

*Property of
P.A. Sangreant - 44*

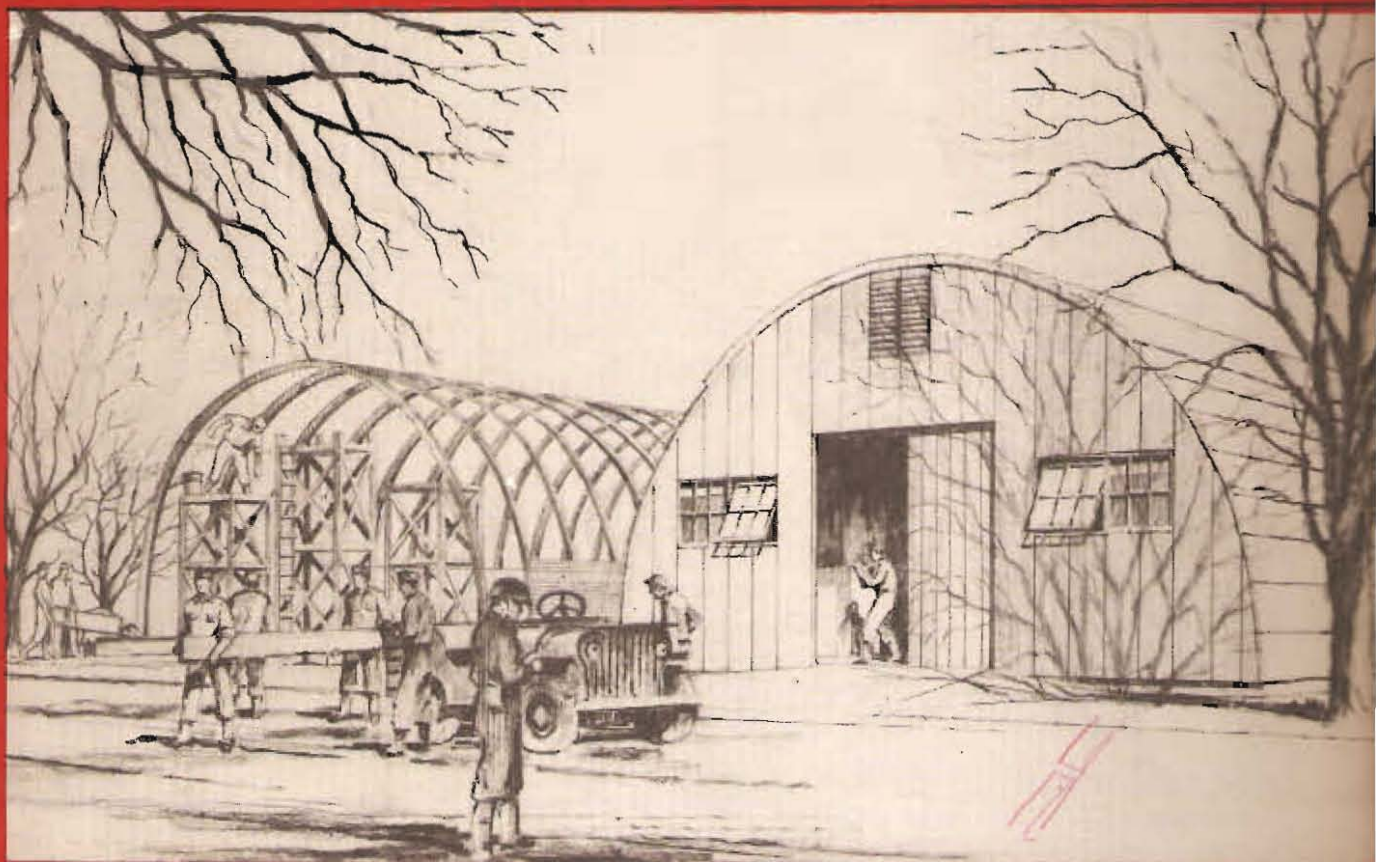


U. S. NAVY

STEEL ARCH RIB UTILITY

AND STORAGE BUILDING

**ERECTION INSTRUCTIONS FOR
THE 40'-0" x 100'-0" BUILDING**



MANUFACTURED FOR

**NAVY DEPARTMENT
BUREAU OF YARDS AND DOCKS**

BY

**STRAN-STEEL DIVISION
GREAT LAKES STEEL CORPORATION
UNIT OF NATIONAL STEEL CORPORATION**

PENOBSCOT BUILDING, DETROIT 26, MICH.



ERECTION SEQUENCE

BASIC UNIT

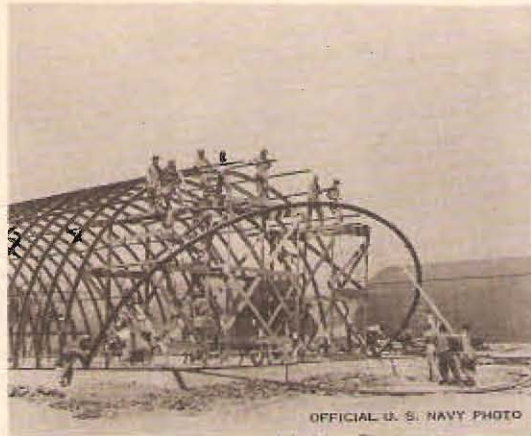
REFER TO

SUGGESTIONS TO ERECTOR

PAGE 12

BEFORE STARTING

ERECTION



FRAME



FOUNDATION

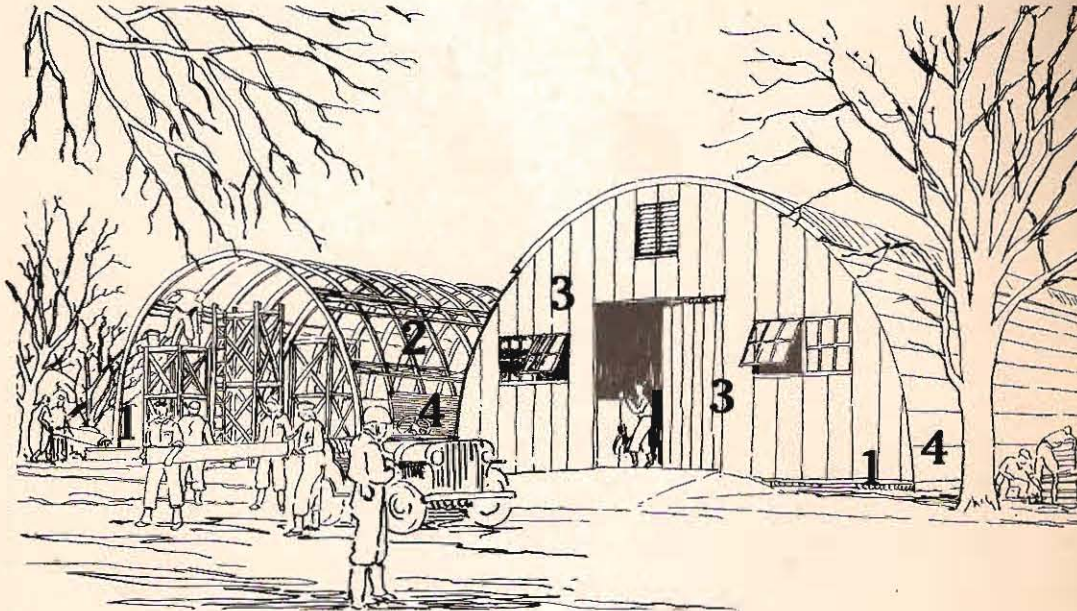
BULKHEAD



COVERING



BUILDING COMPLETE



1. FOUNDATION. Pour concrete, set anchor bolts and locate blocks that form weep holes. Lay channel plate. (See pages 2 and 3.)

2. FRAME. Assemble and raise ribs. Install bridging and purlins. (See pages 4 and 5.)

3. BULKHEAD. Assemble bulkhead frame from steel studs. Hang doors, install windows and apply corrugated iron sheets, louvre, and flashing. (See pages 6 and 7; 8 and 9.)

4. COVERING. Nail flat corrugated sheets on the sides of the building to the ribs and nail the curved corrugated sheets over the top to the purlins. (See pages 10 and 11.)

5. ADAPTATIONS. The electrical system, continuous ventilation, the side openings, the side door, wood platform, alternate foundations and floors. (See pages 14 to 19.)

6. CLEAN UP. Save all scraps, bands, blocks, nails, screws and crating material not used. Sort and store for future use.

BASIC UNIT

THE FOUNDATION

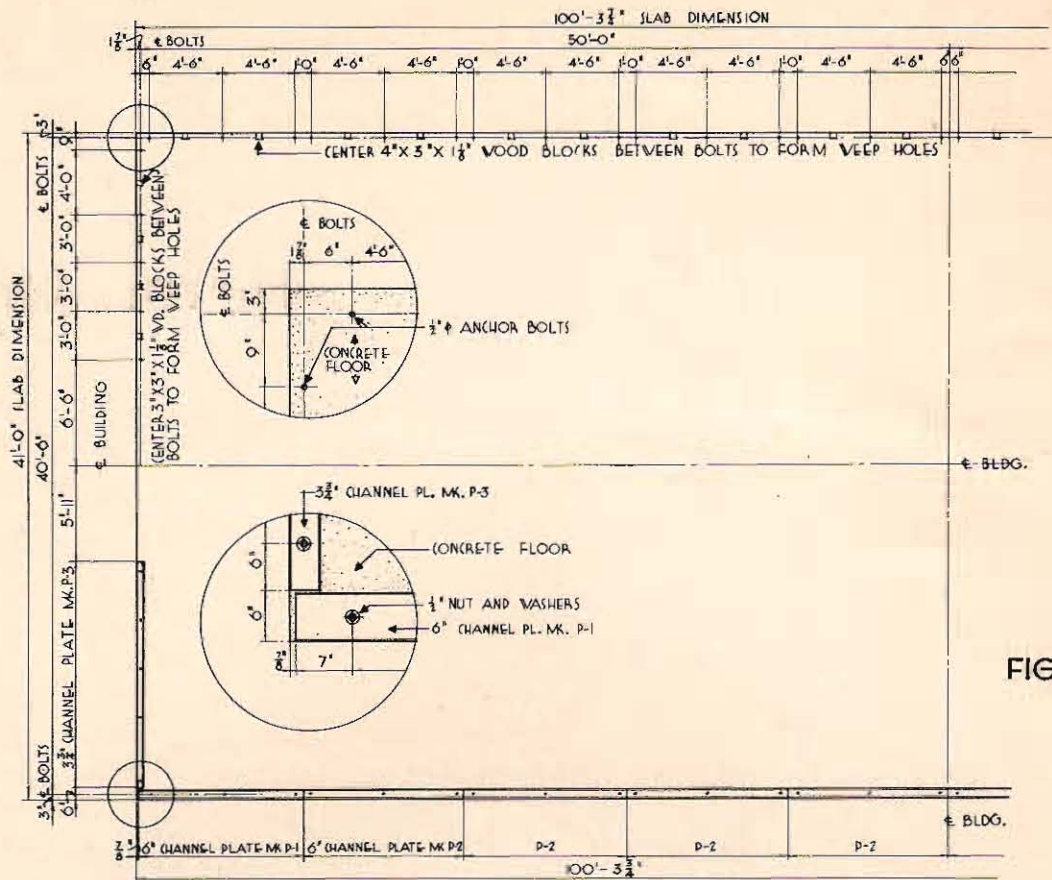


FIG. 1

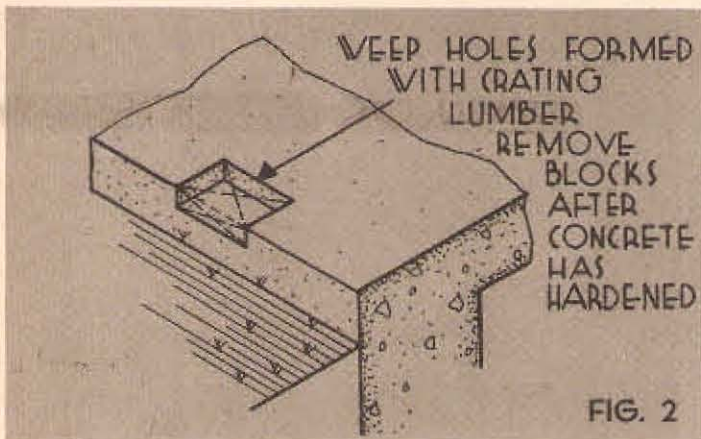
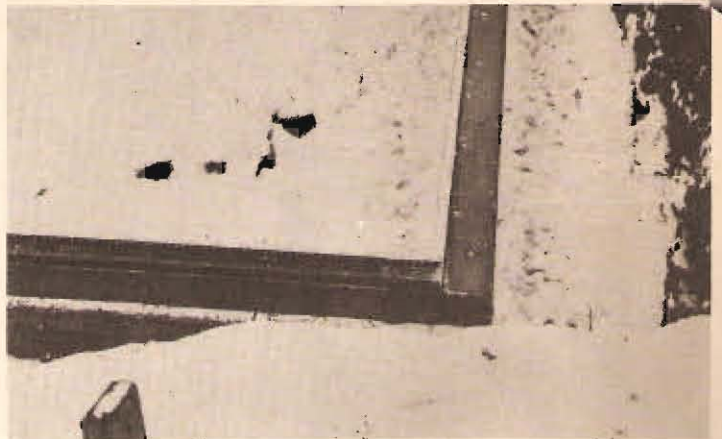
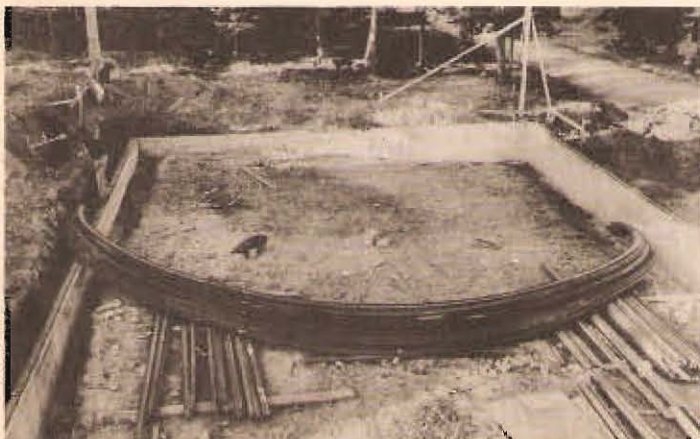


FIG. 2



BOLT CHANNELS



LAY OUT CHANNELS

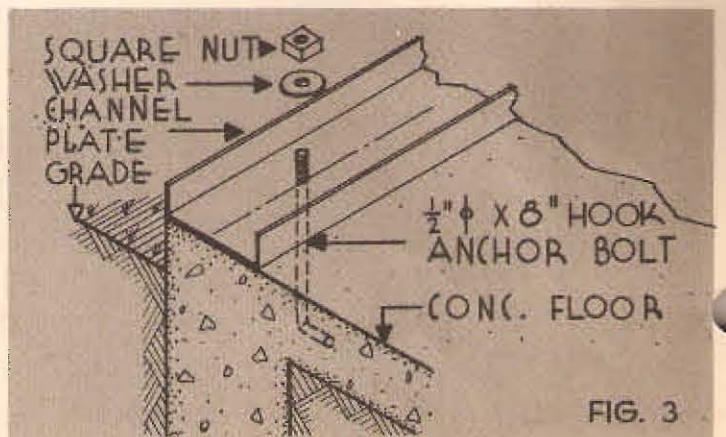
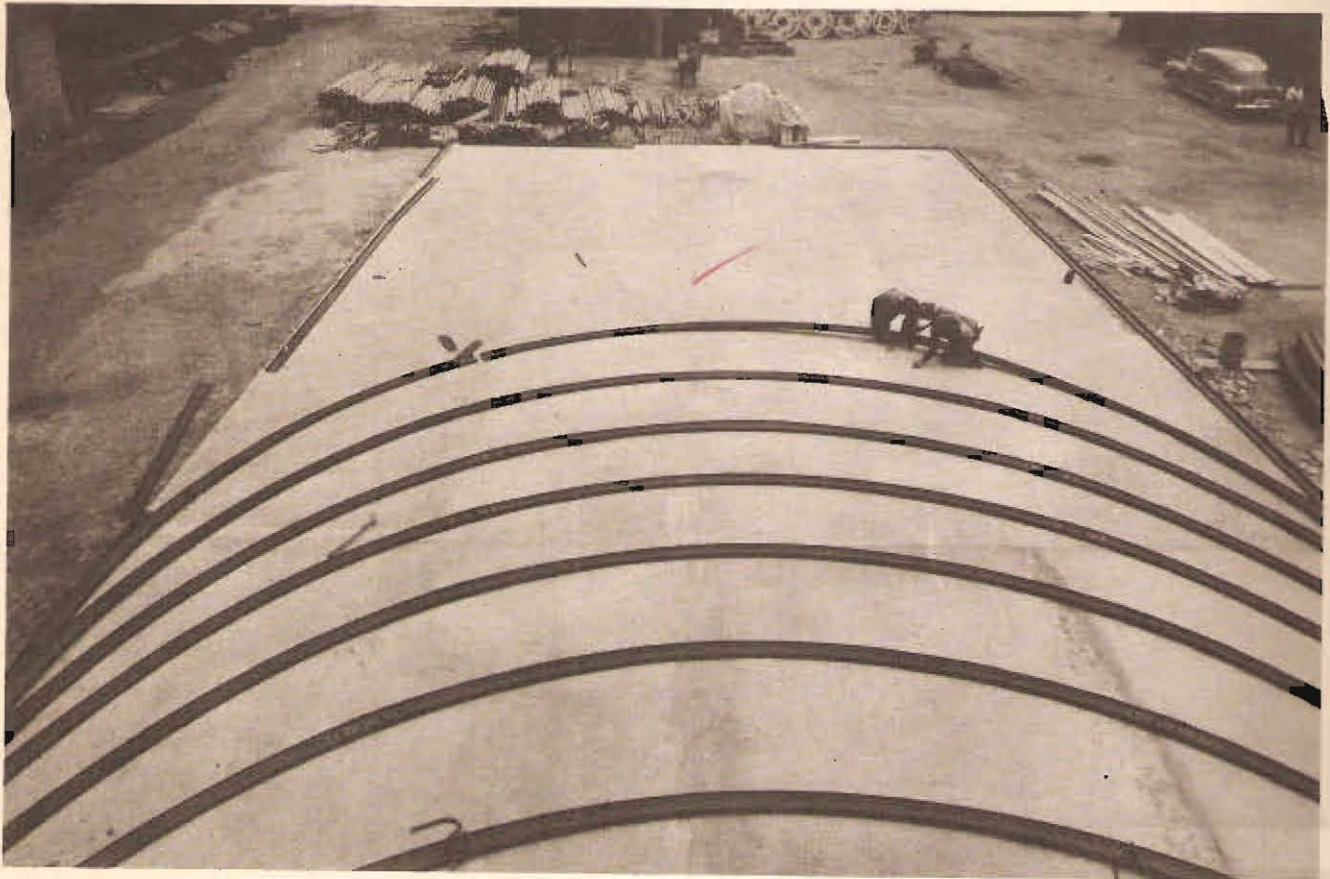


FIG. 3

BASIC UNIT THE FOUNDATION



Place the 6" channel plates over the anchor bolts set in the concrete, square and level the plates and bolt them down. The 3 $\frac{3}{4}$ " channel plates at the ends of the building will be placed when the bulkhead framing is erected.

