



FIELD ERECTION MANUAL



www.vulcansteel.com
1-800-258-3369

DEFINITIONS

MANUFACTURER — The name ***MANUFACTURER*** in this manual is used to refer to the manufacturer, and includes all the divisions and subsidiaries of The Manufacturer that may supply materials to the project.

ERECTOR — The *erector* is the company, entity or individual who is responsible for assembling the building at the job site. The erector may or may not be an ***Authorized Builder*** of The Manufacturer, its divisions or subsidiaries.

BUILDER — The *builder* is the company or individual who purchases the building material from The Manufacturer, its divisions or subsidiaries.

MANUFACTURER RESERVES THE RIGHT
TO MODIFY ANY AND ALL DETAILS OR
RECOMMENDATIONS OF THIS MANUAL
WITHOUT INCURRING OBLIGATION.

Important Note!

All details, recommendations and suggestions in this manual are for general guidelines only, and not meant to be all inclusive. Industry accepted installation practices with regard to all areas not specifically discussed in this manual should be followed. Only experienced, knowledgeable erectors familiar with accepted practices should be used to assure a quality project.

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Important!!!

Read and understand this page before proceeding with any work or further reading.

SAFETY FIRST

THE MANUFACTURER has a commitment to manufacture quality building components that are designed to meet the structural requirements of the building. However, the safety commitment and job site practices of the erector are beyond the control of THE MANUFACTURER and include expertise not possessed by the manufacturers.

It is urgently recommended that safe working conditions and accident prevention practices be the top priority on the job site, and that local, state and federal safety and health standards always be followed to help insure worker safety. These points cannot be stressed too strongly.

Job site safety is a joint responsibility of all parties present on the job site, including owners, architects, engineers, contractors, subcontractors, delivery personnel, and employees of all the above, among others. All should be watchful to avoid hazards which might cause damage to property or injury to any person, including themselves.

Always make certain all employees know the safest and most productive way of erecting a building along with emergency telephone numbers, location of first aid stations and emergency procedures. Avoid working during inclement weather periods when personnel are at increased risk due to high winds, lightning, precipitation, etc.

THE MANUFACTURER recommends daily meetings highlighting safety procedures, the use of hard hats, rubber sole shoes for roof work, proper equipment for handling material and appropriate safety gear, including nets where necessary.

This manual should be interpreted and administered with sound judgment consistent with good safety practices. Its' information is to be disseminated to all workers on the job site. Where any doubt exists as to the language or direction of this manual, do not take a risk, "play it safe".

INTRODUCTION

THE MANUFACTURER manufactures high quality, pre-engineered metal building packages. Quality erection is essential to complete the structure to the satisfaction of the customer.

This manual has been prepared to help guide the erection process and reflects the techniques in use in the metal building industry believed to be most representative of good erection practices. These procedures and methods are by necessity general in nature. The erector should always, especially in special circumstances, use proven and safe erection methods.

This erection manual is intended only as a supplement to the erection drawings that are furnished with each building. The erection drawings show the customer's building as engineered and fabricated according to his requirements. The building erection drawing will always govern with regard to construction details and specific building parts. Contact your sales representative to resolve any matters not addressed.

The information contained in this manual is believed to be reliable, however, THE MANUFACTURER disclaims any responsibility for damages which may result from use of this manual since the actual erection operations and conditions are beyond The Manufacturer's control. Only experienced, knowledgeable erectors with trained crews and proper equipment should be engaged to do the erection.

It is emphasized that The Manufacturer is only a manufacturer of metal buildings and components and is not engaged in the erection of its products. Opinions expressed by The Manufacturer about erection practices are intended to present only a guide as to how the components could be assembled to create a building. The experience, expertise and skills of the erection crews as well as the equipment available for handling the materials determines the quality and safety of erection and the ultimate customer satisfaction with the completed building.

The MBMA's "CODE OF STANDARD PRACTICE" shall govern with respect to the fabrication tolerances, erection methods, and all field work associated with the project in question

The erector should familiarize himself with the contents of this document. Additional copies may be requested at a nominal cost.

SECTION I

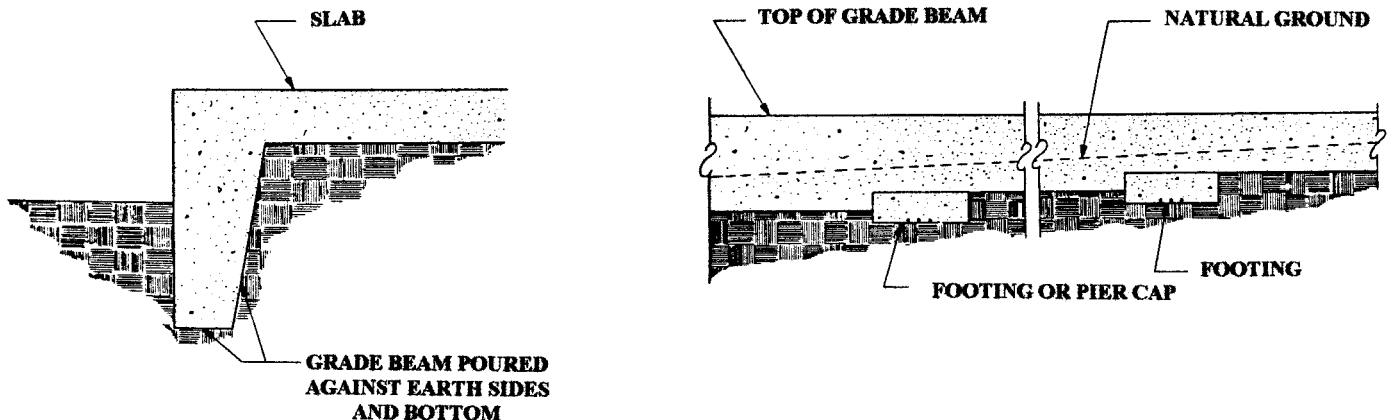
FOUNDATION AND BUILDING ANCHORAGE

GENERAL FOUNDATION INFORMATION

THE MANUFACTURER recommends that all building foundations, including pier sizes, grade beams and floor slabs, be designed by an experienced local foundation engineer. This engineer can also recommend excavation procedures, drainage practices, form work, reinforcing steel requirements and concrete proportioning. This will assure proper designs, expedite the work and reduce costs.

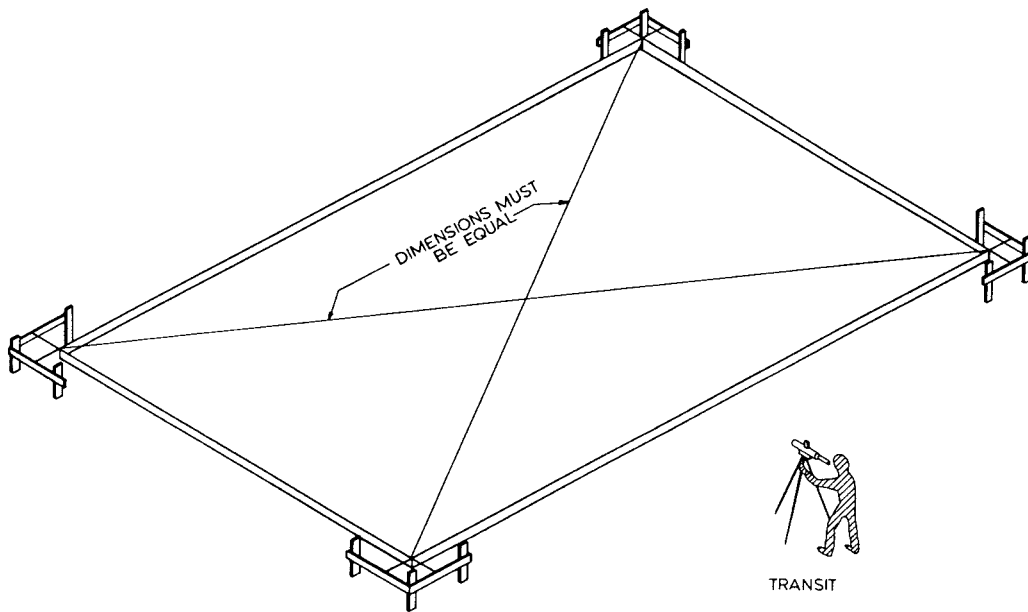
Proven construction techniques should be adhered to in the foundation work. The bottoms of all excavations should be level and smooth, and care should be taken to prevent cave-ins when utilizing the walls of the excavations for concrete forms. Strict adherence to OSHA and other local codes or laws governing “shoring of excavation to prevent accidental cave-ins” is critical. Where the ground surface is not level, the bottoms of the foundations should be in steps coinciding with the piers (as shown). Fill areas should be properly compacted to prevent settling cracks. Footing should extend below any fill material.

Care should be taken to obtain a good finish on the floor slab and to maintain the correct elevation throughout the slab. Shrinkage cracks can be minimized by pouring the slab in alternate sections, “checker board fashion“. The outer corners of the foundation walls and piers should be sharply formed with straight sides and level tops. This will allow neat seating and good alignment of the base angle.



FOUNDATION CHECKING PROCEDURES

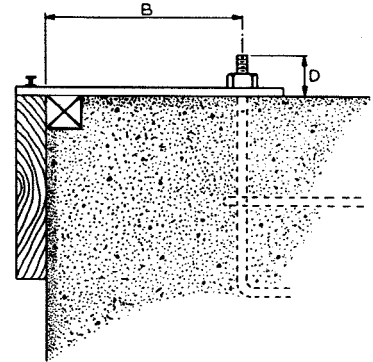
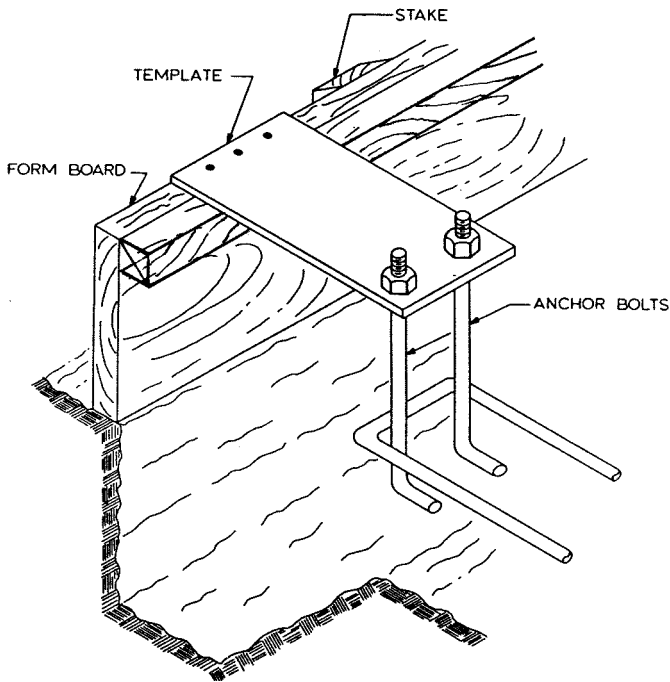
The importance of accurate foundation construction and anchor bolt settings cannot be over-emphasized. Foundation errors and mislocation of anchor bolts are among the most frequent and troublesome errors made in metal building construction. The Following procedures and methods, should help to minimize these costly errors and delays.



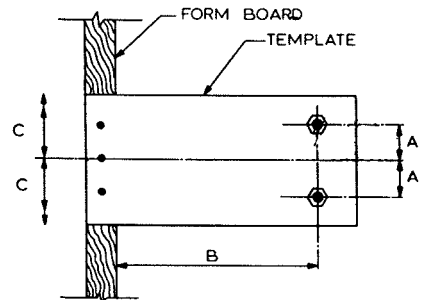
1. To determine that the foundation is square, measure diagonal dimensions to be sure they are of equal length.
2. To determine that the foundation is level, set up a transit or level and use a level rod to obtain the elevation at all columns and posts.
3. Carefully check the location of all anchor bolts against the "Anchor Bolt" drawing furnished by The Manufacturer. All dimensions must be identical to assure a proper start-up.

ANCHOR BOLT SETTINGS

It is extremely important that anchor bolts be placed accurately in accordance with the anchor bolt setting plan. All anchor bolts should be held in place with a template or similar means, so that they will remain plumb and in the correct location during placing of the concrete. Check the concrete forms and anchor bolt locations prior to the pouring of the concrete. A final check should be made after the completion of the concrete work and prior to the steel erection. This will allow any necessary corrections to be made before the costly erection labor and equipment arrives.



PROJECTION OF ANCHOR BOLTS "D" GIVEN ON ANCHOR BOLT PLAN.

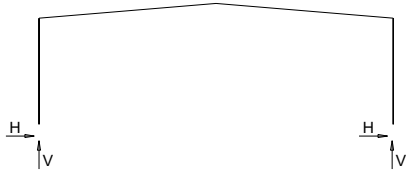


DIMENSIONS A, B, AND C AS GIVEN ON ANCHOR BOLT PLAN.

SECTION II

TYPICAL ERECTION DRAWINGS

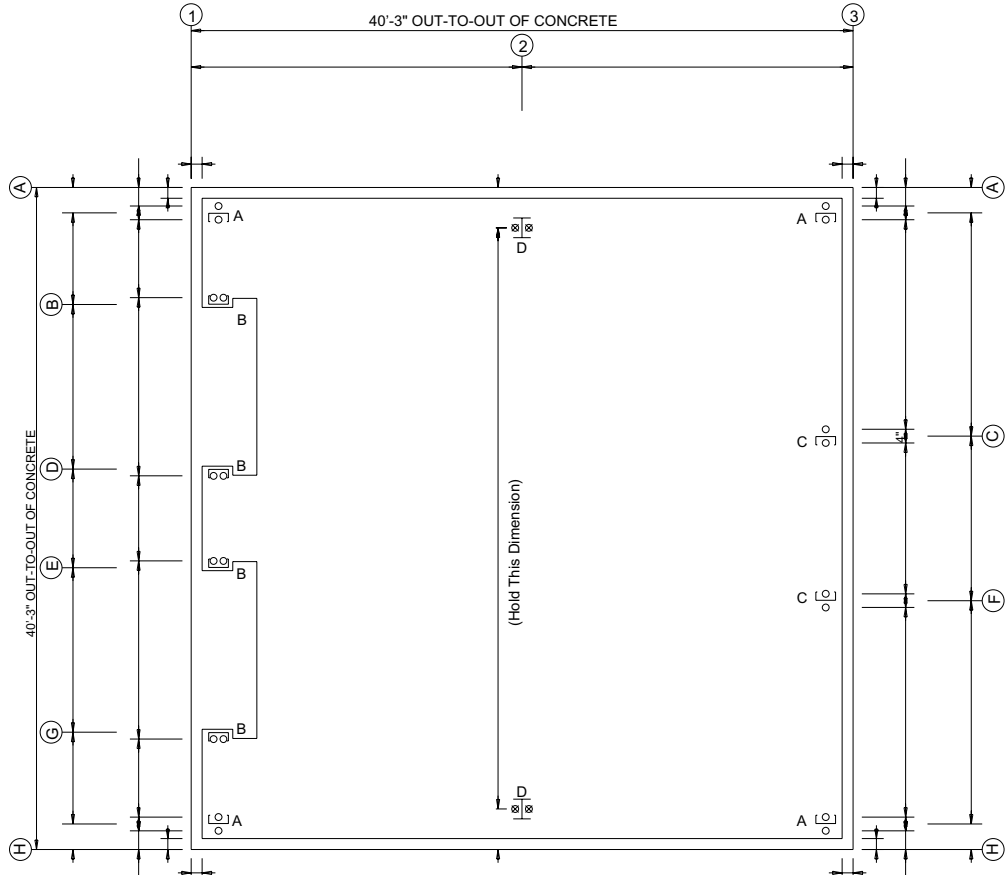
TYPICAL ANCHOR BOLT PLAN



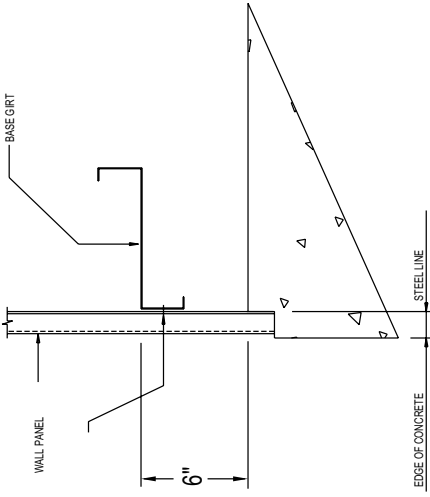
BRACING REACTIONS, PANEL SHEAR

Wall Id	Col Id	Bracing (k) Horiz Reactn	Vert Reactn	Panel Shear Load at Base Angle (lb/ft)
1				0
H	1,2	2.0	0.9	
3				21
A	1,2	2.0	0.9	

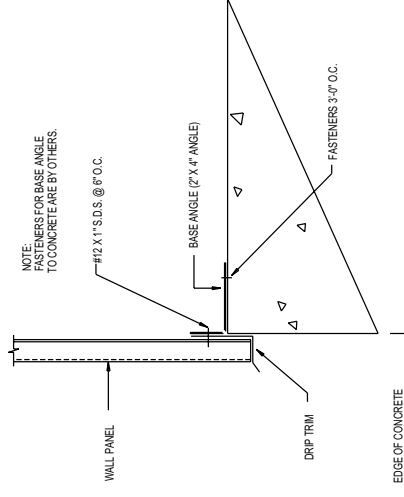
RIGID FRAME:		BASIC COLUMN REACTIONS											
Frame Line	Column Line	---Dead---		-Collateral-		---Live---		--Wind_L1--		--Wind_R1--		--Wind_L2--	
		Horiz	Vert	Horiz	Vert	Horiz	Vert	Horiz	Vert	Horiz	Vert	Horiz	Vert
2	A	0.55	1.36	0.00	0.00	2.70	6.00	-3.62	-6.43	-0.67	-4.36	-3.17	-3.81
2	H	-0.55	1.36	0.00	0.00	-2.70	6.00	0.67	-4.36	3.62	-6.43	0.23	-1.74
Frame Line	Column Line	--Wind_R2--		-Seismic_L-		-Seismic_R-		---Live_R---		-----		-----	
		Horiz	Vert	Horiz	Vert	Horiz	Vert	Horiz	Vert	Horiz	Vert	Horiz	Vert
2	A	-0.23	-1.74	-0.10	-0.06	0.10	0.06	1.35	1.43	-0.53	-0.29	0.47	0.29
2	H	3.17	-3.81	-0.10	0.06	0.10	-0.06	-1.35	4.57	-0.47	0.29	0.53	-0.29



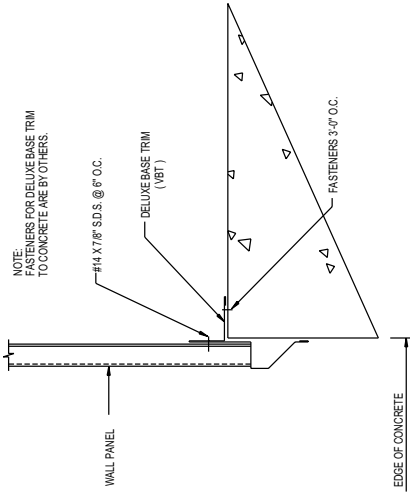
Note! Strict adherence to your specific anchor bolt plan is required. Foundation must be square and on plane! Make certain the anchor bolt plan being used is "For Construction", not "Preliminary" or "Approval".



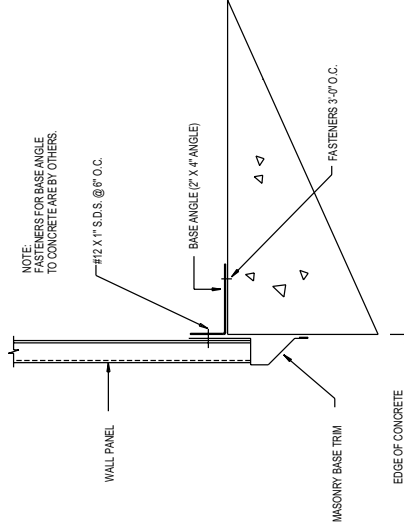
LOW GIRTS WITH SHEET NOTCH
BASE CONDITION



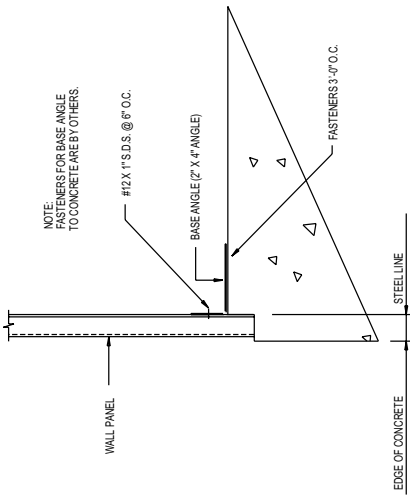
BASE ANGLE WITH
OPTIONAL DRIP TRIM



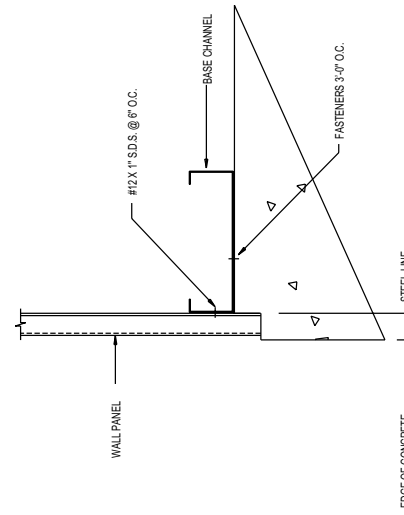
DELUXE BASE TRIM
BASE CONDITION



BASE ANGLE WITH
OPTIONAL BASE TRIM



ANGLE WITH SHEET NOTCH
BASE CONDITION



FLOOR CEE WITH SHEET NOTCH
BASE CONDITION

3. BASE GIRT (OPTIONAL) WILL BE FURNISHED CONTIGUOUS BETWEEN COLUMNS. MUST BE FIELD CUT AT PERSONNEL DOORS.

- GENERAL NOTES
1. SHEETING ANGLE AT BASE FURNISHED IN 20'-0" LENGTHS. SHEETING ANGLE SHOULD BE OMITTED AT OVERHEAD DOORS, PERSONNEL DOORS, AND FRAMED OPENINGS. SHEETING ANGLE SHOULD BE ATTACHED WITH FASTENERS SUPPLIED BY OTHERS.
 2. BASE CHANNEL (OPTIONAL) WILL BE FURNISHED IN REQUIRED LENGTHS. OMIT BASE CHANNEL AT PERSONNEL DOORS. ATTACH BASE CHANNEL WITH FASTENERS SUPPLIED BY OTHERS.

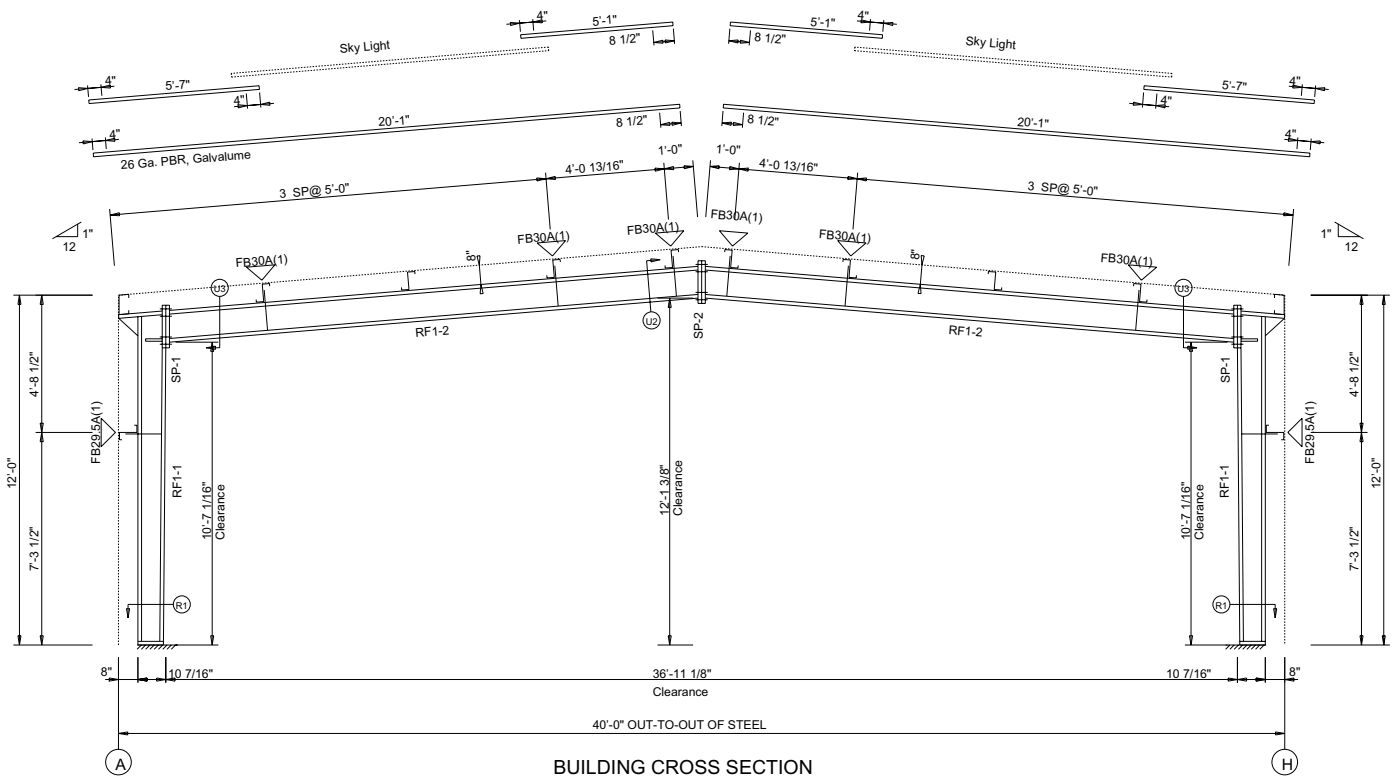
RIGID FRAME CROSS SECTION

The typical section shows the column and rafter arrangement , purlin, girt and frame brace locations, bolt sizes and numbers, inside clearances and the layout of roof panels and skylights. The following illustrates a typical frame cross section and a description of its contents.

1. Building width (feet and inches); dimension is out to out of girt line.
2. Roof panel overhangs.
3. Girt depth (inches).
4. Depth of column at column base (feet and inches).
5. Depth of column and girt at frame knee (feet and inches).
6. Horizontal clear dimension of frame at knee connection (feet and inches).
7. Building eave height (feet and inches); dimension measured from finished floor to top flange of eave strut.
8. Girt spacing (feet and inches).
9. Vertical clear dimension at knee connection (feet and inches).
10. Vertical clear dimension at ridge connection (feet and inches).
11. Roof slope or bevel.
12. Built-up member sizes.
13. Purlin spacing (feet and inches).
14. Flange brace location.
15. Shop located skylite locations.

16. Roof panel endlap dimensions measured from purlin web line (inches).

17. Bolted frame splice designation.



BUILDING CROSS SECTION
FOR FRAME LINE 2

PIECE	MEMBER SIZE TABLE (in)			OUTSIDE FLANGE W x T x LEN	INSIDE FLANGE W x T x LEN
	WEB DEPTH START/END	WEB PLATE THICK	LENGTH		
RF1-1	7.5/10.0	0.134	122.7	5 x 3/16" x 135.9	5 x 1/4" x 122.7
	10.0/10.0	0.250	14.1	5 x 1/4" x 18.2	
RF1-2	10.0/10.0	0.134	221.3	5 x 3/16" x 220.4	5 x 1/4" x 220.4

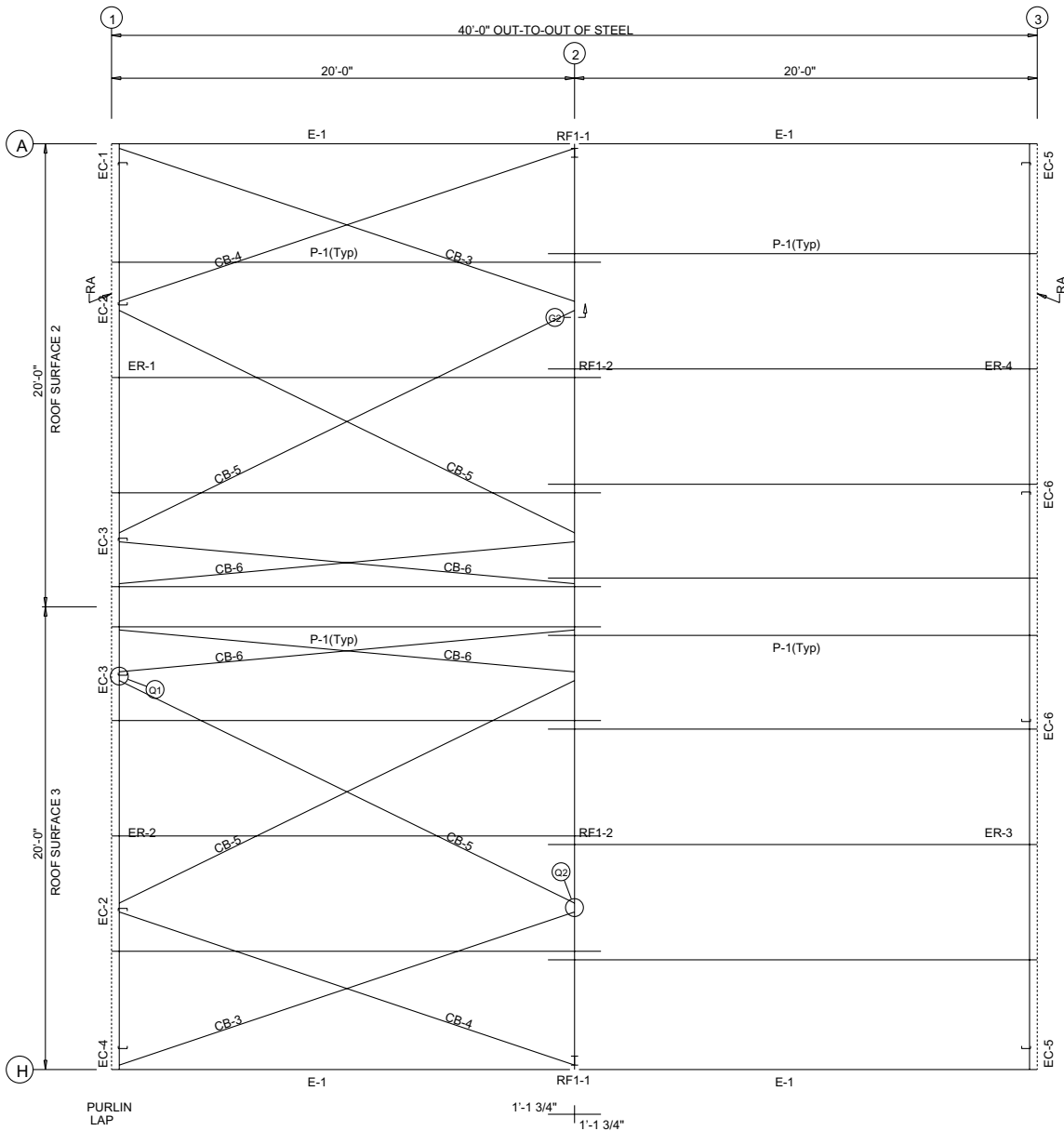
SPLICE BOLTS						
Splice Mark	Top Of Plate			Bottom Of Plate		
	Qty	Typ	Dia Len	Qty	Typ	Dia Len
Sp-1	4	A325	0.750 2.50	4	A325	0.750 2.50
Sp-2	4	A325	0.750 2.50	4	A325	0.750 2.50

∇ FLANGE BRACES: Req'd Both Sides Unless Noted
FBxxA(1): xx=inches, (1)=one side only
A - L2X2X14G

ROOF PLAN

The roof plan shows the layout and part numbers of purlins, eave struts, panels and bracing. A description of the contents on a typical roof framing plan follows.

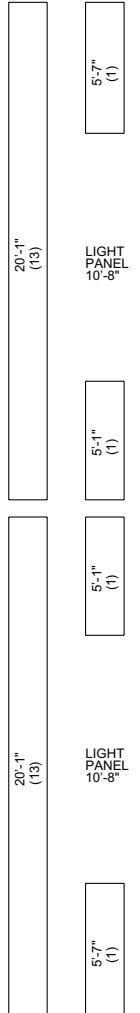
1. Building length shown out to out of purlins (feet and inches).
2. Building width shown out to out of eave struts (or girts) (feet and inches).
3. Roof panel type, gage, and color.
4. Sidewall column line designation (number).
5. Endwall column line designation (letter).
6. Roof member table.
7. Purlin lap dimension.
8. Primary framing part marks.
9. Purlin piece marks.
10. Roof wind bracing piece marks.
11. Eave strut piece mark.



ROOF FRAMING PLAN

ROOF MEMBER TABLE		
MARK	PART	LENGTH
P-1	8X25Z16	21'-1 1/2"
E-1	8E14	19'-11 1/2"
CB-3	0.250CBL	20'-11"
CB-4	0.250CBL	21'-1"
CB-5	0.250CBL	22'-2"
CB-6	0.250CBL	20'-5"

RC-R
(14)

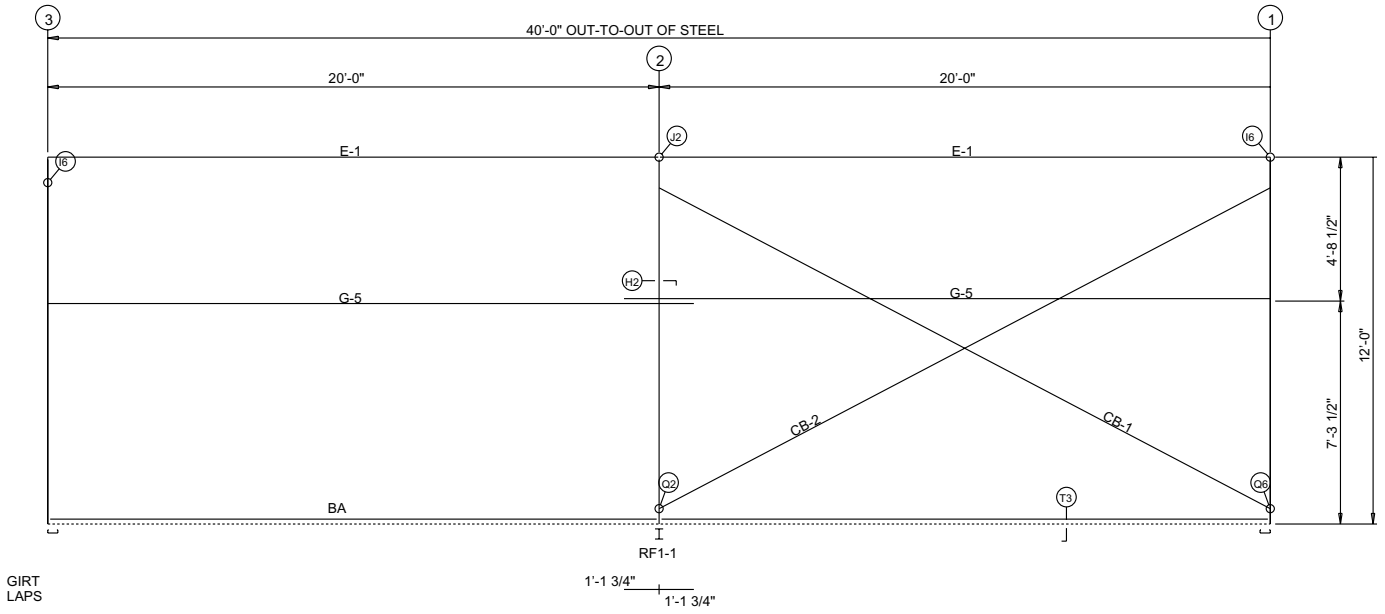


ROOF SHEETING
PANELS: 26 Ga. PBR Galvalume

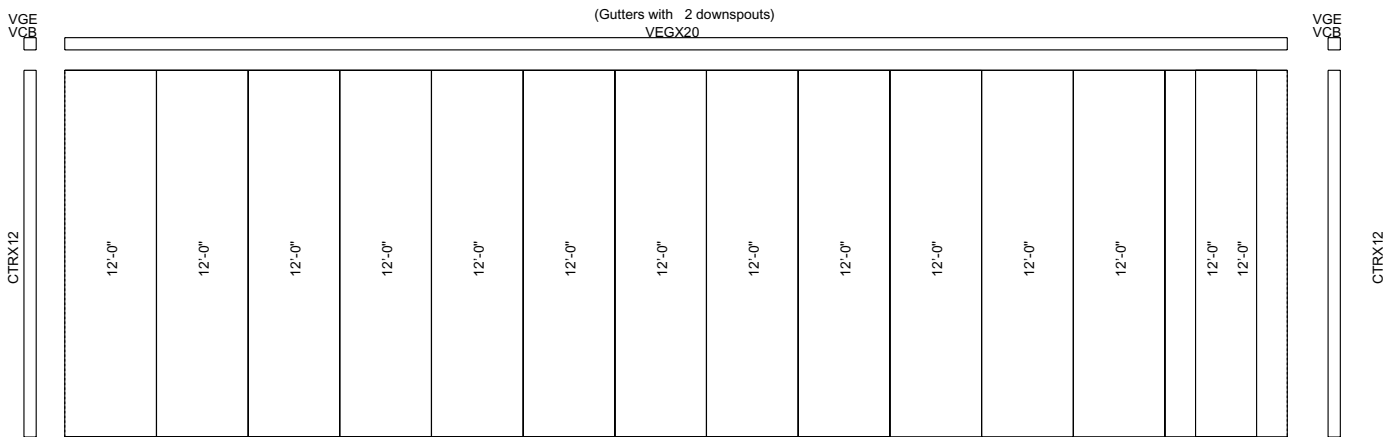
SIDEWALL ELEVATION

The sidewall framing elevation shows the girts, eave struts and sidewall bracing layouts and part numbers. The contents of a typical sidewall elevation drawing are given below .

1. Sequence number of sidewall framing elevation shown used to identify multiple sidewall framing plans associated with job.
2. Building length measured out to out of endwall girts (feet and inches).
3. Sidewall sheeting and trim layout.
4. Sidewall bay spacing (feet and inches) measured centerline to centerline of frames.
5. Sidewall girt spacing (feet and inches).
6. Sidewall column piece mark.
7. Eave strut piece mark.
8. Sidewall girt piece mark.
9. Sidewall bracing piece mark.
10. Sidewall column line designation.
11. Sidewall member table.



SIDEWALL FRAMING: LINE A



SIDEWALL SHEETING & TRIM: FRAME LINE A

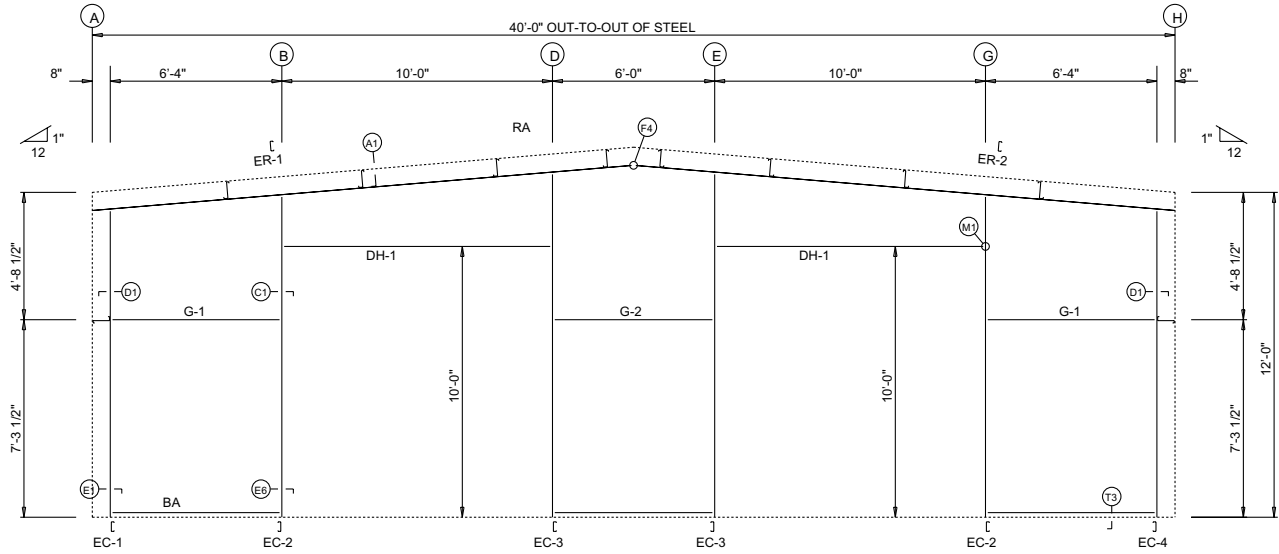
PANELS: 26 Ga. R - Light Stone

MEMBER TABLE		
FRAME LINE A		
MARK	PART	LENGTH
E-1	8E14	19'-11 1/2"
G-5	8X25Z16	21'-1 1/2"
CB-1	0.250CBL	22'-2"
CB-2	0.250CBL	21'-10"

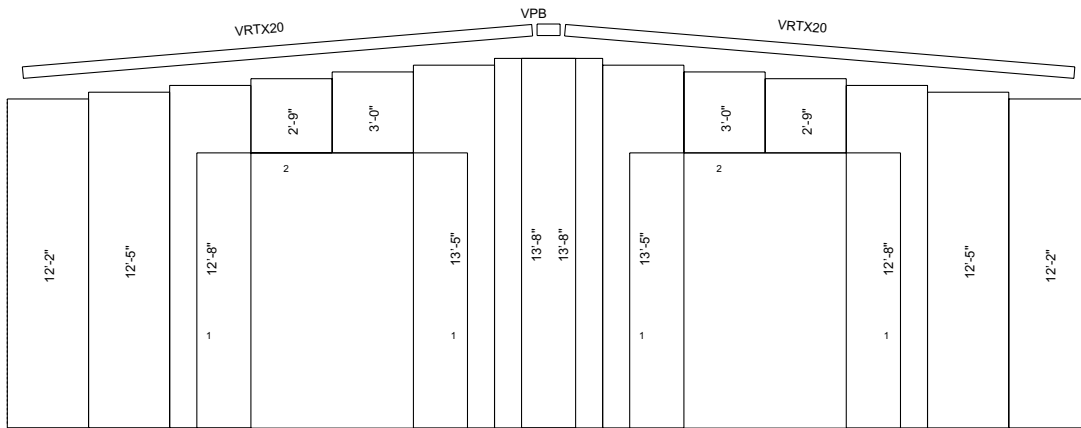
ENDWALL ELEVATION

The endwall elevation shows the end framing column, rafter and girt arrangements and piece marks. Typical column and beam and rigid frame endwall framing elevations are explained below .

1. Endwall framing elevation designation by frame line number.
2. Width of building measured out to out of sidewall girts (dimension shown in feet and inches).
3. Sidewall girt depth (shown in inches).
4. Endwall exterior bay spacing shown on anchor bolt plan less sidewall girt depth (dimension shown in feet and inches).
5. Endwall interior bay spacing (feet and inches) measured centerline to centerline of endwall columns.
6. Building eave height (feet and inches) measured from top of finished floor to top flange of eave strut.
7. Endwall sheeting and trim layout.
8. Endwall member table.
9. Endwall girt spacing (feet and inches).
10. Corner column piece mark.
11. Endwall rafter piece mark.
12. Endwall interior column piece mark.
13. Endwall girt piece mark.
14. Endwall column line designation (letter).



ENDWALL FRAMING: FRAME LINE 1



ENDWALL SHEETING & TRIM: FRAME LINE 1

PANELS: 26 Ga. R - Light Stone

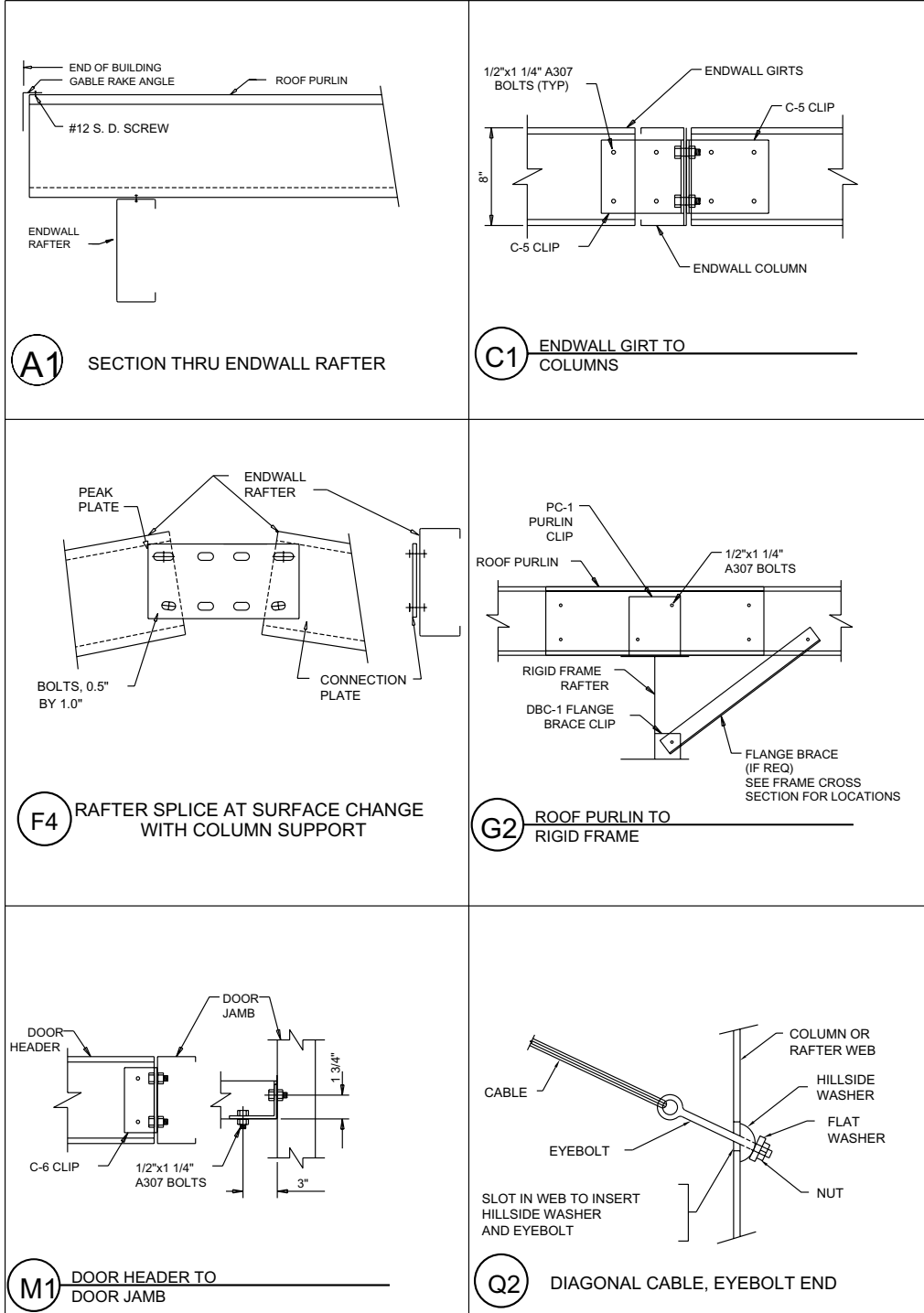
BOLT TABLE: FRAME LINE 1				
LOCATION	QUAN	TYPE	DIA	LEN
ER-1-ER-2	4	A325	1/2"	1 1/4"
Columns	2	A325	1/2"	1 1/4"

MEMBER TABLE FRAME LINE 1		
MARK	PART	LENGTH
EC-1	8x35C16	10'-7 5/8"
EC-2	8x35C16	11'-1 15/16"
EC-3	8x35C16	11'-1 15/16"
EC-4	8x35C16	10'-7 5/8"
ER-1	8x35c16	19'-10 3/16"
ER-2	8x35c16	19'-10 3/16"
DH-1	8x35C16	10'-0"
G-1	8X25Z16	5'-8 1/2"
G-2	8X25Z16	5'-4 1/2"

TRIM TABLE FRAME LINE 1		
ID	MARK	LENGTH
1	JTRX10	10'-3"
2	HTX10	10'-3"

SECTIONS AND DETAILS

SECTIONS AND DETAILS THAT APPLY WILL BE INCLUDED IN EACH SET OF FINAL DRAWINGS.



SECTION III

PRE - ERECTION

ACCESS TO SITE

The vehicle transporting your building parts must gain access to the building site from the adjacent highway or road. Such access should be studied and prepared in advance of arrival. All obstructions, overhead and otherwise, must be removed and the access route graveled or planked if the soil will not sustain the heavy wheel loads.

Inspect to insure that there is enough room to physically perform the tasks required to erect the building. Application of sheeting and trim can be expensive when there is not sufficient working space because of the proximity of adjacent buildings or other obstructions.

The availability of any required utilities should also be considered in advance. Take careful note of any overhead electric lines or other utilities to avoid hazards and damage (Notify your utility company(s) when necessary)

Develop a comprehensive safety awareness program in advance to familiarize the work force with the unique conditions of the site, and the building materials, along with the appropriate "Safe Work" practices that will be utilized.

NOTE ! Two sets of erection drawings for construction and three shipping lists will be delivered by the carrier's driver for every building. These documents are specifically prepared for the construction of each individual building and must be strictly adhered to. Make sure the first page of each document is stamped as shown below:

FINAL
DATE MM/DD/YY

Familiarize yourself and your crew with these drawings prior to start - up.

Previous sets of drawings marked "for permit" or "for approval" are not to be referenced for construction.

UNLOADING OPERATIONS

Pre- planning of the unloading operations is an important part of the erection procedure. This involves careful, safe and orderly storage of all materials. Detailed planning is required at the job site where storage space is restricted. Here, a planned separation of materials in the order of the erection process is necessary to minimize the costly double handling of materials. While set procedures are not possible in all cases, special attention should be given to the following items.

Note! THE MANUFACTURER'S trucks are loaded to maximize efficiency , maximize trailer weight ,and insure safety. Unfortunately, THE MANUFACTURER can not load trucks per customer request.

***** THINK SAFETY AT ALL TIMES *****

1. Location of carrier vehicle during unloading
Unload material near their usage points to minimize lifting, travel and rehandling during building assembly.
2. Prepare necessary ramp for truck
The edges of the concrete slab should be protected to minimize the danger of chipping or cracking from truck traffic if the materials are to be laid out on the slab. One important safety consideration is the fact that materials stored on the slab may subject the workers to possible injury from falling objects.
3. Schedule lifting equipment (not by The Manufacturer)
The type and size of lifting equipment is determined by the size of the building and the site conditions. Length of boom, capacity and maneuverability of lifting equipment will determine its location for both unloading and erection.

Use the same lifting equipment to unload and erect structural parts. Lifting equipment costs are usually minimized by combining the unloading process with building erection. As soon as the truck is unloaded, the lifting equipment should start erecting the columns and raising the assembled rafters into position.

4. Consideration of overhead electric wires
Overhead power lines are a continuing source of danger. Extreme care must be used in locating and using lifting equipment to avoid contact with power lines.
5. Schedule crew
Depending on the crew size, valuable time can generally be gained if the supervisor plans and watches ahead instead of getting tied up with a particular unloading chore.
6. Check shipment !!!!!
When shipments are received in the field, two inspections are necessary :
 - a. When items, boxes, crates, bundles or other large components are received and unloaded from the carrier, they should be checked off from the packing list.

If during the inspection, damages, or shortages of items are found, a report should be filed with the carrier immediately at the site. When damages are evident from the exterior of containers, they should be opened and inspected thoroughly at the time of receiving shipments. Panel crates should be opened and inspected for water damage. Galvanized or galvalume panel crates should always be opened and inspected for white or black rust.

- b. When bundles, crates, cartons, boxes, etc. are opened following delivery, another check must be performed to determine the quantity received and their condition.

If during this inspection damages or shortages of items are found upon opening the crates or cartons, a written claim should be sent to the carrier no later than fourteen (14) days after delivery. If a shortage is discovered within a container, then a written notice should be mailed to The Manufacturer at the same time the claim is sent to the carrier.

Unless these two important inspections are made and any reports or claims are filed immediately, settlements become very difficult and usually all parties suffer the loss.

NOTE! Even when The Manufacturer's trucks are involved in the delivery, careful attention should be paid to the material, and claims filed in the same timely manner.

When filing claims either with the carrier, or with The Manufacturer, the claim should indicate the item(s) in question, the bundle or container in question (if any), the actual quantity received, the quantity which should have been received, or that which was damaged. This is important for quickly retrieving the necessary information. Also, other information such as numbers, names and addresses of consignees and consignors should be indicated on claims, as well as invoice numbers.

These procedures are primarily for your protection. A shortage discovered later, can be caused by theft, misplacement, or other causes, and neither the carrier or The Manufacturer can accept responsibility.

NOTE! Galvanized and galvalume materials are susceptible to damage from prolonged periods of contact with moisture while stacked together. If there is evidence of moisture during unloading, the panels should be separated, dried and stored out of the weather to prevent permanent discoloration. Never install any material if its' quality is in question!

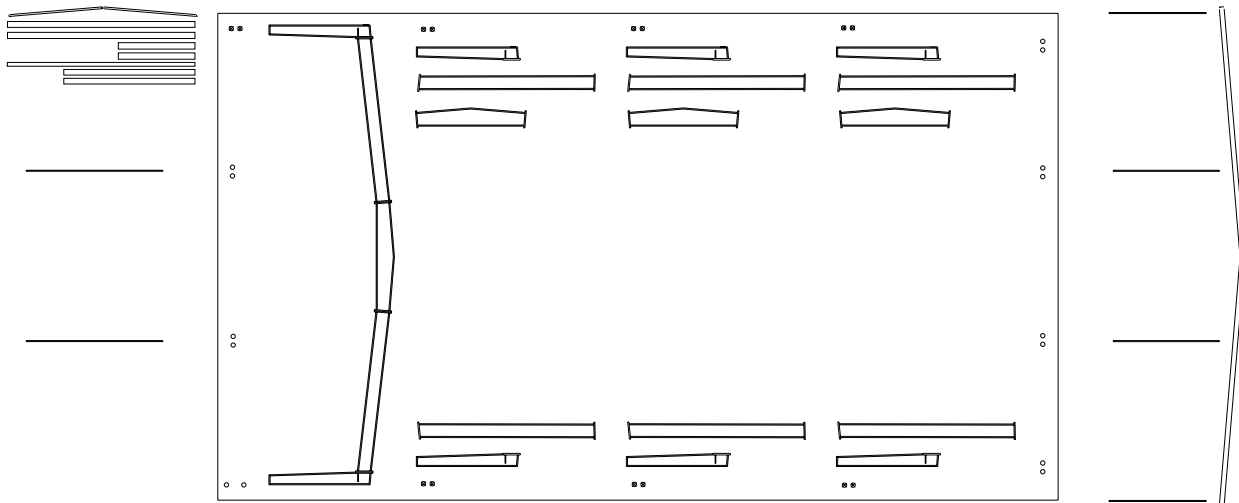
LOCATION OF BUILDING PARTS

- Columns and rafters are usually unloaded near their respective installed positions on blocking on the slab in position for easy makeup.
- Endwalls are usually laid out at each end of slab with the columns near respective anchor bolts.

NOTE! An access area through the center of the building should be left for erection equipment.

- Hardware packages should be located centrally, usually along one sidewall near the center of the building. This will minimize walking distances to other parts of the slab area.
- Purlins and girts, depending on the number of bundles, are usually stored near the sidewalls clear of other packages or parts.
- Sheet packages are usually located along one or both sidewalls off the ground and sloping to one end to encourage drainage in case of rain.
- Accessories are usually unloaded on a corner of the slab or off the slab near one end of the building to keep them as much out of the way as possible from the active area during steel erection.

NOTE: Steps must be taken to protect the entire job site from vandalism and pilferage.



