (1999)) as being suitable for plastering over EPS blocks and as meeting the relevant requirements of the New Zealand Building Code.

The Rockcote Plaster system is a polymer-modified, fibreglass-reinforced, cement-based plaster system supplied by Rockcote Architectural Coatings NZ Ltd. It is to be used and installed in accordance with the conditions of the Appraisal Certificate listed above. It is available in several finishes but only the following is to be used as part of the Superform **POLY** Block fire rated system.

Basecoat layer of Rockcote plaster reinforced with fiberglass mesh.
Top coat of Rockcote Plaster.
Finishing – Rockcote Plaster / sealer (1 coat) and Rockcote Armourglaze (2 coats).

Appraisal Certificate No 193B (1999) is available from Rockcote Architectural Coatings NZ Ltd, Christchurch.

INTERNAL LINING

Standard 10mm, 13mm Gib® board and 13mm Gib® Fyreline have been appraised by BRANZ as being fit for purpose and as meeting the relevant requirements of the New Zealand Building Code.

The internal lining is fixed to the EPS panels using Fosroc Panel Bond or Selleys Liquid Nails adhesive in beads at 250mm centres. The linings are also screw fixed into the Superform **POLY** Block Thermo Plastic PP ties to achieve a FRR. Gypsum dry wall coarse thread screws, 32mm x 6 gauge are required at maximum 300mm centres around the sheet edges and at maximum 450mm centres horizontally and vertically within the body of the sheet. The Gib® Board sheet edge distance is a minimum of 12mm. Each Thermo Plastic PP tie provides a 30mm by 220mm surface for screw fixing. Finishing of the Gib® Board or Fyreline is in accordance with the Winstone Wallboards Limited technical literature.

LIMITATIONS

The maximum vertical loading allowed on Superform **POLY** Block Fire Walls is 60KN/m.

SECTION D: CONSTRUCTION INFORMATION

All Superform **POLY** Blocks shall be installed by a person experienced in this type of work, or it is important that the builder is familiar with the construction procedures detailed below. Full guidance, technical assistance and a training video is available from Rafel International Limited or approved agents.

HANDLING AND STORAGE

The lightweight nature of Superform **POLY** Blocks allows for ease of handling and construction on site. Care must be taken to protect edges and corners from damage, during storing and laying.

Ensure blocks are protected from sunlight and are stored in a clean, dry environment.

INSTALLATION

Laying of Superform POLY Blocks.
Blocks are laid on a level footing base or floor slab. The base must be level to within ± 5mm in 5m.

Spacer tie bridges are to be inserted into each polystyrene face shell to form block modules. There is provision for 10 ties to be inserted into each 1.5 metre long Superform **POLY** Block face shell. All 10 ties must be inserted in the slots provided.

The blocks can be cut with a hot wire or saw to all non-modular sizes.

Care should be taken to ensure the first course of base blocks are set plumb to avoid the need for later adjustment. Tolerances shall be in accordance with NZS 3109.

Locate the base blocks positively in position using an approved foam bond. The slab must be dry and the manufacturer's instructions for use are to be followed. Foam bonds approved for use are FOSROC Foambond, Ramset Fomoplus, and Superform Superfoam or equivalent*(See Details SF5-SF14 Section D pages 10-19).*

For concrete slab on ground construction there are two standard procedures :

A horizontal construction joint is formed a slab thickness below the top of the foundation block, at the top of the foundation level. Starter bars for the floor slab and wall are placed. The foundation is then poured. The floor slab is poured over the foundation level and against the exterior face shell. Wall construction then proceeds.
(See details SF5-SF8 Section D pages 10-13).

The second method is similar to that above except the horizontal construction joint is formed beneath the floor slab at the top of the first or second foundation block. *(See details SF9-SF13 Section D pages 14-18).*

Subsequent blocks are placed accurately to interlock into the block courses below and butt up against each other so that true wall dimensions are obtained.

Horizontal bars may be tied to vertical bars to assist with holding blocks in position as the wall rises.

Blocks must be placed over the vertical interlocking sections of the blocks below, in a stretcher bond pattern.

Work proceeds to the top plate level or to the level of the first wall pour depending on the stage of the construction sequence. After the top course is laid, the wall is rechecked for line, level and plumb and adjusted if necessary.

The top bar is tied into the top tie to stop lifting of the blocks during pouring and to ensure the central position of the vertical bars.

Door and window openings are formed as the wall laying proceeds.

Forming Curved Walls *(See SF37 Section D page 42)*
Curved walls with a minimum radius of 3m can easily be formed by cutting the inside block face short by the difference between the arc of the outside block face, and the arc of the inside block face, forming the curved wall. Care needs to be taken to ensure that the interlocking castellations on the blocks still intermesh between courses. Strips of 12mm ply or customwood 200mm wide, are screwed to every second course on the outside face of the curve, this ensures that a true curve is formed and avoids faceting of the blocks. Refer to SF37 for detailed diagram.

Door and Window Openings (*See SF15-SF22 Section D pages 20-27)*
Blocks are cut horizontally or vertically to coincide with door and window openings or top plate and wall ends. Timber framing is installed as temporary formwork to the opening head. The cut blocks provide side forms for lintel beams over door and window openings.

Care must be taken when setting out the window openings to allow the clearances as specified in the window details see SF15 Section D (page 20).
This shows the need to add to the stated window size.

1. <u>Window height plus 95mm for Sill Option SF15.</u>
   This allows for a piece of rough sawn 100 to 150 wide x 25mm thick H3.1 treated continuous timber head packer, fitted in the opening and fixed to H3.1 treated timber blocks set into the concrete.
   The sill has a 100 to 150 wide x 50mm thick H3.1 treated continuous timber sill packer, fitted in the opening and fixed to H3.1 treated timber blocks set into the concrete and 10mm packing top and bottom is allowed as needed.
   Packing of 10mm top and bottom is allowed as needed.

2. <u>Window width plus 75mm for Jamb detail SF16.</u>
   This allows for a piece of rough sawn 100 to 150 wide x 25mm thick H3.1 treated continuous timber jamb packers, fitted in the opening and fixed to H3.1 treated timber stop ends in the block work.
   Packing of 10mm to either side is allowed as needed.

Open block ends are formed and braced, using EPS stop ends.

Block stop ends are available to be inserted where required at window and door openings and corners.

At corners and at wall intersections the blocks are butted and not overlapped as this allows the walls to be plumbed when the bracing system is fitted to the blocks.

Archways are formed in walls by cutting the archway out, placing a thin flexible material (e.g., 24 gauge sheet metal) against the soffit of the arch and positioning the cut out section back under the arch to provide support during concrete placement, and initial curing.

Shaping of sills, jambs and heads and the insertion of flashings may be required prior to the placement of concrete, depending on the joinery, cladding and lining systems used.

H3.1 treated fixing blocks or batten must be fixed in place prior to pouring to enable the fixing of door and window reveals.

Bracing and Alignment
The erected blocks are braced at corners, at 700crs along the wall and either side of window and door openings to provide security against wall movement from wind and construction loads *(See drawing SF38 on page 43 Section D).*

Ensure the appropriate bracing system is in place prior to and during the placement of concrete and for at least three days after the placement of the concrete.

Advice regarding temporary works such as bracing is available from a Superform **POLY** Block Technical Adviser.

Concreting
Special care is to be taken to ensure no debris is dropped in the wall cavity. Any debris at the base of the wall is to be removed via clean out ports cut in the polystyrene prior to pouring.

All concrete should be supplied from an approved high or special graded ready mix concrete plant.

Concrete strength must not be less than 20MPa High Grade concrete and have a slump of 100-120mm when consolidation is by mechanical vibration and 130-150mm when concrete is consolidated by hand methods.

Concrete should contain aggregate up to 13mm maximum size. Plasticiser/ water reducing agents may be used subject to approval from a Superform **POLY** Block Technical Adviser.

Expansion admixtures and super plasticisers must not be used.

The flow of concrete must be directed at the sides of the block modules to minimise possible block blowouts.

Concrete can be placed by skip and flexible hose or pump/hand placement methods.

The concrete is consolidated by striking the blocks with the hand or suitable implement which will not damage the blocks and also by rodding the concrete within the blocks.

Mechanical vibrators may be used but care must be taken to ensure that a maximum pour rate of 900mm per lift is maintained when vibrating. The vibrator head size is to be a maximum of 25mm.

To minimise the risk of blow out, pours must be carried out in lifts of no greater than 900mm of height per hour up to 3.0m. Each lift being poured, and the lift directly below the lift being poured, must be consolidated.

Each lift must have gone plastic before the next lift is poured on top.

Between pours a construction joint is formed 20mm below the top of the blocks. Reinforcing steel must be in place to provide a continuous connection. Construction joints are to be wire brushed to achieve a suitable roughness.

A guide rail is used to keep the top of the blocks straight.

Bolt Fixings
Bolts, straps and fixings for all structural and non-structural fittings should be embedded in the wet concrete rather than anchored in drilled holes after the concrete has been poured.

Any fixings to be cast in should have polystyrene removed so as to provide a 50mm concrete cover around the fixing. The length of fixings must allow for the thickness of the polystyrene to ensure the minimum embedment, as required by details in this Manual or by specific design, is maintained in the body of the wall.

Insert hold down bolts for the top plate.

Internal timber frame walls joining exterior Superform **POLY** Block system walls are connected by fixing the end stud against timber blocks bolted to the concrete infill via cast in M12 bolts. *(See detail SF 36 as shown in Section D page 41).*

Internal Superform **POLY** Block walls joining exterior Superform **POLY** Block walls are connected by forming a continuous concrete infill joint and providing L shaped reinforcing bars with adequate returns. A vertical reinforcing bar must be placed at the inside bend of the L bars. *(See detail SF35 as shown in Section D page 40).*

Services And Wall Penetrations
Chases, holes, cut-outs and recesses for small size services such as electrical wiring and piping up to 40mm diameter can be located against the concrete in slots cut into the Superform **POLY** Block external polystyrene skins.

Small size services are fixed to the concrete with U clamps and tappets.

Larger services up to 100mm diameter can be located in ducts passing directly through the Superform **POLY** Block walls. The ducts must not be located within 400mm of a lintel, beam or bond beam, and reinforcing cover of 50mm must be maintained.

Any penetrations outside this scope must be specifically designed.

Wall penetrations for services and ventilation can be made by cutting through the Superform **POLY** Block polystyrene face shell. Where this procedure is used, the casting holes should be covered to prevent them being filled with concrete.

The plasticiser in PVC sheathed electrical cables can migrate. PVC sheathed electrical cables must therefore be contained within plastic conduit or laid without conduit in oversize channels cut back to the concrete core. The conduit or the cables must be fixed at regular centres to the concrete core.

Provision for fittings and cabinet joinery.
Ensure that adequate fixing for kitchen and bathroom joinery, and all household fittings such as towel rails, shower mixers and laundry taps, etc, is provided at appropriate locations on the internal wall face by removing portions of the internal EPS face shell and replacing with solid timber blocks before pouring. Fix the blocks to the concrete infill as shown on SF16 Section D (page 21) using appropriate mechanical fixings. These connections can carry a combined load of 25kg shear and 5kg tension.

INSPECTIONS

Before pouring of concrete begins, the Engineer is to be notified and given reasonable opportunity to enable inspection of the reinforcing as fixed and to ensure that the work is carried out according to the intended design.

Where required, the Local Authority Inspector must also be notified.

EXTERNAL CLADDINGS AND INTERNAL LININGS

Requirements for claddings and linings are outlined under section A of the manual. All claddings and linings must be used and installed in accordance with the manufacturers instructions as well as any conditions or limitations imposed by either Rafel International Ltd or by the issuers of an appraisal of such a cladding or lining system.

External walls can be clad 7 days after pouring of the wall. The internal walls can be clad immediately after the external cladding is complete.

If yellowing or embrittlement of the E.P.S. block occurs due to exposure to U.V. radiation, loose material must be removed with a hard bristled brush followed by sanding. The surface must be washed down thoroughly prior to the finishing surface being applied.

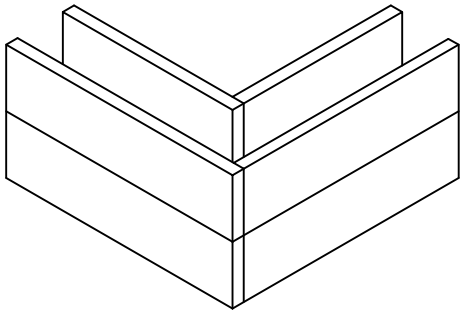
Due to the benefits of more effective curing of the poured concrete within Superform **POLY** Blocks, it is recommended that plastering should not commence within 6-8 weeks of the walls being poured depending on the ambient conditions. It is also recommended that the owner/builder contact the plasterer in this regard prior to plastering commencing. NOTE: If inclement weather is evident or expected, the top of the poured wall should be covered. eg polythene or similar.

CONSTRUCTION DETAILS

Sheets SF5 to SF42 (pages 10-47) of the appendix show details for non specific design house construction.

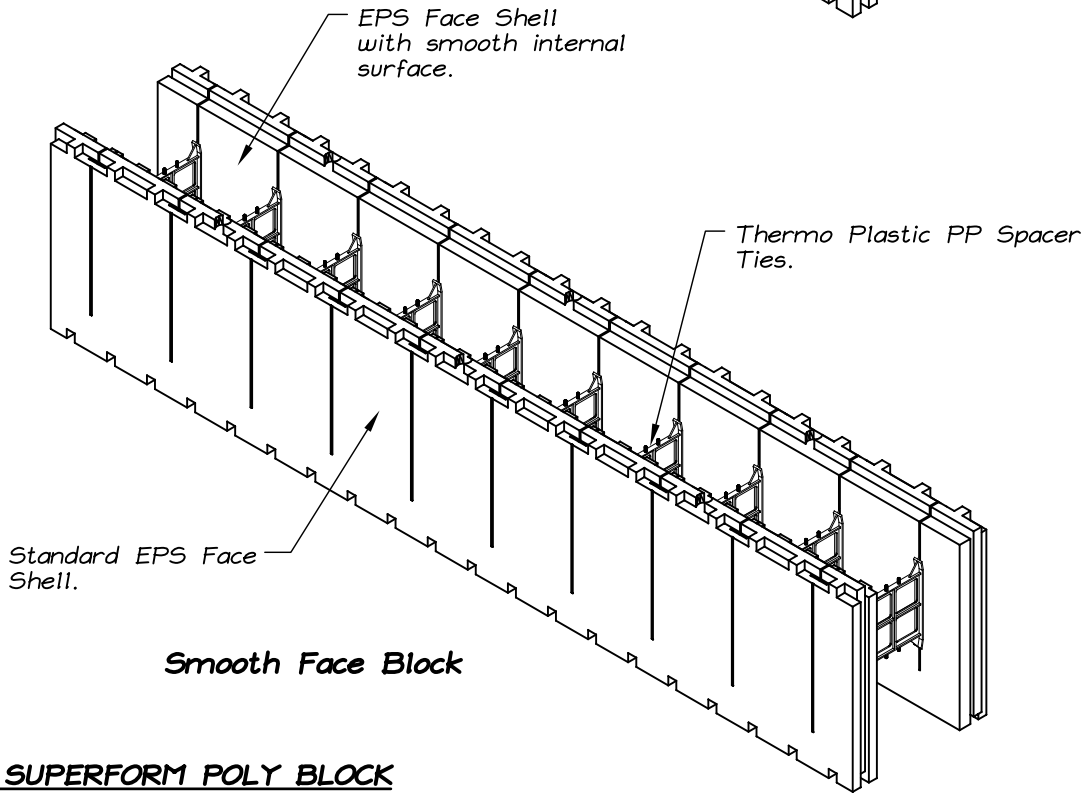
SUPERFORM SOLAR STORAGE WALLS

To form solar storage walls, assemble the Superform **POLY** Blocks by using one **POLY** Block shell that has a smooth face to both sides along with the standard face shell. Lay the blocks with the smooth face shell towards the side of the wall that will act as a solar storage



General Assembly

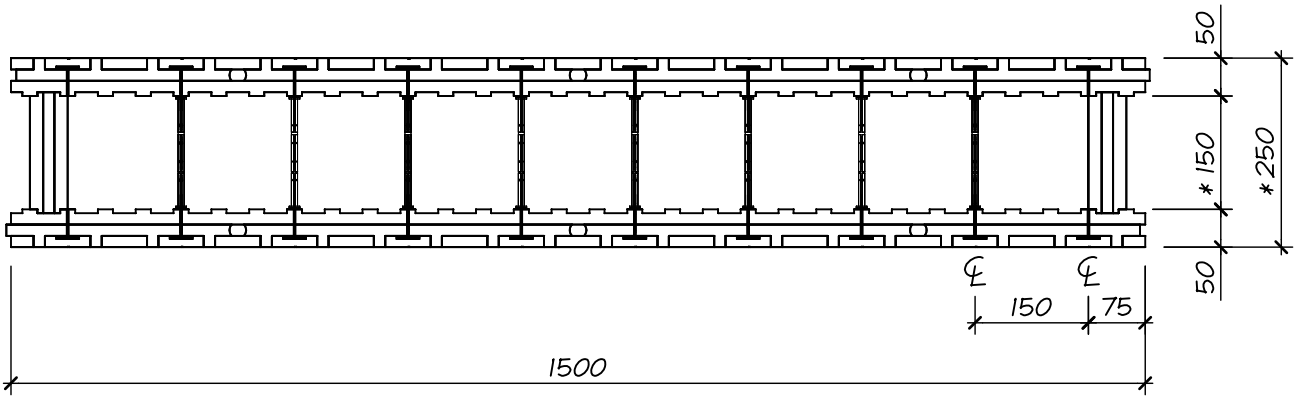
Standard Block



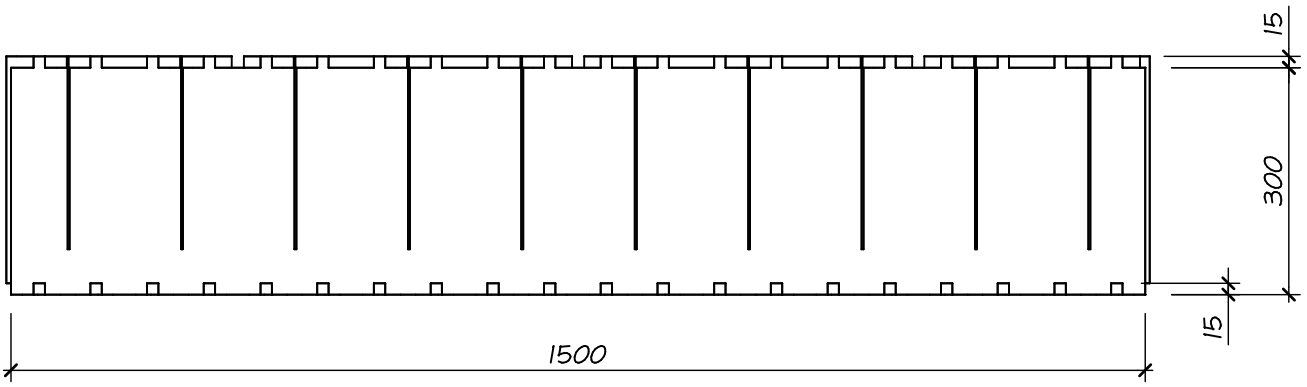
Smooth Face Block

THE SUPERFORM POLY BLOCK

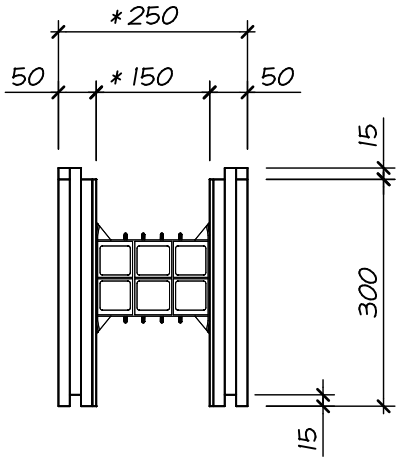
POWELL FENWICK CONSULTANTS LIMITED Your quality engineering partner.	SUPERFORM POLY BLOCK UNIT	© 2005 RAFEL™ International Ltd	SF1



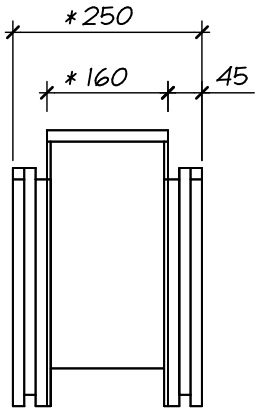
PLAN



SIDE ELEVATION



END ELEVATION

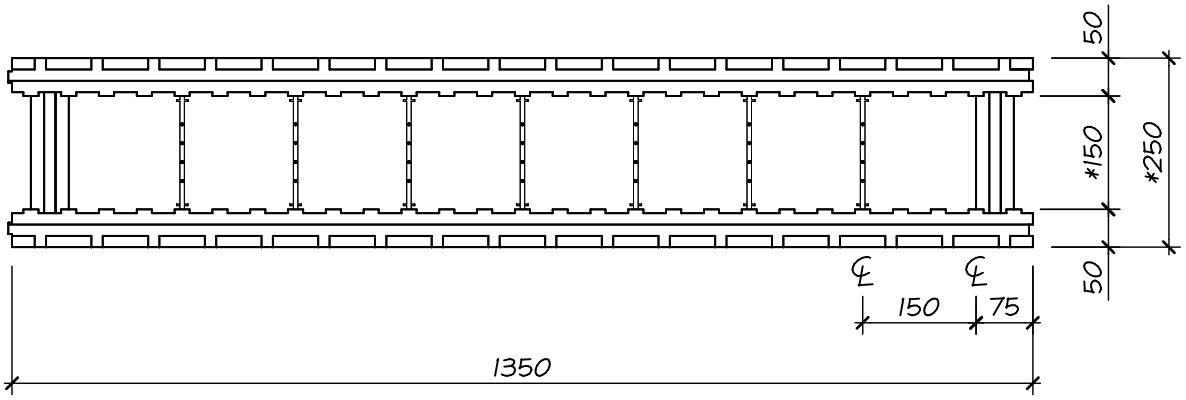


END ELEVATION

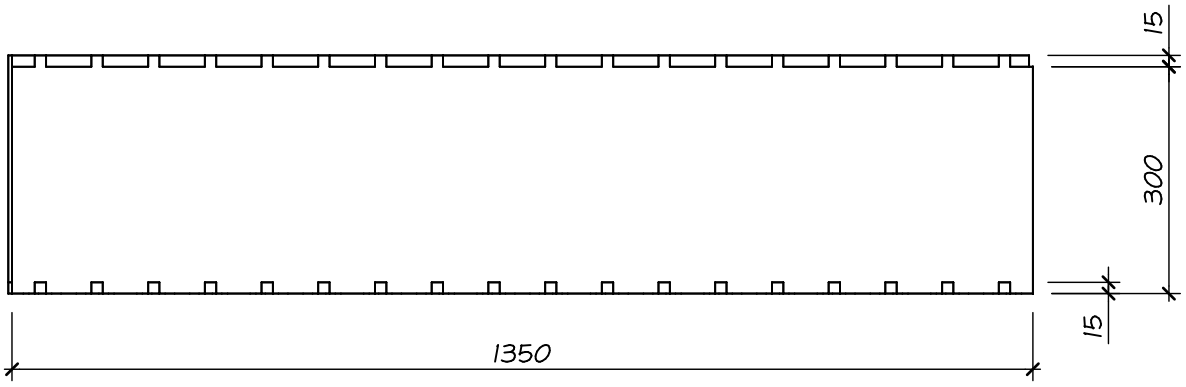
(With Stop End Inserted)

* Typical block shown is 150mm concrete infill (250 wide)
Also available are - 100mm concrete infill (200 wide)
- 200mm concrete infill (300 wide)

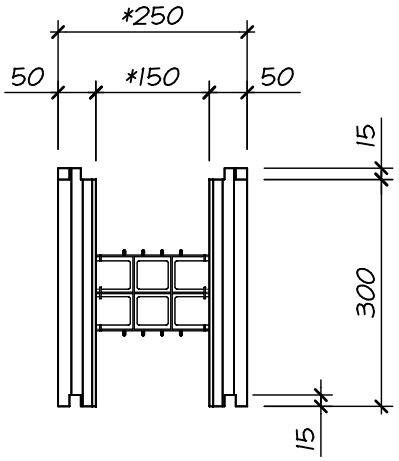
POWELL FENWICK CONSULTANTS LIMITED Your quality engineering partner.	SUPERFORM POLY BLOCK UNIT DIMENSIONS	© 2005 RAFEL™ International Ltd	SF2



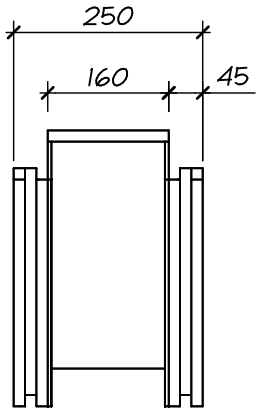
PLAN



SIDE ELEVATION



END ELEVATION

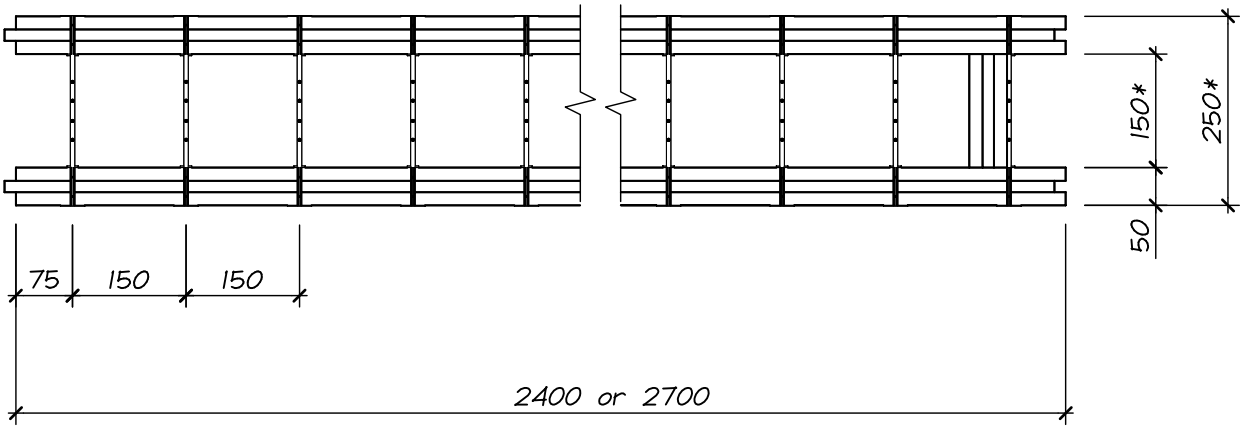


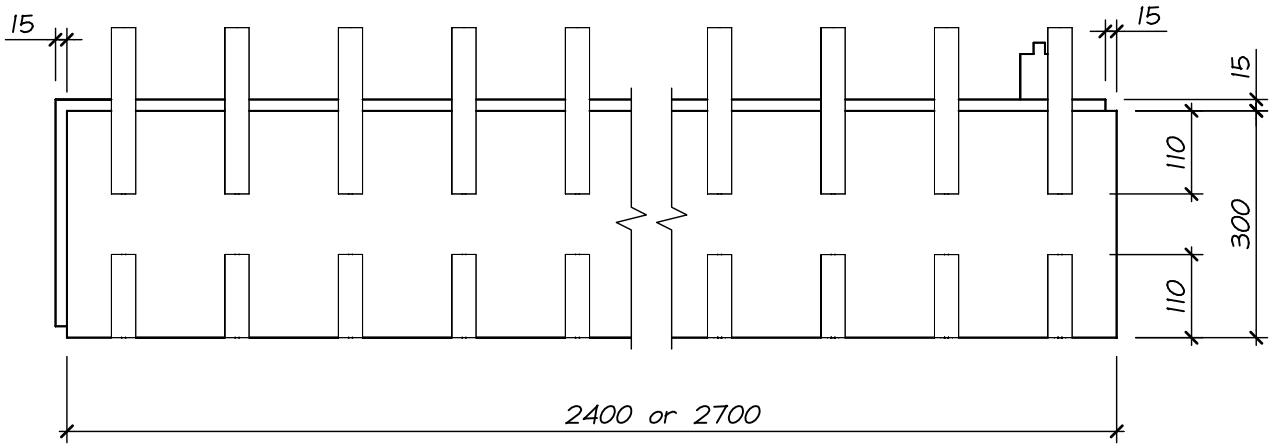
END ELEVATION

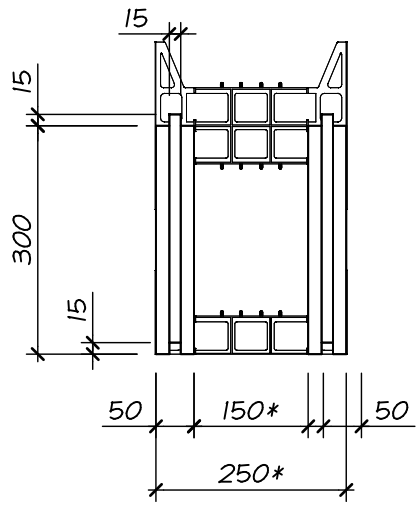
(With Stop End Inserted)

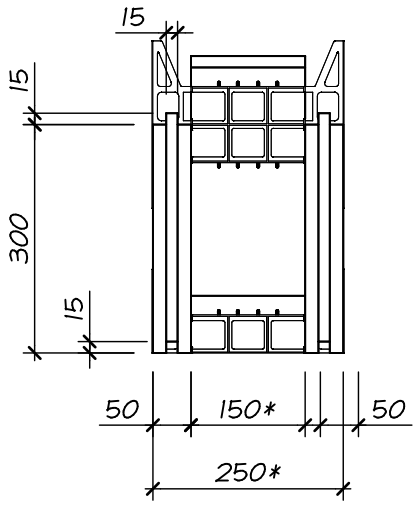
* Typical block shown is 150mm concrete infill (250 wide)
Also available are - 100mm concrete infill (200 wide)
- 200mm concrete infill (300 wide)

POWELL FENWICK CONSULTANTS LIMITED Your quality engineering partner.	SUPERFORM MOULDED BLOCK UNIT DIMENSIONS	© 2005 RAFEL International Ltd	SF3









POWELL FENWICK
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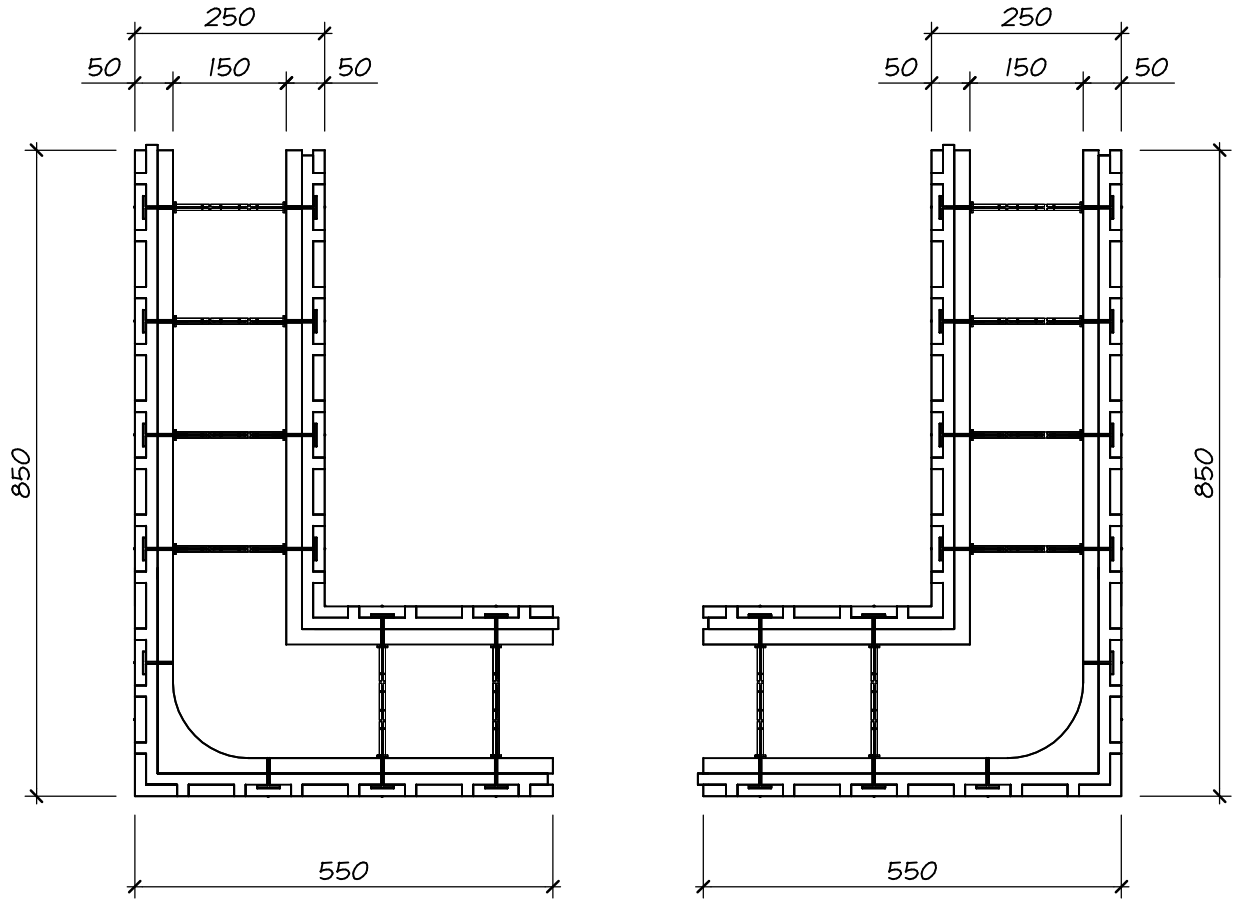
SUPERFORM PANEL BLOCK UNIT DIMENSIONS