1. Set the $\frac{1}{2}$ " x 8" long anchor bolts accurately in the concrete foundation. (See Framing Plan, page 21 and figure 1.) Cut wood blocks from crating lumber (see sections, page 21) and place them in the forms before pouring the concrete. After the concrete has hardened remove these blocks, thereby forming weep holes for draining the moisture from the channel plate. (See figure 2.)
2. Lay the 6" channel plates, which are punched to fit over the bolts, in position down the sides of the building. Starting with the end channels at each side. These are marked P-1 (10'-1" long) and should be placed so that the end of the plate with the hole 7" from the end will be at the corner of the building. (See figure 1.) Then lay the eight intermediate channels on each side. These are marked P-2 and are 10'-0" long. When the channels have been correctly laid there will be a continuous line of channels down each side of the building with an $\frac{1}{8}$ " space between the separate channels. (See figure 1.)
3. Square the plate layout and line up the plates so that the 40'-6" dimension across the building, centerline to centerline of plates, is maintained. If the anchor bolts have been improperly set so the plates cannot be laid square cut new holes in the channels with a cold chisel or a torch. Plates must be square so later work will fit.
4. Carefully level the plates with small wedges at the bolts. When plates are level grout underneath them with cement mortar, slip washers over tops of anchor bolts and draw nuts down tight.

BASIC UNIT THE FRAME

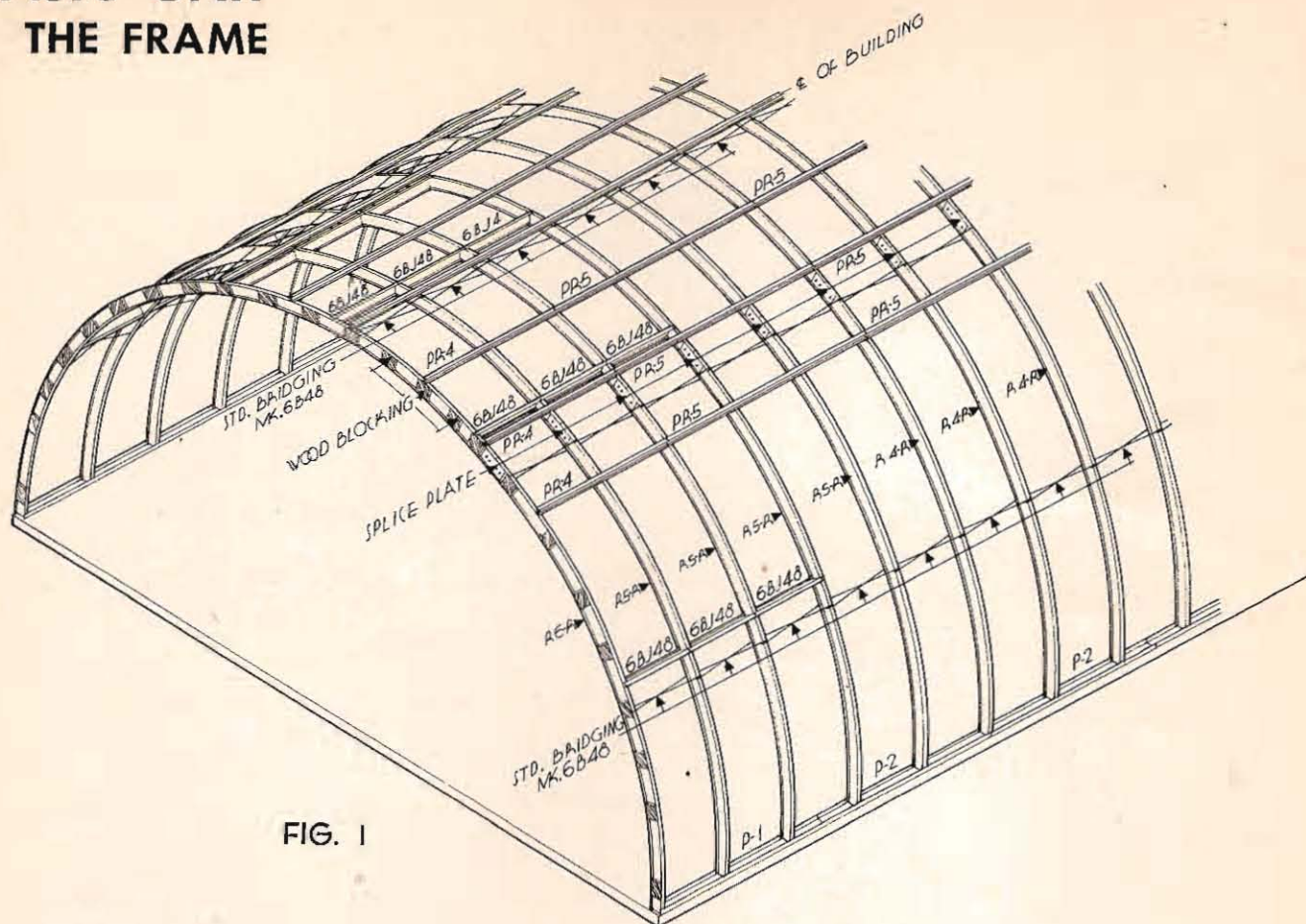


FIG. 1

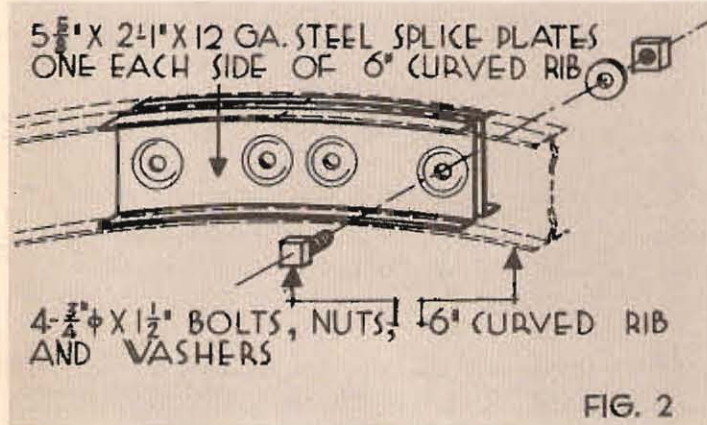


FIG. 2

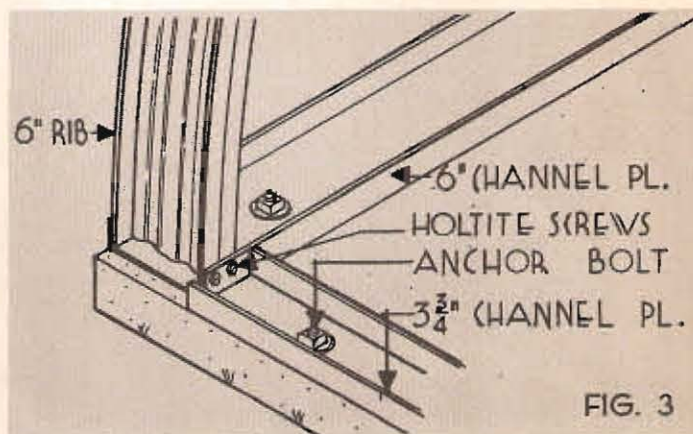


FIG. 3

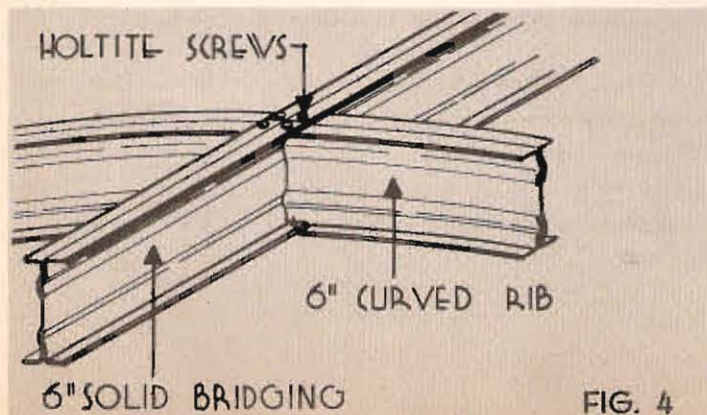


FIG. 4

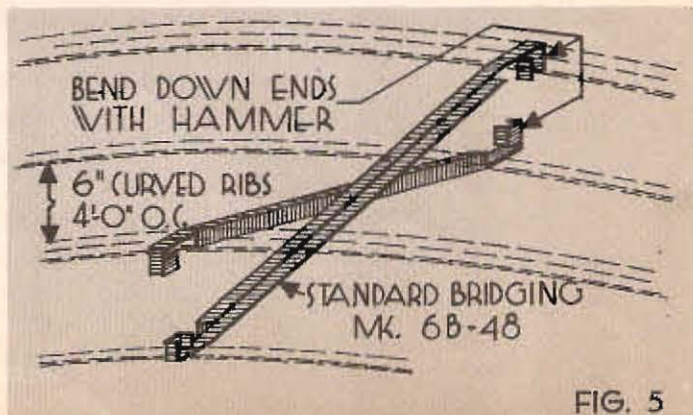


FIG. 5

BASIC UNIT THE FRAME

COMPLETE FRAME



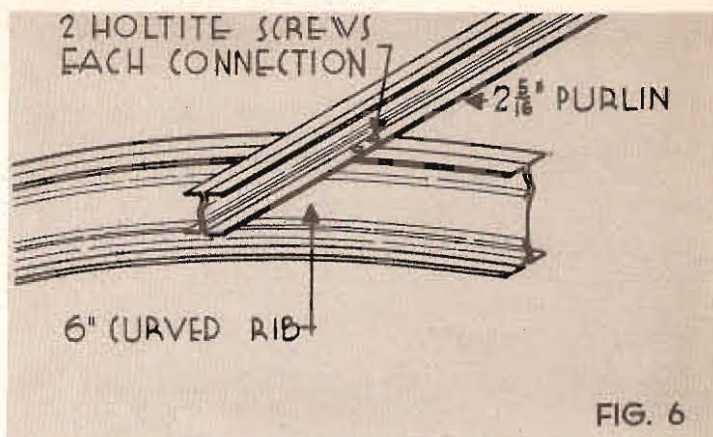
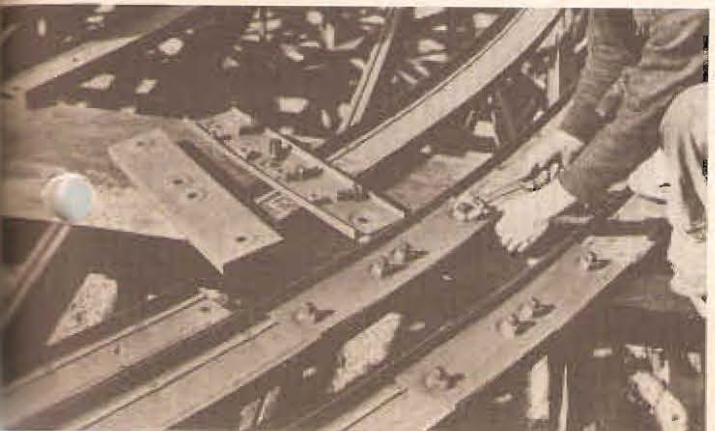
INSTALL BRIDGING



RAISE RIBS



ASSEMBLE RIBS



The frame consists of a series of semi-circular ribs assembled from three sections and spaced at 4'-0" on center. The ribs are secured to the channel plate at the bottom and are braced by five rows of bridging. At the top of the building there are seven rows of steel purlins which run lengthwise of the building and are screwed to the ribs.

1. Assemble all the ribs on the ground. Each rib is numbered for location in the building and consists of three sections marked with the rib number and either "R," "C" or "L." Assemble the ribs near their location in the building. (See page 21 and figure 1.) To do this, place the sections marked "R" and "L" on the ground with their lower ends (which have 4 holes in the flanges) near their location in the plates. Lay the center section marked "C" between them and join the three sections with two splice plates at each joint, one on each side of the rib, and $\frac{3}{4}$ " x $1\frac{1}{2}$ " bolts with washers. (See figure 2.) When assembling the end ribs of the building marked δ (R, C or L) lay them so the wood blocks will face to the outside of the building after the ribs are in position. While the ribs are on the ground mark the location of the clip-on bridging. (See Typical Cross Section, page 21.)

2. To raise the ribs construct three light, movable platforms out of crating lumber, two sections 13'-0" high and one section 15'-6" high will be satisfactory. The ribs can then be easily raised in the manner shown in the accompanying photograph.

Raise the ribs. Raise an end rib first, then follow with the others in sequence, securing each rib as it is raised to the channel plate with four Holtite screws. (See figure 3.) As successive ribs are raised install the bridging between them, noting that the first three spaces at each end of the building receive joist bridging marked δ BJ48 and the piece between the third and fourth rib at the top center of the building is marked δ BJ4. (Place the $\frac{3}{4}$ " hole in this piece nearer the third rib.) Slip the ends of these pieces over the flanges of the ribs and fasten them with Holtite screws. (See figure 4.) After the first four ribs have been raised plumb them and brace them with planks crossed diagonally and nailed to the inside of the ribs. With this bracing in place raise the remaining ribs, attaching the clip-on bridging as the successive ribs are erected. (See figure 5.)

3. Attach the purlins marked PR-4 and PR-5 to the ribs with two Holtite screws placed diagonally at each rib (see figure 6), but use four screws where two purlins join. The purlins should be erected as the ribs are raised using the staging that is then in position for the rib raising operation.

BASIC UNIT

THE BULKHEAD FRAMING

OFFICIAL U. S. NAVY PHOTO



SECURE RAFTER CLIPS

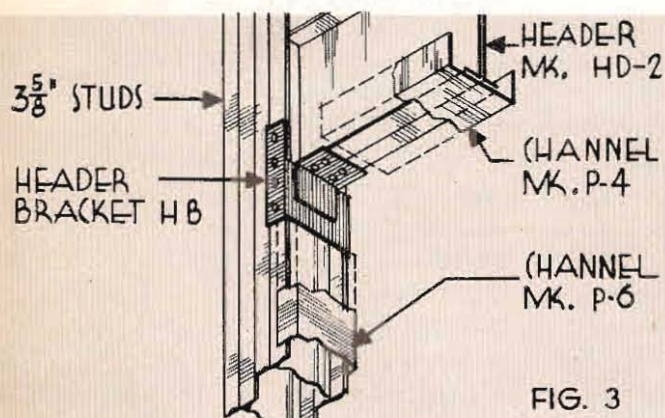


FIG. 3

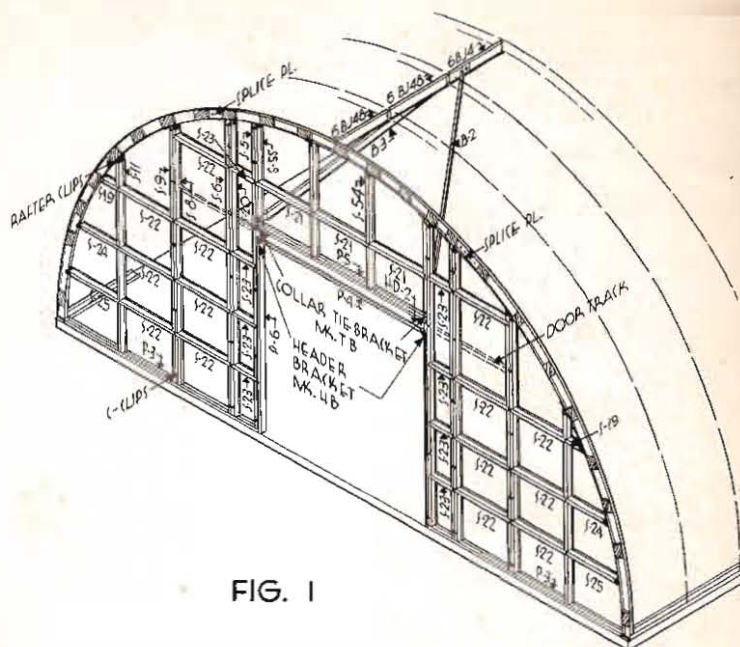


FIG. 1

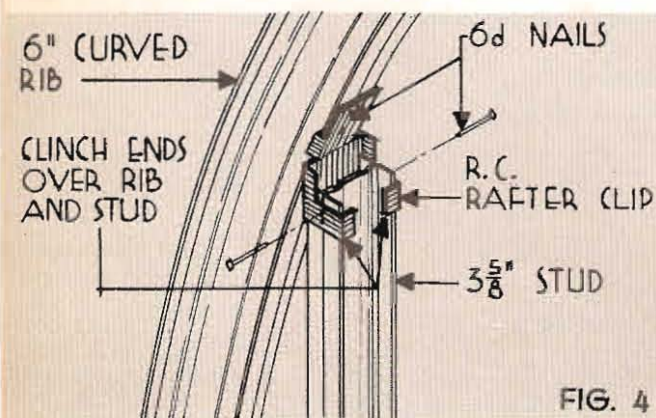


FIG. 4

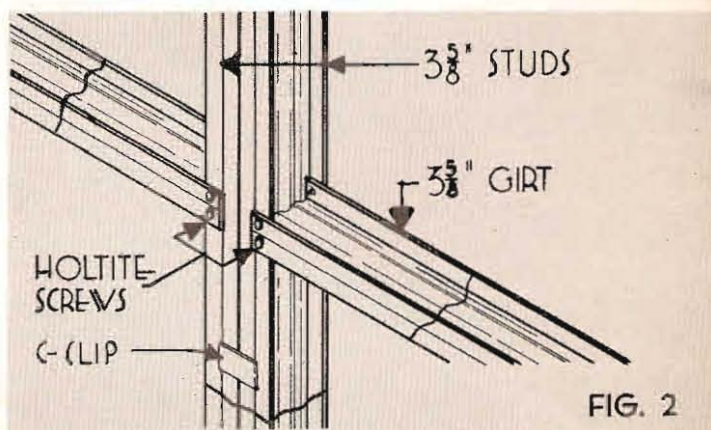


FIG. 2

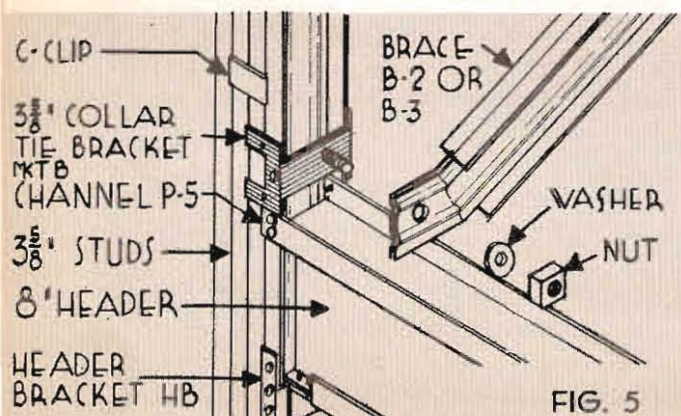


FIG. 5



OFFICIAL U. S. NAVY PHOTO

ASSEMBLE ON GROUND

BASIC UNIT

THE BULKHEAD FRAMING

Assemble the bulkhead frame on the ground from the studs, girts, and accessories, which have been cut to length and punched for assembly with Holtite screws. Raise the complete frame, utilizing the staging previously built for erecting the ribs. With part of the crew on the staging pulling on ropes attached to the upper part of the frame, the remainder of the crew can lift and guide the frame into position over the anchor bolts.