SECTION IV

UNLOADING, HANDLING AND STORING MATERIALS

STRUCTURAL

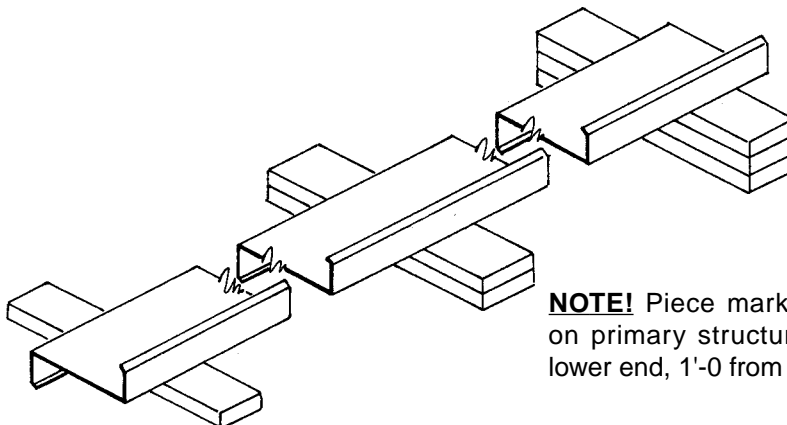
As previously emphasized, a great amount of time and trouble can be saved if the building parts are unloaded at the building site according to a pre-arranged plan. Proper location and handling of components will eliminate unnecessary handling.

Inspect all shipments prior to releasing the tie-downs for loads that may have shifted during transit! **REMEMBER, SAFETY FIRST!**

Blocking under the columns and rafters protects the splice plates and the slab from damage during the unloading process. It also facilitates the placing of slings or cables around the members for later lifting and allows members to be bolted together into sub-assemblies while on the ground. Extra care should always be exercised in the unloading operation to prevent injuries from handling the steel and to prevent damage to materials and the concrete slab.

If water is allowed to remain for extended periods in bundles of primed parts such as girts, purlins, etc., the pigment will fade and the paint will gradually soften reducing its bond to the steel. Therefore, upon receipt of a job, all bundles of primed parts should be stored at an angle to allow any trapped water to drain away and permit air circulation for drying. Puddles of water should not be allowed to collect and remain on columns or rafters for the same reason.

All primer should be touched up as required before erection!



NOTE! Piece marks are stenciled on primary structural members at lower end, 1'-0 from end.

WALL AND ROOF PANELS

THE MANUFACTURER's wall and roof panels including color coated, galvalume and galvanized, provide excellent service under widely varied conditions. All unloading and erection personnel should fully understand that these panels are quality merchandise which merit cautious care in handling.

Under no circumstances should panels be handled roughly. Packages of sheets should be lifted off the truck with extreme care taken to insure that no damage occurs to ends of the sheets or to side ribs. The packages should be stored off the ground sufficiently high to allow air circulation underneath the packages. This avoids ground moisture and deters people from walking on the packages. One end of the package should always be elevated to encourage drainage in case of rain.

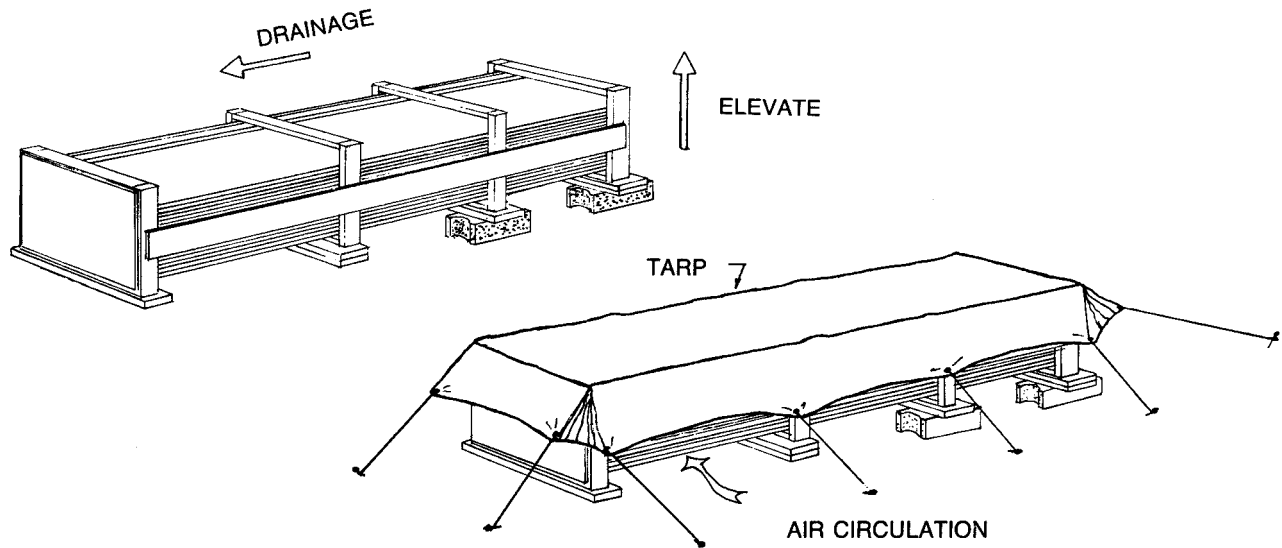
All stacked metal panels are subject, to some degree, to localized discoloration or stain when water is trapped between their closely nested surfaces. THE MANUFACTURER exercises extreme caution during fabricating and shipping operations to insure that all panel stock is kept dry. However, due to climatic conditions, water formed by condensation of humid air can become trapped between stacked sheets. Water can also be trapped between the stacked sheets when exposed to rain. This discoloration caused by trapped moisture is often called wet storage stain.

The stain is usually superficial and has little effect on the appearance or service life of the panels as long as it is not permitted to remain on the panels. However, moisture in contact with the surface of the panels over an extended period can severely attack the finish and reduce the effective service life. Therefore, it is imperative that all panels be inspected for moisture upon receipt of the order. If moisture is present, dry the panels at once and store in a dry, warm place.

CAUTION: Care should always be taken when walking on panels. Use safety lines and nets when necessary! Panels are slippery. Oil or wax applied to the roof and wall panels for protection against weather damage will make them a very slippery surface. Wipe dry any oil that has puddled from bundles stored on a slope. Dew, frost, or other forms of moisture greatly increase the slipperiness of the panels. Always assume panel surface is slippery and act accordingly. **Think safety!!**

WALL AND ROOF PANELS (CONTINUED)

Use wood blocking to elevate and slope the panels in a manner that will allow moisture to drain. Wood blocking placed between bundles will provide additional air circulation. Cover the stacked bundles with a tarp or plastic cover leaving enough opening at the bottom for air to circulate.



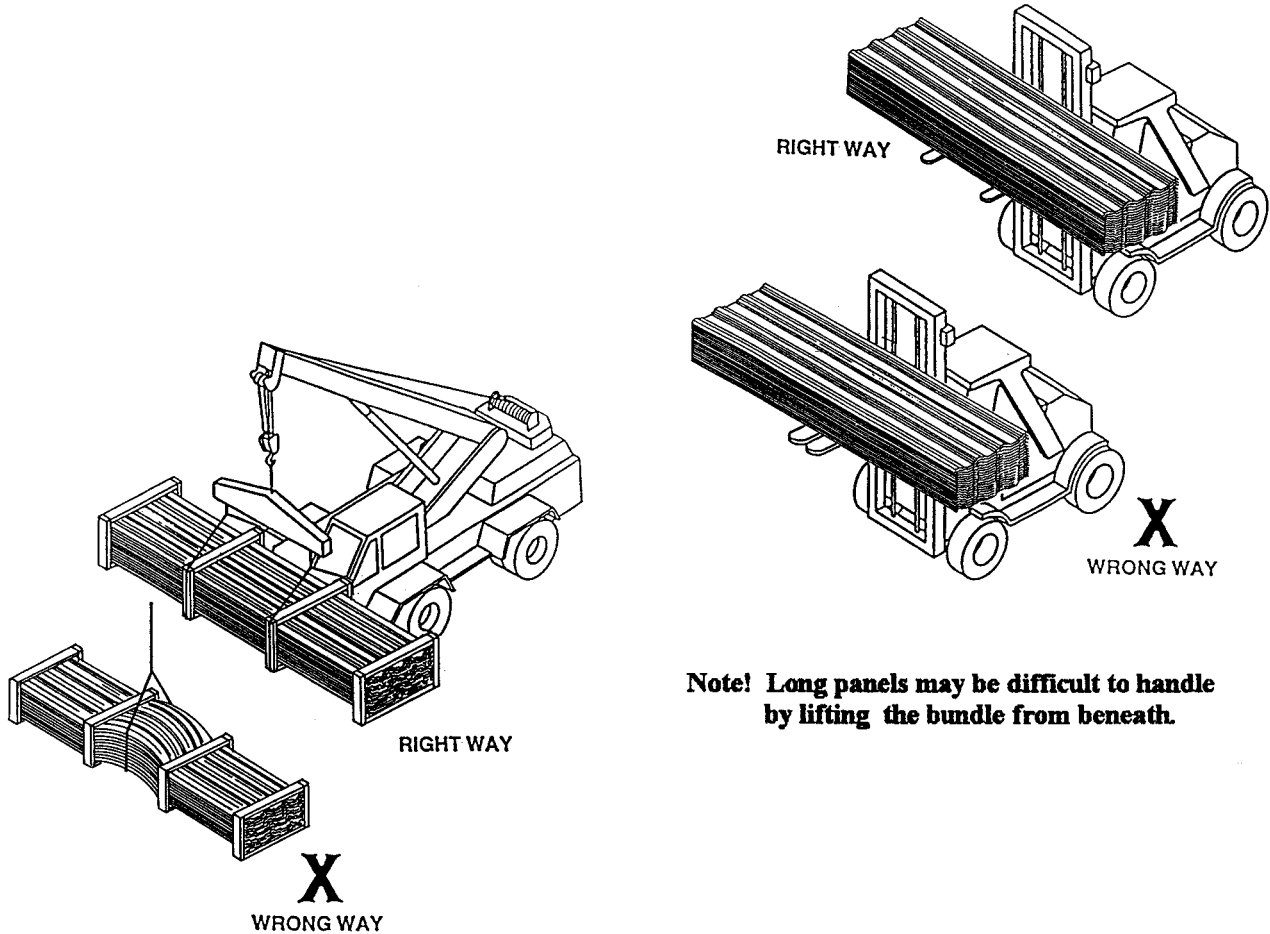
When handling or uncrating the panels, lift, rather than slide, them apart. Burred edges may scratch the coated surfaces when sheets are slid over one another. Never allow panels to be walked on while on the ground.

Rough and improper handling of a panel is inexcusable and a prime example of poor job supervision.

NOTE! Use gloves when handling metal panels to prevent hand injuries. Be aware of the dangers of handling panels on a windy day. A large panel can catch enough wind to knock a worker off his feet, even at ground level!!! **Safety first!**

UNLOADING

A Crane and/or forklift is necessary for unloading the components of a metal building. Care should always be taken to avoid damaging material.

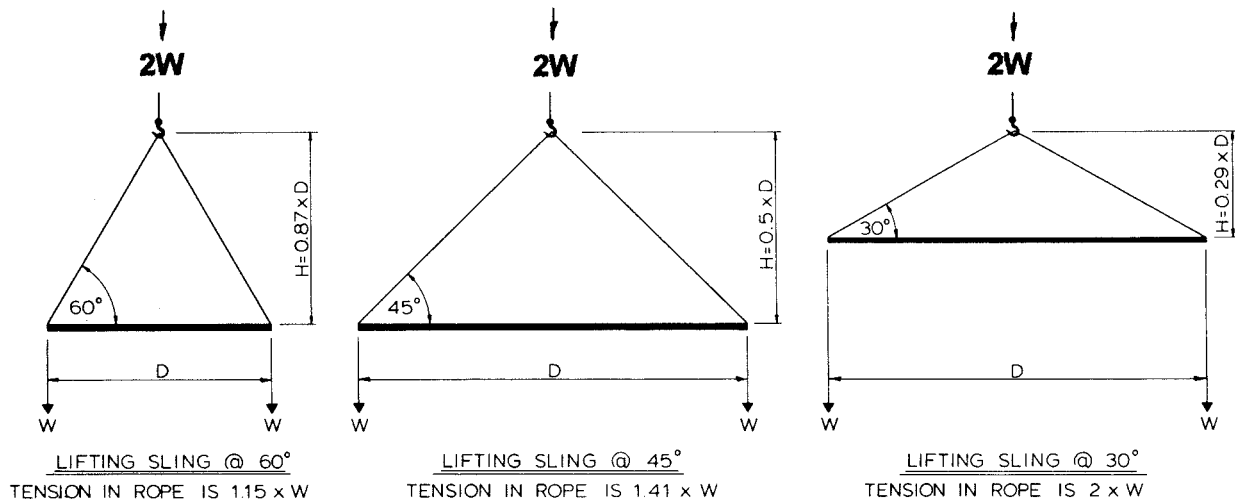


Note! Long panels may be difficult to handle by lifting the bundle from beneath.

Always spread the forks as wide as possible to prevent the panels from bending. Even with the forks as wide as possible, it still may be necessary to lift certain loads with a crane and spreader bar to avoid damaging material.

CABLE TENSION AND HOOK HEIGHT

Tension and hook height for lifting weights at various angles are shown by the diagrams below.



Notice how the cable tension increases as the lifting angle is decreased. It is of interest to note that if this angle is reduced to 15°, the cable tension is 3.9 times the vertical lift; at 10°, it is 5.7 and at 5° it is 11.5. When tension in the cable increases, the compressive or buckling load on the peak rafter section also increases. Slings with low lifting angles should therefore be avoided both to protect the cable and to prevent buckling the rafter.

SAFETY NOTE! Check wire rope for broken strands, broken wires and kinking. Replace damaged, unsafe rope immediately. Always use equipment with an adequate safety margin over the lifted load! **Safety first!!!**

STRUCTURAL FRAMING PRECAUTIONS

The layout, assembly and erection of steel should be completed by responsible personnel, experienced in rigging and handling light steel members in a safe manner. Improper handling can easily result in injury, delays and unexpected added costs. This is particularly true when raising assembled rafters for wide buildings.

KEEPING ERECTION COSTS DOWN

Minimum costs should be obtained when the following conditions are met during the erection of a building:

1. When safety practices are discussed and initiated in advance of any work procedure.
2. When the overall work of erecting the building is divided into individual jobs, and when each job is assigned (in proper sequence) to teams of workers consisting of from two to seven workers each, with three to five worker teams preferred.
3. When individual workers are properly trained and instructed in advance as to what they are to do and the safe way to do it. This eliminates time wasted while waiting to be told what to do next.
4. When building parts are properly laid out according to advanced planning so as to avoid lost time in repetitive handling or in searching for specific items.
5. When as many parts as can be safely raised in a single lift are bolted together in sub-assemblies on the ground where assembly work is faster and safer, thereby, requiring fewer lifts and fewer connections to be made in the air.
6. When erection of the steel framework starts at one end and continues bay by bay to the other end of the building.
7. When the first bay is completed, the individual frames are erected and tied together by skeleton purlins, and the fill-in purlins are installed after the costly lifting equipment has been released.
8. When tools and equipment of the proper kind, in good, safe condition, are available in sufficient quantity.

SECTION V

ERECTION OF PRIMARY AND SECONDARY STRUCTURAL

GENERAL INFORMATION

Many methods and procedures are in use for erecting the structural portion of metal buildings. The techniques of raising frames vary from erecting small clear spans and endwall frames in units to erecting the larger clear spans and modular frames in sections. The erection methods used depend strictly on the type of building, the available equipment, the experience level of the crews, and the individual job conditions.

The variation in these factors preclude the establishment of a firm or specific set of erection rules and procedures. Consequently, the erection operation must be tailored by the erector to fit individual conditions and requirements. However, there are certain erection practices, pertaining to structural members, which are in general use and have proven sound over the years. Descriptions of these follow.

Erectors are cautioned not to cut primary members (rigid frame columns, rafters, end bearing frame rafters, interior columns) . These are the primary support members for the frame and are designed as such. Any cutting of these members may affect the structural stability. A representative of The Manufacturer should be consulted prior to attempting alterations of these members.

NOTE! Do Not install any material if its quality is in question. **THE MANUFACTURER will not be responsible for costs incurred associated with the installation and/or removal of same.**

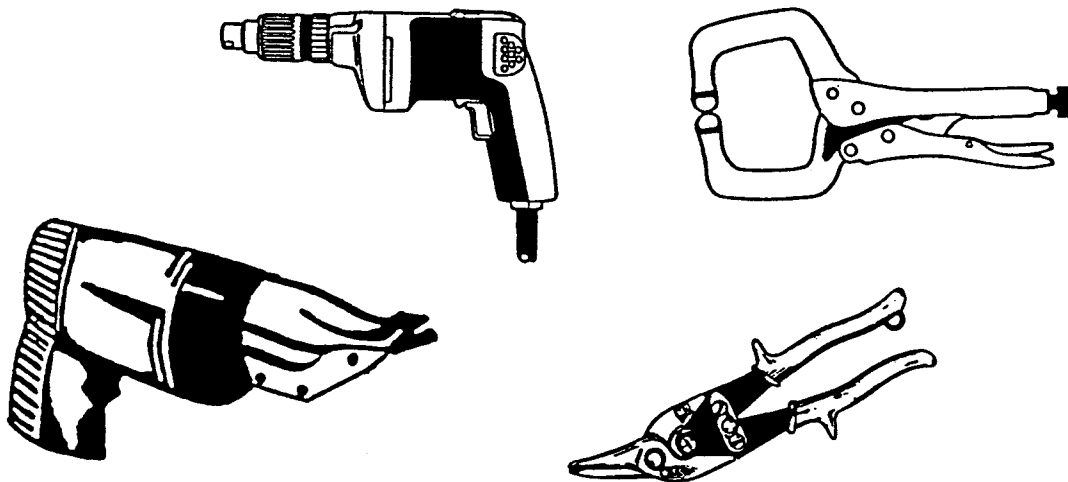
NOTE! In no case should building erection be started on green concrete. Anchor bolts may pull loose, concrete spall (chip out along edges) may occur and equipment may crush or crack slab. Normal Portland cement concrete should cure at least seven days and high-early-strength concrete at least three days before the structural columns are erected. Special circumstances may require even longer curing periods, consult the project engineer, not The Manufacturer, on foundation questions.

RECOMMENDED TOOLS

When buying tools for building erection, it is recommended that only industrial rated, top quality tools be purchased. Experience shows that lighter duty tools, although cheaper initially, will not hold up satisfactorily, and in the long run, will cost more, not only in repairs, but also in lost time. High speed drill bits are always recommended since carbon steel bits will not give satisfactory service. Most erectors find that short jobbers length bits are more economical and rugged than standard length bits.

The smaller hand tools are particularly difficult to maintain because of breakage, losses, pilferage, etc. Some erectors require the workers on the crew to furnish their own tools in this category. Others issue the tools to individuals or foremen who are held responsible and liable for them. Since work rules and customs differ according to localities, each erector should establish a definite policy which is acceptable to his workers while protecting his property.

Maintaining equipment and tools in safe clean first class condition reduces injuries, lowers replacement expense, and stimulates workers to take better care of equipment and greater pride in their work.



NOTE! Make certain that the correct tool is available and used for each phase of building erection. Improper tool usage results in employee injury. All tools should be OSHA approved for commercial construction use.
Safety first!!

**RECOMMENDED MINIMUM BASIC TOOL PACKAGE
FOR 5-7 MAN ERECTION WORK CREWS**

<u>HAND TOOLS</u>	<u>QUANTITY</u>
Belts w/ bolt bags	4 - 6
Bridge reamer, $\frac{9}{16}$ " , $\frac{11}{16}$ " , $\frac{13}{16}$ " , $\frac{15}{16}$ "	1 each
Broom, push	1 - 3
Brush, paint, misc.	2 - 6
Brush, wire	1
Bucket	2
"C" clamps (6", 9" and 12")	4 - 10
Cable, $\frac{1}{2}$ " diameter	300'
Cable clamps	12 - 32
Can, 5 gal gasoline w/safety spout	1 - 2
Can, oil	1
Caulking gun, open barrel	2 - 6
Chain , 35' long (to lock equipment)	1
Chalk line, 100' long and chalk	2
Channel locks	2
Chokers (or as required)	
$\frac{1}{2}$ " cable, 6' long, eyes both ends	4 - 6
$\frac{5}{8}$ " cable, 6' long, eyes both ends	2
$\frac{1}{2}$ " cable, 10'-14' long, eyes both ends	4
Circuit tester	1
Cold chisel	1
Come-a-long, 3 ton	1
Come-a-long, 1 ton	2
Dolly	1
Drift pin (barrel pin, bull pin)	2 - 5
Extension cord, #10-3, 2/4 way box, 250' long	1
Extension cord, #12-3, 100' long	2 - 3
Extension cord, #12-3, 25' long	1
Fire extinguisher, #10	2
Files, assorted	4
First aid kit	1
Flashlight	1
Gloves, pr.	10
Goggles, cutting	3
Goggles, safety	10
Ground fault interrupter(circuit breaker)	as req'd
Hammers	
Carpenters claw	1 - 2
Ball peen	2 - 5

Sledge (10 lb.)	1 - 2
Rubber	1 - 3
Welders chipping	1
Handlines (rope), ½"–⅝" dia., 60' long w/hooks	4 - 7
Hard hats	5 - 11
Knife, pocket	1
Knife, putty	2
Ladders	
Extension, 20' to 40' long	2
Step, 6' to 8' long	2 - 3
Level rod	1
Load binders	3
Mop, sponge	1
Padlocks	4
Pliers, side cutter	2
Plumb bob	1 - 2
Pop rivet gun (manual or electric)	2 - 3
Punch, center	1
Safety Harnesses	5 - 7
Safety Harness tie-off rigging	as req'd
Safety Netting	as req'd
Salt tablets	quantity
Saws, carpenters, hand	1
Saws, hack w/blade	1
Saw horses	4
Scaffold - section w/wheels	2
Screwdriver, sets, flat and Phillips	1 - 4
Screwdriver, 10 pc. set, ¼" hex drive	1
Shear, portable panel	1 each
Shovels	2
Slings, nylon, 4" wide, 10' - 12' long	4
Snips, aviation (2 R/H, 2 L/H, straight cut)	5
Snips, large (bulldogs)	1
Spirit level 4' long	1
Sponges	2
Spreader, 1 set ¾" dia., 20', center eye w/hook ends	1
Staple gun and staples	4
Square, framing	1 - 2
Square, Try	1 - 2
Tape measure - 12' to 16' long	1 - 5
Tape measure - 100' long	1
Tool box	5
Transit	1
Turnbuckles - ¾" min	8

Vice grips, sheet metal	2 - 4
Vice grips, standard	5
Vise grips, welding clamp	2 - 4
Water cooler (5 gal.) and 1 case cups	1
Wedge, steel	2
Wire (9#), rolls	2
Wrecking bar	1
Wrenches, 12" adjustable	5
Wrenches, 15" adjustable	2
Open end structural w/drift handle (3/4", 7/8", 1 1/8", 1 1/4", 1 7/16", 1 1/2", 1 5/8" 1 7/8", 2 1/4")	2 - 7
Box end structural (3/4", 7/8", 1 1/8", 1 1/4", 1 7/16", 1 1/2", 1 5/8" 1 7/8", 2 1/4")	2 - 7
1/2" drive ratchet w/ 3/4", 7/8", 1 1/8" and 1 1/4" six point sockets, extensions and universal	2 - 7
3/4" or 1' drive ratchet with 20" or 24" handle and sockets to a maximum size of 1 5/8"	2 - 7

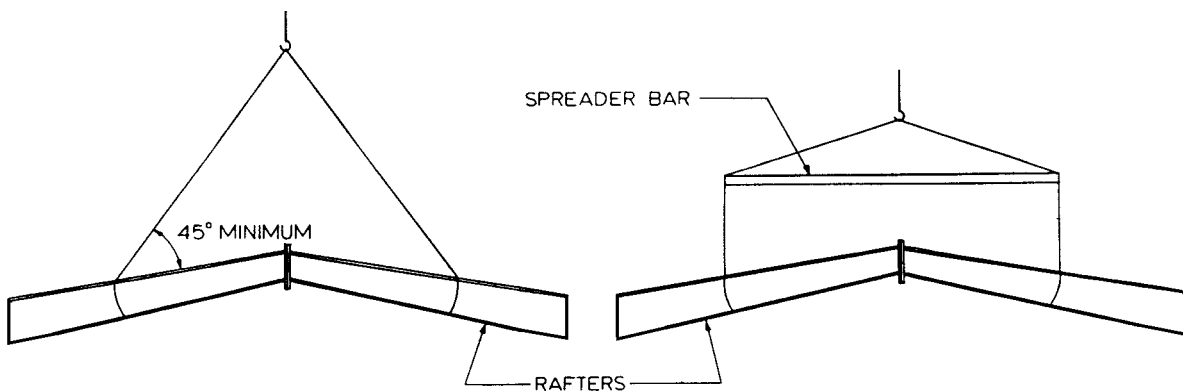
POWER TOOLS

Cutting torch w/100' hose, bottle cart, with fire extinguishers	1
Drill, 1/4" drive	2 - 3
Drill 1/2" drive	1
Drill bits (1/8")	2 - 6 doz
Generator - 2 to 5 KW, with 110V D.C. with 50' ground, 75' lead and access	1
Hammer drill with 6 bits	1
Impact tool 1/2"	1 - 2
Impact wrench and sockets	1
Power nibbler	1
Power shears	1
7 1/2" heavy duty skill saw	1
Screw guns	
1900 RPM electric screw gun-self drill screws	3 - 5
500 RPM electric screw gun self - tapping screws	3 - 5
5/16", 3/8" and 7/16" hexhead sockets	3 - 5
Welding hood with spare lens	1
Welding unit	1

Note! Additional tools may be required depending on the specific requirements of the building. The erector should plan ahead to eliminate delays!

LIFTING CABLES AND SPREADER BARS

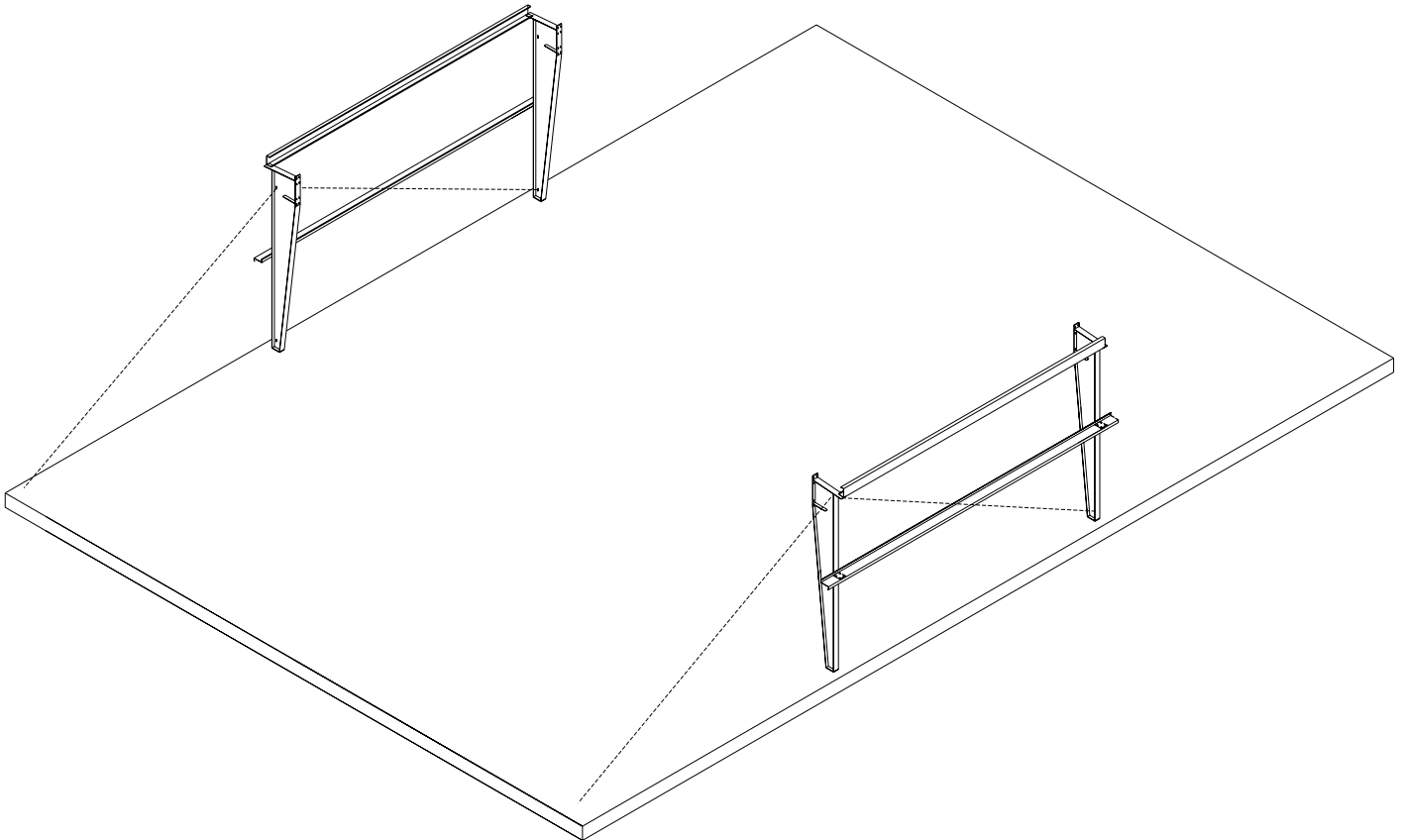
In all instances the length of the lifting cables should be such that the angle between the rafter and the lifting cables is no less than 45 degrees. To reduce the severe compression stresses at the ridge of the rafters which are created by the angle of lifting cables, a spreader bar is recommended, which allows the lifting cables to be parallel to each other. See page 21 for additional information!



NOTE! Stay well in the clear of loads being moved by any lifting device. Hands and feet should be kept clear of moving loads and never stand under a load being lifted. Remember, **SAFETY FIRST!**

RAISING RIGID FRAMES

The intermediate or interior frames nearest the bearing endwall are usually erected first. This bay usually contains the optional diagonal bracing. The proper completion and plumbing of this first bay, as will be discussed later, is extremely important to the successful completion of the building.



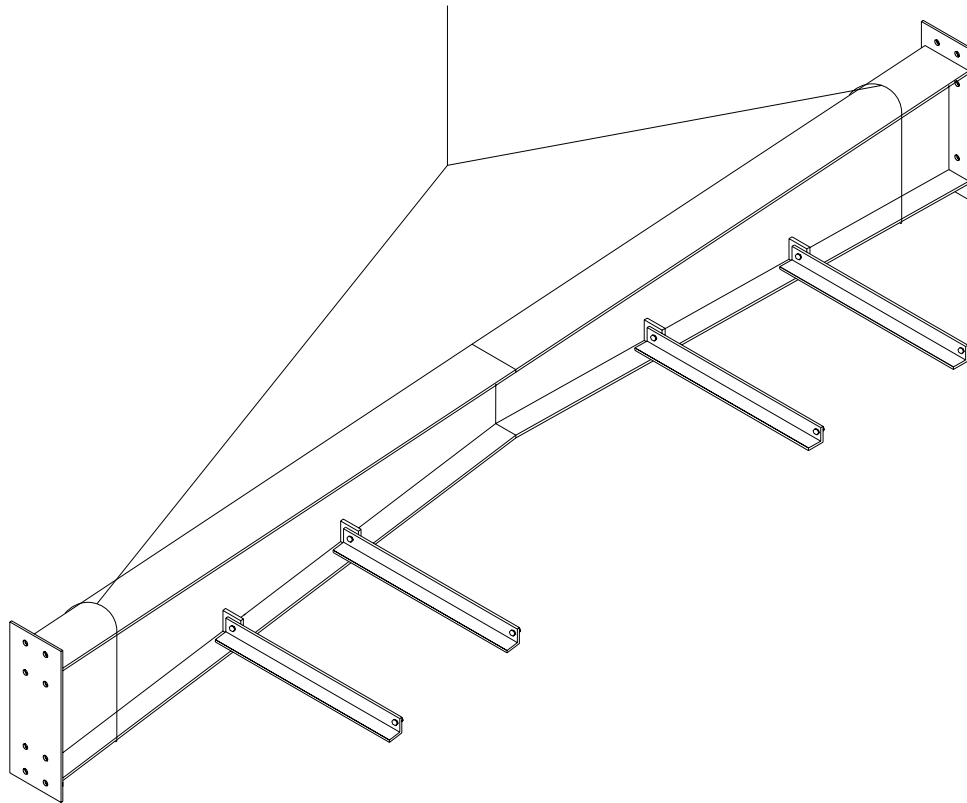
Although several methods are used to erect rigid frames, it has been found most satisfactory to erect the columns first, tie them together with the girts and tighten the anchor bolts*. On small spans and short eave heights, columns can often be set in place by hand without the use of hoisting equipment. Temporary bracing should always be installed as soon as sections are lifted in place.

* The anchor bolt tension may need to be adjusted to seat the rafter.

NOTE! Each worker should be trained to use the safest and most productive erection techniques. **Safety first!**

RAISING RIGID FRAMES (CONTINUED)

After the columns have been erected, the ground assembled rafter is hoisted into place and connected to the columns. The size of the rafter which can be safely handled depends on the equipment available and the experience of the erection foreman. Generally as many connections as possible are made on the ground.

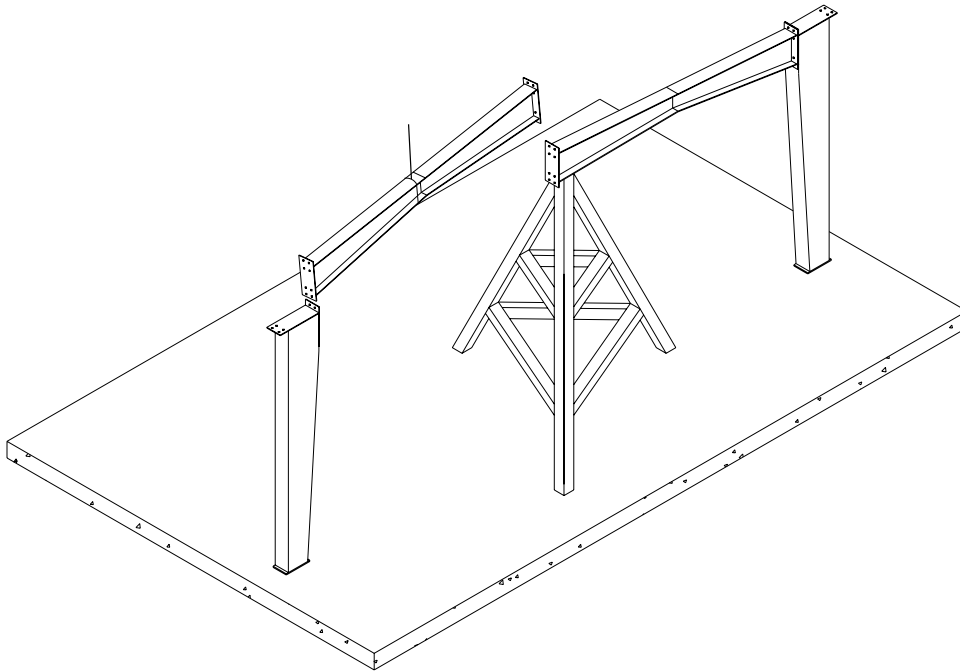


The flange brace should be bolted to the rafter prior to raising in order to save time. The hoisting equipment should never be released from the rafter until the frame is adequately braced, so it cannot buckle or tip in the longitudinal direction of the building.

NOTE! Stay well in the clear of loads being moved by any type of lifting equipment. **Safety first!**

RAISING RIGID FRAMES (CONTINUED)

A second method, when equipment is limited, (while not recommended) is illustrated below. After the column is erected, the first rafter section, with the lifting cable around the balance point, is raised into position and bolted to the column. Then, when the free end of the rafter is supported by any safe method (such as an adequate wood frame, or a metal scaffold, properly braced, and of satisfactory capacity) the lifting cable can be released. The procedure is then repeated until the entire frame is in place and bolted together at the ridge.



Still a third method for erecting rigid frames with limited equipment adopts the same support procedure described previously, but differs in that the sidewall column and the first rafter section are bolted together on the ground and raised into position in one lift. The lifting cable is again attached at the balance point (about the quarter point of the rafter in this case). When the column is secured by the anchor bolts and the free end supported, the process is repeated with the frame bolted together at the ridge.

NOTE! Stay well in the clear of loads being moved by any type of lifting equipment or supported by temporary bracing. **Safety first!**

RAISING RIGID FRAMES (CONTINUED)

When the rafters consist of several roof beams, as in the case of wide buildings, a safe procedure of raising by sections and supporting the free end must be followed, regardless of the type of equipment available. In most instances the work proceeds from outside columns inward toward the peak until the entire frame is bolted into place.

The same general procedures of erection apply to either clear span or multiple span frames. In the case of the latter, the support for rafter sections during erection is generally supplied by the interior columns, themselves, making temporary supports unnecessary.

Two words of caution concerning the erection of rigid frames is in order. The first is that rigid frames, especially free ends or cantilevered sections should never be left "for the day" in an unsupported, unbraced or unguyed condition. Such practice has resulted in the total loss of considerable amounts of erected steel because of wind. The second word of caution pertains to the additional care required in the erection of multiple span frames compared to clear span frames. Frames with interior columns, because of closer supports, have much lighter sections. They are much more apt to buckle during erection than clear span frames, and consequently require greater care in rigging and handling.

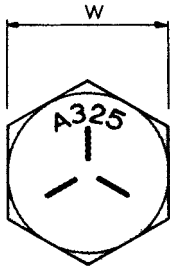
CONNECTION BOLTS

Bolts used to make connections in secondary framing members such as the purlins are usually ½" diameter, ASTM designation A307. All primary framing connections are made with ASTM A325 bolts, usually ⅝", ¾", ⅞" and 1" diameters. The size and grade of the bolt are marked on the building erection drawings.

NOTE! Each worker should be trained to use the safest and most productive erection techniques. **Safety first!**

BOLT TIGHTENING PROCEDURES

A325 BOLTS



BOLT SIZE INCHES	W INCHES	SPECIFIED MINIMUM FASTENER TENSION KIPS (1000 LBS.)	SPECIFIED NUT ROTATION	
			BOLT LENGTH <=4 DIAMETERS	BOLT LENGTH >4 DIAMETERS
½	⅞	12	⅓ TURN	½ TURN
⅝	1⅛	19		
¾	1¼	28		
⅞	1⅝	39		
1	1⅞	51		
1¼	2	71		

JOINTS NOT SUBJECT TO TENSION LOADS

JOINTS NOT SUBJECT TO TENSION LOADS need only be tightened to the snug tight condition, defined as the tightness attained by a few impacts of an impact wrench or the full effort of a man using an ordinary spud wrench.

JOINTS SUBJECT TO TENSION LOADS

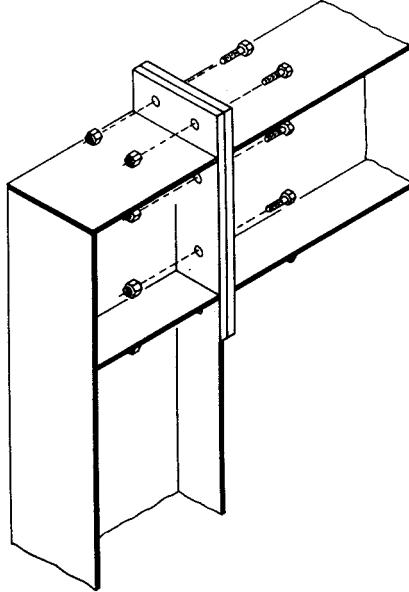
Two tightening procedures are specified for A325 bolts in joints subject to tension loads, Turn-of-the-nut method and Direct tension indicator.

Turn-of-the-nut method - When turn-of-the-nut method is used to provide tension, first bring enough bolts to a “snug tight” condition to insure that the parts of the joints are brought into good contact with each other. Next, place bolts in all remaining bolt holes and bring to “snug tight”. Then additionally tighten all bolts per the above table - progressing from the bolts nearest the web, to the free edges. During this operation there shall be no rotation of the part not turned by the wrench.

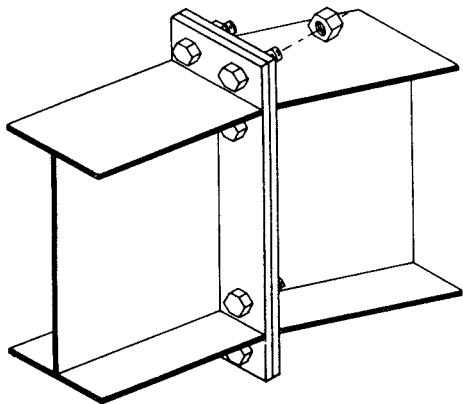
Tightening by use of a direct tension indicator - Tightening by this means is permitted provided it can be demonstrated, by an accurate direct measurement procedure, that the bolts have been tightened to specified tension.

Consult latest edition of the AISC Manual of Steel Construction for more complete instructions for installing high strength bolts.

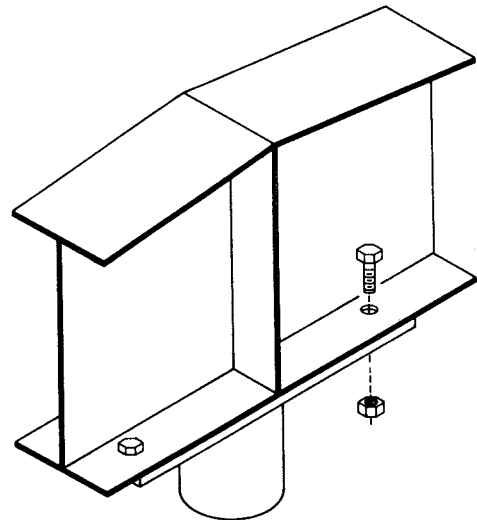
TYPICAL PRIMARY FRAMING CONNECTION DETAILS



**COLUMN TO RAFTER
AT KNEE**

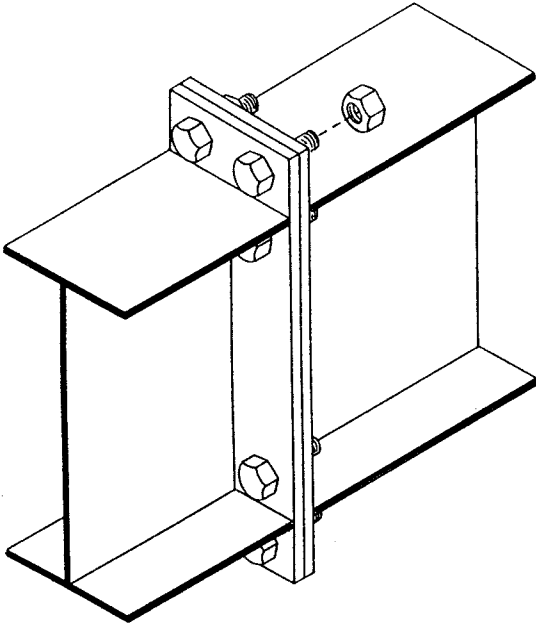


**RAFTER AT RIDGE
WITHOUT COLUMN**

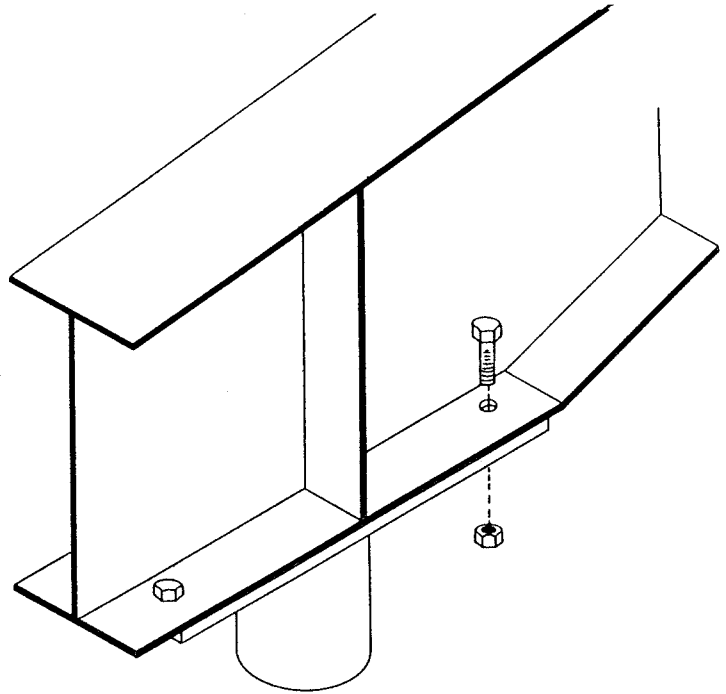


**RAFTER AT RIDGE
WITH COLUMN**

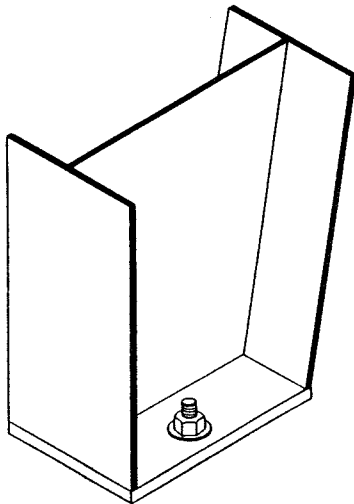
TYPICAL PRIMARY FRAMING CONNECTION DETAILS



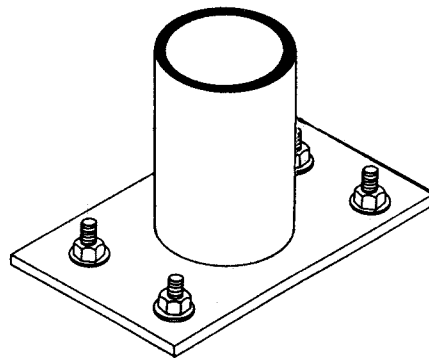
**RAFTER AT INTERMEDIATE
FIELD SPLICE**



**INTERIOR COLUMN
TO RAFTER**

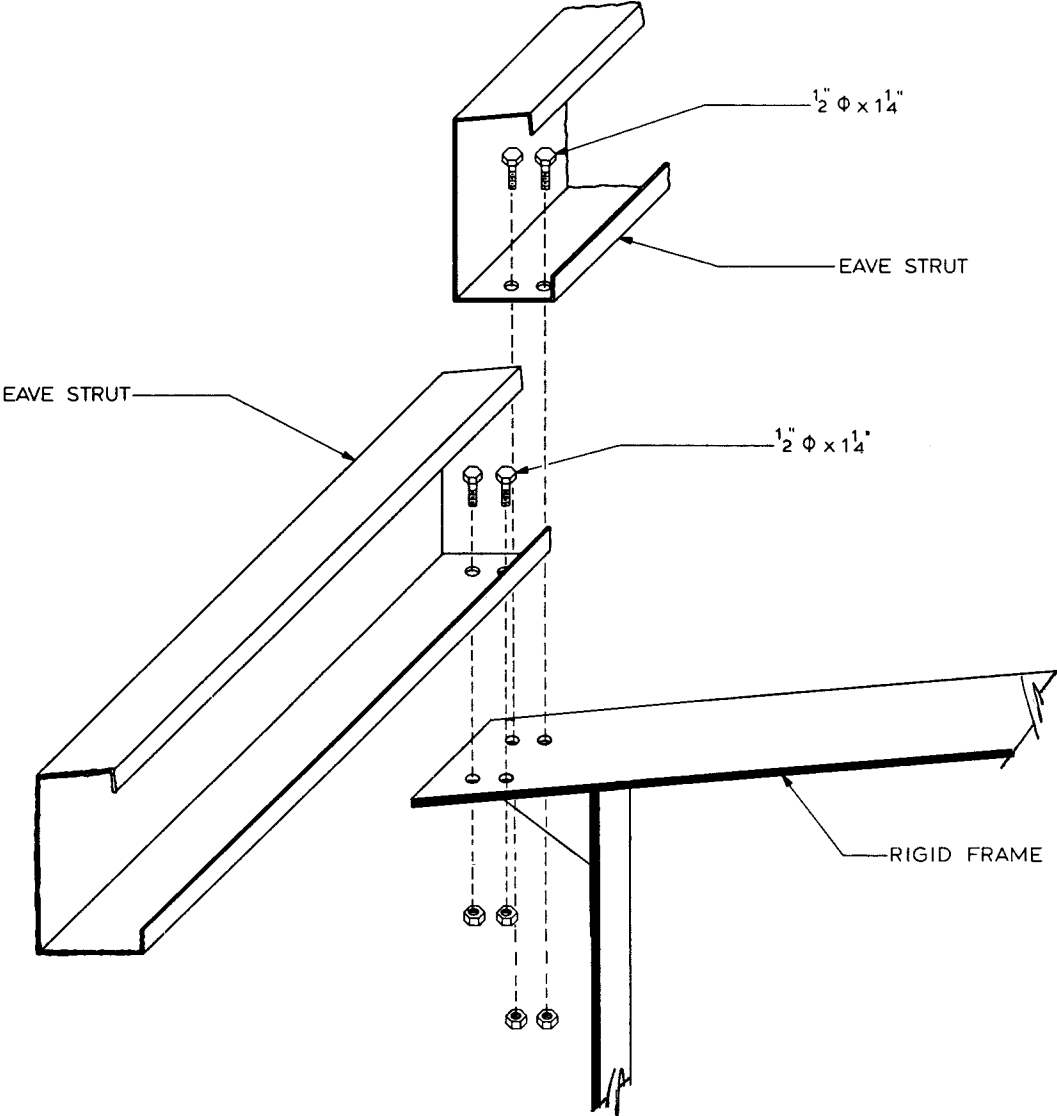


**EXTERIOR COLUMN
TO FOUNDATION**



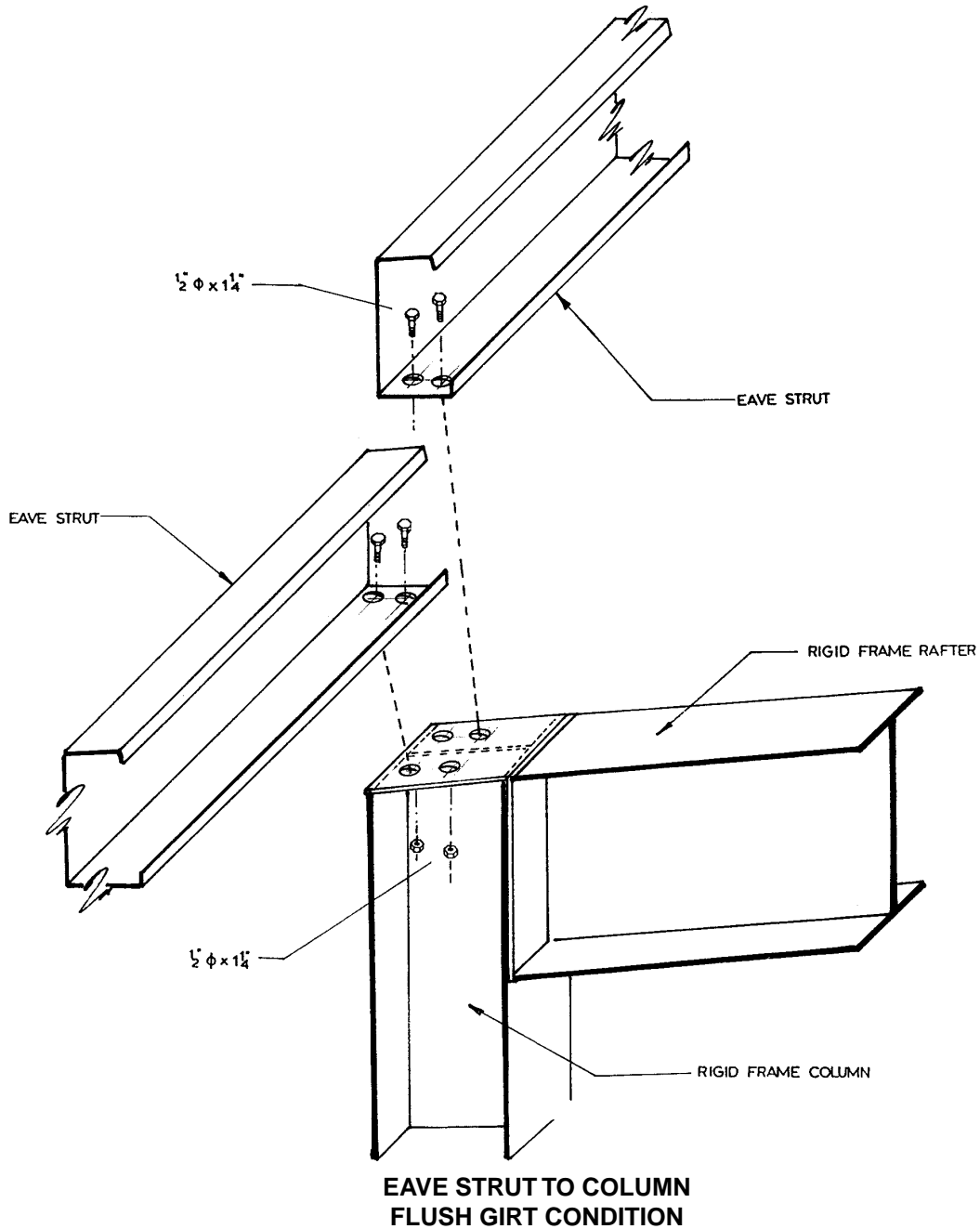
**INTERIOR COLUMN
TO FOUNDATION**

TYPICAL SECONDARY FRAMING CONNECTIONS



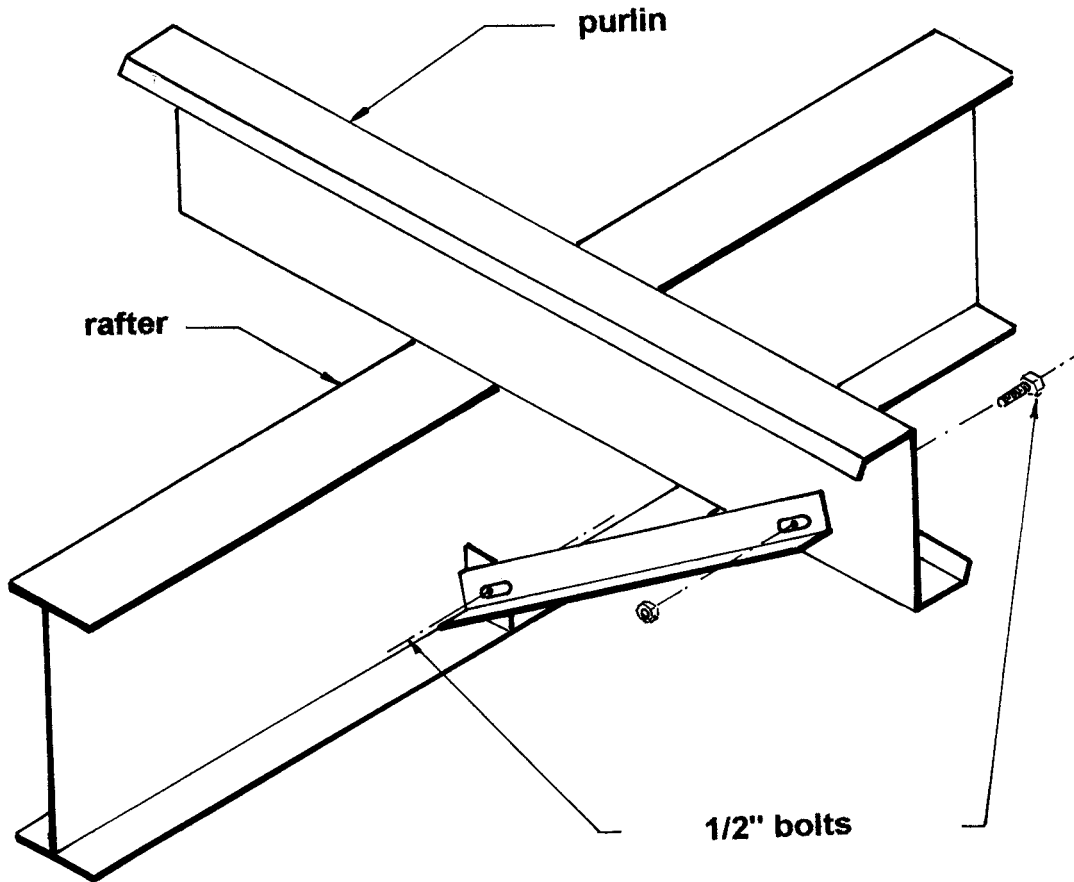
EAVE STRUT TO COLUMN

TYPICAL SECONDARY FRAMING CONNECTIONS



NOTE! The above example represents a typical flush girt - eave strut connection. Consult your personalized erection drawings for specific requirements. **Safety first!**

TYPICAL SECONDARY FRAMING CONNECTIONS

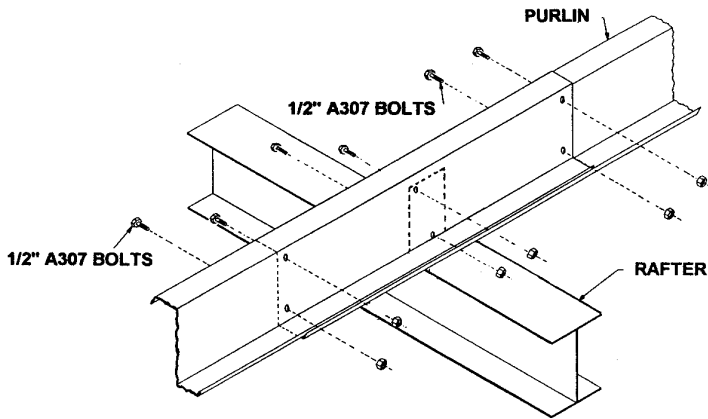


FLANGE BRACE TO PURLIN

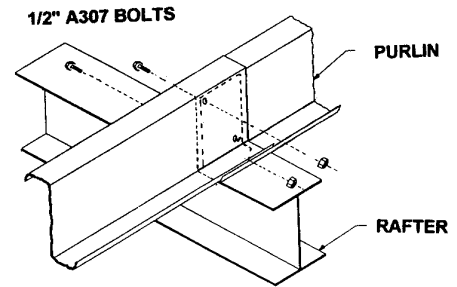
NOTE! Bolts shown here required to be tightened to snug tight condition on round holes only.

