

WELCOME TO THE WORLD OF FUTURE STEEL!

Congratulations on your investment in a Future Steel arch-type steel building.

You have joined the growing ranks of satisfied Future Steel building owners worldwide. Owners, just like you, who demand quality, strength, and maximum utilization of space in their building. Your Future Steel building has been engineered, designed, and manufactured with your demands in mind.

The legendary strength and durability of these buildings is widely acknowledged and well documented. A tribute to the advanced engineering and precision manufacturing processes employed in the production of every Future Steel building.

One major advantage of your Future Steel building is how easy it is to construct. You hold in your hands the key to this ease of construction: The Future Steel Building Manual.

Before you begin construction of your building, read through the manual briefly, once. Then, when you're ready to start actual construction, turn back to page one and simply follow the steps outlined. You'll be amazed by how quickly and easily your building is completed.

Long considered the "Standard of Excellence" in the industry, Future Steel is committed to maintaining that leadership position. Part of our ongoing commitment is absolute dedication to your satisfaction. So if you have any questions or want additional information about your building, please feel free to call our Factory Customer Service toll free line for assistance 1-800-387-2343.

Due to the fact that your X - Series building is the most recent model in the industry, your erection manual has been adapted from previous revisions to similar models. Please excuse any illustrations which do not match the model you have purchased. These illustrations are generic artistic renderings, and are still useful. Again, we apologize for any inconvenience or confusion this may create.

Thank you for your business and again - welcome to the family of satisfied FUTURE STEEL owners.

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Introduction

Please read this manual thoroughly before beginning construction of your building.

Follow the step-by-step directions carefully and your new Future Steel building will provide you with decades of long-lasting service. When properly constructed, your building will provide you with many years of economical protective shelter.

Your building is a Future Steel Model X-_____ Using the model number will help when writing to us, or contacting Customer Service. If you have any questions about your building or this manual, just call 1-800-387-2343 toll-free.

Your Order Number is _____

In several places throughout your manual, you'll find bold-faced **NOTES**. These are recommendations and suggestions intended for your benefit as a building owner. Here are your first three.

NOTE: Future Steel recommends that you purchase construction insurance before you construct your building. Your building does not reach its live load capacity until it is fully assembled. Therefore, sudden weather changes during construction can cause damage. The relatively low cost of construction insurance can help protect you from any repair expenses caused by damage during the construction period.

NOTE: Work safety. Take all necessary precautions to guard against accidents during the construction of your building. Since some building components have sharp edges, workers should wear gloves at all times when handling these components.

NOTE: Be sure to check your parts inventory against the shipping list/packing slip at the time your Future Steel building is delivered.

Storage Guidelines

The heavy-duty commercial steel used in the manufacture of your Future Steel building has been thoroughly inspected as it left the factory.

To ensure that the steel remains in a clean, unstained condition, it is extremely important for you to follow these guidelines:

1. Store in a dry, well-ventilated area.
2. Cut the strapping on all bundles and packages; separating the panels to allow air to circulate freely around each part.
3. Never allow moisture on, or between any steel parts prior to construction.

A special, passive oil has been applied to the steel for added protection during storage. The oil will protect your steel for up to thirty days if your building components are stored outside; and indefinitely, if stored inside. Inside storage is preferred and recommended.

If you must store your building components outside, the following extra precautions should be taken:

1. Cut the strapping and separate all panels with dry pieces of wood.
2. Endwall bundles must be separated so that no two pieces come into contact.
3. All other parts must also be separated and stored on dry wood blocking, off the ground.

Do not simply cover the bundles and packages with a tarp, because serious moisture damage can occur.

NOTE: If steel becomes damp while in contact with other steel pieces, a gray, white or black deposit forms on the surface of the steel. The guidelines listed above will help avoid this staining.

Tools & Equipment

The tools and equipment listed below include everything you'll need for the proper construction of your Future Steel building. These materials are not supplied with your building.

TOOLS:

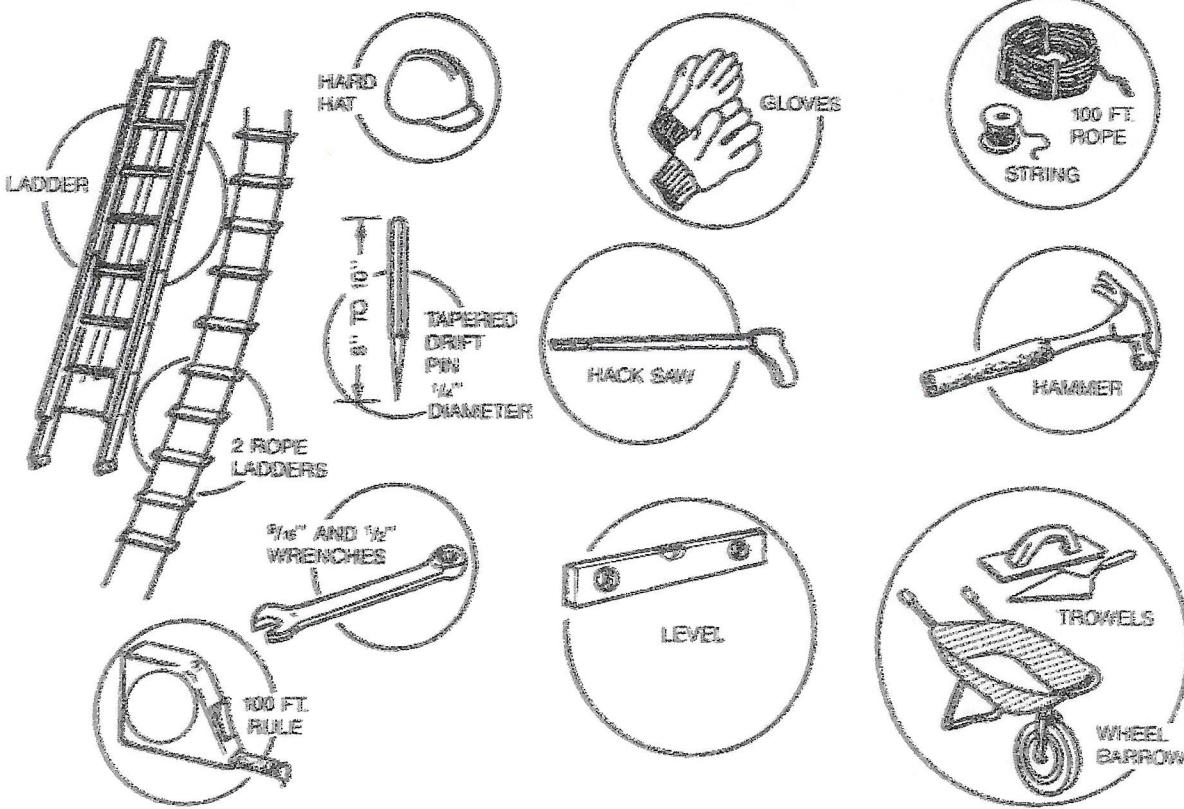
- Hard Hats and Work Gloves
- 2 Tape Measures (50 ft./100 ft., and 10 ft.)
- Spirit Level
- 1/2" and 9/16" Wrenches
- Handsaw, Hacksaw
- Rope (100 ft. length)
- 2 "S" hooks
- Electric Impact Gun
- 1/2" (6) Point Socket

EQUIPMENT:

- Power (circular) saw, Keyhole saw, saber saw
- Electric drill, 3/8" minimum, variable speed
- Drill bits, 3/8" for sheet metal
- Extension Ladders/Rope Ladders
- Scaffolding and Stepladders

NOTE: You may not need all the tools and equipment listed. However, if your building is specially customized, you may require additional tools/equipment.

Equipment List



FOUNDATION

Foundation Notes & Reference

Because the foundation for your building depends upon local soil and loading conditions, we cannot be responsible for the design. This is the one area where most people engage a local contractor or other construction professional. These foundation notes have been prepared for use by your contractor or foundation specialist. They provide instructions and drawings for assuring you a solid, dependable foundation.

Since many local factors influence the design of your particular foundation, foundation dimensions are for illustration only. Here is where your engineer will be of invaluable assistance.

A professional civil engineer can:

- help select your site,
- determine what site preparation is required,
- design the best foundation for your building (including modifications, when necessary),
and
- supervise construction to ensure design details are interpreted correctly.

In fact, you may decide to simply give this section of the construction manual to your engineer – he/she can take it from here!

Five Basic Building Configurations

Although every Future Steel building is designed to meet individual owner specifications, your building will match one of five basic configurations. These five general categories are determined by the types of endwalls you ordered for your building. The categories are listed as "Pack" numbers. Here is a listing of each pack and its distinguishing characteristics.

PACK 1: 1 solid endwall / 1 endwall with sliding doors / or framed opening.

PACK 2: Both (2) endwalls with sliding doors or framed openings.

PACK 3: Both (2) solid endwalls.

PACK 4: 1 open end (no endwall); 1 endwall (either solid, or with sliding doors, or framed opening).

PACK 5: 2 open ends (no endwalls).

For example, a PACK 1 will have a solid wall at one end of the building, and a wall with sliding doors at the opposite end. A PACK 5 will have no walls at either end; the building will be "open" at both ends..

Since no single kind of foundation is appropriate for all five categories, determining the PACK number that matches your building is important. Please select and record your building PACK number below:

My Future Steel Model X- building is PACK # _____.

- **NOTE:** Using your Pack number, along with your building Model (X-), will allow us to provide you with the fastest possible service if you should need to write or call us.

Figure 3 shows a cutaway view of the foundation length for a PACK 4 building. The length is determined by multiplying the number of arches in your building times 24", and adding 11". For example: if your building has 25 arches, the overall foundation length would be 50' 11" (25 arches \times 24" + 11").

For Pack 4 Building

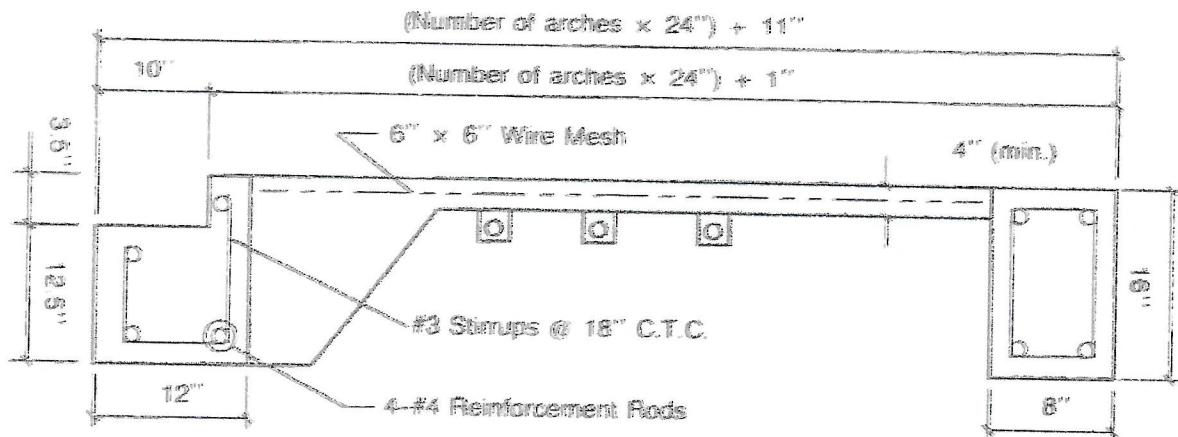


Figure 3
Side View

NOTE: Brackets are suggested only. Not supplied with building.

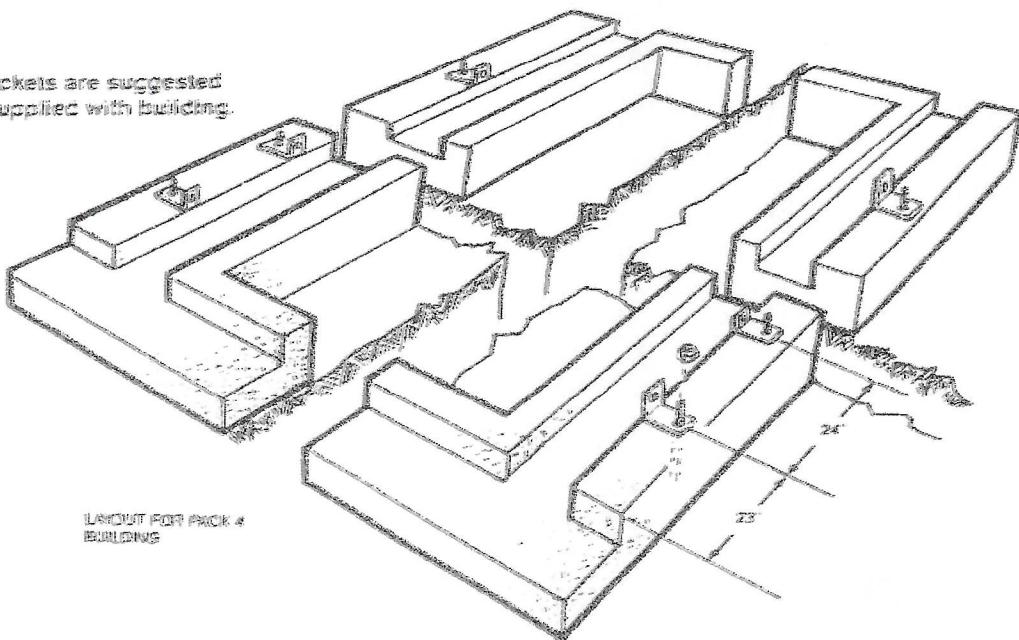


Figure 3A
Reinforcement steel not shown
Floor removed for clarity

Figure 4 shows a cutaway of the foundation length for a PACK 5 building. The length is determined by multiplying the number of arches in your building times 24", and adding 5". For example: if your building has 25 arches, the overall foundation length would be 50' 5" (25 arches \times 24" + 5").

Figure 4 shows a cutaway view of the foundation length for a PACK 5 building. The length is determined by multiplying the number of arches in your building times 24", and adding 5". For example, if your building has 25 arches, the overall foundation length would be 50' 5" (25 arches \times 24" + 5").

For Pack 5 Building

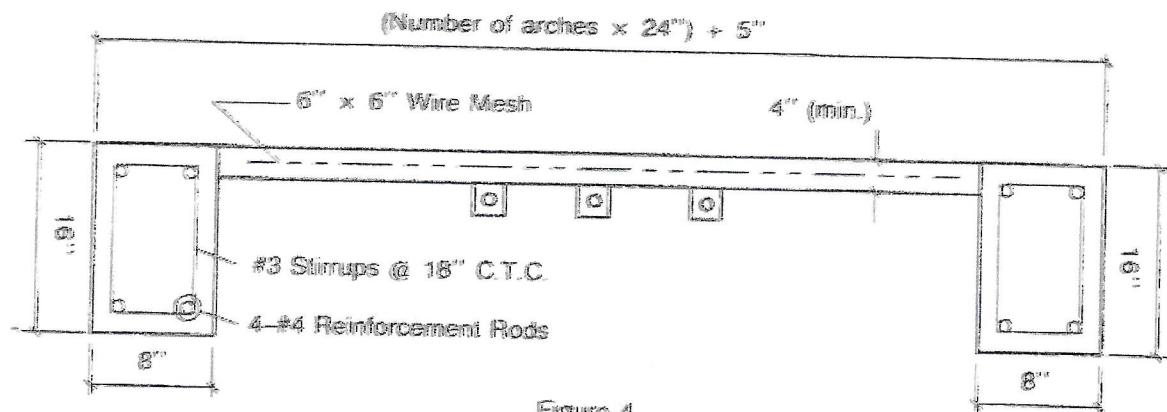


Figure 4
Side View

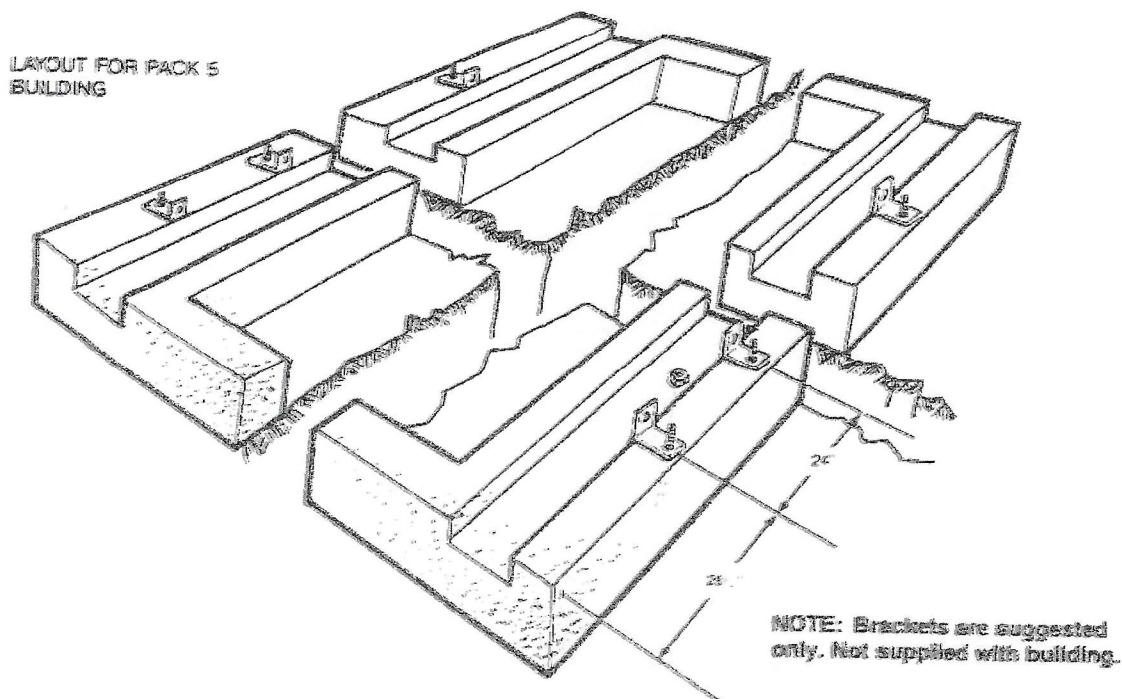


Figure 4A
Reinforcement steel not shown.
Floor removed for clarity.

Summary

The foundation specifications shown in previous Figures (1-4) will provide our engineer/foundation specialist with everything necessary to assure you a sound, stable foundation. Your foundation should be level, as well as square; and it should have the exact dimensions you determined earlier.

NOTE: Although anchor bolts for the hold down brackets are not supplied with your building we strongly recommend their use. The bolts can be easily obtained at your local hardware store, or building supply store. They are used to tie down your building before grouting is completed – to prevent arches from being lifted out of the foundation troughs by wind gusts. The anchor bolts should be inserted before the concrete sets.

NOTE: Proper construction and reinforcement steel for your foundation is a critical factor in the longevity of your Future Steel building. Therefore, reinforcing steel should be detailed, formed, and placed by experienced people following foundation drawings prepared or approved by a registered, professional civil engineer. Local conditions may require more steel, but in general we recommend at least 4 No. 4 bars in the foundation perimeter held in place by No. 3 stirrups.

NOTE: If steel connectors are used instead of a concrete trough, a different foundation layout is required. Check with your Future Steel representative for complete information. Also, you may want to ask about special economical Future Steel base connectors for your building, to determine the most efficient way to mount your building **BEFORE YOUR FUTURE STEEL BUILDING IS SHIPPED.**

Once you've determined the overall length of your Future Steel building foundation, record your foundation dimensions below.

My Future Steel Model X-

foundation dimensions are:

Pack: _____

Length: _____

Width: _____

The remainder of this manual assumes that your foundation already has been correctly installed. If you have any questions about the foundation for your building, please call customer service at 1-800-387-2343 toll-free. Again, you may wish to ask about special Future Steel base connectors for your building.

Getting Started

The hour is at hand and you're ready to begin construction of your Future Steel building!

NOTE: Special care should be taken when unloading your building so you do not damage components.

First, check the tools and equipment you have on hand against the list of tools and equipment. Do you have an adequate source of electricity for the power equipment? Make sure there are enough hard hats and gloves for everyone who will be working on the site.

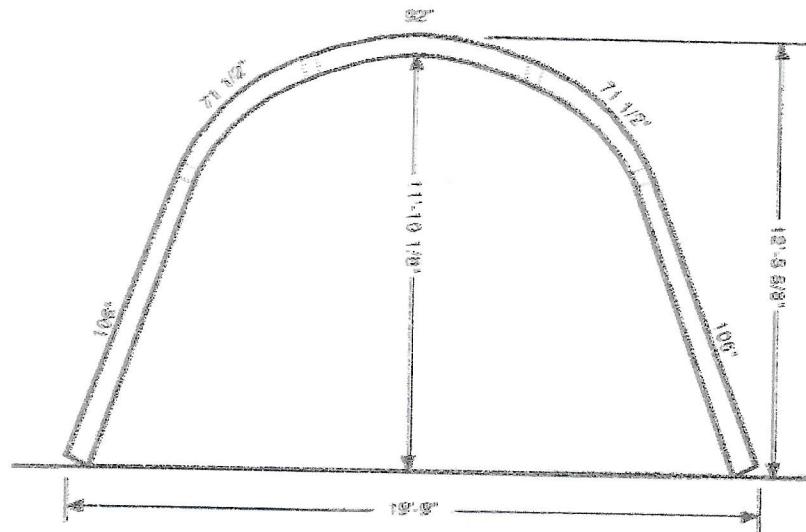
Layout & Preparation of Work Area

There should be two large, clear areas at each end of your building site - approximately 50 feet in diameter. And you should have at least ten feet of clearance down each side of the foundation.

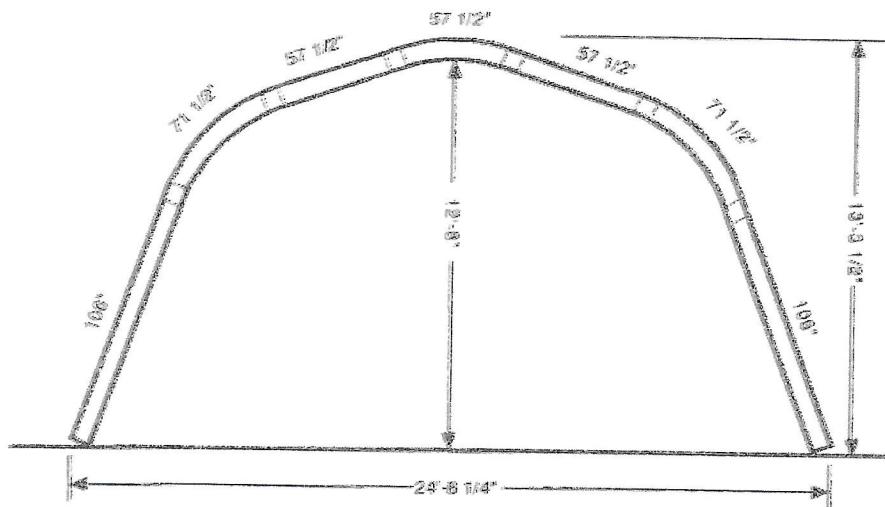
Construction will start at the end of your building with the entrance/way/sliding doors. So your tools and equipment will be most convenient at that end. Scaffolding and ladders should be positioned at the same end.

Last but not least, gather the workers who will be assisting you. Make certain they understand who's giving the orders. Tell them you want the work to proceed smoothly and correctly. If they have questions, ask before proceeding. And above all, you want them to work safely.

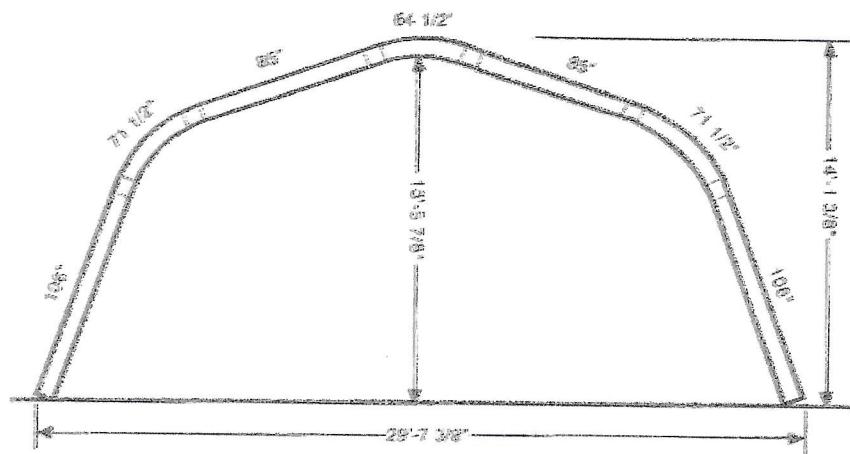
NOTE: When using trough foundation, reduce the height of your building by 3 1/2"



X20-12.5

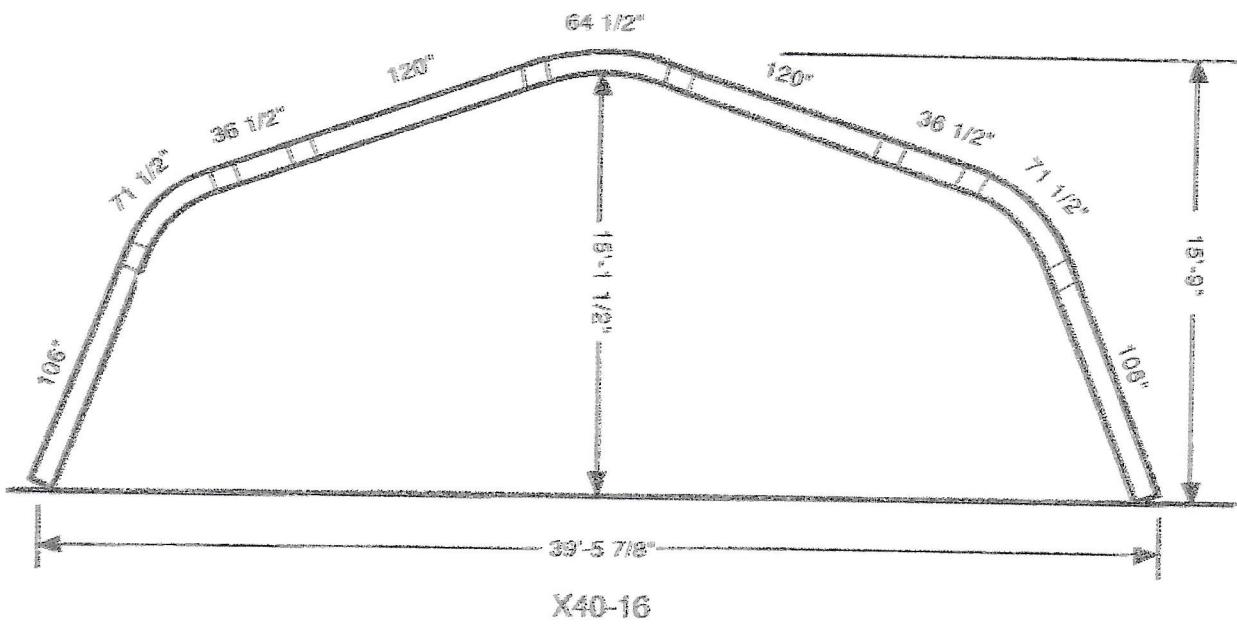
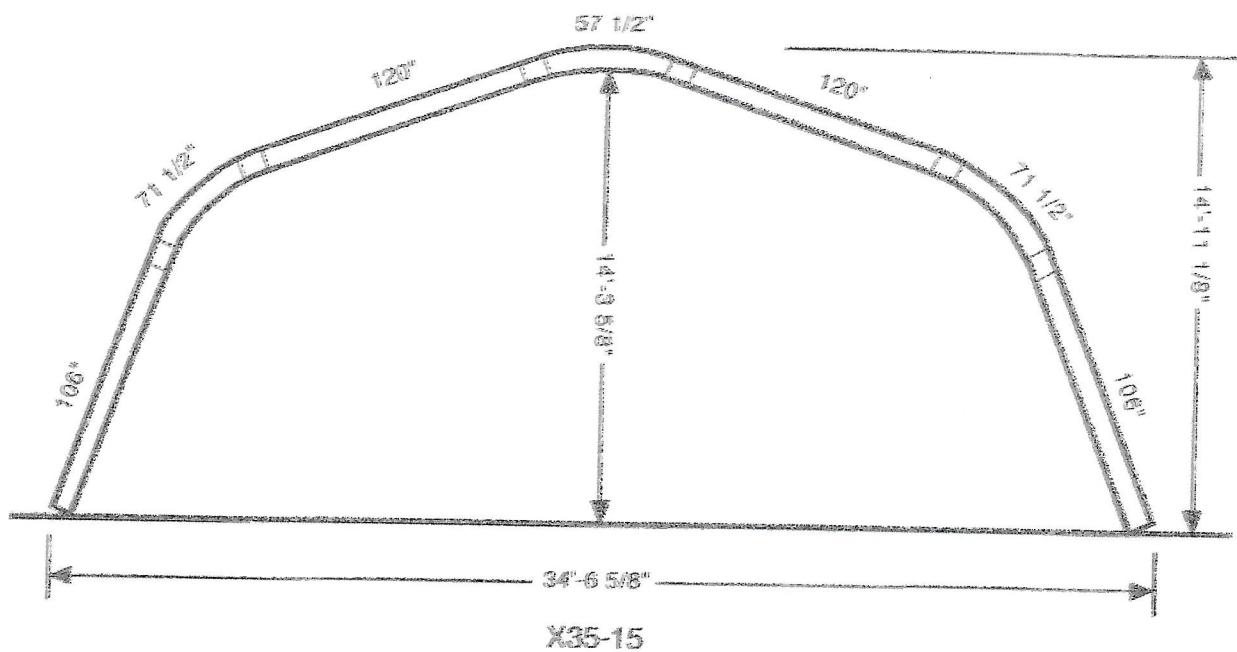


X25-13



X30-14

NOTE: When using trough foundation, reduce the height of your building by 3 1/2"



Erecting the Arches (Complete Arch Method)

The arches of your Future Steel building are the major components, acting as both the sidewalls and the roof. Properly constructed, your building will be watertight. However optional caulking is available for special projects, or upon request.

