ECO-Block
Insulating Concrete Forms

Phone: 1800-669-696

Installation Manual

January 2004

ABOUT THIS MANUAL

This manual is intended to assist the contractor, or installer of the ECO-Block Insulating Concrete Forming System in the proper techniques of construction. This manual assumes that generally accepted construction practices (i.e. level, plumb and square) have been employed when building with the ECO-Block Insulating Concrete Forming System. Structures built with the ECO-Block Insulating Concrete Forming System should be designed, engineered, and constructed in accordance with all applicable building codes and regulations.

DISCLAIMER

In keeping with ECO-Block Aust Pty Ltd (Eco-Block) policy of continuing research and development, we reserve the right to change or modify the contents of this manual at any time. It is the responsibility of the end user to obtain the most recent information available. Since ECO-Block has no control over installation or workmanship, no responsibility for results is expressed or implied. ECO-Block Insulating Concrete Form System and any other marks, drawings, or symbols are the trademarks of ECO-Block.

ABOUT ECO-BLOCK

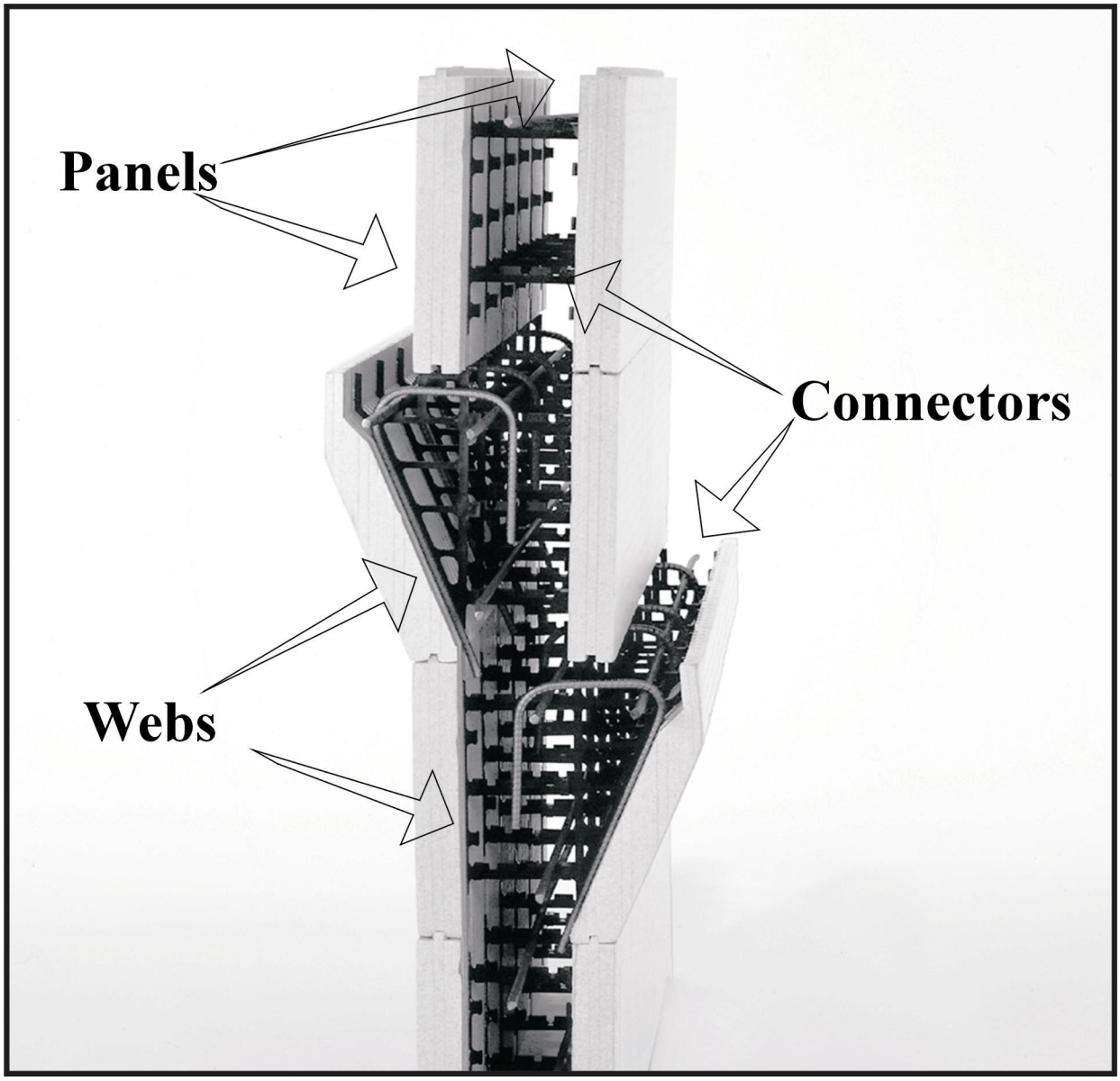
ECO-Block is a highly versatile, cost –efficient, easy-to-use, flat wall, insulating concrete form (ICF) system. The unique patented design consists of foam panels, embedded plastic studs every 203mm on center and connectors. The system ships flat to save space and freight cost. Workers at the job site quickly snap the plastic connectors onto the web to create complete forms, ready for stacking.
Connectors are available in different lengths to create concrete walls 100mm (4 inch), 152mm (6 inch), 203mm (8”), or 250mm (10”) thick using the same foam pieces. Additionally, by using the ECO-Block plastic connector splice, two connectors can be joined together to create walls of greater thickness.

Special right-angle forms are also available for making right and left hand corners. These corner forms speed construction and provide an exterior corner-nailing strip. ECO-Block has various locations to attach the connectors allowing the blocks to be cut almost anywhere vertically horizontally, or at an angle and maintain a strong and stable form.

ECO-Block is the most versatile, cost-effective method to get the benefits of flat wall, insulating, solid concrete construction:

- Quality – A solid stable structure
- Comfort – Indoor quiet – STC 57 (152mm wall)
- Safety – Disaster Resistance
- Security – Increased resistance to natural disasters
- Energy Efficiency – R-4.
- Green - No ozone depleting offgassing, recycled material to meet USGBC/LEEDS requirements

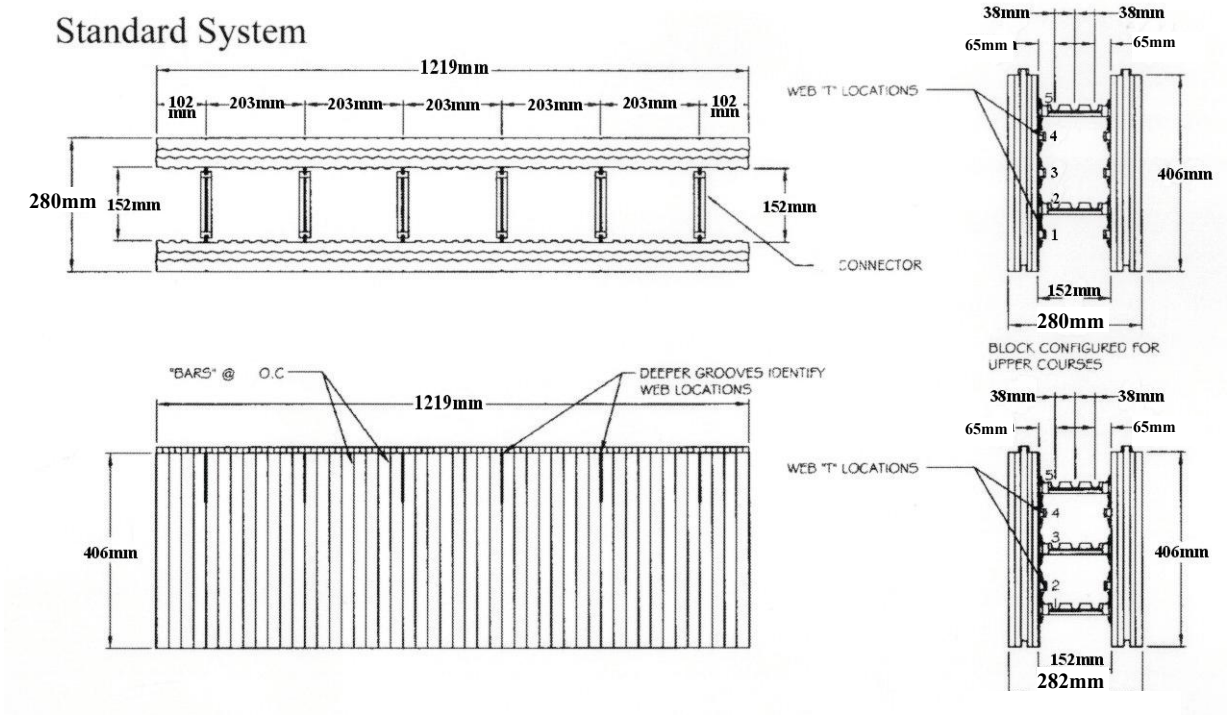
For further help and information, contact your local ECO-Block distributor or ECO-Block 1-800-669-696.

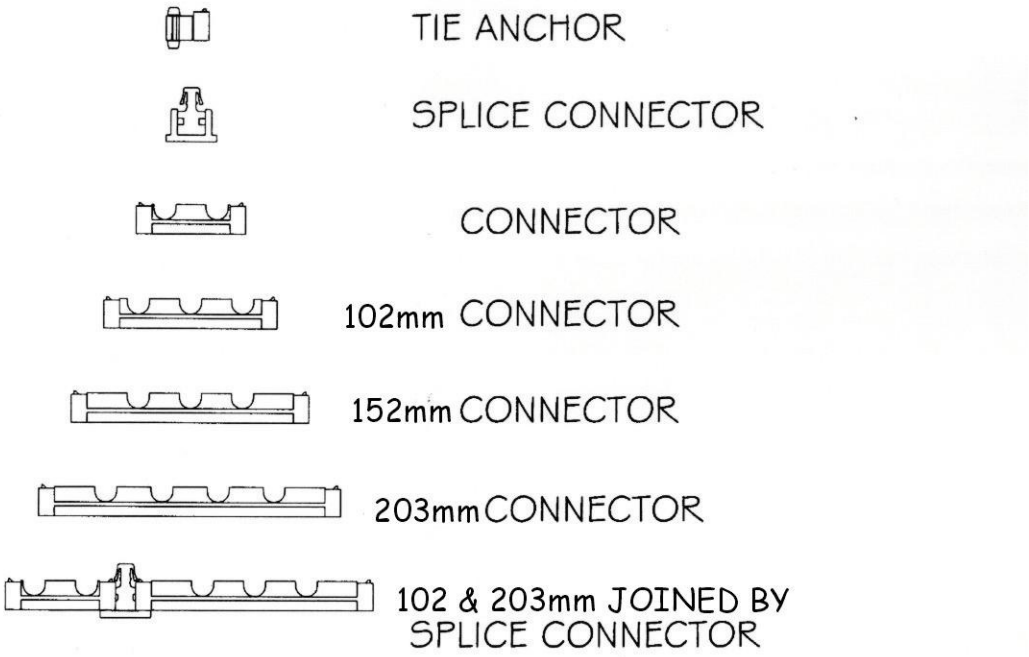


Technical Tip:
When creating a wall greater than 305mm (12”) please contact your Distributor or the ECO-Block office at 1800-669-696 for specific instructions.

Product Specifications

Forming System Components




TIE ANCHOR
SPLICE CONNECTOR
CONNECTOR
102mm CONNECTOR
152mm CONNECTOR
203mm CONNECTOR
102 & 203mm JOINED BY
SPLICE CONNECTOR

Getting Started

Tools and Supplies

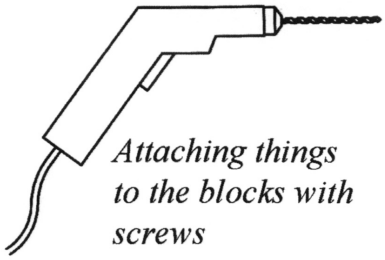
Reciprocating Saw

occasional cuts in stacked formwork, also can be used without blade to consolidate concrete under openings and in corners

Hand Saw

longer, straight cuts

Drill

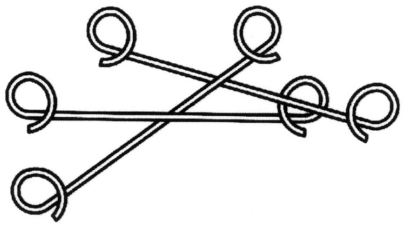


Attaching things to the blocks with screws

Keyhole Saw

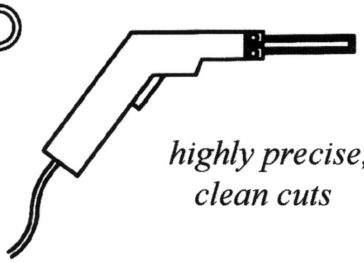
small cuts and holes

Rebar Tie Wires



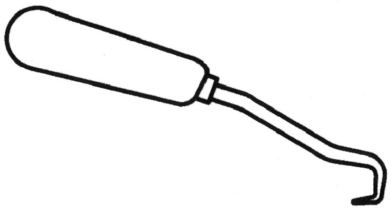
wiring bars securely into precise position

Hot Knife w/ICF Attachments



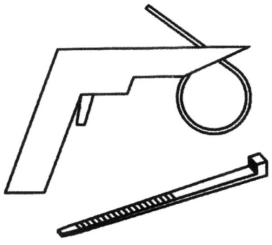
highly precise, clean cuts

Wire Tying Tool



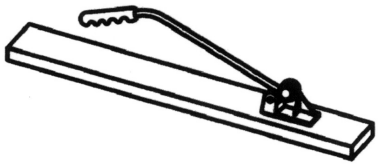
speeding the wiring of rebar

Plastic/Nylon Zip Ties
762 -864 mm



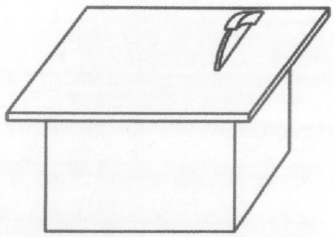
Lashing adjacent blocks together at critical points

Rebar Cutter/Bender



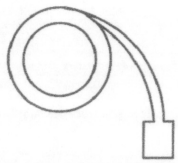
cutting bar to length and bending

Table Saw



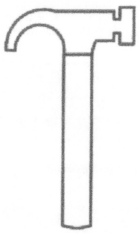
precise straight cuts

Packaging Tape



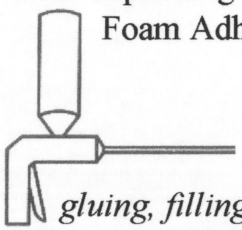
taping foam

Hammer



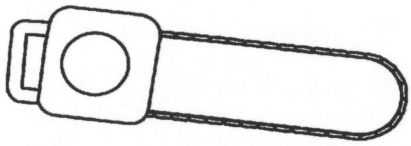
various

Low-expanding Foam Adhesive



gluing, filling gaps

Electric Chain Saw

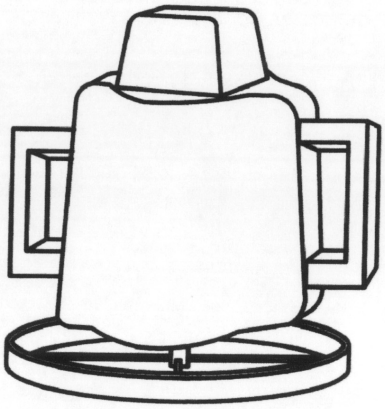


very fast, spews foam bits, needs depth gauge or stop

Perforated Plumbers' Strapping

attachments

Router



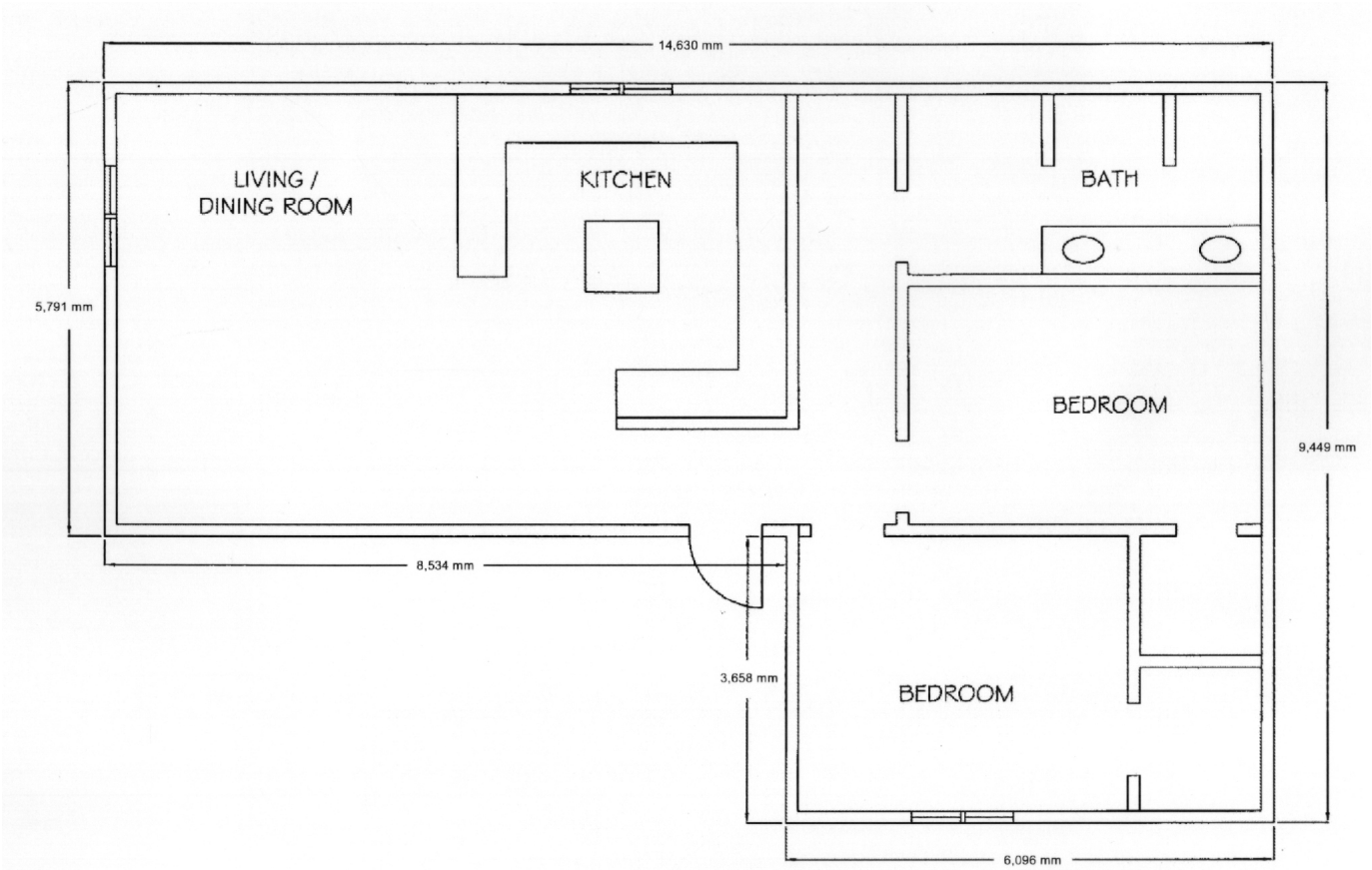
fast, spews foam shavings, needs 38 mm (1.5") bit

The electrician and plumber will need something to cut grooves and rectangles in the foam to allow the placement of conduit, electrical boxes, etc. (These cuts will be made after the placement of concrete). Some options are: Router , Electric saw with depth gauge, hot knife with ICF attachments.

DESIGN

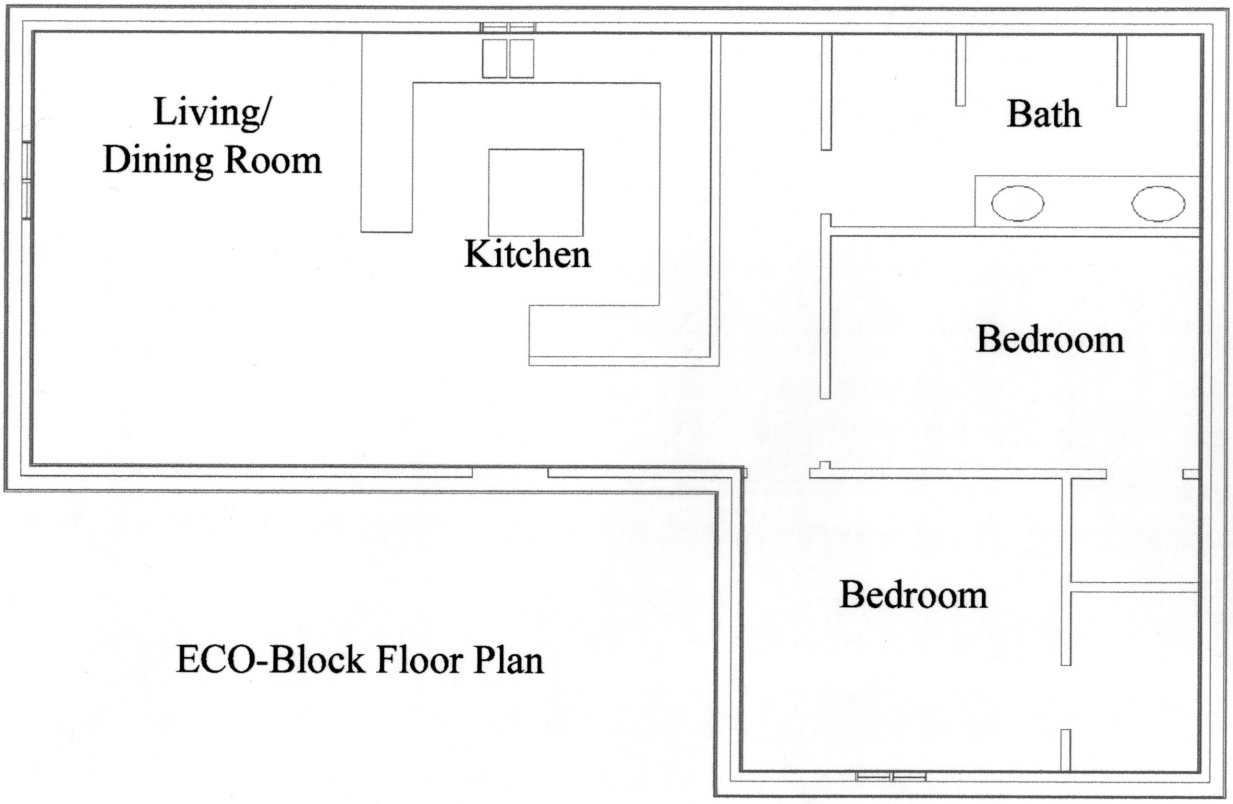
If you are starting with plans designed for another wall system, such as wood frame or concrete block, it is usually easiest to line up the interior side of the new ICF walls with the interior side of the original walls. If you do this all the interior dimensions can stay the same.

Be sure to check for any outside site obstructions such as trees, walls, fences, etc.



Original Floor Plan

ECO-Block is so easy to cut that wall lengths, heights, and openings can all be selected without regard for where the joints between forms fall.



ECO-Block Floor Plan

ESTIMATING

- To find the number of courses you will need take your total wall height in millimeters and divide by your form height.

- To get the total number of corner forms required, multiply the number of courses by the number of corners on the building.

- For the straight forms, add up the outside perimeter of the building and divide by 4, then subtract the number of building corners. The remaining number is the total number of straight forms required for one course.

- Multiply the straight forms per course by the number of courses to get the total number of straight blocks, including openings.

- Add Corner blocks and straight blocks for the total number of forms.

- Calculate the square meter of window and doors.

- Subtract the forms saved at openings from the total number of forms for a solid wall.

- Add 1-3% for waste (the lower percentage if you're more experienced). Minimal waste is accomplished by placing cut pieces larger than 1 web and 2 foam bars back into the wall. See example on the next page.

Note:
An estimating program is available on the ECO-Block web site at **www.Eco-BlockAustralia.com.au**.

Technical Tip: When shipped, the corner forms will be packaged 6 to a bundle, 50% Left Hand & 50% Right Hand. This will automatically stagger the joints.