**TYPICAL SECONDARY FRAMING CONNECTIONS
INTERIOR BAY PURLIN/GIRT FRAMING**

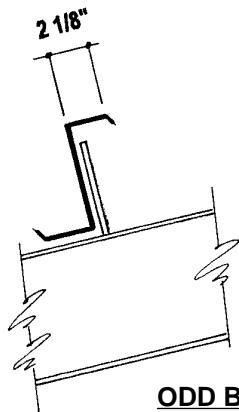
THE MANUFACTURER utilizes uneven legs on "Z" shapes to improve erection time and to increase the overall strength of the member. Since the "Z"s are designed to nest, the erector must be aware that the 2 5/8" flange should be up on odd number bays and down on even number bays, to allow the members to seat properly



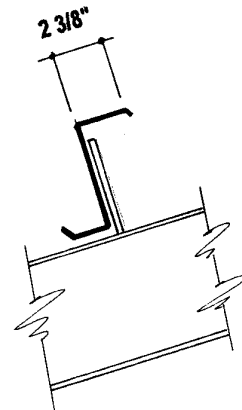
2' - 3 1/2" LAP



0 - 7 1/2" LAP (IF AVAILABLE)



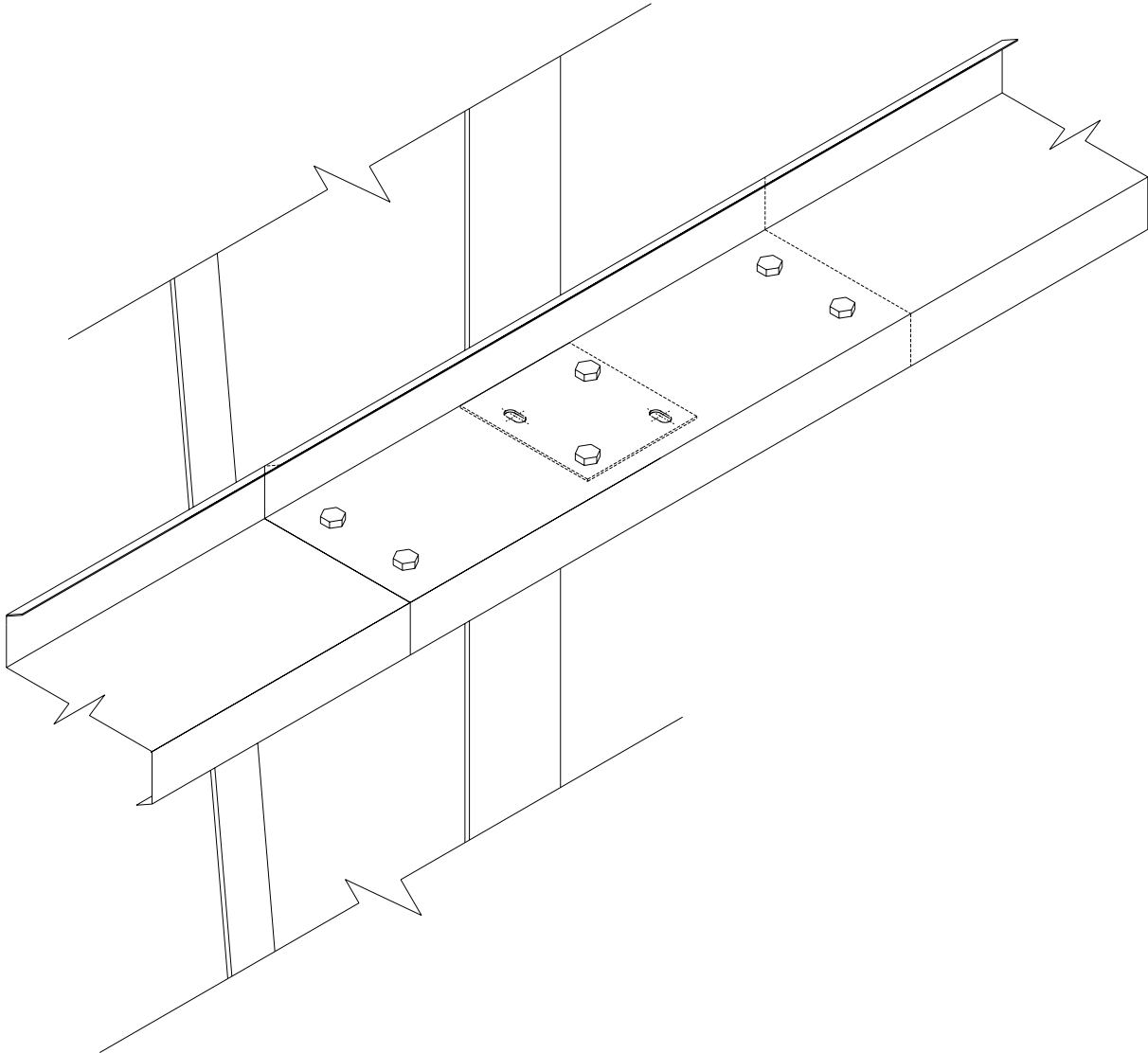
ODD BAY



EVEN BAY

NOTE! Bolts shown here required to be tightened to snug tight condition only!

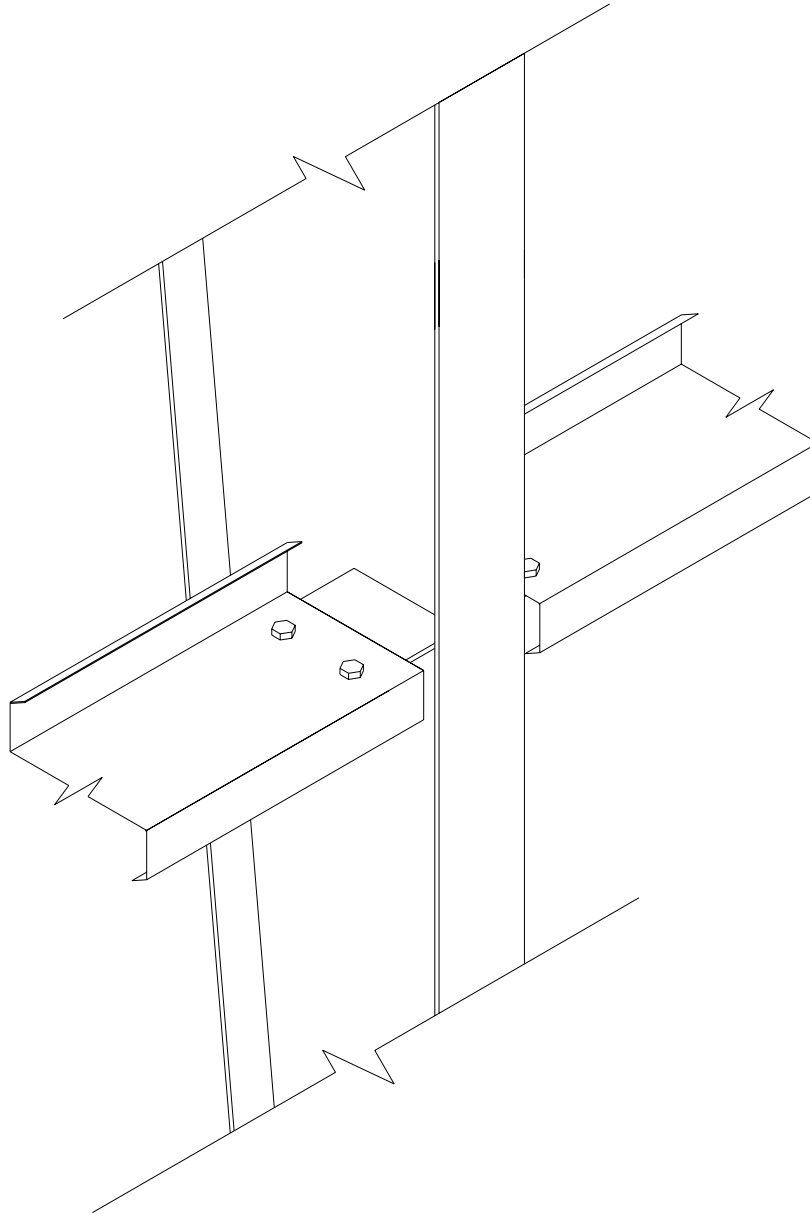
TYPICAL SECONDARY FRAMING CONNECTIONS



INTERIOR BAY PURLIN / GIRT FRAMING

NOTE! Typical connection for girt/purlin to frame at 2'-3½", 3'-3½", 4'-3½", 5'-3½" and 6'-3½" lap. Use (6) ½" dia. A307 bolts without washers as shown. **Safety first!**

TYPICAL SECONDARY FRAMING CONNECTIONS



GIRT TO FRAME

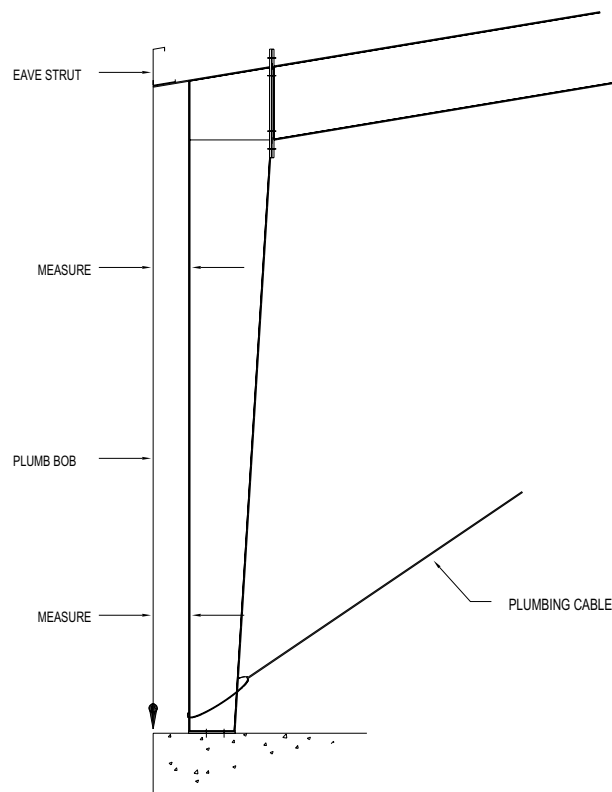
NOTE! The flush girt connection requires two (2) or four (4) ½" dia. bolts.
Safety first!

COMPLETING AND PLUMBING THE FIRST BAY

After the first intermediate or interior frames have been set, THE MANUFACTURER recommends that all purlins, girts, and eave struts be installed in the braced bay and the entire bay plumbed, aligned and braced before proceeding further. If the building is designed without cable bracing, the erector is responsible for providing temporary erection bracing.

When this bay is properly and accurately plumbed and braced, the remaining members, to a large degree, will automatically plumb and align when installed. Only a final check of the building plumb remains, and few adjustments, if any, will be necessary.

Plumb the frame with a plumb bob or transit, not a spirit level. To measure lateral plumbness hang plumb bob from top of the column down the outside flange as shown below. Adjust plumbing cables to obtain equal tape measurements at top of column.

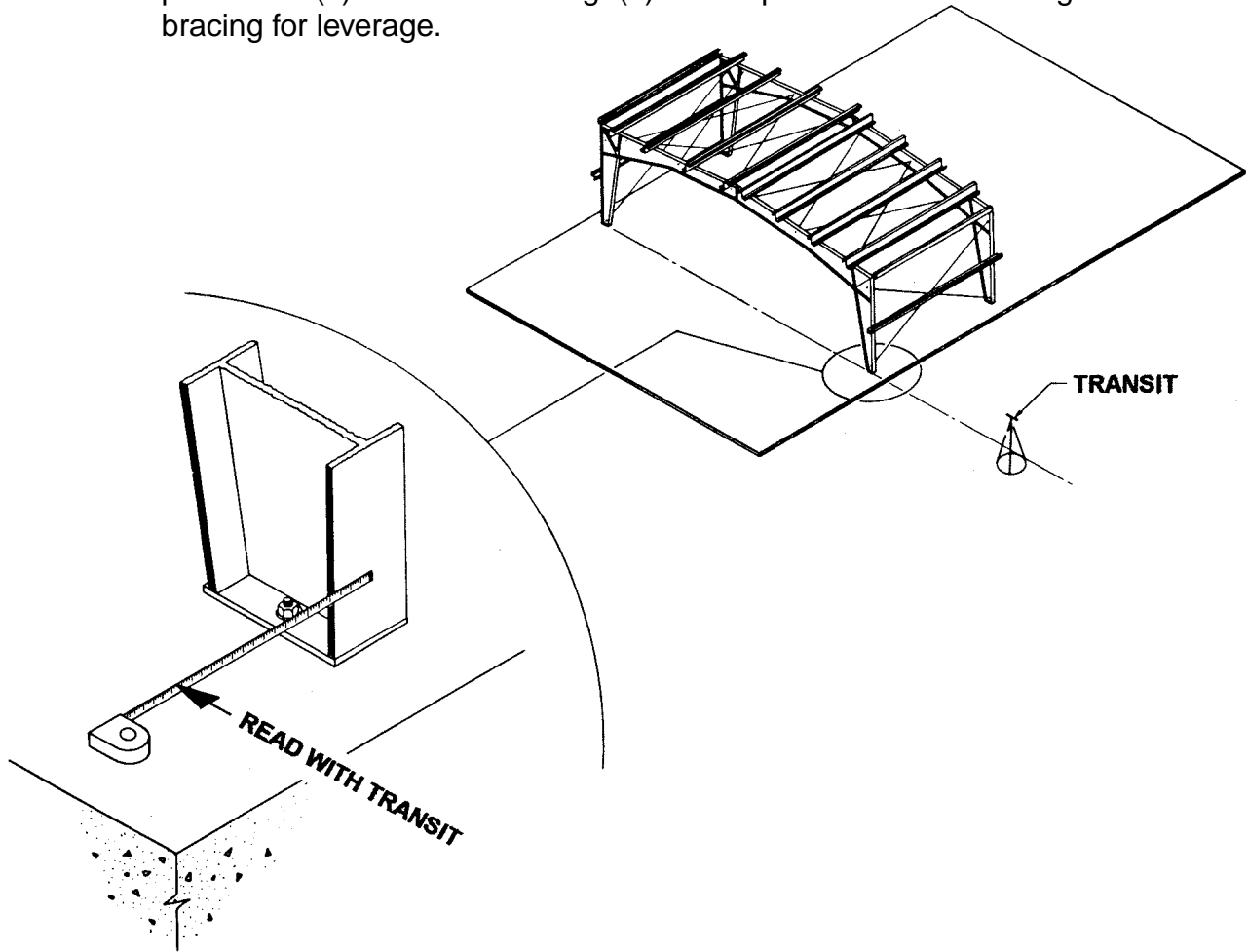


NOTE! Use OSHA approved tie offs, netting or rails when working on roof areas, and adhere to all OSHA safety rules. **Safety first!**

PLUMBING THE BUILDING (CONTINUED)

To plumb the braced bay lengthwise using a transit, sight in the transit parallel to the base of the frame columns by using a position a few inches from the frame line (See sketch). Make sure transit is level. Check frame by reading tape through transit. First bring columns into plumb, then rafters, by adjusting diagonal bracing. Take all measurements from centerline of flange. Take a measurement at the base of the columns and adjust the bracing to correct the transit reading at the rafter measuring location. Once the frame is plumb, all connection bolts and anchor bolts should be tightened.

To plumb the braced bay without a transit, run a chalk line from out of flange to out of flange of columns on the foundation (per drawing). Drop plumb bob(s) from rafter flange(s) and square the frame using the rod bracing for leverage.

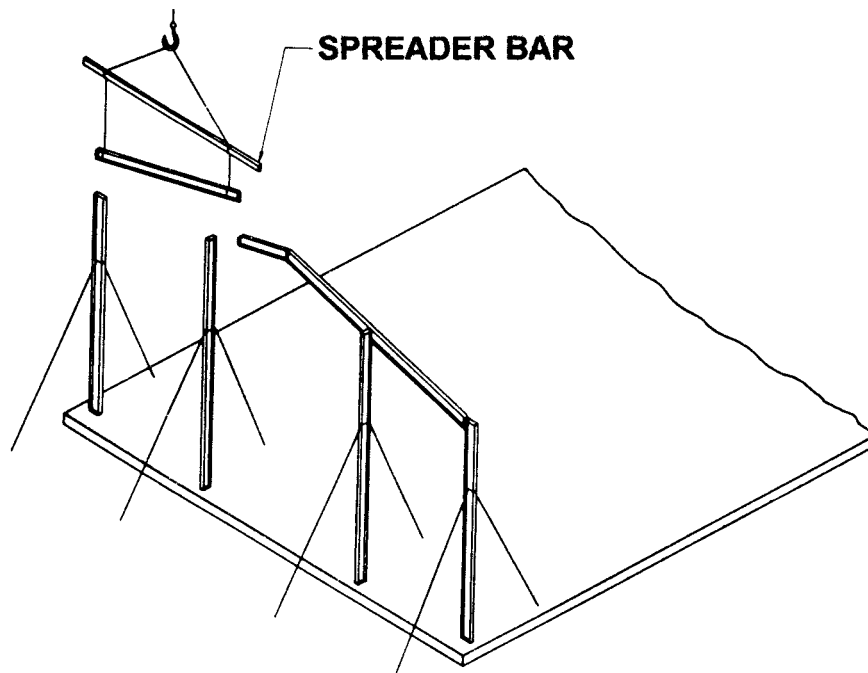


NOTE! Each worker should be trained to use the safest and most productive erection techniques. **Safety first!**

ERECTING THE COLUMN AND BEAM ENDWALLS

Column and beam endwalls of 50 feet or less in span may be raised into position and set on the anchor bolts as a unit. All rafters, columns, girts(except outside endwall girts which connect to the sidewall girts) , door headers, door jambs, clips, diagonal brace rods, etc. should be assembled on the ground with the bolts left finger tight. A spreader bar should be used to raise the endwall frame. Because of the flexibility of the column and beam frames, care must be taken in locating the points of attachment of the cables, and in raising the frame, to avoid bending about the minor axis.

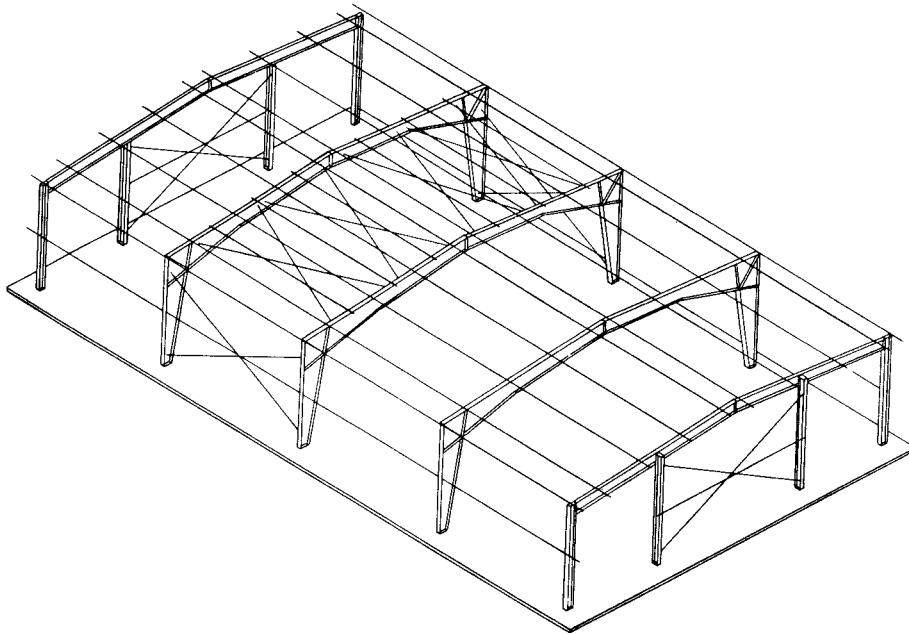
For spans of 60 feet and greater, the columns are usually erected first and then capped with the endwall rafter. The girts, headers, jambs and diagonal brace rods are then added between the end columns. During this erection process, the frame must be properly braced or guyed before the lifting lines are disengaged. Final bolt tightening should be done once the frame is plumb and square.



NOTE! Stay clear of all moving loads Make certain all framing is properly braced or guyed before lifting lines are removed. Follow all OSHA regulations! **Safety first!**

ERECTING THE REMAINING FRAMES

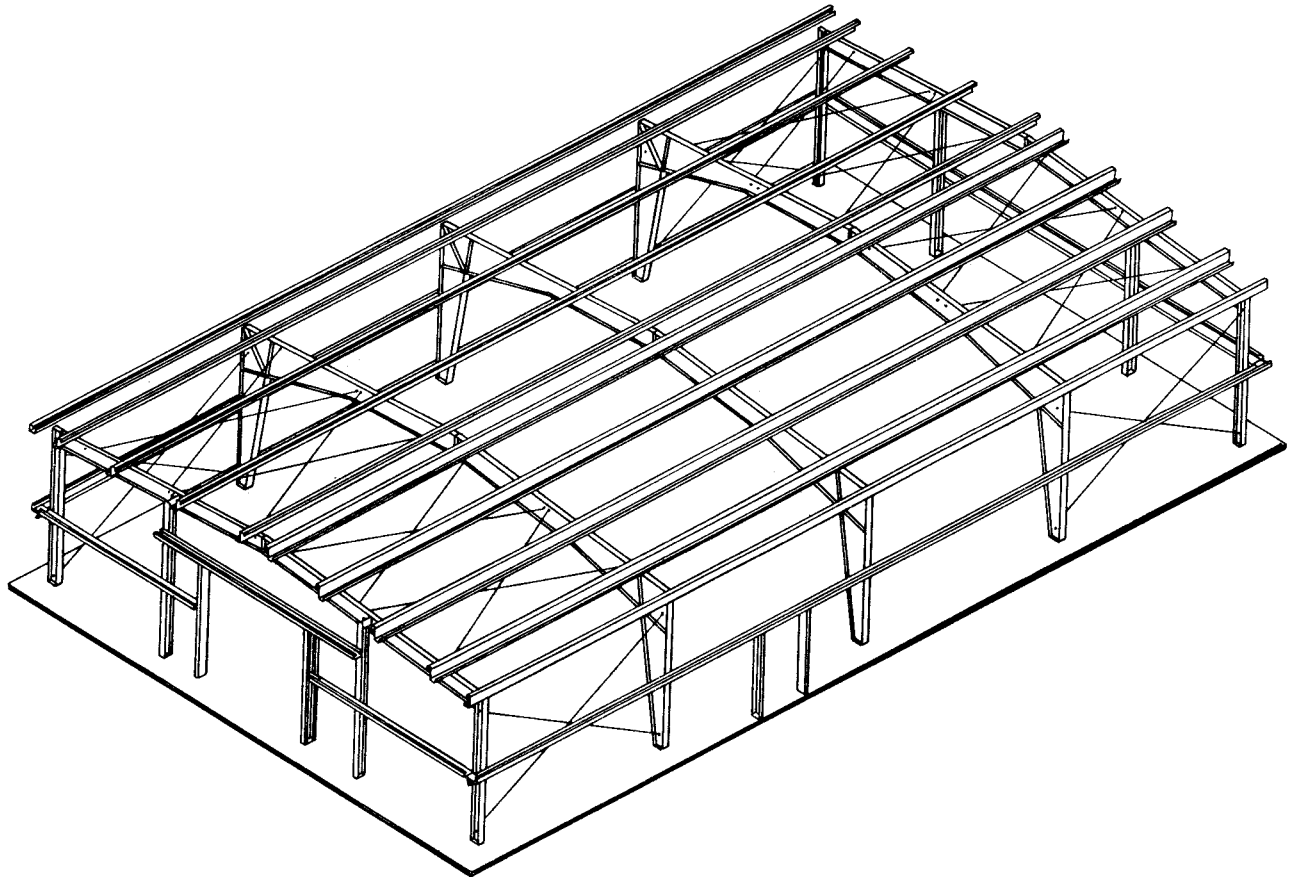
The remaining frames are erected in like manner, initially with only a few purlins being installed in each bay, as shown below, working from one end of the building to the other. To lend overall rigidity to the structure, install flange braces to the purlins at specified locations. All purlin, girt and eave strut connection bolts are left loose so that the entire skeleton frame work can be plumbed without undue difficulty. The remaining purlins can be positioned on the rafter in each bay to facilitate the completion of the roof framing.



NOTE! Always follow all OSHA safety recommendations. **Safety first!**

ERECTING THE REMAINING FRAMES (CONTINUED)

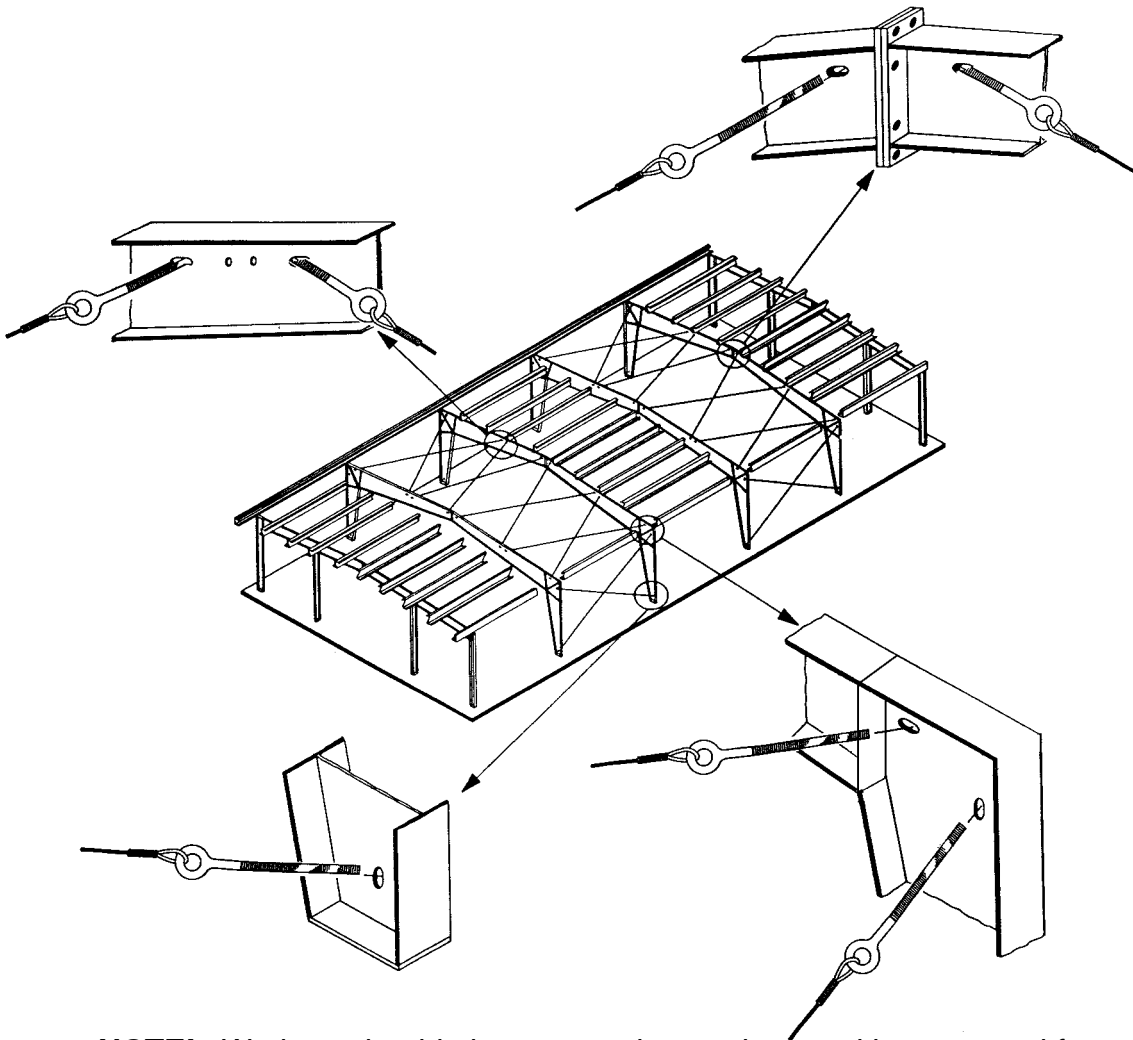
At this point, hoisting equipment will normally not be used again until roof sheeting begins. Remaining purlins and girts are then loose bolted in place, as well as flange braces.



NOTE! Always use OSHA approved tie off, netting or rails when working on roof areas. **Safety first!**

INSTALLATION OF THE WIND BRACING

Diagonal bracing in metal buildings is critical! They provide support for wind loads or other longitudinal loads, such as those created by an overhead crane in the completed structure. Many times additional temporary bracing is needed to stabilize the structure during erection. This requirement should be reviewed by the erector, and any additional bracing should be provided by the erector. On some smaller buildings, diagonal bracing is not needed for the building design, so any erection bracing needed must be furnished by the erector.

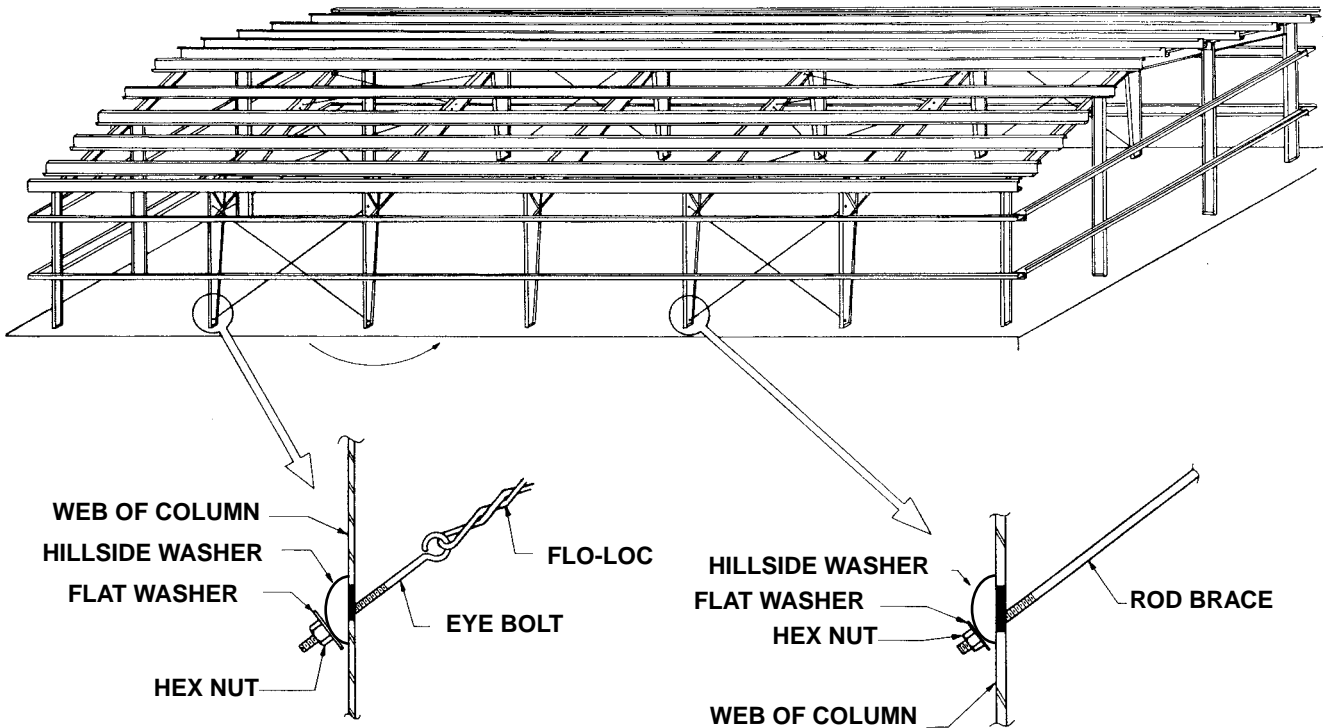


NOTE! Workers should always use gloves when working on metal frames and sheeting. Always follow all OSHA safety recommendations. **Safety first!**

INSTALLATION OF WIND BRACING (CONTINUED)

The diagonal bracing is usually cable or round rod. It should always be installed as shown on the erection drawing and should be tensioned so that the building will not sway or rock when the wind blows. Care should be taken, however, not to over tighten and bend the structural members. The workman should watch the structural members carefully as he tightens the bracing.

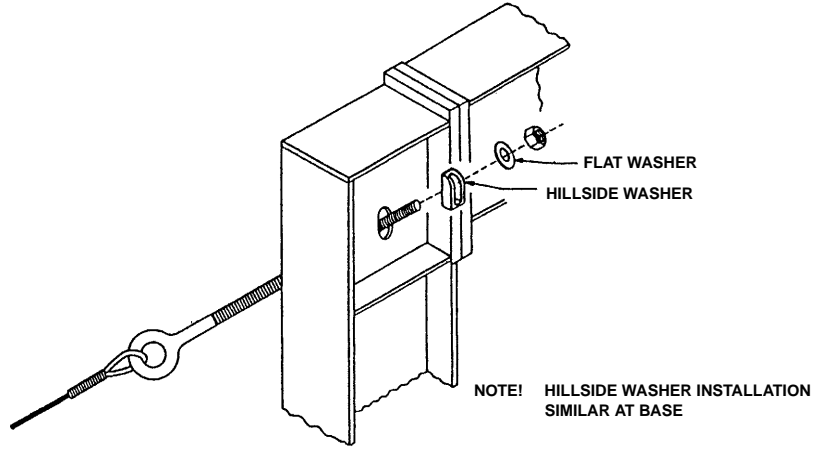
Occasionally the bracing in the wall of a building cannot be installed in the specified bay because of doors or other complications. Usually these can be moved to other bays without affecting the structural integrity of the building. However, before moving any wind bracing check with The Manufacturer. Never modify a building without first notifying The Manufacturer in writing.



NOTE! Follow all OSHA approved safety recommendations, Safety first.

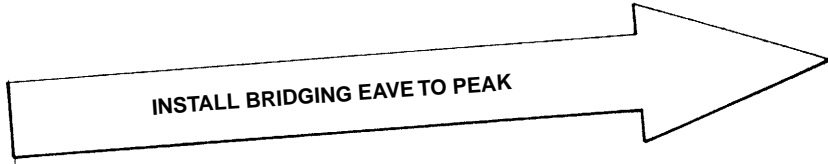
INSTALLATION OF WIND BRACING (CONTINUED)

HILLSIDE WASHER INSTALLATION

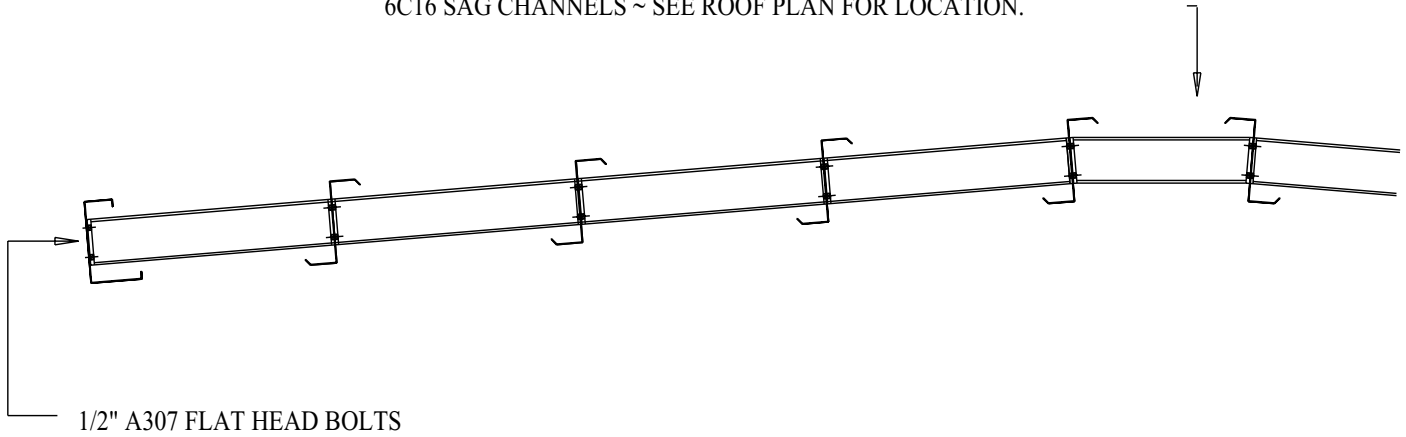


NOTE! Care should be taken not to over-tighten the wind bracing. Over-tightening the bracing can cause permanent damage to the framing.

PURLIN BRIDGING INSTALLATION



6C16 SAG CHANNELS ~ SEE ROOF PLAN FOR LOCATION.



SAG CHANNEL DETAIL

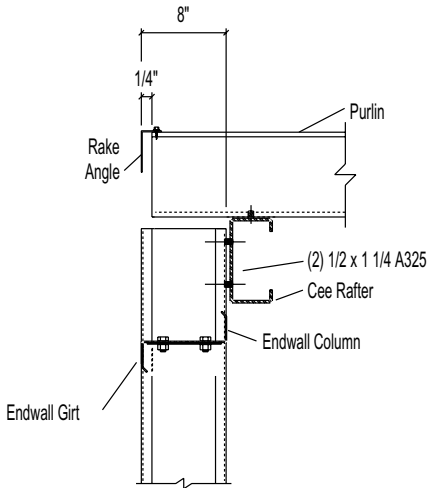
STANDARD 1/2" A307 BOLTS TYPICAL EXCEPT AT EAVE STRUTS.

SECTION VI

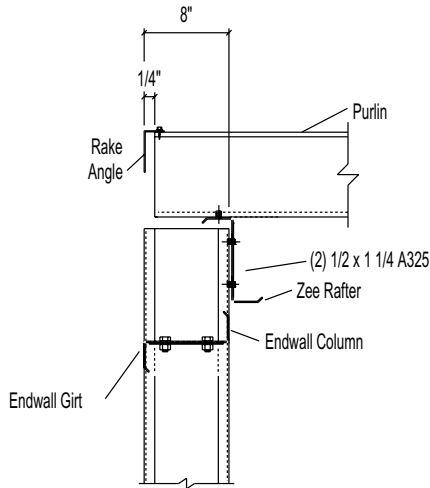
PRIMARY AND SECONDARY STRUCTURAL DETAILS

BEARING FRAME ENDWALL FRAMING

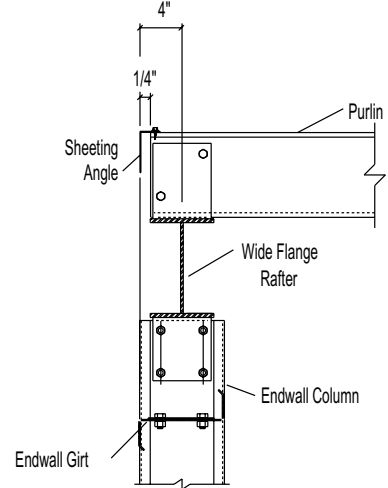
ENDWALL COLUMN TO RAFTER DETAILS



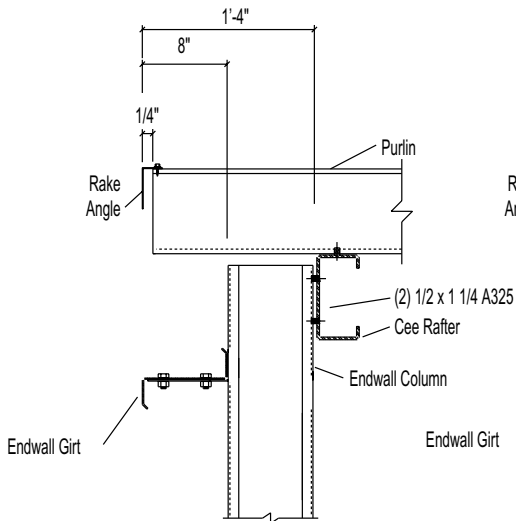
"CEE" RAFTER



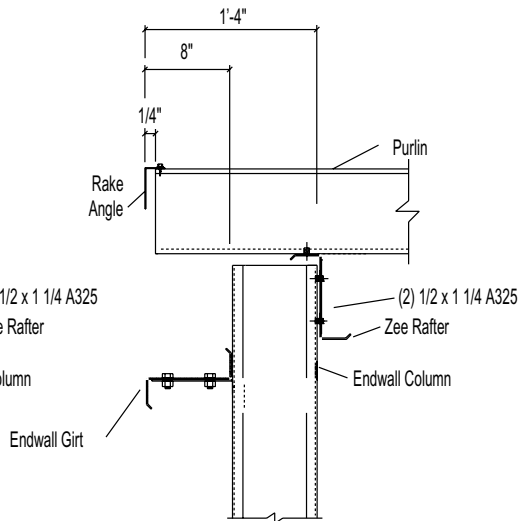
"ZEE" RAFTER
FLUSH GIRT ENDWALL



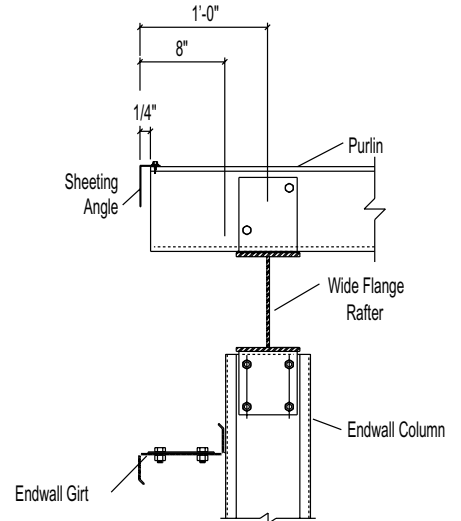
WF RAFTER



"CEE" RAFTER

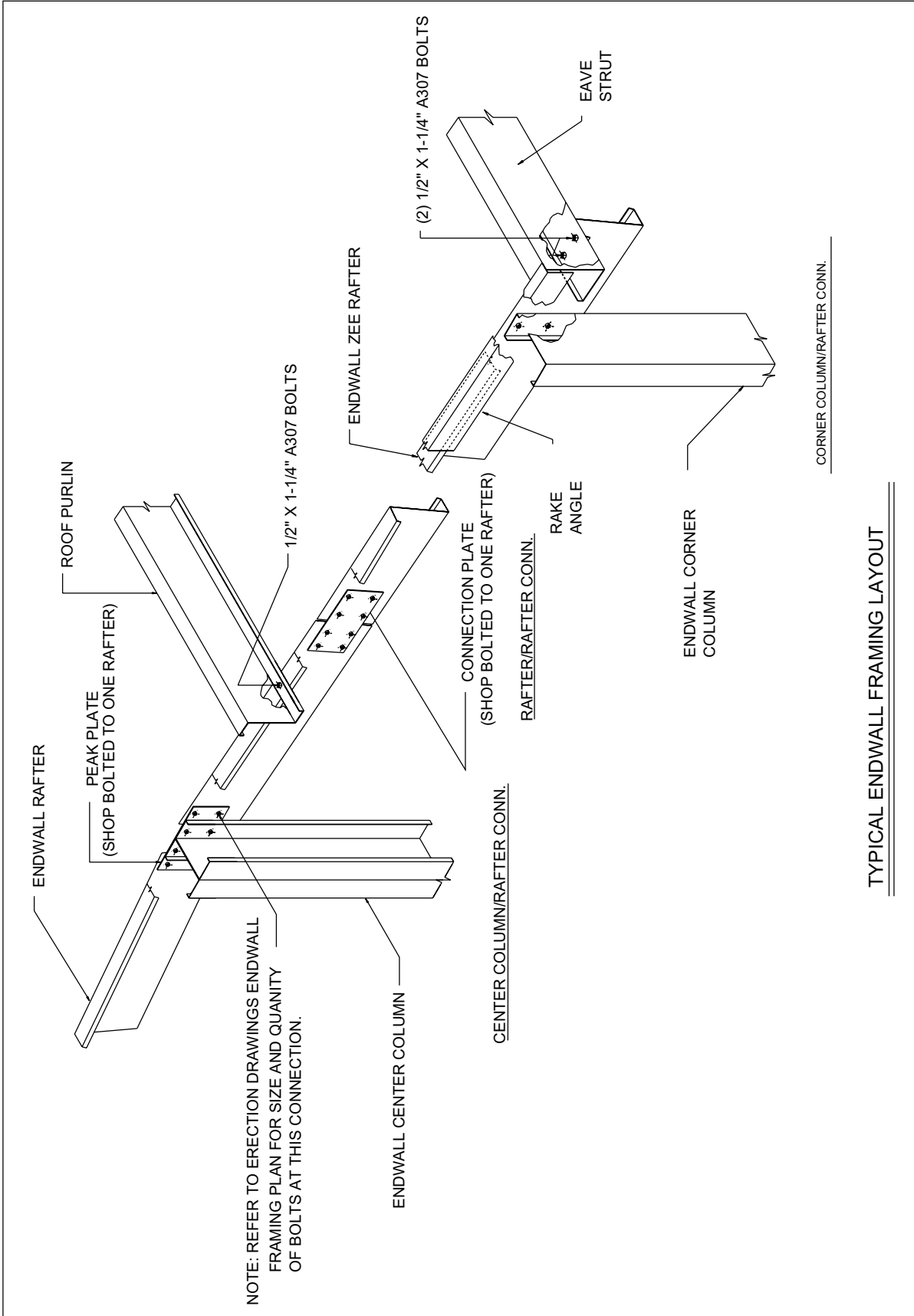


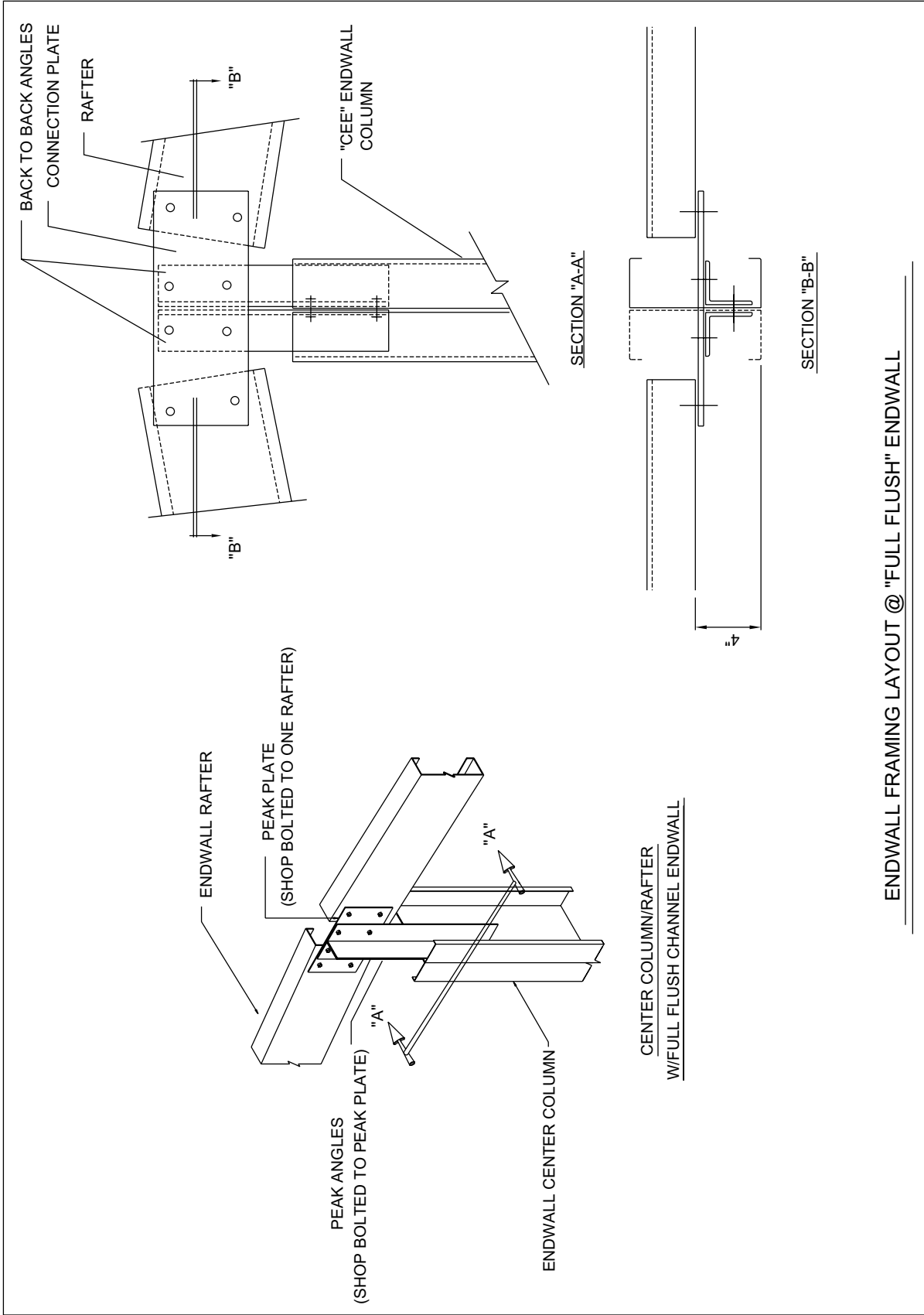
"ZEE" RAFTER



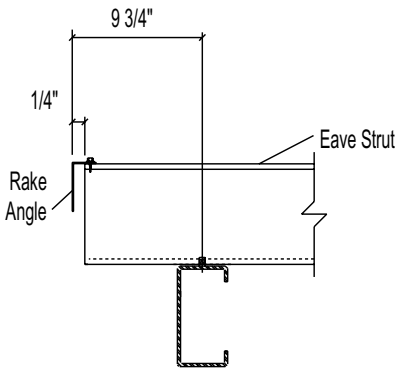
WF RAFTER

BY-PASS GIRT ENDWALL

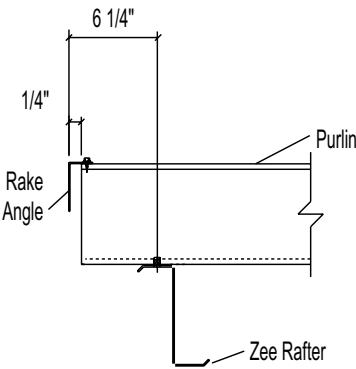




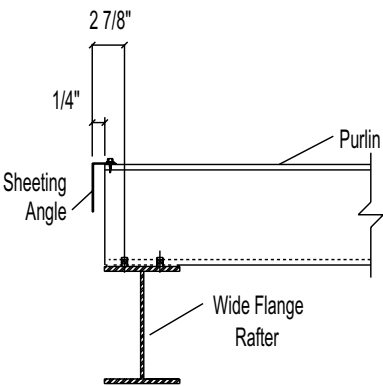
BEARING FRAME EAVE STRUT FRAMING



"CEE" RAFTER

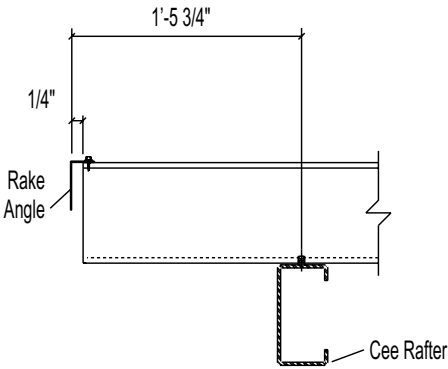


"ZEE" RAFTER

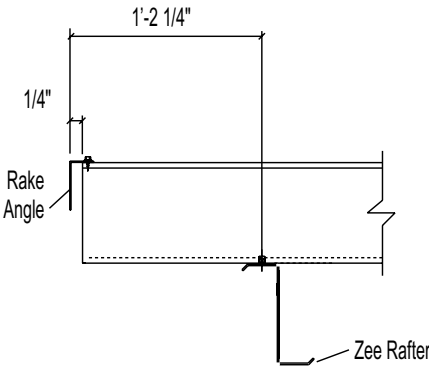


WF RAFTER

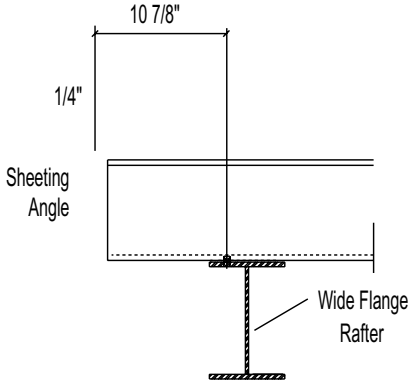
FLUSH GIRT ENDWALL



"CEE" RAFTER



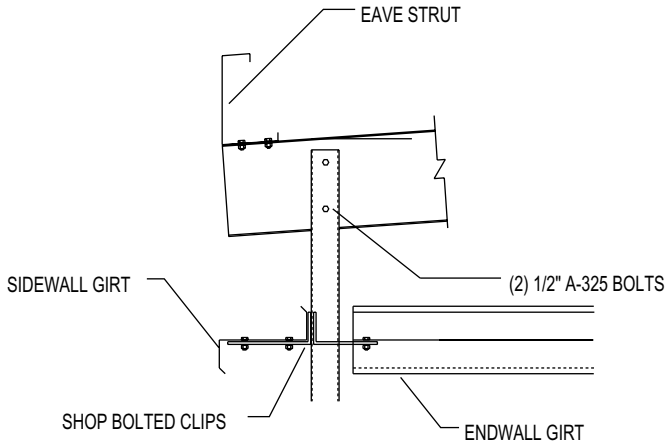
"ZEE" RAFTER



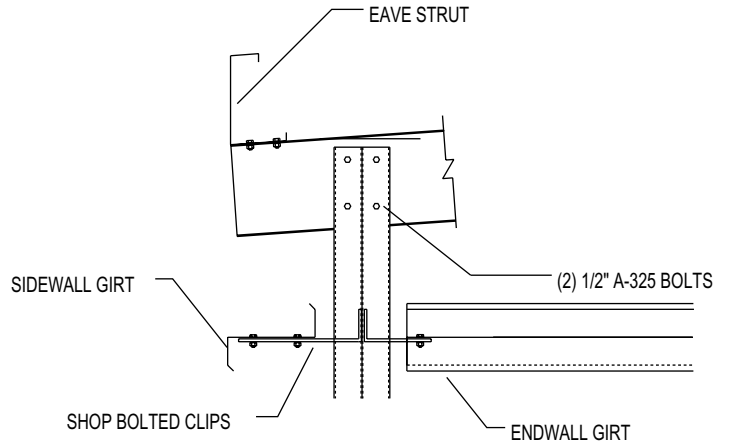
WF RAFTER

BY-PASS GIRT ENDWALL

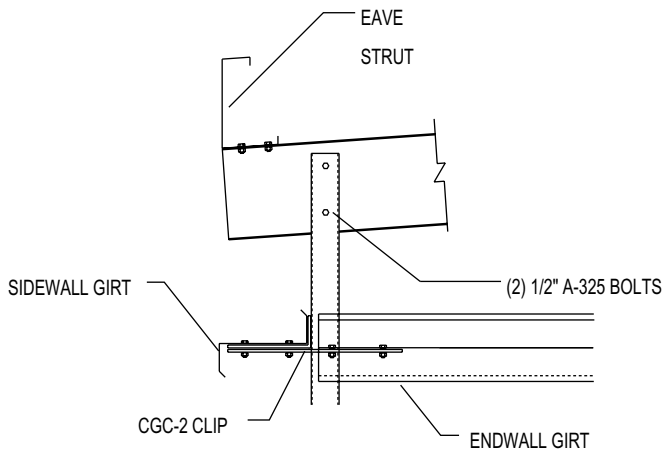
**CORNER COLUMN FRAMING DETAILS
COLD FORMED RAFTER**



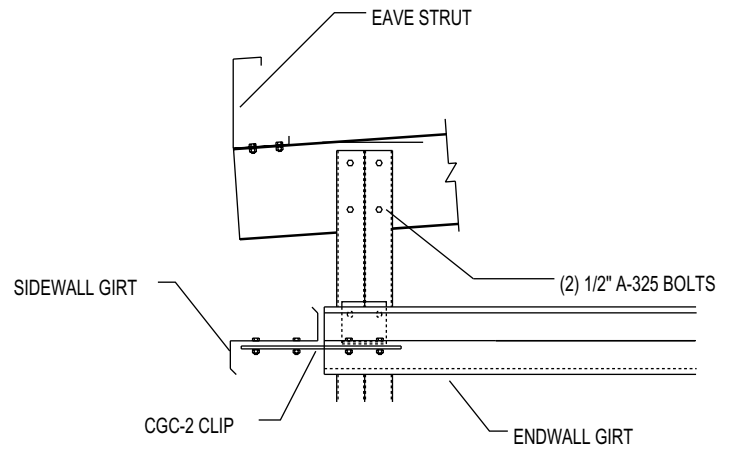
**FLUSH ENDWALL
SINGLE CEE CORNER COLUMN**



**FLUSH ENDWALL
HOT ROLLED CORNER COLUMN
(DOUBLE CEE SIMILAR)**

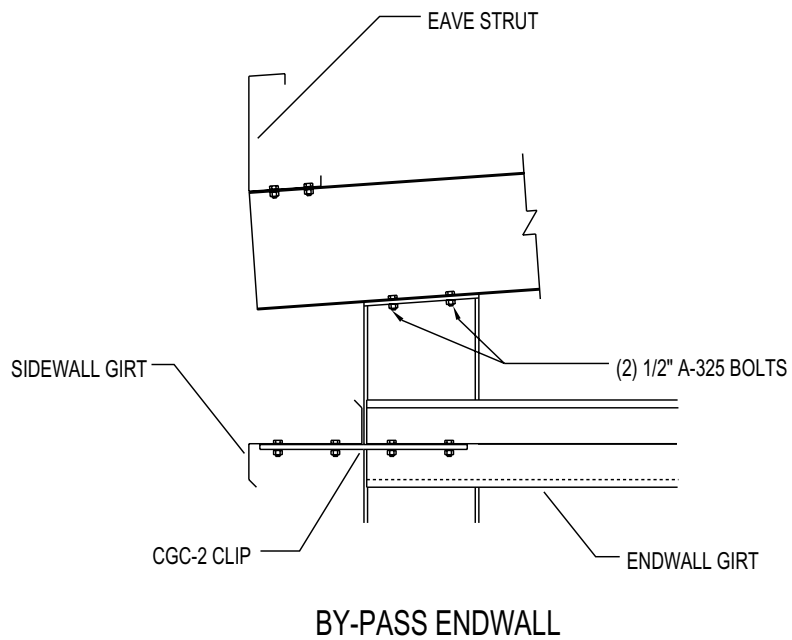
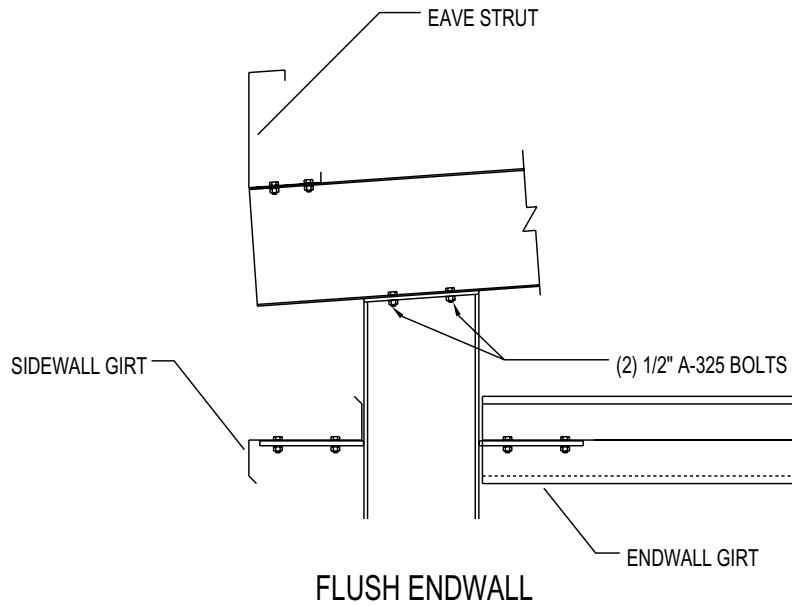


