



INSTALLATION MANUAL

for

**Durabuild Panel
Wall System**

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Product Description

The Durabuild Panel is the core component of our patented modular wall building system that virtually eliminates the use of columns and beams. It saves time, saves money, improves strength and efficiency, and provides a superior finishing surface over conventional building techniques.

Durabuild panels are formed by bonding 6mm Magnesium Oxide (MgO) or Fibre-Cement recessed edge sheets to patented purpose designed inserts. These fabricated panels function essentially as permanent formwork which when erected and braced are filled with reinforced concrete to provide the structural integrity of the wall.

The sheets form the outer skins of the panels providing a smooth, straight, easy to finish surface to which a wide range of finishes can be easily applied.

Additional load capacity is added where necessary by inserting deformed steel reinforcing bars (typically called rebars) before the concrete pour. This is determined by the Structural Engineer's design to comply with local standards and for conditions such as typhoons and seismic activity.

Opening for doors, windows etc. can be planned to suit the modular size of the panels or may simply be cut out of the panels and located anywhere in the structure. The panels can easily be cut on site to suit any building design.

About this Manual

This manual has been written specifically as a reference and guide for installers of the Durabuild panel wall system, and must **not** replace professional consultants on specific projects.

The manual is self-explanatory and covers all aspects of the installation process from tools and equipment required through to panel layout, panel erection and installation of utility services, concrete fill and final surface finishing.

Included in this manual are all relevant standard detail drawings. Installers should familiarize themselves with these drawings.

Note: Because of the flexibility of the system, situations may arise that are not covered in this manual. If this does occur, please contact Durabuild Systems for advice before proceeding.

Durabuild Systems is committed to continual improvement of the system, installation procedures and associated literature. Therefore this Manual will be regularly reviewed and updated. Your feedback and comments are most welcome.

Email any enquiries to: info@durabuildsystems.com

Disclaimer: The information presented herein is supplied in good faith and to the best of our knowledge was accurate at the time of preparation. No responsibility can be accepted by Durabuild Systems or any staff for errors or omissions.

Product Specifications

Panel Height	Panel Width	Panel Thickness	Concrete Thickness	Concrete Volume	Surface Area
2440 mm.	1220 mm.	112 mm.	100 mm.	< 0.29 m3	2.98 m2
		90 mm.	78 mm.	< 0.23 m3	
2745 mm.	1220 mm.	112 mm.	100 mm.	< 0.33 m3	3.29 m2
		90mm.	78 mm.	< 0.26 m3	
3000 mm.	1220 mm.	112 mm.	100 mm.	< 0.36 m3	3.66 m2
		90 mm.	78 mm.	< 0.29 m3	

Note: The above specifications apply to standard sheet sizes – other sizes can be custom made to order

Tools and Equipment

The following tools and equipment are helpful for proper erection of the panels.

- Hammer drill and masonry bits.
- Dustless power cutter – 100 - 125mm blade.*
- 225mm metal cutting saw.
- Power Screw drivers.
- Chemset /epoxy bond equipment.
- Tape Measures.
- Chalk line and string lines.
- Spirit level.
- Step ladder.
- Scaffolding as required.
- Wall bracing props.
- Power source and Junction box with earth leakage safety switch.
- Electrical extension leads.
- Relevant Sun and Safety Protection

Tip: We recommend the **AEG Model MBS 30 Turbo multi construction material saw for its versatility and best in class dust collection efficiency.*

Pre-Construction Requisites

- All installers should have completed the Durabuild Systems Installation training before commencing work.
- Allow 4-6 weeks lead time for delivery of the panels. Stack panels flat on level ground to ensure panels do not twist or distort.
- If using window and door sub frames ensure they are available before the commencement of work.
- Panels must be braced during construction. Allow one brace for every second panel. More may be required in windy conditions.
- Emphasize to concrete contractors the importance of the accuracy of the set out and the finish of the slab as it is critical to the success of the Durabuild panel wall system.
- Ensure that the tools and equipment listed are available and in good working condition.
- Provide the proper safety measures and conditions for all applications.
- Provide the installation team with the following documentation:
 - Relevant Durabuild Systems Manuals.
 - Architectural Drawings.
 - Window reveal / opening schedule.
 - Applicable Engineering Drawings.
 - Detail of roof connection.
 - Flashing details.
 - Panel Layout.
- In the **Panel Layout**, note the following:
 - Position and type of hold down bars.
 - Temporary bracing to be provided.
 - Placement of construction and control joints.
 - Dimensions of windows and doors.
 - Lintel / bond beam reinforcement requirements.
 - Height and profile of non-standard walls.
 - Set downs in floor level if applicable.
 - Location of utilities.

Footings and Slab

Footings are designed to transfer and distribute the loads they support and must be constructed to comply with the Engineer's specifications. The slab can either be constructed with a rebated edge or a square top edge.

It is critical that the slab is formed as level as possible to prevent unnecessary work later in the project

Starter bars are inserted to provide additional bonding between the walls and the slab and should be aligned with the centre of the panel cavity at specified distances.

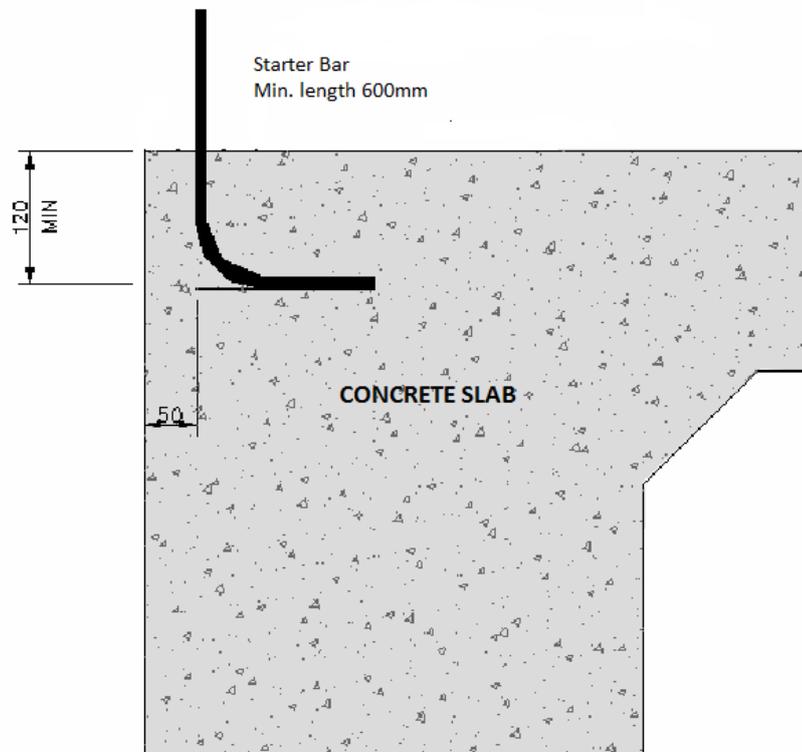


Figure 1
Tie Down Detail

There are two options for inserting the starter bars:

1. They can be cast in place during the concrete pour or
2. Holes can be drilled into the slab and starter bars set in place with an industrial epoxy.

Note: Take care to set starter bars accurately to prevent problems later when placing the panels.

Damp Proofing

It is recommended that an acrylic waterproofing agent is painted onto the slab where walls contact it to prevent rising damp and to create a waterproof seal between the wall and the slab. The bottom 150mm of the starter bars should also be painted to assure a good seal.

Note: Durabuild Systems accepts no responsibility for the waterproofing of the building

Panel Layout

Establish exact building dimensions on the slab ensuring that all corners are square, and then mark with a chalk line.