RAFEL™ International Ltd

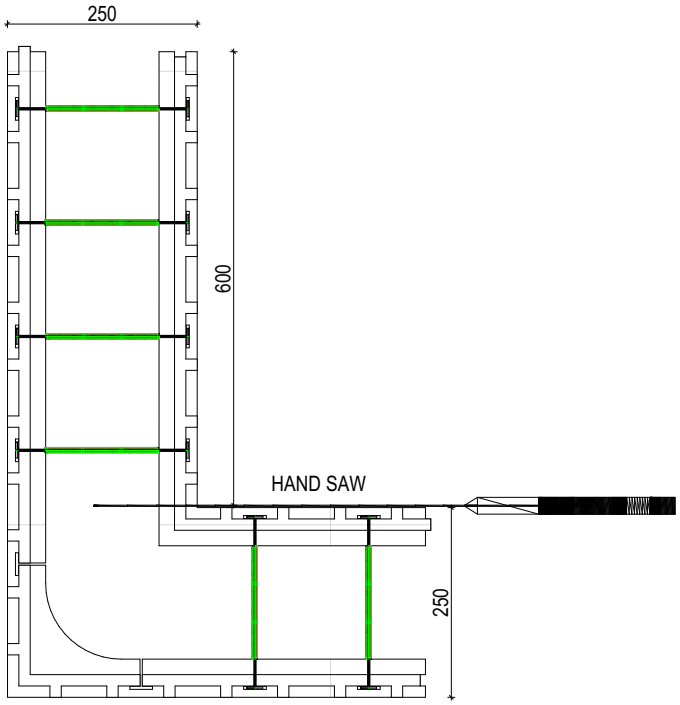
SF4



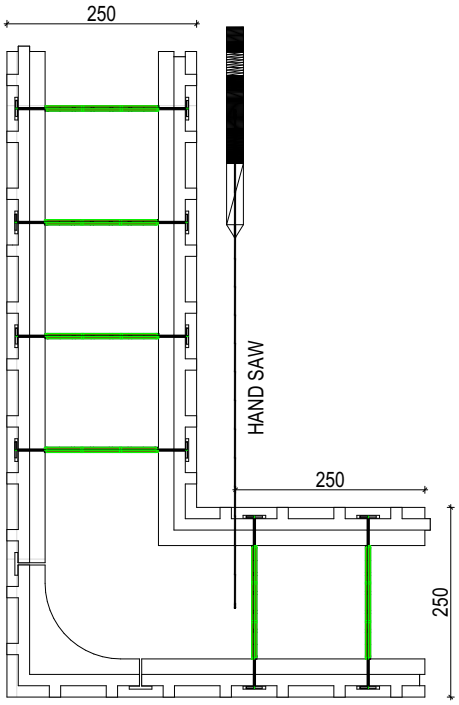
CORNER BLOCK PLAN

1:10

POWELL FENWICK CONSULTANTS LIMITED Your quality engineering partner.	SUPERFORM MOULDED BLOCK UNIT DIMENSIONS	© 2005 RAFEL™ International Ltd	SF4a



CUT ON, FROM STANDARD
250MM BLOCK 600MM LONG



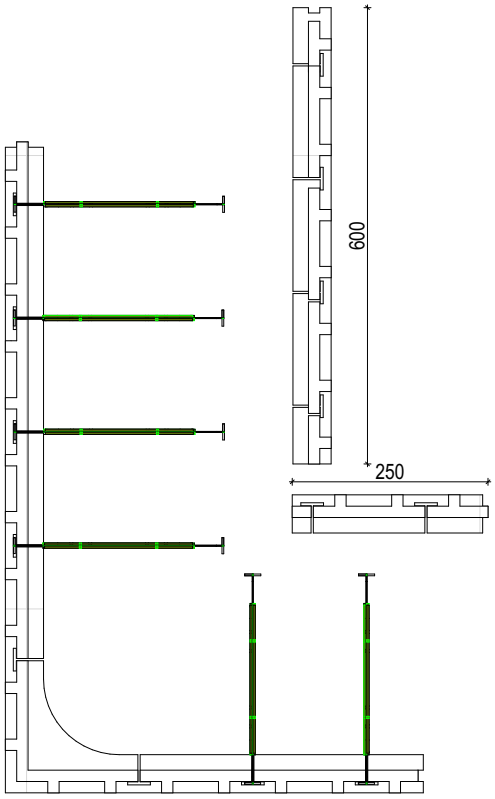
CUT TWO, FROM STANDARD
250MM BLOCK 250MM LONG

POWELL FENWICK
CONSULTANTS LIMITED
Your quality engineering partner.

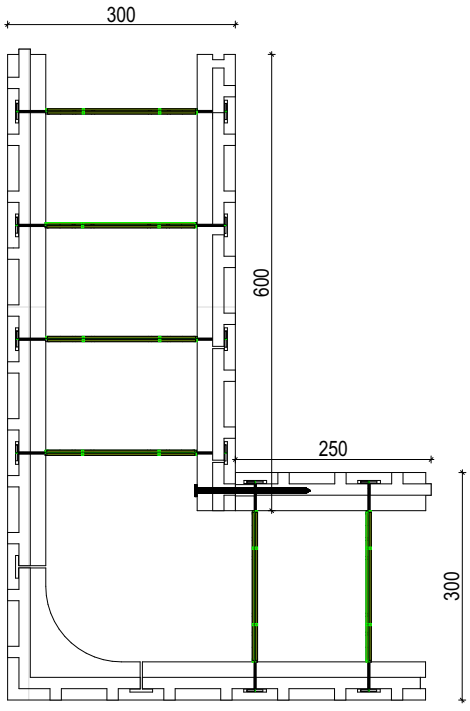
SUPERFORM MOULDED 300 CORNER BLOCK CONSTRUCTION

RAFEL™ International Ltd

SF4b



PRE- ASSEMBLY



ASSEMBLED WTIYH 3/90 X 3.15 NAILS

POWELL FENWICK
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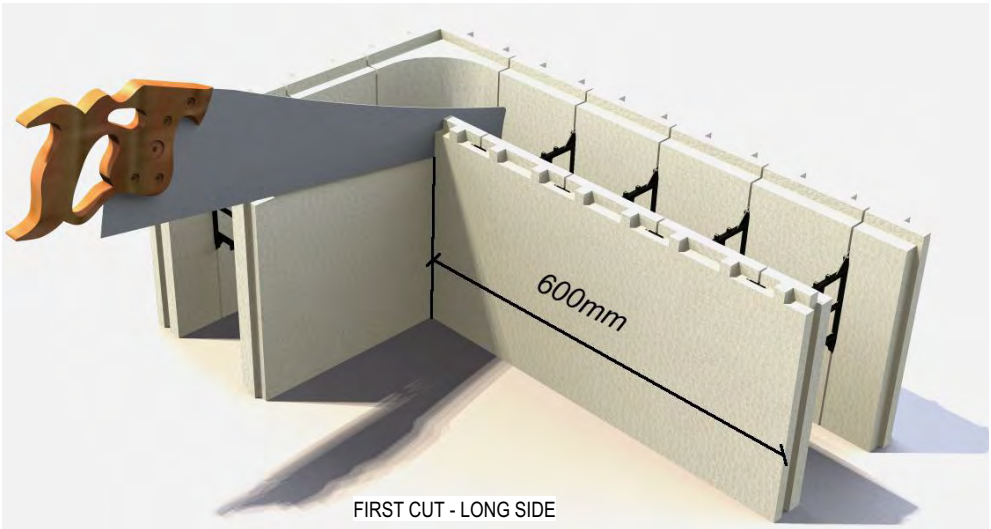
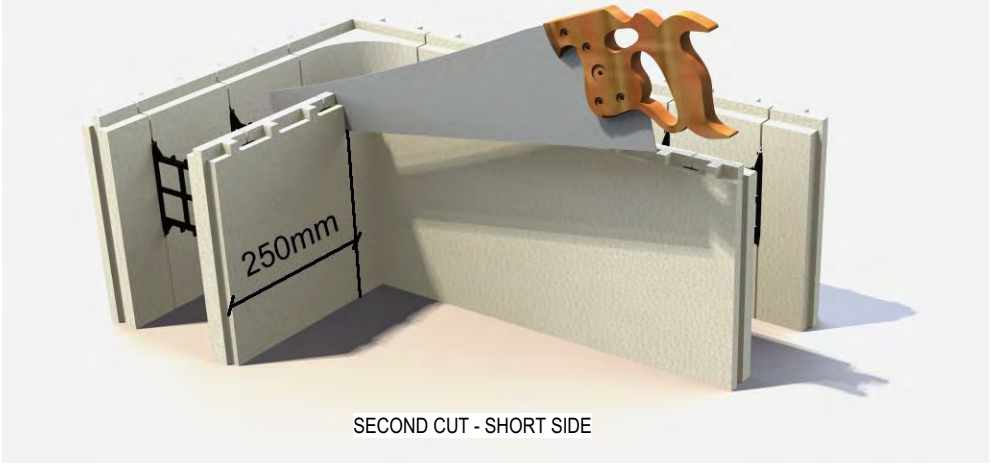
SUPERFORM MOULDED 300 CORNER BLOCK CONSTRUCTION

RAFEL™ International Ltd

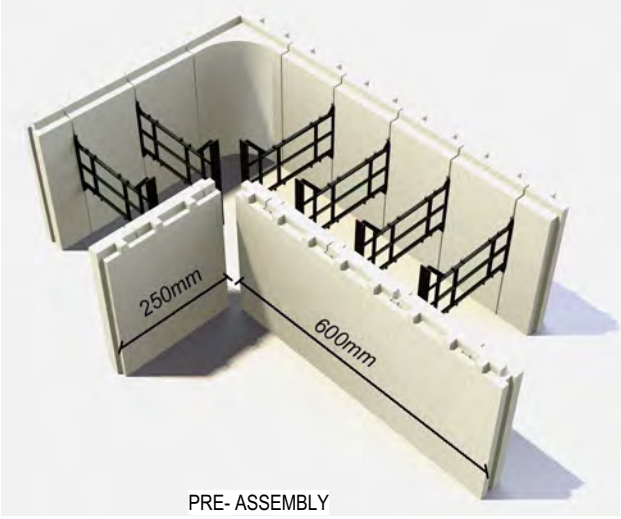
SF4b



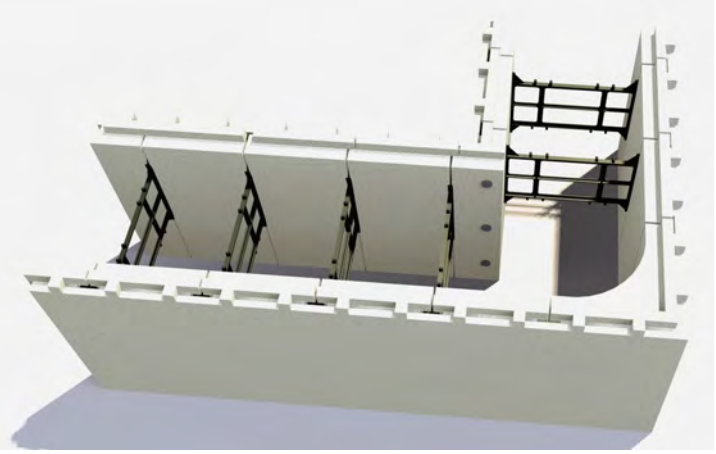
FIRST CUT - LONG SIDE



SECOND CUT - SHORT SIDE



PRE- ASSEMBLY



ASSEMBLED WITH 3 / 90 X 3.15 NAILS

POWELL FENWICK
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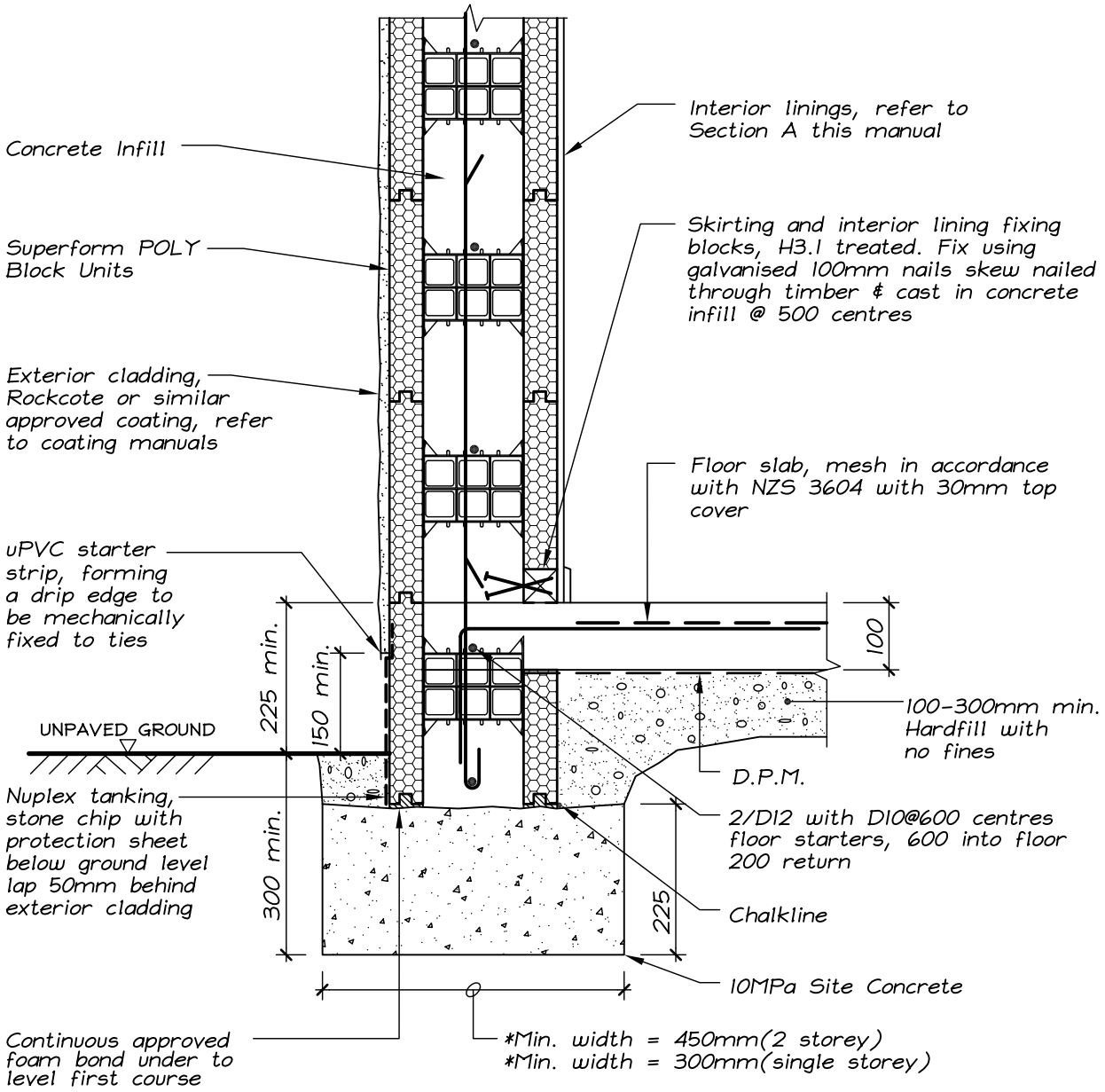
SUPERFORM MOULDED 300 CORNER BLOCK CONSTRUCTION

RAFEL™ International Ltd

SF4b



FOUNDATION/SLAB DETAIL

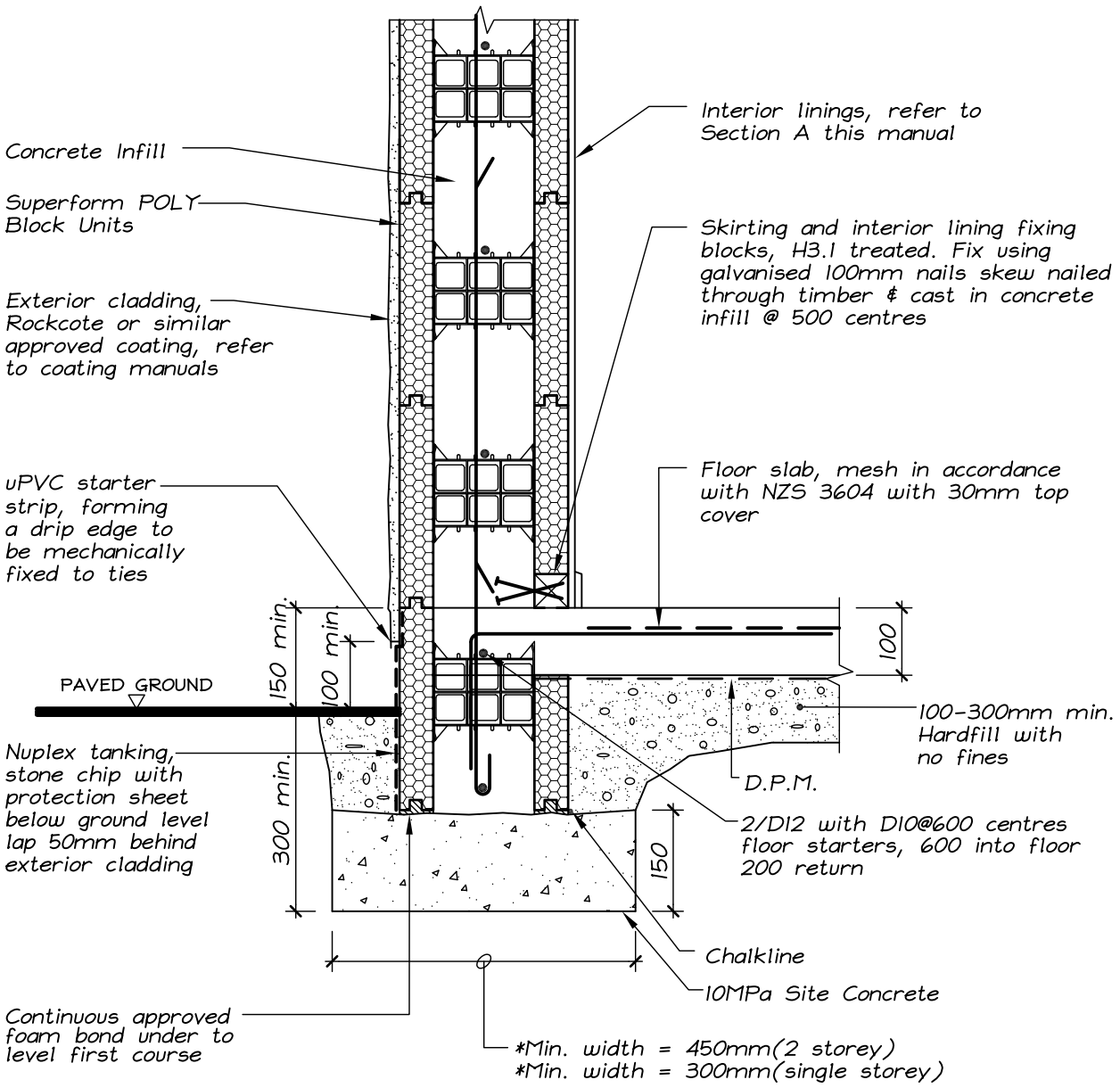
1:10

NOTE: All details indicate minimum reinforcement requirements
Refer to SF4 foundation for paved ground

DESIGN ASSUMPTIONS

- maximum span of roof = 12.0m
- maximum tributary width of concrete floor = 3.0m
- maximum wall height 5.0m (2 storey)
  3.0m (single storey)
- ground bearing of 300kPa in accordance with NZS 3604
- well drained soil conditions in accordance with NZBC

POWELL FENWICK CONSULTANTS LIMITED Your quality engineering partner.	SUPERFORM POLY BLOCK WALL FOOTING (FOR UNPAVED GROUND OUTSIDE)	© 2005 RAFEL™ International Ltd	SF5



FOUNDATION/SLAB DETAIL

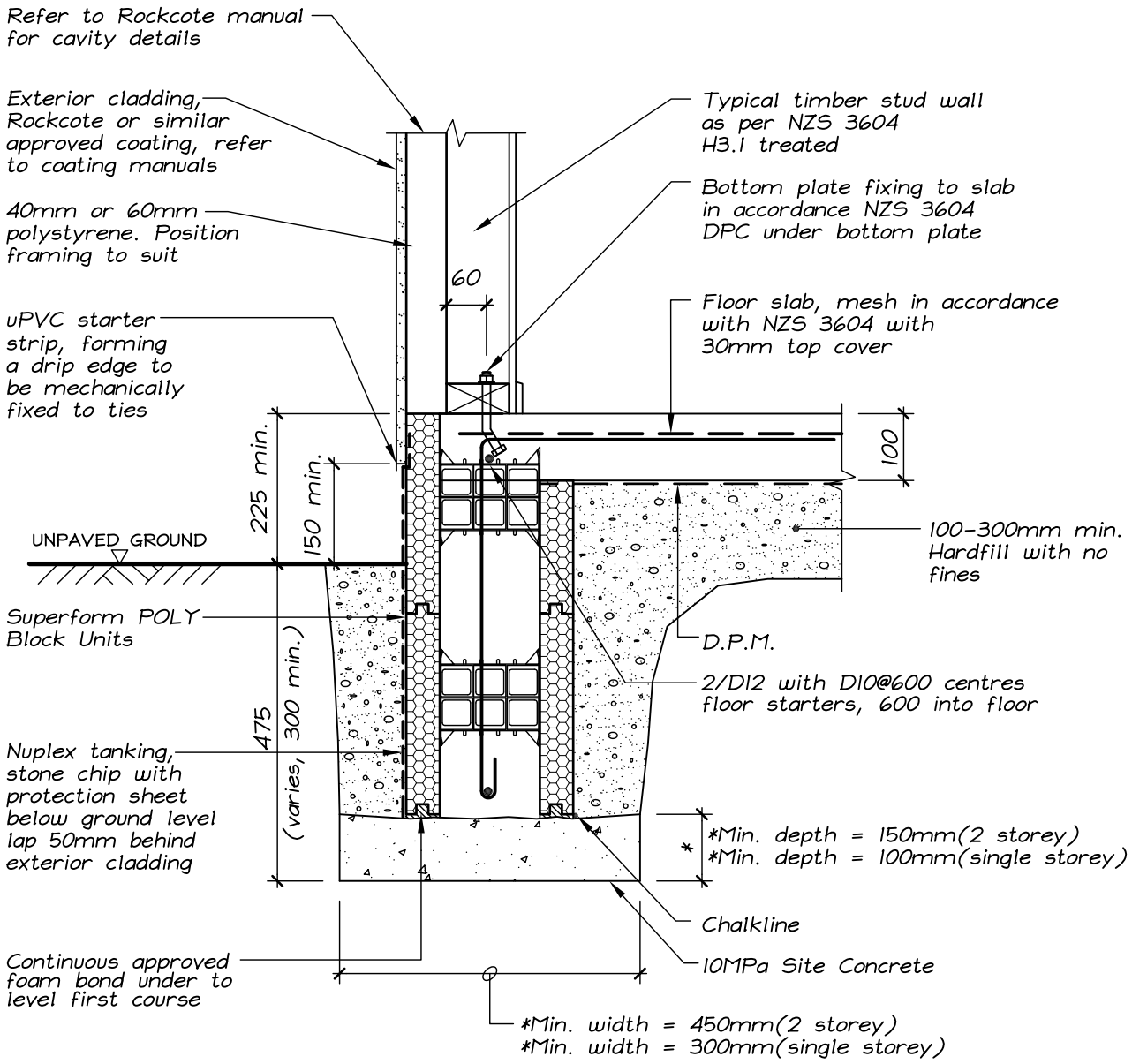
1:10

NOTE: All details indicate minimum reinforcement requirements
Refer to SF3 foundation for natural ground

DESIGN ASSUMPTIONS

- maximum span of roof = 12.0m
- maximum tributary width of concrete floor = 3.0m
- maximum wall height 5.0m (2 storey)
  3.0m (single storey)
- ground bearing of 300kPa in accordance with NZS 3604
- well drained soil conditions in accordance with NZBC

POWELL FENWICK CONSULTANTS LIMITED Your quality engineering partner.	SUPERFORM POLY BLOCK WALL FOOTING (FOR PAVED GROUND OUTSIDE)	© 2005 RAFEL International Ltd	SF6



FOUNDATION/SLAB DETAIL

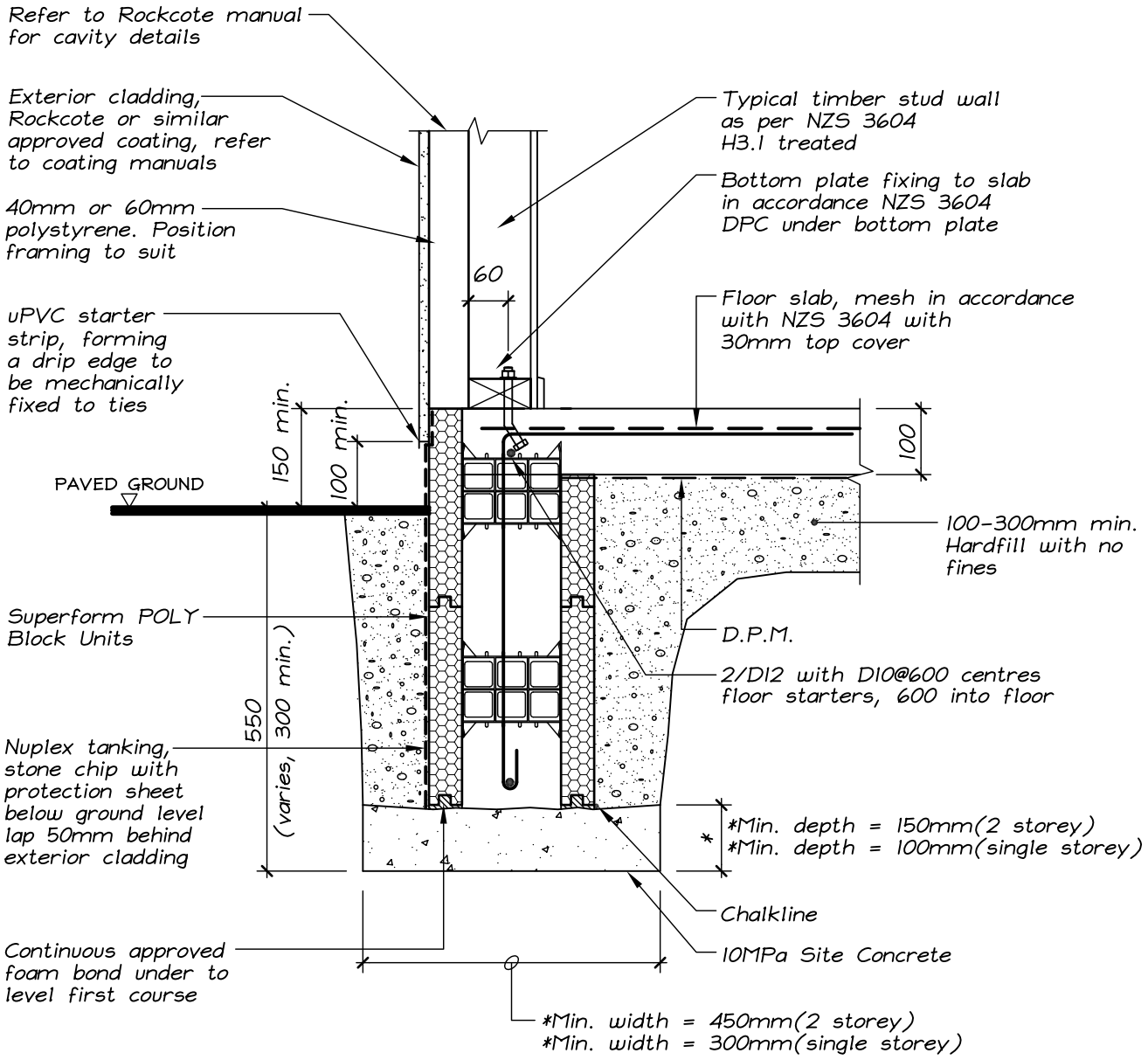
1:10

NOTES: All details indicate minimum reinforcement requirements
Refer to SF6 Foundation for Paved Ground

DESIGN ASSUMPTIONS

- maximum span of roof = 12.0m
- maximum wall height 5.0m (2 storey)
  3.0m (single storey)
- ground bearing of 300kPa in accordance with NZS 3604
- well drained soil conditions in accordance with NZBC

POWELL FENWICK CONSULTANTS LIMITED Your quality engineering partner.	SUPERFORM POLY BLOCK FOOTING ROCKCOTE OVER TIMBER FRAMING – OPTION 1 (FOR UNPAVED GROUND OUTSIDE)	© 2005 RAFEL™ International Ltd	SF7



FOUNDATION/SLAB DETAIL

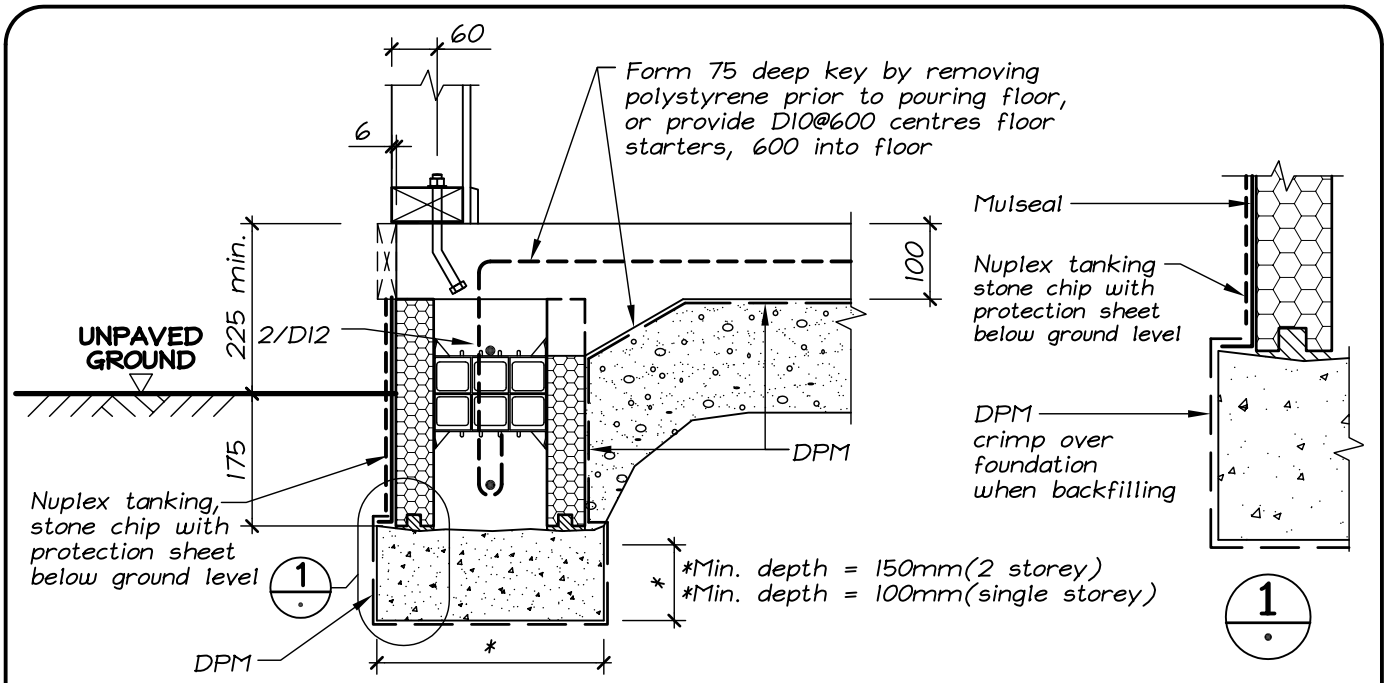
1:10

NOTE: All details indicate minimum reinforcement requirements
Refer to SF5 foundation for natural ground

