



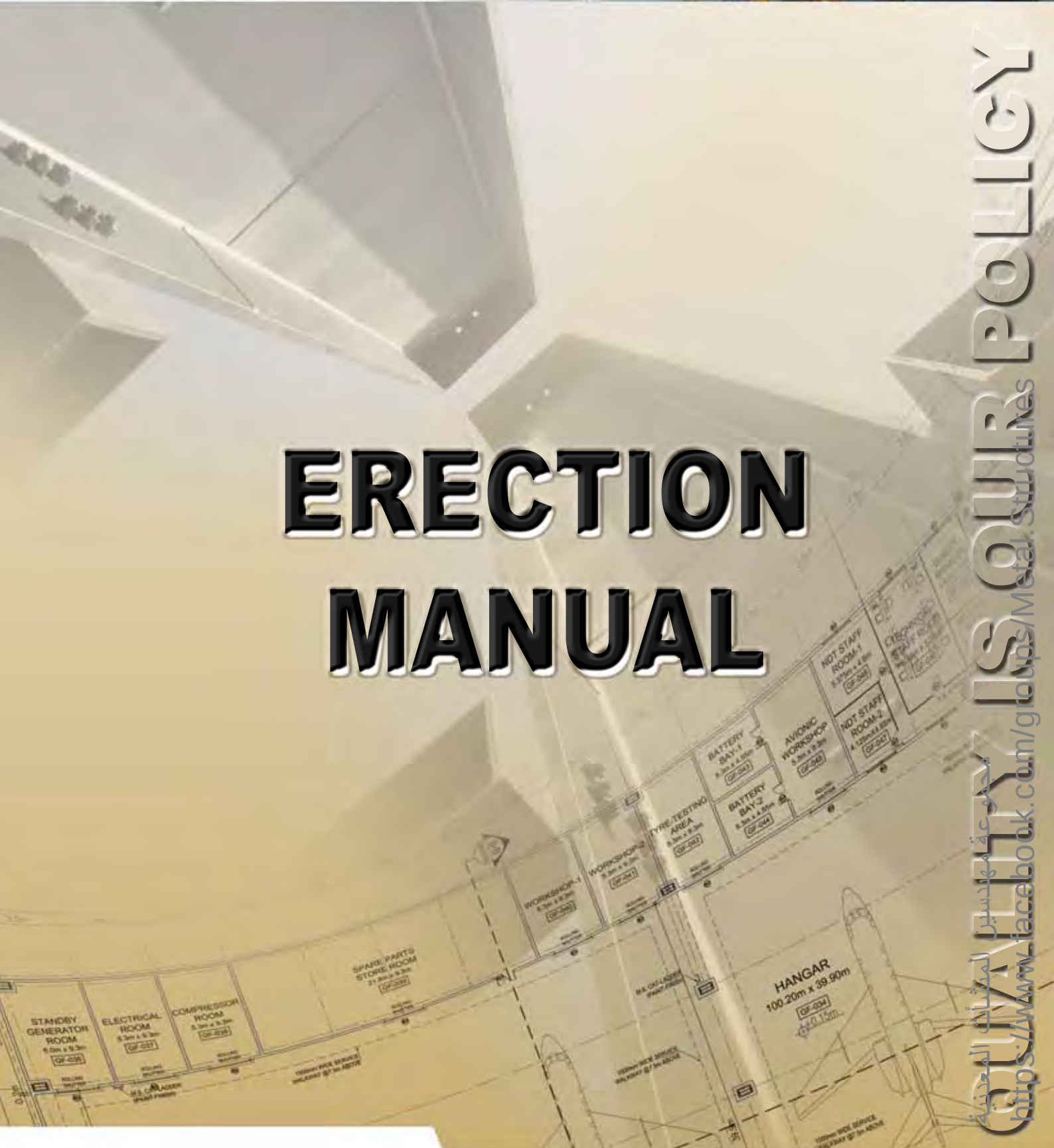
**STEEL**

Building System Integration W.L.L

شركة تكامل لأنظمة المباني (ذ.م.م)



# ERECTION MANUAL



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**MANUFACTURER OF PRE - ENGINEERED STEEL BUILDINGS (PEB'S)**

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## INTRODUCTION

The ERECTION PROCEDURE is intended to provide Building System Integration (BSI) and/or erectors with recommended procedures for erecting BSI buildings as safely and efficiently as possible. However, Building System Integration (BSI) is not liable for, and does not guarantee the quality of erection, nor does BSI assume any responsibility for building defects that may be attributed to improper erection techniques, or the negligence of other parties.

### CORRECTION OF MINOR ERRORS:

- A.** All erection work will be treated as outlined in the American Institute of Steel Construction Code of Standard Practices for Steel Buildings and Bridges, Section 7, which deals with the correction of errors in situations where the material is not being erected by the fabricator and which reads in substance as follows: The correction of minor misfits by moderate amounts of reaming, grinding, welding and cutting, and the drawing of elements into line with drift pins, shall be considered to be normal erection operations. Errors that cannot be corrected using the foregoing means, or that require major changes in member or Connection configuration, shall be promptly reported to BSI Erection Coordinator to enable BSI to either correct the error or approve the most efficient and economical method of correction to be used by the Erector / Builder.
- B.** In cases where the Builder/Erector believes there are errors in shop fabrication that prevent the proper assembling and fitting of parts by the use of drift pins, reaming, chipping or cutting, the Builder/Erector shall immediately report such matters to the BSI ER.WR. So, BSI may either correct the error or approve the method and cost of the correction to be made. The Builder/Erector shall furnish a clear description of the problem in his report to BSI and shall also furnish a suggested solution and the cost thereof. BSI shall have the option of:
- (1) Replacing the defective material with freight allowed to jobsite by carrier of BSI's choice..
  - OR
  - (2) Authorizing field correction of the problem by a method and at a cost agreed to by BSI.

## **INSPECTION BY BSI**

BSI shall have the right to inspect from time to time all erection work being carried on by the Builder/Erector. It shall be the responsibility of the Builder/Erector to finish permits, if required, for entry to the jobsite for the inspection and the Builder/Erector shall provide equipment (ladders level, etc.) for such inspection. If requested, Builder/Erector will receive a copy of the Inspection Report. In the event erection errors are detected at the time of inspection, the Builder/Erector will be notified of the errors in writing with a suggested method of correction.

In the event the errors are not considered by the Builder/Erector, the Owner will be notified in writing by BSI with a copy of the original report included with the Owner notification. A copy of the notification to the Owner will be forwarded to the Builder/Erector. BSI shall have no liability to the Builder/Erector or to any customer for defective workmanship in the erection of buildings including by way of description, but not by way of limitations, defects arising from loose connections, missing parts, roof leaks, damaged sheets, omission of sealer, of closure, scratched surfaces, poor alignment, inadequate drainage or defects arising out of materials furnished and or installed by Builder/Erector or others. The Builder/Erector agrees to indemnify and hold harmless from any and all claims which may or might be made against BSI by any customer or owner arising from or growing out defects in the erection of any BSI Building erected by or under the direction of, or for the account of the Builder/Erector.

## **STORAGE AND PROTECTION OF COVERING :**

- A.** When Aluminium, galvanized, or the galvanized pre-painted coating on pilled flat sheets or nested formed sheets or galvanized purlins or girts become wet from rain, natural condensation, or other causes, white rust may result. This may occur either in transit or in storage at the jobsite.
- B.** Formed pre-painted sheets must be protected from moisture in the same manner as plain galvanized sheets until boldly exposed to the weather. The sheets must be properly packaged and stored, otherwise, white rust may develop at minute cracks in the paint and at the cut edges.
- C.** It is important on receipt of material, to examine packages for damage. Builders and or Erectors, are encouraged to take prompt action where cuts, tears, or other damage is evident. If a small amount of moisture is present, the sheets should be dried before restacking or storage. Damp sheets should never be restacked until thoroughly dry.
- D.** Roofing and siding sheets should be erected as soon as possible after their arrival at the jobsite. If temporary storage is absolutely necessary, they should be stored indoors. Where indoor storage is not possible, the procedure shown in this MANUAL must be followed to prevent the entry of moisture into the bundle and consequent storage stain

## **ERECTION**

- A.** Before starting erection, make sure that you have a complete set of Erection drawings marked "Issued For Construction". The cover sheet of BSI Erection drawings list all the drawings in the set along with the latest revision number and date.
- B.** It is the Builder / Erector's responsibility for mobilization, receiving, off loading and furnishing necessary tools for the proper erection of a BSI Building.
- C.** The structure should be adequately braced at all times before raising the next component. The structure must be secured with temporary or permanent bracing before release of lifting equipment and at the end of the day, weekends or other shutdowns. When commencing erection of the building, the first bay must be erected with all wind bracing, eave purlins/struts, purlins, girts and flange braces completely installed and all bolts properly tightened to make certain that the building is properly braced. (Refer to appropriate pages that follow in this Manual).
- D.** All joints should be made up and all bolts are in place before releasing Lifting Equipment.
- E.** Until the first run of roof sheets is secured, temporary scaffold should be used to start sheeting so that Cladding Crew will have something to stand on. Refer to proper method of walking on the roof described in the sheeting section of this Manual.
- F.** All Cladding Crew should be cautioned regarding roof openings. Any uncovered openings should be properly guarded.
- G.** Workers should never slide down columns and other structural members. Ladders should be used to get on and off the building. Wall girts and diagonal braces should not be used as ladders.

## **CLAIMS**

It is the responsibility of the Owner, Builder or Erector to make an inspection upon arrival of all products shipped to the Customer, Builder or Erector.

It is the responsibility of the Builder/Erector to report such claims for shortages or defective material immediately to the Owner, or Customer to enable him to file a claim for the shortage or defective material.

If package items are found to contain shortages or defective material, these must be reported to BSI Erection coordinator of site, in writing, within 15 days after receipt of the shipment. All claims must be reported in details giving part numbers, description and length. This information may be obtained directly from the Bill of Materials furnished with the building.

## RECOMMENDED TOOLS & EQUIPMENT FOR ERECTION

The following list of tools and equipment is considered adequate for erection of most BSI buildings. Actual Equipment requirement may vary due to differences in building type and size, jobsite conditions and erection personnel. The list is intended to serve as a recommendation only and should not be used as a limitation to your inventory of erection equipment should be in accordance with the general guidelines set forth in this Manual.

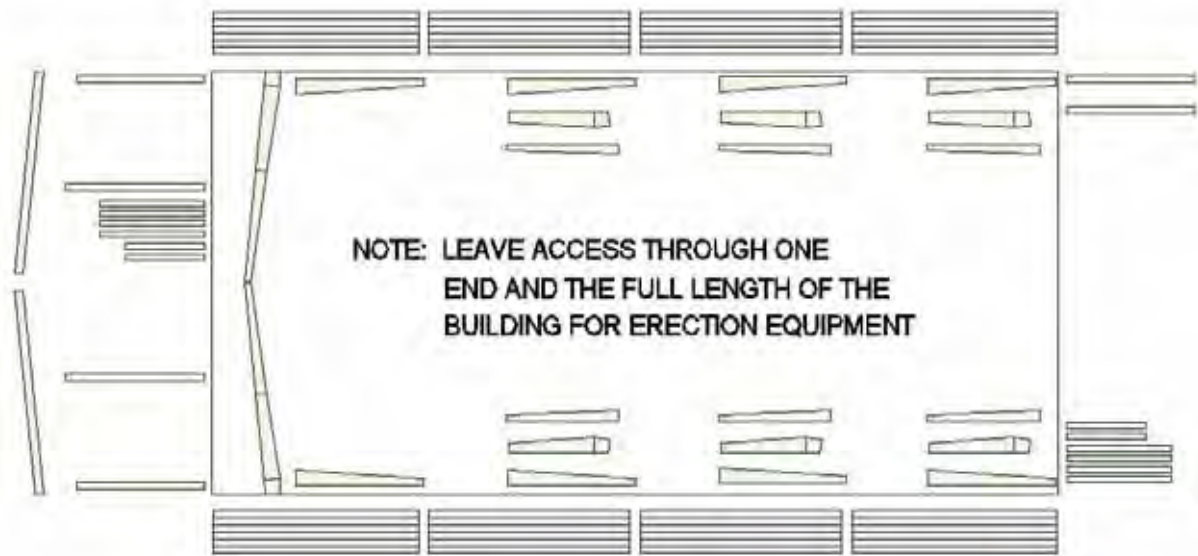
| S/No. | Items                    | Qty  | Description                                                     |
|-------|--------------------------|------|-----------------------------------------------------------------|
| 1     | Screw Guns               | 2    | With magnetic hex socket heads and replacement drivers          |
| 2     | Sheet Metal Nibbler      | 1    | Electric sheet cutting tool with replacement Bits               |
| 3     | Power Impact Wrench      | 2    | With assorted impact sockets 12mm to 36mm                       |
| 4     | Electric Drill           | 2    | Heavy Duty, 12mm                                                |
| 5     | Electric Drill           | 2    | Heavy Duty, 6mm                                                 |
| 6     | Electric Screw Gun       | 4    | Heavy Duty with hex sockets                                     |
| 7     | Electric Power Saw       | 1    | Heavy Duty with metal & carbide blades                          |
| 8     | Electric Extension Cords |      | Sufficient for maximum number of tools used at once             |
| 9     | Electric Arc Welder      | 1    | With leads and extra welding head                               |
| 10    | Portable Generator       | 1    | Gas driven – for electric power at jobsite                      |
| 11    | Gas Cutting Outfit       | 1    | With hose, gauges, torch & replacement heads                    |
| 12    | Socket Wrenches          | 2    | Sets 12mm drive with assorted sockets and ratchet drive handles |
| 13    | Spud Wrenches            | 6    | Assorted sizes 12mm to 36mm                                     |
| 14    | Box End Wrenches         | 2    | Sets - assorted sizes 12mm to 36mm                              |
| 15    | Open End Wrenches        | 2    | Sets - assorted sizes 12mm to 36mm                              |
| 16    | Vice Grip Pliers         | 2    |                                                                 |
| 17    | Pop Rivet Tool           | 2 ea | Manual and Electric                                             |
| 18    | Stapler Gun              | 4    | With staples                                                    |
| 19    | Hammers                  | 2 ea | Shop, Sledge, Rubber                                            |
| 20    | Sheet Metal Cutters      | 2 ea | Left, Right, Straight                                           |
| 21    | Drift Pins               | 4    | Heavy Duty                                                      |
| 22    | Hack Saw                 | 4    | With assorted blades                                            |
| 23    | Chokers                  | 4    | 3/8"                                                            |
| 24    | Chokers                  | 4    | 1/2"                                                            |

| S/No. | Items                          | Qty    | Description                               |
|-------|--------------------------------|--------|-------------------------------------------|
| 25    | Cable Clamps                   |        | Assorted Sizes                            |
| 26    | Slings                         | 4      | With Clevises                             |
| 27    | Spreader Bar                   | 1 ea   | 3m, 5m                                    |
| 28    | Steel Cable                    | 100m   | With Turnbuckles                          |
| 29    | Work Platform                  | 2      | 6m, Steel or Plywood reinforced           |
| 30    | Extension Ladders              | 2      | 6m                                        |
| 31    | Safety Belts with Tool Pouches |        | Sufficient for Crew                       |
| 32    | Safety Helmets                 |        | Sufficient for Crew                       |
| 33    | Goggles                        | 2      | For Power cutting                         |
| 34    | Goggles                        | 2      | For burning equipment                     |
| 35    | Welding Hood                   | 1      | With additional lens for electric welding |
| 36    | Steel Measuring Tape           | 4      | 5m                                        |
| 37    | Steel Measuring Tape           | 2 ea   | 15m and 30m                               |
| 38    | Level                          | 2 ea   | 1.2m, 2m                                  |
| 39    | Framing & T-Square             | 1 ea   |                                           |
| 40    | Transit & Level Rod            | 1 ea   |                                           |
| 41    | Chalk Line                     | 1 Ball | Yarn                                      |
| 42    | Nylon Line                     | 100m   |                                           |
| 43    | Manila Rope                    | 100m   | ea 3/8", 1/2"                             |
| 44    | Caulking Guns                  | 4      | Cartridge Type                            |
| 45    | Brooms                         | 2      |                                           |
| 46    | Dust Pans                      | 2      |                                           |
| 47    | Water Can with cup holder      |        |                                           |
| 48    | Mobile Crane                   | 1      | Capacity depends on scope of work         |
| 49    | Forklift                       | 2      | Capacity depends on scope of work         |
| 50    | Telescopic Handler             | 1      |                                           |
| 51    | Scissor Lift                   | 1      |                                           |

## COMPONENT UNLOADING PROCEDURES

### UNLOADING AND MATERIAL LAYOUT

As the building materials are loaded, it should be placed in and around the building site near the place where it will be used. While each job will vary according to size or site conditions, the layout below is a typical arrangement which offers convenience and accessibility during assembly and erection



Rigid frame columns are laid in position for raising

Rafters are stocked for sub-assembly and easily accessible for setting.

Girts, purlins, eave struts and bracings are divided according to the requirement of each bay.

Nested parts (purlins, girts etc.) Should be separated and blocked to allow drainage of collected moisture to prevent rusting, prior to erection.

Endwall materials is laid out for each end.