1. Lay the channel plates, P-3, near their location at either side of the doorway. Then lay the vertical studs with their lower ends (with holes punched in the flanges) at their positions in the channels and their upper ends resting on saw horses, making it possible to work on both sides of the studs. Be sure the studs are spaced accurately and screw them to the channel plate with Holtite screws. Attach the header brackets HB to the two door jamb studs marked S-4 so the angles on the brackets project into the doorway (see figure 3). Turn the door header marked HD-2 so the brackets on it will be inside the building and at the top of the header, lay it on the angles of the header brackets and secure it, thereby connecting the two S-4 studs. (See figures 3 and 6.) Next attach the channels marked P-5 and P-4 to the top and bottom of the header respectively and secure the two S-54 studs into the P-5 channel, turning them so the flanges that are punched will be outside the building. Then install the horizontal studs marked S-21, S-22, S-23, S-24, S-25 and S-19, screwing them to both flanges of the vertical studs (see figures 1 and 2).

Attach the rafter clips marked RC to the tops of the vertical studs and to the free ends of the horizontal studs S-19, S-24 and S-25. Slip these clips over the studs, clinch the tabs of the clips over the flanges of the studs, and bend the projecting part of the clips to the approximate angle it will assume when in place. Do not nail the clips to the studs until later as they may have to be adjusted in height after the frame is raised. (See figure 4.)

Attach one collar tie bracket, marked TB, to each stud marked S-55 so that its bolts project into the door opening and is nearer the inside of the building. Bend the tabs of the brackets around the studs, but again do not fasten the brackets to the studs until later as they may need adjustment before the braces can be attached. (See figure 5.)

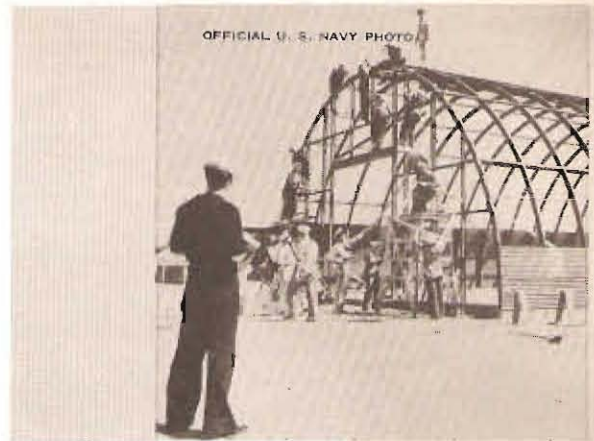
The "C" clips, which connect the double studs, should be driven in place after the accessories described above are in position. Insert the legs of the clip into the nailing grooves of each of the adjoining studs and drive the clip down tight with a hammer. Place these clips on each side of the studs, spacing them at about 4'-0" O.C. (See figure 2.)

The channels marked P-6 slip over the door jamb studs S-55 to form finished door jambs. Keep the bottoms of these channels flush with the bottom of the channel plates and screw them to the studs with Holtite screws. (See figures 6 and 7.) Lay the 2" x 4" nailer in the channel P-4 of the door header so it will be on the outside of the bulkhead when the frame is raised and nail it to the channel with common nails. (See figure 6.)

2. Square the entire bulkhead assembly before raising. Hold it square by means of boards crossed diagonally and nailed directly to the frame, on either side of the door opening. Leave this bracing in place until the framing is raised and secured.

3. Raise the frame evenly and slowly to its vertical position. After the frame is in position plumb it carefully. Then level it with small wedges at the studs and grout under the channel plate with cement mortar. Bulkhead must be level so doors will operate. Bolt channels down tight. Adjust rafter clips until the projecting part of the clip is snug against the underside of the rib then nail each clip to the studs and the rib with 6d nails. (See figure 4.)

Install the braces marked B-2 and B-3 connecting the two at one end through the hole in the solid bridging 6BJ4 with a $\frac{3}{4}$ " x $1\frac{1}{2}$ " bolt (see figure 8). Connect the other end of each brace to one of the collar tie brackets over the door header, bending the tabs on the braces to make the connection. Nail and screw the collar tie brackets to the studs. (See figure 5.)



COMPLETE FRAME

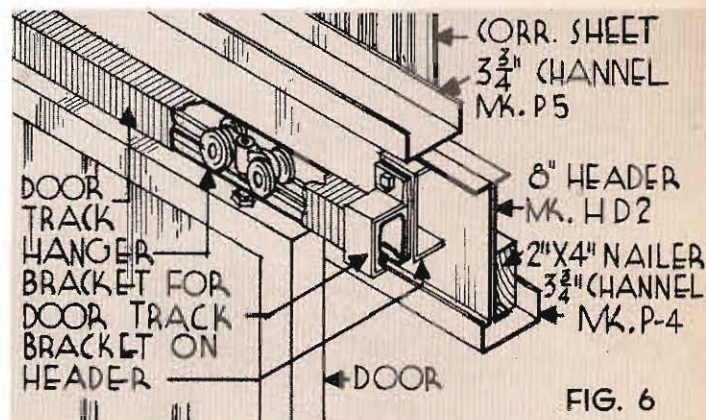


FIG. 6

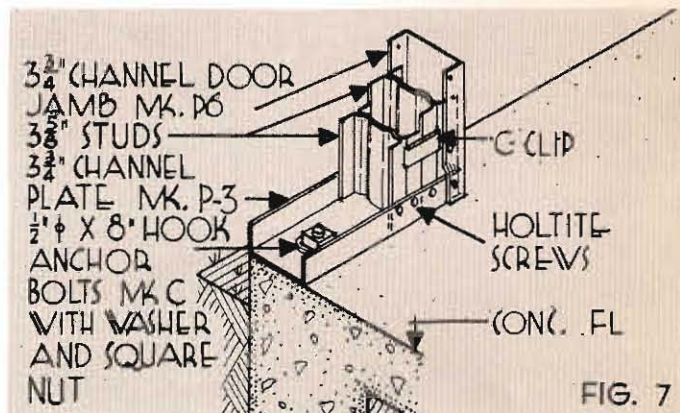
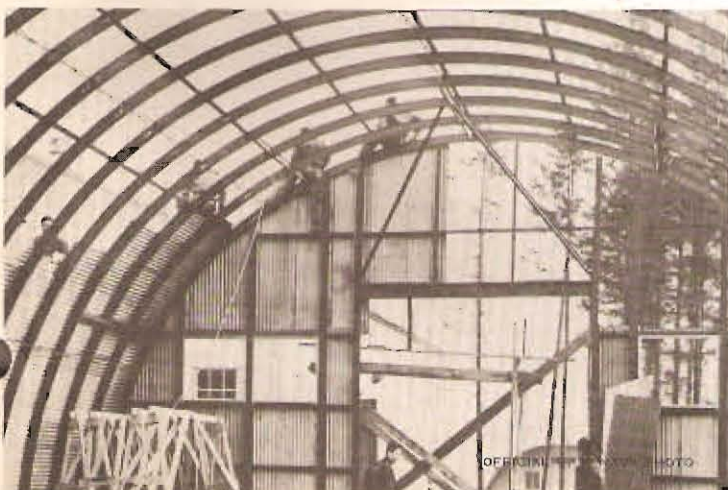


FIG. 7



INSTALL BRACES

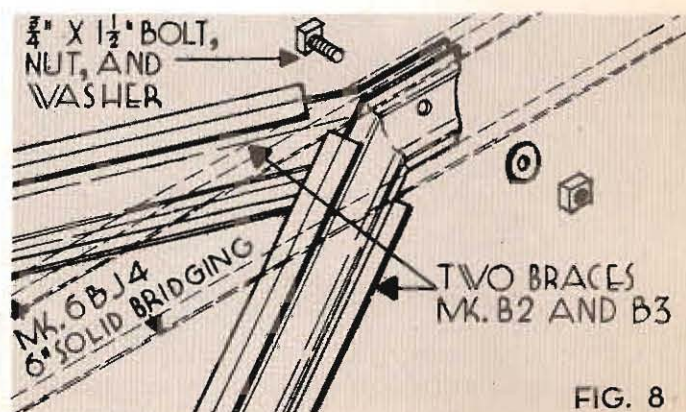
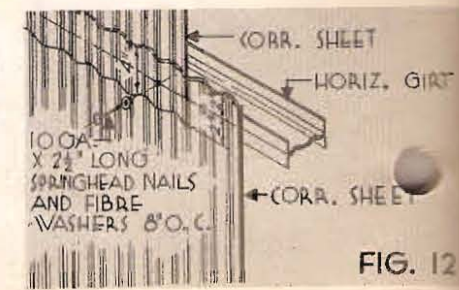
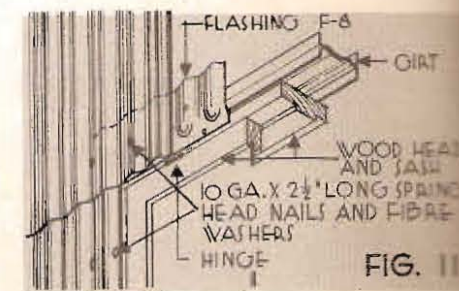
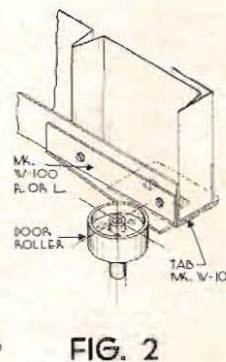
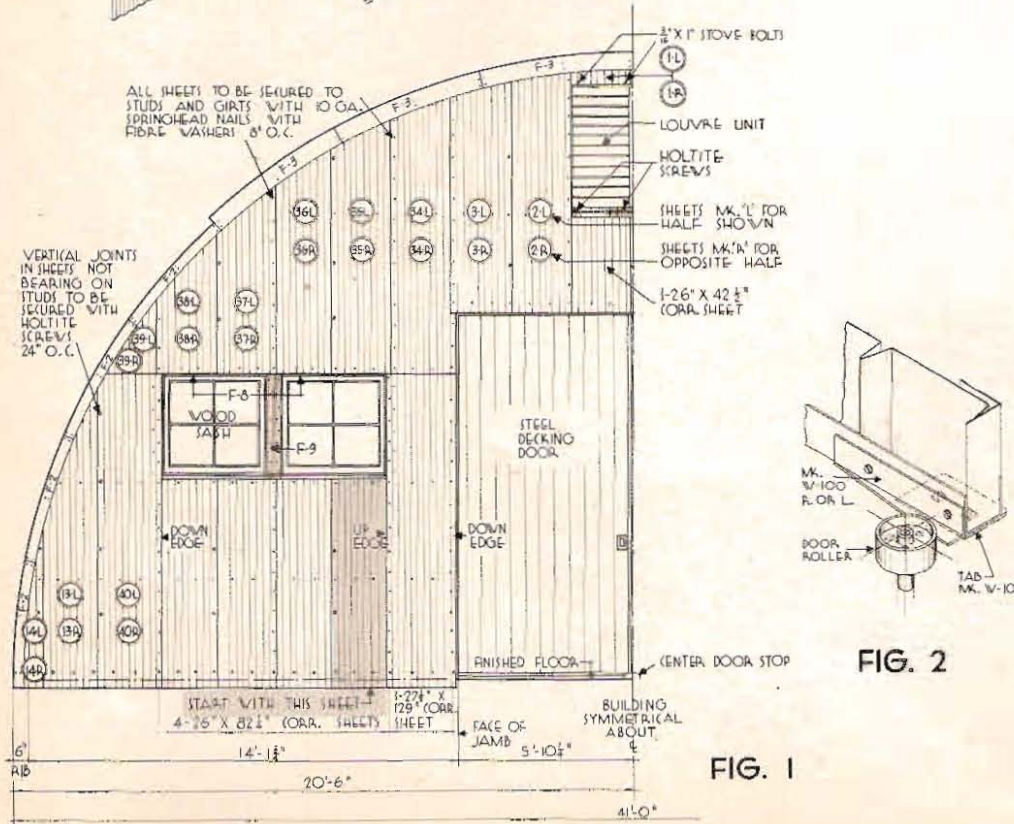
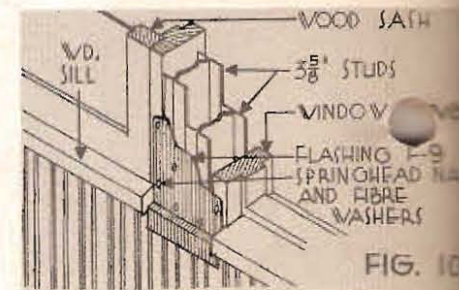
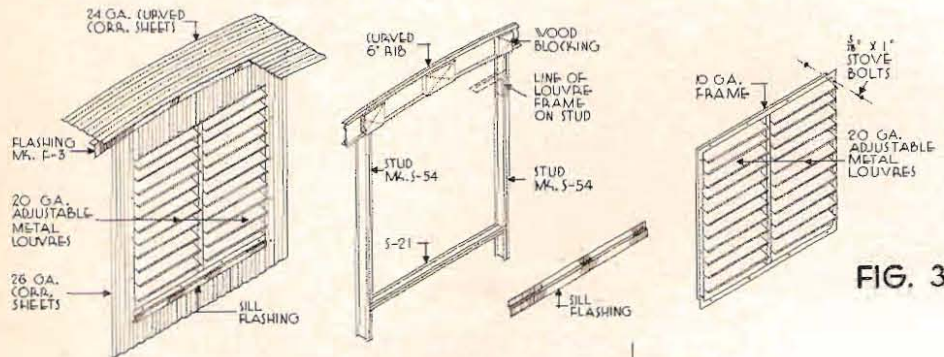
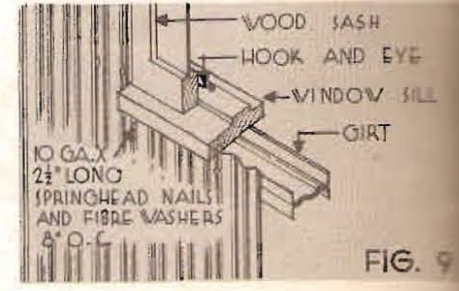
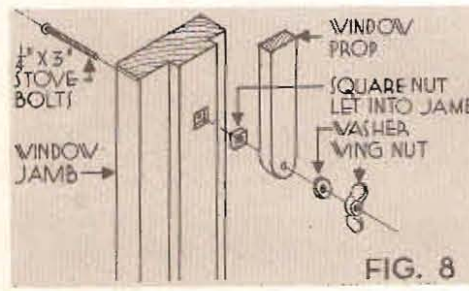
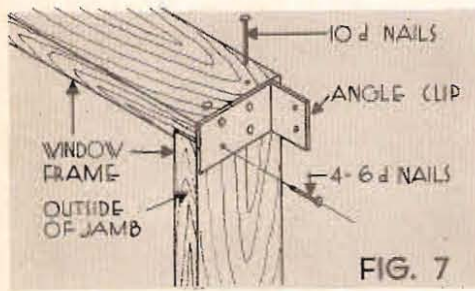
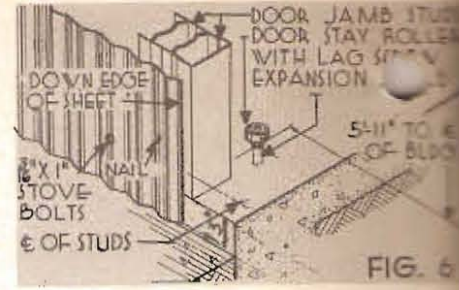
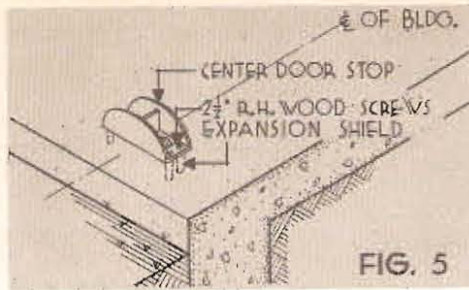
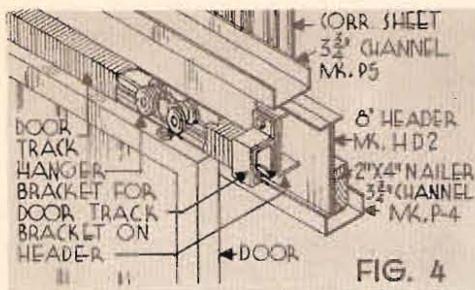


FIG. 8

BASIC UNIT

THE BULKHEAD COVERING DOORS AND WINDOWS



BASIC UNIT

THE BULKHEAD COVERING DOORS AND WINDOWS

Install the doors and windows before applying the bulkhead covering. The bulkhead covering then must be applied before the sides of the building are covered.

DOORS. Bolt the brackets that support the door track to the studs and the door header (marked HD-2) with $\frac{1}{2}$ " dia. bolts through the holes punched for that purpose. (See section H-H page 22 and figure 4.) If the bulkhead has been properly leveled the track will be level and the doors will operate easily. Attach a tab marked W 101 and a wedge marked W 100R or W 100L to the bottom of each door leaf. (See figure 2.) These serve, respectively, to keep the door clear of the screw heads in the channel plate and to hold it tight against the jamb when closed. Hang the doors then locate the center door stop (See figure 5) and secure it to the concrete with wood screws and expansion shields. With the door in closed position locate the door stay rollers at each jamb so the doors are held firmly against the jambs. (See figure 6.)

WINDOWS. Assemble the window frame from the knocked down parts, noting that the jambs are opposite hand. Nail these parts together with 10d nails. (See figure 7.) Attach the window props, one to each jamb (see figure 8), and hinge the sash at the top of the frame so it will swing to the outside of the building. Screw the hooks and eyes, two to each window, into the sill and bottom rails. (See figure 9.) After the window has been assembled attach an angle clip to the top and bottom of each jamb, placing it so the long leg lies flat on the jamb and the short leg is perpendicular to the jamb and will be inside the building when the frame is in position. Nail the clips with four 6d nails. (See figure 7.) Set the windows into the framed opening of the bulkhead from the inside of the building so the projecting angles rest against the inside of the studs. Adjust the windows for height, then, with 8d nails, nail through the angle clips into the studs to hold the window in position.