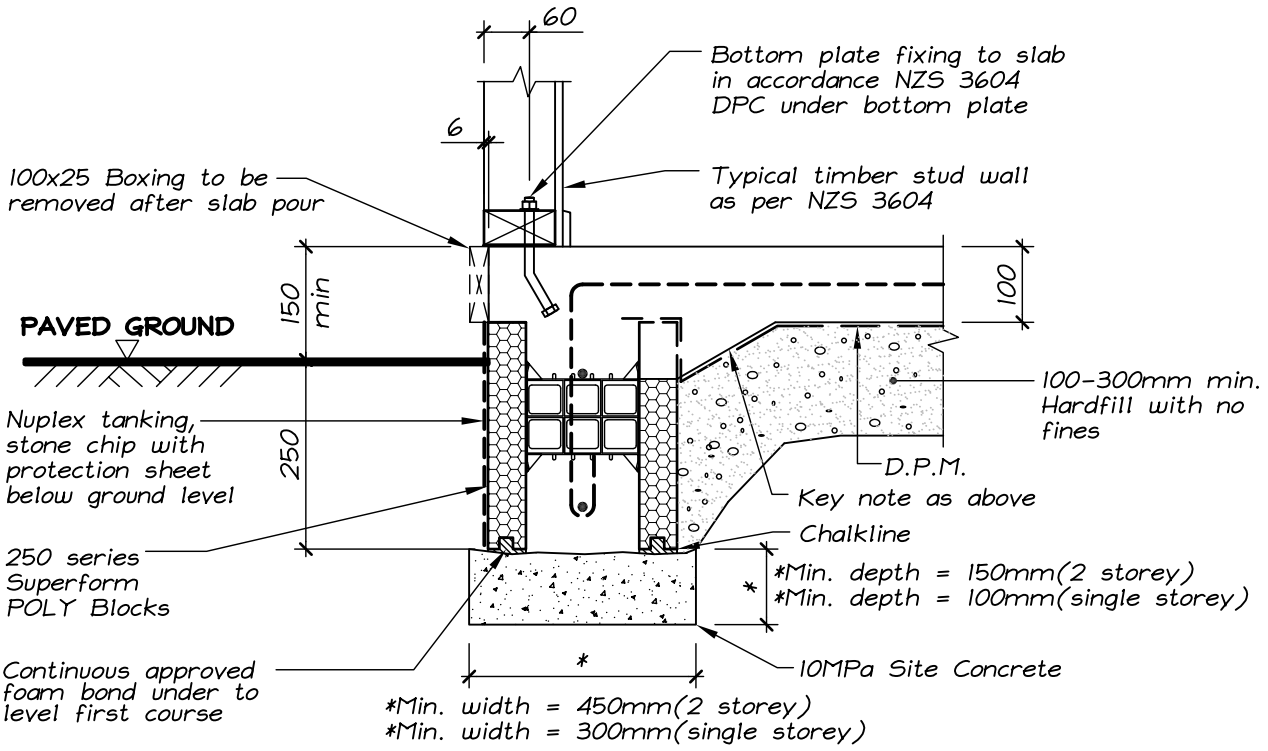
DESIGN ASSUMPTIONS

- maximum span of roof = 12.0m
- maximum wall height 5.0m (2 storey)
  3.0m (single storey)
- ground bearing of 300kPa in accordance with NZS 3604
- well drained soil conditions in accordance with NZBC

POWELL FENWICK CONSULTANTS LIMITED Your quality engineering partner.	SUPERFORM POLY BLOCK FOOTING ROCKCOTE OVER TIMBER FRAMING – OPTION 1 (FOR PAVED GROUND OUTSIDE)	RAFEL International Ltd	SF8



DESIGN ASSUMPTIONS · **poorly drained site (otherwise as below)**



FOUNDATION/SLAB DETAIL

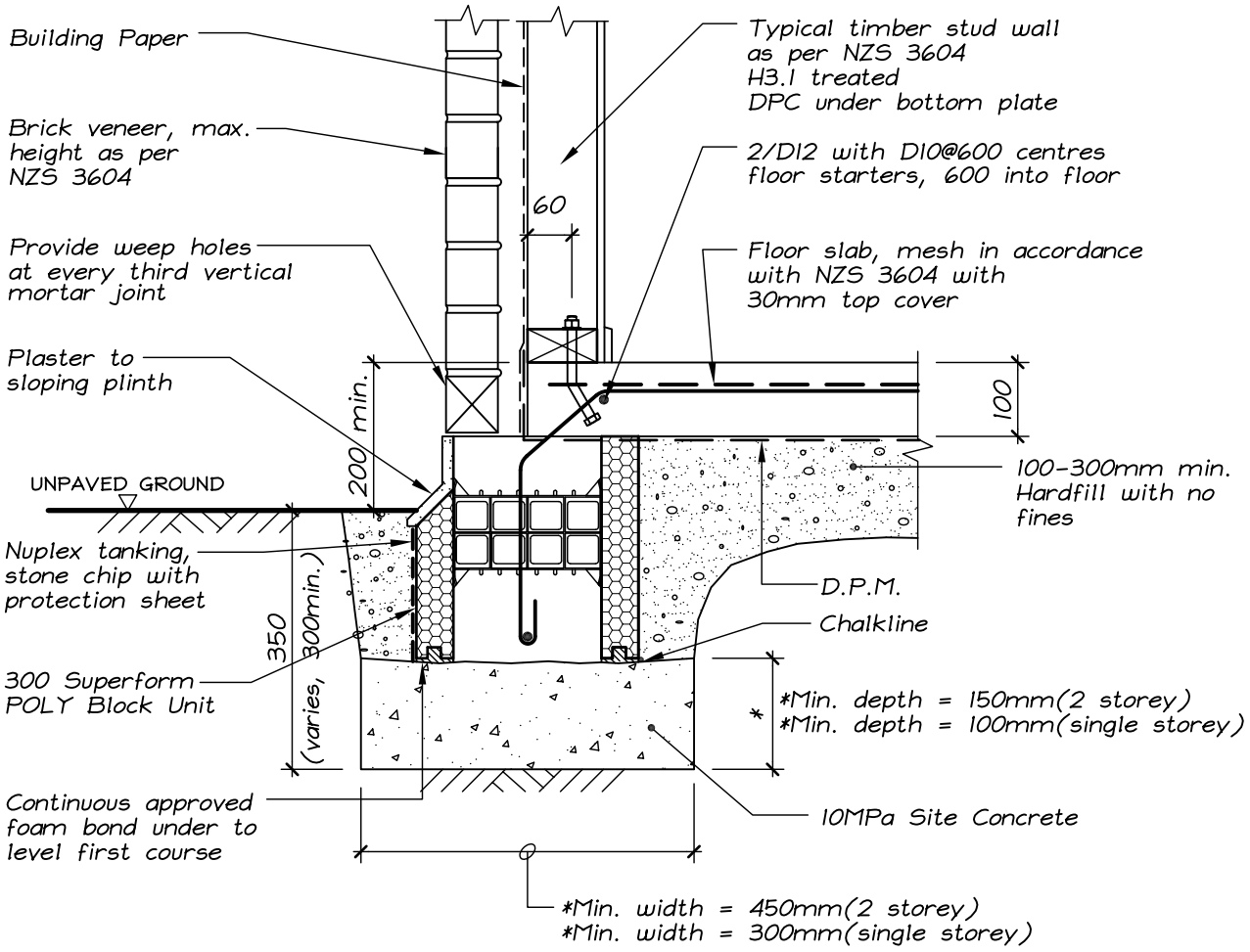
1:10

NOTE: All details indicate minimum reinforcement requirements

DESIGN ASSUMPTIONS

- **well drained soil conditions in accordance with NZBC**
- maximum span of roof = 12.0m
- maximum wall height 5.0m (2 storey)
  3.0m (single storey)
- ground bearing of 300kPa in accordance with NZS 3604

POWELL FENWICK CONSULTANTS LIMITED Your quality engineering partner.	SUPERFORM POLY BLOCK FOOTING ROCKCOTE OVER TIMBER FRAMING – OPTION 2 (FOR UNPAVED & PAVED GROUND OUTSIDE)	© 2005 RAFEL™ International Ltd	SF9



FOUNDATION/SLAB DETAIL

1:10

NOTES: All details indicate minimum reinforcement requirements
All brick veneer to meet the relevant performance requirements of the New Zealand Building Code
Refer to SF9 Foundation for Paved Ground

DESIGN ASSUMPTIONS

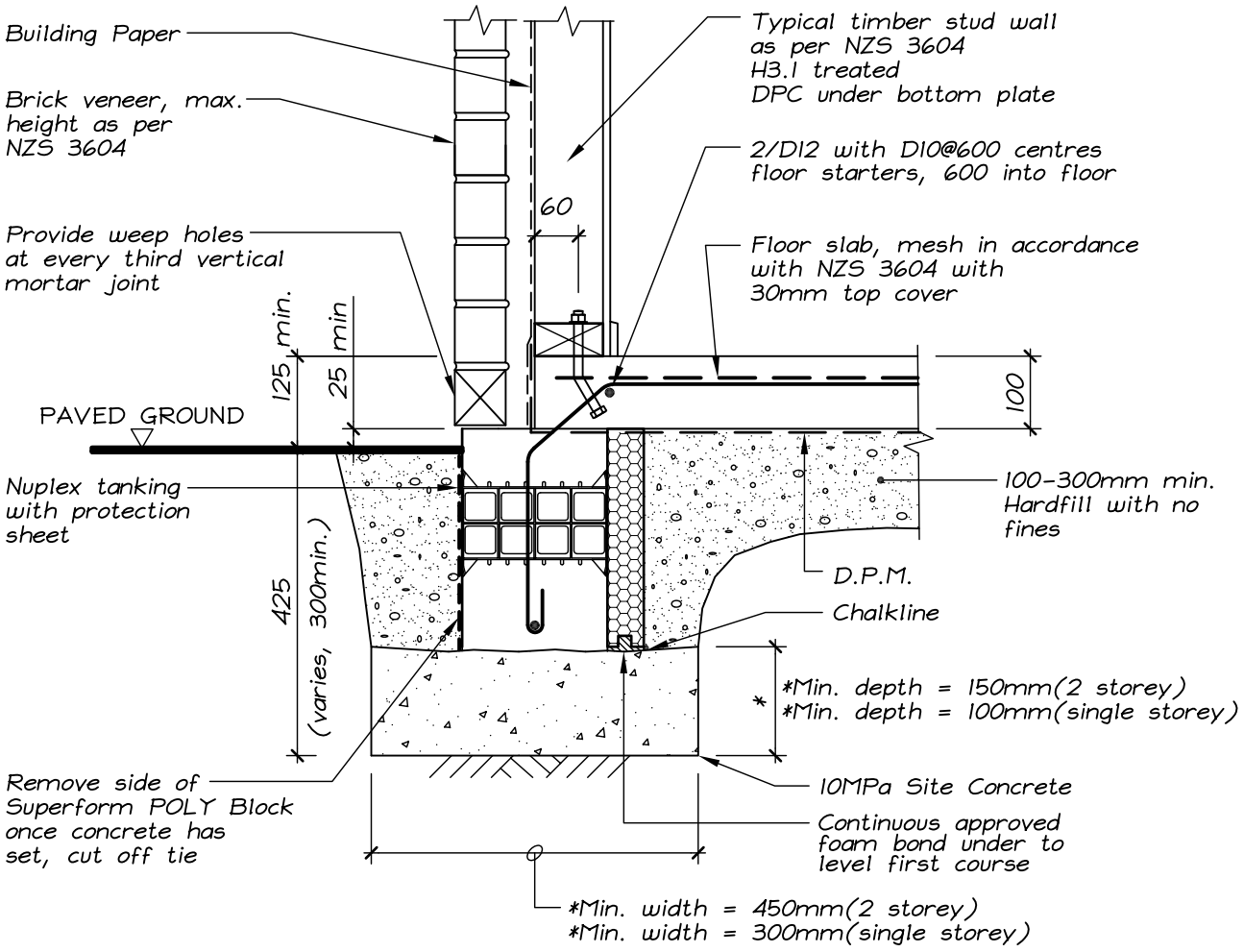
- maximum span of roof = 12.0m
- maximum wall height 5.0m (2 storey)
  3.0m (single storey)
- veneer detailing at openings and eaves shall comply with NZS 3604
- ground bearing of 300kPa in accordance with NZS 3604
- well drained soil conditions in accordance with NZBC

POWELL FENWICK CONSULTANTS LIMITED
Your quality engineering partner.

SUPERFORM POLY BLOCK FOOTING
BRICK VENEER OVER TIMBER FRAMING – OPTION 1
(FOR UNPAVED GROUND OUTSIDE)

RAFEL™ International Ltd

SF10



FOUNDATION/SLAB DETAIL

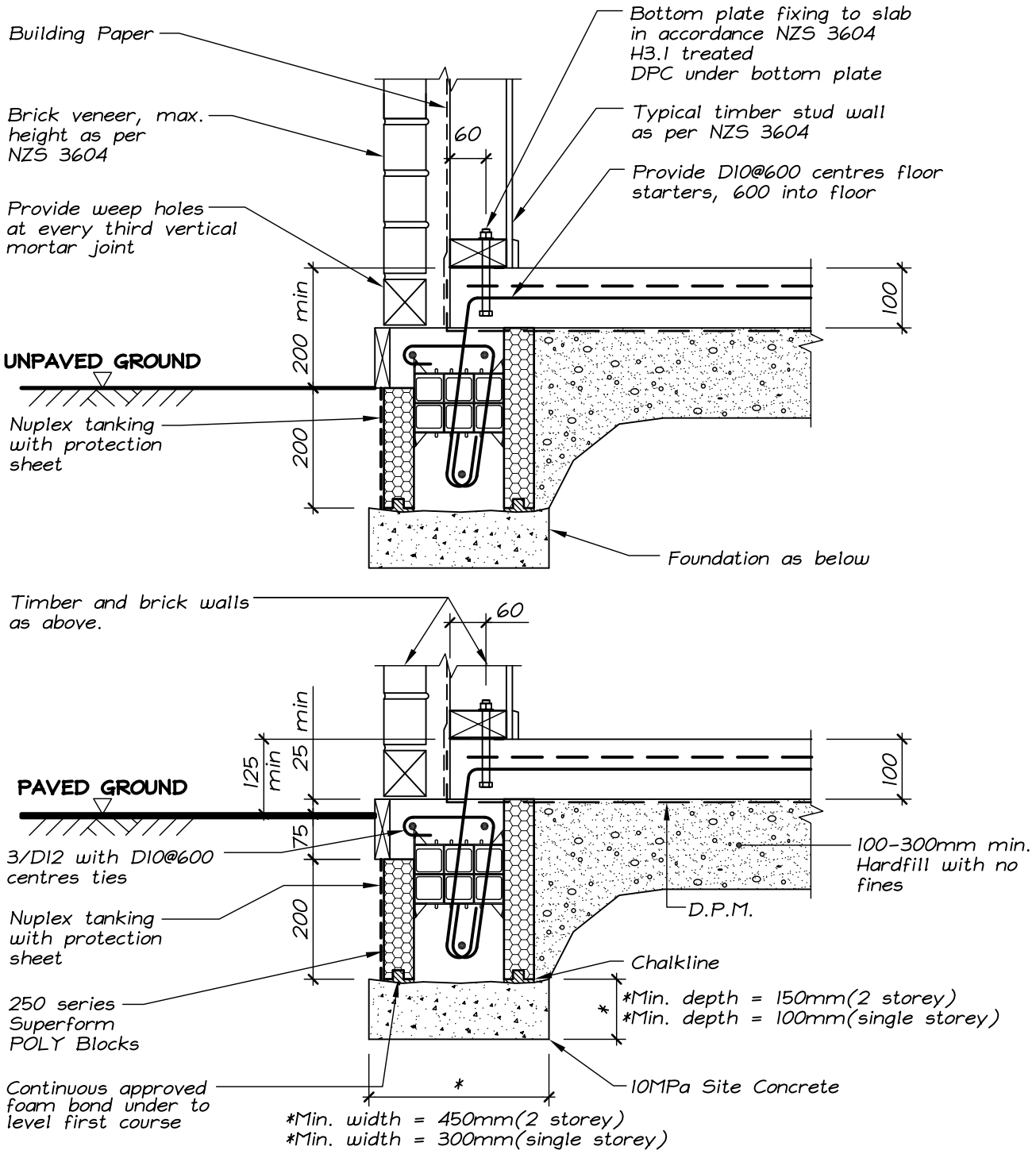
1:10

NOTES: All details indicate minimum reinforcement requirements
All brick veneer to meet the relevant performance requirements of the New Zealand Building Code
Refer to SF8 Foundation for Natural Ground

DESIGN ASSUMPTIONS

- maximum span of roof = 12.0m
- maximum wall height 5.0m (2 storey)
  3.0m (single storey)
- veneer detailing at openings and eaves shall comply with NZS 3604
- ground bearing of 300kPa in accordance with NZS 3604
- well drained soil conditions in accordance with NZBC

POWELL FENWICK CONSULTANTS LIMITED Your quality engineering partner.	SUPERFORM POLY BLOCK FOOTING BRICK VENEER OVER TIMBER FRAMING – OPTION 2 (FOR PAVED GROUND OUTSIDE)	RAPEL™ International Ltd	SF11



FOUNDATION/SLAB DETAIL

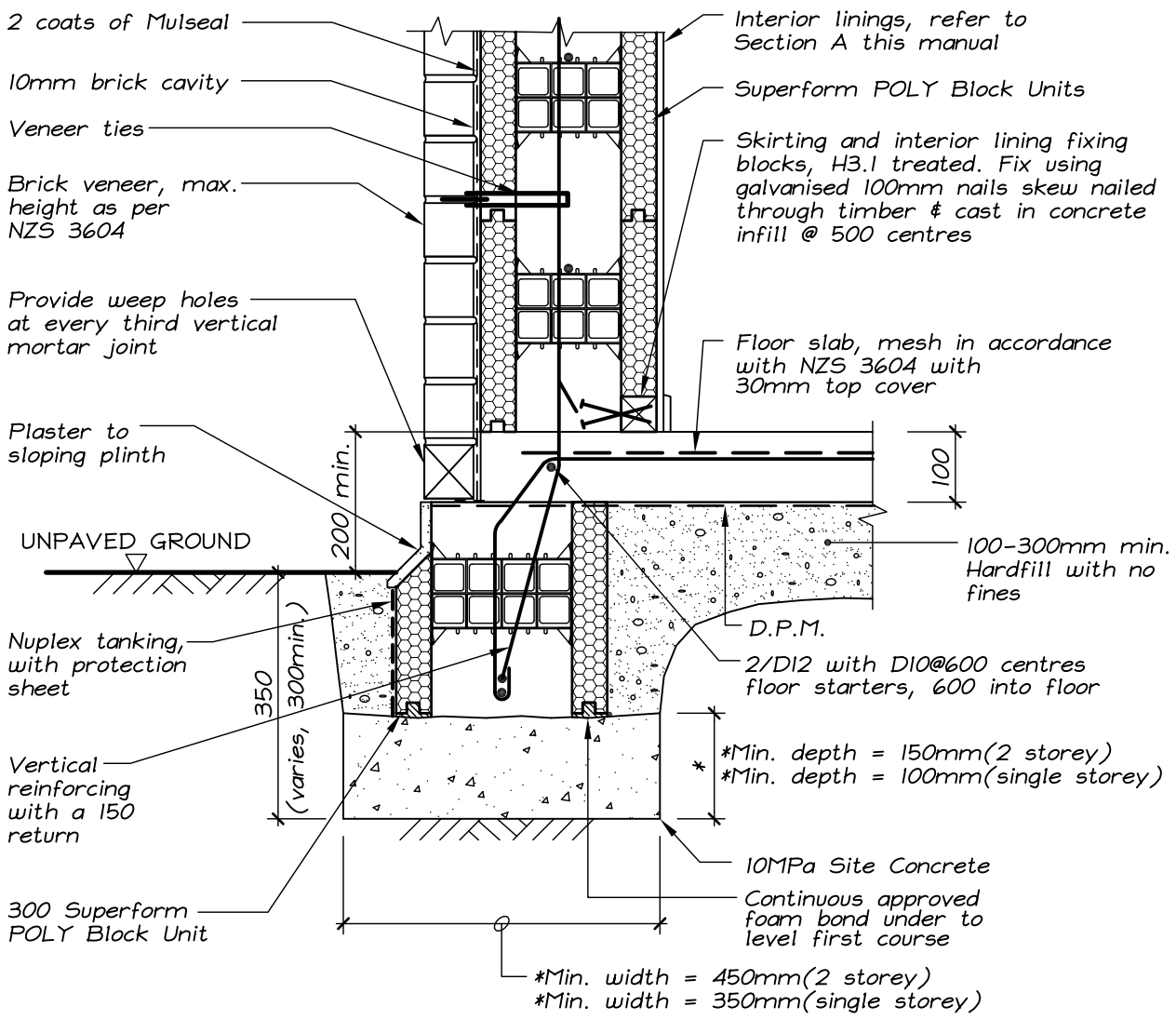
1:10

NOTE: All details indicate minimum reinforcement requirements

DESIGN ASSUMPTIONS

- maximum span of roof = 12.0m
- maximum wall height 5.0m (2 storey)
  3.0m (single storey)
- ground bearing of 300kPa in accordance with NZS 3604
- well drained soil conditions in accordance with NZBC

POWELL FENWICK CONSULTANTS LIMITED Your quality engineering partner.	SUPERFORM POLY BLOCK FOOTING BRICK VENEER OVER TIMBER FRAMING – OPTION 3 (FOR UNPAVED & PAVED GROUND OUTSIDE)	© 2005 RAFEL™ International Ltd	SF12



FOUNDATION/SLAB DETAIL

1:10

NOTES: All details indicate minimum reinforcement requirements
All brick veneer to meet the relevant performance requirements of the New Zealand Building Code
Refer to SF9 Foundation for Paved Ground

DESIGN ASSUMPTIONS

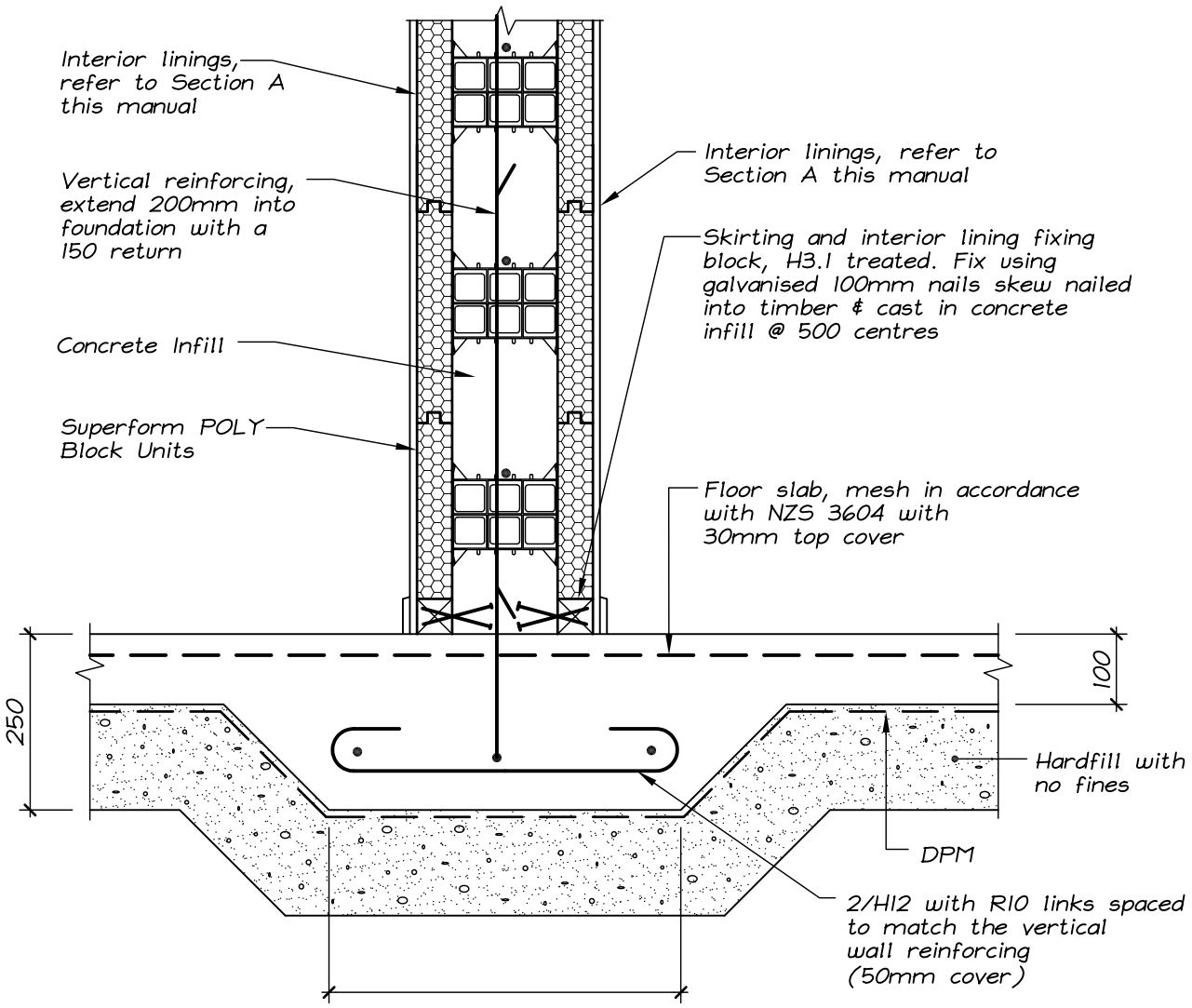
- maximum span of roof = 12.0m
- maximum tributary width of concrete floor = 3.0m
- maximum wall height 5.0m (2 storey)
  3.0m (single storey)
- veneer detailing at openings and eaves shall comply with NZS 3604
- ground bearing of 300kPa in accordance with NZS 3604
- well drained soil conditions in accordance with NZBC

POWELL FENWICK CONSULTANTS LIMITED
Your quality engineering partner.

SUPERFORM POLY BLOCK WALL AND FOOTING BRICK VENEER CLAD

RAFEL™ International Ltd

SF13



minimum width = 350mm (single storey)
minimum width = 500mm (two storey with suspended timber floor to NZS 3604)
minimum width = 700mm (two storey with suspended concrete floor)

INTERNAL SUPERFORM WALL FOUNDATION

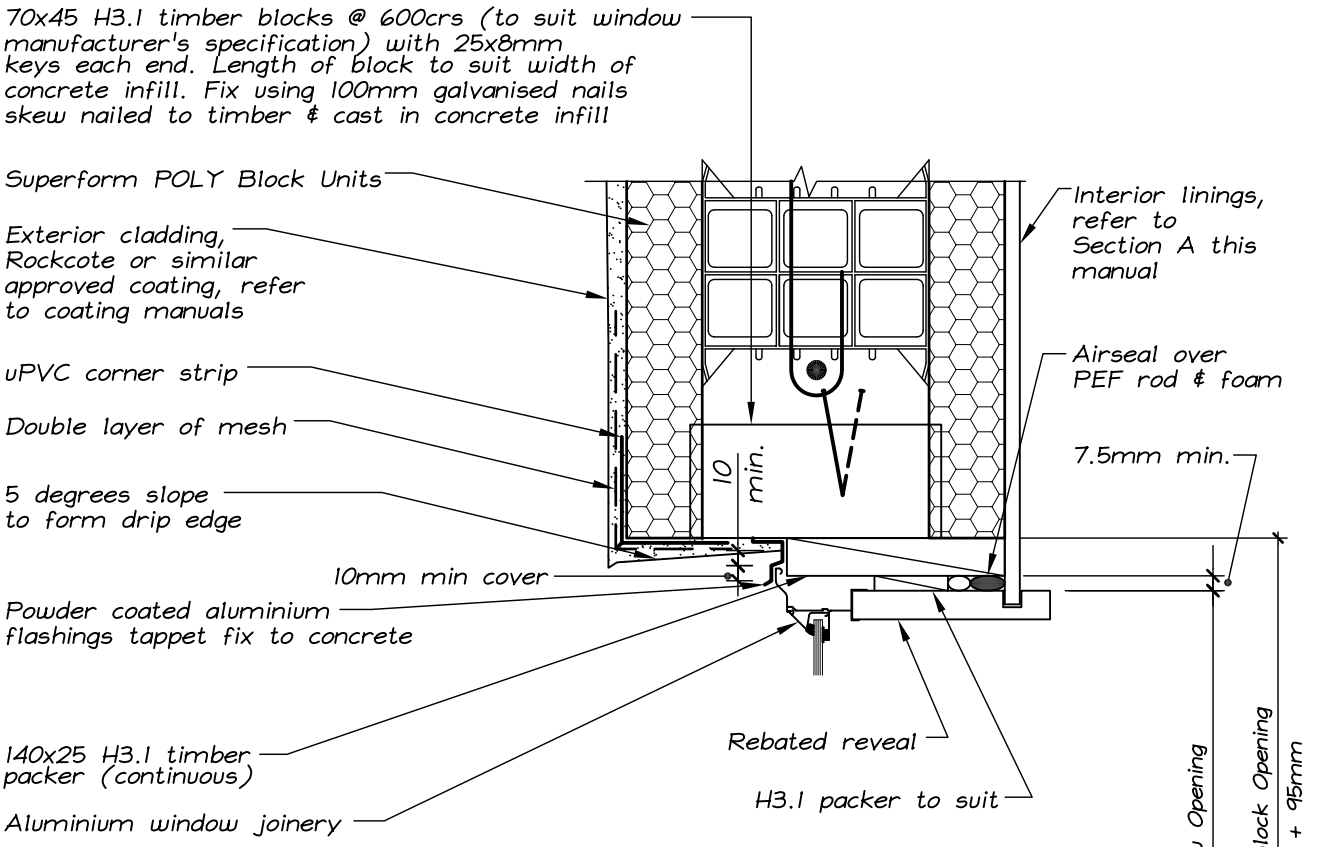
1:10

NOTE: All details indicate minimum reinforcement requirements

DESIGN ASSUMPTIONS

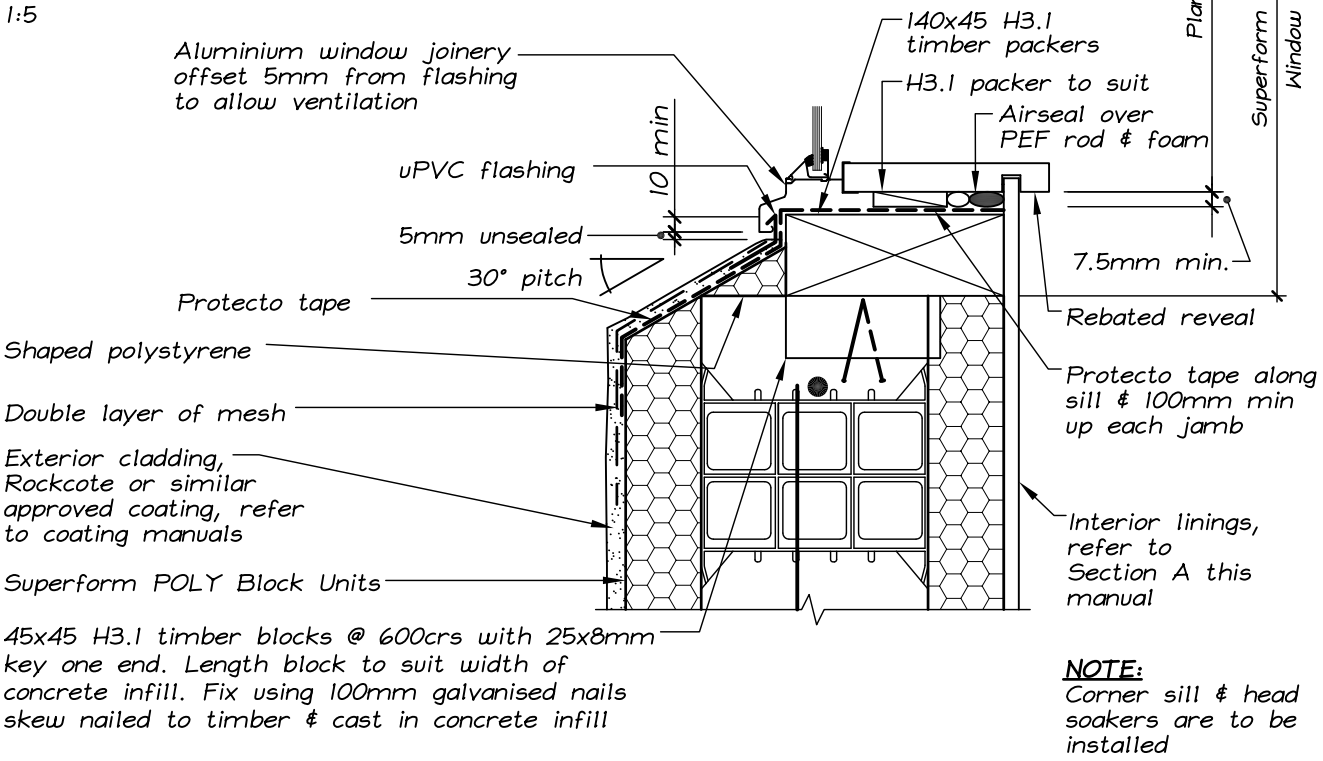
- ground bearing of 300kPa in accordance with NZS 3604
- well drained soil conditions in accordance with NZBC