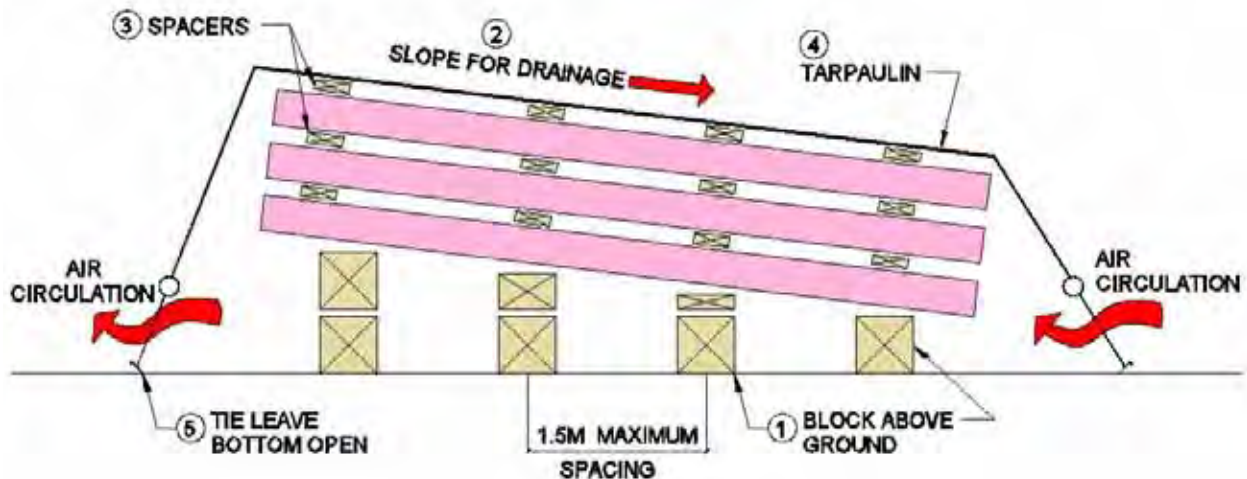
Small components (nuts, bolts, clips, fasteners etc.) Are stored in a given area convenient to parts of the building.

Wall and roof paneling and other components which will not be used in the initial stage of erecting the steel are placed to the outside of the work area and properly stored and protected from weather.

Insulation should not be stored on the edge of the roll as this will damage the edges.

## STORAGE AND PROTECTION

### FOR ROOF AND PANELS



1. Block above the ground to keep water out
2. Slope bundles for drainage.
3. Stack sheeting with spacers between bundles.
4. Cover with canvas tarpaulin to protect from rain.
5. Tie down cover ends away from the stack to permit air circulation.

Do not wrap under or restrict air movement.

### **Important**

Do not use plastic sheeting as a cover because it will promote moisture.

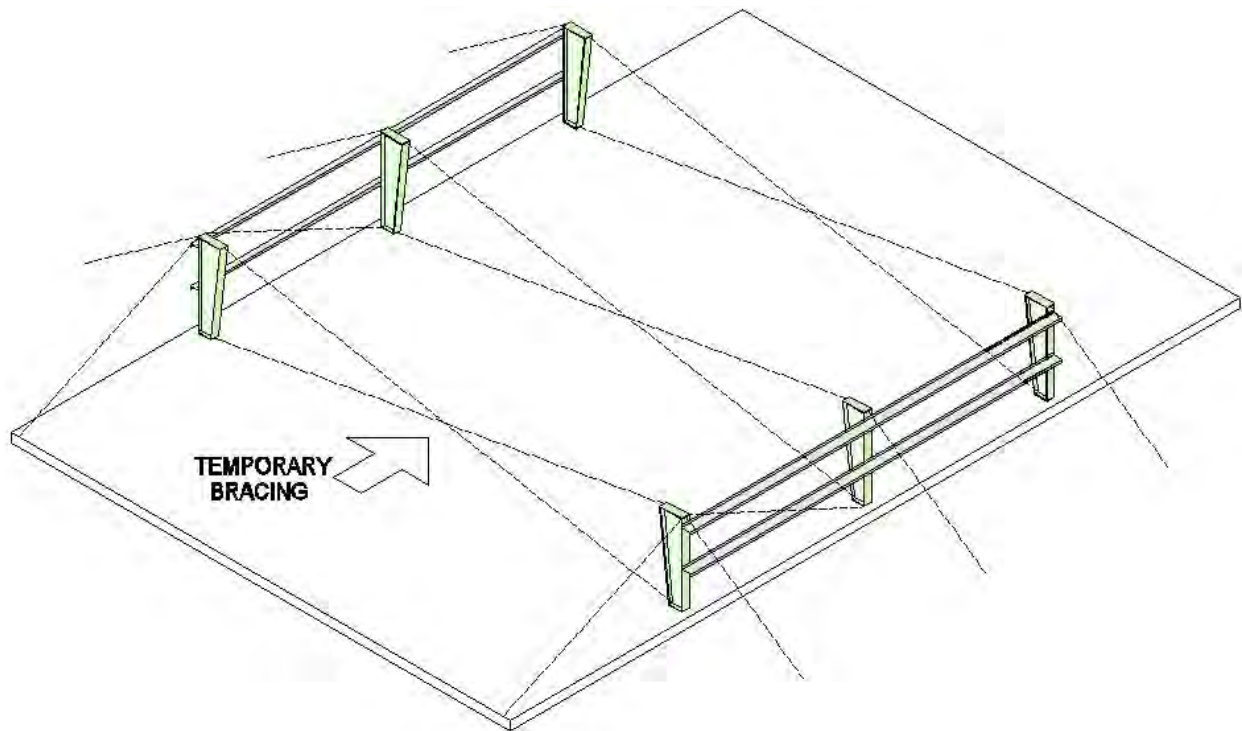
### **ANCHOR BOLTS :**

It is the responsibility of the civil contractor to lay down / fix the anchor bolts and to coordinate with the Builder / Erector to check alignment proper to casting concrete and agree to hand over the anchor bolts to Builder / Erector.

## PEB STEEL FRAMING

### ERECTION PROCEDURE

#### STEP NO. 1



#### IMPORTANT

All columns should be erected  
Just prior to roof rafter and  
Secondary framing erection

#### SEQUENCE

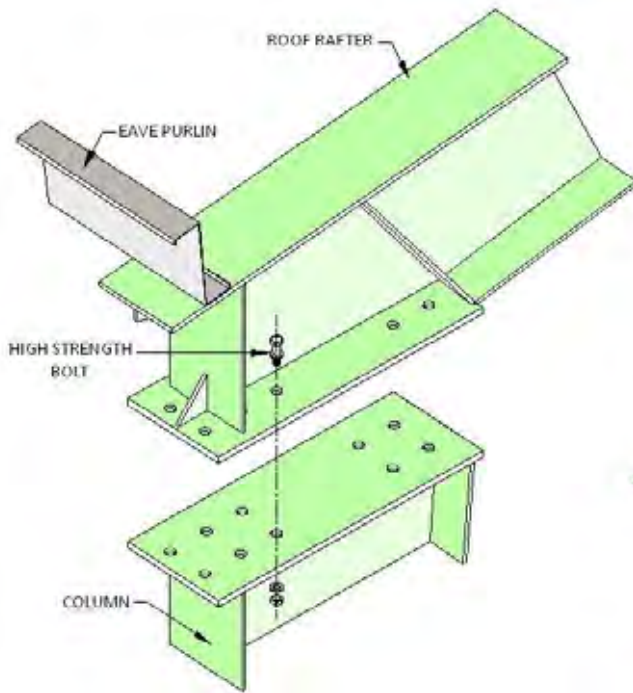
1. Check anchor bolt plan and erection drawings for special condition.
2. Stand columns in place and tighten anchor bolt nuts.
3. Attach girts and install temporary bracings

#### NOTES:

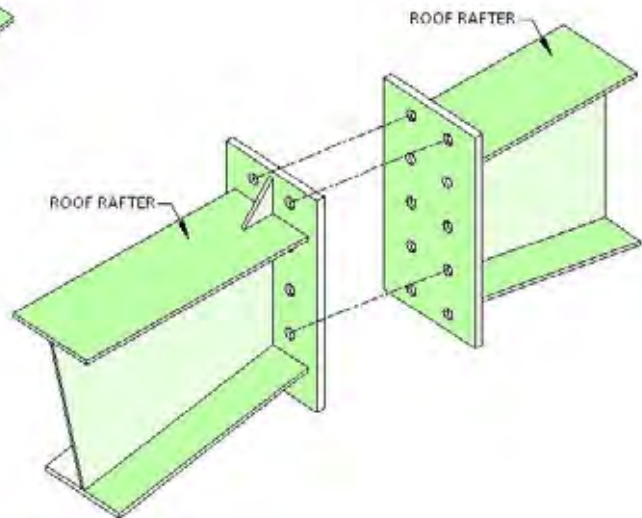
1. Plan to erect **A Braced Bay First**. Usually this is the first interior bay from either end of the building.
2. The “turn of nut” method is usually used in tightening the anchor bolts.
3. It is the responsibility of the erector to provide temporary erection bracings until the structure is complete.

## PEB STEEL FRAMING

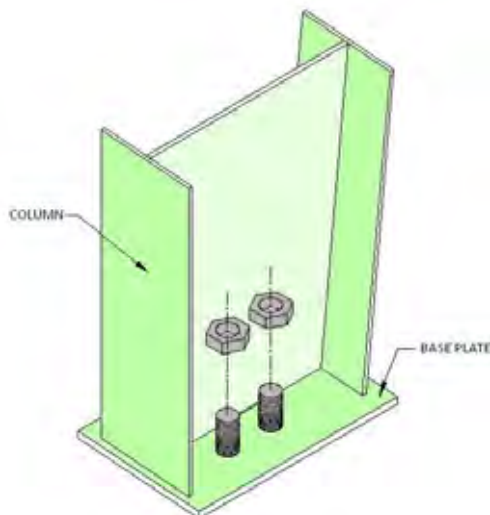
### RIGID FRAME CONNECTION DETAILS



**HAUNCH CONNECTION  
(COLUMN TO ROOF RAFTER)**



**ROOF RAFTER SPLICE  
CONNECTION**



**COLUMN AT BASE**

#### NOTES:

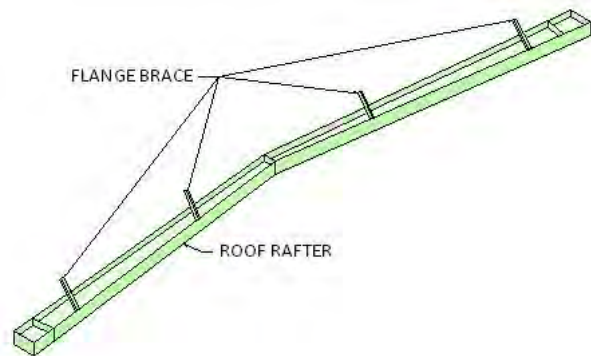
1. All connections are field bolted.
2. Refer to your erection drawings for Quantity and bolt sizes.
3. All bolts to be high strength.
4. All bolts are to be installed using "Turn of the nut method" refer glossary.
5. Install and tighten all frames connection Bolts as each rigid frame is assembled.

## PEB STEEL FRAMING

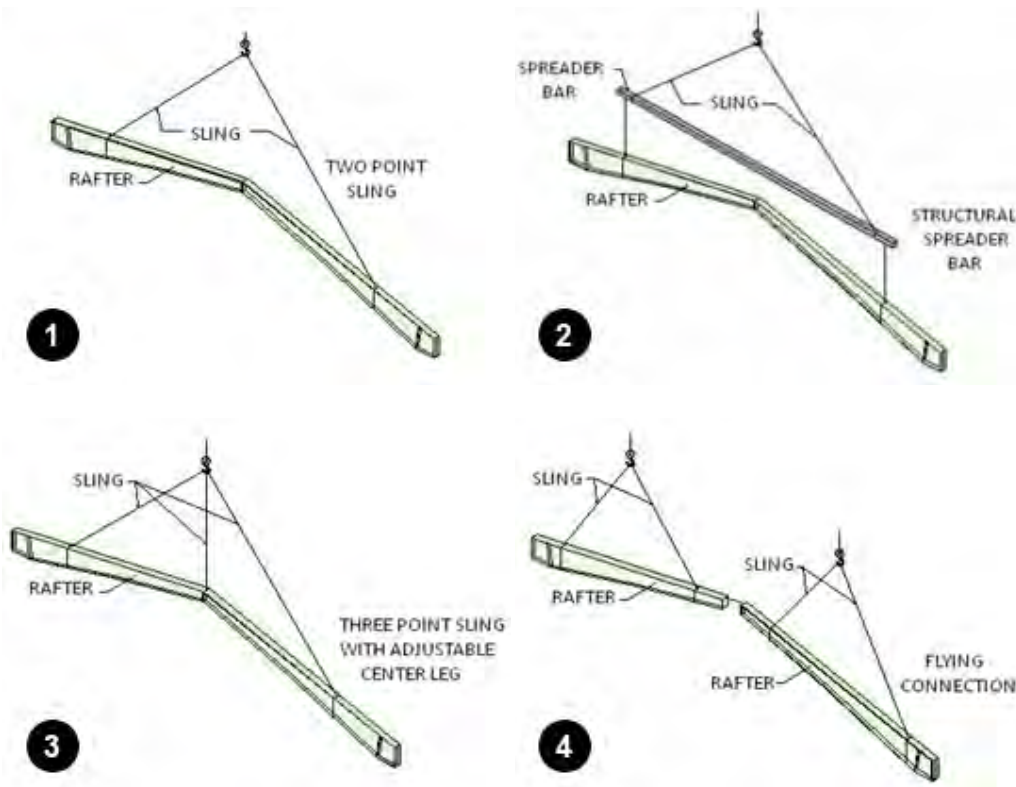
### ERECTION PROCEDURE

#### Attachment of flange braces on the ground.

Check your primary framing drawings for Flange brace locations. Attach flange braces to the roof rafter assembly while on the ground to one side. Attach flange braces to opposite side when roof rafter assembly is raised into vertical position.



Shown are 4 methods which may be used for rigging slings for lifting the Roof Rafter Assemblies.

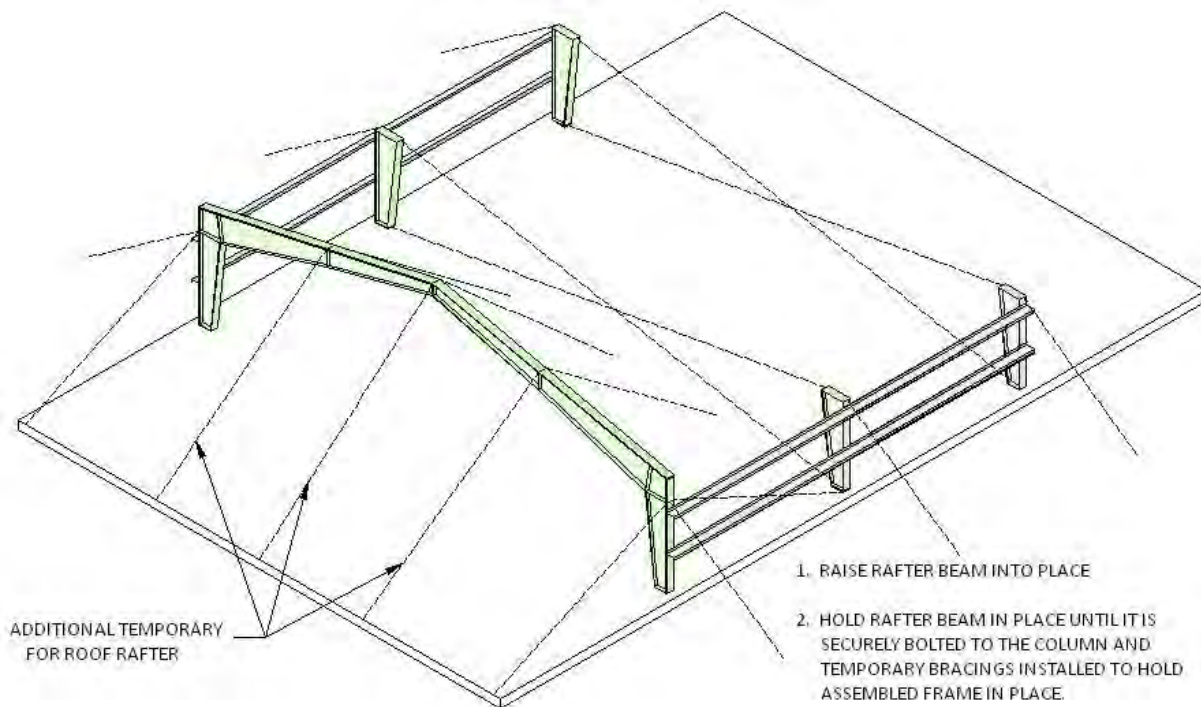


Regardless of the method you use, make sure it is suitable and adequate for the job when considering size of the roof rafter assemblies and the lifting equipment available at site.