**BY-PASS ENDWALL
SINGLE CEE CORNER COLUMN**

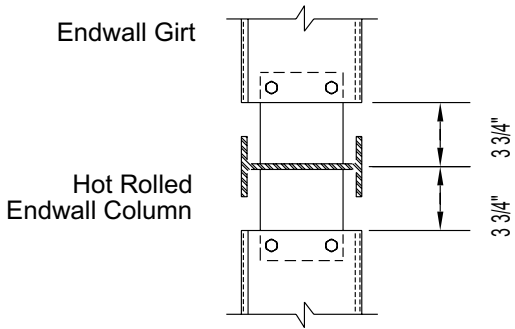


**BY-PASS ENDWALL
HOT ROLLED CORNER COLUMN
(DOUBLE CEE SIMILAR)**

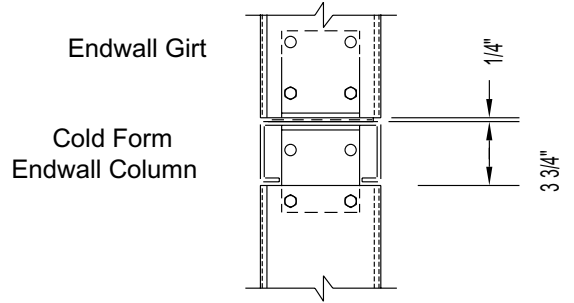
**CORNER COLUMN FRAMING DETAILS
HOT ROLLED COLUMN & RAFTER**



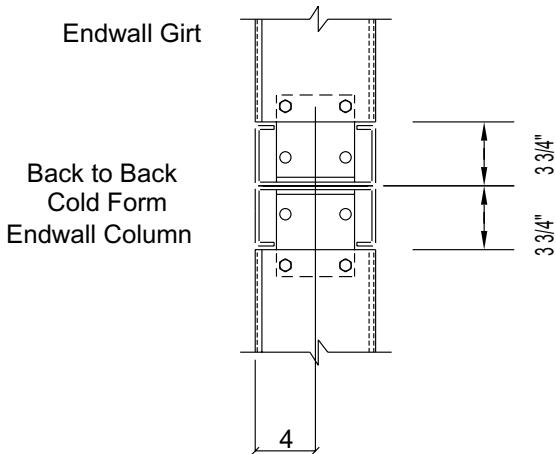
ENDWALL FRAMING WITH FLUSH GIRTS



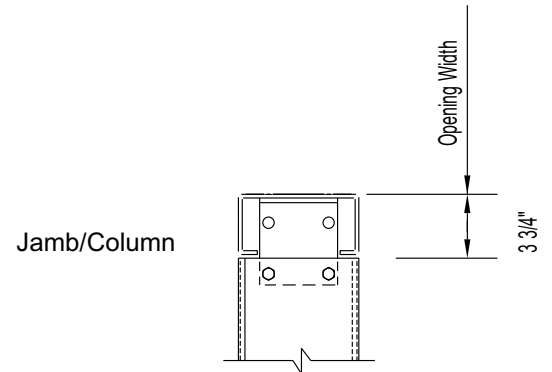
HOT ROLLED ENDWALL COLUMN



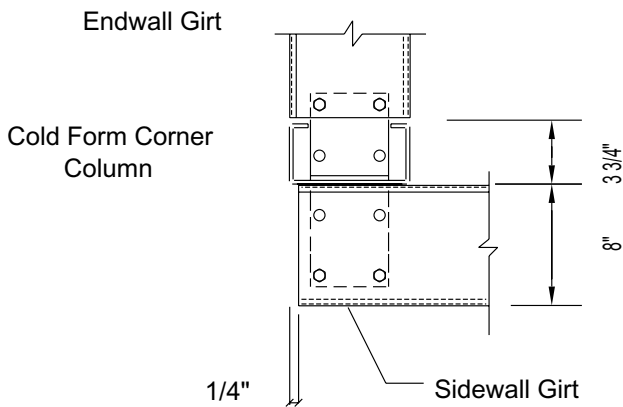
COLD FORM ENDWALL COLUMN



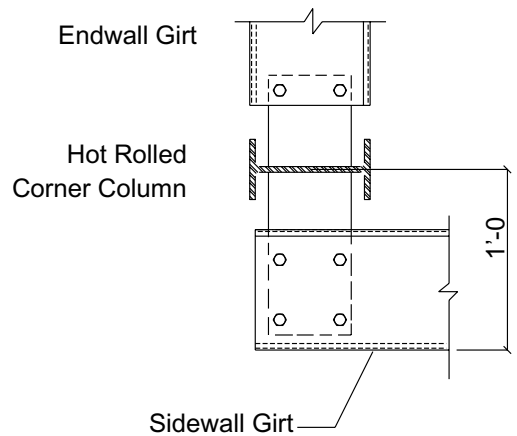
**COLD FORM ENDWALL COLUMN
(BACK TO BACK CEE'S)**



ENDWALL JAMB/COLUMN

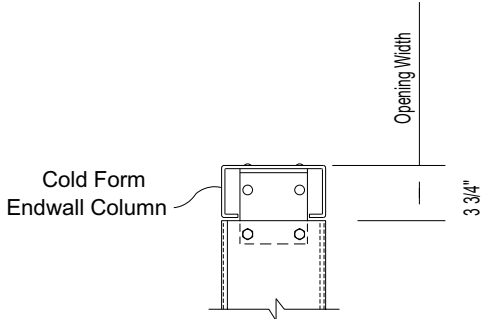


COLD FORM CORNER COLUMN

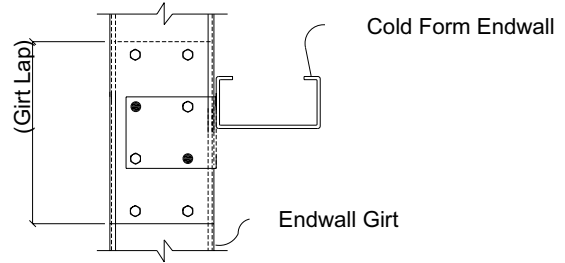


HOT ROLLED CORNER COLUMN

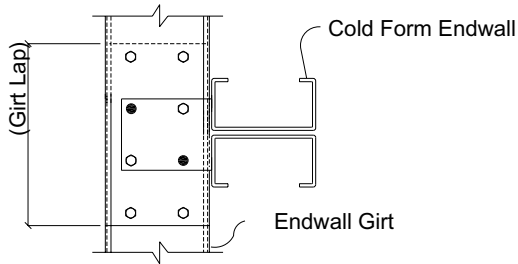
ENDWALL FRAMING WITH BY-PASS GIRTS



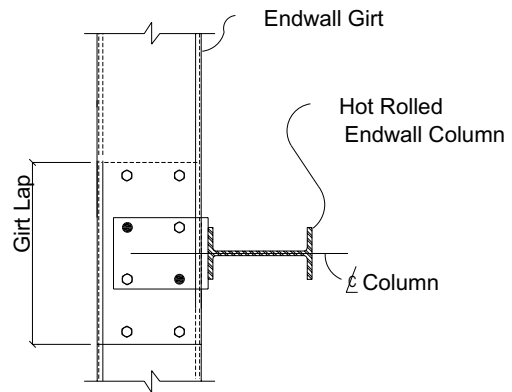
ENDWALL JAMB/COLUMN



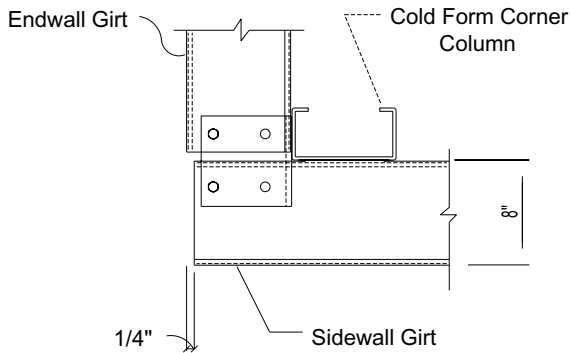
**COLD FORM ENDWALL COLUMN
(Six Bolt Connection)**



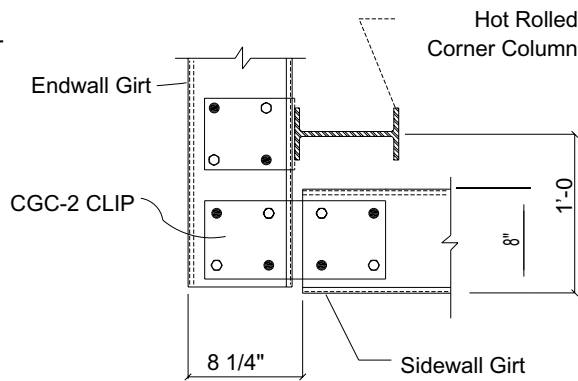
**COLD FORM ENDWALL COLUMN
(Back to Back Cee's)
(Six Bolt Connection)**



**HOT ROLLED ENDWALL COLUMN
(Six Bolt Connection)**

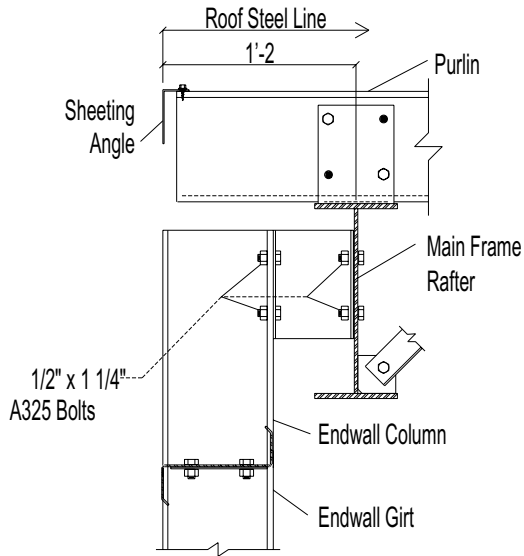


**COLD FORM CORNER COLUMN
(Six Bolt Connection)**

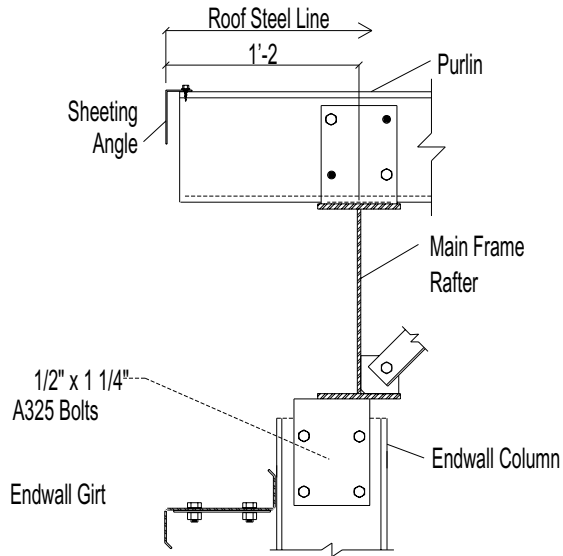


**HOT ROLLED CORNER COLUMN
(Six Bolt Connection)**

MAIN FRAME ENDWALL FRAMING

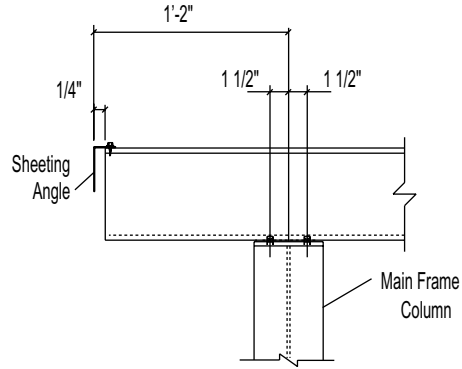


FLUSH GIRT ENDWALL

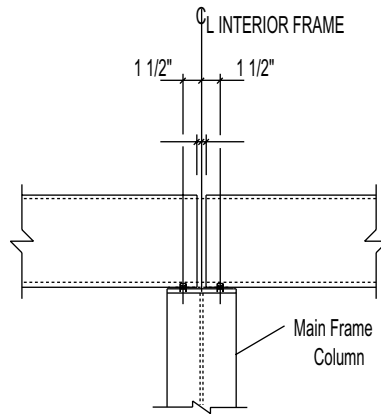


BY-PASS GIRT ENDWALL

MAIN FRAME EAVE STRUT FRAMING

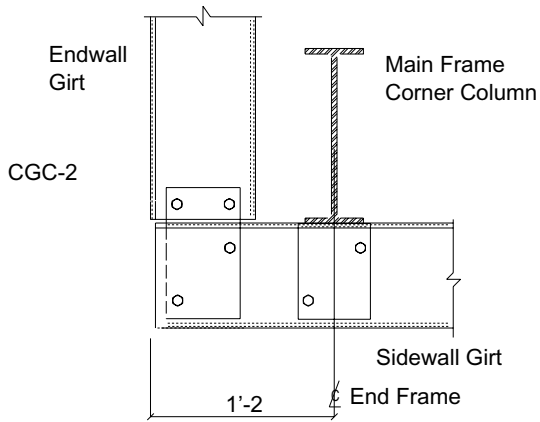


**END BAY
FLUSH OR BY-PASS GIRT ENDWALL**

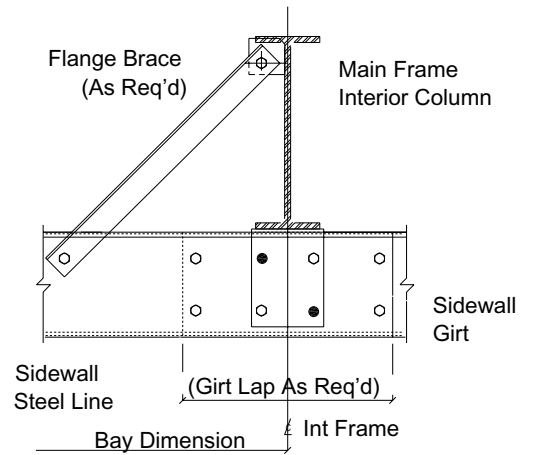


**INTERIOR BAY
FLUSH OR BY-PASS GIRT ENDWALL**

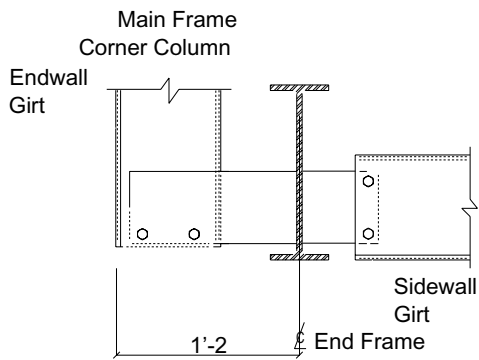
**MAIN END FRAME AND INTERIOR FRAME
GIRT CONNECTIONS**



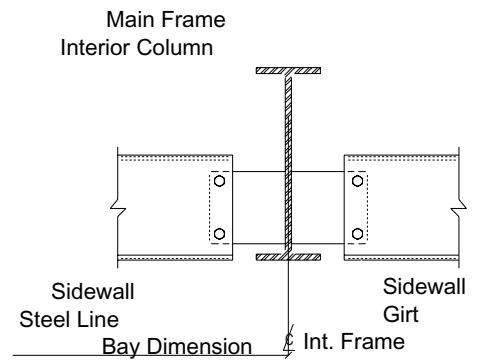
BY-PASS GIRT CORNER COLUMN



BY-PASS INTERIOR COLUMN

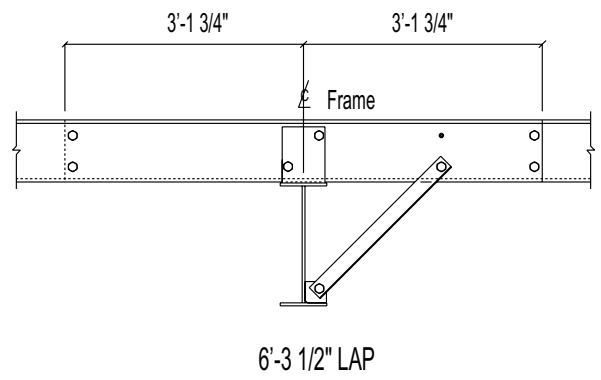
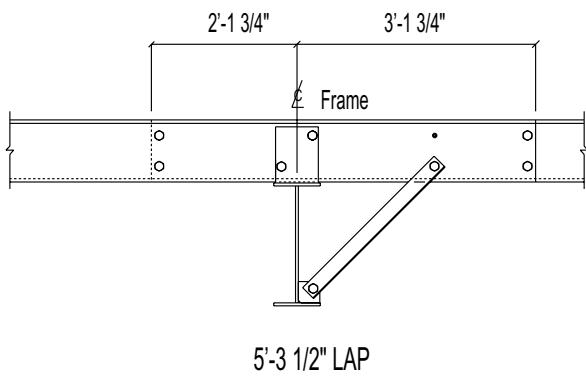
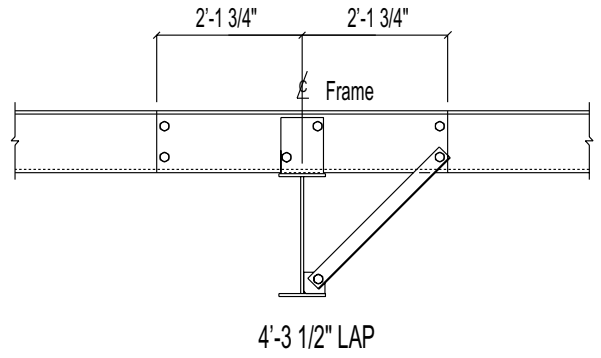
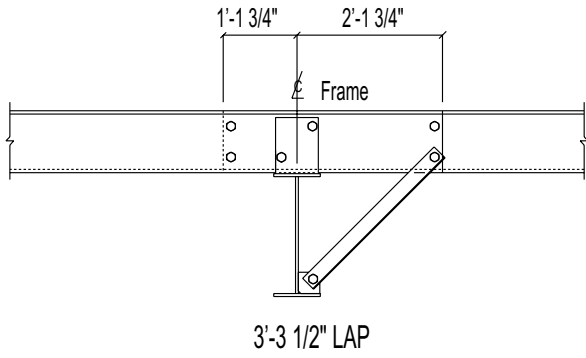
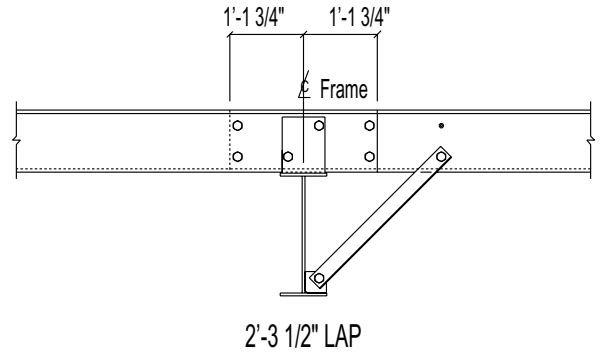
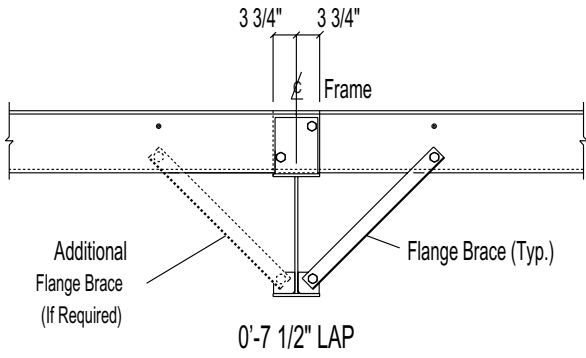


FLUSH GIRT CORNER COLUMN

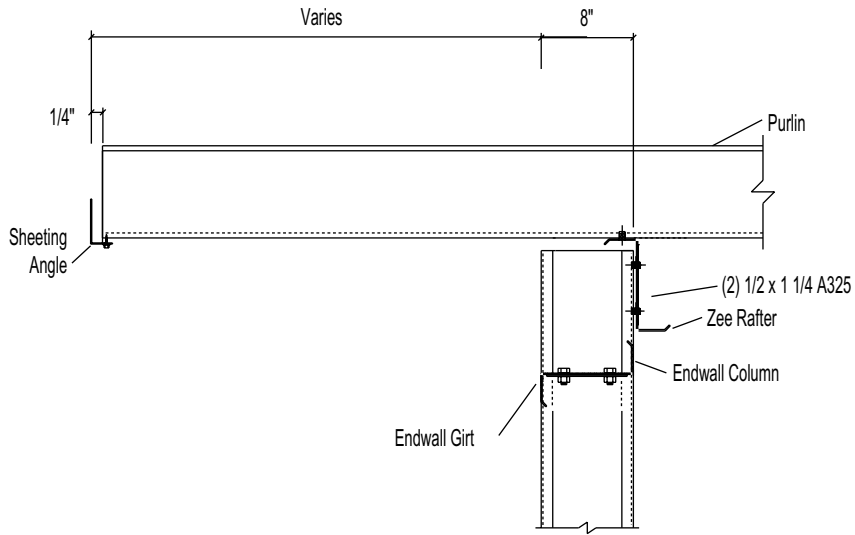


FLUSH GIRT INTERIOR COLUMN

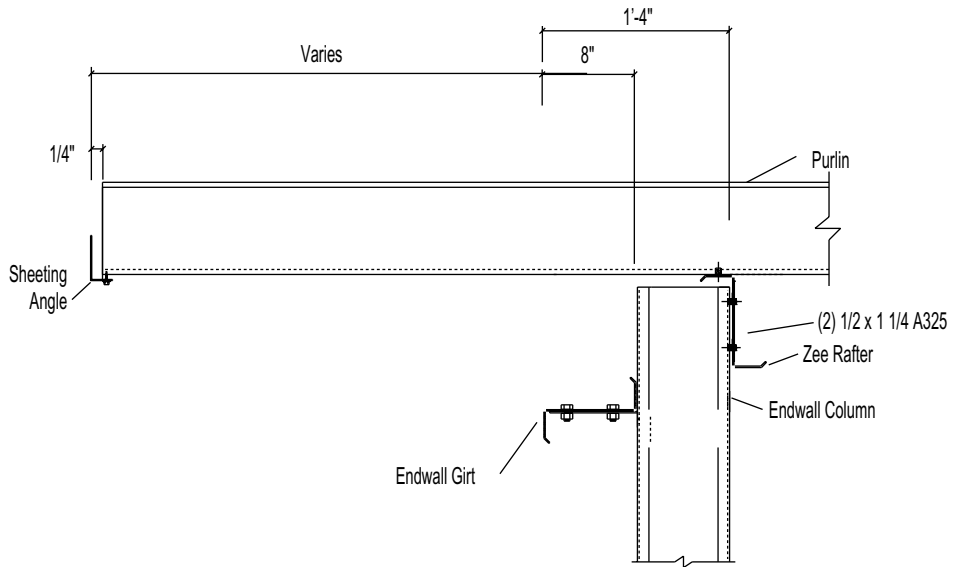
INTERIOR BAY PURLIN / GIRT FRAMING



**COLD FORMED ENDWALL FRAMING
WITH PURLIN EXTENSION**

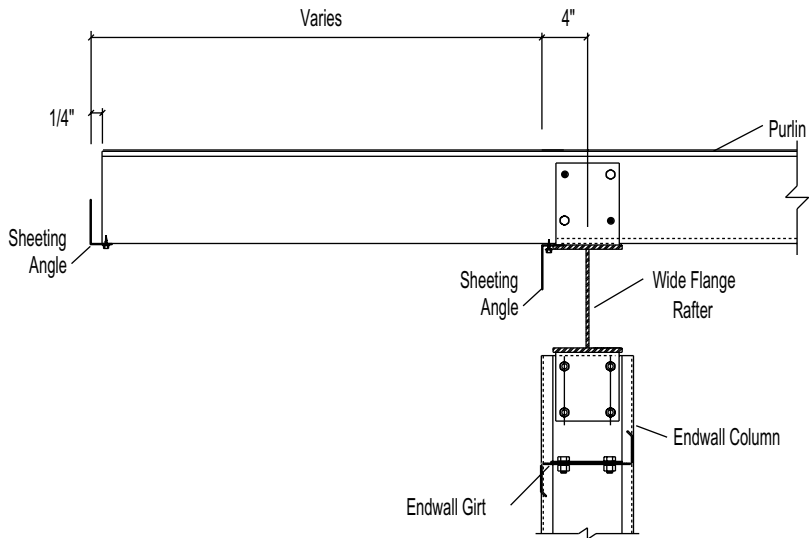


FLUSH GIRT ENDWALL

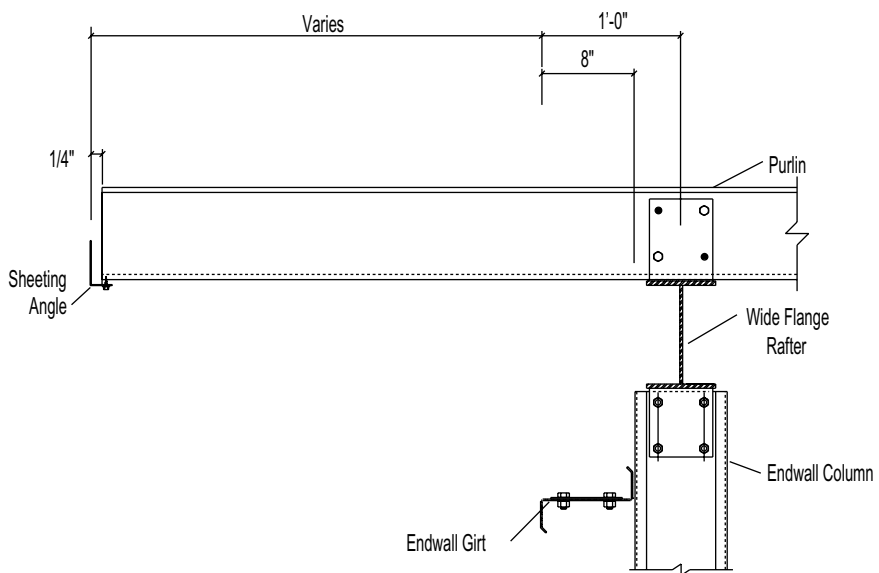


BY-PASS GIRT ENDWALL

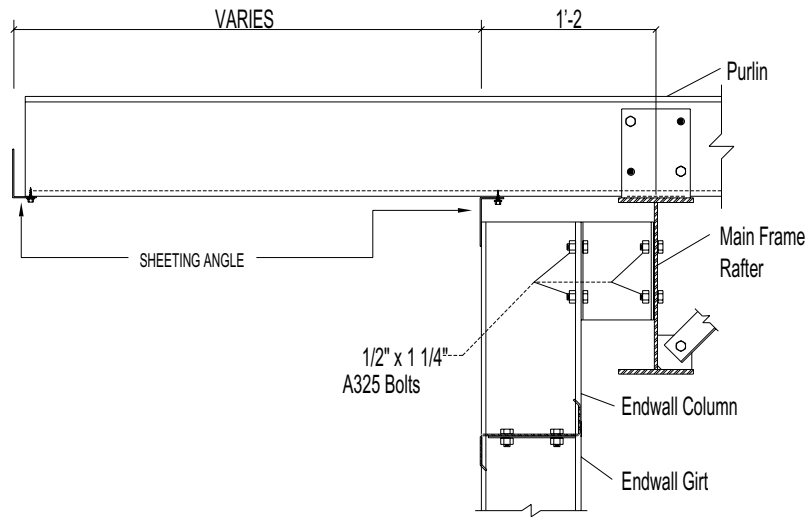
**HOT ROLLED ENDWALL FRAMING
WITH PURLIN EXTENSION**



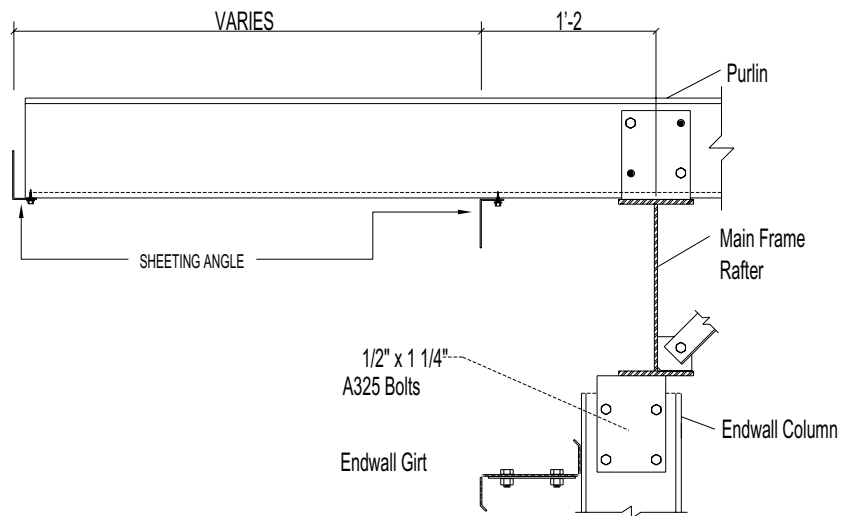
FLUSH GIRT ENDWALL



**MAIN FRAME ENDWALL FRAMING
WITH PURLIN EXTENSION**

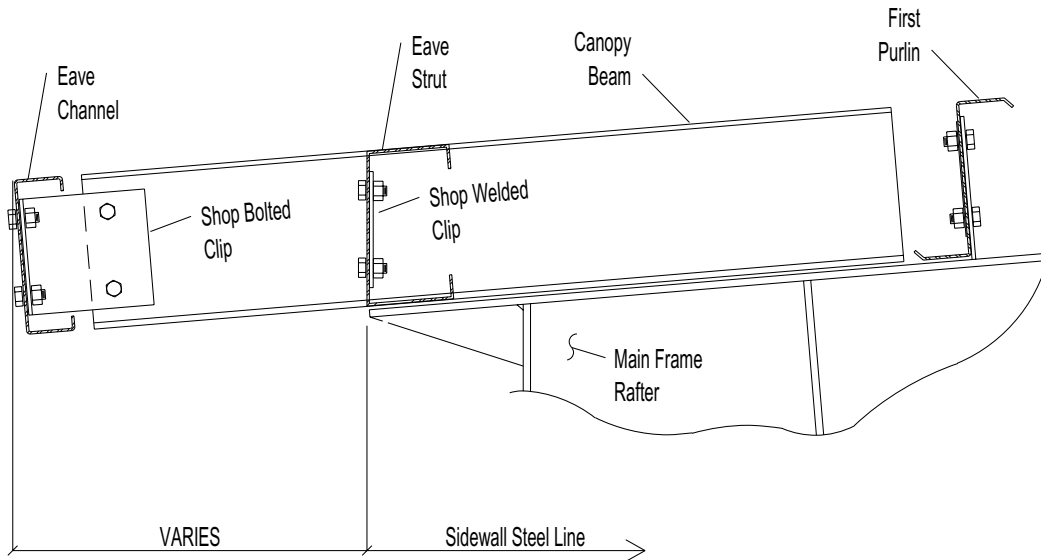


FLUSH GIRT ENDWALL



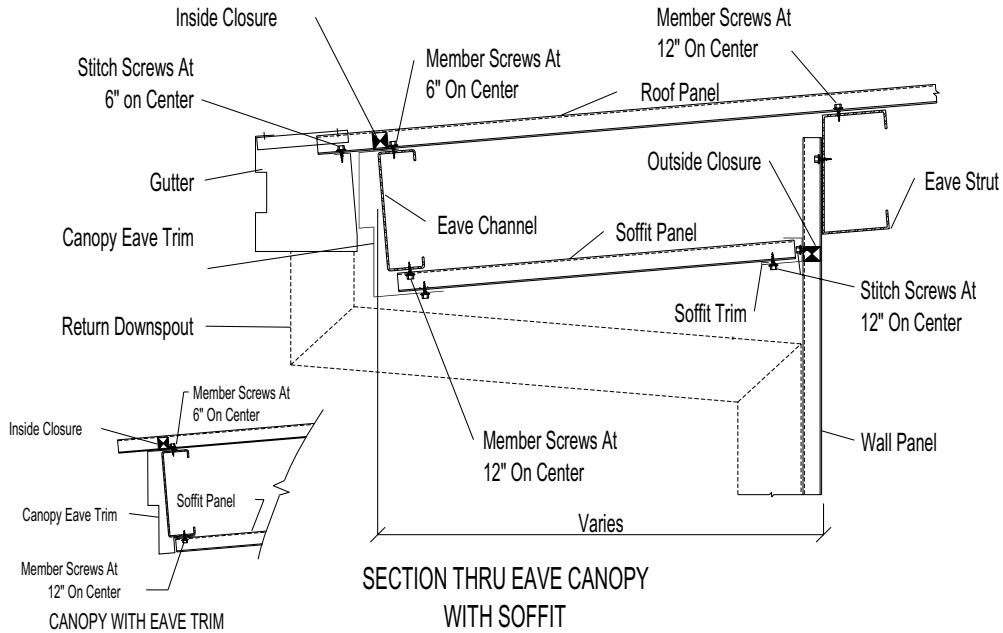
BY-PASS GIRT ENDWALL

EAVE CANOPY FRAMING



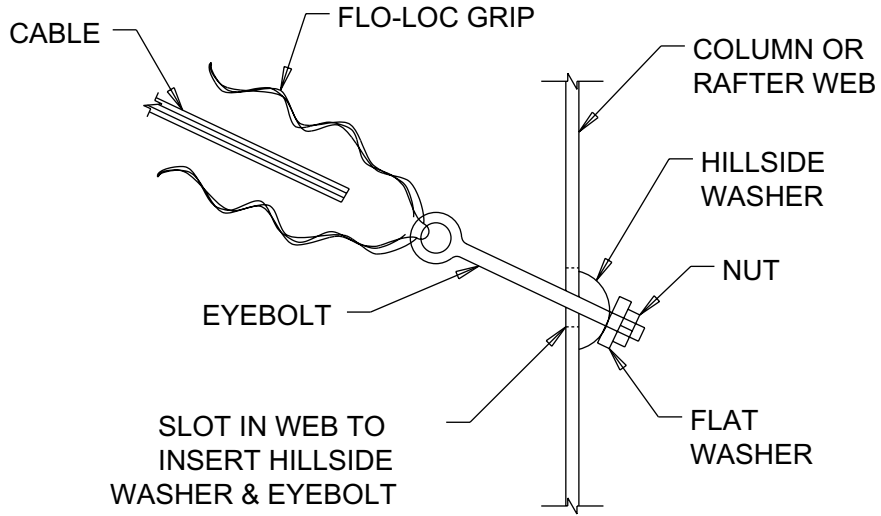
EAVE CANOPY AT MAIN FRAME

EAVE CANOPY SHEETING

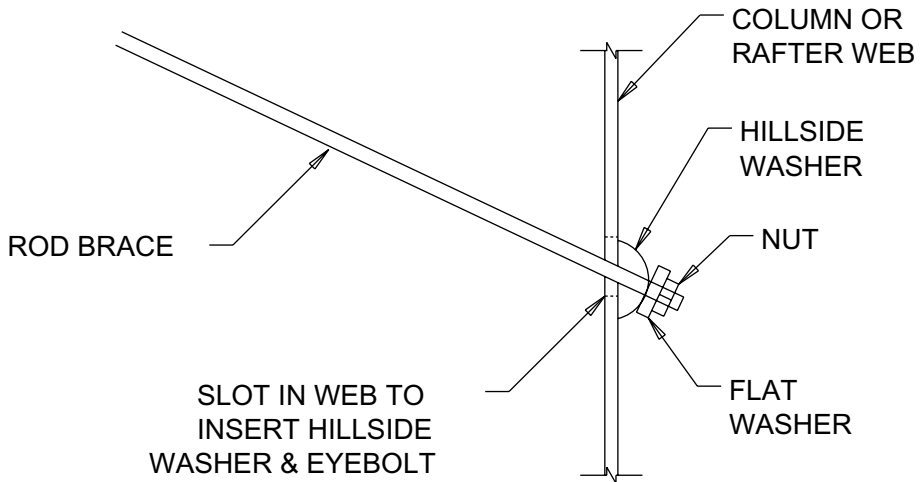


SECTION THRU EAVE CANOPY WITH SOFFIT

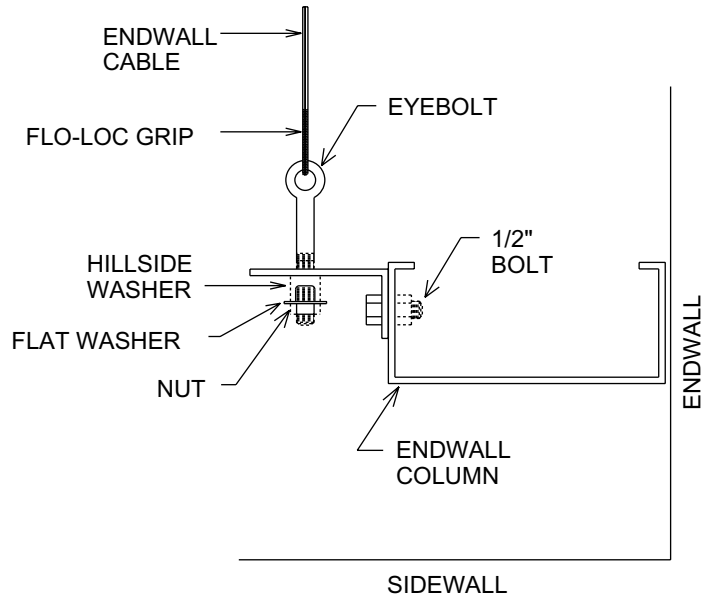
**CABLE OR ROD BRACE
TO FRAME CONNECTION**



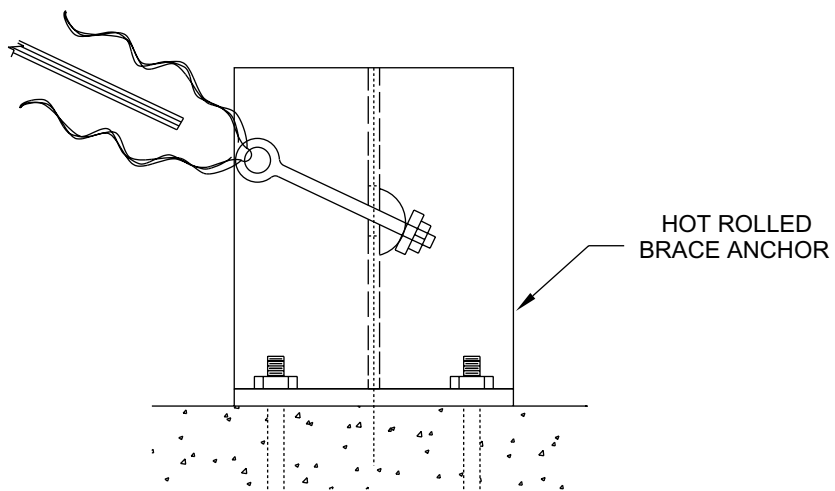
CABLE BRACE TO FRAME DETAIL



AUXILIARY BRACING DETAILS

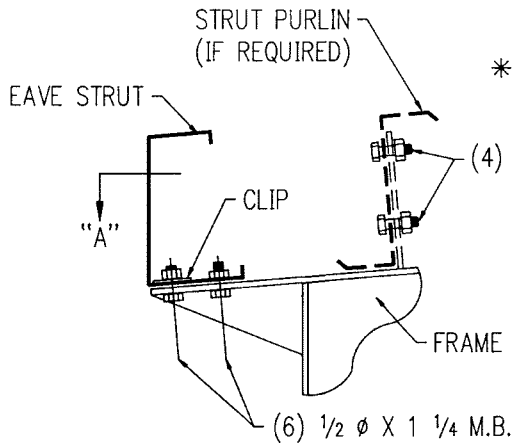


CABLE BRACE TO COLD FORMED ENDWALL COLUMN DETAIL

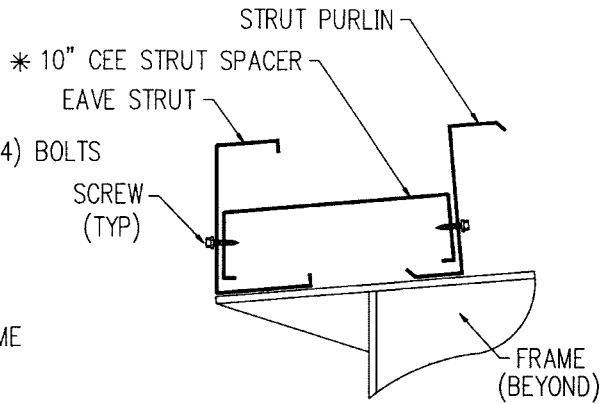


BRACE ANCHOR DETAIL

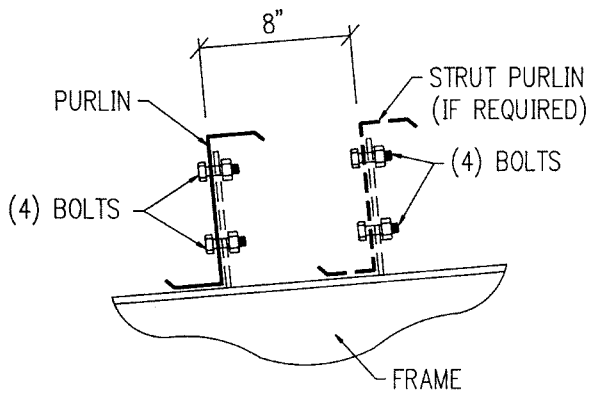
PURLIN / EAVE STRUT DETAILS



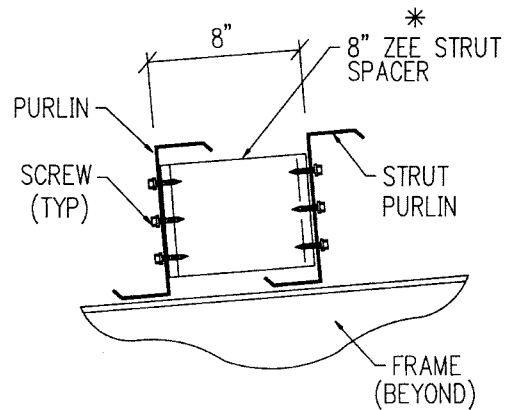
EAVE STRUT CONNECTION WITH STIFFENER PLATE



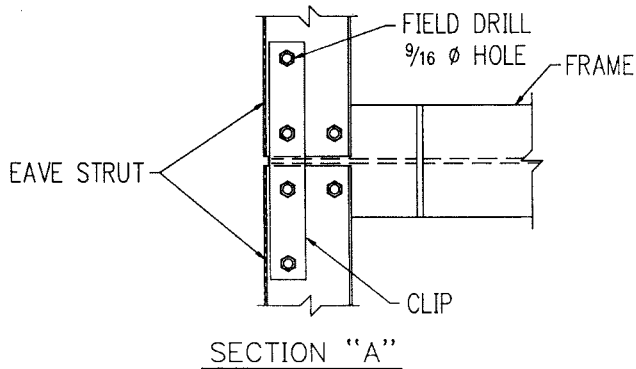
STRUT PURLIN CONNECTION (AT DIAPHRAM)



(4) BOLT PURLIN CLIP CONNECTION AT MAIN FRAME



STRUT PURLIN



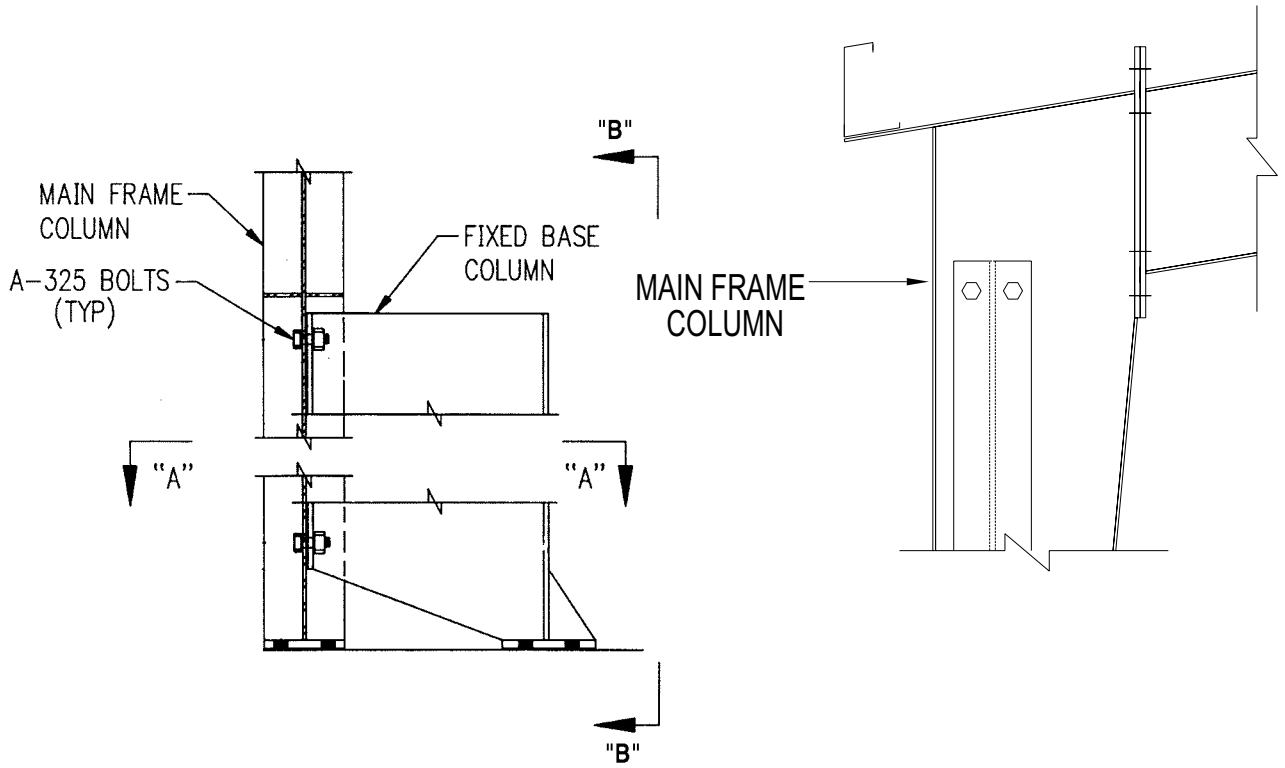
SECTION "A"

NOTE:

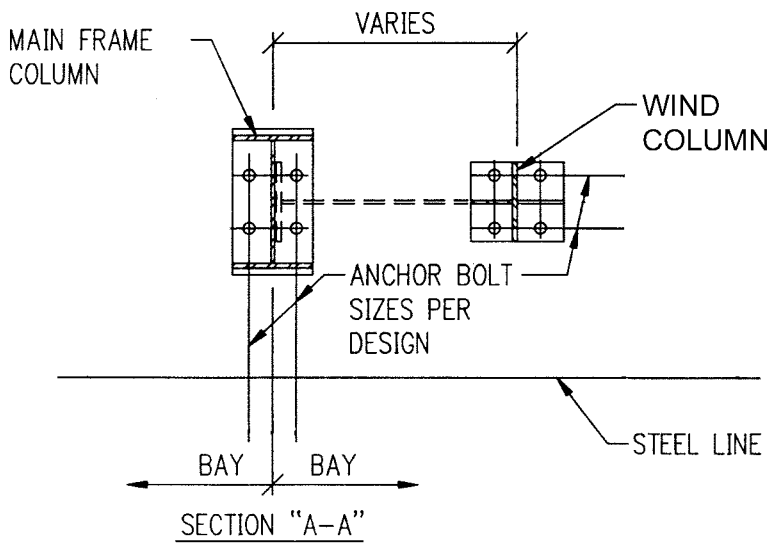
ALL CONNECTION BOLTS ARE 1/2 inch diameter by 1 inch MACHINE BOLTS UNLESS NOTED

- * FOR 20'-0" AND UNDER BAYS LOCATE STRUT SPACER AT (2) EQUAL SPACES; 21'-0" TO 25'-0" BAYS LOCATE AT (3) EQUAL SPACES; 26'-0" TO 30'-0" BAYS LOCATE AT (4) EQUAL SPACES

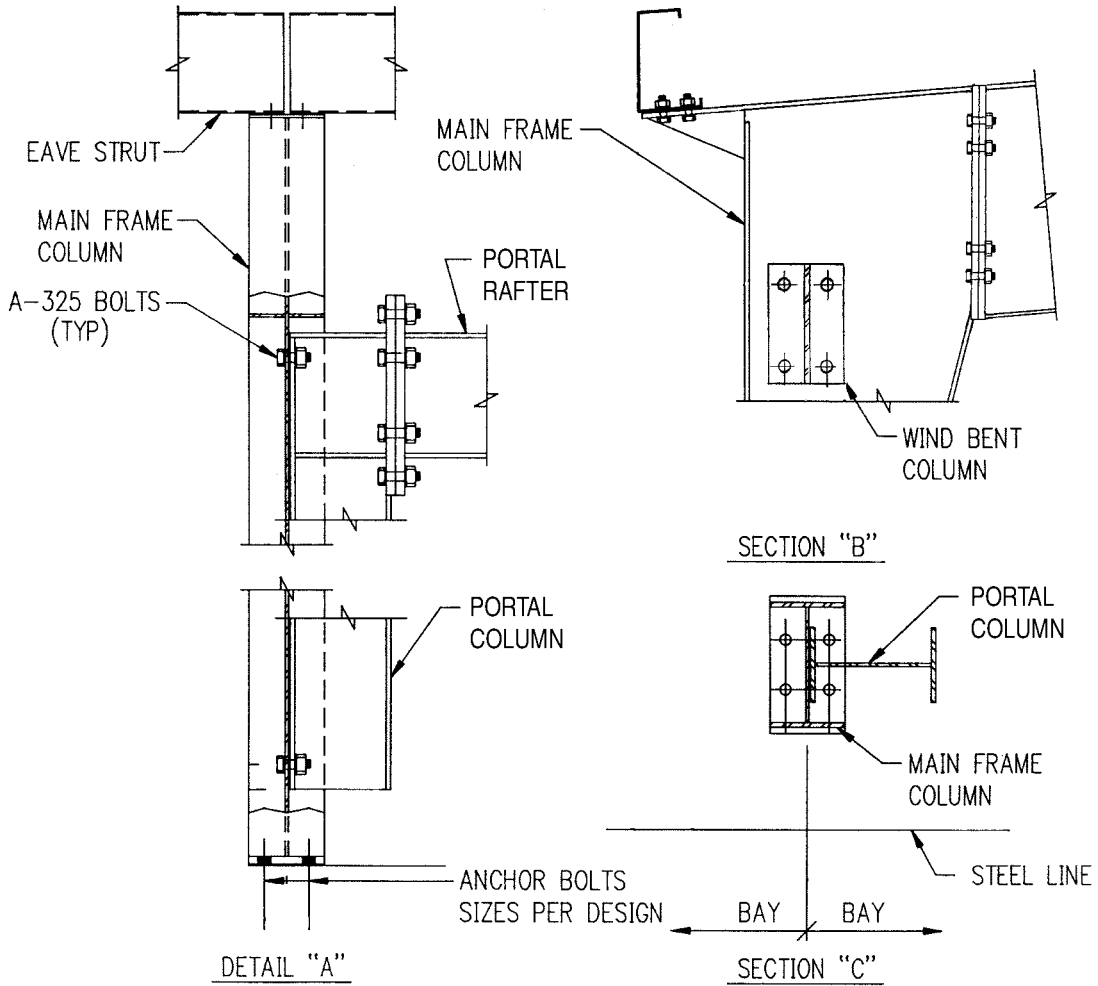
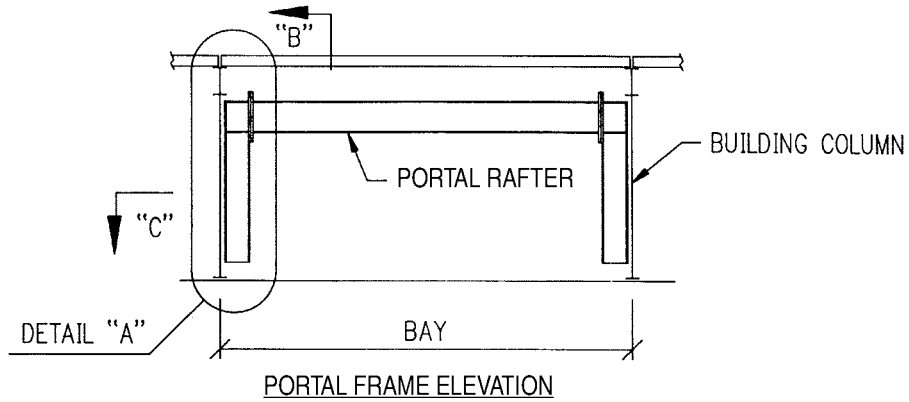
WIND COLUMN TO MAIN FRAME DETAIL