Set out from chalk lines to the outside face of the panels. Mark out the location for door and window openings with a permanent marker for future reference.

Set out can accept minor adjustments.

Track Placement

The bottom tracks perform two main functions:

1. To accurately locate the panels in the correct position.
2. To provide support to the bottom edges of the panels during the concrete pour.

For maximum concrete to concrete contact, it is recommended that 30mm x 30mm pre-drilled angle is used for the bottom fixing tracks. Alternatively, a 30mm x 100mm slotted C section channel of light gauge galvanised iron or even an extruded plastic C section channel could be used.

Position the bottom track flush with the edge of the slab. Fix down with concrete nails or other suitable fixing methods at 600mm centres. Omit the track in sections where door and window openings meet the slab.

Note: External angle tracks are removed after the concrete has set and can be reused on other jobs.

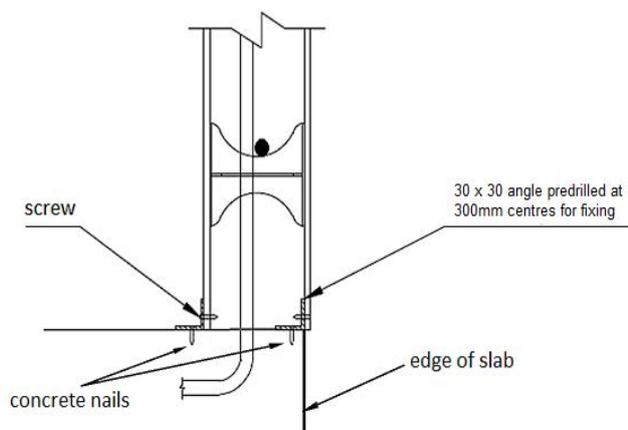


Figure 2
External wall to slab edge

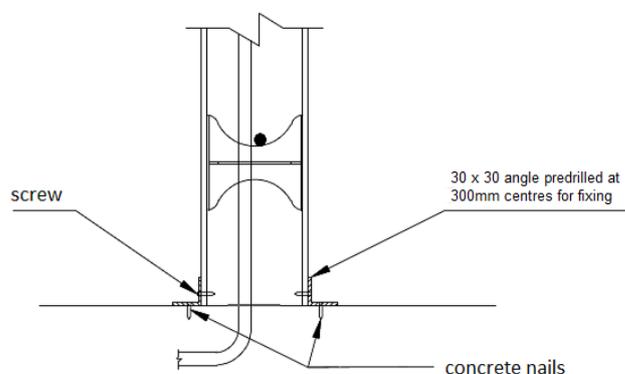


Figure 3
Internal wall to slab

Panel Erection

Starting with a Corner Panel, place the first panel over the bottom angle tracks. Stand the panel plumb (ensure edge is vertical) and screw the base of the panel to the angle track at 300mm centres. (Figures 4a&4b)

Tip: A plastic door wedge can be helpful in getting the panels plumb



Figure 4a



Figure 4b

Brace the panel in a vertical position. An adjustable brace using a turnbuckle for minor adjustments is preferred however a simple brace made from angle iron or pipe will suffice. (Figure 5)



Figure 5

Position the adjacent corner panel in place and ensure it is plumb before screwing it to the track at 300mm centres. Screw an angle strip into the internal corner for extra support. Refer to figure 6



Figure 6

Place adjoining panels over the track and slide in to fit and screw into place. See details figure 7. Brace every second panel.

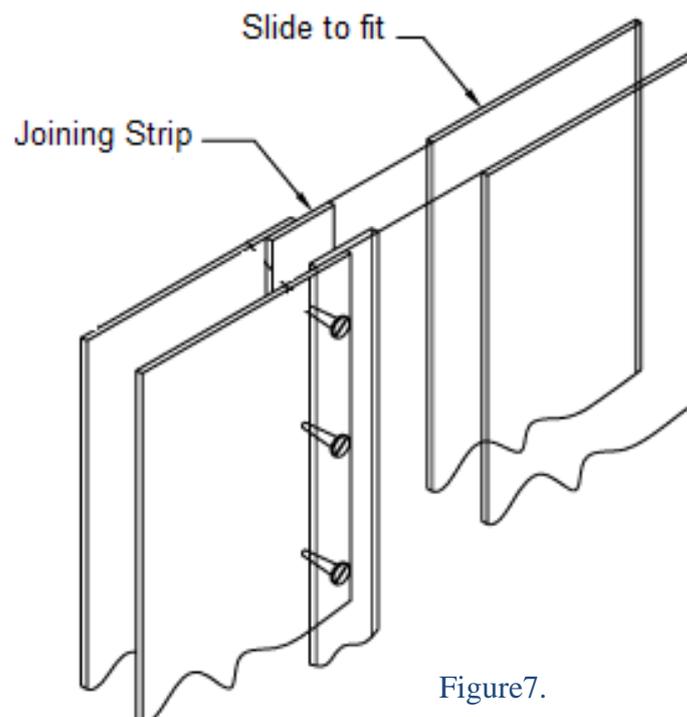


Figure7.

Raked and Curved Profiles

The Durabuild panel wall system offers high degrees of design flexibility. Where raked and curved wall tops are required, the panels are supplied oversized, the profiles plotted and the panels are cut to suit.

Window and Door Frames

- Ensure that the panel next to the window frame is in the correct position.
- Install the sill panel, check for plumb and screw fix at 300mm centres.
- If using window sub frames, install into position ensuring it is plumb and square.
- Slide and fix the side panel into position.
- Slide the top lintel panel down into position and fix.
- Continue fixing further panels in the usual manner

Note: The openings will require temporary support to carry the horizontal and vertical loads. Use wooden supports to square and brace the openings before pouring the concrete.

Reinforcement around Openings

To account for the increased stresses in the wall around the openings for doors and windows, additional reinforcing is required both vertically and horizontally. The location of the openings has a direct impact on the reinforcing design and lintels above windows and doors over 600mm wide require special design consideration.

For full information, please refer to engineering specifications designed to comply with regional standards.

Utility Services

Any type of service that conforms to the relevant building codes can be installed in the Durabuild panel wall system.

Plumbing

Where possible, it is recommended that plumbing be dropped into position from the ceiling space. Where shower combinations and similar units are used, various options are available.

- Prior to the concrete pour, cut out the panel face, install units and then box up to accept core filling.
- Chase out the wall just after concrete core filling, install units and then patch the wall to a smooth surface finish.

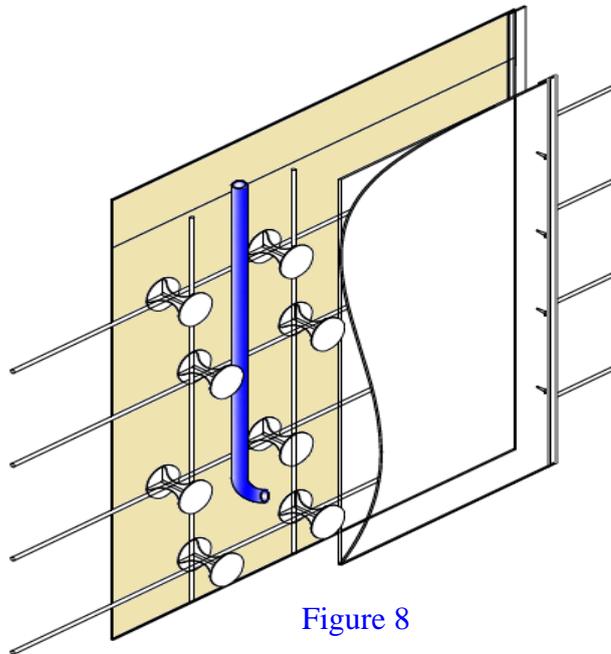


Figure 8

Note: It is recommended that pipes are pressure tested prior to core filling.