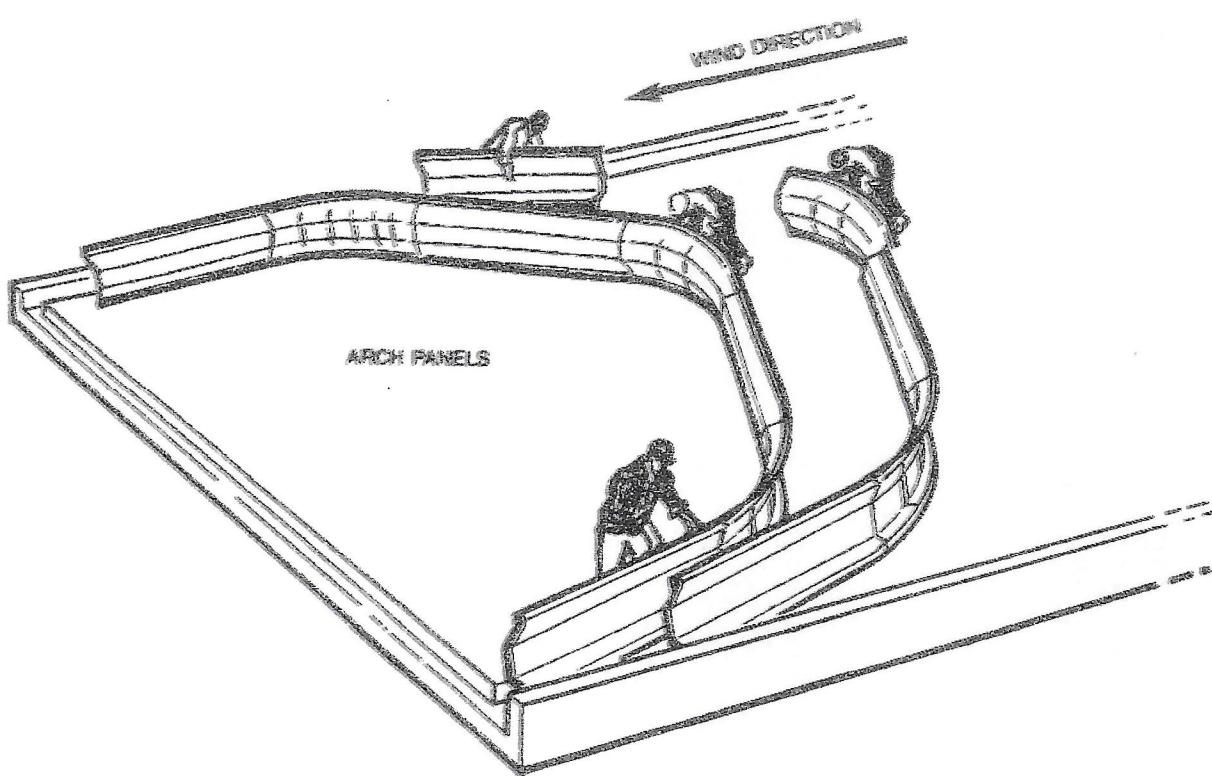


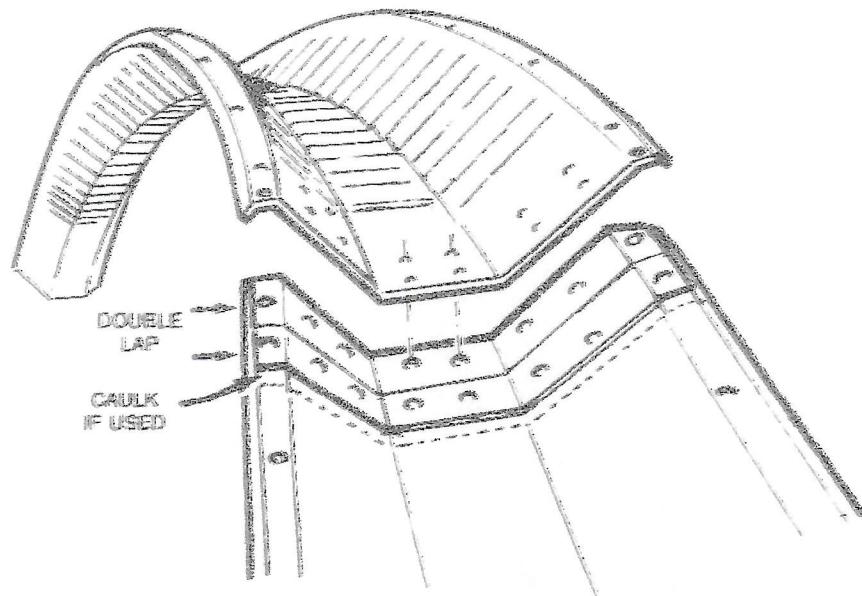
Figure 5

NOTE: Future Steel produces a special type of strip caulking designed for your building. It offers superior sealing capability and extreme ease of application. Future Steel's custom caulking will not freeze, crack or deteriorate in any way.

STEP 1

Caulking should be applied to the panels as shown in Figure 6, before the pieces are joined together.

NOTE: Caulking is an optional item, supplied at extra cost and can be purchased through your Sales Rep., or may be purchased at the local hardware store.



STEP 2

Figure 6

When joining the panels to create the full arch, the pieces should be overlapped properly to ensure that rain will flow down the arch. See Figure 7.

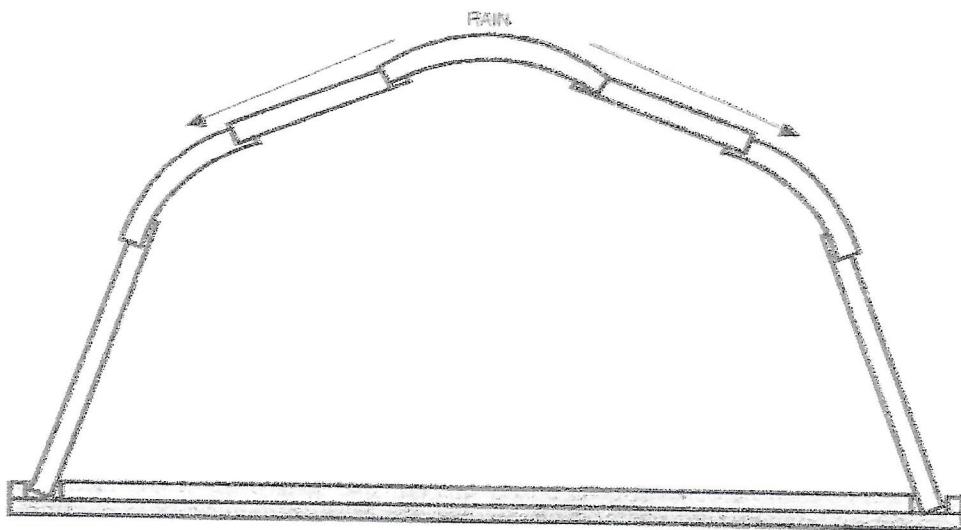
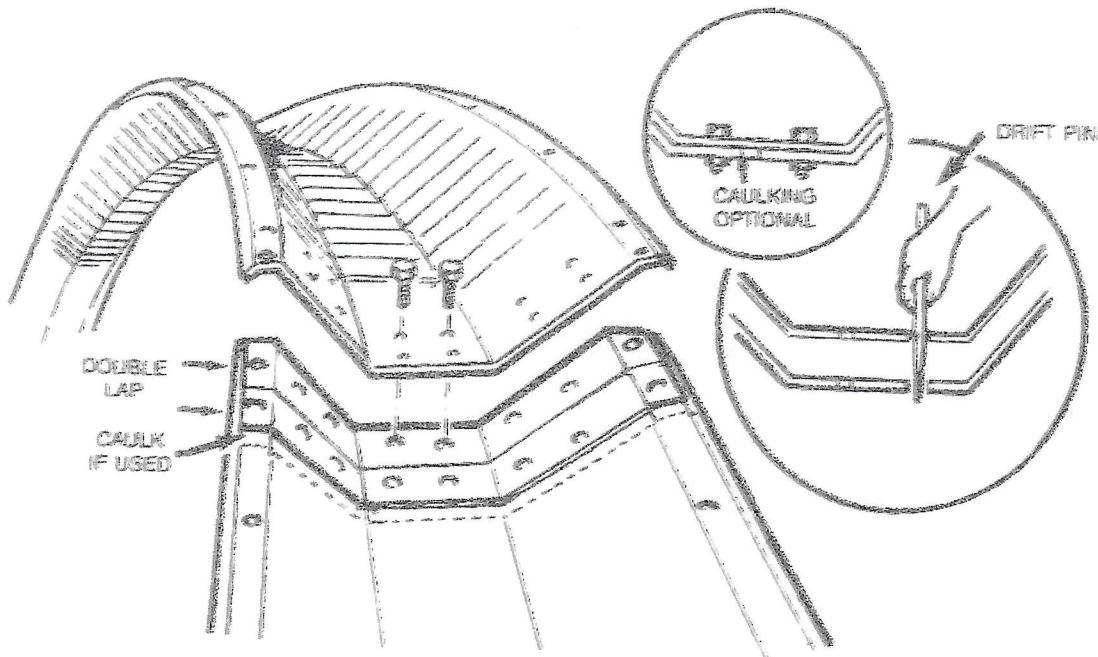


Figure 7

STEP 3

The panels are bolted end to end using drift pins to align the holes. The bolts should not be completely tightened at this time, but should be left finger tight.



STEP 4

Figure 8

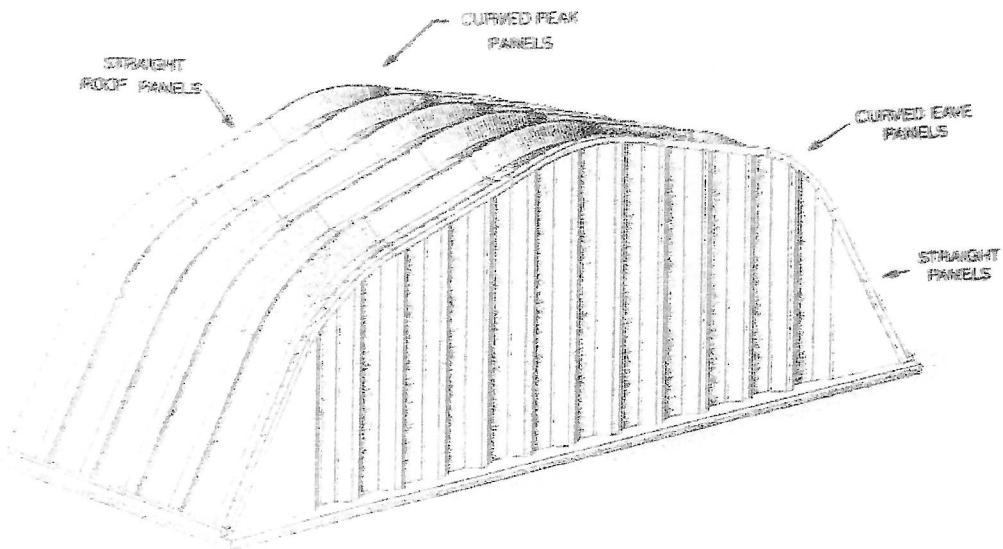


Figure 9

Once the arch panels have been assembled into complete units you are ready to raise them into position.

NOTE: Tighten all arches finger tight only until building is complete. When all arches are standing and plumb, tighten bolts completely, starting with straight panels and eave panels on both sides.

Special care should be taken erecting the first arch, as single arches are very flexible and can be hard to control. Distortion must be avoided. It is recommended to bolt on the curved angles before raising the first arch. This adds to the stiffness of the arch.

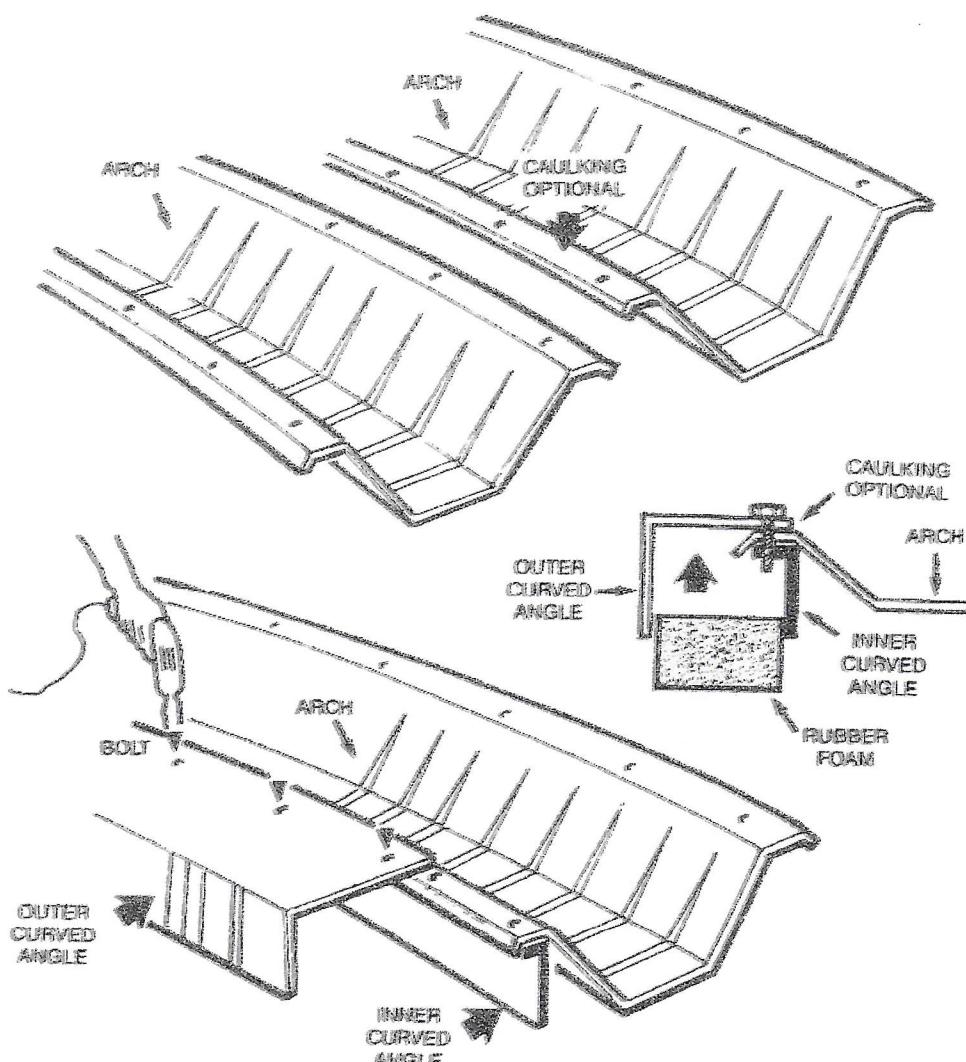


Figure 10

NOTE: Assembling curved angles is the same as assembling the arches. The difference is that the curved angles only overlap one hole. Curved angles are to be field cut. Also straight curved angles are packaged with endwalls, if they are not the right length cut them to the same length as straight arch panel.

Preparing to Raise Arches

The first arch is the most difficult to raise into position and great care should be taken on this step.

When raising the arches up into position, care must be taken to avoid twisting and distortion. It is better to raise the arches manually rather than use a crane or boom truck, to avoid distortion.

A few sections of scaffolding will make the raising of the arches much easier. Home made staging may be employed if no scaffolding is available in the area. Some people find it convenient to build a stage on top of a flat wagon which provides a rolling platform from which to work.

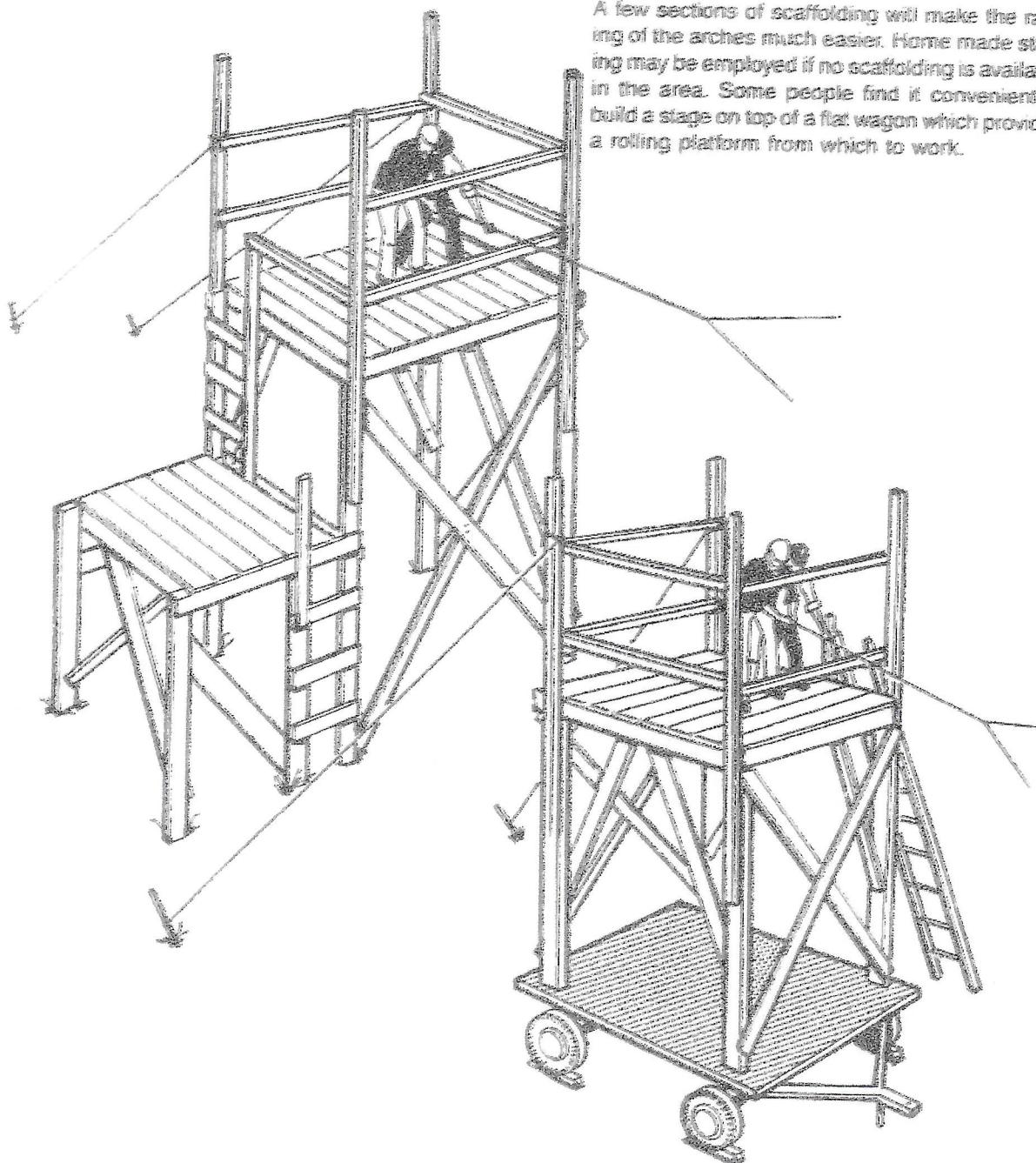


Figure 11

Putting Up First Arch

Two "S" hooks should be fashioned out of 5/16" diameter rod to be used to attach to the arch for raising.

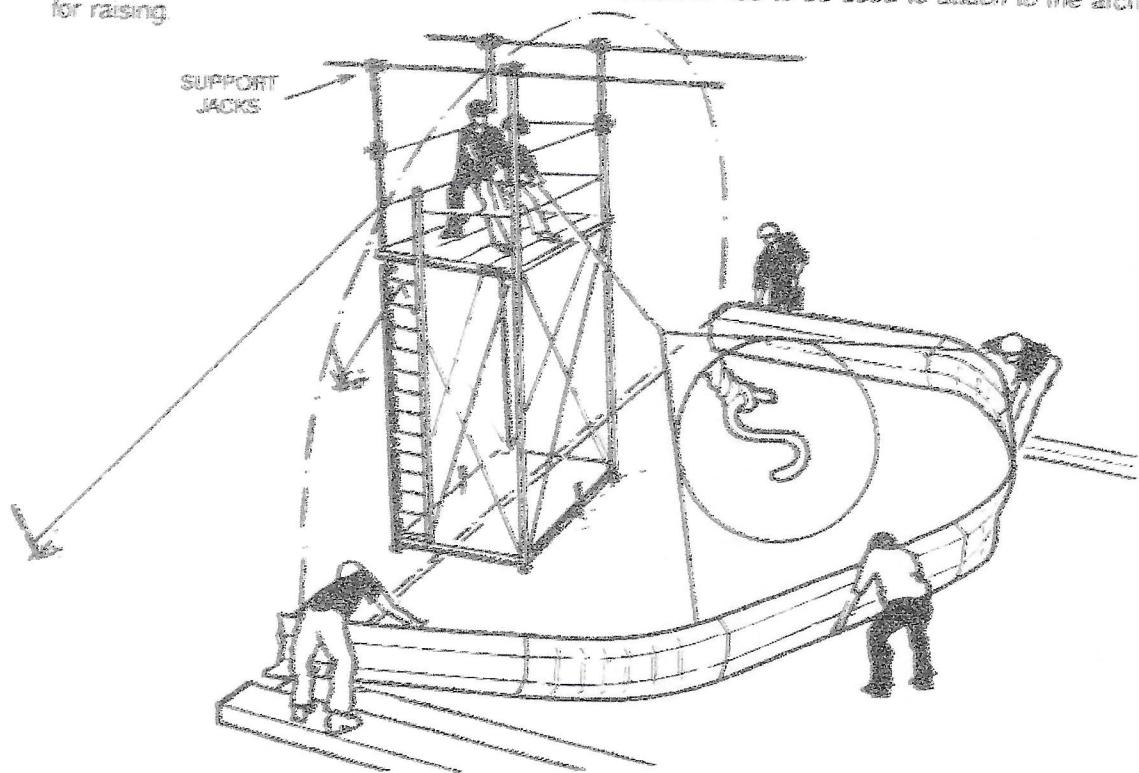
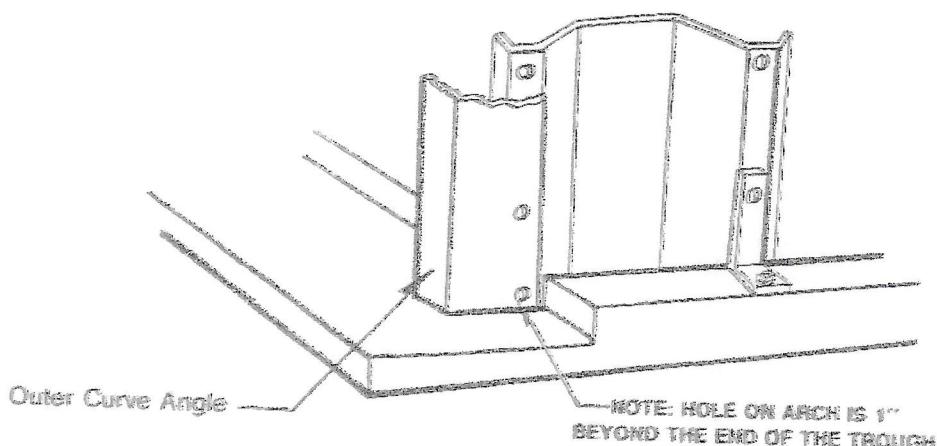


Figure 12

The "S" hooks are tied to the rope and then placed in holes in the arch panel approximately ten to twelve holes from the center of the arch. The hole location changes depending on the height of your scaffold, and the number of people you have. With the hooks and ropes in place, and one or two persons at each corner to guide the arch into the trough, the first arch is pulled to an upright position.

Positioning First Arch

Once the first arch has been raised it should be positioned at the correct location in the trough. The distance from the end of the wall to the hole in the arch panel should be exactly 1". This is for pack 1-4 buildings only.



Securing First Arch

When the first arch is into position it should be tied off either to the scaffolding or to stakes driven into the ground. This is to provide a more solid starting point from which to continue the erection of the arches.

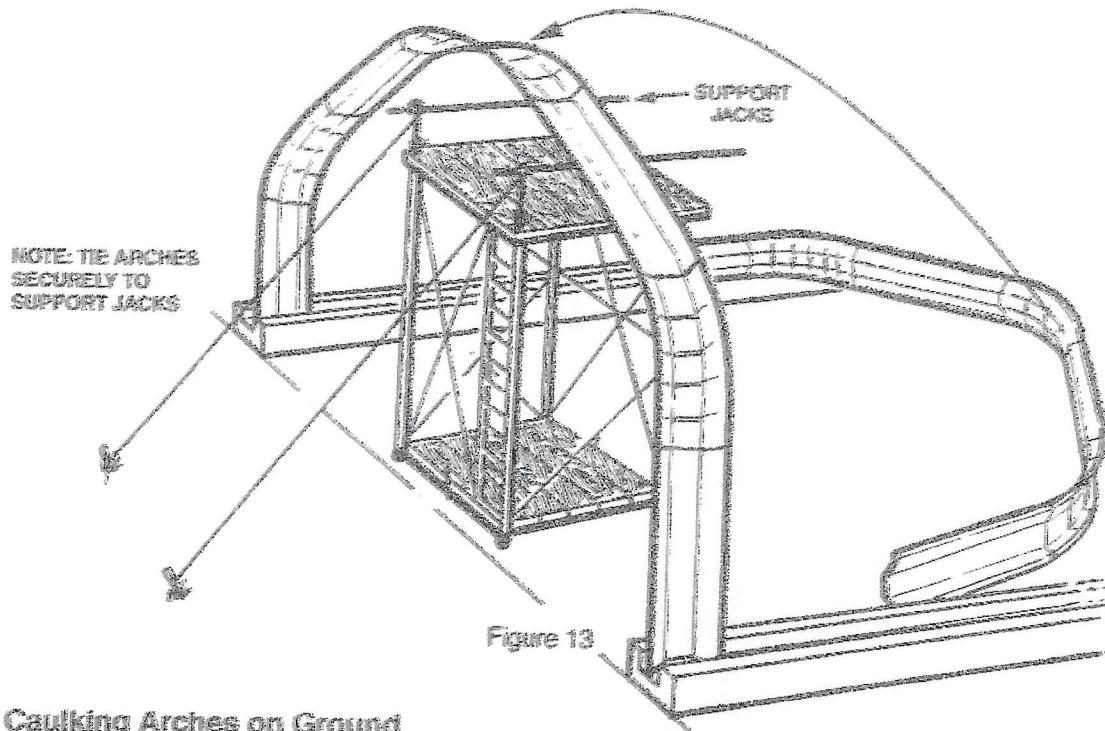


Figure 13

Caulking Arches on Ground

If caulking is being used, before the second and subsequent arches are raised into position, it should be applied along the entire length of the arch. Apply the caulking in a continuous strip on the underside of the arch panel between the outside edge of the panel and the holes.

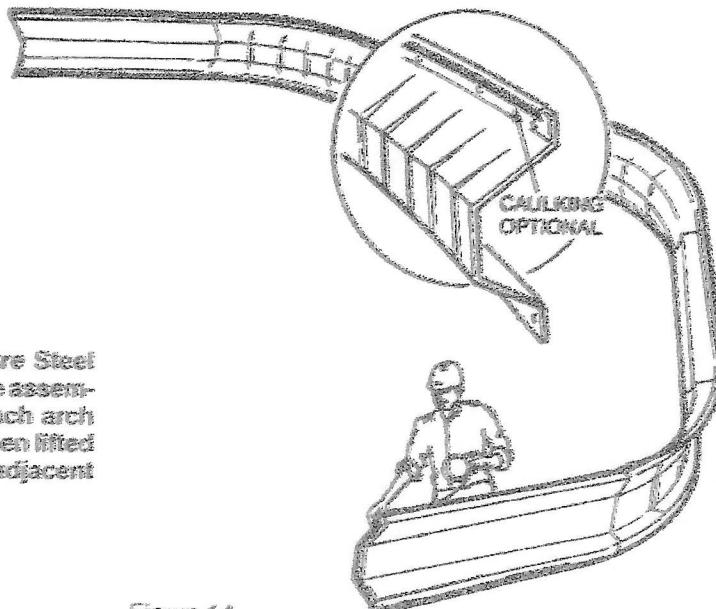


Figure 14

NOTE: The key to your Future Steel building is that a majority of the assembly is done on the ground. Each arch is assembled on the ground, then lifted into place and bolted to an adjacent arch.

Raising Second Arch

The second arch is pulled up in the same manner as the first and lifted over the rim of the first arch.