Connectors

- Take the total number of Standard and Brick-Ledge forms and multiply by the number of connectors per block according to the system you are using (see chart below).
- In order to increase the holding capacity of the bottom course of forms, extra connectors can be added. If you choose to add the extra connectors, you will need to take the perimeter length/4 and multiply by 6 (6 extra connectors per block)
- Take the number of corner forms and multiply by the number of connectors per block according to the system you are using (see chart below)
- Add these together for a total connector count.

System	Form Type	# of Connectors per Block
Standard	Corner	8
Standard	Standard	12

Example:

Connectors:

Straight forms + brick-ledge = 231 x 12 = 2,772

Corner forms = 44 x 8 = 352

Number of blocks per course connectors: 40 x 6 = 240

2,772 + 352 + 240 = 3,364 Connectors total

Concrete

- . Take the total number of forms (not including waste) and divided by the number of blocks filled per cubic yard according to system type and core size.

- One cubic meter of concrete will fill:

System	Core Size	# Of Blocks Filled/m^2	M^3 per square meter
Standard	102mm	20	1 cubic m^2
Standard	152mm	14	1 cubic m^2
Standard	203mm	10	1 cubic m^2
Standard	254mm	9.5	1 cubic m^2

For the purpose of this example let's assume the following:

- (1) #4 horizontally at the top of the wall and at the 1/3 points of the wall.
- (1) #4 every 400mm center vertically
- (1) #4 vertical along either side of each opening, an extra #4 horizontally atop each opening, and one short diagonal bar at the top corners of each opening.
- NOTE: Rebar overlaps at least 600mm on each end.
- Add the three extra bars that go over each opening.
- Determine the total number of meters you will need to cover with your rebar. To accomplish this multiply your perimeter by the total number of horizontal rebar courses.
- When you have the total number of meters, divide this number by the length that each bar will reach (Make sure you account for your overlap)
- Add on the verticals, including one extra along each side of an opening.
- Add 1-3 % for waste
- You can order your corner bars pre-bent so you don't have to bend them
- Horizontal rebar provides temperature and crack control, while vertical rebar provides for side loads like wind, and vertical superimposed loads.

To achieve optimum results when building an ECO-Block structure, the ideal crew would consist of:

- One experienced person (who understands level, plumb and square)
- Two laborers

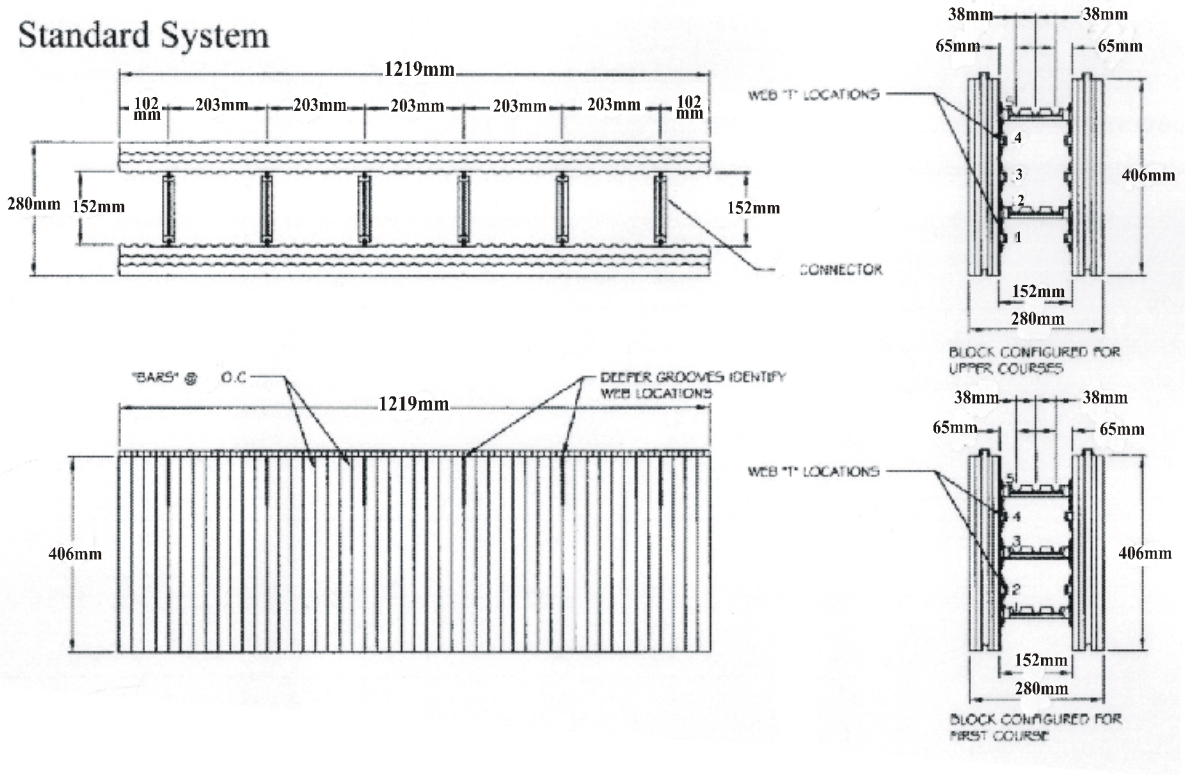
LABOR GUIDELINES

The question is frequently asked-"how much labor is required to install ECO-Block ICFs?" After carefully monitoring many past projects, the following guidelines have been developed. These labor rate guidelines assume that the footings or concrete slab are in place and ready to accept the first course of forms. These rates also assume a standard height of 2.4m. The labor rates include erecting the forms, erecting and stripping the alignment system, placing re-bar and concrete, and cleaning the site.

Installation Guidelines

Assembling and Cutting Standard System

The latching webs and connectors allow for quick and easy assembly of the forms. For the first course of forms, it is recommended that (3) rows of connectors be installed for a total of (18) per block in order to resist the pressure being exerted on the forms from the concrete. These connectors should be installed at the 1, 3, and 5 web “T” locations. Subsequent courses only require (2) rows of connectors be installed, for a total of (12) per block. These connectors should be installed at the 2 and 5 web “T” locations.



Technical Tip:
Use the 1st assembled block as a jig to assemble successive blocks. More experienced builders may elect not to use (3) connectors on the bottom course.

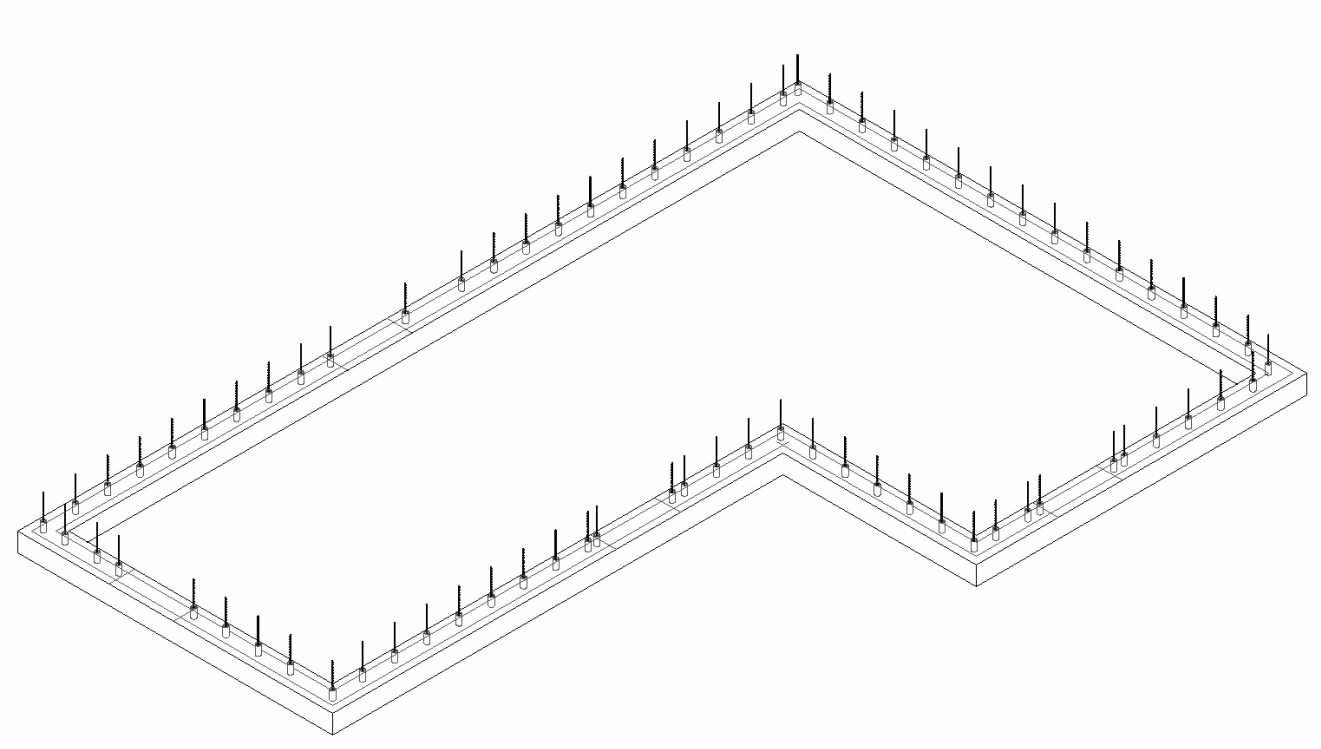
Foundation/Footing with dowel locations and 65mm track installed

Whether you are working off of a footing or a slab, following a few simple layout guidelines will help maintain straight walls. Some options are:

- Snap chalk lines to mark where the outside and inside of the ECO-Block forms will go
- . Attach a 65mm channel to the slab using a powder actuated nailer and place the corresponding side of the ECO-Block forms into the channel. The channel can also be installed while the concrete is wet to allow fasteners to be pushed into the wet concrete.

Technical Tip:

- . Although not required, some builders like to use a PVC or metal collar to capture the vertical rebar, when inserted from above.
- Mark the location of your window and door openings on the footing. This will serve as a reminder of where to cut your forms as you build.



Footing with optional PVC/Metal collars

Build bucks for all the doors and windows as you install the forms. Constructing your bucks out of the Universal Buck system is quick and easy. With the Universal Buck you can build to any length and any R.O. dimension. The 203mm long, modular components fit any size concrete core (100mm+) in increments and cut with ordinary tools.

The End Rails and Filler Pieces are slid together on the job and locked in-place with PVC cement. By staggering the joints of the End Rails and Filler Pieces, bucks of virtually any length can be assembled.

Once the End Rails and Filler Pieces are locked in place with the PVC cement, the Universal Buck handles like dimensional lumber and is cut with standard tools.

Standard Webs (available from leftover/cut EPS panels on site) can slide into the rear slots on the Filler Pieces. These Webs enable the Universal Buck to be tied back into the form with Zip Ties adding stability prior to concrete placement. Similarly, once concrete is placed, the Webs anchor the entire Buck solidly into the concrete.

The Universal Buck is braced with the Corner Buck Braces. For windows, two braces are screwed into the opposite inside corners and two on opposite outside corners. After the concrete is placed and set, the metal braces are removed for reuse.

Technical Tip:

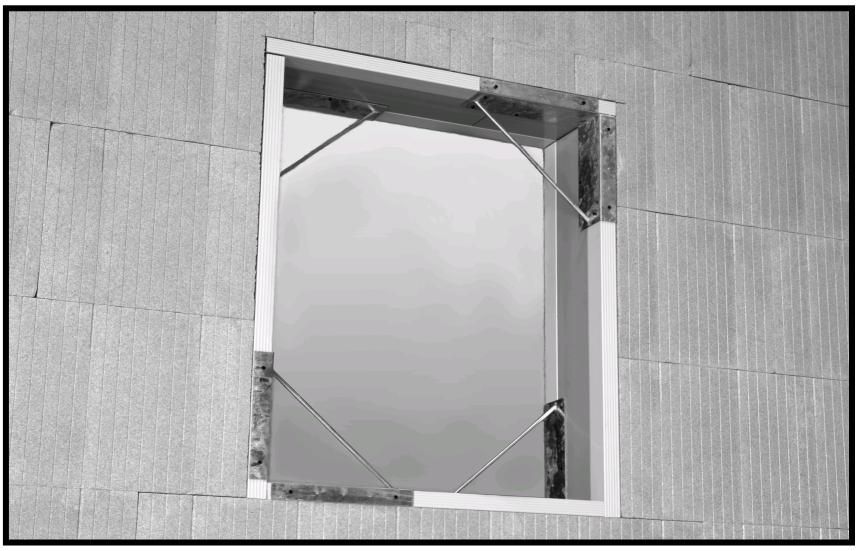
Buck Installation – Leave a small gap (about ½) between the top (header) of the window buck & the bottom of the ECO-Block course above. This allows for a slight bit of settlement while placing concrete.

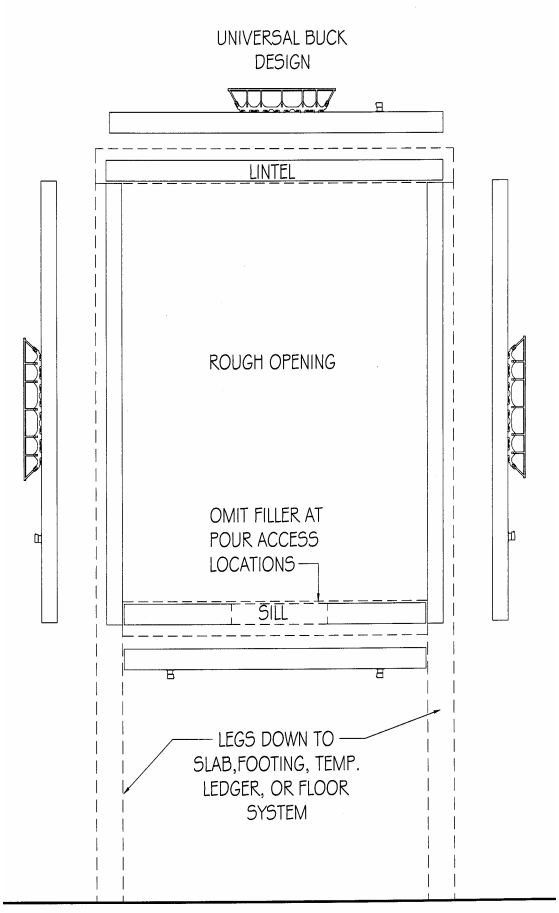
You can construct your bucks from pressure treated lumber or wrap kiln-dried lumber with plastic wrap or DR Sill Seal or other barrier for all parts of the wood that will come into contact with the concrete.

- Add 76mm (3”) to the width of your rough opening for the thickness of the lumber on each side (this assumes that the nominal thickness is 38mm)
- Cut a piece of 2 x 12 to this length for the intel
- For the jambs, take the height of the rough opening and add 38mm for the thickness of one piece of timber. Cut (2) pieces
- Cut (2) 2 x 4’s (for a window) or a single piece of lumber (for a door) to the exact rough opening width for the sill.
- Nail the pieces together with the intel over the two jambs
- Square the buck and attach vertical and horizontal braces to support the buck frame from concrete pressure

Set anchor bolts in each jamb to hold the buck securely to the concrete or nail through the jamb into the concrete cavity with #20 galvanized nails prior to concrete placement

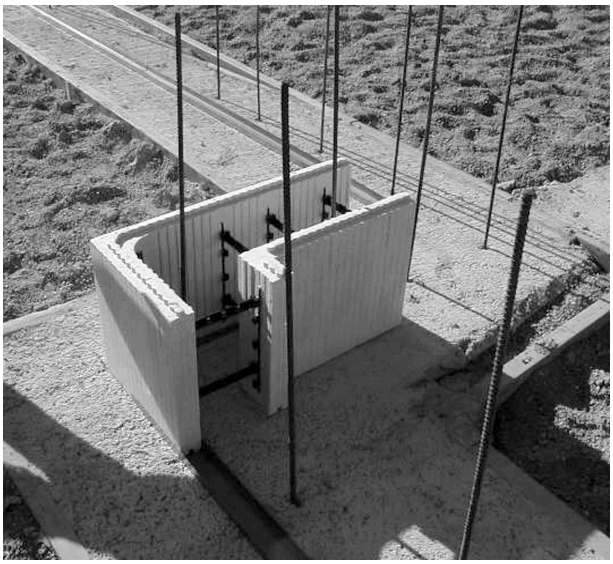
Universal Buck System
With Corner Bracing





Stand the door bucks into position, plumb them and hold them in place with kickers. If possible, run the kickers to the outside to keep your work area clear.

Select a corner to start placing the forms. Place a corner form (right hand or left) at the selected corner and begin to install the first course. Work in one direction around the foundation cutting the forms where necessary. Use Nylon Zip ties to tie the top connector of each adjacent block together. This will help align the first course and create an excellent base for subsequent courses.

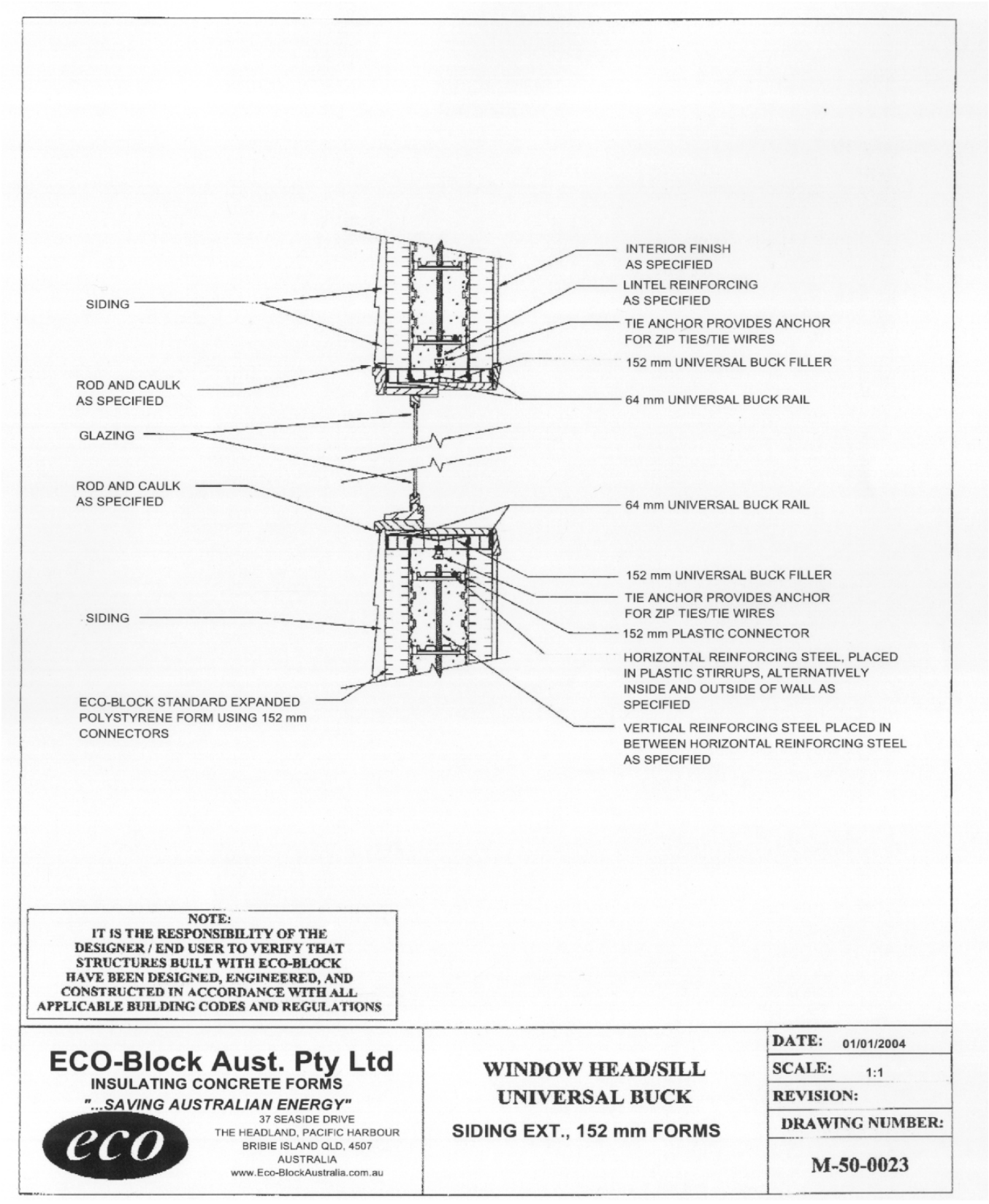


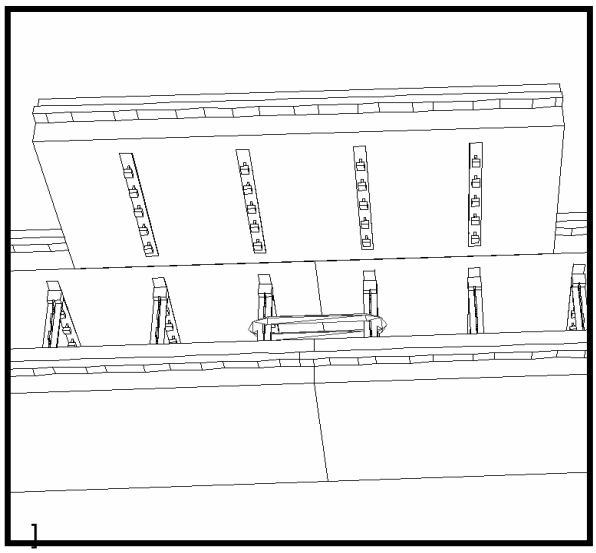
Cut the forms that butt up to a door buck, meet under a window or in the middle of a wall as necessary.

Technical Tip:

Always cut on the form's score lines to keep the serpentine tongue and groove in alignment. Always cut a hair short so you don't have towedge a form into place.

If a cut leaves more than 8 bars past a web, attach a strap across the cut on each side of the form to reinforce the cut.