## PEB STEEL FRAMING

### ERECTION PROCEDURE

#### STEP NO. 2



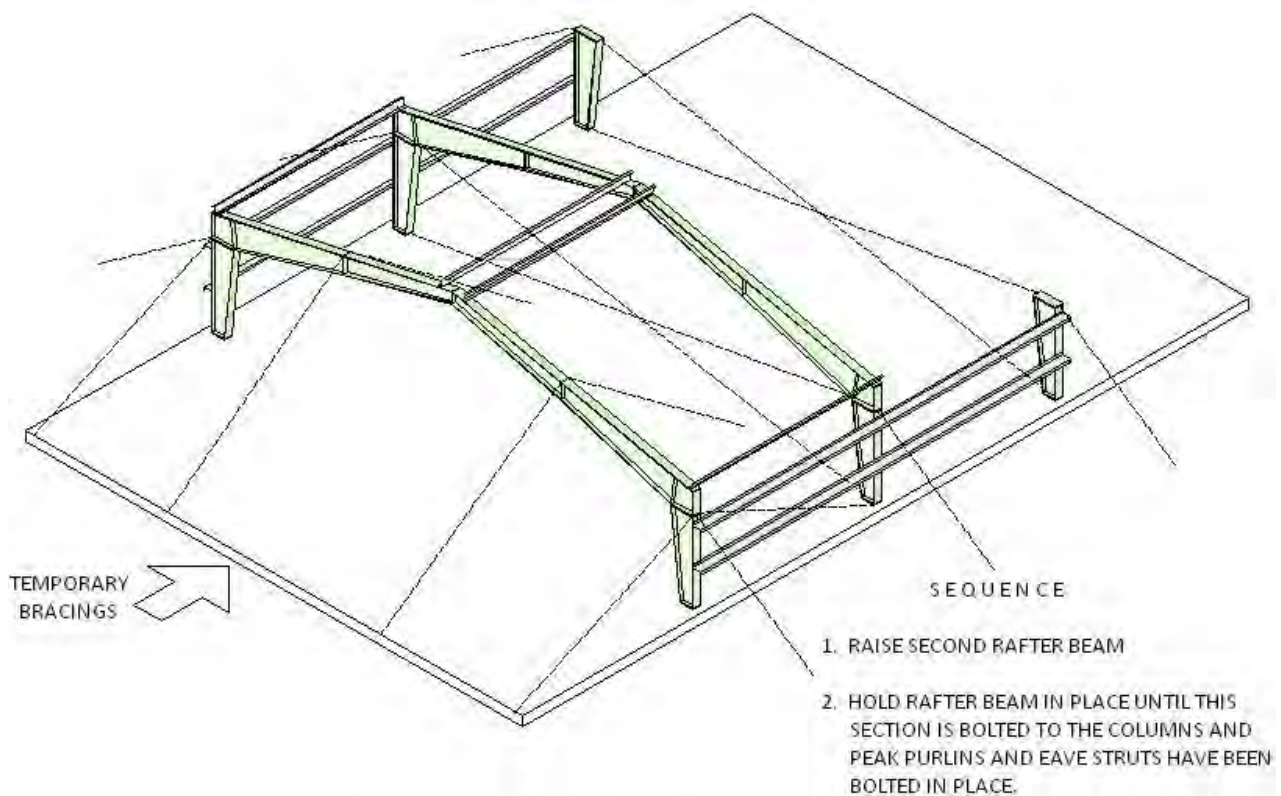
#### NOTES:

1. Assemble roof rafter components on the ground.
2. Make sure roof rafter is level and straight before structural bolts are fully tightened.
3. Bolt in place as many clips and flanges braces as possible before raising roof rafters to reduce erection time as it is easier to assemble these pieces on the ground than it is to do it in the air.
4. For suggested methods of hoisting roof rafter, refer to sheet no.

## PEB STEEL FRAMING

### ERECTION PROCEDURE

#### STEP NO. 3



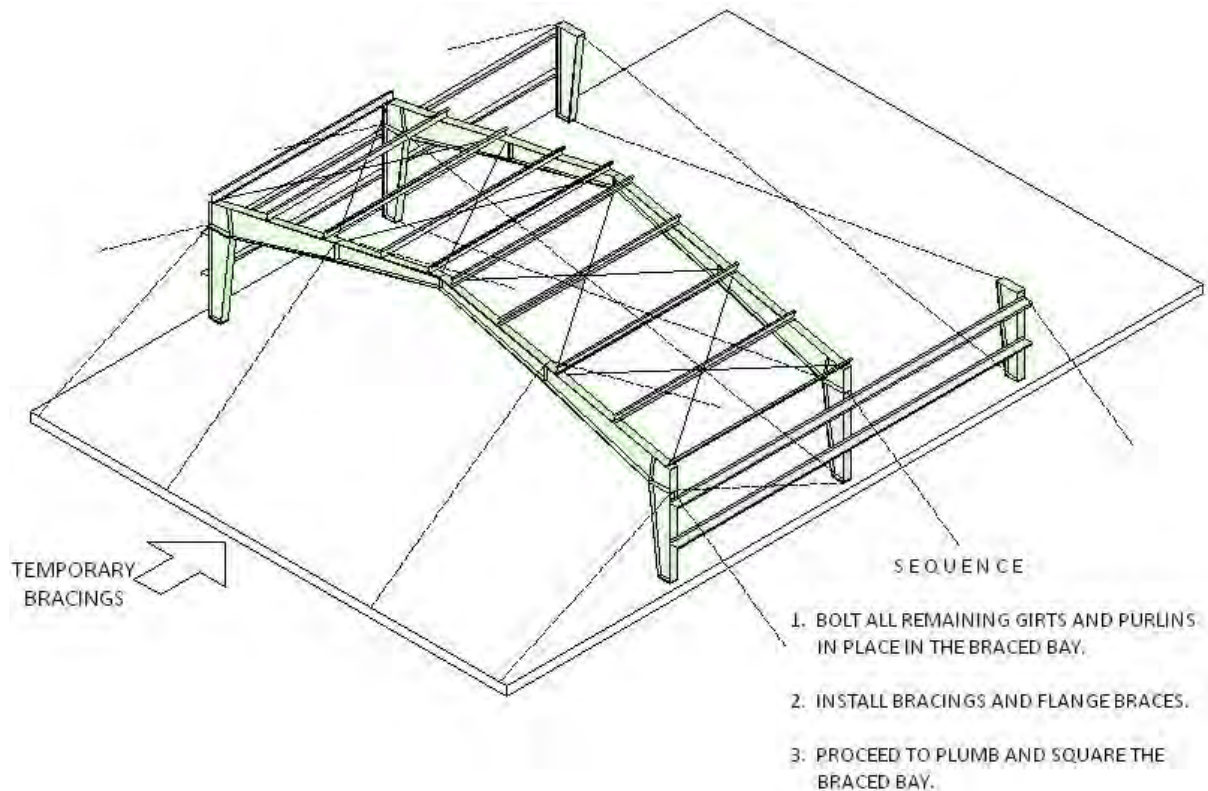
#### NOTES:

If the roof rafter consists of more than two segments, additional purlins are to be installed while roof rafter is held in place so that there are at two purlins spanning between roof rafter segments.

## PEB STEEL FRAMING

### ERECTION PROCEDURE

#### STEP NO. 4

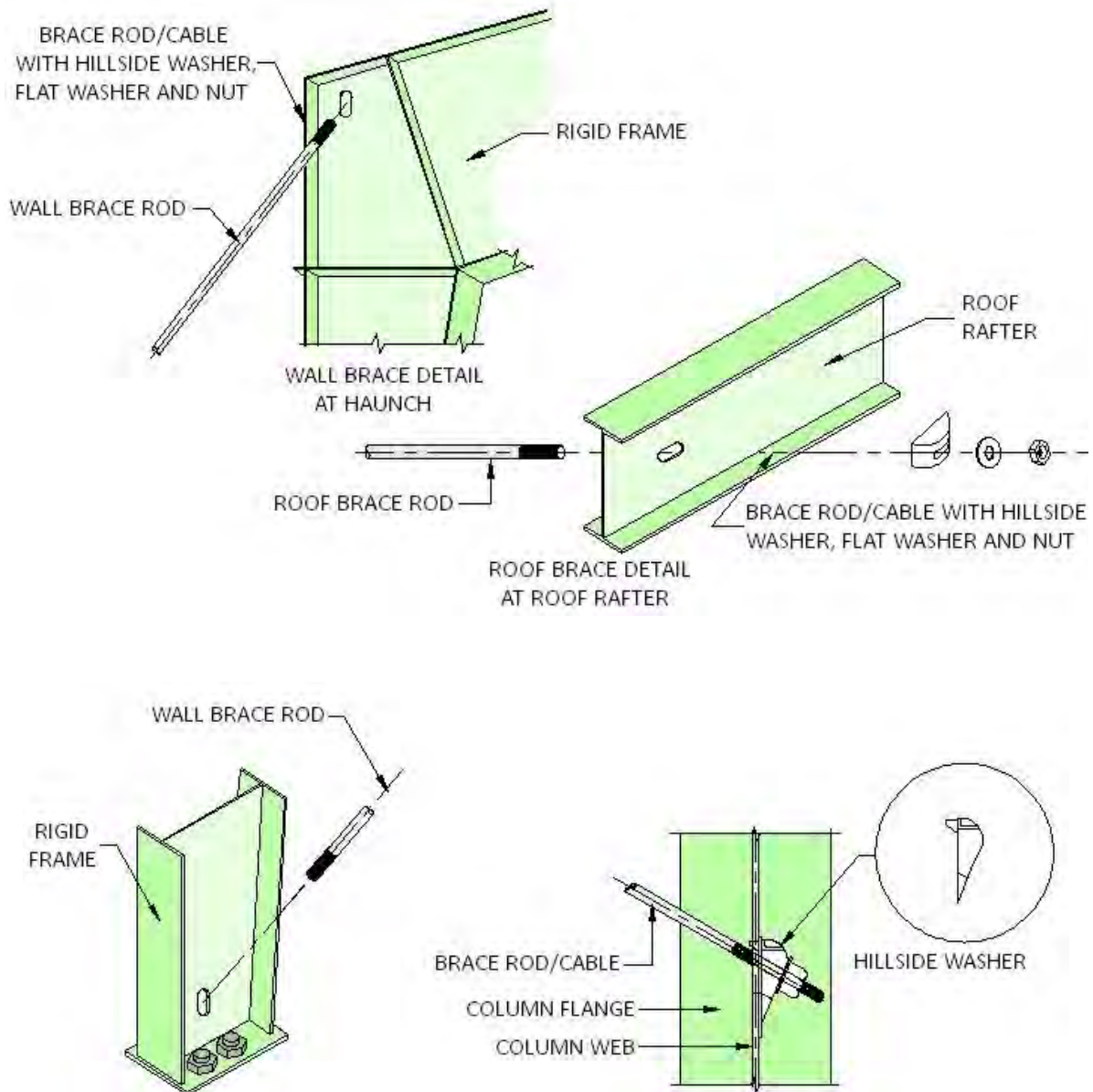


#### NOTES:

1. Refer to step 5 - for methods of plumbing and squaring the braced bay.
2. No further erection is to process until item 3 of step 4 has been fully completed.

## PEB STEEL FRAMING

### ROD / CABLE BRACING



THE PROTRUDING LOG ON THE HILLSIDE WASHER IS ALWAYS LOCATED IN THE SLOTTED HOLE TO RESTRAIN ITS MOVEMENT WHEN BRACE ROD IS TIGHTEN.

## PEB STEEL FRAMING

### PLUMBING AND SQUARING

#### STEP NO. 5

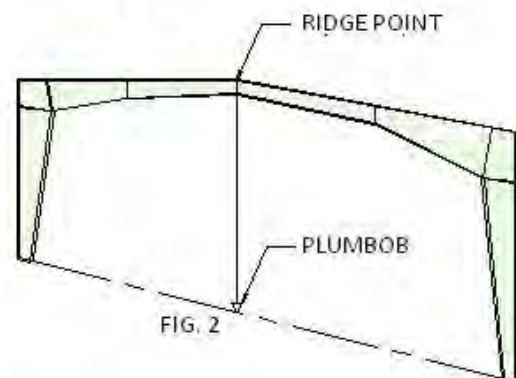
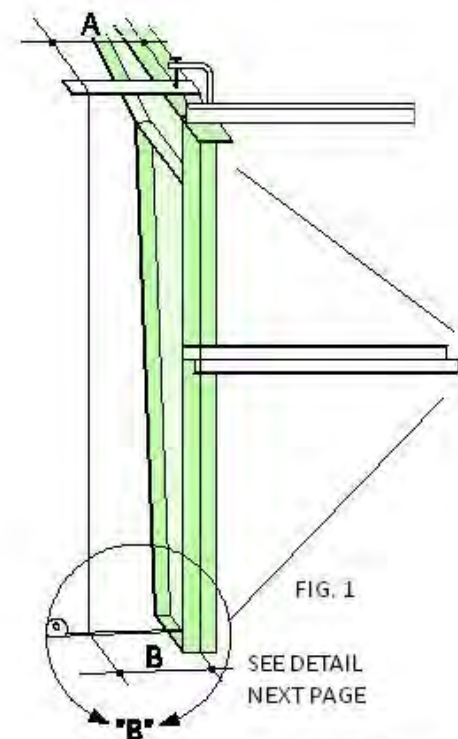
#### SEQUENCE

As soon as all purlins, girts and eave struts have been installed in the braced bay, it should be accurately plumbed and square to insure correct alignment of the succeeding bays. This is accomplished by adjusting the diagonal bracing and temporary bracing in the roof and wall planes.

1. With all the rods loosely installed, plumb the columns of the rigid frame by tightening or loosening the nut on the brace rods. Remember, when one brace rod is tightened the other rod must be loosened. When columns are plumb, sidewall brace rod should be finally tightened to a "Taut" condition. Dimension "B" must be the same as dimension "A" for columns to be plumb. See fig. 1.
2. The roof beams should be aligned in progression from the eave to the ridge. Plumb the roof rafter at each connection point and the ridge by tightening or loosening the rod at those points. Stretch a line across the flanges at the base of the column. Drop a plumbob from the ridge point of the roof rafter. Adjust as necessary so that the plumbob is in line with the line at the base of columns. When this occurs the ridge is plumb. See fig. 2

#### NOTES:

Before step 2 is started, check to make sure the column and roof rafter flanges are the same width. If flanges are not the same width, allow for measurement adjustments to compensate for the width difference before proceeding with step 2.



## PEB STEEL FRAMING

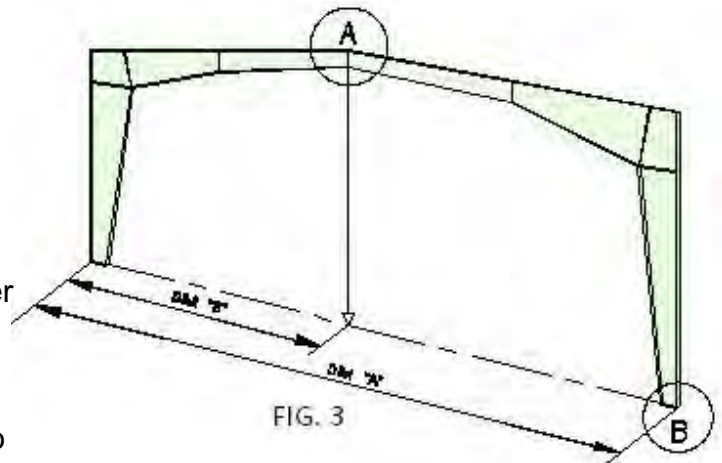
### PLUMBING AND SQUARING

#### STEP NO. 5 (Continued)

##### SEQUENCE ( Continued )

3. Check to be sure that ridge point of the rigid frame is over the center line of the building.

Measure to established dim "A"  
Dimension "B" is  $\frac{1}{2}$  dim "A" establish center line of building from dimensions "A" & "B" and make center line on the floor slab.  
Drop a plumbob from the ridge point of the building. Adjust ridge point if necessary so that plumbob aligns with the center line of the building.

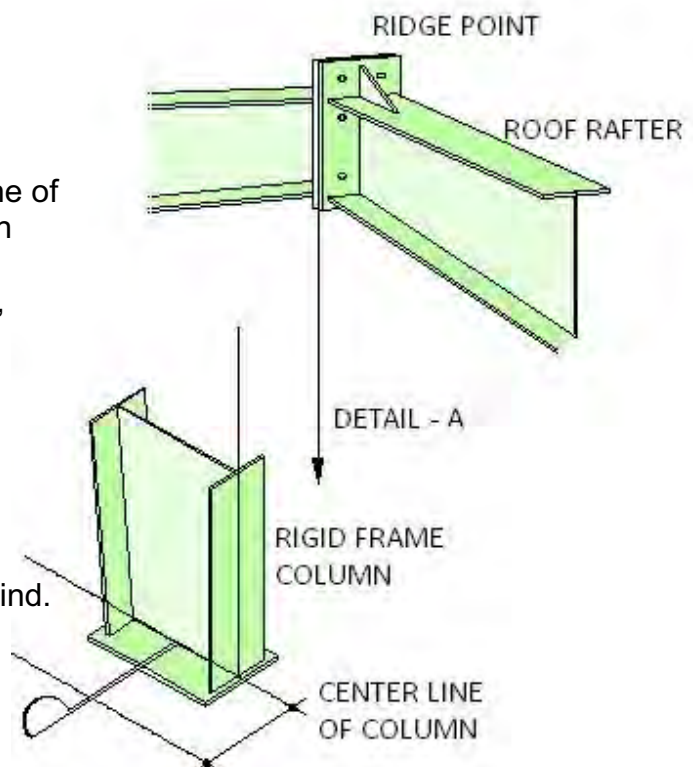


##### Notes:

The plumbing and squaring operation is one of the most important functions of the erection sequence. Spend sufficient time on this sequence to insure the braced bay is level, plumb and square to avoid problems when continuing the erection sequence.

