



# ManEX Construction Manual

Supplied By: **Blue River Steel Buildings(South  
West) Ltd**

Customer: **Mr Smith**

Site Location: -

**Congratulations on your purchase of a Capital Steel Building. Before commencing any assembly, it is advisable to read through these instructions in detail to gain a thorough understanding of assembly methods and associated details.**

**Before you start the erection of your building it is essential that you have all the statutory approvals that are required from the local authorities in your area.**

This manual is not intended to be a work safety manual. Capital Steel intends this manual to be an erection guided only and it is the builder's responsibility to ensure that all safety recommendations of the OSHA (Occupational Safety and Health Administration) are followed.

Do not work on the building in damp conditions without taking proper precautions and do not walk on roof sheeting in damp or frosty conditions.

If you are using a subcontract builder to erect your building, check with the governing authority to see if he needs to be licensed and also check that all insurances for both he and his employees are current.

This manual must be used in conjunction with the engineer's plans as submitted to the building department.

**NOTE: THE ENGINEERS PLANS SUPERCEDES ANY INFORMATION IN THIS MANUAL.**

### **Caution**

Some parts may have sharp edges. It is advisable to wear gloves when handling these. It is also advisable to wear protective eyewear when drilling holes or using any cutting equipment. When erecting the structure protective headwear and footwear are essential.

Do not erect your structure in windy conditions, and ensure all anchors are inserted when instructed to do so.

### **Common safety hazards**

These are just a few of the more common safety hazards, although every possible hazard should be addressed and resolved prior to commencing.

- Electrical wires – both overhead and underground
- Water pipes
- Wet tools, materials, surfaces
- Pitfalls, ledges, potholes
- High wind areas

## **Initial Checks**

Before you start to erect your building it is advisable that you carry out the following procedures:

- 1 Check that you have all of the materials. The supplier of this building will have issued you with a material check list. Ensure that all of the products on the list have been delivered.
- 2 Check your concrete. Your slab should be level and the same size as your building. Undersize slabs will not allow you to anchor your building correctly. Oversized slabs will require the wall sheets to be trimmer by 25mm and your water tight seal will be lost. The slab diagram supplied to you will give you your diagonal measurements to check that the concrete is correct.
- 3 Any shortages or damages must be reported to the place of purchase within 48 hours of delivery.

**This manual is to be read in conjunction with:**

**1. Engineering plans supplied with the building.**

This contains a Members Isometric Drawing of your building and is specific to the building purchased. It has all of the connection details for the building and contains elevation drawing of the building. These drawings will nominate member sizes and spacing, as well as other relevant information.

**2. Bill Of Materials**

This is a list of all components ordered for this building. You can consult it to check you have received all components. It also shows what each component is intended for.

## **Tools required by an owner builder**

(The following tools are the minimum required. Without them you will not be able to construct your building)

- Hammer
- Small Tape Measure 8m
- 110v Transformer
- 110V Extension leads, preferably two at 30m
- Tin snips
- Socket set
- Permanent marker and Pencil
- Ropes, usually 4 at 10m, 10mm nylon will suffice
- String line
- Builders level (Spirit Level)
- Set square
- Screw Drivers
- 110V Tek screw gun with a 5/16" hex head – or an electric hand drill with torque control
- An electric Impact drill with a 12 and 16mm masonry bit.
- Angle Grinder
- Silicone and Calking gun with two tubes of gutter silicone
- Rivet gun
- Appropriate access equipment to reach working height safely

**The following are not absolutely necessary but will be very handy if you can get them.**

- Quick release clamps
- Chalk line with blue chalk
- Nibbler
- Cut off saw or chop saw
- Long tape measure (30m)
- 110V generator, if power is not available
- Water level or auto level
- Surge protector/circuit breaker protection
- Cordless drill

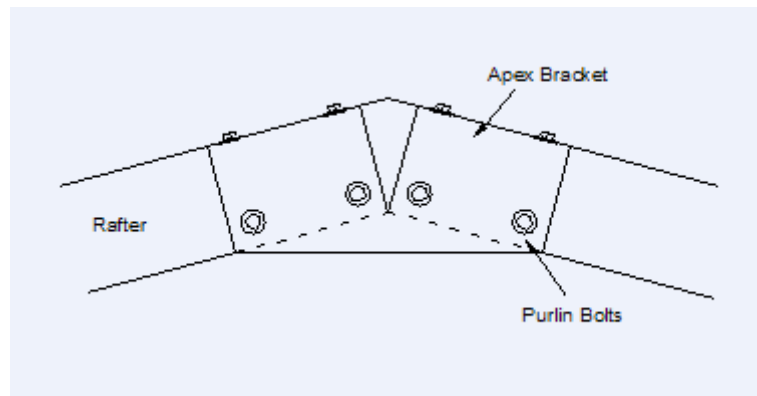
# Specification Sheet

<b>Building Geometry</b>			
<b>Width:</b>	5.4m	<b>Length:</b>	5.5m
<b>Wall Height:</b>	2.4m	<b>Roof Pitch:</b>	10deg
<b>Number of Side Bays:</b>	2	<b>Side Bay Width:</b>	2.75m
<b>Number of End Bays:</b>	2	<b>End Bay Width:</b>	2.7m
<b>Design</b>			
<b>Wind Zone:</b>	Zone C	<b>Distance From Sea:</b>	2Km
<b>Location:</b>	Town	<b>Altitude:</b>	100m
<b>Member Schedule</b>			
<b>Gable End Column:</b>	C15016	<b>Gable End Rafter:</b>	C15016
<b>Internal Column:</b>	C15016	<b>Internal Rafter:</b>	C15016
<b>Gable End Mullion:</b>	C15016	<b>Eave Purling:</b>	C15016 C Section - Section depth 152mm
<b>Gable End Wall Roller Door Mullion:</b>	Side Roller Door Jamb 61	<b>Side Wall Roller Door Mullion:</b>	Side Roller Door Jamb 61
<b>Knee Brace:</b>	NA	<b>Apex Brace:</b>	NA
<b>Roof Purlin:</b>	Tophat 61mm 1.5mm 390 grade	<b>Roof Purlin Spacing:</b>	0.884 m
<b>Side Wall Girt:</b>	Tophat 61mm 1.5mm 390 grade	<b>Side Wall Girt Spacing:</b>	1.200 m
<b>End Wall Girt:</b>	Tophat 61mm 1.5mm 390 grade	<b>End Wall Girt Spacing:</b>	1.438 m
<b>Cladding and Flashings</b>			
<b>Wall Cladding:</b>	AS24 1000 Wall 0.5	<b>Roof Cladding:</b>	AS13/3 Corro Roof 0.5
<b>Gutter:</b>	Gutter Plastisol	<b>Ridge Cap:</b>	Ridge Capping Plastisol
<b>Corner Flashing:</b>	Corner Flashing Plastisol	<b>Opening Flashing:</b>	Opening Flashing Plastisol
<b>Barge:</b>	Barge Capping Plastisol		

## **End Rafter Assembly C150**

Find the four **End Rafters** in the materials supplied. The size and length will be noted on the specification sheet. These may be a different size and/or thickness to the **Internal Rafters**.