INTERIOR FINISH
AS SPECIFIED
LINTEL REINFORCING
AS SPECIFIED
TIE ANCHOR PROVIDES ANCHOR
FOR ZIP TIES/TIE WIRES
152 mm UNIVERSAL BUCK FILLER
64 mm UNIVERSAL BUCK RAIL
SIDING
ROD AND CAULK
AS SPECIFIED
GLAZING
ROD AND CAULK
AS SPECIFIED
64 mm UNIVERSAL BUCK RAIL
152 mm UNIVERSAL BUCK FILLER
TIE ANCHOR PROVIDES ANCHOR
FOR ZIP TIES/TIE WIRES
152 mm PLASTIC CONNECTOR
SIDING
HORIZONTAL REINFORCING STEEL, PLACED
IN PLASTIC STIRRUPS, ALTERNATIVELY
INSIDE AND OUTSIDE OF WALL AS
SPECIFIED
ECO-BLOCK STANDARD EXPANDED
POLYSTYRENE FORM USING 152 mm
CONNECTORS
VERTICAL REINFORCING STEEL PLACED IN
BETWEEN HORIZONTAL REINFORCING STEEL
AS SPECIFIED
NOTE:
IT IS THE RESPONSIBILITY OF THE
DESIGNER / END USER TO VERIFY THAT
STRUCTURES BUILT WITH ECO-BLOCK
HAVE BEEN DESIGNED, ENGINEERED, AND
CONSTRUCTED IN ACCORDANCE WITH ALL
APPLICABLE BUILDING CODES AND REGULATIONS
ECO-Block Aust. Pty Ltd
INSULATING CONCRETE FORMS
"...SAVING AUSTRALIAN ENERGY"
37 SEASIDE DRIVE
THE HEADLAND, PACIFIC HARBOUR
BRIBIE ISLAND QLD, 4507
AUSTRALIA
www.Eco-BlockAustralia.com.au
WINDOW HEAD/SILL
UNIVERSAL BUCK
SIDING EXT., 152 mm FORMS
DATE: 01/01/2004
SCALE: 1:1
REVISION:
DRAWING NUMBER:
M-50-0023



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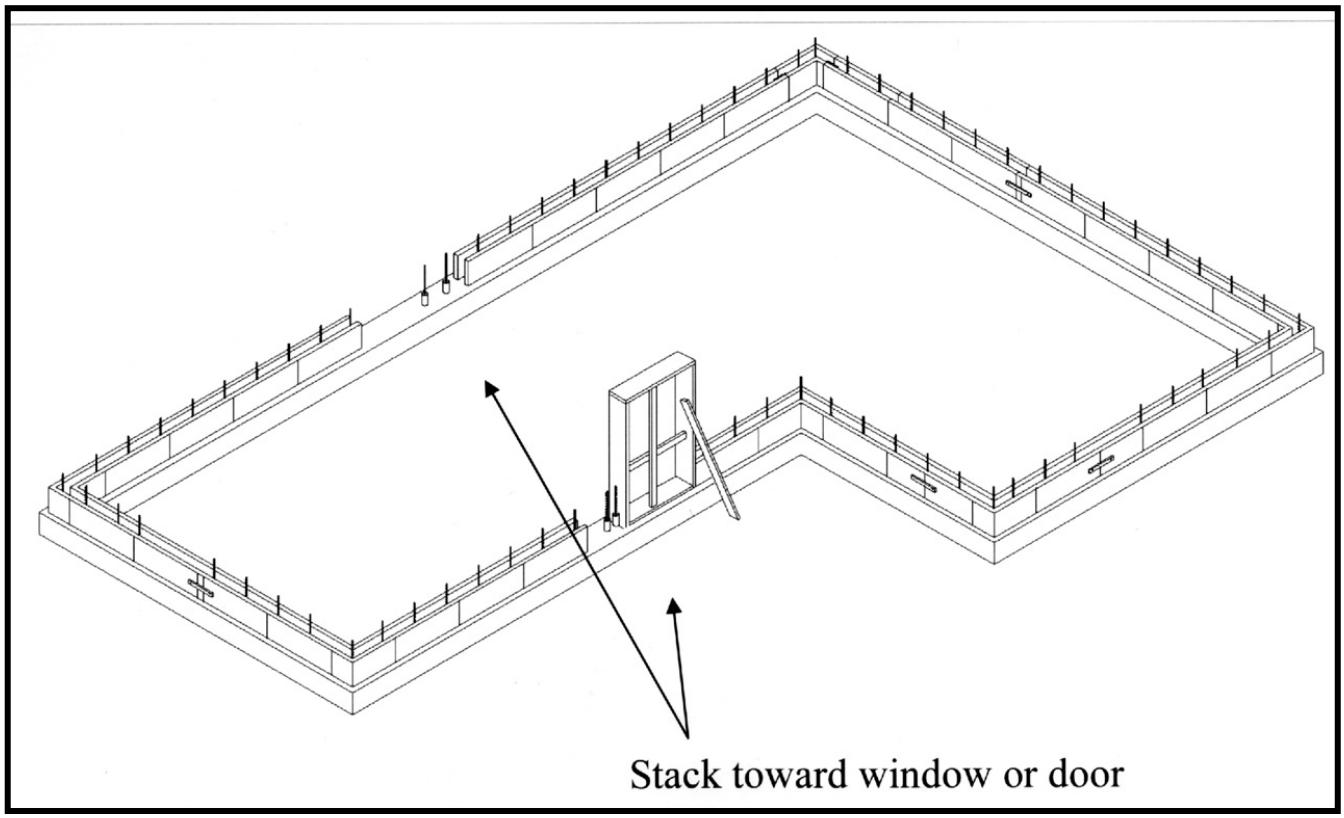
Zip tie or wire the top connectors of all adjacent blocks on the first course together to hold them in line.

Technical Tip: Place a whole or cut piece of ECO-Block on each 1st course block connection. This will ensure that the tongue and groove system is perfectly aligned, allowing for easy stacking.



Start at the same corner as on the first course. If a right hand corner was placed on the first course, place a left hand corner on the second (or vice versa), this will offset the joints 400mm on center.

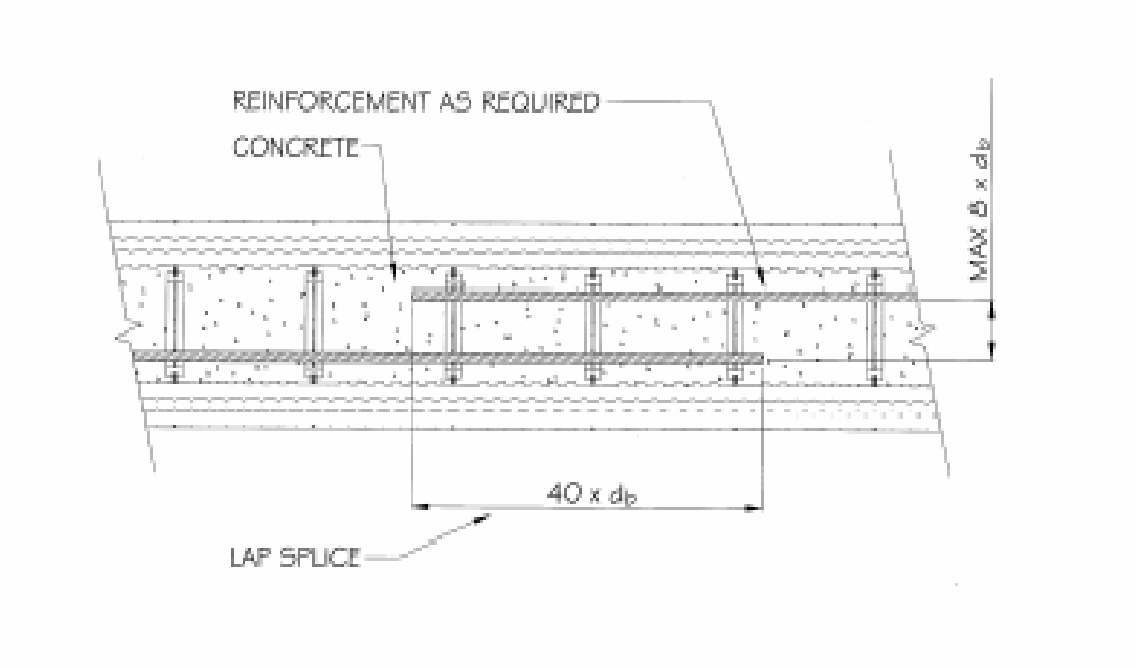
Work around the perimeter in the same fashion as the first course. Cut the forms as necessary making sure to stagger any vertical joint at least 100mm – 203mm. Zip tie or wire the top connectors of each corner block to the adjacent straight panels on all courses.

If you have reached the sill level for the windows, notch the forms, set the bucks and plumb them with kickers. Make sure the kickers are easy to adjust so they can be re-plumbed later if necessary.

Second Course, Leveling and Wall Openings

If the plans call for horizontal rebar somewhere in the second course (between 400mm and 800mm), set it now. Lap the rebar at least the required length (d*b* * 40) and snap the bars into the notches provided on the connectors. Notice that the connectors have multiple locations to snap the bar into allowing you to stagger the location of the horizontal bar as you install additional courses of ECO-Block. Staggering the horizontal bar will allow you to thread the vertical bar between the offset horizontal bars, keeping it securely in the center of the wall. (See upper courses)

Note: The maximum gap between non-contact parallel bars in a lap splice shall not exceed db*8, where db is the diameter of the smaller bar or 152mm whichever is less.

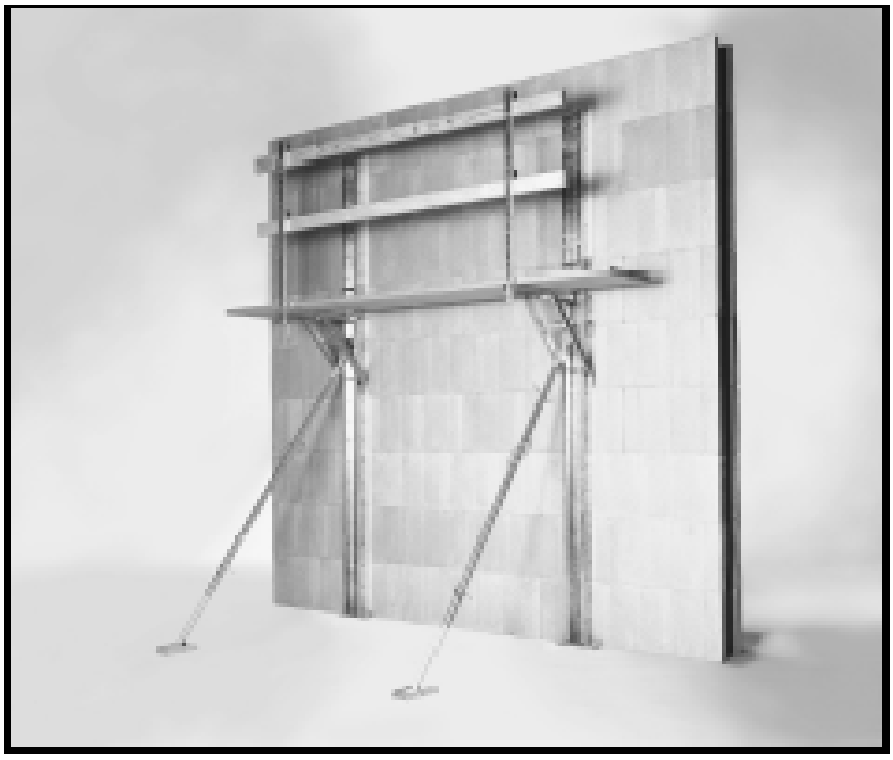


The rules for the third course are the same as those for the second.

Once the third course is in place it is time to attach the ICF Bracing System. Place the strong-backs precisely on the chalk line that was previously snapped on the footing. Screw the strong-backs to the webs making sure the wall is lined up with the chalk line. When screwing into the webs, make sure to place the screws in the top of the slots, snug them, but do not over tighten. This will allow the forms to “settle” slightly as the concrete is placed. When the wall is plumb, attach the foot of the strong back to the slab or footing with concrete nails or tapcons. Now, secure the diagonal turnbuckle to the slab or soil making sure the turnbuckle is in the middle position so it can be adjusted in either direction as necessary.

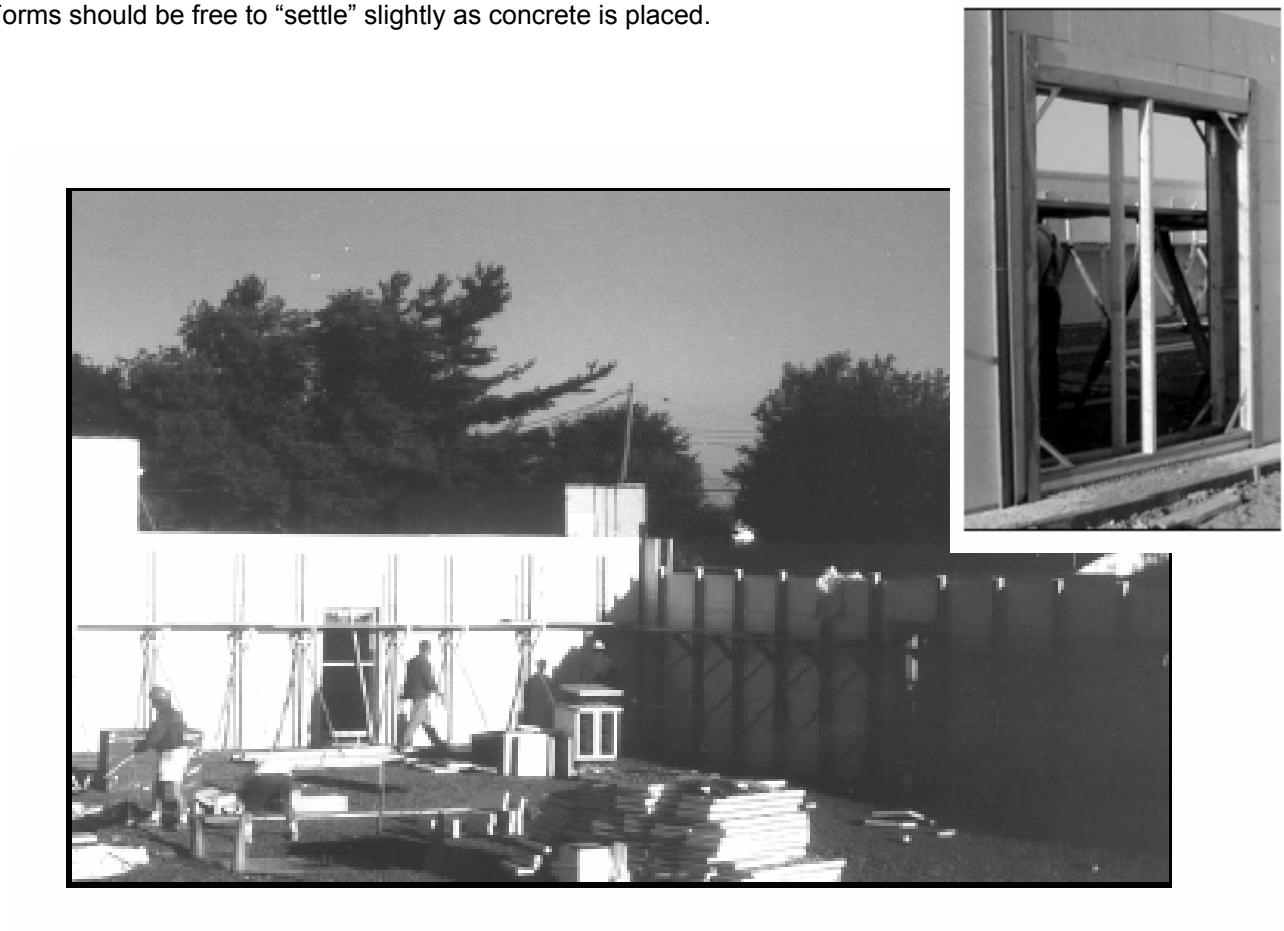
Note: If the walk boards are 2.4m or more above the ground, OSHA requires scaffolding to have toe boards and handrails.

When determining the spacing of the ICF Bracing System, place a brace as close as possible to the corners while still allowing the scaffold planks to pass by each other. Then, installthe braces every 1.2m-1.8m on center as necessary. The brace spacing for your project will depend on your experience level as well as the height and core size of the wall you are constructing



Third Course and Wall Alignment Installation

Technical Tip: When attaching the ICF Bracing System to the walls, be sure to place the screws in the top of the slots. Snug them, but do not over tighten as over tightening will strip out the screw hole in the plastic webs. Forms should be free to “settle” slightly as concrete is placed.



ICF Bracing System installed

UPPER COURSES AND VERTICAL REBAR PLACEMENT

Continue to stack the ECO-Block following the rules for the second and third course.

When you get to the window and door bucks, notch the forms as necessary. Attach the bucks securely to the forms by placing wooden flanges screwed to the face of the wall and into the bucks.

Strapping tape can also be used to secure the bucks to the forms. If the plans call for horizontal rebar in the top course, set it now. Make sure to maintain the staggered pattern.

Thread the vertical rebar between the staggered horizontal bars making sure there is one vertical bar next to each dowel coming out of the foundation. Tie each vertical to the horizontal along the top or to a connector to hold it firmly in the center of the wall.

If this is the top story of ECO-Block, make sure the vertical rebar is 80mm below the top of the wall or bottom of the sill plate. If another story of ECO-Block will be built on top, make sure to leave enough rebar extending beyond the top of the wall to maintain the minimum lap requirements.

Technical Tip:

Tie each vertical a little “off” the bottom, so it provides weight on the wall and helps hold the forms firmly together. Keep vertical bar down 3” from the top of wall. Remember to maintain your minimum lap splice requirements.

Installing a floor ledger system in conjunction with your ECO-Block wall system is an easy task. Several companies have made ICF floor ledger attachment systems, including Simpson Strong Tie. The Simpson Strong Tie ICF Ledger Connector System (ICFLC) installs quickly and allows the ledger board to be set after the concrete is placed.

To install the ICFLC follow these steps:

1. Snap a chalk line on the wall at the appropriate location marking the top and bottom of the ledger board.
2. Mark the required on center spacing (this can be done with a marker or by making an indentation in the foam with the ICFLC bracket).
3. Make a vertical cut at the marked locations.
4. Insert an ICFLC bracket through each cut. If a good friction fit is not achieved, glue the exposed flange of the ICFLC to the foam to hold it in place during concrete placement.
5. Concrete can now be placed.

Installation of a wood ledger:

1. Slip the CFLC-W underneath the wood ledger (see illustration on opposite page)
2. Verify that the ledger board is level and at the proper height. Once this has been verified, attach the 6 screws, screwing through the ICFLC-W, ledger board and into the IICFLC.

Installation of a steel ledger:

Place the steel ledger directly up against the ICFLC (making sure the ledger is level and at the proper height) and attach the required number of screws through the steel ledger and into the ICFLC.

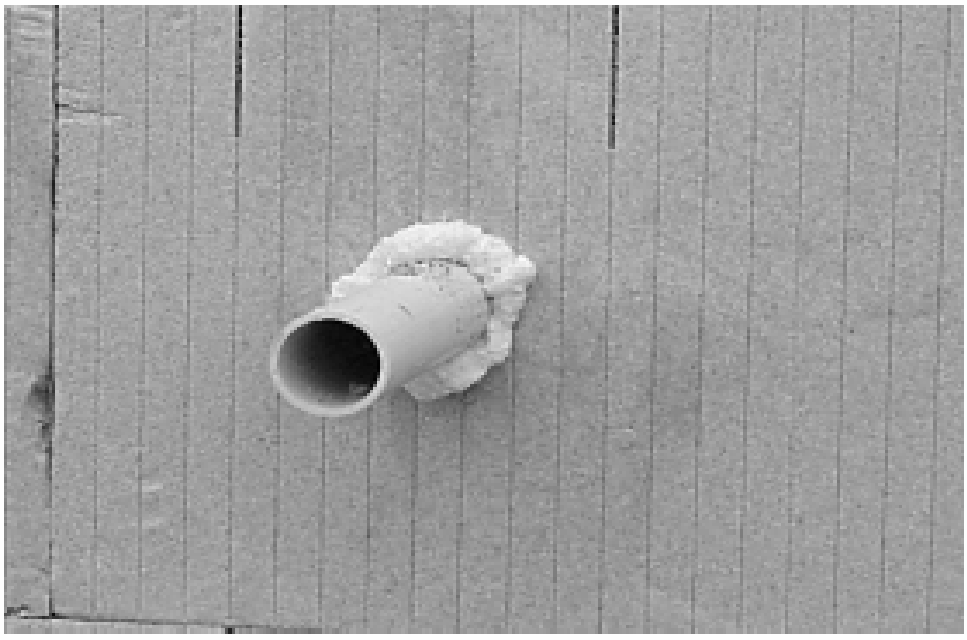
Wall Inserts and Other Pre-Placement Attachments

Put sleeves for penetrations and anchors for interior walls into the formwork before the pour.

Place a sleeve for anything that will have to pass through the wall, such as:

- Water, electric, phone, CATV and gas service
- Sewer connection
- Wire for outdoor lights and doorbells
- Pipe for outdoor spigots

Use a length of PVC pipe longer than the width of the wall for easy placement. The diameter of the PVC pipe should be slightly larger than what will be placed through it. After the pour is complete and the bracing system is being removed, trim the excess length of PVC flush with the forms.



Technical Tip: Make a comprehensive list of penetrations and add to a pre-pour checklist.

Plumbing the wall

Plumb and straighten all walls before the pour. By attaching scrap 50mm x 90mm in the corners vertically on the top course of forms you will be able to run a string line around the building. As one worker measures along the wall to make sure the distance between the string and the wall is consistent, someone else can be adjusting the kickers as necessary to bring the wall into plumb.

Technical Tip:

Again, check to make certain that the diagonal turnbuckles of the wall alignment system are adjusted to the middle of their travel.

Covering the top of wall

If another story of ECO-Block will be built on top of this one, cover all the top edges of the wall with wide tape or something else removable. This keeps the top of the forms clean, which allows additional forms to be stacked on top.

Technical Tip:

1.2m-1.8m pieces of plastic or aluminum gutter work well to cover the top of the wall. These pieces may be moved along as you pour. Wide tape will also work well to cover the top of the block

Pre-Placement Checklist

Reserve a few hours the day before the pour to double-check the wall. Foam is easy to correct, concrete is hard.

Item	Done
Does the layout match the plans everywhere?	
Are the walls plumb everywhere?	
Are the walls square?	
Is the top of the wall level?	
Are all bucks in place, level, plumb and square?	
Is each buck securely connected to the forms?	
Are all bucks diagonally braced against racking?	
Are all cuts and potential weak spots reinforced?	
Are all penetration sleeves in place and glued securely?	
Are all anchor bolts for interior walls in place?	
Is the top course of horizontal rebar (if any) in place?	
Are all vertical bars in position and tied securely?	
Are all beam pockets installed?	
Are all lintels properly reinforced?	
Is the ledger or ledger connections (if any) in place and securely fastened?	
Have you planned out the position of the anchor bolts or straps (if any) at the top of the wall?	
Do you have enough anchor bolts or straps on hand for the top of the wall?	
Do you have squares of plywood or scrap 1x4s to screw over the wall if weak spots appear?	
Have you received your building department inspection and approval?	
Have you received your engineer inspection and approval (if necessary)?	
Is the job site clear for the operation of the concrete truck, pump (if any) and the crew that will be on the ground?	
Is the concrete ordered and quantity verified?	
Is the pump (if any) ordered?	
Is the site clear?	
Is there good access for the pump truck and concrete truck?	

Concrete Placement

Below-grade pours (such as foundations) can be done out of the chute of the concrete truck or conveyer, however using a pump is best.

Above-grade pours require lifting equipment. Most popular is the boom pump because of its easy maneuverability. Order a boom pump with a line reduction 50 to 75mm hose and with two ninety-degree angles near the end (forming an “S”) or a loop attachment. Both of these slow down the flow of the concrete.

A line pump is smaller, and often less expensive. Order one with a 80mm line or less.
You will need 1-2 workers on the ground during the pour to help move the line.

Conveyor

Concrete Truck

Boom Pump

Amount

After the wall is built and ready to pour, re-estimate the amount of concrete. Do not rely on the original estimate. The layout may have changed.

A quick way to re-estimate the number of cubic meters of concrete needed is to count up the number of blocks in the walls, and divide:

For 102mm (4") walls	**Divide by 20**	**one cubic meter fills 20 blocks**
For 152mm (6") walls	**Divide by 14**	**one cubic meter fills 14 blocks**
For 203mm (8") walls	**Divide by 10**	**one cubic meter fills 10 blocks**
For 254mm (10") walls	**Divide by 9.5**	**one cubic meter fills 9.5 blocks**

Mix:

We recommend the following specifications for the concrete:

Compressive Strength	**1,360kgs at 28 days**
Aggregate size	**9.5mm for the 102mm (4") block;**
	12.7mm for the 152 mm (6") block;
	19mm for the 203mm (8") block;
Water/cement ratio	**Less than 0.6**
Slump	**5.5 – 6.5**

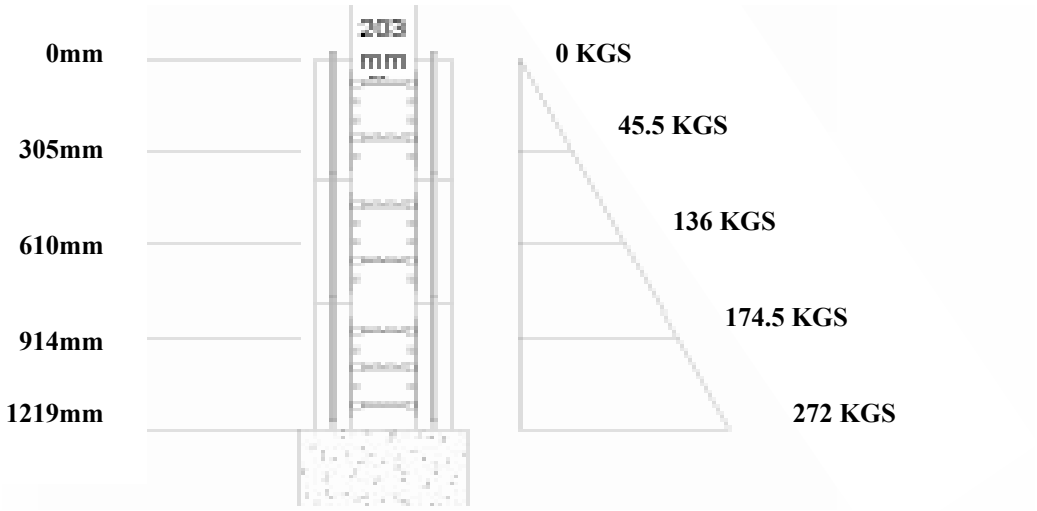
Consult the concrete supplier for the availability of an ICF mix design.