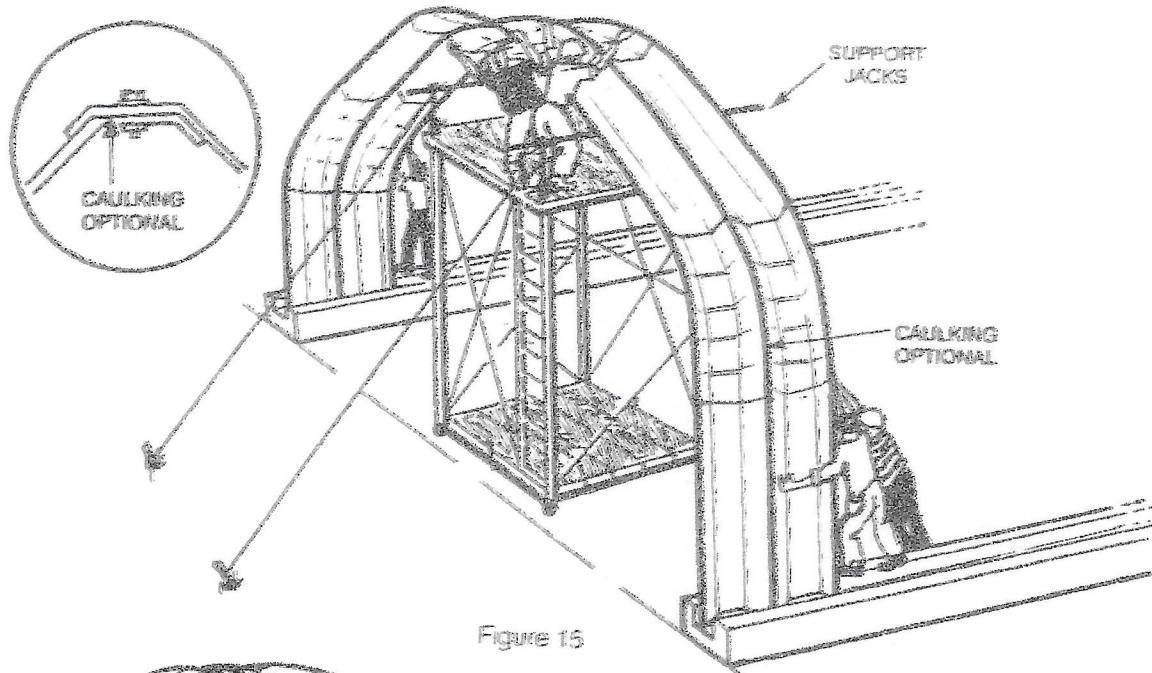


Figure 15

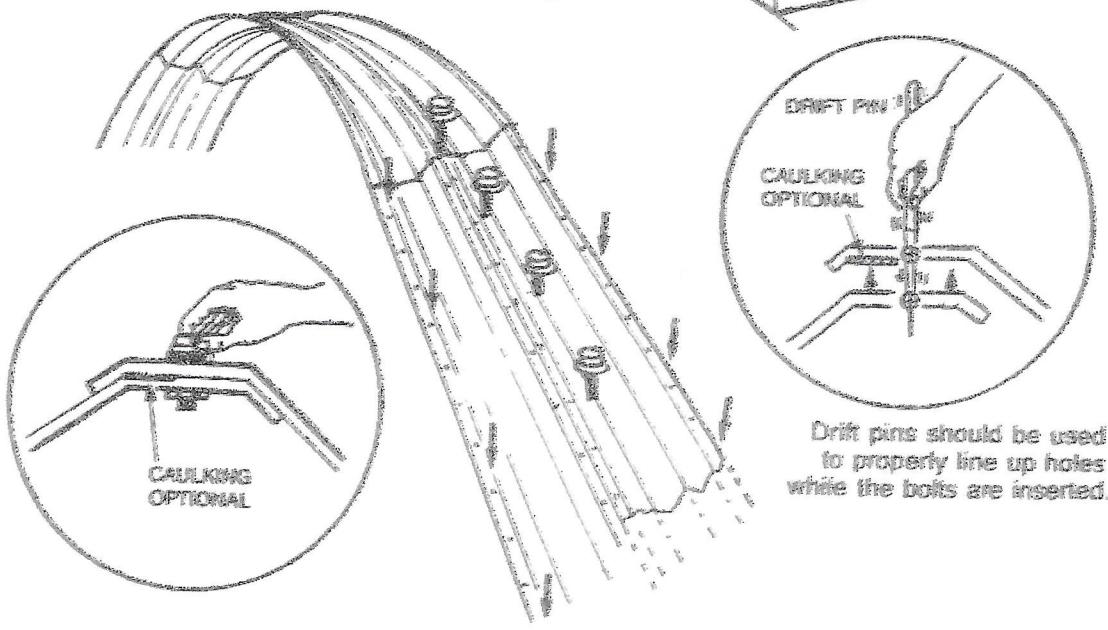


Figure 16

There should be no need to tear or elongate the holes in order to make them line up. By using the drift pin the holes can be made to line up without damaging the panel. At this stage only every third or fourth bolt need be inserted along the arch.

NOTE: Leave all bolts finger tight until all arches have been erected and plumb.
(See NOTE page 16.)

Fastening Arches Down

As each arch is bolted into place, it should be fastened down to the brackets in the concrete.

This is very important to prevent a strong wind from lifting the arches out of the trough prior to grouting.

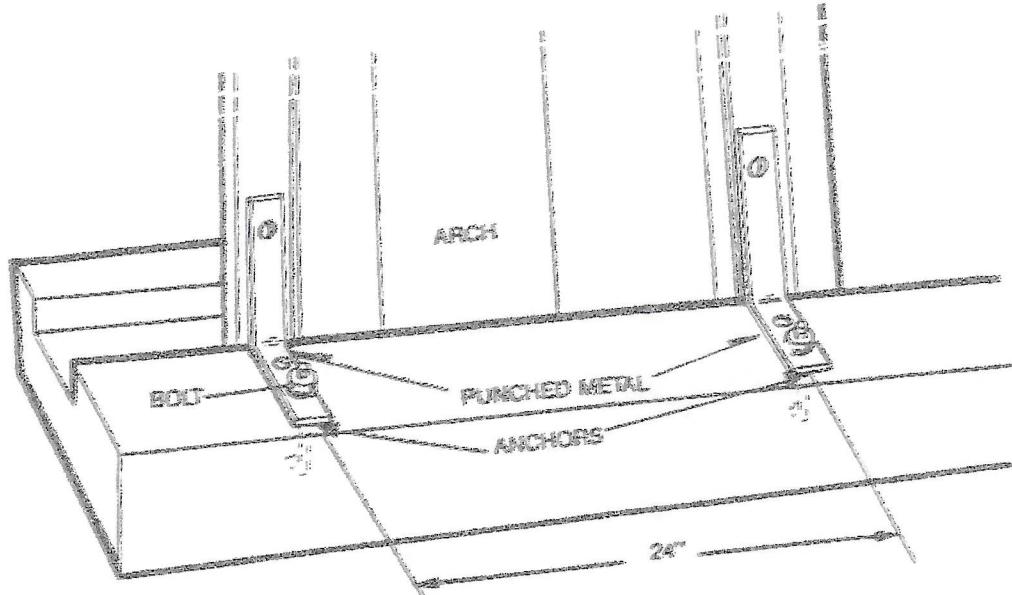


Figure 17

CAUTION: WE STRONGLY RECOMMEND THE USE OF A SAFETY HARNESS BRACED TO THE SCAFFOLD.

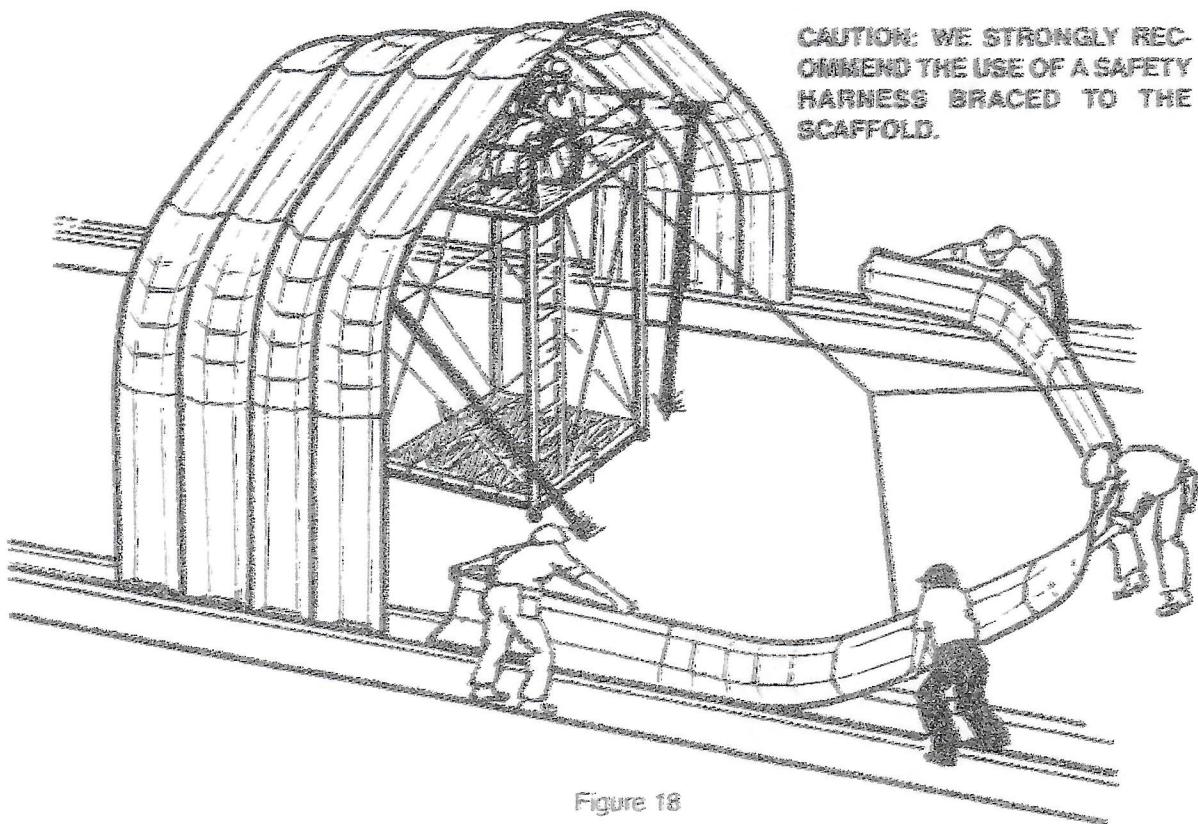


Figure 18

CAUTION: THE ERECTED ARCHES ARE VERY SUSCEPTIBLE TO WIND DAMAGE UNTIL THEY ARE GROUTED IN AND FULLY TIGHTENED. MAKE SURE THERE ARE AMPLE TEMPORARY HOLD DOWNS FASTENING THE STRUCTURE.

Checking Arch Length

As the erection progresses the centre dimension should be checked approximately every 10 ft. to ensure that the arches are not spreading. The dimensions from the bolt hole of one arch to the bolt hole of the next arch should be 24" centre to centre.

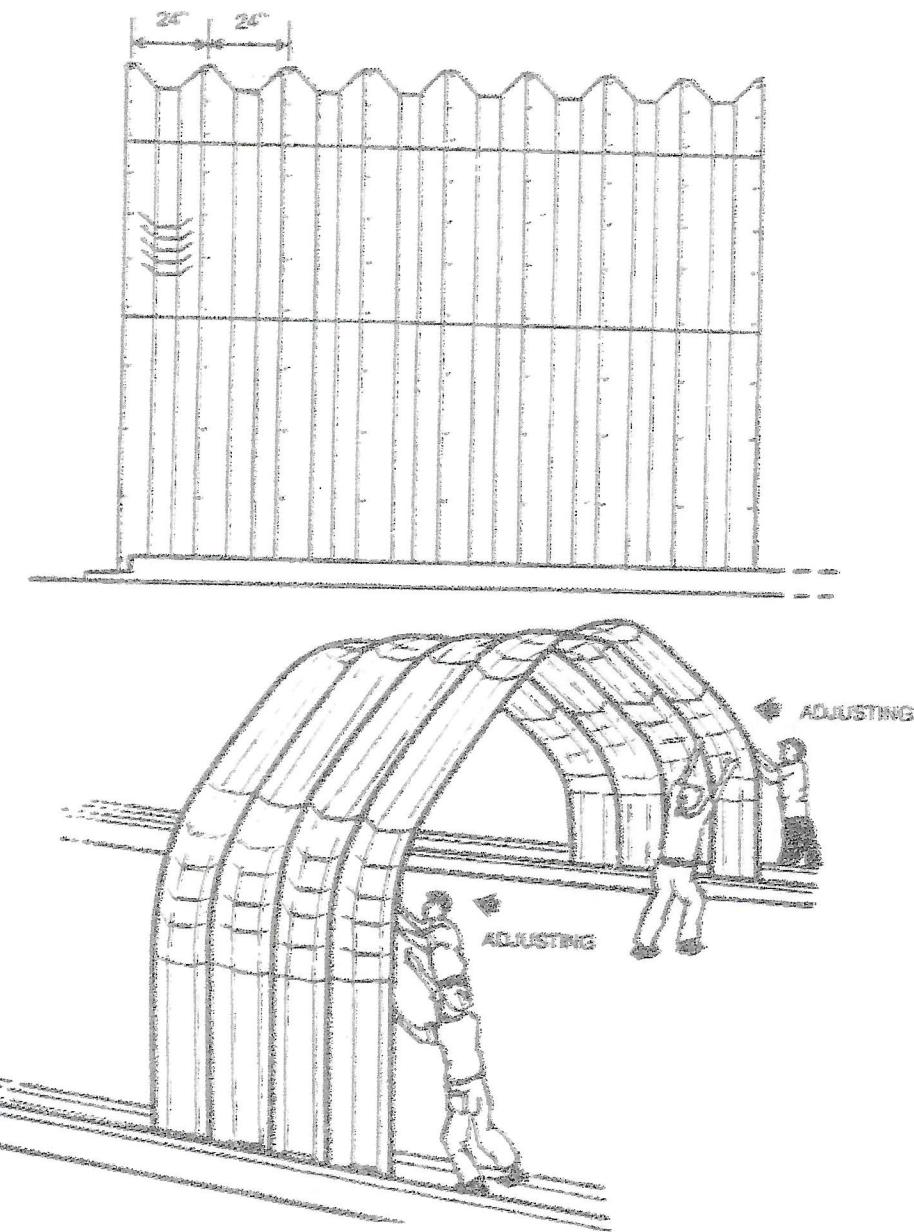


Figure 19

The dimension should be checked on both sides of the building as well as the peak. If the structure is tending to creep ahead, it can be adjusted by pushing back on the arch sections from the inside of the building. Two to three men can move five arches back one or two inches to bring the building back into line.

Strapping the Arches

We have included metal angles with holes punched every 24" to help maintain the proper center-to-center dimensions of the arches.

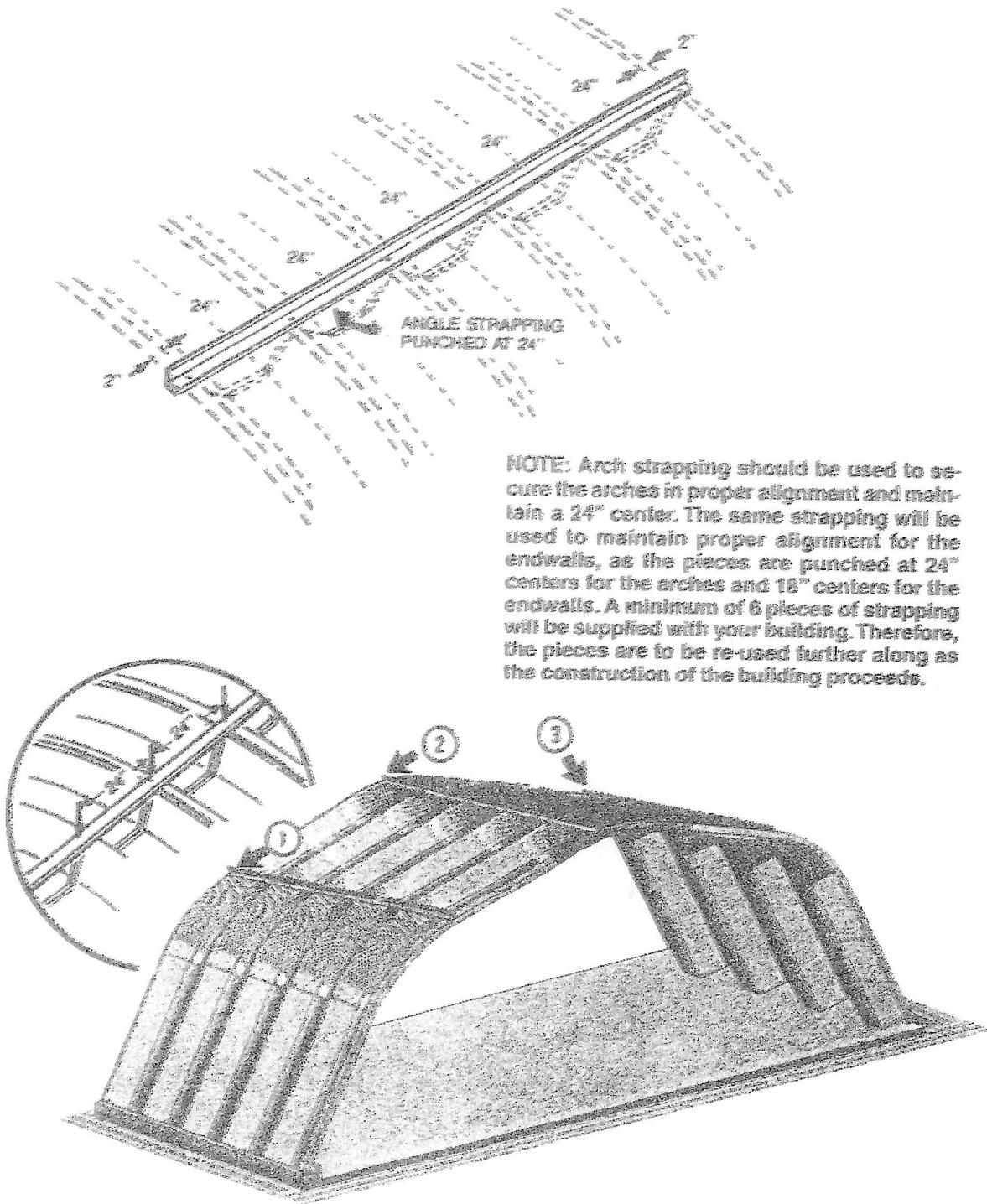


Figure 20

Three of these straps should be bolted onto the arches, one on each side and one at the peak as the erection proceeds.

Maintaining Proper Arch Shape

At this time, the center point of the foundation should be found and marked. A plumb bob should be suspended from the center point of the arch. The arch should then be propped up by means of 2" x 6" wood planks and adjusted so that the plumb bob is directly over the center line of the building. The arch should also be propped at the peak to maintain the correct height. This bracing of the arches is very important in maintaining the proper shape and for making erection of subsequent arches easier. These planks should be used at approximately 10 ft. intervals along the entire length of the building and the inside width and height dimensions checked and maintained.

NOTE: Building may collapse if not properly braced.

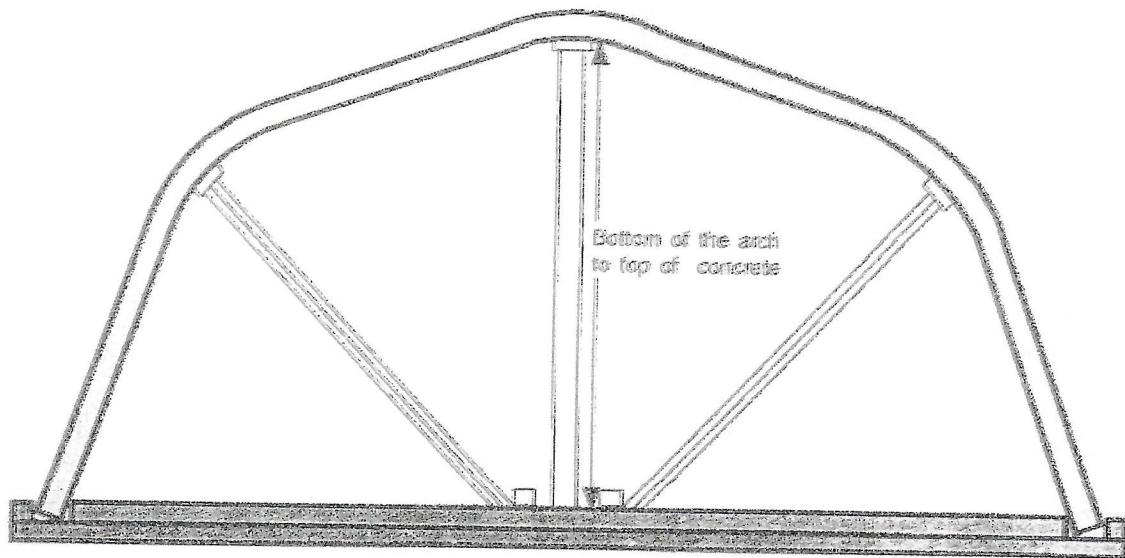


Figure 21

Skylights

If you have purchased fiberglass skylights, the steel sheets will have been removed from your order. As you progress with erection of the arches you should remove the panels from the area where you wish to install the skylight. Do not install the skylights until all the arches have been erected (see special section on installation of skylights) but rather just leave out steel panels for the time being.

Erecting the Arches (Half Arch Method)

An alternative method of erecting the arches. If you do not have enough manpower, you may elect to erect the building in half sections. The following diagrams show how to raise the arches using the half arch method.

All directions regarding caulking and lapping of joints are the same for this method as for the entire arch method. The instructions for raising of arches should be carefully read and fully understood before attempting to erect the building.

STEP 1

Assemble arches in half sections on the ground as shown below. Remember to caulk all joints and to lap panels in the correct manner described on page 16, Figure 7.

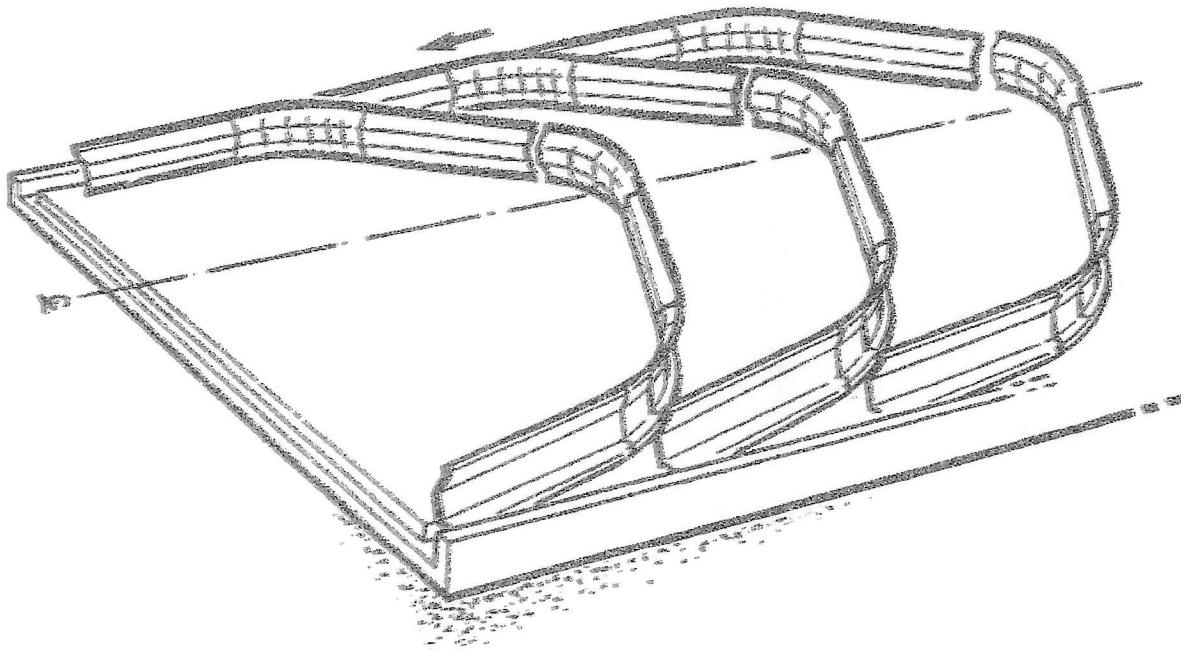


Figure 22

STEP 2

Using the rope method explained in the whole arch section raise half of the arch and support on scaffolding.

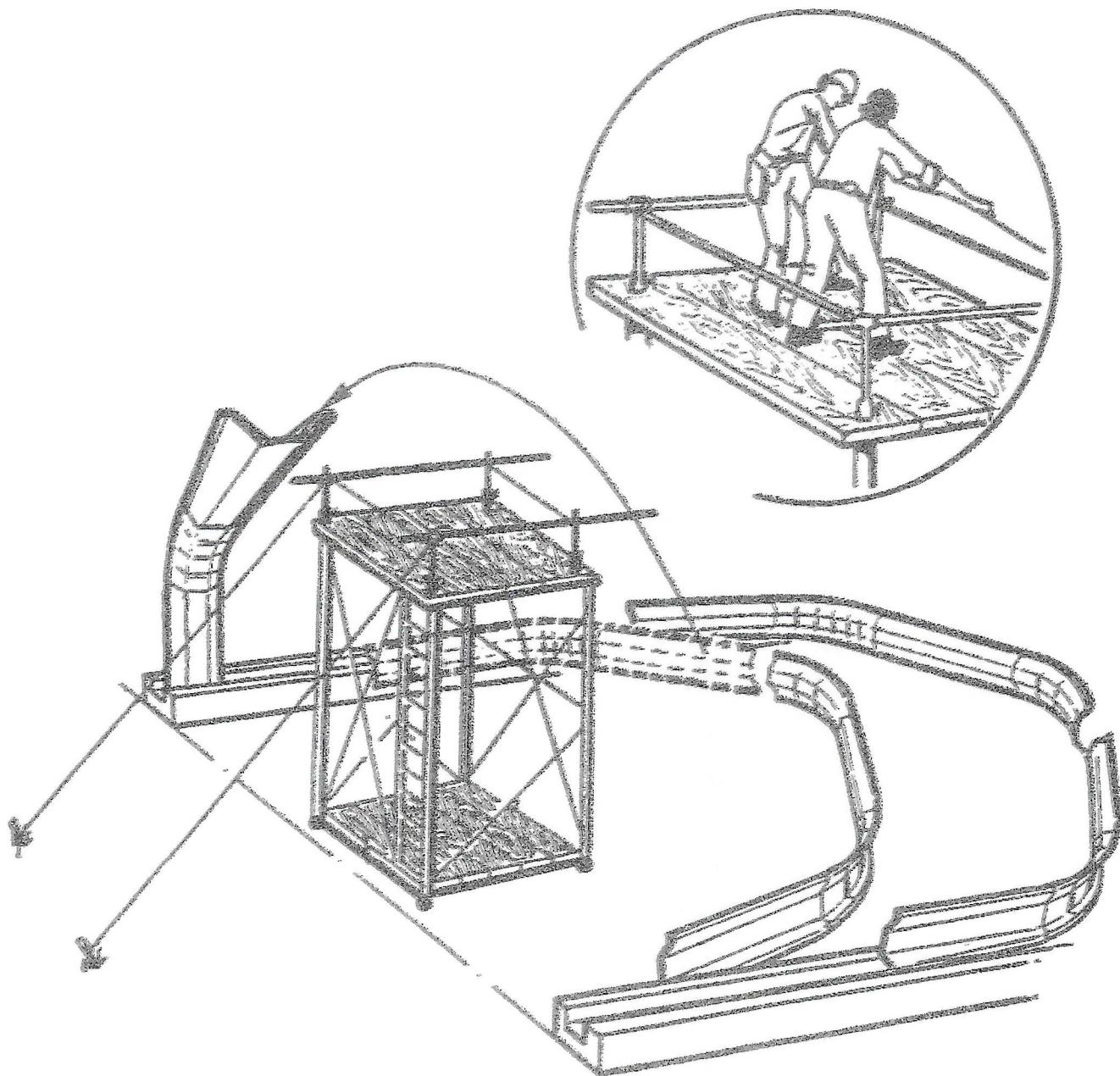


Figure 23

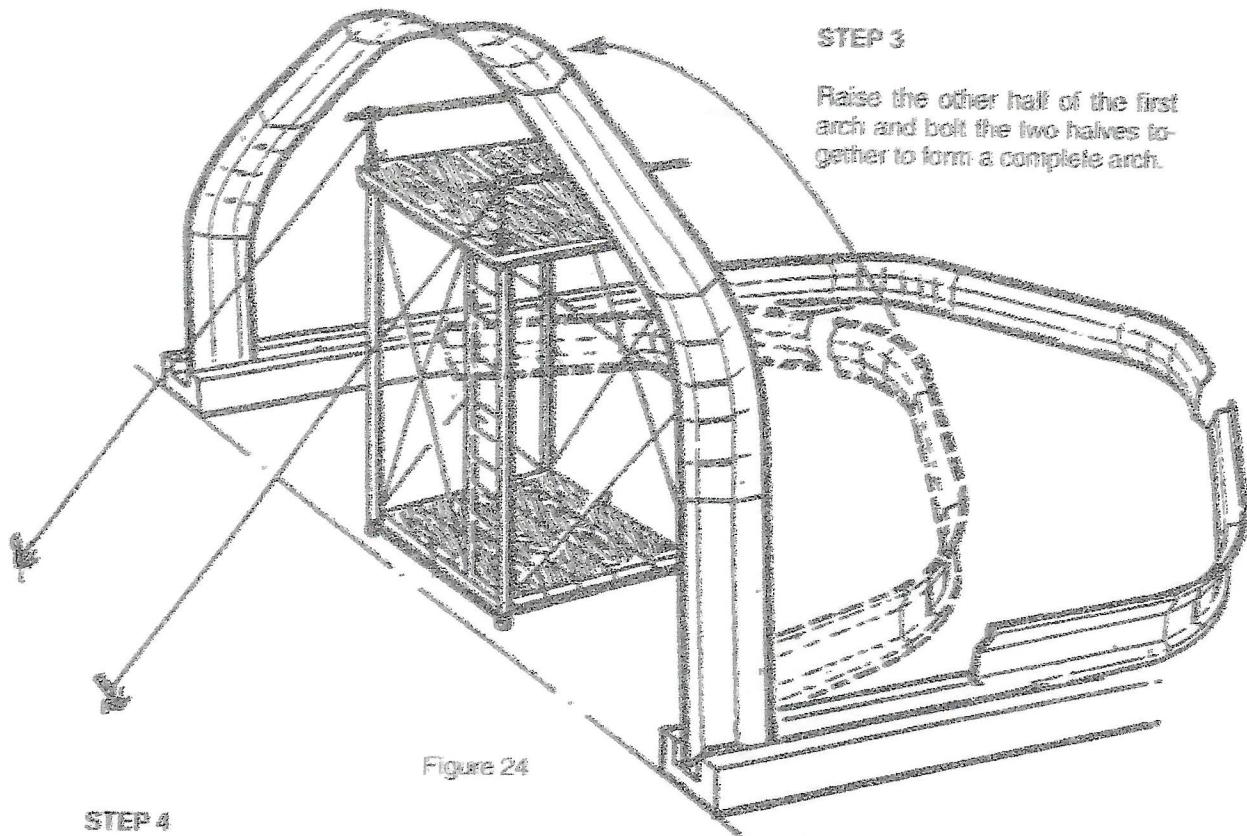


Figure 24

STEP 4

Raise another half section of arch and bolt every 3 or 4 holes.