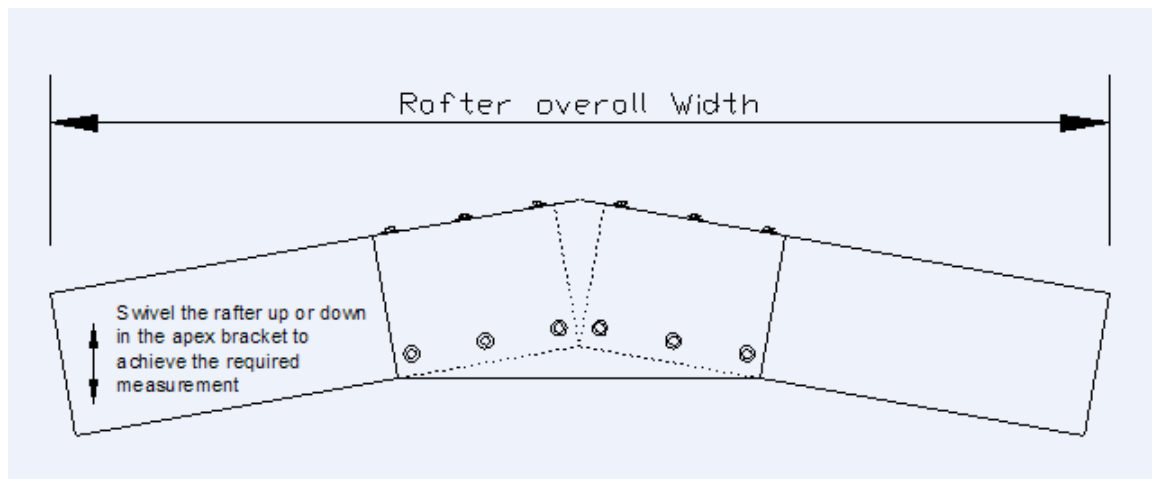
Find the two **Apex Brackets** which join these **End Rafters** together.



The **Apex Bracket** is to be fixed to the webbed side of the **External Column** using the **Purlin Bolts** provided.

Insert one **Frame Screw** through the face of the **Apex Bracket** into the rafter on each side as close to the point where they meet as possible.

Check the overall width of the joined **External Rafters** prior to inserting any bolts. This measurement can be found on the Specification Sheet provided.



Once the desired width is obtained, insert the **Purlin Bolts** and tighten. This job is made easier if the **External Rafter** assembly is either elevated or the **Apex Bracket** area is marginally off the slab giving you room to slide a hand under the assembly to tighten the bolts.

Remove these assemblies from the work area when completed.

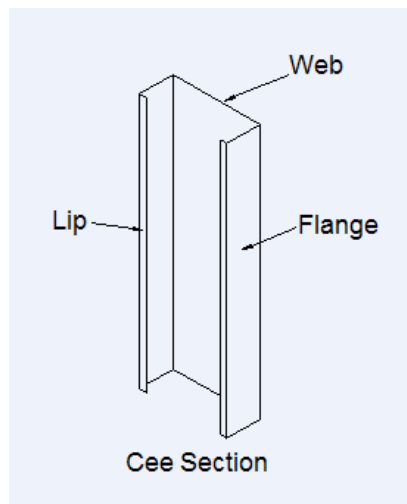
## End Column Assembly.

Find the four **End Columns** in the materials supplied. The size and length will be noted on the specification sheet. These may have a different size and/or thickness to the **Internal Columns**.

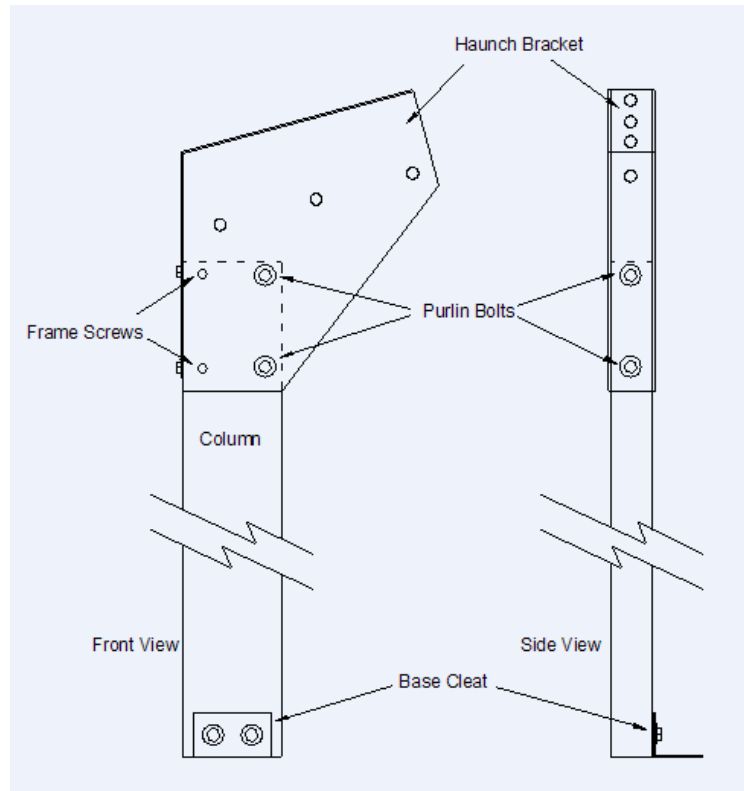
The **Haunch Bracket** connects to the top of the **End Column** and will eventually join the **End Columns** to the **End Rafters**.

The Capital Steel Buildings **Haunch Brackets** are engineered for an omni directional application. (They can be used in either a left or right direction)

**End columns** must have webbed side facing inwards. (Webbed side denotes the flat surface area on Cee section)



The **Haunch Bracket** is to be fixed to the webbed side of the **End Column** using the **Purlin Bolts** provided. Once all **Purlin Bolts** are fastened, a minimum of two **Frame Screws** should then be used to secure the **Haunch Bracket** to the Cee section and prevent any movement in the bolt holes.



### Base Cleats

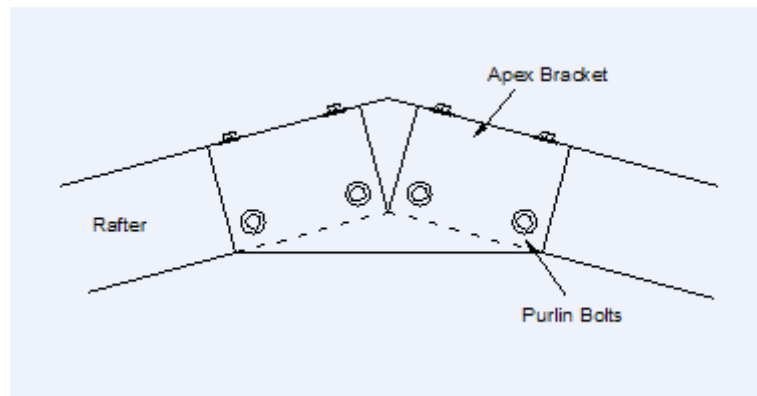
The **Base Cleat** is used to fasten the **End Columns** to the anchor point.

The **Base Cleat** is to be fastened to the webbed side of the **End Column** using the **Purlin Bolts** provided as shown in the diagram above.