COVERING. The bulkhead is covered with corrugated iron sheets, the corrugations of which run vertically. In general nail the sheets to both the vertical and horizontal studs with springhead nails and fibre washers spaced at 8" O.C., placing a nail at the laps and nailing twice between laps, always nailing at the top of a corrugation. Over the door and at the ribs nail to the wood blocking. At vertical joints not bearing on studs secure the sheets to each other with Holcite screws at 24" O.C. Bolt the sheets to the channel plate with stove bolts at 8" O.C.

Apply the sheets on each side of the doorway first. When these are in place apply the sheets and install louvre over the doorway. The following description applies to the half of the bulkhead shown in figure 1; the corrugated sheets of which are marked with a number and the suffix "L." The corrugated sheets on the other half are applied in the same manner and order as on this half; the numbers of these sheets, however, carry the suffix "R."

Start with the 26" x 82 $\frac{1}{4}$ " sheet (under the windows) that is nearest the door. (See figure 1.) Turn the edge of this sheet down and project it 2 $\frac{1}{2}$ " toward the center of the building beyond the centerline of the stud marked S-20. Shove the top of the sheet into the groove in the window sill allowing the bottom to project 3" below the bottom of the channel plate. (See figures 6 and 7.) Nail this sheet, then apply the other three sheets under the windows lapping them one corrugation at the joints. After these are secured nail the flashing marked F-9 to the window mullion so that it projects down over the corrugated sheets below (see figure 10), then nail the flashing marked F-8 to the window head. (See figure 11.)

Lay the 27 $\frac{1}{2}$ " x 129" sheet between the window and the door jamb so the edge of the sheet turns down on the door jamb and the bottom lines with the other sheets. Adjust this sheet side-wise until it finishes on both door and window jamb and fits into the corrugations of the starting sheet under the window, then nail it to the studs, at the window bend the edge down and nail it to the window jamb.

Next apply sheet 40L, then 13L and 14L, lapping them one corrugation at the joints. After these are nailed, apply in the following order, sheets 34L, 35L, 36L, 37L, 38L, and 39L. These lap 4" over the sheets below and lap each other one corrugation. (See figure 12.) When both halves of the bulkhead are covered to this point, apply the sheets and install the louvre over the doorway. Apply the two 26" x 42 $\frac{1}{2}$ " sheets under the louvre first, nailing them to the horizontal stud S-21. Fasten the sill flashing (see figure 3) to the bottom of the louvre with Holcite screws and attach the operating lever bracket (see figure 13), then set the louvre in place between the studs so the flashing laps over the corrugated sheets below, and bolt it to the studs with stove bolts. When the louvre is secured apply the two sheets above it (1L and 1R) attaching them to the louvre frame with stove bolts and nailing them to the blocking in the ribs. Complete the bulkhead by applying the two sheets on either side of the louvre. (See figure 1.)

CURVED FLASHING. Nail the curved flashing in place, the pieces marked F-2 occur where there are no purlins, at the purlins the wider pieces, marked F-3 are used. Start with the lowest piece (marked F-2) lining it with the bottom of the corrugated sheets then lap each succeeding piece over the one below. The corrugated part of the flashing lies on the top of the rib or purlin and the flat part comes down over the face of the bulkhead. Nail the flashing to the wood blacks in the ribs and tack it to the top of the ribs with common nails. The roofing sheets later cover the top of the flashing. (See figure 14.)



EXTERIOR VIEW OF BULKHEAD



CURVED FLASHING



START WITH SHEETS UNDER WINDOWS



INTERIOR VIEW OF BULKHEAD

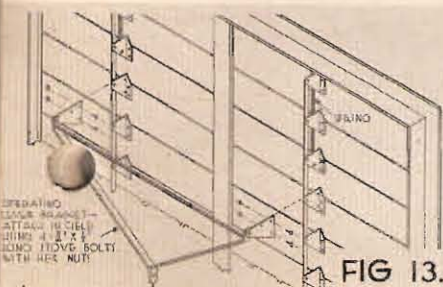


FIG. 13.

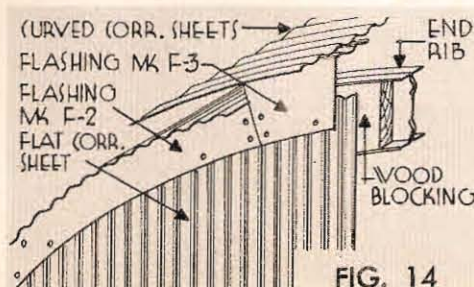


FIG. 14

BASIC UNIT

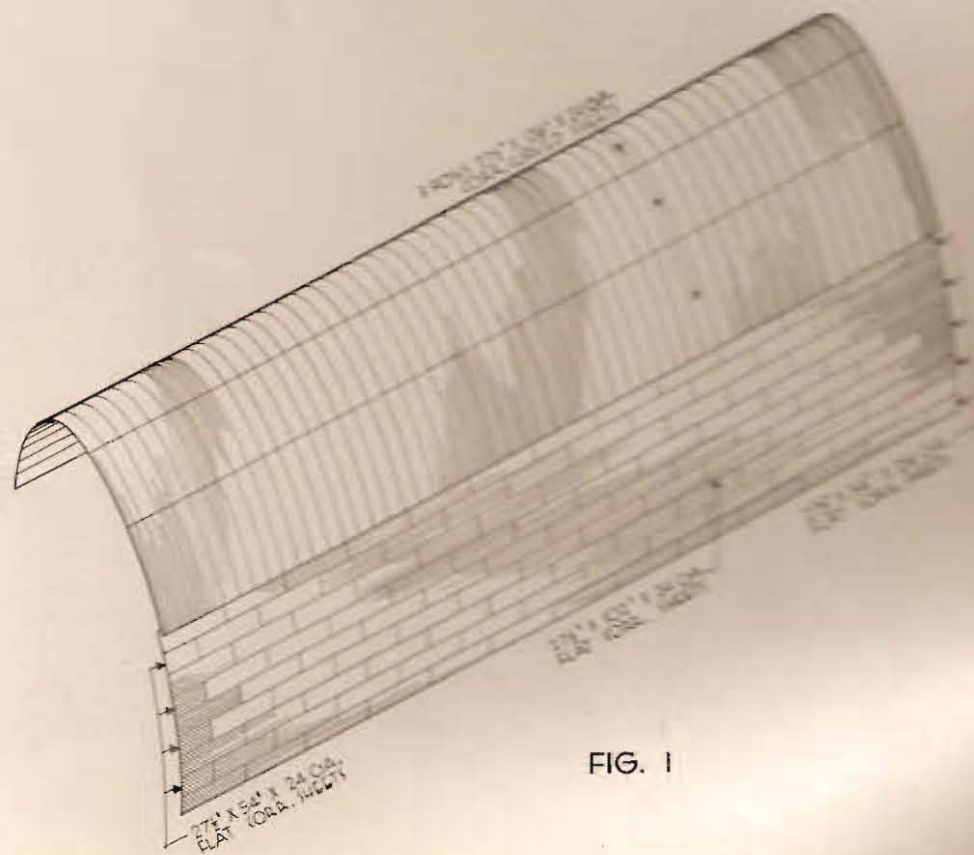
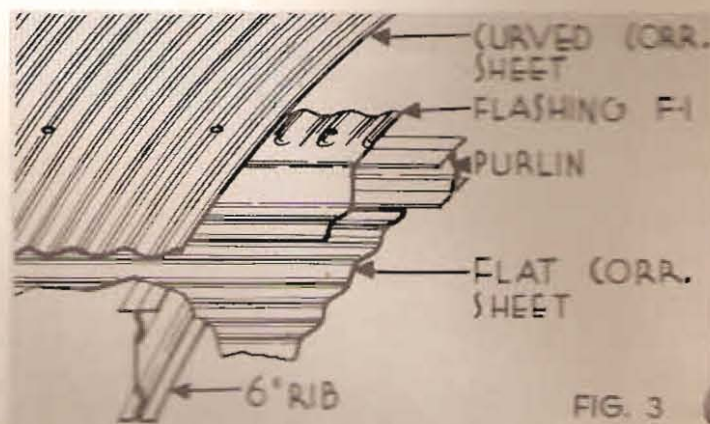
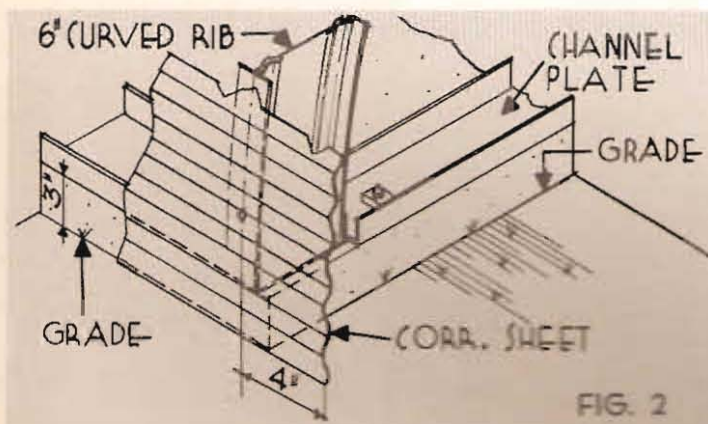
THE SIDE AND ROOF COVERING



STARTING SHEET



LINE THE SHEETS



BASIC UNIT

THE SIDE AND ROOF COVERING



PROCEED FOR NINE ROWS OF SHEETS ON EACH SIDE



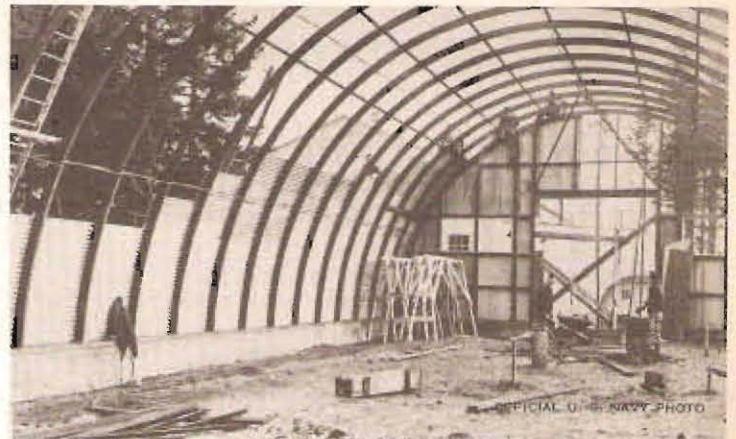
START WITH LOWER ROWS OF CURVED SHEETS



SCAFFOLD SUGGESTION



COVERING COMPLETED



INTERIOR VIEW

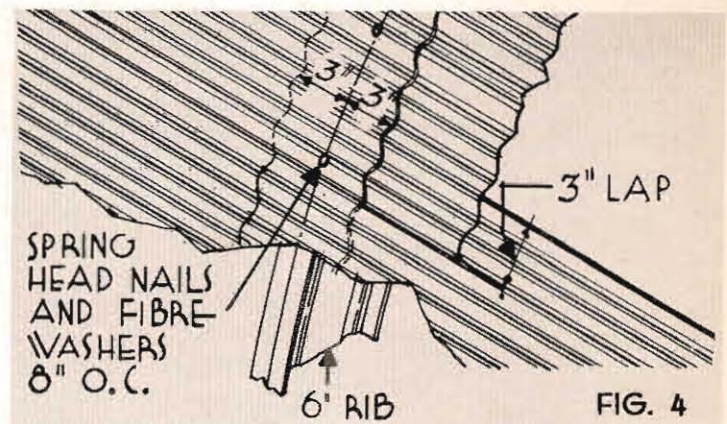


FIG. 4

The sides of the building are covered with corrugated iron sheets. From 3" below the bottom of the channel plate up to the lowest purlin the sheets are flat, with corrugations running lengthwise of the building, and are nailed to the ribs. Over the top of the building the sheets are curved, with corrugations running at right angles to the purlins, and are nailed to the purlins. In both cases the sheets are nailed with springhead nails and fibre washers, one nail at each lap and two nails evenly spaced between laps (8" O.C.). Always nail at the high point of a corrugation.


1. Apply the flat sheets first, starting with the lowest row, the bottom edge of which should be 3" below the bottom of the channel plate. Project the end sheets in the row 4" beyond the centerline of the end rib, then the other end of these sheets will project 2" beyond the centerline of an intermediate rib (either 2nd or 3rd depending on sheet length). The intermediate sheets in the row project 3" beyond the centerlines of the ribs, making a 6" lap at the joints. (See figure 3.) To seal this joint "butter" the laps with a 2" wide strip of mastic between the sheets before nailing. Nail the lowest row of sheets and lap each succeeding row of sheets over the lower row $1\frac{1}{2}$ corrugations ($3\frac{1}{2}$ ") and nail. Proceed in this manner for 9 rows of sheets on each side of the building. (See figure 2.)

2. Lay the flashing marked F-1 before applying the curved roof sheets. Place this flashing so its lengthwise corrugations match those of the flat sheets just laid and so its cross corrugations lap over the purlins. (See figure 4.) Nail this flashing at each rib and fasten it to the sheets underneath, twice between ribs, with Holrite screws.

3. The top of the building is covered with three rows of curved corrugated sheets 126" long. Lay the lower row of sheets on each side first. Place the starting sheet in each of these rows so that the turned up side of the sheet (corrugation) projects 1'-1" beyond the centerline of the end rib. Adjust this sheet until it forms a 10" overhang beyond the centerline of the lowest row of purlins, the other end will then project 4" above the centerline of the upper row of purlins. Lap adjoining sheets in these rows $1\frac{1}{2}$ corrugations and line their edges with those of the starting sheets. Nail the sheets as they are laid.

Lay the top center row of sheets last. Center the sheets in this row on the top center row of purlins; they will then lap over each lower row of sheets 8". Project the starting sheet of the center row until it is in line with the starting sheets of the lower rows, check to see that its corrugations match those of the lower rows then nail the sheet and proceed with the remaining sheets of the row nailing each as it is laid.

SUGGESTIONS TO ERECTOR.

 **ORGANIZATION.** The erection of the SSAR Utility Building is simple and fast. One operation easily follows another—if the operations are done in sequence and properly. It is important to get off to the right start by being careful to get the channel plates square and level and the ribs plumb. Likewise the bulkhead framing must be square and level so the windows and corrugated iron will fit and so the doors will operate.

A logical division of personnel is into crews for (1) setting the channels, (2) raising the ribs, (3) framing the bulkhead and (4) applying the covering.

The instructions give each operation complete in its proper order; it is not always necessary, however, to finish an operation throughout the entire building before the next one is begun. Much time can be saved by having the crews working on their respective portions of the work simultaneously, for example, the rib crew can be assembling ribs, and the bulkhead crew can be assembling the bulkhead framing while the channels are being laid. Then, after the first four ribs from the end have been raised, plumbed, and braced, the bulkhead can be pulled up into position while the erection staging is still near the end of the building. The men applying the corrugated iron covering can begin their work after the first bulkhead is raised and their work should follow closely behind that of the crew raising the remainder of the ribs. Meanwhile, the bulkhead crew should assemble the other bulkhead framing and have it ready for erection when the last rib is in position.

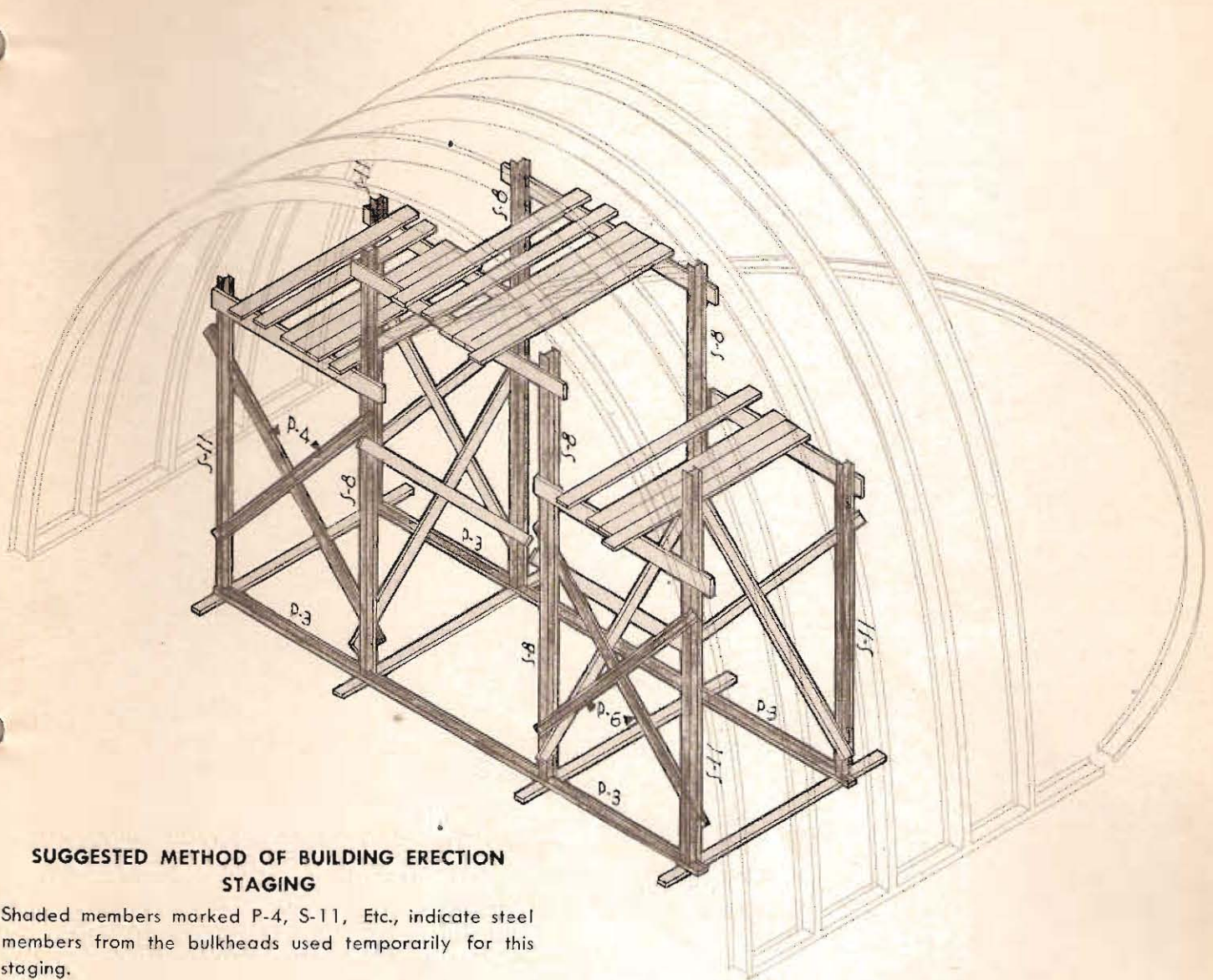
HINTS. If any of the steel members have become damaged in shipment, the easiest way to straighten them is by placing the bent part over a crate or sawhorse and having a man bear down on each end. The hardest way to straighten is by using a hammer.

