

ERECTION INSTRUCTIONS

FOR THE

U. S. NAVY

STEEL ARCH RIB

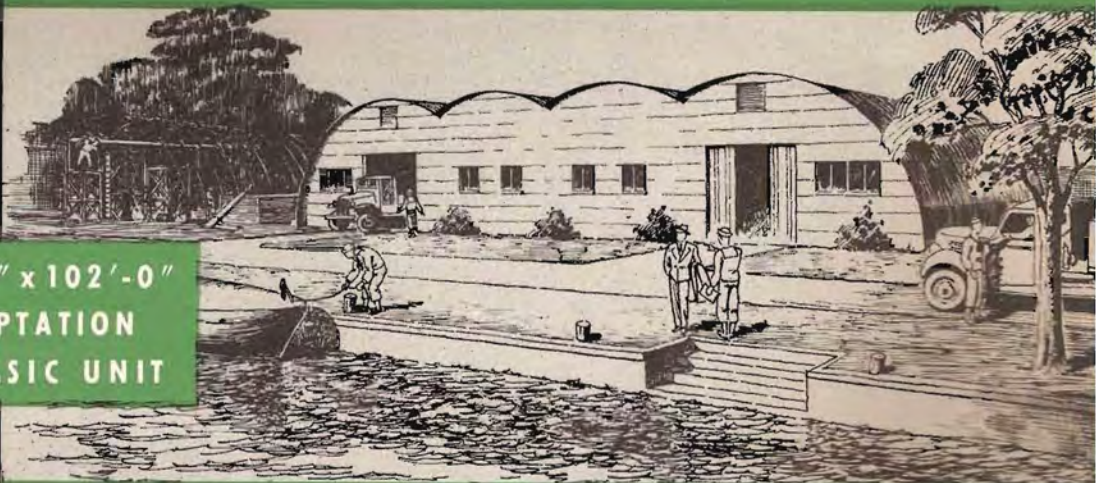
UTILITY BUILDINGS



40'-0" x 100'-0"
CONVERSION TYPE
BASIC UNIT



100'-0" x 102'-0"
ADAPTATION
OF BASIC UNIT



MANUFACTURED FOR NAVY DEPARTMENT
BUREAU OF YARDS AND DOCKS
BY STRAN-STEEL DIVISION
GREAT LAKES STEEL CORPORATION

DESIGN
NOVEMBER
1944

REFER TO
SUGGESTIONS TO ERECTOR
PAGE 13
BEFORE STARTING
ERECTION

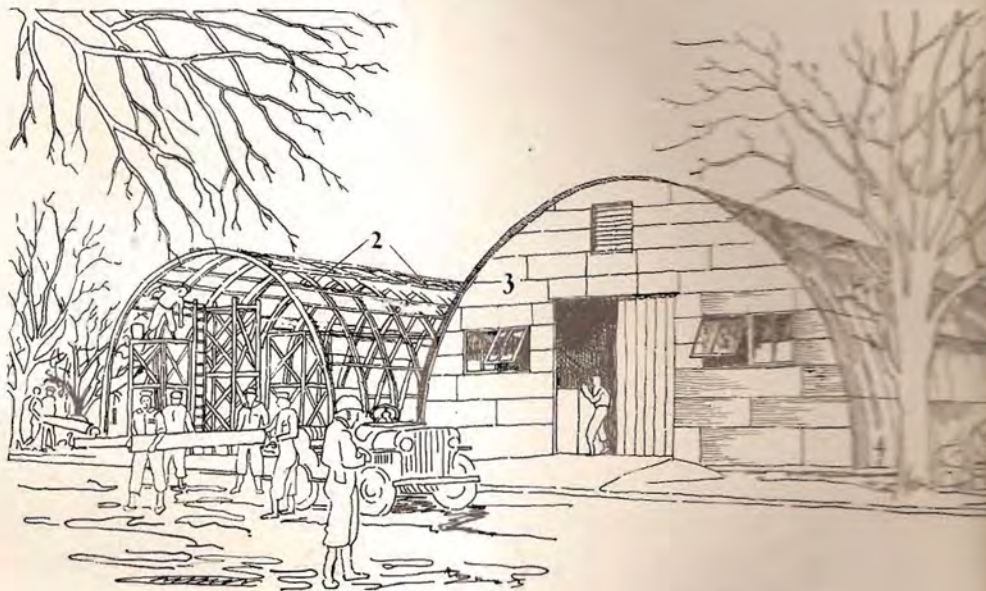
FRAME



FOUNDATION



BULKHEAD



COMPLETE BULKHEAD



SIDE COVERING

1. Foundation. Set anchor bolts, pour concrete. Lay channel plate. (See pages 2 and 3.)

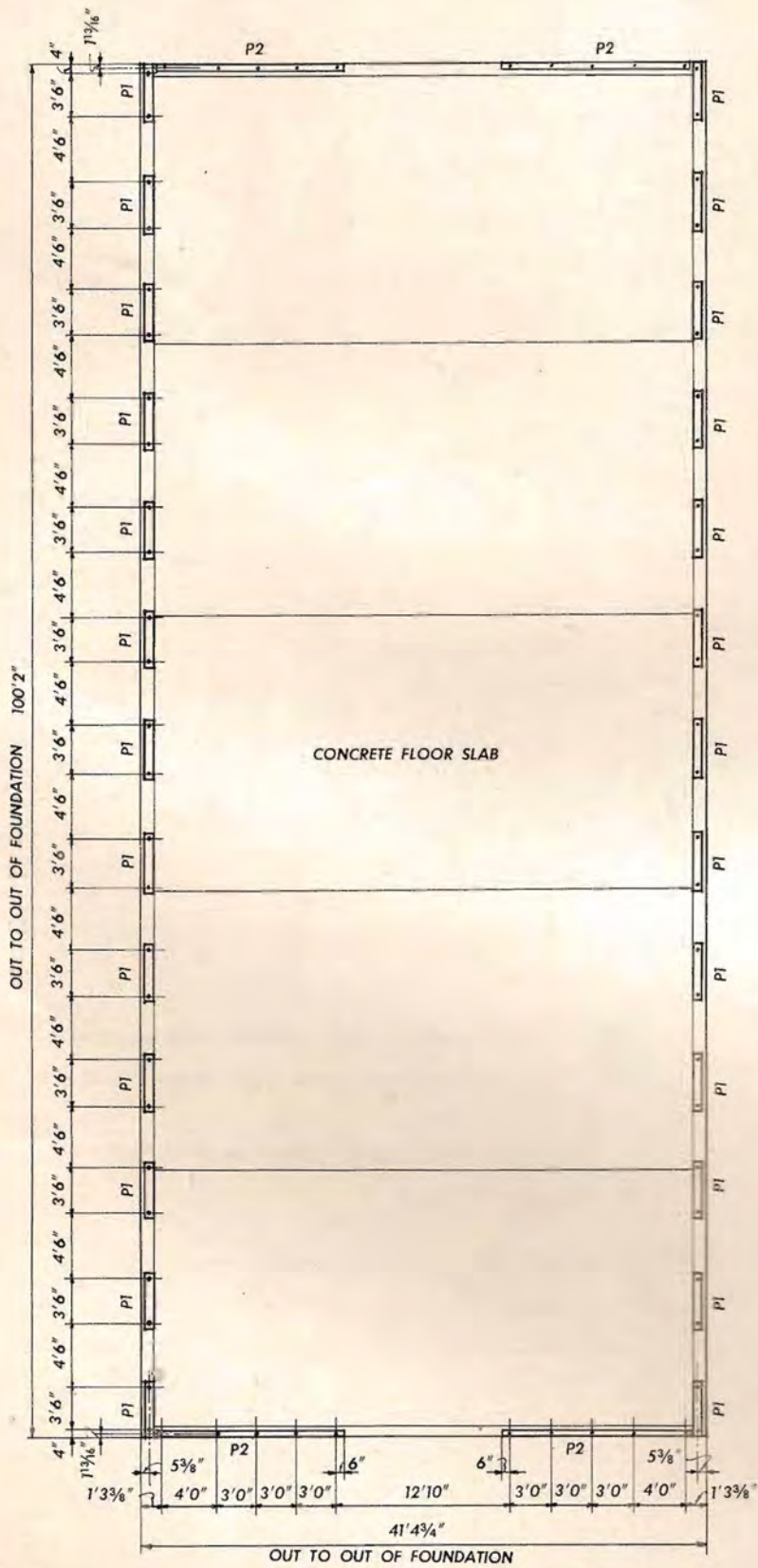
2. Frame. Assemble and raise ribs. Install purlins. (See pages 4 and 5.)

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 corrugated sheets on the sides of the building to the purlins. (See pages 10 and 11.)

5. Clean Up. Save all scraps, bands, blocks, nails, screws and crating material not used. Sort and store for future use.

BASIC UNIT FOUNDATION



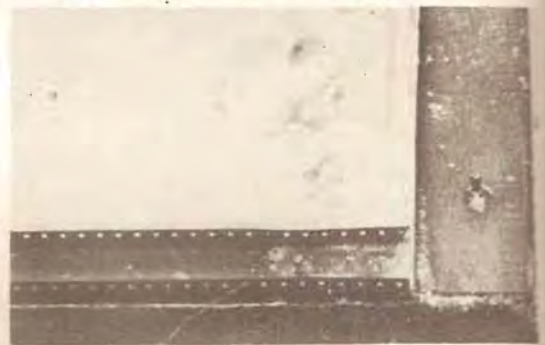
PLAN OF ANCHOR BOLTS AND CHANNEL PLATES



FOUNDATIONS IN PLACE



CORNER DETAIL



CHANNEL PLATE

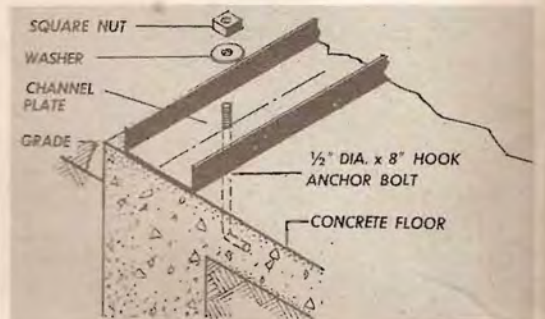
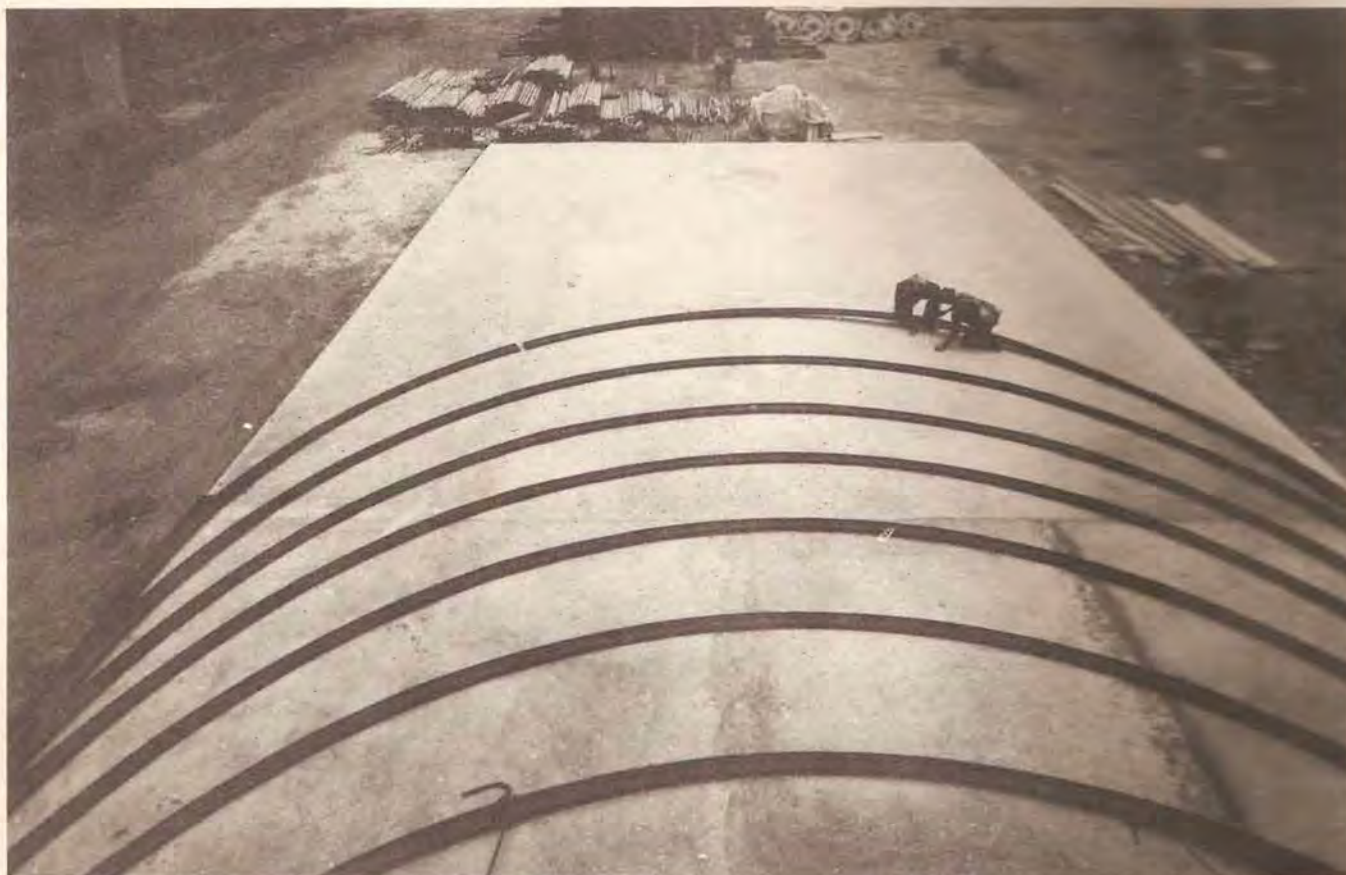


PLATE AND ANCHOR BOLT



ASSEMBLE RIBS ON GROUND

1 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. Place concrete forms, pour the concrete. Place the $\frac{1}{2}$ " round by 8" long anchor bolts accurately (see foundation plan), using the 6" channel plates as templates or measuring along forms and using points on the forms as off-sets to position off center lines of anchor bolts.

2. After the concrete has hardened remove the wooden formwork.

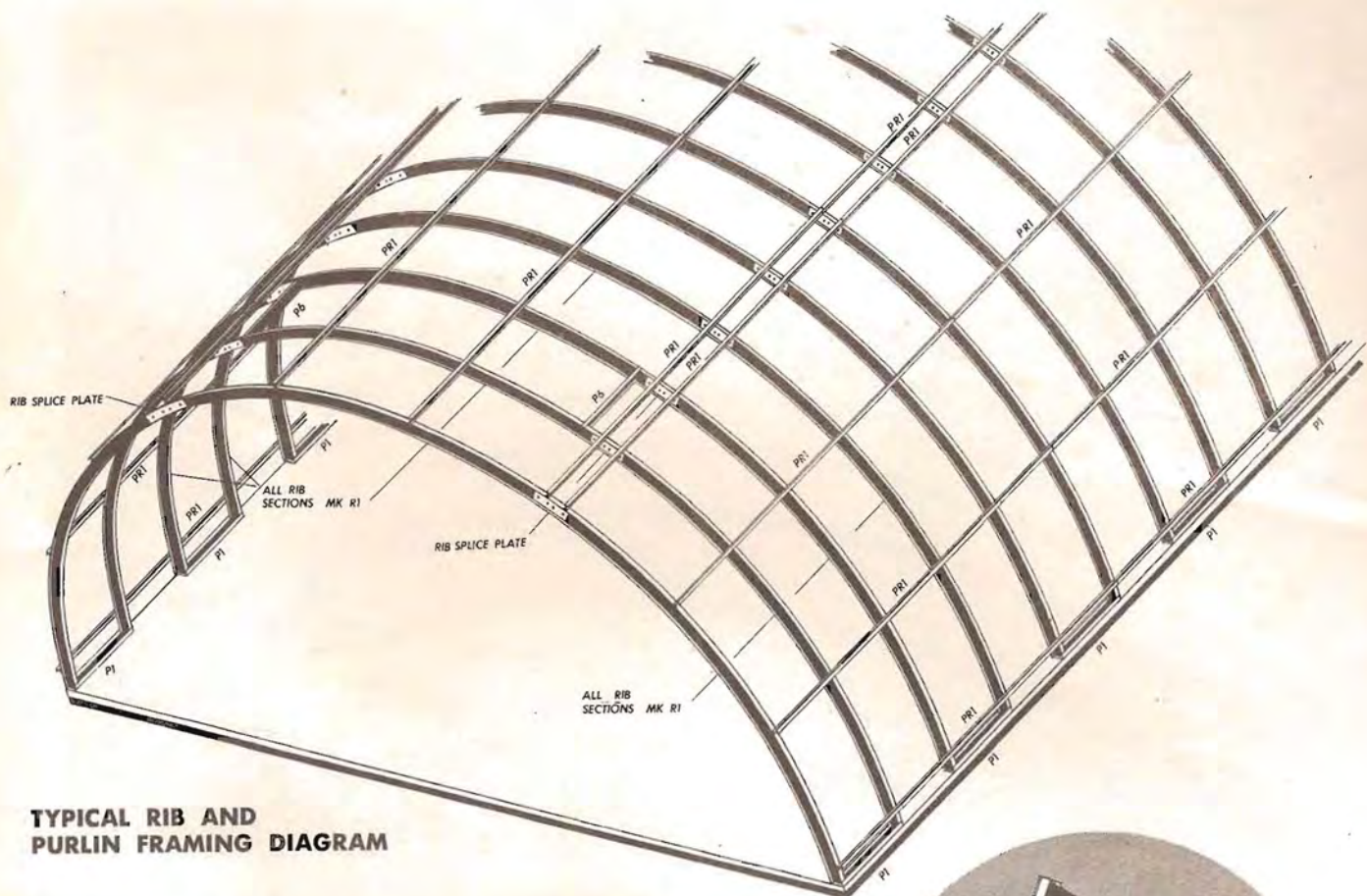
3. Lay the 6" channel plates, which are punched to fit over the bolts, in position down the sides of the build-

ing, starting with the end channels at each side. These are marked P-1 (4' 2" long) and should be placed 3' 10" apart.

4. 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.

5. 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. Suggestion—floor slab can be poured conveniently in four longitudinal strips about ten feet wide to make screeding easy.

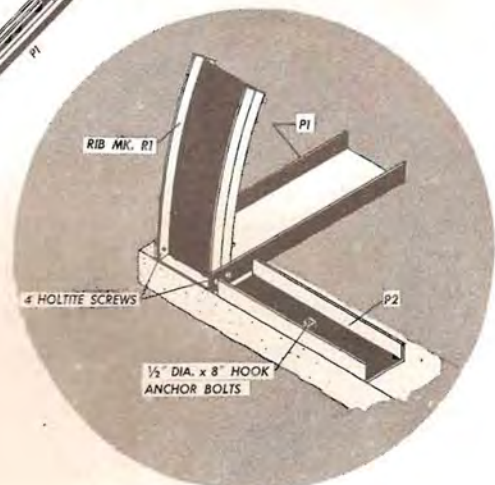
BASIC UNIT FRAME



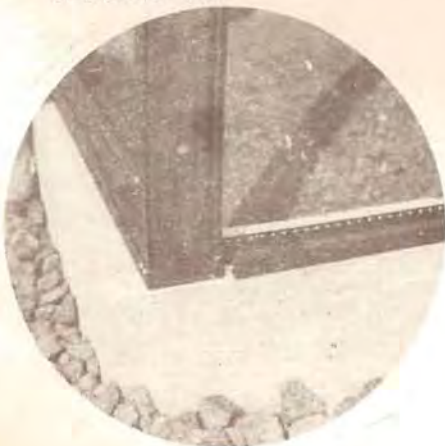
**TYPICAL RIB AND
PURLIN FRAMING DIAGRAM**



SPLICING RIB



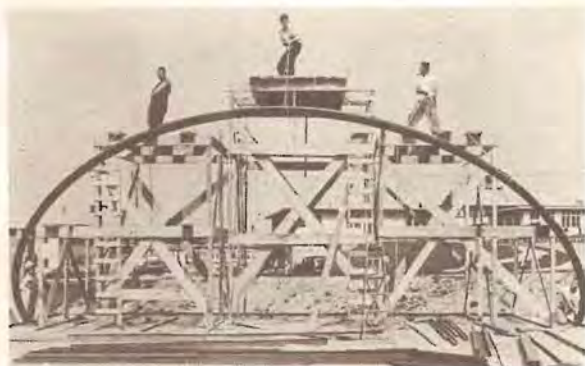
END RIB



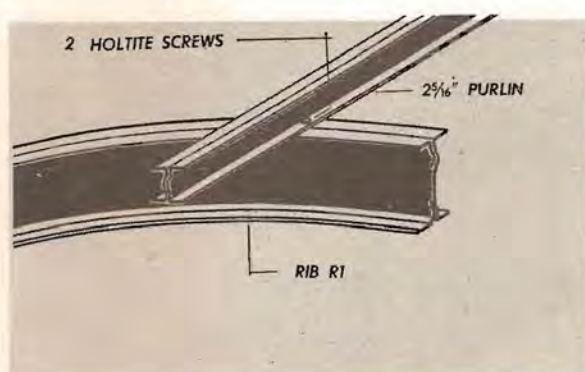
CORNER DETAIL



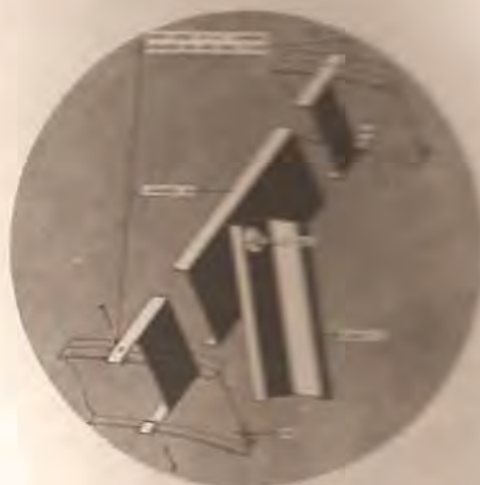
COMPLETED SPLICE



ERECT FIRST RIB



RIB AND PURLIN



P6 AND L1



ERECT LAST RIB

2 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. At the top of the building there are twelve 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 consists of three sections, each marked "R1." Assemble the ribs near their location in the building. To do this, place the sections on the ground near their location in the plates 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 photos.)

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 photographs.