## **Internal Rafter Assembly C150**

Find the **Internal Rafters** in the materials supplied. The size and length will be noted on the specification sheet. These may be a different size and/or thickness to the **End Rafters**

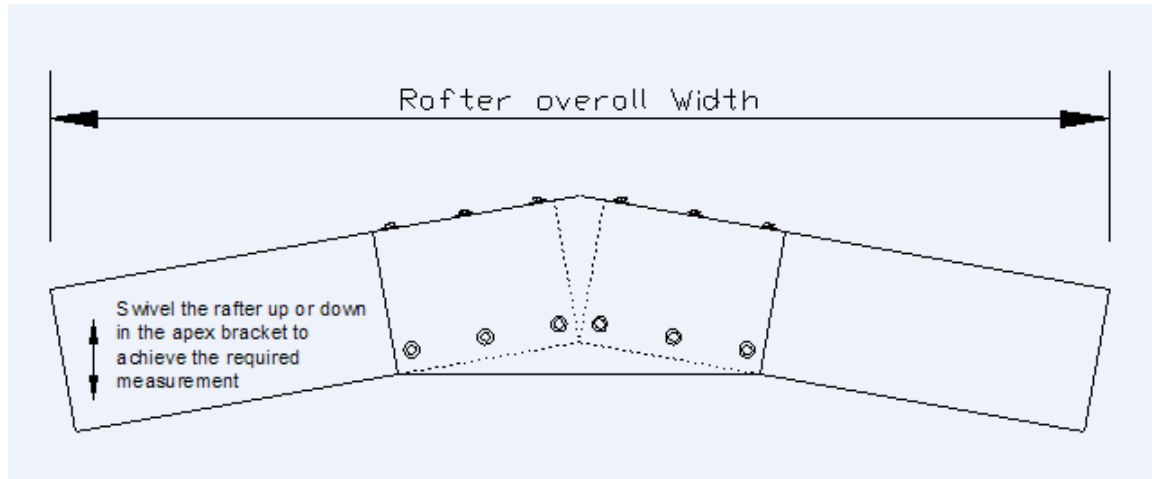
Find the **Apex Brackets** which join these **Internal Rafters** together.



The **Apex Bracket** is to be fixed to the webbed side of the **Internal Column** using the **Purlin Bolts** provided.

Insert one **Frame Screw** through the face of the **Apex Bracket** into the rafter on each side as close to the point where they meet as possible.

Check the overall width of the joined **Internal Rafters** prior to inserting any bolts. This measurement can be found on the Specification Sheet provided.



Once the desired width is obtained, insert the **Purlin Bolts** and tighten. This job is made easier if the **Internal Rafter** assembly is either elevated or the **Apex Bracket** area is marginally off the slab giving you room to slide a hand under the assembly to tighten the bolts.

Remove these assemblies from the work area when completed.

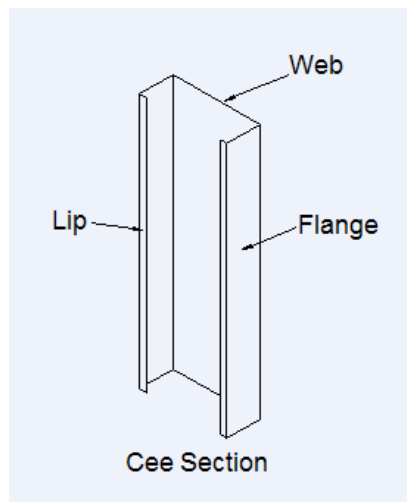
## Internal Column Assembly

Find the **Internal Columns** in the materials supplied. The size and length will be noted on the specification sheet. These may be a different size and/or thickness to the **End Columns**.

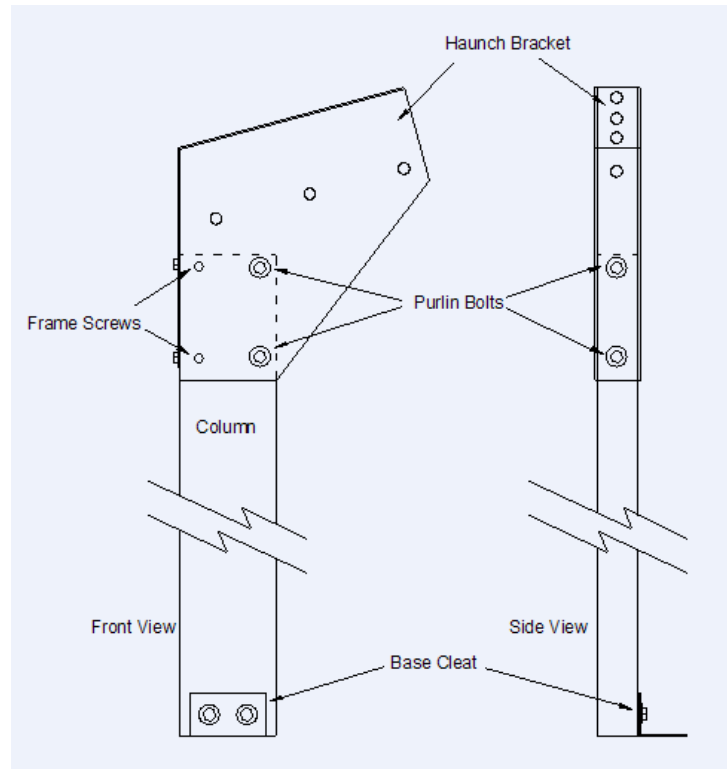
The **Haunch Bracket** connects to the top of the **Internal Column** and will eventually join the **Internal Columns** to the **Internal Rafters**.

The Capital Steel Buildings **Haunch Brackets** are engineered for an omni directional application. (They can be used in either a left or right direction)

**Internal columns** will normally have webbed side facing the dominant opening or major access point to the building. (Webbed side denotes the flat surface area on Cee section) This is to provide a neat appearance.



The **Haunch Bracket** is to be fixed to the webbed side of the **Internal Column** using the **Purlin Bolts** provided. Once all **Purlin Bolts** are fastened, a minimum of two **Frame Screws** should then be used to secure the **Haunch Bracket** to the Cee section and prevent any movement in the bolt holes.



### Base Cleats

The **Base Cleat** is used to fasten the **Internal Columns** to the anchor point.

The **Base Cleat** is to be fastened to the webbed side of the **Internal Column** using the **Purlin Bolts** provided, as per the diagram above.

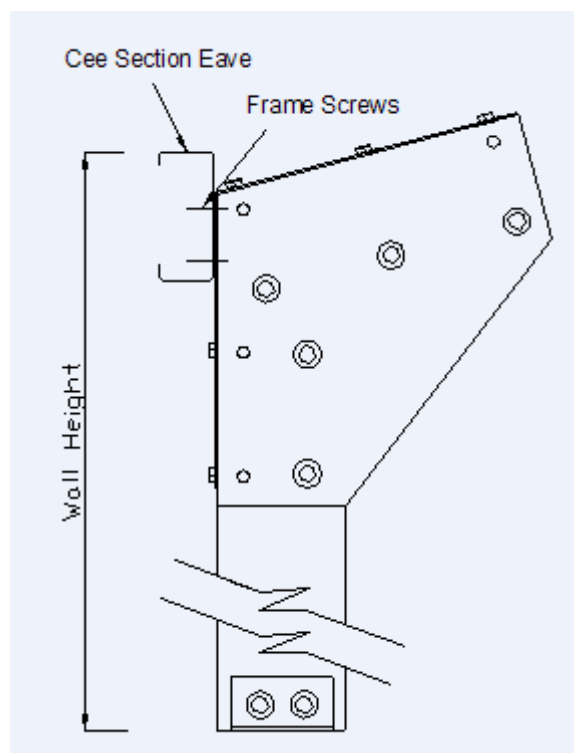
## **C150 Eave Purlin**

A 150mm Cee section **Eave Purlins** is used when 61mm tophats are supplied for **Side Wall Girts**. Both the **Side Wall Cladding** and **Roof Sheeting** are fixed to the **Eave Purlins**.

Lay the columns out where the building is being erected. Place the base of the column close to where it is being attached to the foundation. The top of the column should be towards the centre of the building.

The **Eave Purlins** are fixed to the top outside edge of the columns. To attach correctly, measure up from the base of the columns and attach the **Eave Purlins** at the nominal height of the wall. The overall length of the building is set at this point, and the Cee section **Eave Purlins** are screwed flush with to the back edge of the gable end posts using **Frame Screws**.

Only use one **Frame Screw** at each joint to allow the frame to pivot when measured and squared. Once the frame is square a total of two **Frame Screws** should be fixed in each joint. This is done after the **Side Wall Girts** are installed.