##### Caution:

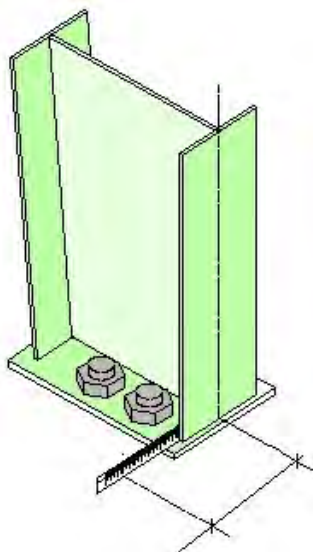
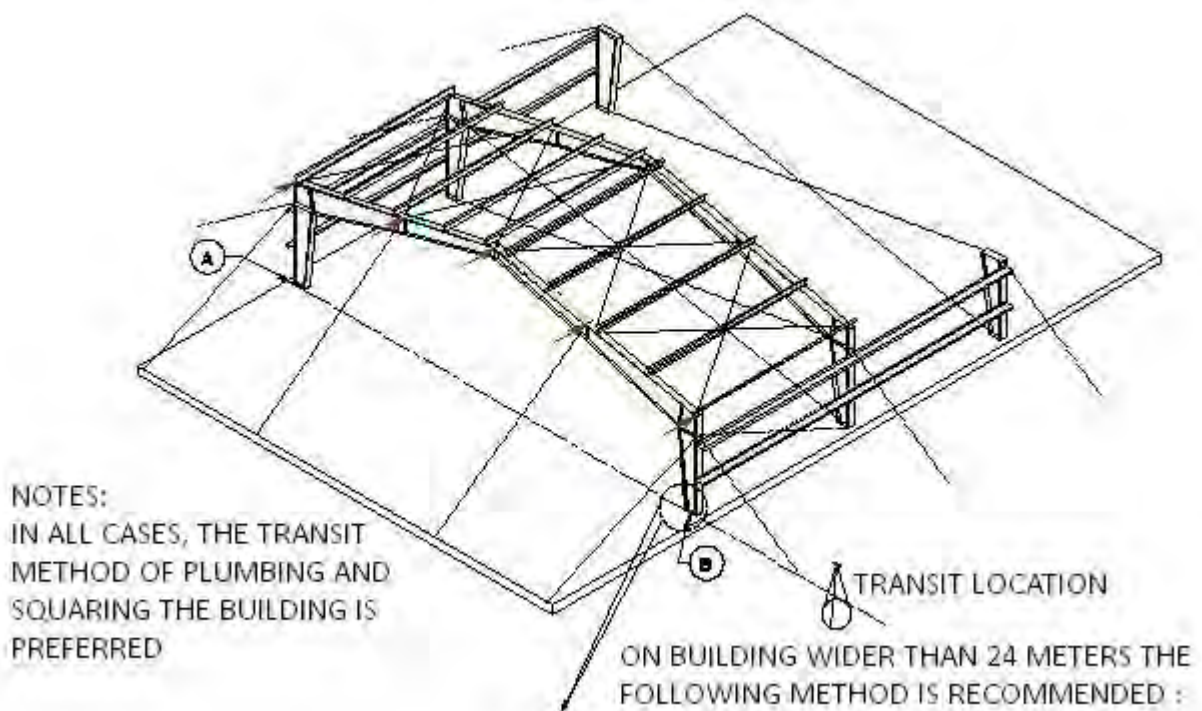
This method is not recommended under Conditions that would be affected by the wind.



## PEB STEEL FRAMING

### PLUMBING AND SQUARING

#### STEP NO. 5 (Continued)



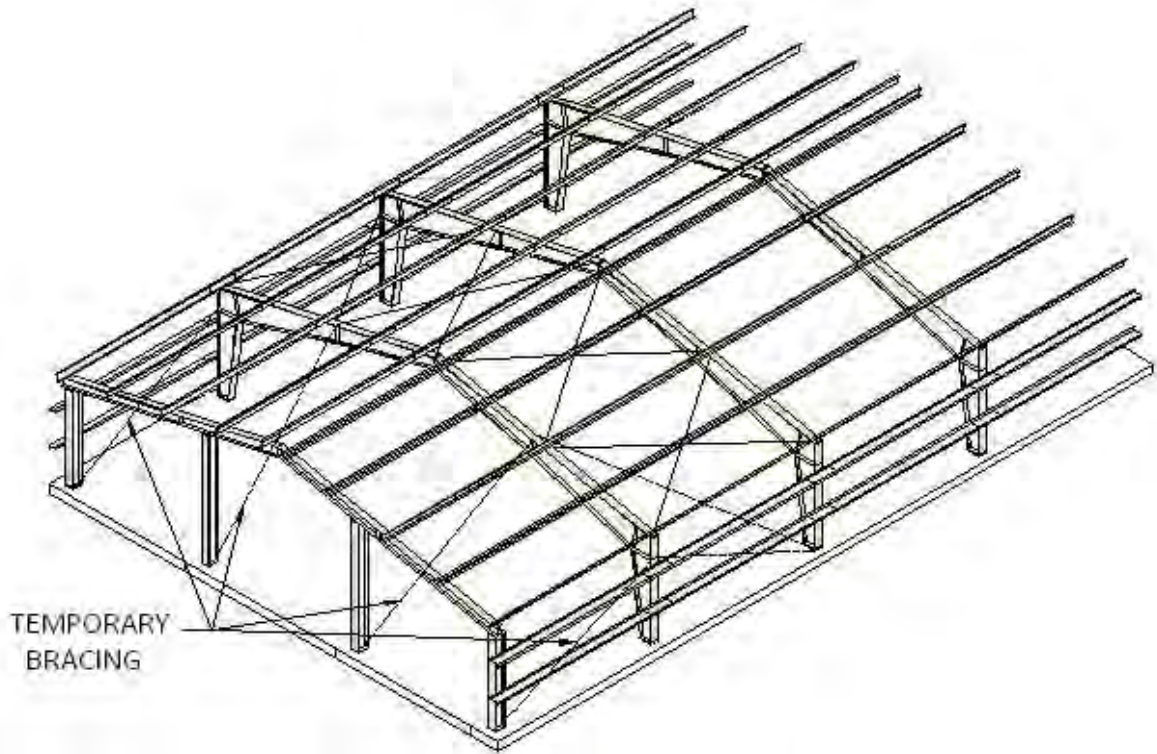
#### SEQUENCE

1. Locate transit as shown above ( in this example it is located slightly to the left of the first rigid frame).
2. Make sure the transit is perfectly level.
3. Rotate transit until you get the same exact tape reading at points a & b. (base of column Outside flange – see detail)
4. Lock horizontal rotation of transit.
5. Adjust rod bracing until the tape reading at point a & b is obtained at all points indicated on the above sketch – take all readings from the same surface as “A” & “B”.

## PEB STEEL FRAMING

### ERECTION PROCEDURE

#### STEP NO. 6



#### **SEQUENCE**

Proceed with the erection of the remaining frames and bearing end frames.

In each braced bay shown on the erection drawings, repeat step 4 before proceeding with the erection of additional bays.

Eave struts and peak purlins may be installed in intermediate bays between braced bays to stabilize frames, however, do not start more work than can be completed in a work day to ensure all steel component framing is completed in those bays before leaving the site at the end of the day.

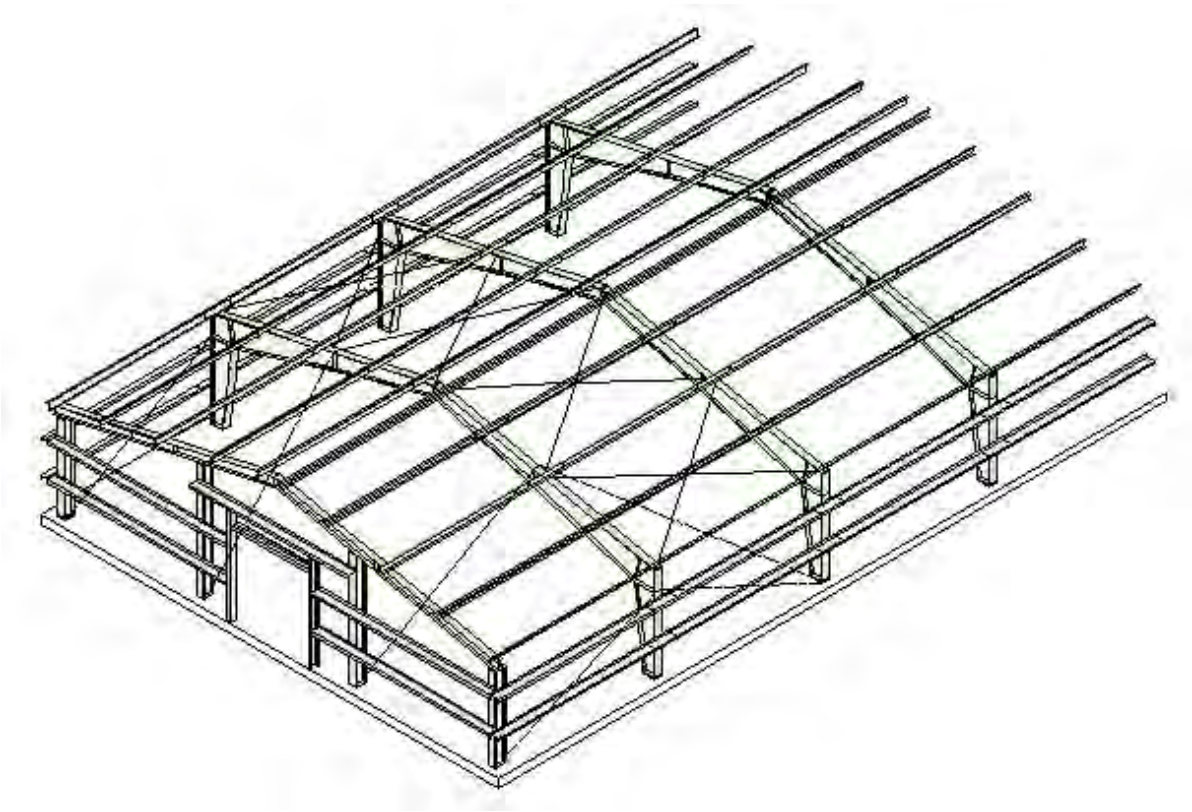
#### **IMPORTANT NOTES :**

As erection progresses, each braced bay must be fully completed as outlined in step 4 before proceeding with the erection of additional bays.

## PEB STEEL FRAMING

### ERECTION PROCEDURE

#### STEP NO. 7



#### SEQUENCE

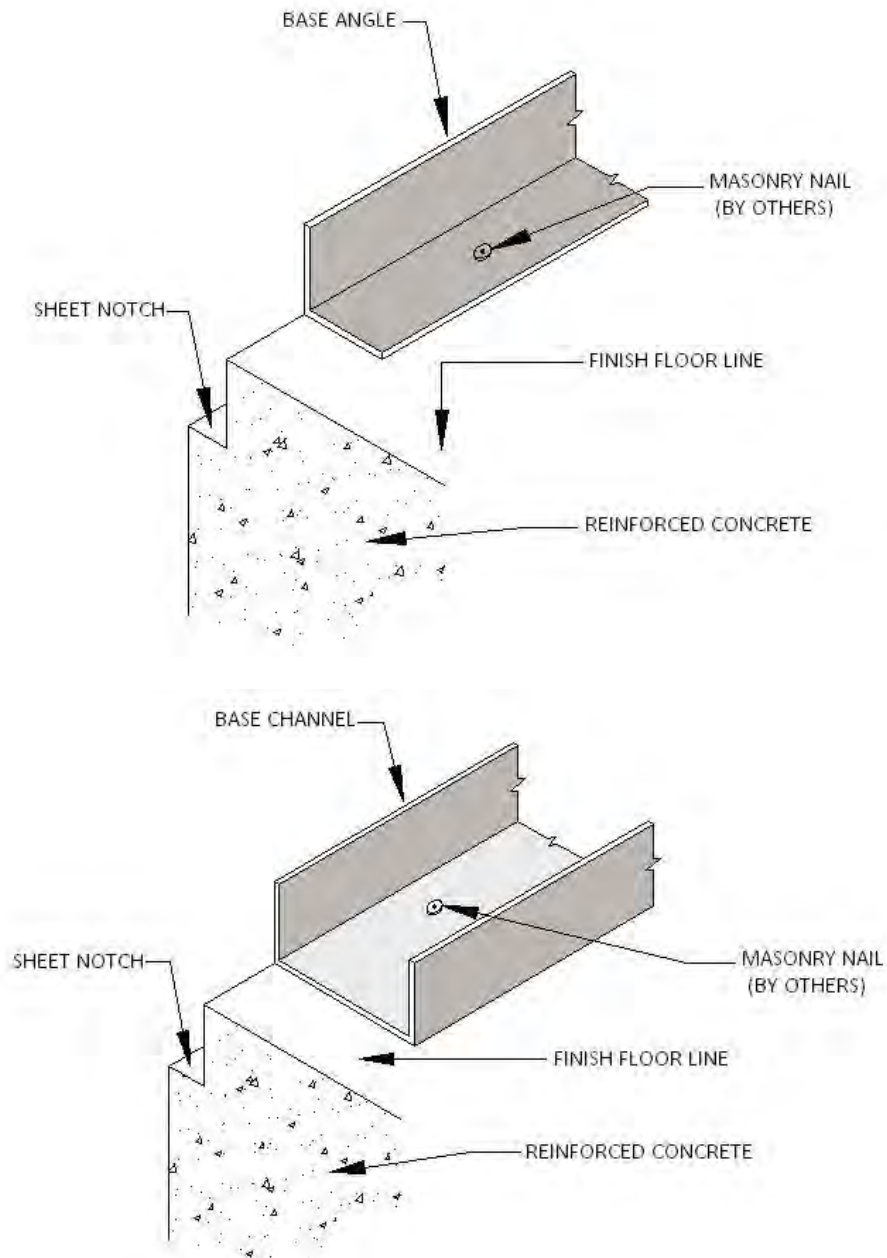
1. Complete erection of main and secondary framing.
2. Upon completion of all secondary framing in the braced bay, plumbing and squaring the braced bay, installing secondary framing in the end bay, paneling may commence and be worked in conjunction with the completion of the balance of the secondary framing. This could save time on larger buildings if separate sheeting crews are used.

#### NOTE:

When the building reaches this stage of erection, sheeting should proceed immediately. The structure without sheeting should not be left standing for prolonged periods of time without taking proper precautions (temporary bracing, Blocking etc.) To prevent wind damage especially to purlins and girts due to Excessive vibration they expose to in the unsheeted condition.

## PEB STEEL FRAMING

### BASE ANGLE / BASE CHANNEL



Base channel is substituted for base angle when liner is furnished with the building. The civil contractor provides masonry nail using nail gun to hold base angle / base channel firmly.

## ROOF PANELING

### PREVENT DAMAGE

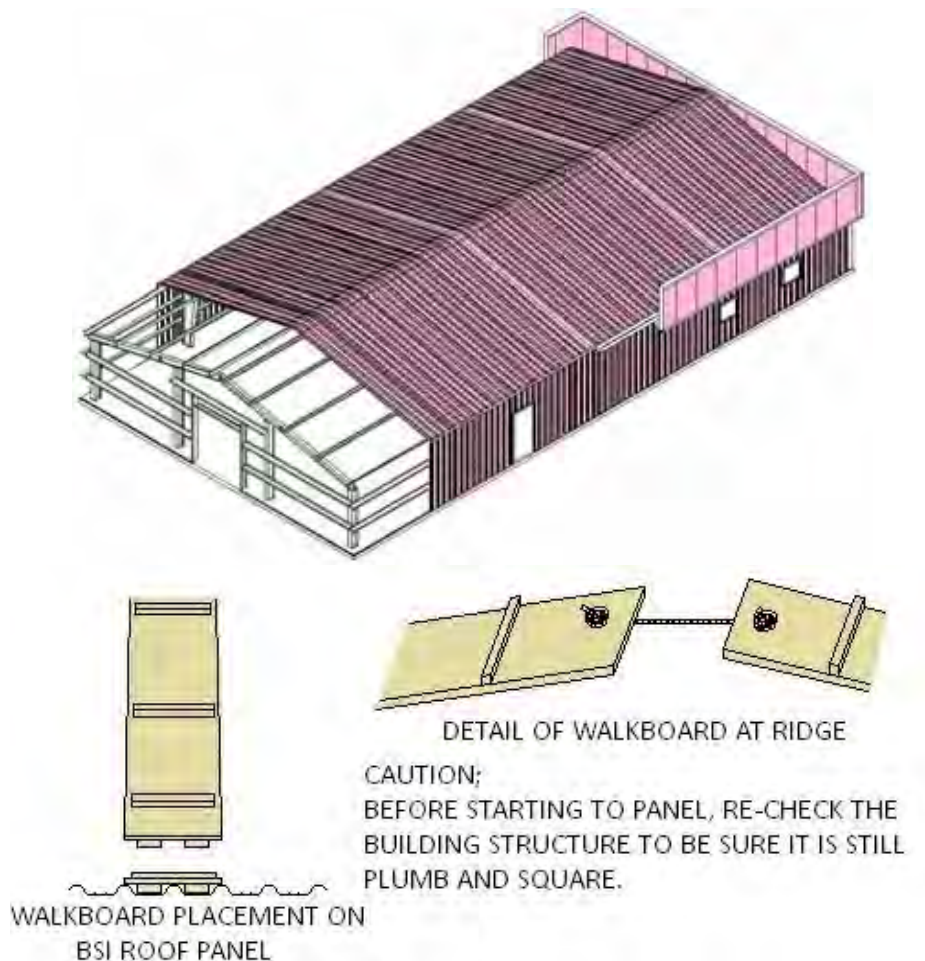
BSI Rib Roof Panels may be damaged by erection traffic. Traffic damage can be avoided by the use of walk boards.