Raise the ribs. Raise an end rib first, then follow with the others in sequence, securing each rib as it is raised

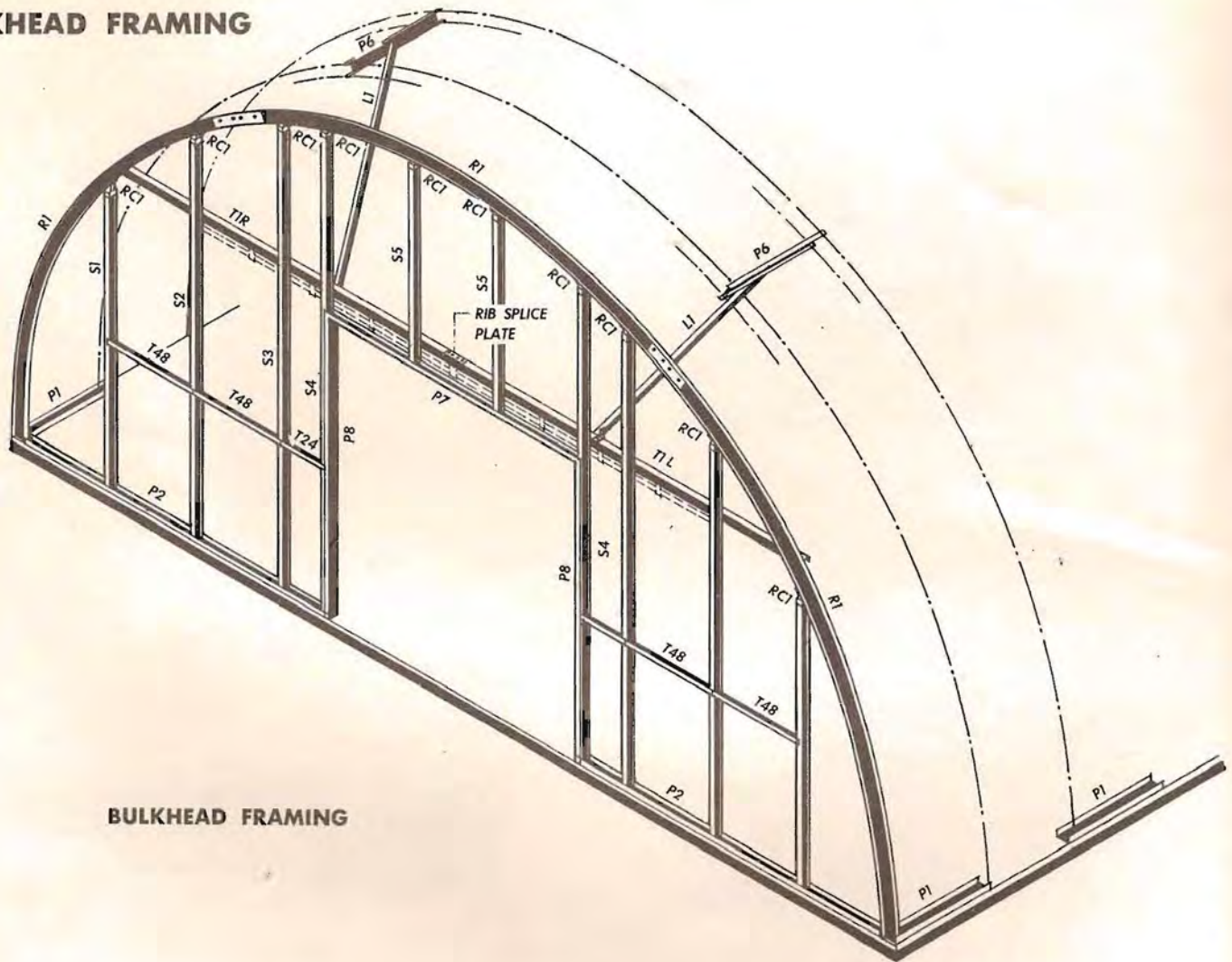
to the channel plate with four Holtite screws. (See detail.)

3. As successive ribs are raised, install the purlins between them, noting that the 2nd bay from each end of the building receives two pieces of 6" channel marked P6, punched for brace marked L1. Slip the ends of these pieces over the flanges of the ribs, bend around rib flange and nail to nailing groove.

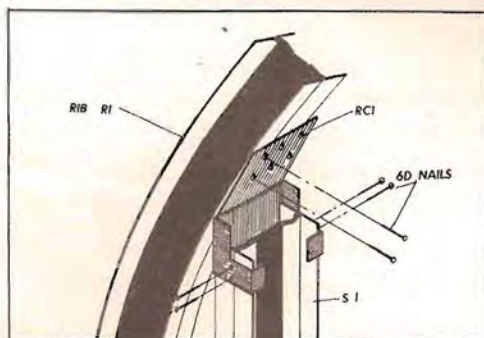
4. After the first four ribs have been raised, plumb them and brace them with planks crossed diagonally and nailed to the inside of the ribs. With this bracing in place, raise the remaining ribs attaching purlins as the successive ribs are erected.

5. Attach the purlins marked PR-1 to the ribs with two Holtite screws placed diagonally on each rib (see detail), 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.

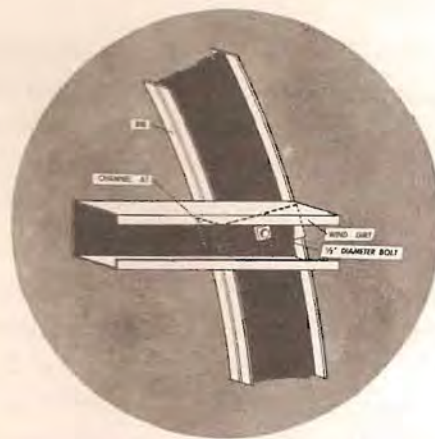
BASIC UNIT BULKHEAD FRAMING



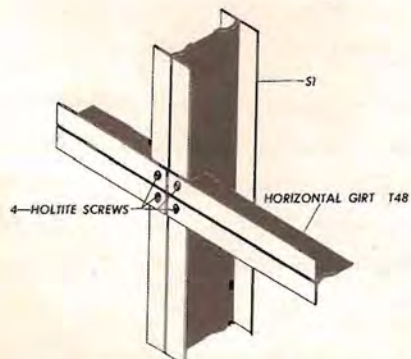
BULKHEAD FRAMING



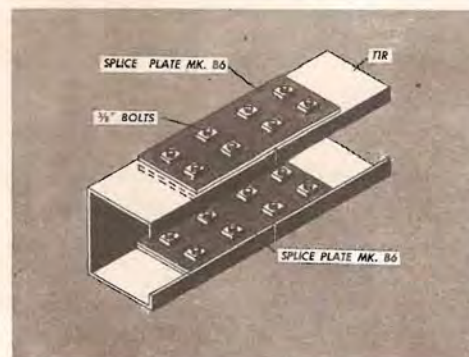
DETAIL OF RAFTER CLIP



WIND GIRT AT RIB



T48 CONNECTION TO STUD

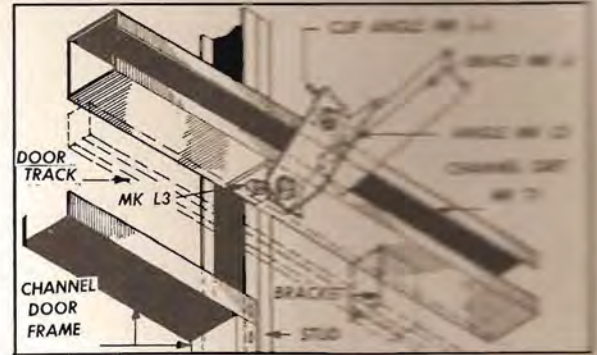


WIND GIRT SPLICE

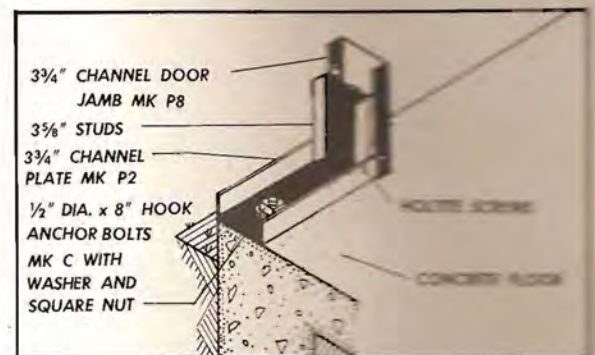


BULKHEAD FRAME

Note: For details not shown hereon see pages 15, 16, and 28.



CONNECTION OF BRACE L1 TO GIRT T1



RIBS AND PURLINS

3

Assemble the bulkhead frame on the ground. Raise the complete frame, utilizing the staging previously built for erecting the ribs.

1. Lay the channel plates, P-2, near their location at either side of the doorway. Then lay the vertical studs with their lower ends at their positions in the channels and their upper ends resting on saw horses.
2. Attach the channel jambs marked P-8 to the jamb studs marked S-4, then secure the channel header marked P-7 to the jambs and insert studs marked S-5 and fasten with Holtite screws.
3. To the frame thus assembled, add the vertical studs S-1, S-2, S-3 and S-4, and the horizontal girts T-24 and T-48, using Holtite screws at each connection. (See detail.)
4. Connect the wind girts marked T1L and T1R with splice plates marked B-6. Secure to bulkhead frame with four Holtite screws at each stud.
5. Bolt the angle brackets marked L-2 and L-3 to wind girt through holes provided for this purpose. Do not connect braces marked L-1 until bulkhead is raised.
6. Attach the rafter clips marked RC1 to the tops of the vertical studs marked S-1, S-2, S-3, S-4 and S-5.

Slip these clips over the studs, clinch the tails 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, since they may have to be adjusted in height after the frame is raised. (See detail.)

7. 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.

8. 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.

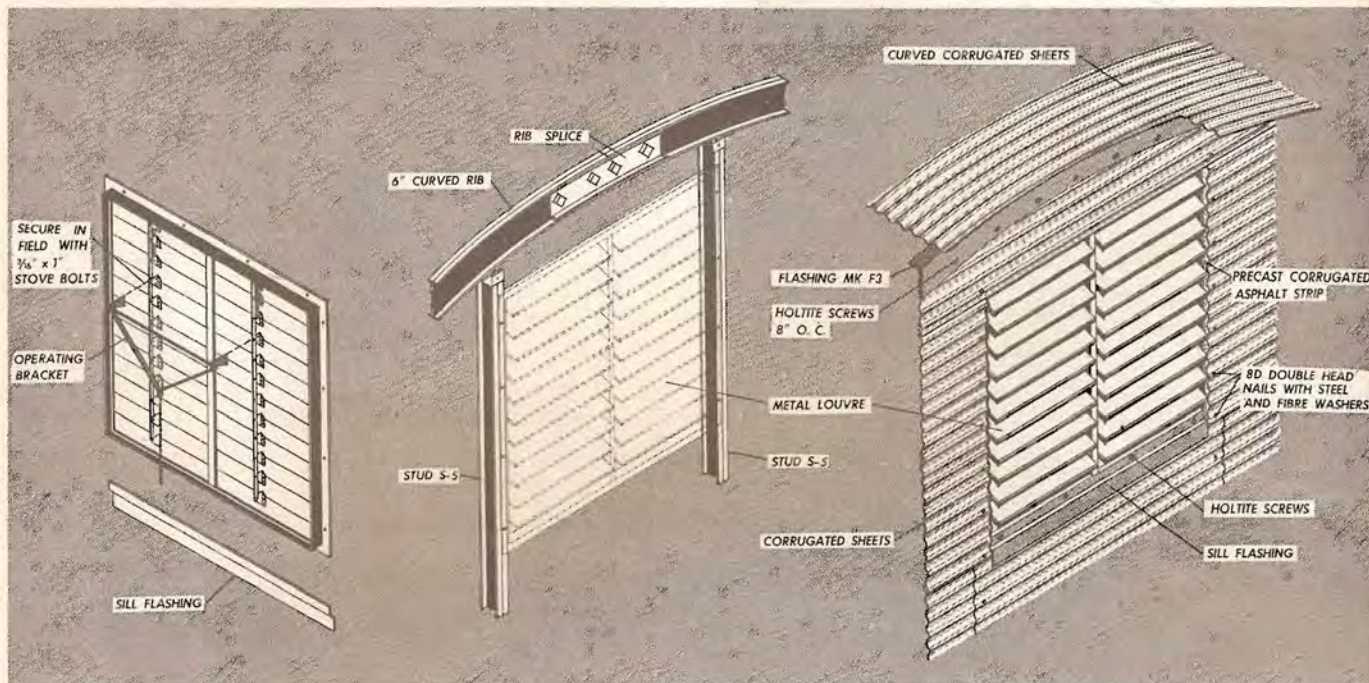
9. Bolt channels down tight.

10. 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 16d nails.

11. Install the braces marked L-1, bolting them to 6" channel marked P-6 through the holes provided for that purpose, and to bracket angle marked L-2 on "C" section header. (See details.)

BASIC UNIT

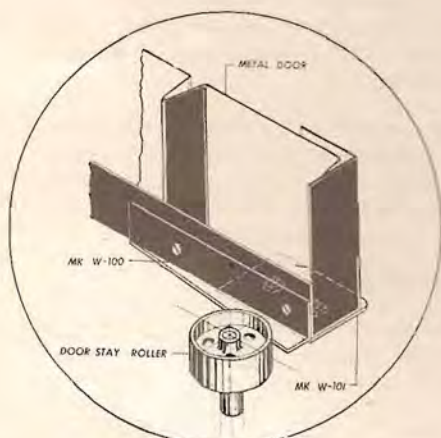
BULKHEAD COVERING, DOORS AND WINDOWS



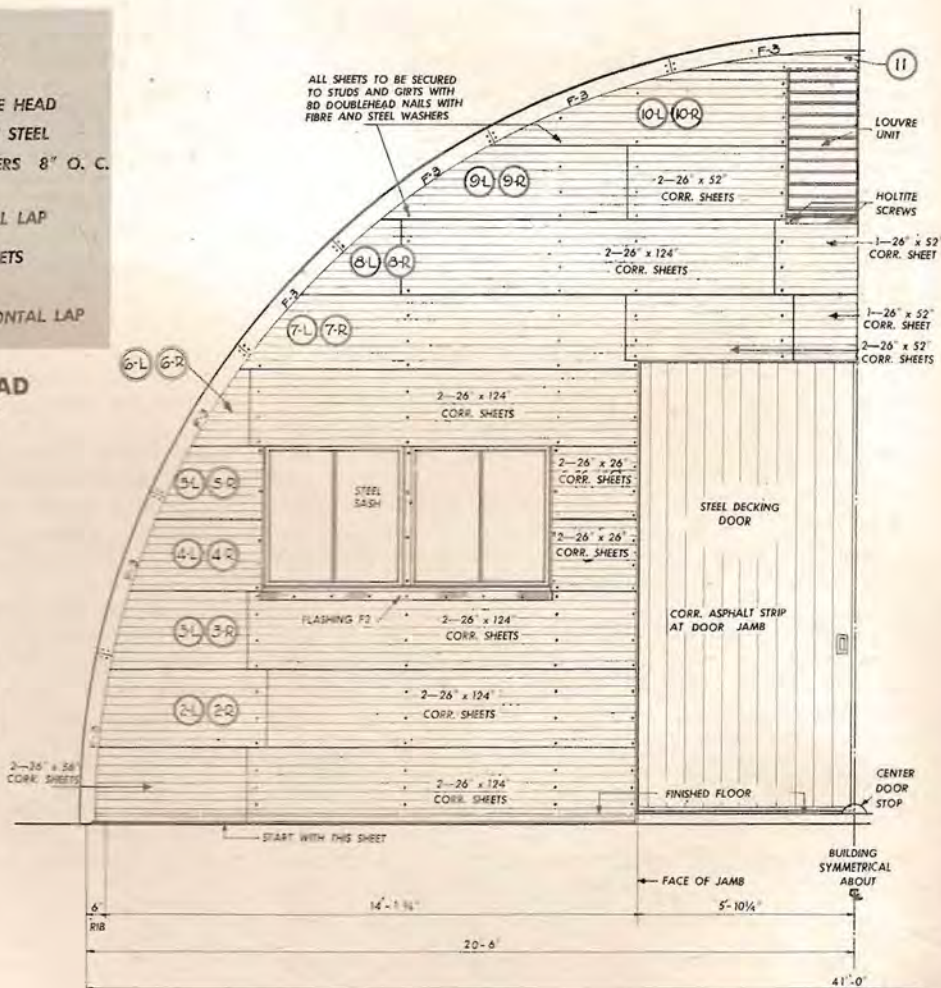
DETAILS OF LOUVRE



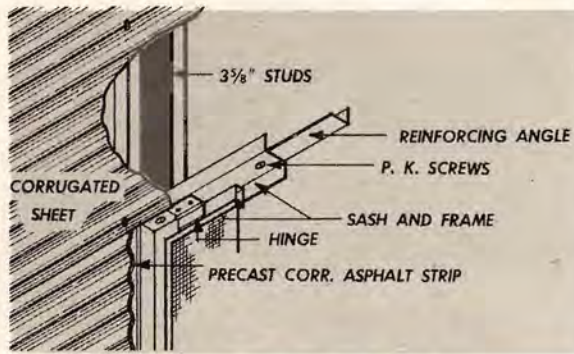
DETAIL SHOWING BULKHEAD CORRUGATED SHEET LAP



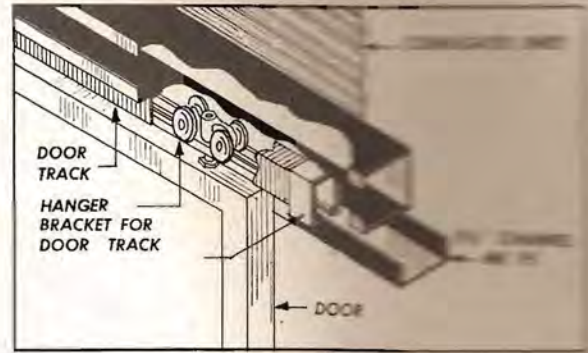
DOOR STAY ROLLER



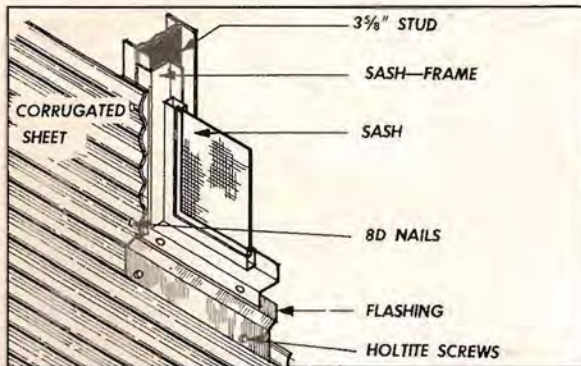
ONE HALF BULKHEAD ELEVATION SHOWING CORRUGATED SHEETS (OTHER HALF SIMILAR BUT OPPOSITE HAND)



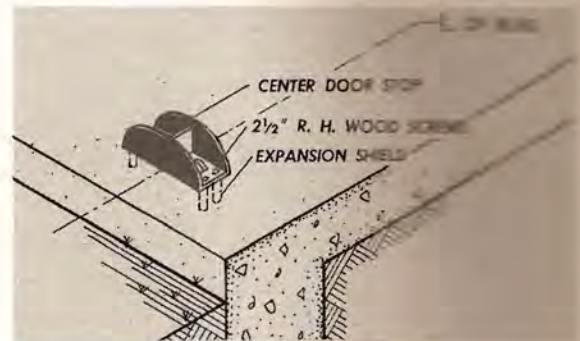
DETAIL AT WINDOW HEAD



DOOR TRACK AND HANGER



BOTTOM CORNER OF WINDOW



CENTER DOOR STOP

4 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.

1. Doors. Bolt the brackets that support the door track to the door header (see detail). Attach a tab marked W101 and a wedge marked W100R or W100L to the bottom of each door leaf. 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 and secure it to the concrete. With the door in closed position, locate the door stay rollers at each jamb so the doors are held firmly against the jambs. (See detail.)

2. Windows. Assemble the window frames from the knocked-down parts. Fasten these members together with clip angles and metal screws provided. Attach stay bars to the muntins, and hinge sash at top of frame so it will swing to outside of building. After the frames have been assembled, slide them into place between the studs with bottom of sills 6' 0 1/2" above floor and nail to studs through holes provided in frames. Caulk mullion joint and install sill flashing F2.

3. Covering. The following description applies to the half of the bulkhead shown in drawing, 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 56" sheet at lower outside edge of bulkhead. Turn this sheet so that bottom corrugation appears convex from outside of building and allow it to project 3" below bottom of channel plate P-2. Fasten to rib with filshie nail and nail to stud marked S-1, with edge projecting 3" beyond center line of stud S-1.

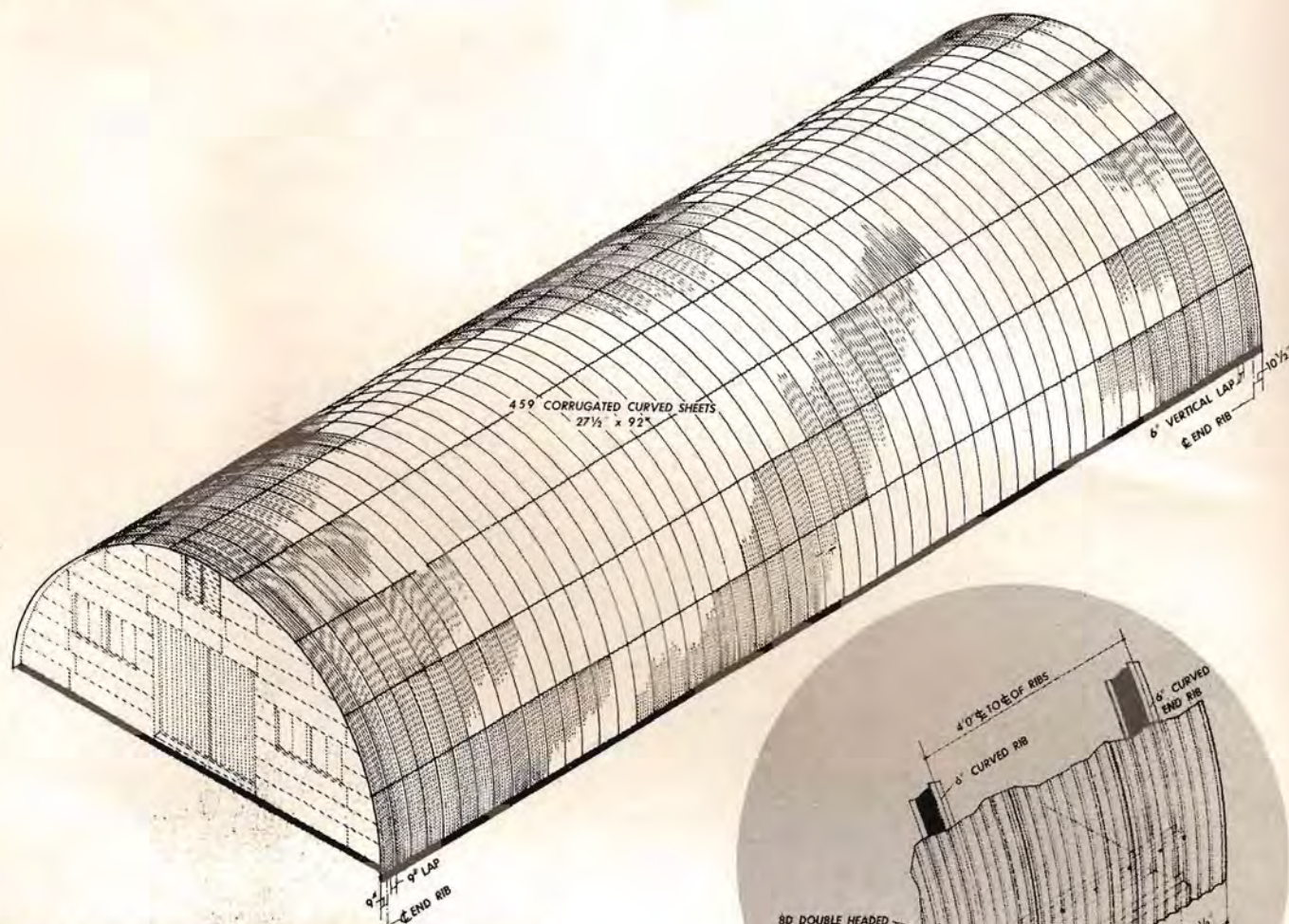
Next apply 26" x 124" sheet, keeping door edge 1/4" back from face of jamb channel. Now install sheet 2-L and 26" x 124" sheet, lapping them one corrugation over sheets below, and 6" at vertical joints. Continue in this manner, placing the sheets as shown.