POWELL FENWICK CONSULTANTS LIMITED Your quality engineering partner.	SUPERFORM POLY BLOCK INTERNAL WALL FOOTING	© 2005 RAFEL International Ltd	SF14



ALUMINIUM WINDOW HEAD DETAIL

1:5

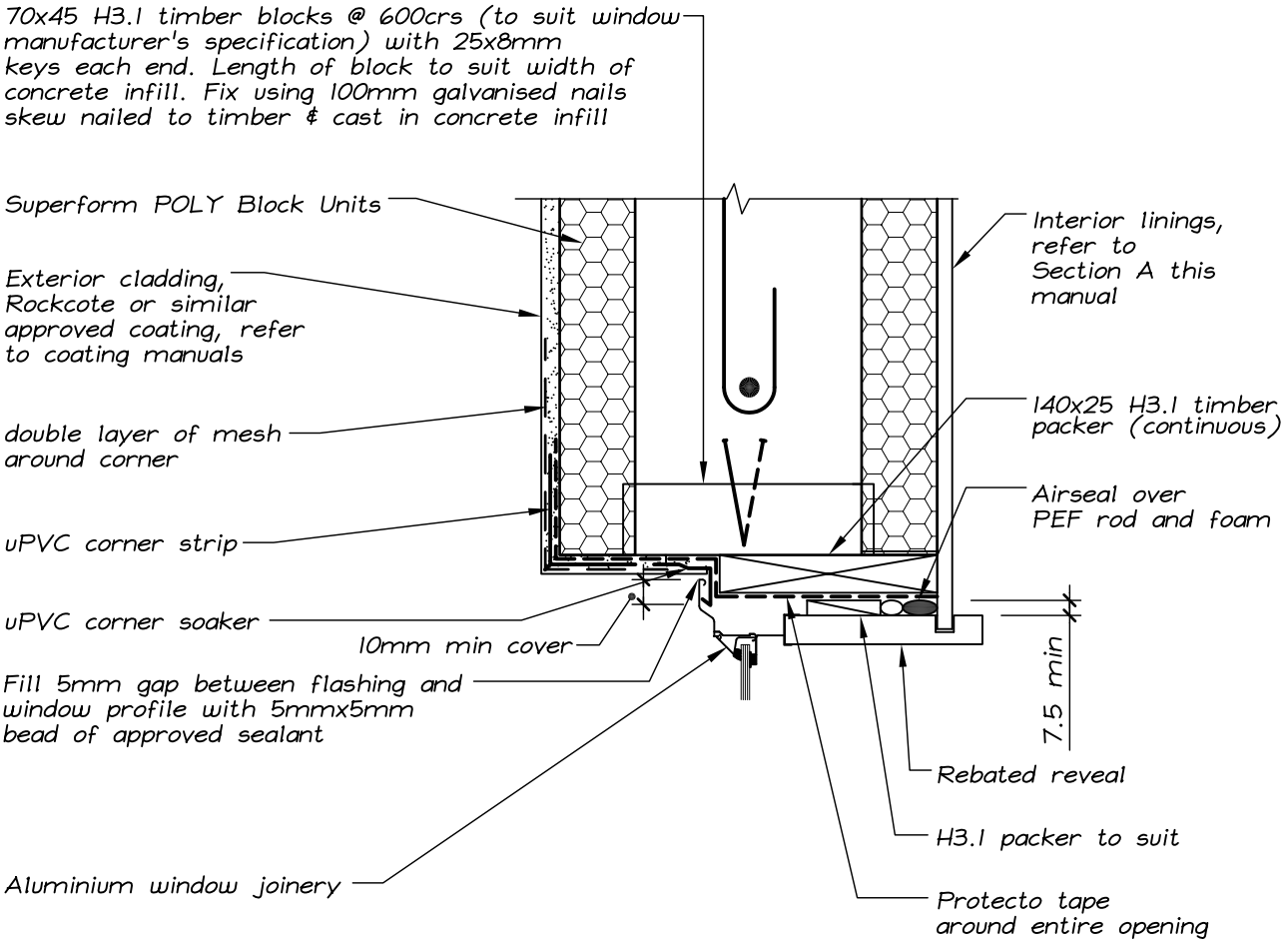


NOTE:
Corner sill & head soakers are to be installed

ALUMINIUM WINDOW SILL DETAIL

1:5

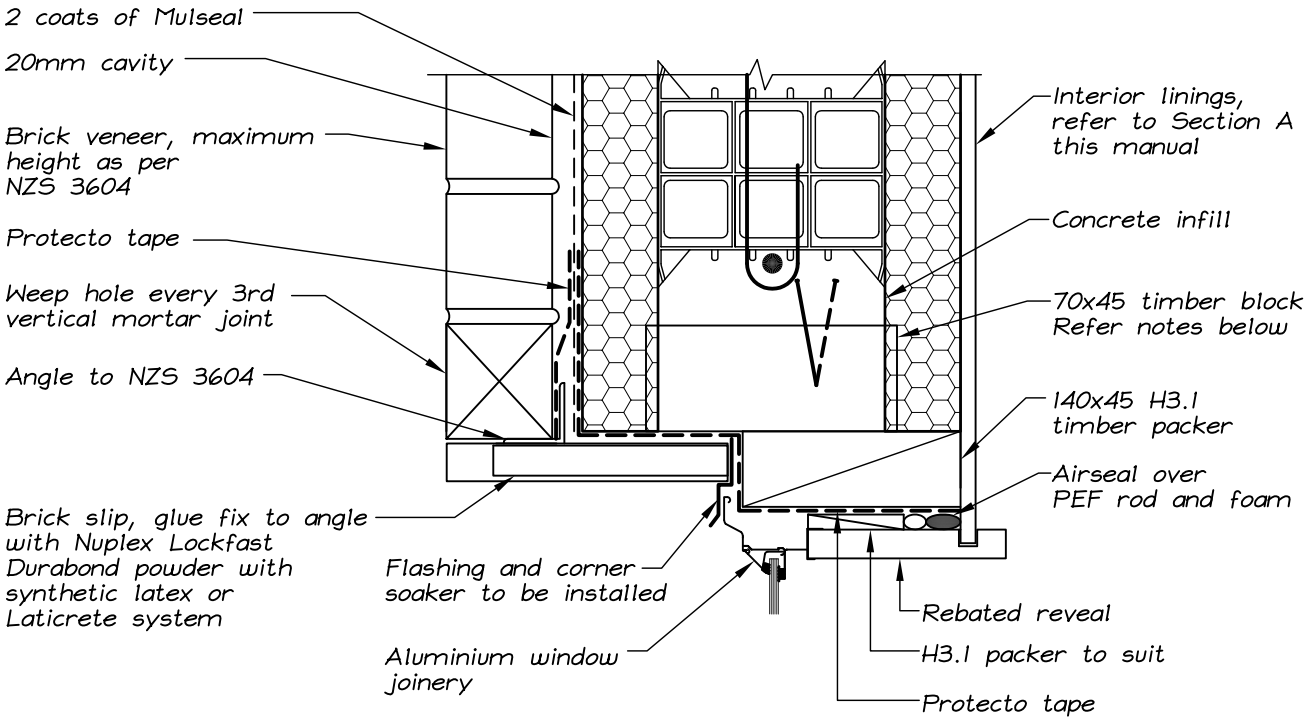
POWELL FENWICK CONSULTANTS LIMITED Your quality engineering partner.	SUPERFORM POLY BLOCK WINDOW DETAILS	© 2005 RAFEL International Ltd	SF15



ALUMINIUM WINDOW JAMB DETAIL

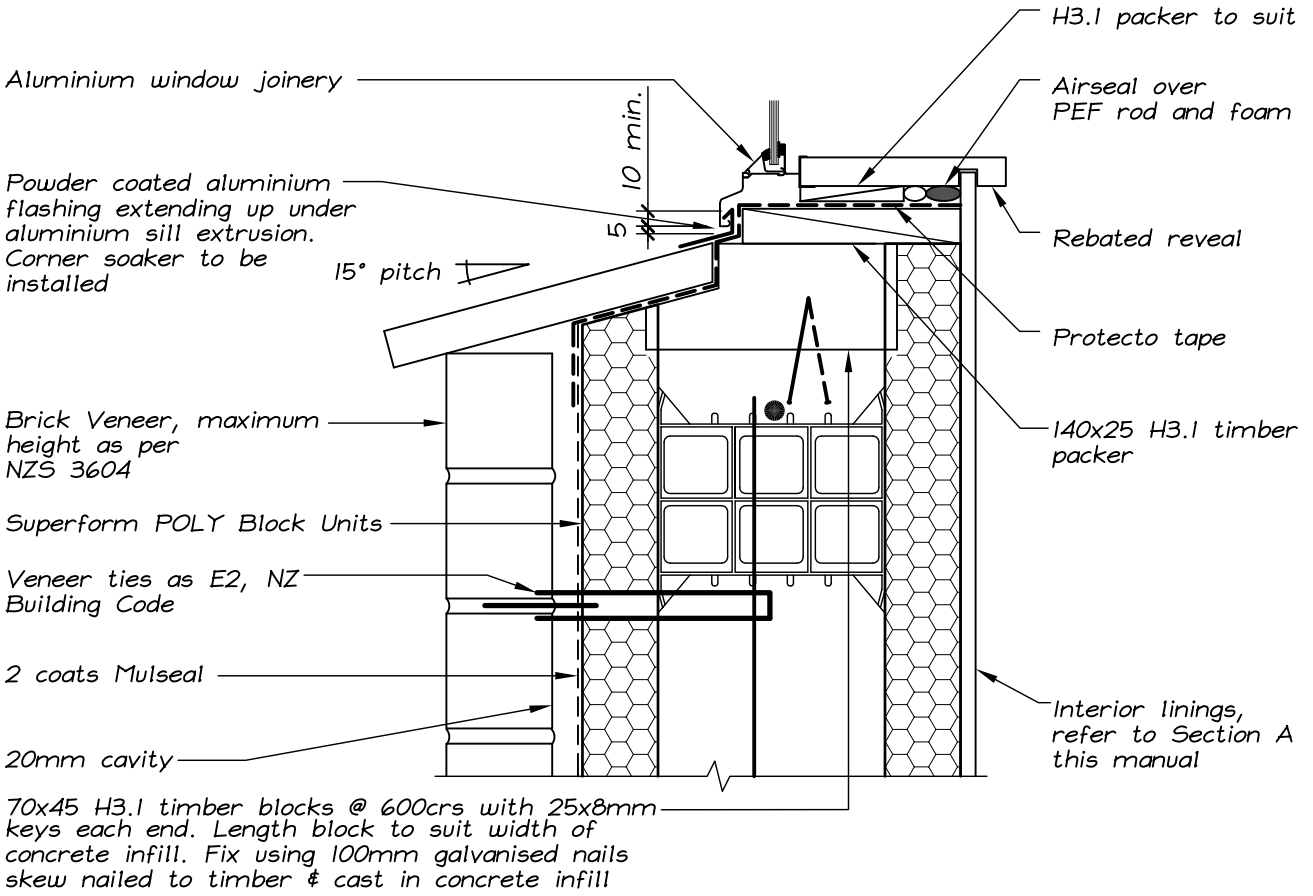
1:5
NOTE - Windows and joinery to be confirmed with the window manufacturer.

POWELL FENWICK CONSULTANTS LIMITED Your quality engineering partner.	SUPERFORM POLY BLOCK WINDOW DETAILS	RAFEL International Ltd	SF16



ALUMINIUM WINDOW HEAD DETAIL

1:5



ALUMINIUM WINDOW SILL DETAIL - OPTION 1

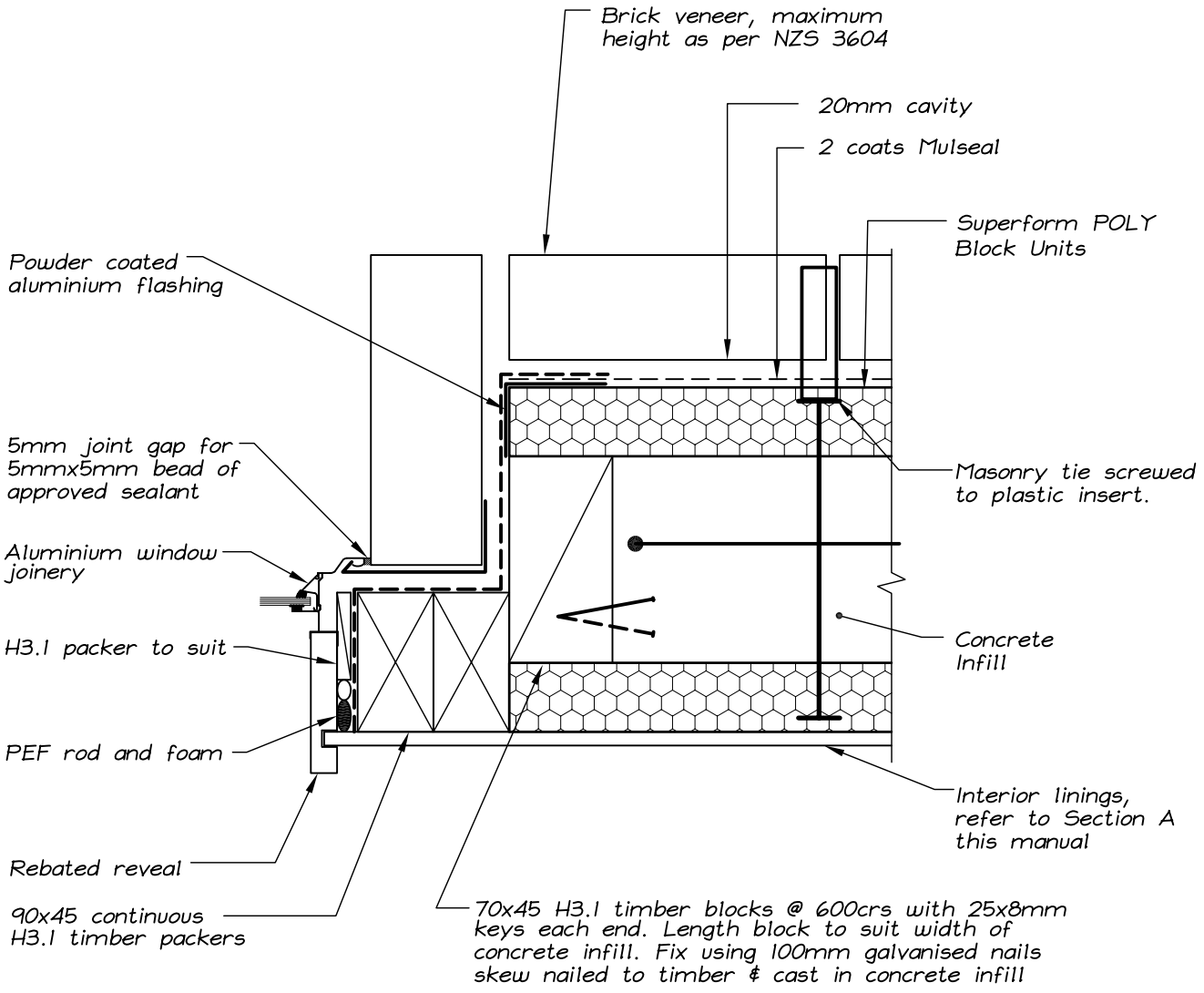
1:5

POWELL FENWICK CONSULTANTS LIMITED
Your quality engineering partner.

SUPERFORM POLY BLOCK
BRICK VENEER
WINDOW DETAILS

RAFEL International Ltd

SF17

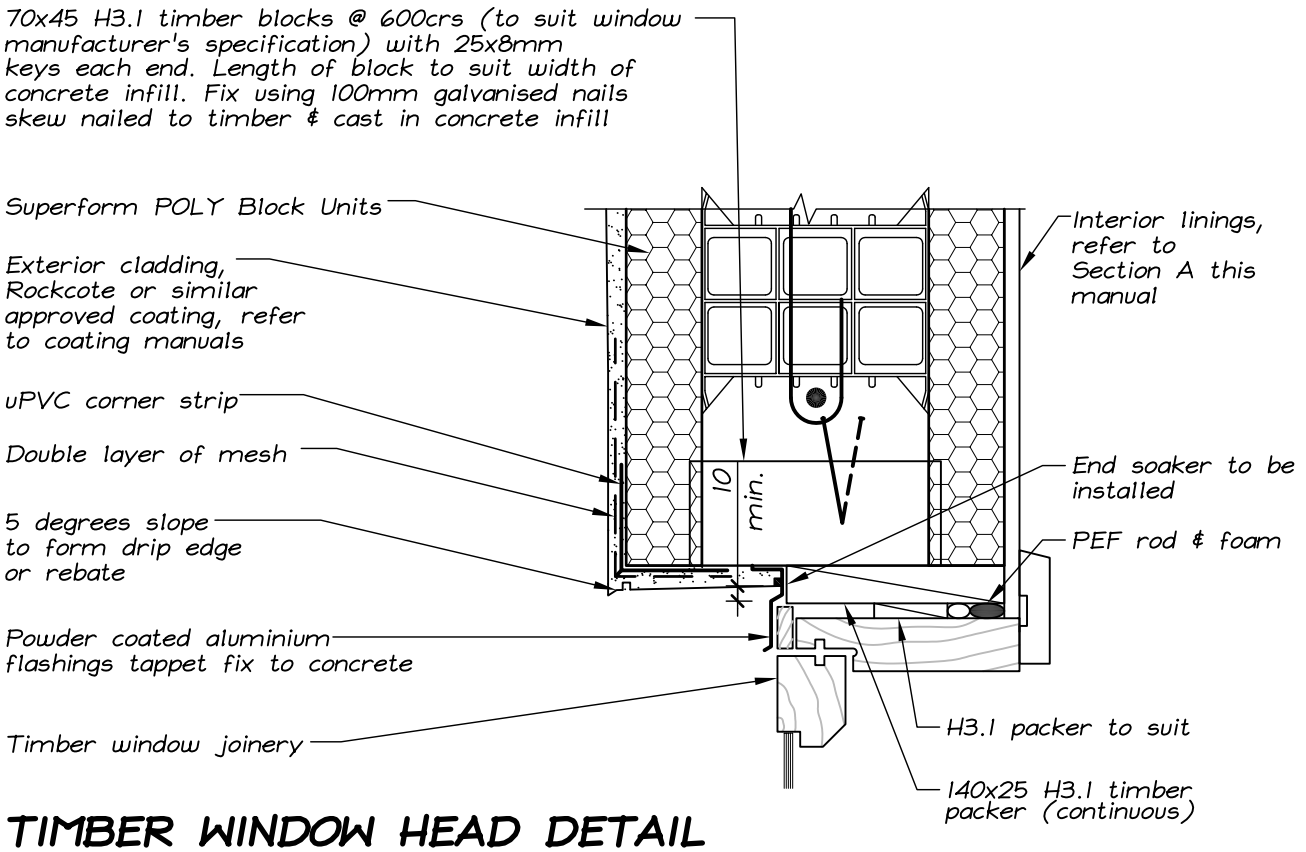


ALUMINIUM WINDOW JAMB DETAIL

1:5

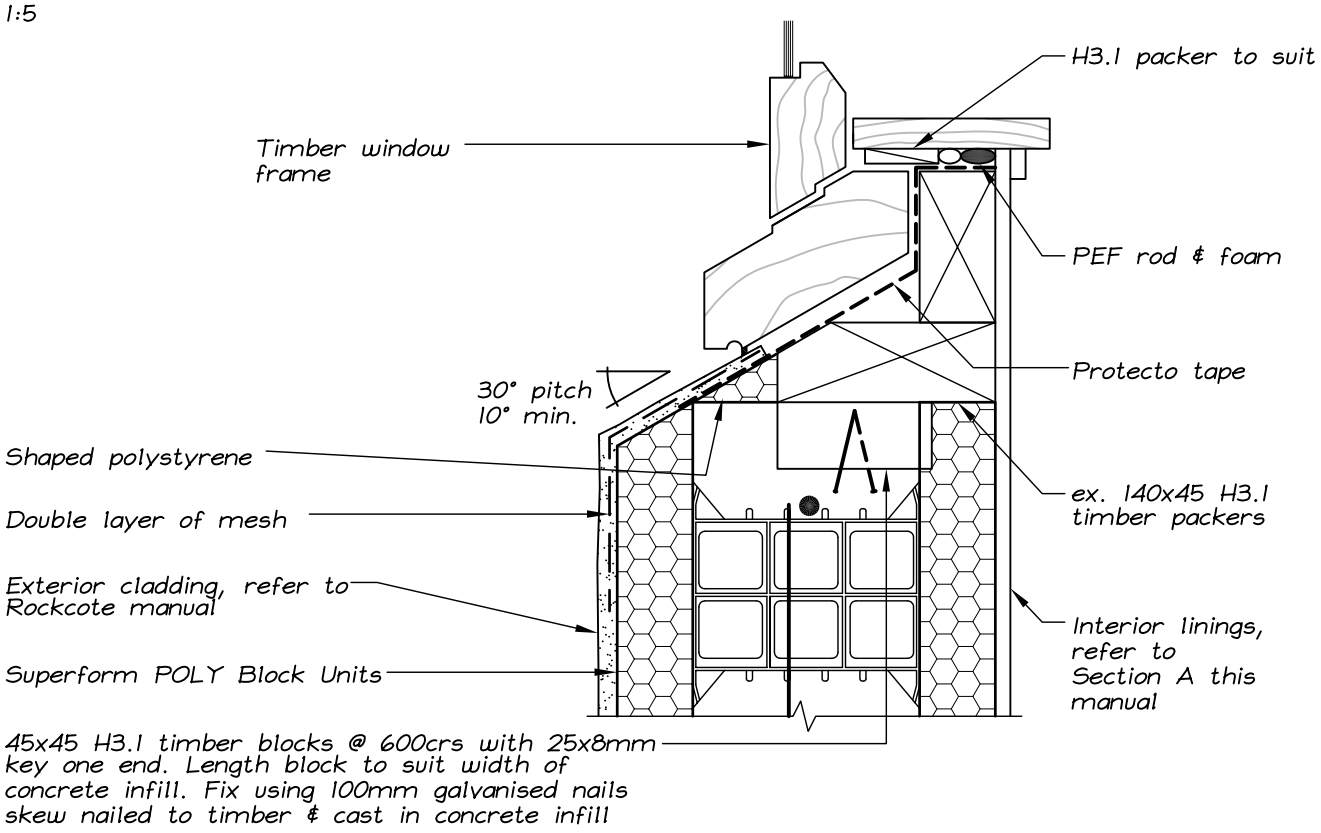
NOTE - All brick veneer to meet the relevant performance requirements of the New Zealand Building Code

POWELL FENWICK CONSULTANTS LIMITED Your quality engineering partner.	SUPERFORM POLY BLOCK BRICK VENEER WINDOW DETAILS	© 2005 RAFEL™ International Ltd	SF18



TIMBER WINDOW HEAD DETAIL

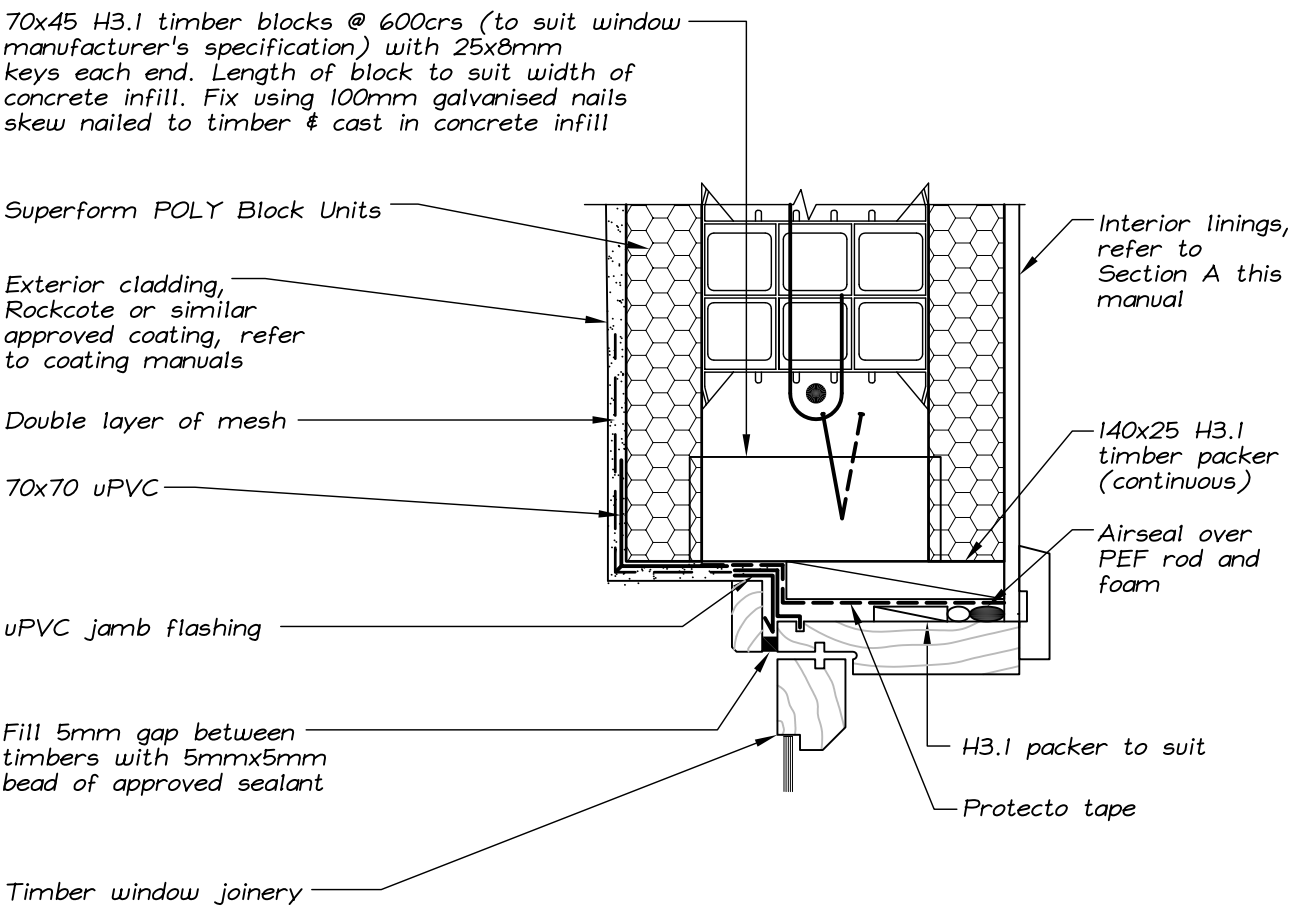
1:5



TIMBER WINDOW SILL DETAIL

1:5

POWELL FENWICK CONSULTANTS LIMITED Your quality engineering partner.	SUPERFORM POLY BLOCK WINDOW DETAILS	© 2005 RAFEL™ International Ltd	SF19

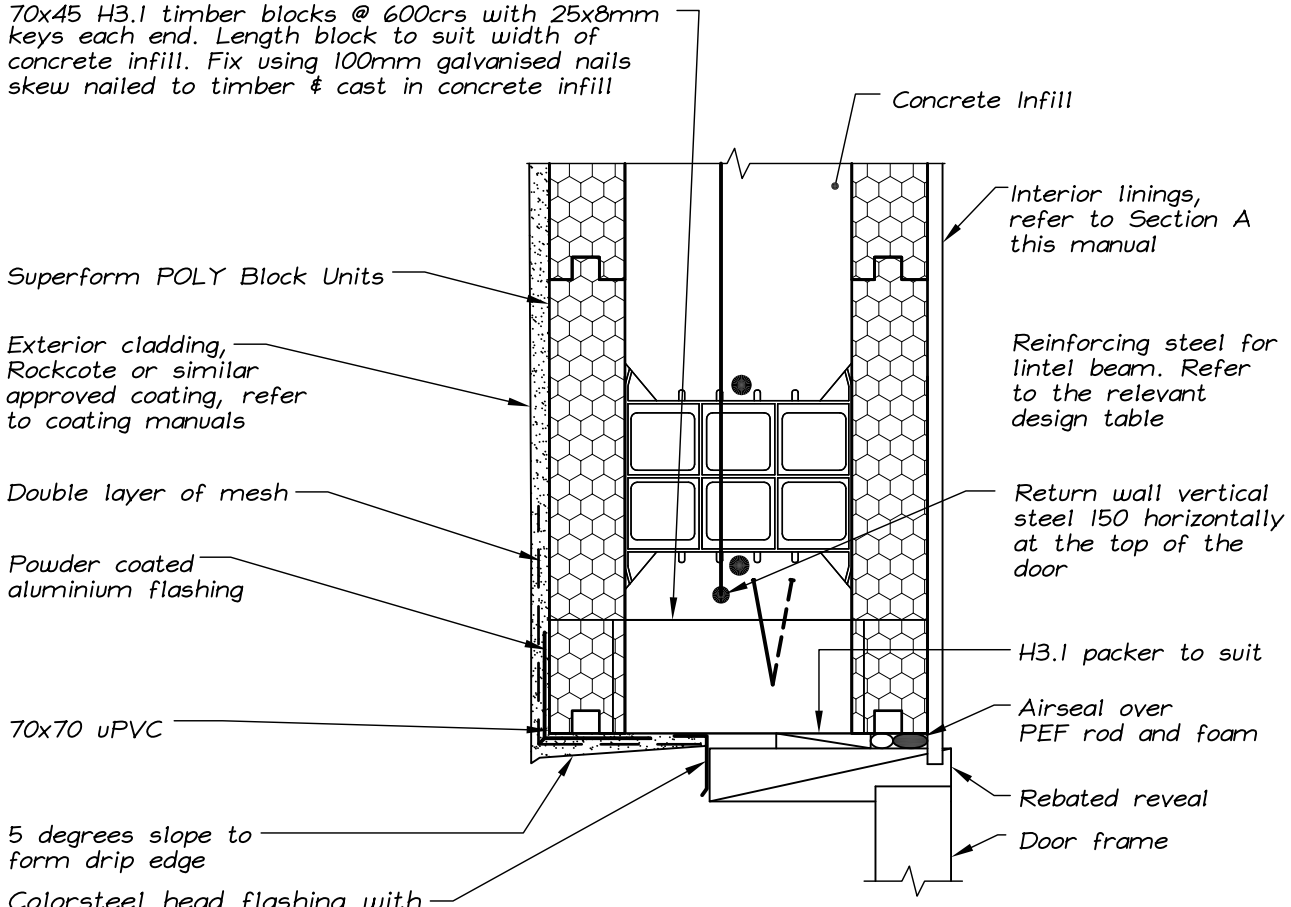


TIMBER WINDOW JAMB DETAIL

1:5

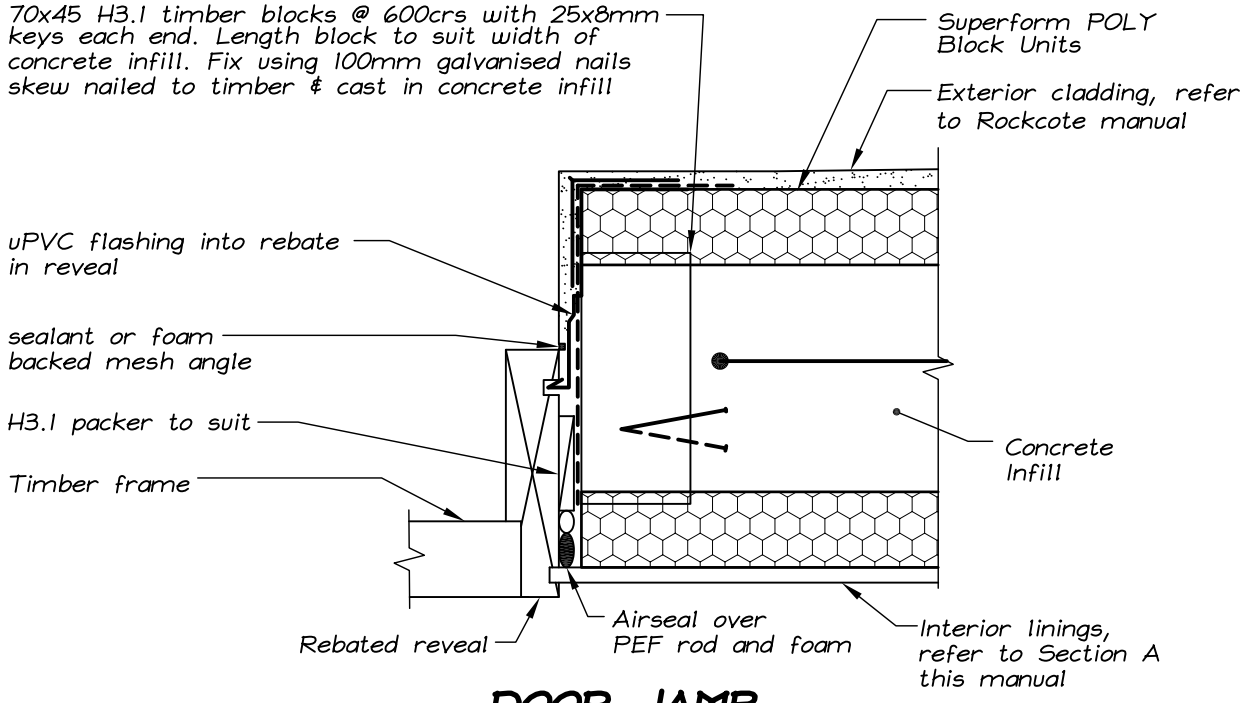
NOTE - Windows and joinery to be confirmed with the window manufacturer.