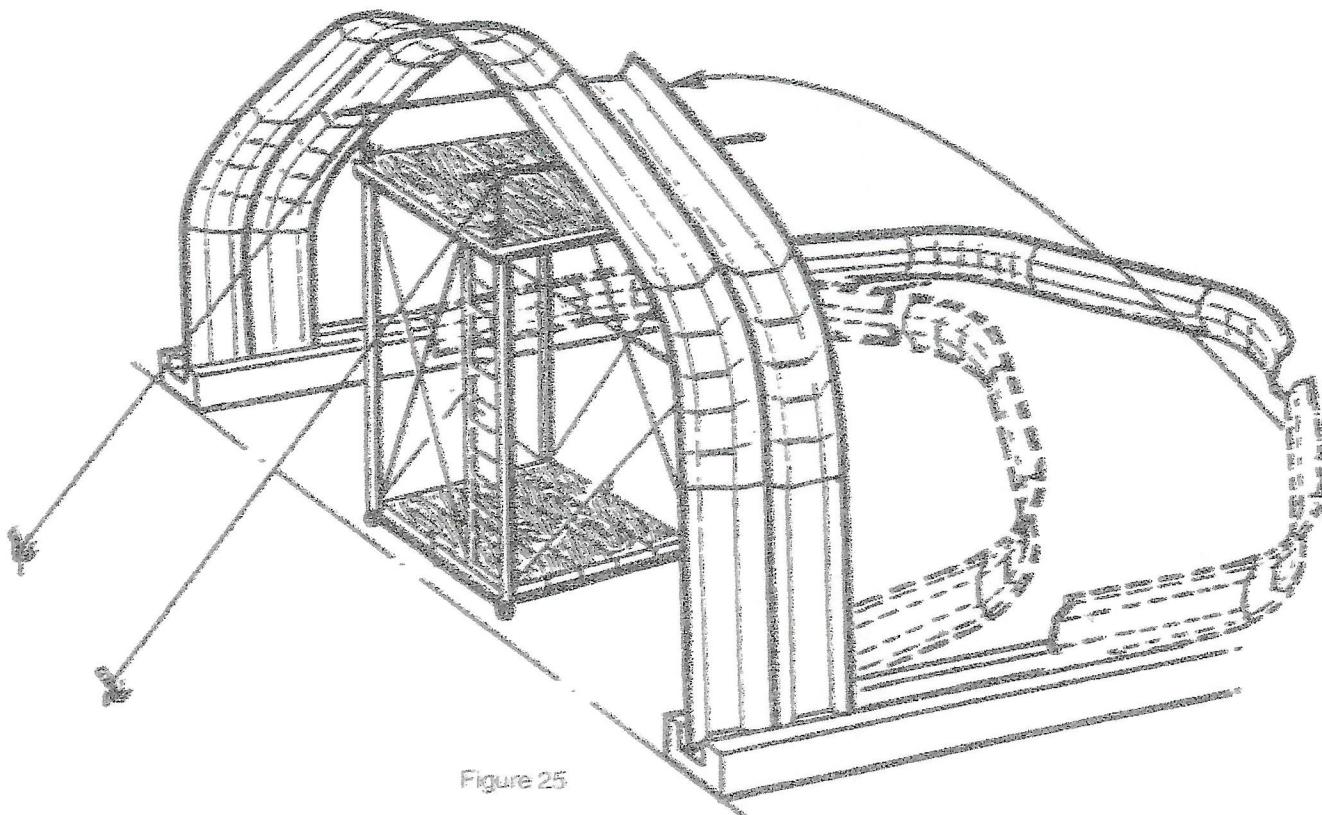


Figure 25

STEP 5

Raise the remaining half of the second arch and complete the section.

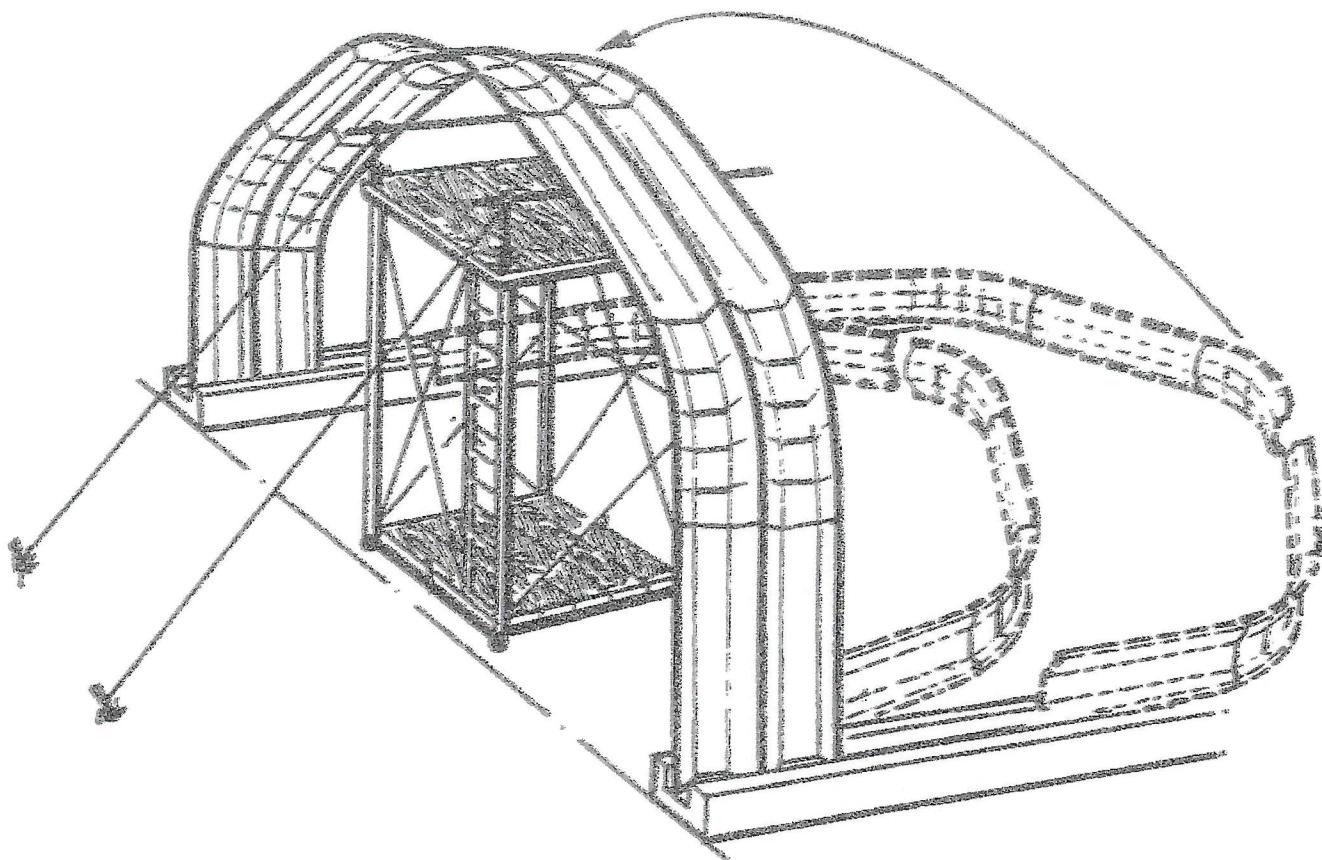


Figure 26

NOTE: Continue this process until all arches are complete. Check back to that the caulkig, overlapping and installation of the curved angles is according to direction.

Raising the Last Arch

When the last arch is ready to be raised, the curved angle may be bolted into place on the ground or after the arch is up and in position. Again, this depends on your preference and the availability of help. In either case, remember to overlap pieces to allow proper rain drainage. Refer back to the section on curved angles near the front of this manual.

Now that all the arches are up and in position the balance of the bolts may be inserted. Remember that the bolts that are already in place are only finger tight, not completely tightened.

Summary

We feel that the methods described for erecting the arches are the easiest and most efficient method. If, for some reason these methods are not acceptable, the arches may be erected piece-by-piece. There are many methods for erecting the arches, all of which have their advantages. There are, however, certain rules which should be adhered to regardless of the method chosen.

1. Lap all joints to ensure proper rain run off.
2. If caulking is used make sure to lap all joints and seams.
3. Start erection at door end with arch 1" past end of trough.
4. All arches must be bolted down to brackets on concrete.
5. Arches should be braced and plumb to maintain center height and proper shape.
6. Check and maintain 24" center to center dimension of arches along entire length of building.
7. Keep all bolts finger tight, do not tighten with wrench, until completion of arches.

By observing the above recommendations and reading the instructions carefully, the arches will be centered and symmetrical. This will allow for easy installation of endwalls.

Erection of Endwalls

The erection of the endwalls is very important and extra care should be taken at this stage. The instructions should be read carefully until all the steps are clear in your mind before you attempt to install the endwalls.

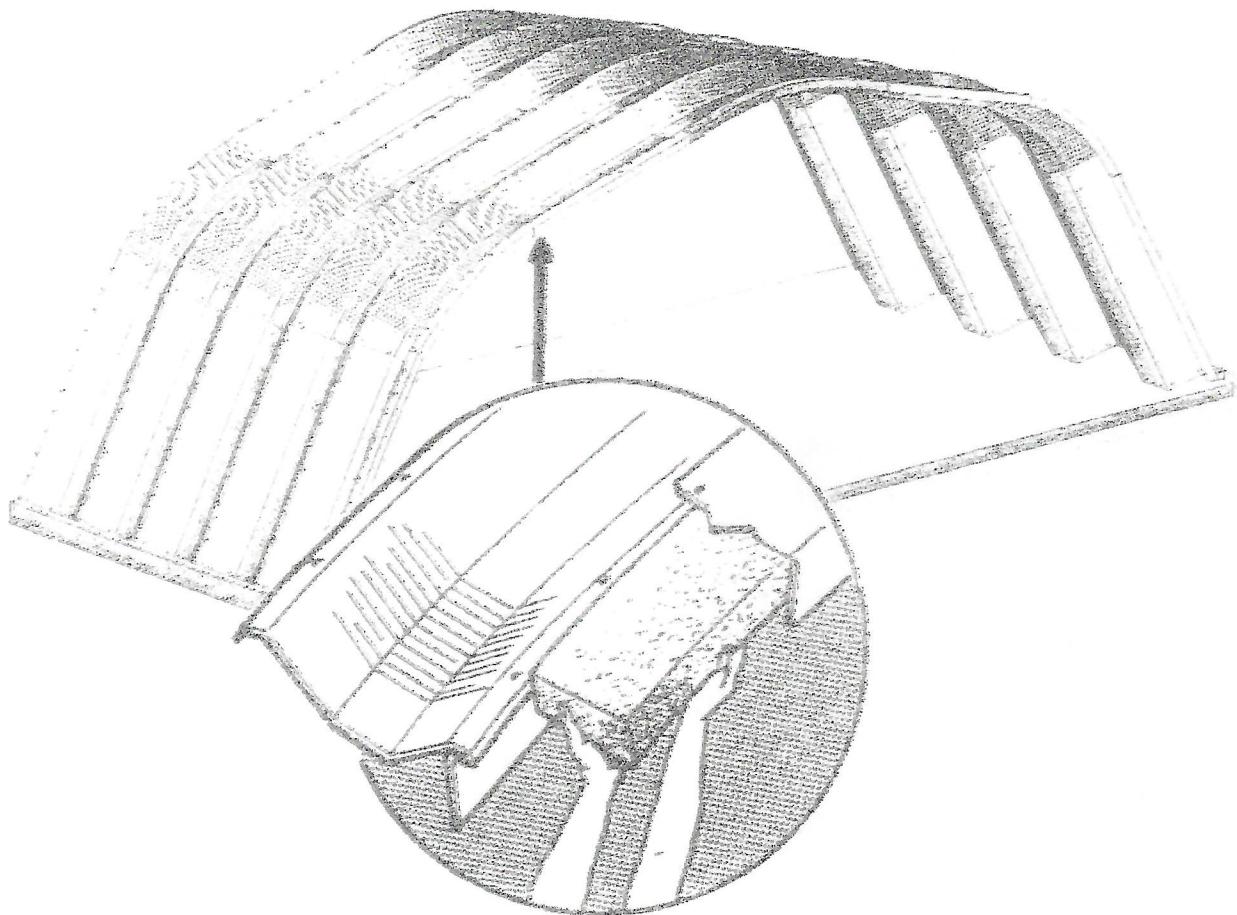


Figure 27

Foam Weatherstrip

This is only supplied with buildings that have endwalls. If your building has endwalls, then weatherstrip will be included. The pieces of foam weatherstrip should be inserted between your curve angles, side-to-side of arch. This will help to seal off the endwall when it is installed.

Endwall with Sliding Doors

The endwall with sliding doors should normally be erected first. Checking the door size and laying out the proper dimensions is very important for a good fit and should be done with care. The center line of the concrete should be established and marked, (this is the reference point for the other dimensions).

Use this same method for framed opening.

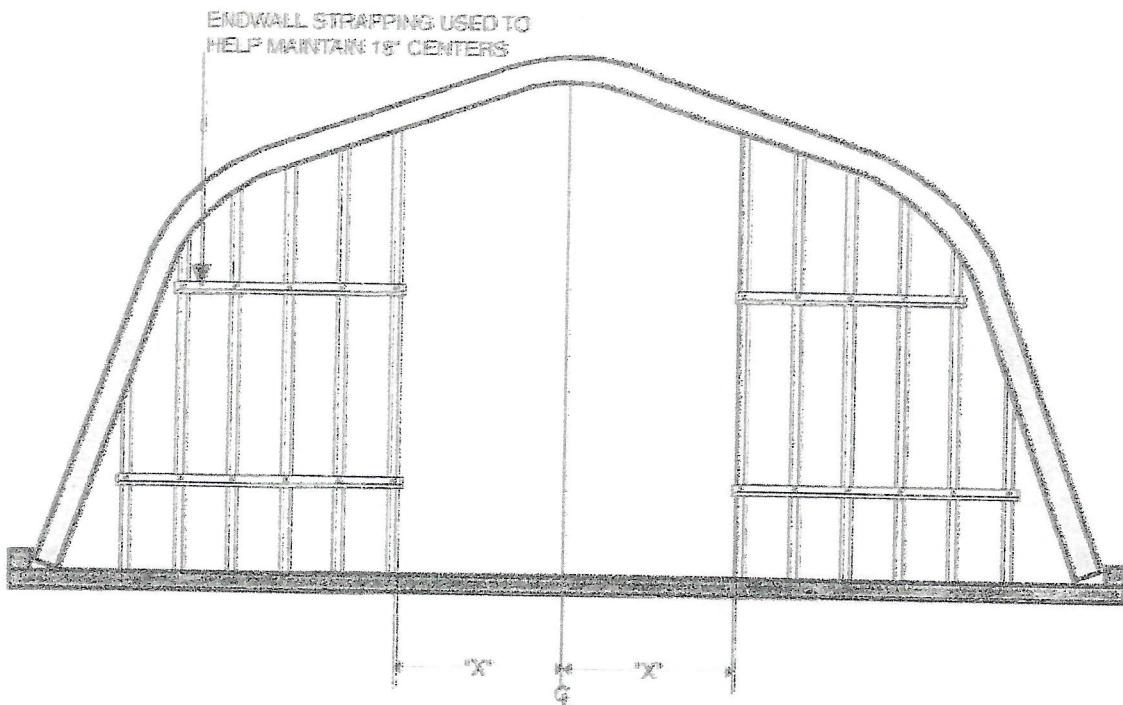


Figure 28

NOTE: Dimensions "X" represents 1/2 your total door width, eg. If your door is twenty feet wide, the dimension "X" equals 10 ft. To layout this dimension, plumb center line of your building, and measure 10 ft. left and right of center of building. Edge of Panel F1 begins here.

Place all endwall panels in on both sides, starting with Panel F1, working your way from the center towards the two sides. Panels beside door could be overlapped in two pieces if height is greater than 16 feet. Be sure to keep all bolts hand tightened.

Squaring the Opening

Now that all the endwall panels are in place, the opening should be squared. The panels should be adjusted so that the opening is perfectly square diagonally. Dimension "X" should be checked at the top and bottom of the panels and is measured from the centre line to the edge of the panel.

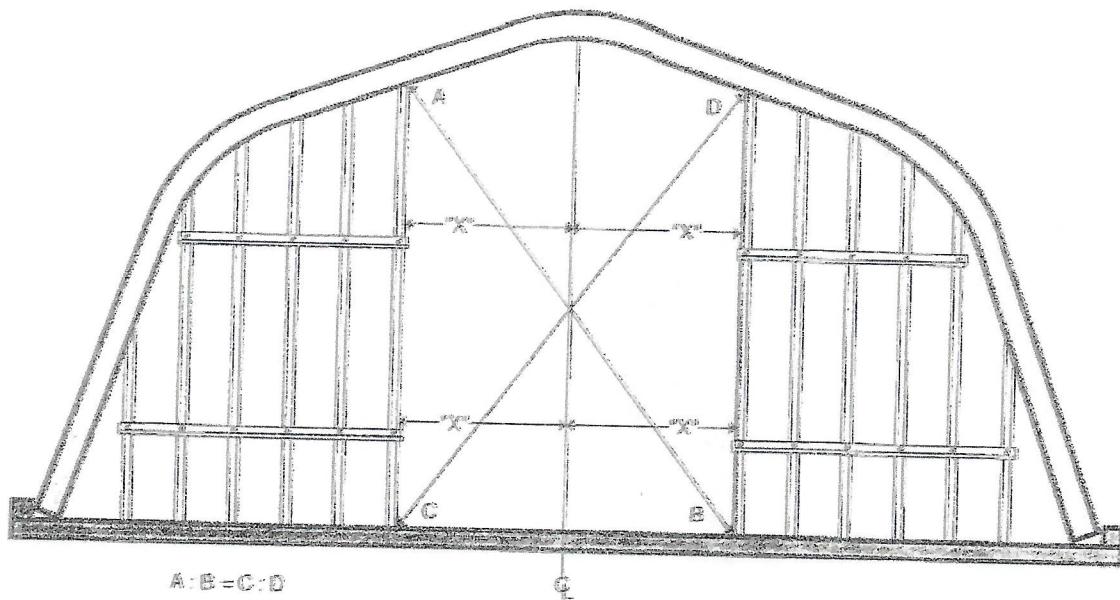


Figure 29

Securing Endwall Panels to Curved Angle

When these dimensions have been checked and the opening is diagonally square, holes should be drilled through the outer curved angles and endwall panels fastened to the curved angles. It is best to start with the panels at the door opening and work to the corner panels.

Fastening Panels to Outer Curved Angles

One hole should be drilled through the outer curved angle in line with the peak of the endwall panel, as shown below. Insert bolt and tighten with a wrench.

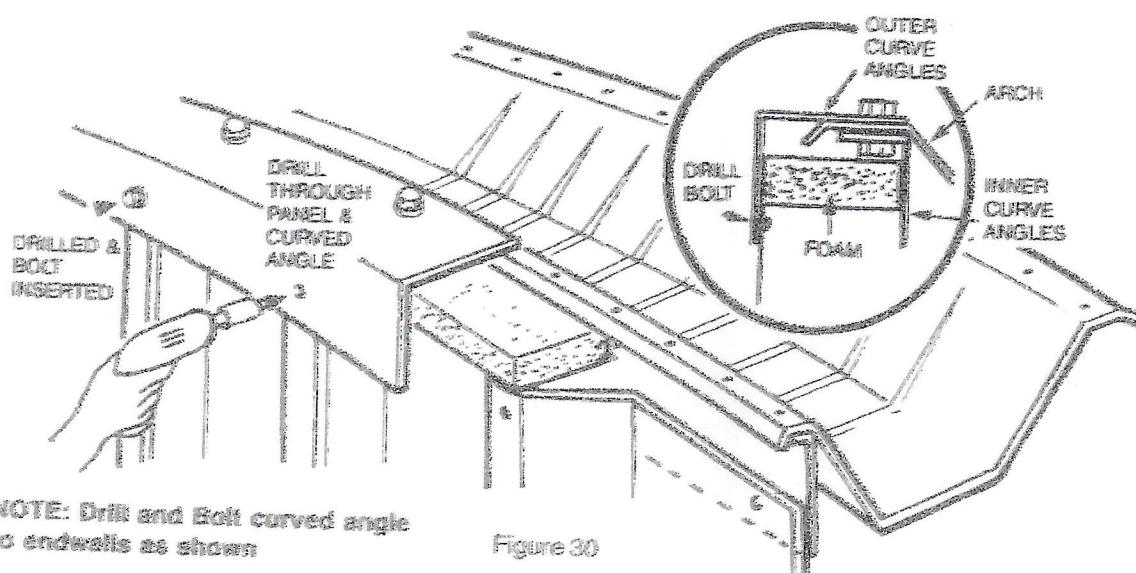


Figure 30

Fastening to Inner Curved Angle

Inner curved angle is pre-drilled to line up with bolt pattern of arches and outer curved angle.

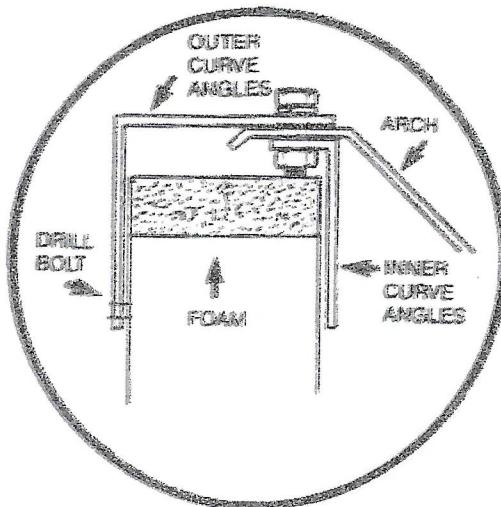


Figure 31

Fastening Flat Corner Panels to Curved Angle

The two flat corner panels must also be fastened to the curved angle. Holes must be drilled every 8" along the outer curved angle and the flat corner panel. No holes are required through the inner curved angle for the flat corner panels.

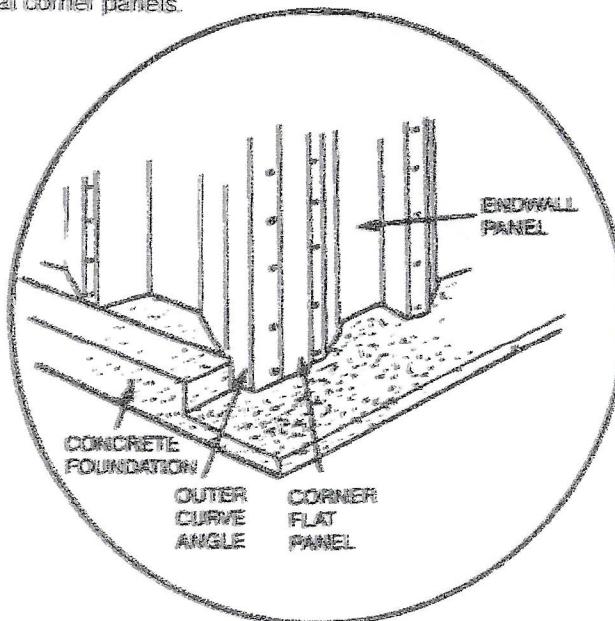


Figure 32

Door Jamb and Stiffener

Stiffeners are to be field cut to fit the inside of large curved angle. Once cut to proper size install along with door jamb and bolt together. Door jamb is required for sliding doors only.

Installing Door Jamb

Now that the endwall panels are all secured, and the opening is squared, and plumb, the door jambs and stiffeners are bolted into position onto the panels on either side of the door opening.

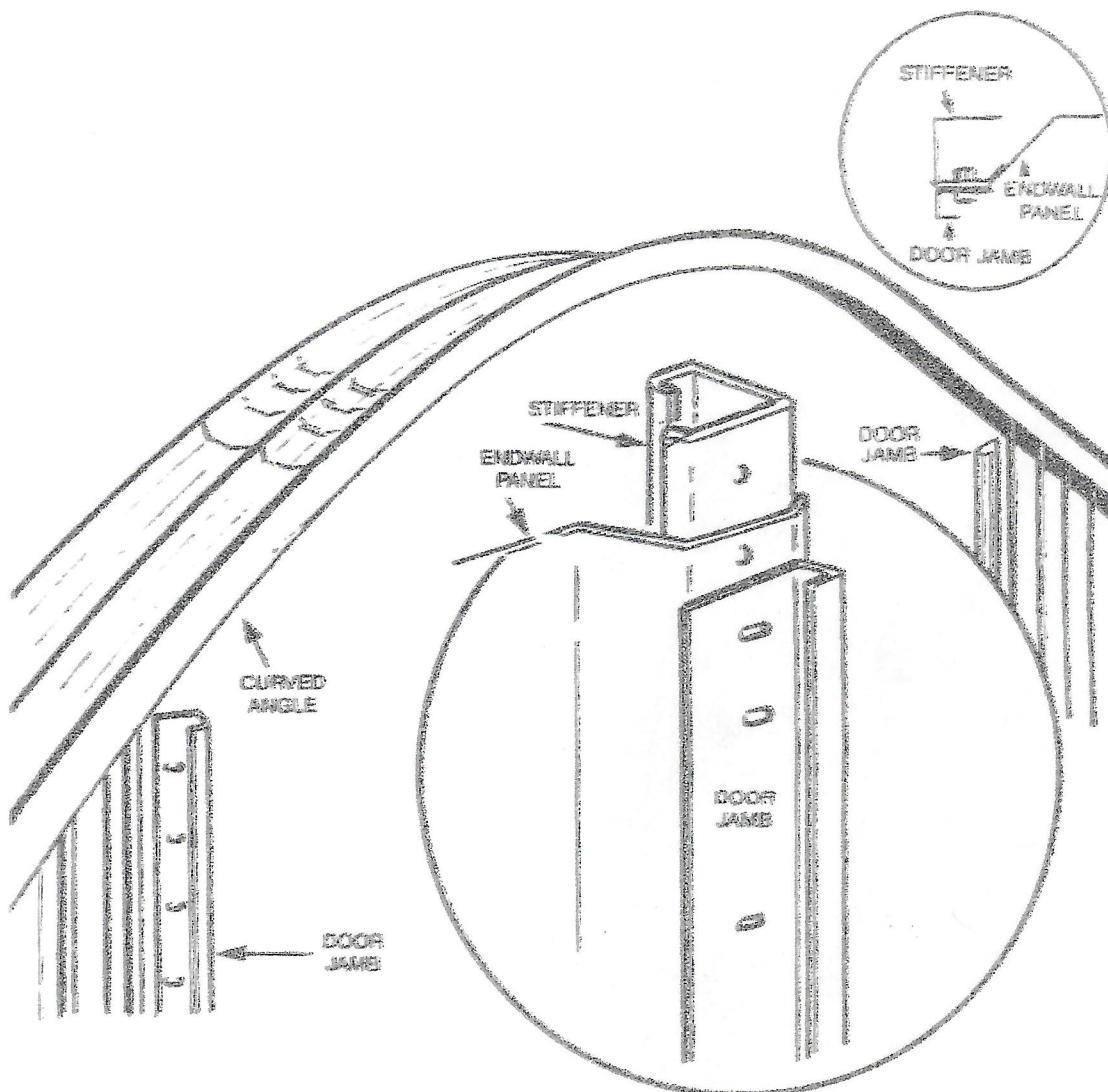


Figure 33

Attachment Plates

Attachment Plates are required only for sliding doors.

The attachment plates are inserted behind the door jamb and bolted to the jamb. Use the top two holes of the door jamb and the bottom two holes of the attachment plates. Field drill may be required. Attachment plate not always required.

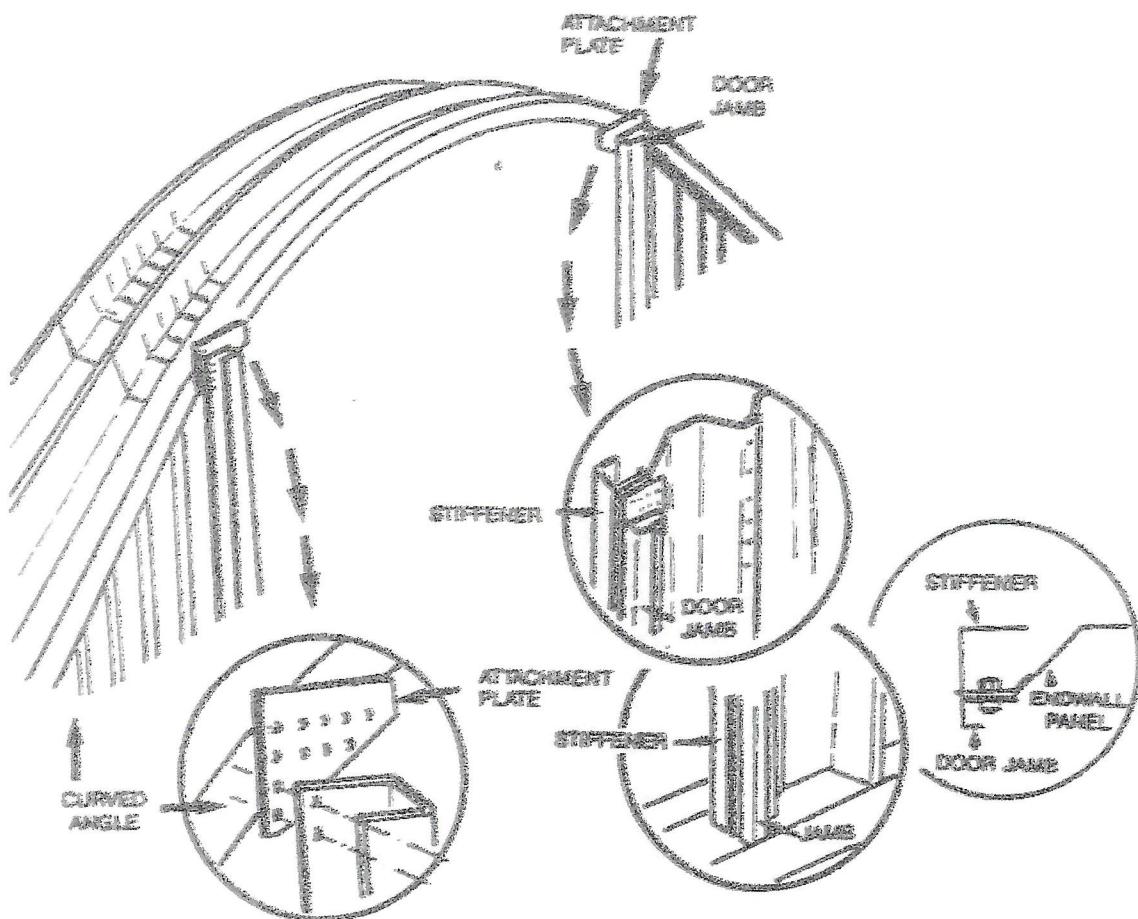


Figure 34

Connector Beam Assembly

Connector beams are supplied only when corrugated Panels are above door.