Apply the 26" x 54" sheet under the louvre first, nailing it to vertical studs S-5. Fasten the sill flashing to bottom of louvre frame with Holtite screws, and attach the operating lever bracket. (See detail.) Then set the louvre in place between the studs marked S-5 so that the sill flashing laps over the corrugated sheet below, and bolt it to the studs with stove bolts. When the louvre is secured, apply sheets 9L and 10L; nailing them to studs and ribs.

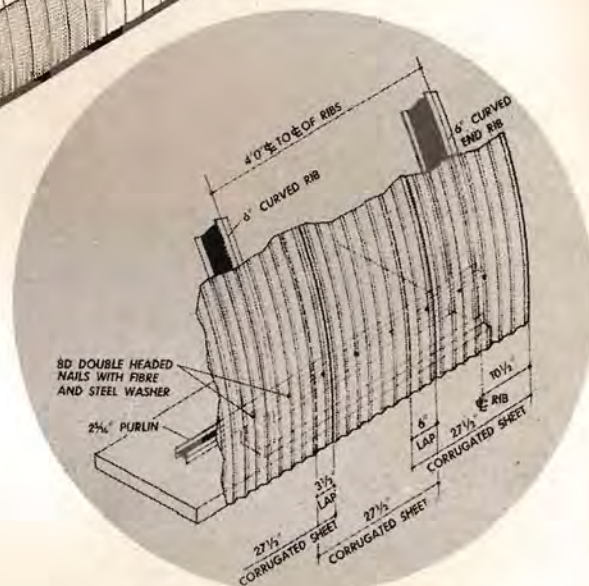
Complete the bulkhead by applying sheet 11, attaching to rib with filshie nails.

4. Curved Flashing. Nail the curved flashing F-3 to purlins and fasten to corrugated sheets with Holtite screws. Start with the lowest piece (marked F-3) lining it with the bottom of the corrugated sheets, then lap each succeeding piece over the one below.

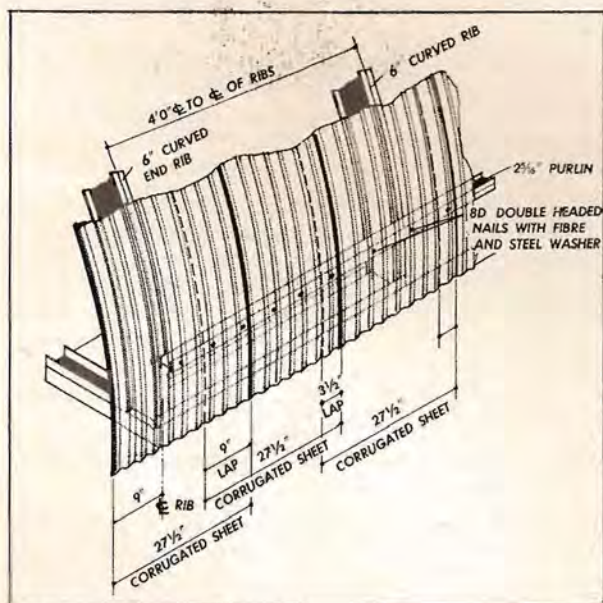
BASIC UNIT SIDE AND ROOF COVERING



LAYOUT OF CORRUGATED ROOFING SHEETS



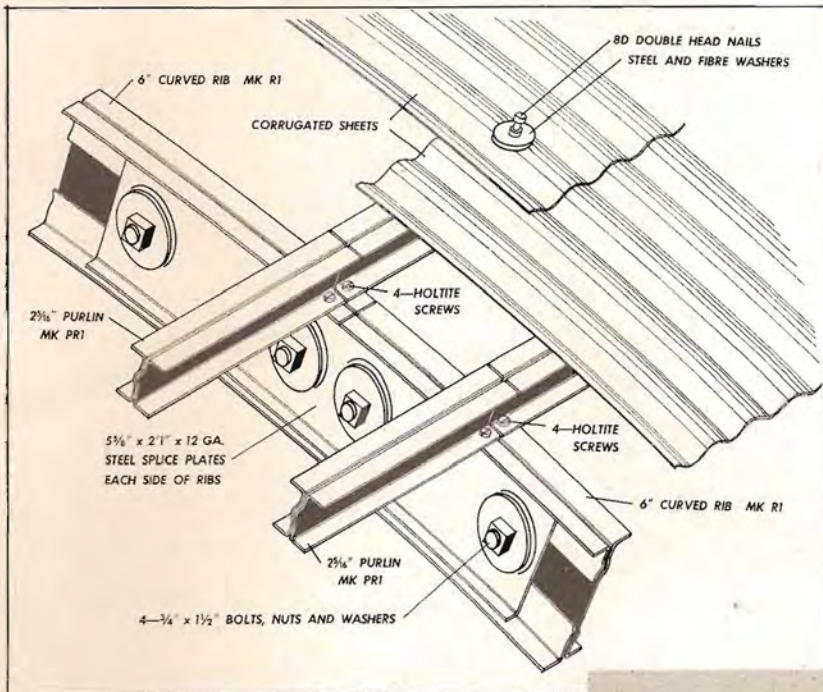
END OF BOTTOM ROW



START OF BOTTOM ROW



SHEETS IN PLACE



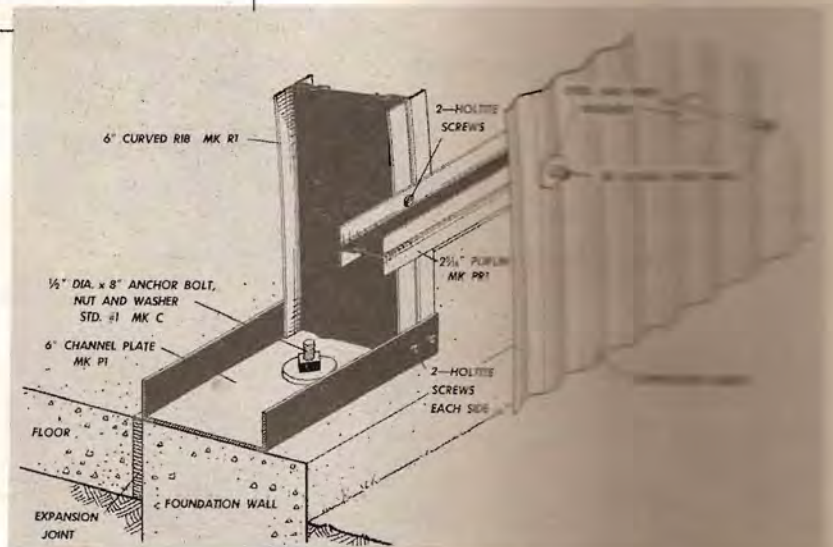
DETAIL AT PURLINS



APPLY SHEETS



APPLY ROOFING SHEETS

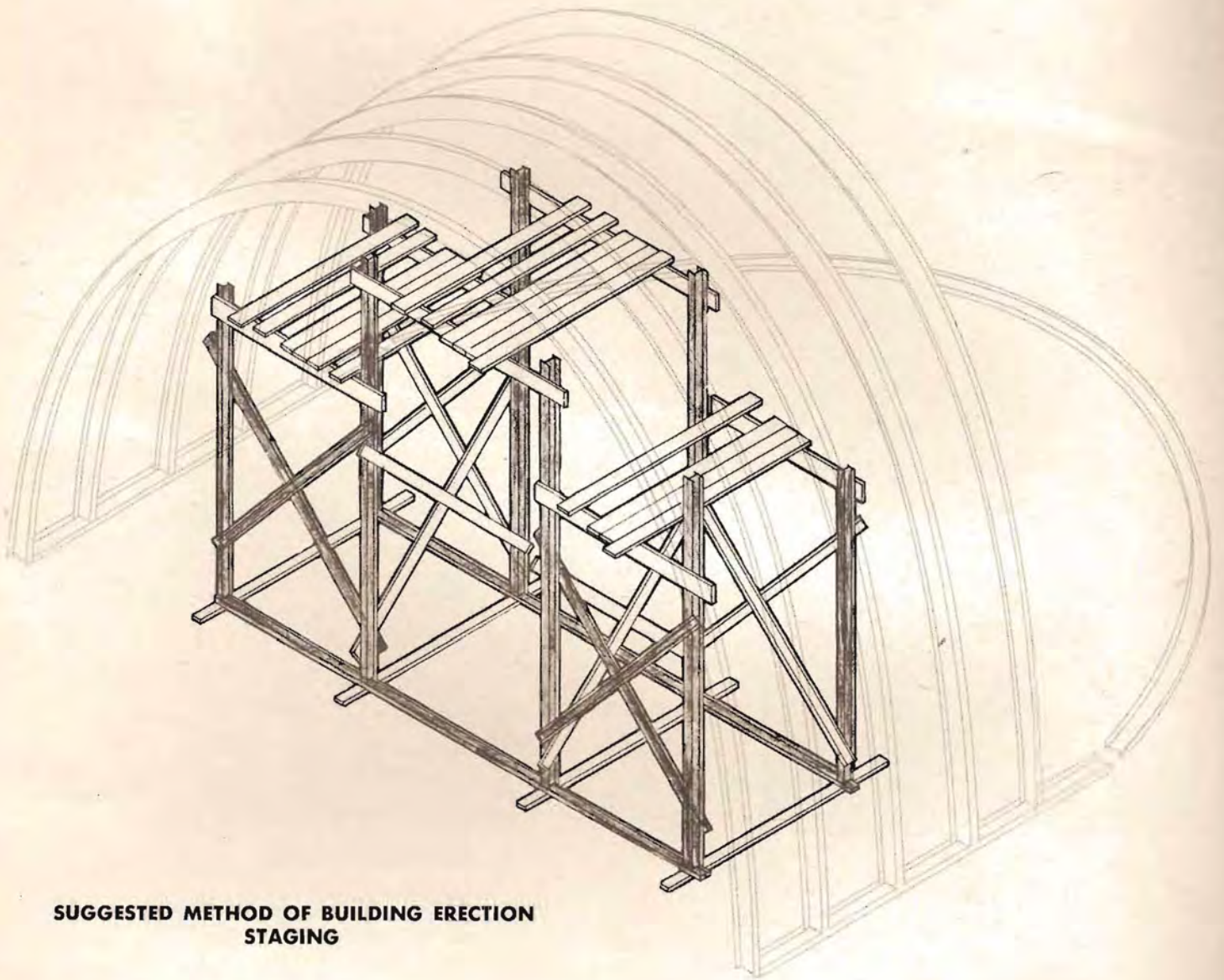


DETAIL AT FLOOR

5 The sides and roof of building are covered with 459 corrugated metal sheets, 27½" wide by 92" long, nailed to purlins with 8d double headed nails and fibre and steel washers at 8" o.c. Start with bottom row of sheets at side wall, keeping bottom of

sheets 3" below bottom of channel plate. Typical side lap is 3½". See details for special laps and overhang at ends. Install second, third and fourth rows of sheets, then repeat this process on other side of building before applying top row.

**BASIC UNIT
SCAFFOLDING**



**SUGGESTED METHOD OF BUILDING ERECTION
STAGING**

Organization. The erection of the SSAR Utility Building is simple and fast. One operation 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 starting 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 the 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. Open crates carefully so lumber can be reused in building erection staging.

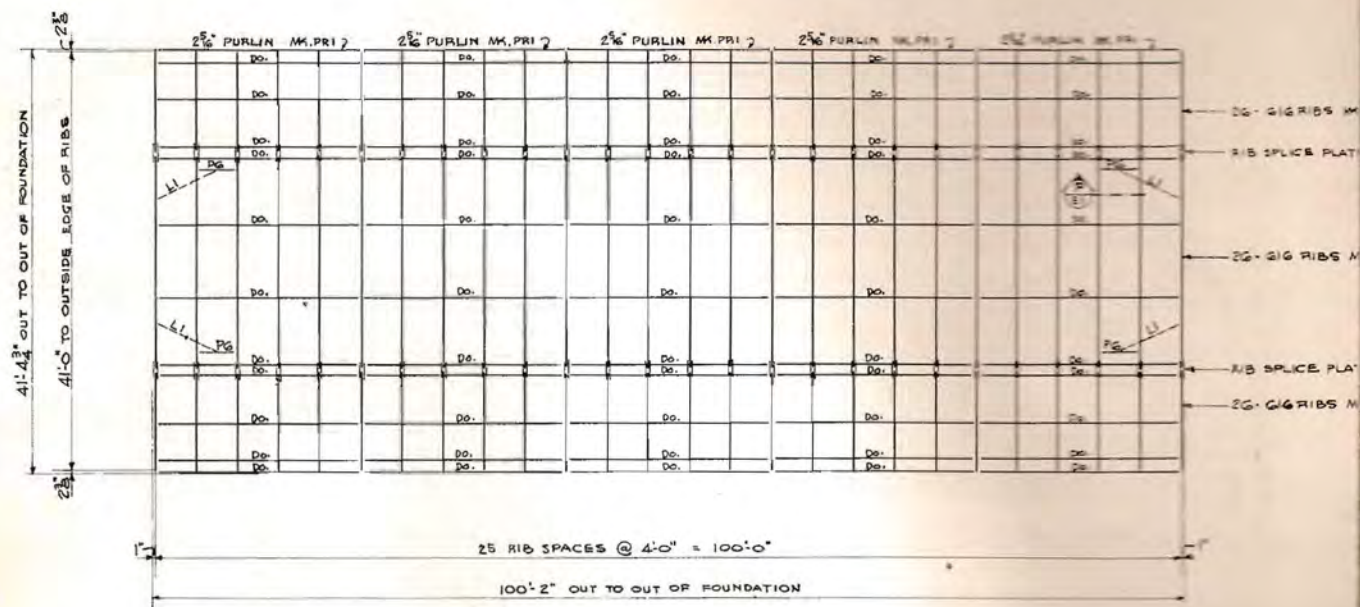
The importance of using the right nails, screws and attachments cannot be too strongly stressed. Follow the instructions closely in this regard.

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 make by tool check.

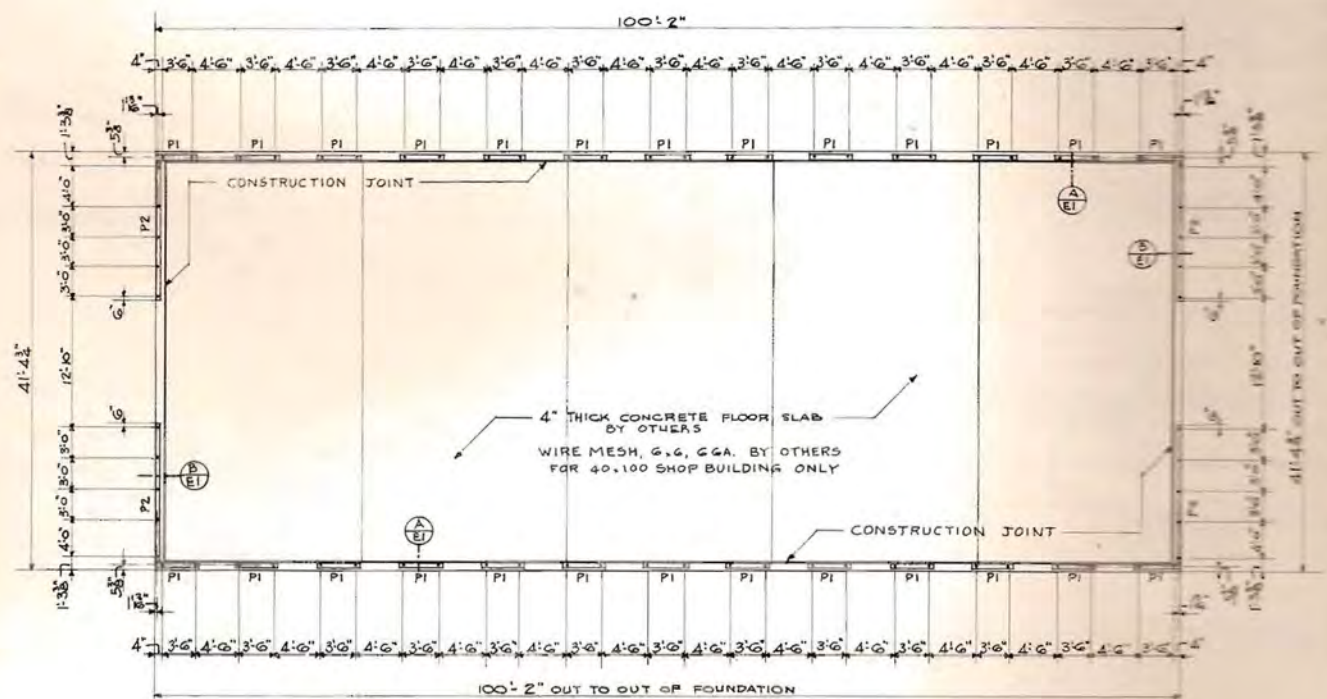
Take good care of the tools.

WORKING DRAWINGS

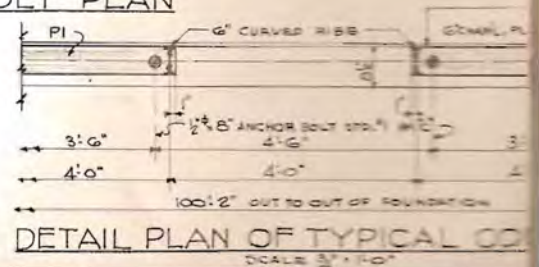
 The drawings reproduced on the following pages are the working drawings from which the basic building was manufactured. On these drawings all the parts necessary to assemble the building appear along with their piece markings. These drawings should be studied in conjunction with the erection instructions 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.

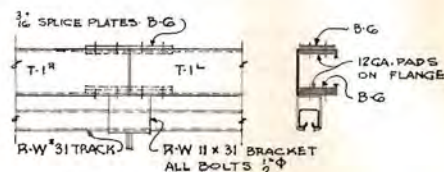
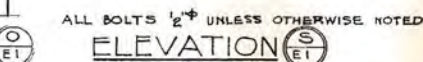
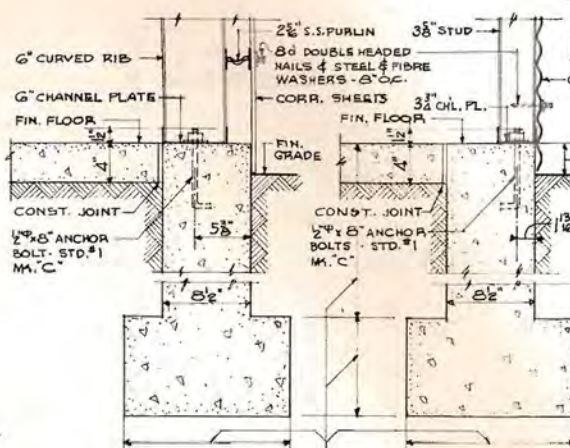
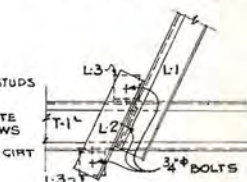
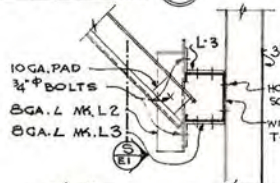
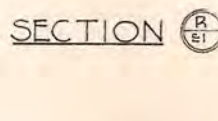
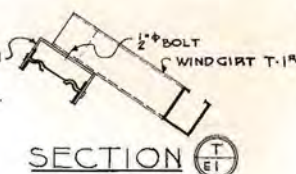
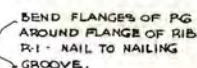
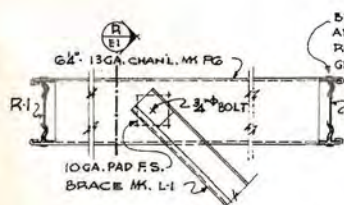
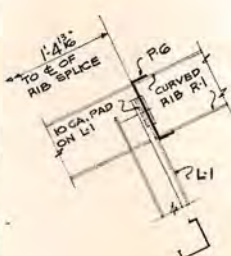
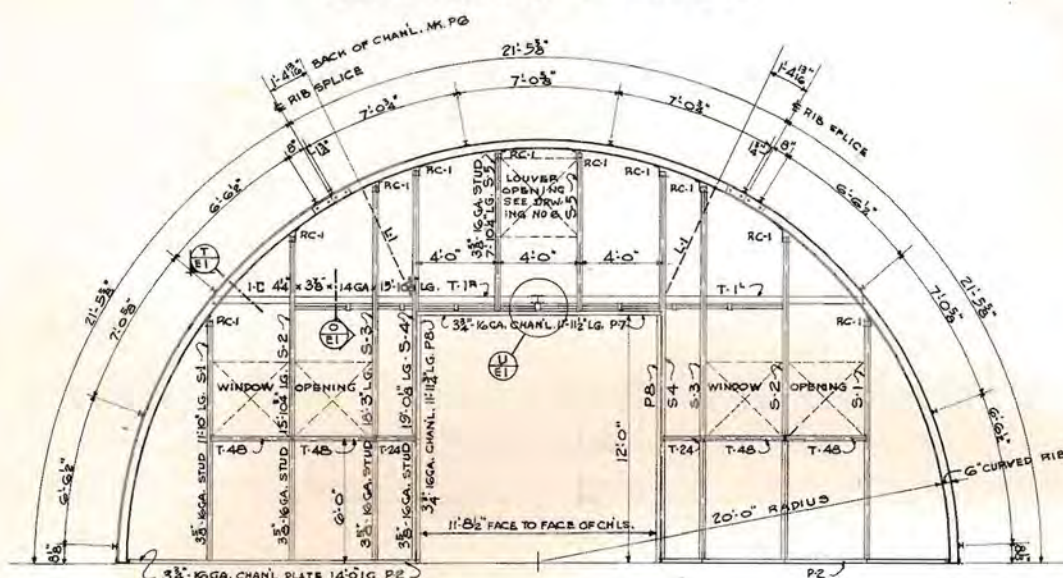


ROOF FRAMING PLAN
SCALE 3/8" = 1'-0"