POWELL FENWICK CONSULTANTS LIMITED Your quality engineering partner.	SUPERFORM POLY BLOCK WINDOW DETAILS	© 2005 RAFEL International Ltd	SF20



DOOR HEAD

1:5



DOOR JAMB

1:5

NOTE - Doors and joinery to be confirmed with the manufacturer

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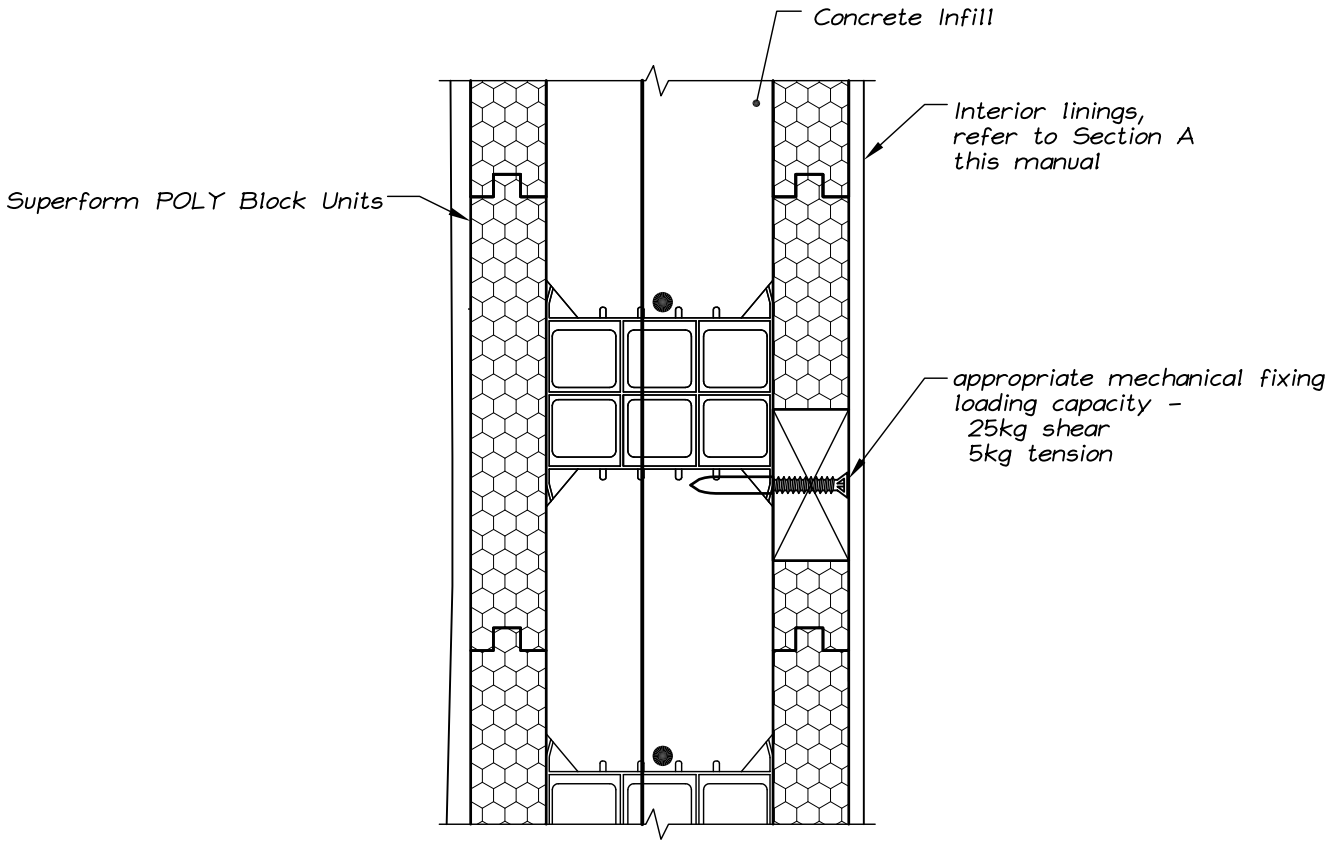
Your quality engineering partner.

SUPERFORM POLY BLOCK DOOR DETAILS

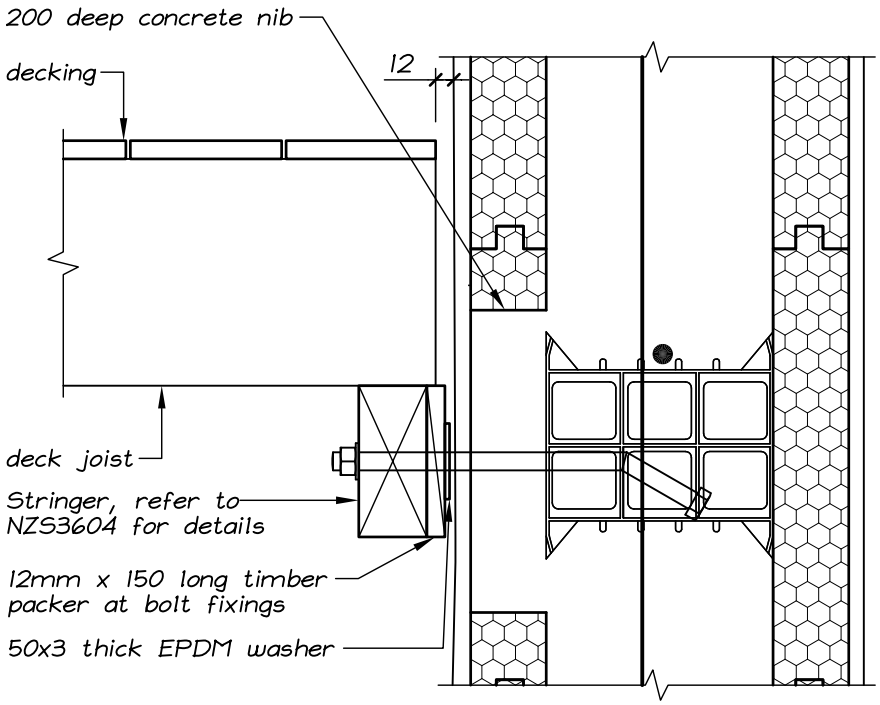
RAFEL International Ltd

SF21



WALL FIXING BLOCK

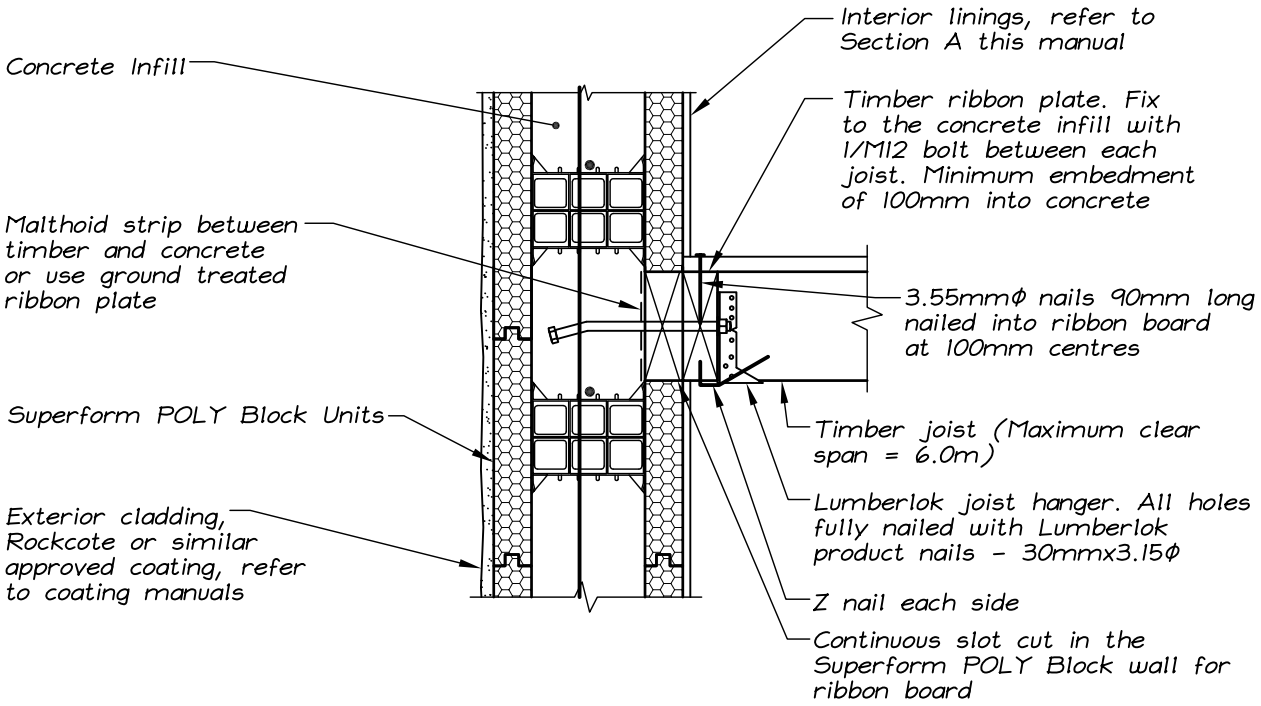
1:5



WALL FIXING BLOCK TO DECK

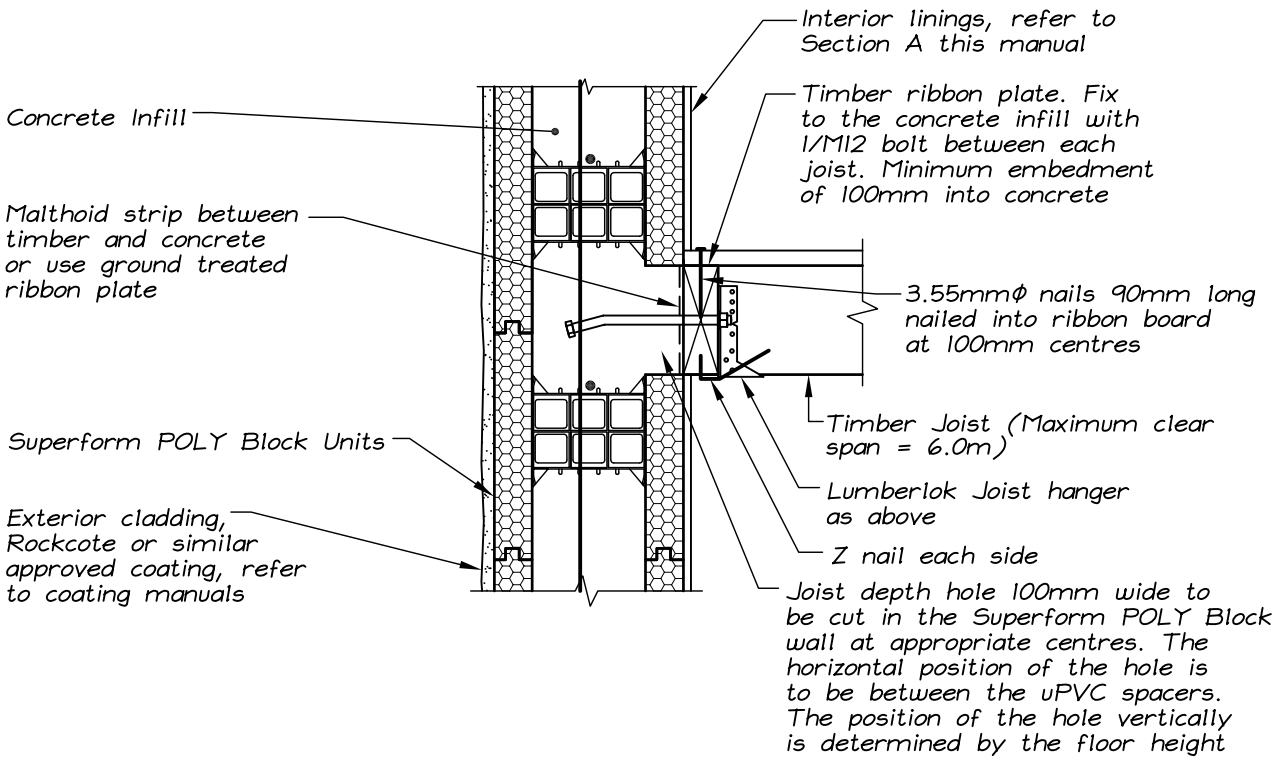
1:5 wall to enclosed deck similar

POWELL FENWICK CONSULTANTS LIMITED Your quality engineering partner.	SUPERFORM POLY BLOCK WALL FIXING BLOCK	© 2005 RAFEL™ International Ltd	SF22



TIMBER FLOOR/WALL DETAIL - OPTION 1

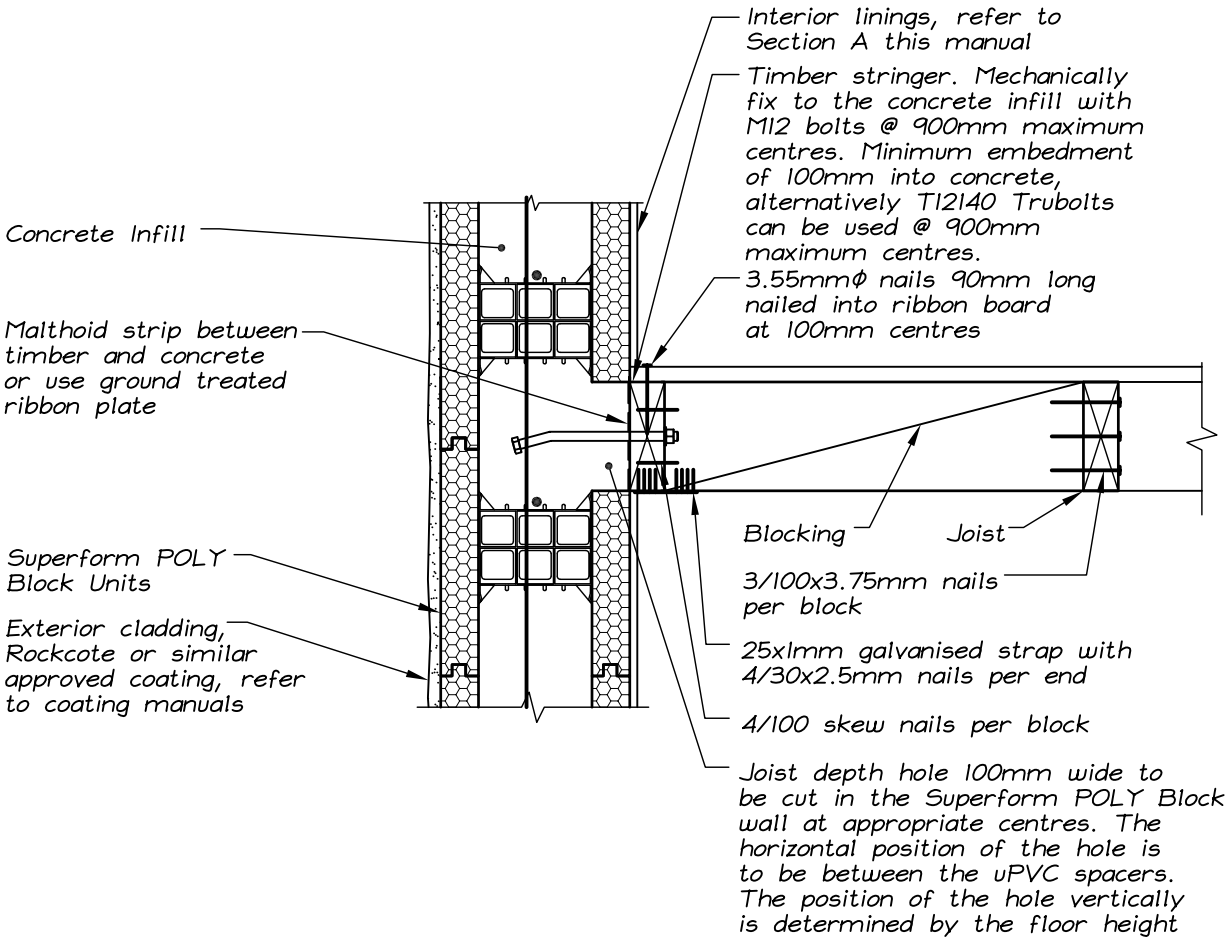
1:10
JOIST SUPPORTED BY THE WALL
(TIMBER FLOOR SYSTEM IN ACCORDANCE WITH NZS 3604)



TIMBER FLOOR/WALL DETAIL - OPTION 2

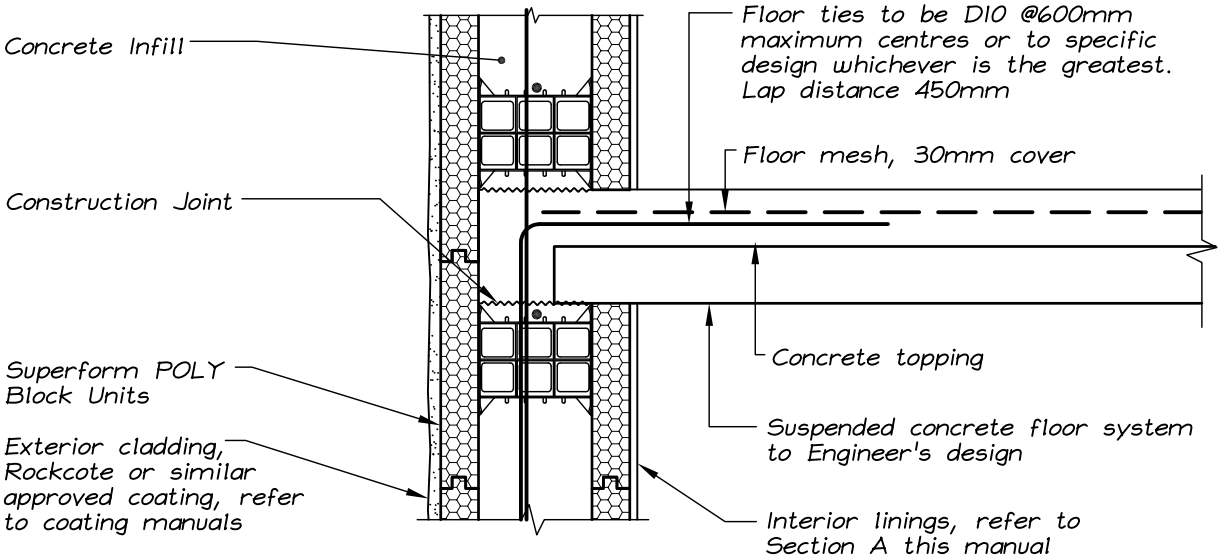
1:10
JOIST SUPPORTED BY THE WALL
(TIMBER FLOOR SYSTEM IN ACCORDANCE WITH NZS 3604)

POWELL FENWICK CONSULTANTS LIMITED Your quality engineering partner.	SUPERFORM POLY BLOCK WALL/FLOOR CONNECTIONS	© 2005 RAFEL™ International Ltd	SF23



TIMBER FLOOR/WALL DETAIL

1:10
JOIST PARALLEL TO WALL
(TIMBER FLOOR SYSTEM IN ACCORDANCE WITH NZS 3604)



CONCRETE FLOOR/WALL DETAIL

1:10

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SUPERFORM POLY BLOCK WALL/FLOOR CONNECTIONS

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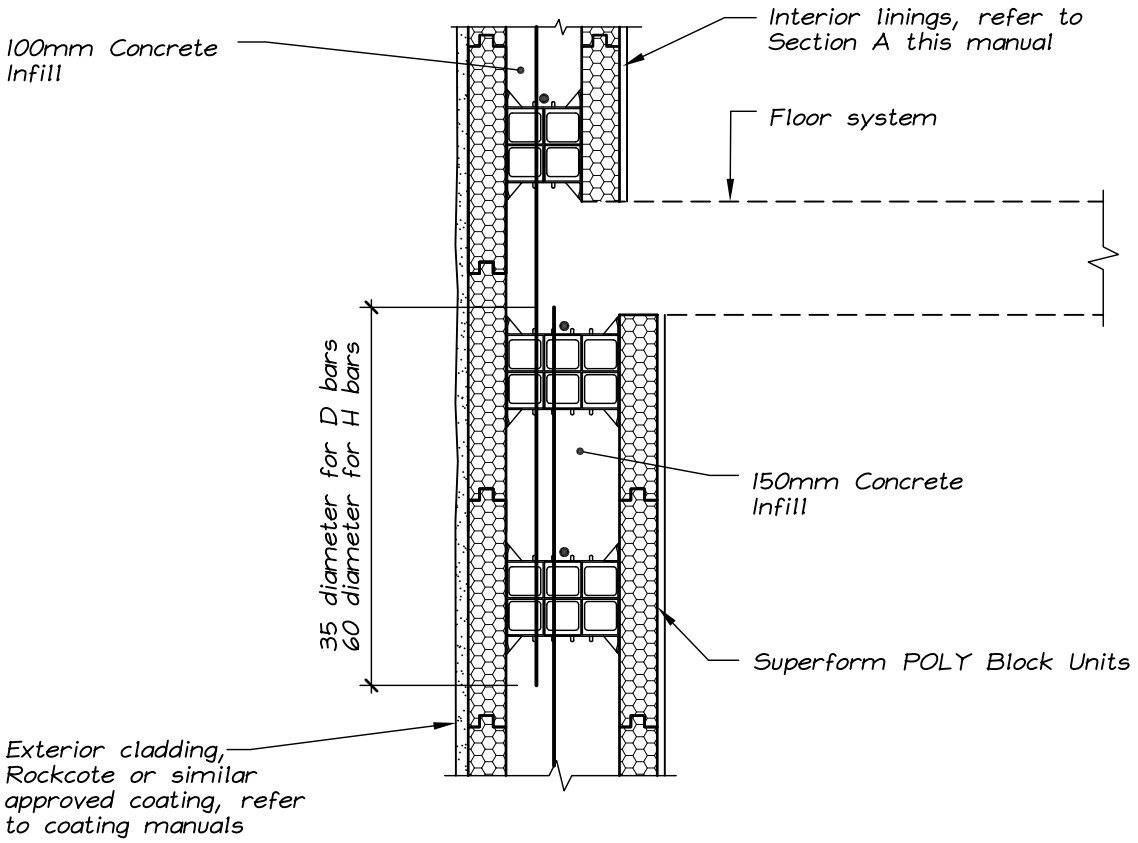
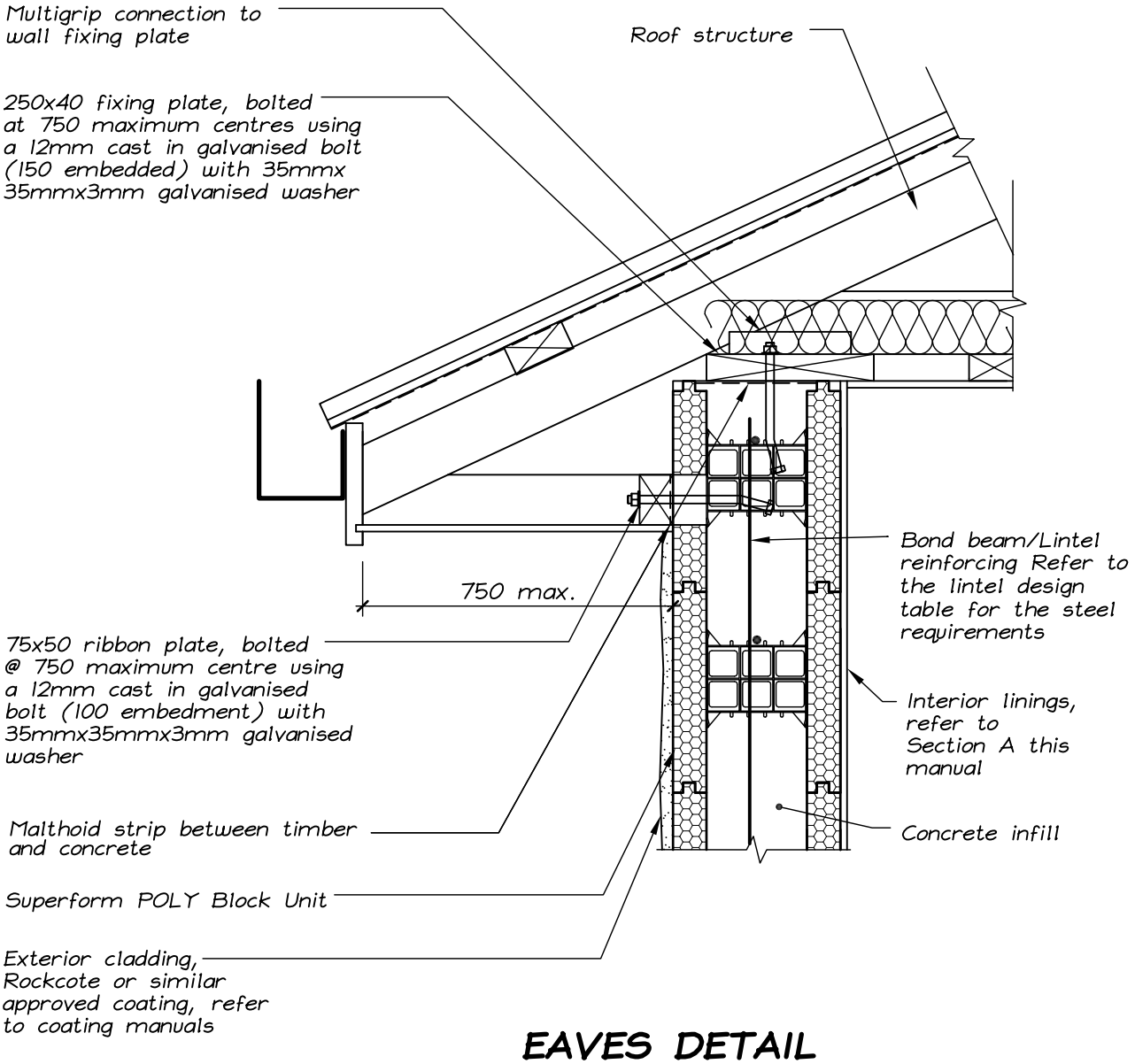


DETAIL FOR 50mm DECREASE IN WALL THICKNESS

1:10

POWELL FENWICK CONSULTANTS LIMITED Your quality engineering partner.	SUPERFORM POLY BLOCK WALL THICKNESS CHANGE DETAIL	© 2005 RAPEL™ International Ltd	SF25



EAVES DETAIL

1:10

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SUPERFORM POLY BLOCK
EAVES DETAIL

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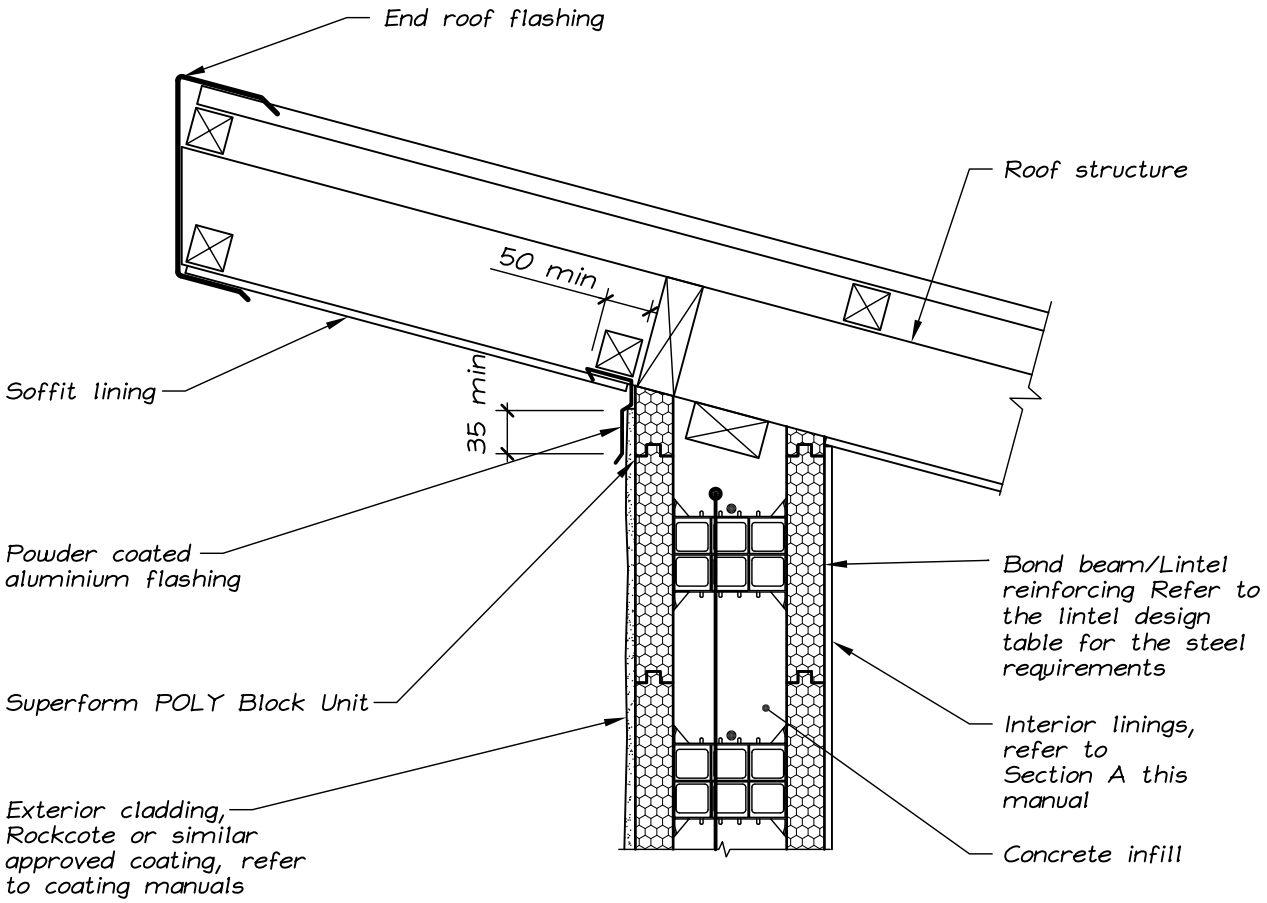
SF26