This method is to be used for framed opening also. Connector beam does not always have two sections which are joined in the centre, with a splicer plate. The connector beam is placed behind door jamb and drops approximately 1" as shown on Figure 35. Figure 36 shows connector beam installed where a door is higher than the top of the arch.

The end wall panels above the door should now be installed. The panels slide into position from the bottom between the inner and outer curved angles, pushed up and then the bottom of the panel positioned on the connector beam. Line up holes in panels, and bolt together and drill as shown in Figure 36.

The last panel to go in is a flat panel at both ends. It is fitted in the same fashion as the standard panels. When the panel is in place it must be drilled and bolted through the outer curve angle only.

Connector Beam Assembly

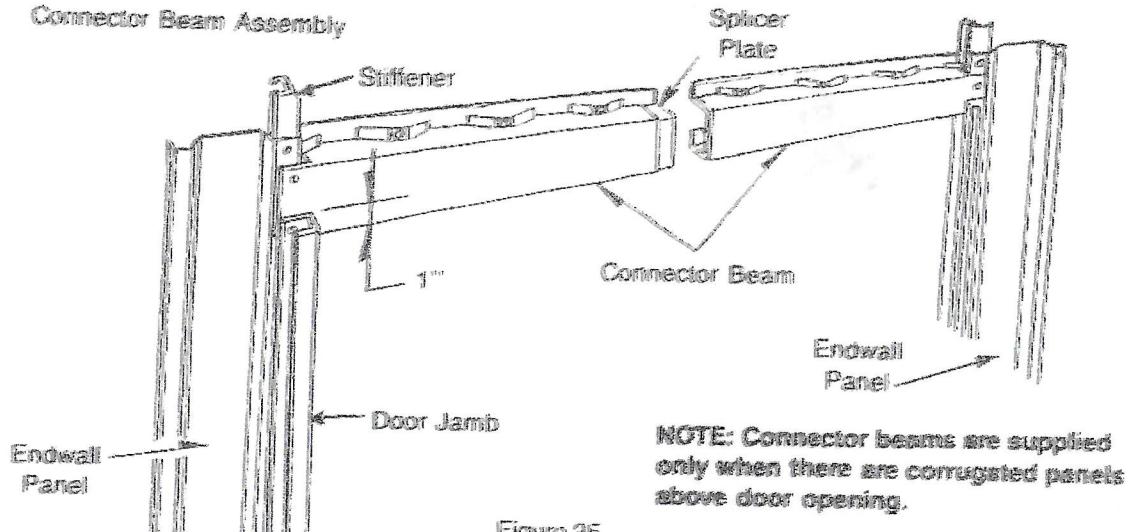


Figure 35

Two connector beams should be braced inside the building by installing a wind brace provided for this purpose. The braces are 60 or 120 inches long (depending on door height) with flattened ends in which holes have been punched. Bolt the brace inside the bottom of the connector beam, and bolt the other end to the arches, after drilling a hole in the arch. It is good practice to apply some caulking around the hole to prevent leaks.

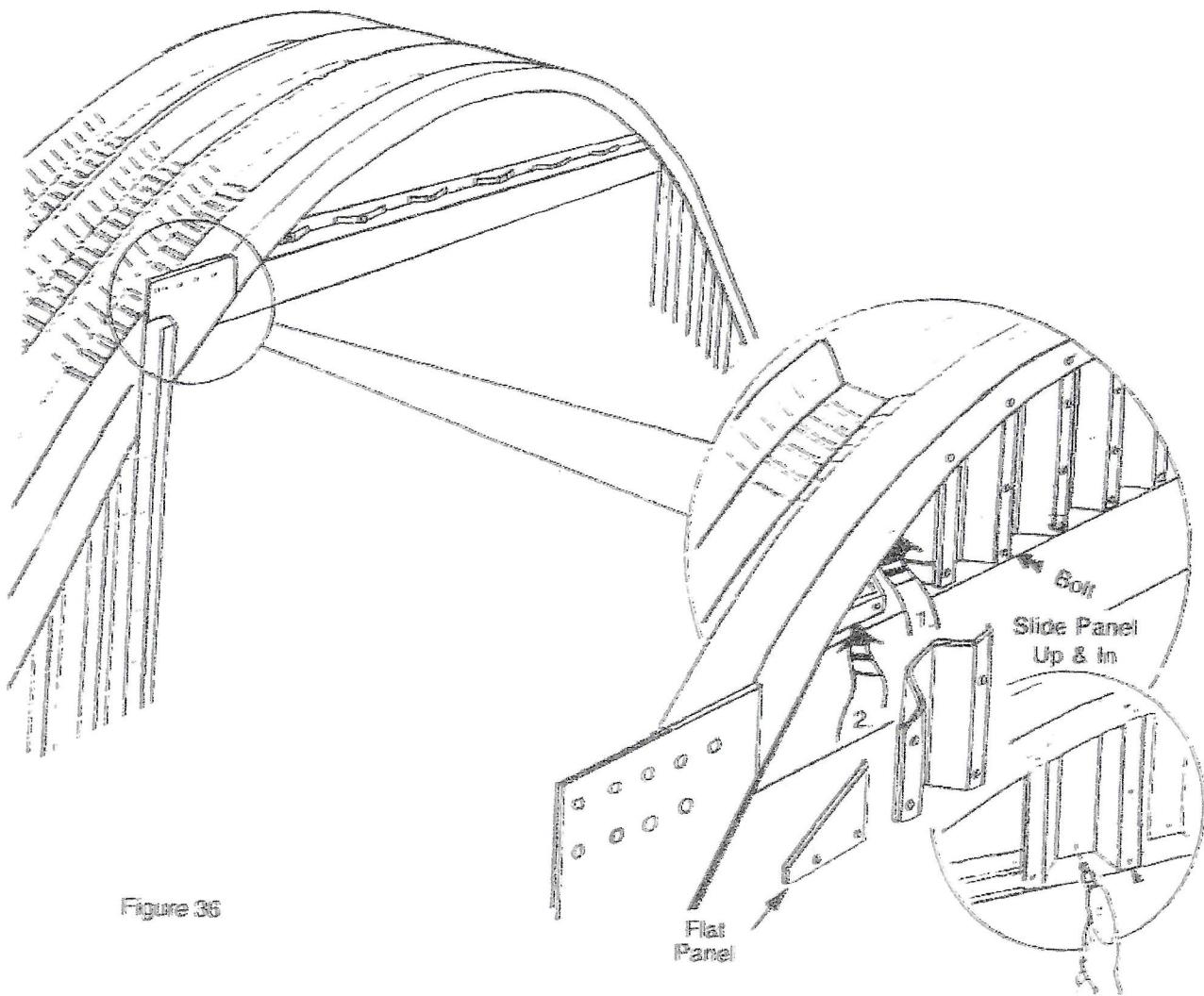


Figure 36

Header Beam Assembly

This is required for Sliding Doors only.

The track brackets should now be fastened to the sections of header beam. Now that the brackets are in place, the track can be fed into the brackets. See below.

NOTE: Header beam can be pre-assembled on the ground and raised in one piece to proper location if sufficient manpower is available.

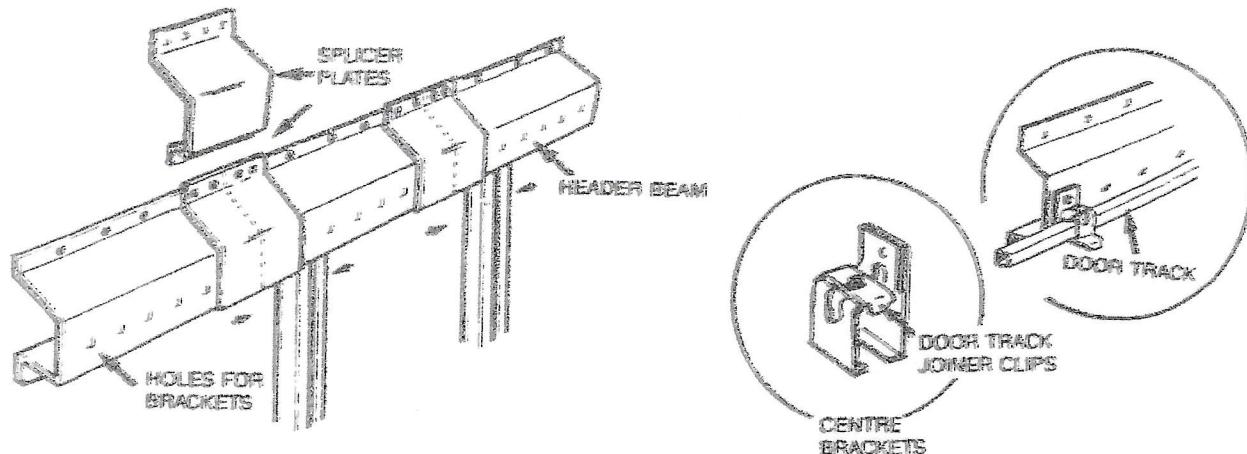


Figure 37

When the header beam is being assembled into position over the door opening the lower lip of the header beam is tucked behind the door jamb. As soon as that has been done, center the header beam with the door opening. Insert as many bolts as possible, connecting the beam to attachment plate, or to the curved angle.

NOTE: It is a good idea to put a strip of caulking along the header beam top flange. This will prevent possible corrosion due to water seepage into this joint.

As soon as the header beam is bolted on it should be checked for being straight and level. If everything is in order all bolts joining the header beam to the connector beam should be tightened. Checking the dimensions is important: the header beam should not only be perfectly straight but level as well, to ensure that the doors will open smoothly. Use vertical posts to help support header beam.

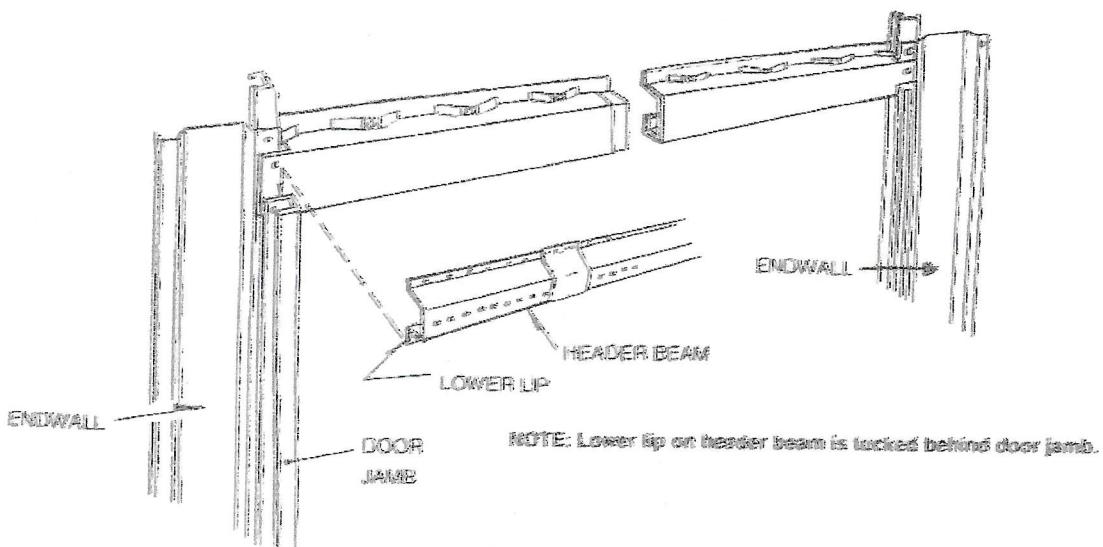


Figure 38

NOTE: If opening above door is less than 33", flat panel instead of corrugated end wall panels will be supplied.

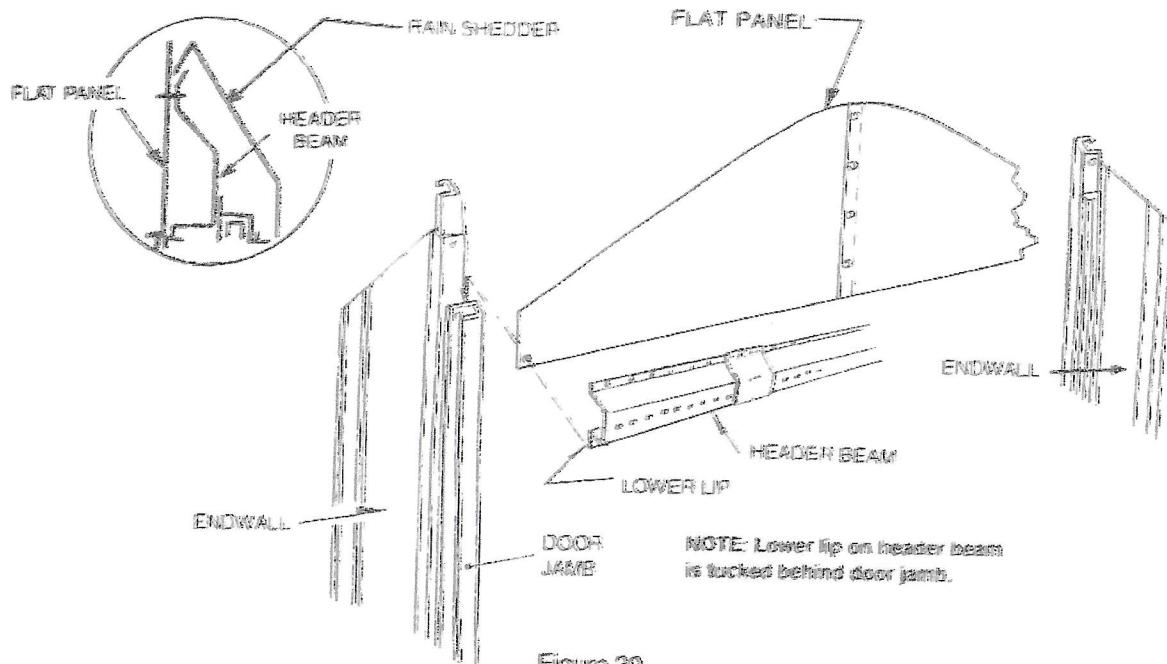
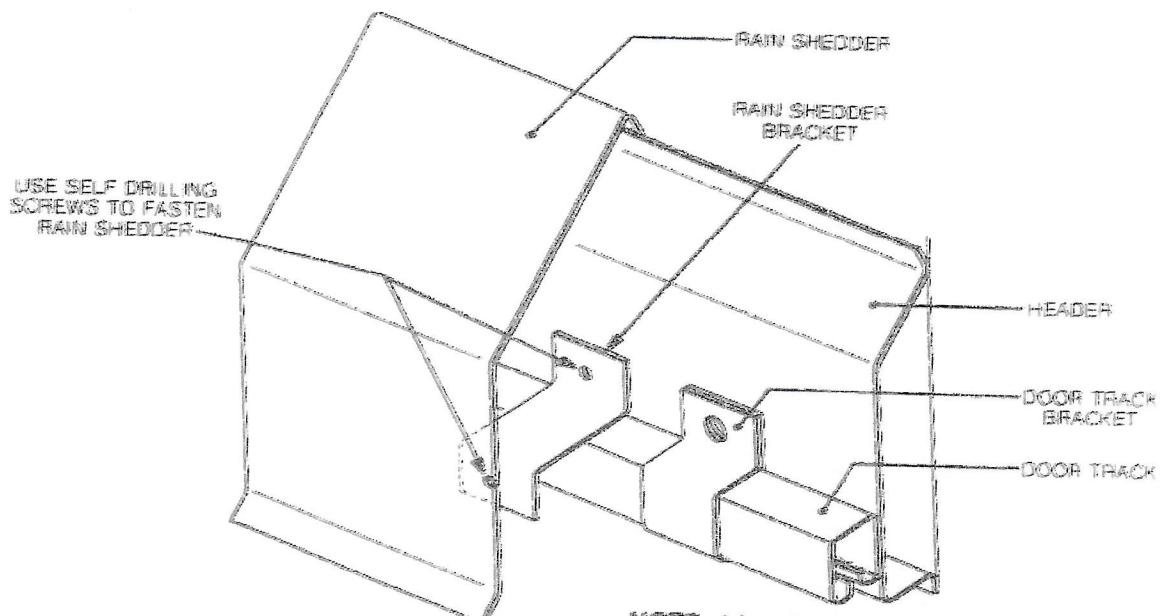


Figure 39

Door Track Assembly

When the header beam is securely bolted, the door tracks can be installed in the track brackets by pushing them into the brackets at the ends of the header beam, and sliding them along until they meet. Normally, they will join at a track bracket, so that they can be fastened to each other by means of a joiner clip (found in the hardware box).



NOTE: After the doors have been installed, drill a hole through track and header beam and install bolt and nut assembly to prevent door from coming off track when fully opened.

Figure 40

Bracing the Header Beam

The header beam assembly must be braced to the outside of the building. This step is important because the doors can catch the wind when wide open, and damage to the header beam could result. Long (120") and/or short (60") pieces of channels with flattened ends are used for this purpose.

The windbraces must be bolted from the arches to the bottom of the header beam (see Figure 45). For maximum effect, they should be installed as nearly horizontally as possible. We recommend you install the windbraces before the doors are hung. This completes the installation of the door endwall. If your building has two doorwalls, simply repeat the procedure for the other end.

NOTE: Ensure that your header beam is level before proceeding further.

Installing Vertical Posts

NOTE: There are two methods of installing your vertical posts, if your door opens beyond the building, then header beam is installed in front of vertical post (see Figure 41a). Otherwise the header beam is installed inside of the vertical post (see Figure 41b).

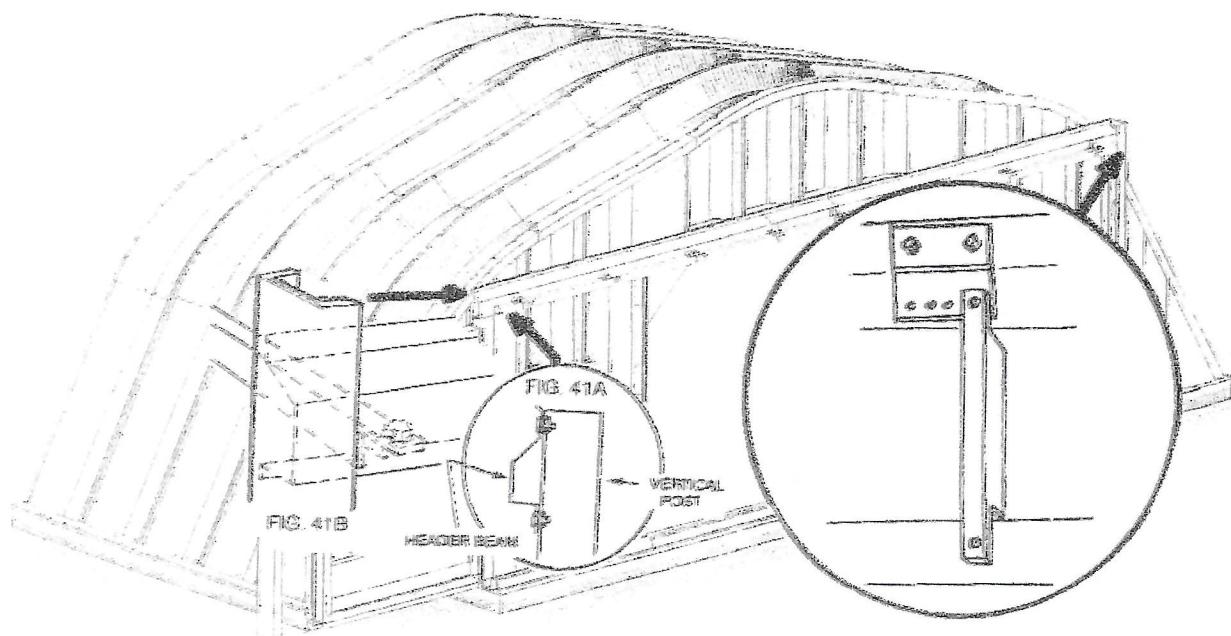
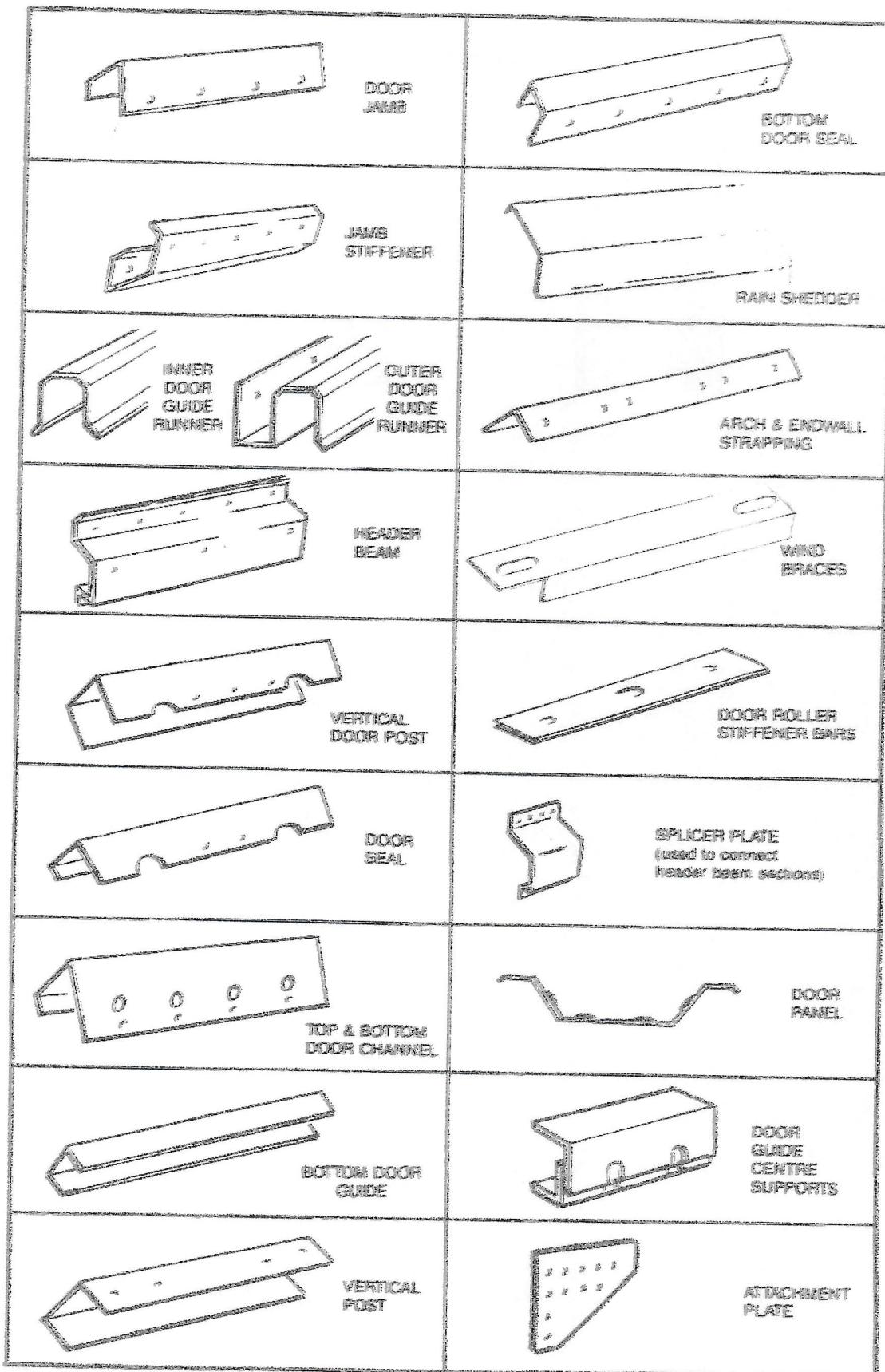


Figure 41

Sliding Door Parts



Installing Door Guides

The Future Steel door guide consists of two outer door guides which are bolted to the endwalls with clips facing towards door opening. The inner guide can be one or two sections. If centre door guide consists of two sections, a centre door guide support will be provided to align and level the two inner door guides.

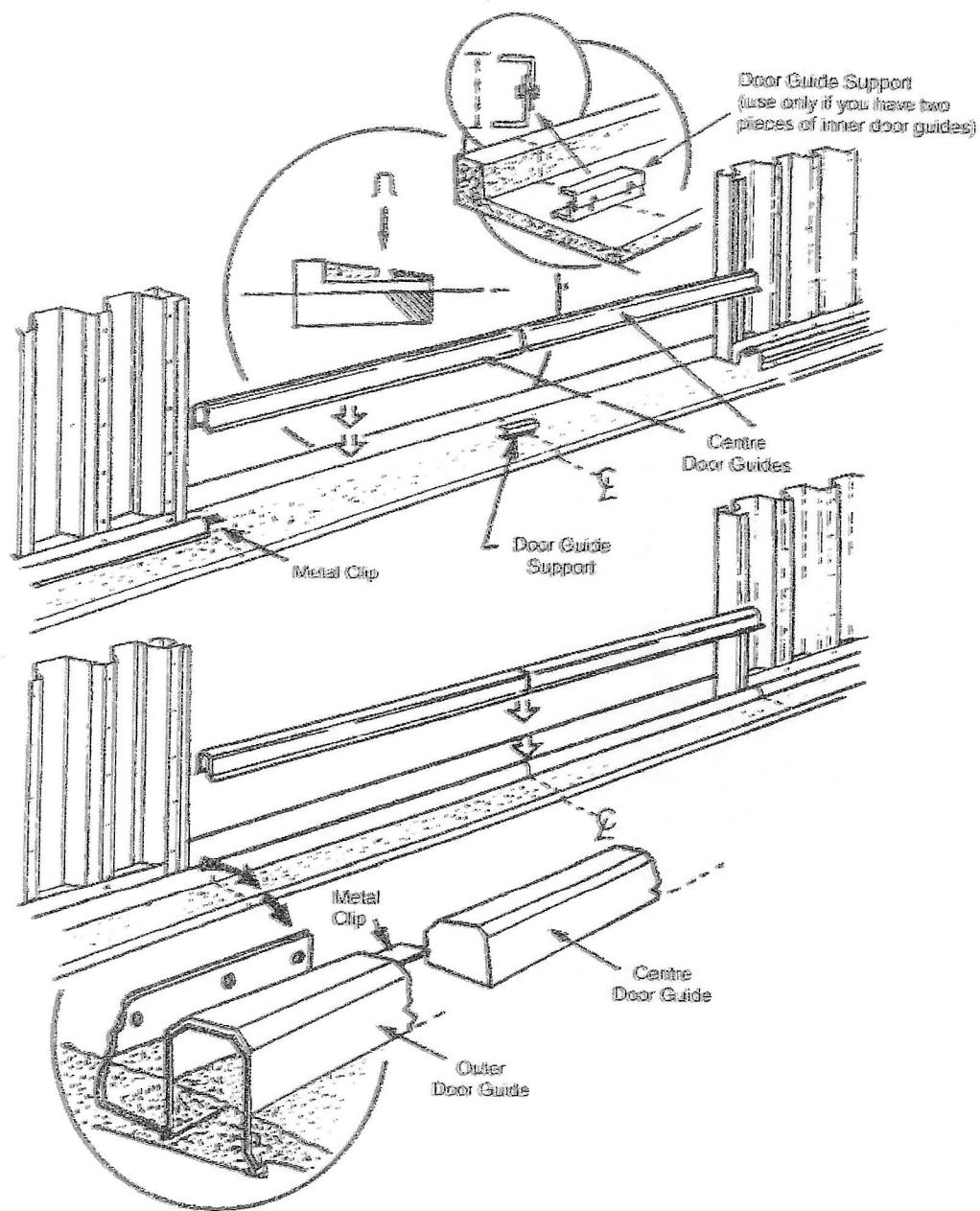


Figure 42

Sliding Door Assembly

The standard sliding door for your Future Steel building consists of a left and a right section. We recommend you assemble these doors in a horizontal position, raised approximately three feet off the ground, so someone can work under the door during assembly. Wooden sawhorses are good for this purpose.

NOTE: If your building has been ordered with special doors, such as over-sized or off-centre doors, the following instructions may not apply. (Refer to drawings.)

Begin your assembly on the ground. Locate the top door channel (it has some small holes in the top) and the stiffener bars. The stiffener bars are flat strips of steel with a nut welded to their centres. They are packed in the hardware box. Bolt them to the inside of the top door channel, as shown in Figure 43.