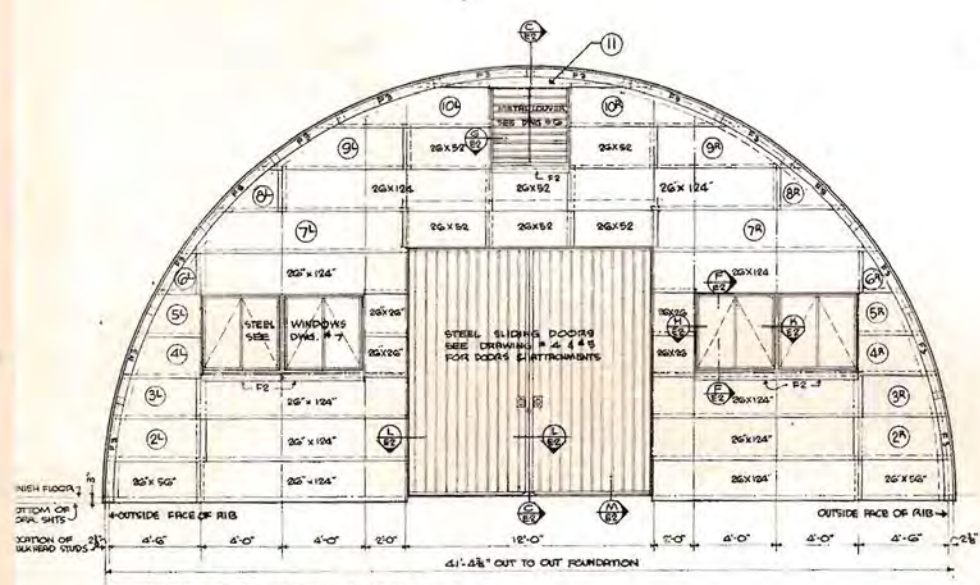
FOUNDATION & ANCHOR BOLT PLAN
SCALE 3/8" = 1'-0"



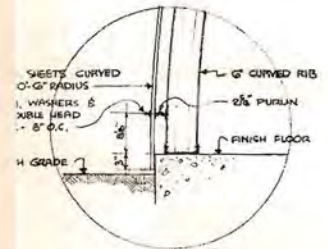


REVISIONS	STRAN STEEL DIVISION GREAT LAKES STEEL CORPORATION DETROIT, MICHIGAN			
	40' x 100' SSAR CONVERSION TYPE UTILITY BLDG. FOUNDATION & FRAMING PLANS			
DATE 10-14-44	DRAWN R.E.S.	CHECKED	JOB NO.	SHEET NUMBER
SCALE NOTED	CUSTOMERS ORDER 1-C-7112	ESTIMATE NUMBER	2730	E1

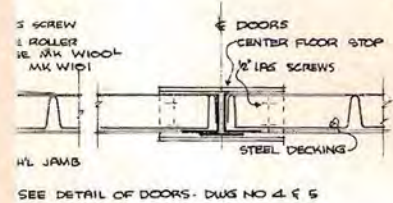




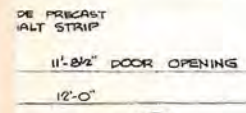
ELEVATION OF BULKHEAD
SCALE: 1/8" = 1'-0"



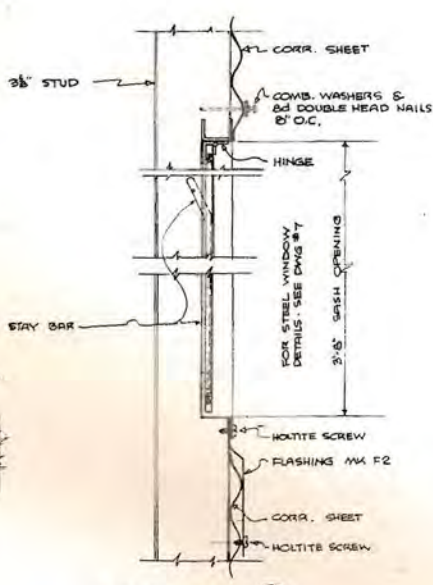
SECTION D
SCALE: 1/8" = 1'-0"



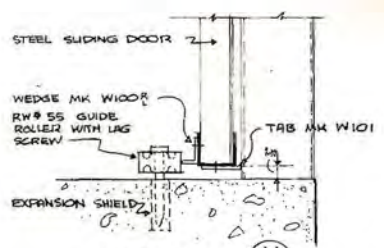
SEE DETAIL OF DOORS - DWG NO 4 & 5



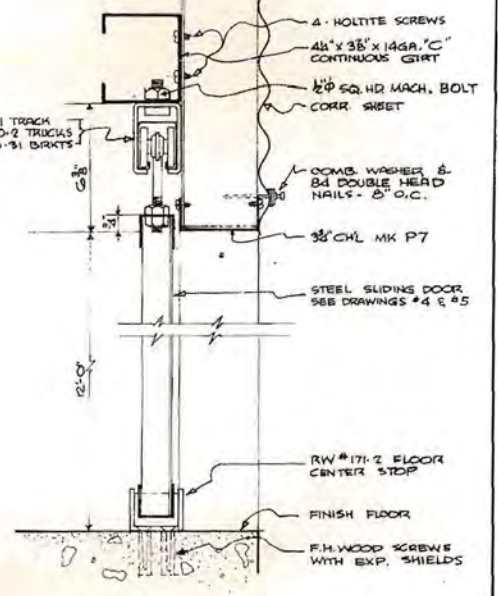
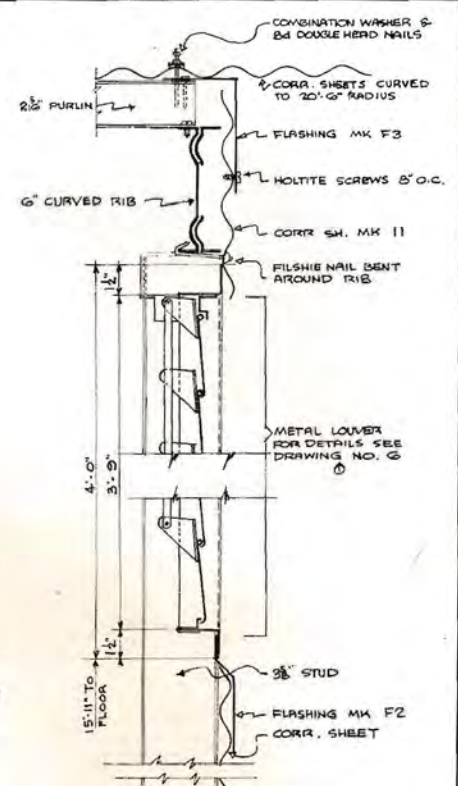
SECTION L
SCALE: 3/8" = 1'-0"



SECTION F
SCALE: 3/8" = 1'-0"

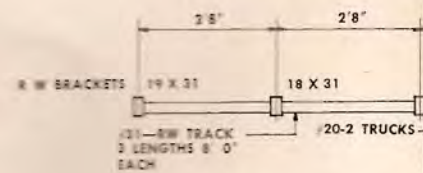
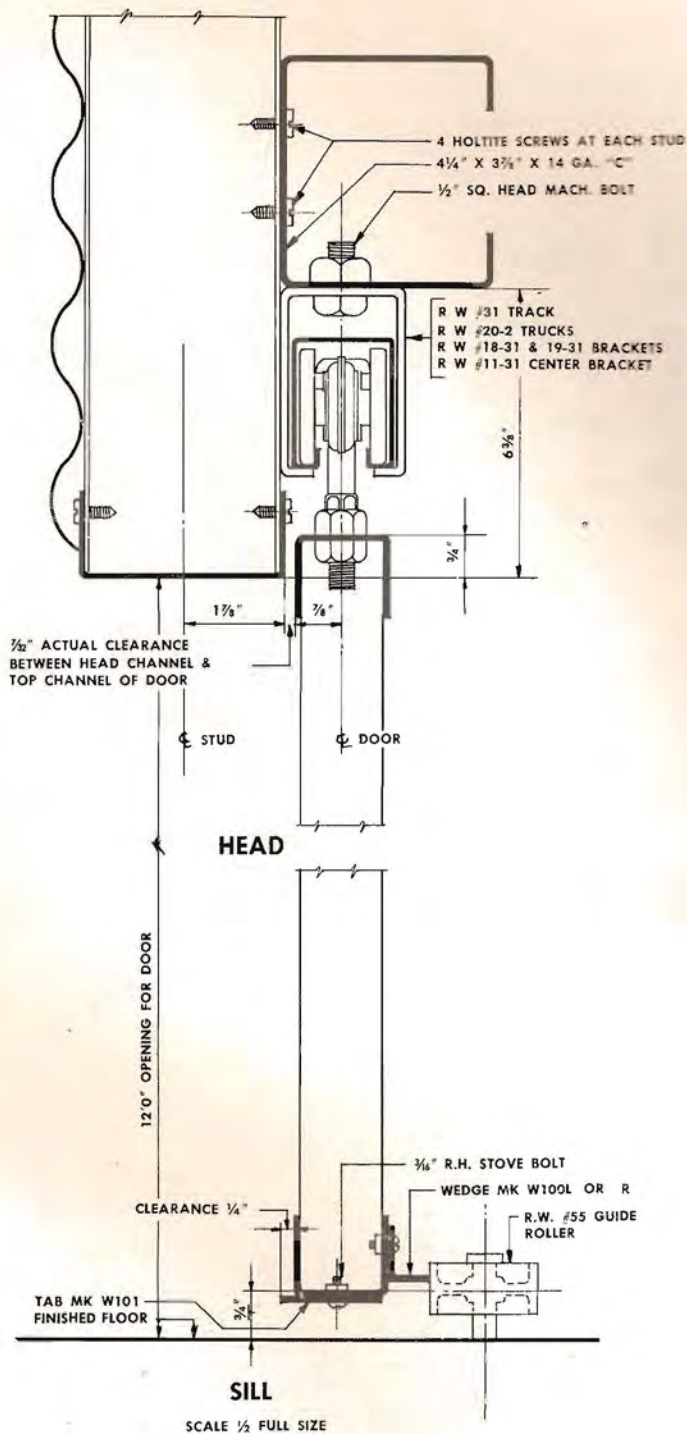


SECTION M
SCALE: 3/8" = 1'-0"

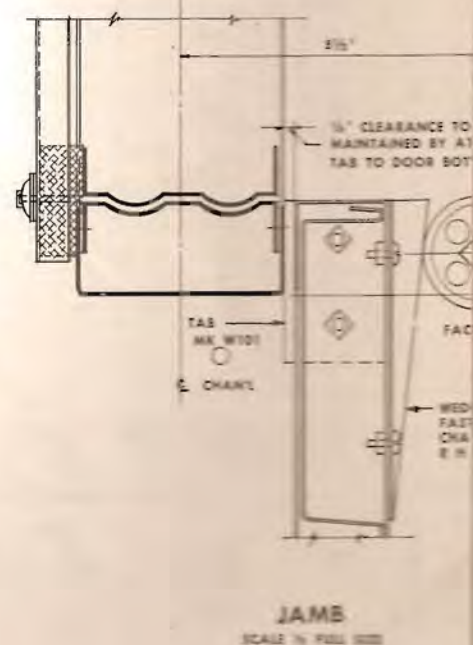
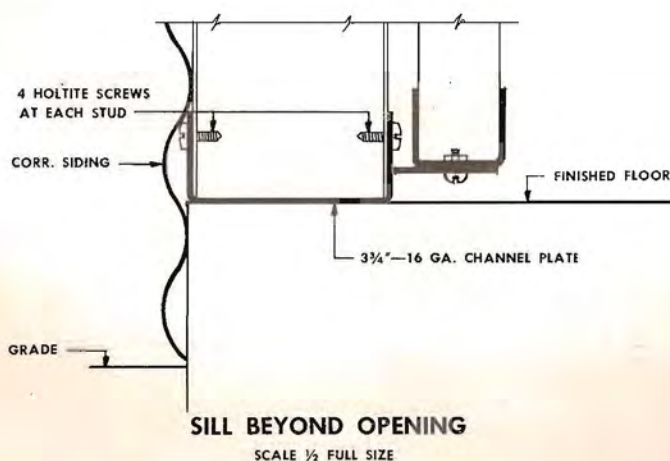


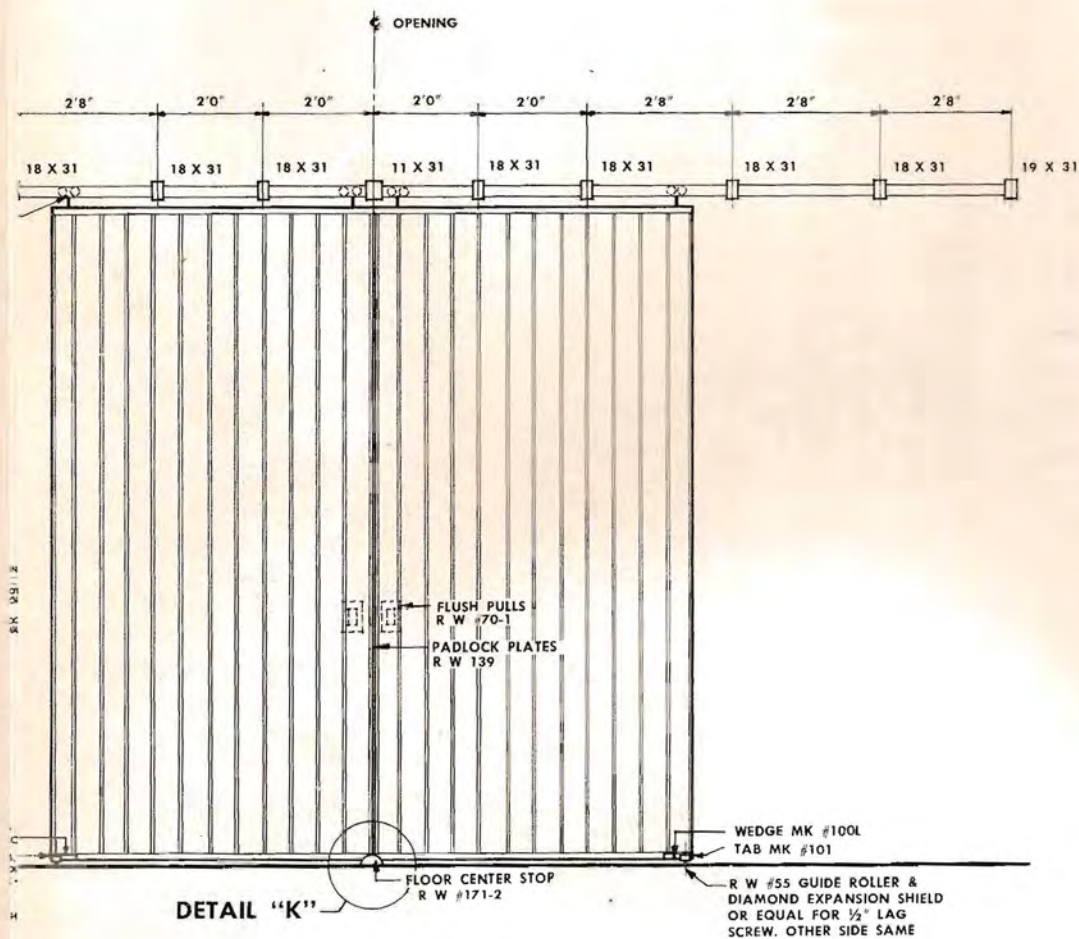
SECTION C
SCALE: 3/8" = 1'-0"

REVISIONS			
1. ESTIMATED COVER, 14" TO 16" MINIMUM			
2. SEE SCALE			
STRAN STEEL DIVISION			
GREAT LAKES STEEL CORPORATION			
DETROIT, MICHIGAN			
SSAR 40'x100' CONVERSION			
TYPE UTILITY BLDG.			
ROOF PLAN AND BULKHEAD			
DATE 10-14-44	DRAWN CSC	CHECKED	JOB NO.
SCALE AS NOTED	CUSTOMER'S ORDER	ESTIMATE NUMBER	2730
			SHEET NUMBER E2



WEDGE MK W100R
 TAB MK W101





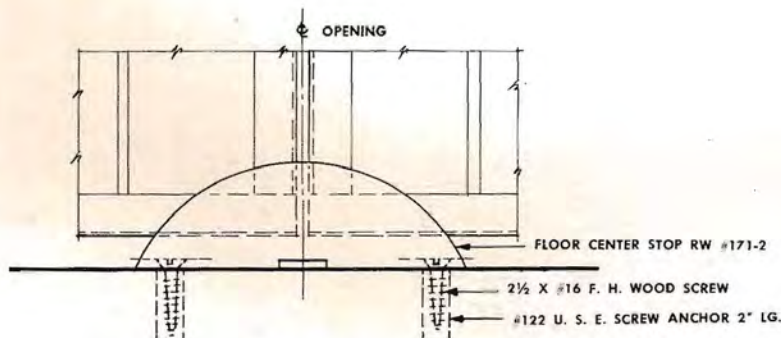
DETAIL "K"

INTERIOR ELEVATION

SCALE 1/2"=1'-0"



GE MK W100L & R
EN TO BOTTOM
N'L WITH 2 3/8"
STOVE BOLTS



DETAIL "K"

SCALE 1/2 FULL SIZE

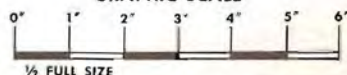
PAINT NOTE

PAINTE ALL SURFACES OF DOOR LEAVES 1 (ONE)
STANDARD SHOP COAT OF METALLIC PRIMING PAINT
BEFORE SHIPMENT. SEE 8/M FOR SPECIFICATION
OF FINISH COAT OF PAINT.

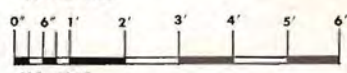
NOTE

HARDWARE TO BE RICHARD-WILCOX OR EQUAL
PADLOCKS ARE NOT FURNISHED UNDER THIS
CONTRACT

GRAPHIC SCALE



1/2 FULL SIZE



1/2" = 1'-0"

BILL OF MATERIAL FOR 1 BUILDING

Item Mark	No. of Pieces	Crate Contents	Item Mark	No. of Pieces	Crate Contents
	6	#HD816 American Fork & Hoe Claw Hammer			BULKHEAD SHEETS (Continued)
	6	#1510 Mayhew Steel 10" Screw Drivers			
	6	$\frac{3}{8}$ " x $8\frac{1}{2}$ " Endres Center Punches	10R	2	26" x 102" x 26 Ga. Galv. Corr. Sheet
	2	#175 Warren $\frac{3}{4}$ " Drift Pins	10L	2	26" x 102" x 26 Ga. Galv. Corr. Sheet
	4	#AC112 Crescent 12" Adjustable Wrenches	11	2	26" x $136\frac{1}{2}$ " x 26 Ga. Galv. Corr. Sheet
	1	#21 Sargent 16 oz. Plumb Bob		4	26" x 126" x 26 Ga. Galv. Corr. Sheet
	1	#14 Danielson 10" Combination Pliers		16	26" x 124" x 26 Ga. Galv. Corr. Sheet
	2	A9 Endres 1" Cold Chisels		4	26" x 56" x 26 Ga. Galv. Corr. Sheet
	2	#236 Stanley 6'0" ZZ Rule		12	26" x 52" x 26 Ga. Galv. Corr. Sheet
	1	150' Coil 16 Ga. Annealed Wire		8	26" x 26" x 26 Ga. Galv. Corr. Sheet
	1	250' Coil 9 Ga. Annealed Wire			
	1	24" Warren Wrecking Bar		2	Pr. 6'0" x 12'0" Steel Sliding Doors
	1	#809 Atkins 26" Hand Saw		4	#19 x 31 End Track Brackets
	1	2 $\frac{1}{4}$ " F. E. Hand Axe (American Fork & Hoe)		16	#18 x 31 Track Brackets
	1	#347N 24" Wood Level Stanley		2	#11 x 31 Center Brackets
	3	Balls 100' Masons Line		6	Pcs. #31 Door Track 8'0" Long
	3	Pcs. Blue Chalk		2	Pr. #55 Door Guide Rollers with Lag Screws
	1	#2165 Union Hack Saw Frame and 6 Blades		2	#171-2 Door Center Floor Stops
	1	60' Coil $\frac{5}{8}$ " Sisal Rope (Bowen & Allison)		4	Pr. #20-2 Door Trucks
	2	#B1 Crescent Mastic Guns		8	#16 x 2 $\frac{1}{2}$ " Lg. F. H. Wood Screws
	1	A110 Crescent 10" Adjustable Wrench		8	#122 USE Screw Anchors $\frac{5}{16}$ " I.D. x 2" Lg. for #16 Wood Screws
		NOTE: Tool Kits—5 Tool Kits Required for 8 Buildings.		4	Diamond Expansion Shields for $\frac{1}{2}$ " Lag Screws
	1	Set Erection Instructions	W100R	2	L 1 $\frac{1}{8}$ " x $\frac{3}{4}$ " x 12 Ga. x 0'6" (Door Wedge)
	72	$\frac{1}{2}$ " Dia. x 8" Anchor Bolts with Nuts and Washers	W100L	2	L 1 $\frac{1}{8}$ " x $\frac{3}{4}$ " x 12 Ga. x 0'6" (Door Wedge)
B6	4	$3\frac{3}{8}$ " x $\frac{3}{16}$ " Splice Plates 0'8 $\frac{1}{2}$ "	W101	4	2" x 12 Ga. Door Tab 3" Long
A1	4	6" x 13 Ga. Channel 0'2 $\frac{1}{2}$ "		20	$\frac{3}{16}$ " x 1" R. Hd. Stove Bolts with Sq. Nuts
L2	4	Angles 2 $\frac{3}{4}$ " x 2 $\frac{3}{4}$ " x 8 Ga. 0'10 $\frac{1}{2}$ "		20	$\frac{3}{16}$ " Cut Steel Washers
L3	8	Angles 3 $\frac{3}{4}$ " x 2 $\frac{3}{4}$ " x 8 Ga. 0'2 $\frac{1}{2}$ "			BULKHEAD FRAMING
RC1	20	3 $\frac{5}{8}$ " Rafter Clips			
	240	$\frac{3}{4}$ " x 1 $\frac{1}{2}$ " Mach. Bolts with Sq. Nuts	L1	4	Angles 3" x 3" x 14 Ga. Brace 8'3 $\frac{1}{4}$ "
	240	$\frac{3}{4}$ " Cut Steel Washers	T1R	2	Channels 4 $\frac{1}{4}$ " x 3 $\frac{7}{8}$ " x 1" 14 Ga. Girt 15'10 $\frac{3}{8}$ "
	100	$\frac{1}{2}$ " x 1" Machine Bolts with Sq. Nuts	T1L	2	Channels 4 $\frac{1}{4}$ " x 3 $\frac{7}{8}$ " x 1" 14 Ga. Girt 15'10 $\frac{3}{8}$ "
	100	$\frac{1}{2}$ " Cut Steel Washers	S1	4	3 $\frac{5}{8}$ " x 16 Ga. S.S. Studs 11'10"
	3500	#14 x $\frac{5}{8}$ " Cadmium Plated Sheet Metal Screws P. K. Style "A"	S2	4	3 $\frac{5}{8}$ " x 16 Ga. S.S. Studs 15'10 $\frac{3}{4}$ "
	350	8d Common Nails	S3	4	3 $\frac{5}{8}$ " x 16 Ga. S.S. Studs 18'3"
	3500	8d Double Head Galv. Nails	S4	4	3 $\frac{5}{8}$ " x 16 Ga. S.S. Studs 19'0 $\frac{1}{8}$ "
	3500	$\frac{5}{8}$ " Comb. Steel and Fibre Washers with .140" Dia. Hole in Center	S5	4	3 $\frac{5}{8}$ " x 16 Ga. S.S. Studs 7'10 $\frac{1}{4}$ "
	3500	$\frac{5}{8}$ " Comb. Steel and Fibre Washers with .250" Dia. Hole in Center	T24	4	Half Stud Trimmers 1'11 $\frac{1}{2}$ "
	100	Filshie Nails	T48	8	Half Stud Trimmers 3'11 $\frac{1}{2}$ "
			P2	4	3 $\frac{3}{4}$ " x 1 $\frac{5}{8}$ " x 16 Ga. Channel Pl. 14'0" Long
			P6	4	6" x 1 $\frac{3}{4}$ " x 13 Ga. Channel 4'5"
			P7	4	3 $\frac{3}{4}$ " x 16 Ga. Channel Pl. 11'11 $\frac{1}{2}$ "
			P8	8	3 $\frac{3}{4}$ " x 16 Ga. Channel Pl. 11'11 $\frac{3}{4}$ "
P1	26	6" x 1 $\frac{3}{4}$ " x 16 Ga. Channel Pl. 4'2" Lg.			