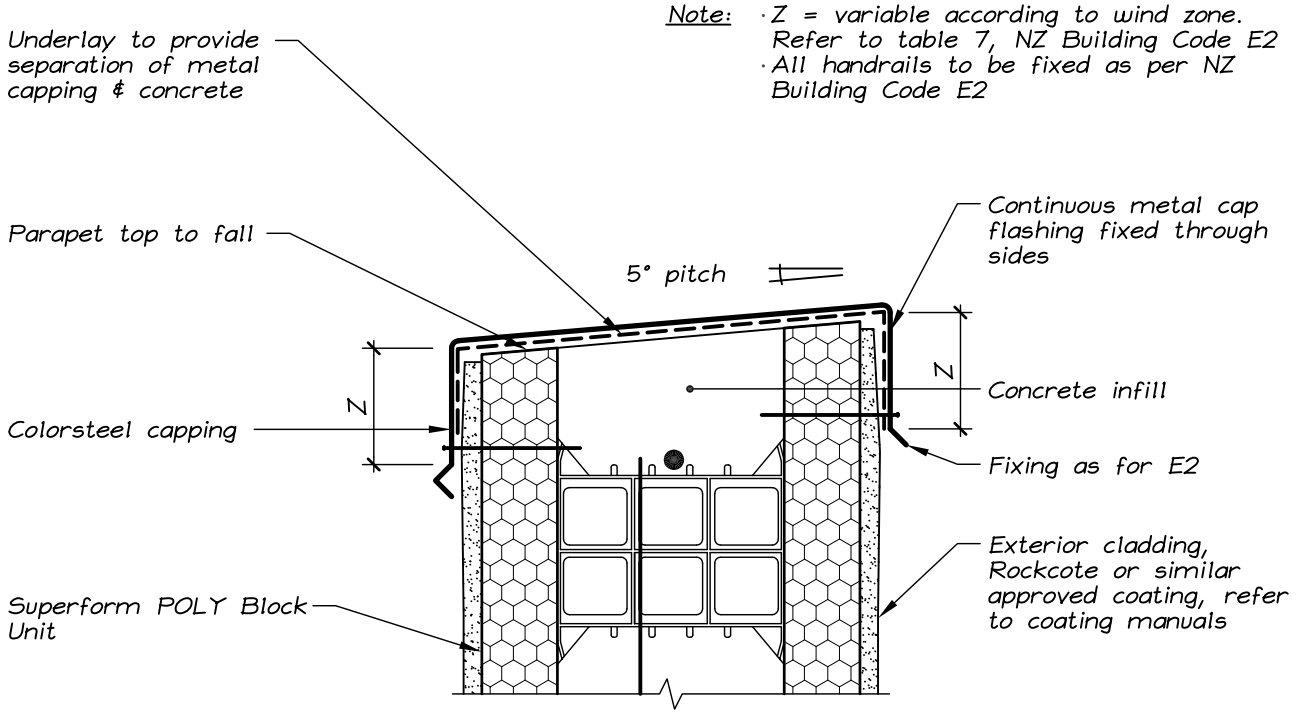
REVERSE SLOPE EAVES

1:10

Soffit linings and appropriate flashing must be installed on completion of plastering

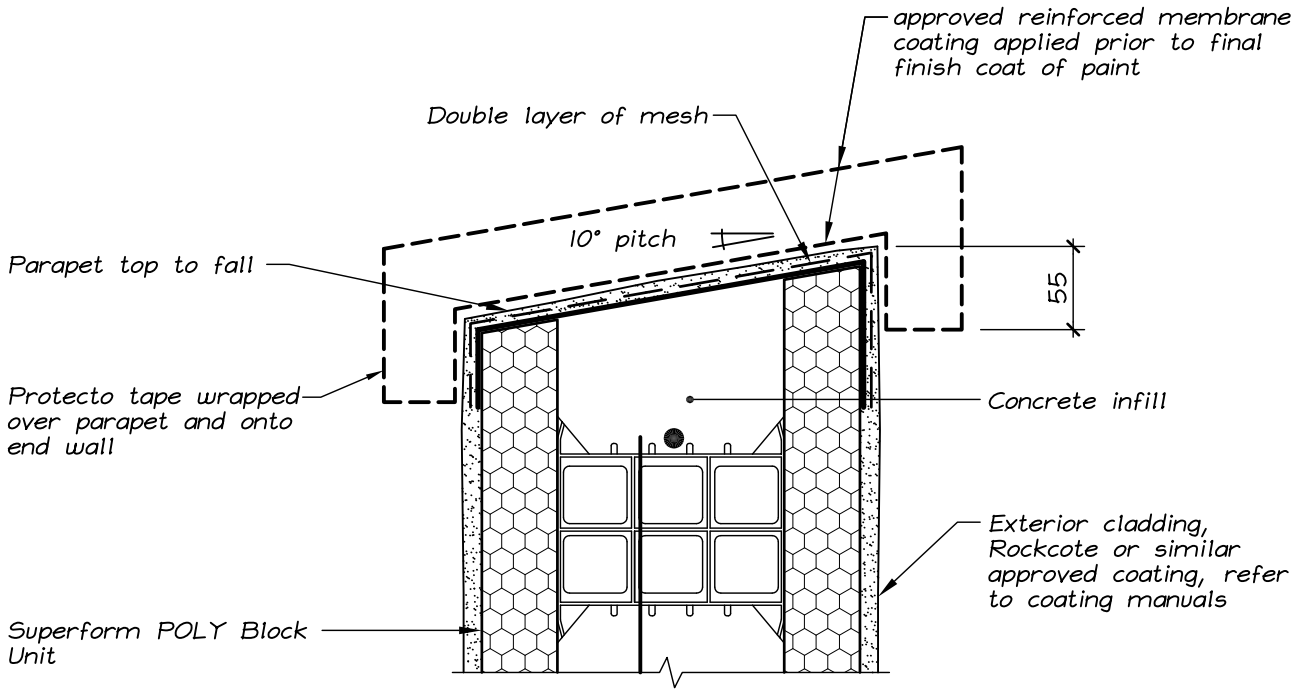
POWELL FENWICK CONSULTANTS LIMITED Your quality engineering partner.	SUPERFORM POLY BLOCK EAVES DETAIL	© 2005 RAFEL™ International Ltd	SF27

Note: · Z = variable according to wind zone. Refer to table 7, NZ Building Code E2
· All handrails to be fixed as per NZ Building Code E2



PARAPET WITH CAPPING

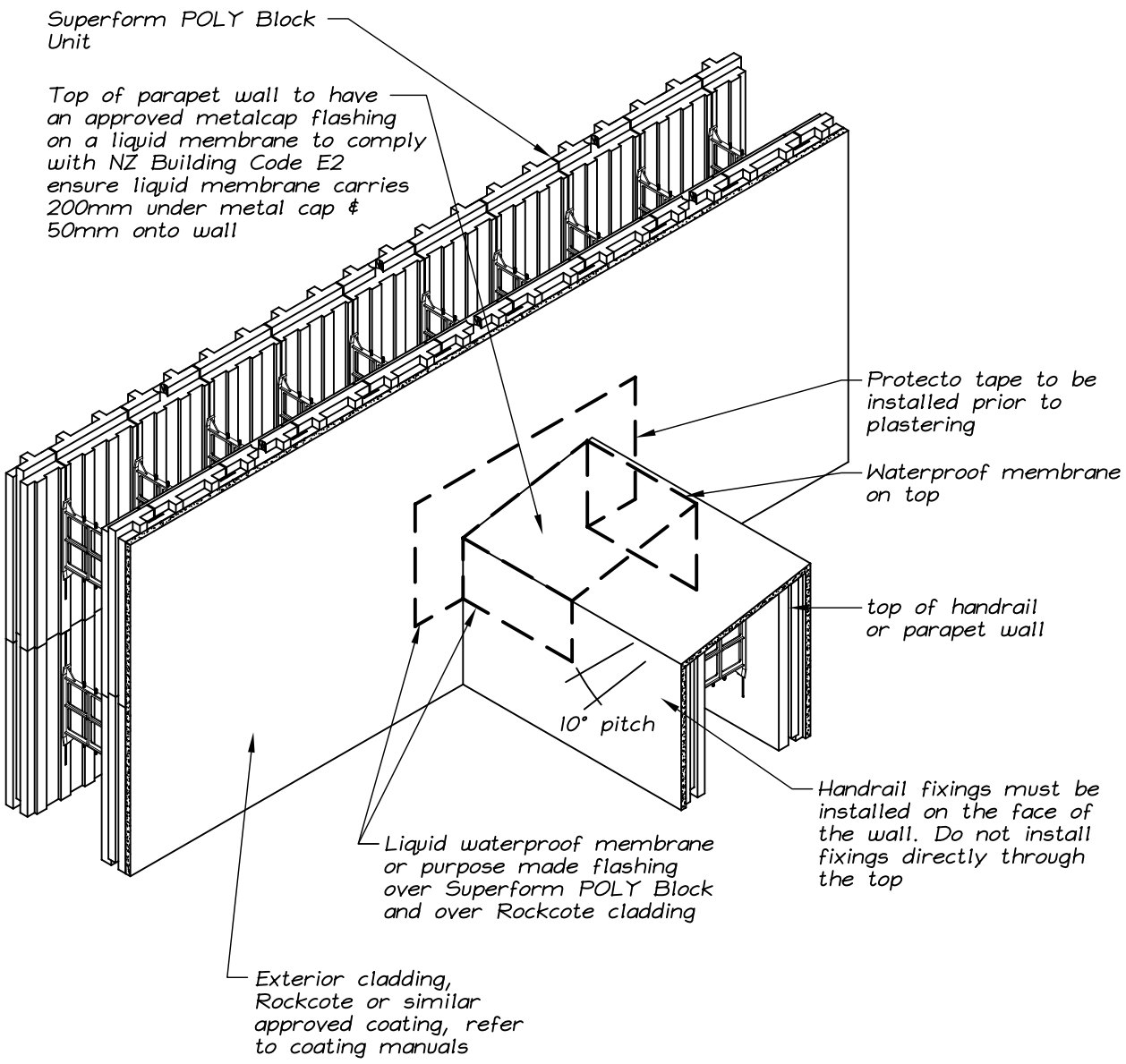
1:5



PARAPET/HANDRAIL OPTION

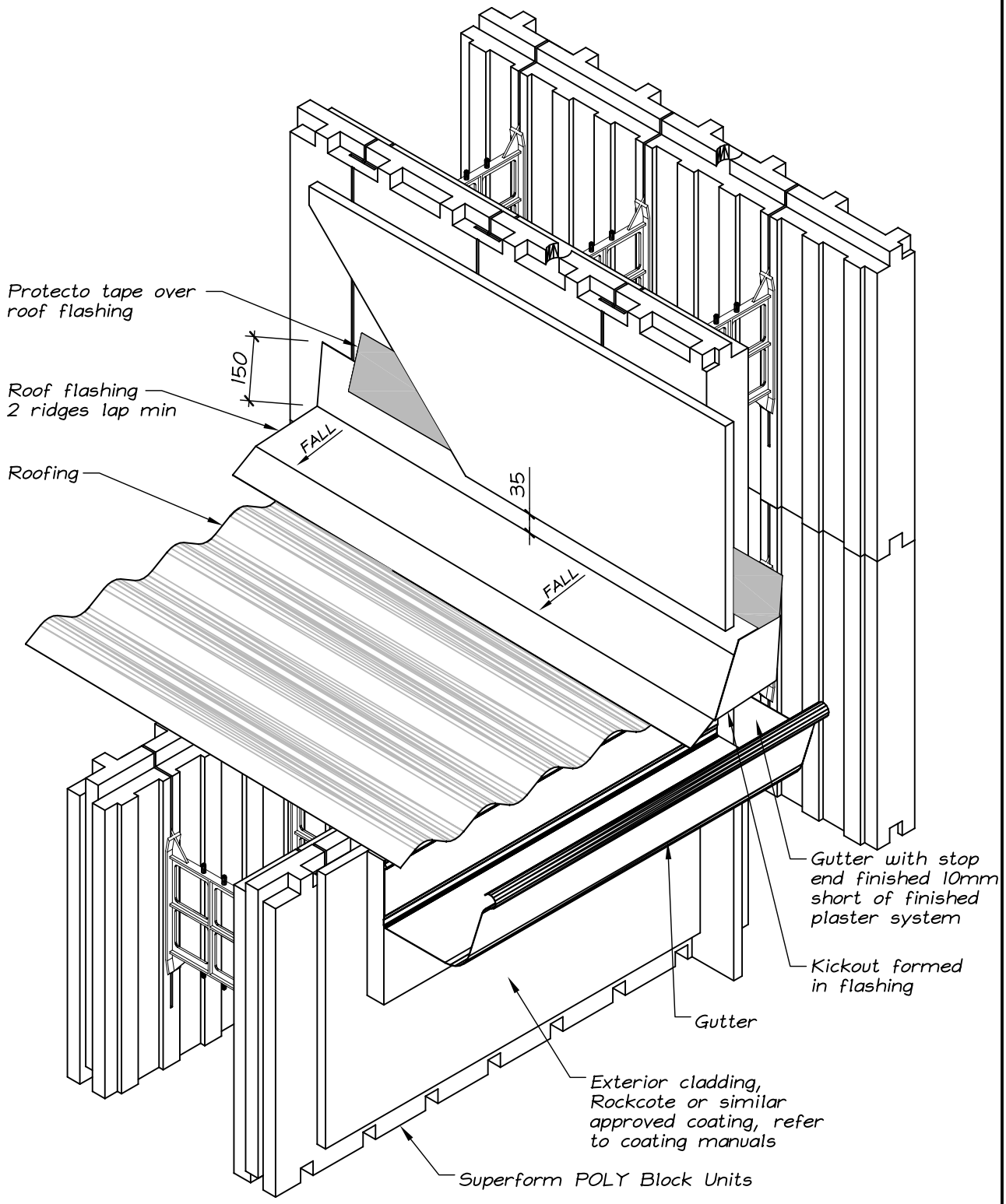
1:5

POWELL FENWICK CONSULTANTS LIMITED Your quality engineering partner.	SUPERFORM POLY BLOCK PARAPET DETAILS	© 2005 RAPEL™ International Ltd	SF28



NOTE: refer to NZBC E2/AS1 Paragraph 9.9.10.2 for the performance requirements of the waterproofing membrane

POWELL FENWICK CONSULTANTS LIMITED Your quality engineering partner.	SUPERFORM POLY BLOCK HANDRAIL/PARAPET TO WALL	© 2005 RAFEL International Ltd	SF29



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SUPERFORM POLY BLOCK ROOF PARAPET FLASHING

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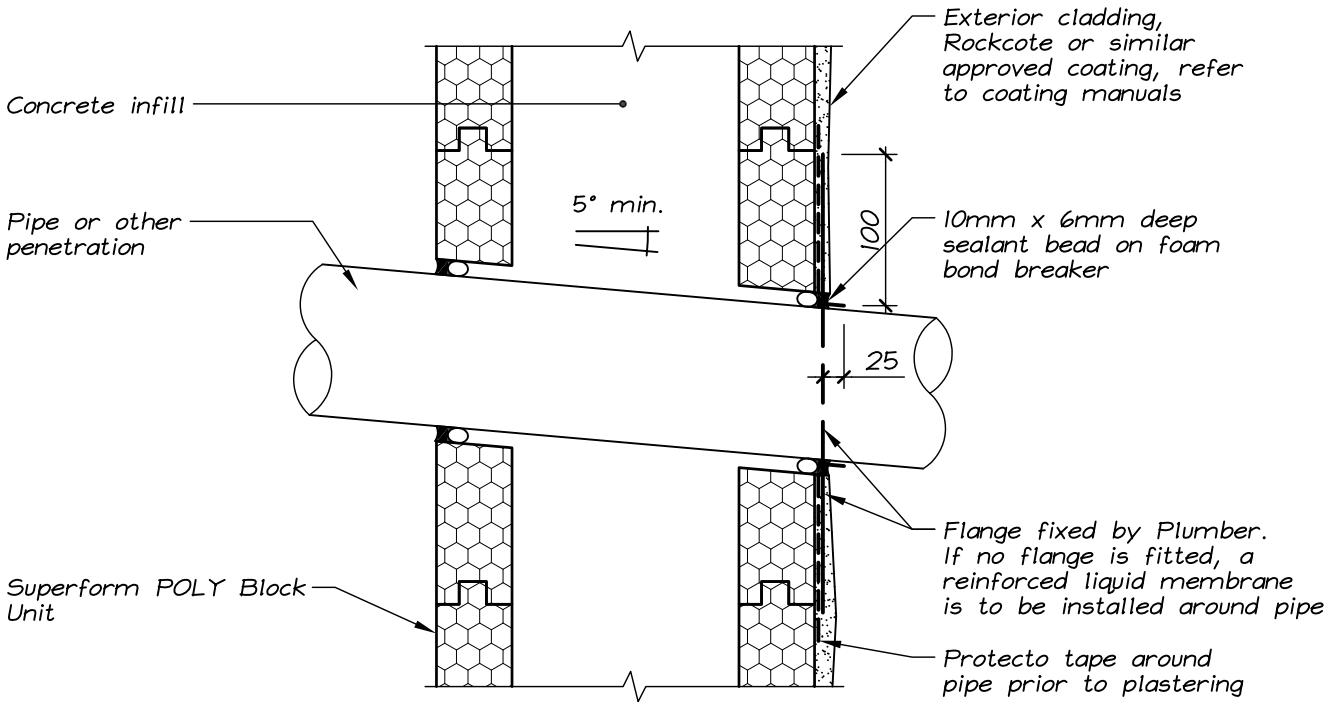
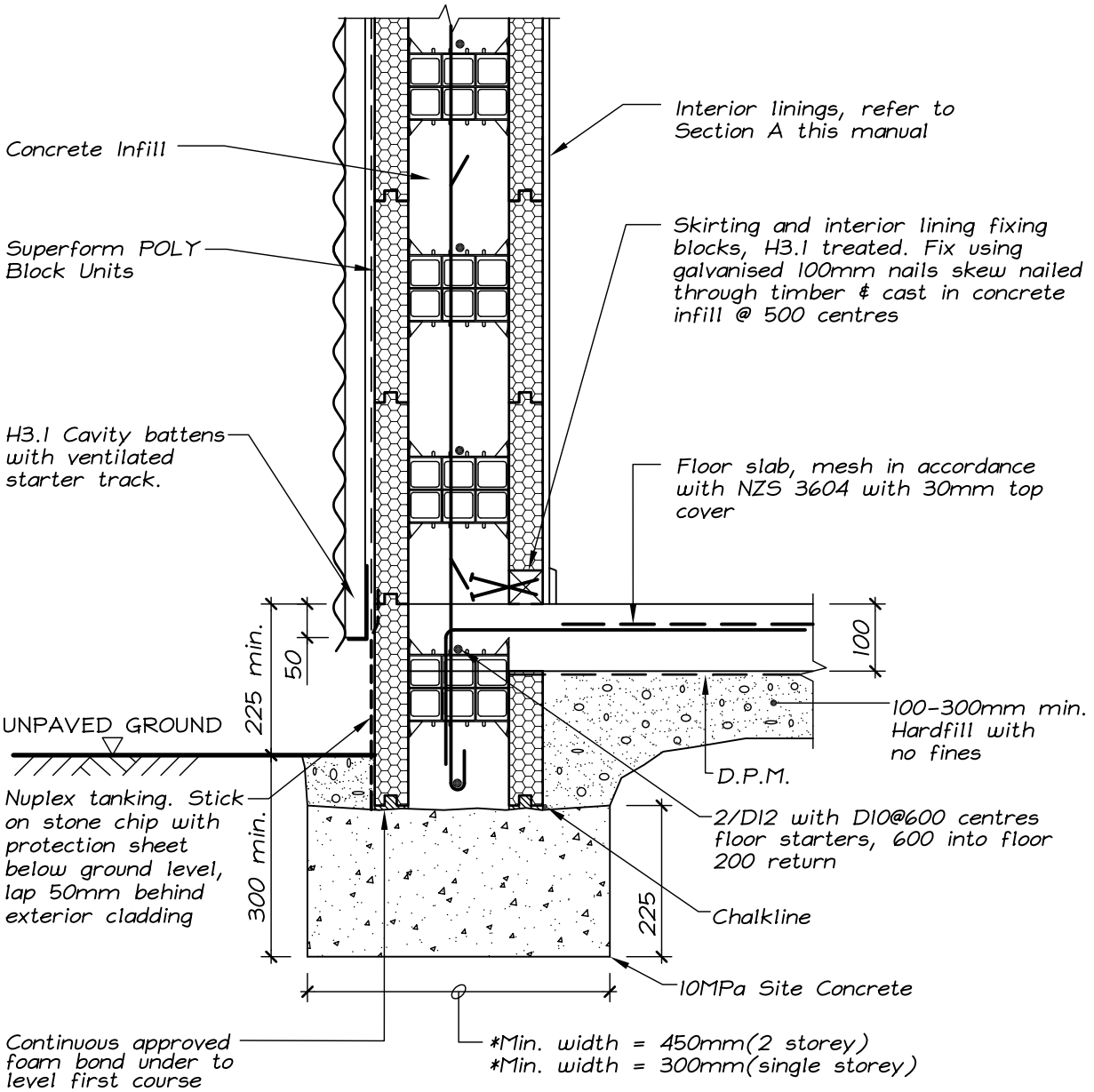


PIPE PENETRATION

1:5

POWELL FENWICK CONSULTANTS LIMITED Your quality engineering partner.	SUPERFORM POLY BLOCK PENETRATION DETAIL	© 2005 RAFEL™ International Ltd	SF31



CLADDING DETAIL

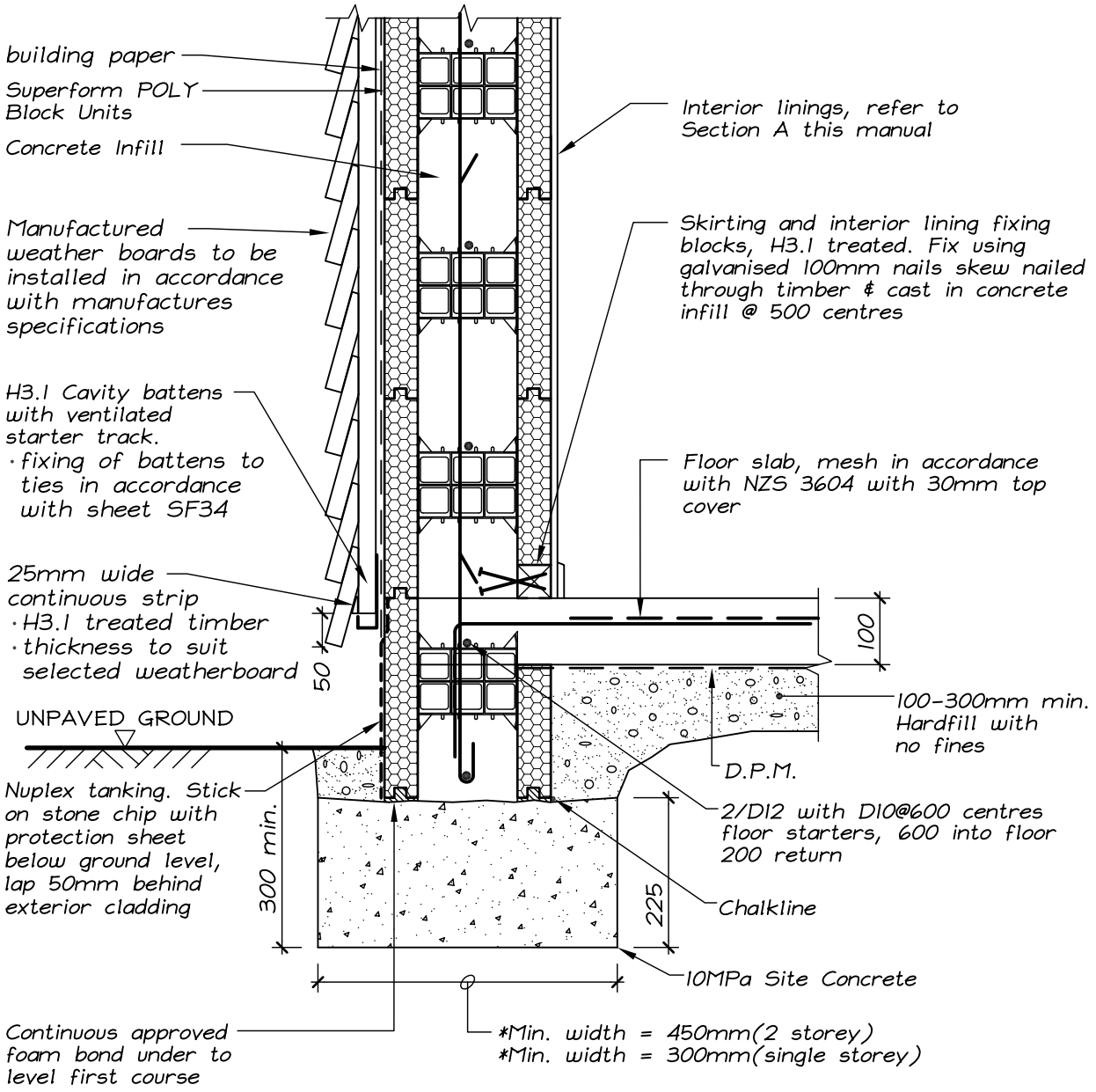
1:10

NOTE: All details indicate minimum reinforcement requirements
Refer to SF4 foundation for paved ground

DESIGN ASSUMPTIONS

- maximum span of roof = 12.0m
- maximum tributary width of concrete floor = 3.0m
- maximum wall height 5.0m (2 storey)
  3.0m (single storey)
- ground bearing of 300kPa in accordance with NZS 3604
- well drained soil conditions in accordance with NZBC

POWELL FENWICK CONSULTANTS LIMITED Your quality engineering partner.	SUPERFORM POLY BLOCK PROFILED CLADDING WALL DETAIL	© 2005 RAFEL International Ltd	SF32



CLADDING DETAIL

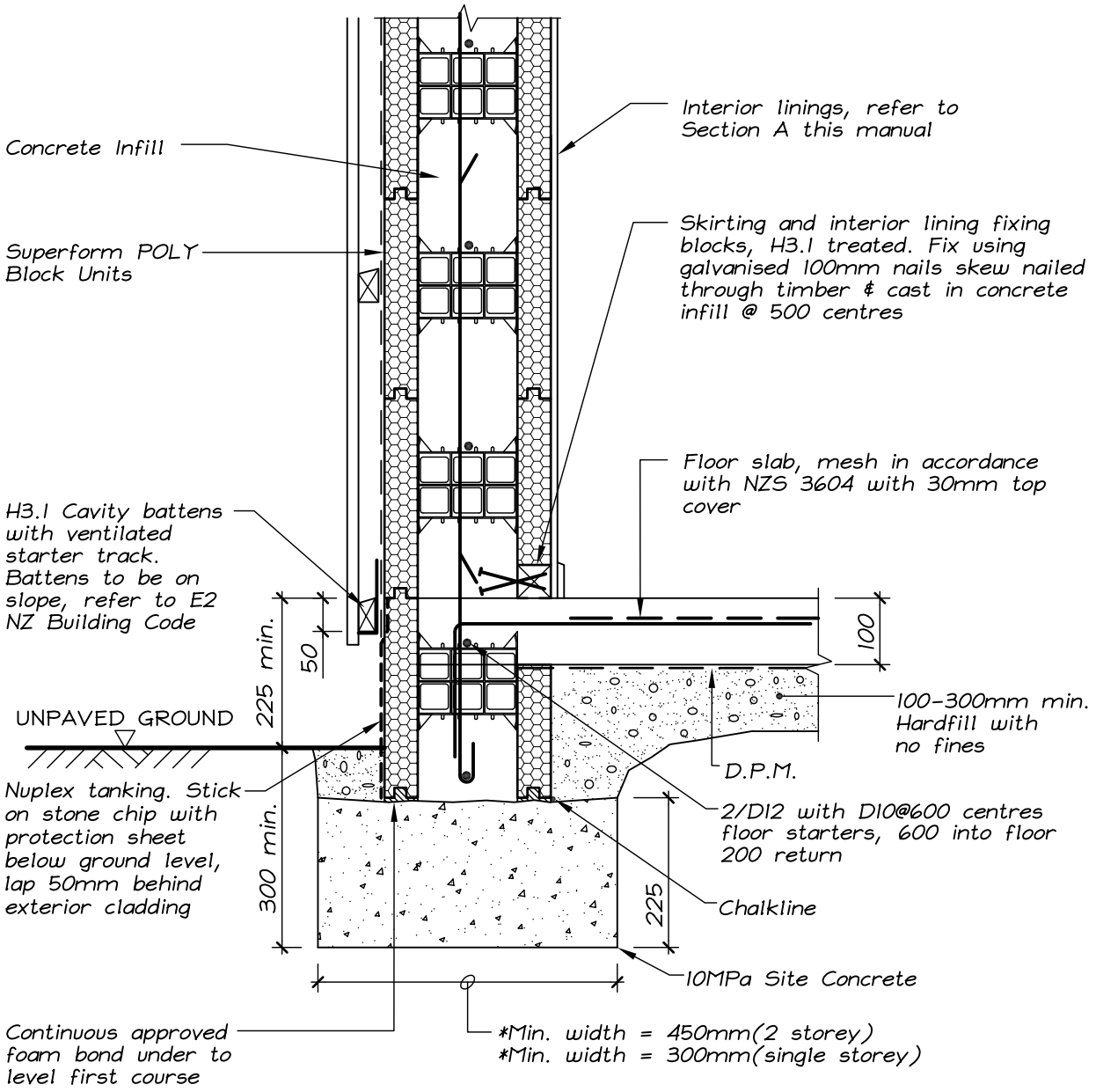
1:10

NOTE: All details indicate minimum reinforcement requirements
Refer to SF4 foundation for paved ground

DESIGN ASSUMPTIONS

- maximum span of roof = 12.0m
- maximum tributary width of concrete floor = 3.0m
- maximum wall height 5.0m (2 storey)
  3.0m (single storey)
- ground bearing of 300kPa in accordance with NZS 3604
- well drained soil conditions in accordance with NZBC

POWELL FENWICK CONSULTANTS LIMITED Your quality engineering partner.	SUPERFORM POLY BLOCK WEATHER BOARD CLADDING WALL DETAIL	© 2005 RAFEL International Ltd	SF33a



CLADDING DETAIL

1:10

NOTE: All details indicate minimum reinforcement requirements
Refer to SF4 foundation for paved ground

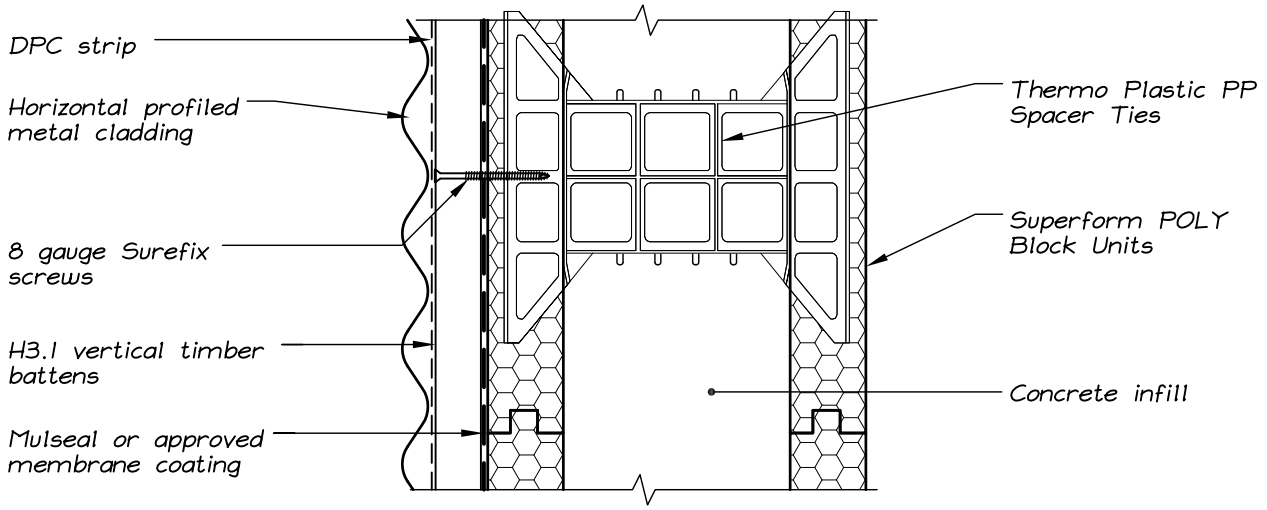
DESIGN ASSUMPTIONS

- maximum span of roof = 12.0m
- maximum tributary width of concrete floor = 3.0m
- maximum wall height 5.0m (2 storey)
  3.0m (single storey)
- ground bearing of 300kPa in accordance with NZS 3604
- well drained soil conditions in accordance with NZBC