There is a trick to opening the banded crates. When this is known and used, much time and effort can be saved. Take one of the screwdrivers furnished for assembling the frame, insert flat side under steel band about an inch or inch-and-half. Turn the screwdriver about the handle roughly an eighth turn. This brings the sharp edge of the screwdriver in contact with the band. Pull up quickly. This motion cuts the band rather than breaking it. When the knack of using a screwdriver is learned, opening the crates is an easy job.

The importance of using the right nails, screws, and attachments cannot be too strongly stressed. Follow the instructions closely in this regard.

TOOLS. A complete set of necessary tools is furnished for erecting the complete buildings. They should be supplied to the men who will use them. If there are many buildings to be erected at one location, the best scheme is to open all the boxes containing tools and pool them. Then issue by tool check.

Take good care of the tools.



SUGGESTED METHOD OF BUILDING ERECTION STAGING

Shaded members marked P-4, S-11, Etc., indicate steel members from the bulkheads used temporarily for this staging.

ADAPTATION SUGGESTIONS

On the following pages are given suggestions showing how, by making field changes, the building may be adapted to various uses and field conditions. The material for making these changes is not furnished with the building but in most cases consists of items that can be easily obtained or even improvised from native materials. For some of the changes, material removed from the building can be reused. We emphasize that these adaptations are intended as suggestions only to illustrate the adaptability of the buildings. The specific problem must be solved in the field where all conditions are known.

ADAPTATIONS

THE ELECTRICAL SYSTEM

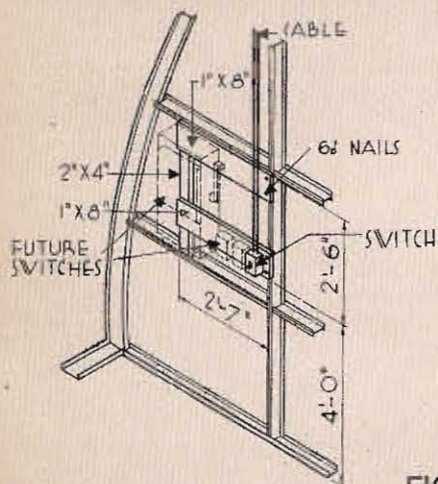


FIG. 2

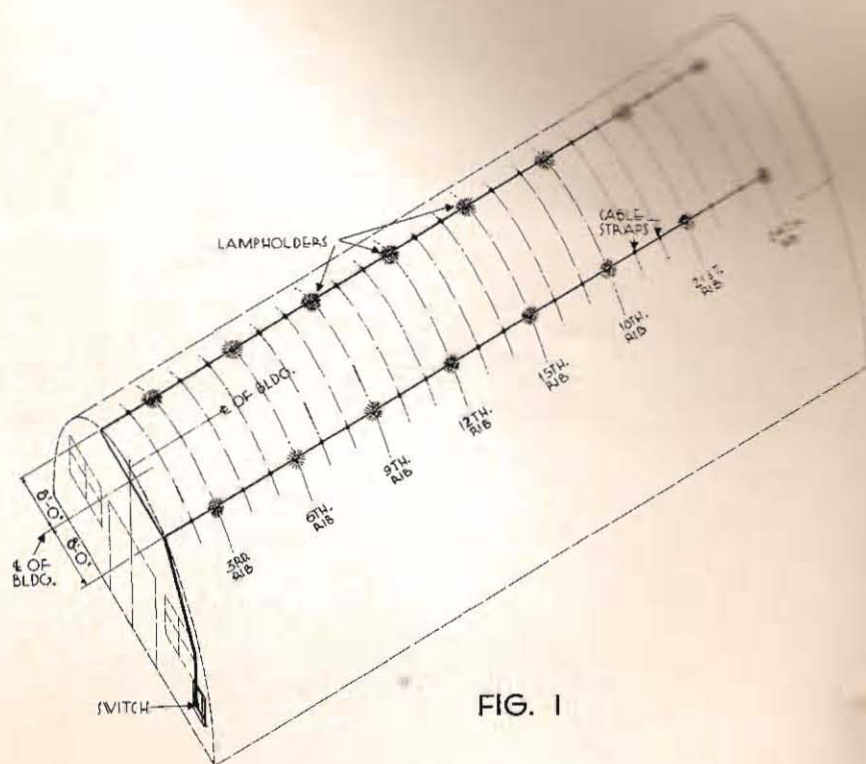


FIG. 1

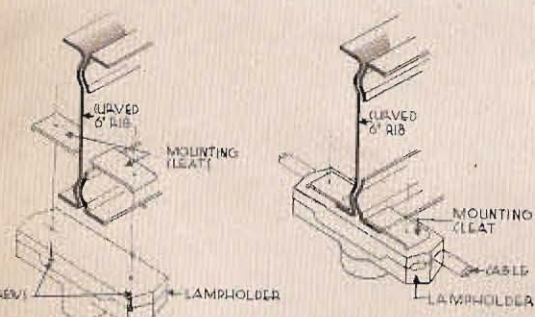


FIG. 3

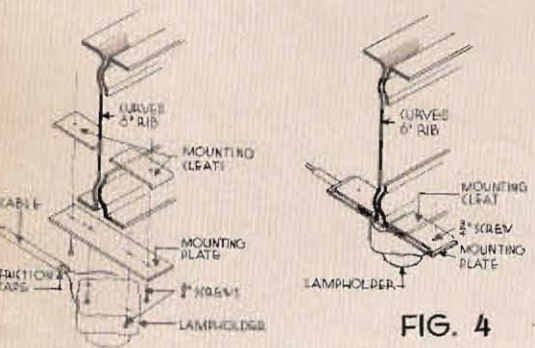


FIG. 4

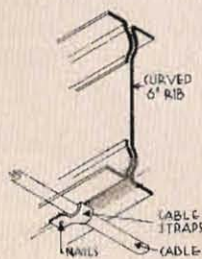
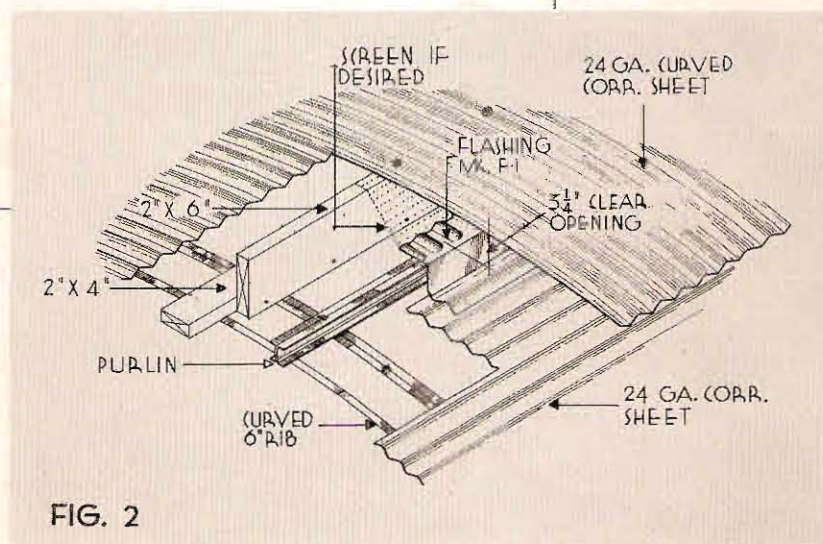
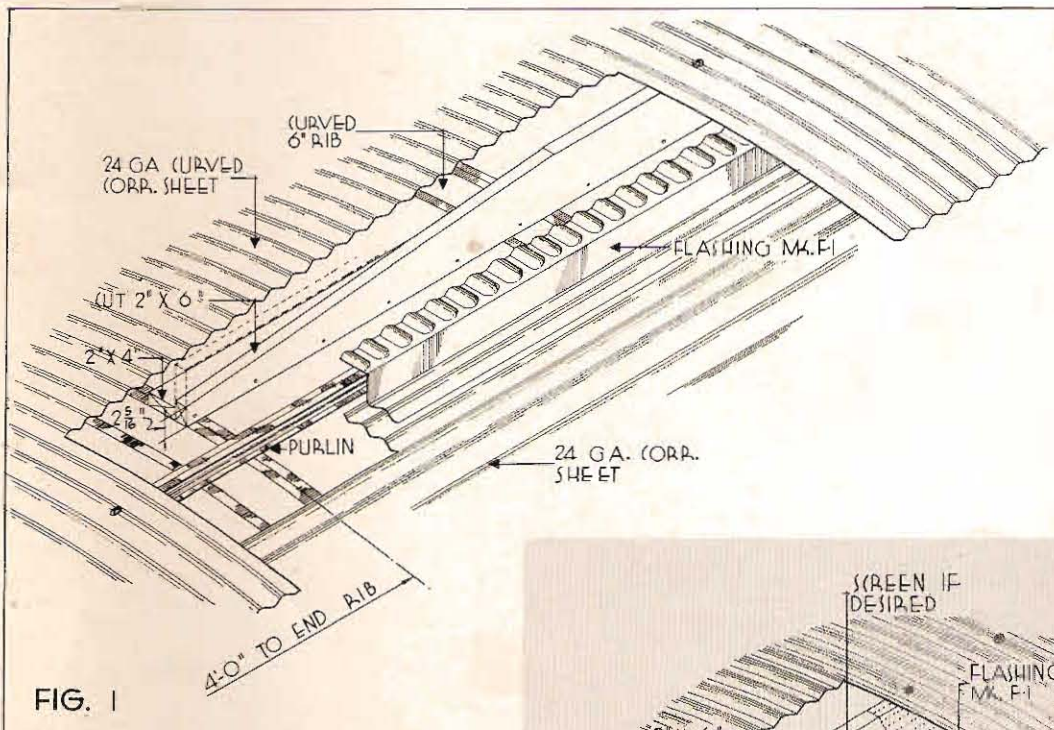


FIG. 5

The illustrations suggest methods of installing electrical work when it is necessary to light the building. Electrical materials, however, are not furnished. Mount the switches on mounting boards nailed to the steel bulkhead framing at the service end of the warehouse. (See figure 2.) Take the cables up the bulkhead wall, securing them to the studs and girts with cable straps. Fasten the lamp holders directly to the bottom of the ribs by means of metal mounting cleats and screws. (See figure 3.) Between lamp holders fasten the cable to each rib with cable straps nailed directly to the ribs. (See figure 5.)

ADAPTATIONS THE CONTINUOUS VENTILATOR

Continuous ventilation may be provided by blocking up the lower rows of curved sheets near their lower ends. Use a wood 2" x 6" for this purpose, placing it edgewise on the ribs about 6" or 7" above the lowest purlin and nailing it to 2" x 4" wood blocking laid flat on the ribs. (See figure 2.) The 2" x 6", though it may be of any length desired, should always terminate on a rib and never come closer to the ends of the building than the second rib from either end. Taper the top of the 2" x 6" from $2\frac{5}{16}$ " wide at each end to full width at 4'-0" from the ends (see figure 1), making it possible to warp the sheets from the normal position to the raised position without disturbing the flashing at the bulkheads. Apply the curved roof sheets as before but nail them to the 2" x 6", where it occurs, instead of to the lower purlins. If it is necessary to screen the opening thus formed, the screen cloth should be stretched from the lower purlin to the 2" x 6" before the sheets are applied. The roof may be returned to normal position by removing the blocking and nailing the sheets to the purlins.



ADAPTATIONS

THE SIDE OPENINGS

Openings in the side of the building may be provided when additional light or ventilation is necessary. To do this erect the basic unit according to the instructions, but create a lean-to roof down the sides of the building by supporting the second, third, and fourth rows of corrugated sheets on wood framing. The resulting openings, then, may be screened and the ends of the openings may be closed with Masonite or plywood panels. The drawings suggest how this may be accomplished through the use of framing lumber, screen cloth, corrugated asphalt strip, and nails in addition to the materials that are furnished with the buildings.