PR1	60	2 $\frac{5}{16}$ " x 18 Ga. Purlins 19'11 $\frac{7}{8}$ "
R1	20	6" x 16 Ga. 21'5 $\frac{1}{2}$ " Ribs 2 Crates Req'd.
R1	19	6" x 16 Ga. 21'5 $\frac{1}{2}$ " Ribs 2 Crates Req'd.
	92	27 $\frac{1}{2}$ " x 92" x 24 Ga. Corr. Galv. Sheets (Curved) Curved to 20'6" Rad. Inside 5 Crates Req'd.

BULKHEAD SHEETS

2R	2	26" x 57" x 26 Ga. Galv. Corr. Sheet
2L	2	26" x 57" x 26 Ga. Galv. Corr. Sheet
3R	2	26" x 54 $\frac{1}{2}$ " x 26 Ga. Galv. Corr. Sheet
3L	2	26" x 54 $\frac{1}{2}$ " x 26 Ga. Galv. Corr. Sheet
4R	2	26" x 48" x 26 Ga. Galv. Corr. Sheet
4L	2	26" x 48" x 26 Ga. Galv. Corr. Sheet
5R	2	26" x 39 $\frac{1}{2}$ " x 26 Ga. Galv. Corr. Sheet
5L	2	26" x 39 $\frac{1}{2}$ " x 26 Ga. Galv. Corr. Sheet
6R	2	26" x 29" x 26 Ga. Galv. Corr. Sheet
6L	2	26" x 29" x 26 Ga. Galv. Corr. Sheet
7R	2	26" x 132" x 26 Ga. Galv. Corr. Sheet
7L	2	26" x 132" x 26 Ga. Galv. Corr. Sheet
8R	2	26" x 43" x 26 Ga. Galv. Corr. Sheet
8L	2	26" x 43" x 26 Ga. Galv. Corr. Sheet
9R	2	26" x 89 $\frac{1}{2}$ " x 26 Ga. Galv. Corr. Sheet
9L	2	26" x 89 $\frac{1}{2}$ " x 26 Ga. Galv. Corr. Sheet

T3	8	Window Sash
B3	8	Window Heads
JR3	8	Window Sills
JL3	8	Window Jambs
S3	32	Splice Plates
SB2	8	Stay Bars
	160	#10 x $\frac{1}{4}$ " R. H. Type "Z" Parker Kalon Sht. Metal Screws
	8	#8—32 x $\frac{3}{8}$ " R.H.M.S.
F2	10	6 $\frac{1}{2}$ " x 28 Ga. Galv. Flashing 54"
F3	28	3 $\frac{1}{2}$ " x 5 $\frac{3}{8}$ " x 28 Ga. Galv. Flashing (Curved) 64"
	1	5 Gal. Can Mastic
	1	5 Gal. Can Paint
	1	4" Wide Paint Brush
	44	2 $\frac{1}{2}$ " Corr. Asphalt Strip 2" Wide 2'4" Lg.
	2	Metal Louvres Complete with Frame
	2	24 Ga. Sill Flashing
	28	$\frac{3}{16}$ " x 1" Stove Bolts with Nut & Washer
	10	$\frac{3}{16}$ " x $\frac{1}{2}$ " Stove Bolts with Nut & Washer
	8	#14 x $\frac{5}{8}$ " Sheet Metal Screws, Type "A"
	104	Splice Plates 5 $\frac{5}{8}$ " x $\frac{3}{4}$ " x 12 Ga. x 2'1"

ADAPTATION ERECTION SEQUENCE



BULKHEAD FRAMING



ASSEMBLE FRAME



FOUNDATIONS



BULKHEAD SHEETS



ROOFING SHEETS



COMPLETED BUILDING



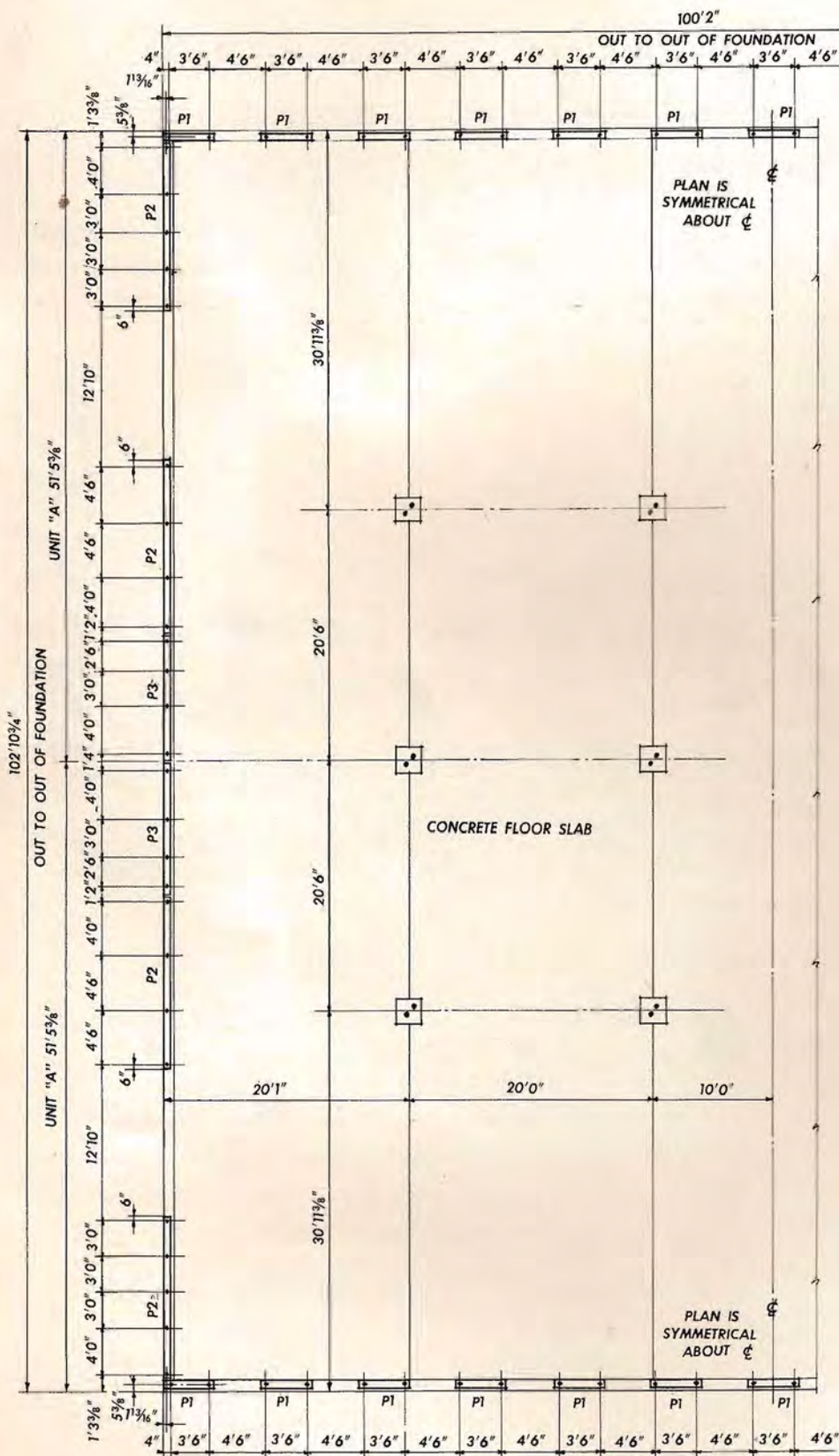
1. Foundations. Lay out building, set anchor bolts, and pour concrete. Place channel plates. (See pages 20 and 21.)

2. Columns, Girders, and Struts. Assemble and erect interior columns and beams, bulkhead studs S4 and S6 with girts P5 and T48, install rod and knee bracing. Plumb, brace and guy free standing columns. (See pages 22, 23, 24 and 25.)

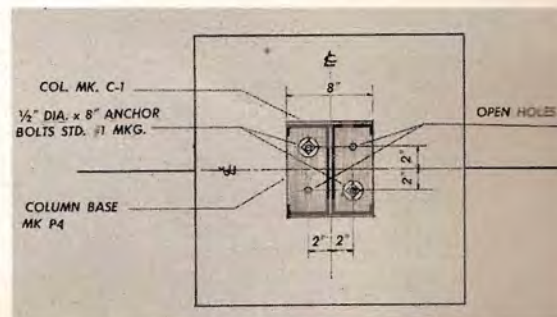
3. Ribs and Purlins. Assemble and raise ribs, install purlins. (See pages 26 and 27.)

4. Bulkheads. Assemble remainder of bulkhead framing from steel studs and girts, hang doors, install windows, and apply corrugated metal sheets, louvers and flashing. (See pages 28 and 29.)

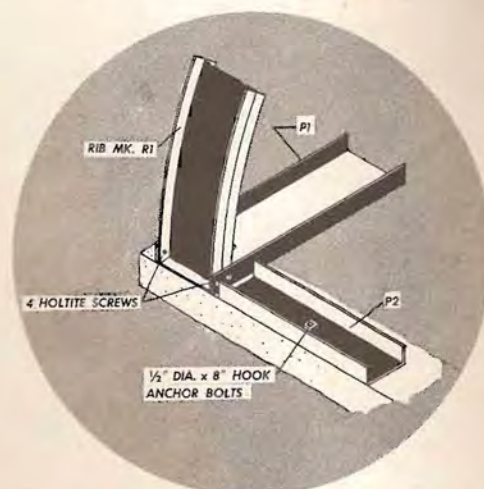
5. Exterior Covering. Install gutters. Nail corrugated roofing sheets to purlins. (See pages 30 and 31.)

ADAPTATION
FOUNDATION

**ONE HALF FOUNDATION AND ANCHOR BOLT PLAN
OTHER HALF SIMILAR EXCEPT OPPOSITE HAND**



DETAIL AT COLUMN BASE



**DETAIL AT CORNER SHOWING
PLATES AND FIRST RIB**



CHANNEL PLATE

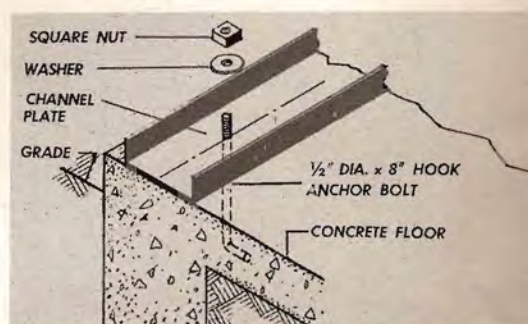
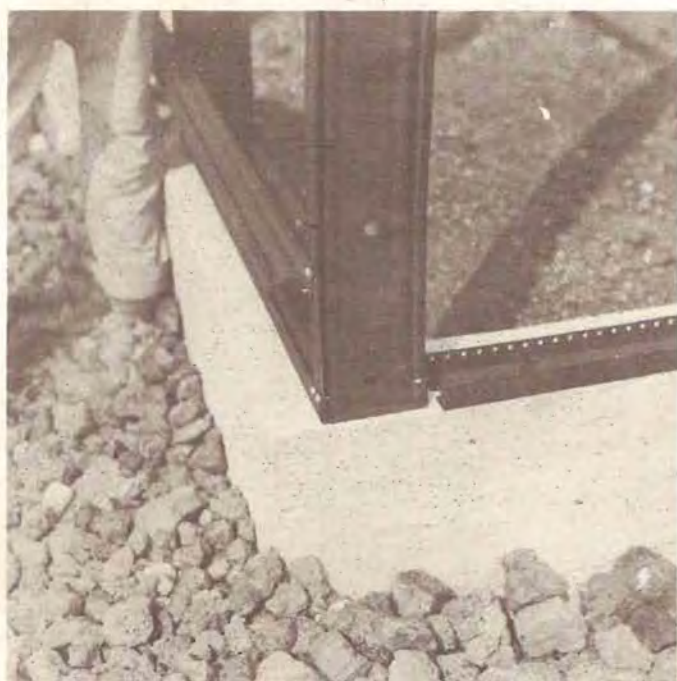


PLATE AND ANCHOR BOLT



FOUNDATIONS IN PLACE



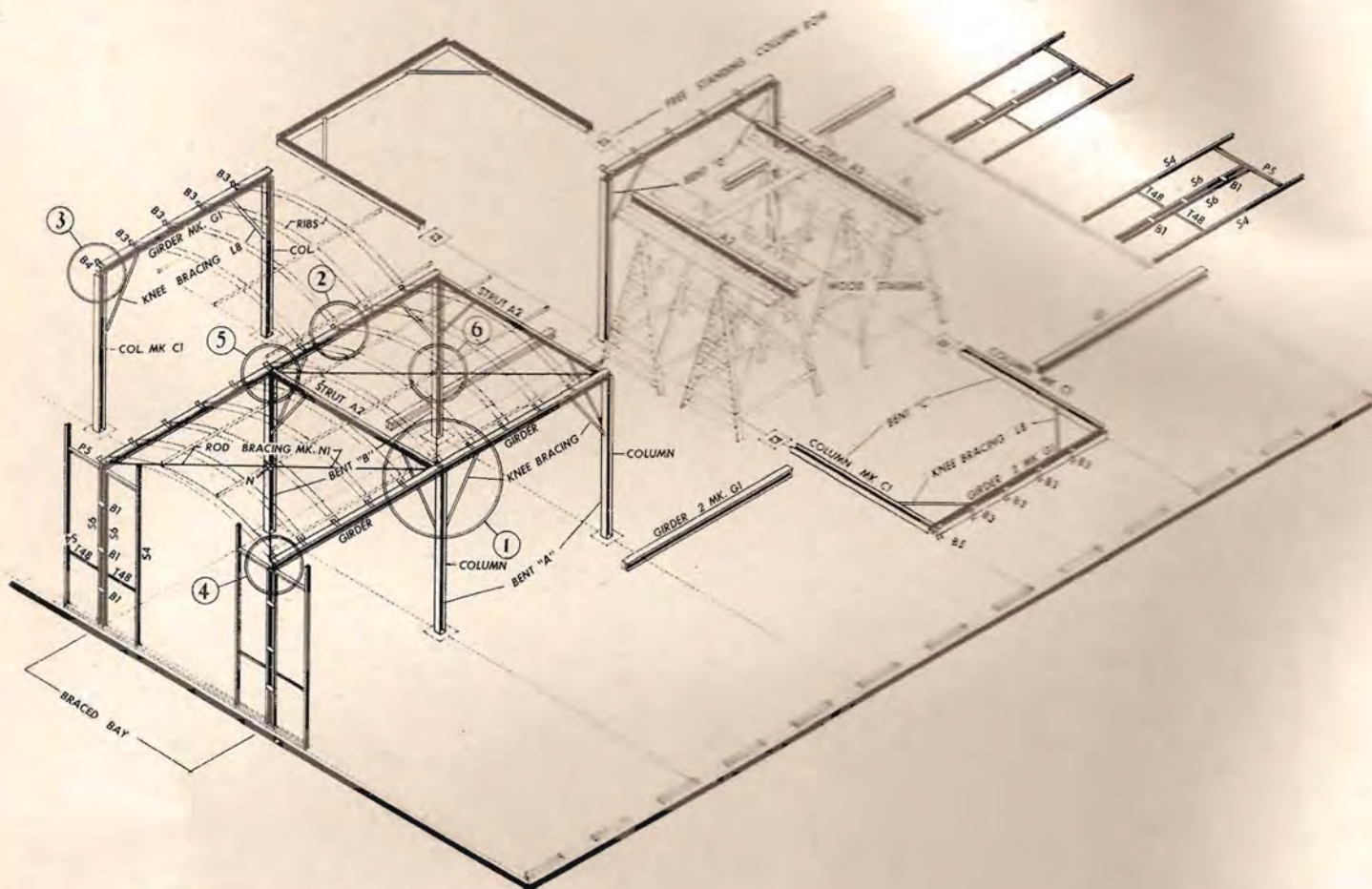
CORNER DETAIL

1 **A.** Level the site and lay out building accurately to dimensions shown on foundation plan.

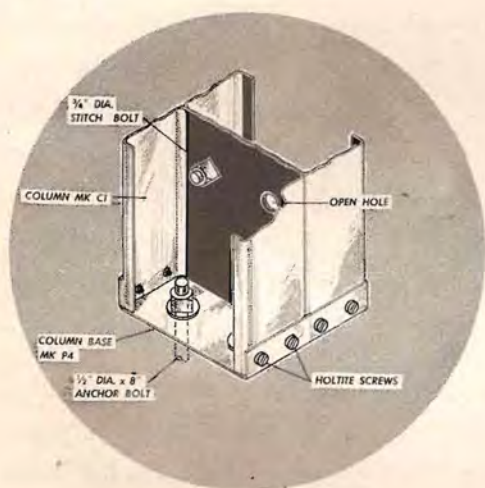
Excavate for wall and column footings, set anchor bolts, noting that all anchor bolts project $1\frac{1}{2}$ " above finished floor line, and pour concrete. (The engineer in charge of erection must design the footings to suit local soil conditions.) If anchor bolts have been improperly set, cut new holes in channel plates with torch or cold chisel.

B. Level the plates with small wedges at the bolts. When plates are true and level, grout in under them with lean cement mortar and tighten bolts. See basic unit for details not shown on these pages.

ADAPTATION COLUMNS, GIRDERS AND STRUTS



COLUMNS AND GIRDERS SHOWING
ORDER OF ERECTION



DETAIL AT COLUMN BASE

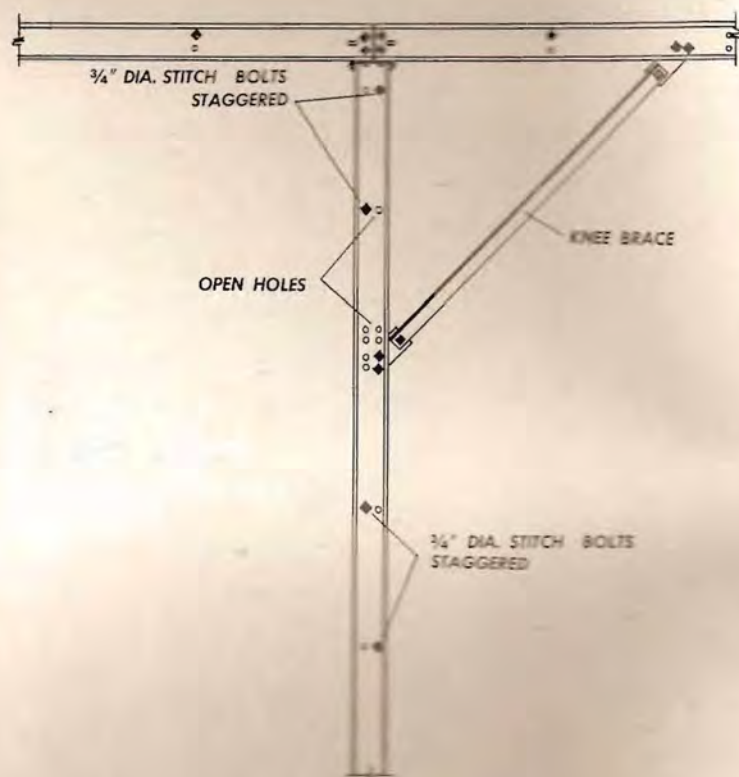
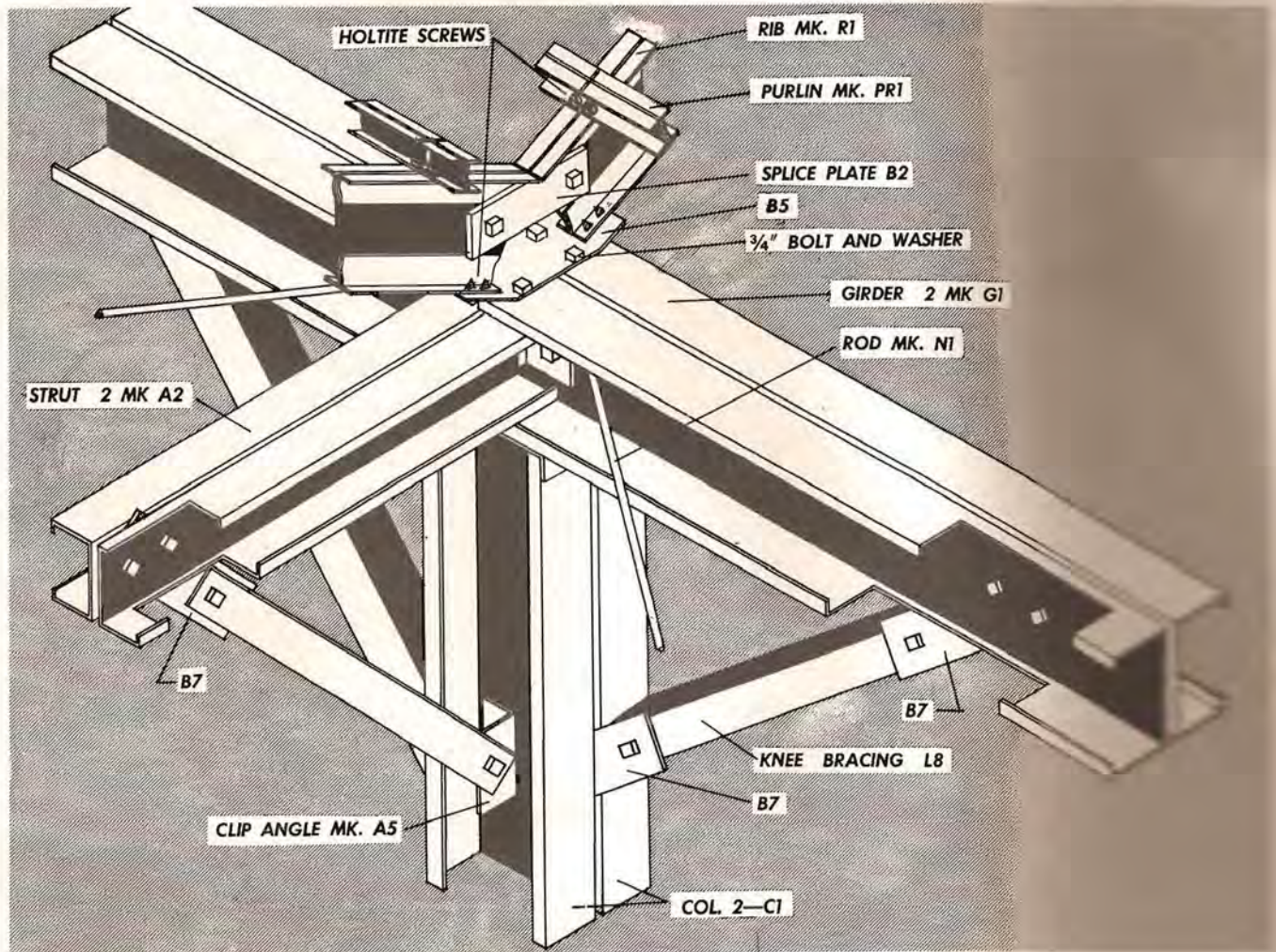
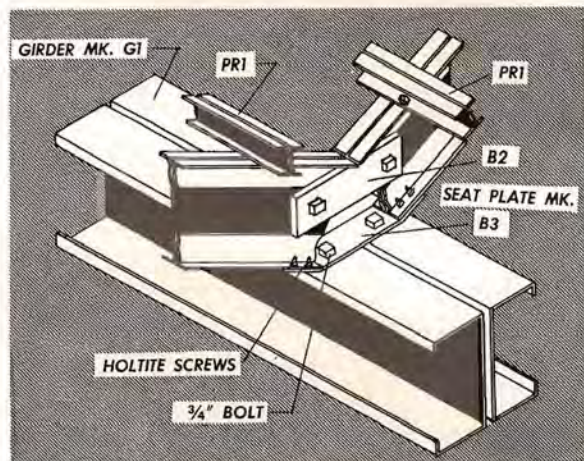