If the engineer or architect on the job specifies another mix design, follow their specifications.

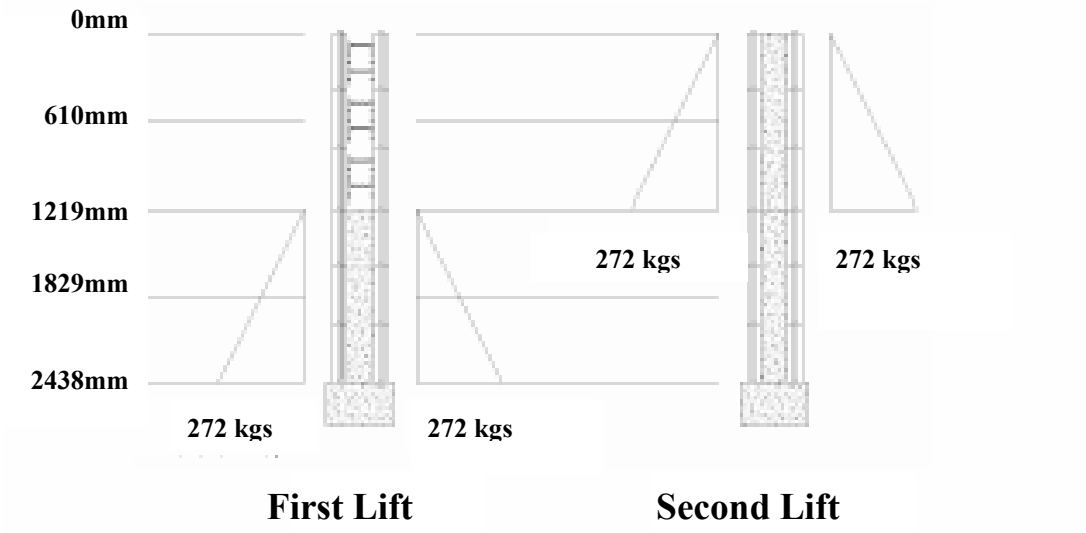
DO NOT ADD EXTRA WATER TO THE CONCRETE, EITHER AT THE PLANT OR AT THE JOB SITE. THIS PRODUCES WEAK CONCRETE AND INCREASES THE PRESSURE ON THE FORMS.

During the pour, concrete puts outward pressure on the forms. ECO-Block is designed to withstand it. However, the installer needs to avoid steps that would dangerously increase these pressures.

The outward pressure is highest at the bottom of a lift. That is the reason for extraconnectors and bracing near the bottom.



As the concrete hardens, the pressure gradually reduces to near zero. By the time the crew begins the second lift, the concrete of the first lift has usually cured enough that there is little likelihood of difficulties in the bottom of the wall. As the second lift is poured, the highest pressure occurs at the bottom of the second lift.



Things that increase the outward pressure on the forms are:

- . The force of the falling concrete
- Vibration
- . Water added to the concrete

As concrete falls into the forms it exerts an outward pressure approximately 1.5 times greater than the pressure it exerts when it is resting in the forms. Many recommendations are geared towards minimizing this extra pressure, including using an S-bend on a boom pump, a 80mm line on any pump, and breaking the fall of the concrete from the chute with a shovel. Not doing these things will increase the pressure on the forms and the risk of form failure. The maximum pressure develops at the bottom of the lift.

Vibrating the forms will also increase the pressure approximately 1.5 times. Using a smaller diameter vibrator can significantly reduce this pressure. The recommended diameter is 30mm. Under no circumstances should a vibrator greater than 2.5mm in diameter be used on the walls. When the walls are being vibrated maximum pressure will again occur at the bottom of the forms, so be sure to watch carefully. Other forms of vibration (tapping the wall along the webs, applying a hand sander or reciprocating saw externally along the webs) have a similar but lesser effect.

Adding extra water to the concrete can increase pressures more than 1.5 times depending on the amount added. It also weakens the final concrete, and may weaken it below what is required. Therefore ADDING EXTRA WATER TO THE CONCRETE IS NOT RECOMMENDED.

Note: Because the cavity on a 100mm wall tends to fill much faster than a 152mm or thicker wall, the concrete pressures tend to occur quicker. PLACE CONCRETE VERY SLOWLY WHEN FILLING A 100mm WALL!

Plan to get experienced help the first couple of times you place the concrete.

Select a starting point near the center of a wall. Begin placing concrete in the wall, swinging the concrete hose in a back and forth motion, while moving around the wall perimeter.

Each pass around the wall perimeter is considered a “lift”. Concrete should be placed in 3’-4’ lifts until the wall cavity is filled.

The swinging motion of the hose allows the concrete pressure to be evenly dispersed over several feet.

When pouring a corner swing the hose to either side of the corner allowing the concrete pressure to be dispersed away from the corner, NOT directly in the corner.

Follow the same procedure on the remaining walls, working around the building in a consistent direction (clockwise or counterclockwise).

Follow the same procedure outlined above as many times as necessary until the wall is filled keeping in mind that if another story of ECO-Block will be built on top of this one, the concrete should be kept at least 100mm below the top of the wall.

If the concrete is being placed out of a chute, have one worker hold a shovel at the bottom of the chute to direct the concrete and slow its fall.

Technical Tip: While the walls are being poured, protect the top of the block with tape (masking, duct, etc.). This will keep the tongue connection clean allowing for easy stacking of additional forms.

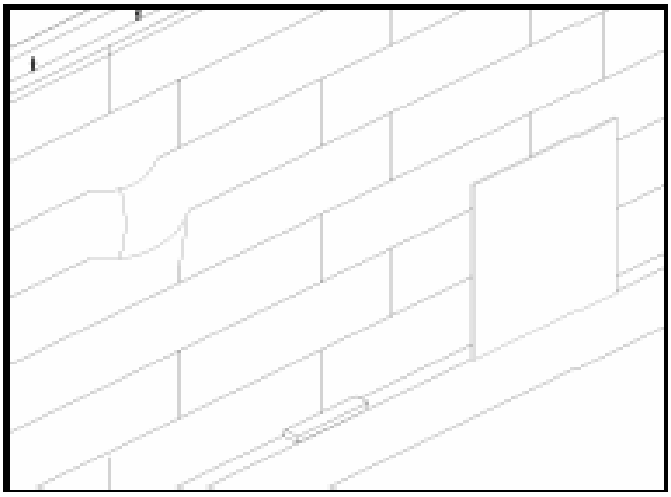
Have 1-2 workers on the ground continuously consolidating concrete and watching for bulges, should they occur.

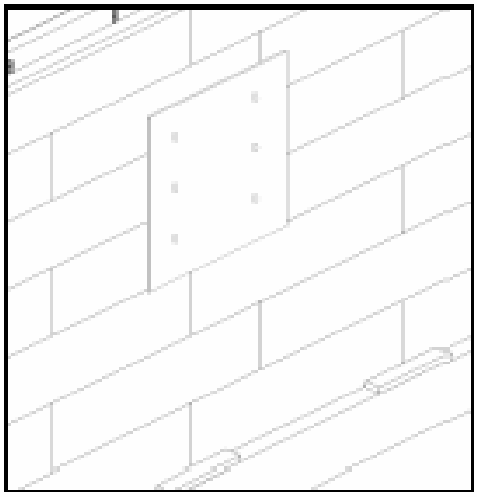
Some consolidation methods are:

- Use an internal vibrator – 19mm – 20mm diameter or less. Remember to consolidate from the bottom of the wall towards the top, and be careful not the hit the sides of the form.
- . "Rodding" – plunge a length of rebar up and down a few times into the concrete from above.
- . Touch the vertical rebar with a reciprocating saw after the blade has been removed.

Consolidate every foot or so repeatedly down each wall, following the pour.

If the crew spots a bulge, reinforce it with a square of plywood or some 100 x 25mm screwed flat over the bulge. Screw these wood reinforcements directly to the ECO-Block webs with #10 course thread drywall screws.





Technical Tip:

- . Put a 50mm x 90mm timber against the wall over a web and tap it lightly with a hammer or vibrate it with a hand sander or the end of a reciprocating saw with no blade in it.
- . Protect the top of the wall from damage with aluminum or plastic gutter pieces or tape.

If any of the foam happens to blow out, stop the concrete placement on that wall. This rarely happens but it is possible if the rate of placement has been too fast, or the concrete is too wet. Move the placement to the next wall and continue to work as the crew repairs the hole. To repair the hole, remove the concrete down to the bottom of the hole. Replace the torn form fragment, cover it by screwing plywood or 100 x 25mm to the webs at least 41mm, or (2) webs beyond the torn form. The placement can now resume on the repaired wall.

If you are building another story of ECO-Block on top of this one, leave the concrete rough on top and at least 100mm below the top of the wall. If a roof or frame walls will go on top, trowel the concrete smooth and check the wall for level at close intervals. Insert anchor bolts or straps as necessary for the roof trusses or top plate. Before, during and after placement, check the string line and adjust the braces as necessary to bring the wall to perfect plumb everywhere. Immediately after the pour, check all dimensions, including diagonals and adjust as necessary.

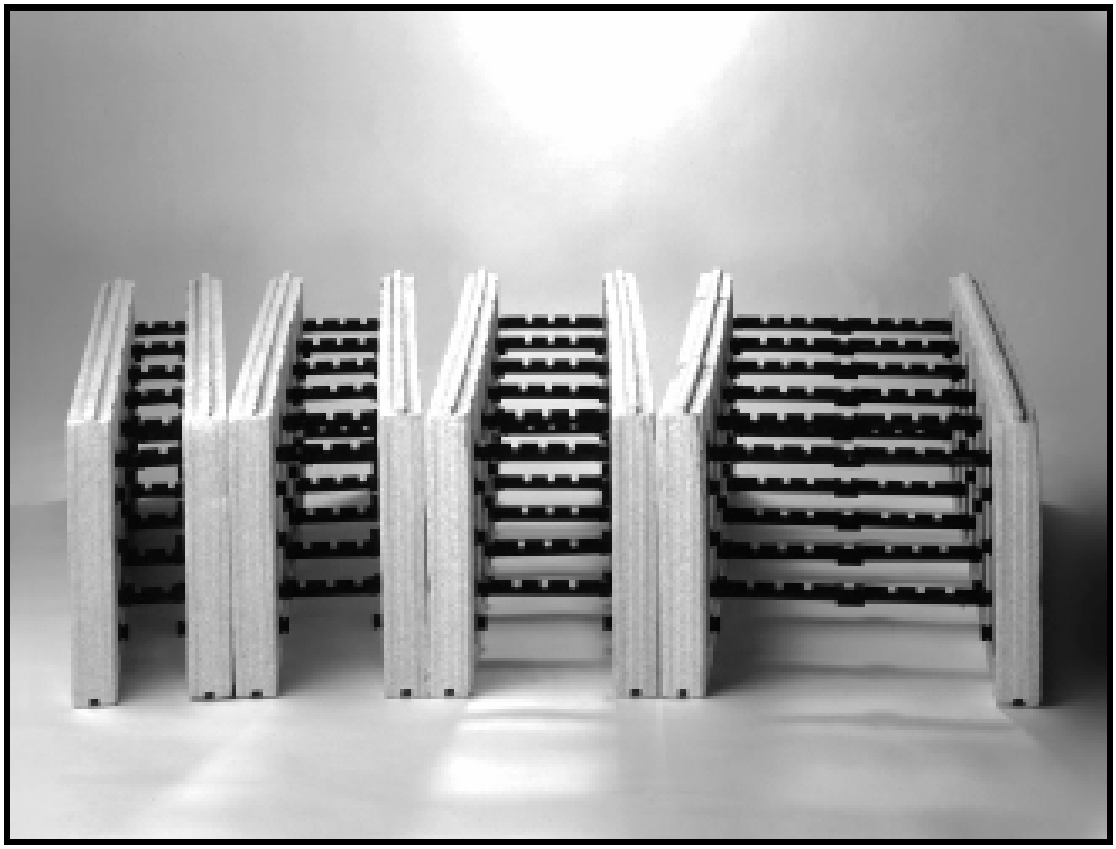
Any time after the concrete has set up (at least one day), the reinforcement from both sides of each buck can be removed.

Do not remove the bracing and scaffolding until the concrete has reached adequate strength, usually 3-5 days.

It is possible to get a wall of almost any thickness by linking the standard 100m, 152mm, 203mm, and 250mm-connectors with the ECO-Block connector splices. After linking connectors to the desired length, insert them into the forms following the standard procedure. Utilization of our splice connectors allows walls to be created from 100mm to 610mm +, in 5mm increments.

Be certain to include all necessary connectors and splices in your materials estimates. Also, on walls 250mm thick or more, connect at three locations (T's) per web. This is only necessary for courses exceeding 600pcf, or usually the first three courses. (see concrete pressures)

Wide Walls



Technical Tip:

When creating a wall greater than 300mm please contact your Distributor or the ECO-Block office for specific instructions.

T-Walls

With the ECO Block System, T-wall intersections are easily and quickly accomplished. A “T” wall occurs when one wall has a second wall adjoin it in the middle of its run.

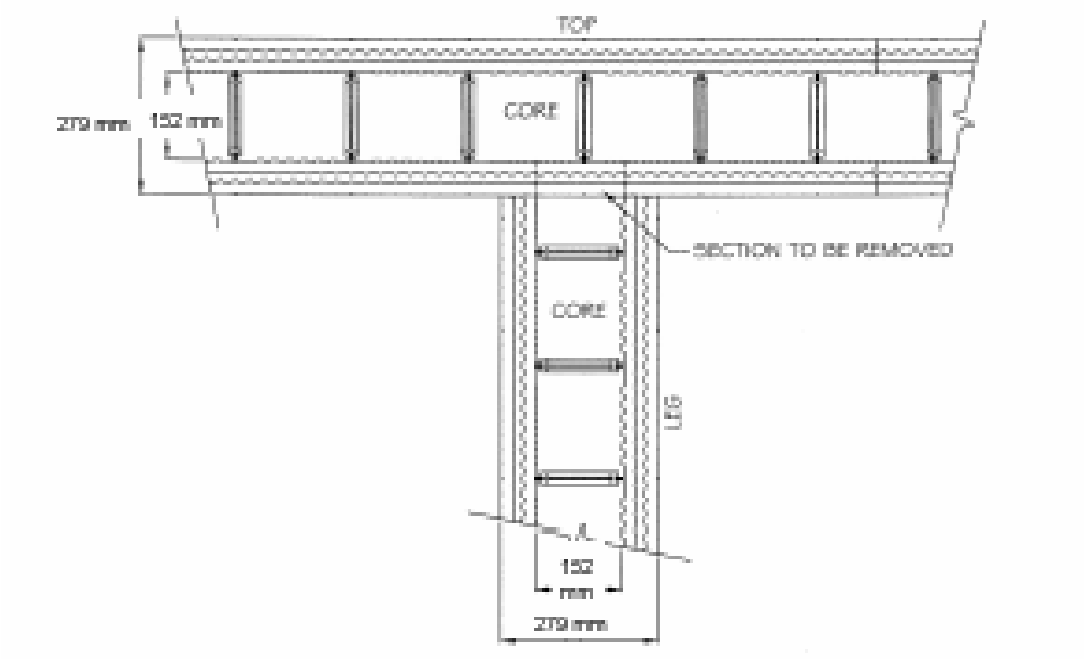
To build a T-wall, place the first block of the wall that forms the *leg* of the “T” against the wall forming the *top* of the “T”. Mark the panel of the *top* of the ”T”, indicating where the concrete core of the *leg* wall will be. This is the section that needs to be cut and removed.

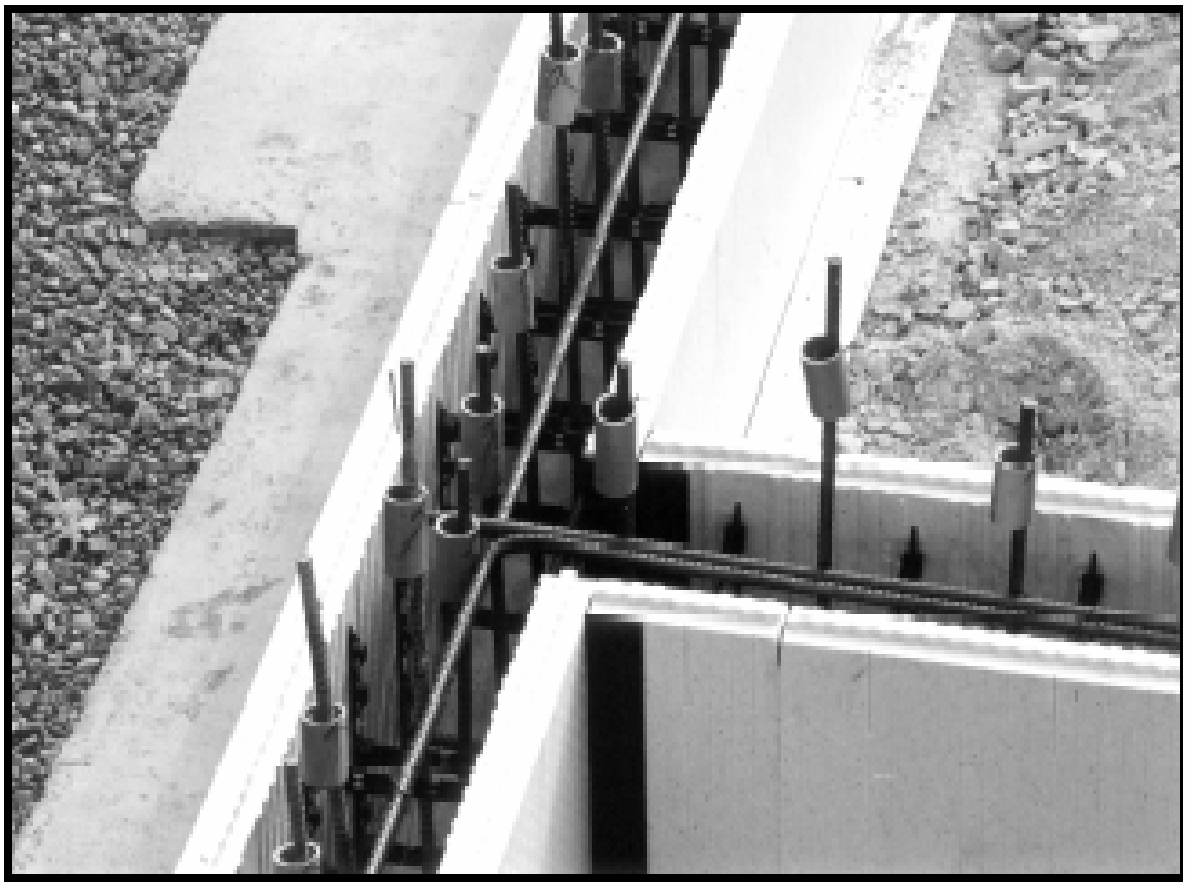
Should the concrete core of the *leg* wall occur where a web is positioned in the *top* wall, cut and remove this section of panel including the web. This situation is why we have the Tie Anchor to tie the outside of the removed web to the webs in the *leg* of the “T”.

Assembly

If the *leg* wall core occurs between the webs of the *top* wall, simply butt the forms together and use (2)-900 ECO TIES around the connectors of both walls to pull the walls together.

If the *leg* wall core occurs where a web has been removed, use (2)-Tie Anchors attached to the second and fourth positions of the remaining web in the *top* wall. Use (2)-900mm Zip Ties to pull the walls together by slipping an ECO TIE through each of the Tie Anchors and around the connectors of the *leg* wall.





Technical Tips:

Remember the “4 BAR” rule. If a cut leaves more than 4 bars showing past a web, additional shoring should be installed prior to placement of concrete.

Use caution when tightening the ECO TIES. It is possible to pull the outer panel of the “top” leg wall in too far. Properly tightened, there should be no more than .3mm of inward deflection.

Place rebar as specified!

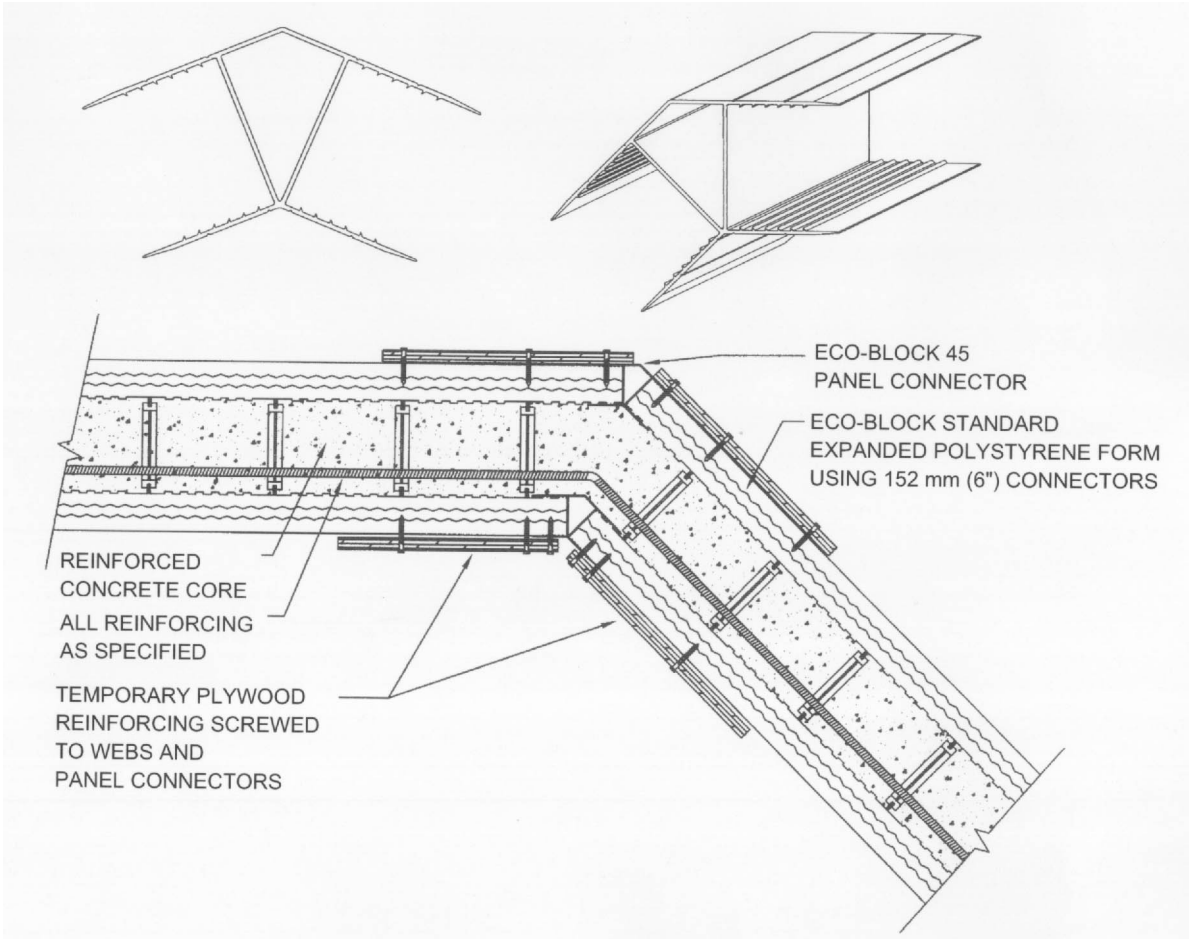
45° Corners

- The 45º panel connector is an excellent way to create 45º corners on the job site.

- The 45º panel connector has been designed to eliminate mitering on the job site. Simply slide the panel connector over the end of the standard panel and instantly the 45º corner has been created. When creating the inside corner, make sure to line up the webs – some cutting will be required.