## **Side Wall Girts - 61mm Tophats**

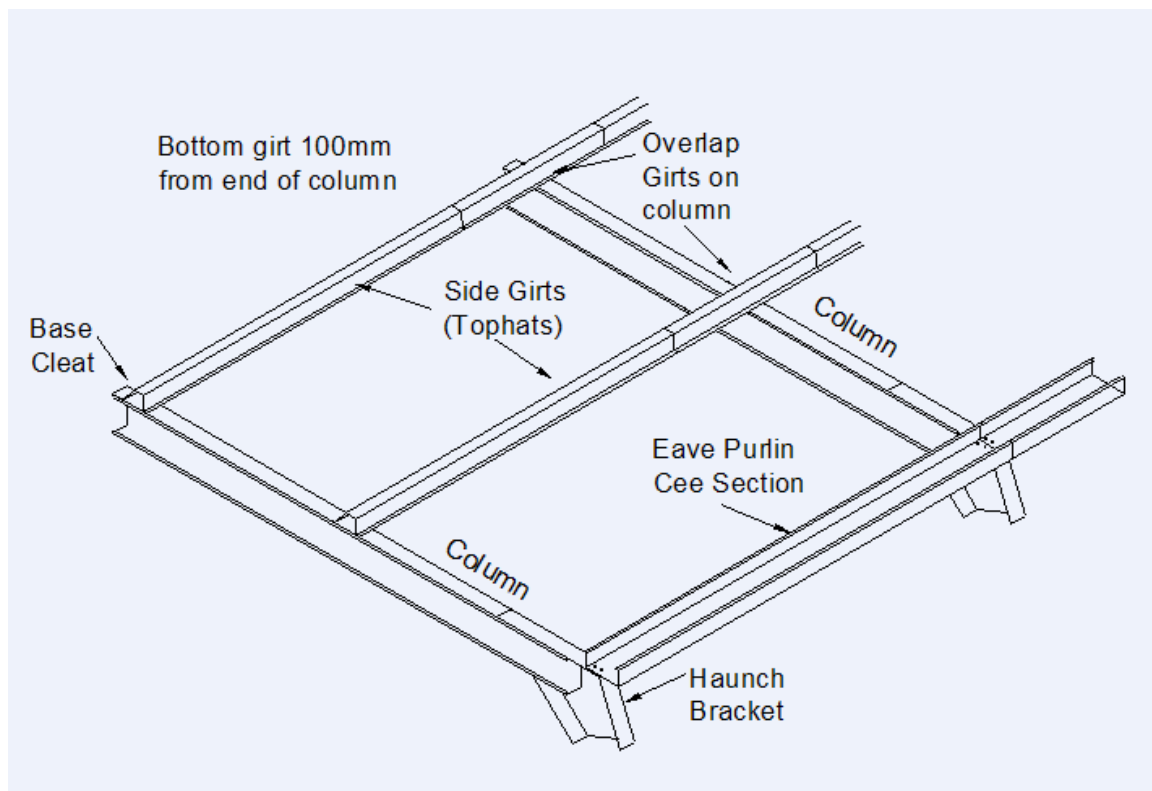
Once the **Eave Purlins** are attached the 61mm Tophats used as Side Wall Girts can be attached. Build the side wall frame on the ground, and stand it once complete.

Measure up from the bottom of the columns to mark the fixing point for each **Side Wall Girt**. (Refer to the Specification Sheet for the **Side Wall Girt** spacing.)

Screw the 61mm tophats to the **End Column** first, allowing them to overlap at the **Internal Columns** unscrewed. Measure the total length of the **Eave Purlin**, then measure the distance between the wall columns to determine the bay widths.

Use the overall **Eave Purlin** measurement to gain the overall length of the bottom **Side Wall Girt**. The bay width measurements will provide the fixing point for the bottom **Side Wall Girts** to the **Internal Columns**. Secure the bottom **Side Wall Girt** using one **Frame Screw** at each join to temporarily secure and allow the frame to pivot when measured and squared.

Place the remaining **Side Wall Girts** on the wall in the marked location ensuring the **Side Wall Girt** spacing is adhered to, and fasten them with one **Frame Screw** per connection.

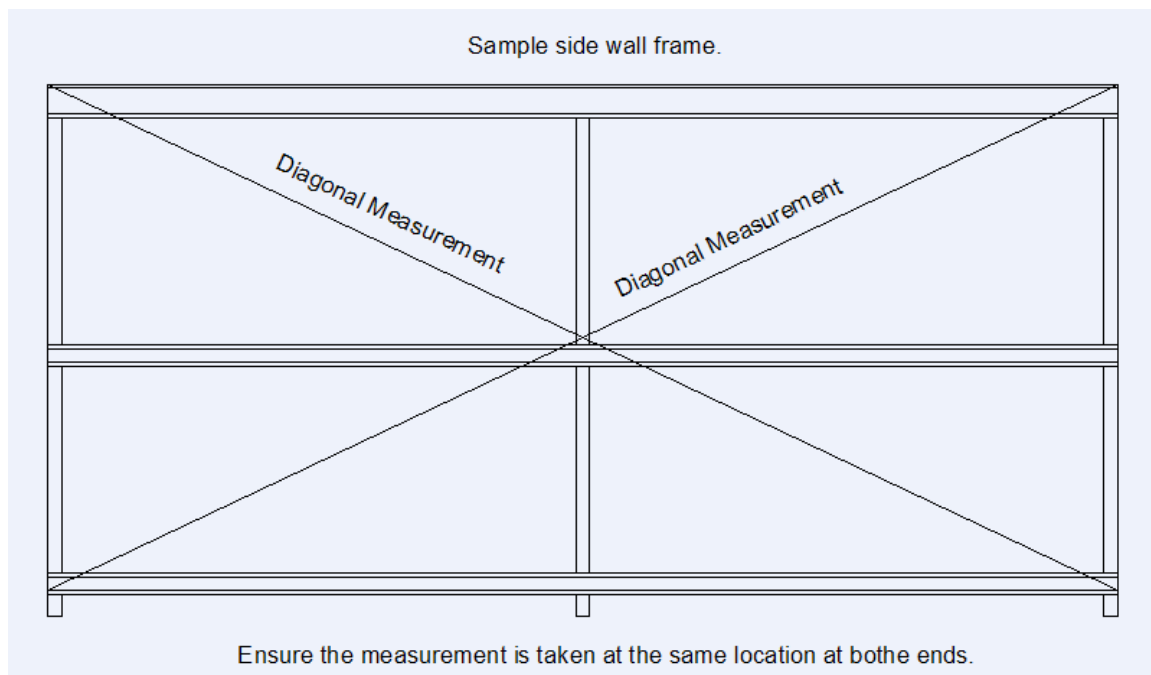


Attach a string line to the top of the **Haunch Brackets** and align all of the columns prior

to squaring the wall using the diagonal measurements.

Square the side wall frame by taking the overall diagonal measurements. If the wall is more than two bays or longer than your tape measure, insert a mark on the **Eave Purlin** and the bottom **Side Wall Girt** which is more manageable. (Eg. 6m) The wall can be adjusted to achieve the same measurements in both directions. Once squared, secure the side wall frame by fixing a second frame screw in each join.

Hint – It is easier to adjust the diagonal measurement by pushing or pulling on bottom of the wall which will slide on the column flange. The top of the wall will catch on the **Haunch Brackets** and is more likely to twist on the elevated brackets.