DIAGRAM SHOWING LOCATION OF STITCH BOLTS

ADAPTATION COLUMNS, GIRDERS AND STRUTS



DETAIL 1



DETAIL 2



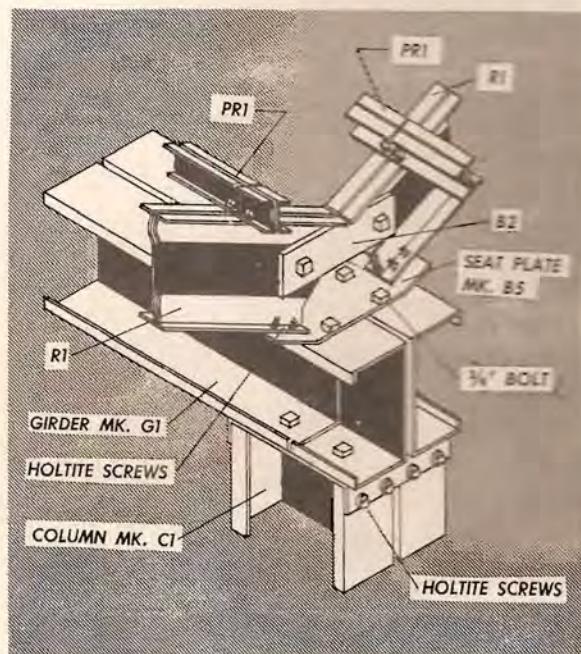
RIBS AND GIRDERS

2 A. Assemble columns, girders and rods (from "C" sections) on the ground, close to their position in the building. Bolt the "C" sections together with $\frac{3}{4}$ " x $1\frac{1}{2}$ " stitch bolts, staggered, leaving one open hole opposite each bolt.

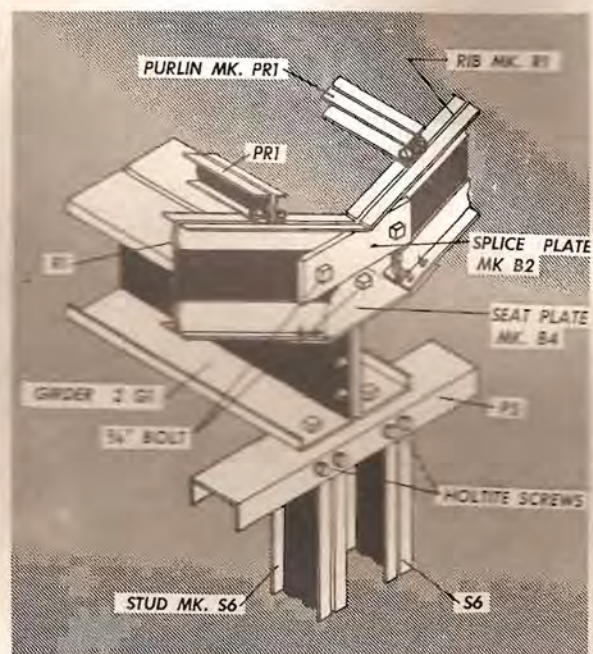
B. Build wooden staging similar to that shown in drawings. Then assemble, on the ground, the bent marked "A" on drawing, complete with girders, columns, column caps and bases, knee bracing, gusset plates, clip angles, and bent plates for rib connections. Raise the bent into position, brace and guy, and tighten anchor bolts.

C. Next, assemble the bent marked "B" on drawings, erect in the same way, install struts 2-A2, and rod bearing N1. This frame will now stand alone, and after installing the four rib sections R1 with their purlins, wood staging can be moved to erect bents "C" and "D" in the manner just outlined.

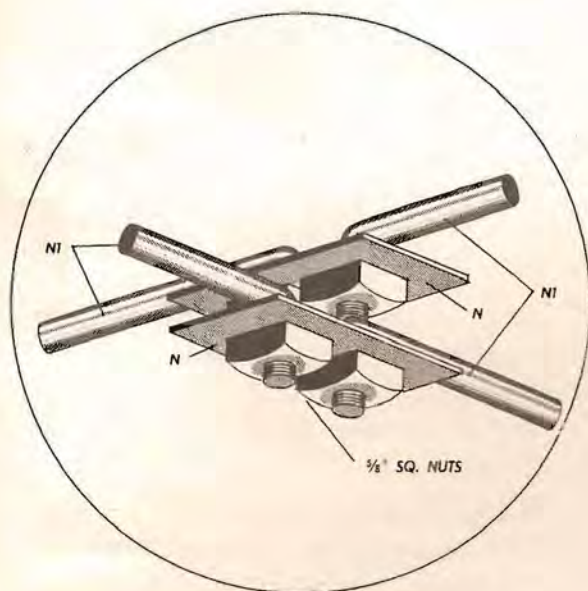
ADAPTATION COLUMNS, GIRDERS AND STRUTS



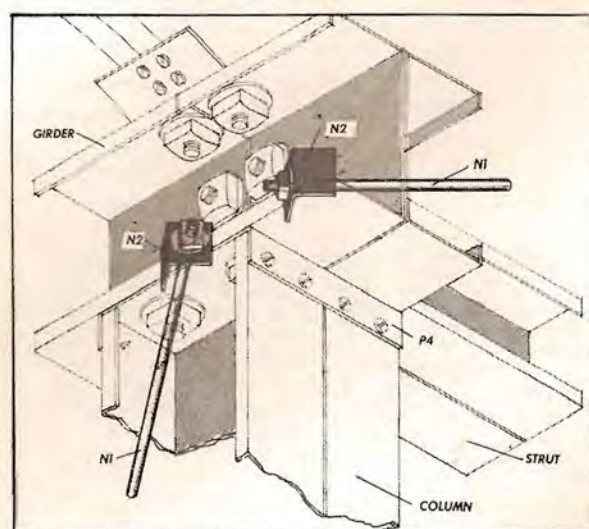
DETAIL 3



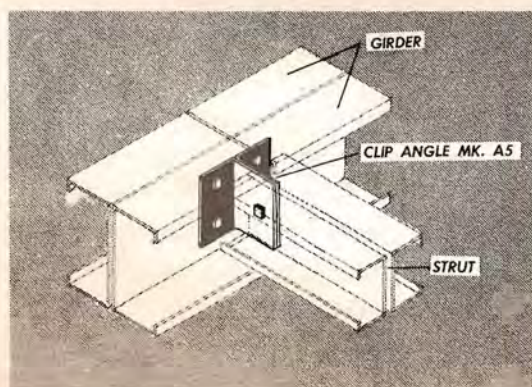
DETAIL 4



DETAIL OF TIE RODS



WASHERS FOR TIE RODS



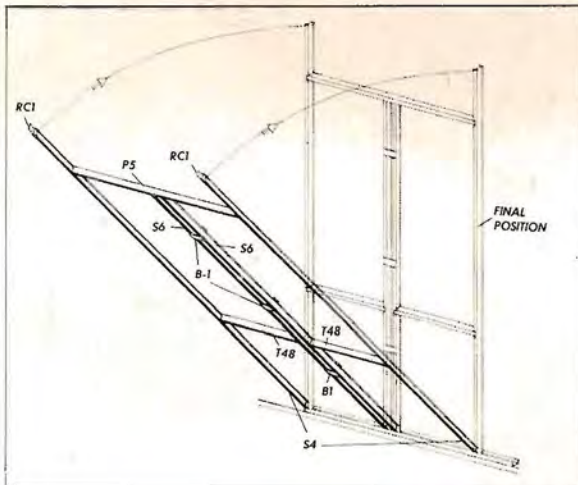
DETAIL SHOWING ANGLE CONNECTION



COLUMN BASE



ASSEMBLING FRAME



ERECT FRAME



FRAME IN PLACE

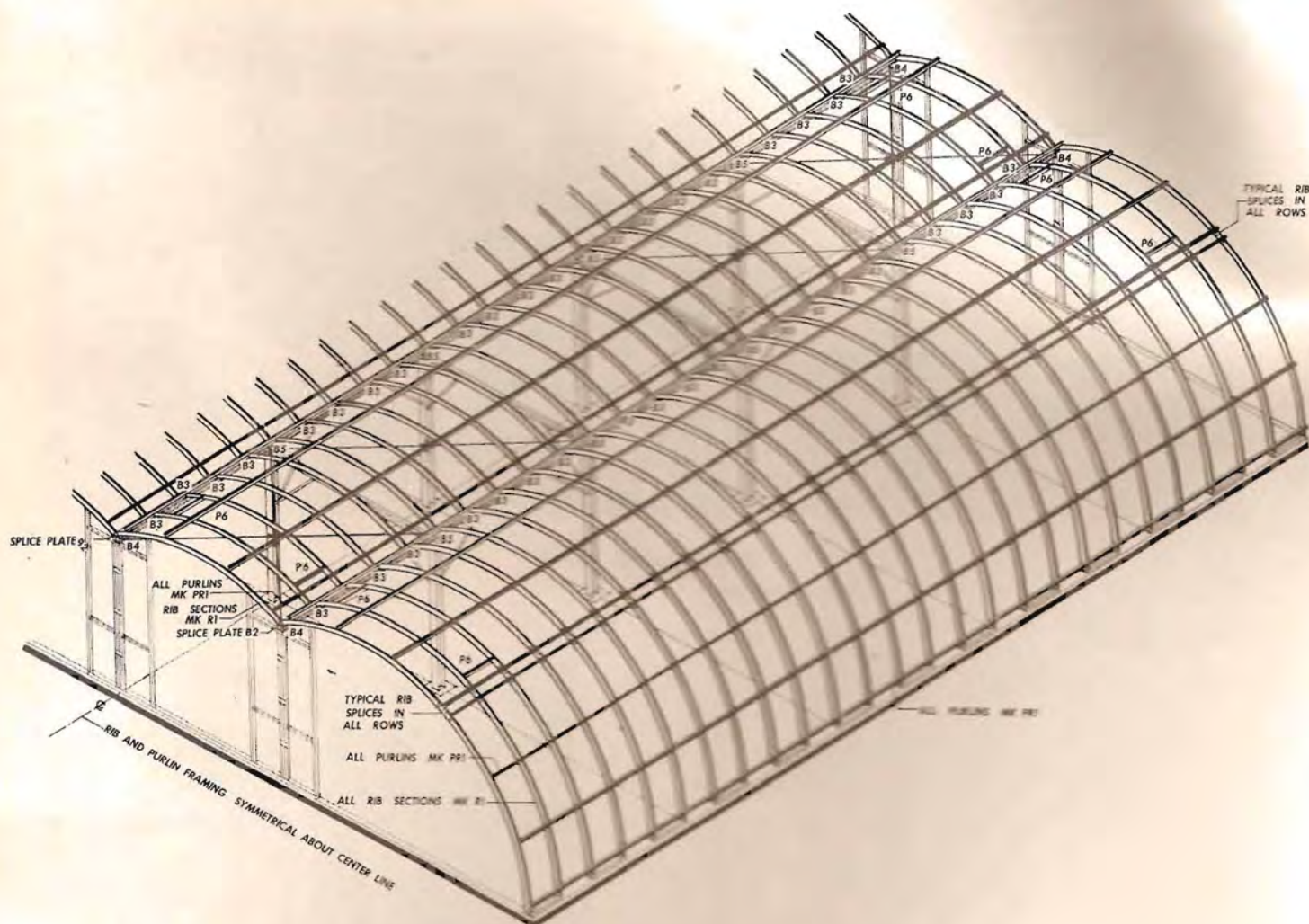
2 (Continued) **D.** Now assemble bulkhead frames, each consisting of two studs S6, two S4, (connected with batten plates B1) with rafter clips RC1, channel girt P5, and half stud girts T48. Erect these frames complete, fasten to channel plate with Holtite screws, brace and guy.

E. Erect the remainder of the girders in the braced bay, and install balance of rod sway bracing N1. Check for plumb, and true up entire braced bay before proceeding.

F. Assemble the free-standing columns in pairs, and erect by bents, complete with girder and knee bracing in the order used at braced bay. Make sure that bent plates B3, B4 and B5 are attached to girder before bents are raised.

G. As each bent is erected, install rib sections R1 and purlins PR1 between braced bay and free-standing column row. This will brace column row until outer row of ribs is in place.

ADAPTATION RIBS AND PURLINS



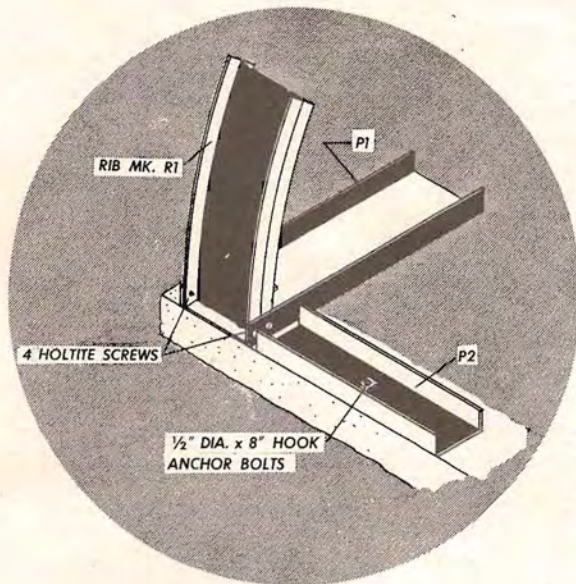
ONE HALF RIB AND PURLIN FRAMING DIAGRAM
(OTHER HALF SIMILAR)



SPLICING RIBS



KNEE BRACES



END RIB



ERECT RIBS

- 3** **A.** Working on the ground, assemble all the ribs that span between braced bay and channel plates P1. Using wood staging, erect these ribs. Raise an end rib first, then follow with the others in sequence, securing each rib as it is raised to channel plate P1 at bottom, and bent plate B3, B4 or B5, as the case may be, at the girder. As successive groups of ribs are raised, install the purlins between them using two



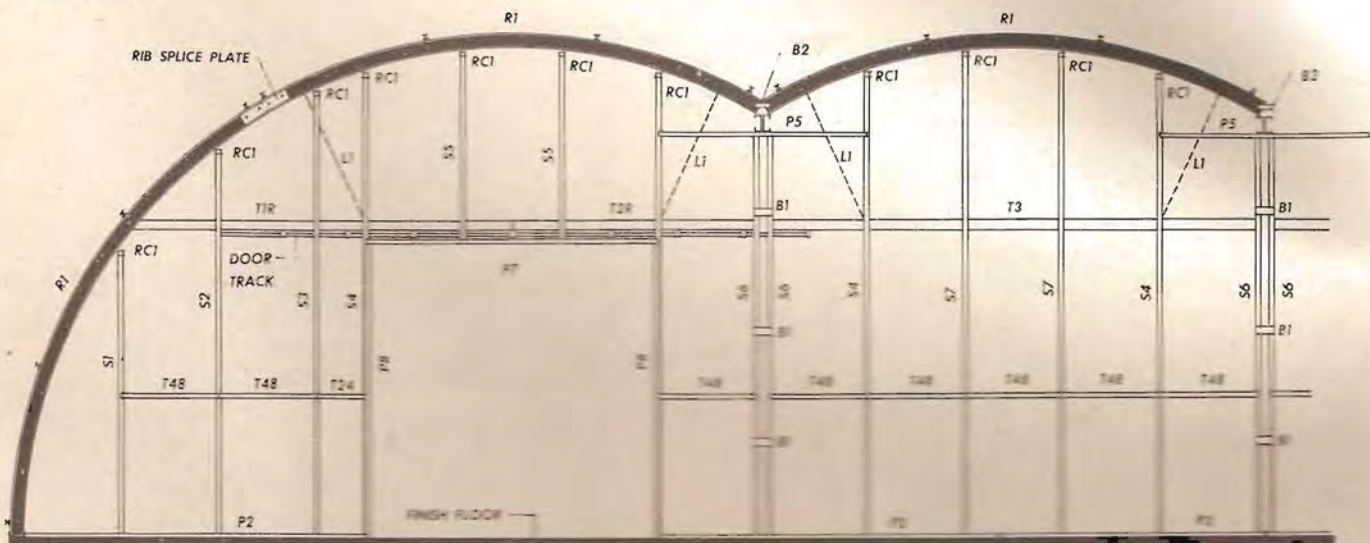
RIB AND PURLIN FRAMING



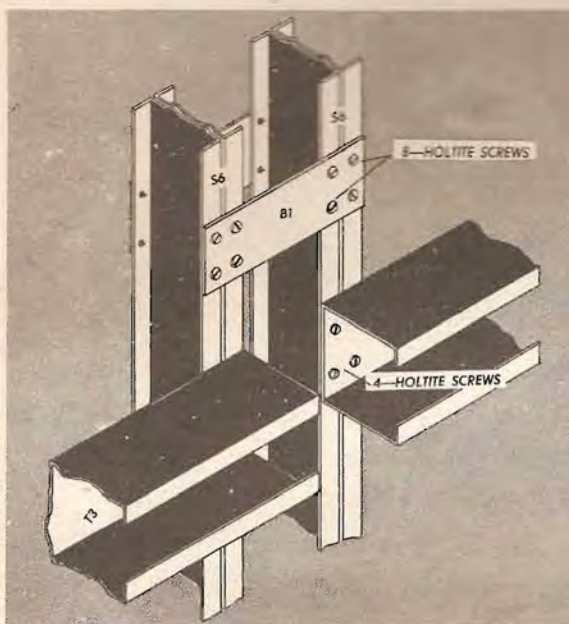
P1 AND P2

- Holtite screws placed diagonally at each rib and four screws where purlins join. Install channel sections P2 in second purlin bays from each end of building.
- B.** Now move wood staging to other side of building and assemble and erect the remainder of the ribs, purlins, and channel sections P2 in the manner just outlined. For details not shown on these pages, see Basic Unit.

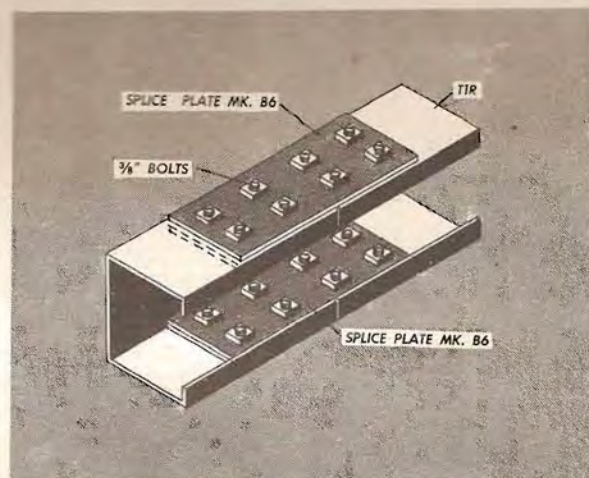
ADAPTATION BULKHEADS



ONE HALF ELEVATION OF BULKHEAD FRAMING
(OTHER HALF SIMILAR BUT OPPOSITE HAND)



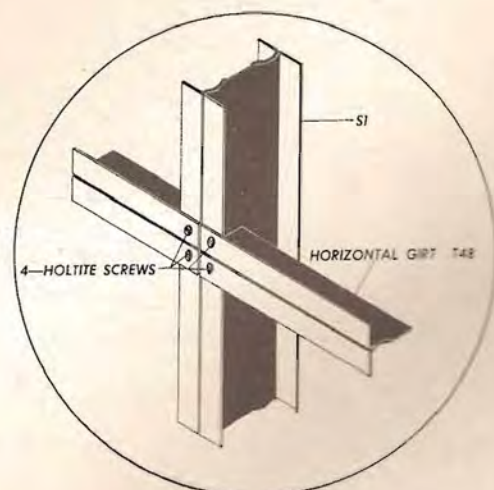
WIND GIRTS AND BATTEN
PLATES AT STUDS S6



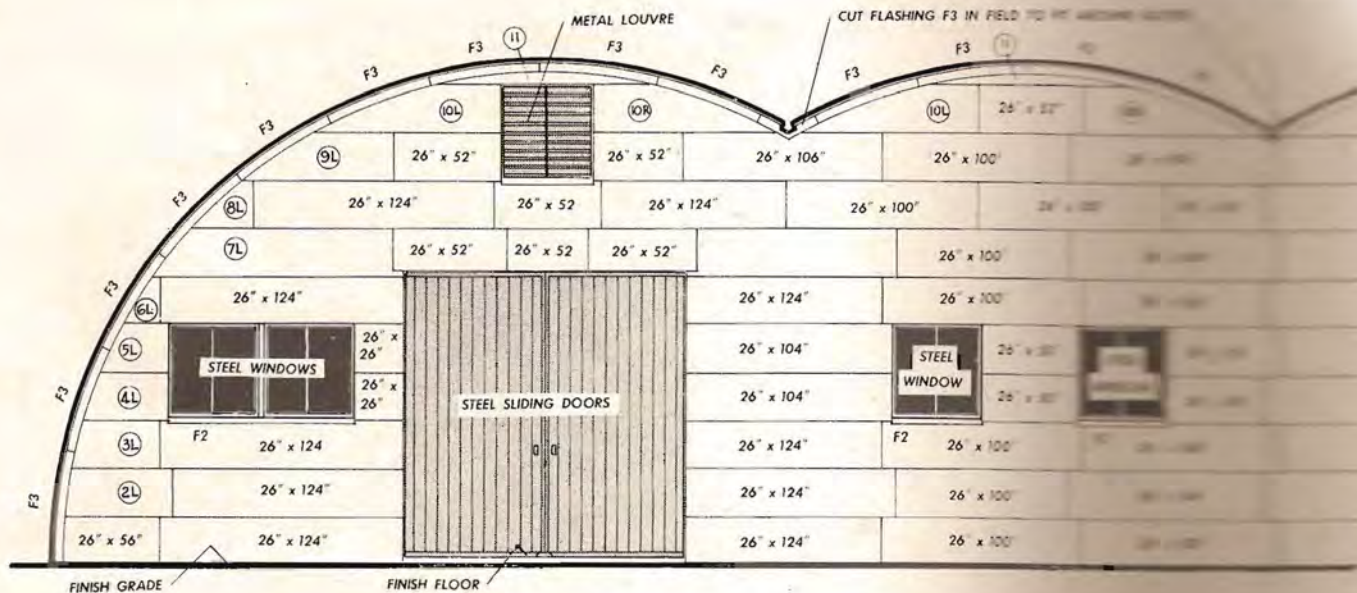
WIND GIRT SPLICE



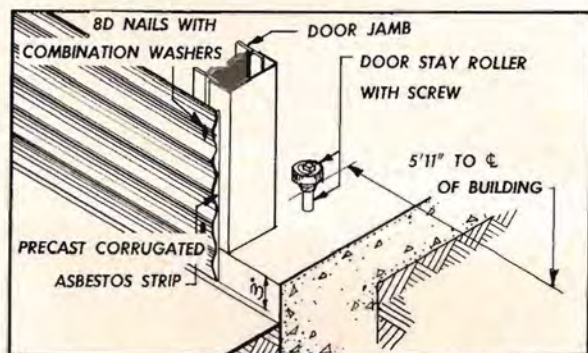
BULKHEAD FRAMING



STUD AND GIRT



ONE HALF ELEVATION OF BULKHEAD SHOWING CORRUGATED SHEETS
(OTHER HALF SIMILAR BUT OPPOSITE HAND)



DOOR JAMB AND STAY ROLLER



DOOR JAMB

4

A. To the bulkhead frame already erected, add the studs S1, S2, S3, S4, S5 and S7, complete with rafter clips RC1. Add girts T24, remainder of girts T48, and wind girt. Note details of wind girt splice and connection to end rib. Connect wind brace L1 to girt and channel section P6. Install channel door frames P7 and P8, hang doors and install windows. For door and window details not shown on these sheets, see Basic Unit.