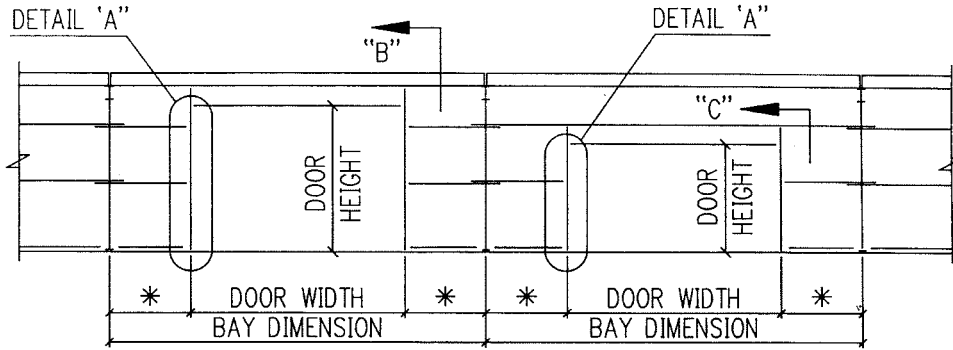
FIXED BASE AT MAIN FRAME



PORTAL FRAME TO MAIN FRAME DETAIL

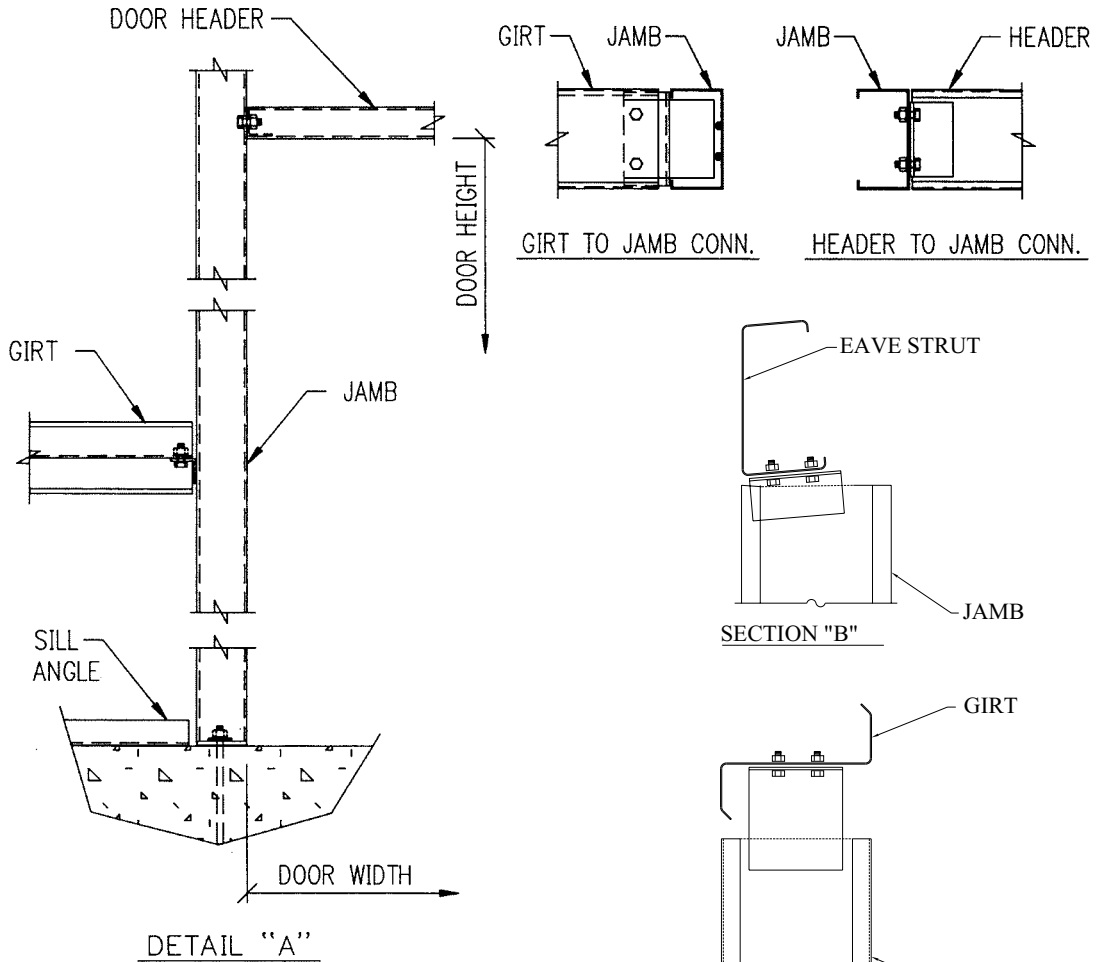


FRAMED OPENING FRAMING DETAILS



WALL ELEVATION

* = 1'-5½" MINIMUM

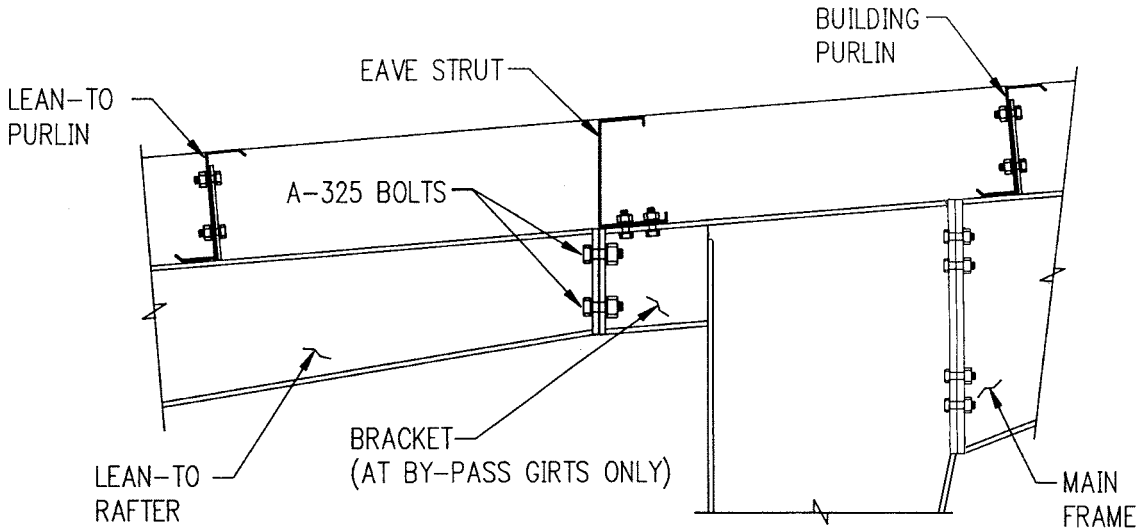


DETAIL "A"

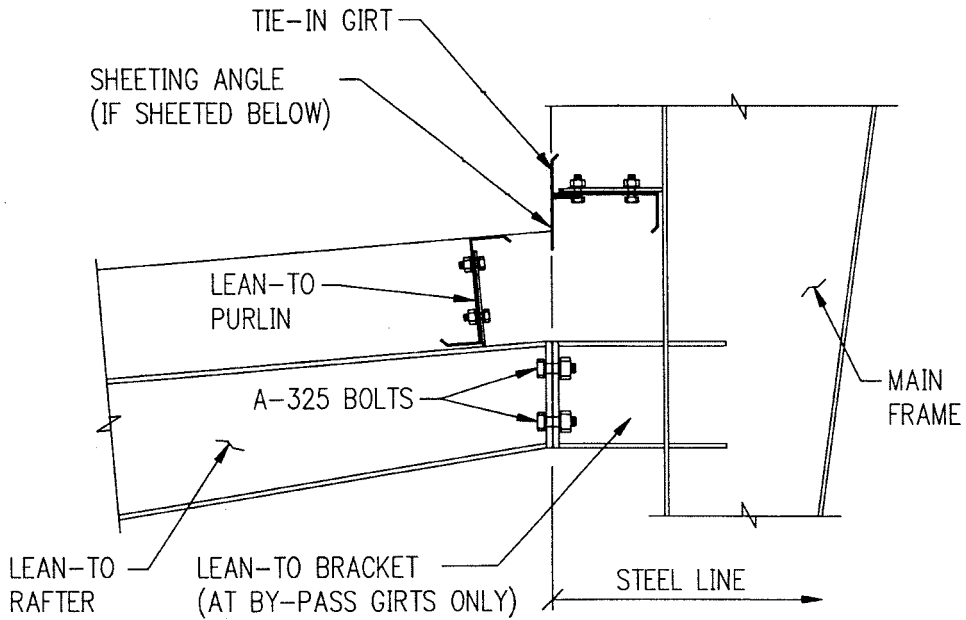
ALL BOLTS ARE 1/2" Ø x 1" M.B. UNLESS NOTED

SECTION "C"

**EAVE LINE AND BELOW EAVE LINE
LEAN-TO CONNECTIONS**



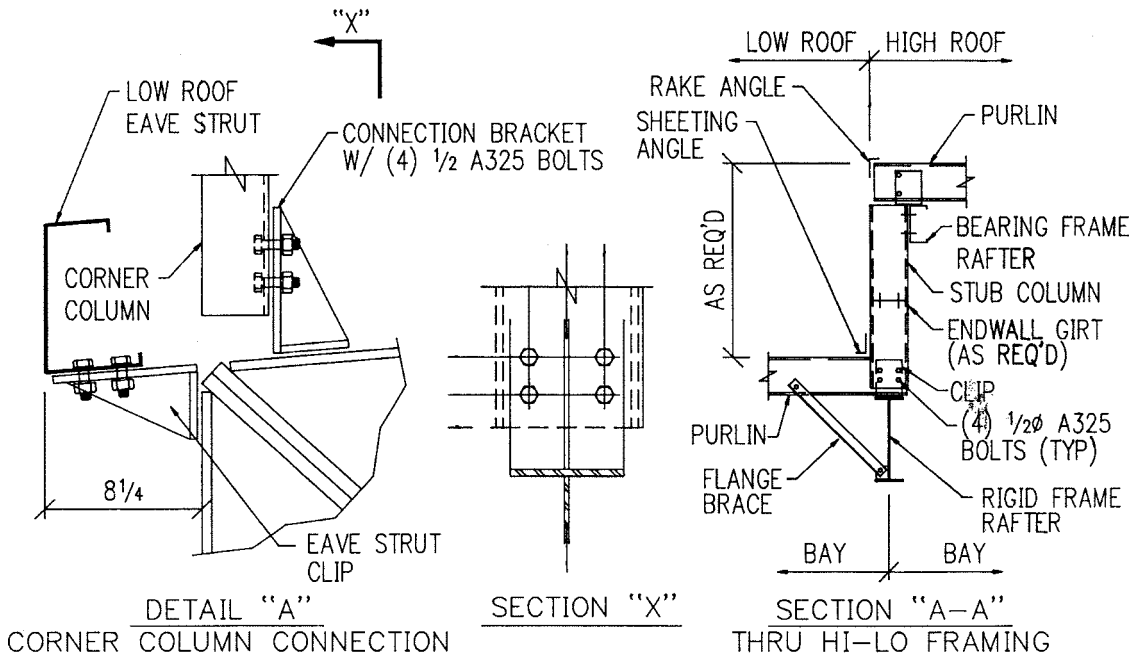
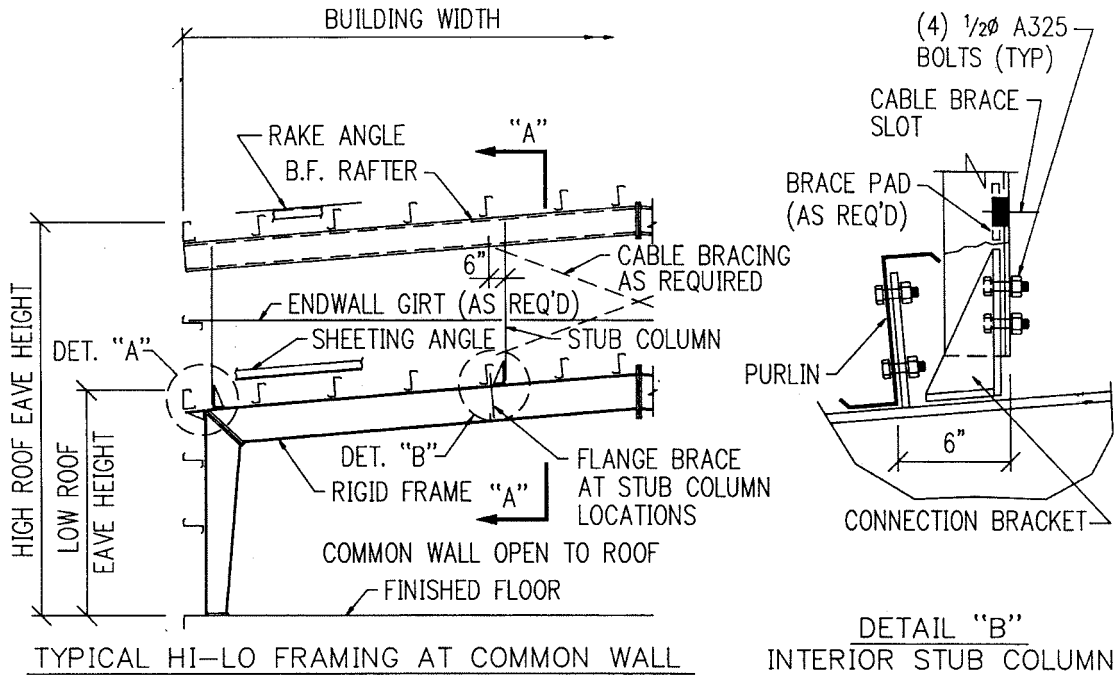
EAVE LINE LEAN-TO CONNECTION



BELOW EAVE LEAN-TO CONNECTION

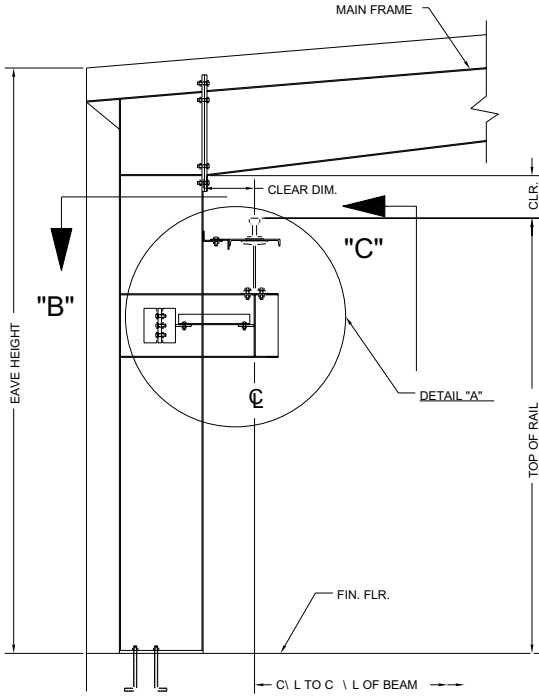
ALL BOLTS ARE 1/2"Ø X 1" M.B. UNLESS NOTED

**FRAMING AT HI-LO CONDITION
AT COMMON WALL**

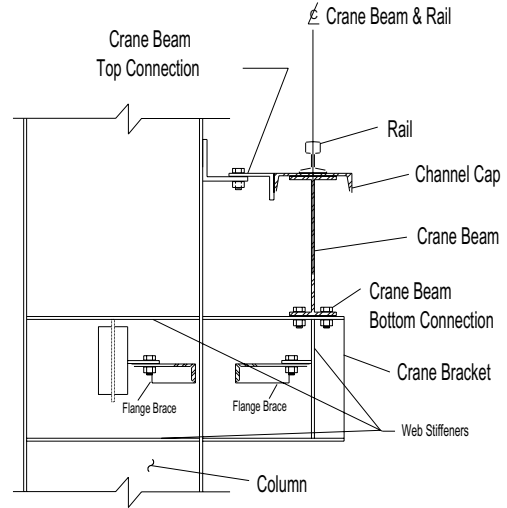


TOP RUNNING CRANE BRACKET DETAILS

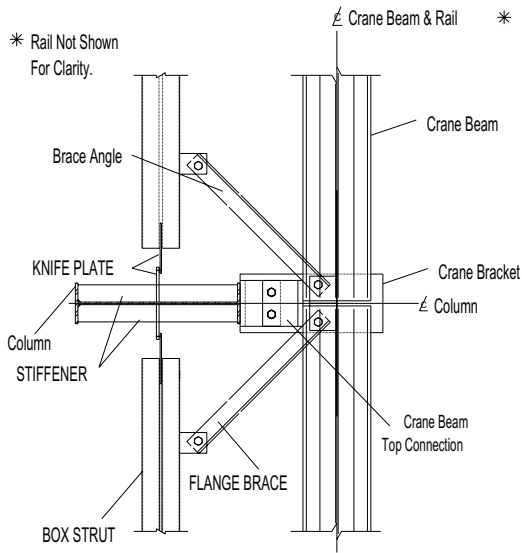
Specific bracket details vary from building to building — consult erection drawings prior to installation.



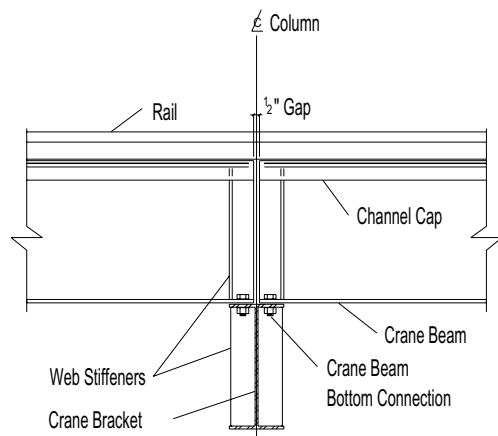
CRANE BEAM AND BRACKET



SECTION "A"

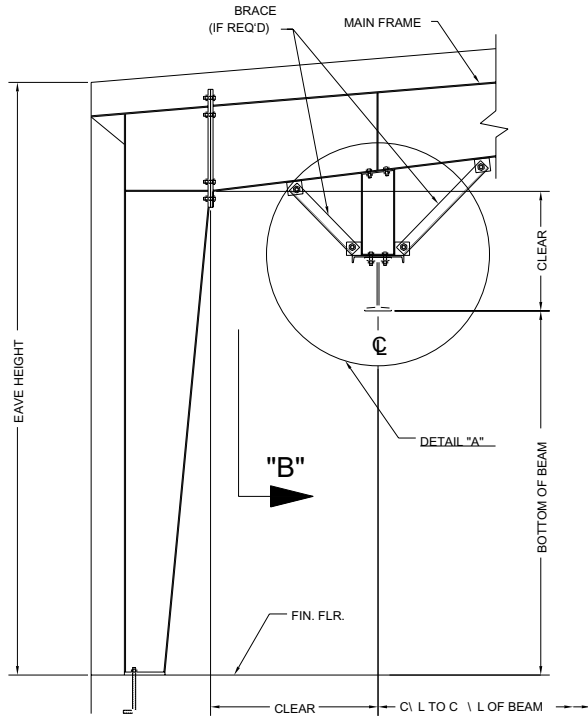


SECTION "B"

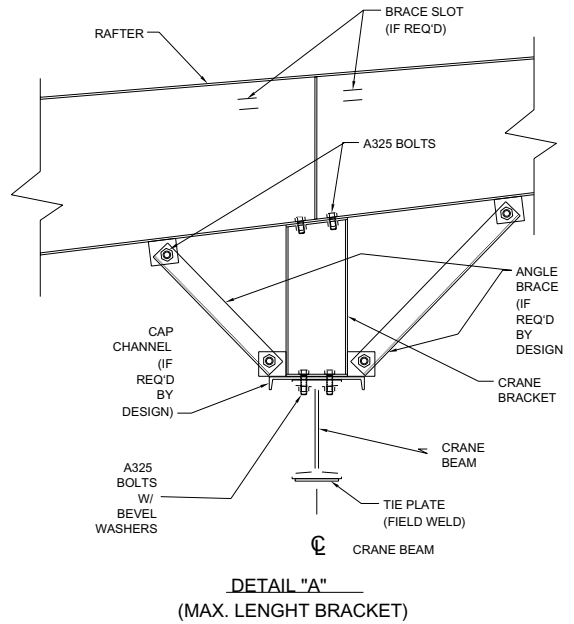
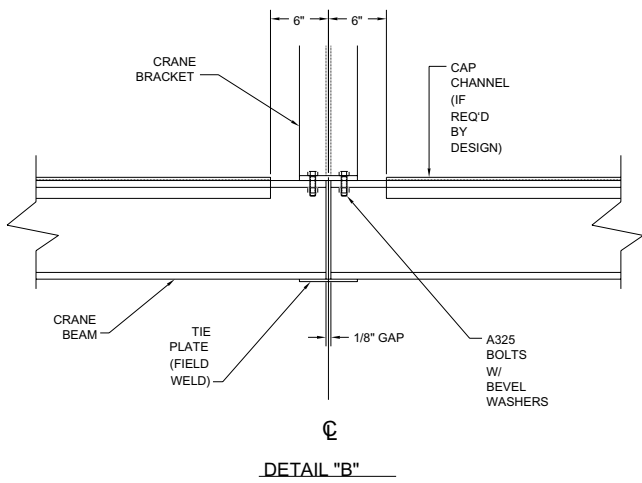
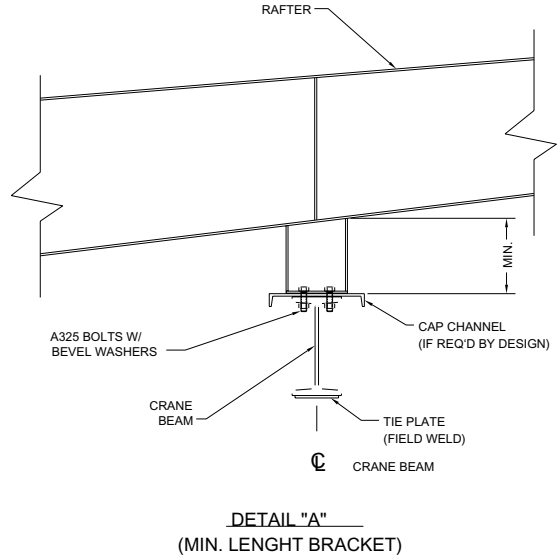


SECTION "C"

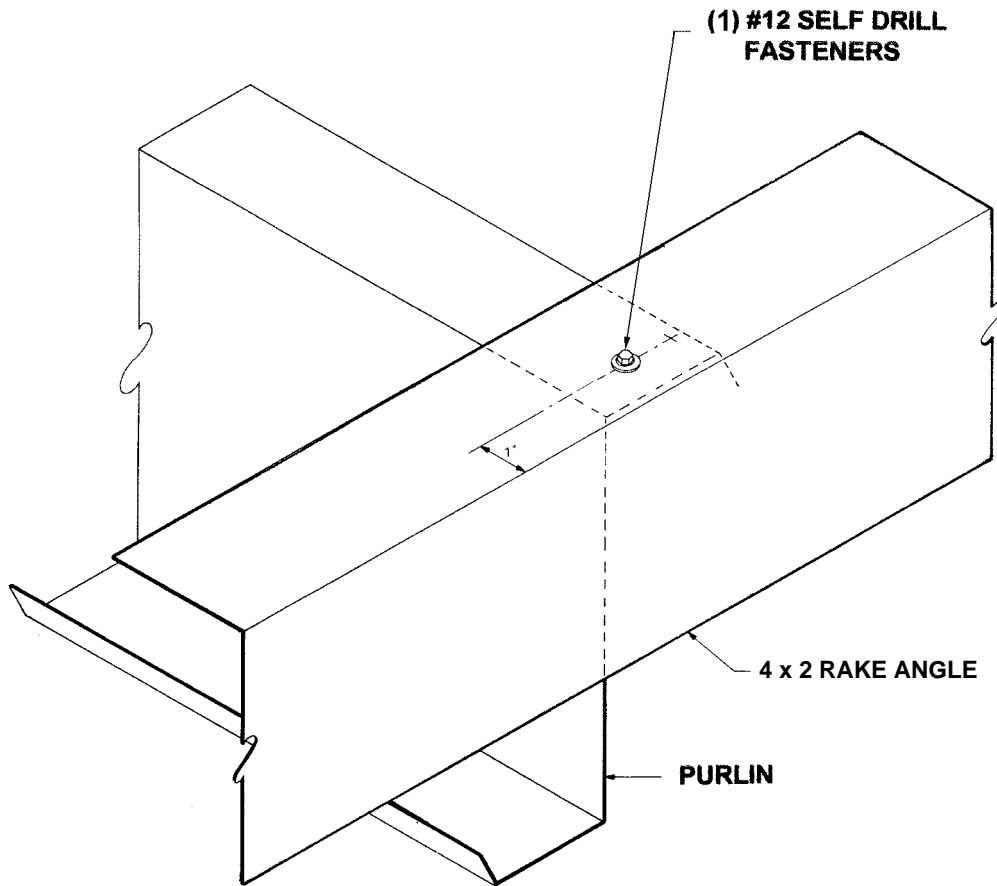
UNDERHUNG CRANE BRACKET DETAILS



CRANE BEAM AND BRACKET FRAMING



RAKE (GABLE) ANGLE

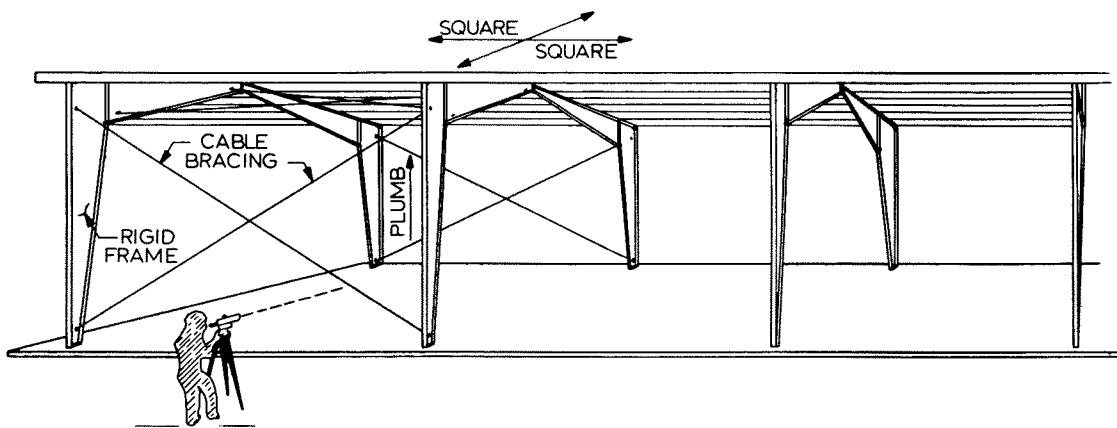


NOTE! Each worker should be trained to use the safest and most productive erection techniques. **Safety first!**

SECTION VII

SHEETING

All the primary and secondary framing should be erected, plumbed and the bolts properly tightened before the sheeting of the building is started. Framed openings should also be installed, plumbed, squared and tightened before sheeting begins.



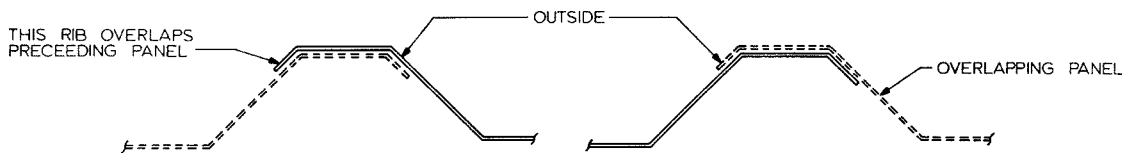
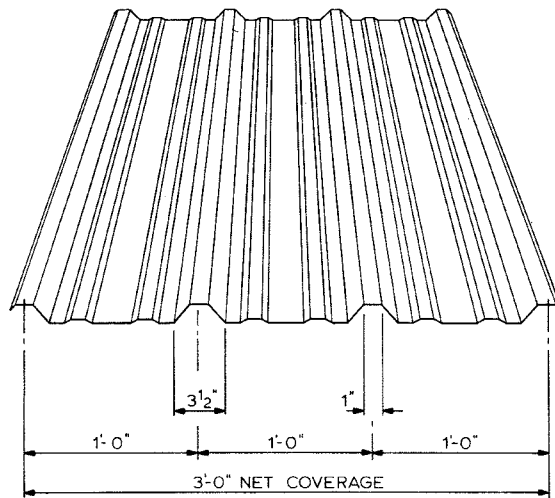
THE MANUFACTURER's wall and roof panels are quality merchandise and should be handled with care. When unpacking panels, pick them up and apart; never slide one panel over another. When lifting panels, support long panels to prevent buckling.

This section contains erection instructions for exposed fastener metal panels only. The Ultra-Dek and Double-Lok roof systems, as well as the Batten-Lok roof system have their own Erection Manuals.

NOTE! Workers should always use gloves when lifting sheets and follow all OSHA safety recommendations. **Safety first!**

“R” PANEL

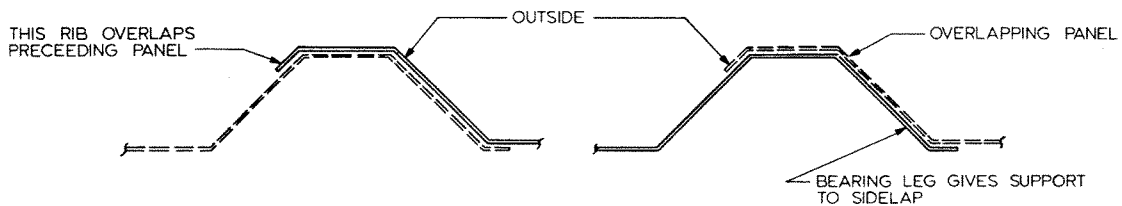
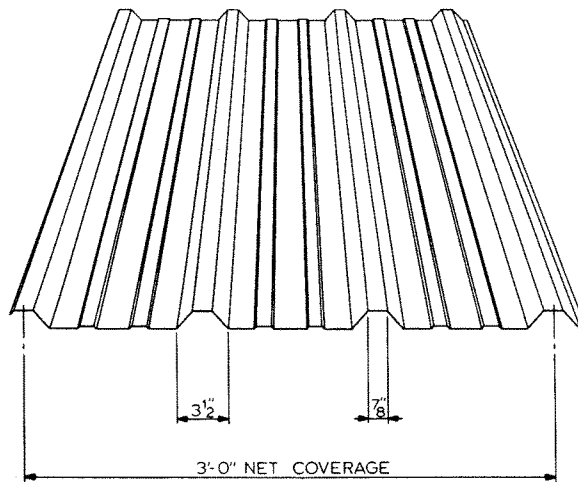
The “R” panels are designed for both roof and wall applications. Its symmetric profile allows for installation without regard to sheeting direction. Sheeting can be started from either end of the building; however, by applying the sheets toward the direction of the prevailing view, the overlap line on the side of every third rib will be less visible. Where heavy prevailing winds occur, place the edge to be lapped into the wind!



DANGER! Do not step on the major ribs, the side edge or end edge of the R panel. Always follow all OSHA safety recommendations. **Safety first!**

“PBR” PANELS

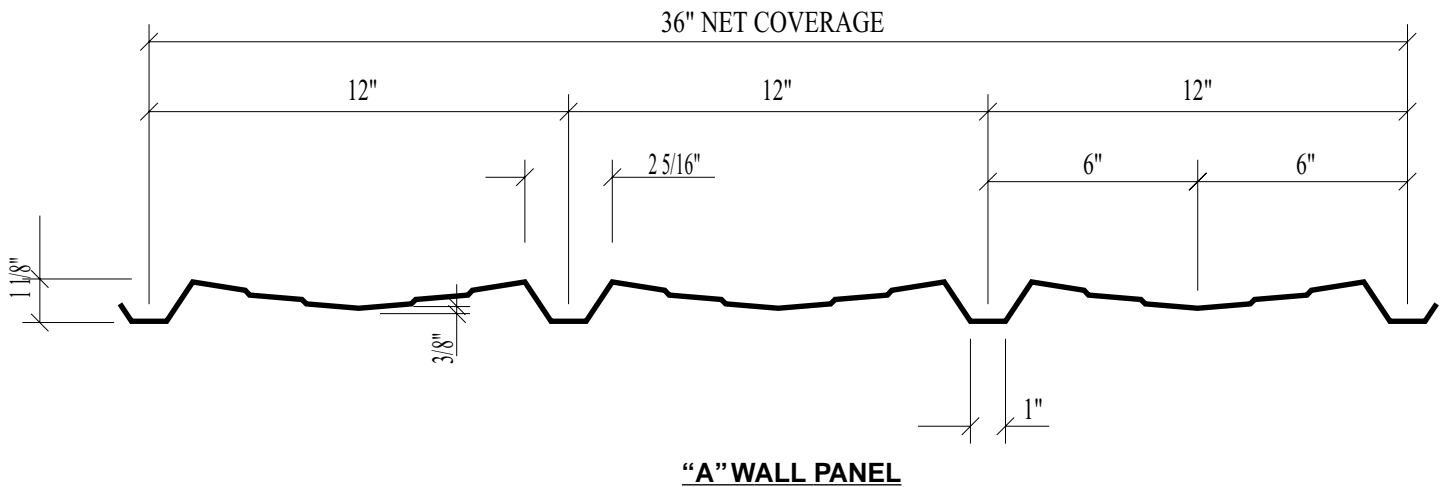
The “PBR” panels are designed for roof application, but may on occasion be installed on the wall. The profile is the same as the “R” panels except for the addition of the support leg on the leading edge on one side. Erection of this panel requires that the proper direction of its application be established. The support leg allows for better nesting with the overlapping rib of the next panel. As shown below, the installation of the panels would proceed from left to right.



DANGER! Do not step on the major ribs of the PBR panels. Always follow all OSHA safety recommendations, **Safety first!**

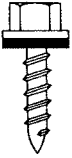
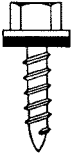

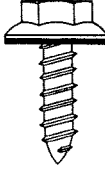

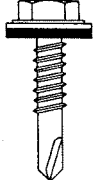
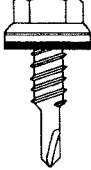
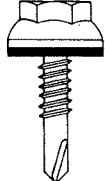
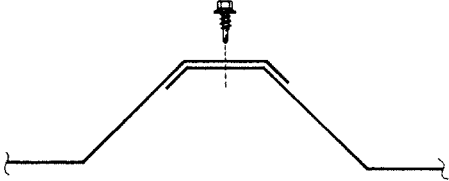
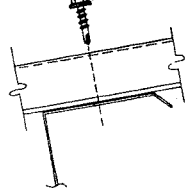
“A” PANEL

The “A” panels are designed for wall applications only. The ribs incorporated into its design produce smooth shadow lines and semi-concealed fasteners. Sheeting can begin from either end of the building, and application of the architectural panel is not directional. Properly installed, the lap edges of the “A” panel will have minimum visibility.




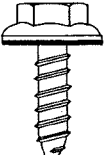


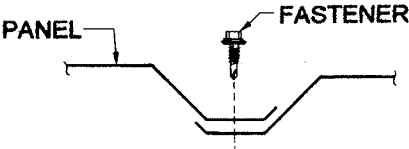
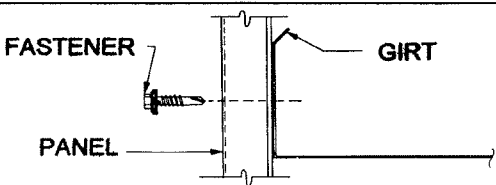


NOTE! Do not apply pressure to the pan of the panels during installation, when the pressure is released “oil canning” will occur. **Safety first!**

ROOF FASTENERS

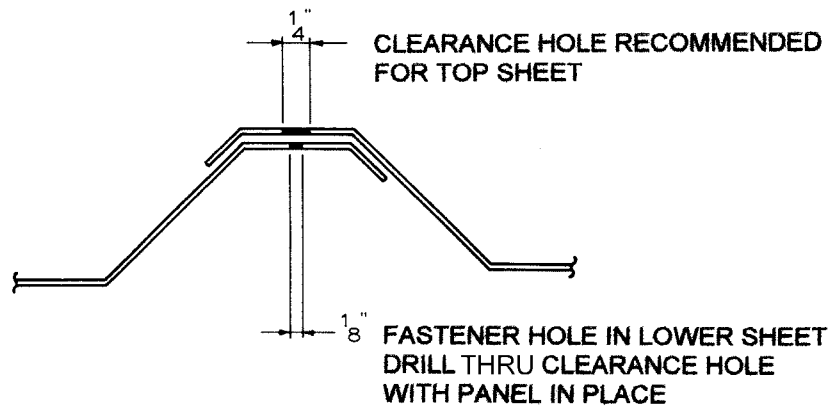
ROOF STITCH	TO STRUCTURE
 <p>#14 x 3/4" SELF TAPPING CARBON STEEL</p>	 <p>#14 SELF TAPPING CARBON STEEL 0-3½" INSULATION – 1" LONG 3½-6" INSULATION – 11/4" LONG</p>
 <p>#14 x 3/4" SELF TAPPING LONG LIFE FASTENER</p>	 <p>#14 SELF TAPPING LONG LIFE FASTENER 0-3½" INSULATION – 1" LONG 3½-6" INSULATION – 11/4" LONG</p>
 <p>#14 x 7/8" SELF DRILLING CARBON STEEL</p>	 <p>#12 SELF DRILLING CARBON STEEL 0-3½" INSULATION – 1" LONG 3½-6" INSULATION – 11/4" LONG</p>
 <p>#14 x 7/8" SELF DRILLING LONG LIFE FASTENER</p>	 <p>#12 SELF DRILLING LONG LIFE FASTENER 0-3½" INSULATION – 1" LONG 3½-6" INSULATION – 11/4" LONG</p>
 <p>PANEL TO PANEL</p>	 <p>PANEL TO STRUCTURE</p>

WALL FASTENERS

WALL STITCH	TO STRUCTURE
 <p>#14 x 3/4" SELF TAPPING CARBON STEEL</p>	 <p>#14 SELF TAPPING CARBON STEEL 0-3½" INSULATION - 1" LONG 3½-6" INSULATION - 1¼" LONG</p>
 <p>#14 x 7/8" SELF DRILLING CARBON STEEL</p>	 <p>#14 SELF TAPPING LONG LIFE FASTENER 0-3½" INSULATION - 1" LONG 3½-6" INSULATION - 1¼" LONG</p>
 <p># 14 x 7/8" SELF DRILLING LONG LIFE FASTENER</p>	 <p>#12 SELF DRILLING CARBON STEEL 0-3½" INSULATION - 1" LONG 3½-6" INSULATION - 1¼" LONG</p>
 <p>PANEL TO PANEL</p>	 <p>PANEL TO STRUCTURE</p>

RECOMMENDED DRILL SIZES FOR SELF-TAPPING FASTENERS

APPLICATION		FASTENER SIZE AND THREAD TYPE		
		# 10 TYPE A	# 14 TYPE A	# 14 TYPE AB
SHEET TO STRUCTURE	18 GA.	NA	NA	NO. 9
	16 GA.			NO. 7
	15 GA.			NO. 7
	14 GA.			NO. 7
	13 GA.			NO. 4
	12 GA.			NO. 4
SHEET TO SHEET		$\frac{1}{8}$ " DIAMETER	$\frac{1}{8}$ " DIAMETER	$\frac{1}{8}$ " DIAMETER

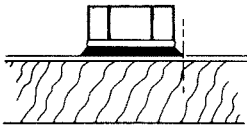


NOTE! Always wear OSHA approved eye protection when necessary, as well as adhering to all OSHA safety recommendations. **Safety first!**

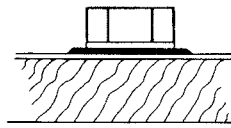
FASTENER INSTALLATION

Correct fastener installation is one of the most critical steps when installing roof panels. Drive the fastener in until it is tight and the washer is firmly seated. Do not overdrive fasteners. A slight extrusion of neoprene around the washer is a good visual tightness check.

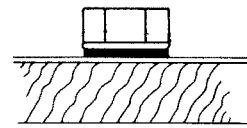
Always use the proper tool to install fasteners. A fastener driver (screw gun) with an RPM of 1700-2000 should be used for self-drilling screws. A 500-600 RPM fastener driver should be used for self-tapping screws. Discard worn sockets, these can cause the fastener to wobble during installation.



**CORRECT DEGREE
OF TIGHTNESS**
NOTE SLIGHT CIRCLE
OF SEALANT



TOO TIGHT!
SEALANT SQUEEZED TO THIN,
EXTRUDES FAR BEYOND
FASTENER HEAD



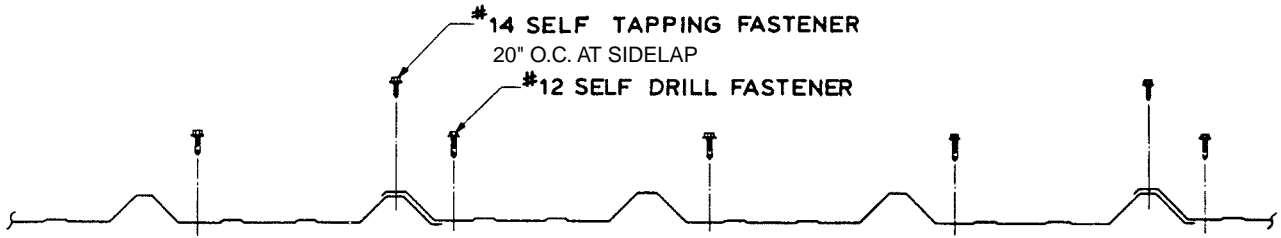
TOO LOOSE!
SEALANT IS NOT
COMPRESSED TO
FORM SEAL

NOTE! Always remove metal filings from surface of panels at the end of each work period. Rusting filings can destroy the paint finish and void any warranty.

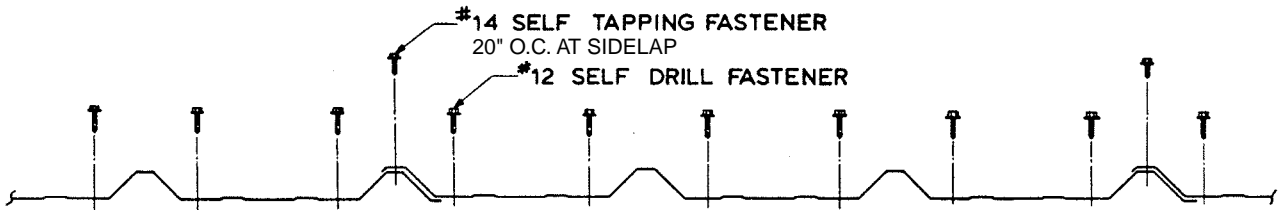
MASTIC SEALANT

Proper mastic application is critical to the weather tightness of a building. Mastic should not be stretched when installed. Apply only to clean, dry surfaces. Keep only enough mastic on the roof that can be installed in a day. During warm weather, store mastic in a cool dry place. During cold weather (below 60°) mastic **must** be kept warm (60°–90°) until application. After mastic has been applied, keep protective paper in place until panel is ready to be installed.

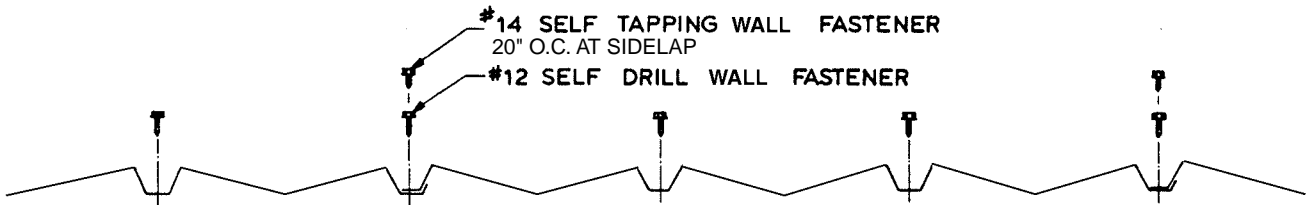
FASTENER LAYOUT



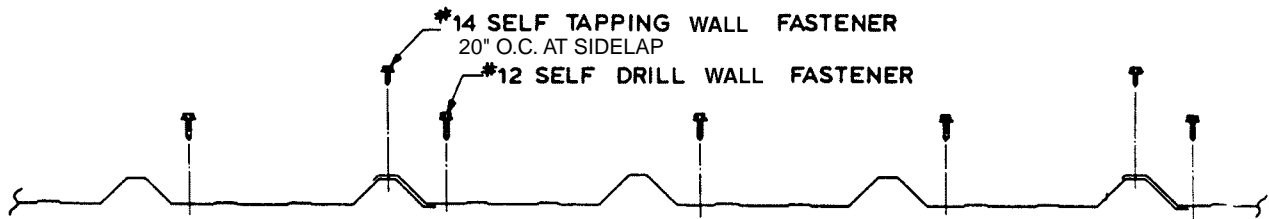
**"R" and "PBR" Roof Panel Fastener Spacing
Intermediate Purlins**



**"R" and "PBR" Roof Panel Fastener Spacing Eave Strut,
Wall and Roof Panel End Laps, Ridge Purlin, Base Angle, Eave Struts
Note! UL 90 Uplift Rated Roofs Require Fasteners At Each Side of High Ribs
At All Purlin On Certain "UL" Construction Systems And Eave Strut Locations
(Consult Your Specific Requirements Prior To Installation)**



**Architectural Wall Panel Fastener Spacing
Base Angle, Intermediate Girts, Eave Strut**

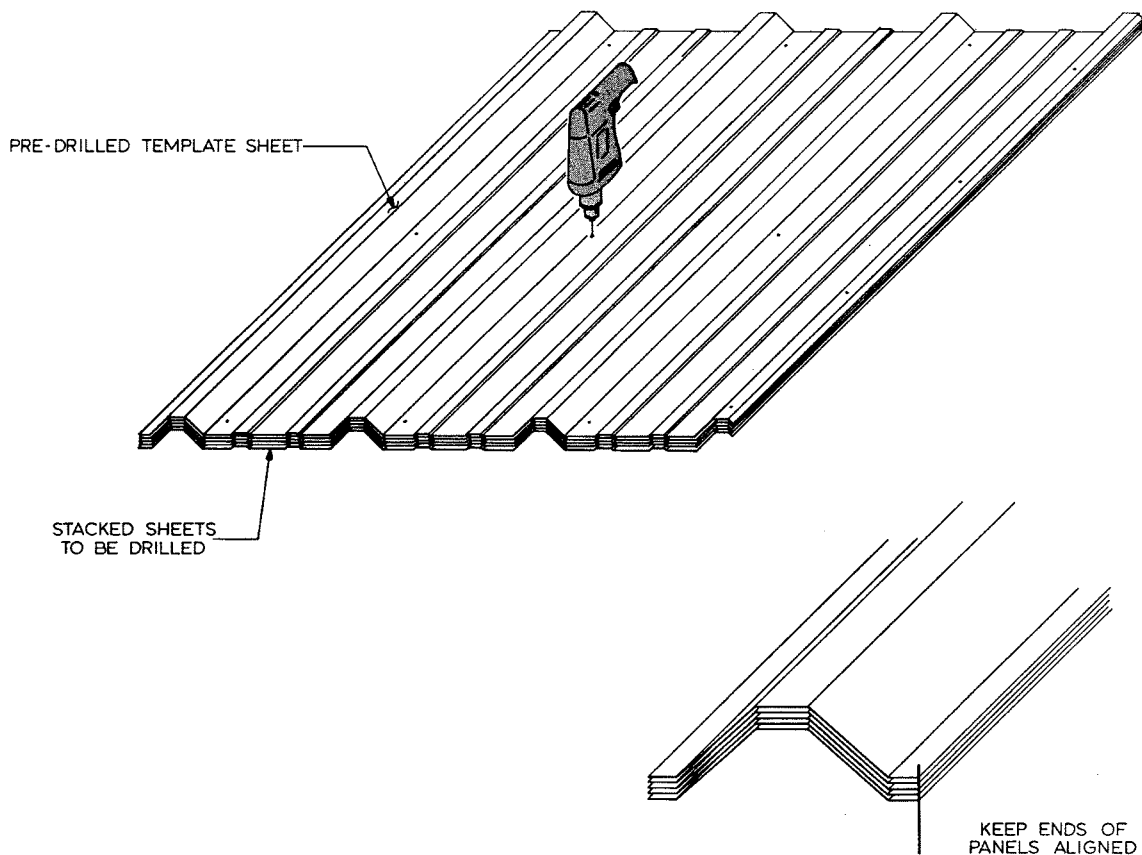


**"R" and "PBR" Wall Panel Fastener Spacing
Intermediate Girts**

NOTE! Do not overdrive fasteners!!

SCREW ALIGNMENT

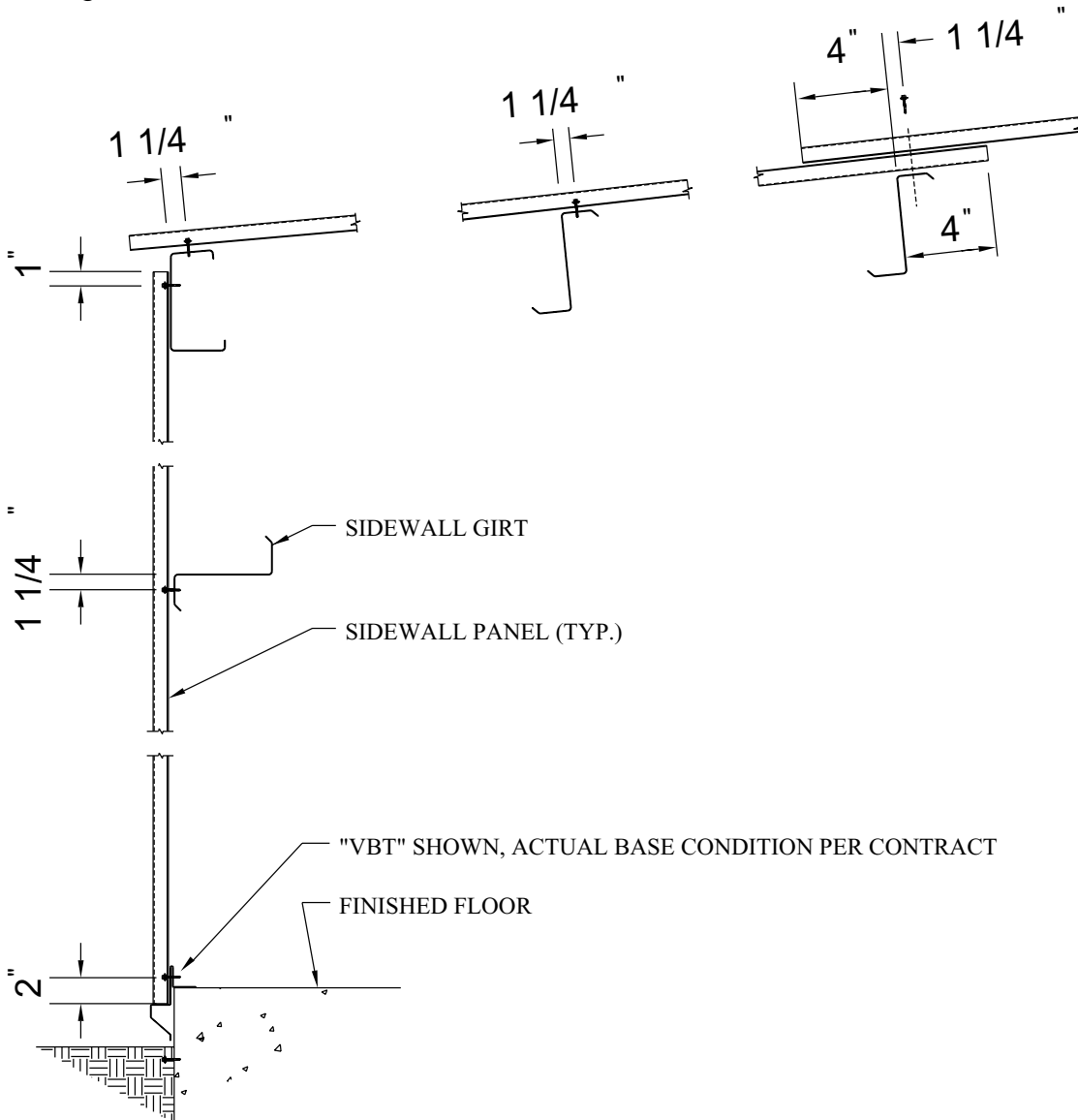
Good alignment of the screws, especially on the wall panels, will give a professional appearance to the wall panel installation. One way this can be accomplished is by pre-drilling holes in the panels at identical locations. Up to 15 panels can be stacked together and drilled using a template panel. Use $\frac{1}{8}$ " or $\frac{5}{32}$ " diameter drill bit for panel to structural fasteners and a $\frac{1}{4}$ " diameter bit for the sidelap clearance holes. It is important to clean metal filings off panel surfaces after drilling to avoid rust stains.



NOTE! Use OSHA approved eye protection when operating a drill. Electrical tools must be properly grounded. Do not use electrical tools or equipment while standing on wet surfaces. **Safety first!**

SCREW ALIGNMENT (CONTINUED)

The template panel should be laid out for the proper screw locations in accordance with the building erection drawings. Since pre-drilling will “hand” the panels, it will also be necessary to select the end of the building from which the paneling is to begin. Before drilling the template panel, it should be checked for proper hole locations against the building framework. Be sure there is no excessive deflection in the purlins and girts.

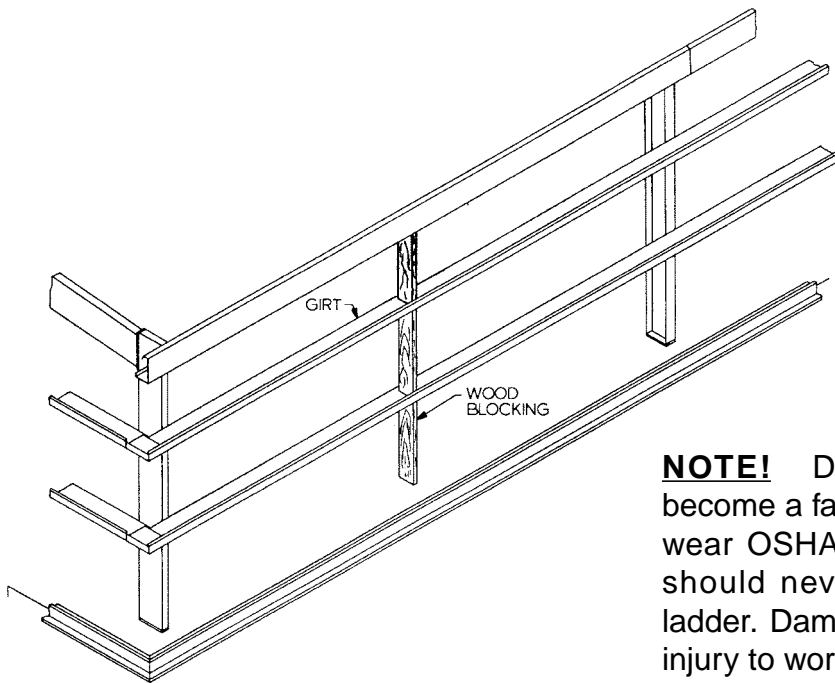


NOTE! Safety first!