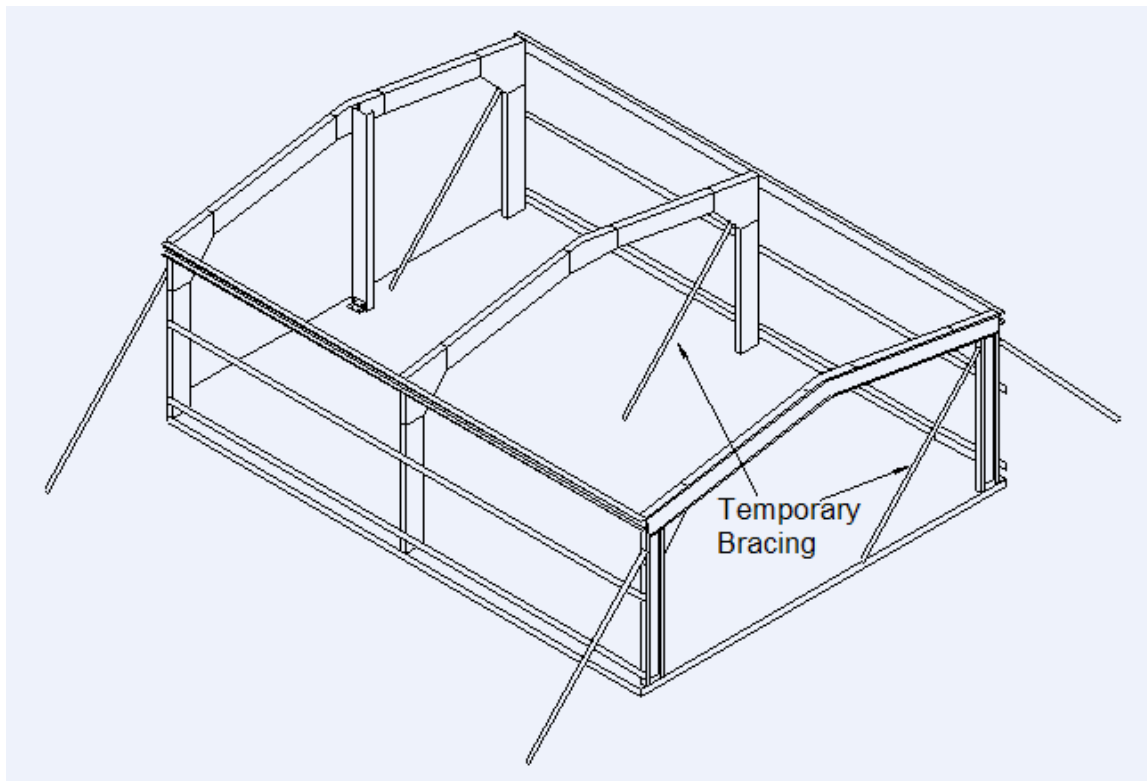


## **End Wall Mullions TH61**

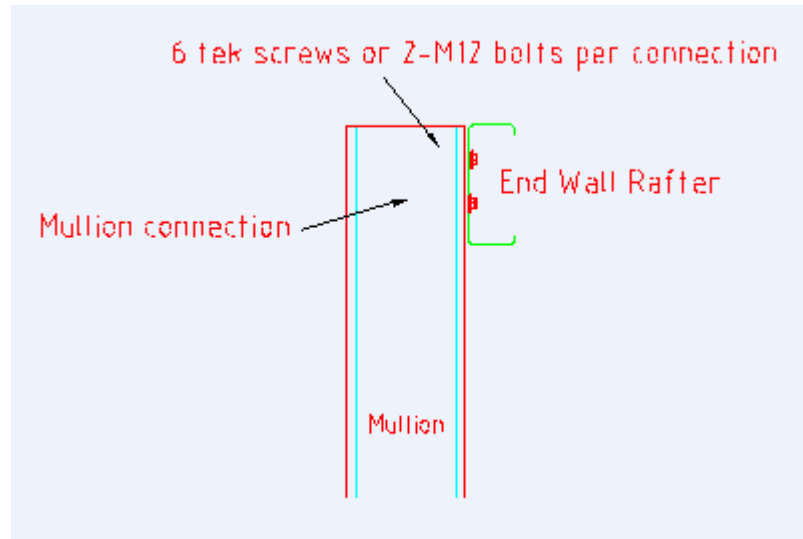
Once the rafters are secure, the **End Wall Mullion/s** can be installed.

Attach the **Base Cleats** to the **End Wall Mullions** using the **Purlin Bolts** supplied.

Mark the location of where the mullion base is to be stood, using the End Wall Bay Spacing measurement in the Specification Sheet. Stand the **End Wall Mullion/s** against the **End Rafter** and if needed mark it to be cut the same height as the top of the **End Rafter**. Once cut, attach the **End Wall Mullion** side-on to the rafter directly using two **Frame Screws** to hold it in position, then drill and insert two **Purlin Bolts**.



The measurement from the outside face of the **End Wall Mullion** to the outside of the slab should be the same as the **End Wall Girt** height which in this instance is 61mm as noted in the Specification Sheet.



Once level horizontally, secure the **End Wall Mullion** by drilling and inserting the **Sleeve Anchors** into the concrete base. Fasten the **Sleeve Anchors** using a socket wrench, making sure the fastener is completely tightened. Secure the top of the **End Wall Mullion** with at least six **Frame Screws** into the **End Rafter**.

## **Roof Purlins - 61mm tophats**

The **Roof Purlins** are used to bridge the rafters and hold them square and rigid. They are also the fixing point for the **Roof Sheets**.

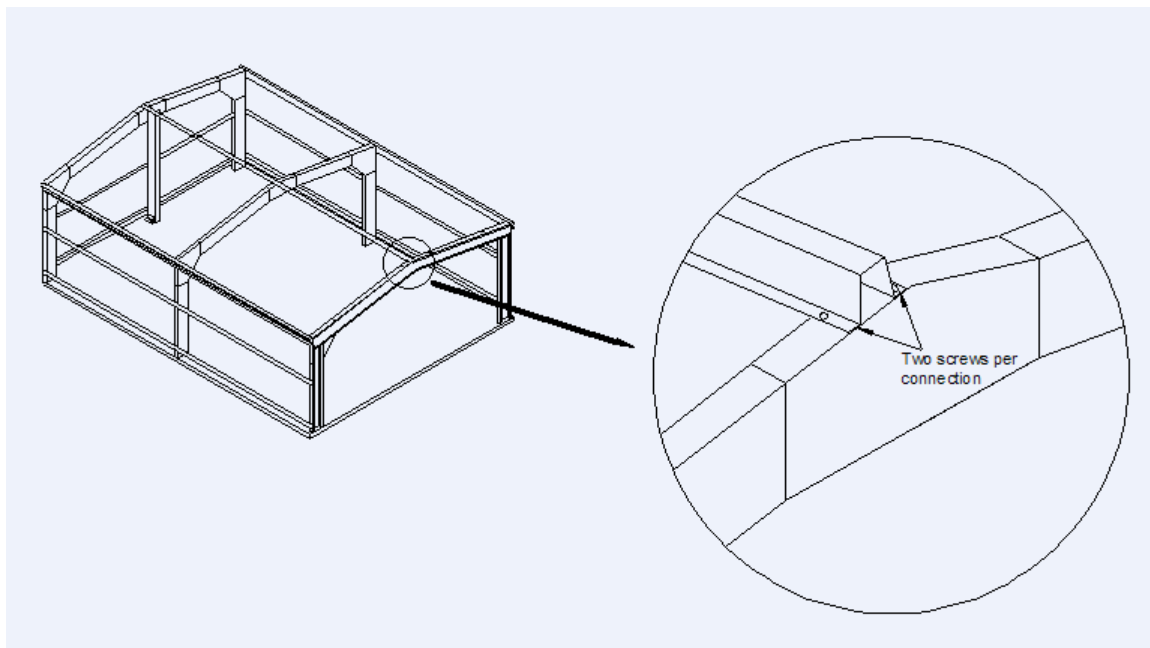
Once the rafters have been set in place, the **Roof Purlins** can be applied. The overall length of the **Roof Purlins** will be the same length of the building.