Two sets are suggested; one for the workman laying or fastening panels, the other for traffic up and down the roof.

The walk boards are also an excellent safety precaution on steep roofs.

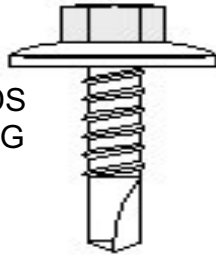
If you must step on the roof panel, always walk on the flat of the panel, on or close to the purlins.

**“NEVER WALK ON THE MAJOR CORRUGATION”**

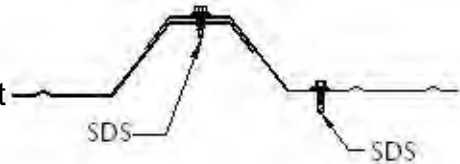


## FASTENERS AND APPLICATION

5.5 DIA. SDS  
25mm LONG



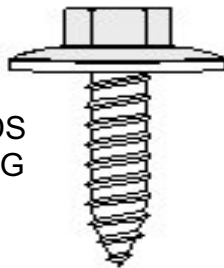
Panel to panel  
Panel to framing without  
Insulation with 50mm  
Insulation with 70mm  
Insulation



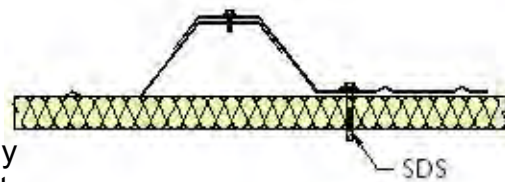
For replaced stripped  
screws



5.5 DIA. SDS  
25mm LONG



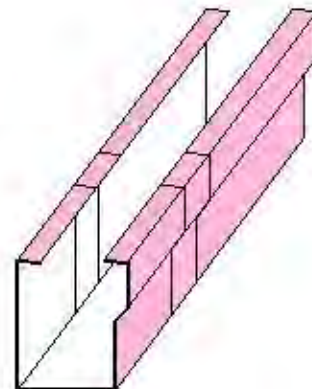
Panel to structural only  
with insulation 35mm to  
150mm



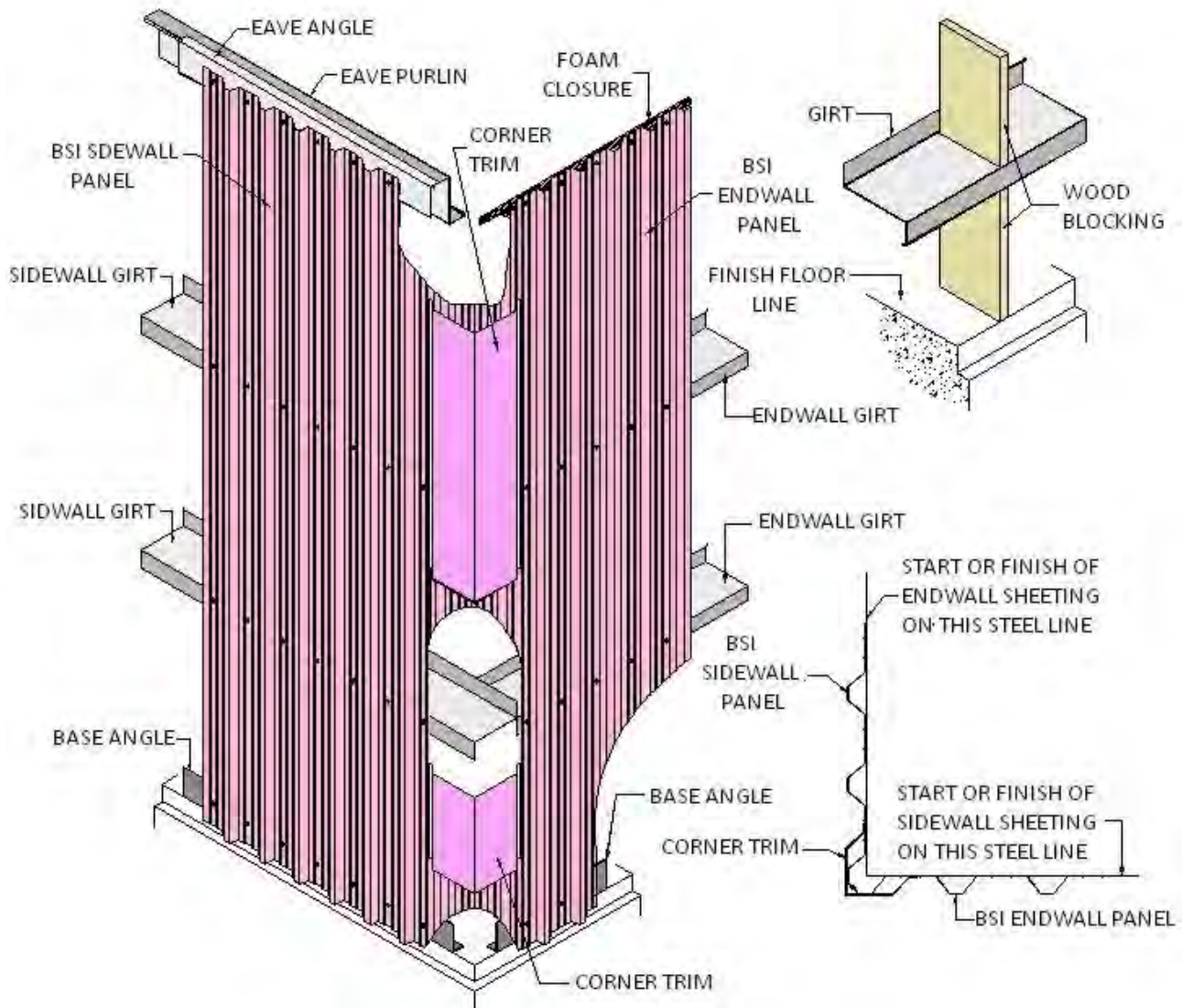
4.8 DIA. SDS  
20mm LONG



All trims, splices and  
downspouts

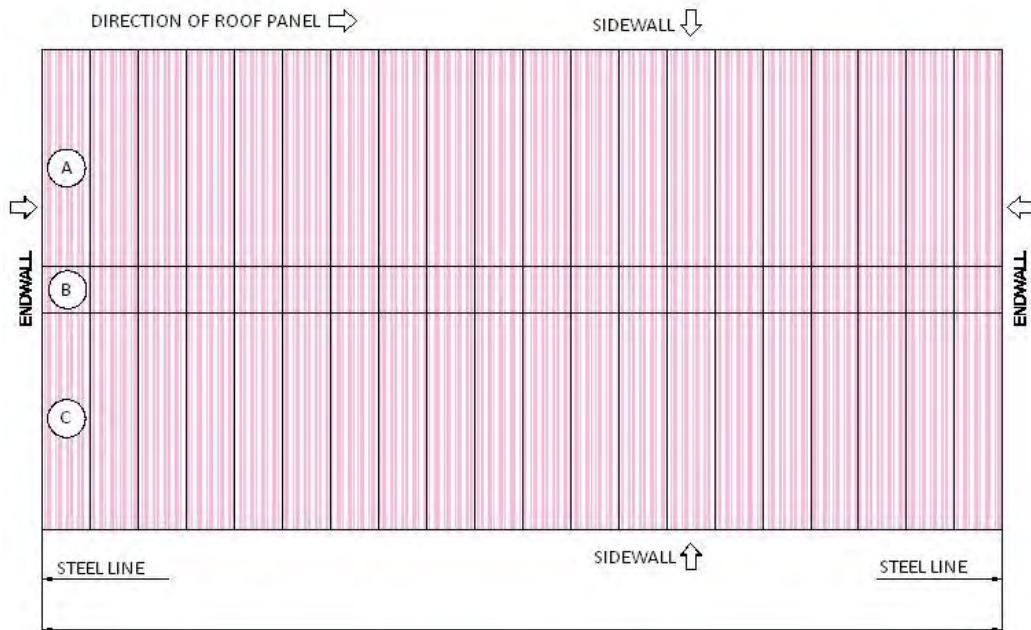


## SIDEWALL AND ENDWALL INSTALLATION



1. Block girts to "level" position before starting panel erection. Maintain blocking until panel to structural fasteners are installed.
2. Align and plum first wall panel.
3. To prevent "oil-canning" all panel fasteners should start from base angle and secured to each structural girt toward the eave.
4. Foundation must be square, level and correct to the out to out of steel dimensions.
5. Erection crew is to clean all wall panels before leaving jobsite.

## INSTALLATION OF BSI ROOF PANELS

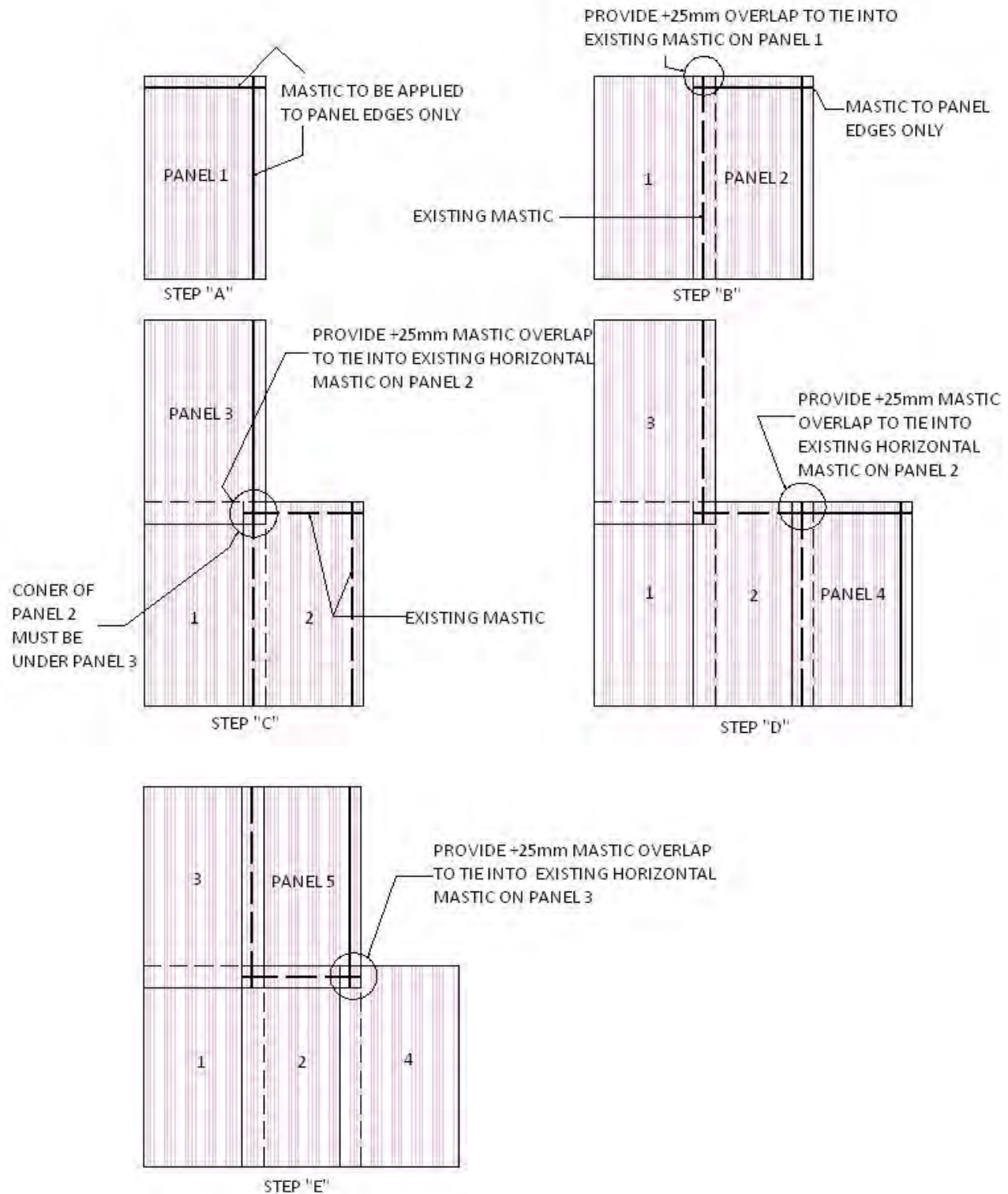


1. (A) & (C) denote BSI roof sheet panels. (B) denotes BSI ridge peak panel.
2. Locate the center of the roof sheet panel exactly over steel line or as indicated on the erection drawing – attach panels (A) and (C) and then attached ridge peak panel (B).
3. Each side of roof sheet panel and the ridge peak panel must be run in conjunction with each other to ensure correct alignment.
4. Refer to other sections of this manual for details relating to eave alignment of roof panels, sealer application and fasteners types.
5. All damage paint finishes are to be retouched to prevent rusting.
6. In the event a screw is installed in the wrong location or should a screw break during the driving process, remove the screw and install one of the larger diameter to prevent leakage.
7. Concentrated heavy loads (personnel or materials) occurring on the roof during construction shall be distributed uniformly over a large area in such a manner as to prevent damage to the building components.
8. All metal shavings occurring as a result of drilling operations on the roof are to be remove in a manner as to prevent damage or staining of roof finish.

( \* The roof should be swept clean at the end of each day )

**NOTE :** For buildings having roof extensions, canopies lean-to's etc. Wall paneling must be installed before roof sheet panels to allow for working clearances.

## ROOF SHEETING SEQUENCE AND MASTIC APPLICATION



## ROOF SHEETING SEQUENCE AND MASTIC APPLICATION

|   |   |   |   |    |    |    |    |    |
|---|---|---|---|----|----|----|----|----|
| 3 | 5 | 7 | 9 | 11 | 13 | 15 | 17 | 19 |
| 1 | 2 | 4 | 6 | 8  | 10 | 12 | 14 | 16 |

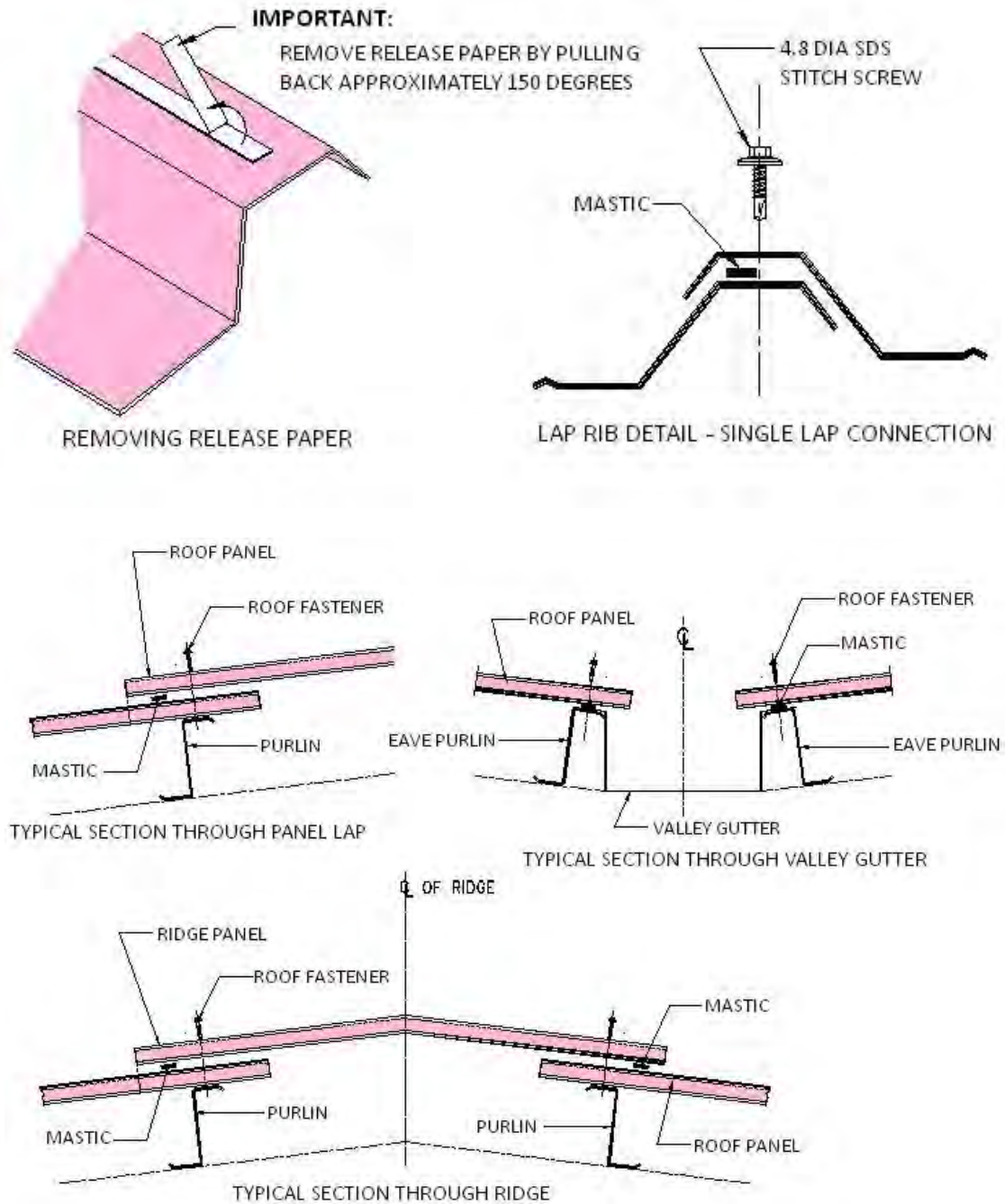


**SHEETING SEQUENCE NOTES:**  
THIS PROCEDURE AND MASTIC APPLICATION SAVES TIME IN PICKING SHEET CORNERS AND INSURE A SEALED FOUR LAP CONNECTION.