Where plumbing lines must be located under the slab, pipes can be run in the centre of the bottom track to the required location, then add vertical risers to the required height. The panel is fixed so that the vertical riser is positioned within the void. Cut a hole into the panel at the required location and fit an elbow to protrude through the hole.

Electrical

The recommended method for electrical installation is wiring within the roof space and dropping down the wall cavity to the required locations.

- Drill an appropriate size hole in the panel at the required location.
- Cut the conduit to length and fit an electrical box on the lower end.
- Feed the conduit into the panel cavity and align the electrical box with the hole and fix in place.

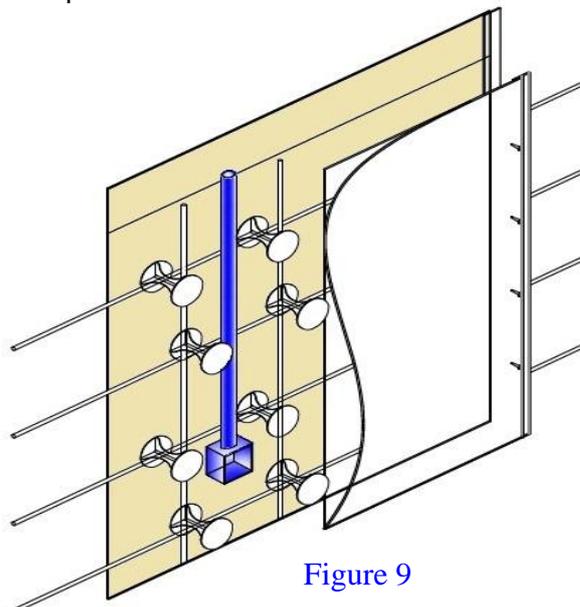


Figure 9

Placing Reinforcement Bars

Place deformed reinforcing bars (rebar) as per the Engineer's design schedule.

Shear walls require starter bars of the same size and spacing as the vertical reinforcement to connect the wall to the floor. If the wall is not required to resist racking forces, the starter bars can be reduced to one N12 bar at the end of the walls and the side of openings and bars at 2m maximum spacing along the wall.

The horizontal rebars are typically inserted into the wall cavity from a corner or an end to rest on the concave surface of the plastic inserts which automatically centres them. Leave a minimum of 300mm for splicing if required.

The vertical rebars simply slide down the gap created between the offset inserts. It is recommended that every second vertical rebar is staggered to opposite sides of the horizontal rebars. Vertical rebars typically extend a minimum of 300mm through top of wall to form reinforcing for subsequent levels.

Tip: For long walls it may be necessary to use a bar with a hooked end from the top of the wall to guide the rebar into position along the inserts.

Corners and Wall Ends

Corners are left open until the reinforcing bars are in position. This allows the rebars to be wired and inspected before fixing the corner caps in place.

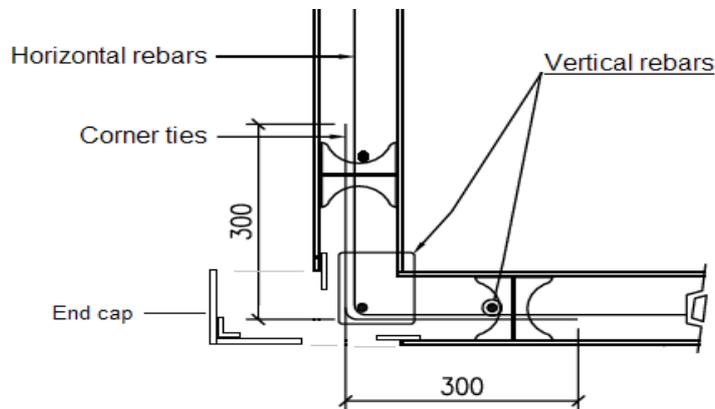
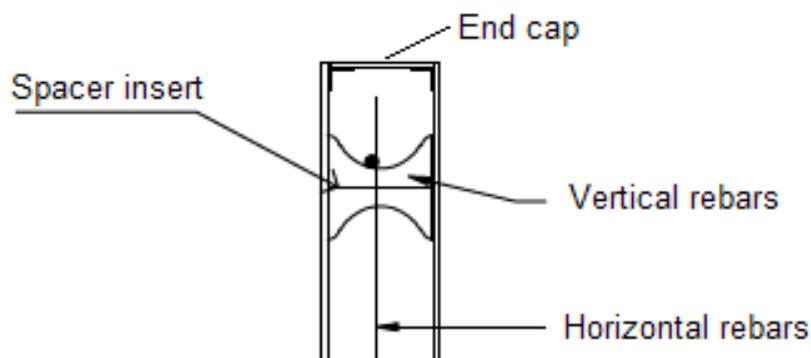


Figure 10

Ends of blade walls should have the horizontal bars turned down before fixing capping. If the wall is not a shear wall, a starter bar should be placed at the end of the wall and at a maximum of 2m centres along the wall.



Expansion Joints

It is essential that expansion joints are placed in the surface sheets at no more than 6.0 metre centres at locations nominated by the Engineer in the standard drawings.

Pre-Pour Inspection

A string line should be fastened at the top of the wall length to assist in the alignment of the wall. Any minor adjustment to the alignment during the pour can be made using the turnbuckle on the bracing props.

The following pre-pour checklist should be thoroughly inspected prior to pouring the concrete.

- Is reinforcing in place as specified? Pay particular attention around window and door openings and lintels.
- Have window and door sub frames been adequately braced to prevent distortion during the concrete pour.
- Ensure all utility services are installed as indicated.
- Check that all panels are plumb, straight and adequately braced.
- Ensure all relevant authorities have carried out all inspections prior to concrete pouring.
- Are there sheets of plywood and a screwdriver drill available in the unlikely event of a blowout?
- Is scaffolding properly installed?
- If ready mixed concrete is being used, has the quantity of the correct specification been estimated and ordered?
- Do you have an internal vibrator or rubber mallet ready?
- Is there room for a concrete truck to manoeuvre?

The Concrete

Load Bearing Walls - The recommended concrete mix is 20MPa (3,000psi) with a slump of 120 – 140. Where higher strength is required it is preferable to increase the wall thickness rather than the concrete strength.

Non Load Bearing Walls - A foamed lightweight concrete mix is an economical option which offers benefits such as better thermal, acoustic and fire rating qualities.

The Concrete Pour

WARNING! This is the most critical stage of the construction operation and if directions are not followed carefully, failure of the system can occur.

The preferred method for pouring concrete is with a line or boom pump. However if the equipment is not available it can be hand mixed and bucketed. Regardless of the method used, the principles remain the same.

To avoid “*blowouts*” when using a pump, it is recommended using a reducer and also attaching a 90 degree elbow to slow down the flow of the concrete. A flexible hose attached to the end of the pump can also be helpful. The flow of concrete should be less than 10 cubic metres per hour.

For either method, the concrete should be filled progressively in layers of between 300mm to 600mm working around the perimeter.

Rather than firing the concrete directly to the bottom of the cavity it is preferable to position the flow beside a window or door frame and let it slump down the natural diagonal towards the lower levels. This method will reduce pressure as well as providing good penetration of the concrete.

Where window sub frames are used, fill sill panels after drilling a hole to take a funnel spout.

A second person should follow the installer around the perimeter to consolidate the concrete and to make any necessary adjustments to the alignment of the wall relative to the string line.