Make up the necessary rows of **Roof Purlins** the same length as the building, do this on a flat surface. When screwing the tophats together, use two wall screws, one in each side of the overlap.

Measure the distance between the side wall columns to determine the bay sizes. Mark the bay sizes on the complete **Roof Purlins**. These marks will allow you to screw the **Internal Rafters** square to the **Internal Columns**.

If there are more than three bays in the building, separate the **Roof Purlins** into lengths no larger than three. Once the **Roof Purlins** are lifted onto the rafters, rejoin them by relocating the initial screw holes.

Mark the rafters with the Roof Purlin spacing listed in the Specification Sheet.



Fix the **Roof Purlins** to the **End Rafters** using a single **Frame Screw**, then align the **Internal Rafters** with the marks on the **Roof Purlins**. Use one **Frame Screw** at each join to allow the frame to pivot when squared.

Use a spirit level to plumb the **End Wall Mullion** which will also plumb all of the rafters. If there are no **End Wall Mullions**, mark a straight line between two side wall columns

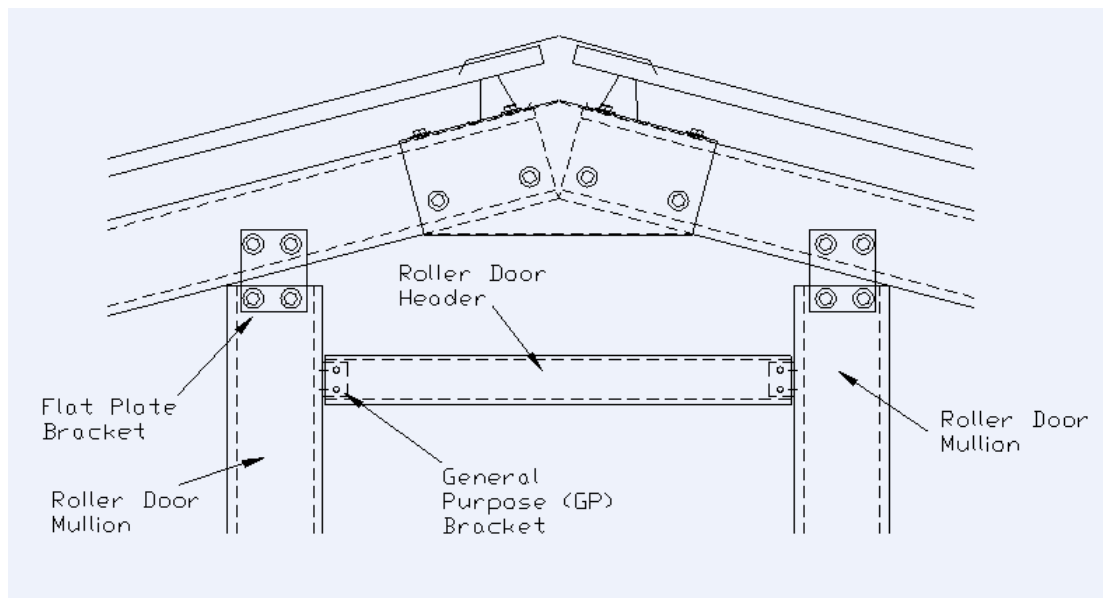
using a chalk line. Now hang a plumb bob from the rafter, once the plumb bob meets the line, the rafter is plumb.

Once the rafters are plumb, fasten a total of two **Frame Screws**, per rafter, into each **Roof Purlin** joint to secure the roof.

## **Roller Doors - End Wall**

Once the **Roof Purlins** are secure, the end wall **Roller Door Mullions** can be fitted. Measure the **Roller Door** and the roller door tracks. Subtract the combined width of the tracks from the total curtain width of the door which will provide your door opening measurement.

Measure and mark where the **Roller Door Mullions** will be fixed on the concrete, then fix the **Base Cleats** to the **Roller Door Mullions** using the **Purlin Bolts** provided. Stand the **Roller Door Mullions** against the **End Rafter** and mark them to be cut flush with the bottom edge of the **End Rafter**. Once cut, fix the **Flat Plate** supplied to the **Roller Door Mullions** using two **Frame Screws**, then drill and fix two **Purlin Bolts**. Place the **Roller Door Mullions** in the correct position to be fixed, secure the **Roller Door Mullions** by drilling and inserting the **Sleeve Anchors** into the concrete base. Fasten the **Sleeve Anchors** using a socket wrench, making sure the fastener is completely tightened.



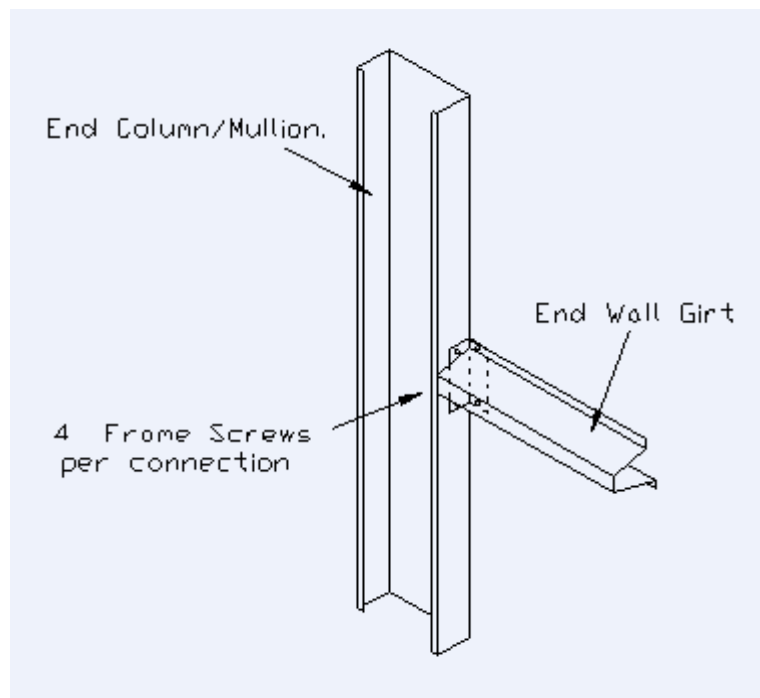
Once the **Roller Door Mullions** are anchored to the ground, they can be levelled and fastened to the **End Rafter** using the two **Frame Screws** and two **Purlin Bolts**, which need to be drilled before insertion.

The **Roller Door Header** beams will be fixed using **General Purpose Brackets**. Measure and mark the **Roller Door Mullions** at the same height as the **Roller Door**. For example, if the **Roller Door** is 2100mm high, the **Roller Door Header** will be set at 2100mm. Screw the **GP Brackets** to the top of these marks using two frame screws and then fix the **Roller Door Header** to the brackets using two **Frame Screws** into each side of the **GP Bracket**.

## **End wall Girts - 61mm**

Attach **General Purpose (GP) Brackets** to the inside flange of the **End Columns, End Roller Door Mullions** and **End Wall Mullions**, in any location where there is a gap between them of greater than 200mm. The **GP Bracket** is connected to the flange of these sections using two **Frame Screws**.

They are connected at the same height as the **Side Wall Girts**. Cut and fit the **End Wall Girts** to the **GP Brackets**. Use two **Frame Screws** to connect the **End Wall Girts** to the **GP Brackets**.



## Strap Bracing

Refer to the engineering specifications to determine which bays need **Strap Bracing**. The **Strap Bracing** will need to be applied prior attaching the **Wall Cladding** and the **Roof Sheeting**.