### GENERAL SHEETING NOTES

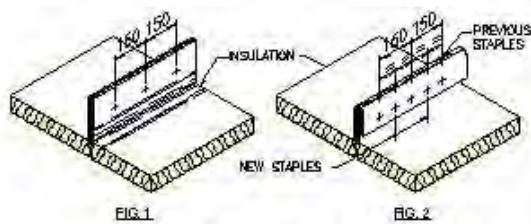
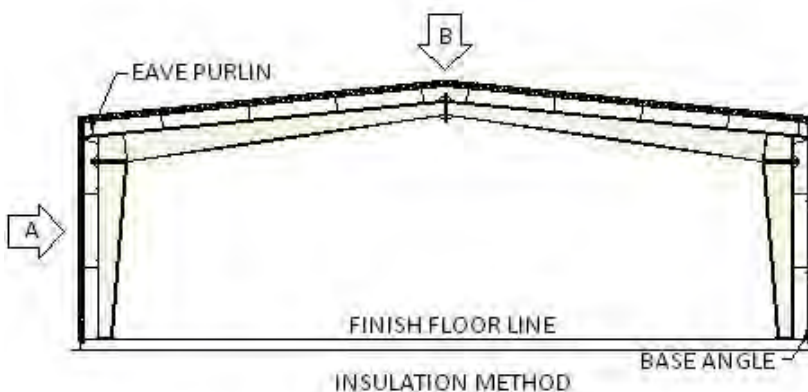
1. It is recommended that sidewall and endwall sheeting should precede roof sheeting.
2. The building is to be plumb, square and tight before sheeting begun.
3. Sheeting is shown in a left to right pattern as an illustration only. actual sheeting is begin at the leeward end of the building so that the panel laps will be away from the prevailing wind. this will improve water tightness of the roof and prevent wind uplift of unsecured panels.
4. Check location of center line of center line of high rib 5mm from steel line at end of building so adjustment on gain or loss can be made if necessary.
5. Erection crew is to sweep roof panels clear all metal shavings daily until roofing is completed.

## INSTALLATION PROCEDURE TAPE MASTIC ( ROOF SEALING )



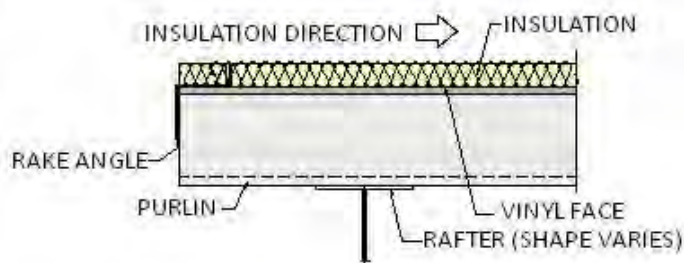
## INSULATION INSTALLATION PROCEDURES

1. Wall insulation "A" is shipped in maximum length rolls and are to be field cut to exact length before installing refer to erection drawings for specific details for your building.
2. Wall insulation should extend from top of eave purlin/angle to 30mm below finished floor. Secure insulation to eave angle by 50mm width double faced tape, pull facing tight and hold in place at the base angle by 50mm width double face tape until wall panel is attached. Refer to succeeding page the proper fixing of insulation by double faced tape at eave & base angles.
3. Roof insulation "B" depending on building width, may be shipped in one roll or a series of rolls (refer to your erection drawings for specific details).
4. Secure one end of insulation at eave purlin by 50mm width double faced tape, pull until facing is tight, secure the other end of insulation to the corresponding purlin by 50mm width double faced tape. Peak purlins must always have 50mm double faced tape. Refer to the succeeding page the proper fixing at eave purlin and proper splicing lap joints at purlin.

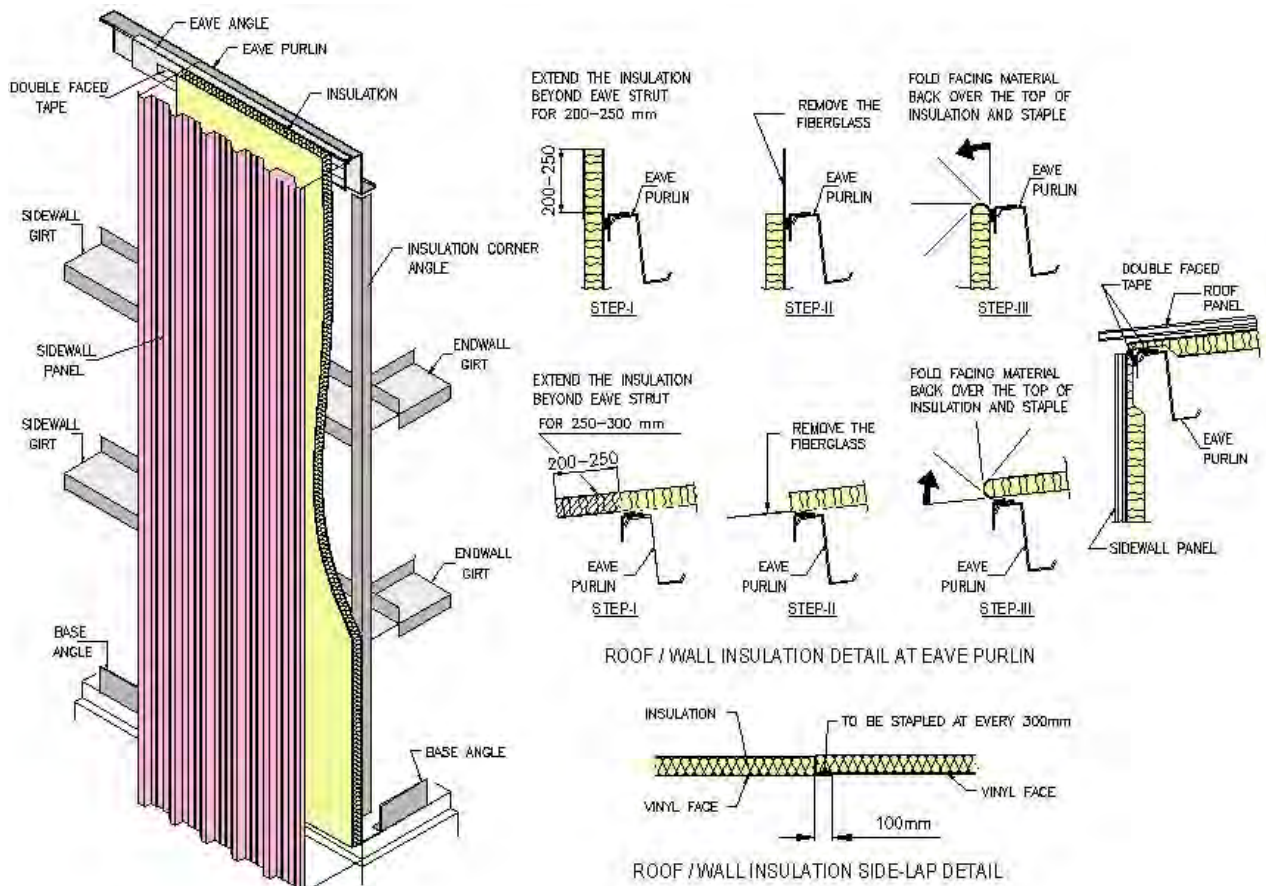


1. PULL TABS TOGETHER & STAPLE AT APPROX. 150mm ON CENTERS ALONG FULL LENGTH AS SHOWN IN FIG. 1.
2. FOLD TABS OVER & STAPLE THRU FOLDED TABS BETWEEN PREVIOUS STAPLES AS SHOWN IN FIGURE 2.

FASTENING OF INSULATION TABS INSTRUCTION

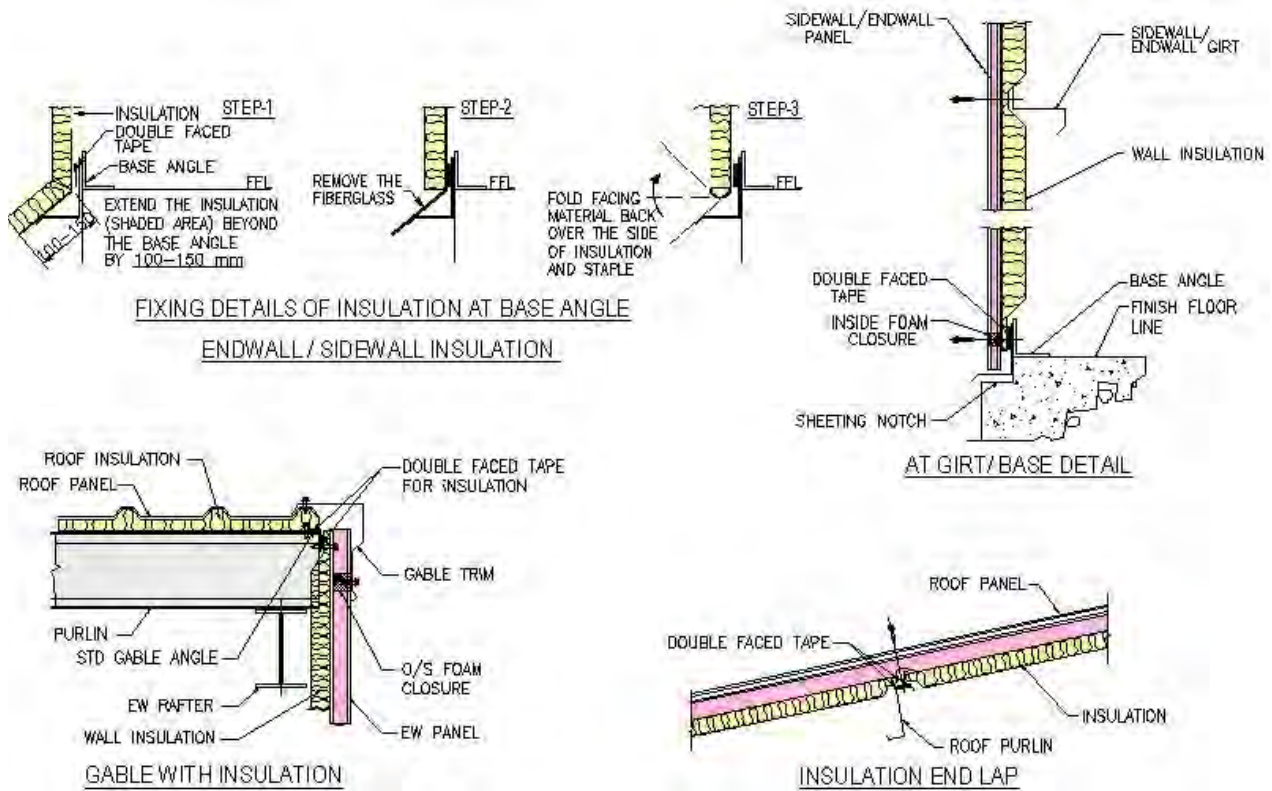


## SIDEWALL AND ENDWALL INSULATION



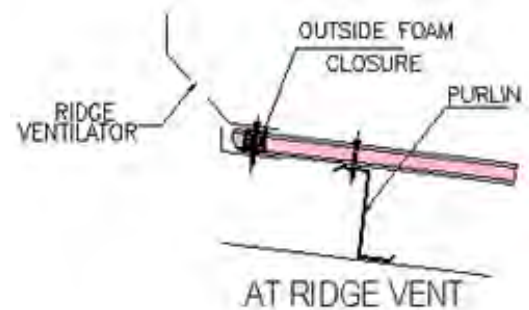
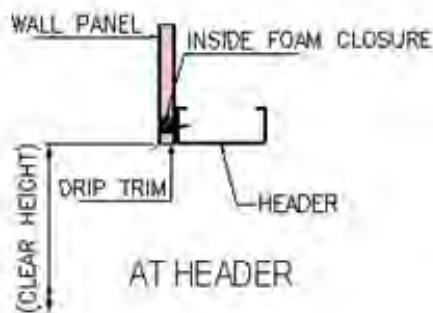
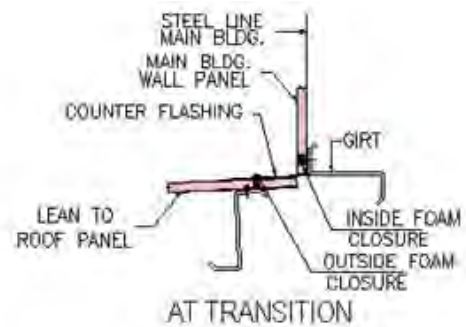
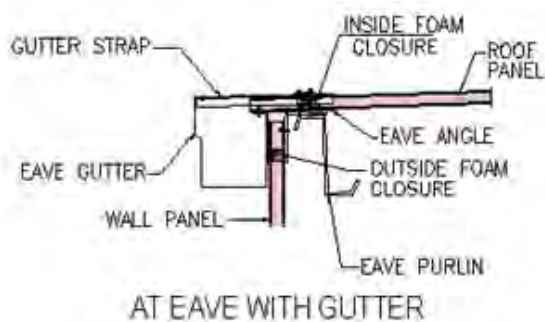
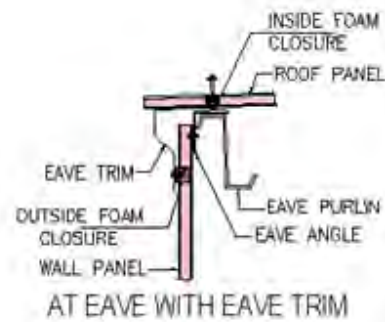
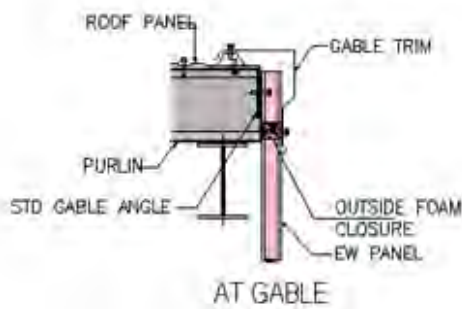
Fix one end of the insulation to the eave purlin by double faced tape, proper folding of the insulation end is shown above. Pull down the insulation to obtain a taut, smooth inside surface. Fix other end to base angle with double faced tape, proper folding of insulation end is shown on the next page. Apply the first panel over the insulation and install panel fasteners working from the bottom to the top of the panel. Make sure that the insulation is properly placed and plumb. Take note that BSI supplied insulation have 100mm overlap at one side.

## INSULATION INSTALLATION PROCEDURES

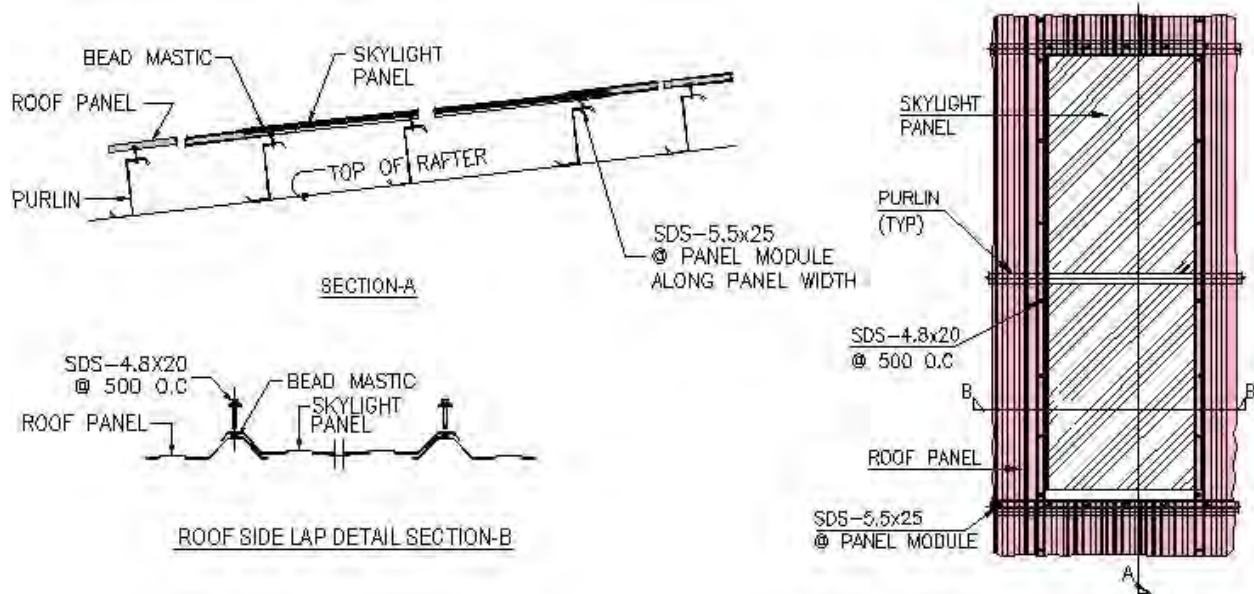


Refer to your erection drawings for the roof insulation splice location, fix one end of insulation to upper purlin and the other end to eave purlin. Pull & stretch the insulation to obtain smooth surface inside then fix with ends properly fold. Check that the insulation is properly placed and plumb. Staple side tabs properly and apply the roof panels from the eave up in the normal manner.