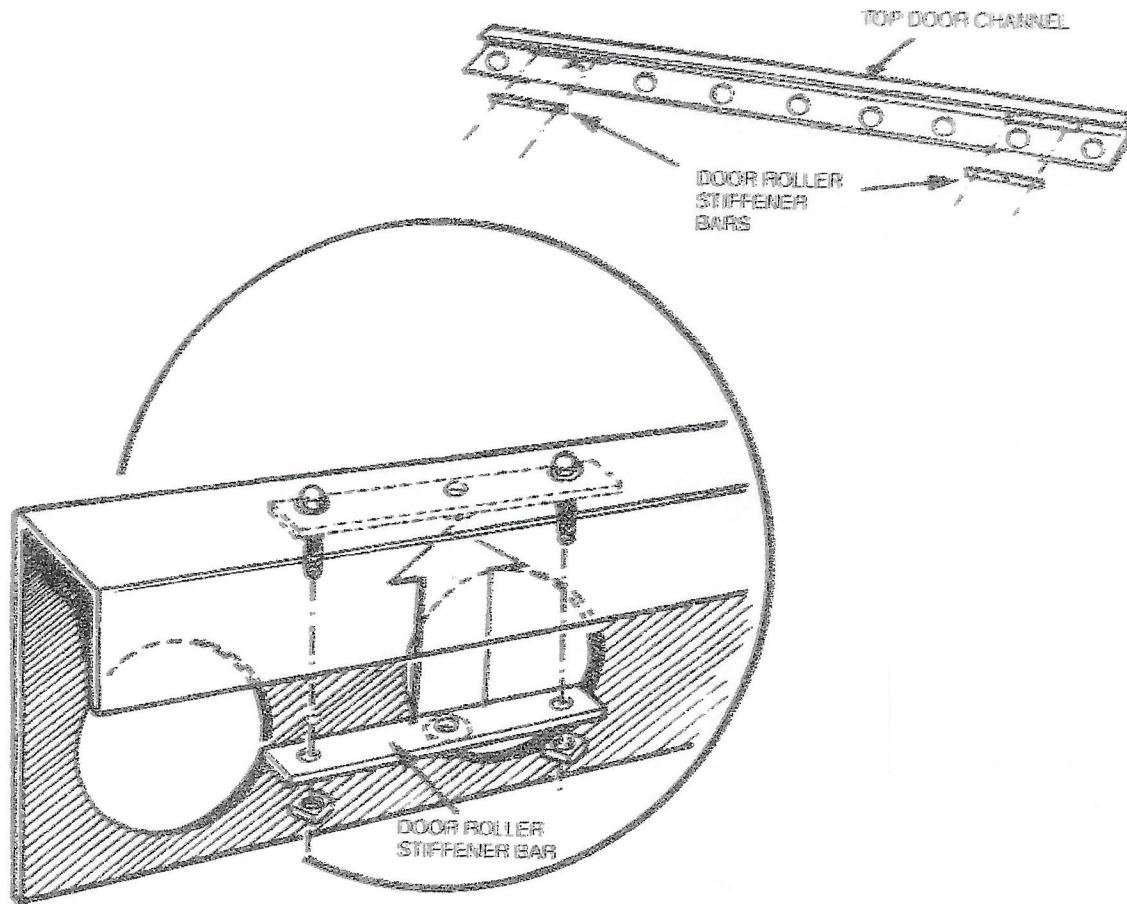


Figure 43

The vertical door channels are ready for assembly after bolting the door seals or closures onto snow, rodents or birds.

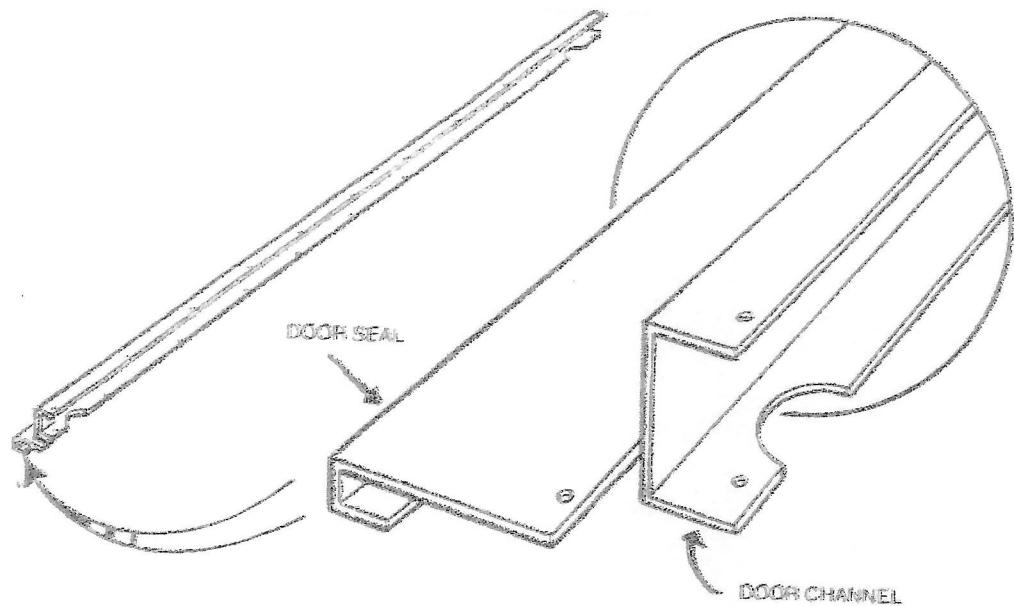


Figure 44

NOTE: It is best to bolt the side door closure seal once the door is completely assembled.

A side door seal must be bolted onto one vertical door channel for each door (see Figure 45), whereas the center door seal is attached to one of the vertical channels by means of selfdrilling screws, found in the hardware box (see Figure 45).

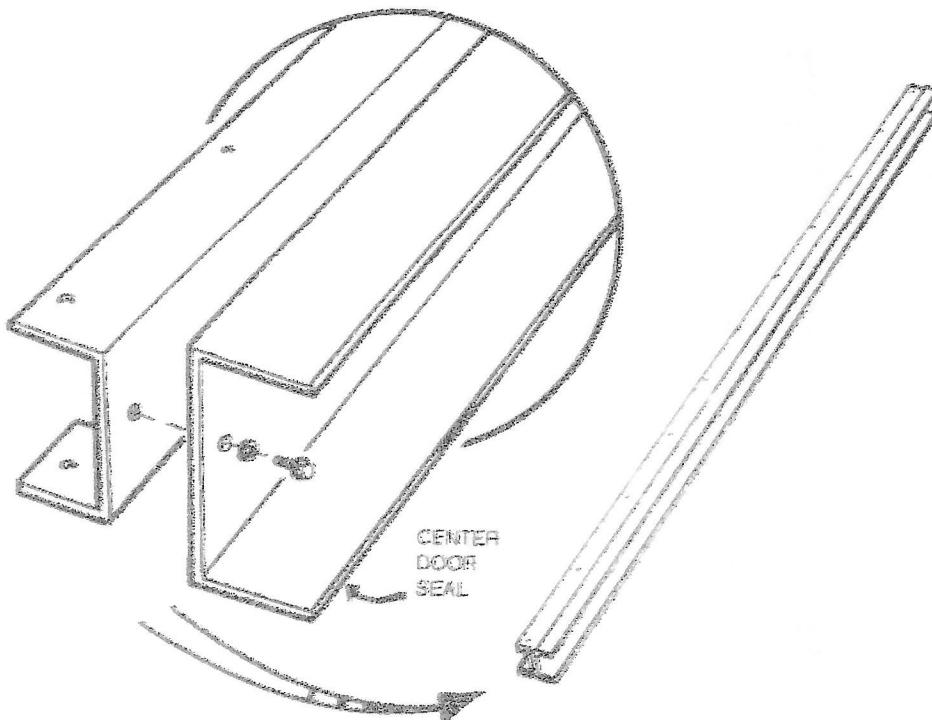


Figure 45

Locate the door rollers in the hardware box, and thread them into the top door channel by engaging their threaded stems with the nuts of the stiffener bars (see Figure 46). The top door channel may now be bolted to two vertical channels, leaving the bolts loose, and this frame should be carefully raised off the ground and placed on the sawhorses or other supports. It is then quite easy to slide the door panels into this frame from the bottom end (see Figure 47).

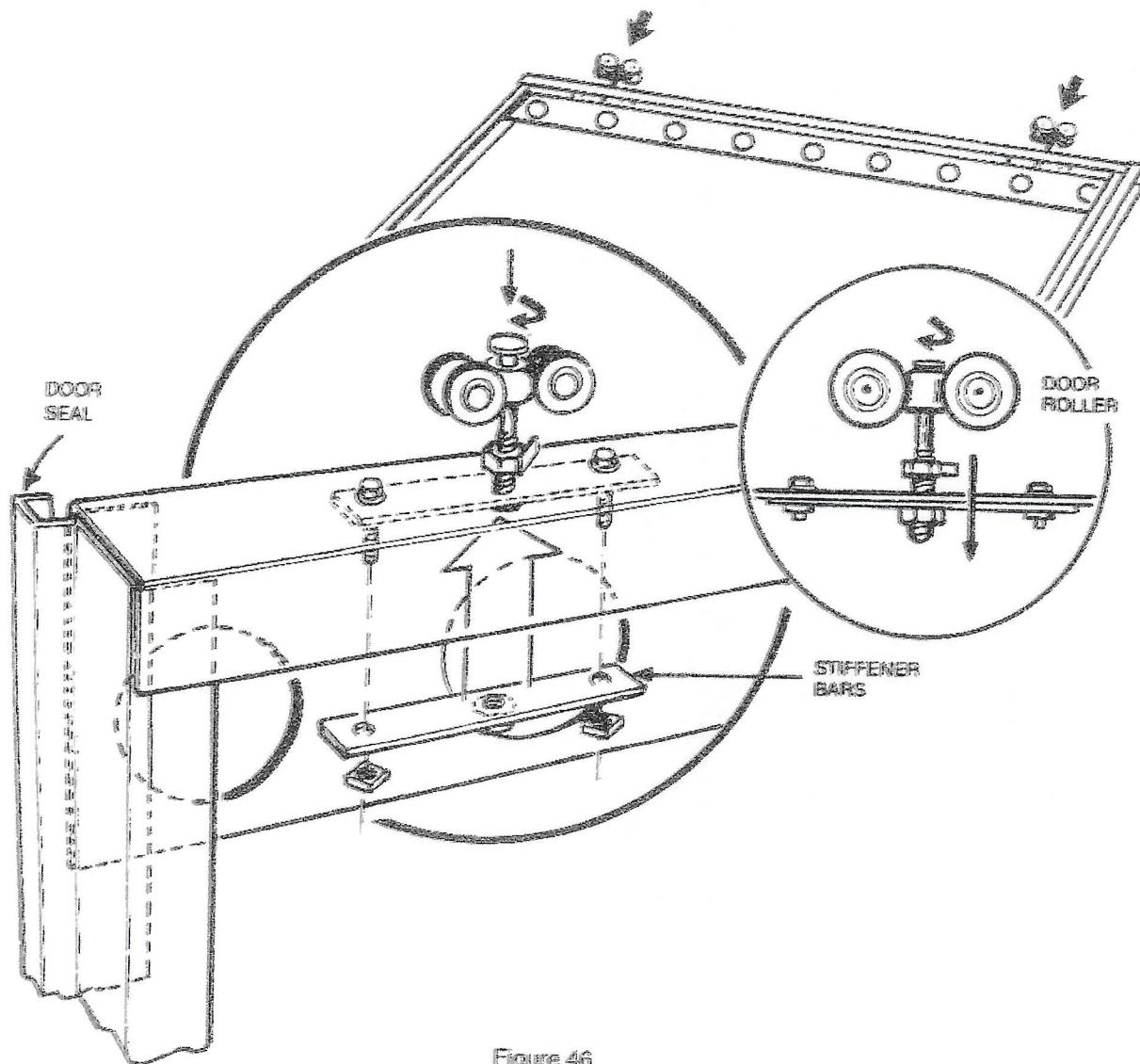


Figure 46

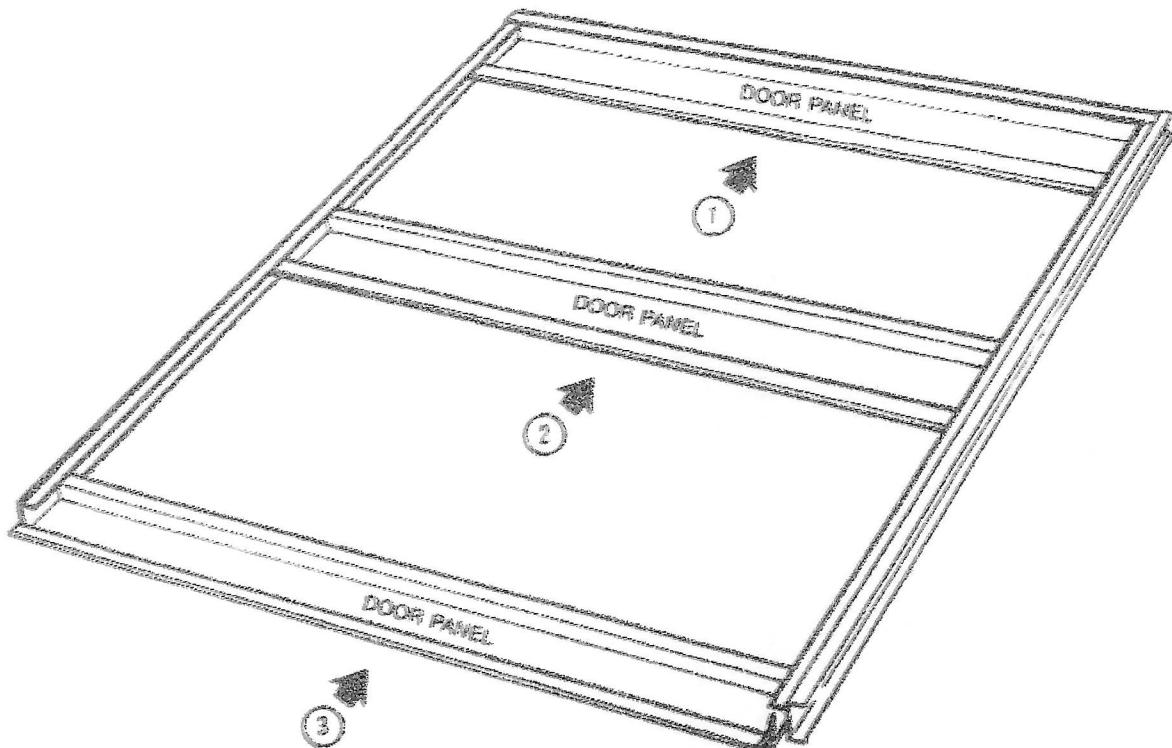


Figure 47

It is very important to make certain that the door panels overlap each other properly: the higher panel must overlap the panel immediately below it, on the outside of the door. If this is not done, rain will seep into the seam and create corrosion. By proper lapping water is prevented from leaking in (see Figure 48).

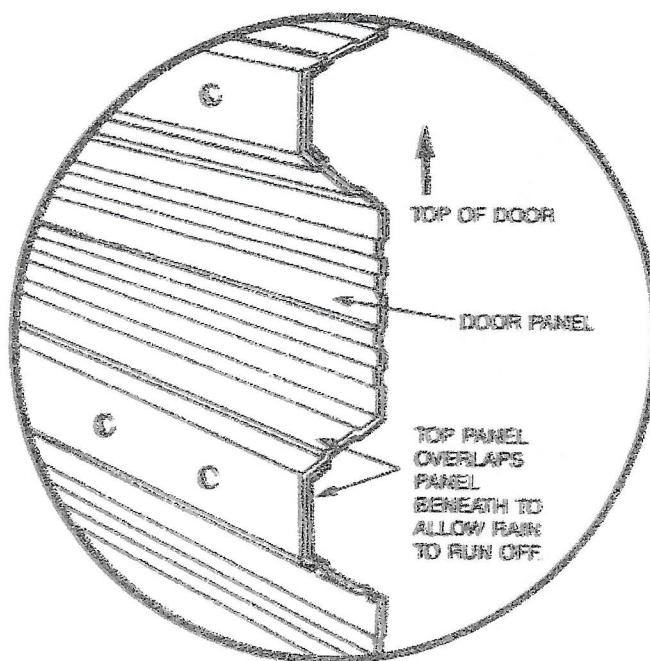


Figure 48

The door may now be completed by bolting the bottom door channel in place after the last door panel has been inserted. First, however, make sure to bolt the bottom door guide securely to the bottom door channel (see Figure 49), then bolt the bottom door channel loosely to the frame.

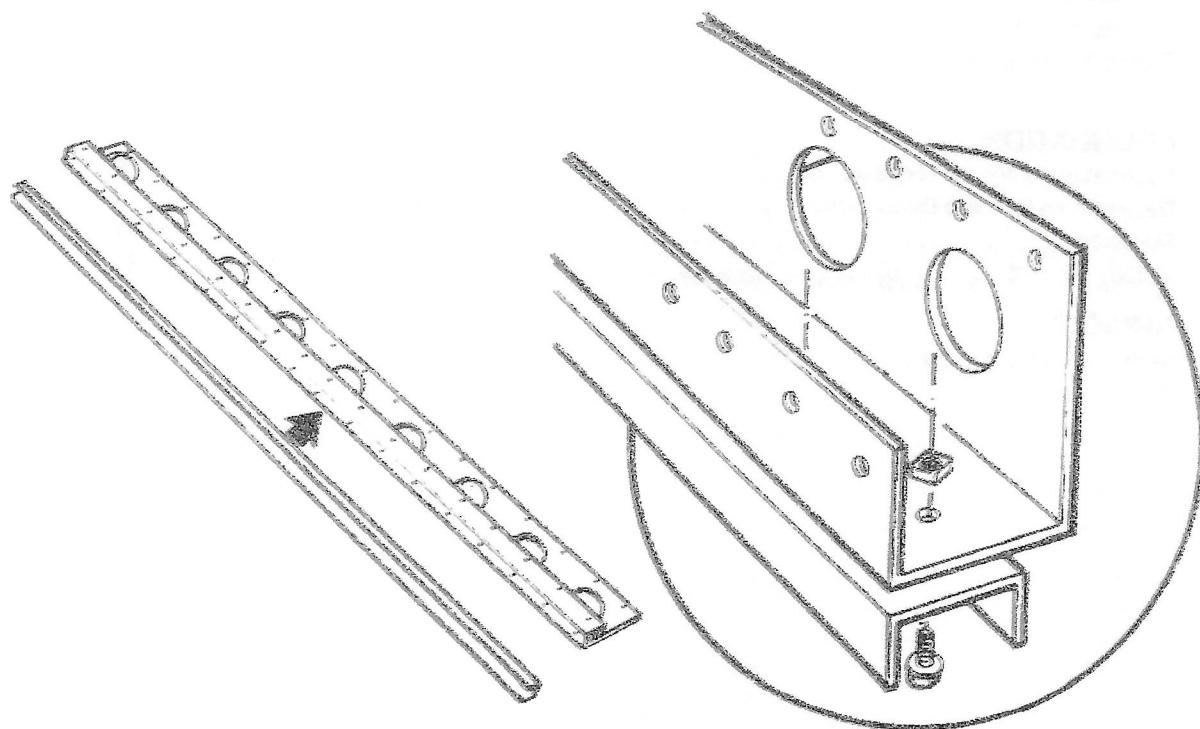


Figure 49

If the door frame is reasonably square it should be easy to insert all bolts into the door panel holes. This is done by having someone insert the bolts from the top (this should be the outside of the door) and by having someone else put on the nuts underneath. The nuts should not be tightened until the door is perfectly square.

The recommended procedure for squaring up the door is to leave it on the horses, and to measure diagonally, corner to corner. When the two diagonal dimensions are the same the door is square, and the bolts in the corners of the frame should be securely tightened, taking care not to disturb the squareness of the door. When the frame has been secured, all other bolts should be tightened. When this has been done the door should be lifted carefully and turned over.

It is necessary to drill bolt holes through the top and bottom door panels, so that they can be bolted to the top and bottom door channels. This can be done through the large round access holes in the channels.

NOTE: The bolts should be inserted from the outside of the door assembly, so that the nuts are inside the door, otherwise these bolts will cause interference with the door jamb.

When the door is ready for installation it should be lifted up by a number of people (2 to 6, depending upon door size) and carefully placed in an upright position at the end of the header beam.

CAUTION: THE LARGER DOORS CATCH THE WIND AND MAY EASILY BE DISTORTED OR BLOWN OVER. DO NOT ATTEMPT INSTALLATION ON WINDY DAYS.

The vertical post, which was temporarily installed, must be removed to install the door. The door is then lined up with the door track, and while one man guides the rollers into the track, the others engage the door with the bottom door guide and slide it into the track. This process is repeated for the other door (see Figure 50).

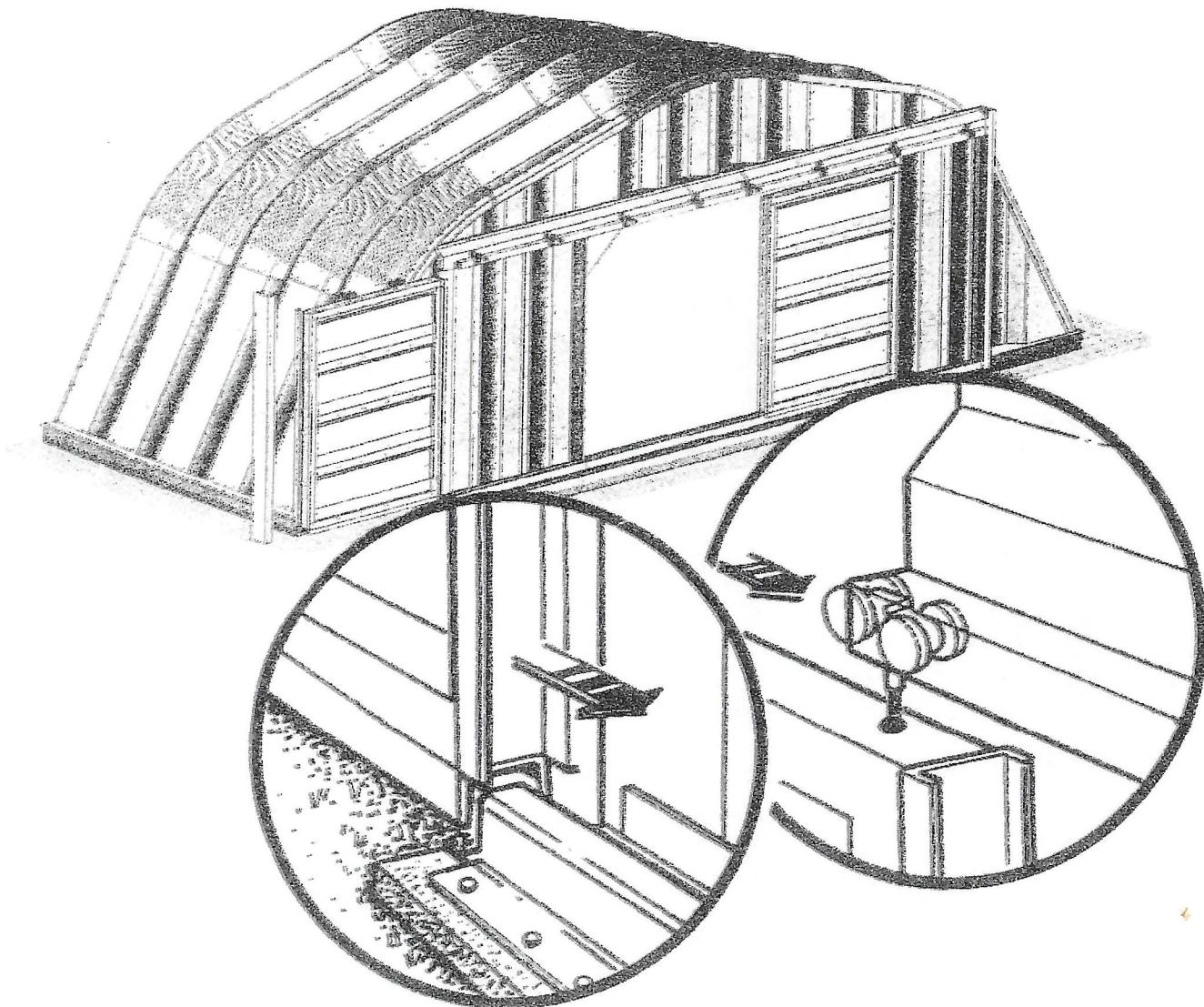


Figure 50

The doors should be adjusted and levelled. Check both doors with a spirit level, and check whether they are running smoothly on the bottom door guides. If the two doors are brought together so that one enters the centre door seal of the other, the doors should be in perfect alignment.

Any adjustments can be made by means of the door rollers. The threaded spindle in the center of the door rollers can be turned by means of needle-nose pliers or other suitable tools. Adjust either end of the door up or down (see Figure 51). When all adjustments have been made, the locknuts on the spindles should be securely tightened.

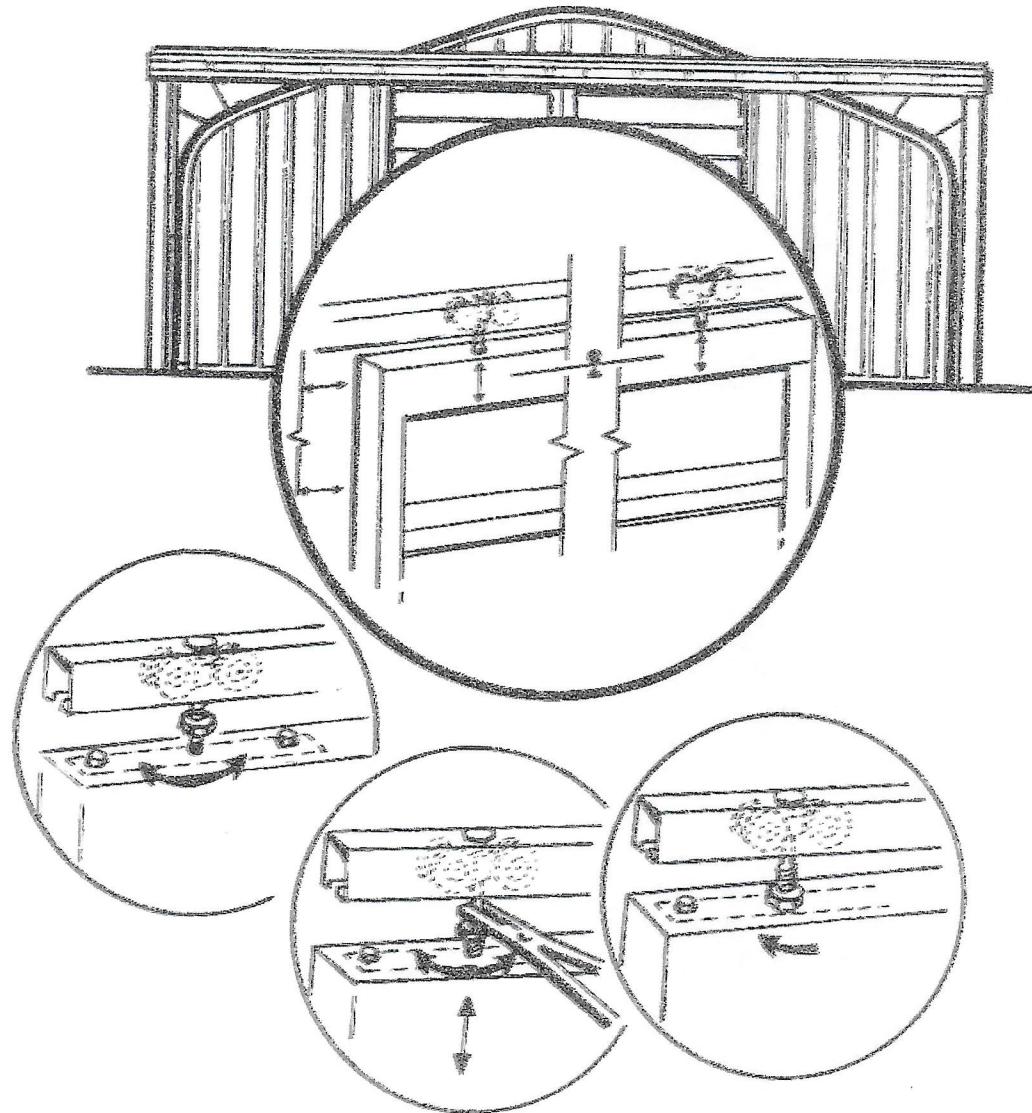


Figure 51

The doors are finished by attaching the door handles and the door latch, which are packed in the hardware box. The door latch is a toggle-type latch, engaging a hook on the outer door. It is easily installed by closing the doors and holding the latch and the hook in the right position, on the outside of the building. Bolt holes can then be marked on the door panels and drilled; after which the latch can be bolted on (see Figure 52).

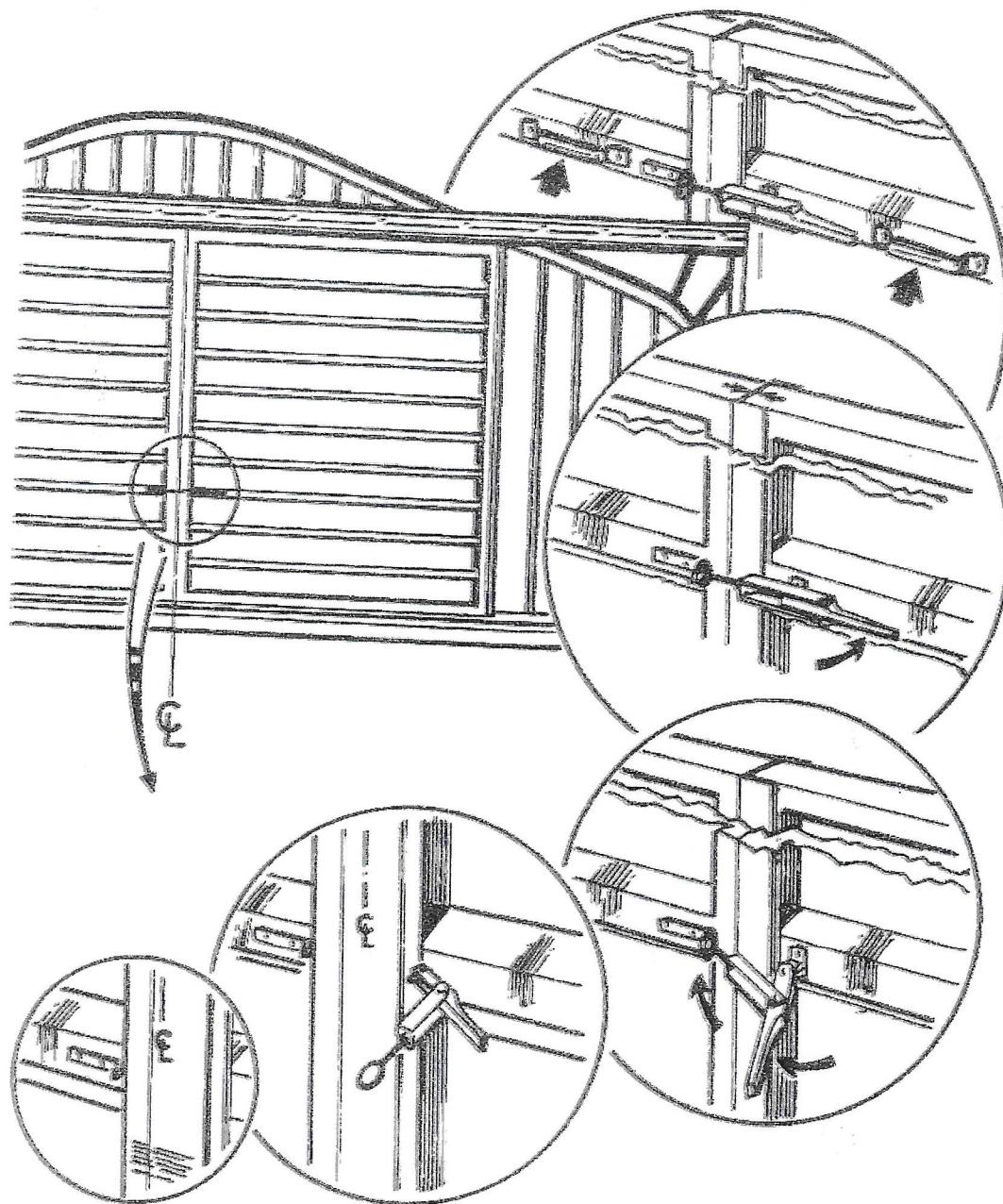


Figure 52

When your doors have been installed and adjusted, the rain shedder panels can be installed. You will have enough material to cover the entire length of the header beam, with the rain shedder panels overlapping each other by a few inches.