### **Walls**

Measure the diagonal length of the wall bay, from the top of the column to the base of the next column. Add 1m to this measurement to allow for attachment to the columns. Cut two lengths of strap to this measurement.

To attach correctly fasten the **Strap Bracing** to the bottom of the side wall column on each side of the bay using a single **Frame Screw**. Pivot the **Strap Bracing** and screw to the top of the side wall column on the opposite side of the bay applying the desired tension. This can be achieved easily using a claw hammer in a rotational mode with the strapping passing through the slot in the head. This is then fixed with a **Framing Screw**.

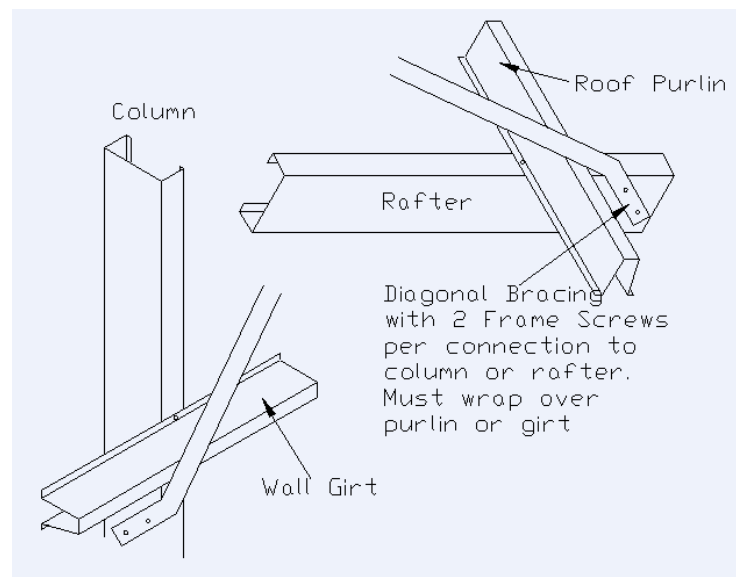
Once the desired tension has been set, apply a second **Frame Screw** at each joint to secure.

### **Roof**

Measure the diagonal length of the roof bay. Add 1m to this measurement to allow for attachment. Cut two lengths of strap to this measurement.

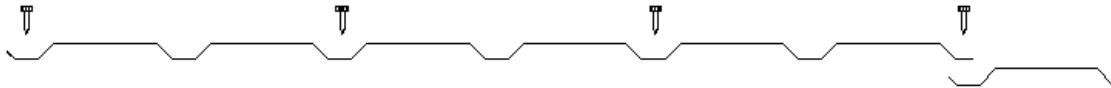
To attach correctly fasten the strap bracing to the bottom of the rafter on each side of the bay using a single frame screw. Pivot the strap bracing and screw to the top of the rafter on the opposite side of the bay applying the desired tension.

Once the desired tension has been set, apply a second frame screw at each joint to secure.



## Wall cladding – AS1000/24

Start the first sheet on the side wall flush with the top edge of the **Eave Purlin** and 25mm in from the side corner. Fix a single **Wall Screw** into the bottom **Side Wall Girt** through the bottom right hand corner of the sheet. Pivot the sheet on this screw until level, and then fix a second screw into the middle **Side Wall Girt** to hold the sheet.

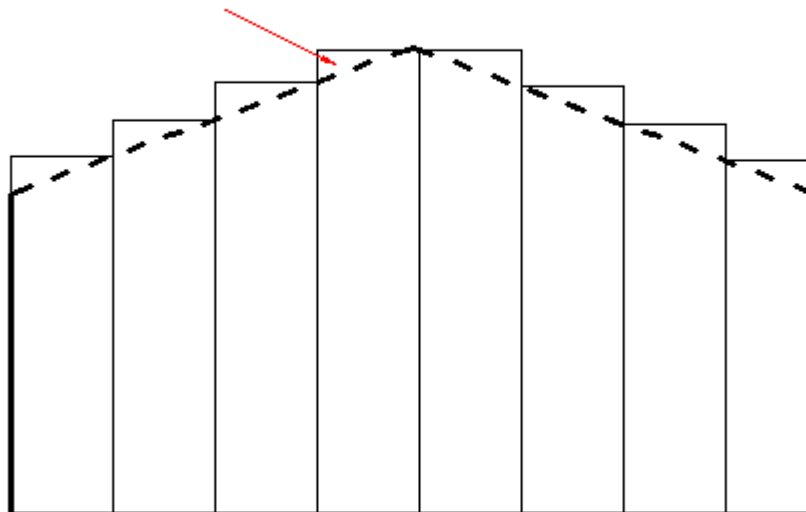


Continue the process until the final sheet is reached. The final sheet will need to be cut to length if it extends beyond the wall.

**REMEMBER:** The wall sheets must overlap concrete by at least 25mm to seal the building.

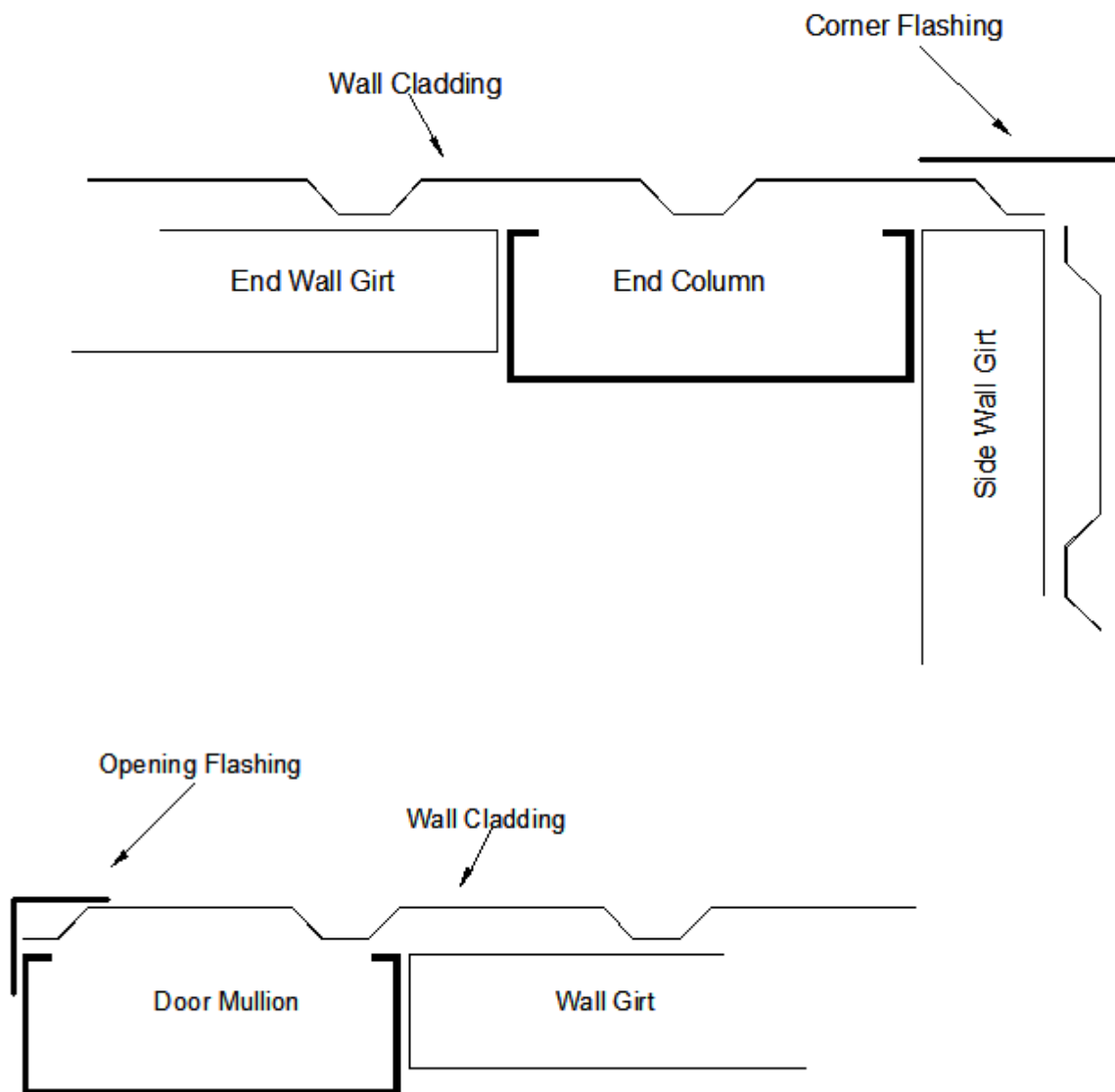
Once both side walls are sheeted, the gable ends may be sheeted. Align the bottom of the first **End Wall Sheet** with the bottom of the side wall sheet to set the height. Use the same method as the side walls to sheat the ends once the height has been set.