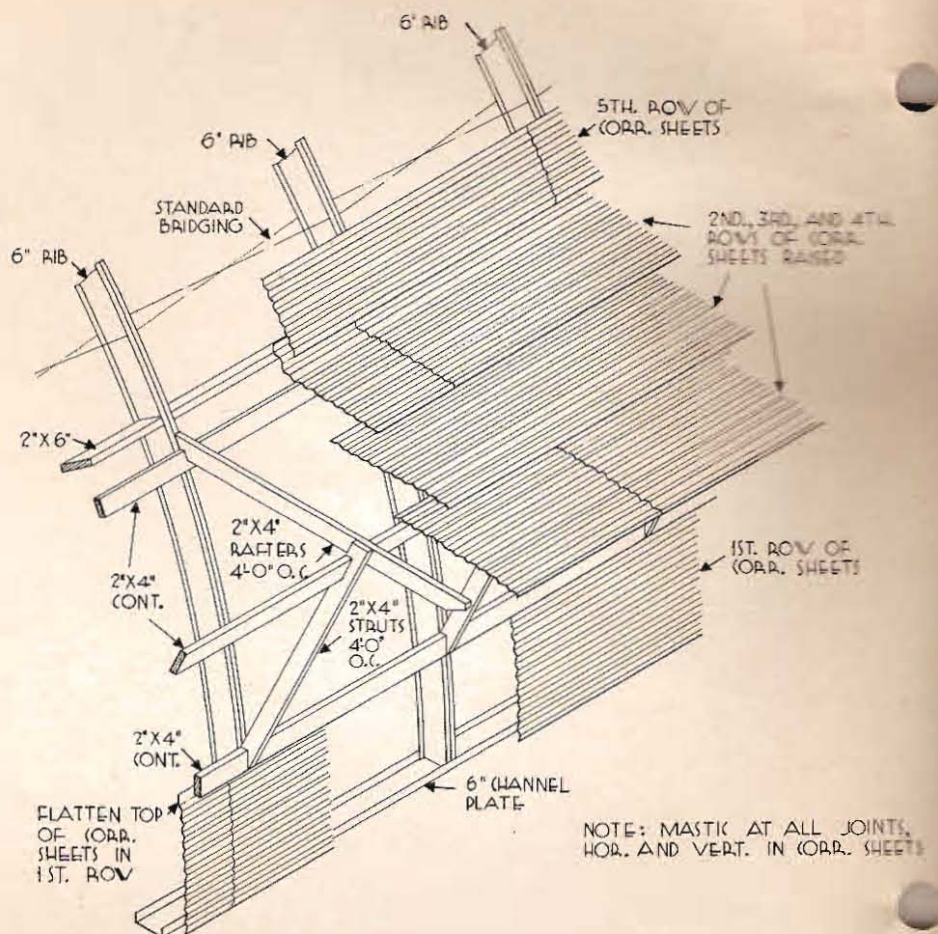


FIG. 1

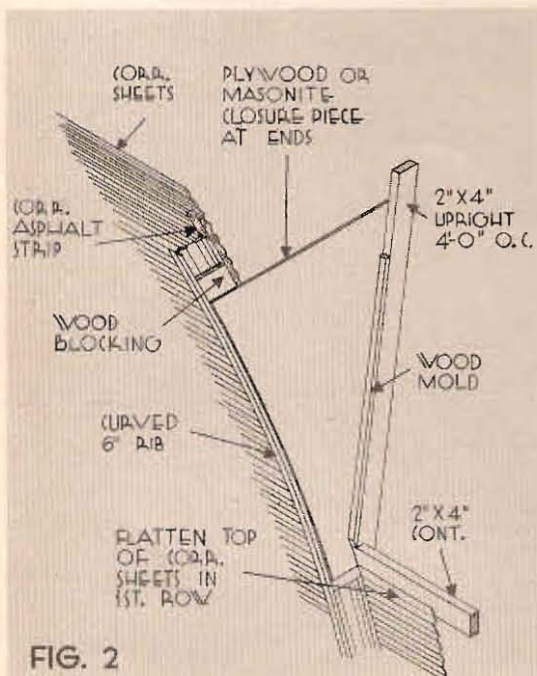


FIG. 2

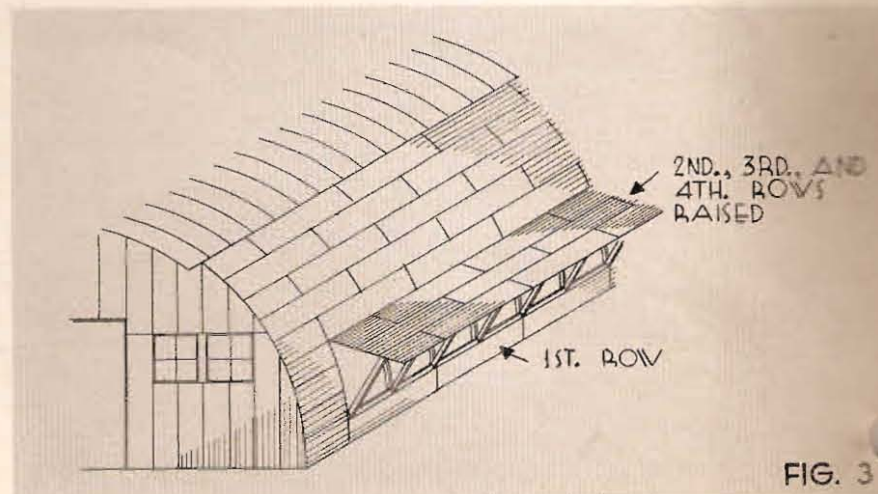
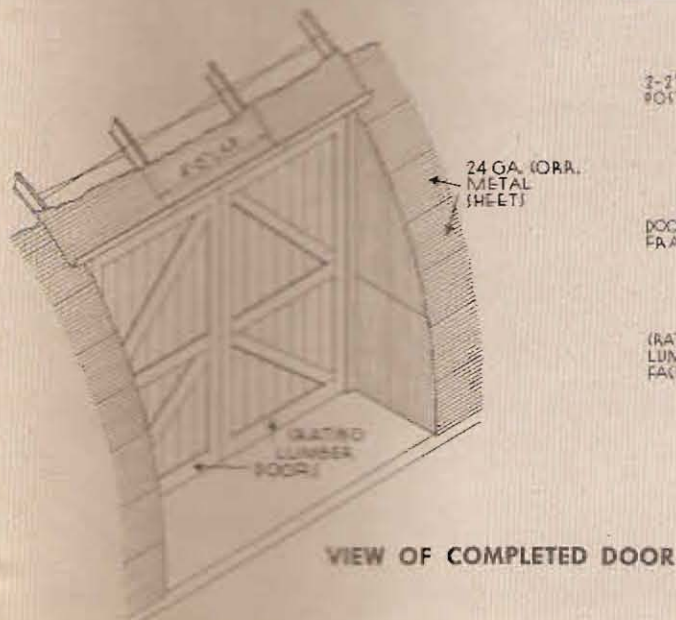
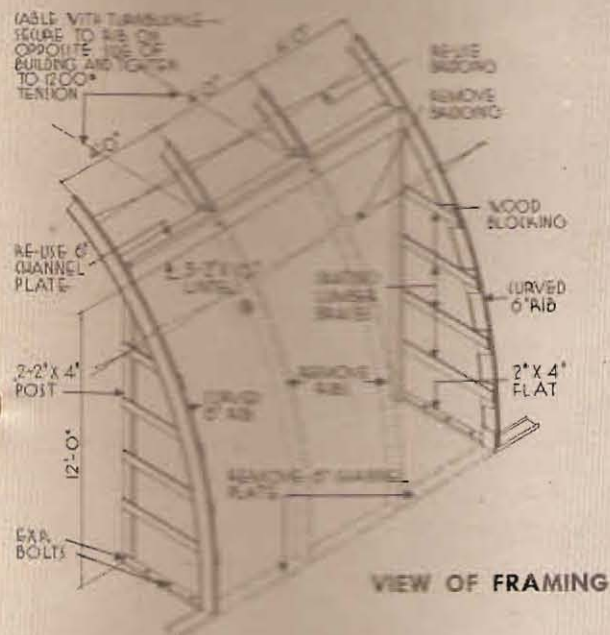
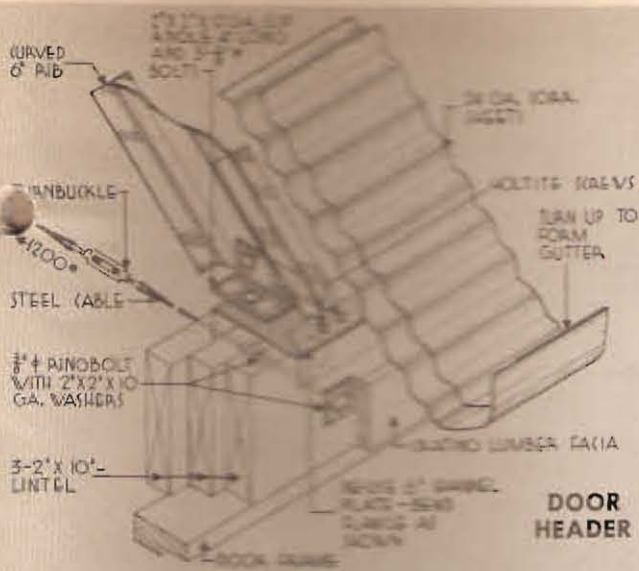
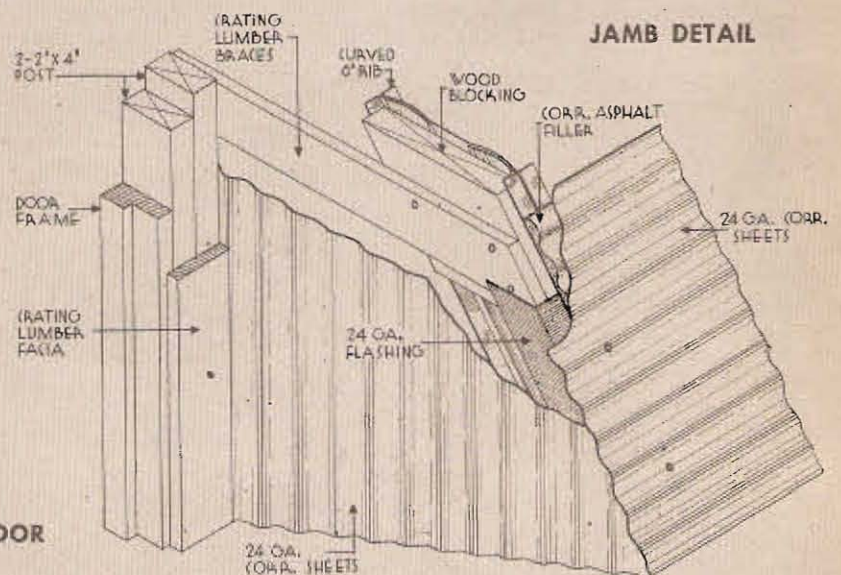


FIG. 3

ADAPTATIONS THE SIDE DOOR



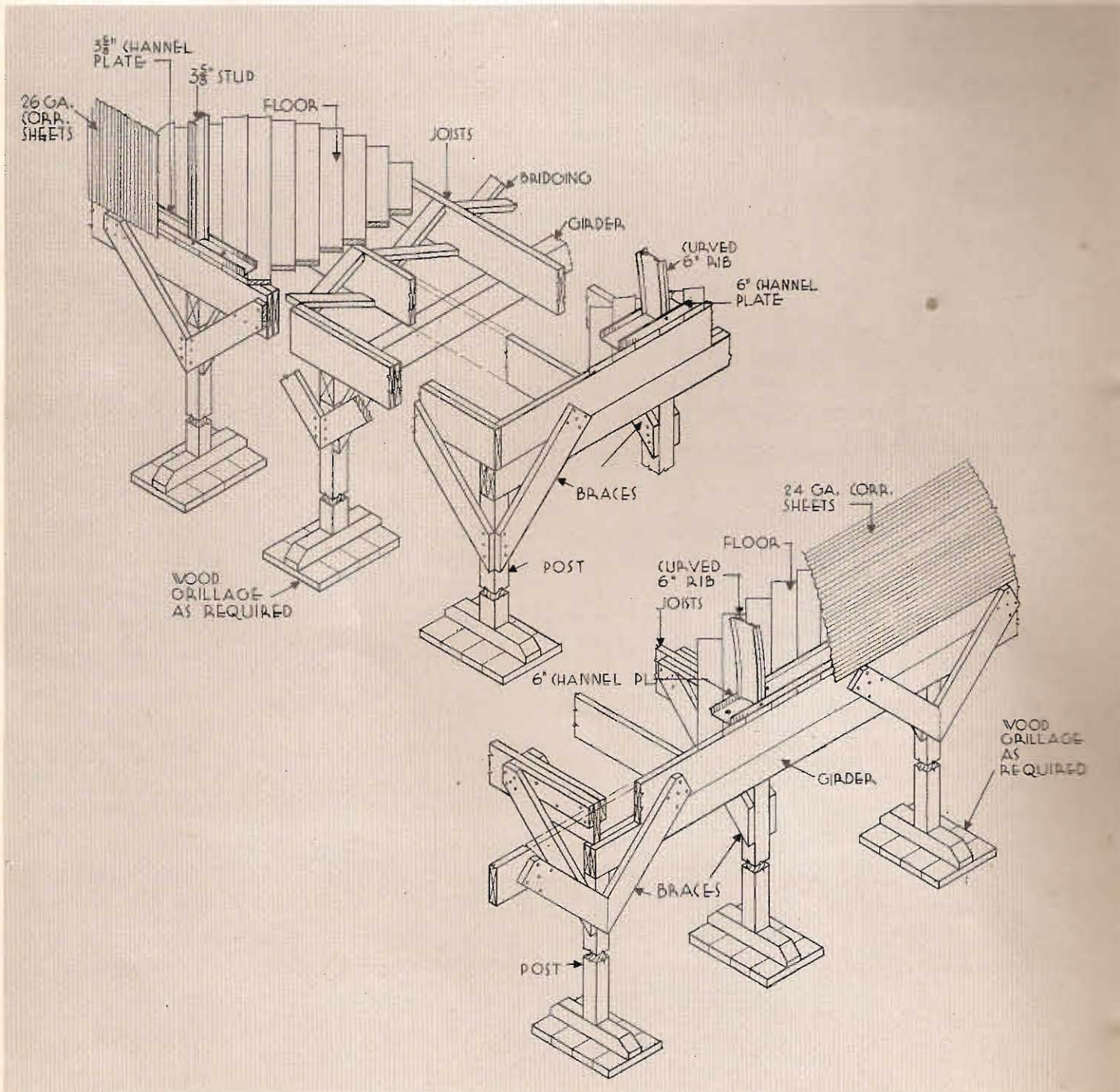
Doorways may be cut into the sides of the building if desired. These may be 4', 8' or 12' wide always in multiples of the 4'-0" rib spacing. The accompanying drawings show a suggested method of framing the opening, supporting the rib loads, and covering the walls. Note that the wood lintel must be strong enough to carry the rib load, also that a cable tie becomes necessary when the rib is cut in order to absorb the horizontal thrust of the rib. Tie these cables across the building to the same rib on the opposite side of the building. Reuse the corrugated sheets cut from the opening and make the metal fittings from the cut off portions of the ribs. With the exception of the lintel and posts, the lumber may be obtained from crating material.



ADAPTATIONS

RAISED WOOD FLOOR

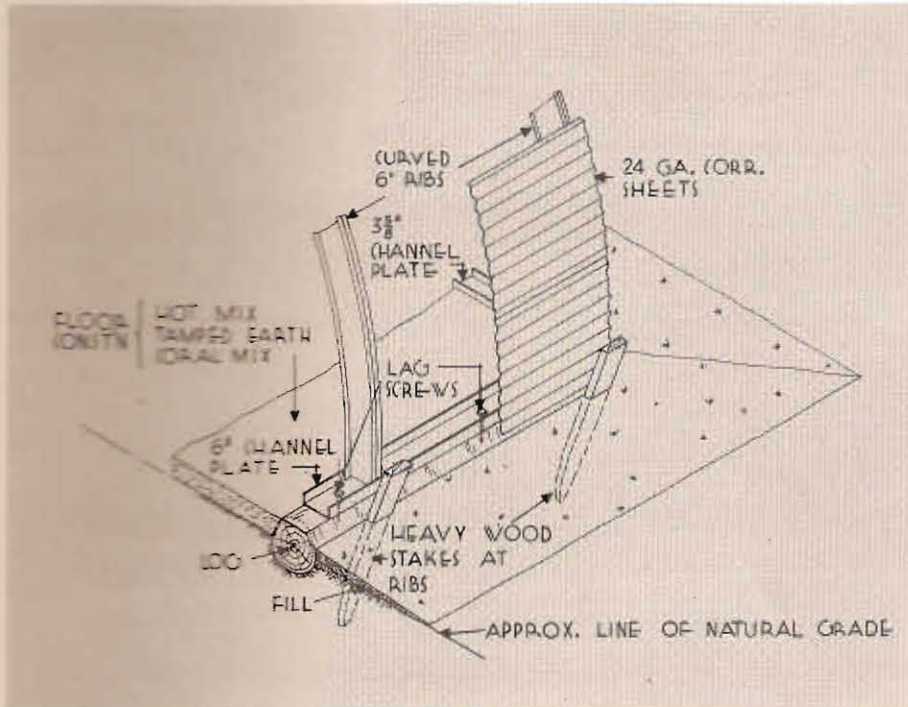
For conditions where it is desirable or necessary to raise the floor of the building above the ground a wood platform may be built. The metal channel plates can then be bolted to the wood platform and the building erected as previously outlined. Under maximum load there is an outward thrust of slightly more than 900 pounds at the base of each rib, and a downward force of 2200 pounds. A joist under each rib can be made to act as a tie to counteract the thrust, provided it is continuous across the building and is securely connected to the channel plate. The building must be adequately braced against wind. Lumber sizes and footing dimensions depend on loading conditions and should be determined in the field. The accompanying drawings, which are intended as suggestions only since the lumber is not furnished with the building, show how the platform may be framed.



ADAPTATIONS

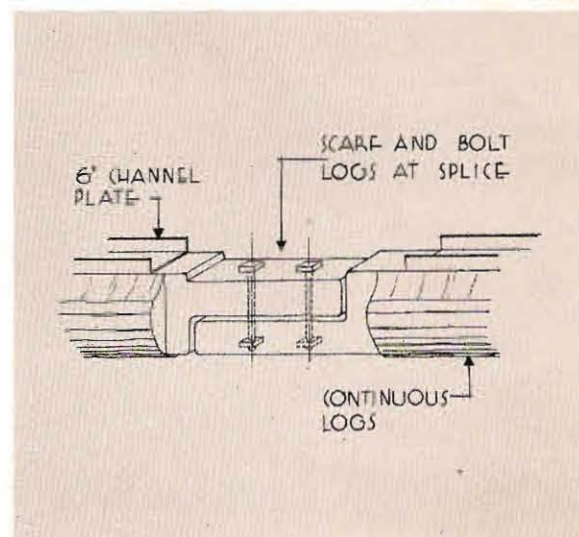
ALTERNATE FOUNDATIONS

Where concrete is not available the warehouse may be set on a foundation of heavy timber or logs. Line up and level this foundation, then log screw the channel plate to the wood. Drive a heavy stake at each rib to take the outward thrust of the rib then erect building as outlined on previous pages. The floor may be of any convenient material, hot mix, coral mix, or even tamped earth finished up to the log foundation.




FRAMING

SPLICE DETAIL

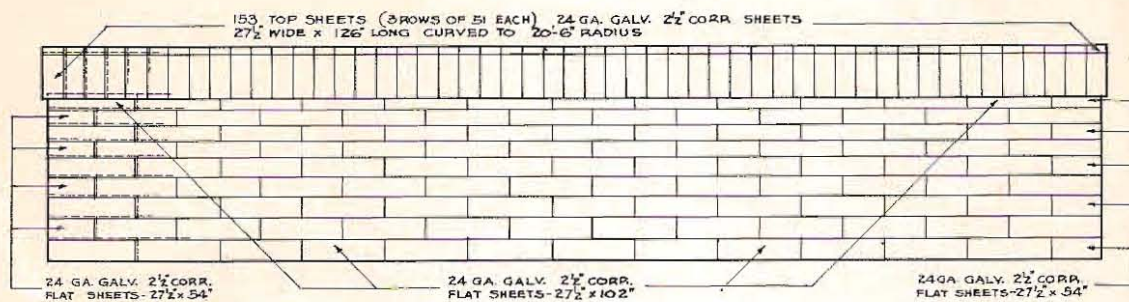


WORKING DRAWINGS

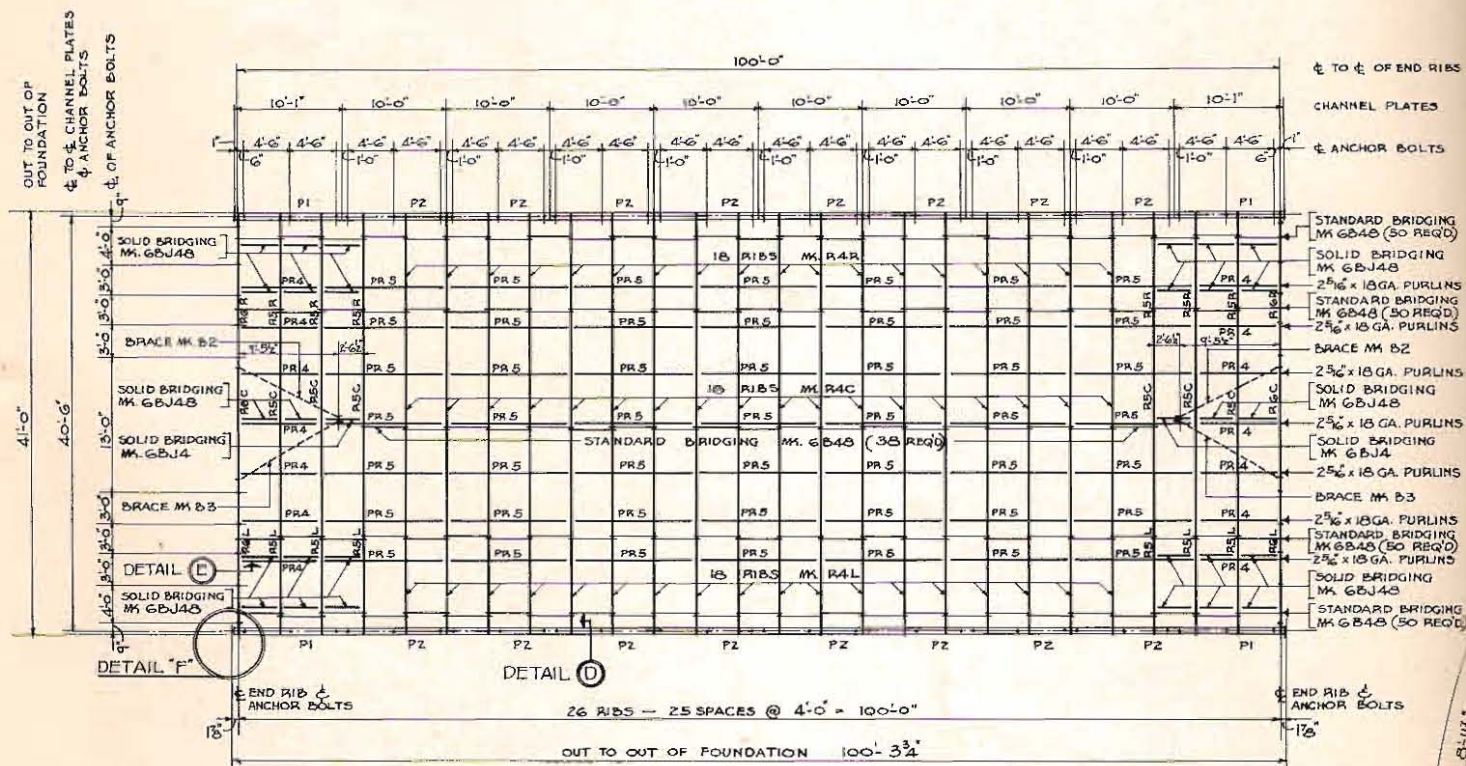
 The drawings reproduced on the following pages are the working drawings from which the basic building was manufactured. On these drawings all the parts necessary to assemble the building appear along with their piece markings. These drawings should be studied in conjunction with the erection instructions and illustrations appearing in other parts of the book. When so used they will help the erector understand the entire building and see the reason for each successive operation. We caution the erector not to cut, or repunch any part without first making sure that cutting or punching is necessary as each member was fabricated to fit into its respective position in the building without additional cutting, etc.