POWELL FENWICK CONSULTANTS LIMITED Your quality engineering partner.	SUPERFORM POLY BLOCK PROFILED CLADDING WALL DETAIL	© 2005 RAFEL™ International Ltd	SF33

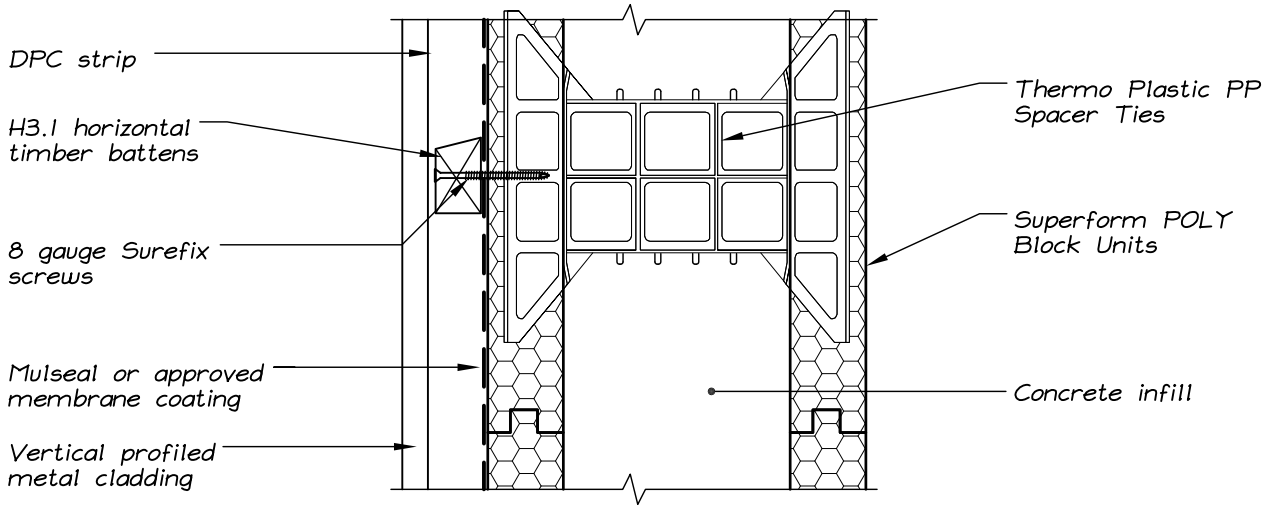
BATTENS FIXED VERTICAL OR HORIZONTAL

Battens at 600crs
Fix battens to Thermo Plastic PP Spacer Ties
with 8 gauge x 75mm Surefix screws at 300crs.
Stainless steel screws are to be used in coastal areas,
refer to tables in E2 in the New Zealand Building Code
or
Battens at 1200crs
Fix battens to Thermo Plastic PP spacer Ties
with 8 gauge x 75mm Surefix screws at 150crs.
Stainless steel screws are to be used in coastal areas,
refer to tables in E2 in the New Zealand Building Code



HORIZONTAL METAL PROFILED CLADDING

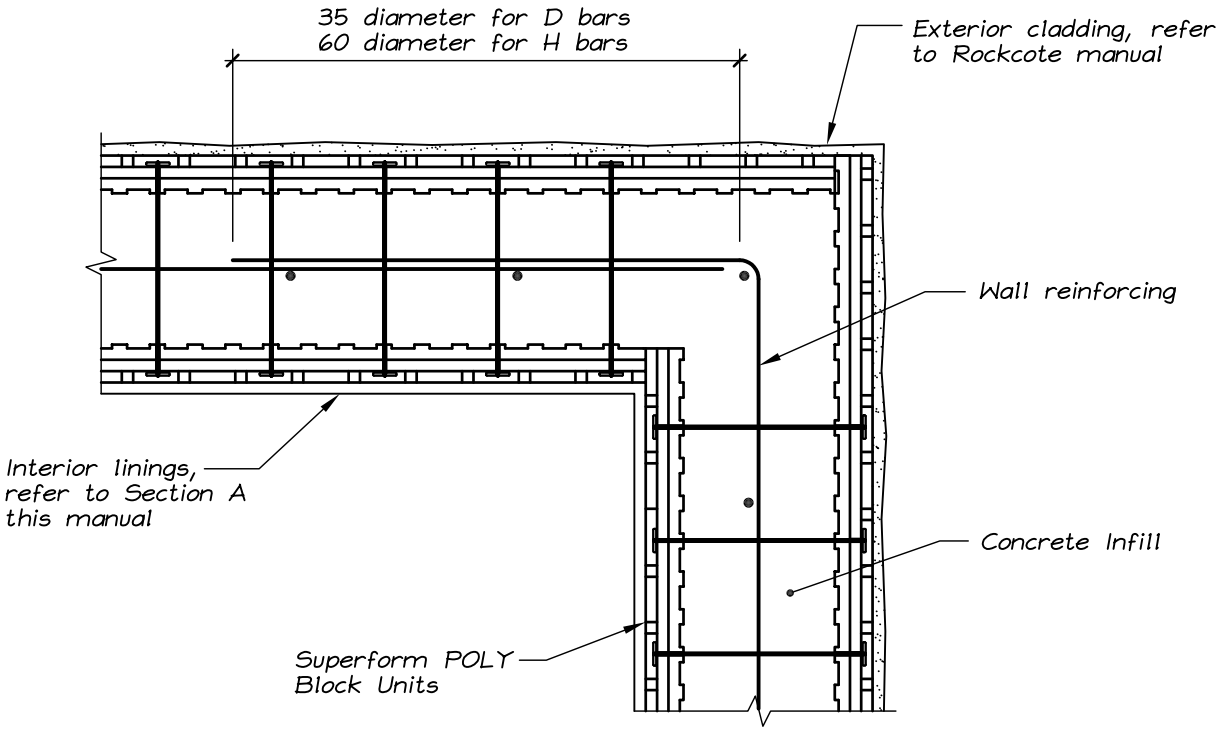
1:5



VERTICAL METAL PROFILED CLADDING

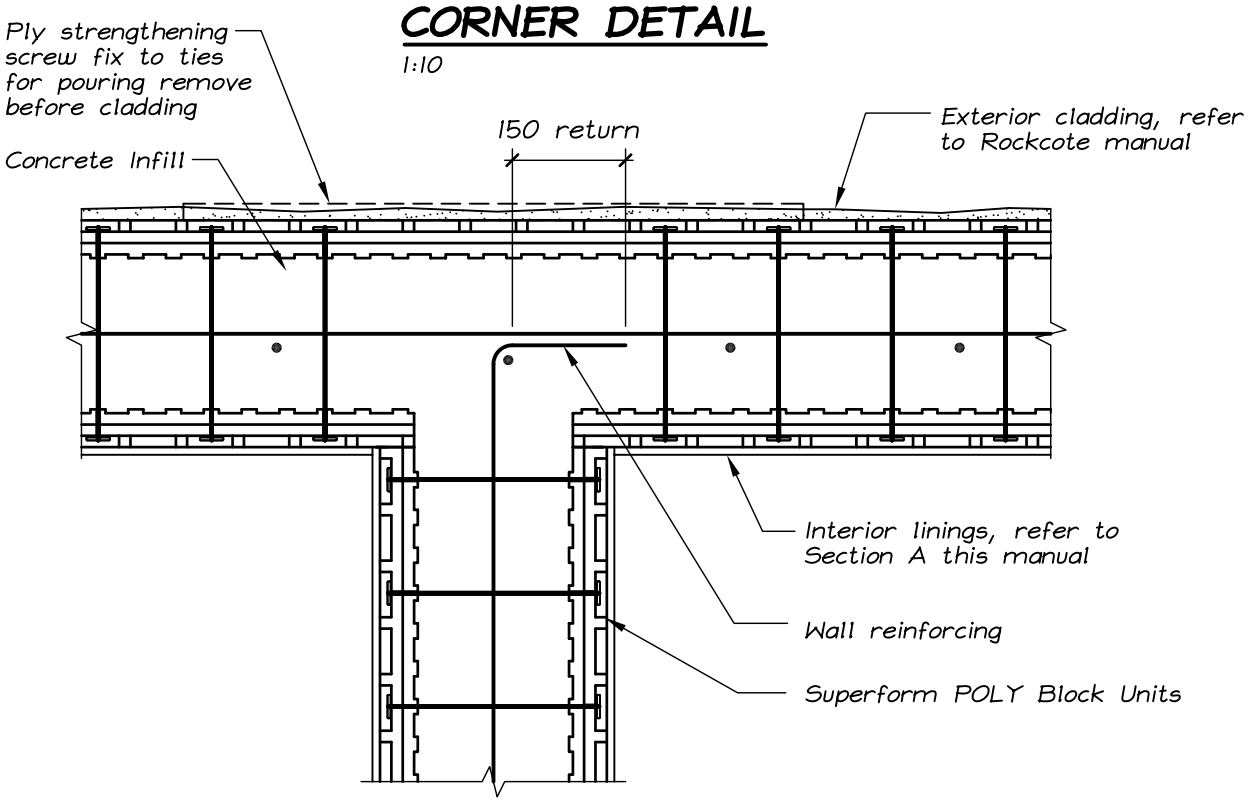
1:5

POWELL FENWICK CONSULTANTS LIMITED Your quality engineering partner.	SUPERFORM POLY BLOCK PROFILED CLADDING WALL DETAILS	© 2005 RAPEL™ International Ltd	SF34



CORNER DETAIL

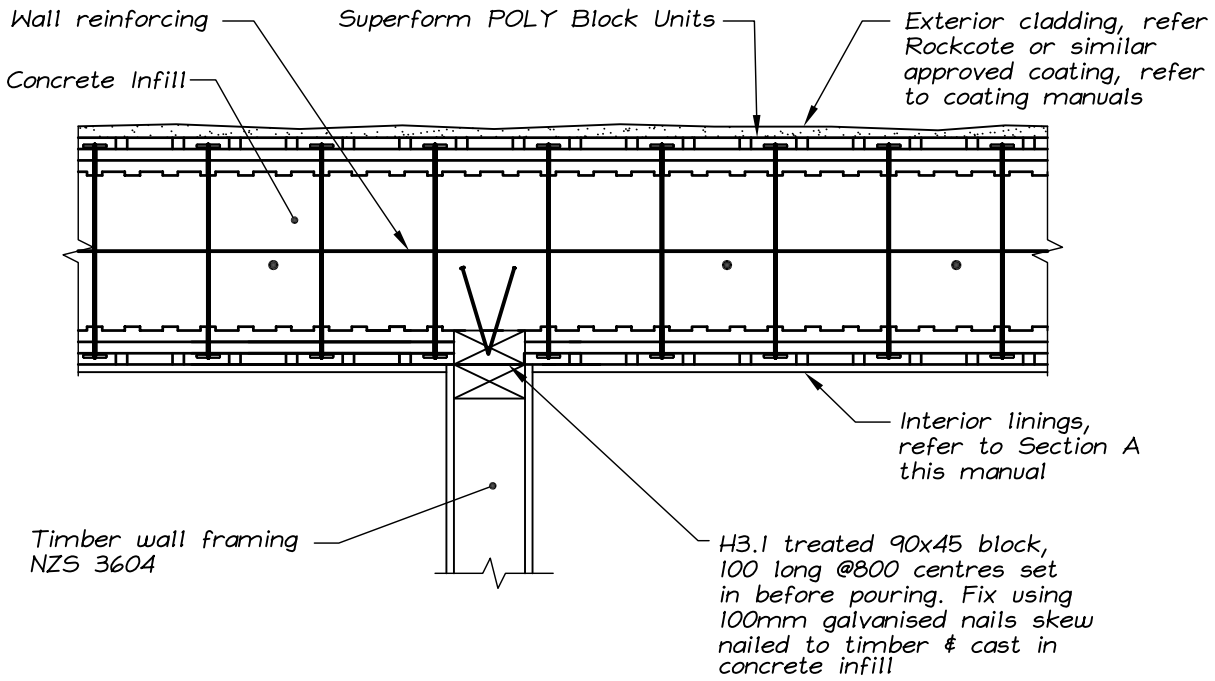
1:10



EXTERNAL SUPERFORM POLY BLOCK TO INTERNAL SUPERFORM POLY BLOCK WALL DETAIL

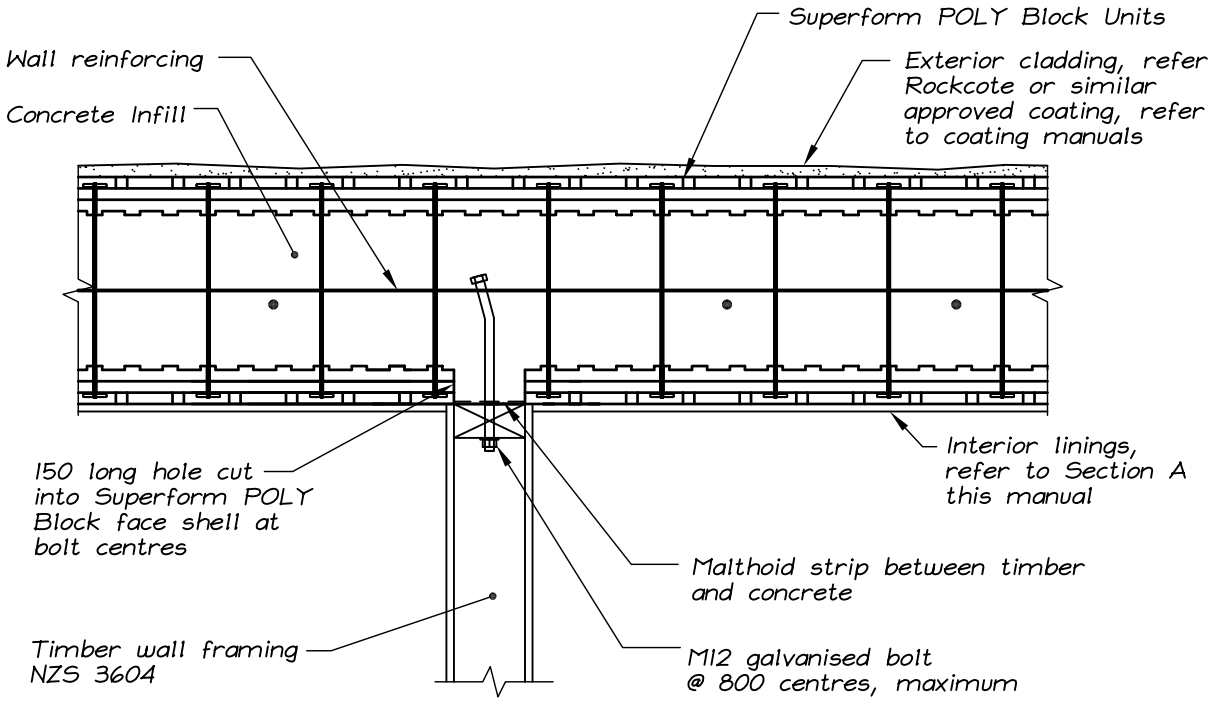
1:10

POWELL FENWICK CONSULTANTS LIMITED Your quality engineering partner.	SUPERFORM POLY BLOCK CORNER DETAILS	© 2005 RAFEL™ International Ltd	SF35



INTERNAL TIMBER TO EXTERNAL SUPERFORM POLY BLOCK WALL DETAIL

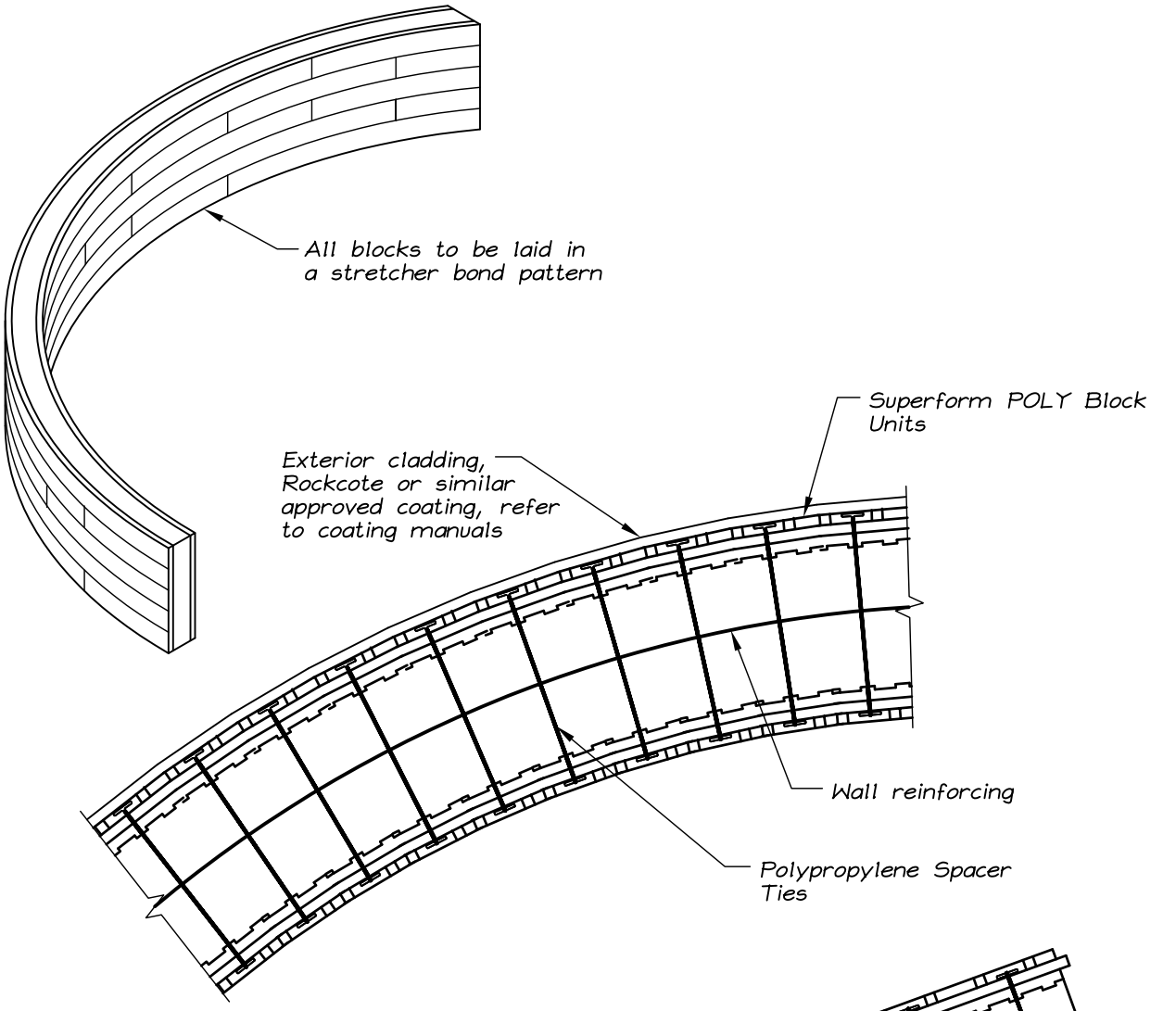
1:10



INTERNAL TIMBER TO EXTERNAL SUPERFORM POLY BLOCK WALL - ALTERNATIVE DETAIL

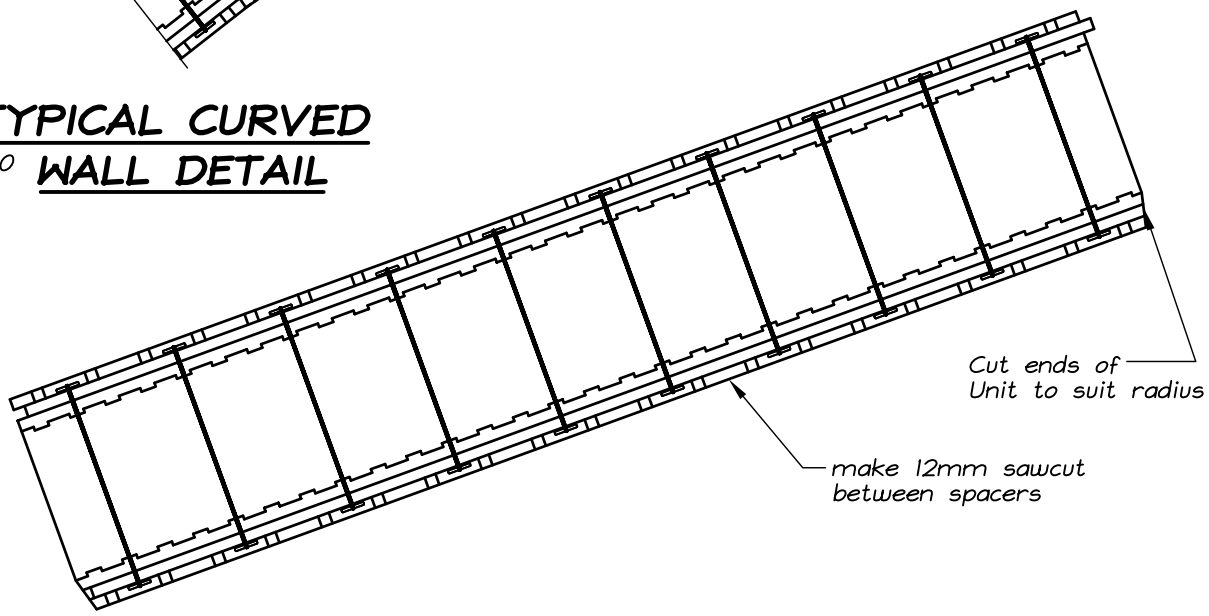
1:10

POWELL FENWICK CONSULTANTS LIMITED Your quality engineering partner.	SUPERFORM POLY BLOCK TO TIMBER WALL CONNECTIONS	© 2005 RAFEL International Ltd	SF36



TYPICAL CURVED WALL DETAIL

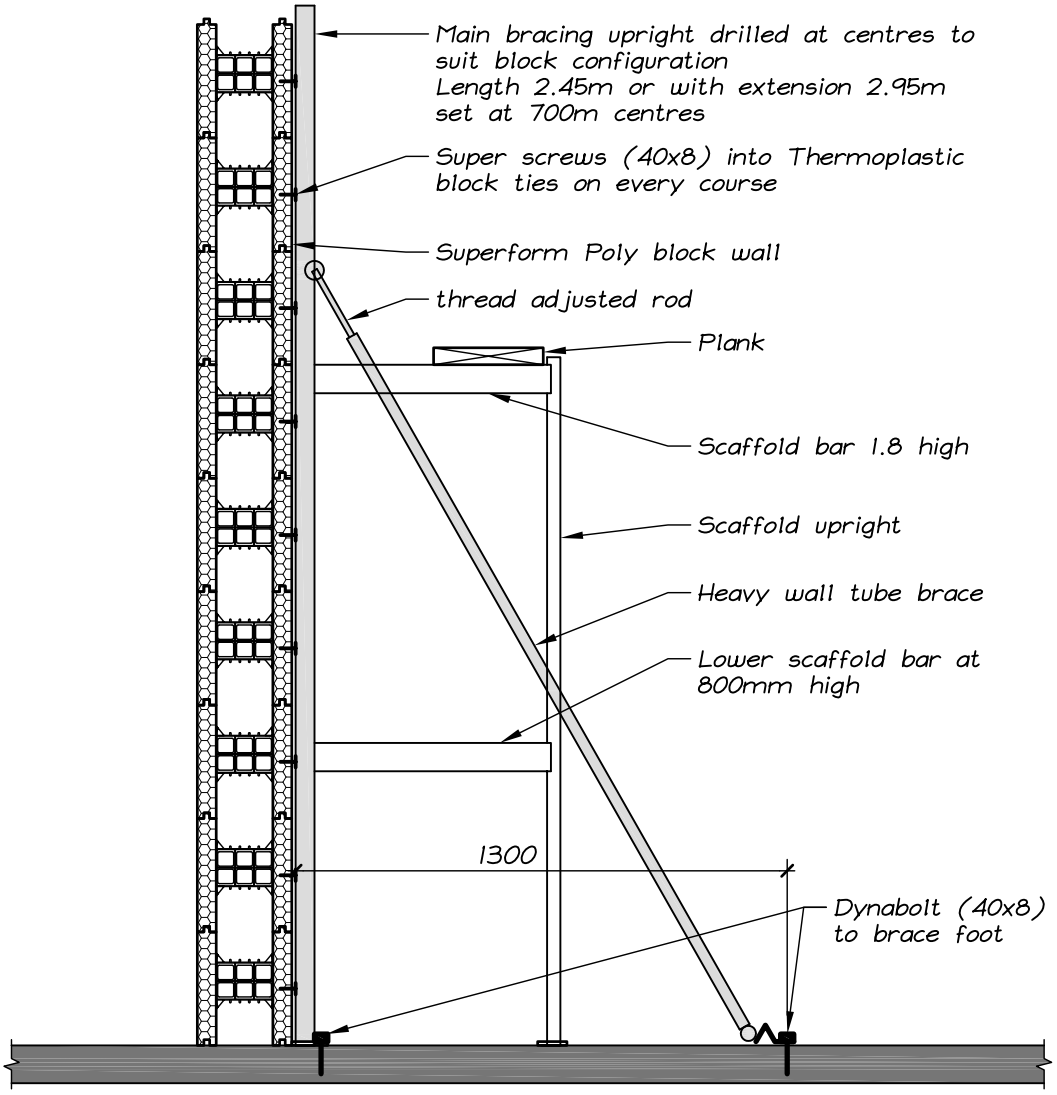
1:10



CUTTING OF SUPERFORM POLY BLOCK UNIT FOR CURVED WALL

1:10

POWELL FENWICK CONSULTANTS LIMITED Your quality engineering partner.	SUPERFORM POLY BLOCK CURVED WALL DETAILS	RAPEL™ International Ltd	SF37



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SUPERFORM POLY BLOCK WALL BRACING SYSTEM

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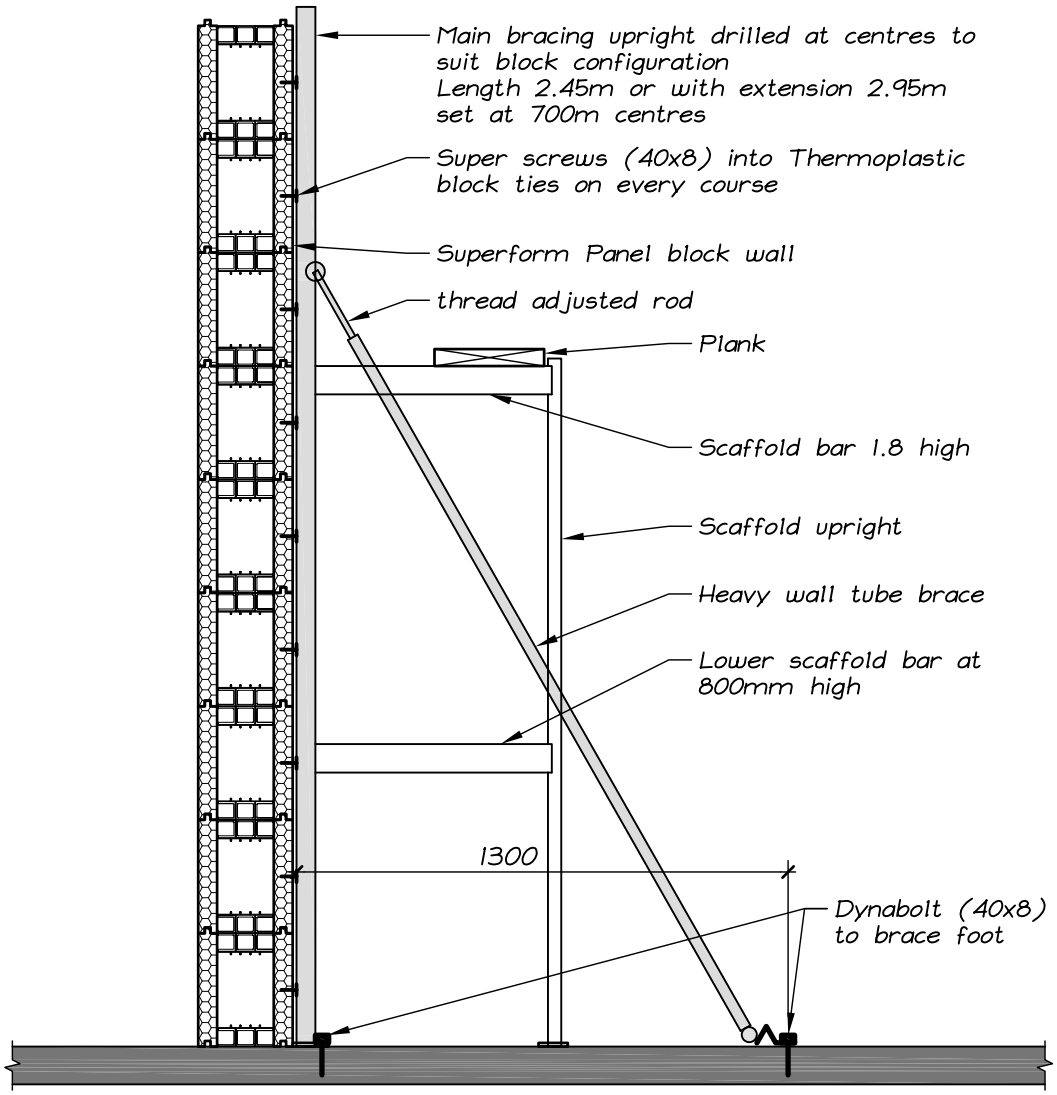

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SUPERFORM PANEL BLOCK WALL BRACING SYSTEM

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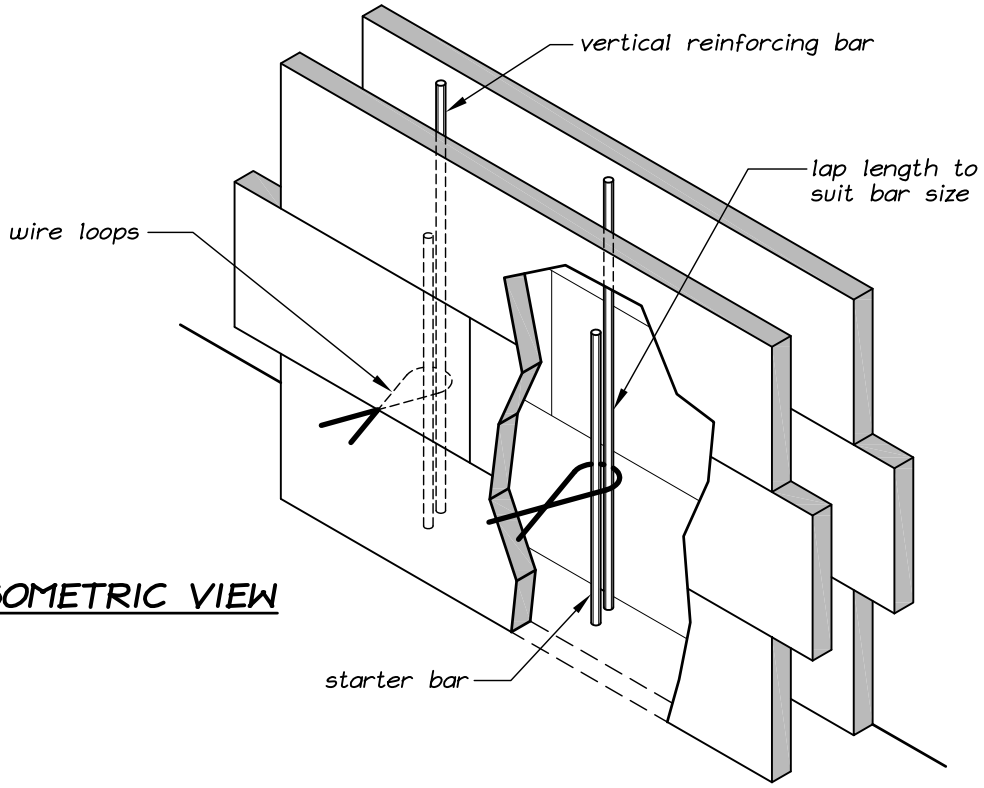
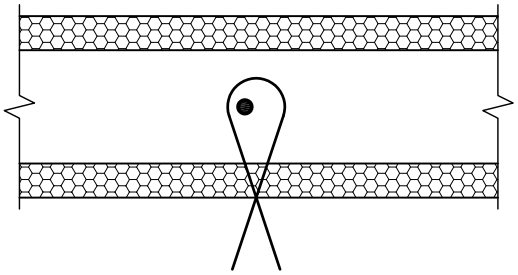
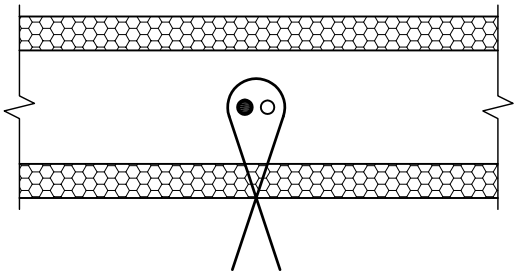
SF39