Consolidating the Concrete

Each layer of concrete should be consolidated to ensure that the spacers and rebars are totally embedded in concrete and that there are no air pockets. This can be done using various methods depending on the available equipment:

1. Use an internal vibrator of maximum 25mm diameter. The proper technique to consolidate the concrete is to insert the head of the vibrator “fast in” to the bottom of the wall and “slow out” to remove.
2. If a vibrator is not available, the “rodding” method, which is simply jiggling a reinforcing rod up and down inside the cavities, will suffice.
3. Alternatively tapping the panel surface with a rubber mallet will produce the required results. Any hollow sound heard reveals air pockets therefore requiring further consolidating.

Note: Do not over consolidate the concrete

Finishing the Concrete

If additional levels are to be added to the building it is recommended that the concrete should be left rough to provide a better bond between successive walls. The starter bars for the next level are also inserted vertically into the wet concrete of the first pour.

If the building is to be only a single level, the concrete should be finished to a smoother finish. Typically the wall will have a wall plate installed to provide attachment to roof trusses/rafters and allowance needs to be made to anchor the wall plate. These should comply with the local building code requirements.

The string line that was erected prior to the concrete pour should be finally checked to ensure that the wall is straight and true by making a visual reference at the top of the wall. The walls can easily be brought into plumb by simply adjusting the turnbuckles in the bracing props.

Tip: Remove all spilt concrete and clean it off wall and floors before it sets.

Surface Finishing

Following the procedures below can result in a level 4 finish which is equivalent to plasterboard and the generally accepted standard for residential dwellings.

Surface Preparation

Any screws not embedded properly should be driven below the sheet surface. All fixings are to be set over with mesh jointing tape and two successive coats of jointing compound before feathering the top coat out to a width of 300mm.

For external and internal corners apply 70mm wide joint compound to both sides of the corner. Then centre *fibreglass* joint tape and press it firmly into the base coat and cover it with a thin skim coat of the joint compound.

Allow to dry and then apply a thin finishing coat by laying additional joint compound into the corner feathering out the edges.

When dry, sand lightly taking care not to scuff the panel sheet surface.

Tip: Fibreglass jointing tape is more flexible and is preferred over paper jointing tape.

Final Finish

The sheets provide a smooth surface requiring minimal finishing.

External Walls

For external walls, we recommend an acrylic based texture finish available from several manufacturers who offer full technical advice and warranty for their systems if components are used to their specifications.

Some Manufacturers include:

- **Wattyl Granosite** www.wattyl.com.au/Granosite
- **Rockcote** www.rockcote.com.au/
- **Dulux Acratex** www.dulux.com.au/specifier/product

However cladding materials such as stone, tile, colorbond and woodgrain planks are easily attached if desired.

Internal Walls

A flat or low sheen acrylic paint is recommended for internal walls. The general painting procedure includes application of a primer/sealer followed by a minimum of two coats of full strength *premium* quality paint.

Tip: When subjected to critical glancing light conditions, full or semi-gloss paints or dark colours, will highlight any minor imperfections in the wall surface.

Tiles, wall papers or other claddings can be applied if preferred.

However, all finishes should be applied in accordance with the manufacturer's instructions and specifications.

Suspended Floor System

A typical method of constructing a poured in place concrete floor (or roof) is the use of a composite steel deck.

The deck spans from wall to wall and depending on loading conditions may have intermediate supports under the deck spans.

The corrugated steel deck allows less concrete to be used in the floor system yet it is stronger than a floor made of flat stock steel.

Another advantage is that wiring, plumbing etc. can be routed along the channels created beneath the corrugations.

The steel deck is set in place after the concrete walls have cured to adequate strength.

This system must be constructed to the Structural Engineer's specifications designed to comply with the local building code regulation.

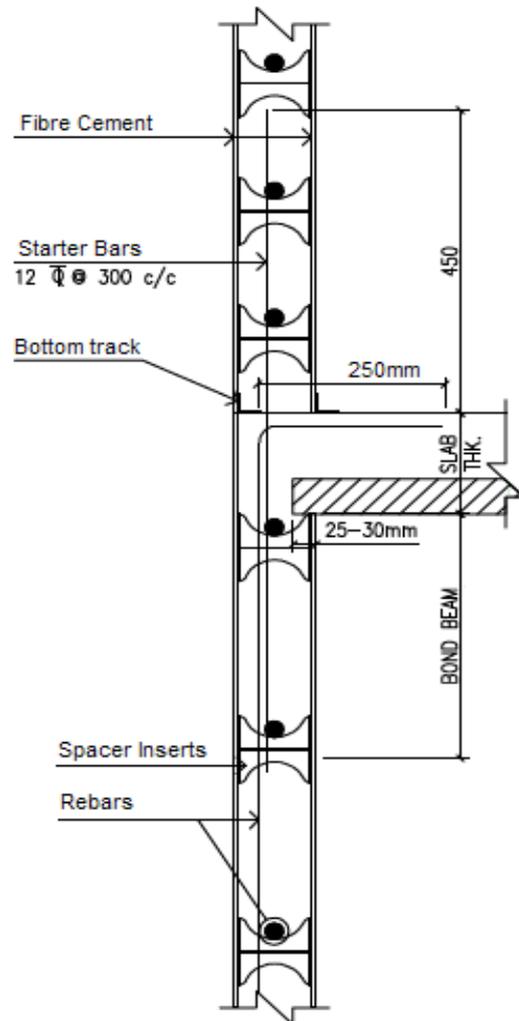


Figure 12

Rafter or Roof Truss Connection

Rafters or roof trusses can be connected to the wall plate by using a number of different methods. Illustrated below is an example of one typical method.