The top of the panels are shaped like a hook; this hooks over the top flange of the header beam. The rain shedder panels are then secured to the track brackets using the selfdrilling screws provided in the hardware box. A selfdrilling screw should be used on each overlap and we recommend you attach the panels to the upper header beam flange with selfdrilling screws at approximately two-foot centres.

As a final touch, take the plastic rain shedder cap and place it on the rain shedder panels, in the exact centre of the building. Attach it with selfdrilling screws (see Figure 53).

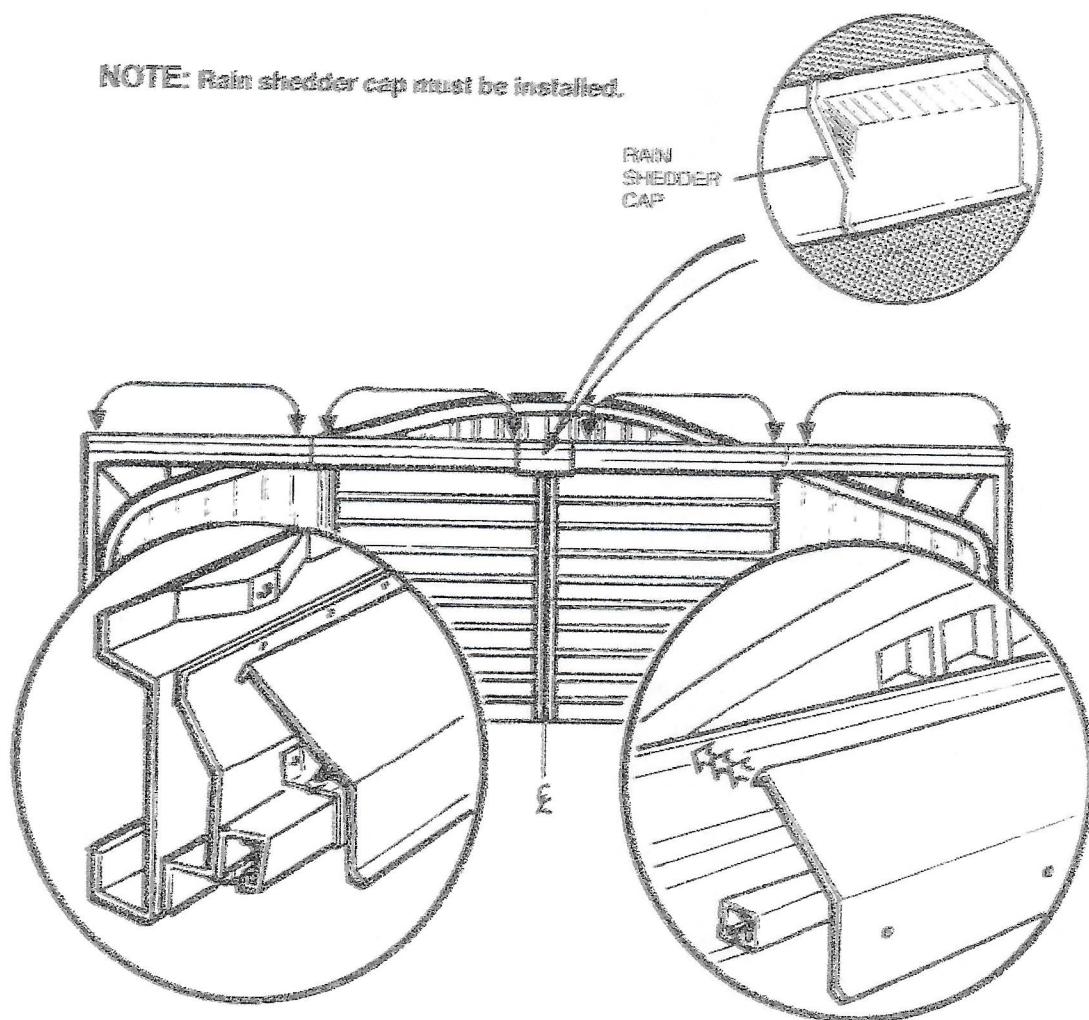


Figure 53

Erection of Solid Endwall

The erection of a solid endwall is relatively simple. Before the panels are installed, strips of foam must be inserted into the curved angles, exactly as was done at the other end. These stuffers provide a seal between the arches and the endwall panels.

The center line of the building should be marked on the concrete and on the curved angles. At this point, place all endwall panels loosely in place. Starting with the two panels no. S1. On center line, start to bolt panels together finger-tight. Ensure S1 panel's peak faces outside of building as shown in Figure 54. Use endwall strapping to maintain proper spacing. (Strapping is the same as that which was used for the arches.)

When all panels are bolted together, including corner panels (corner panels are always made out of flat steel), drill all panels and bolt all around the curved angles. Now all bolts can be tightened.

NOTE: The endwall panel cannot be made longer than 16'. If your building is higher than 16', some of the panels must be put together by joining a short piece (the upper panel) to a straight 16' piece (the lower panel). This is done by overlapping the two panels 12 inches. The lap should be on the outside so that rain cannot run down into the seam.

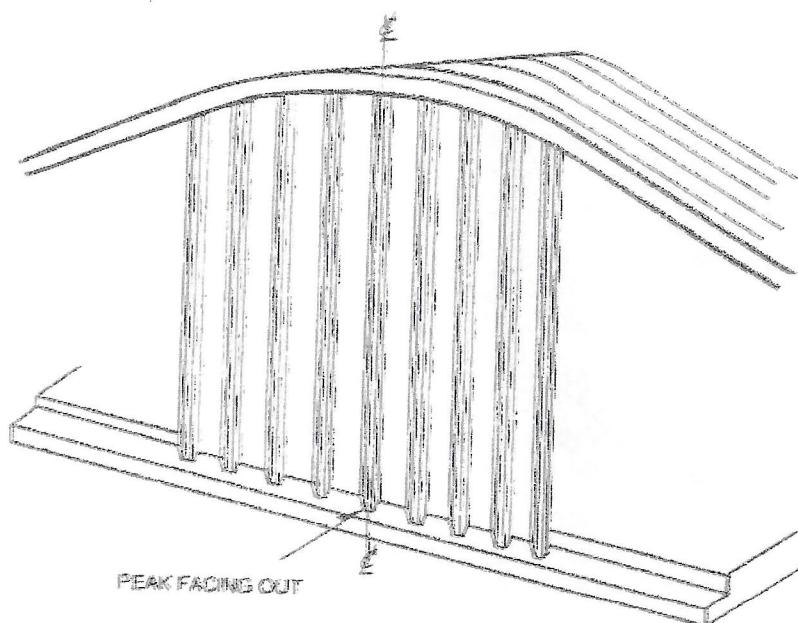
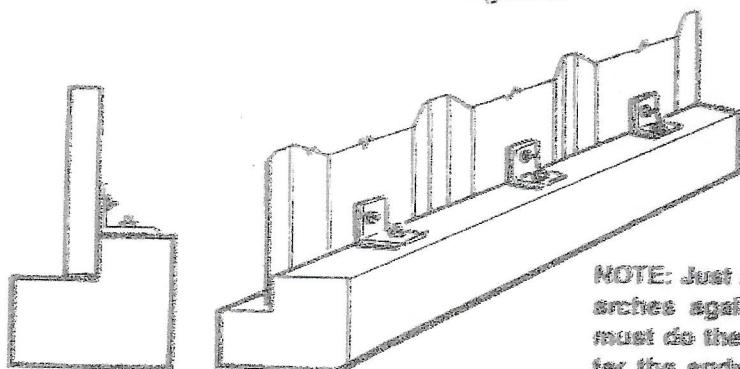


Figure 54



NOTE: Just as you have anchored the arches against a gust of wind, you must do the same to the endwall. After the endwall panels have been installed and before grouting, each panel must be clinch anchored to the top of the foundation.

Grouting the Building

When assembly of your building has been completed, your building must be anchored to the foundation by filling the foundation troughs with cement grout. The shape of the arches may result in wind suction during strong gusts of wind, which might lift some of the arches out of the troughs. It is therefore important to grout the building as soon as the assembly is completed. Grouting also contributes to the stiffness of the arches, resulting in a stronger building.

CAUTION: GROUT MUST NOT CONTAIN ANY CORROSION SUBSTANCES, SUCH AS CALCIUM CHLORIDE; THIS COULD RESULT IN CORROSION OF THE STEEL. ASK YOUR CONCRETE SUPPLIER! GROUT IS USUALLY ONE PART PORTLAND CEMENT & 2 1/2 PARTS SAND.

NOTE: Grouting is done on a 1" slope, so water will run away from the building.

NOTE: Arches and endwalls must be grouted on the inside and outside to properly anchor your building to the foundation. After grout is dried, we recommend that you caulk the seam where the grout meets the steel.

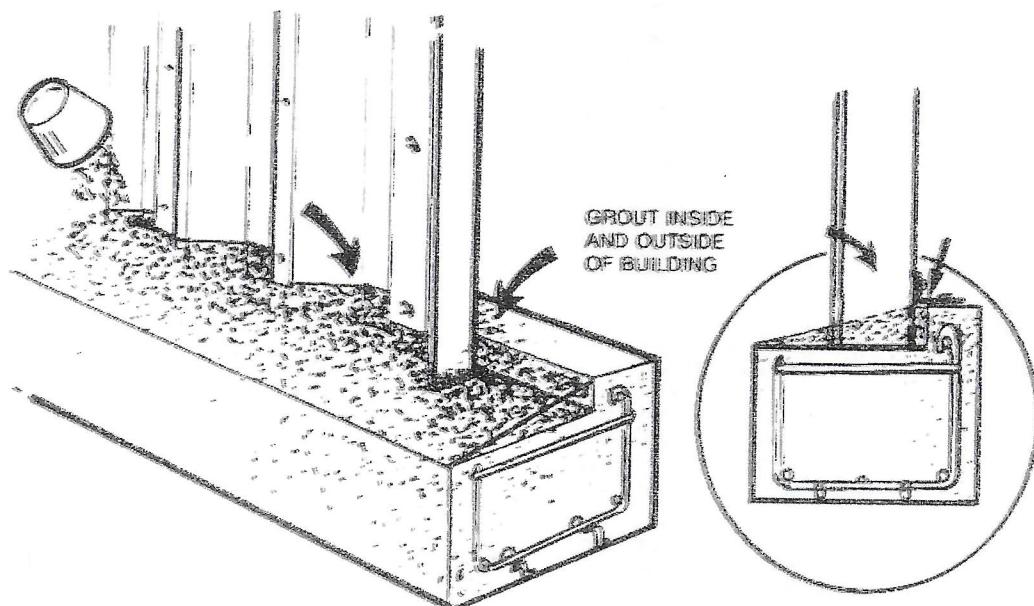


Figure 56

ACCESSORIES

Installing Ventilators

Find the ventilator boxes in your shipment, the vent adapter is usually packaged with the ventilator.

CAUTION: WE RECOMMEND A MINIMUM SPACING OF TWENTY FEET OR TEN ARCHES BETWEEN VENTILATORS FOR ADEQUATE AIR CIRCULATION. VENTILATORS SHOULD ONLY BE INSTALLED IN PEAK OF YOUR BUILDING. FOR ADDITIONAL VENTS FOR YOUR BUILDING, PLEASE CONTACT YOUR AUTHORIZED FUTURE STEEL BUILDING REPRESENTATIVE.

Installing the Vent

Once you have determined the location of the vent, place adapter over arch and with a marker outline the hole in the adapter. Drill hole at inside edge of hole, now cut out the hole using a pair of snips or a key hole saw. Caulk around hole and install adapter, drill and bolt to the arch. Place vent over adapter and secure with small sheet metal screw.

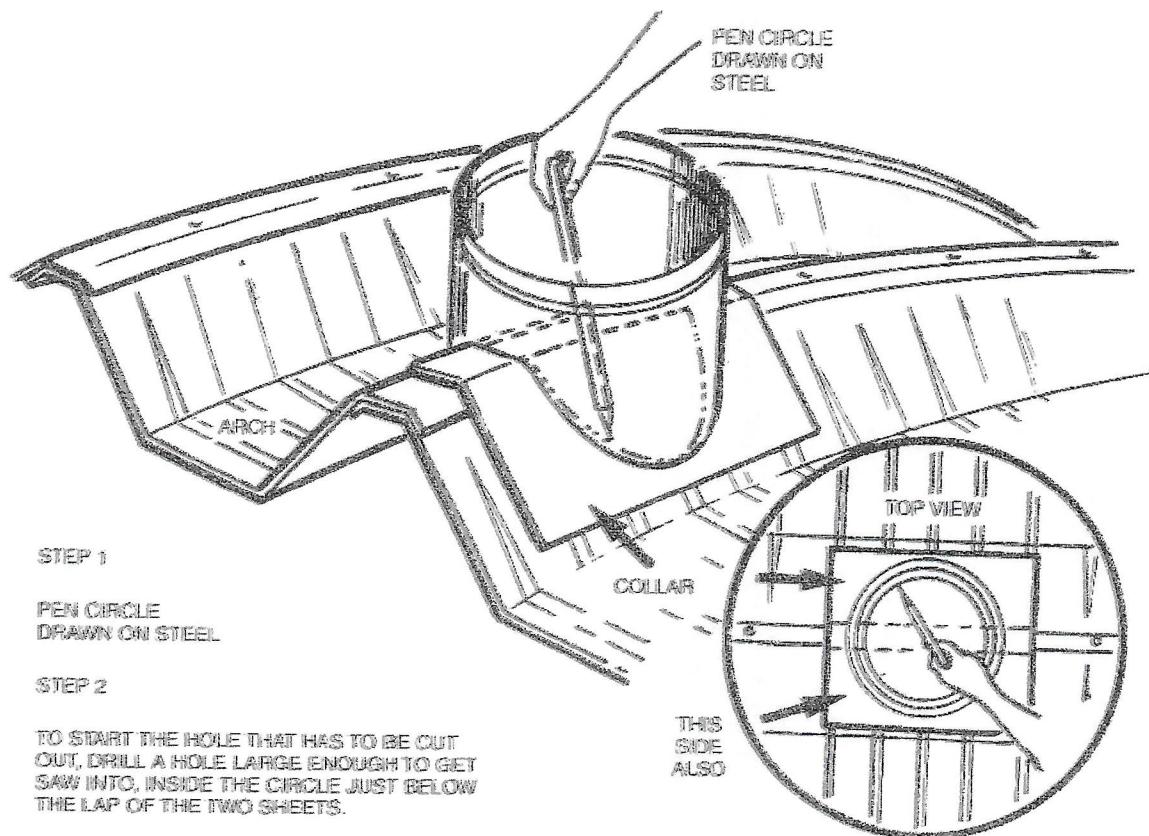


Figure 56

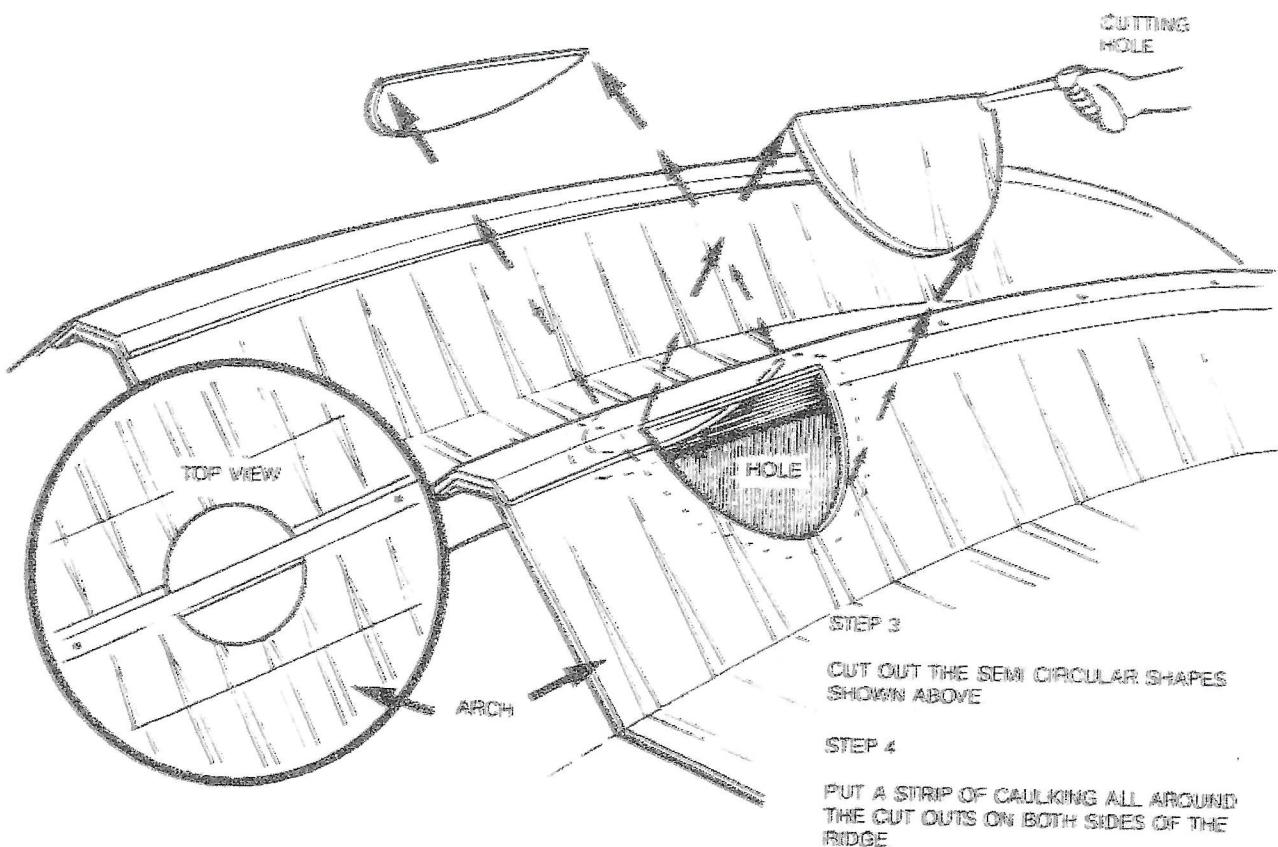


Figure 57

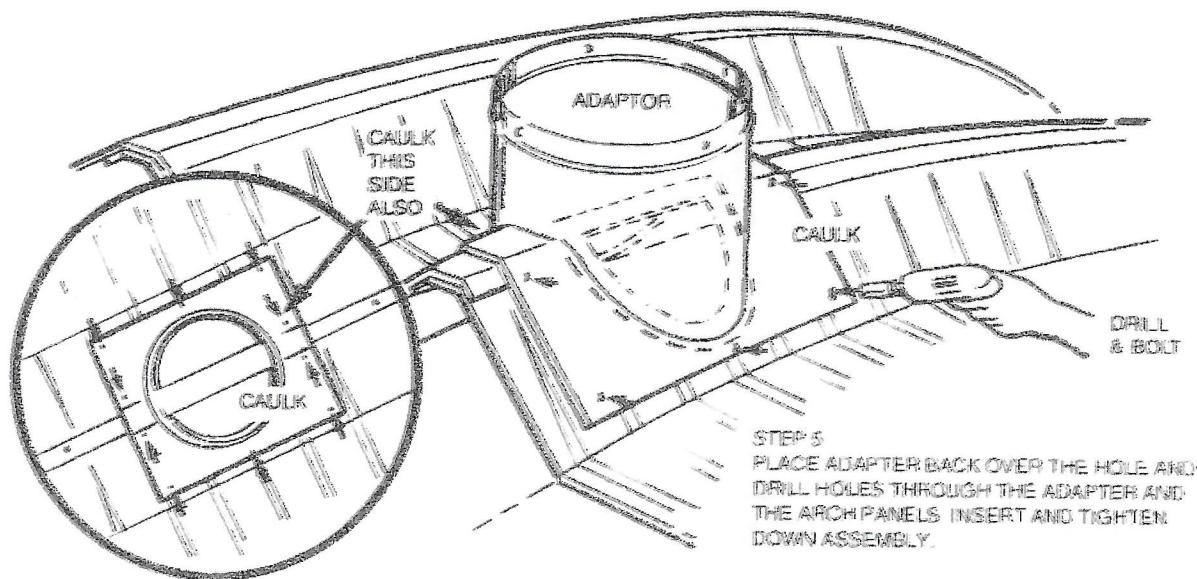


Figure 58

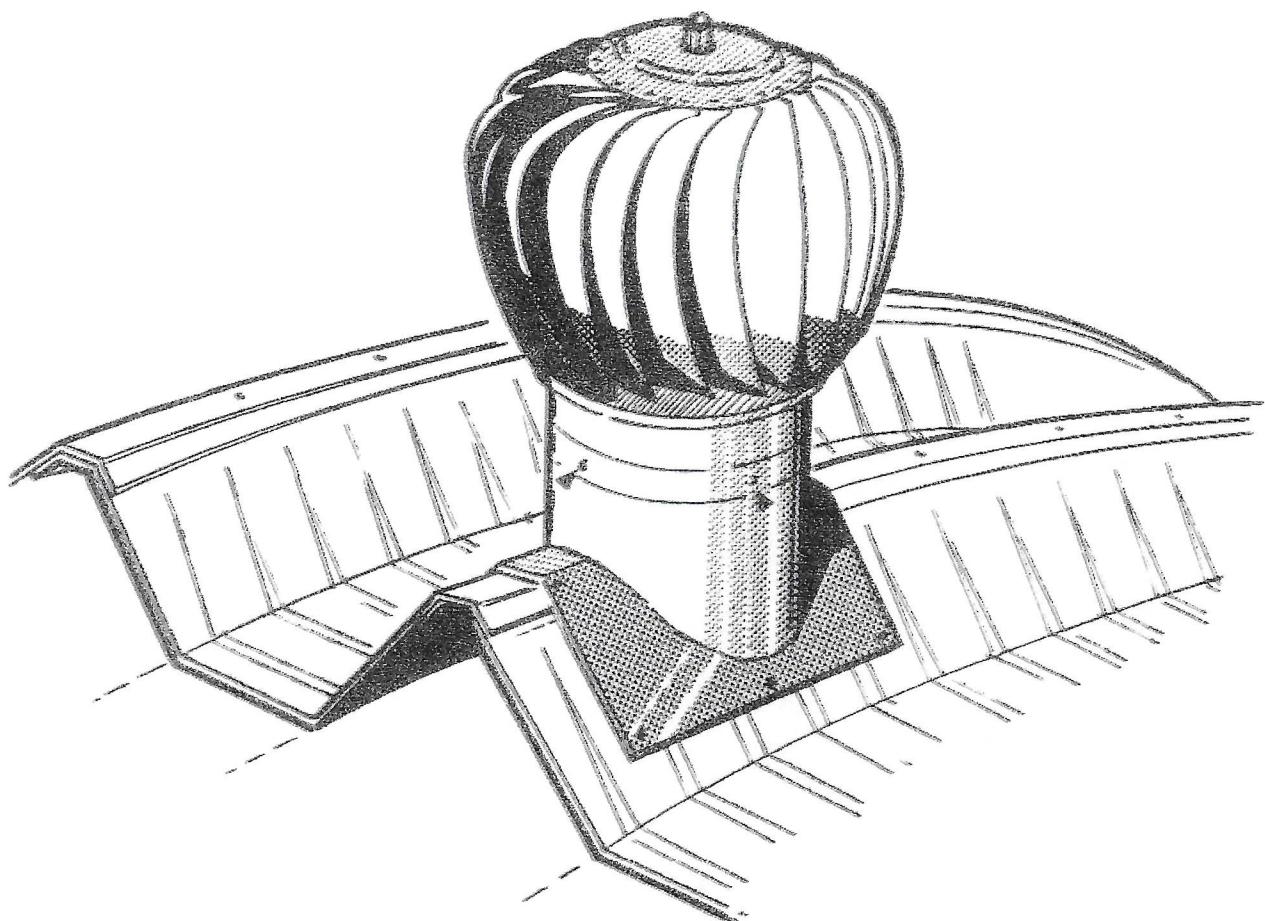


Figure 59

STEP 6

MOUNT TURBO VENTILATOR OVER ADAPTER AND SECURE WITH STRONG SCREWS.

Installing Skylights

Skylights are installed at the straight roof panel. Remove all bolts from the steel panel where you want to place a skylight, and hit out the panel (see Figure 60).

CAUTION: WE RECOMMEND RESTRICTING THE NUMBER OF SKYLIGHTS USED TO ONE SKYLIGHT PER EVERY TEN ARCHES OR ONE EVERY FIVE ARCHES WHEN STAGGERED FROM ONE SIDE TO OPPOSITE SIDE. SKYLIGHTS ARE NOT AS STRONG AS STEEL PANELS, AND ESPECIALLY WHERE HEAVY SNOWFALL IS INVOLVED, USING TOO MANY SKYLIGHTS COULD SERIOUSLY ENDANGER STRUCTURAL INTEGRITY. YOU SHOULD NEVER ATTEMPT TO ERECT AN ARCH CONTAINING A SKYLIGHT: PUT UP THE ARCH WITH STEEL PANELS ONLY, AND REPLACE A STEEL PANEL LATER ON. SKYLIGHTS WILL BREAK IF THEY ARE INSTALLED IN AN ARCH BEFORE BEING ERECTED.

NOTE: Clean up shavings if your drill touches the steel.

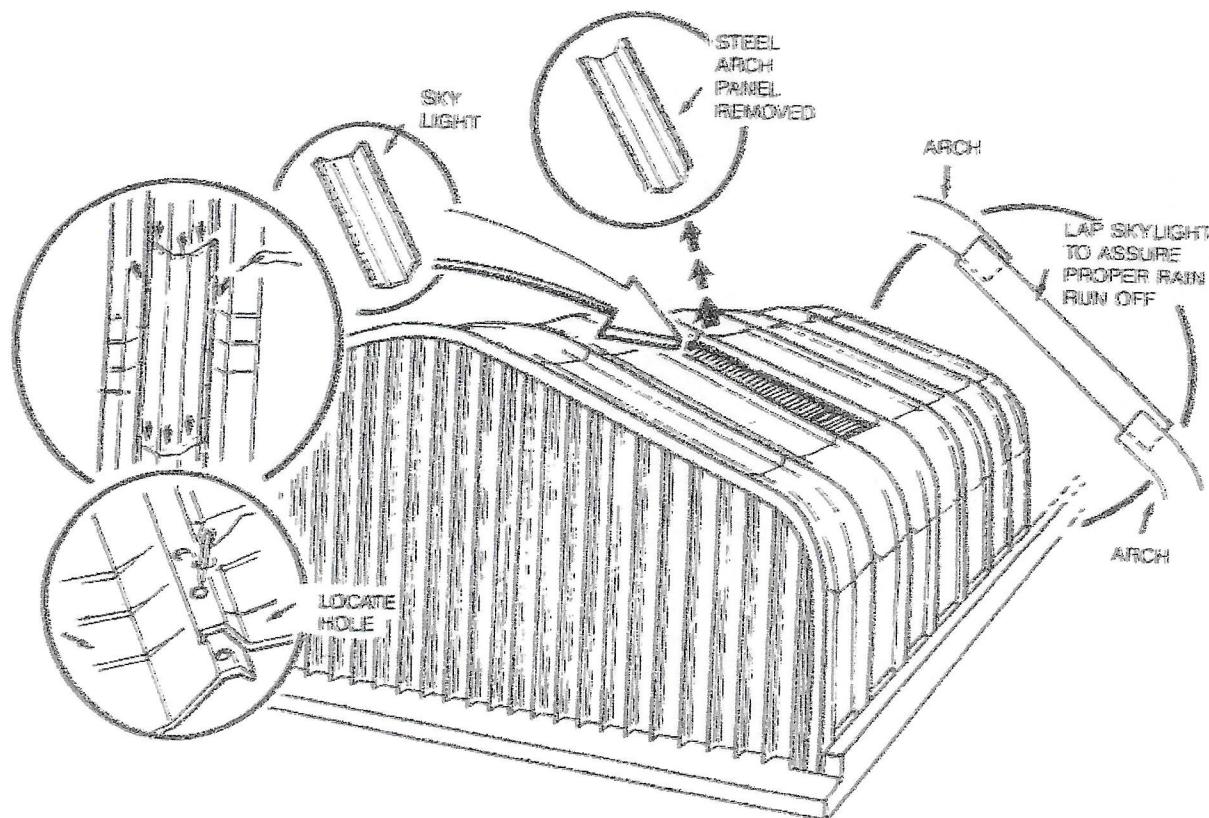


Figure 60

NOTE: Our special deep "V" shaped skylight provides you with up to three times the light of conventional flat skylight.