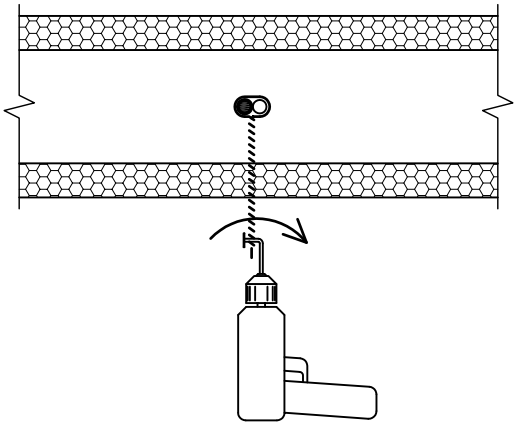
ISOMETRIC VIEW



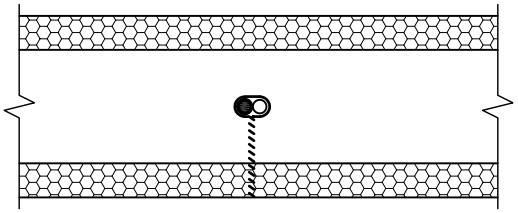
1) Superform blocks are erected with wire ties looping around starter bars and penetrating internal face of wall



2) Vertical reinforcing bars are dropped down the wall, ensuring the bar is contained within the wire loop and base of the bar is above the concrete floor



3) The wire is twisted closed with a cordless drill or similar



4) The wire is trimmed as required

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SUPERFORM POLY BLOCK TYING VERTICAL BARS OPTION 1

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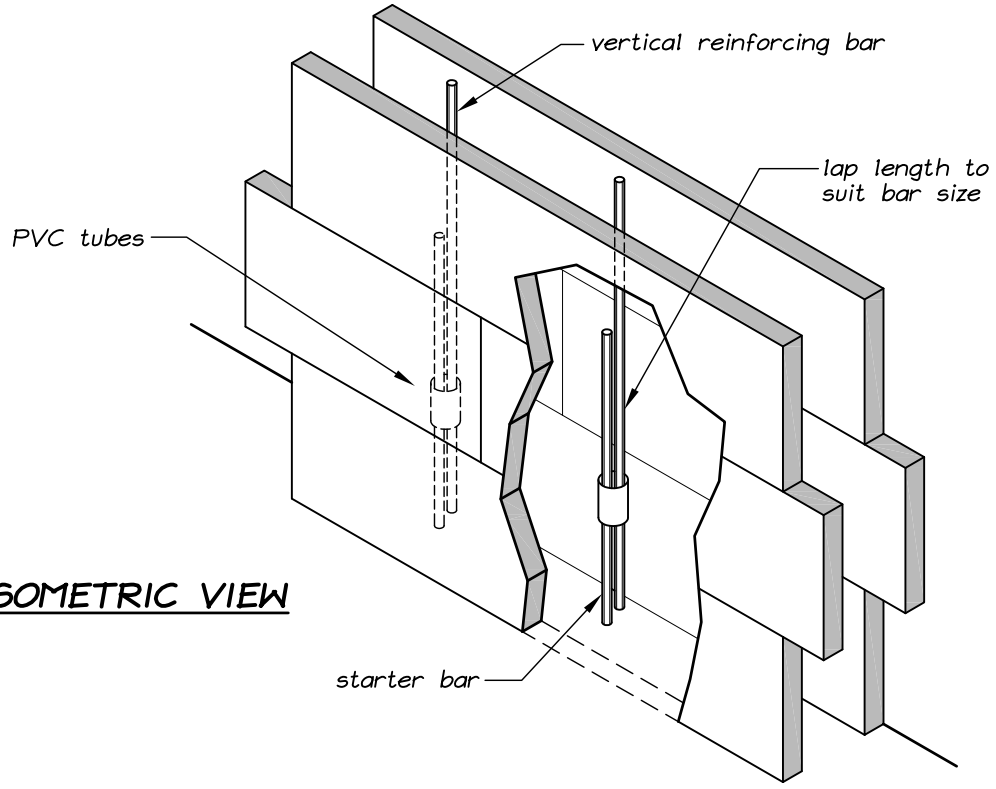
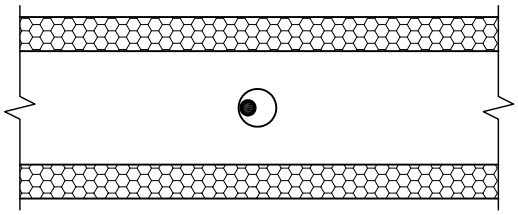
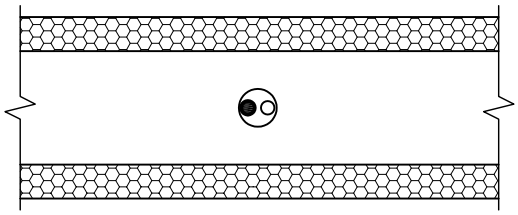


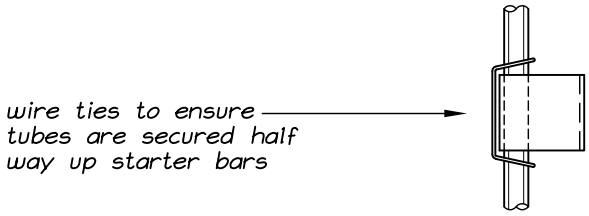
ISOMETRIC VIEW



1) Superform blocks are erected with 50Φ PVC or polythene tubes, 50mm long tied to the starter bar



2) Vertical reinforcing bars are dropped down the wall, ensuring the bar is contained within the PVC tube



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SUPERFORM POLY BLOCK TYING VERTICAL BARS OPTION 2

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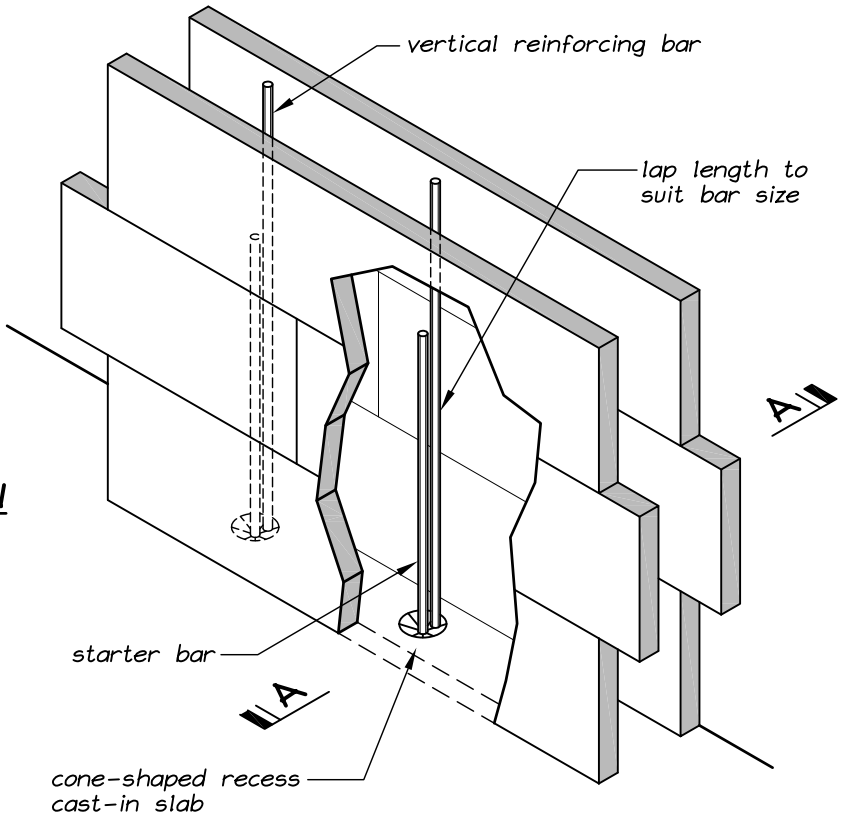
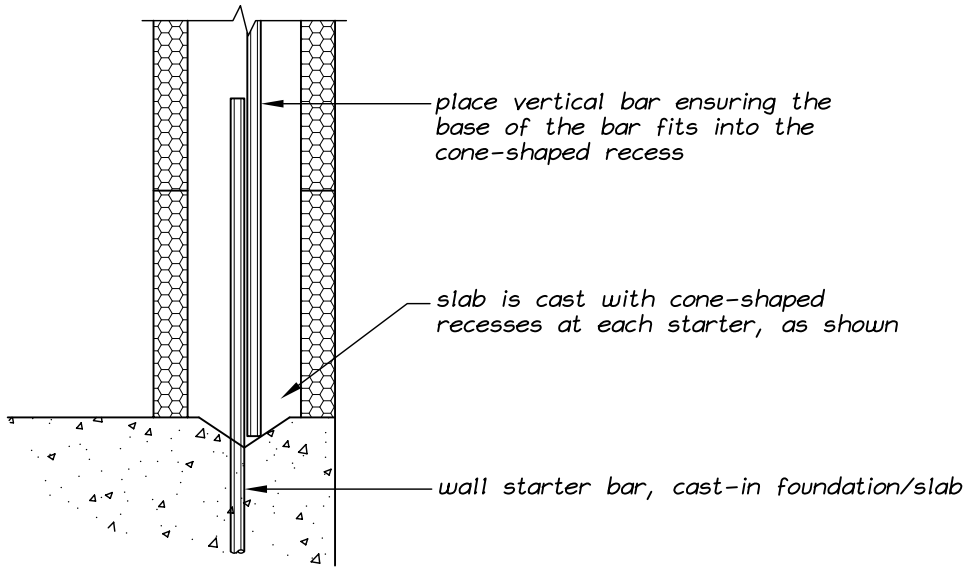
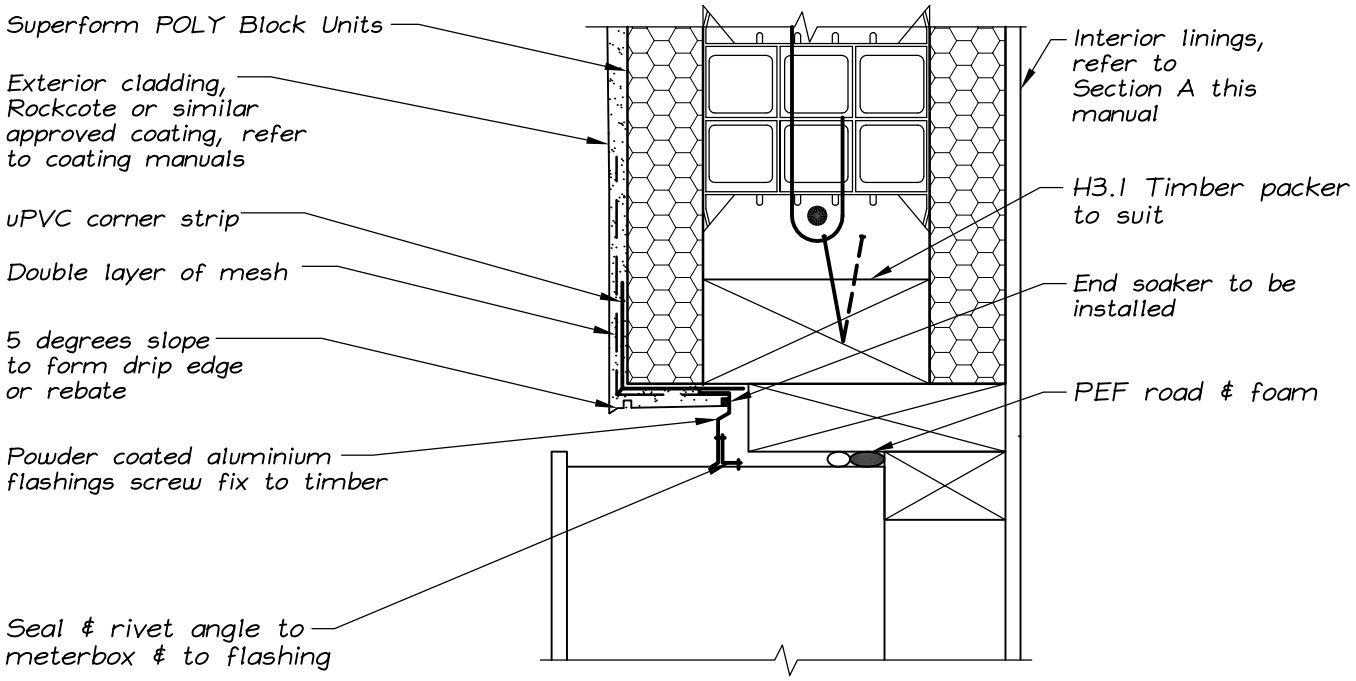
ISOMETRIC VIEW





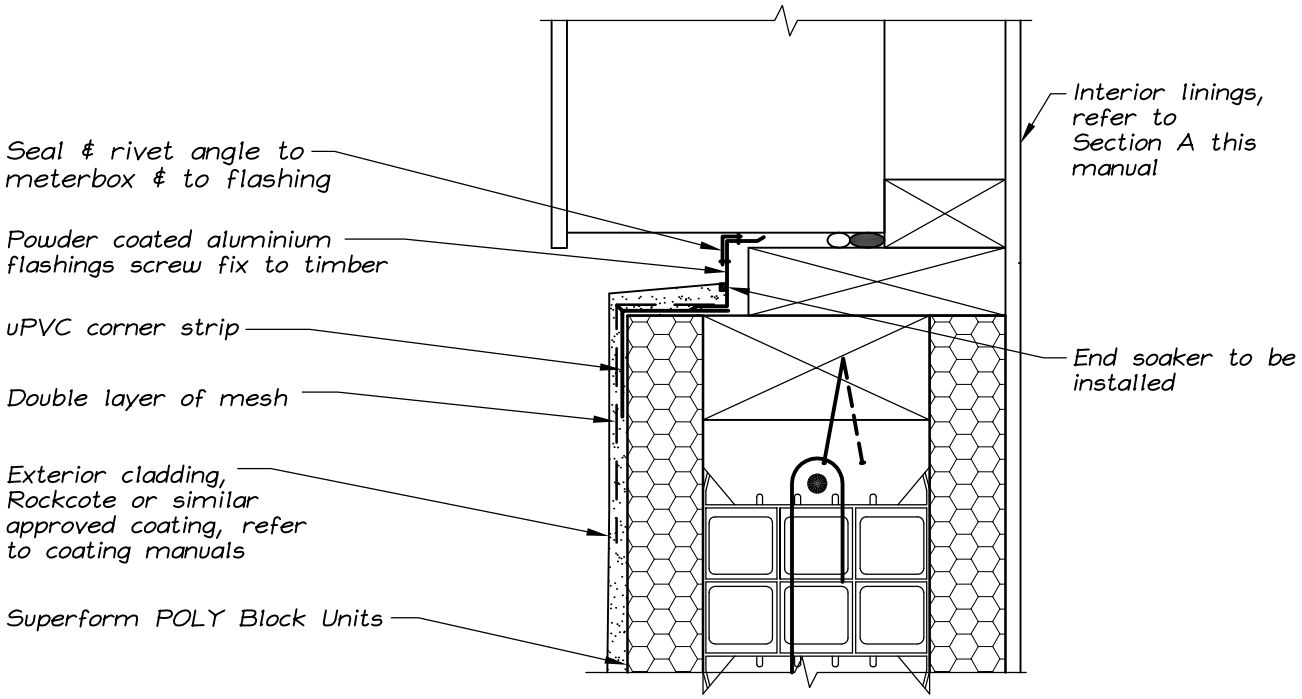
SECTION A-A

POWELL FENWICK CONSULTANTS LIMITED Your quality engineering partner.	SUPERFORM POLY BLOCK TYING VERTICAL BARS OPTION 3	© 2005 RAPEL™ International Ltd	SF42



METERBOX HEAD & JAMB FLASHING DETAIL

1:5



METERBOX SILL FLASHING DETAIL

1:5

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SUPERFORM POLY BLOCK METERBOX OPTION 1

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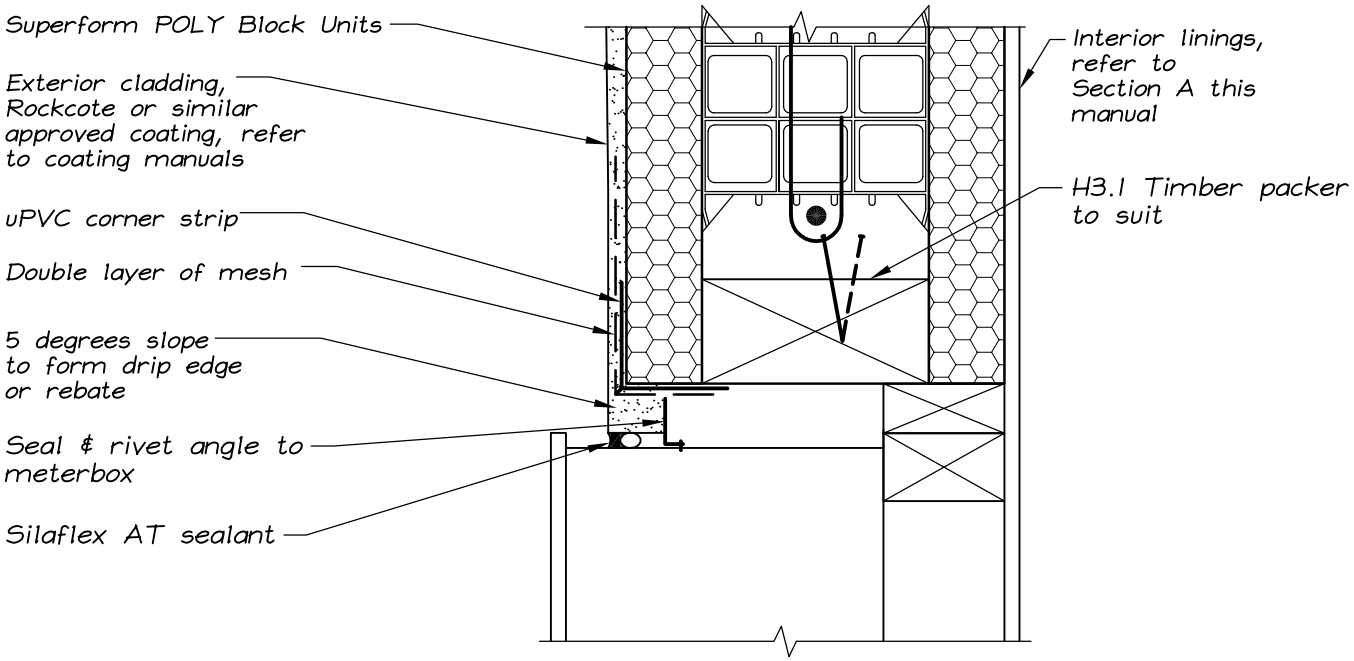

ALTERNATIVE METERBOX DETAIL

1:5

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SUPERFORM POLY BLOCK METERBOX OPTION 2

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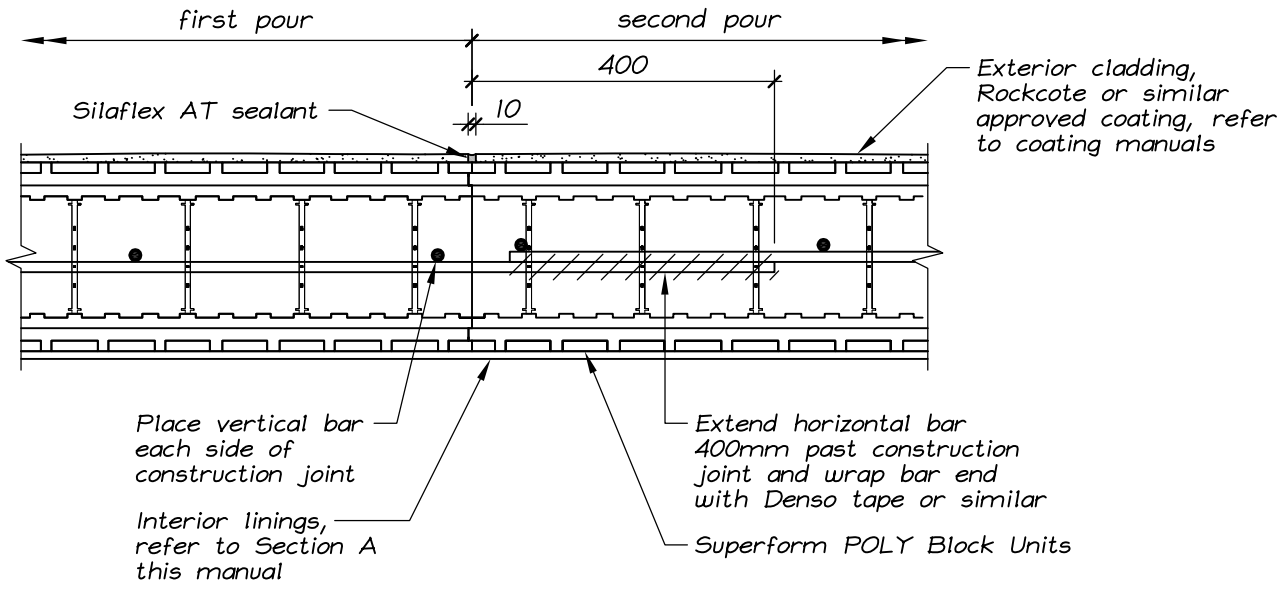
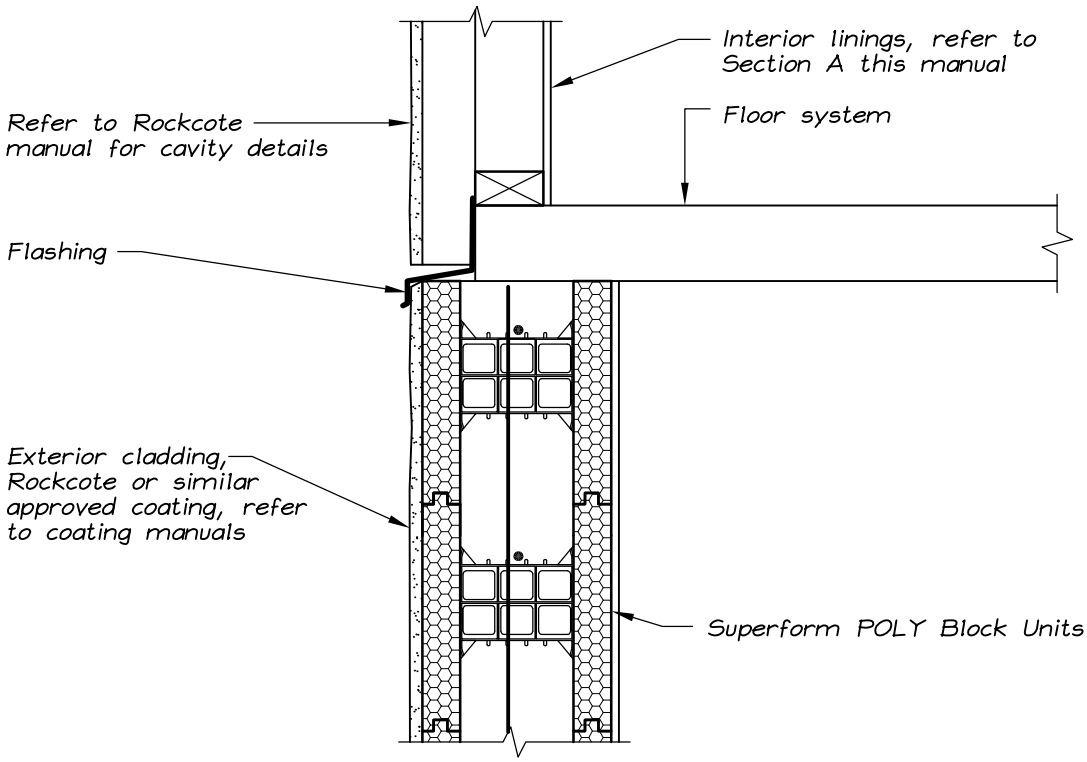


VERTICAL CONSTRUCTION JOINT

1:10



HORIZONTAL CONSTRUCTION JOINT

1:10

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SUPERFORM POLY BLOCK CONSTRUCTION JOINTS

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APPENDIX A

EZI-SPEC

SUPERFORM BLOCKWORK

1. PRELIMINARY AND GENERAL

Refer to the Preliminary and General Clauses of this Specification and the General and Special Conditions of Contract which are equally binding on all trades. This section of the Specification shall be read in conjunction with all other sections.

2. EXTENT OF WORK

This Section of the Contract consists of the supply, fabrication, reinforcement, and concrete grout filling of the Superform polystyrene block walls shown on the drawings.

3. INSTALLATION

All work is to be carried out in accordance with the Superform **POLY** Block Manual. The following procedures are emphasised :

Laying of Superform POLY Blocks.

Blocks are laid on a level footing base or floor slab. The base must be level to within ± 5mm in 5m. Spacer tie bridges are to be inserted into each polystyrene face shell to form block modules. There is provision for 10 ties to be inserted into each 1.5 metre long Superform **POLY** Block face shell. All 10 ties must be inserted in the slots provided. The blocks can be cut with a hot wire or saw to all non-modular sizes. Care should be taken to ensure the first course of base blocks are set plumb to avoid the need for later adjustment. Tolerances shall be in accordance with NZS 3109. Locate the base blocks positively in position using an approved foam bond. The slab must be dry and the manufacturer's instructions for use are to be followed. Foam bonds approved for use are FOSROC Foambond, Ramset Fomoplus, and Superform Superfoam *(See Details Superform **POLY** Block Manual).*

Blocks are placed accurately, in a stretcher bond pattern, to interlock into the block courses below and butt up against each other so that true wall dimensions are obtained. Horizontal bars are tied to vertical bars to assist with holding blocks in position as the wall rises. Work proceeds to the top plate level or to the level of the first wall pour depending on the stage of the construction sequence. After the top course is laid, the wall is rechecked for line, level and plumb. Adjust if necessary. The top bar is tied onto the plastic tie to stop lifting of the blocks during pouring and to ensure the central position of the vertical bars. Door and window openings are formed as the wall laying proceeds.

Forming Curved Walls

Curved walls with a minimum radius of 3m can easily be formed by cutting the inside block face short by the difference between the arc of the outside block face, and the arc of the inside block face, forming the curved wall. Care needs to be taken to ensure that the interlocking castellations on the blocks still intermesh between courses. Strips of 12mm ply or customwood 200mm wide, are screwed to every second course on the outside face of the curve, this ensures that a true curve is formed and avoids faceting of the blocks.

Door and Window Openings *(See Details Superform **POLY** Block Manual).*

Blocks are cut horizontally or vertically to coincide with door and window openings or top plate and wall ends. Timber framing is installed as temporary formwork to the opening head. The cut blocks provide side forms for lintel beams over door and window openings. Care must be taken when setting out the window openings to allow the clearances as specified in the window details see *(See Details Superform **POLY** Block Manual).*
This shows the need to add to the stated window size. Open block ends are formed and braced, using EPS stop ends. Block stop ends are available to be inserted where required at window and door openings and corners. At corners and at wall intersections the blocks are butted and not overlapped as this allows the walls to be plumbed when the bracing system is fitted to the blocks. Archways are formed in walls by cutting the archway out, placing a thin flexible material (e.g., 24 gauge sheet metal) against the soffit of the arch and positioning the cut out section back under the arch to provide support during concrete placement, and initial curing. Shaping of sills, jambs and heads and the insertion of flashings may be required prior to the placement of concrete, depending on the joinery, cladding and lining systems used.
H3.1 treated fixing blocks or batten must be fixed in place prior to pouring to enable the fixing of door and window reveals.

Bracing and Alignment

The erected blocks are braced at corners, at 900crs along the wall and either side of window and door openings to provide security against wall movement from wind and construction loads *(See Details Superform **POLY** Block Manual).* Ensure the appropriate bracing system is in place prior to and during the placement of concrete and for at least three days after the placement of the concrete. Advice regarding temporary works such as bracing is available from a Superform **POLY** Block Technical Adviser.

Concreting

Special care is to be taken to ensure no debris is dropped in the wall cavity. Any debris at the base of the wall is to be removed via clean out ports cut in the polystyrene prior to pouring.
All concrete should be supplied from an approved high or special graded ready mix concrete plant. Concrete strength must not be less than 20MPa High Grade concrete and have a slump of 100-120mm when consolidation is by mechanical vibration and 130-150mm when concrete is consolidated by hand methods. Concrete should contain aggregate up to 13mm maximum size. Plasticiser/ water reducing agents may be used subject to approval from a Superform **POLY** Block Technical Adviser. Expansion admixtures and super plasticisers must not be used. The flow of concrete must be directed at the sides of the block modules to minimise possible block blowouts. Concrete can be placed by skip and flexible hose or pump/hand placement methods. The concrete is consolidated by striking the blocks with the hand or suitable implement that will not damage the blocks and also by rodding the concrete within the blocks. Mechanical vibrators may be used but care must be taken to ensure that a maximum pour rate of 900mm per lift is maintained when vibrating. The vibrator head size is to be a maximum of 25mm. The wall shall be poured to a maximum pour height of 3.6m, in lifts of a maximum of 900mm. Each lift shall be allowed to achieve initial set. Before the subsequent lifted is placed. The two lifts are to be vibrated together to ensure a wall construction without cold joints is formed. Between pours a construction joint is formed 20mm below the top of the blocks. Reinforcing steel must be in place to provide a continuous connection. Construction joints are to be wire brushed to achieve a suitable roughness.

Bolt Fixings

Bolts, straps and fixings for all structural and non-structural fittings should be embedded in the wet concrete rather than anchored in drilled holes after the concrete has been poured.
Any fixings to be cast in should have polystyrene removed so as to provide a 50mm concrete cover around the fixing. The length of fixings must allow for the thickness of the polystyrene to ensure the minimum embedment, as required by details in this Manual or by specific design, is maintained in the body of the wall. Insert hold down bolts for the top plate. Internal timber frame walls joining exterior Superform **POLY** Block system walls are connected by fixing the end stud against timber blocks bolted to the concrete infill via cast in M12 bolts. *(See Details Superform **POLY** Block Manual)* Internal Superform **POLY** Block walls joining exterior Superform **POLY** Block walls are connected by forming a continuous concrete infill joint and providing L shaped reinforcing bars with adequate returns. A vertical reinforcing bar must be placed at the inside bend of the L bars. *(See Details Superform **POLY** Block Manual)*

Services And Wall Penetrations

Chases, holes, cut-outs and recesses for small size services such as electrical wiring and piping up to 40mm diameter can be located against the concrete in slots cut into the Superform **POLY** Block external polystyrene skins. Small size services are fixed to the concrete with U clamps and tappets. Larger services up to 100mm diameter can be located in ducts passing directly through the Superform **POLY** Block walls. The ducts must not be located within 400mm of a lintel, beam or bond beam, and reinforcing cover of 50mm must be maintained.

Any penetrations outside this scope must be specifically designed. Wall penetrations for services and ventilation can be made by cutting through the Superform **POLY** Block polystyrene face shell. Where this procedure is used, the casting holes should be covered to prevent them being filled with concrete. The plasticiser in PVC sheathed electrical cables can migrate. PVC sheathed electrical cables must therefore be contained within plastic conduit or a PVC tolerant non migratory TFS PVC sheath cable where direct contact with polystyrene may occur or laid without conduit in oversize channels cut back to the concrete core. The conduit or the cables must be fixed at regular centres to the concrete core.

Provision for fittings and cabinet joinery.

Ensure that adequate fixing for kitchen and bathroom joinery, and all household fittings such as towel rails, shower mixers and laundry taps, etc, is provided at appropriate locations on the internal wall face by removing portions of the internal EPS face shell and replacing with solid timber blocks before pouring. Fix the blocks to the concrete infill as shown in the Superform **POLY** Block Manual. These connections can carry a combined load of 25kg shear and 5kg tension.

INSPECTIONS

Before pouring of concrete begins, the Engineer is to be notified and given reasonable opportunity to enable inspection of the reinforcing as fixed and to ensure that the work is carried out according to the intended design.
Where required, the Local Authority Inspector must also be notified.