## FOAM CLOSURES AND APPLICATIONS



## SKYLIGHT INSTALLATION



### Detail of Skylight

Installation of skylight shall be as in the manner of installing roof sheet panels, refer roof sheeting sequence. Protective measures are to be taken to prevent personnel from damaging the skylight. **“Never Walk On Skylight”**.

## **MATERIAL CLAIMS STANDARD POLICY**

### **1. GENERAL :**

#### **(A) Definition**

A Claim is defined as any request for the replacement of materials related to any job or part order already shipped where there is no charge to the Customer.

#### **(B) Type of Claim**

The majority of Claims fall within the following categories:

##### Category 1 - Items not received

**A.** Any material shown on the shipper and not received on site due to:

- (I) Lost during transportation
- (II) Back ordered (material not available on the shipping date)

**B.** Any items ordered but not included in the shipper and accordingly not received on site.

##### Category 2 - Damaged Items

Any material received on site not in good condition.

##### Category 3 - Incorrectly Fabricated Items

Any material not fabricated in a manner suitable for installation in accordance with BSI's standard product manual and/or construction drawings.

##### Category 4 - Design Errors

Any material manufactured, shipped and found unable to provide the function originally specified in the work order.

##### Category 5 - Incorrect Quantities Received

Items received in full according to quantities shown on the shipper but found incorrect during construction.

There could be surplus or shortage in any item due to an error in preparing the shipper.

##### Category 6 - Buyouts Claims

This type is limited to the bought-out items. Shipped directly to the site (not via BSI Plant) without issuing a shipper covering the item.

The claim could be any of the previous four categories.

### **(C) Claims and Insurance**

Appendix 1 - which defines :

- (I) BSI's legal responsibilities
- (II) BSI's definition of shipping terms
- (III) BSI's commercial responsibilities assumed for and on behalf of the Customer (CIF Shipment only) is considered as complimentary part of our policy and procedures.

Cost of replacing items lost or damaged during transportation including freight will be paid. Eventually, by the insurance company or by customer (if the shipment was not insured) and therefore, requests for such material cannot be defined as claims and will be treated as an order or straight sale.

## **2. CLAIMS ACCEPTANCE**

Sales offices should not accept any claim unless:

- (A) Submitted in writing from the Customer to the appropriate sales office.
- (B) Submitted within the following periods:
  - (I) Items not received and/or damaged (Category 1 & 2)
    - **UNPACKED ITEMS:**  
5 days from date of arrival to the jobsite
    - **PACKED ITEMS**  
3 days from date of arrival to the jobsite.
  - (II) Mis-fabricated items and/or incorrect quantities (Category 3, 4 & 5) any time during erection with a maximum of one year from date of arrival to site.

## **3. ALL ACCEPTED CLAIMS MUST BE REVIEWED BY THE SALES AND ERECTION COORDINATOR BEFORE FORWARDING TO THE HEAD OFFICE.**

## **4. ALL CLAIMS MUST RELAYED TO HEAD OFFICE BY FAX OR IN WRITING TO THE ATTENTION OF TECHNICAL SERVICE MANAGER STATING THE FOLLOWING:**

- (A) Date
- (B) Sales Manager or Erection Coordinator initiating claim is inserted.
- (C) The job number is listed
- (D) The nature of the claim is described
- (E) The action you require
- (F) Material required, quantity and part number
- (G) Be sure to sign the request
- (H) List the name of the sales manager & general sales manager receiving copies.

## **PRE-ENGINEERED BUILDING GLOSSARY**

### **ACCESSORY**

A Building product which supplements a basic solid panel building such as a door, window, skylight, ventilator, etc.

### **AGRICULTURAL BUILDING**

A structure designed and constructed to house farm implements, bay, grain, poultry, livestock or other horticultural products. Such structure shall not include habitable or occupiable spaces, spaces in which agricultural products are processed, treated or packaged, nor shall an agricultural building be a place of occupancy by the general public.

### **ALUMINIUM COATED STEEL**

Steel coated aluminum for corrosion resistance.

### **ANCHOR BOLTS**

Bolts used to anchor members to a foundation or other support.

### **ANCHOR BOLT PLAN**

A plan view drawing showing the diameter, location and projection of all anchor bolts for the component of the Metal Building System and may show column reactions (magnitude and direction). The maximum base plate dimensions may also be shown.

### **APPROVAL DRAWINGS**

A set of drawings that may include framing plans, elevations and sections through the building for the approval of the Buyer/Owner.

### **ASD**

Allowable Stress Design.

### **ASSEMBLY**

A group of mutually dependent and compatible components or subassemblies of components.

### **ASTRAGAL**

A closure between the two leaves of a double swing door or double slide door.

### **AUTOMATIC CRANE**

A crane which when activated operates through a pre-set cycle or cycles.

### **AUTOMATIC WELDING**

A welding procedure utilizing a machine to make a weld.

### **AUXILIARY CRANE GIRDER**

A girder arranged parallel to the main girder for supporting the platform, motor base, operator's cab, control panels, etc., to reduce the torsional forces that such load would otherwise impose on the main crane girder.

### **AUXILIARY HOIST**

A supplemental hoisting unit, usually designed to handle lighter loads at a higher speed than the main crane hoist.

### **AUXILIARY LOADS**

Dynamic live loads such as those induced by cranes and material handling systems.

### **AXIAL FORCE**

A force tending to elongate or shorten a member.

### **BAR JOIST**

A name commonly used for "Open Web Steel Joists".

### **BASE ANGLE/CHANNEL**

An angle secured to a wall or foundation used to attach the bottom of the wall paneling.

### **BASE PLATE**

A plate attached to the bottom of a column which rests on a foundation or other support, usually secured by anchor bolts.

### **BASE TUBE**

A continuous member imbedded in the edge of the foundation to which the wall panels are attached.

### **BAY**

The space between the main frames measured normal to the frame.

### **BEAM**

A member, usually horizontal, that is subjected to bending loads. There are three types, single, continuous or cantilever.

### **BEAM AND COLUMNS**

A structural system consisting of a series of rafter beams supported by columns. Often used as the end frame of a building.

### **BEARING FRAME ENDWALL**

Frame composed of corner columns, wind columns, flush girts and rafter sections which is designed to carry one half bay loading, also referred to as "Light Endwall"

### **BEARING PLATE**

A steel plate that is set on the top of a masonry support on which a beam or purlin can rest.

### **BENT**

See "Main Frame".

### **BILL OF MATERIALS**

A list that enumerates by part number or description each piece of material or assembly to be shipped. Also called tally sheet or shipping list.

### **BIRD SCREEN**

Wire mesh used to prevent birds from entering the building through ventilators or louvers.

### **BLIND RIVET**

A small headed pin with expandable shank for joining light gauge metal. Typically used to attached flashings, gutters, etc.

### **BOX GIRDER**

Girders, trucks or other members of rectangular cross section enclosed on four corners.

### **BRACING**

Rods, angles or cables used in the plane of the roof and walls to transfer loads, such as wind, seismic and crane thrusts to the foundation.

### **BRACKET**

A structural support projecting to a structural member. Example are canopy brackets, lean-to brackets, and crane runway brackets.

### **BRIDGE (CRANE)**

That part of an overhead crane consisting of girders, trucks, end ties, walkway and drive mechanism which carries the trolley and travels in a direction parallel to the runway

### **BRIDGE CRANE**

A load lifting system consisting of a hoist which moves laterally on a beam, girder or bridge which in turn moves longitudinally on a runway made of beams and rails.

### **BRIDGING**

Bracing or systems of bracing used between structural members.

### **BRITISH THERMAL UNIT (BTU)**

That amount of heat required to raise the temperature of one pound of water by 1°F.

### **BUILDING**

A structure forming an open, partially enclosed, or enclosed space constructed by a planned process of combining materials, components, and subsystems to meet specific condition of use.

### **BUILDING AISLE**

A space defined by the length of the building and the space between building columns.

### **BUILDING CODE**

Regulations established by a recognized agency describing design loads, procedures and construction details for structures usually applying to a designated political jurisdiction (city, county, state, etc.)

### **BUILT-UP MEMBER OR SECTION**

A structural member, usually an I-shaped section, made from individual flat plates welded together.

### **BUILT-UP ROOFING**

A roof covering made up of alternating layers of tar and asphaltic materials.

### **BUMPER**

An energy-absorbing device for reducing impact when a moving crane or trolley reaches the end of its permitted travel, or when two moving cranes or trolleys come into contact.

### **BUTT PLATE**

The end plate of a structural member usually used to rest against a like plate of another member forming a connection. Usually called a splice plate or bolted end plate

### **BY-PASS GIRT**

Girts which overlap at outside column flange to form a continuous member.

### **“C” SECTION**

A member formed from steel sheet in the shape of a block “C”, that may be used either singularly or back to back.

### **CAB-OPERATED CRANE**

A crane controlled by an operator in a cab supported on the bridge or trolley.

### **CAMBER**

Curvature of a flexural member in the plane of its web before loading

### **CANOPY**

A projecting roof system that is supported and restrained at one end only.

### **CANTILEVER BEAM**

A beam supported at one end having a free end and a fixed end.

### **CAPILLARY ACTION**

That action which causes movement of liquids when in contact with two adjacent surfaces such as panel side laps.

### **CAP PLATE**

A plate located at the top of a column or end of a beam for capping the exposed end of the member.

### **CAPACITY**

The maximum load (usually stated in tons) which a crane is designed to support.

### **CAULK**

To seal and make weather-tight joints, seams or voids by filling with a weatherproofing compound or material.

### **CHANNEL, HOT ROLLED**

A C-shaped member formed while semi-molten state at the steel mill to a shape having standard dimensions and properties.

## **CLADDING**

The exterior metal roof and wall paneling of a Metal Building System. See also "Components & Cladding".

## **CLIP**

A plate or angle used to fasten two or more members.

## **CLOSURE STRIP**

A resilient strip, formed to the contour of ribbed panels and used to close openings created by ribbed panels joining other components.

## **COLD-FORMING**

The process of using press brakes or rolling mills to shape steel into desired cross sections at room temperature.

## **COLUMN**

A main member used in a vertical position on a building to transfer loads from main roof beams, trusses, or rafters to the foundation.

## **COMPONENT**

A part used in a Metal Building System. See also "Components and Cladding".

## **COMPONENTS AND CLADDING**

For wind load consideration, members that do not qualify as part of a Main Wind Force Resisting System. They include girts, joists, purlins, studs, wall and roof panels, fasteners, end wall columns and end wall rafters of bearing end frames, roof overhung beams, canopy beams, and masonry walls when acting as other than shear walls.

## **CONNECTION**

The means of attachment of one structural member to another.

## **CONTINUITY**

The terminology given to a structural system denoting the transfer of loads and stresses from member to member as if there were no connection.

## **CONTINUOUS GIRT OR PURLIN**

Girts or Purlins that overlaps at columns or frames to form a continuous member

## **CONTINUOUS RIDGE VENT**

Series of Roof Ventilators connected to each other located along roof peak line.

## **CONTRACT DOCUMENT**

The Documents that define the material and work to be provided by a Contractor or the General Contractor for a Construction Project.

## **CORNER COLUMN**

Usually a "C" shape, located at the corner of a bearing frame end wall.

### **CORNER TRIM**

Pre-formed sheet metal trim used to close the junction of side and end wall panels or sheets.

### **CRANE**

A machine designated to move material by means of a hoist.

### **CRANE AISLE**

That portion of a building aisle in which a crane operates, defined by the crane span and the uninterrupted length of a crane runway.

### **CRANE GIRDER**

The principal horizontal beams of the crane bridge which supports the trolley and is supported by the end tracks.

### **CRANE RAIL**

A track supporting and guiding the wheels of a bridge crane or trolley system. On Underhung cranes, the crane rail also acts as the runway beam.

### **CRANE RUNWAY BEAM**

The member that supports a crane rail and is supported by columns or rafters depending on the type of crane system. On Underhung bridge cranes, the runway beam also acts as the crane rail.

### **CRANE SPAN**

The horizontal distance center to center of runway beam.

### **CRANE STOP**

A Device to limit travel of a trolley or crane bridge. This device normally attached to a fixed structure and normally does not have energy-absorbing ability.

### **CRANE SUPPORT COLUMN**

A separate column which supports the runway beam of a top running crane.

### **CURB**

A raised edge on a concrete floor slab or roof accessory.

### **CURTAIN WALL**

Perimeter wall panels which carry only their own weight and wind load.

### **DAMPER**

A baffle used to open or close the throat of ventilators.

### **DEAD LOAD**

The weight of the Building System construction consisting of members such as framing and covering.

### **DEALER**

A party who, as a routine part of his business, buys Metal Building Systems from a manufacturer for the purpose of resale.

## **DEFLECTION**

The displacement of a structural member relative to its supports due to applied loads. Deflection should not Be confused with “Drift”.

## **DESIGN LOADS**

The loads expressly specified in the contract document which the Metal Building System is designed to Safely resist.

## **DIAPHRAGM ACTION**

The resistance to racking generally offered by the panels, fasteners, and members to which they are attached.

## **DOOR GUIDE**

An angle or channel used to stabilize or keep plumb a sliding or rolling door during its operation.

## **DOUBLE FACED TAPE**

An Adhesive Tape used to secure fiberglass blanket insulation to base angles/channels, eave struts/purlins, and purlins.

## **DOWNSPOUT**

A conduit used to carry water from the gutter of a building.

## **DRIFT (SIDESWAY)**

Horizontal displacement at the top of a vertical element due to lateral loads. Drift should not be confused With “Deflection”.

## **DRIFT PIN**

A tapered pin used during erection to align holes in steel members to be connected by bolting.

## **EAVE**

The line along the sidewall formed by the intersection of the planes of the roof and wall.

## **EAVE GUTTER**

See “Gutter”.

## **EAVE HEIGHT**

The vertical dimension from finish floor to the eave.

## **EAVE PURLIN/STRUT**

A structural member located at the eave of a building which supports roof and wall panels.

## **EAVE TRIM**

The trim used to close of top of sidewall panels in lieu of eave gutter.

## **ELASTIC DESIGN**

A design concept utilizing the proportional behavior of materials when all stresses are limited to specified allowable values in the elastic range.

## **END BAY**

The bay adjacent to the endwalls of a building. Usually the distance from the endwall to the first interior main frame measured normal to the endwall.

## **ERECTION**

The on-site assembling of Fabricated Metal Building System components to form a complete structure.

## **ERECTION DRAWINGS**

Roof and Wall erection (framing) drawings that identify individual components and accessories furnished by the manufacturer in sufficient detail to permit proper erection of the Metal Building System.

## **ERECTOR**

A party who assembles or erects a Metal Building System.

## **EXPANSION JOINT**

A break or space in construction to allow for thermal expansion and contraction of the materials used in the structure.

## **FABRICATION**

The manufacturing process performed in a plant to convert material into finished Metal Building System components. The main operations are cold forming, cutting, punching, welding, cleaning and painting.

## **FACADE**

An architectural treatment, partially covering a wall, usually concealing the eave and or rake of the building.

## **FASCIA**

A decorative trim or panel projecting from the face of a wall.

## **FIXED BASE**

A column base that is designed to resist rotation as well as horizontal or vertical movement.

## **FLANGE**

The projecting edge of a structural member.

## **FLANGE BRACE**

A member used to provide lateral support to the flange of a structural member.

## **FLASHING**

A sheet metal closure to ensure weather tightness.

## **FOOTING**

A pad or mat, usually of concrete, located under a column, wall or other structural member, that is used to distribute the loads from that member into the soil.

## **FOUNDATION**

The substructure which supports a building or structure.

## **FRAME**

The primary steel structure members, made up of columns and rafters which supports the secondary framing.

## **FRAMED OPENING**

Framing members and flashing which surround an opening

## **GABLE**

The triangular portion of the endwall from the level of the eave to the ridge of the roof.

## **GABLE ANGLE**

An angle attached to purlins at gable for attachment of endwall sheets or panels.

## **GAGE**

The distance between holes punched in flanges, base plates , and splice plates.

## **GALVANIZED**

Steel coated with zinc for corrosion resistance.