- The 45º panel connector has “teeth” allowing it to grip the panels, however installing additional strapping to prevent a weak spot during concrete placement is a good idea.

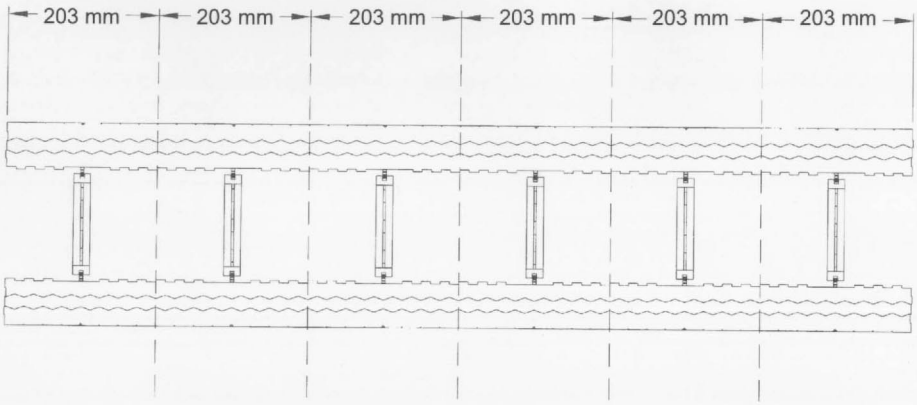
- The illustration below depicts one possible method of reinforcement. The use of zip ties will also provide additional strength to the corner when placing concrete.



Radius Walls

To create a curved wall:

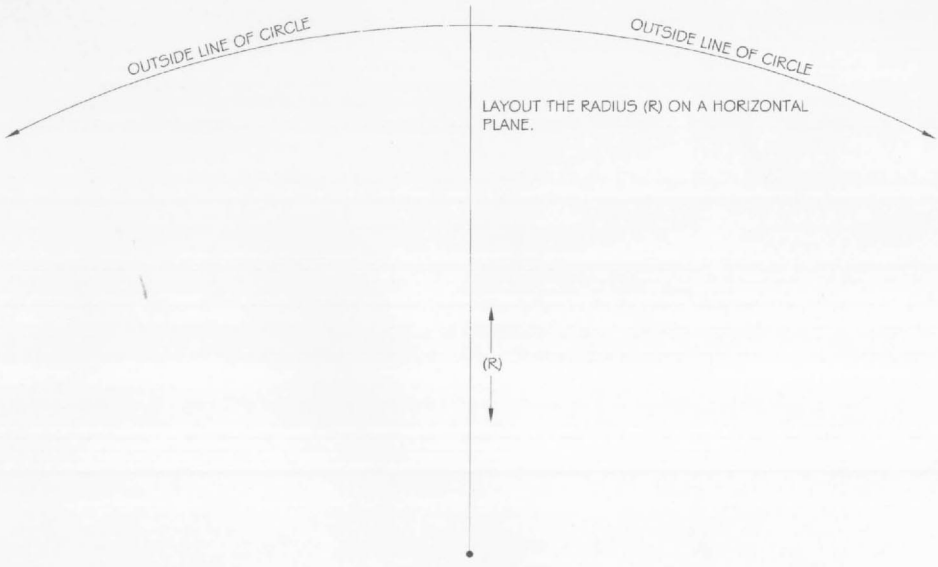
Step 1: Cut straight panels into 203 mm (8") increments. When cutting, make sure you keep the web centered in the 203 mm (8")



CUT BLOCK IN 203 mm (8") INCREMENTS
KEEPING THE WEB IN THE CENTRE

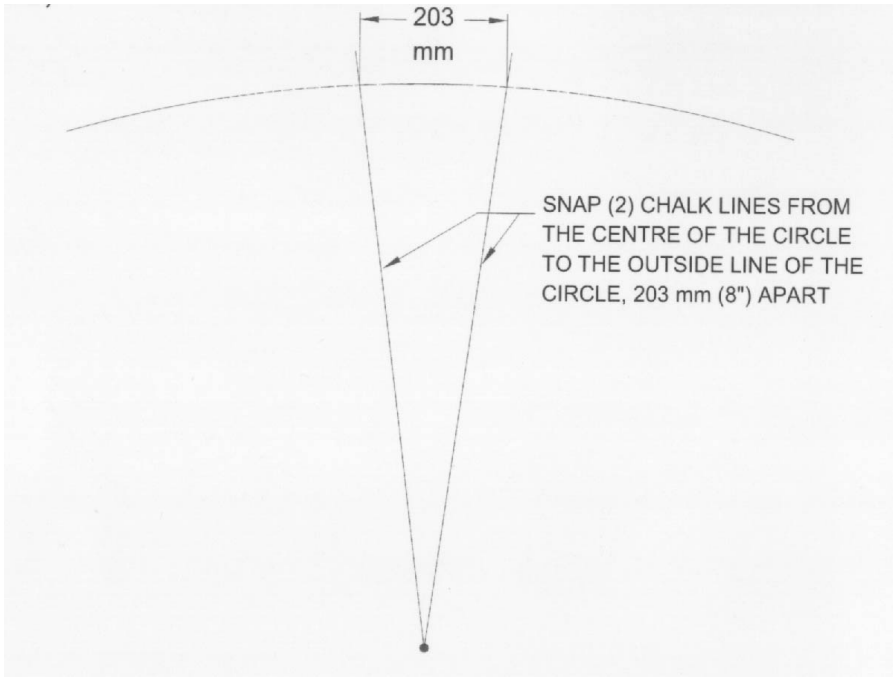
Step 2: Mark the outside of the radius on the footing or slab.

If site conditions do not permit the radius to be marked on the footing or slab, any horizontal surface will do.

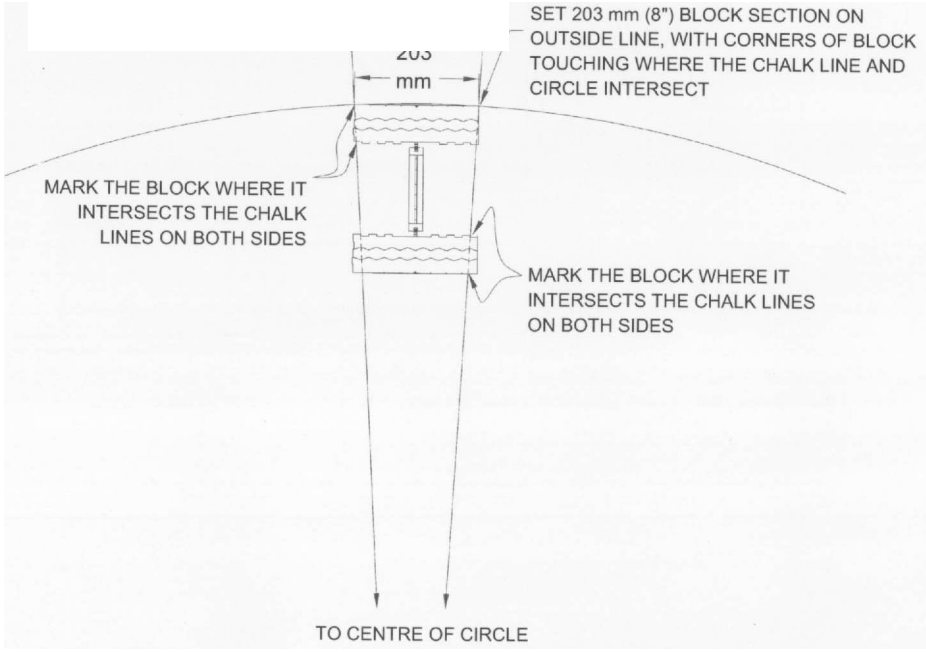


Step 3: From the center of the circle, snap a chalk line extending beyond the mark for the outside of the radius.

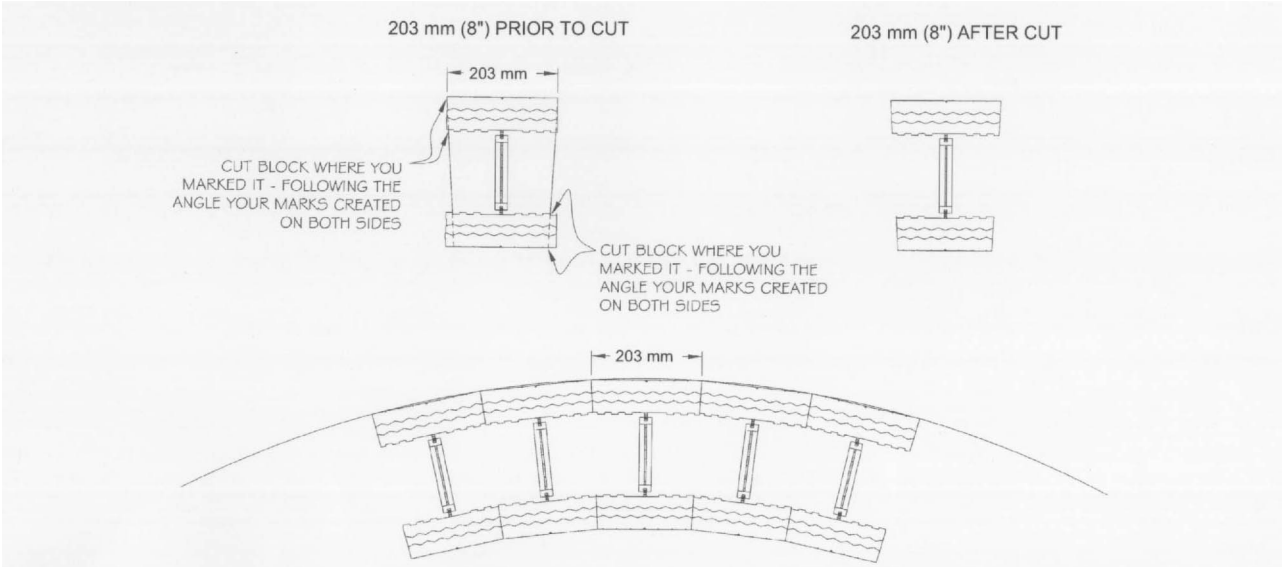
Step 4: From the intersection of the two lines, measure 2.3mm horizontally. From the center of the circle, snap another chalk line at the 203mm mark.



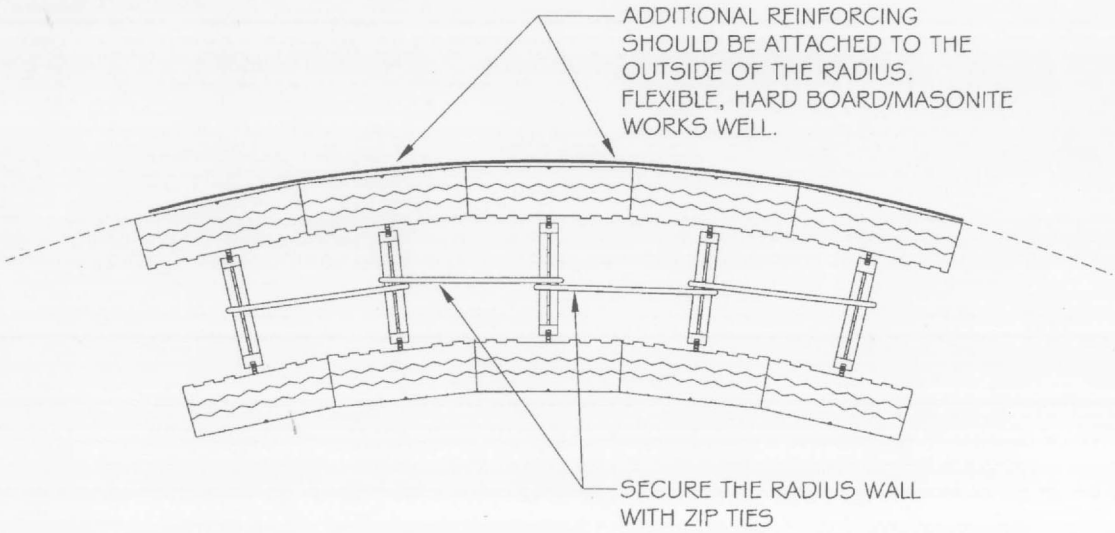
Step 5: Set (1) of the 203mm block sections on the outside radius line. Make sure the outside corners of the block are at the intersection of the chalk lines and the radius line.
Mark the block where it touches the chalk line.



Step 6: Cut the block where you marked it, following the angle your marks created.



Step 7: Zip tie the blocks together. Additional reinforcing in the form of flexible, hardboard / masonite should be attached to the outside of the wall.



Note: Steps 5 and 6 will need to be repeated until the proper number of blocks have been cut to complete the wall.
Stack the forms, aligning webs vertically

ATTACHING FRAME WALLS

Attaching interior frame walls to the exterior ECO-Block walls can be accomplished in a number of ways.

Method 1:

- Prior to concrete placement, locate the interior walls. Insert the proper anchors through the foam and into the concrete core. Upon concrete placement, the anchors will be embedded into the concrete core.

Method 2:

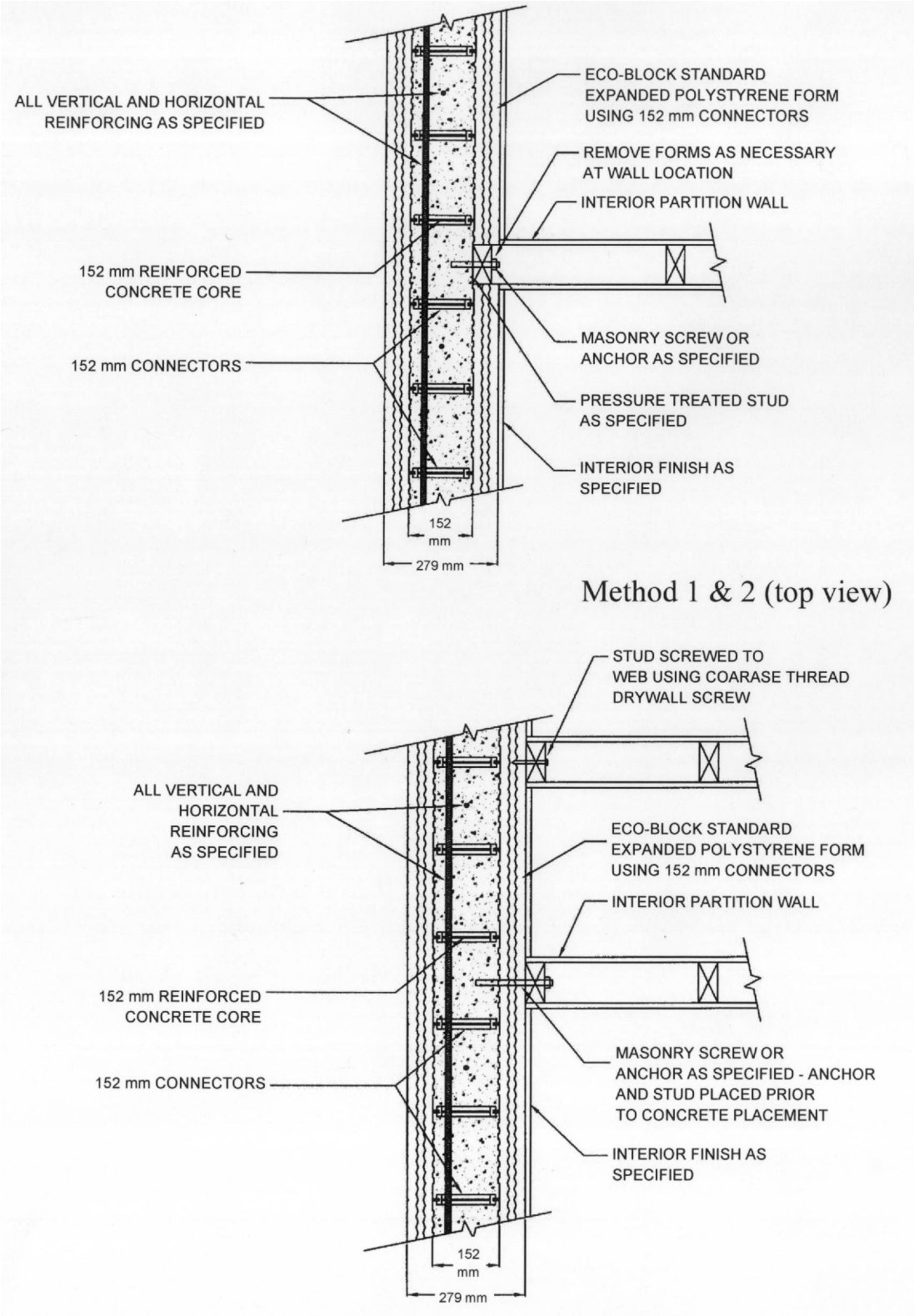
- If the interior walls happen to fall on one of the webs that are located every 203mm on center, simply screw the stud to the web with a coarse thread drywall screw.

Method 3:

- Locate the interior wall partition and remove the section of foam. By removing the foam, the treated stud can now be anchored directly to the concrete core with the proper mounting hardware.

See the illustrations on the following page.

Attaching Frame Walls

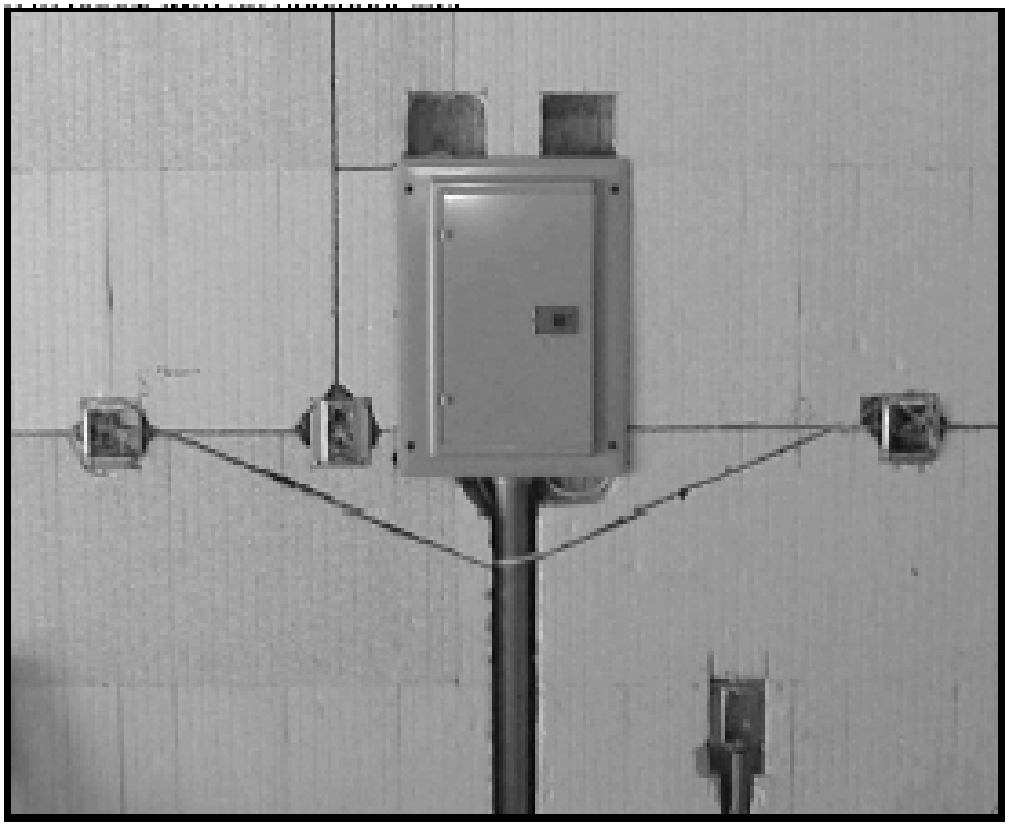


Electrical and plumbing lines are easily installed into the ECO-Block wall. For electrical boxes, use a hot knife or router to remove the foam at the desired location. Once the foam is removed the boxes can be screwed to the webs using a standard drywall screw, screwed to the concrete using concrete anchors, or glued to the concrete.

To create channels in the foam for wiring, use a hot knife, router, or electric chain saw with a depth stop. Angle the channel so it has a lip on the bottom to hold the cable in place, or spot glue the cable with EPS compatible foam adhesive.

The channels for the plumbing lines will be created in the same fashion. For larger lines furring out the wall may be necessary.

Plumbing can be installed inside the wall cavity prior to the pour, but this can create a severe weak spot, so be sure to check with an engineer first..



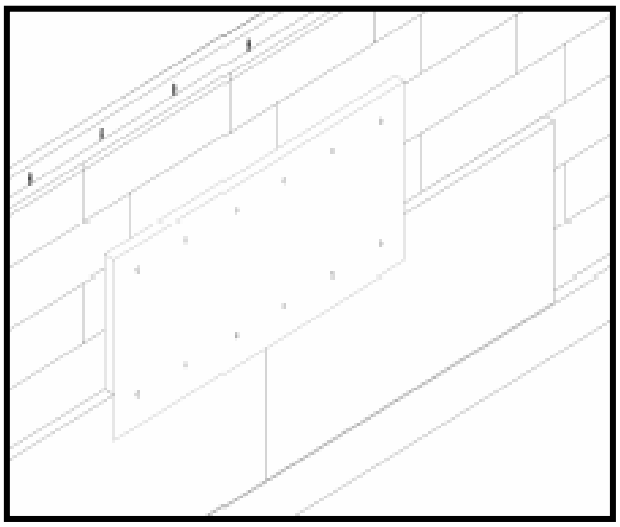
Technical Tip:

Cut horizontal runs at the course-to-course interlock, since webs are cut short at this point.

Plumbing and Electrical Lines

Interior

Workers can screw wallboard and paneling to the plastic webs just as it attaches over frame construction. You can use a foam-compatible adhesive in addition to or instead of screws if you prefer. Check with your local building code if you choose to use only foam - compatible adhesive. Eco-Block recommends using screws, however if you choose to nail, use ring-shank nails for a better grip.



When installing cabinets, it is a good idea to screw plywood, sized slightly smaller than the outline of the cabinets to the ECO
This provides and excellent surface for fastening the cabinets. Butt the wallboard directly up to the edge of the plywood.

For very heavy wall-mounted fixtures (like a sink), rout out or hot knife the foam to make room for timber that you attach directly to the concrete with concrete screws. Later you can screw the fixture to the wood.

Exterior

Any nailed or screwed siding (vinyl, clapboard, hardboard) attaches to the ECO-Block studs just over frame construction. Eco-Block recommends screwing with #10 course thread screws, however, if you choose to nail, use ring-shank nails for a better grip.

Consult the manufacturer of the siding for specific installation instructions. ECO-Block can accommodate either a cement render or an acrylic-based product. Both types are typically reinforced with fiberglass mesh. They are durable and resist cracking in both hot and cold climates. For the proper installation requirements, consult the manufacturer of the stucco product you choose.

For brick or other masonry, insert brick ties through forms and into the cavity before you pour to lock them into the concrete. An alternative method is to secure the brick ties directly to the web with #10 course thread screws.

Below grade, use a dampproofer or waterproofer just as you would over a conventional basement. Self-adhesive membranes work well as do spray-on and roll-on products so long as they are foam-compatible. Products with solvents in them can dissolve the foam, so check with the manufacturer or distributor of the waterproofing product concerning application to EPS, prior to application.

The ECO-Block panel can be easily added to tilt-up wall assemblies during the forming /placing process. Using the panels in tilt-up construction is the economical solution for high performance insulation and sound control (complete with furring/strapping on 200mm). The versatility of the ECO-Block panel system insures that the design and performance objectives of the tilt-up structure will be achieved.

The flexible ECO-Block panel can be used in many different tilt-up wall assemblies. It will increase the thermal performance and Sound Transmission Classification, while reducing the construction time (and cost) on most tilt-up structures.

Tilt-Up Methods:

Exterior Insulation

ECO-Block panels are placed in the tilt-up forms, prior to placement of steel and concrete. Having the panels on the exterior of the building increases the thermal performance of the assembly by a magnitude of 0.5 over insulating the interior surface of the tilt-up panel. In addition, having ECO-Block panels on the exterior of the structure allows for the immediate application of various stucco finishes. This reduces the amount of time needed for completion.