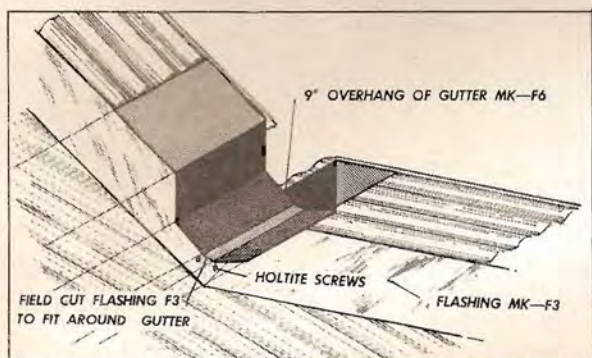
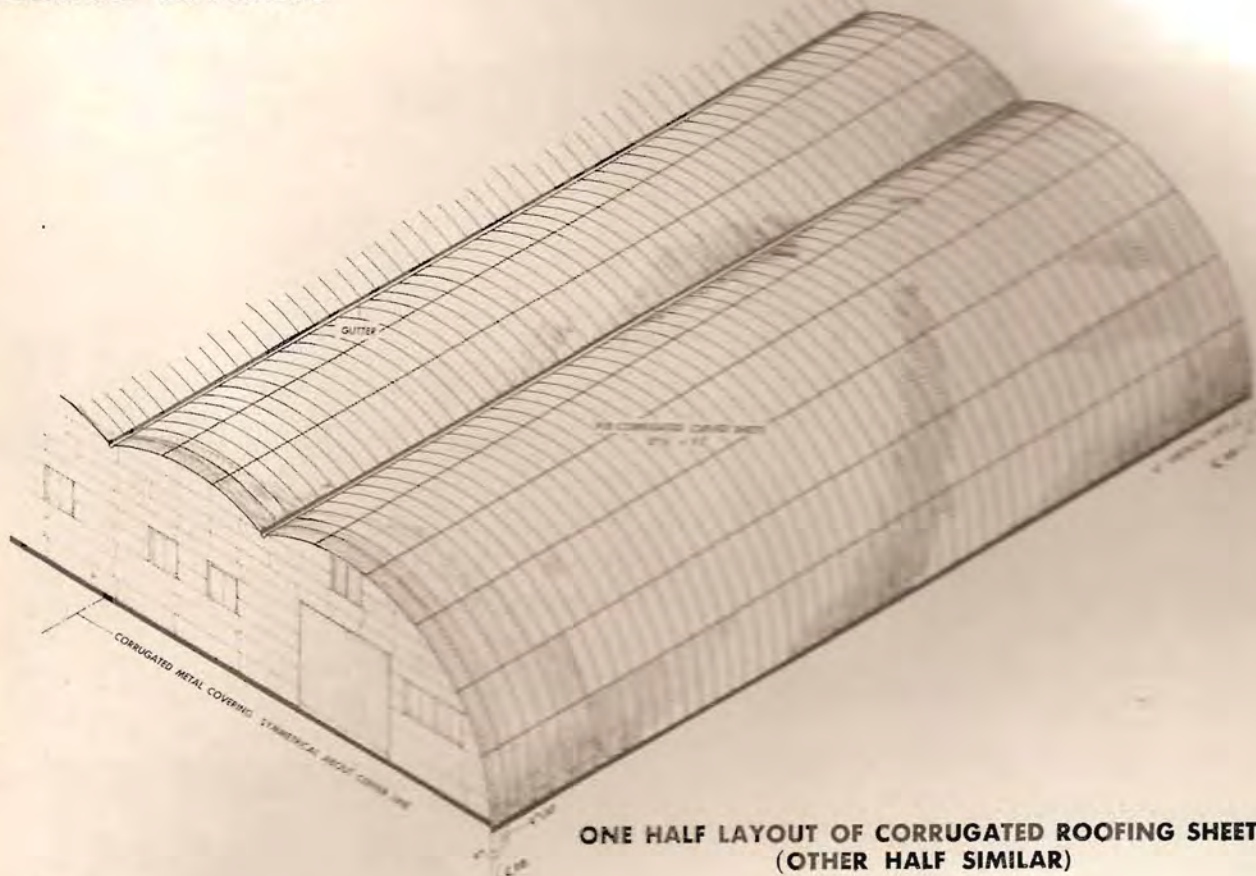
B. The following description applies to the half of the bulkhead shown in drawing, the corrugated sheets of which are marked with a number and the suffix "L." The corrugated sheets on the other half are applied in the same manner and order as on this half; the numbers of these sheets, however, carry the suffix "R." Start with the 26" x 56" sheet at lower outside edge of bulkhead. Turn this sheet so that bottom corrugation appears

convex from outside of building, and allow it to project 3" below bottom of channel plate P-2. Fasten to rib with filshie nail and nail to stud marked S-1, with edge projecting 3" beyond center line of stud S-1.

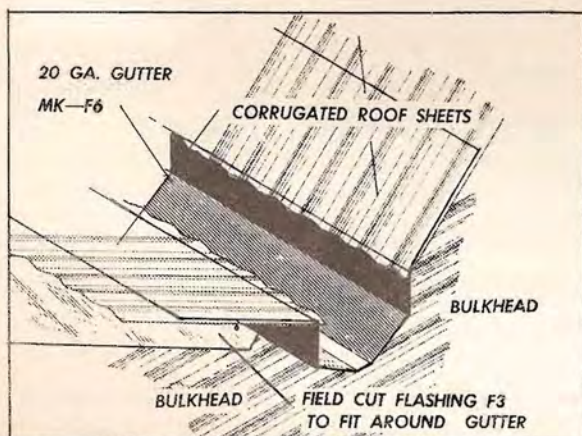
C. Next apply 26" x 124" sheet, leaving 3/4" gap 3/4" back from face of jamb channel. Then install sheet 2-L and 26" x 124" sheet, lapping them over corrugation over sheets below, and 6" at vertical joint. Continue in this manner, placing the sheets as shown until all sheets are in place. For work around doors and door details not shown here, see Basic Unit, pages 1 and 2.

D. Nail the curved flashing F-3 to jamb and secure to corrugated sheets with filshie screws. Start with the lowest piece (marked F-3) hang it with the bottom of the corrugated sheet, then lap each succeeding piece over the one below. (See detail showing necessary field cutting of flashing F-3 at girts.)

ADAPTATION EXTERIOR COVERING



BOTTOM VIEW OF GUTTER AT BULKHEAD



TOP VIEW OF GUTTER AT BULKHEAD



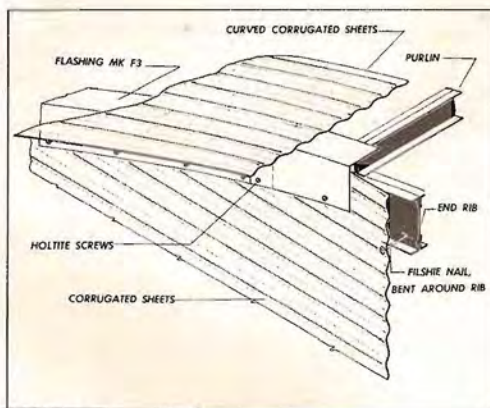
INSTALLING GUTTER



**PLAN OF
GUTTER**



INSTALL TOP SHEETS LAST



BULKHEAD FLASHING F-3

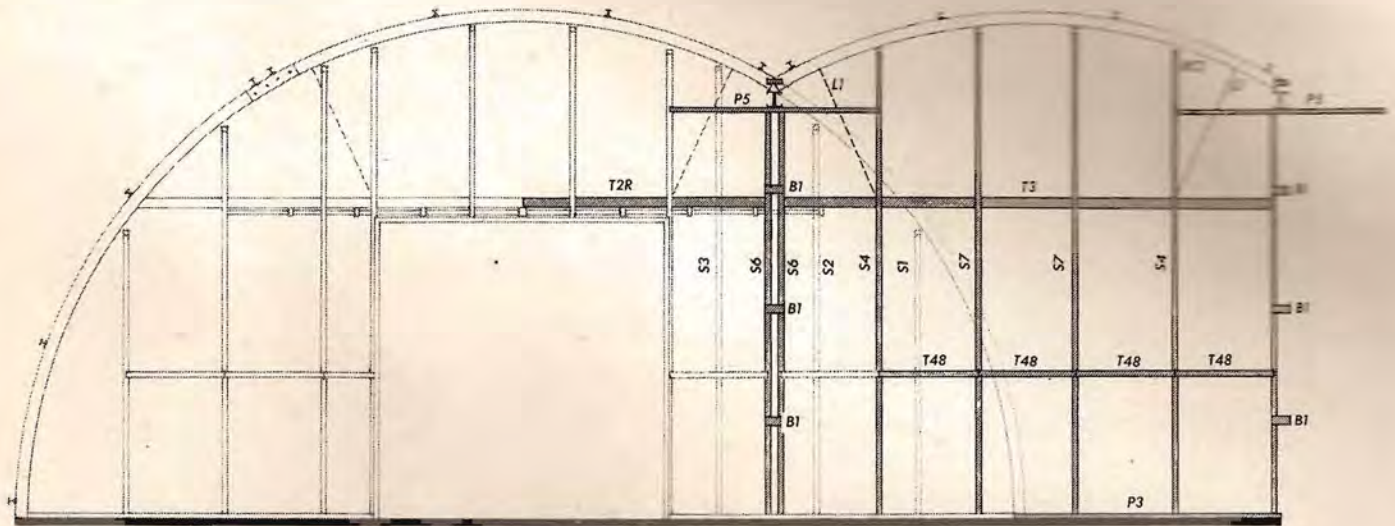


START WITH LOWEST ROW

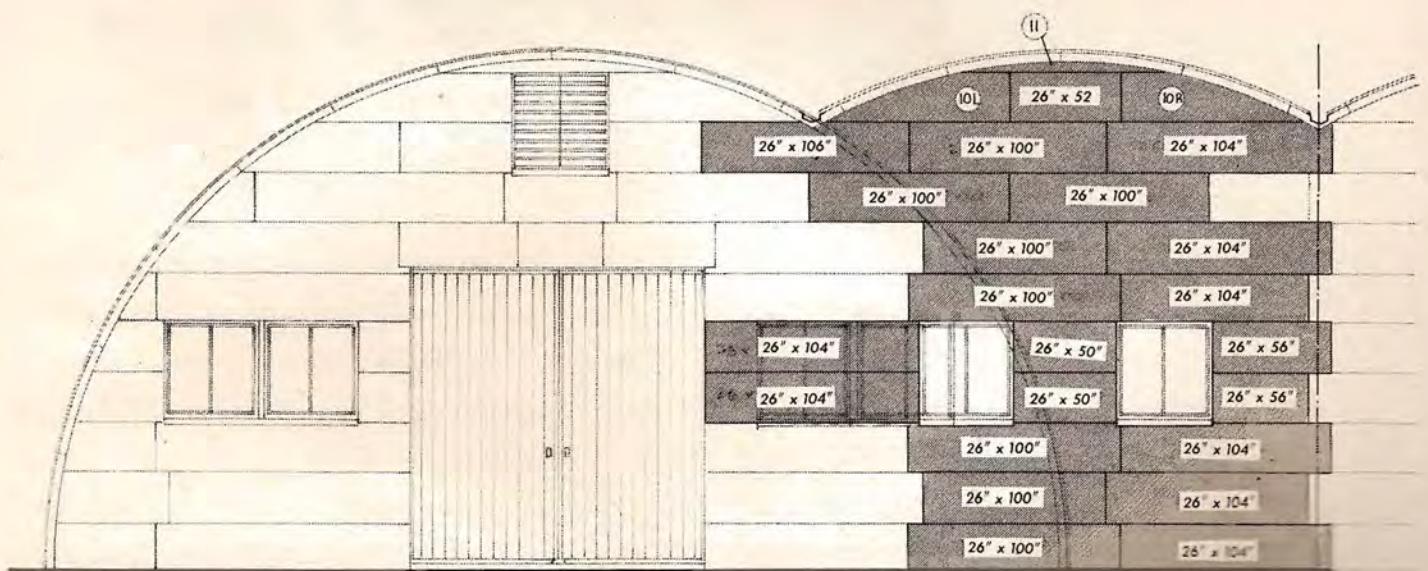
- 5** **A.** The roof area is drained by means of sheet metal gutters at each row of columns. These gutters must be installed before roofing sheets are applied. Place gutter sections (F6 to F12 inclusive) according to plan, starting at outside walls and working toward center of building. Nail gutters to purlins at either side of girders. See detail of gutter overhang at end walls.
- B.** The sides and roof of building are covered with 918 corrugated metal sheets, 27 1/2" wide by 92" long, nailed

to purlins with double headed nails and fibre washers at 8" o.c. Start with bottom row of sheets at side walls, keeping bottom of sheet 2" below bottom of channel plate. Typical side lap is 1 1/4". See details for special laps and overhang at ends. Install second, third and fourth rows of sheets, then install sheets at gutters before applying top row. Continue in this manner until building is covered, noting that top row laps both side rows. See Basic Unit for details not shown on these pages.

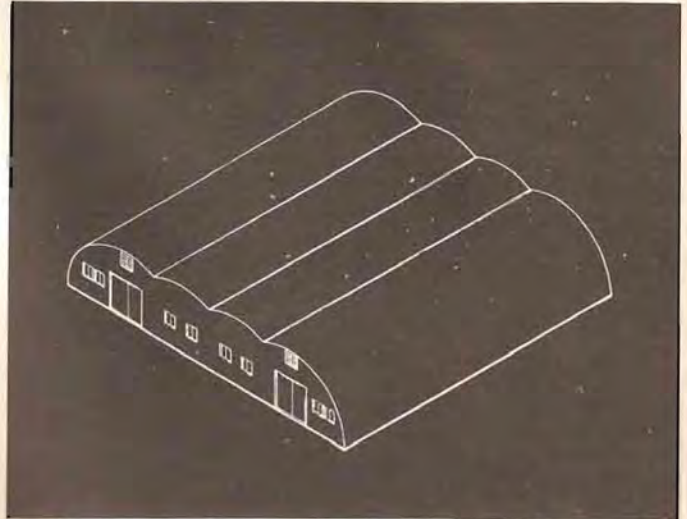
**ADAPTATION
ADDITIONAL MATERIAL FOR CONVERSION**




**ONE HALF ELEVATION SHOWING ADDITIONAL FRAMING
(OTHER HALF SIMILAR EXCEPT OPPOSITE HAND)**



**ONE HALF ELEVATION SHOWING ADDITIONAL CORRUGATED SHEETS
(OTHER HALF SIMILAR EXCEPT OPPOSITE HAND)**



 To convert 3—40' x 100' utility buildings into one 100' x 102' utility building adaptation as indicated on diagrammatical section, there are certain framing members and corrugated sheets to be added and discarded.

(A) The additional framing members required are shown cross hatched and marked on the framing elevation.

The following members are to be discarded for each two 40' x 100' bulkheads: 2—studs MK.S1; 2—studs MK.S2; 2—studs MK.S3; 2—half studs MK.T24; 1—wind girt MK.T1R and 1—wind girt MK.T1L.

(B) The additional corrugated sheets required are shown cross hatched and sizes given on the bulkhead elevation.


The following corrugated sheets are to be discarded for each two 40' x 100' bulkheads—one each of the following sheets. MK.2R, 2L, 3R, 3L, 4R, 4L, 5R, 5L, 6R, 6L, 8R, 8L, 9R, 9L, and four sheets 26" x 26".

Note that all flashings and windows are used in this adaptation, also some of the sheets will have considerable lap.

(C) For the main framing, all members will be used except one row of rib splice plates for each 40' x 100' building, which will be discarded. The additional framing members required are shown on other drawings.

(D) For the main shell, all the corrugated sheets will be used. The only new material required will be three rows of gutters for each 100' x 102' building.

WORKING DRAWING

 The drawings reproduced on the following pages are the working drawings from which the adaptation 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.

Hand-drawn floor plan of a rectangular building, divided into two units, each 51'-5 3/8" wide. The plan shows a grid of 25 rib spaces @ 4'-0" = 100'-0" and 100'-2" out to out of foundation. Dimensions include 30'-11 3/8", 20'-6", 20'-0", 20'-1", and 20'-5".

UNIT "A" 51'-5 3/8"
SEE SH. C2 FOR FRAMING

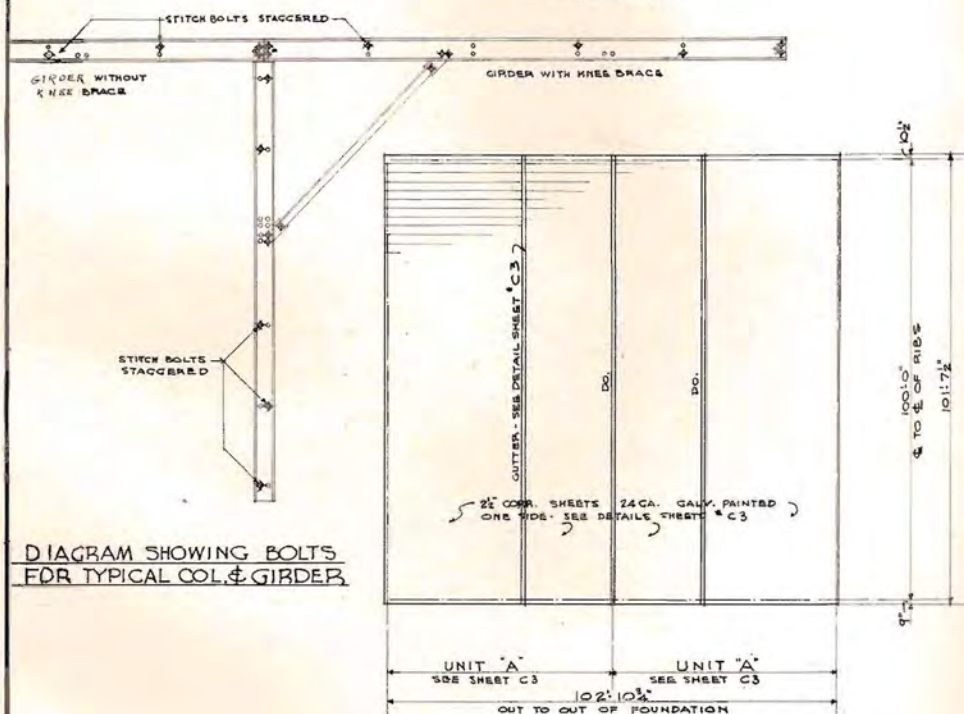
UNIT "A" 51'-5 3/8"
SEE SHEET C2 FOR FRAMING

102'-10 3/8"
OUT TO OUT OF FOUNDATION

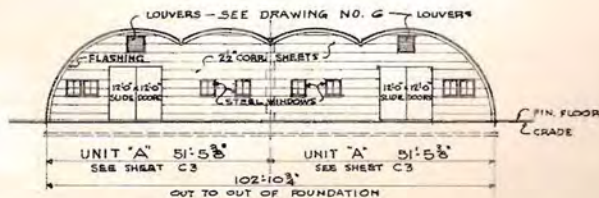
25 RIB SPACES @ 4'-0" = 100'-0"
100'-2"
OUT TO OUT OF FOUNDATION

30'-11 3/8"
20'-6"
20'-0"
20'-1"
20'-5"