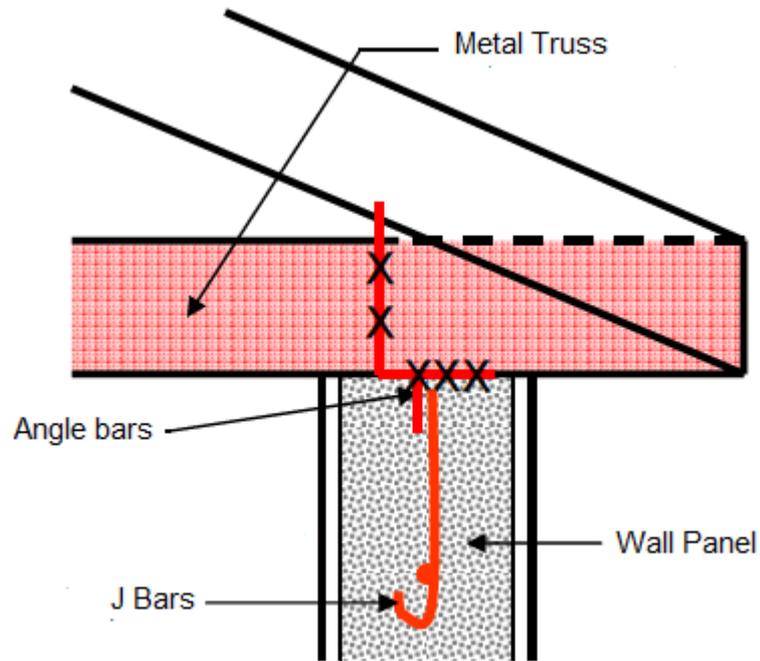


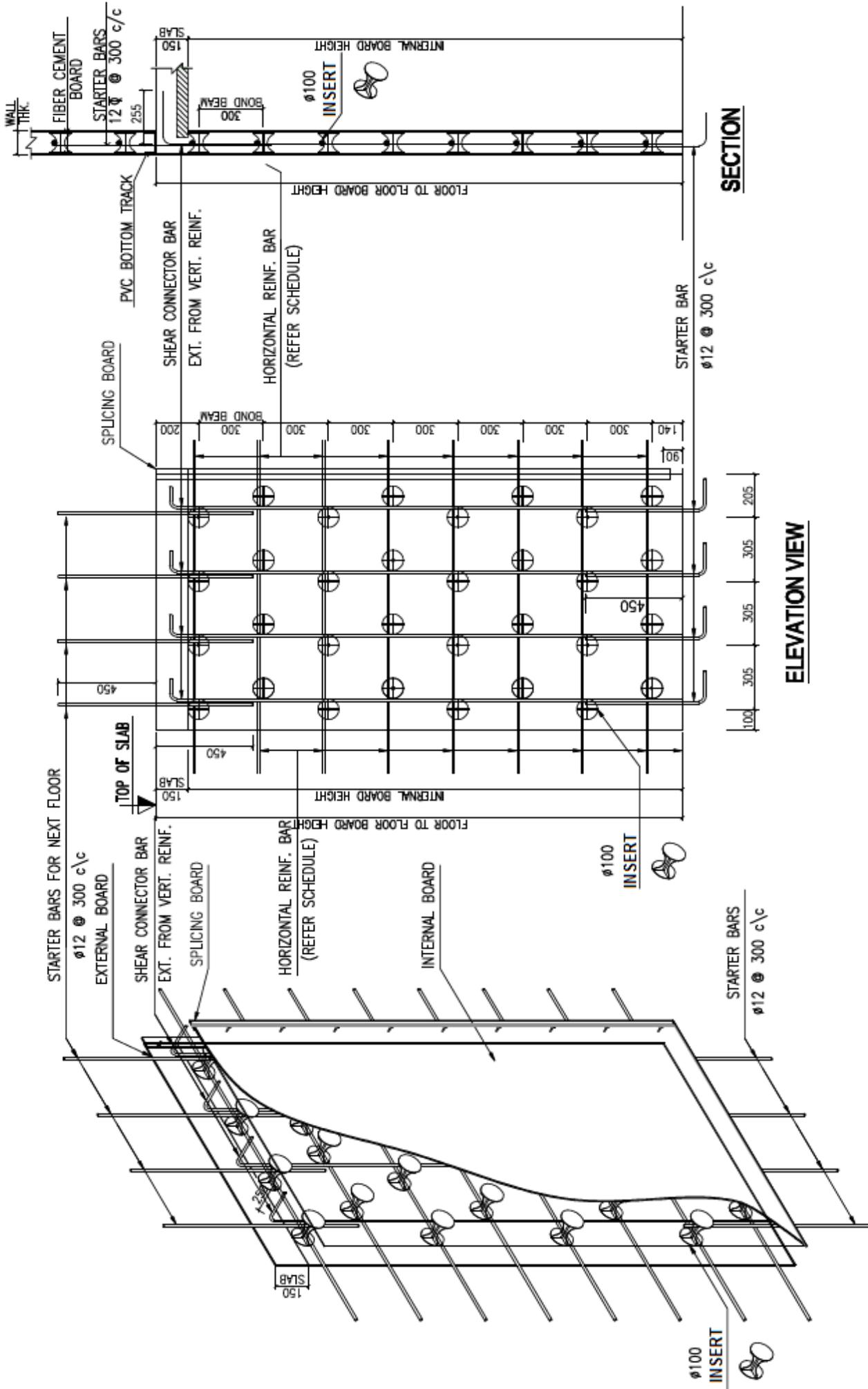
Figure 13

Check with local building code regulations for design requirements which may vary due to wind uplift conditions etc.

Standard Detail Drawings

The following drawings detail the preparation and construction of the Durabuild Panel Wall System

- Typical Durabuild Panel
- Exploded Isometric View
- Typical Work Elevation
- Typical Wall to 1st Floor connection Detail
- Typical Fibre Cement Wall Board Detail
- Typical Corner Joint Detail
- Typical Wall Splicing Joint Detail
- Typical Wall to Slab Connection Details



EXPLODED ISOMETRIC

ELEVATION VIEW

SECTION

STARTER BARS FOR NEXT FLOOR
 $\phi 12 @ 300 \text{ c/c}$

EXTERNAL BOARD

SHEAR CONNECTOR BAR
 EXT. FROM VERT. REINF.

SPLICING BOARD

HORIZONTAL REINF. BAR
 (REFER SCHEDULE)

INTERNAL BOARD

STARTER BARS
 $\phi 12 @ 300 \text{ c/c}$

WALL THK.

FIBER CEMENT BOARD

STARTER BARS
 $12 \phi @ 300 \text{ c/c}$

255

SLAB

150

BOND BEAM

300

$\phi 100$ INSERT

INTERNAL BOARD HEIGHT

PVC BOTTOM TRACK

SHEAR CONNECTOR BAR
 EXT. FROM VERT. REINF.

HORIZONTAL REINF. BAR
 (REFER SCHEDULE)

FLOOR TO FLOOR BOARD HEIGHT

STARTER BAR
 $\phi 12 @ 300 \text{ c/c}$

SPLICING BOARD

BOND BEAM

200

300

300

300

300

300

300

300

300

300

140

90

TOP OF SLAB

SHEAR CONNECTOR BAR
 EXT. FROM VERT. REINF.

SPLICING BOARD

HORIZONTAL REINF. BAR
 (REFER SCHEDULE)

$\phi 100$ INSERT

FLOOR TO FLOOR BOARD HEIGHT

STARTER BARS FOR NEXT FLOOR
 $\phi 12 @ 300 \text{ c/c}$

EXTERNAL BOARD

SHEAR CONNECTOR BAR
 EXT. FROM VERT. REINF.

SPLICING BOARD

HORIZONTAL REINF. BAR
 (REFER SCHEDULE)