## **GANTRY CRANE**

A crane similar to an overhead crane except that the bridge for carrying trolley or trolleys is rigidly supported on one or more legs running on a fixed rails or other runway.

## **GIRDER**

A main horizontal or near horizontal structural member that supports vertical loads. It may consist of several pieces.

## **GIRT**

A horizontal structural member that is attached to sidewall or endwall columns that supports paneling.

## **GLAZE**

The process of installing glass in windows and doors.

## **GLAZING**

Glass panes of paneling used in windows and doors.

## **GRADE**

The term used when referring to the ground elevation around a building.

## **GROUT**

A mixture of cement, sand and water used to fill cracks and cavities. Sometimes used under base plates or leveling plates to obtain uniform bearing surfaces.

### **GUSSET PLATE**

A steel plate used to reinforce or connect structural elements

### **GUTTER**

A light gauge metal member at an eave, valley or parapet designed to carry water from the roof to downspouts or drains.

### **HAIR PIN**

“V” shaped reinforcing steel used to transfer anchor bolt shear to the concrete floor mass.

### **HAUNCH**

The deepened portion of a column or rafter designed to accommodate the higher bending moments at such points. (Usually occurs at the intersection of column and rafter).

### **HAUNCH BRACE**

A diagonal member from the intersection of the column and rafter section of the rigid frame to the eave member to prevent lateral buckling of the haunch.

### **HEADER**

A horizontal framing member located on top of a framed opening.

### **HIGH STRENGTH BOLTS**

Any bolt made from steel having a tensile strength in excess of 100,000 pounds per square inch.

### **HIGH STRENGTH STEEL**

Structural Steel having a yield stress in excess of 36,000 pounds per square inch.

### **HIP ROOF**

A roof which is formed by sloping planes from all four sides.

### **HOIST**

A mechanical lifting device usually attached to a trolley which travels along a bridge, monorail or jib crane. May be chain or electric operated.

### **HOT-ROLLED SHAPES**

Steel sections (angles, channels, S-shapes, W-shapes, etc.) which are formed by rolling mills while steel is in a semi-molten state.

### **IMPACT WRENCH**

A power tool used to tighten nuts on bolts.

### **INNER LINER**

Liner paneling on the inside of walls

### **INSIDE CORNER TRIM**

Trim which flashes inside corners.

### **INSULATION**

Any material used in building construction to reduce heat transfer

### **JACK BEAM**

A beam used to support another beam, rafter or truss and eliminate column support.

### **JACK TRUSS**

A truss used to support another beam, rafter or truss and eliminate column support.

### **JAMB**

The vertical framing members located at the sides of an opening.

### **JIB CRANE**

A cantilevered or suspended beam with hoist and trolley. This lifting device may pick-up loads in all part of a circle around column to which it is attached.

### **JIG**

A device used to hold pieces of material in a certain position during fabrication

### **JOIST**

Light beam for supporting a floor or roof.

### **KIP**

A unit of measure equal to 1,000 pounds.

### **KNEE**

The connecting area of a column and rafter of a structural frame such as a rigid frame.

### **KNEE BRACE**

A diagonal member at a column and rafter intersection designed to resist horizontal loads.

### **LEAN-TO**

A structure having only one slope and depending upon another structure for partial support.

### **LENGTH**

The dimension of the building measured perpendicular to the main framing from end wall to end wall.

### **LEVELING PLATE**

A steel plate used on top of a foundation or other support on which a structural column can rest.

### **LINER PANEL**

A metal panel attached to the inside flange of the girts or inside of a wall panel.

### **LIP**

A flange stiffener on cold-formed sections.

### **LIVE LOAD**

Any moving or variable load which the structure must support which is not permanently attached to the

### **LOUVER**

An opening provided with fixed or movable, slanted fins to allow flow of air.

### **LOW RISE BUILDING**

A description of a class of building usually less than 60 feet eave height. Commonly, they are single story, But do not exceed four stories.

### **MAIN FRAME**

An assemblage of rafters and columns that support the secondary framing members and transfer loads directly to the foundation.

### **MASTIC**

See "Sealant".

### **MASONRY**

Anything constructed of materials such as bricks, concrete blocks, ceramic blocks and concrete.

### **MEZZANINE**

An intermediate level between floor and ceiling occupying a partial area of the floor space.

### **MEZZANINE BEAM**

Primary framing for Mezzanine Floors.

### **MEZZANINE JOIST**

Secondary framing for Mezzanine Floor.

### **MOMENT**

The tendency of a force to cause rotation about a point of axis.

### **MOMENT CONNECTION**

A connection designed to transfer moment as well as axial and shear forces between connecting members.

### **MONITORS**

Superstructure located above the ridge of a building used for ventilation or additional light.

### **MULLIONS**

Vertical member connecting two windows located side by side.

### **MULTI-GABLE BUILDING**

Buildings consisting of more than one gable across the width of the building.

### **MULTI-SPAN BUILDING**

Buildings consisting of more than one span across the width of the building. Multiple gable buildings and Single gable buildings with interior columns are examples.

### **NIBBLER**

An electrical hand tool used to cut steel, roof or wall sheet openings.

### **PARAPET**

That portion of the vertical wall of a building which extends above the roof line.

### **PARTITION**

An interior dividing wall.

### **PEAK**

The uppermost point of a gable

### **PEAK BOX**

A pre-engineered trim piece that trims gable trim connection and bear the name of the building manufacturer.

### **PERSONNEL DOOR**

A door used by personnel for access to and exit from a building.

### **PIECE MARK**

A number given to each separate part of the building for erection identification. Also called mark number or part number.

### **PIER**

A concrete structure designed to transfer vertical load from the base of a column to the footing.

### **PILASTER**

A reinforced or enlarged portion of a masonry wall to provide support for roof loads or lateral loads on the wall.

### **PINNED BASE**

A column base that is designed to resist horizontal and vertical movement, but not rotation.

### **PIN CONNECTION**

A connection designed to transfer axial and shear forces between connecting members but not moments.

### **PITCH**

The peak height of a gabled building divided by its overall span.

### **PLASTIC DESIGN**

A design concept based on multiplying the actual loads by a suitable load factor, and using the yield stress as the maximum stress in any member, and taking into consideration moment redistribution.

### **POP RIVET**

A small headed pin with expandable shank for joining light gauge metal, used to attach flashings, gutters, etc.

### **PORTAL FRAME**

A rigid frame so designed that it offers rigidity and stability in its plane, it is generally used to resist longitudinal loads where other bracing methods are not permitted.

### **PRIMER PAINT**

Initial coat of paint applied at factory to steel structure framings for protection against elements during shipping and erection only.

### **PURLIN**

A horizontal structural member which supports roof covering

### **PURLIN STRUT**

Additional purlin added at or near intersection of wind bracing members at the rigid frame where a series of wind bracing is required in the roof plane. This strut may or may not be a continuous member throughout the length of the building.

### **RAFTER**

The main beam supporting the roof system.

### **REACTIONS**

The resisting forces at the column bases holding the structure in equilibrium under a given loading condition.

### **REINFORCING STEEL**

The steel placed in concrete as required to carry the tension, compression and shear stresses.

### **RIDGE**

The horizontal line formed by opposing sloping sides of a roof running parallel with the building length.

### **RIDGE PANEL**

A transition of the roofing materials along the ridge of a roof, sometimes called ridge roll or ridge flashing.

### **RIGID FRAME**

A structural frame consisting of members joined together with moment connections so as to render the frame stable with respect to the design loads, without the need for bracing in its plane.

### **ROLL-UP DOOR**

A door that opens by traveling vertically.

### **ROOF SLOPE**

The tangent of the angle that a roof surface makes with the horizontal, usually expressed in units of vertical rise to 12 units of horizontal run.

### **SAG MEMBER**

A tension member such as rods, straps or angles used to limit the deflection of a girt or purlin in the direction of its weak axis.

### **SANDWICH PANELS**

A panel used as covering consisting of an insulating core materials with inner and outer metal skins.

### **SCREEDING**

The process of striking of the excess concrete to bring the top surface to proper finish and elevation.

### **SEALANT**

Any material which is used to seal cracks, joints or laps.

### **SECONDARY FRAMING**

Members which carry loads from the building surface to the main framing. Example are purlins and girts.

### **SEISMIC LOAD**

The lateral load acting in any horizontal direction on a structural system due to the action of an earthquake.

### **SELF DRILLING SCREW (SDS)**

A fastener which combines the function of drilling and tapping.

### **SELF TAPPING SCREW (STS)**

A fastener which taps its own threads in a predrilled hole.

### **SHEETING ANGLE OR EAVE ANGLE**

An angle used for securing sheet panels.

### **SHEAR**

The force tending to make two contacting parts to slide upon each other in opposite directions parallel to their plane of contact.

### **SHIMS**

A piece of steel used to level base plates or aligns columns or beams.

### **SHIPPING LIST**

A list that enumerates each piece to be shipped.

### **SHOP PRIMER PAINT**

The initial coat of primer paint applied in the shop.

### **SIDE WALL**

An exterior wall which is perpendicular to the frames of a building system.

### **SILL**

The bottom horizontal framing member of a wall opening such as window or door.

### **SINGLE SLOPE**

A sloping roof in one plane. The slope is from one wall to the opposite wall.

### **SINGLE SPAN**

A building or structural member without intermediate support.

### **SKYLIGHT**

A roof accessory to admit light, normally mounted on a curbed framed opening.

### **SLIDE DOOR**

A single or double leaf door which opens horizontally by means of sliding on an overhead trolley.

### **SNUG TIGHT**

The tightness of a bolt in a connection that exists when all plies in a joint are in firm contact.

### **SOFFIT**

A material which covers the underside of an overhang.

### **SOIL PRESSURE**

The load per unit area a structure will exert through its foundation on the soil.

### **SPAN**

The distance between supports of beams, girders, or trusses.

### **SPLICE**

A connection in a structural member.

### **SPLICE PLATE**

A plate used to connect two steel structure members

### **SPUD WRENCH**

A tool used by erectors to line up holes and to make up bolted connections; a wrench with tapered handle.

### **STEEL LINE**

The outside perimeter of a steel structure or inside of wall panels.

### **STIFFENER**

A member used to strengthen a plate against lateral or local buckling. Usually a flat bar welded perpendicular to the longitudinal axis of the member.

### **STITCH SCREW**

A fastener connecting panels together at the sidelap.

### **STRESS**

A measure of the load on a structural member in terms of force per unit area.

### **STRUT**

A member fitted into a framework which resist axial compressive forces.

### **STUD**

A vertical wall member to which exterior or interior covering or collateral material may be attached. May be either load bearing or non-load bearing.

### **SWEEP**

The amount of deviation of straightness of a structural section measured perpendicular to the web of the member.

### **TAPERED MEMBERS**

A built up plate member consisting of flanges welded to a variable depth web.

### **TENSILE STRENGTH**

The longitudinal pulling stress a material can bear without tearing apart.

### **TENSION FORCES**

Forces acting on a member tending to elongate it.

### **THRUST**

A horizontal component of a reaction usually at the column base.

### **TIE**

A structural member that is loaded in tension.

### **TORQUE WRENCH**

A wrench containing an adjustable mechanism for measuring and controlling the amount of torque of turning force to be exerted, used in tightening nuts of high strength bolts.

### **TRIM**

The light gauge metal used in the finish of a building, especially around openings and at intersections of surfaces, often referred to as flashing.

### **TRUSS**

A structure made up of three or more elements, with each member designed to carry a tension or compression force. The entire structure in turn acts as a beam.

### **TURN OF THE NUT METHOD**

A method of pre-tensioning high strength bolts. The nut is turned from the "Snug Tight" position, corresponding to a few blows of an impact wrench of the full effort of a man using an ordinary spud wrench, the amount of rotation required being a function of the bolt diameter and length.

### **UNIT STRESS**

Stresses per unit area.

### **UNSUPPORTED COLUMN**

The condition that exists when a column has no lateral support. A column is unsupported when there are no braces attached to the flanges.

### **UPLIFT**

Wind load on a building which causes a load in the upward direction.

### **VALLEY GUTTER**

A channel used to carry off water from the "V" of roofs of multi-gabled buildings.

### **VAPOR BARRIER**

Material used to retard the flow of vapor or moisture to prevent condensation from forming on a surface.

### **WAINSCOT**

Wall material, used in the lower portion of a wall, that is different from the material in the rest of the wall.

### **WALL, BEARING**

Wall capable of supporting a structural system.

### **WALL, NON-BEARING**

Wall not capable of supporting a structural system.

### **WALL COVERING**

The exterior wall surface consisting of panels.

### **WEB**

That portion of a structural member between the flanges.

### **WEB MEMBERS**

The system members connecting the chords of a truss.

### **WHEEL BASE**

Distance from center to center of outermost crane wheels.

### **WHEEL LOAD**

The vertical force without impact produced on a crane wheel bearing on a runway rail or suspended from a runway beam. Maximum wheel load occurs with the crane at rated capacity and the trolley positioned to provide maximum vertical force at one set of wheel

### **WIND BENT**

A wind bracing system used in sidewalls when diagonal brace rods are not permitted.

### **WIND COLUMN**

A vertical member designed to withstand horizontal wind loads.

### **WIND LOAD**

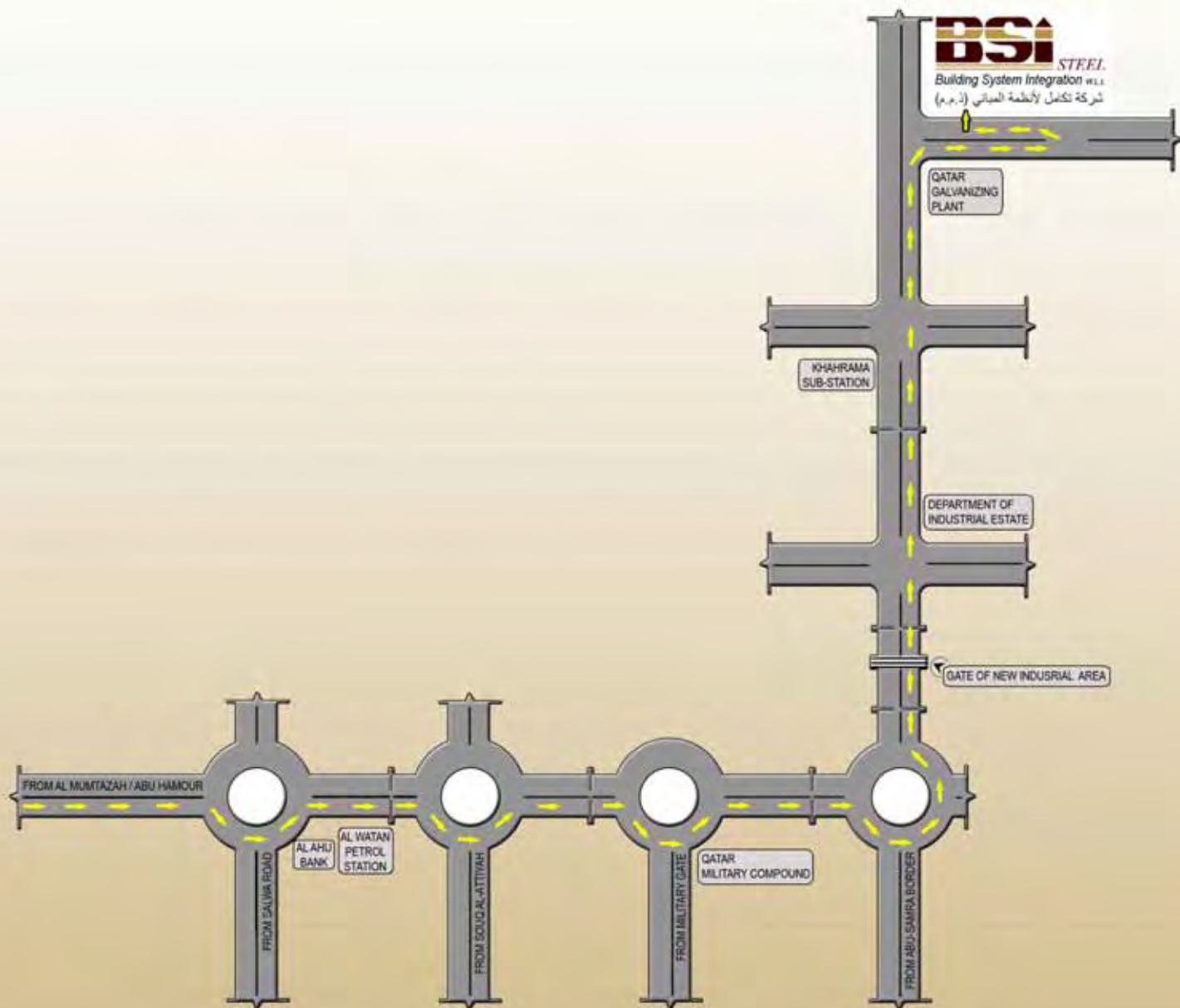
The load caused by the wind from any horizontal direction

### **YIELD STRESS**

The stress at which the strain ceases to be directly proportional to the stress.

### **“Z” SECTION**

A member cold formed from steel sheet in the shape of a “Z”.



**BSI STEEL**  
Building System Integration W.L.L.  
شركة تكامل لأنظمة المباني (ذ.م.م)

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