NOTE: If the arches are made of a heavier steel than the standard arch thickness, extra heavy skylights are available. Ask your dealer for prices and details.

NOTE: The number of steel panels shipped is reduced by the number of skylights ordered. If, for example, you order two skylights, then the factory will ship two steel panels less than a full set.

Skylight Accessories

A steel panel should be unbolted and removed (if not already removed during erection of arches) from the building in the area where you wish to install skylight.

Use the steel panel that you removed as a template to transfer hole location to skylight. Once you have marked and drilled all the holes, place the skylight into the opening making sure to lap the adjacent sheets in the correct direction. Make sure that the skylight is properly lapped to insure proper rain run off. Insert bolts and tighten, make sure not to over tighten bolts, as this may cause the skylights to crack.

CAUTION: FIBREGLASS PANELS CAN BE VERY BRITTLE, ESPECIALLY AT LOWER TEMPERATURES. AVOID BENDING OR TWISTING THE SKYLIGHT, AND DRILL THE HOLES SLOWLY AND CAREFULLY, OR ELSE THEY MAY CRACK THE SKYLIGHT, CAUSING LEAKAGE.

NOTE: PLEASE CONTACT YOUR SALESPERSON BEFORE SHIPMENT OF YOUR NEW FUTURE STEEL BUILDING TO DISCUSS PRICE ADVANTAGES OF PURCHASING SKYLIGHTS IF YOU HAVE NOT ALREADY DONE SO.

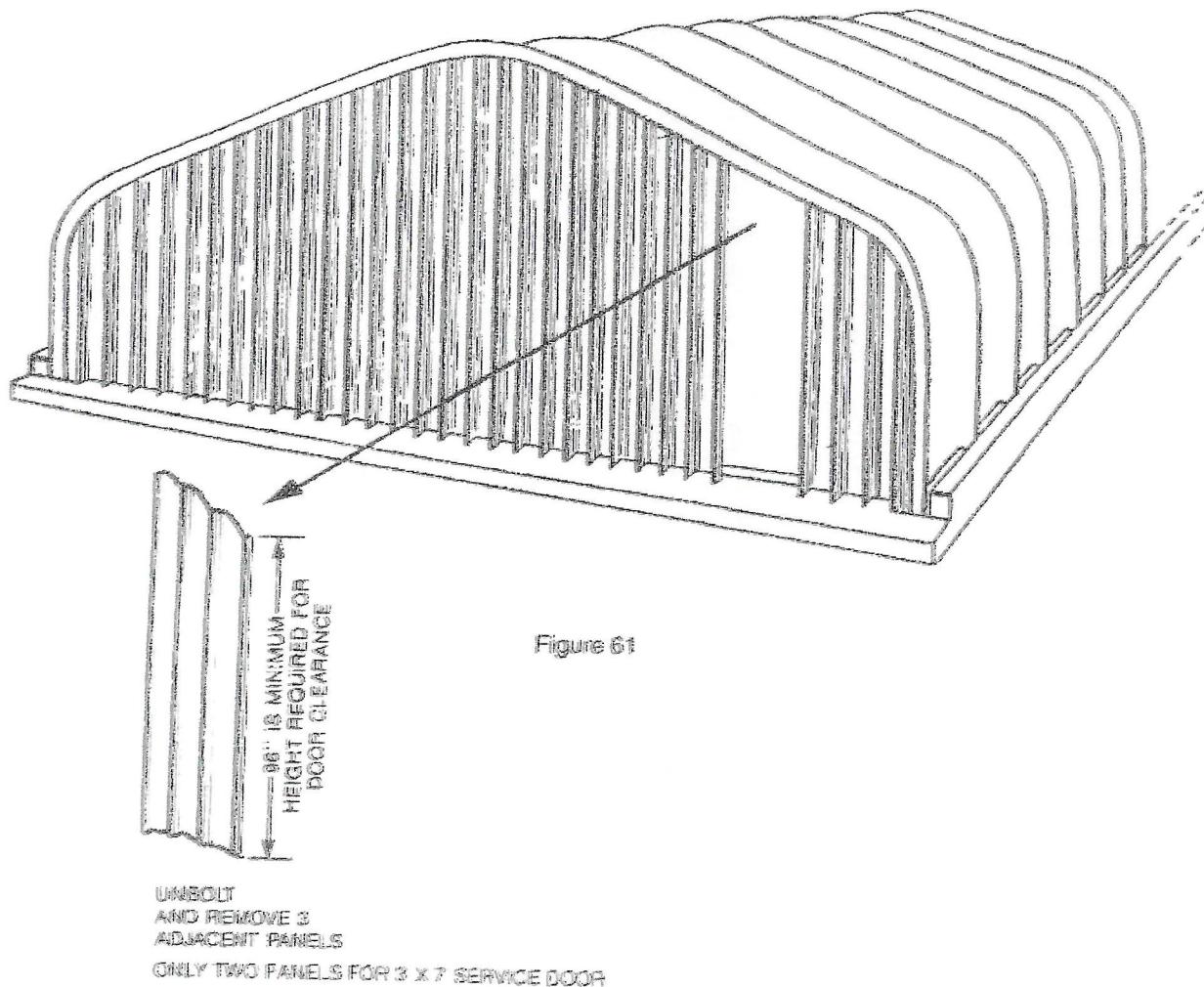
Installing Service Doors

Service doors can be easily installed in the endwalls. They are shipped completely assembled and hung in a steel frame, ready for installation in the endwall.

NOTE: Service doors must be installed in the endwalls **BEFORE** the endwalls are grouted in.

NOTE: If the service door is intended for installation in an endwall, beside the main sliding door, leave at least one endwall panel between the main sliding door and the service door.

When you have decided where to put the service door, take into account that you have to remove three adjoining panels, all of which must be a minimum of 8 (feet) long. Otherwise the door will not fit into the opening (see Figure 61).



When you have decided on the best location for the door, unbolt and remove the three endwall panels, and simply lift the complete service door assembly into the opening. Line up the bolt holes in the endwall panels next to the door, insert the bolts and tighten them (see Figure 62).

The service door assembly is designed to be positioned in a 4-inch deep endwall trough, and is grouted right into the trough when the whole endwall is grouted.

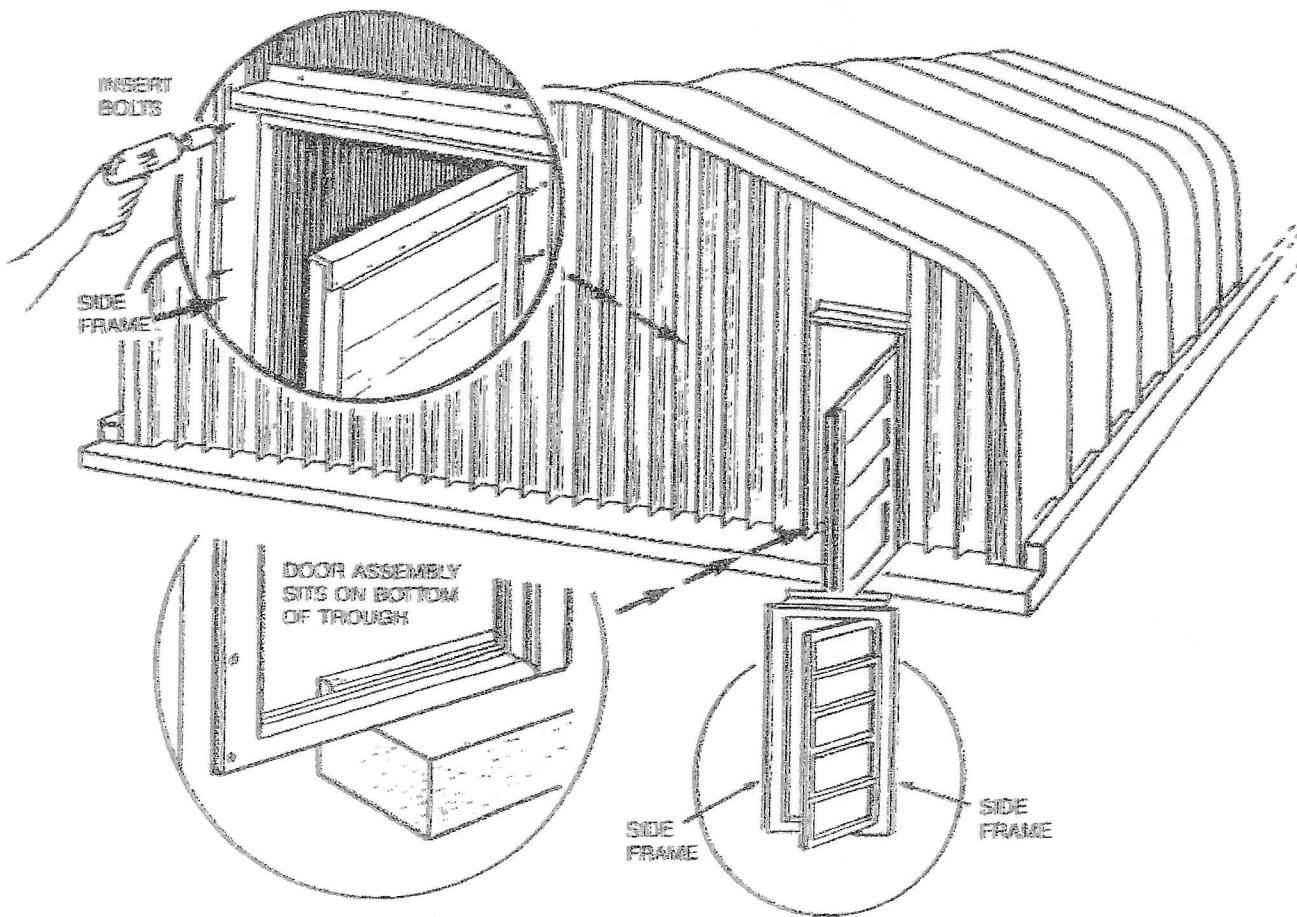


Figure 62

THE SERVICE DOOR
IS DELIVERED COMPLETELY
READY FOR INSTALLATION

Now go back to the three endwall panels which were removed to make an opening for the door. Then put the tops of the panels back over the service door, and bolt them to the adjacent panels and to the curved angles again (see Figure 63). From inside the building, drill through the holes in the top of the door frame, insert bolts and tighten them. This completes the installation of the door.

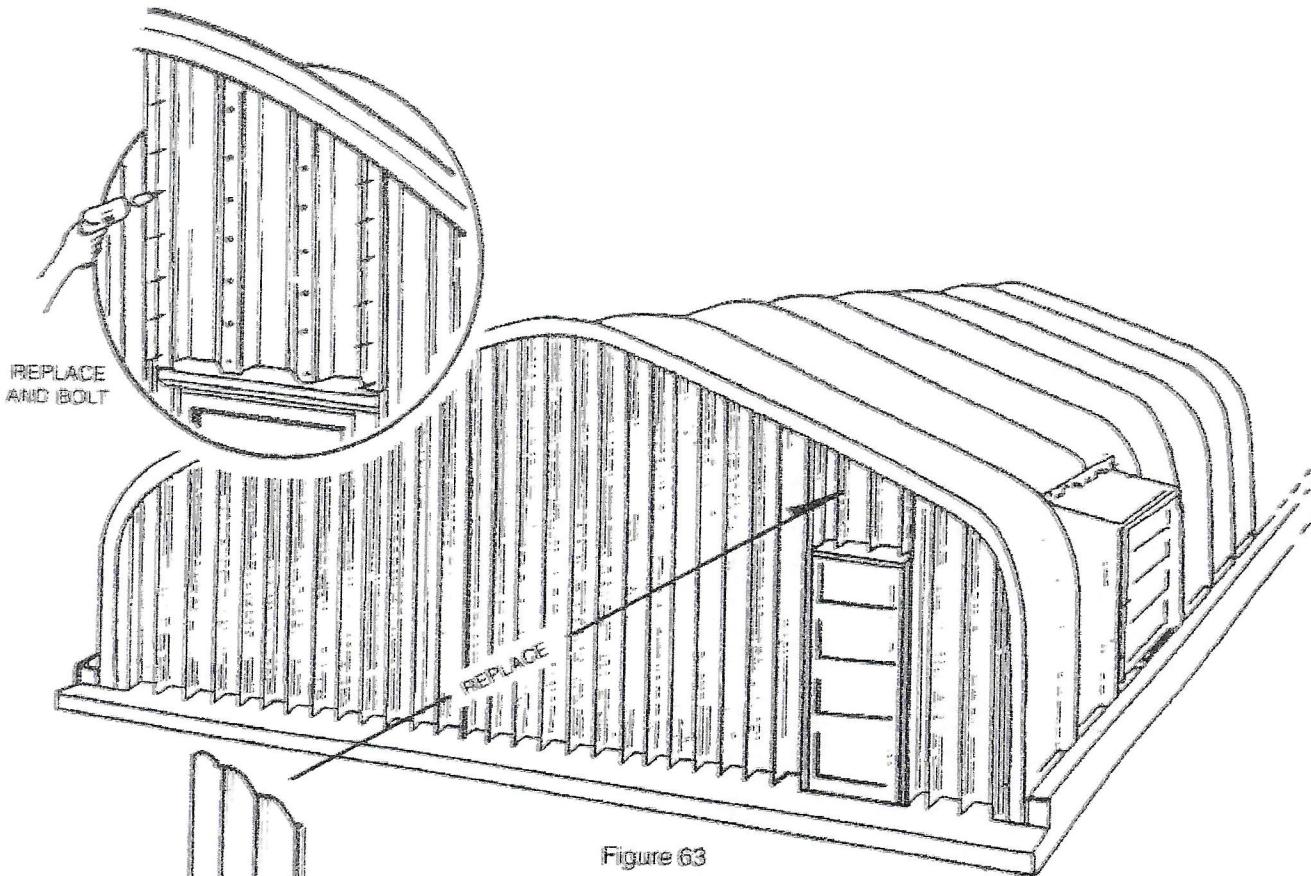
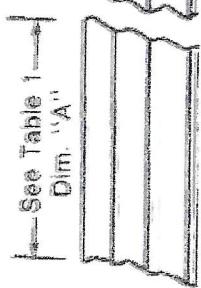


Figure 63



DOOR SIZE	FOUNDATION TYPE	DIM. "A"
3x7 & 4x7 Standard	TRough	93"
3x7 & 4x7 Conventional	TRough	90"
3x7 & 4x7 Conventional	IND. CON or "C"-Channel	86"
3x7 & 4x7 Standard	IND. CON or "C"-Channel	93"

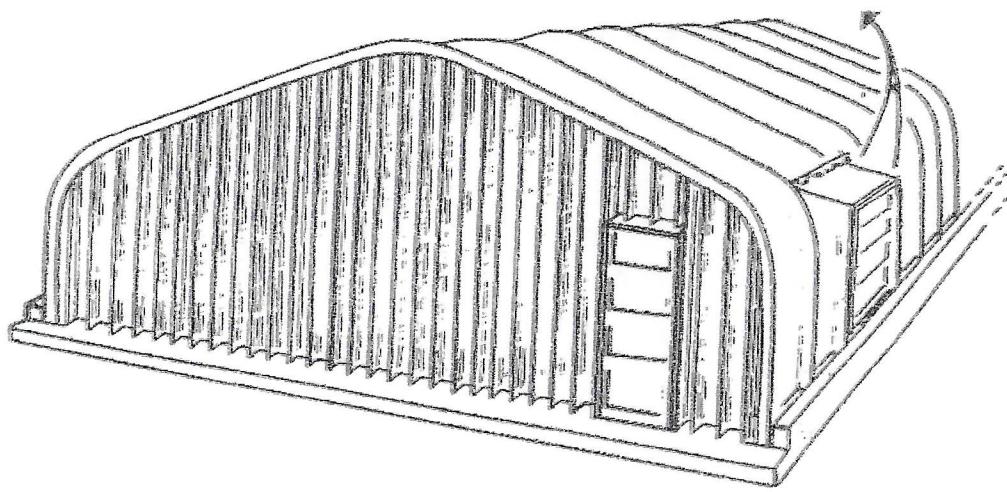
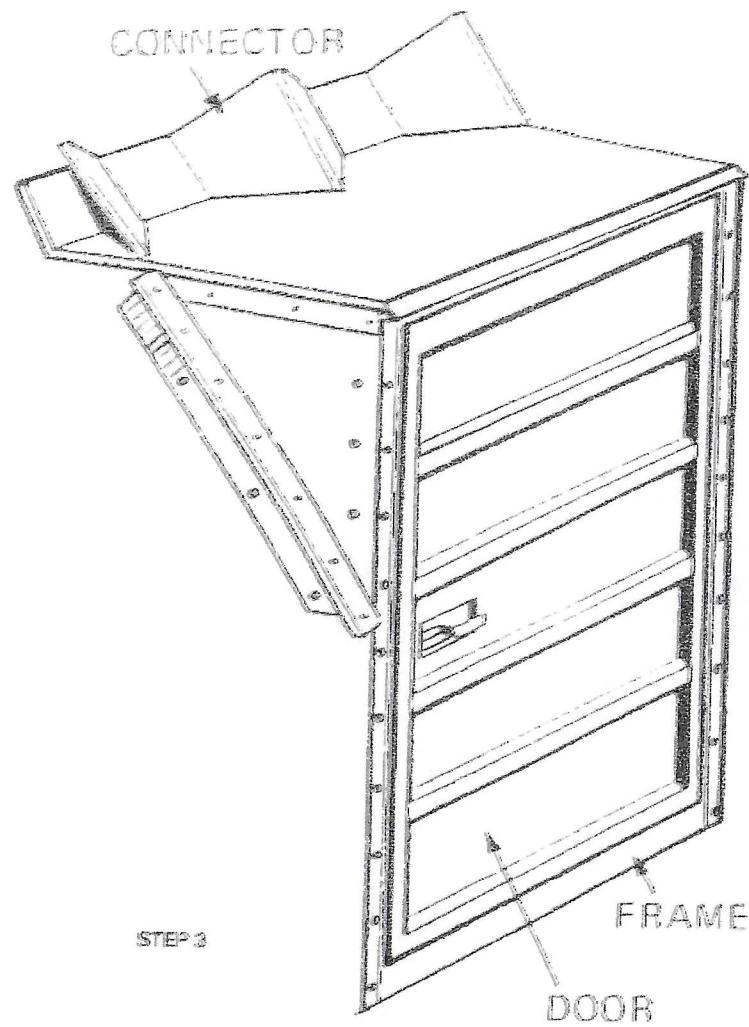


Figure 65

Installing Sidewall Door & Windows

When you've picked the location for your door, the corresponding two adjacent panels must be field-cut at a vertical height of $92\frac{1}{2}$ inches. The connector is bolted to the arch panels, and the door assembly is propped vertically on the sidewall foundation. The roof panel now should be bolted at one end to the connector, and at the other end to the top of the door frame. Curved angles are now bolted to the outside of the two adjacent arch panels. The sidewall panels are bolted to the roof panel, the curved angles and to the side of the door assembly. See below.

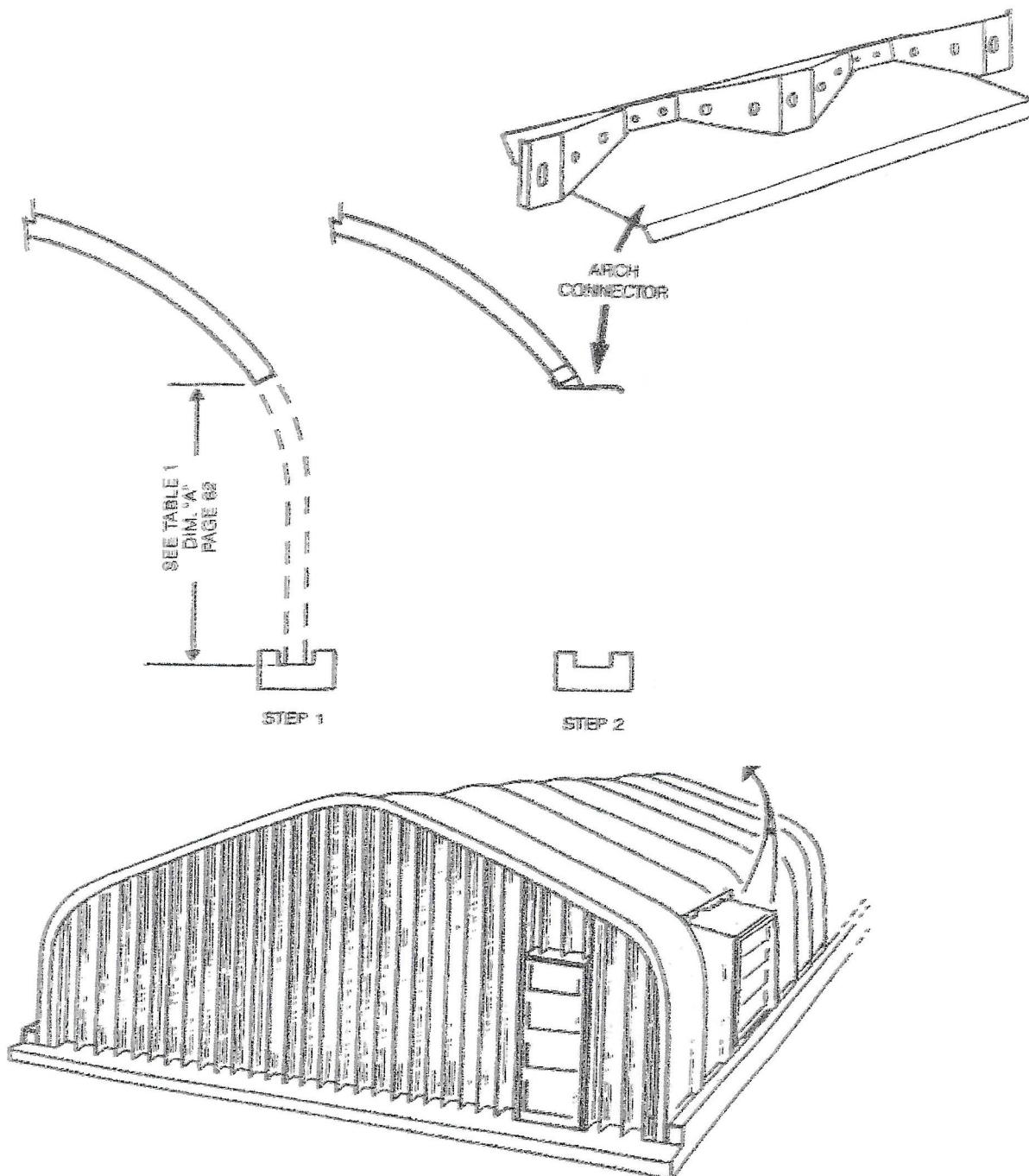


Figure 64

Installing Interior Partition

Find a suitable location for your partition and note that it must lie directly beneath an arch panel as illustrated in Figure 66. The C-channel is then anchored into the concrete in the appropriate location. Bolt one set of inner curved angles to the arch panel such that, when the partition panels are seated in the C-channels, the panels are vertical when braced against the curved angle. The partition panels are then installed using the procedures used when installing the endwall panels. Once they are all bolted to the first curved angle, the second curved angle is then butted up against the partition and bolted in place. When all panels are in place, they can be bolted to the C-channel. Note that most bolt holes must be drilled at the site.

Building Cross-Section

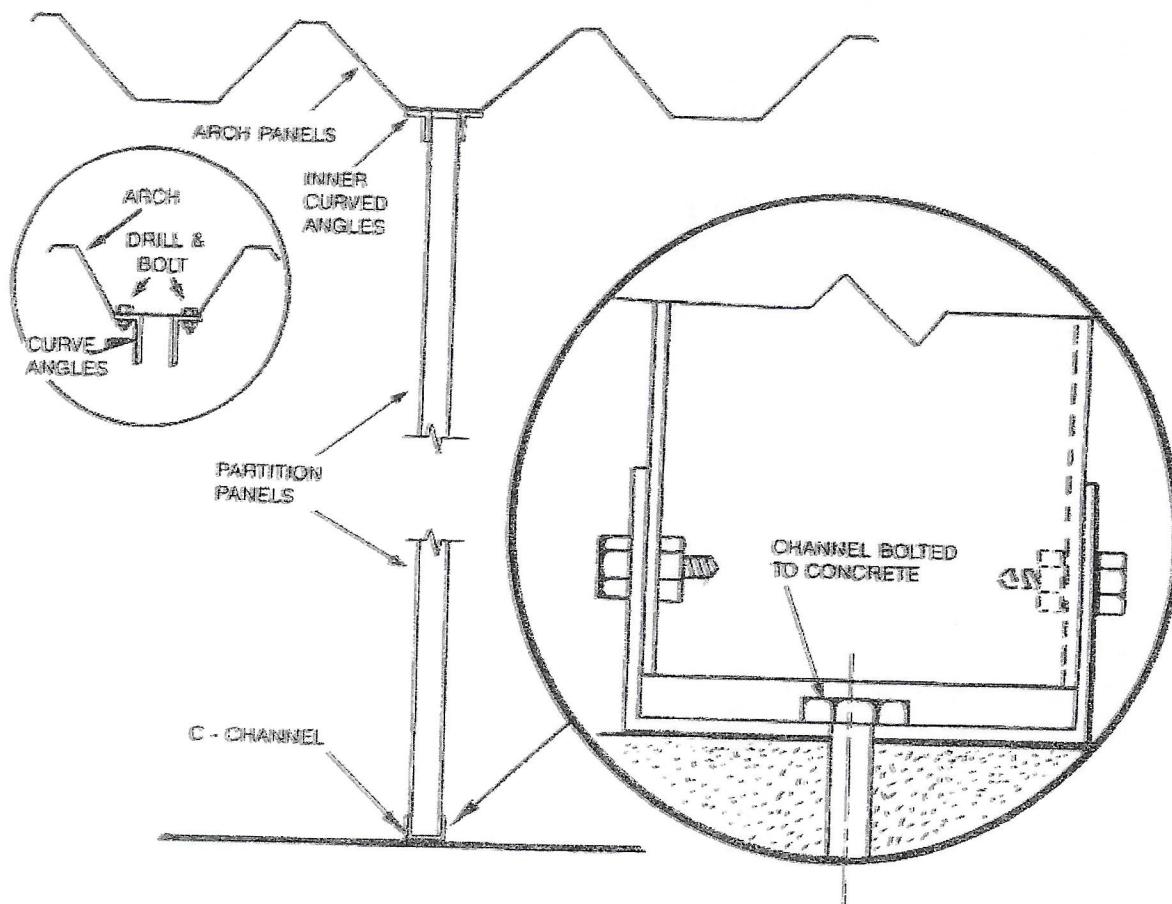


Figure 66

Installing Insulation (Future Steel Insulation System)

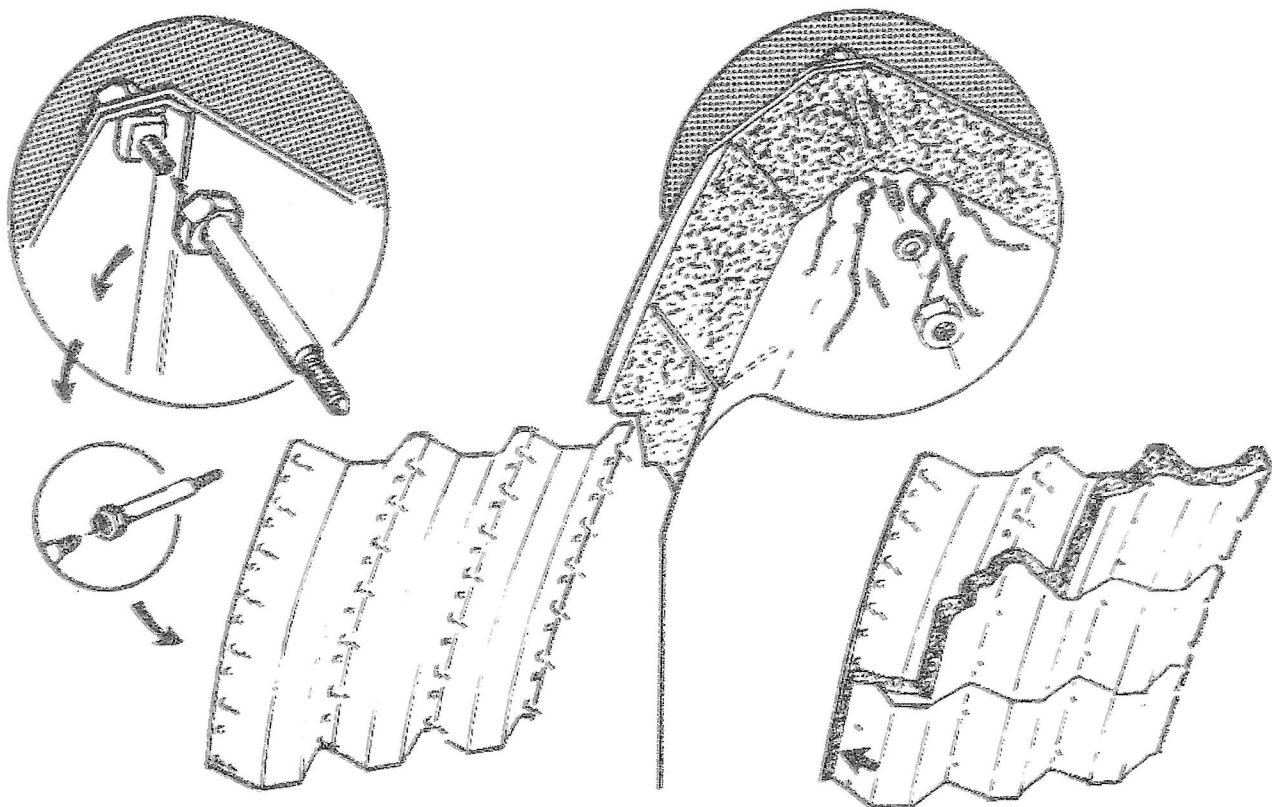


Figure 67

Please contact the Future Steel Salesperson in your area regarding our additional accessories:

- Window Louvers
- Endwall Bracing Kits
- Tie Down Kits
- Anchor Bolts
- Window Frames and Windows
- Base Connectors
- Overhead Door Frames
- Overhead Doors

NOTE: Save on freight charges by having accessories shipped along with your building.