ALIGNING THE GIRTS

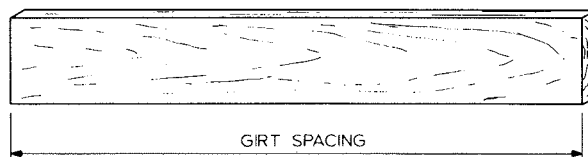
Installation of the building walls is generally done before the roof. Before starting the wall installation, check to be sure that the eave strut and girts are straight and plumb. One method of aligning the girts is to cut temporary wood blocking to the proper length and install between the lines of girts.. This blocking can be moved from bay to bay which will reduce the number of pieces required. Normally, one line of blocking per bay will be sufficient. Banding can also be used to hold the girts straight and plumb.

NOTE! Temporary girt blocking is not recommended on concealed fastener panels. The removal of the blocks after panel installation will cause oil canning.



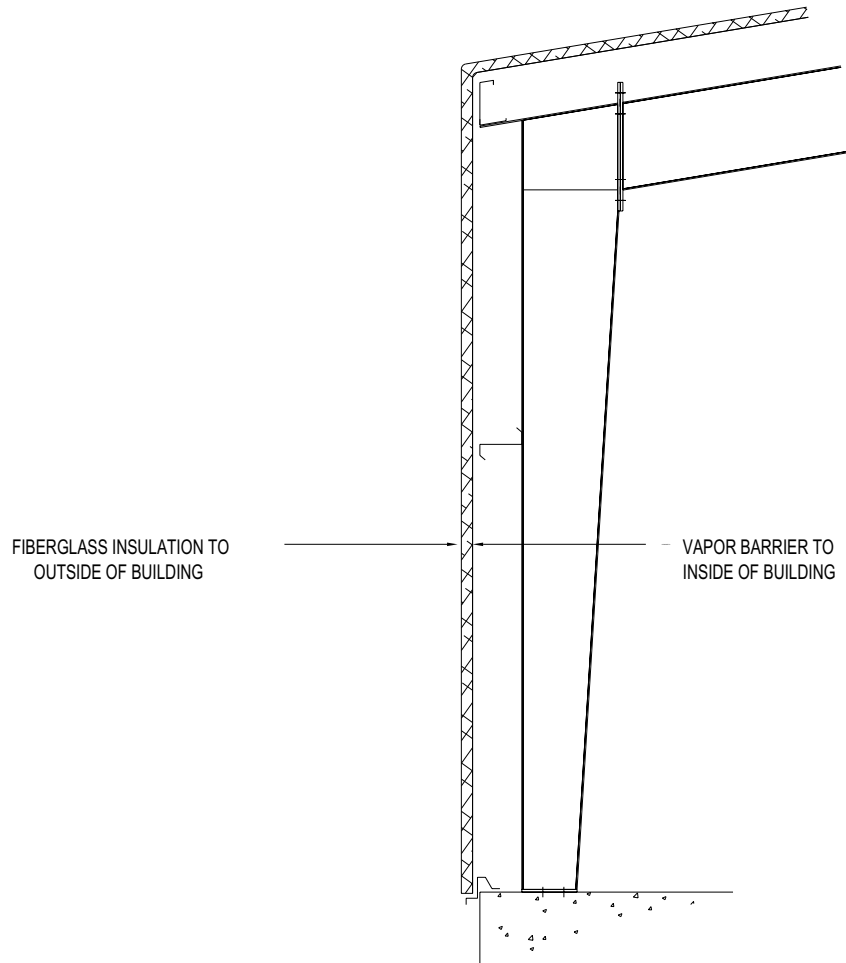
NOTE! Do not allow blocking to become a falling hazard. Workers should wear OSHA approved hard-hats. Girts should never be used as a climbing ladder. Damage to girt clips, as well as injury to worker may result. **Safety first!**

Typical construction of the wood blocking is shown below. A 2 x 4 minimum board size should be used. Refer to the cross section framing drawing that accompanied the building to determine the girt spacing.



WALL INSULATION

There are many types of insulation installed in pre-engineered steel buildings. However, fiberglass blanket insulation is the most common type used, and these instructions pertain to this type only. One side of the blanket insulation should have a vapor barrier that must face the inside of the building regardless of whether the insulation is for heating or cooling.



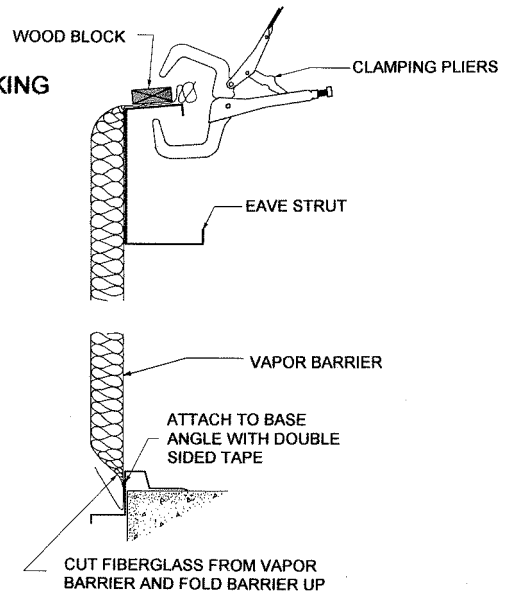
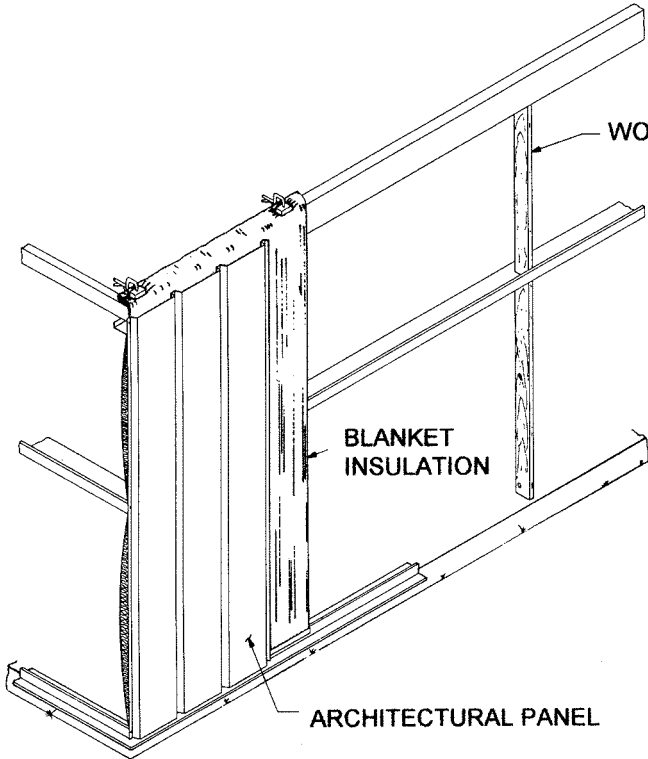
WALL INSULATION INSTALLATION

Cut the insulation to length allowing an additional 6" or more to facilitate handling. The wall panel can be used as a guide.

NOTE! The insulation must compress between the girt and the wall during installation. Insulation too thick or dense to compress adequately will induce waviness or oil canning in certain types of wall panels.

WALL INSULATION (CONTINUED)

The first run of wall insulation should be installed so that its forward edge is just ahead of the leading edge of the wall panel. The most widely used procedure is to use a 4 ft. starter run, then switch to 3 ft. or 6 ft. runs. This keeps the forward edge of the insulation 1 ft. ahead of the wall panel for joining the next blanket.



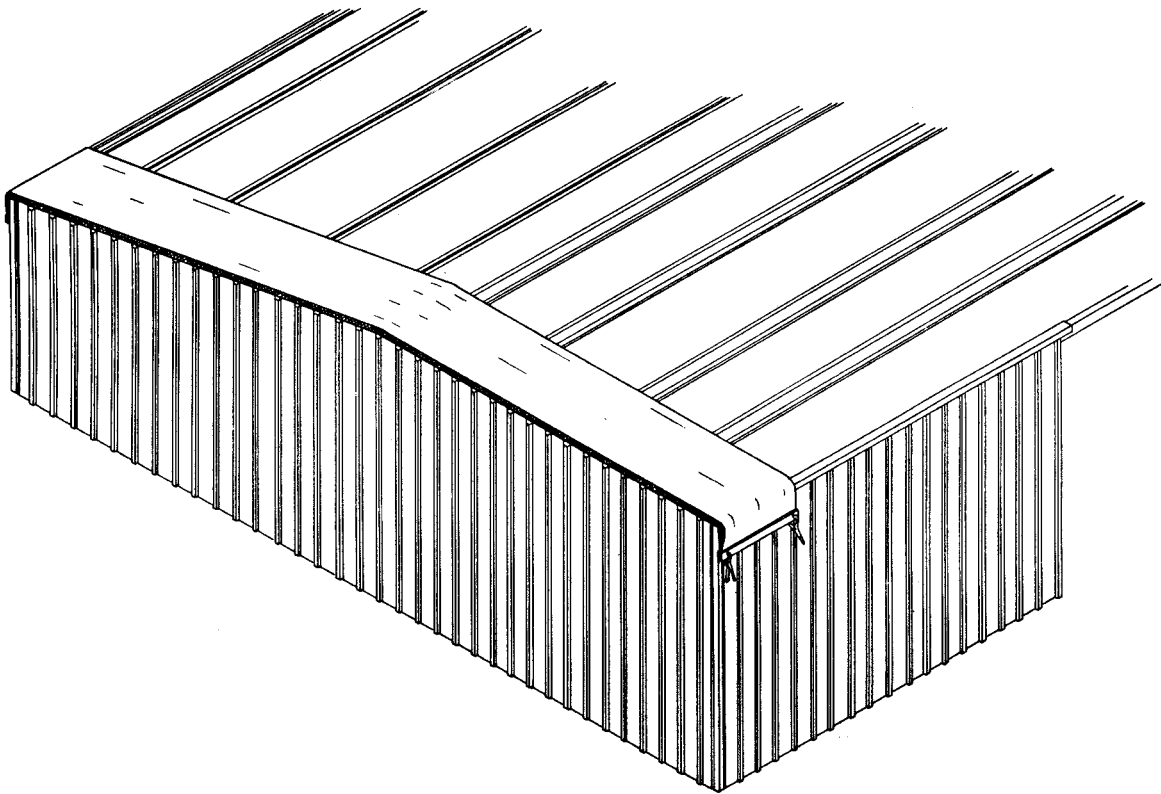
Top and Bottom

Note! Do not allow the insulation to wick moisture from the floor!

NOTE! Insulation has no load bearing strength. Do not lean or prop material against wall insulation. Observe all proper safety procedures when handling fiberglass insulation, such as dust masks, gloves, and long sleeved shirts, to minimize contact with the insulation fibers. **Safety first!**

ROOF INSULATION

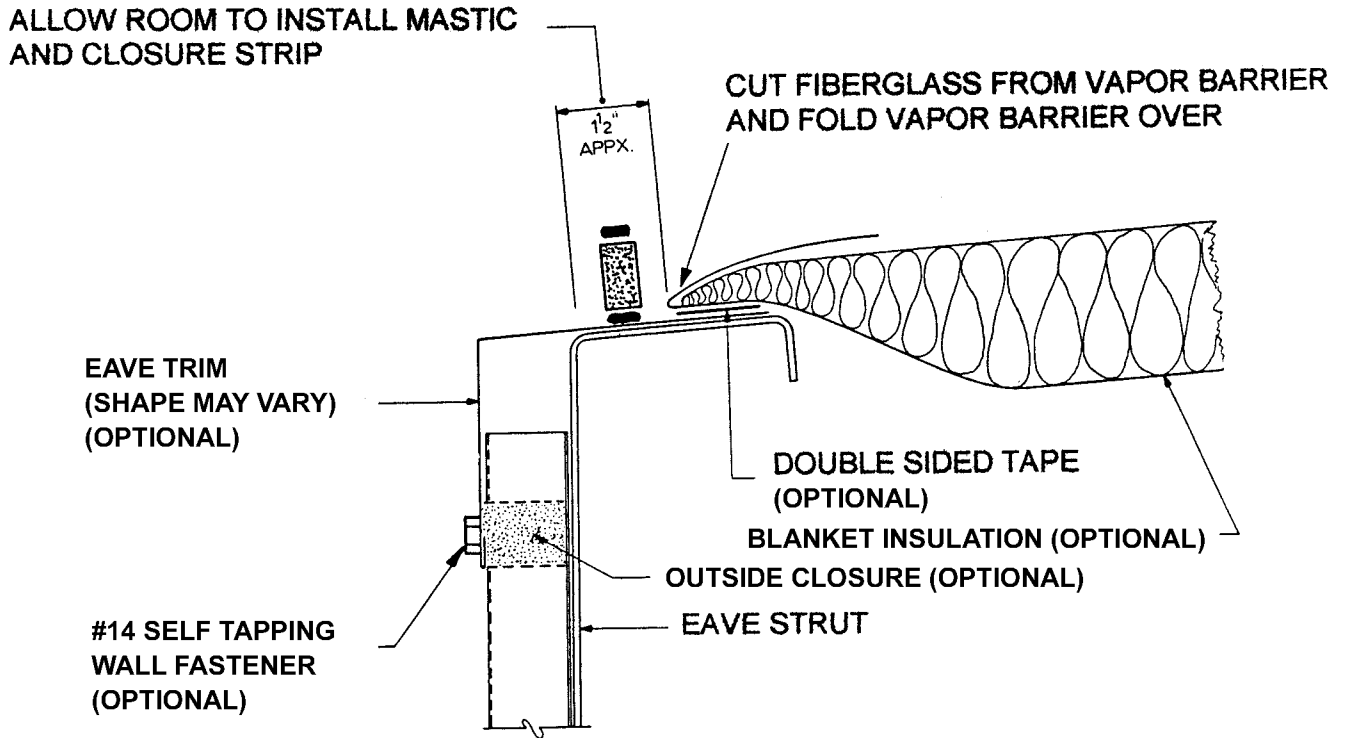
Pre-cut roof insulation to reach from eave to eave allowing approximately 2 feet of additional length to facilitate handling. Hold insulation at one sidewall and roll out insulation across the purlins, vapor barrier to the inside of the building. Stretch the insulation to provide a tight and smooth inside surface. Weights clamped to each end can be used to hold insulation taut.



NOTE! Insulation has no load bearing strength. Maintain body weight on approved scaffold or walk boards. Follow all OSHA recommended safety instructions regarding safety harnesses and/or nets to protect from falls!
Safety first!

ROOF INSULATION (CONTINUED)

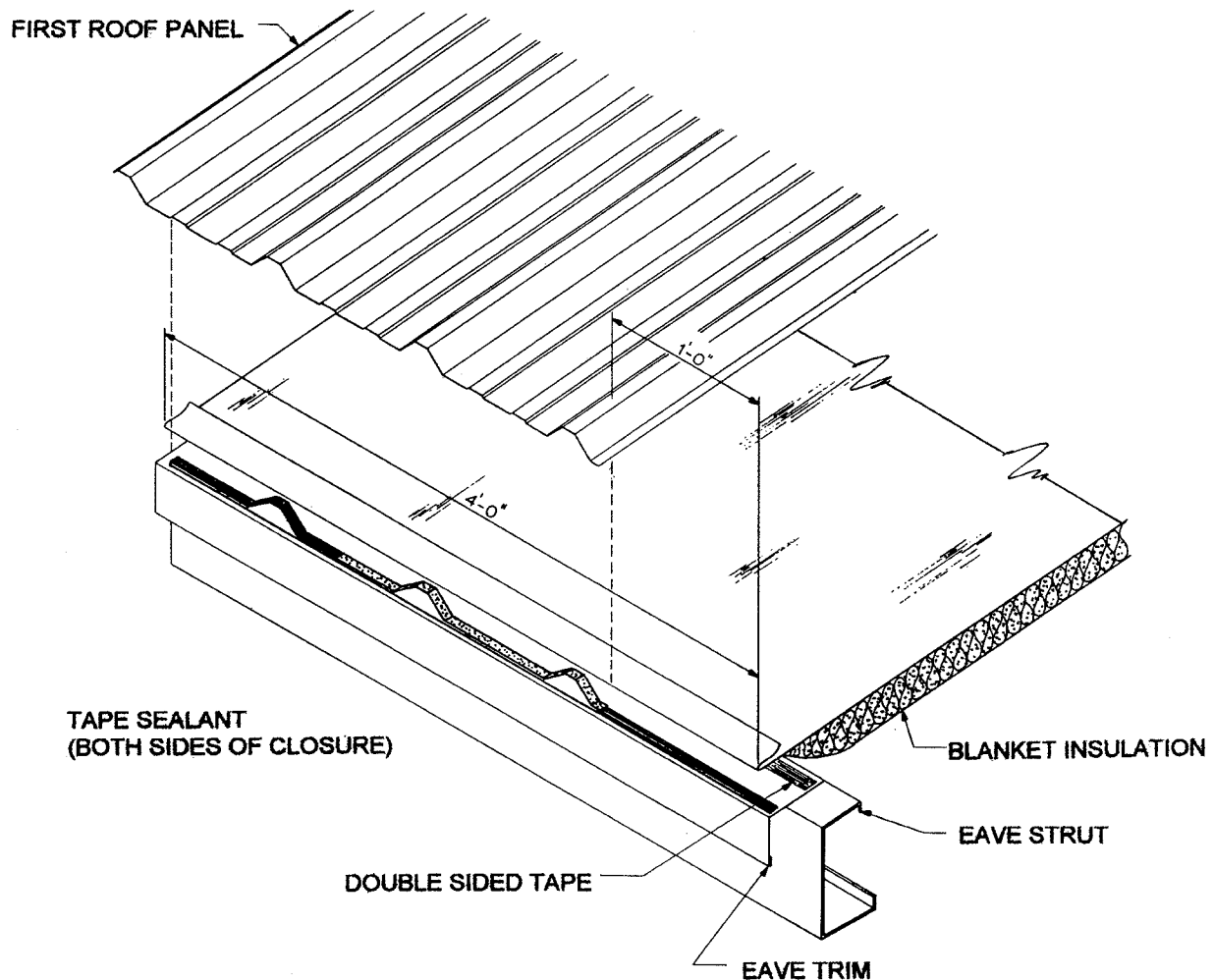
Double sided tape or contact adhesives can be used to hold insulation in place while the roof sheets are being installed. Trim excess insulation to the edge of the eave trim and cut fiberglass approximately 4 inches from end leaving only facing. Fold facing over end of blanket insulation to seal the ends.



NOTE! Do not install more insulation on the roof than can be covered by roof panels before the work period ends. Do not allow the insulation to become wet. **Safety first!**

ROOF INSULATION (CONTINUED)

A four foot starter roll of insulation is recommended to maintain the insulation joint ahead of the sheeting edge. Seal insulation sidelap joints with adhesives or fold and staple per manufacturer's instructions. As on the walls, the general sequence is to install the roof sheets in conjunction with the insulation.



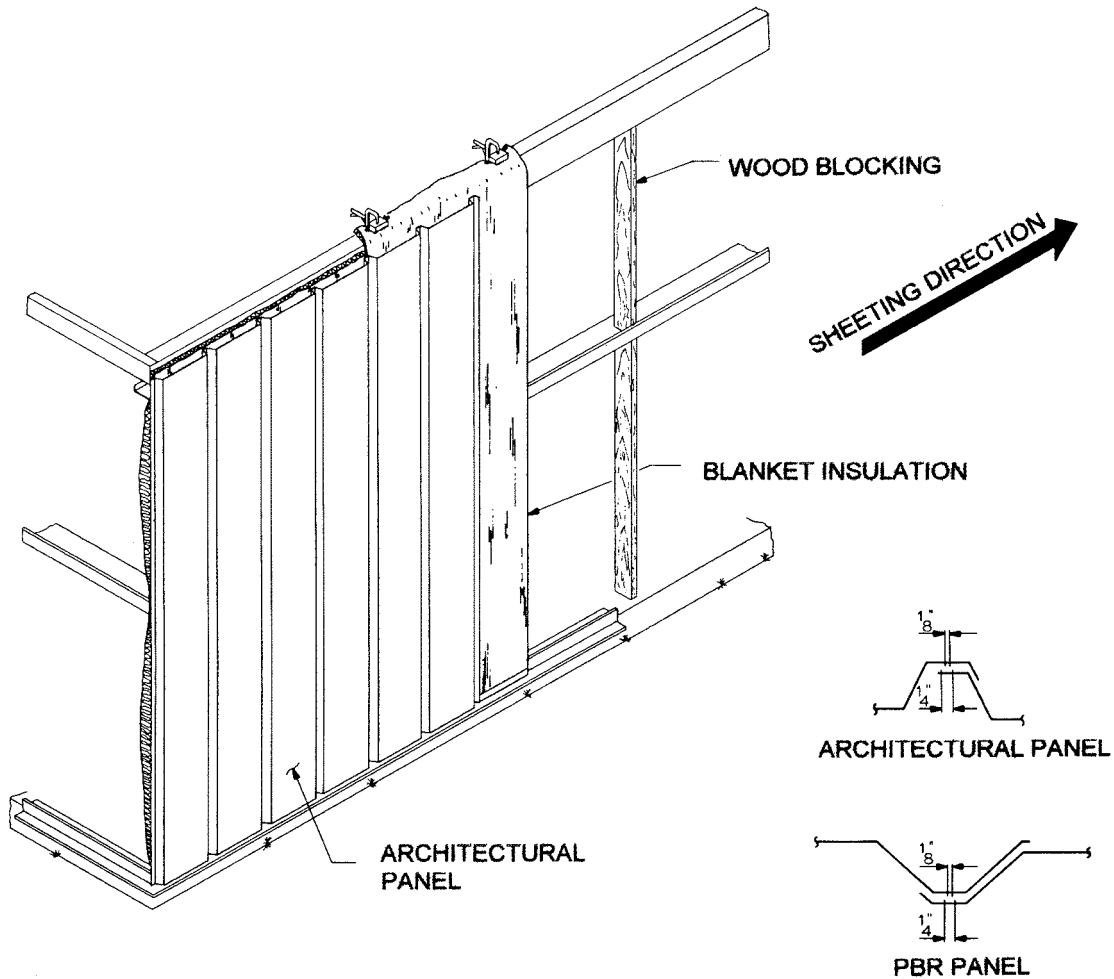
NOTE! Wipe oil and other slippery substances from roof panels. Do not step on rib of panel, near a crease in the panel, near a side edge or within five feet of the end of unsecured panel. Use OSHA approved tie offs, netting or rails when working on roof. Insulation has no load bearing strength. Maintain body weight on approved scaffold or walk boards

Safety first!

NOTE! The insulation sidelap must be sealed to prevent condensation and minimize temperature loss at laps.

INSTALLATION OF WALL PANELS

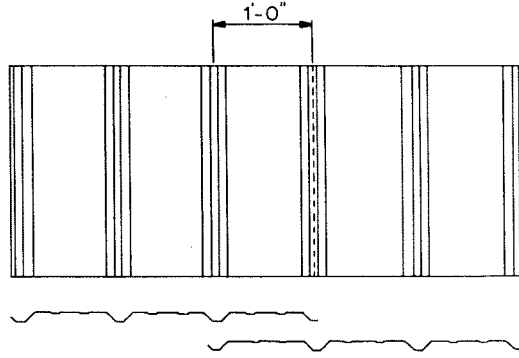
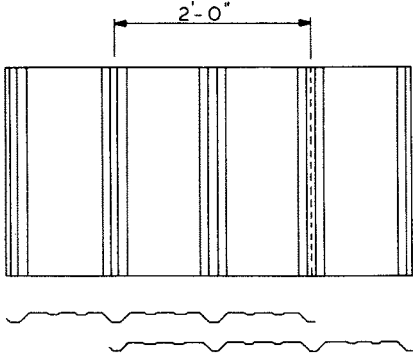
Adjoining panels are installed with the pre-drilled overlapping rib toward the last erected panel. Position panel to structural making sure that it is kept plumb. Drill structural if required and install fasteners at lapped rib. Check for proper coverage and correct as necessary. Install remaining fasteners. Note that clearance holes in overlapping rib must be pre-drilled.



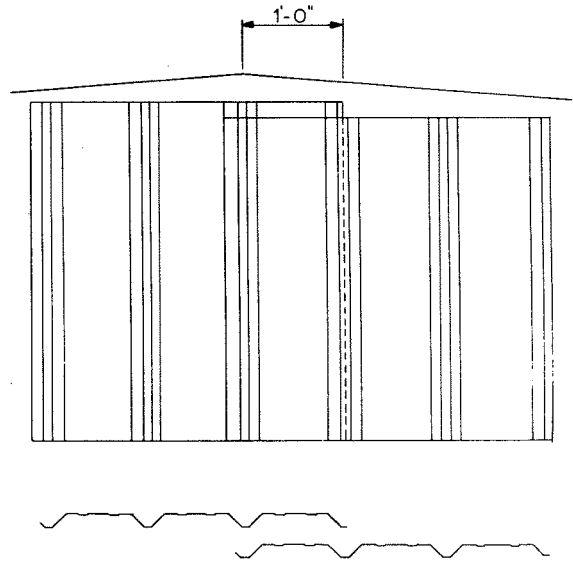
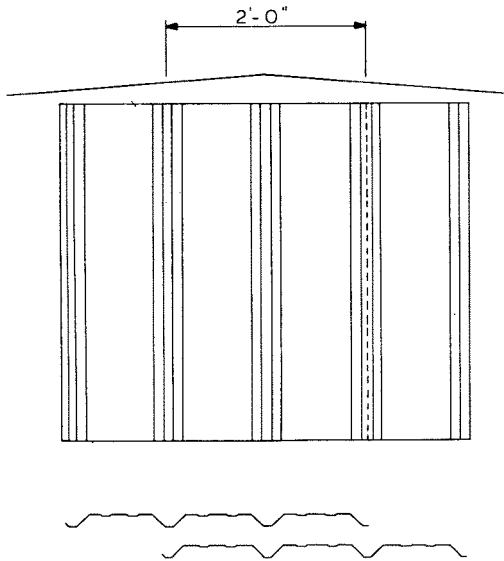
NOTE! Wear OSHA approved eye protection when operating drill. Electric tools must be properly grounded. Do not use electrical equipment while standing on wet surfaces. **Safety first!**

INSTALLATION OF WALL PANELS (CONTINUED)

Backlapping the panels 1 foot or 2 foot is routinely done to match panel coverage with the building width and length. On the sidewall this is done with the last panel installed. On the endwall this is normally done near the center and will be marked on the erection drawings.



SIDEWALL



ENDWALL

NOTE! Always follow all OSHA safety recommendations. Remember, **Safety first!**

SAFETY PRECAUTIONS FOR ROOFING WORK

THE MANUFACTURER strongly recommends that erection employees be continuously trained and re-trained in safe and productive work practices. Working on the roof area in the installation of roof structurals, insulation or roof panels requires proper training, correct equipment and constant alertness to minimize the danger of falls. Hard hats should be worn on job sites to prevent injury from falling objects. Safe work practices on all erection duties should be carefully reviewed with erection crews prior to beginning each job

NEVER STEP ON SKYLIGHTS OR TRANSLUCENT PANELS!!!!!!!



Panels May Collapse If Not Properly Secured

Roof panels must be completely attached to the purlins and to panels on either side before they can be a safe walking surface. Skylights or translucent panels can never be considered as a walking surface.

Partially attached or unattached panels should never be walked on!

Do Not:

1. Step on rib at edge of panel.
2. Step near crease in rib at edge of panel.
3. Step within 5 feet of edge on unsecured panel.

A single roof panel must never be used as a work platform. An OSHA approved runway should be used for work platforms! (consult OSHA Safety and Health Regulations for the Construction Industry). **Safety first!**

SAFETY NOTE! CAUTION!!! PANELS MAY BE SLICK

Because of the demands of the manufacturing process, oil has been applied to the coil stock to protect the coil, as well as the finished panel during manufacturing, shipping and storage! Metal panels must be wiped clean prior to panel installation.

NOTE! Always wear rubber sole work boots! When on the roof, use OSHA approved protection devices such as safety lines, safety nets or catch platforms.



UNSECURED PANELS MAY SLIP IF STEPPED ON!

Employees should be continuously warned to never step on a single unsecured roof panel, or a stack of roof panels laying unattached on the purlins.

Secure each end of the panel with clamps or appropriate fasteners and place walkboards of adequate size and strength in the flat of any panels not fully secured to the purlins and supported by panels on each side. Walkboards should run the full length of the panel and be fastened together by drilling a hole near the end of each board and tied with rope to the next board.

Cut a groove in the bottom of each board so that the board will lie flat and not tip back and forth because of the rope.

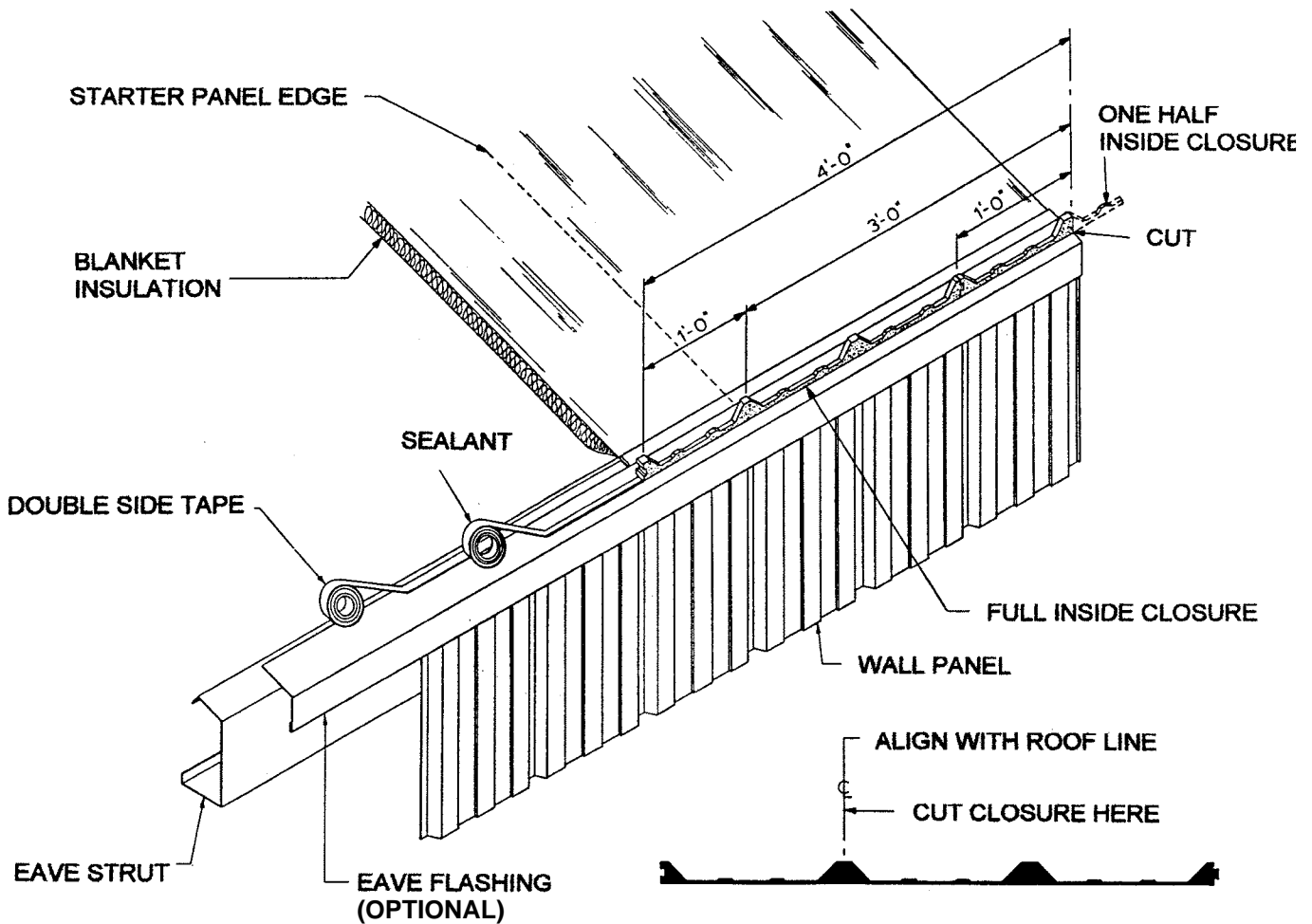
SAFETY PRECAUTIONS

All safety precautions referred to throughout this manual, as well as all OSHA safety requirements or other customary or statutory requirements must be adhered to in order to maximize employee safety.

Daily meetings describing safe work procedures, use of hard hats, rubber sole shoes for roof work, proper equipment for handling material and protection devices are recommended. **Safety first!**

PREPARING THE EAVE

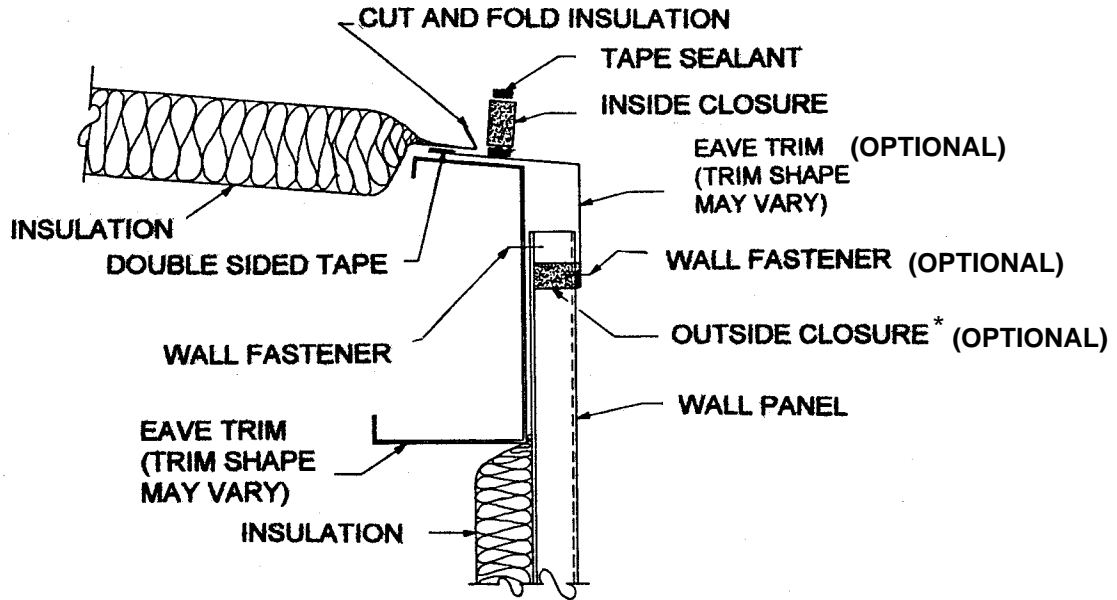
After installing the first run of insulation, prepare the eave for the first roof panel by applying tape sealant along the eave outside of the insulation and leaving release paper in place. Sealant must be applied in a straight line and without voids. Do not stretch the sealant. Use a knife to cut if necessary. Cut an inside closure strip as shown and place starter piece on top of the sealant (removing protective paper from the sealant only as required). Align the major rib of the closure with the edge of the endwall roof line. Splice a full closure to the starting closure and apply along the top of the eave sealant. If roof is subject to ice and snow build-up, the splice in the closure strip must be caulked to insure weathertightness.



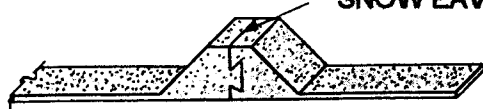
NOTE! Insulation has no load bearing strength. Maintain body weight on approved scaffolding or walk boards. **Safety first!**

PREPARING THE EAVE (CONTINUED)

Along the top of the closures that have been placed along the eave, *apply a second run of tape mastic*. Prior to removing paper backing, check and mark for proper alignment of the first roof panel.. Note that self-tapping screws will require holes be drilled in the supporting structure prior to installation. Continue mastic and closure run along eave in preparation for the next roof panel.



CAULK CLOSURE SPLICE WHEN ICE & SNOW EAVE CONDITIONS MAY OCCUR

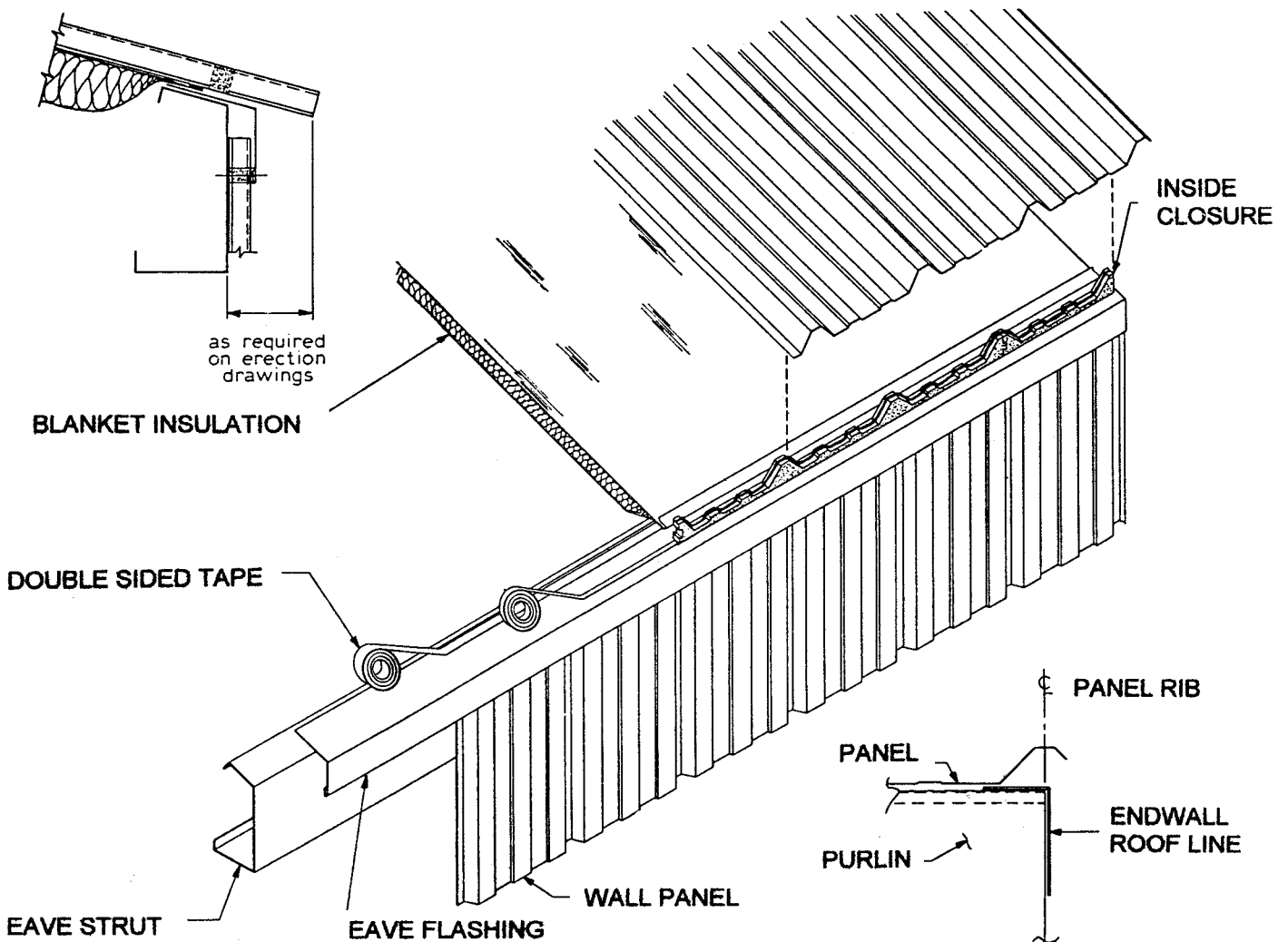


NOTE! Safety first!

*** Outside closure is optional**

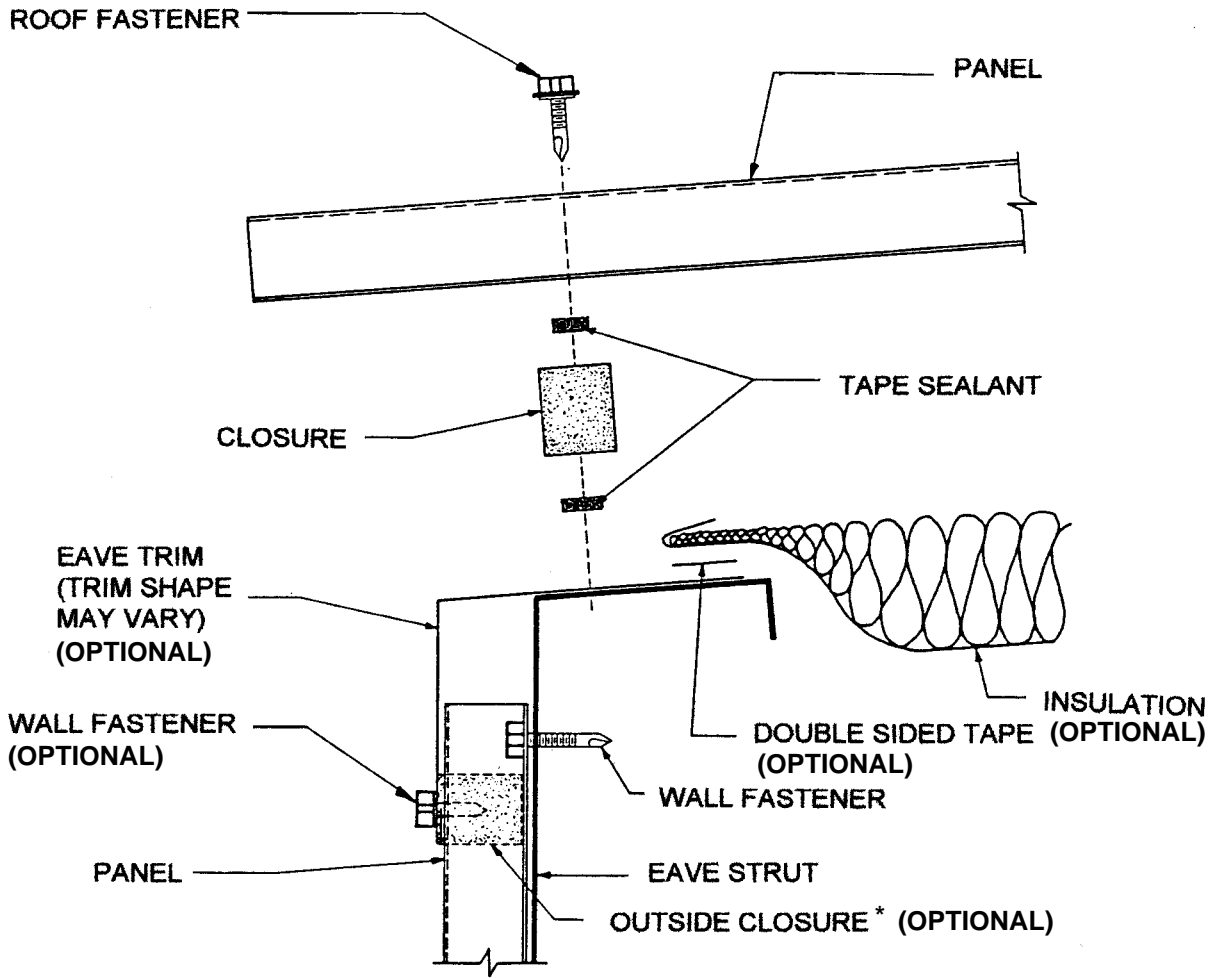
INSTALLATION OF FIRST ROOF PANEL

Once the eave is prepared, the first roof panel may be installed. Check the erection drawings to determine the roof overhang at the eave. Set the roof panel in place over the inside closure (after removing the paper from the mastic) insuring the major ribs of the panel nest properly with the inside closure. Align the panel edge with the edge of the endwall roof line. With the panel properly placed, secure the panel to the structure with appropriate fasteners. If the building requires more than one panel per run, do not install fasteners at the purlin located at the upslope end of the panel. These fasteners will be installed after the overlapped panel is installed.



NOTE! Do not walk on unsecured panels. Wipe oil and other slippery substances from roof panels. **Safety first!**

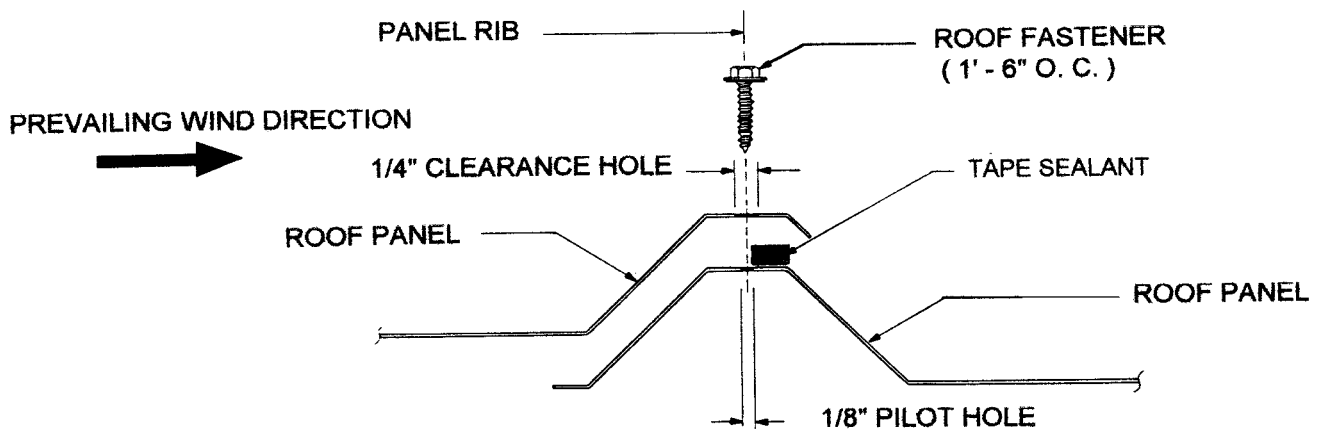
SECTION AT EAVE



Note! Safety first

SEALING THE SIDELAP

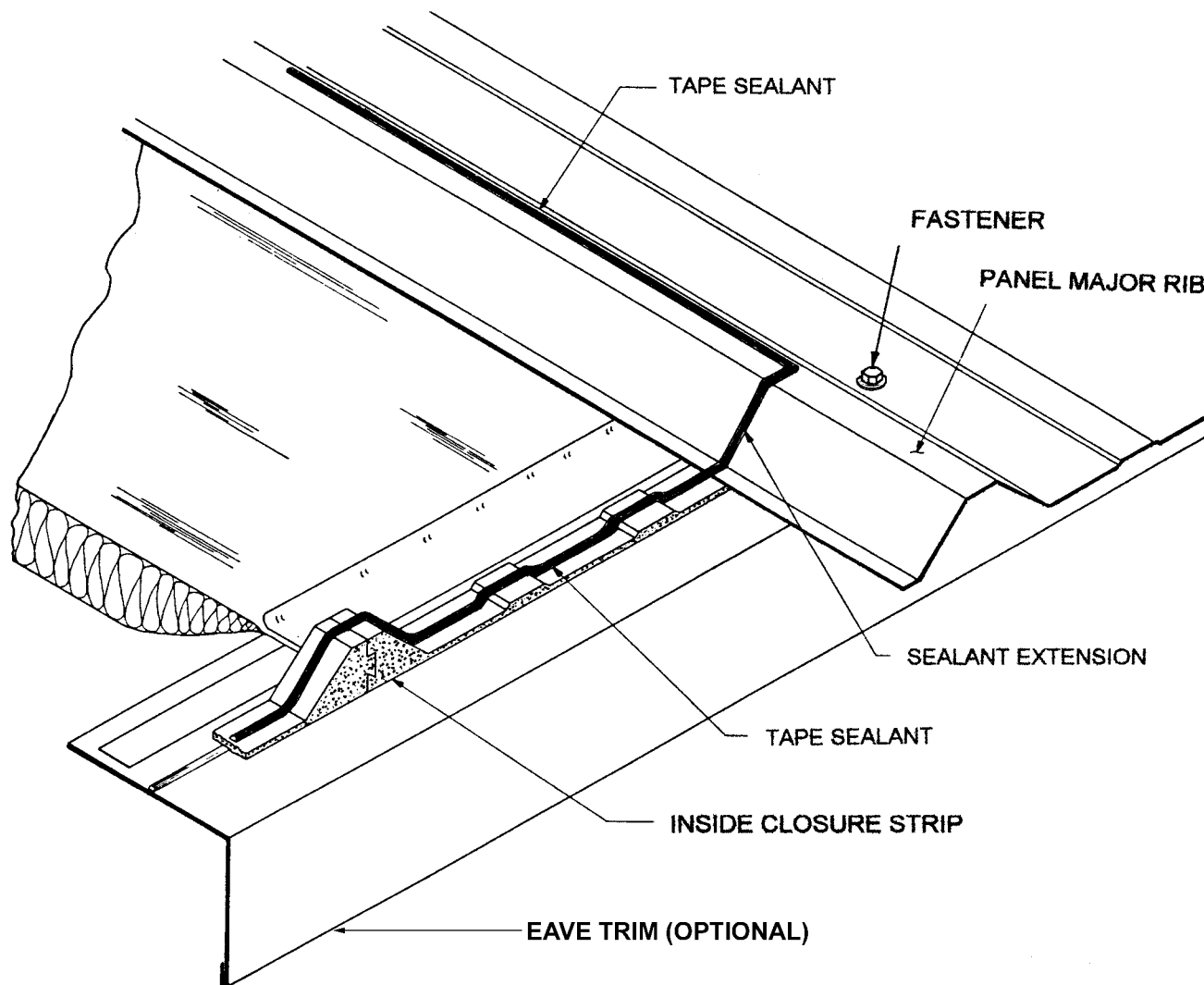
Apply the sidelap tape sealant to the weather side edge of the lower panel's major rib as shown. The tape sealant should only be applied to clean, dry surfaces. With the release paper in place, press firmly along the length of the sealant to insure proper adhesion. In removing the protective paper from the tape sealant, care should be taken not to pull the tape sealant away from the panel. Install the adjoining panel positioning the overlapping rib with care. Drill, at the center of the clearance holes in the overlapping panel, $\frac{1}{8}$ " pilot holes for the lap fasteners. Stitch the lap with the No. 14 self-tapping fasteners supplied with the job. Never allow the sealant to be placed in other locations.



NOTE! Use OSHA approved eye protection when operating a drill. Sweep up all drill shavings from panels at end of each work period to minimize surface rust and damage to panel finish **Safety first!**

SEALING THE EAVE

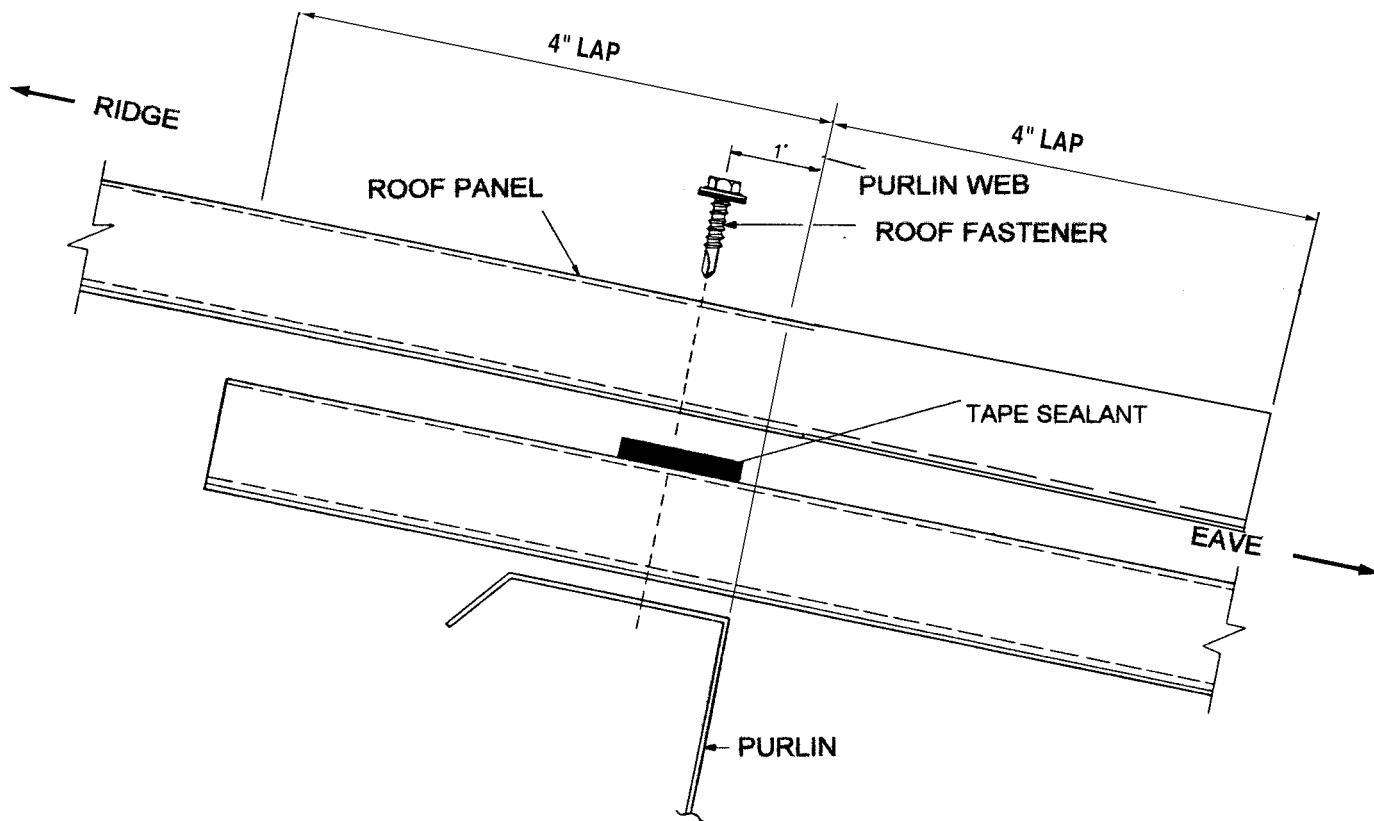
Tape sealant location at the eave is critical. To insure a weather tight seal, the sidelap sealant must extend down from the top of the rib to the sealant on the eave closure. The sealant extension must splice into the eave mastic.