COAT ALL VERTICAL
CORRUGATED SHEET
CAULKING COMPOUND
ATTACH CORRUGATED
2' LONG SPRING
8" O.C. AT RIBS AND
24" O.C. AT HORIZONTAL
AND AT VERTICAL
PAINT ALL EXTERIOR
CORRUGATED SHEET
WITH ONE (1) COAT
SPECIFICATION FOR
CAMOUFLAGE PAINT

FLASHING
#10 GA. 2 1/2" SPRING
HEAD NAILS
(SEE NOTE
ABOVE)

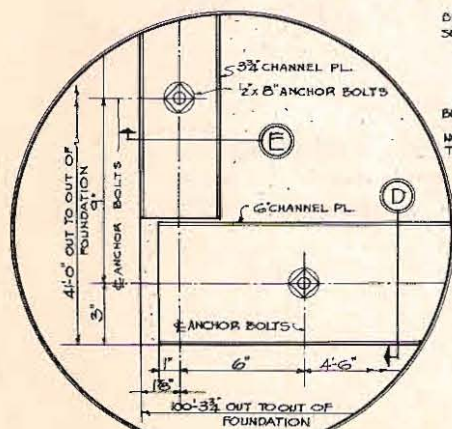
24 GA. GALV. -
CORR. SHEETS

SIDE ELEVATION
SCALE $\frac{1}{8}" = 1'-0"$
OPPOSITE SIDE SIMILAR

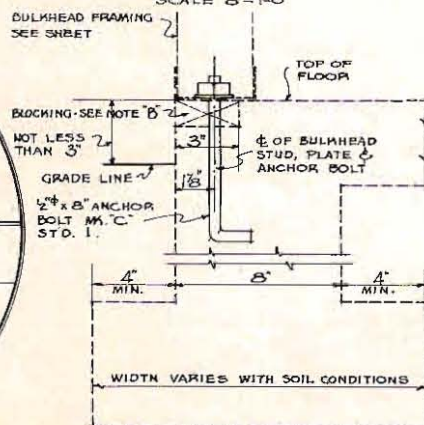


FRAMING PLAN

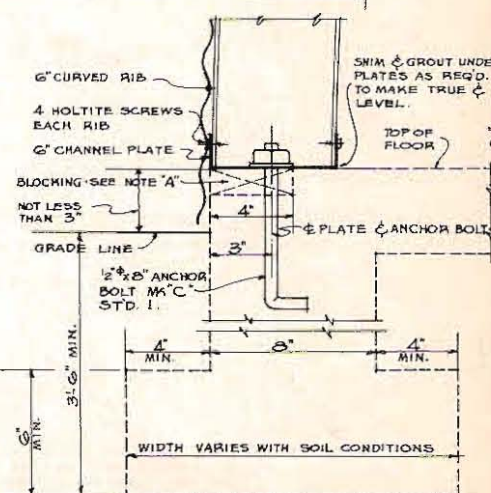
SCALE $\frac{1}{8}'' = 1'-0''$



DETAIL "F"
SCALE 3"=1'-0"



DETAIL "E"

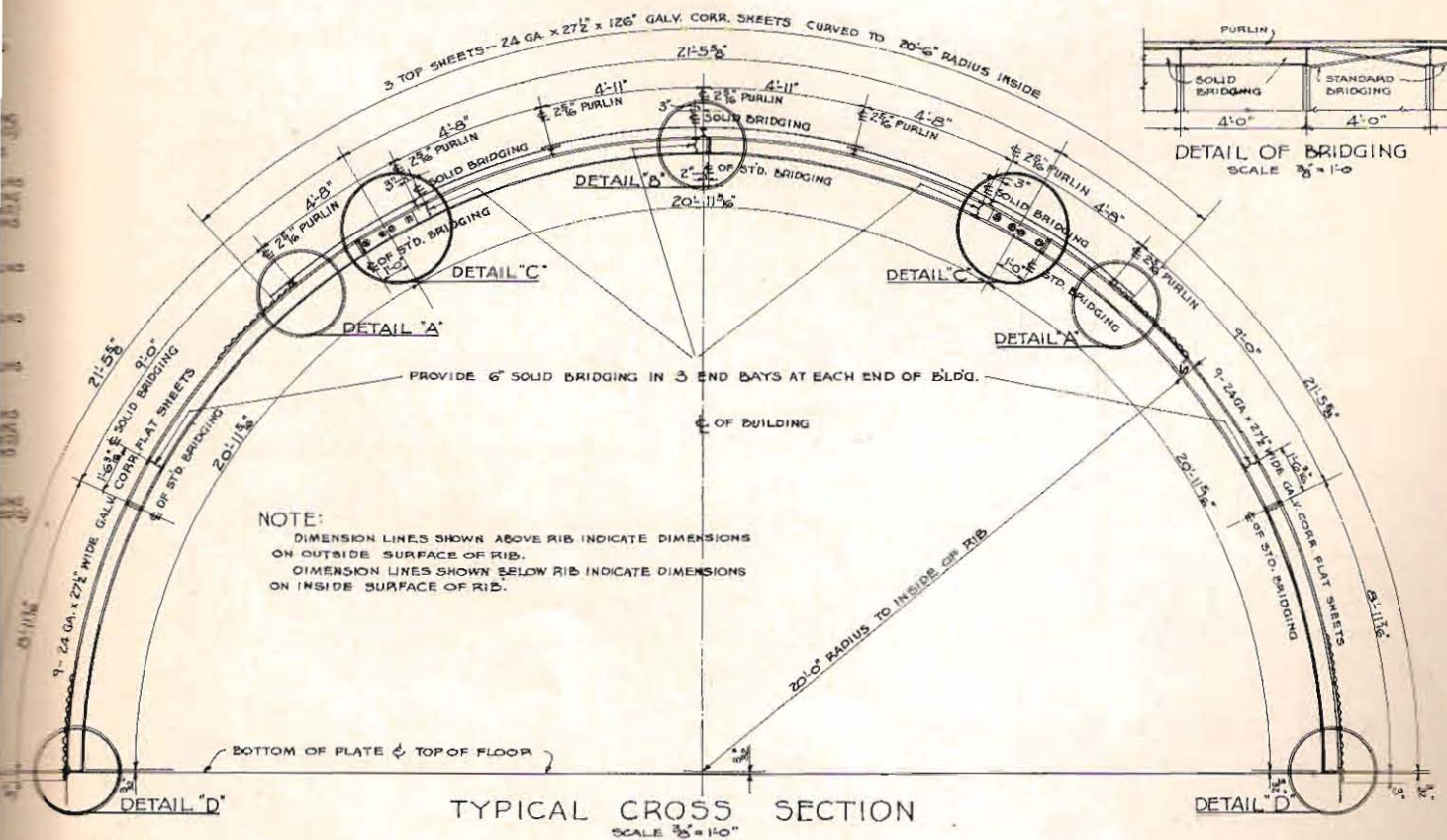
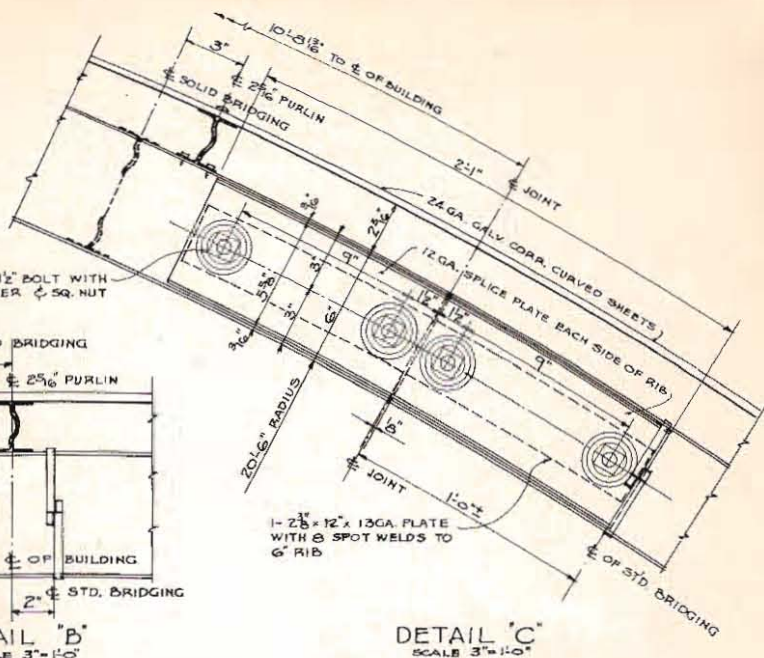
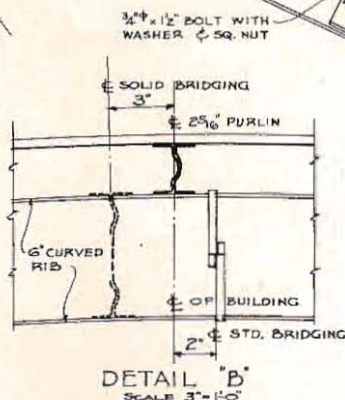
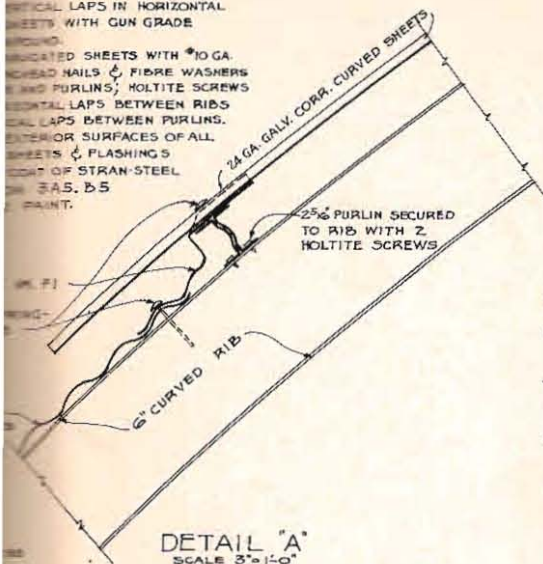


DETAIL "D"

SCALE 3" = 1'-0"

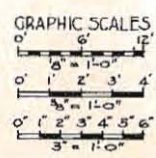
VERTICAL LAPS IN HORIZONTAL SHEETS WITH GUN GRADE

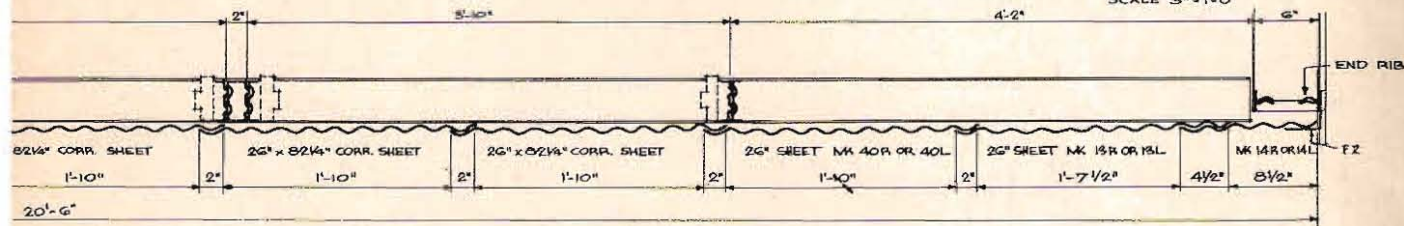
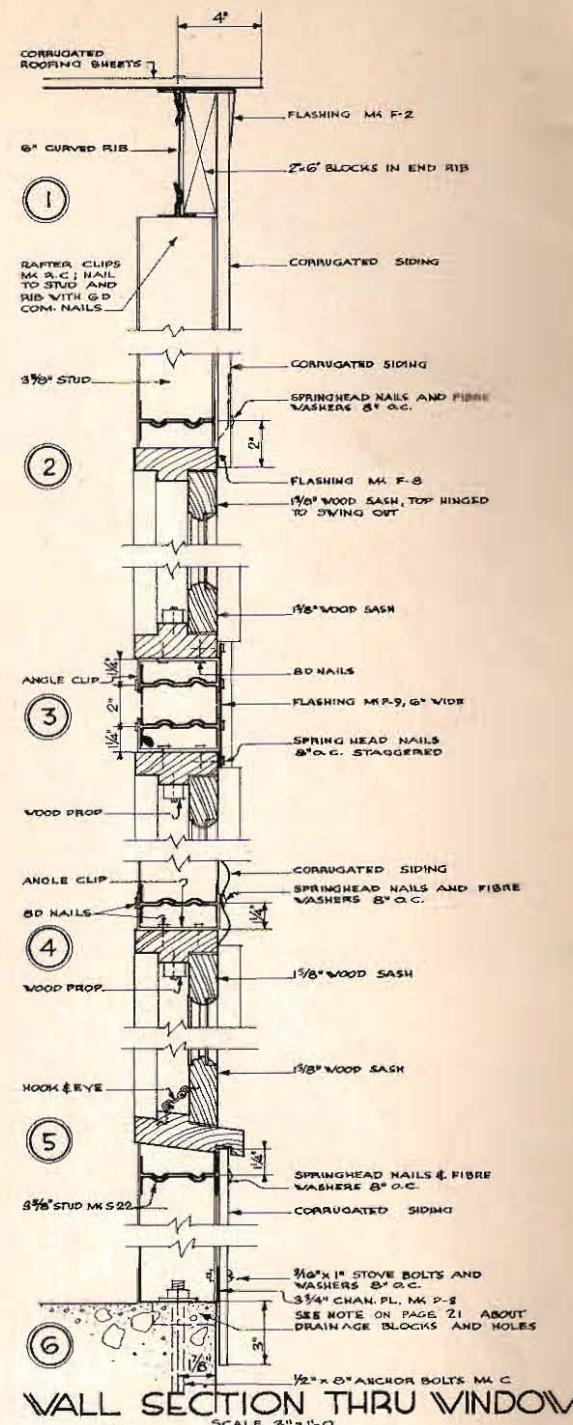
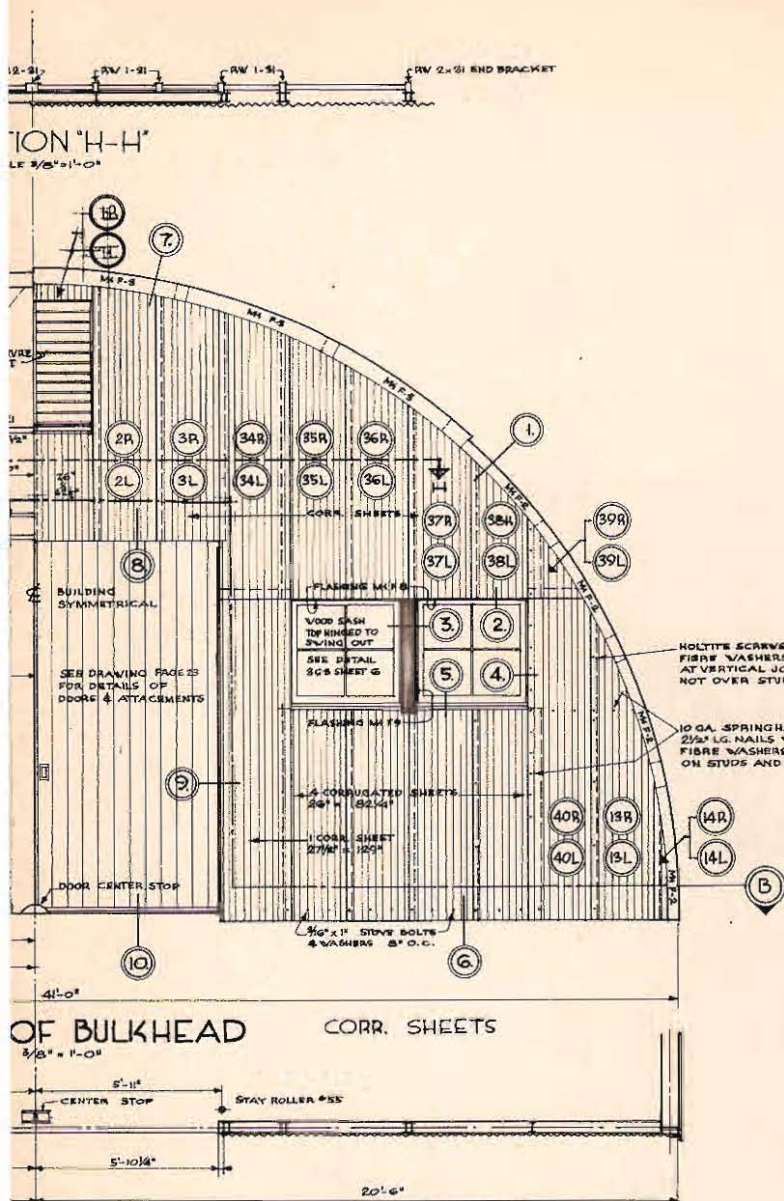
INDICATED SHEETS WITH #10 GA. CORRODED NAILS & FIBRE WASHERS AND PURLINS; HOLTITE SCREWS. VERTICAL LAPS BETWEEN RIBS. VERTICAL LAPS BETWEEN PURLINS. EXTERIOR SURFACES OF ALL SHEETS & FLASHINGS. COAT OF STRAN-STEEL. 3AS. B5 PAINT.



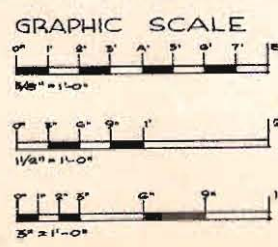
NOTE 'A':
CUT BLOCKS 1/8" x 4" LONG FROM CRATING LUMBER. 2" TO 3" WIDE. 50 BLOCKS REQUIRED PER BUILDING. SET BLOCKS IN CONCRETE FOUNDATION TO CENTER BETWEEN ANCHOR BOLTS (2" FROM ANCHOR BOLT TO WOOD BLOCK) AND FLUSH WITH OUTSIDE FACE OF BUILDING. REMOVE BLOCKS AFTER CONCRETE HAS HARDENED.

NOTE 'B':
CUT BLOCKS 1/8" x 3" LONG FROM CRATING LUMBER. 2" TO 3" WIDE. 10 BLOCKS REQUIRED PER BUILDING. SET BLOCKS IN CONCRETE FOUNDATION TO CENTER BETWEEN ANCHOR BOLTS AND FLUSH WITH OUTSIDE FACE OF BUILDING. REMOVE BLOCKS AFTER CONCRETE HAS HARDENED.