INTERNAL BOARD

STARTER BARS
 $\phi 12 @ 300 \text{ c/c}$

450

SLAB

150

FLOOR TO FLOOR BOARD HEIGHT

$\phi 100$ INSERT

100

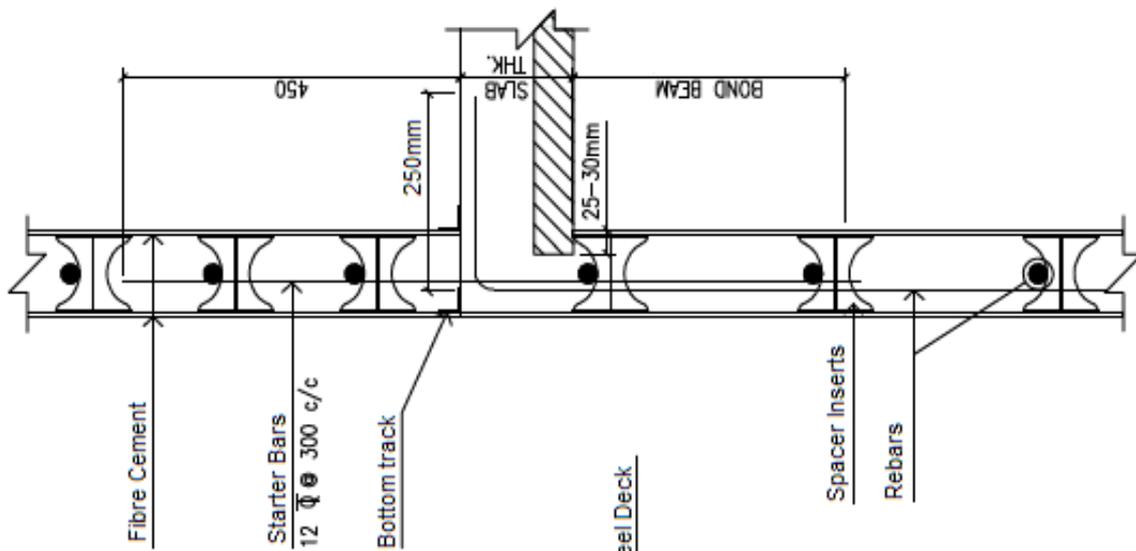
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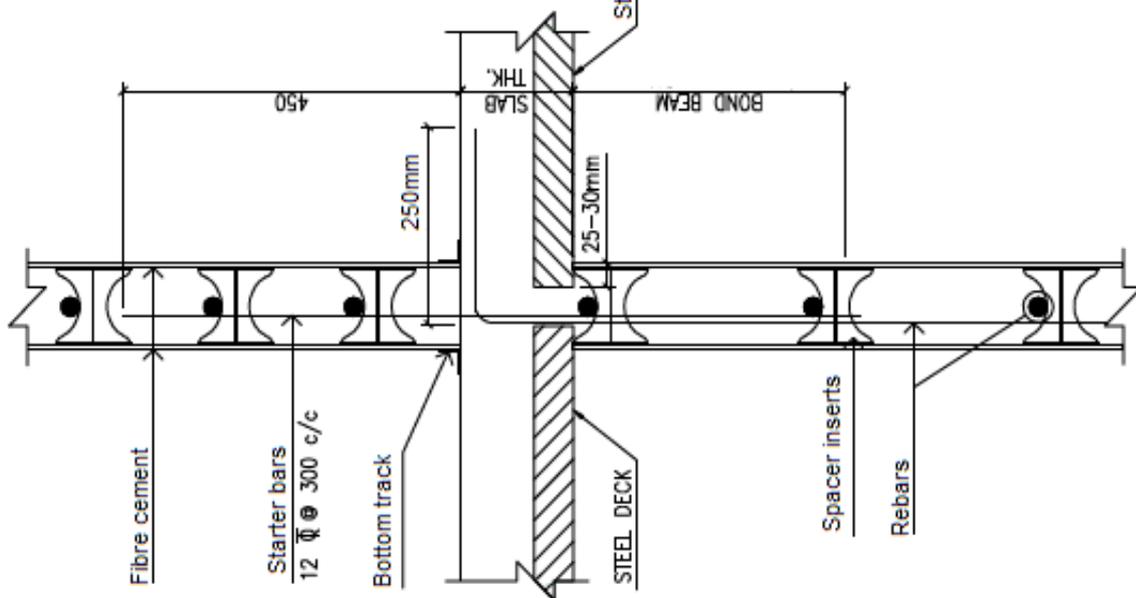
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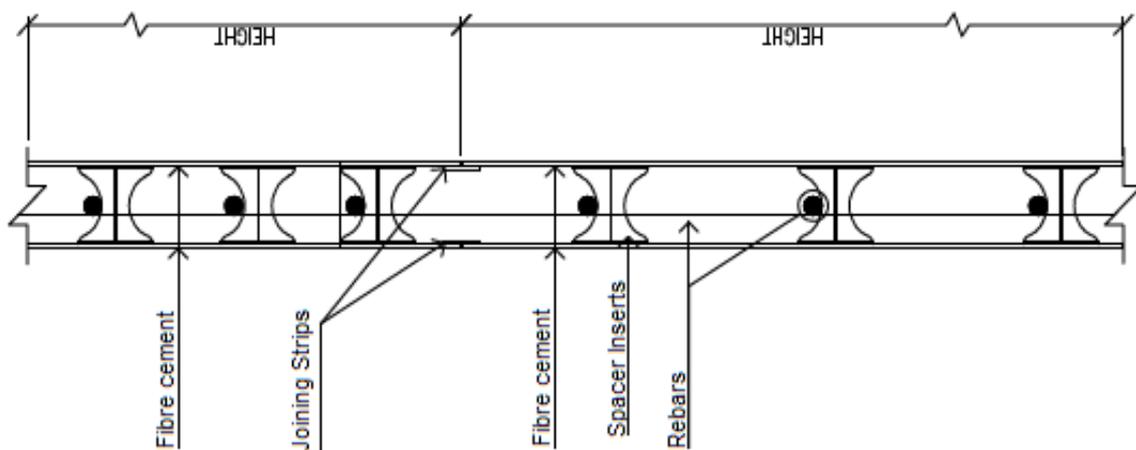
$\phi 100$ INSERT