NOTE! Workers should maintain a constant awareness of their location in relation to the roof edge at all times. Follow all OSHA recommended safety suggestions. **Safety first!**

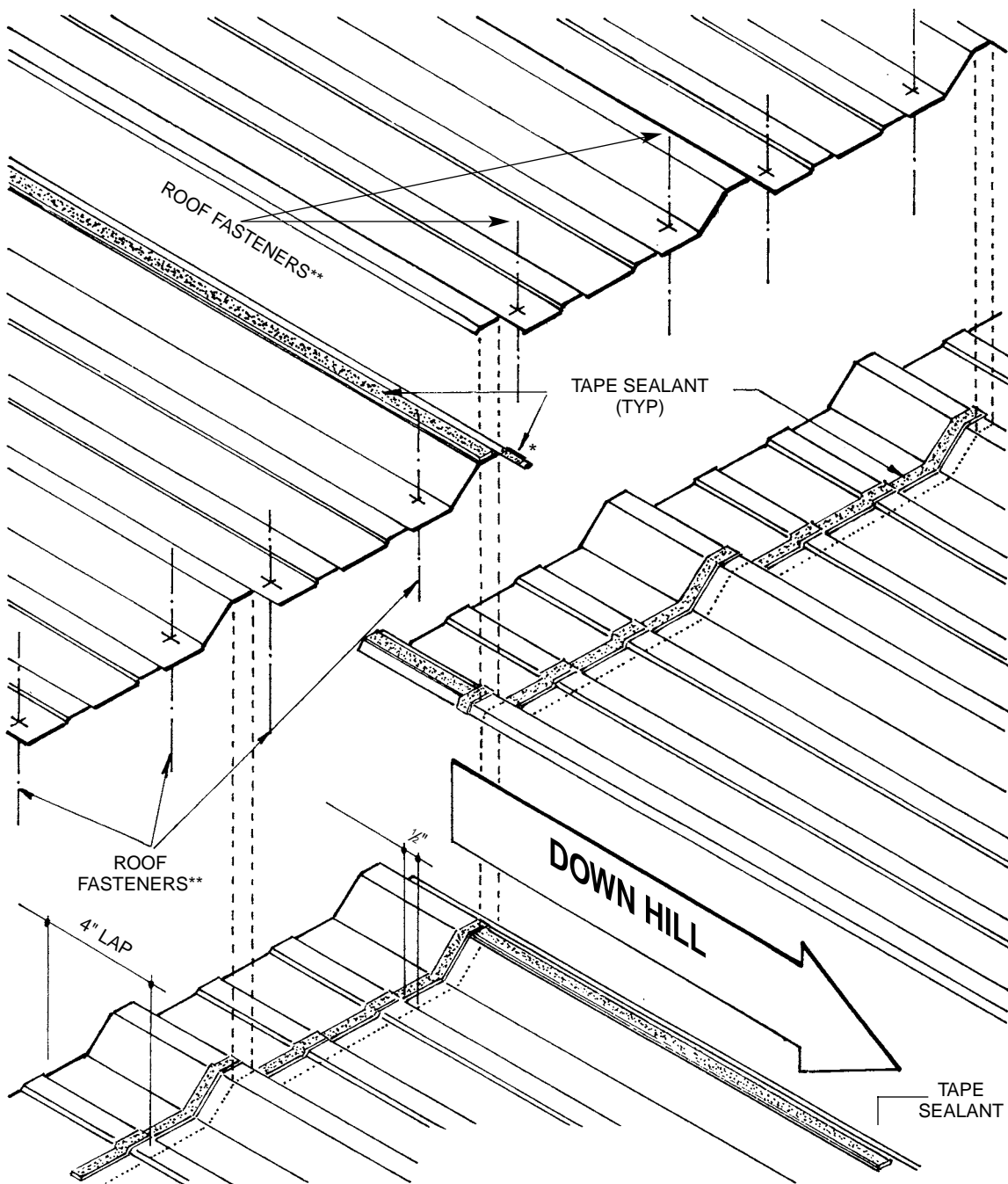
SEALING THE ENDLAPS

At the panel endlaps place a run of tape sealant across the full panel width $\frac{1}{2}$ " below the fastener line. The panel endlaps have a 4" minimum overlap located over a purlin as shown. Locate the fasteners 1" above the purlin web according to the fastener layout .



NOTE! Do not step on panel endlaps until fully secured with fasteners
Safety first!

PANEL ENDLAPS



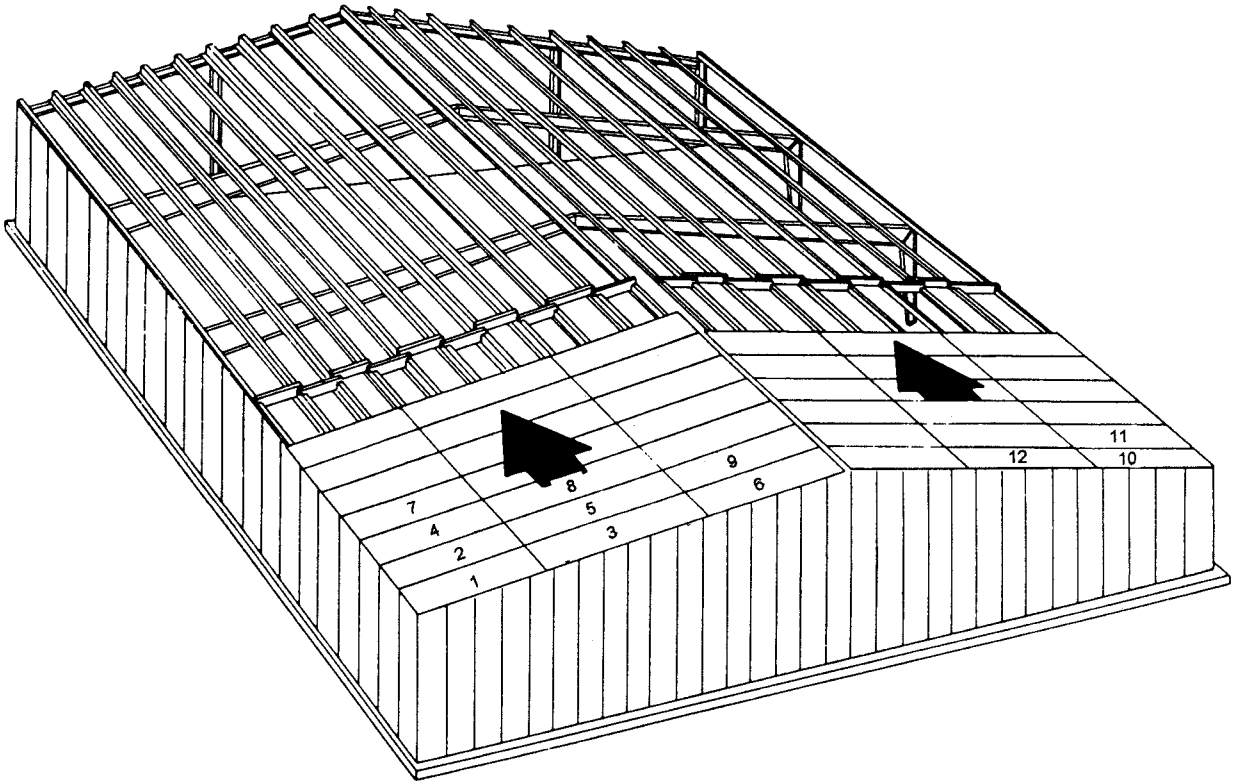
* Apply tape sealant to far side of major rib to complete seal at Panel Lap.

** Structural Fasteners must be placed on the uphill side of mastic.

NOTE! Each worker should be trained to use the safest and most productive erection techniques. **Safety first!**

ROOF SHEETING SEQUENCE

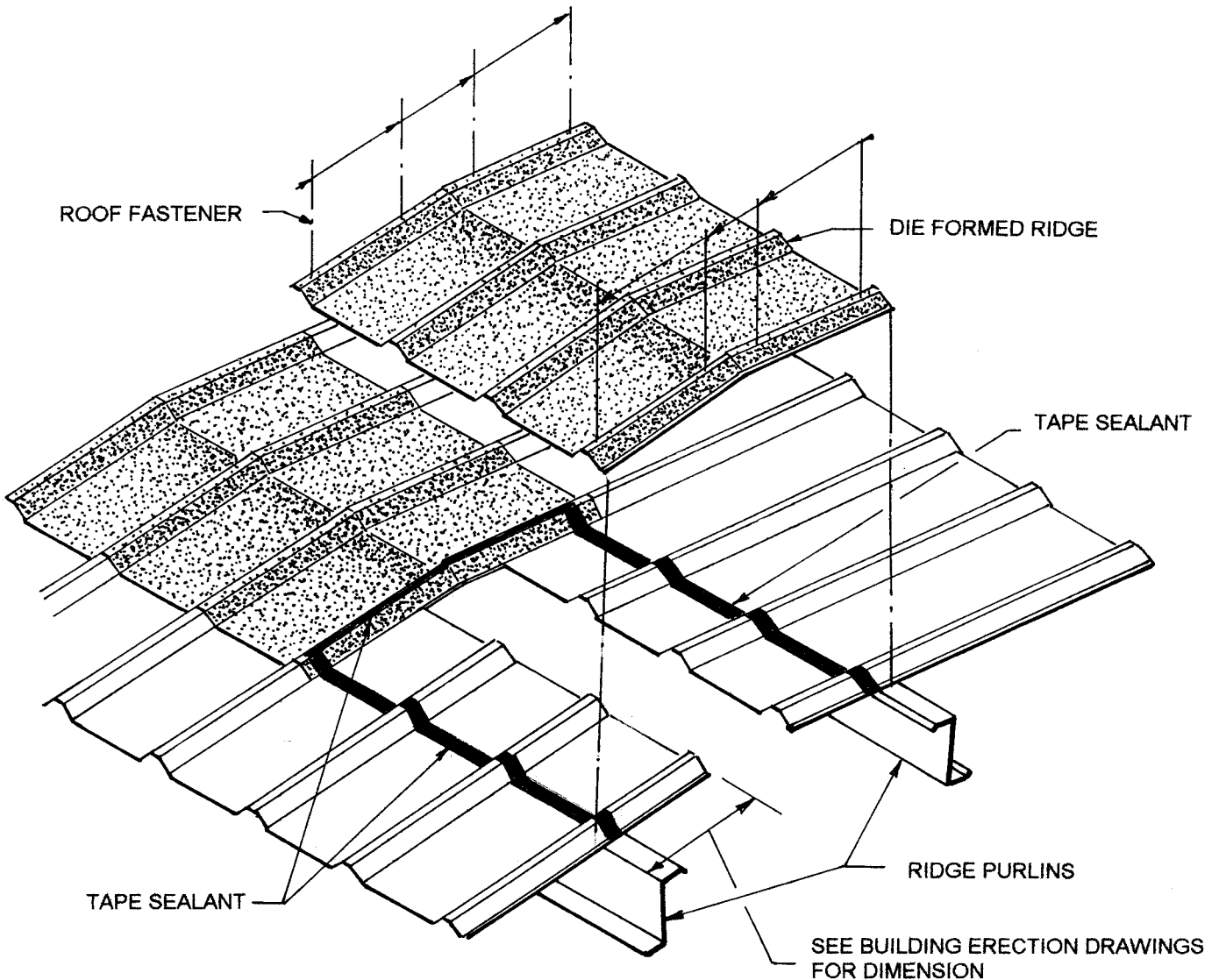
It is recommended that both sides of the ridge of a building be sheeted simultaneously. This will keep the insulation covered for the maximum amount of time and the panel ribs can be kept in proper alignment for the ridge panel. Check for proper coverage as the sheeting progresses. *Note panel sheeting sequence below!*



NOTE! If oil or other slippery substances are present on the roof panels, wipe them clean immediately to prevent slipping or falling. Workers should maintain a constant awareness of their location relative to the roof edge. Use OSHA approved tie offs, netting's or rails when working on roof surfaces. **Safety first!**

DIE FORMED RIDGE INSTALLATION

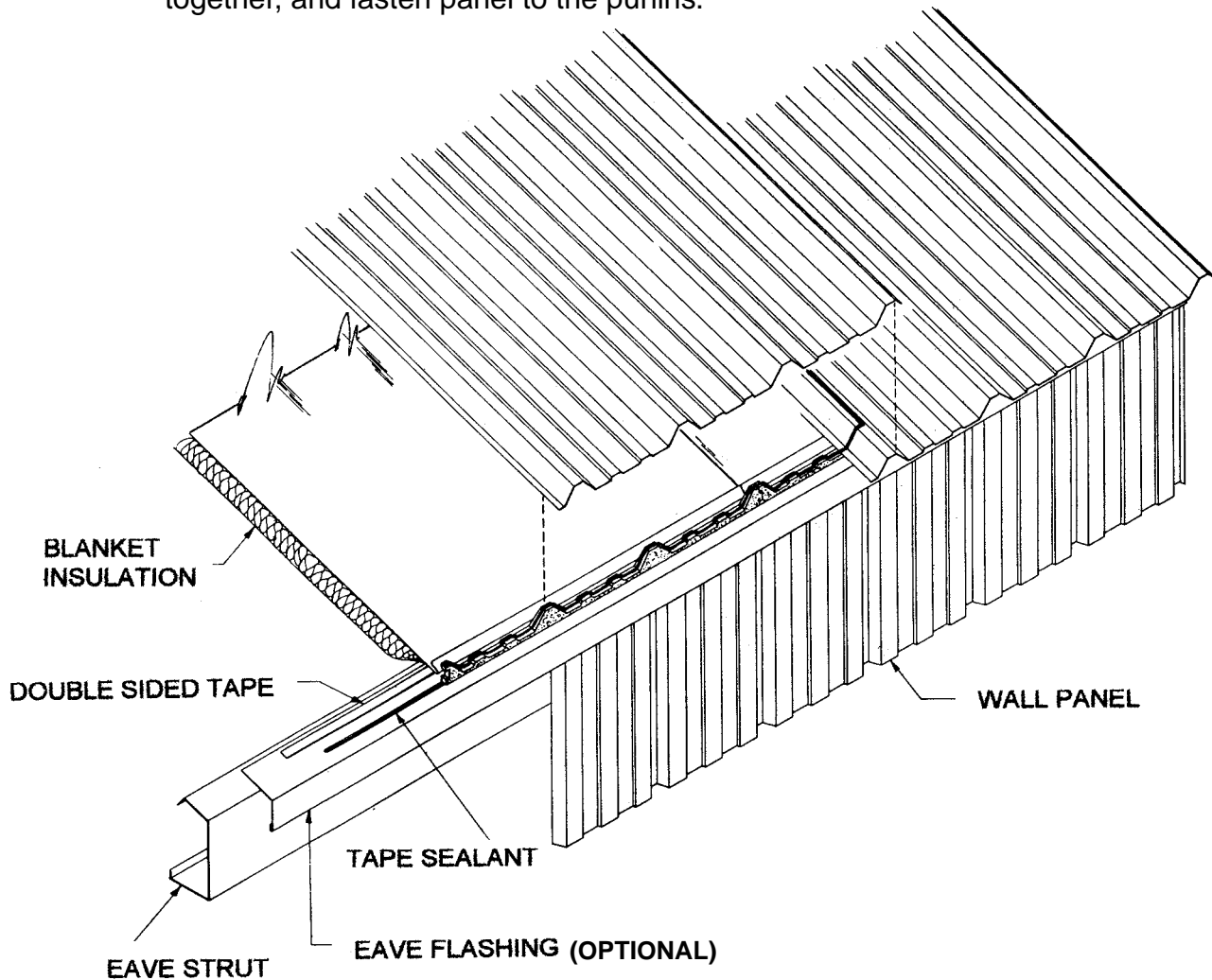
Die formed ridge panels are to be installed as each side of the roof is sheeted. This will aid in keeping both sides of the roof aligned. After having installed a run of panels on each side of the roof, apply sealant to the panels as shown. Set die formed ridge panel in place and install lap and purlin fasteners. Apply tape sealant along the top of the leading rib to prepare for the next sidelap.



NOTE! Do not walk on unsecured ends of panels. **Safety first!!**

INSTALLATION OF ROOF PANELS

With the first panel run installed and secured, and sidelap sealant applied, the second panel run may be started. Prepare the eave with an inside closure and tape sealant as shown previously. Position the panel so that the overlapping ribs will nest properly. Be sure to check for proper overhang and panel coverage. Stitch the major ribs of the two panels together, and fasten panel to the purlins.

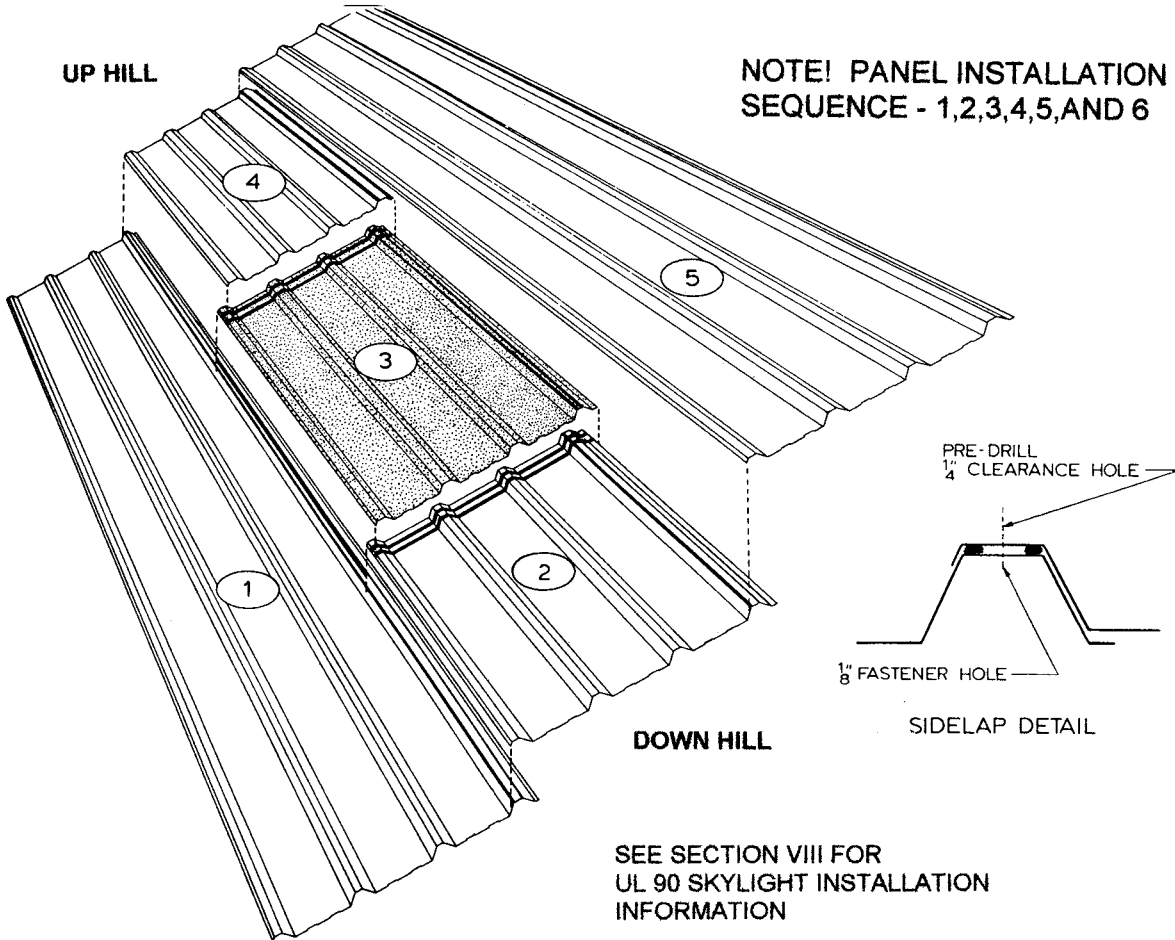


NOTE! Safety first!

NOTE! Sweep up all drill shavings from panels at end of each work period to avoid surface rust and damage to panel finish.

SKYLIGHT INSTALLATION

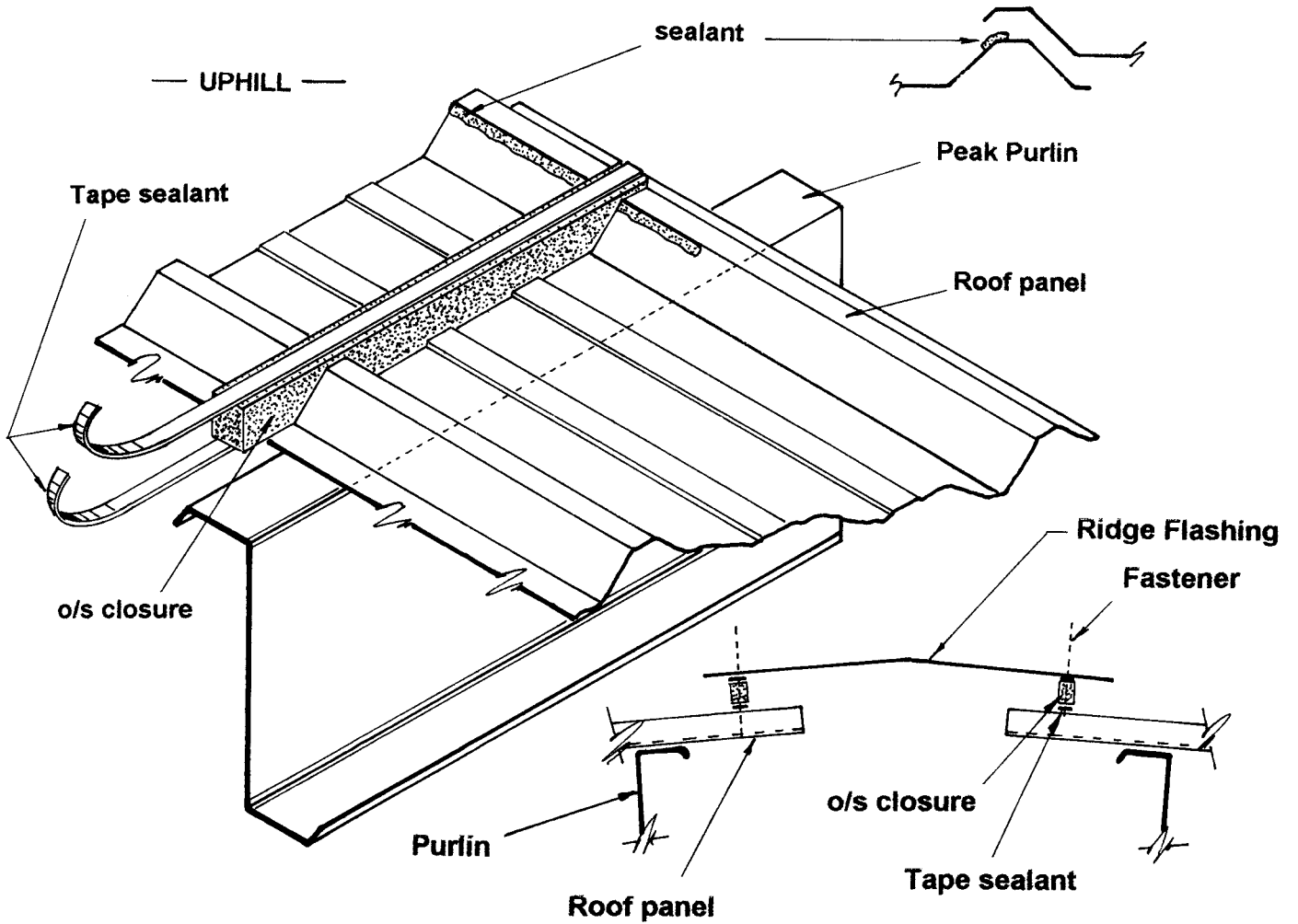
Skylight panels are installed using the same procedures as a steel panel. Care should be taken when installing fasteners in the skylights to avoid cracking the material. Pre-drill $\frac{1}{4}$ " diameter fastener clearance holes in the overlapping sidelap and endlap.



NOTE! Do not under any circumstances step or walk on surface of skylight. If foot traffic is necessary over skylight, use walk boards that are properly supported by building purlins. Placing of "DANGER, DO NOT WALK" markings on every skylight must be done without fail. **Safety first!**

TAPE SEALANT APPLICATION AT RIDGE FLASHING

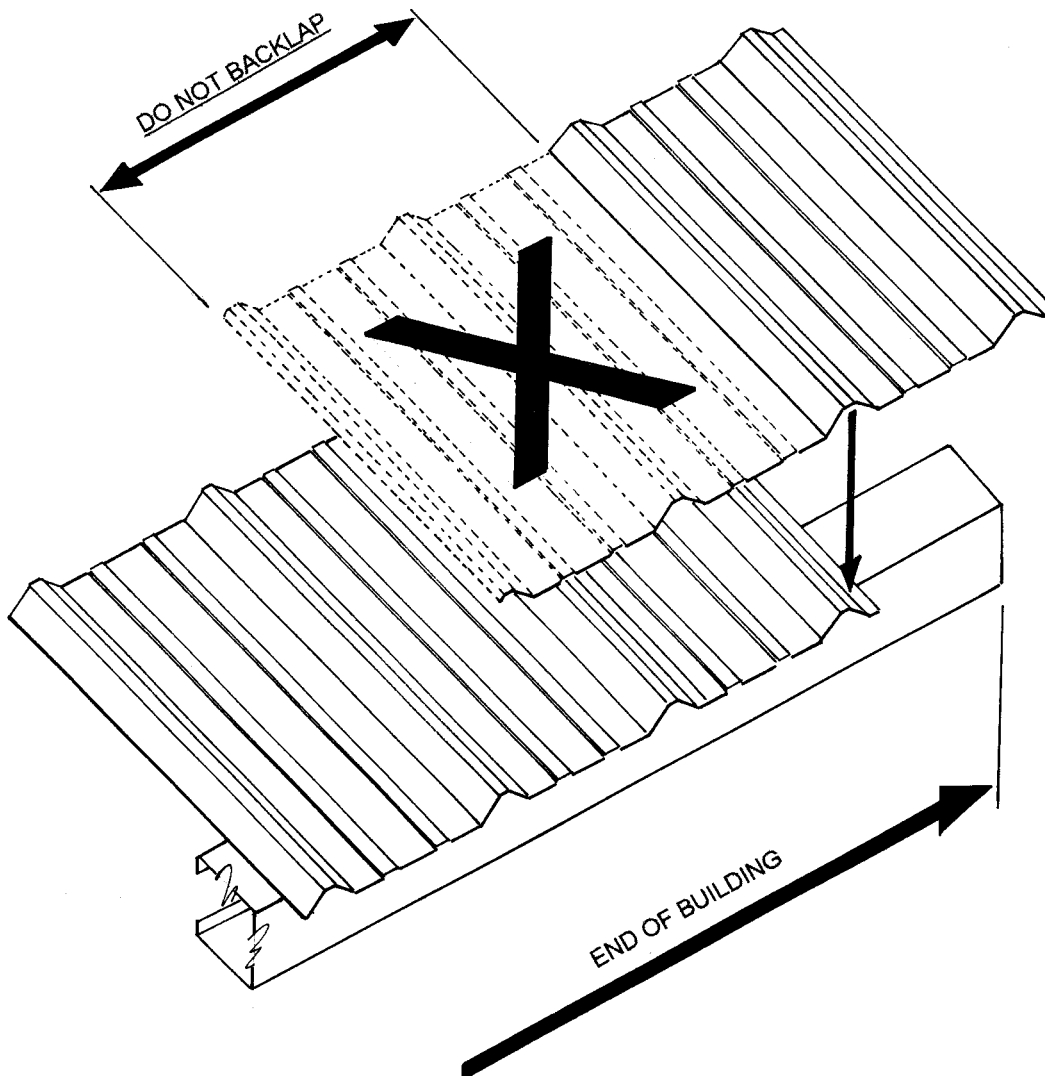
Apply panel sidelap tape sealant as shown for building with ridge flashing and outside closures. The mastic is placed along the inside edge of the major rib from the ridge purlin web line to the upper end of the panel.



RIDGE FLASHING DETAIL

INSTALLATION OF FINAL PANEL

While backlapping the last roof panel (to match panel coverage with the building length) is routinely done, this installation method can compromise the integrity of the roof by trapping moisture between the panels. This moisture could, in time, create an environment conducive to rust and metal failure. THE MANUFACTURER recommends field cutting the final panel lengthwise to create the desired panel width necessary to finish off the building. *The cut edge of the panel should always be installed on the outside edge, not the lap edge.* The “narrow” panel should be handled with care, and foot traffic avoided until the final panel is completely installed.

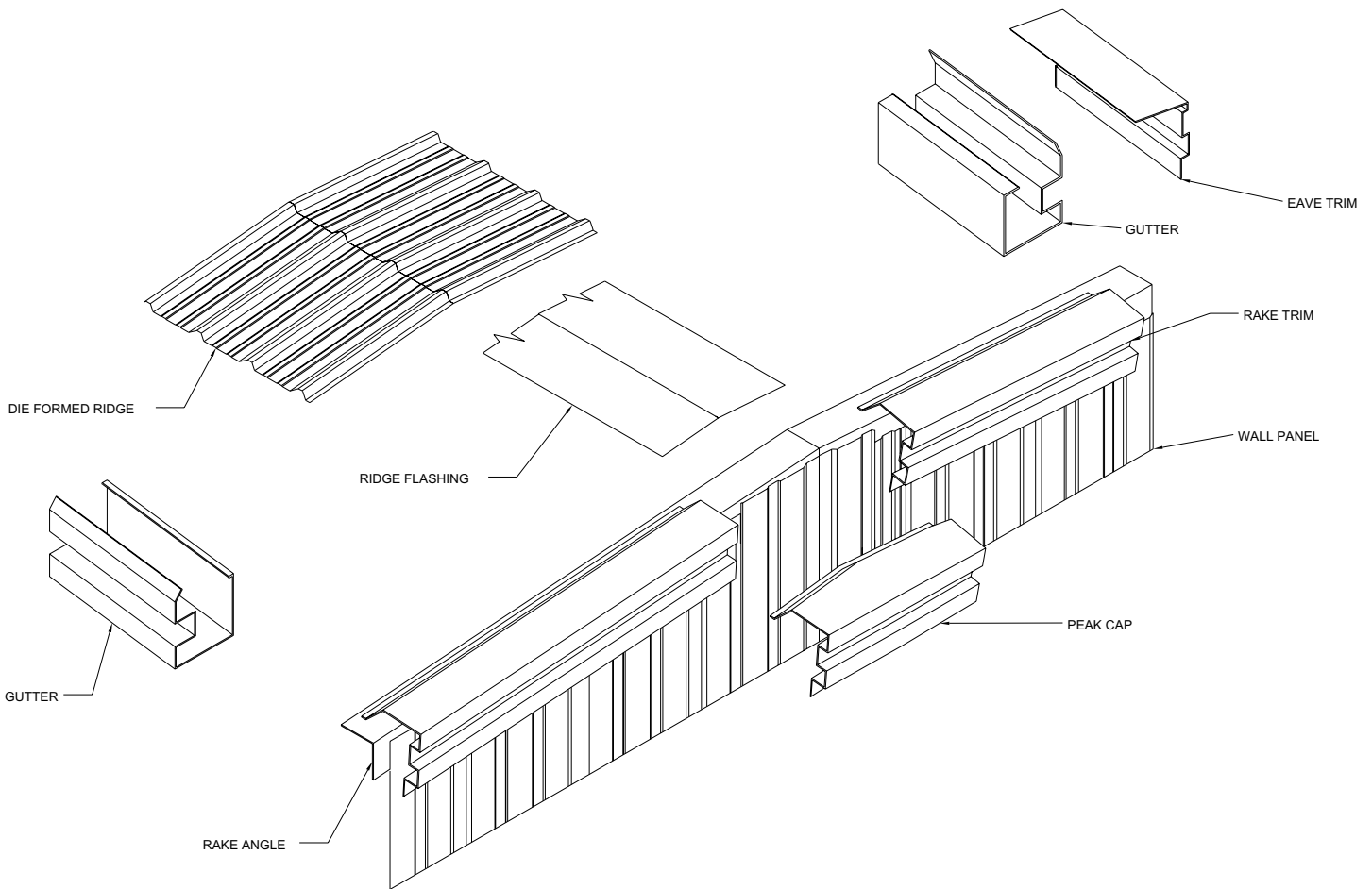


NOTE! Safety first!

SECTION VIII

FLASHING, GUTTER AND TRIM

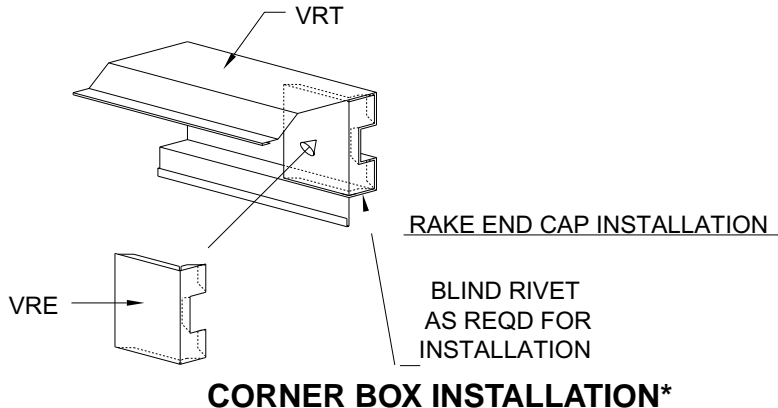
The correct installation of flashing, gutters, and trim cannot be over-emphasized. The overall appearance of the finished building depends primarily on the quality of the installation of the flashing, gutters and trim. Keep all gutter and flashing lines straight. Make all bends sharp and neat. Be sure edges are not jagged, dented, crimped, or serrated. End joints and laps must be closely controlled.



NOTE! Flashing should be stored off the ground to avoid moisture and handling damage. Elevate one end of the package above the lower end to encourage drainage in case of rain. Always wear gloves when handling sheet metal. Safety First!

RAKE TRIM ENDCAP INSTALLATION

For buildings with minimum eave trim and no gutter, install rake* end cap as shown below. Attach to rake trim with 7 blind rivets. Trim inside and outside closures to fill void between rake trim and roof.



*** Various building types do not come with a corner box - on these buildings the rake and eave trim must be field fitted as required.**

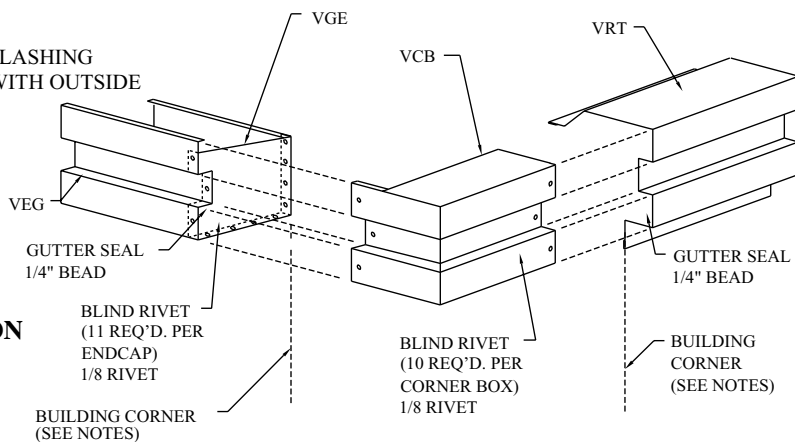
Caulk and install an end cap in the end of a section of gutter and fasten with blind rivets. Position the gutter and rake trim allowing a minimum of 2" overlap with the corner box. The corner box laps over the gutter and under the rake trim. An alternate method is to assemble the corner box to a section of rake or gutter and lift into position. Align the corner box for good appearance and fasten with blind rivets. Seal connection with caulk, closure and sealant as shown. Caulk over rivets located on top side of corner box.

NOTES:

1. START AND STOP GUTTER AND RAKE FLASHING AT BUILDING CORNERS AND ALIGN WITH OUTSIDE EDGE OF WALL PANEL AT CORNERS.
2. CORNER BOX CAN BE USED ON ALL ROOF SLOPES.

SAFETY PRECAUTION:
WORKERS SHOULD ALWAYS WEAR GLOVES WHEN HANDLING METAL SURFACES WITH SHARP EDGES.

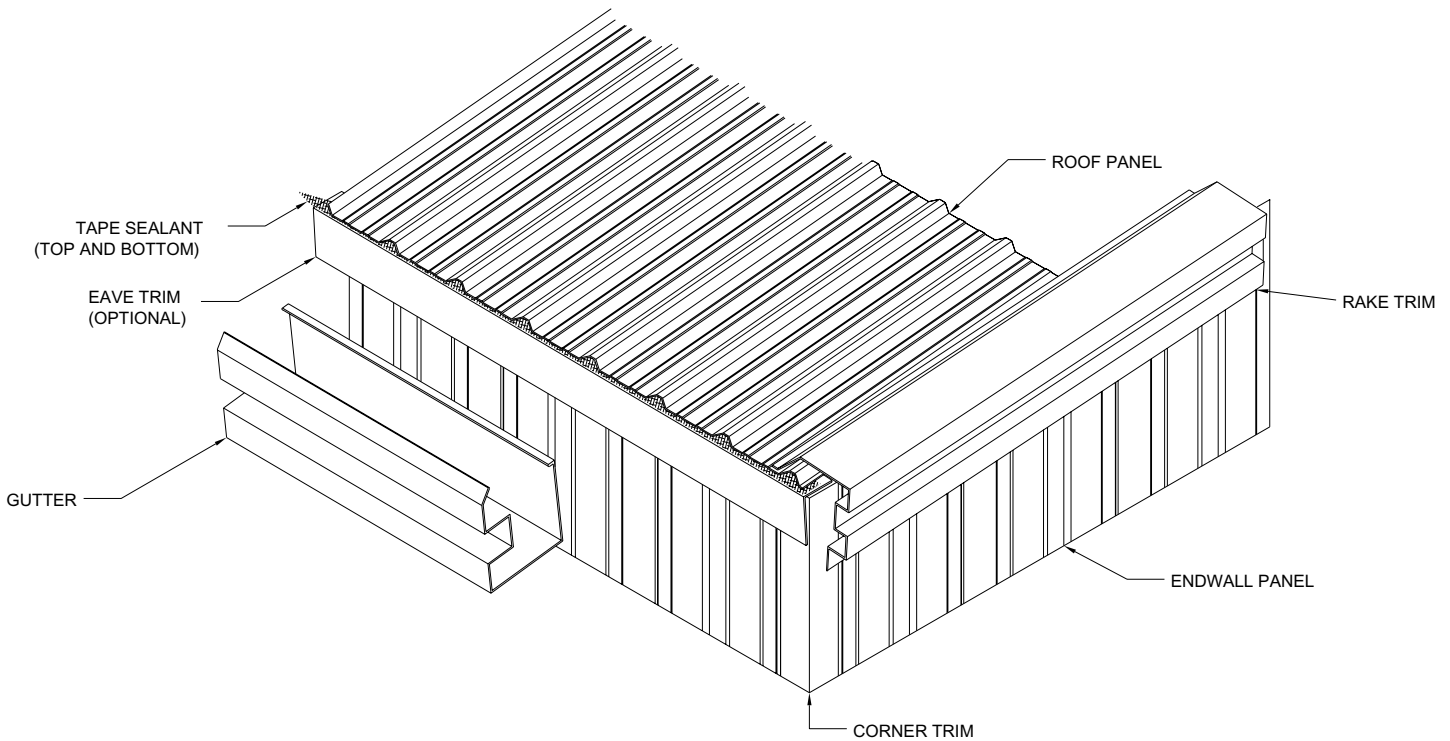
CORNER BOX INSTALLATION



***NOTE!** THE MANUFACTURER Manufactures various trim profiles — the examples shown may or may not match building in question.

EAVE FLASHING AND GUTTER INSTALLATION

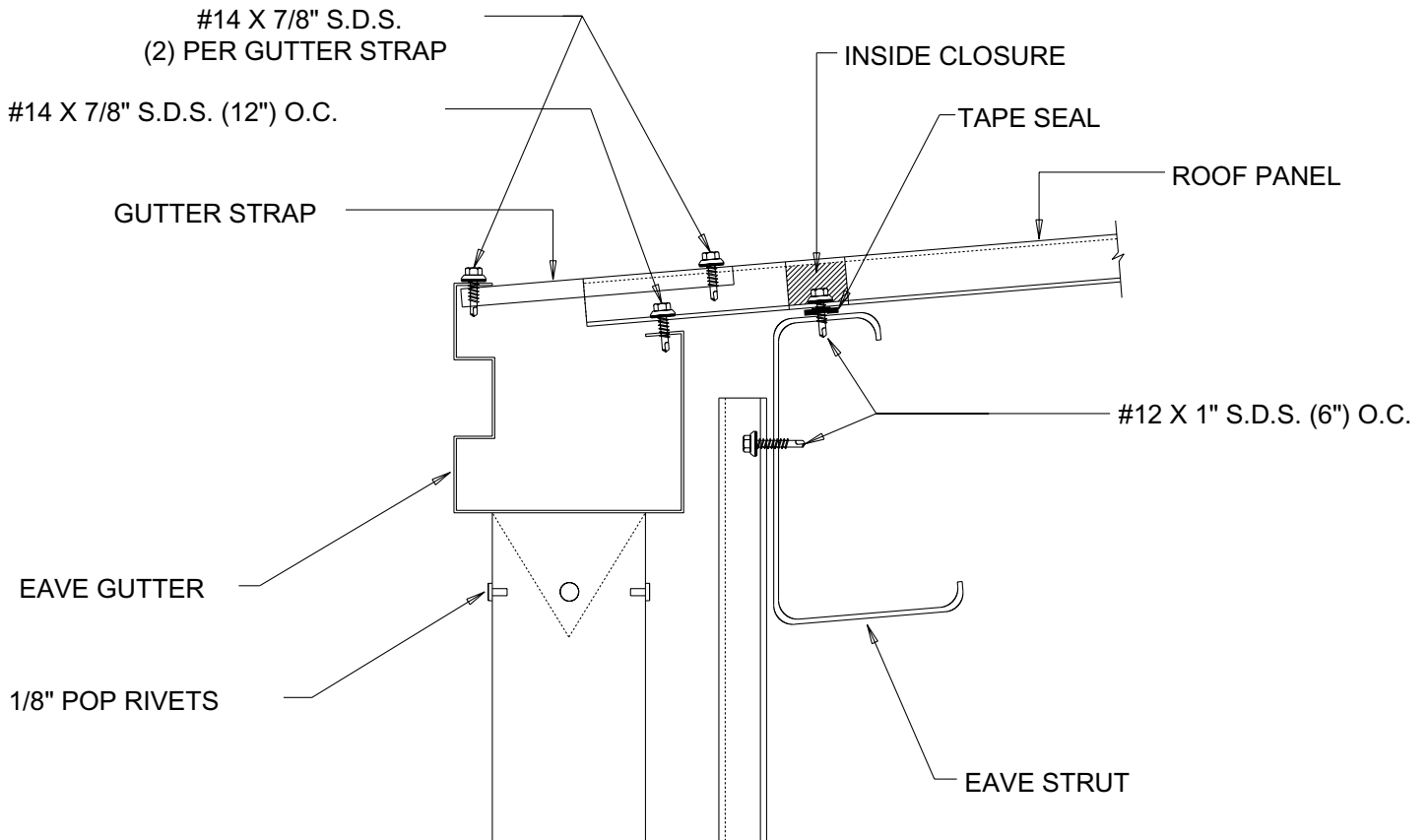
Eave flashing and/or gutters should be installed from the rear to front of the building so that the flashing or gutter sections starting at the front of the building always overlap the following sections. This will conceal any exposed raw seams when looking down the sidewall from the front (or prevailing view). Assemble as many sections of gutter as can be handled by equipment and crew on the ground and lift into place.



NOTE! Workers should always use gloves when handling flashing and follow all OSHA safety recommendations. Never install any material if its quality or appropriateness is in question! THE MANUFACTURER manufactures various trim profiles - the examples shown may or may not match building in question. Safety first!

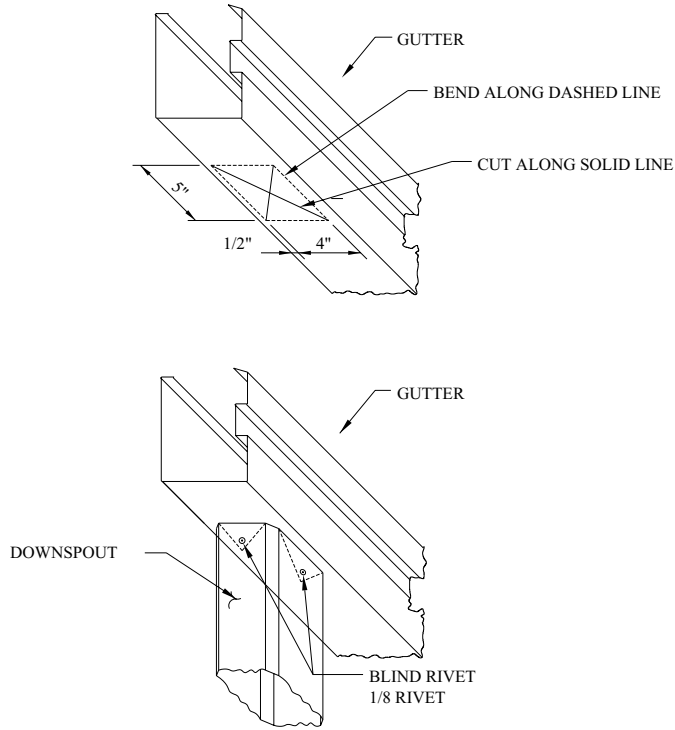
INSTALLING GUTTER CLIPS

Below is the method of attaching the gutter to the building. Gutter straps will be provided with all buildings ordered with gutter. The system requires the gutter straps be installed at 3'-0 centers.



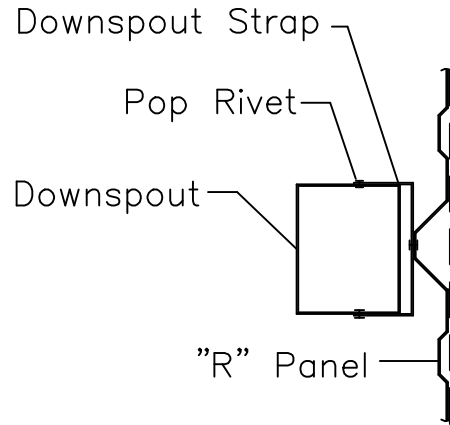
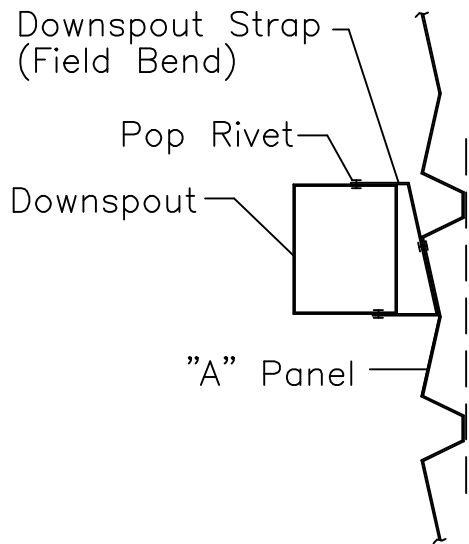
NOTE! Use extreme caution when working at the eave of the building. **Safety first!** THE MANUFACTURER utilizes different gutter profiles. When snow and ice conditions exist, an alternate Eave Detail may be considered.

DOWNSPOUT INSTALLATION DETAIL



DOWNSPOUT OUTLET DETAIL

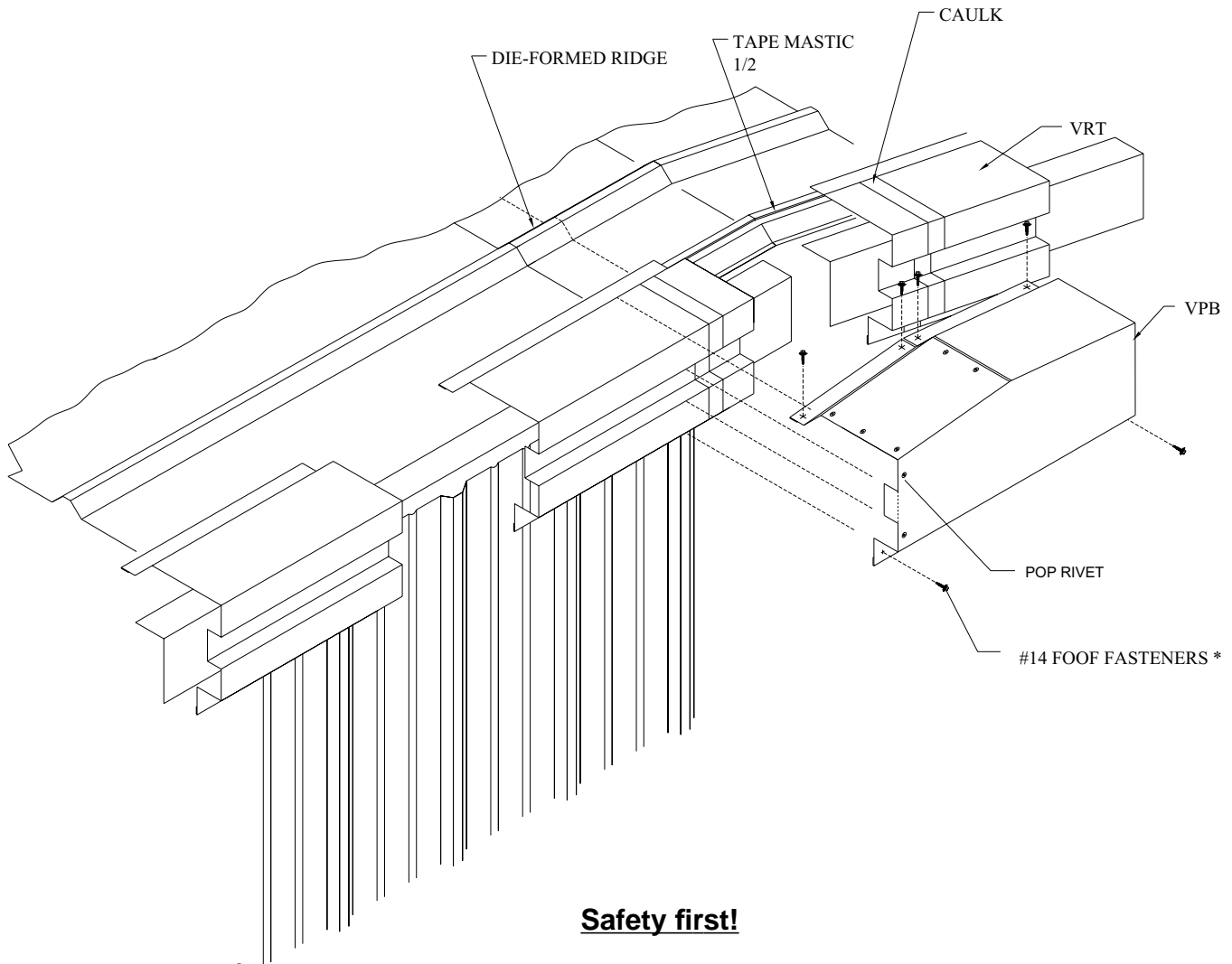
INSTALLATION OF DOWNSPOUT TO WALL PANELS



RAKE TRIM AND PEAK BOX INSTALLATION

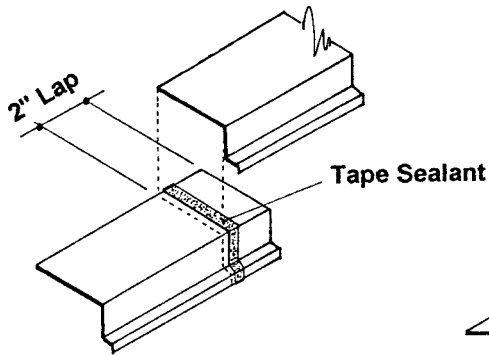
THE MANUFACTURER manufacturers various trim profiles. The profile shown may or may not apply to your building. The example still serves as a general guideline to installing the peak box and rake trim.

Apply caulking to rake trim as shown below prior to final installation. Rake Trim and/or Peak Box should lap over rake trim a minimum of 2 inches. Attach to wall panel with pop rivets using an outside closure to seal box at the wall. Attach box to roof with #14 roof fasteners and stitch to trim with blind rivets as shown. Seal the connection at the roof panel with 1/2" tape mastic sealant.

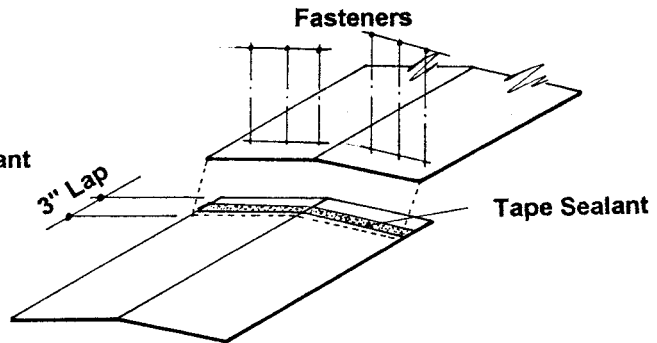


* Splice rake trim together with rivets as shown at peak box (1" on centers max.) Seal all rake trim laps with sealant to assure a weather-tight seal.