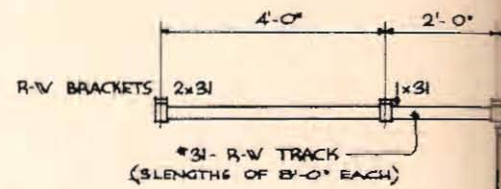
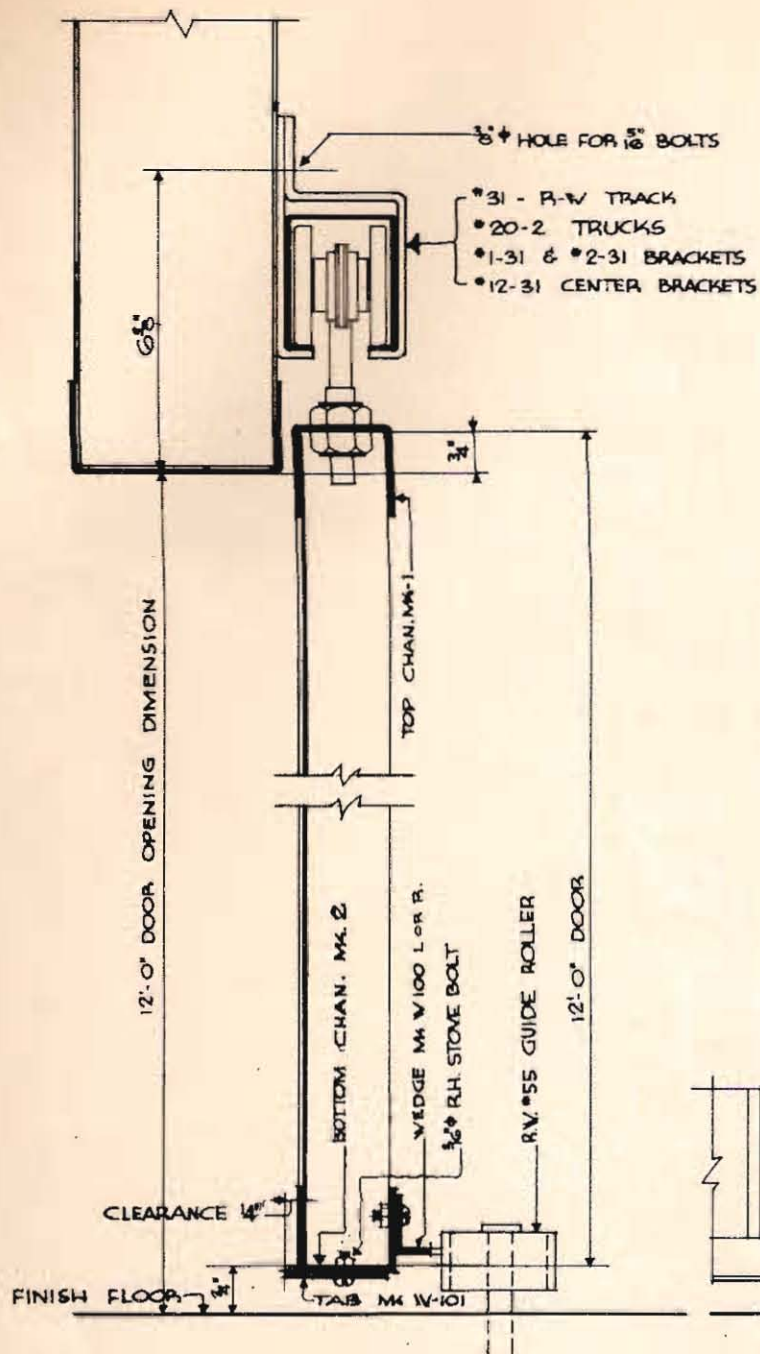




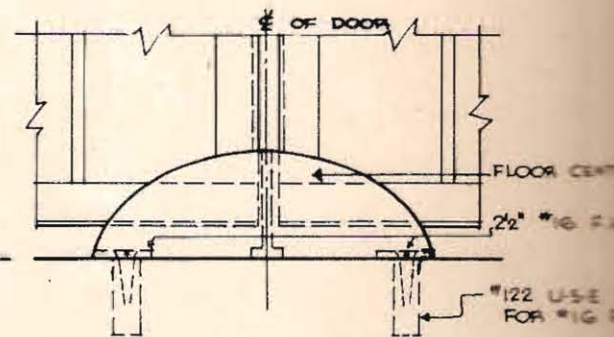
AT B-B
ATED SHEET LAYOUT
1/2" = 1'-0"



PAINT NOTE! PAINT EXTERIOR FACE OF ALL CORRUGATED SHEETS AND ALL FLASHING 1 SHOP COAT STRAN-STERL SPEC. S.A.B. BS

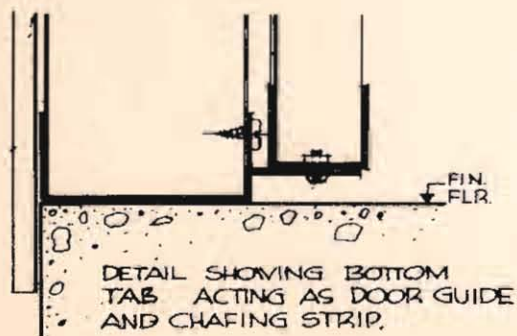


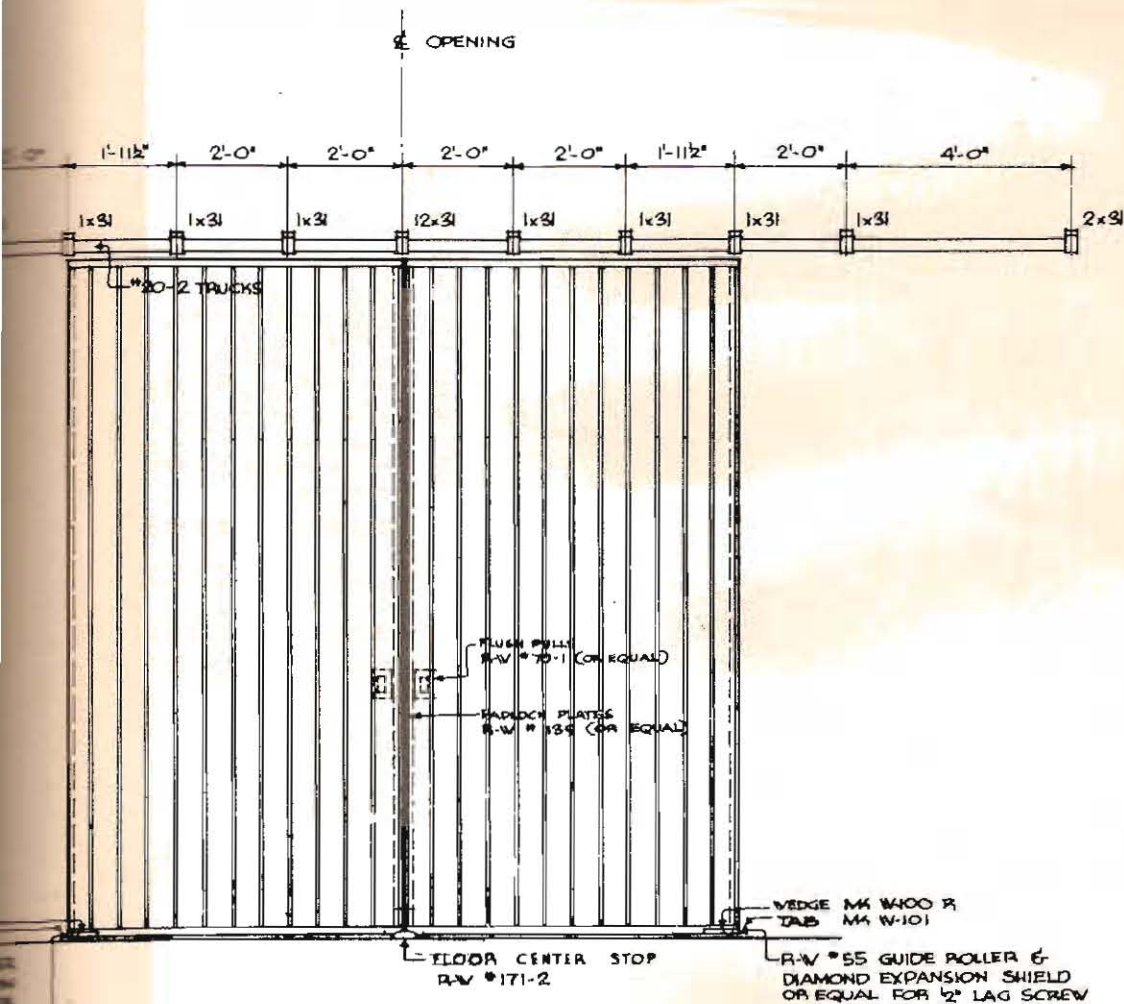
VEGE MK V-100 L
 TAB MK V-101
 R-W #55 GUIDE ROLLER
 & DIAMOND EXPANSION
 SHIELD OR EQUAL FOR
 1/2" LAG SCREW



VERTICAL SECTION
 ONE HALF FULL SIZE

DETAIL - "K"
 DETAIL FOR CENTER STOP
 FASTENING
 NO SCALE





INTERIOR ELEVATION

SCALE - 1/2" = 1'-0"

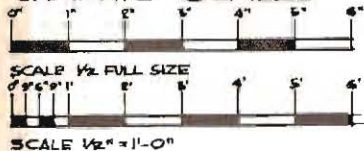
PAINT NOTE!

PAINT ALL SURFACES OF DOOR LEAVES 1 (ONE) STANDARD SHOP COAT OF METALLIC PRIMING PAINT BEFORE SHIPMENT
PAINT EXTERIOR OF DOOR 1 (ONE) COAT OF STRAN-STEEL SPECIFICATION 3A6.B5

NOTE

HARDWARE TO BE RICHARDS-VILCOX OR EQUAL
PADLOCKS NOT FURNISHED UNDER THIS CONTRACT

GRAPHIC SCALES



BILL OF MATERIAL FOR 1 BUILDING

Mark	No. Pieces	Description	Mark	No. Pieces	Description
		GENERAL			BULKHEAD FRAMING (Continued)
	82	1/2" Dia. x 8" Hooked Bolts with Nuts and Washers	6BJ4	2	6" 16 Ga. Solid Bridging 3'11 1/2"
	120	"C" Clips	6BJ48	28	6" 16 Ga. Solid Bridging 3'11 1/2"
	4	3 5/8" Header Brackets		104	Splice Plates 5 5/8" x 3/4" x 12 Ga. x 2'1'
	44	3 5/8" Rafter Clips	PR4	14	2 5/16" 18 Ga. Purlins 8'0 7/8"
	4	3 5/8" Collar Tie Brackets	PR5	49	2 5/16" 18 Ga. Purlins 11'11 7/8"
	220	3/4" x 1 1/2" Bolts with Nuts	6B48	240	6" Std. Clip on Bridging
	220	3/4" Washers		110	27 1/2" x 8'6" x 24 Ga. Corr. Galv. Flat Sheets
	120	3/16" x 1" Stove Bolts with Nut and Washer		9	27 1/2" x 4'6" x 24 Ga. Corr. Galv. Flat Sheets
	1 Pkg.	(3500) Holtite Screws			ROOF SHEETS
	300	6d Common Nails			
	4200	2 1/2" 10 Ga. Spring Head Galv. Roofing Nails			
	1 Pkg.	(5600) 5/8" Fibre Washers			
	16	Door Track Brackets		78	27 1/2" x 126" x 24 Ga. Corr. Galv. Curved Sheets
	4	Door Track End Stops	F1	50	12 1/4" x 4'6" 24 Ga. Flash. Galv.
	2	Center Door Stops	F2	16	3 1/2" x 3" x 5'0" 28 Ga. Flash. Galv.
	4	Door Stay Rollers	F3	12	3 1/2" x 5 3/8" x 5'4" 28 Ga. Flash. Galv.
	2	Door Floor Stops	F8	8	6" x 4'2" 26 Ga. Flash. Galv.
	8	Door Trucks	F9	4	6" x 4'0" 26 Ga. Flash. Galv.
	30	5/16" x 1" R. H. Stove Bolts with Nut and Washer		1	5 Gals. Can Paint
	8	Screw Anchors for #16 Wood Screws		1	4" Paint Brush
	4	Screw Anchors for 1/2" Lag Screw		8	Window Sash
	8	2 1/2" Lg. #16 F. H. Wood Screws		8	Window Sills
	16	1 1/2" x #10 Wire Gate Hooks and Eyes		8	Window Jamb Heads
	16	3" x 3" Butt-hinges with 6—1" Lg. F. H. Screws		8	Window Side Jambs—Right Hand
	16	1/4" x 3" Stove Bolts		8	Window Side Jambs—Left Hand
	16	1/4" Wrought Steel Washers		16	Window Props
	16	1/4" Wing Nuts		33	18 1/4" x 16 7/8" D. S. B. Glass
	32	3 3/4" x 1 5/8" x 16 Ga. Angle 2" Lg.			BULKHEAD SHEETS
	350	8d Common Nails			
	300	Glaziers Points			
	1	Gal. Can containing approx. 16 5/8" # Putty			
	100	1/4" x 1" Lg. Stove Bolts and Nuts	1R	2	26 Ga. 26" W. x 1'1 1/2" Lg. Sheets
W100-R	2	Door Wedge Guides	1L	2	26 Ga. 26" W. x 1'1 1/2" Lg. Sheets
W100-L	2	Door Wedge Guides	2R	2	26 Ga. 26" W. x 8'5 3/8" Sheets
W101	4	Door Tabs	2L	2	26 Ga. 26" W. x 8'5 3/8" Sheets
		RIB FRAMING	3R	2	26 Ga. 26" W. x 8'2" Lg. Sheets
P-1	4	6" Channels 13 Ga. 10'0 7/8"	3L	2	26 Ga. 26" W. x 8'2" Lg. Sheets
P-2	16	6" Channel 13 Ga. 9'11 7/8"	34R	2	26 Ga. 26" W. x 9'7 1/2" Sheets
R4R	14	6" 14 Ga. 21'5 1/2" Ribs	34L	2	26 Ga. 26" W. x 9'7 1/2" Sheets
R6R	2	6" 14 Ga. 21'5 1/2" Ribs with Wood Blocks	35R	2	26 Ga. 26" W. x 8'11" Sheets
R4L	14	6" 14 Ga. 21'5 1/2" Ribs	35L	2	26 Ga. 26" W. x 8'11" Sheets
			36R	2	26 Ga. 26" W. x 7'11 1/4" Sheets
			36L	2	26 Ga. 26" W. x 7'11 1/4" Sheets
			37R	2	26 Ga. 26" W. x 6'8 1/8" Sheets

R6C	2	6" 14 Ga. 21'5 1/2" Ribs with Wood Blocks
R4C	14	6" 14 Ga. 21'5 1/2" Ribs
R6C	2	6" 14 Ga. 21'5 1/2" Ribs with Wood Blocks
R5R	6	6" 14 Ga. 21'5 1/2" Ribs
R5L	6	6" 14 Ga. 21'5 1/2" Ribs
R4C	4	6" 14 Ga. 21'5 1/2" Ribs
R4L	4	6" 14 Ga. 21'5 1/2" Ribs
R4R	4	6" 14 Ga. 21'5 1/2" Ribs
R5C	6	6" 14 Ga. 21'5 1/2" Ribs

BULKHEAD FRAMING

S-54	2	3 5/8" 16 Ga. Stud 7'2 3/8"
S4	2	3 5/8" 16 Ga. Stud 19'0 1/2"
S5	2	3 5/8" 16 Ga. Stud 18'11 1/8"
S6	2	3 5/8" 16 Ga. Stud 18'3 1/2"
S8	2	3 5/8" 16 Ga. Stud 16'1"
S9	2	3 5/8" 16 Ga. Stud 15'11 1/2"
S11	2	3 5/8" 16 Ga. Stud 12'2"
S19	2	3 5/8" 16 Ga. Stud 1'4"
S20	2	3 5/8" 16 Ga. Stud 18'4 1/4"
S21	3	3 5/8" 16 Ga. Stud 3'11 1/2"
S22	14	3 5/8" 16 Ga. Stud 3'9 1/2"
S23	8	3 5/8" 16 Ga. Stud 1'7 1/2"
S24	2	3 5/8" 16 Ga. Stud 3'0 1/4"
S25	2	3 5/8" 16 Ga. Stud 3'10"
P3	2	3 3/4" 16 Ga. Chan. Pl. 14'1"
P4	1	3 3/4" 16 Ga. Chan. Pl. 11'6"
P5	1	3 3/4" 16 Ga. Chan. Pl. 11'11 1/2"
P6	2	3 3/4" 16 Ga. Chan. Pl. 11'8 1/4"
HD2	1	8" 14 Ga. Header and Clips 11'9 7/8"
B-2	1	3 5/8" 16 Ga. Brace 13'4 7/8"
B-3	1	3 5/8" 16 Ga. Brace 13'7 5/8"
HDR	1	1 5/8" x 3 3/8" x 11'9" Wood
	3	Door Track 8'0"

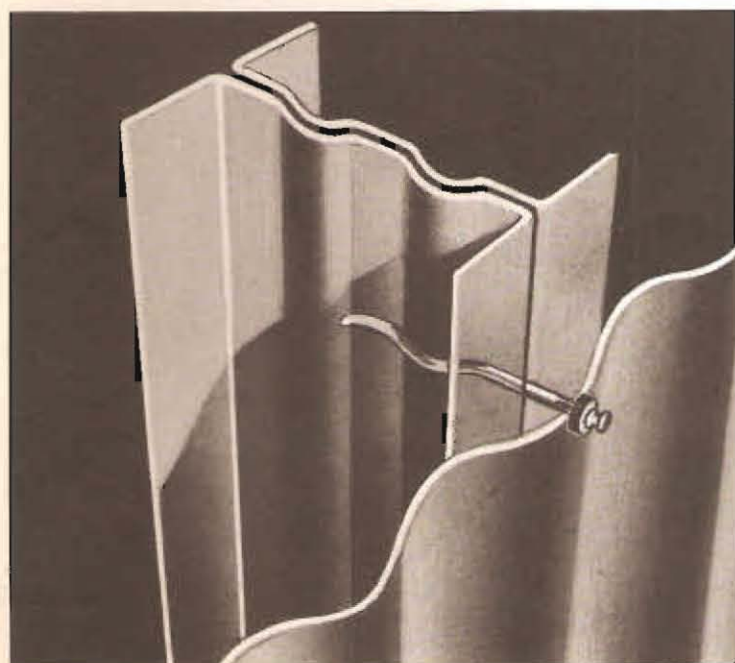
37L	2	26 Ga. 26" W. x 5'0 8/8" Sheets
38R	2	26 Ga. 26" W. x 5'0 5/8" Sheets
38L	2	26 Ga. 26" W. x 5'0 5/8" Sheets
39R	2	26 Ga. 26" W. x 3'1" Sheets
39L	2	26 Ga. 26" W. x 3'1" Sheets
40R	2	26 Ga. 27 1/2" W. x 10'9" Lg. Sheets
40L	2	26 Ga. 27 1/2" W. x 10'9" Lg. Sheets
13R	2	26 Ga. 26" W. x 10'6" Lg. Sheets
13L	2	26 Ga. 26" W. x 10'6" Lg. Sheets
14R	2	26 Ga. 13" W. x 6'9 7/8" Sheets
14L	2	26 Ga. 13" W. x 6'9 7/8" Sheets
	4	26 Ga. 27 1/2" W. x 10'9" Lg. Sheets
16	4	26 Ga. 26" W. x 6'10 1/4" Lg. Sheets
	4	26 Ga. 26" W. x 3'6 1/2" Lg. Sheets
	4	6'0" x 12'0" Steel Doors
	1	Mastic—10 Gallon Can

LOUVRES

2	Metal Louvres Complete with Frame
2	24 Ga. Sill Flashing
28	3/16" x 1" Stove Bolts with Nut and Washer
10	3/16" x 1 1/2" Stove Bolts with Nut and Washer
8	#14 x 5/8" Sheet Metal Screws

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PHANTOM VIEW SHOWING NAIL IN NAILING GROOVE

THE STRAN-STEEL NAILING GROOVE

■ The distinctive feature of Stran-Steel is the nailing groove—an exclusive Stran-Steel patent. This groove is in all Stran-Steel joists, arch ribs and studs, which are made by welding two pieces of steel together. The small space remaining between these pieces is just large enough to admit an ordinary nail. When a nail is driven into the groove, it is deformed and clinched in a grip of steel with a holding power much greater than that of wood. In this manner collateral materials are secured to the steel framework with the ordinary hammer-and-nails method.

Construction in which Stran-Steel framing is used proceeds in the same way as with ordinary framing. Dimensions of Stran-Steel members conform exactly to the requirements of the collateral materials used with it.