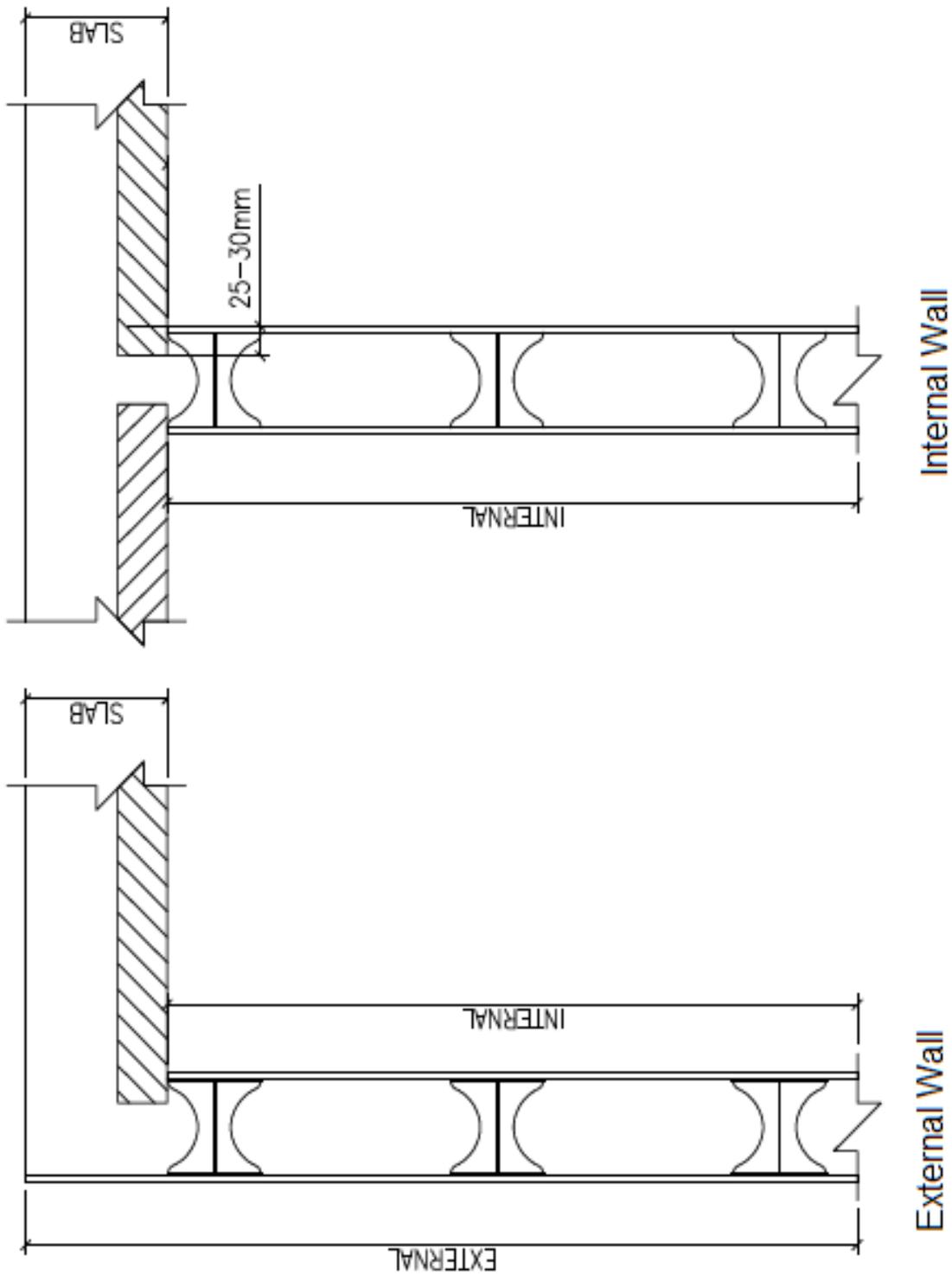
External Wall / Floor Connection



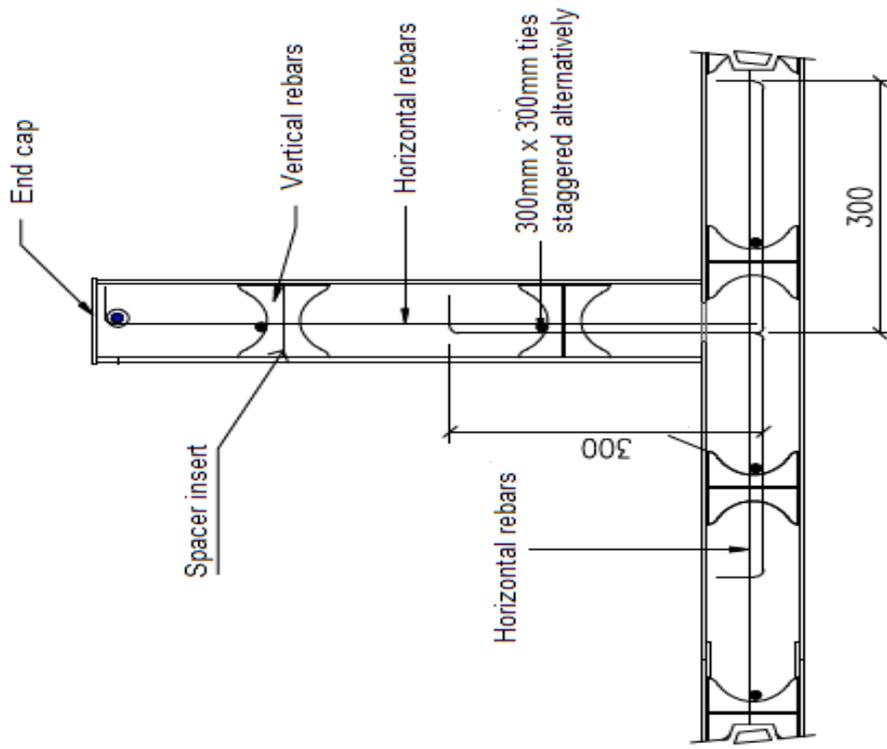
Interior Wall / Floor Connection



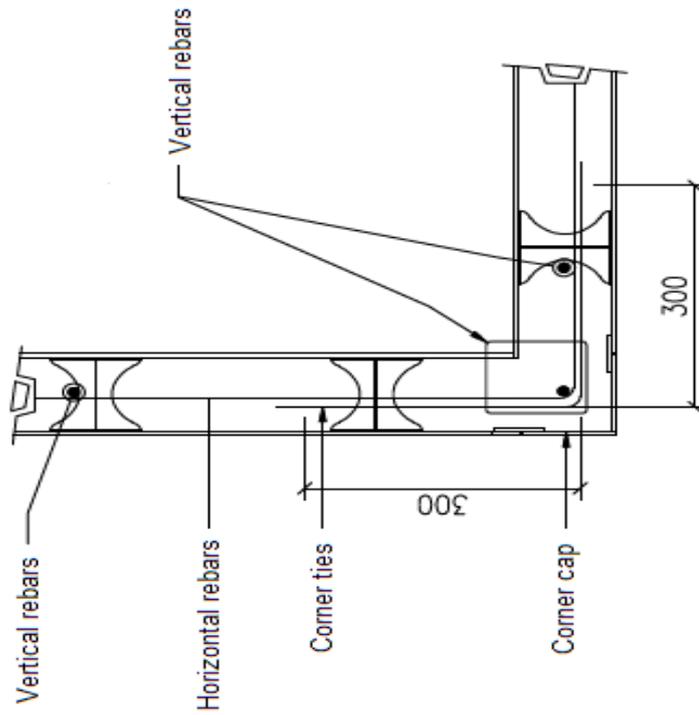
Extended Wall



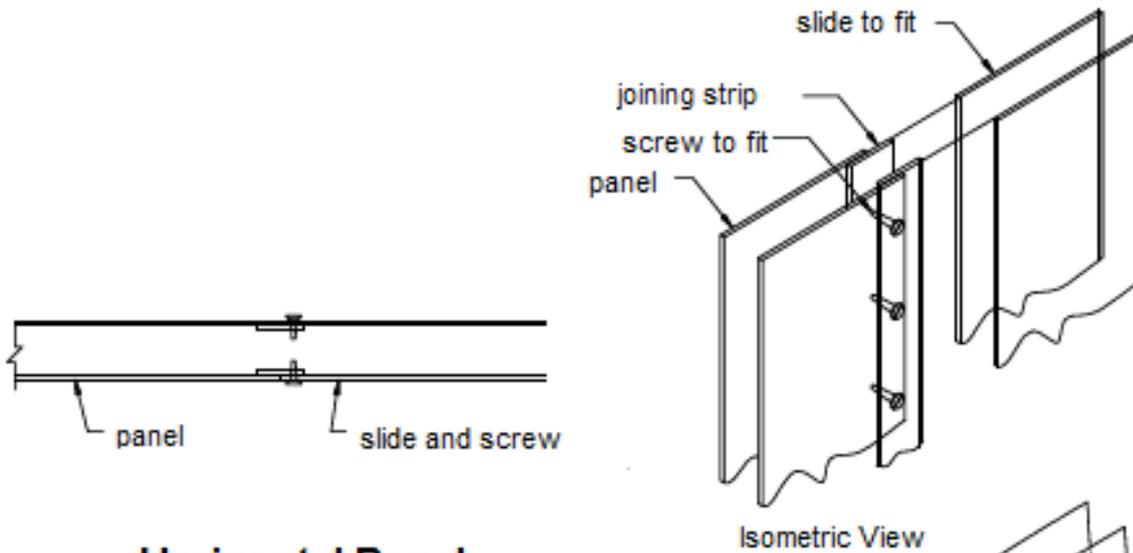
FIBRE CEMENT SHEET DETAIL



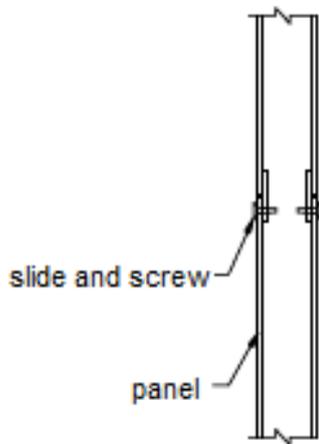
T-Joint - Plan View



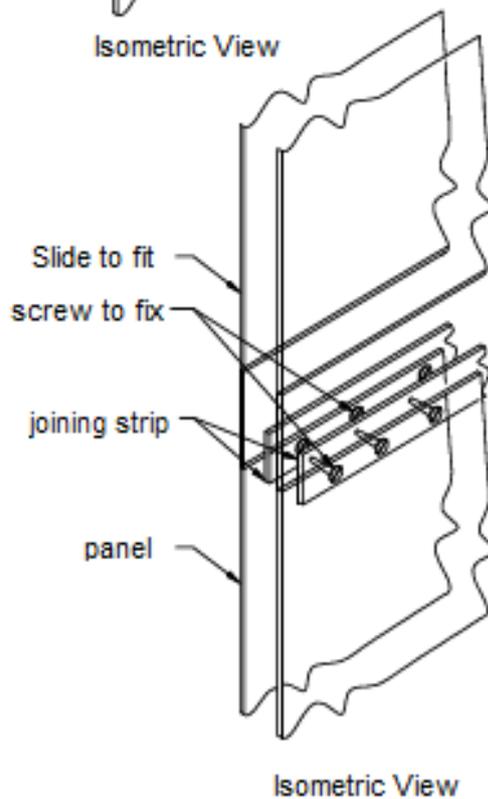
External Corner - Plan View



Horizontal Panel