Interior Wet Set:

ECO-Block panels can be “wet set” on the concrete tilt-up wall panel, after concrete has been placed. This provides insulation and “nailing strips” on the interior of the building after the tilt-up panels have been erected. In addition, this method saves the labor needed to “finish” the interior concrete surface.

Combination Method:

The third method is to combine both of the previously mentioned assemblies by laying the ECO-Block interior panels within the tilt-up forms, placing the concrete and then “wet setting” exterior panels on top. This assembly will result in a structure that is ready for stucco on the exterior and wallboard on the interior. The STC and thermal performance of this assembly will equal that of standard ECO-Block construction.

Tilt-Up Walls

To construct an insulated tilt-up Wall by the first method, first lay the panels down on the ground and frame them with wood. Prior to the concrete pour, place rebar using 100mm connectors. Snap the connectors onto the webs in desired locations, then insert the rebar horizontally into the connectors and wire to the connector every 1.2 to 1.8m.

This way, the 100mm connectors serve the same function as a rebar chair. The distance between the top rebar slot on the connector is exactly 60mm above the surface of the EPS or 40mm below the surface of the four inches of concrete, which is the engineering required by the code.

Pour concrete and allow to cure before tilting the wall section. The result is four inches of concrete on the inside and 60mm EPS insulation on the outside. The furring strips are already in place. The wall is immediately ready to finish as required.

Appendix A

Technical Section

(Additional Professional Design Details are available in CAD format on CD ROM from ECO-Block.
Please contact your local Distributor or Eco-Block 1800-669-696.)

ECO-Block® ICFs

Standard Blocks:
- Packaged 6 blocks in BLUE bag
- Dimensions: 826x419x1219 mm
  32.5x16.5x48 inches
- Weight: 16.33 kg (36 lbs)
- Volume: 421.67 dm^3 (14.9 ft^3)

152 mm (6") Corner Block:
- Packaged 6 blocks in a GREEN bag (three left/three right)
- Dimensions: 813x470x1245 mm
  32x18.5x49 inches
- Weight: 12.93 kg (28.5 lbs)
- Volume: 472.61 dm 3 (16.7 ft3)

Brick Ledge Panel:
- Packaged 6 panels in a YELLOW bag
- Dimensions: 889x457x1219 mm
  35x18x48 inches
- Weight: 10.43 kg (23 lbs)
- Volume: 481 dm3 (17 ft3)

102 mm (4") Connectors:
- Packaged 1000 to a box (BLACK label)
- Dimensions: 578x394x254 mm
  22.75x15.5x10 inches
- Weight: approx. 15.88 kg (35 lbs)
- Volume: 57.32 dm3 (2.04 ft3)

203 mm (8") Connectors:
- Packaged 500 to a box (RED label)
- Dimensions: 578x394x254 mm
  22.75x15.5x10 inches
- Weight: approx. 15.88 kg (35 lbs)
- Volume: 57.32 dm 3 (2.04 ft3)

254 mm (10") Connectors:
- Packaged 500 to a box (PURPLE label)
- Dimensions: 584x508x254 mm
  23x20x10 inches
- Weight: approx. 21.50 kg (47.4 lbs)
- Volume: 57.32 dm 3 (2.04 ft 3)

102 mm (4") Corner Block:
- Packaged 6 blocks in BLACK bag (three left/ three right)
- Dimensions: 813x470x1245 mm
  32x18.5x49 inches
- Weight: 13.15 kg (29 lbs)
- Volume: 472.61 dm3 (16.7 ft3)

203 mm (8") Corner Block:
- Packaged 6 blocks in a RED bag (three left/three right)
- Dimensions: 813x470x1245 mm
  32x18.5x49 inches
- Weight: 12.70 kg (28 lbs)
- Volume: 472.61 dm3 (16.7 ft3)

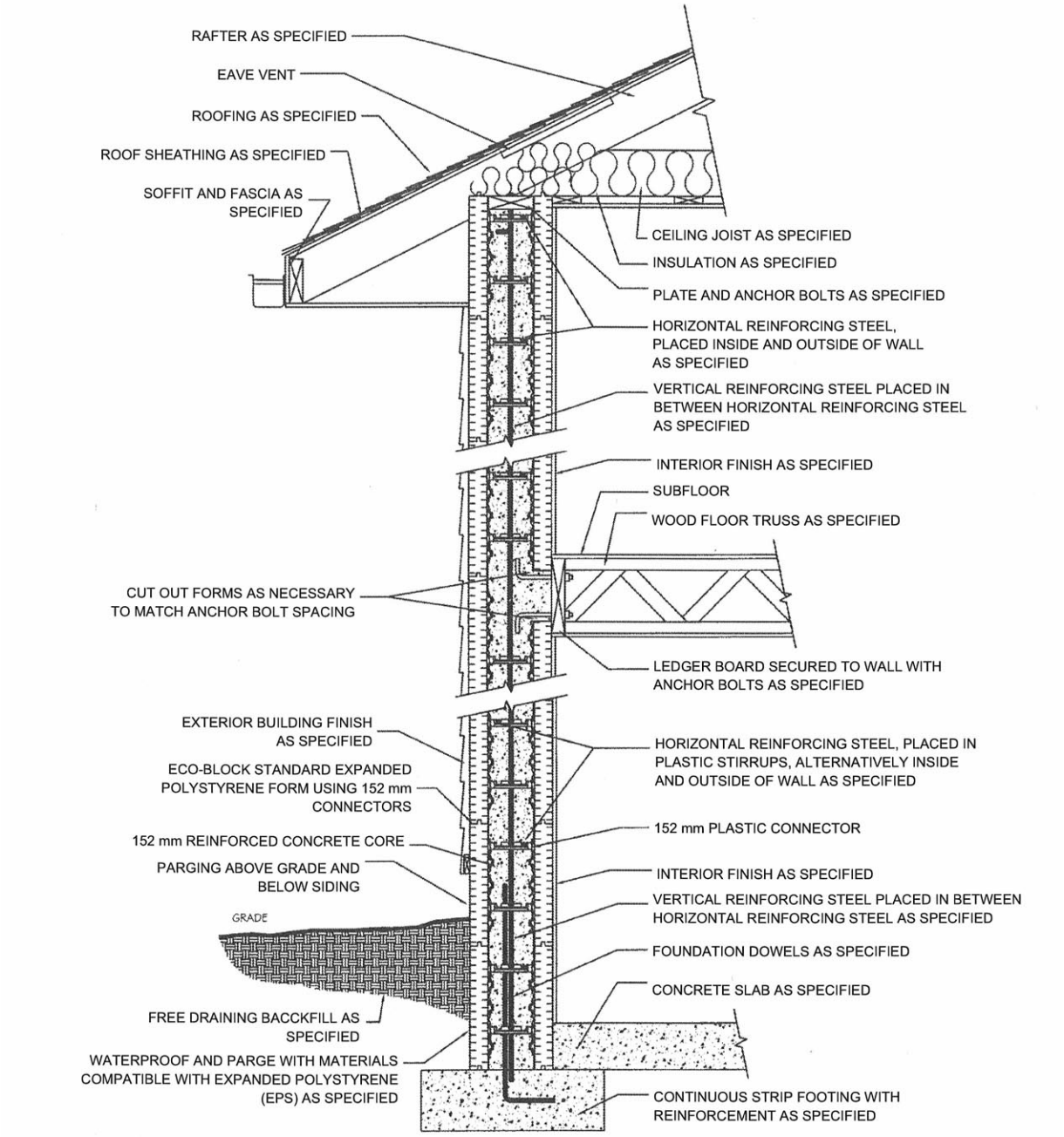
Brick Ledge Rail:
- Package 50/box
- Dimensions: 1219 mm tube
  48-inch tube
- Weight: 3.18 kg (7.0 lbs)

152 mm (6") Connectors:
- Packaged 500 to a box (GREEN label)
- Dimensions: 572x292x254 mm
  22.5x11.5x10 inches
- Weight: approx. 10.89 kg (24 lbs)
- Volume: 57.73 dm3 (2.04 ft3)

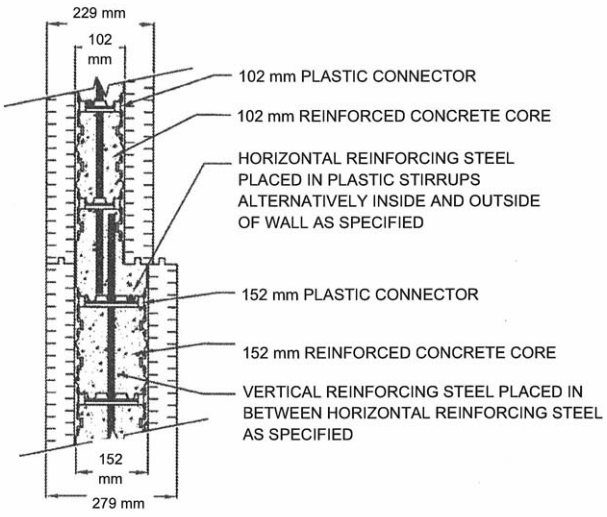
Splice Connectors:
- Packaged 1000 to a box (ORANGE label)
- Dimensions: 572x292x254 mm
  22.5x11.5x10 inches
- Weight: approx. 11.34 kg (25 lbs)
- Volume: 57.73 dm3 (2.04 ft3)

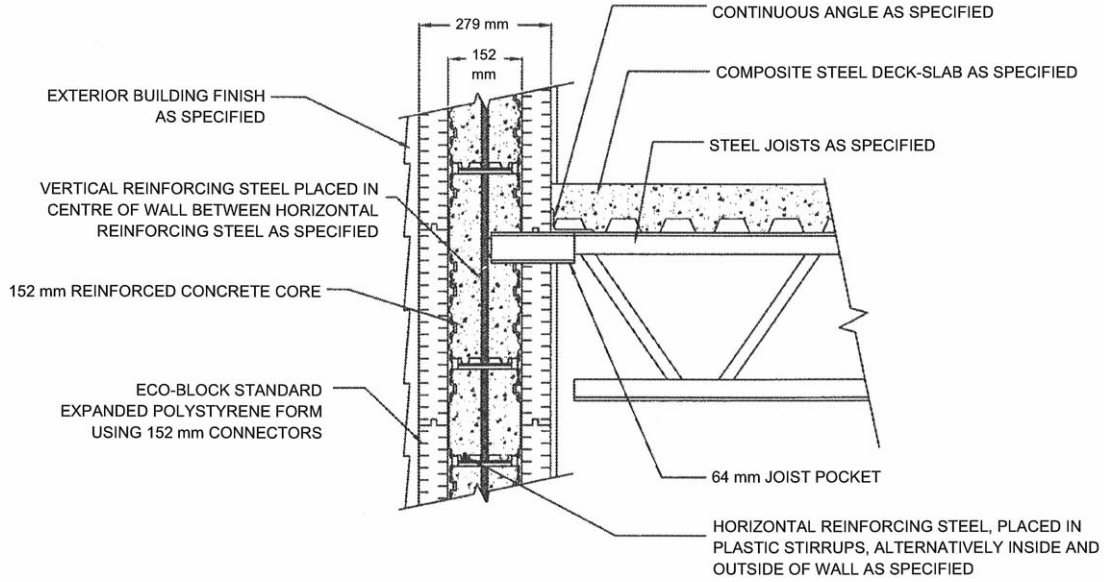
25 mm (1") Extensions (Tie Anchor):
- Packaged 500 to a box (BLUE label)
- Dimensions: 292x292x254 mm
  11.5x11.5x10 inches
- Weight: approx. 4.76 kg (10.5 lbs)
- Volume: 21.23 dm3 (0.75 ft3)

Note: All ECO-Block® ICFs are packaged in UV protective color-coded bags. These bags can safely be stored outside, however, it is recommended that the bags not be placed in direct contact with the ground.

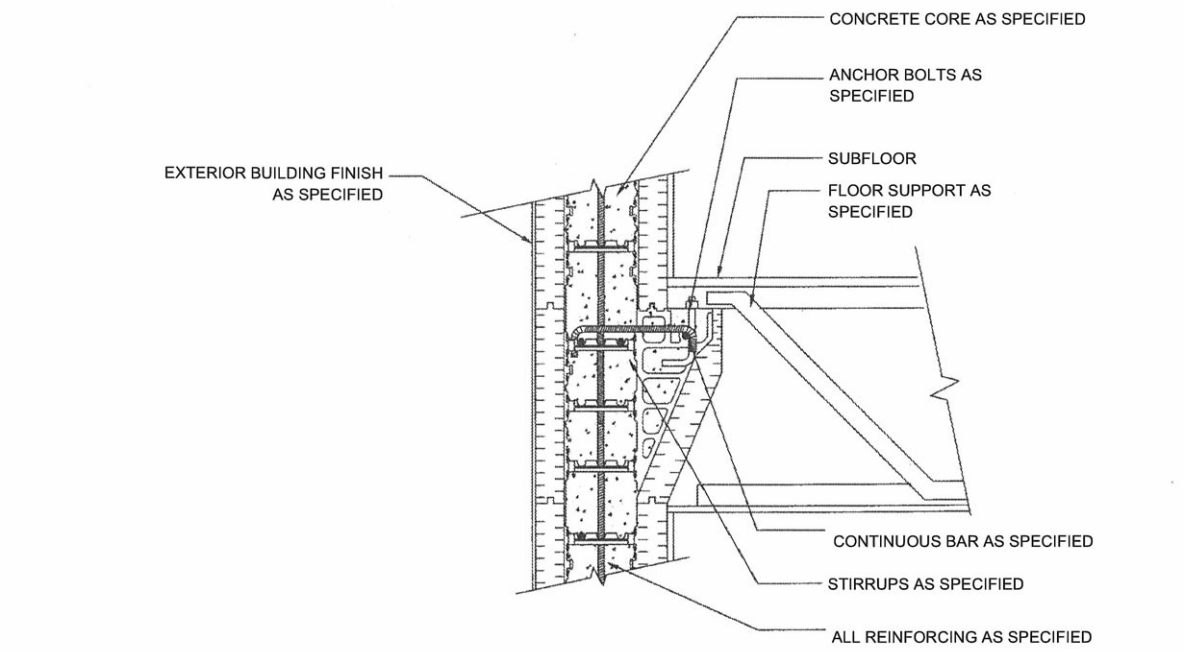


ECO-Block Aust. Pty Ltd **INSULATING CONCRETE FORMS** ***"...SAVING AUSTRALIAN ENERGY"*** 37 SEASIDE DRIVE THE HEADLAND, PACIFIC HARBOUR BRIBIE ISLAND QLD, 4507 AUSTRALIA www.Eco-BlockAustralia.com.au	**TYPICAL WALL SECTION 2 STORY**	**DATE:** 01/01/2004 **SCALE:** N.T.S. **REVISION:** **DRAWING NUMBER:**





ECO-Block Aust. Pty Ltd **INSULATING CONCRETE FORMS** ***"...SAVING AUSTRALIAN ENERGY"*** 37 SEASIDE DRIVE THE HEADLAND, PACIFIC HARBOUR BRIBIE ISLAND QLD, 4507 AUSTRALIA www.Eco-BlockAustralia.com.au		**DATE:** 01/01/2004 **SCALE: N.T.S.** **REVISION:** **DRAWING NUMBER:**



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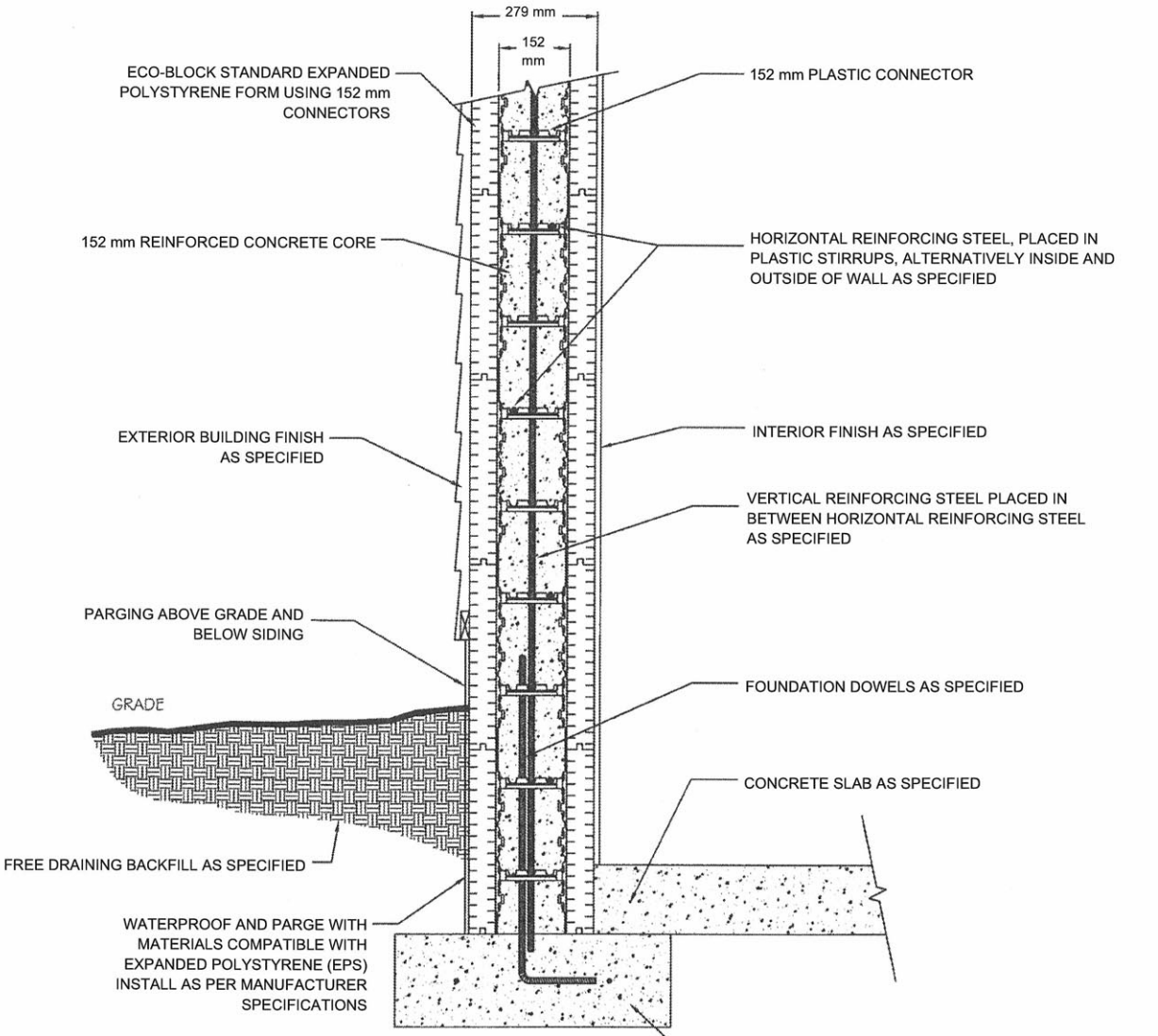

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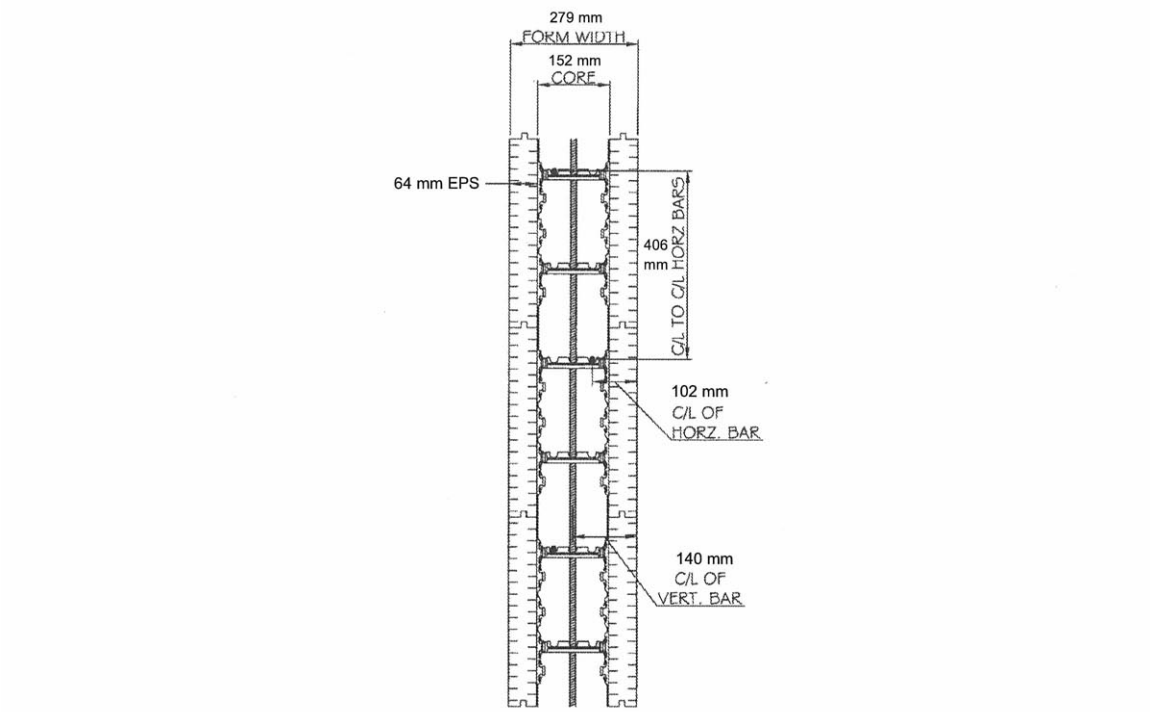

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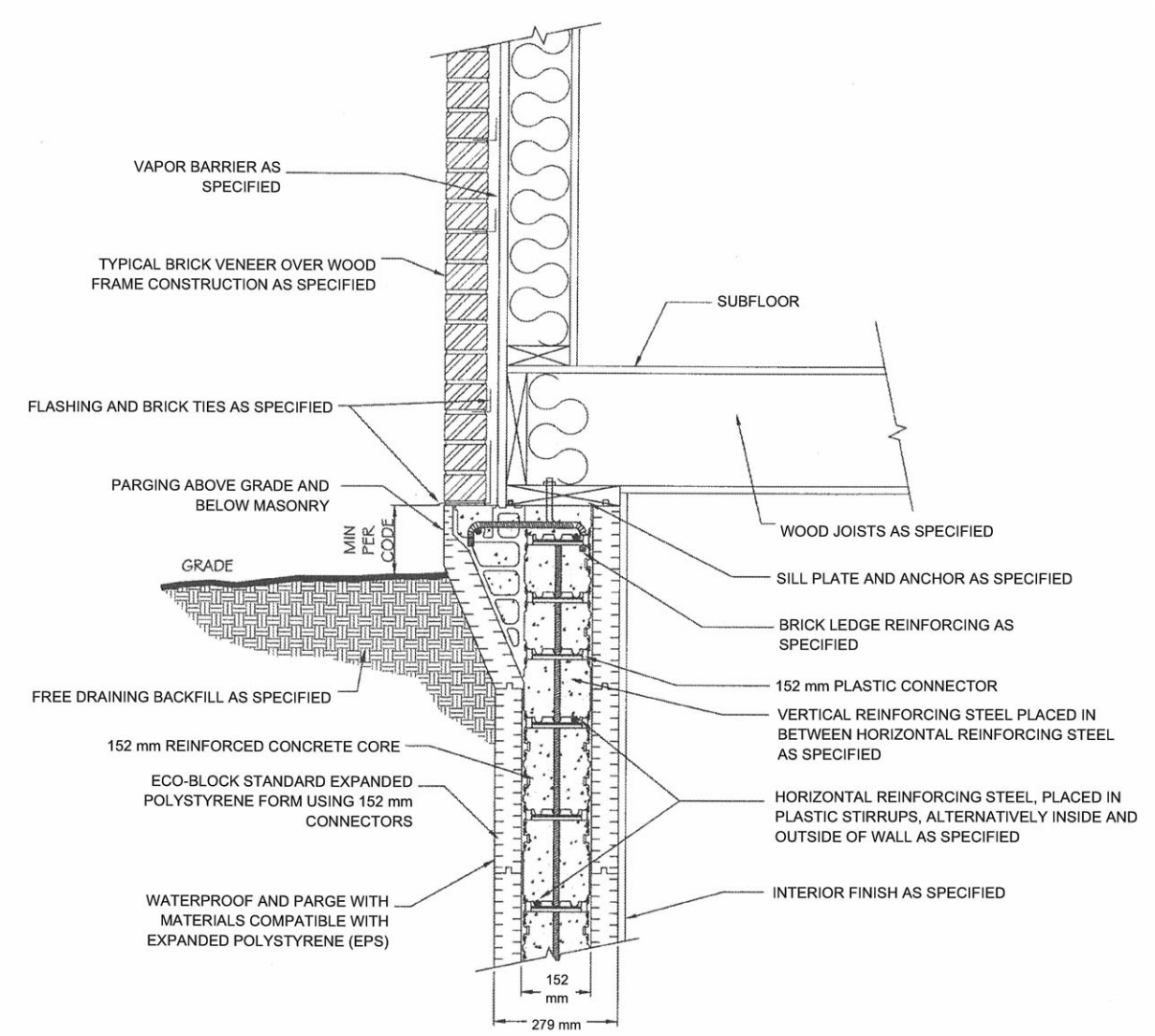