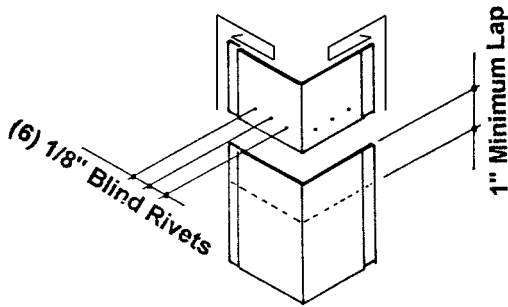
**FLASHING
CAULK AND LAP DETAILS**



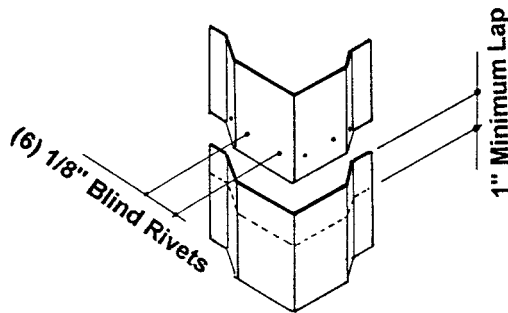
EAVE TRIM



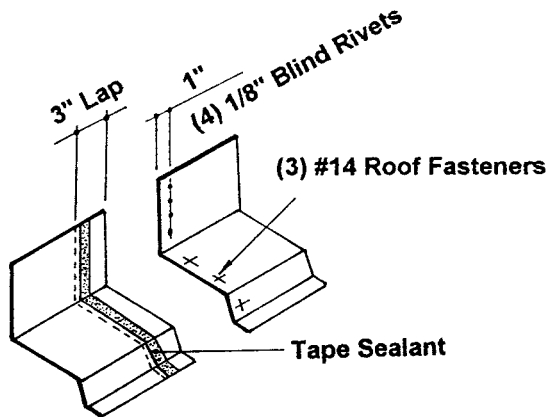
RIDGE FLASHING



"A" PANEL CORNER



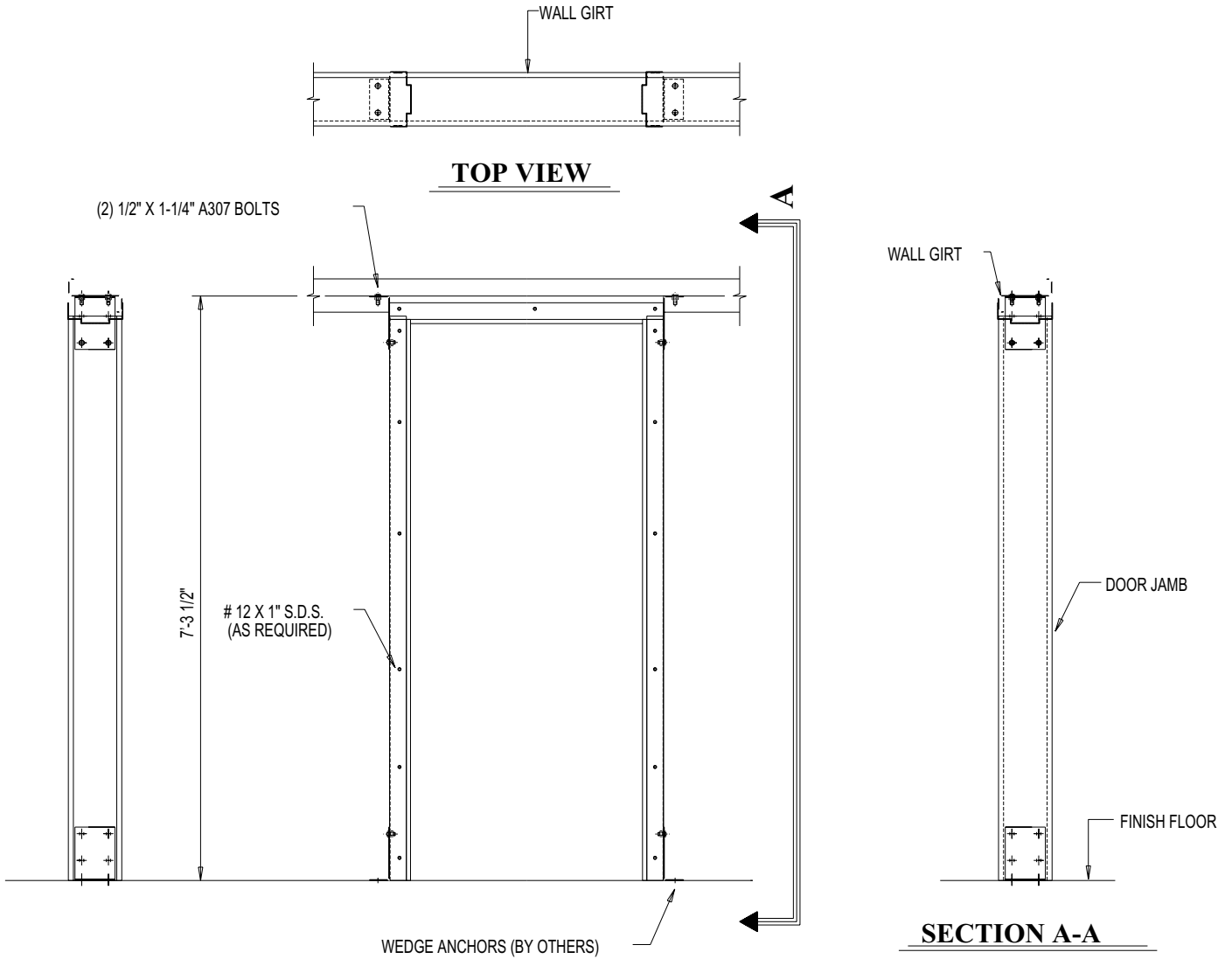
"R" PANEL CORNER



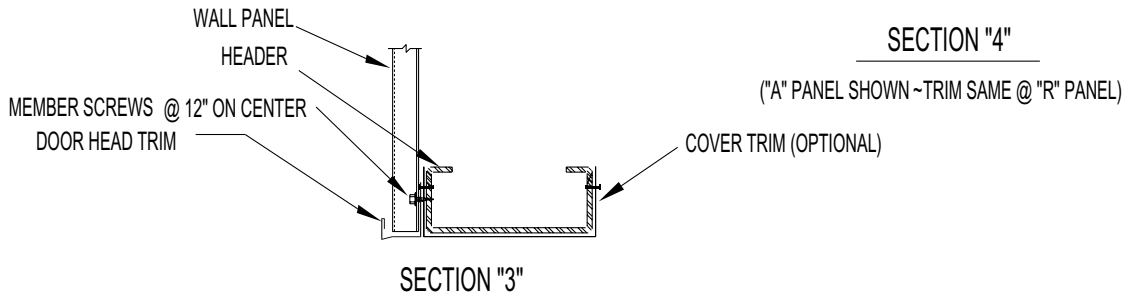
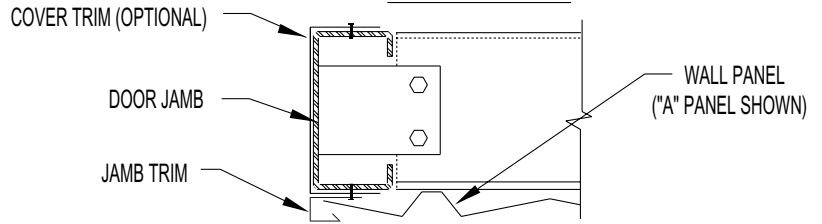
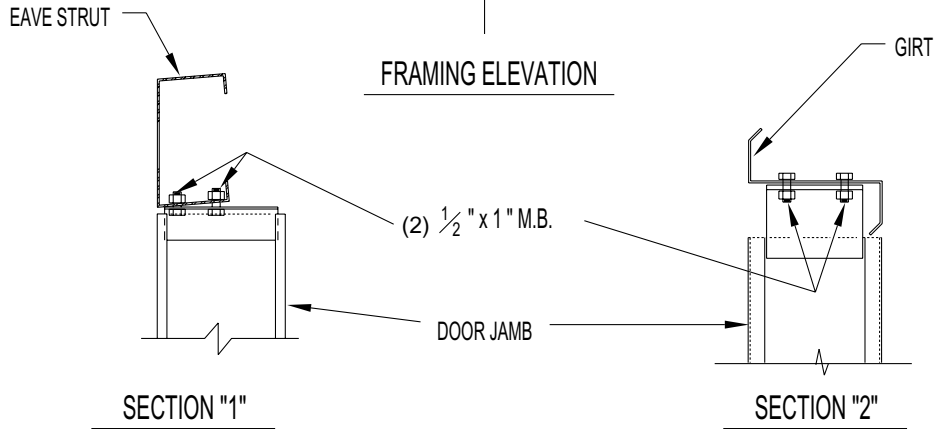
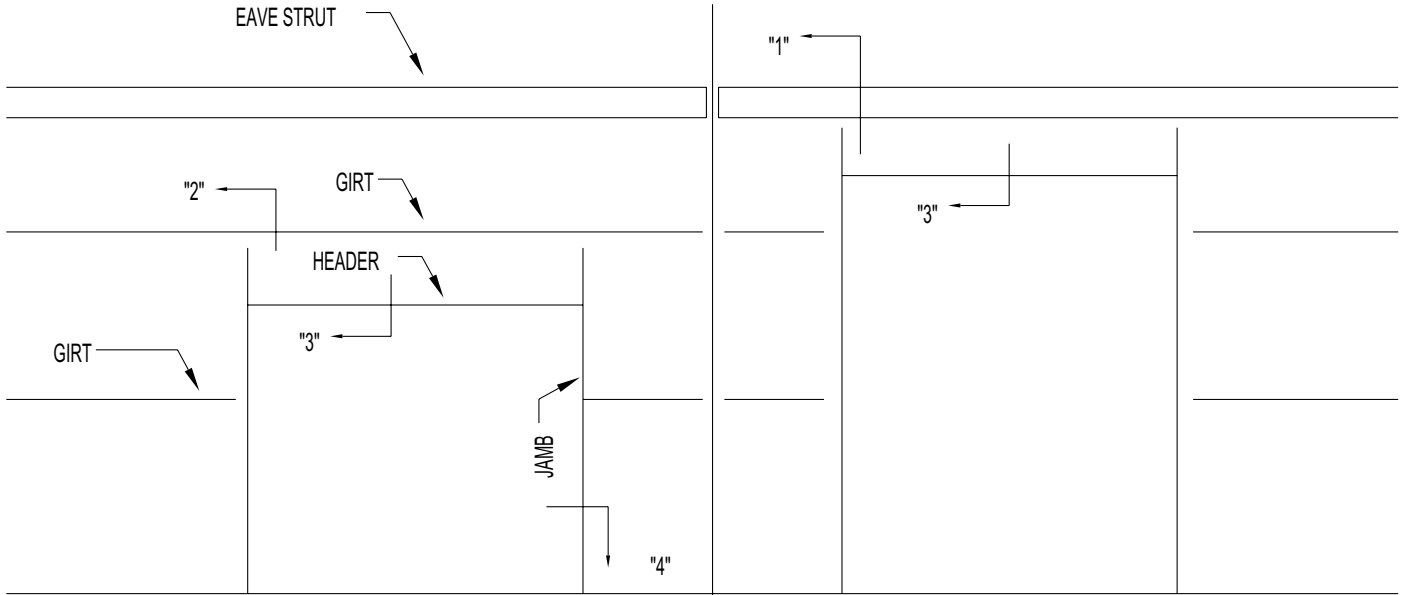
"ROOF TO WALL" TRIM

NOTE! THE MANUFACTURER manufactures a wide variety of flashing configurations . The examples shown are meant to impress upon the erector the importance of sealants and fasteners at flashing laps. Consult The Manufacturer for any questionable details. **Safety first!**

PERSONNEL DOORS



OVERHEAD DOOR FRAMED OPENING

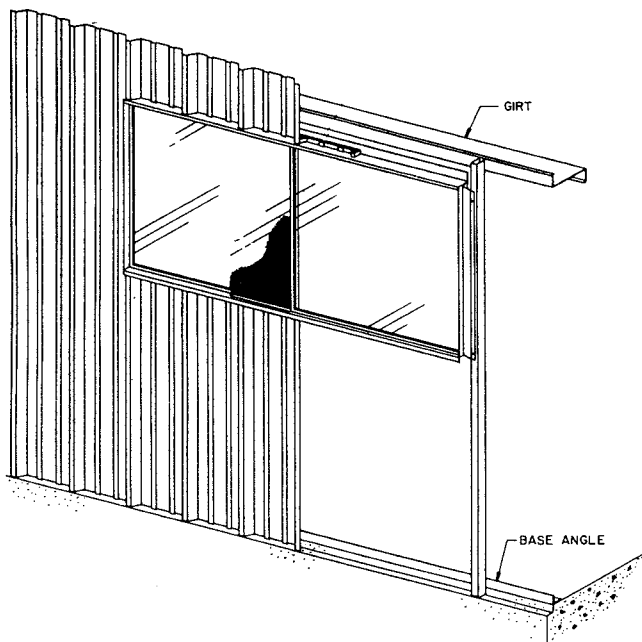


ALUMINUM HORIZONTAL SLIDE WINDOW IN "R" PANEL WALL

HORIZONTAL SLIDE WINDOWS

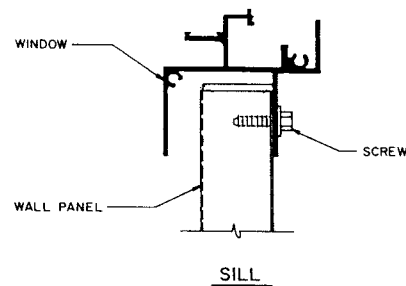
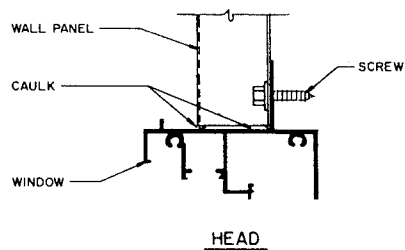
SIZE	AVAILABLE GLAZING				AVAILABLE FINISH	
	DSB CLEAR	OBSCURE	INSULATED	BRONZE TINTED	MILL ALUM	BRONZE PAINTED
3030	STANDARD	OPTIONAL	OPTIONAL	OPTIONAL	STANDARD	OPTIONAL
4030	STANDARD	OPTIONAL	OPTIONAL	OPTIONAL	STANDARD	OPTIONAL
6030	STANDARD	OPTIONAL	OPTIONAL	OPTIONAL	STANDARD	OPTIONAL

CHANNEL FRAMING (NOT SHOWN) IS REQUIRED AT WINDOW LOCATION WHEN LINER PANEL IS REQUESTED, SUB FRAMING AT WINDOWS AND LOUVERS IS OPTIONAL, SEE PAGE 126.



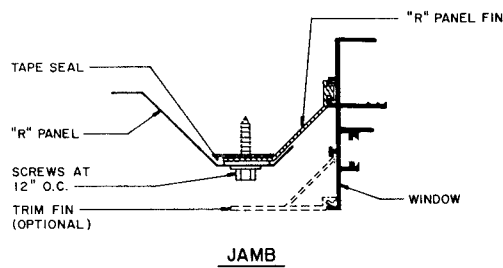
GENERAL NOTES:

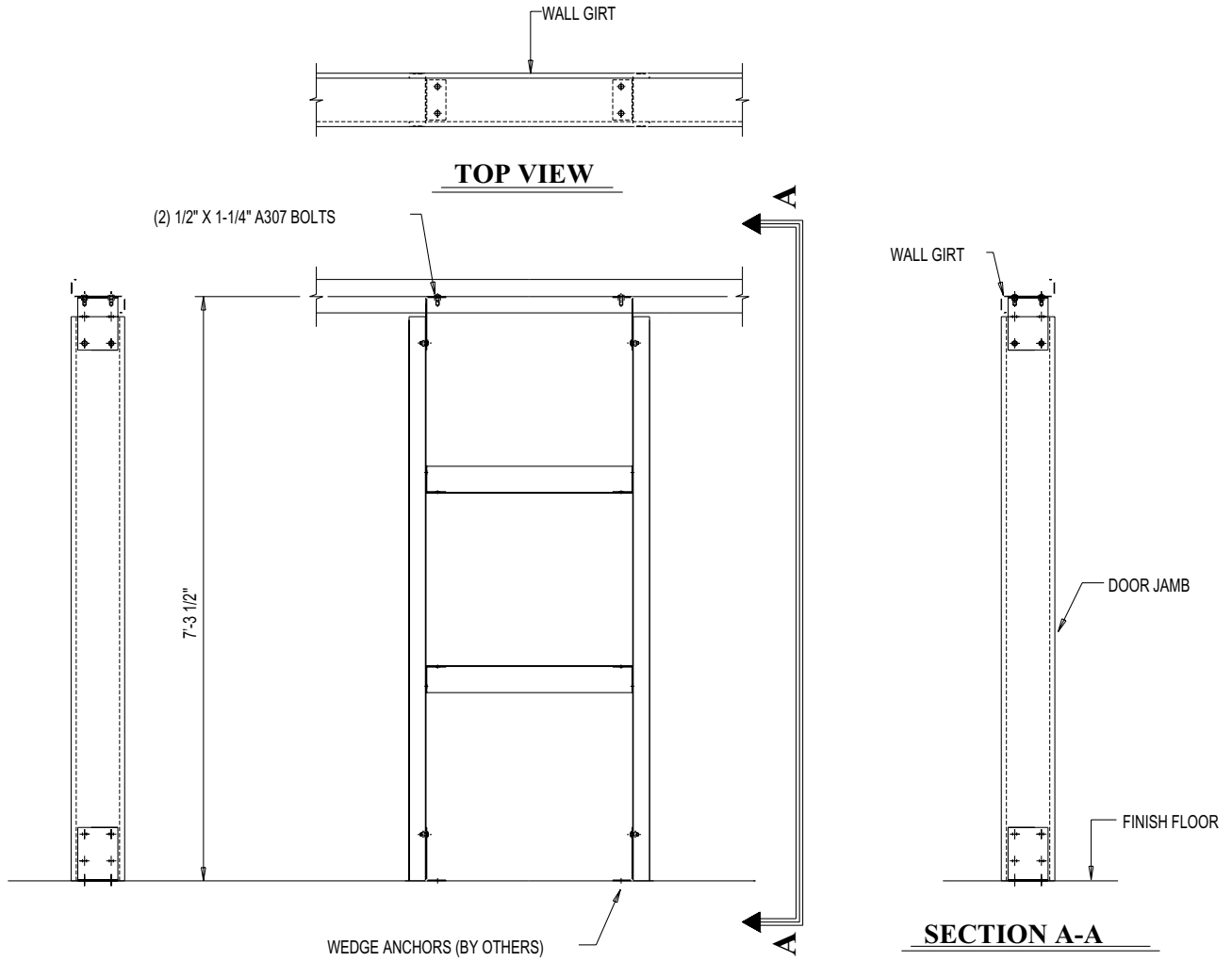
1. ALUMINUM HORIZONTAL SLIDE WINDOWS SHALL BE SELF-FLASHING UNITS FABRICATED FROM 6030 ALLOY, T5 TEMPER HARDNESS.
2. FINISHES ARE STANDARD MILL, OR BRONZE PAINTED UPON REQUEST.
3. ALL WINDOWS SHALL BE FURNISHED WITH DOUBLE STRENGTH (D.B.S.) CLEAR GLASS AS STANDARD, WITH OBSCURE, INSULATED AND BRONZE TINTED AS AVAILABLE OPTIONS.
4. NYLON ROLLERS WILL BE ATTACHED FOR A SMOOTH SLIDING ACTION.
5. HALF SCREENS SHALL BE FURNISHED AS STANDARD FOR ALL WINDOWS.



ERECTION:

1. ALL WINDOWS ARE FURNISHED FOR FIELD LOCATION AT MAJOR RIBS. PANELS ABOVE AND BELOW WINDOW MUST BE FIELD CUT AND MAY BE CUT FROM A FULL LENGTH PANEL.
2. FOR BUILDINGS THAT HAVE A LOW GIRT THE JAMB STIFFENERS WILL BE OMITTED.
3. LOCATE WINDOW AND ATTACH TEMPORARILY WITH POP RIVETS. POP RIVETS ARE NOT INTENDED FOR ANY PURPOSE AFTER INSTALLATION OF WALL PANELS IS COMPLETE.
4. USING STANDARD PROCEDURE, ERECT WALL PANELS UP TO WINDOW LOCATION. CUT A 3'-0" SECTION FROM A FULL LENGTH PANEL AND INSTALL SHORT PANELS ABOVE AND BELOW WINDOW. BE SURE THAT FILLER STRIPS ARE POSITIONED BEFORE ATTACHING PANELS. CONTINUE WITH STANDARD WALL ERECTION PROCEDURE.
5. CAULK CONTINUOUSLY ALONG WINDOW HEADER TO INSURE A WATER TIGHT INSTALLATION.





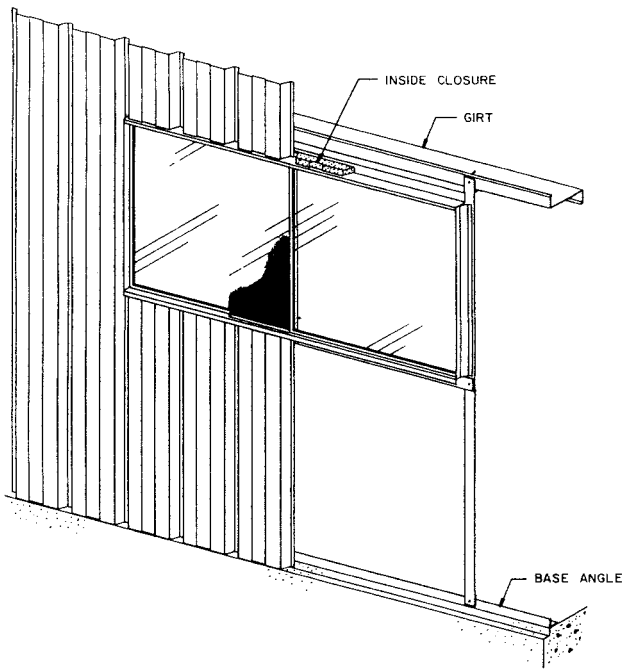
**DETAIL @ WINDOW/LOUVER FRAMED OPENING
(OPTIONAL)**

ALUMINUM HORIZONTAL SLIDE WINDOW IN "A" PANEL WALL

HORIZONTAL SLIDE WINDOWS

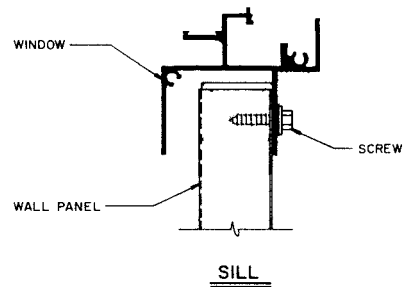
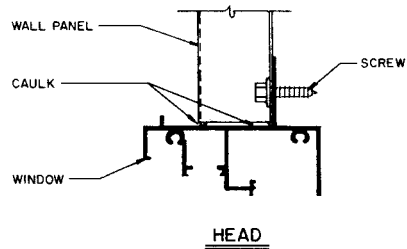
SIZE	AVAILABLE GLAZING				AVAILABLE FINISH	
	DSB CLEAR	OBSCURE	INSULATED	BRONZE TINTED	MILL ALUM	BRONZE PAINTED
3030	STANDARD	OPTIONAL	OPTIONAL	OPTIONAL	STANDARD	OPTIONAL
4030	STANDARD	OPTIONAL	OPTIONAL	OPTIONAL	STANDARD	OPTIONAL
6030	STANDARD	OPTIONAL	OPTIONAL	OPTIONAL	STANDARD	OPTIONAL

CHANNEL FRAMING (NOT SHOWN) IS REQUIRED AT WINDOW LOCATION WHEN LINER PANEL IS REQUESTED.



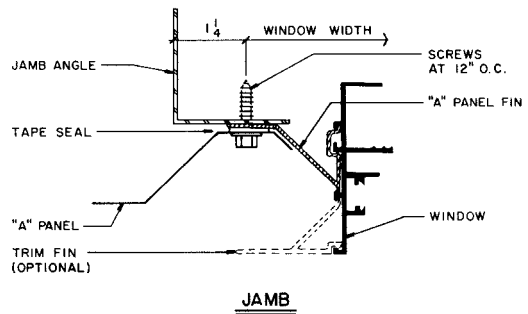
GENERAL NOTES:

1. ALUMINUM HORIZONTAL SLIDE WINDOWS SHALL BE SELF-FLASHING UNITS FABRICATED FROM 6030 ALLOY, T5 TEMPER HARDNESS.
2. FINISHES ARE STANDARD MILL, OR BRONZE PAINTED UPON REQUEST.
3. ALL WINDOWS SHALL BE FURNISHED WITH DOUBLE STRENGTH (D.B.S.) CLEAR GLASS AS STANDARD, WITH OBSCURE, INSULATED AND BRONZE TINTED AS AVAILABLE OPTIONS.
4. NYLON ROLLERS WILL BE ATTACHED FOR A SMOOTH SLIDING ACTION.
5. HALF SCREENS SHALL BE FURNISHED AS STANDARD FOR ALL WINDOWS.

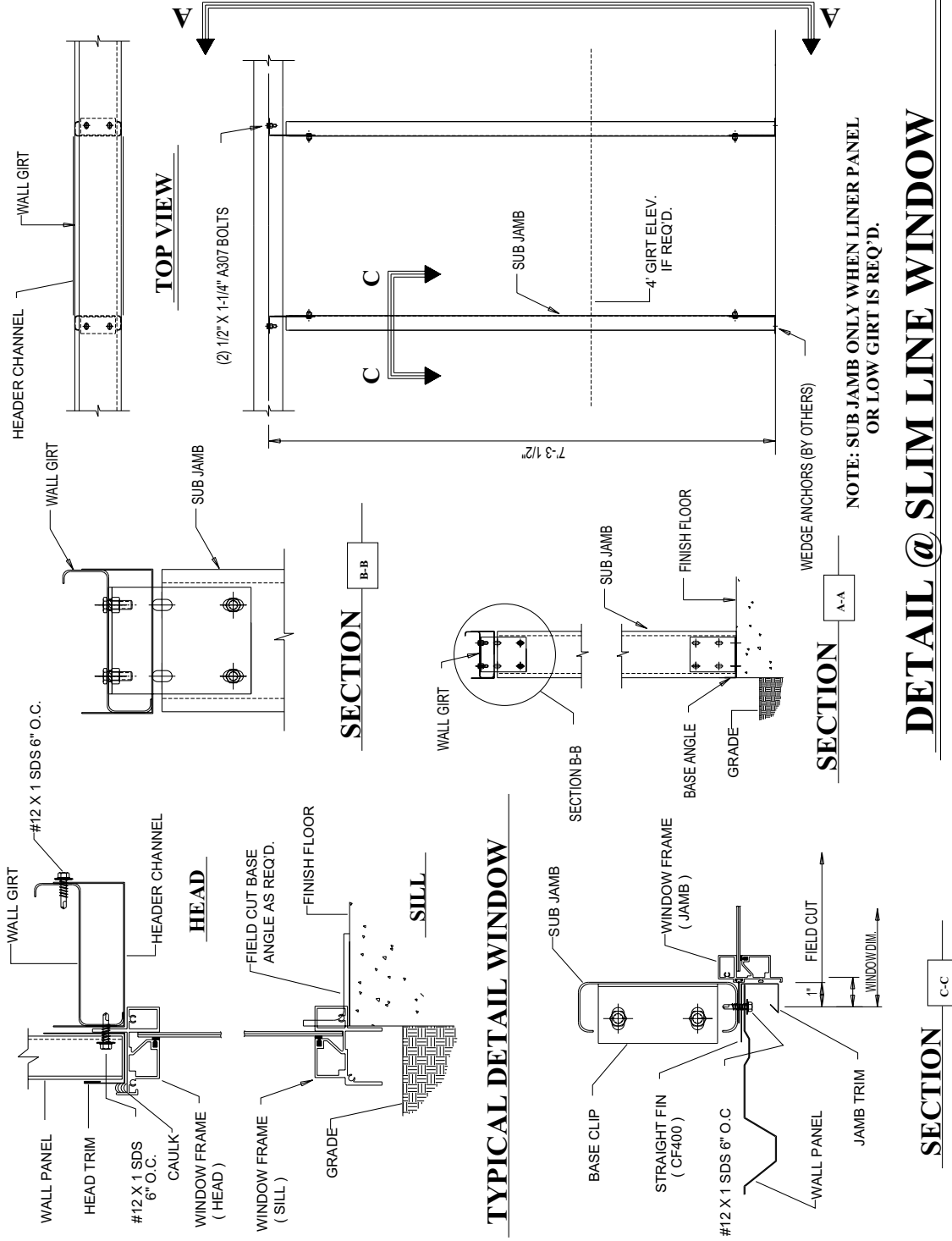


ERECTION:

1. ALL WINDOWS ARE FURNISHED FOR FIELD LOCATION AT MAJOR RIBS. PANELS ABOVE AND BELOW WINDOW MUST BE FIELD CUT AND MAY BE CUT FROM A FULL LENGTH PANEL.
2. FOR BUILDINGS THAT HAVE A LOW GIRT THE JAMB AND SILL ANGLES WILL BE OMITTED.
3. LOCATE WINDOW AND ATTACH TEMPORARILY WITH POP RIVETS. POP RIVETS ARE NOT INTENDED FOR ANY PURPOSE AFTER INSTALLATION OF WALL PANELS IS COMPLETE.
4. USING STANDARD PROCEDURE, ERECT WALL PANELS UP TO WINDOW LOCATION. CUT A 3'-0" SECTION FROM A FULL LENGTH PANEL AND INSTALL SHORT PANELS ABOVE AND BELOW WINDOW. BE SURE THAT FILLER STRIPS ARE POSITIONED BEFORE ATTACHING PANELS. CONTINUE WITH STANDARD WALL ERECTION PROCEDURE.
5. CAULK CONTINUOUSLY ALONG WINDOW HEADER TO INSURE A WATER TIGHT INSTALLATION.

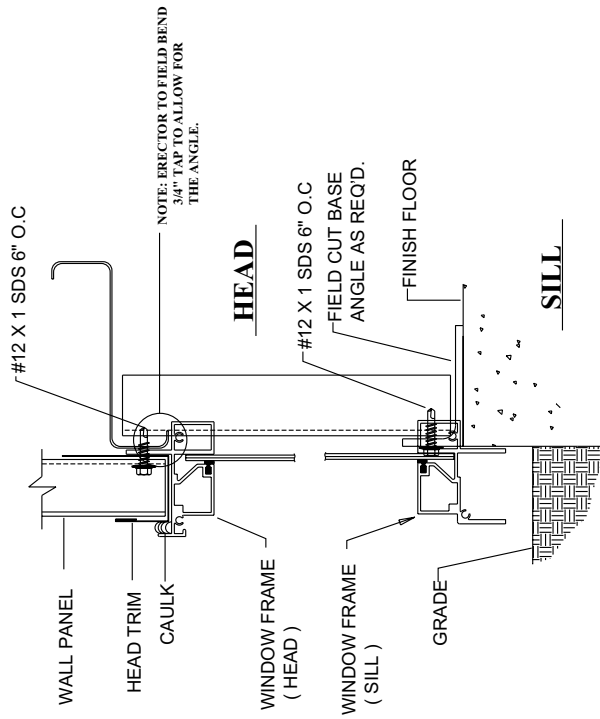


**ALUMINUM NARROW LITE
ACCENT WINDOW**

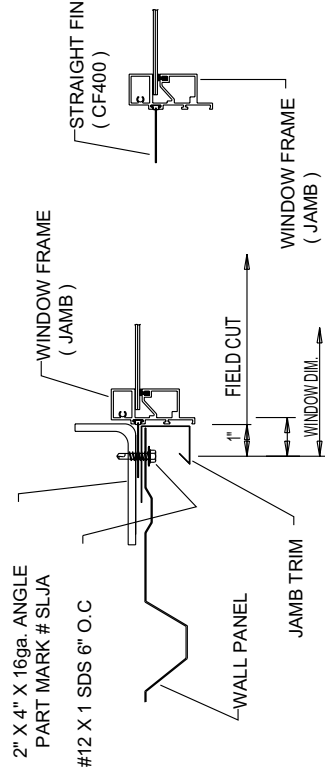


**DETAIL @ SLIM LINE WINDOW
W/ SUB-JAMB**

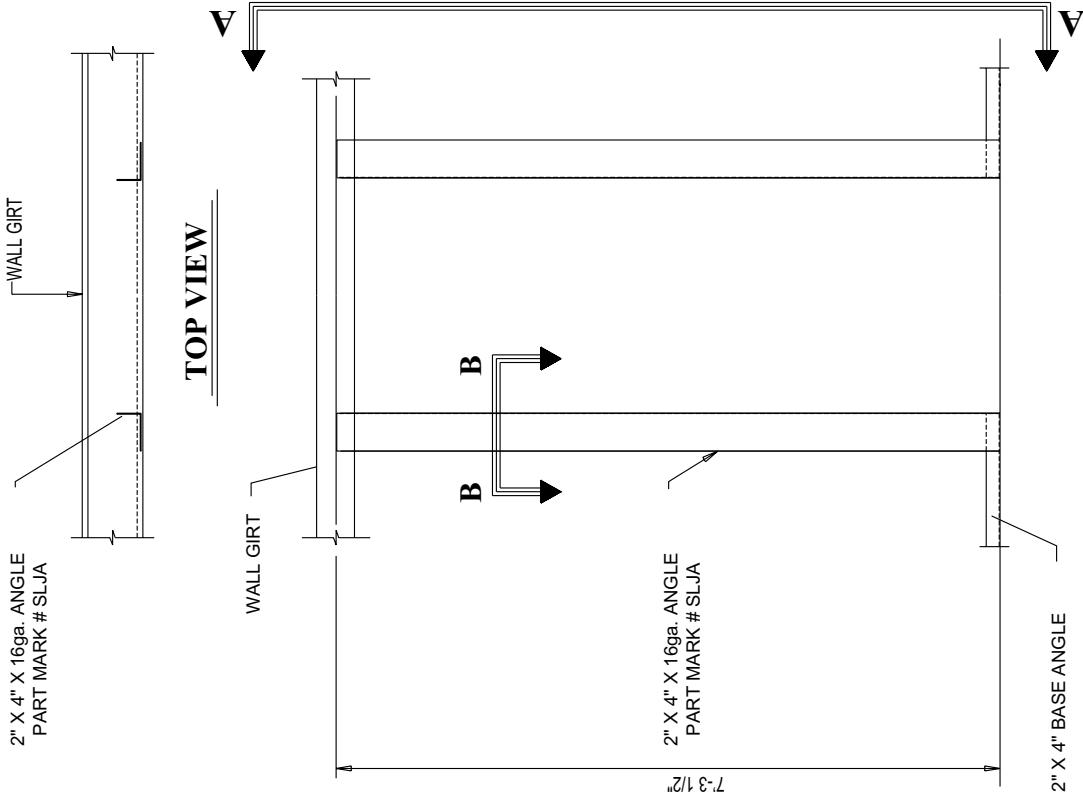
TYP. SLIM LINE WINDOW FRAMING



SECTION A-A

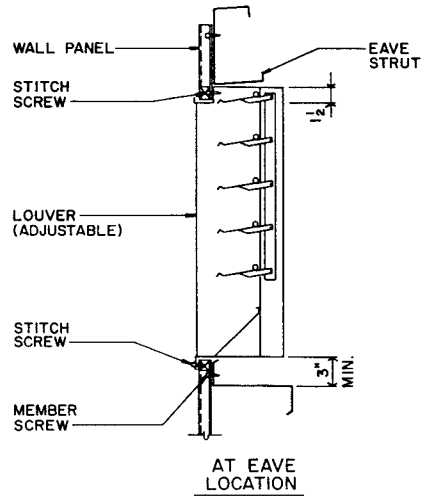
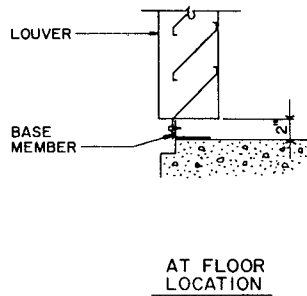
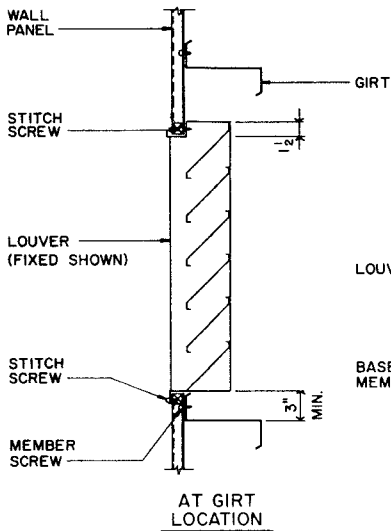
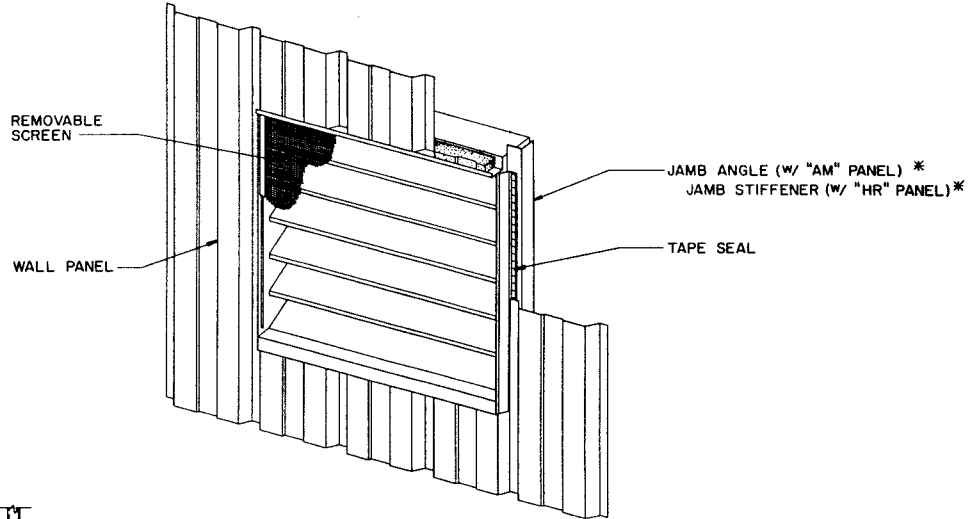


SECTION B-B

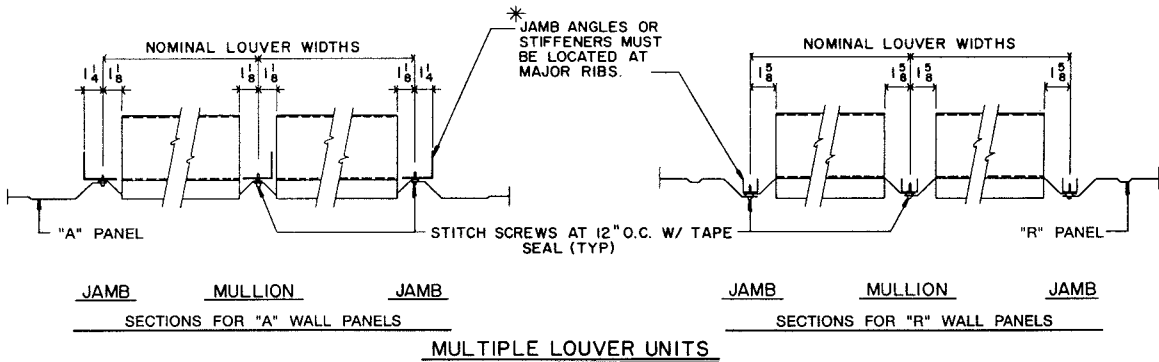


**DETAIL @ SLIM LINE WINDOW
W/ ANGLE FRAMING**

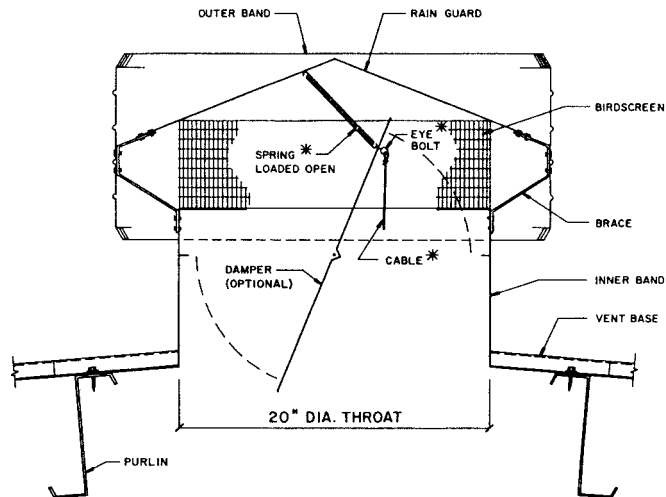
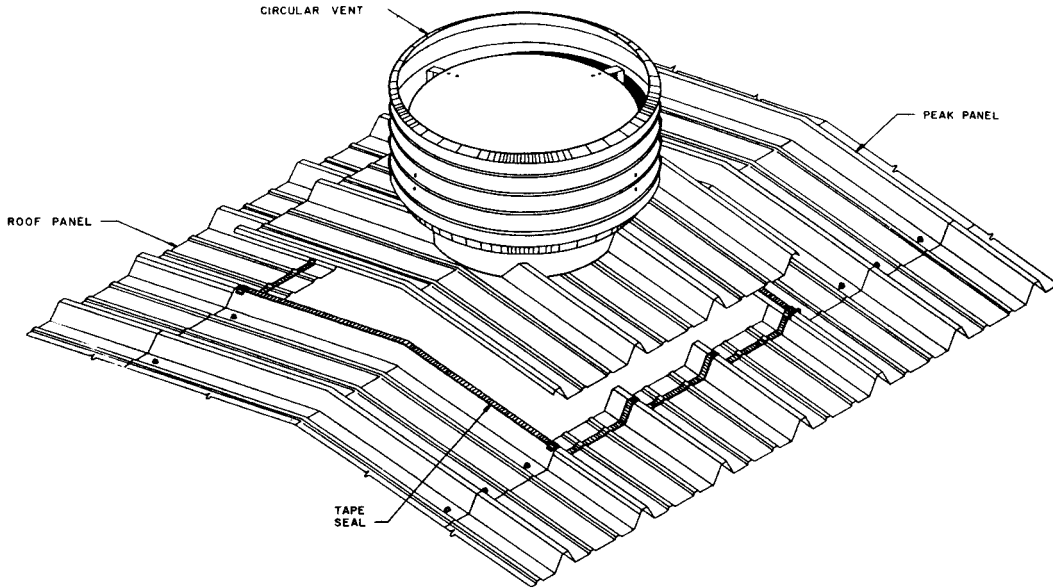
**SELF - FLASHING FIXED
AND ADJUSTABLE LOUVERS**



TYPICAL LOUVER SECTIONS



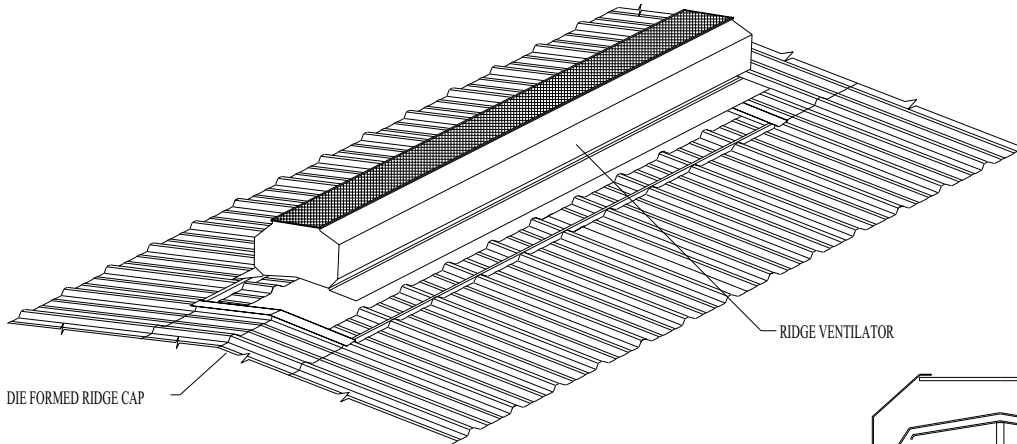
ROUND GRAVITY VENTS



* INCLUDED WITH DAMPER OPTION

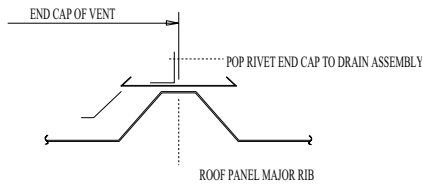
SECTION

CONTINUOUS RIDGE VENTILATORS

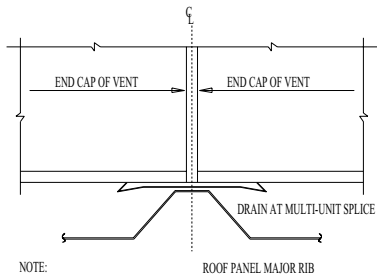


DIE FORMED RIDGE CAP

RIDGE VENTILATOR

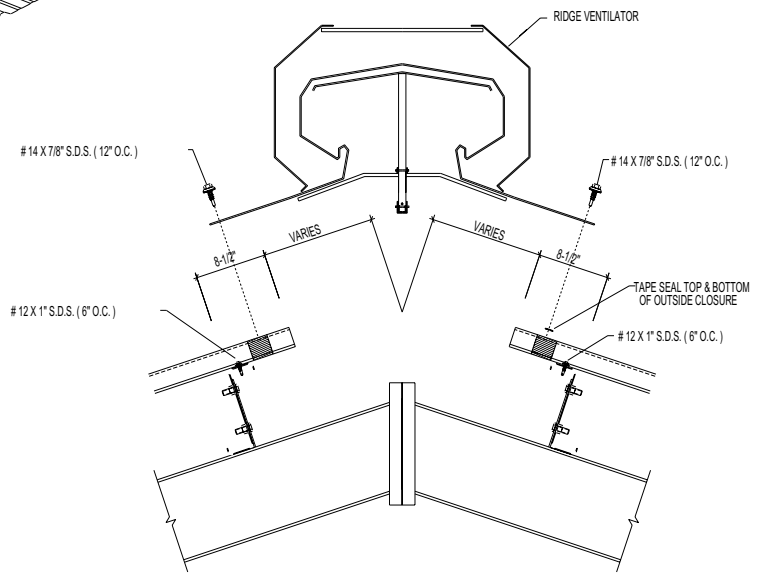


DRAIN ASSEMBLY DETAIL @ SINGLE RIDGE VENT



NOTE:
BREAK DRAIN ASSEMBLY TO
FOLLOW EXACT ROOF SLOPE.

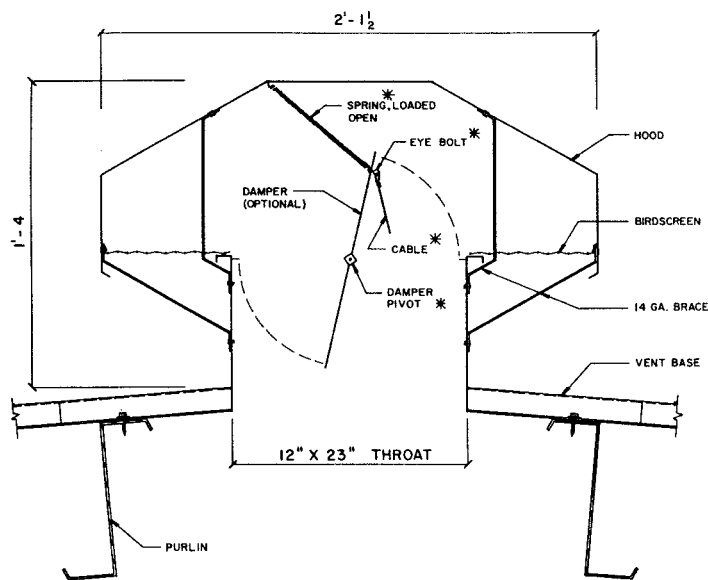
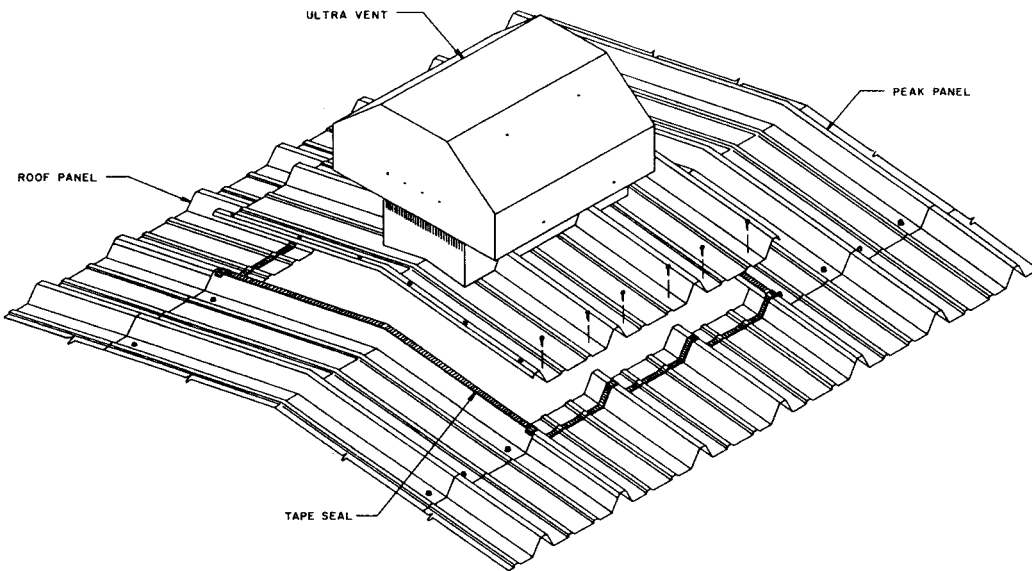
DRAIN ASSEMBLY DETAIL @ CONTINUOUS RIDGE VENT



TYPICAL SECTION @ RIDGE VENT

RIDGE VENT DETAILS FOR "R" TYPE ROOF SYSTEM
(SPECIAL DETAILS APPLY FOR STANDING SEAM OR
INSULATED ROOF SYSTEMS, SEE ERECTION DRAWINGS)

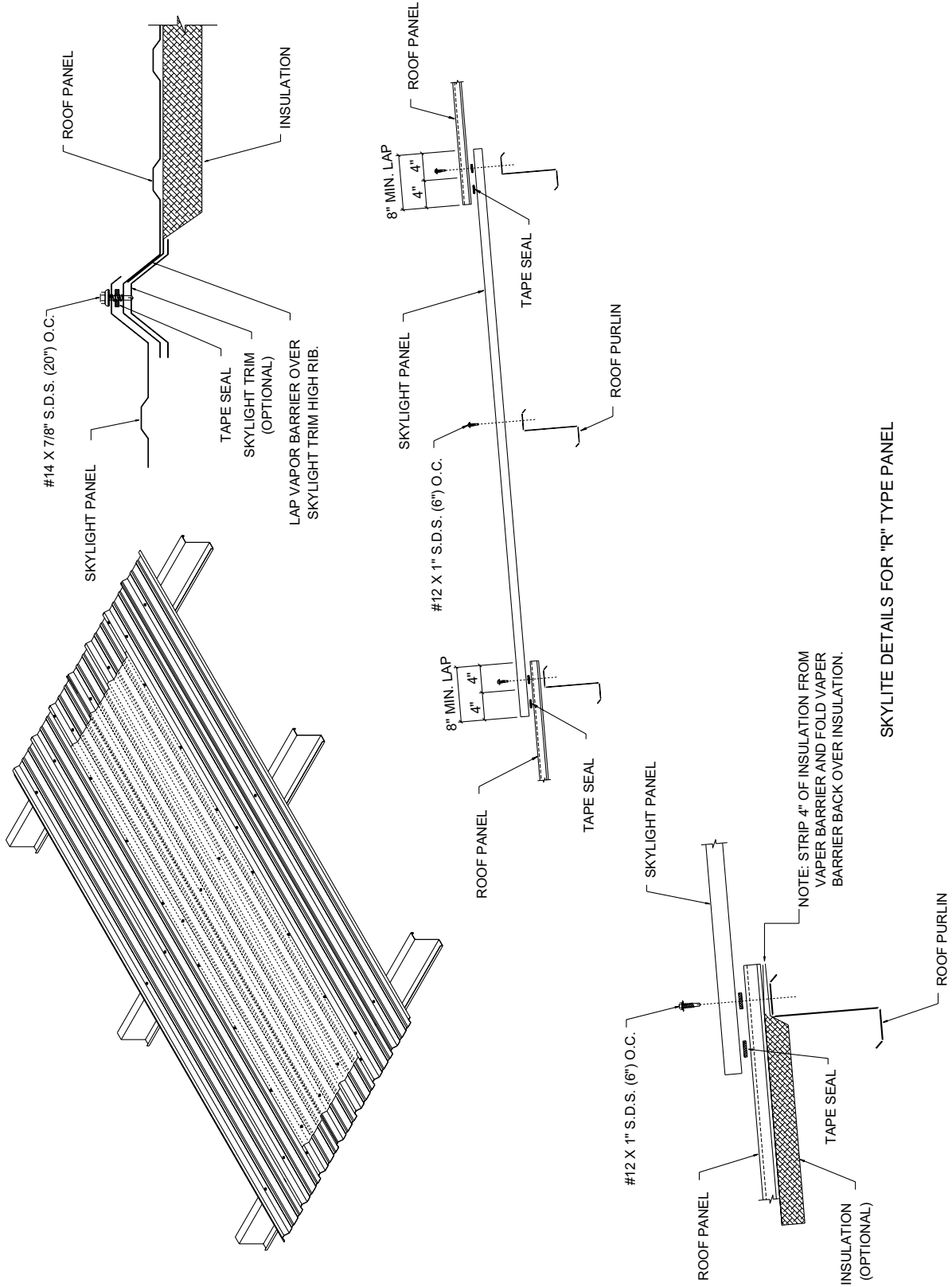
ULTRA VENT



* INCLUDED WITH DAMPER OPTION

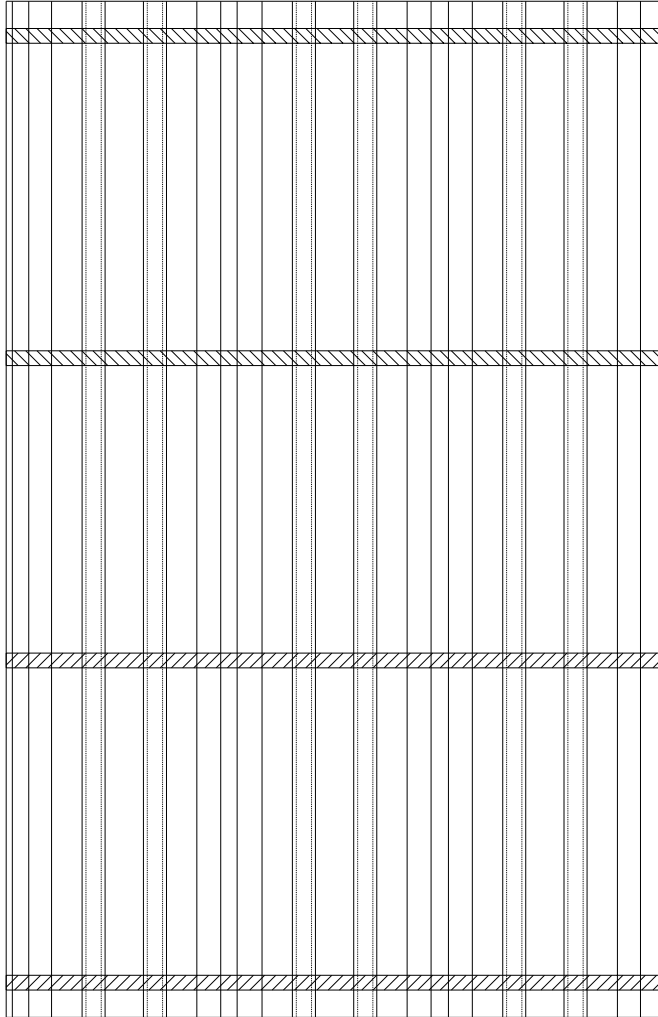
SECTION

“R” PANEL TRANSLUCENT ROOF PANELS



SKYLITE DETAILS FOR "R" TYPE PANEL

“INSULATED” SKY LIGHT PANEL

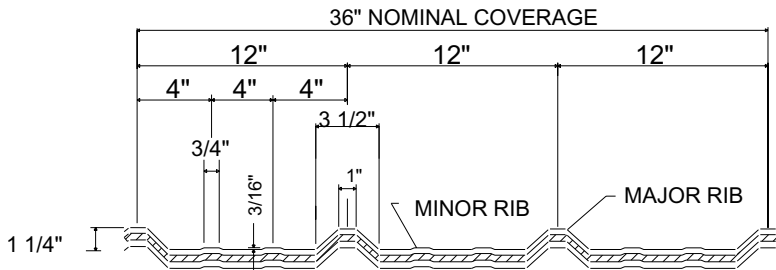


1/4"x1/2" FOAM STRIP BETWEEN PANELS

1/4"x1/2" FOAM STRIP BETWEEN PANELS

1/4"x1/2" FOAM STRIP BETWEEN PANELS

1/4"x1/2" FOAM STRIP BETWEEN PANELS

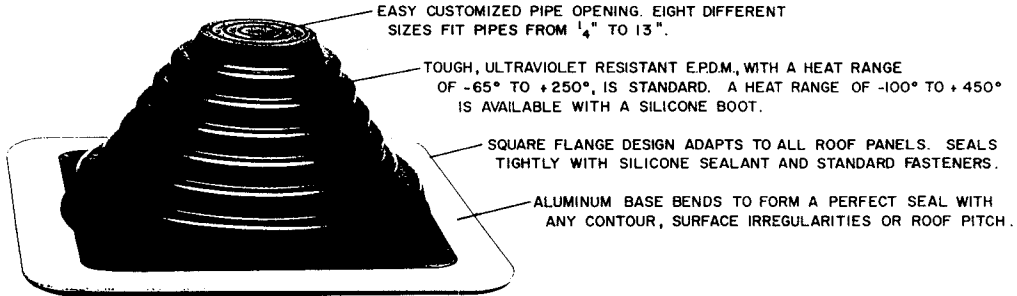


TOP PANEL IS WHITE (LIGHT TRANSMITING)

(4) 1/4"x1/2" FOAM STRIPS BETWEEN PANELS

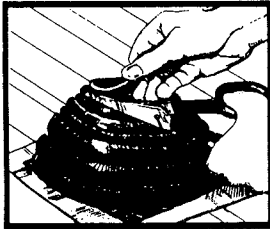
BOTTOM PANEL IS CLEAR

ROOF JACK



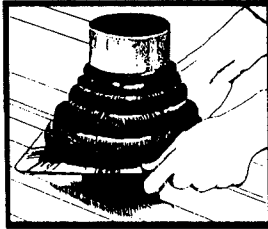
SIZING CHART			
MASTER FLASH NUMBER	PIPE SIZE	BASE DIMENSION	OPENING DIAMETER
3	1/4" - 4"	8"	CLOSED
5	4" - 7"	11"	3 1/2"

OTHER SIZES AVAILABLE UPON REQUEST.
STANDARD IS BLACK COLOR.



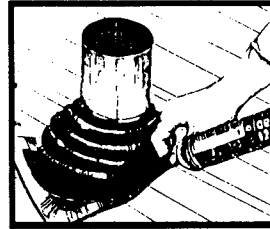
STEP ONE — TRIM

TRIM OPENING TO 20% SMALLER THAN PIPE DIAMETER.



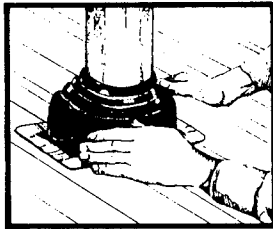
STEP TWO — SLIDE

SLIDE DOWN OVER PIPE.



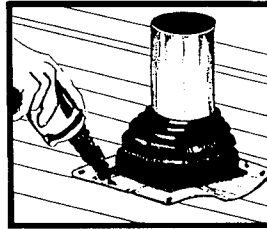
STEP THREE — SEAL

APPLY URETHANE / SILICONE SEALANT BETWEEN FLASHING AND ROOF PANEL.



STEP FOUR — FORM

PRESS DOWN, BENDING FLASHING TO FIT IRREGULARITIES. USE LARGE SLOT SCREWDRIVER TO PRESS INTO TIGHT ANGLES.



STEP FIVE — FASTEN

USE FASTENERS TO FINISH SEALING.