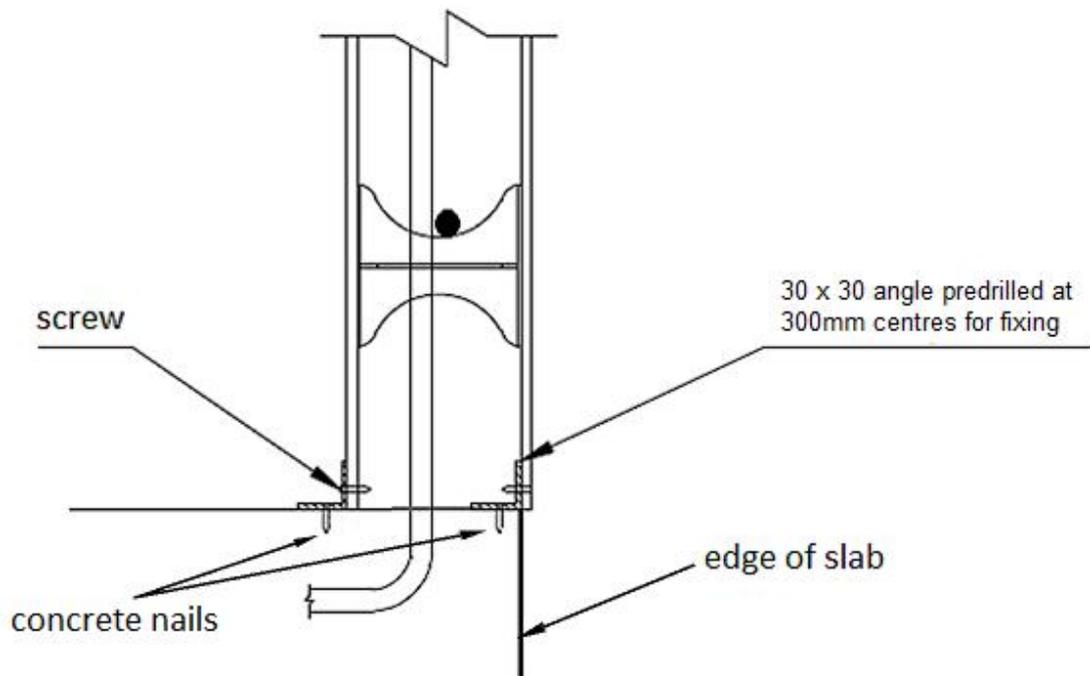


Vertical Panel

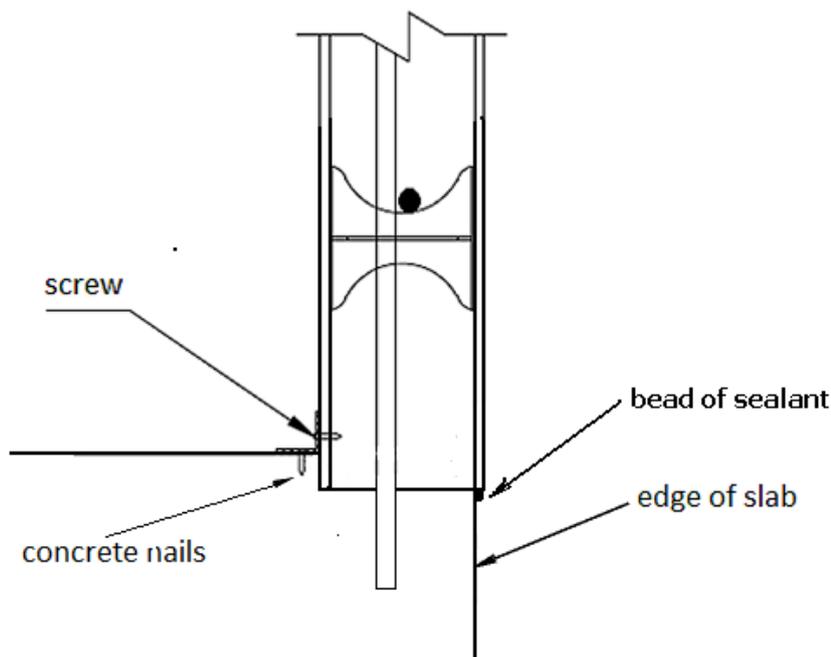


TYPICAL PANEL JOINT DETAIL

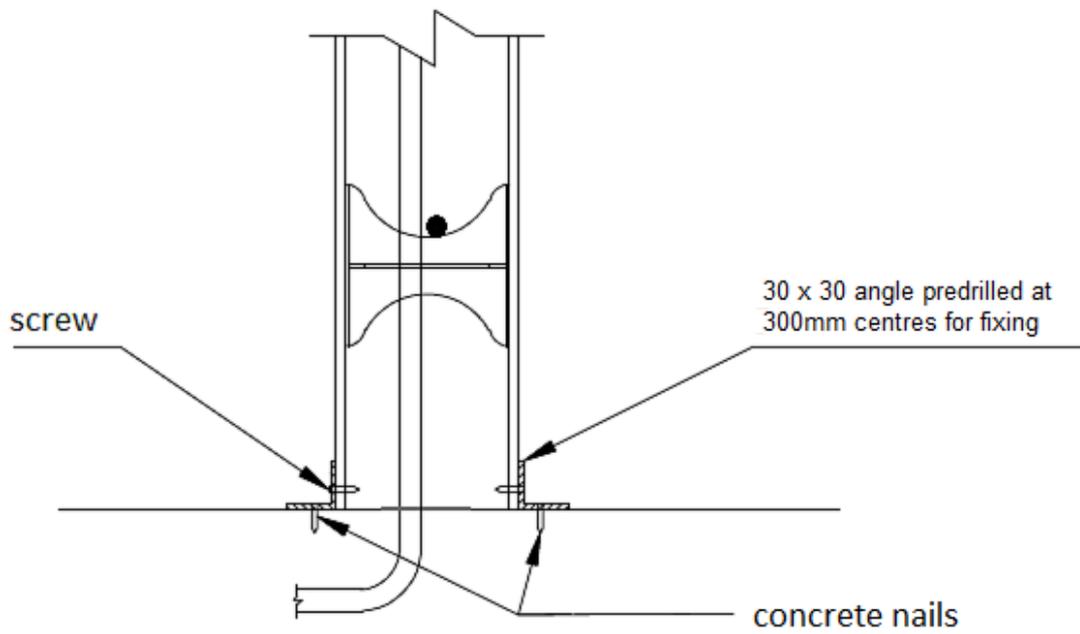
TYPICAL WALL TO SLAB CONNECTION DETAIL



External Wall to Square Top Edge Slab Connection



External Wall to Rebated Top Edge Slab Connection



Internal Wall to Slab Connection

Note: External angle tracks are removed after the concrete has set and can be reused on other jobs.

... Notes ...