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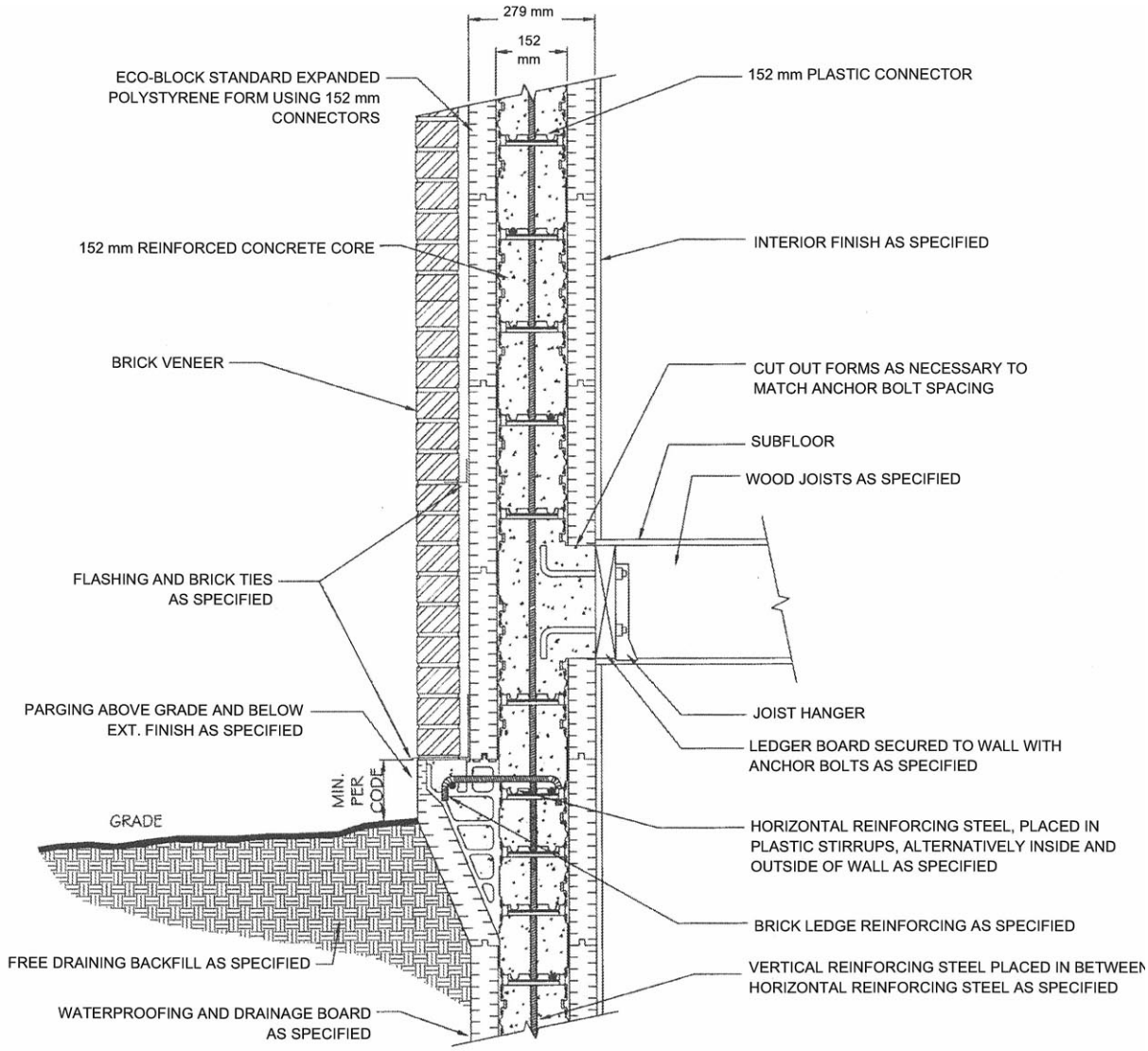

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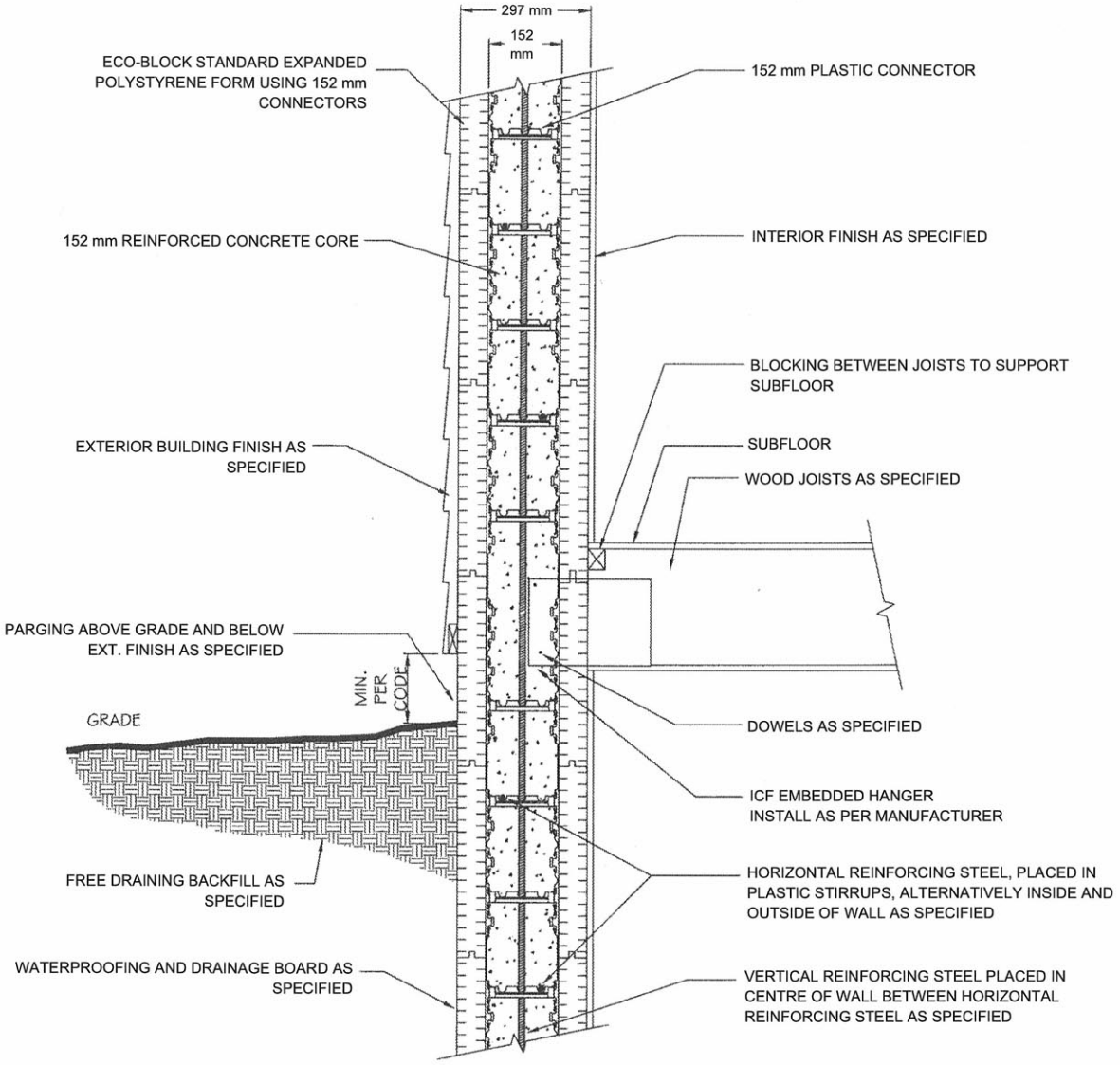
ECO-Block Aust. Pty Ltd **INSULATING CONCRETE FORMS** ***"...SAVING AUSRALIAN ENERGY"*** 37 SEASIDE DRIVE THE HEADLAND, PACIFIC HARBOUR BRIBIE ISLAND QLD, 4507 AUSTRALIA www.Eco-BlockAustralia.com.au	**LEDGER BOARD CONNECTION** **WD JOISTS PERP. TO WALL** **MASONRY VENEER,** **152 mm FORMS**	**DATE:** 01/01/2004 **SCALE:** N.T.S. **REVISION:** **DRAWING NUMBER:** **M-30-0011**



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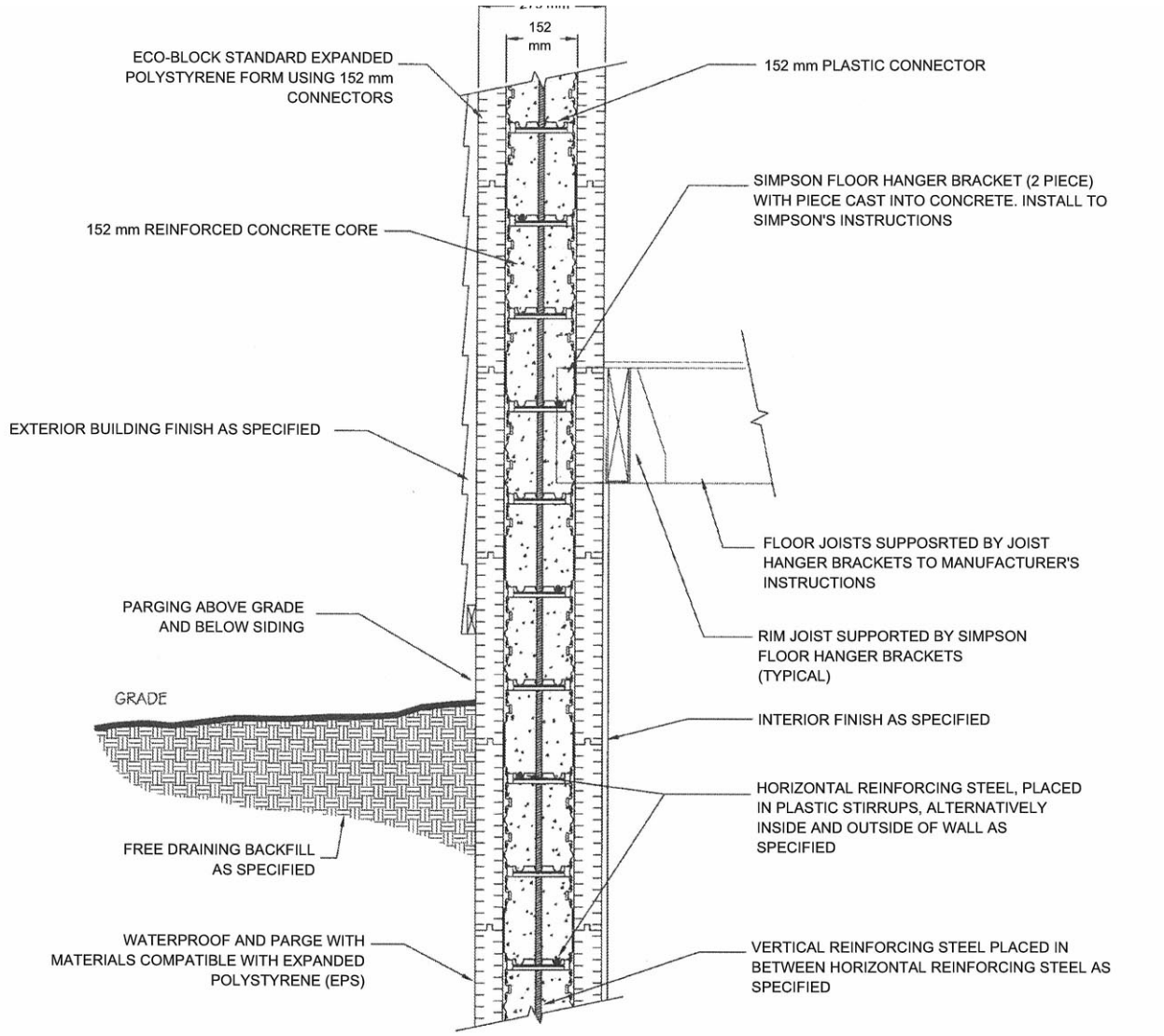

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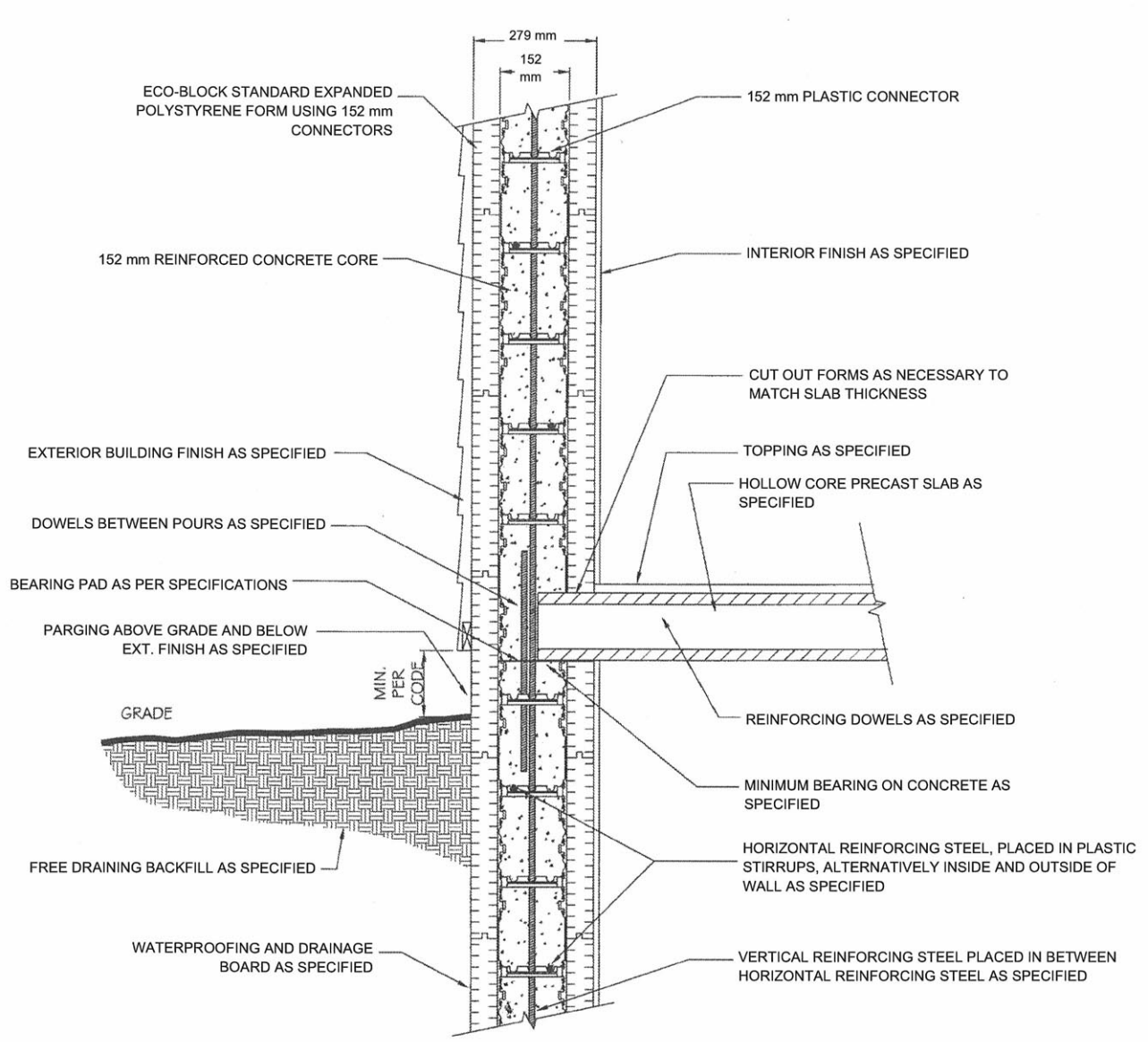

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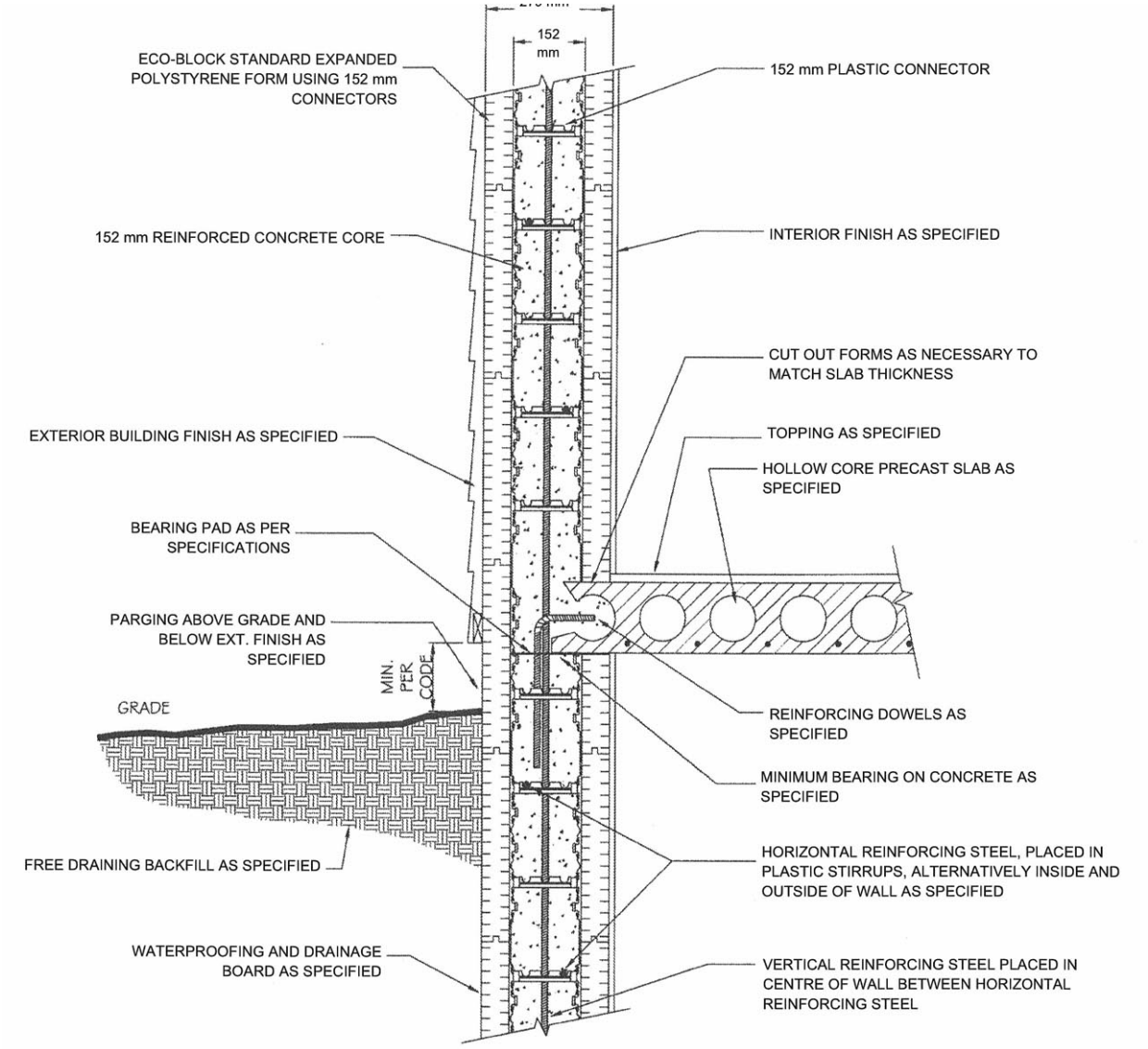
INSULATING CONCRETE FORMS
"...SAVING AUSTRALIAN ENERGY"
37 SEASIDE DRIVE
THE HEADLAND, PACIFIC HARBOUR
BRIBIE ISLAND QLD, 4507
AUSTRALIA
www.Eco-BlockAustralia.com.au

HOLLOW CORE PRECAST FLOOR SLAB - EXT. BEARING
WALL - 152 mm FORMS

DATE:	01/01/2004
SCALE:	N.T.S.
REVISION:	
DRAWING NUMBER:	
	M-40-0004



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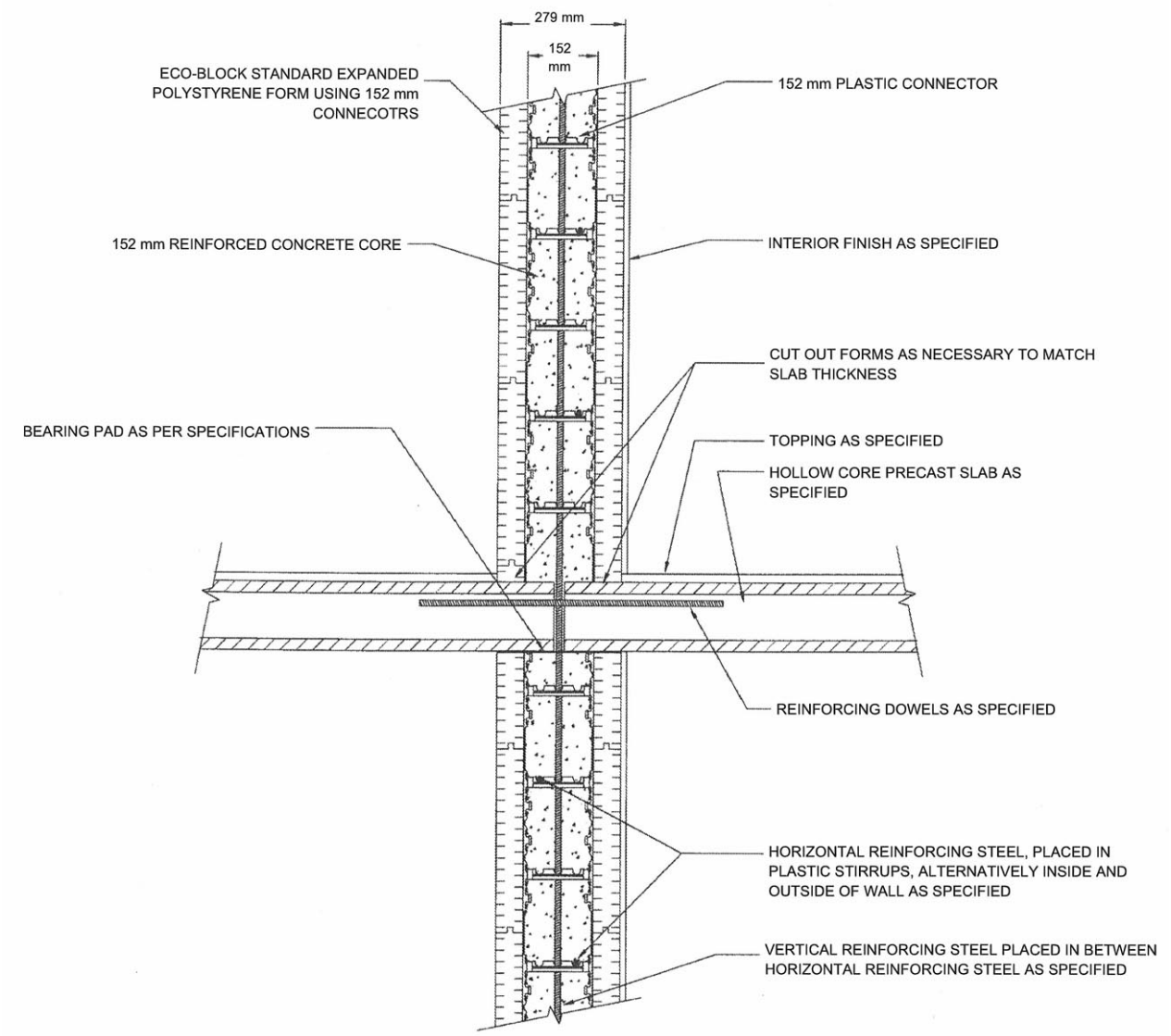
ECO-Block Aust. Pty Ltd **INSULATING CONCRETE FORMS** ***"...SAVING AUSTRALIAN ENERGY"*** 37 SEASIDE DRIVE THE HEADLAND, PACIFIC HARBOUR BRIBIE ISLAND QLD, 4507 AUSTRALIA www.Eco-BlockAustralia.com.au	**HOLLOW CORE PRECAST FLOOR SLAB - EXT. SIDE** **WALL - 152 mm FORMS**	**DATE:** 01/01/2004 **SCALE:** N.T.S. **REVISION:** **DRAWING NUMBER:** **M-40-0005**