**Trim Cladding along  
the top of the rafter**



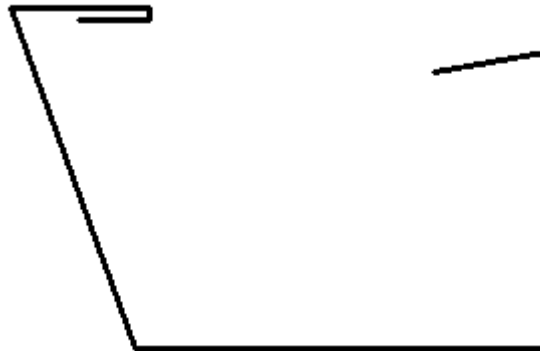
Once the **End Wall Cladding** has been fastened to the **End Wall Girts**, use a chalk

line to mark just above the **End Rafter** line where the top of the **End Wall Sheets** need to be cut. Once cut, the **End Wall Sheets** can be screwed to the top edge of the rafter. At open gable end, trim the cladding around the openings.



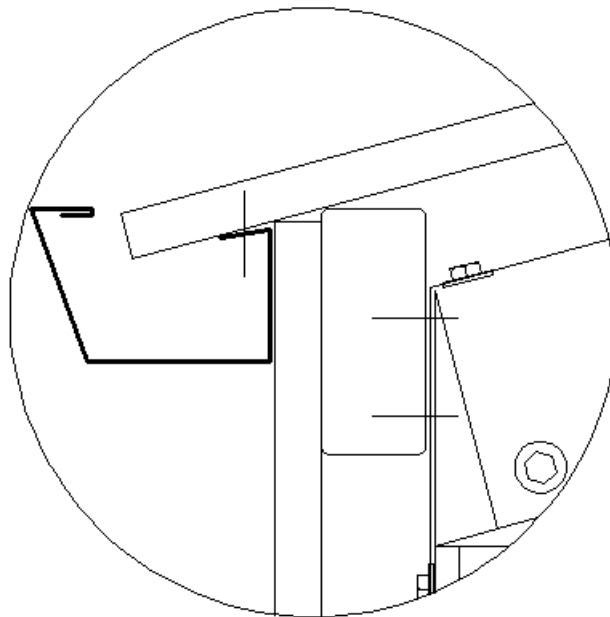
For cutting thin metal on site, we recommend using either snips or a nibbler. Cut materials over the ground and not over other materials. Sweep all metallic swarf and other debris at the end of each day and at the completion of the installation. Failure to do so can lead to surface staining where the metal particles rust.

## **Gutter - 2755**



The **Stop Ends** and **Down Pipe Nozzles** must be fixed to the **Gutters** using galvanized **Rivets** supplied, and then sealed with neutral-cure silicone sealant.

Once the **Side Wall Cladding** and **Roofing** is completed, attach the **Gutter** by inserting a wall screw through the pan of the roof sheet and into the back of the **Gutter**. It is recommended that one screw per roof sheet is inserted.



The gutter has been supplied slightly longer than the bay size to allow sufficient overlap. One gutter is fitted inside the other in a male - female connection.

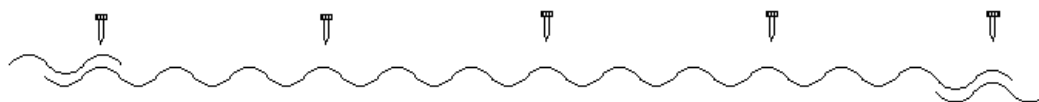
Remember to apply neutral-cure silicone when joining separate lengths.

## **Roofing Custom Orb**

If **Skylights** are to be installed, determine the position of the skylights prior to installing the **Roof Sheets**.

Starting at the front of the building, measure and mark the roof and **Eave Purlins** 35mm from the end of the building.

Position the first **Roof Sheet** on the **Roof Purlins** with the male edge (Roll Down) facing the front of the building. The sheet should extend beyond the **Eave Purlin** and half way into the **Gutter**.



### **Fixing Schedule**

Align the **Roof Sheet** with the 35mm marks on the **Roof Purlins**, then secure the sheet with a single **Roof Screw** through the rib into the apex positioned **Purlin**.

Measure how far the **Roof Sheet** extends past the apex positioned **Purlin**. Pivot the Sheet on the single **Roof Screw** until the overhang on each side is equal, then secure the **Roof Sheet** with a second **Roof Screw**.

Overlap the second **Roof Sheet** and align the two **Roof Sheets** at the apex. Fasten a single **Roof Screw** into the apex positioned Purlin through the overlapped sheets. Pivot the sheet on the single **Roof Screw** until the overhang on each side is equal, then secure the sheet with a second Roof Screw. Initially, only secure the **Gutter** end of the sheets with a single **Roof Screw** through the overlap into the **Eave Purlin** or the bottom row of **Roof Purlins**.

Continue this process until the final sheet is secure. The final sheet may need to be cut with a pair of snips or a nibbler if it extends beyond the length of the roof or overlapped further over the previous **Roof Sheet** to obtain the correct coverage of the roof area.

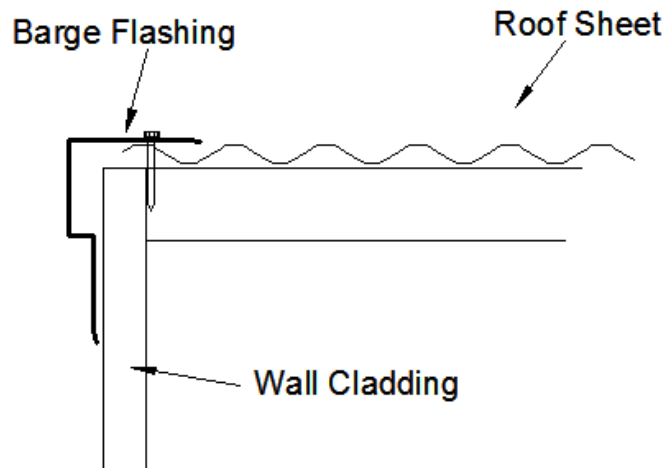
Once all the **Roof Sheets** are secure, mark the location of the **Roof Purlins** using chalk line. Insert the **Roof Screws** as per the diagram.

### **Roofing Skylights (If used)**

Once the position of the **Skylights** is determined, start sheeting the roof using the normal installation process. When the position for the skylight has been reached, install them using the screw pattern used at the eave of the building as shown above.

Ensure that the skylight is installed over the roof cladding on both sides, not over one side and under the other like the **Roof Cladding**.

Install the **Barge Flashing** as shown below.



Install the **Ridge Capping** as shown.