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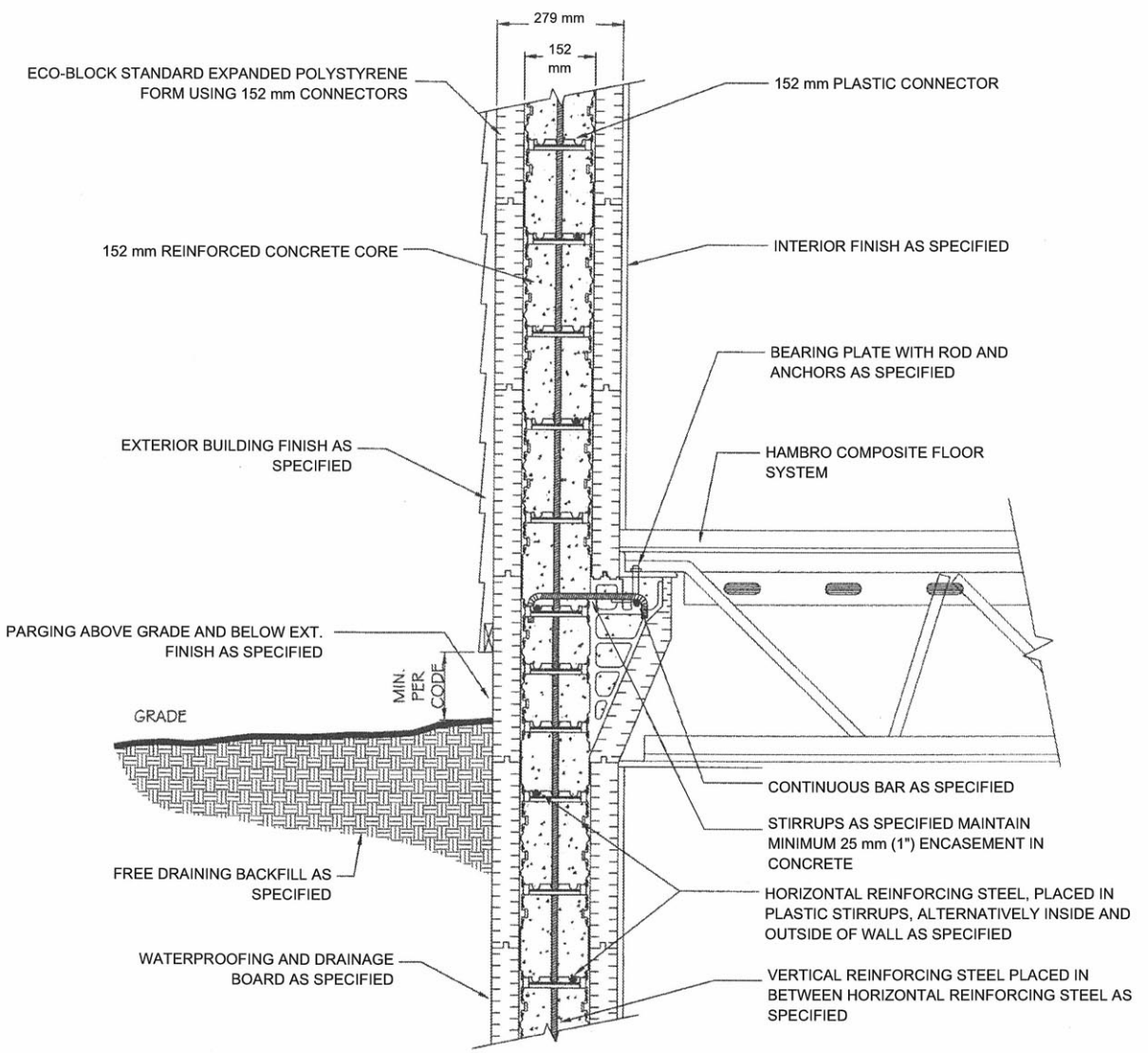

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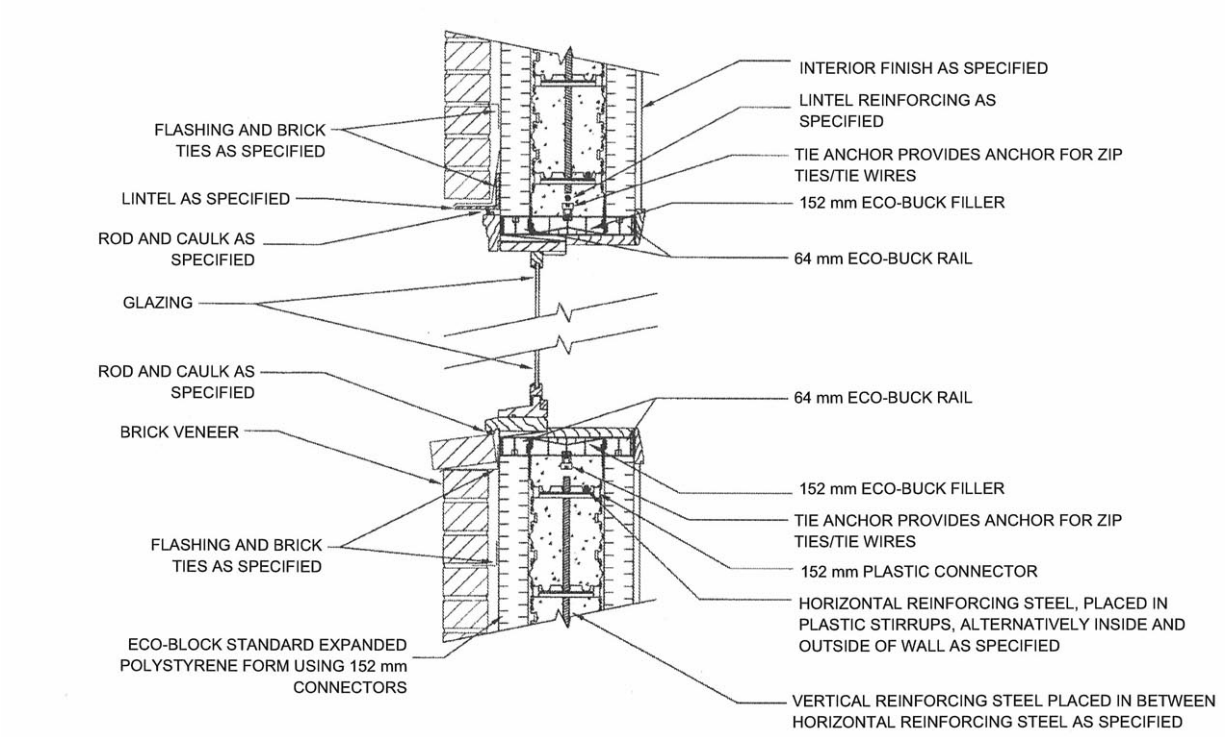
INSULATING CONCRETE FORMS
"...SAVING AUSTRALIAN ENERGY"
37 SEASIDE DRIVE
THE HEADLAND, PACIFIC HARBOUR
BRIBIE ISLAND QLD, 4507
AUSTRALIA
www.Eco-BlockAustralia.com.au

HAMBRO COMPOSITE FLOOR SYSTEM - EXT. BEARING WALL
MET. 2 CONN. - 152 mm FORMS

DATE:	01/01/2004
SCALE:	N.T.S.
REVISION:	
DRAWING NUMBER:	M-40-0040



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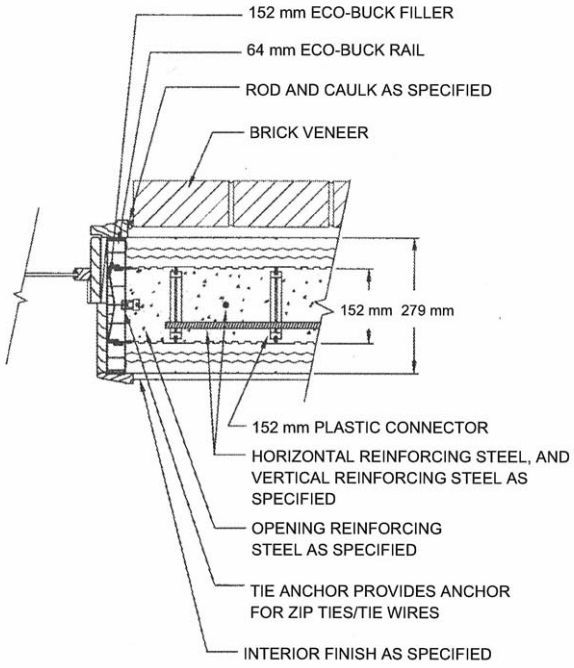
"...SAVING AUSTRALIAN ENERGY"
37 SEASIDE DRIVE
THE HEADLAND, PACIFIC HARBOUR
BRIBIE ISLAND QLD, 4507
AUSTRALIA
www.Eco-BlockAustralia.com.au

WIN. HEAD/SILL - ICF BUCK MASONRY VENEER EXT.
152 mm FORMS

DATE:	01/01/2004
SCALE	N.T.S.
REVISION:	
DRAWING NUMBER:	M-50-0007



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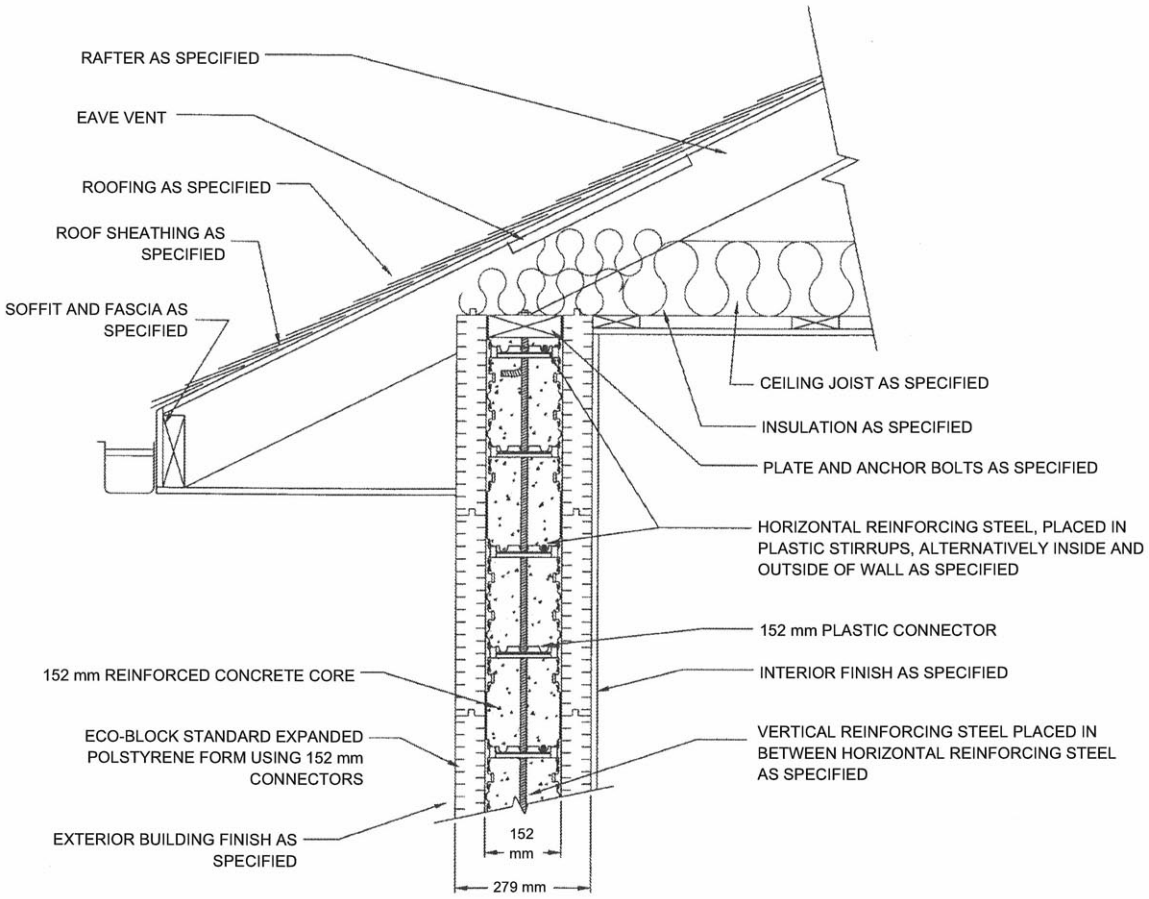
ECO-Block Aust. Pty Ltd **INSULATING CONCRETE FORMS** ***"...SAVING AUSTRALIAN ENERGY"*** 37 SEASIDE DRIVE THE HEADLAND, PACIFIC HARBOUR BRIBIE ISLAND QLD, 4507 AUSTRALIA www.Eco-BlockAustralia.com.au	**WINDOW JAMB - ICF BUCK MASONRY VENEER EXT.** **152 mm FORMS**	**DATE:** 01/01/2004 **SCALE:** N.T.S **REVISION:** **DRAWING NUMBER:** **M-50-0008**



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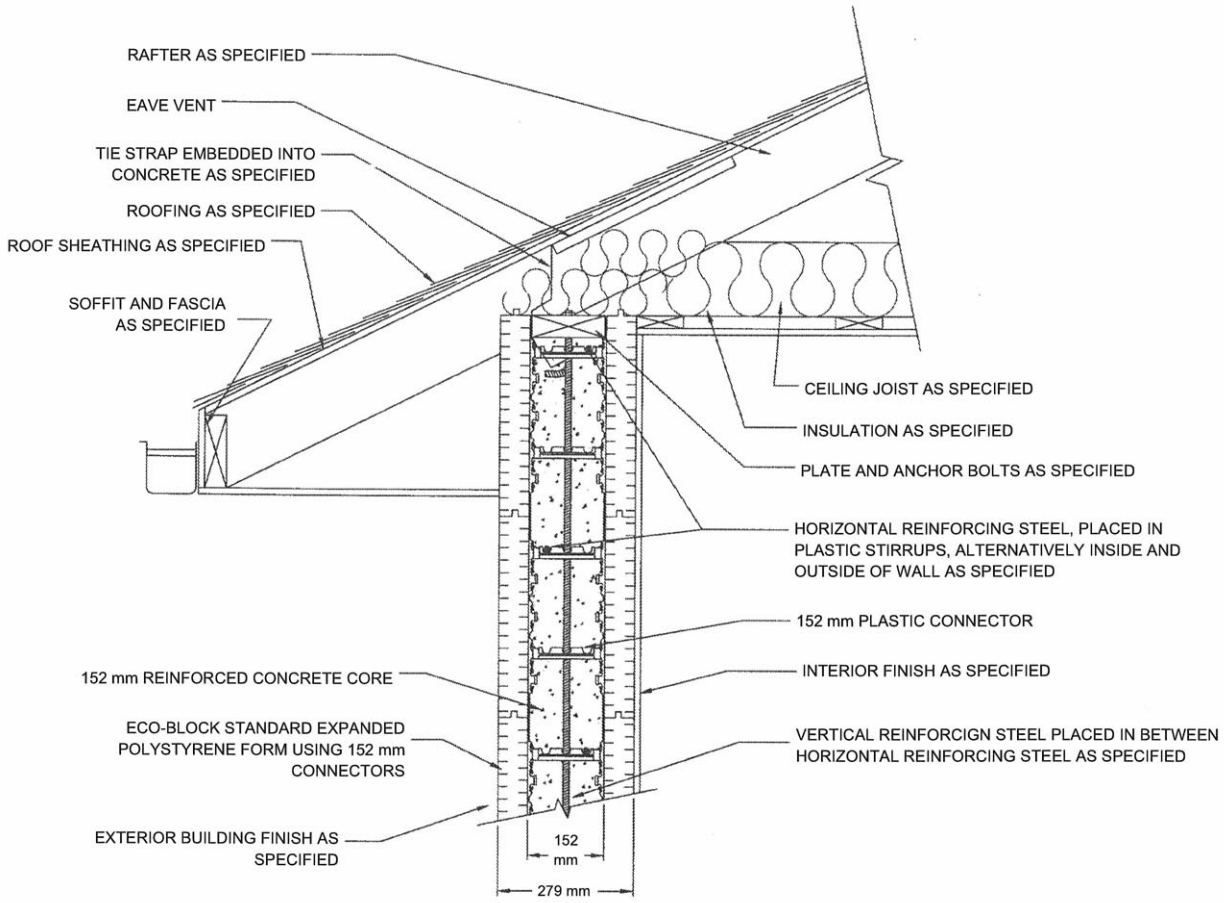

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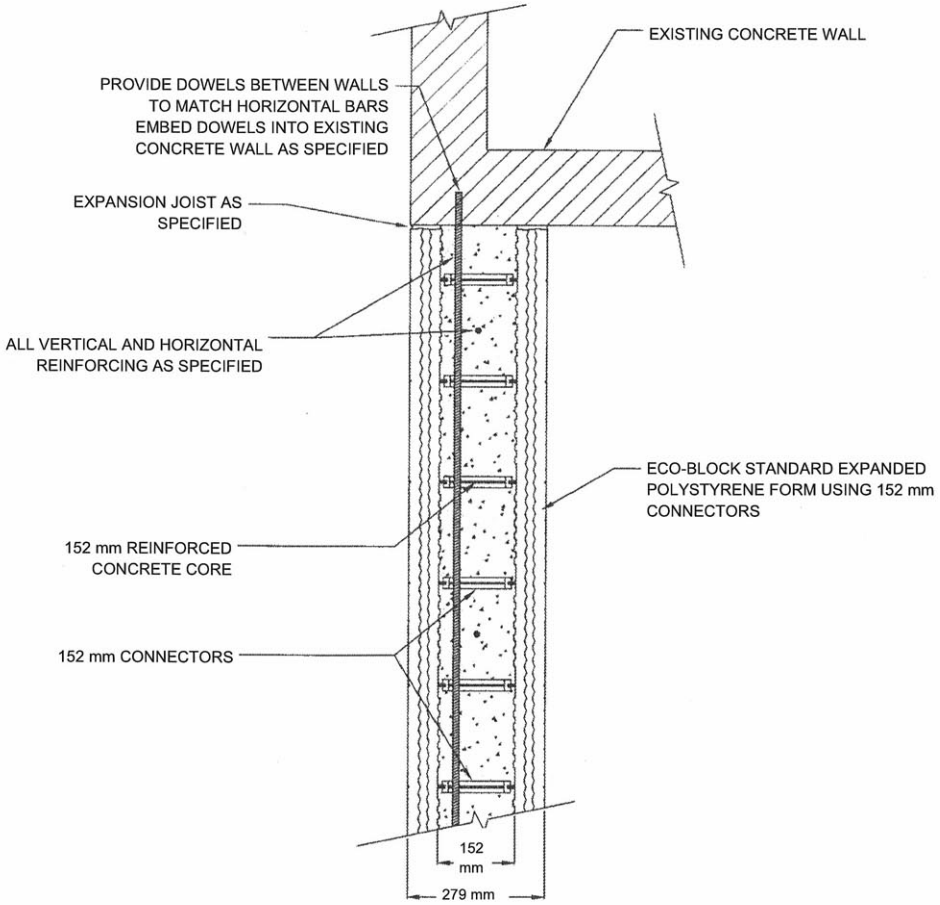

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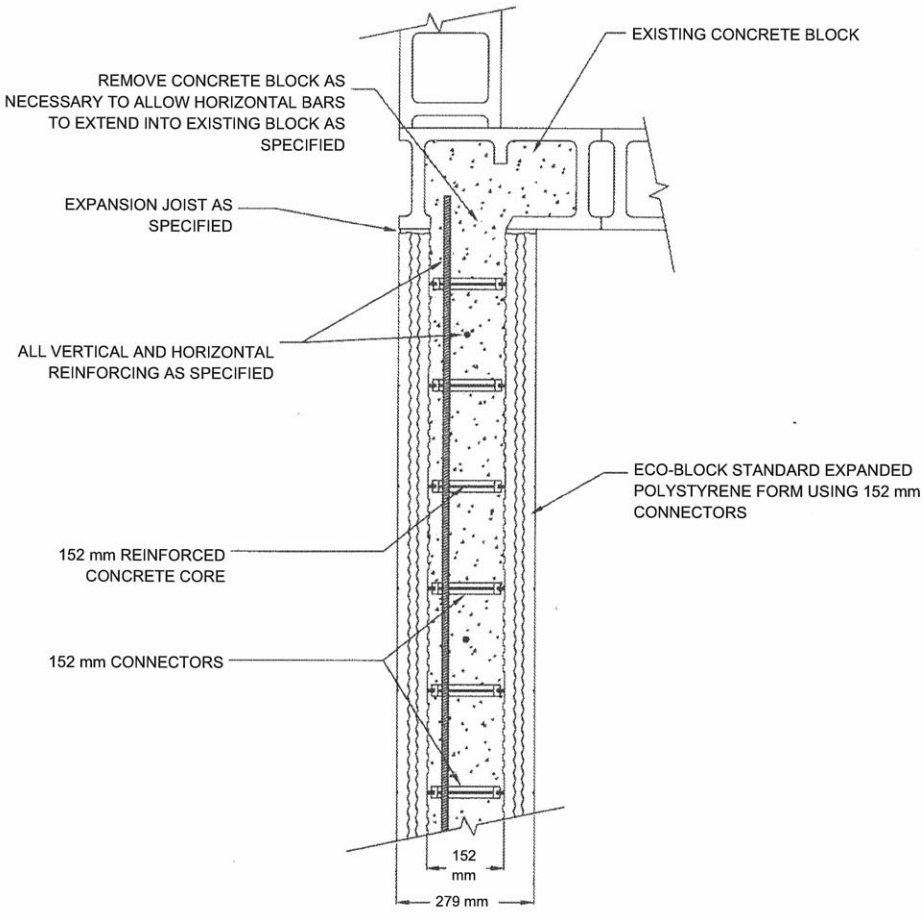
ECO-Block Aust. Pty Ltd **INSULATING CONCRETE FORMS** ***"...SAVING AUSTRALIAN ENERGY"*** 37 SEASIDE DRIVE THE HEADLAND, PACIFIC HARBOUR BRIBIE ISLAND QLD, 4507 AUSTRALIA www.Eco-BlockAustralia.com.au	**ATTACHMENT TO EXIST. CONCRETE WALL** **152 mm FORMS**	**DATE:** 01/01/2004 **SCALE:** N.T.S. **REVISION:** **DRAWING NUMBER:** **M-70-0002**



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ECO-Block Aust. Pty Ltd **INSULATING CONCRETE FORMS** ***"...SAVING AUSTRALIAN ENERGY"*** 37 SEASIDE DRIVE THE HEADLAND, PACIFIC HARBOUR BRIBIE ISLAND QLD, 4507 AUSTRALIA www.Eco-BlockAustralia.com.au	**ATTACHMENT TO EXIST. CONCRETE BLOCK WALL** **152 mm FORMS**	**DATE:** 01/01/2004 **SCALE:** N.T.S. **REVISION:** **DRAWING NUMBER:** **M-70-0006**