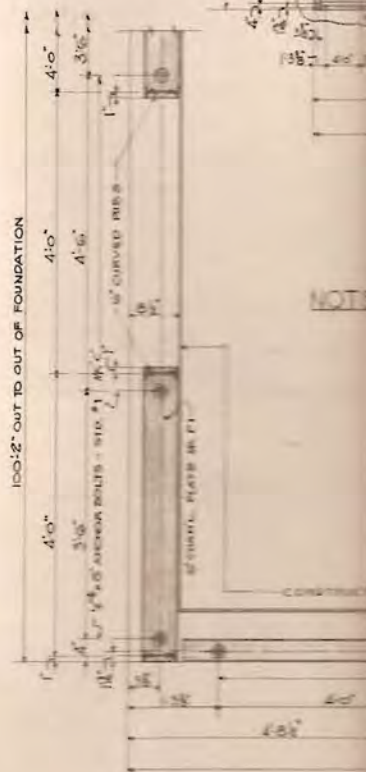
FLOOR PLAN
SCALE $\frac{1}{8}" = 1'-0"$

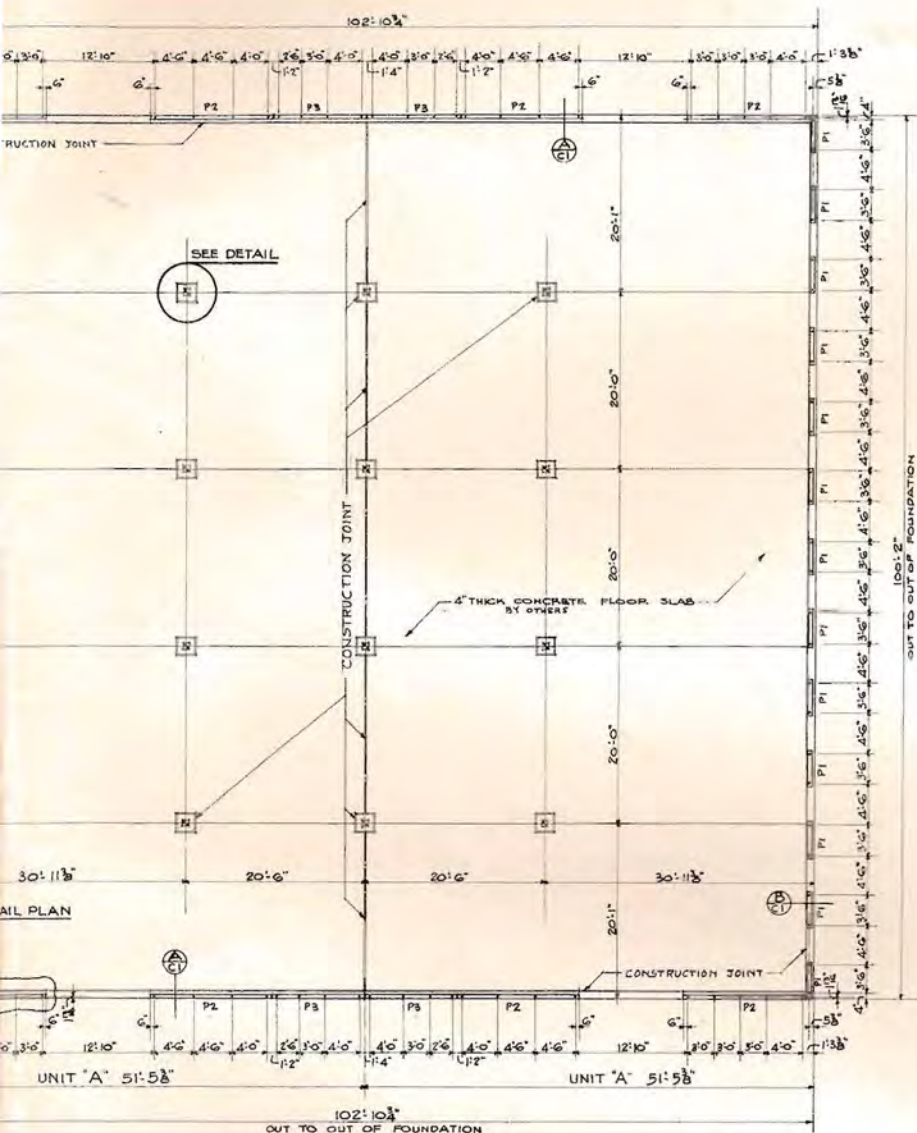


ROOF PLAN
SCALE $\frac{1}{16}'' = 1'-0''$



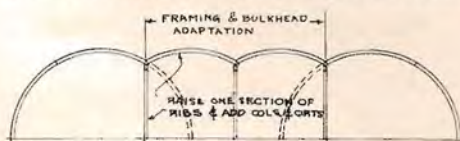
FRONT ELEVATION
SCALE 1/8" = 1'-0"



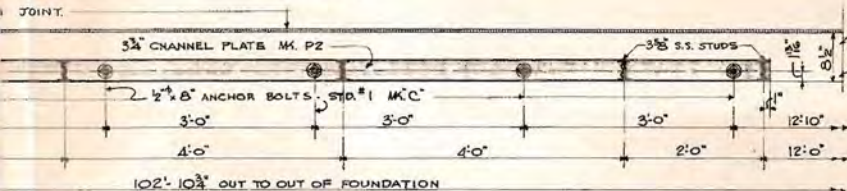


FOUNDATION & ANCHOR BOLT PLAN
SCALE 1/8" = 1'-0"

REFER TO SHEETS C2 & C3 FOR FRAMING, CORRUGATED SHEETS AND ELEVATIONS



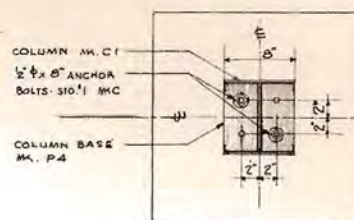
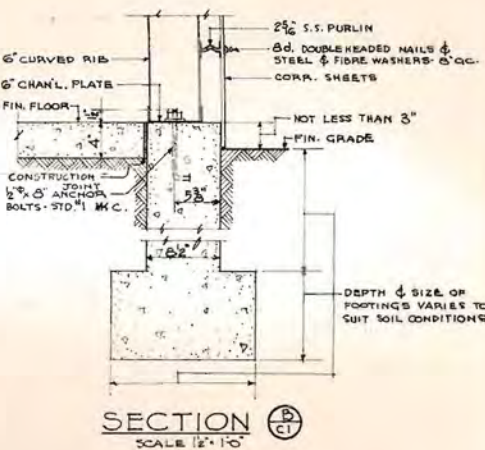
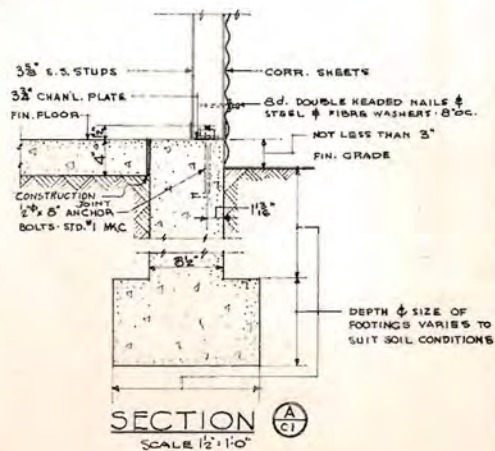
DIAGRAMMATICAL SECTION SHOWING
CONVERTING TWO 40' x 100' SSAR
CONVERSION TYPE UTILITY BLDGS.
INTO ONE 102'-10 3/4" x 100'-2" BUILDING.
NO SCALE



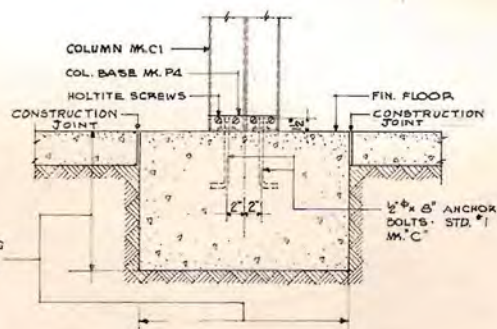
DETAIL PLAN OF TYPICAL CORNER
SCALE 1" = 1'-0"

MATERIAL FOR FRAMING & BULKHEAD ADAPTATION
STOCK NO. _____

3 ROWS (COLUMNS & GIRDERS)
1 SET EXTRA BULKHEAD MATERIAL FOR INTERMEDIATE SECTION
3 ROWS OF GUTTERS
ROOF ARCH BRACING

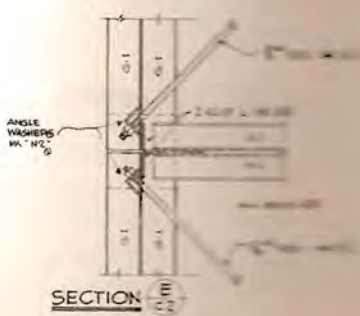
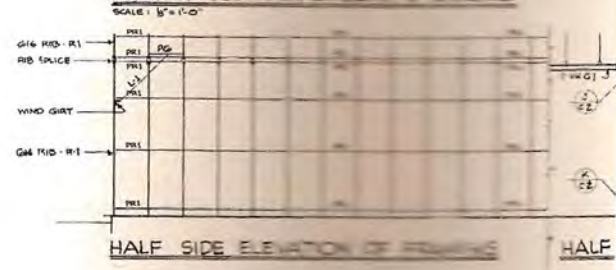
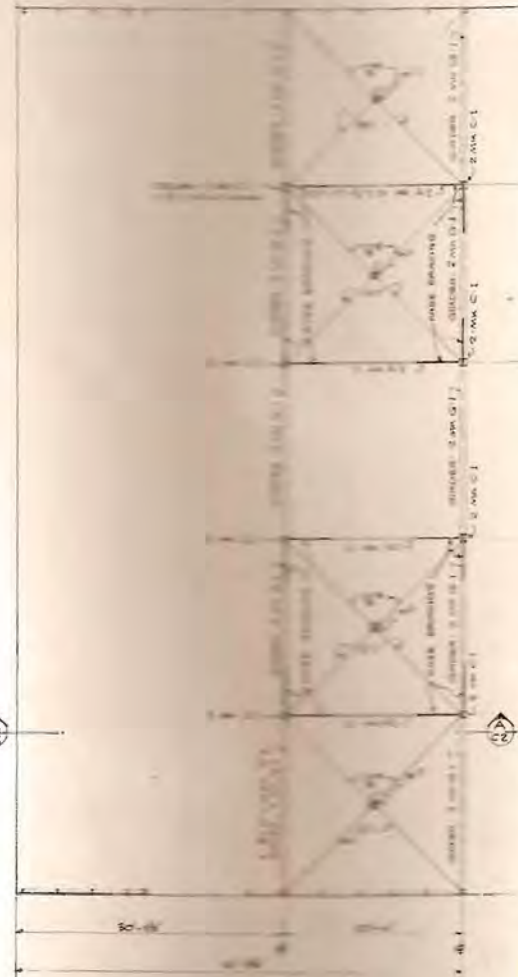
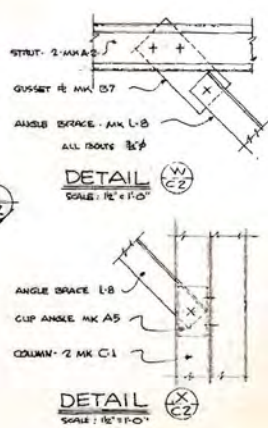
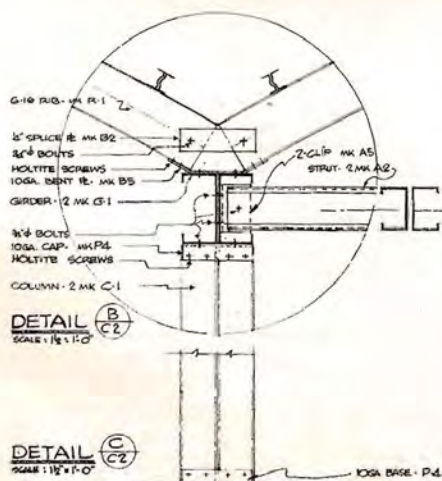
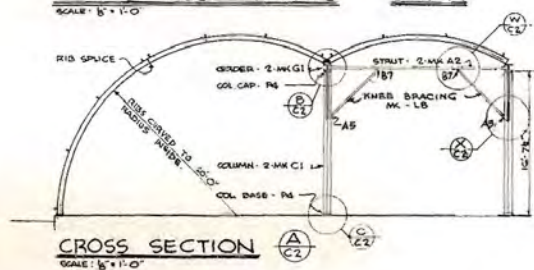
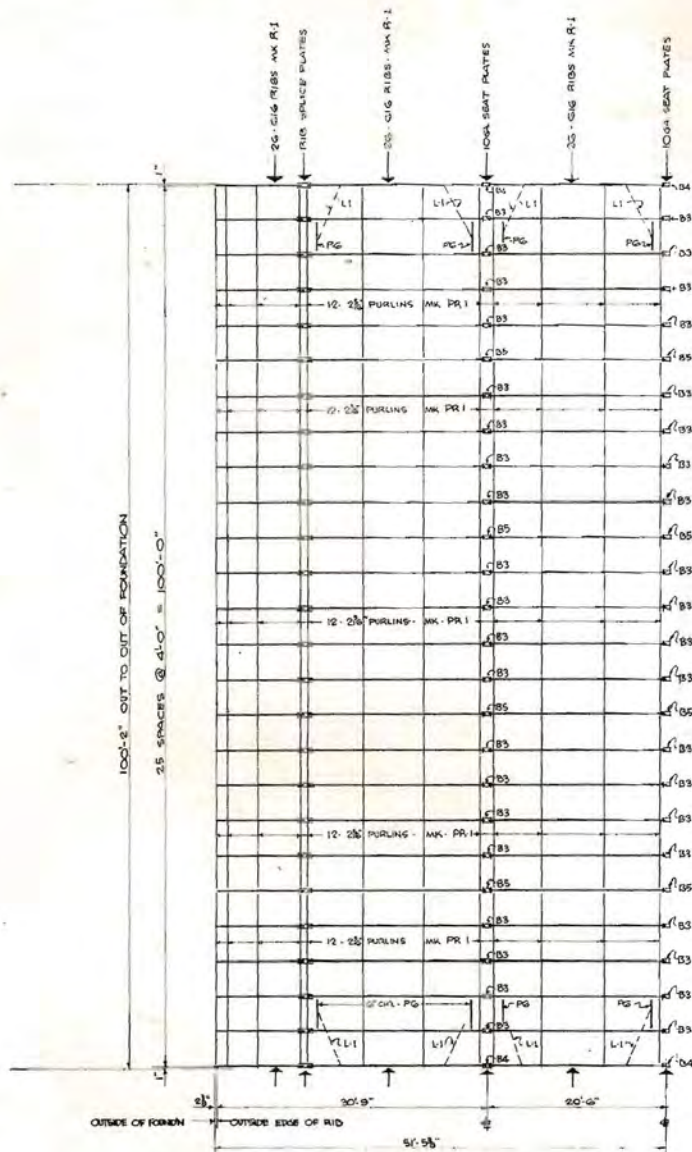


PLAN



SECTION
DETAIL OF TYPICAL COLUMN BASE
SCALE 1/2" = 1'-0"

REVISIONS				
DATE	9-30-44	DRAWN	RES	CHECKED
SCALE	NOTED	CUSTOMER'S ORDER	1-C-17112	ESTIMATE NUMBER
STRAN STEEL DIVISION				
GREAT LAKES STEEL CORPORATION				
DETROIT, MICHIGAN				
SSAR UTILITY BUILDING				
ADAPTATION				
KEY PLANS				
FOUNDATION & ANCHOR BOLT PLAN				
JOB NO.	2730	SHEET NUMBER	C1	





PLAN OF TRACK BRACKETS

CHANGES IN MATERIAL FOR
ONE BULKHEAD ADAPTATION
MATERIAL TO BE DISCARDED

- MATERIAL TO D
- 1- 3/8" STUD MK. S1
 - 1- do. do. MK. S2
 - 1- do. do. MK. S3
 - 1- HALF STUD MK. T-24
 - 1- WIND GIRT MK. T-1 L

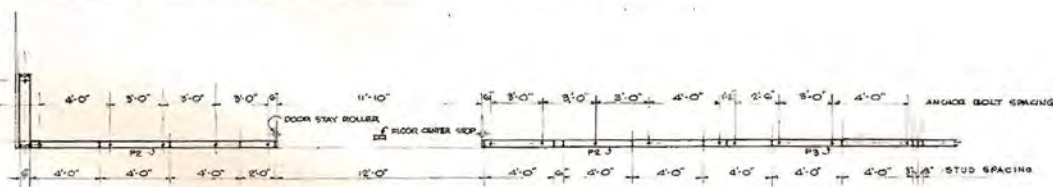
NEW MATERIAL

- 3- 3" STUDS MM. S6
2- 4" do. MM. S4
2- do. do. MM. S7
1- 3" CHANL. PLATE MM. P3
1/2 do. do. do. MM. P5
1- WIND GIRT MM. T-2A.
1- do. do. MM. T-3
4- HALF STUDS MK. T-4B
1- RAFTER CLIP MM. RC-1
2- CL BRACES MM. L-1
2- L CLIPS MM. L-2
4- L do. MM. L-3
3- BATTEN PLATES MM. B-1



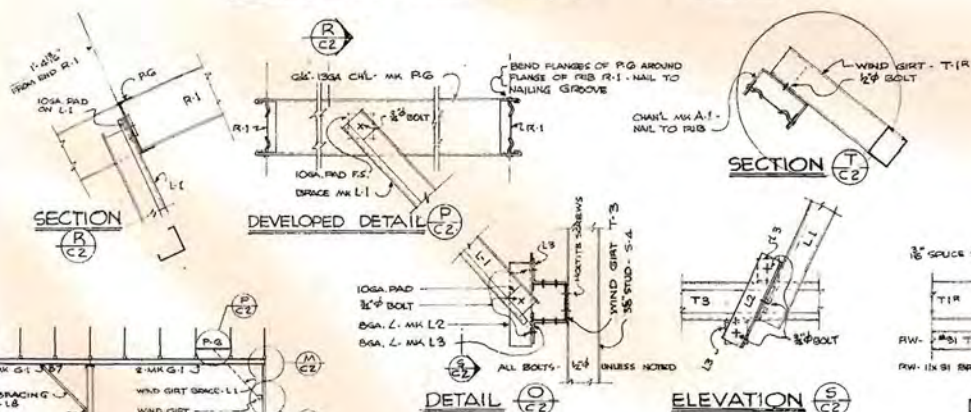
ELEVATION OF BULKHEAD FRAMING

UNIT "A"

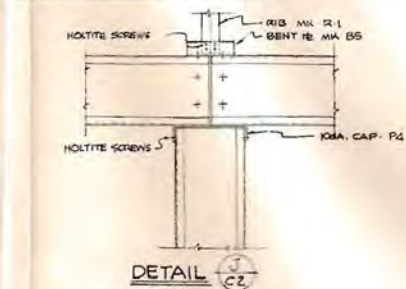


PLAN OF BULKHEAD FRAMING

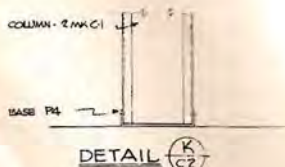
UNIT "A"



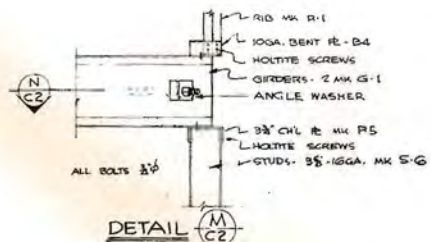
LONGITUDINAL SECTION



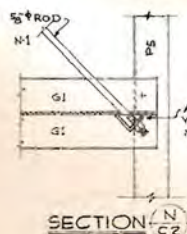
DETAIL



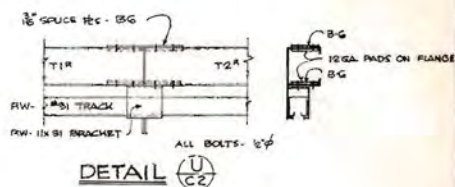
DETAIL $\left(\begin{smallmatrix} K \\ C2 \end{smallmatrix} \right)$



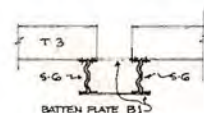
DETAIL



SECTION $\frac{N}{C}$



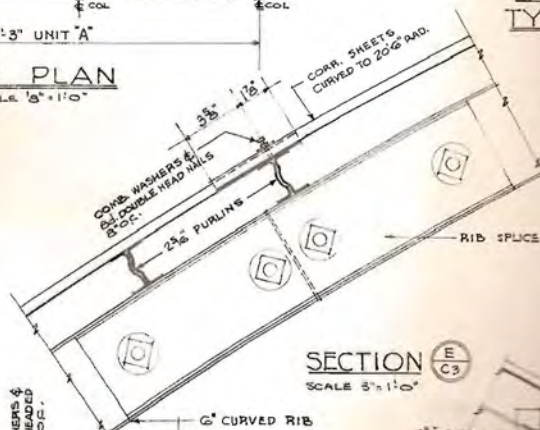
DETAIL $\left(\frac{\bar{U}}{C_2} \right)$

SECTION $\frac{V}{C2}$

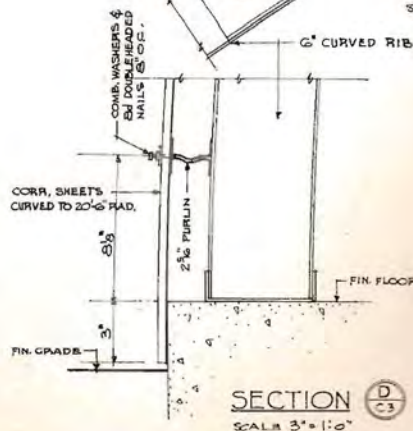
REVISIONS 1. 12/15/84 2. 12/15/84 3. 12/15/84		STRAN STEEL DIVISION GREAT LAKES STEEL CORPORATION DETROIT, MICHIGAN			
		SSAR UTILITY BUILDING ADAPTATION FRAMING PLAN & DETAILS - UNIT "A"			
DATE: 12-30-84 DRAWN: CSC CHECKED:		FOR NO.: 2730		SHEET NUMBER: C2	
SCALE: AS NOTED 1/8"=1'-0"		ESTIMATE NUMBER:			



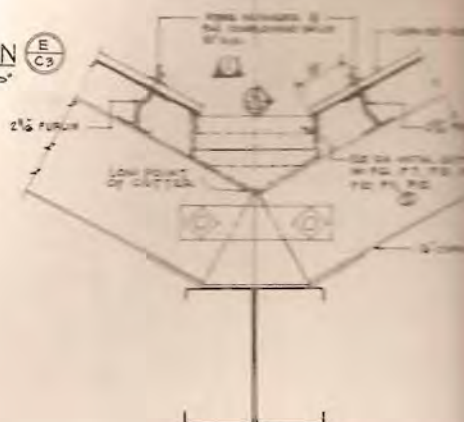
PLAN SECTION
TYPICAL GUTTER




DETAIL PLAN
SCALE $\frac{3}{4}" = 1'-0"$



DETAIL PLAN
SCALE $\frac{3}{4}'' = 1'-0''$



SECTION 
SCALE 3" = 1'-0"

ANGES IN MATERIAL FOR BULKHEAD ADAPTATION RIAL TO BE DISCARDED

1. SHEET MM. 2R
do MM. 3R
do MM. 4R
do MM. 5R
do MM. 6R
do MM. 8R
do MM. 9R
do 26" x 26"

MATERIAL

1. SHEET MM. 11
do MM. 10L
do MM. 10R
do 26" x 50"
do 26" x 52"
do 26" x 56"
do 26" x 100"
do 26" x 104"
do 26" x 106"

FLASHING F3 FOR EVERY
HEADS)

AL GUTTERS PER UNIT

N. FLOOR

OT. OF CORR. SH.

1. ALL CORR. SHEETS (CURVED & FLAT)
SHALL BE NAILED TO PURLINS, STUDS
& TRIMMERS WITH 8d. DOUBLE-
HEADED NAILS & COMB. STEEL &
FIBRE WASHERS 8" O.C.

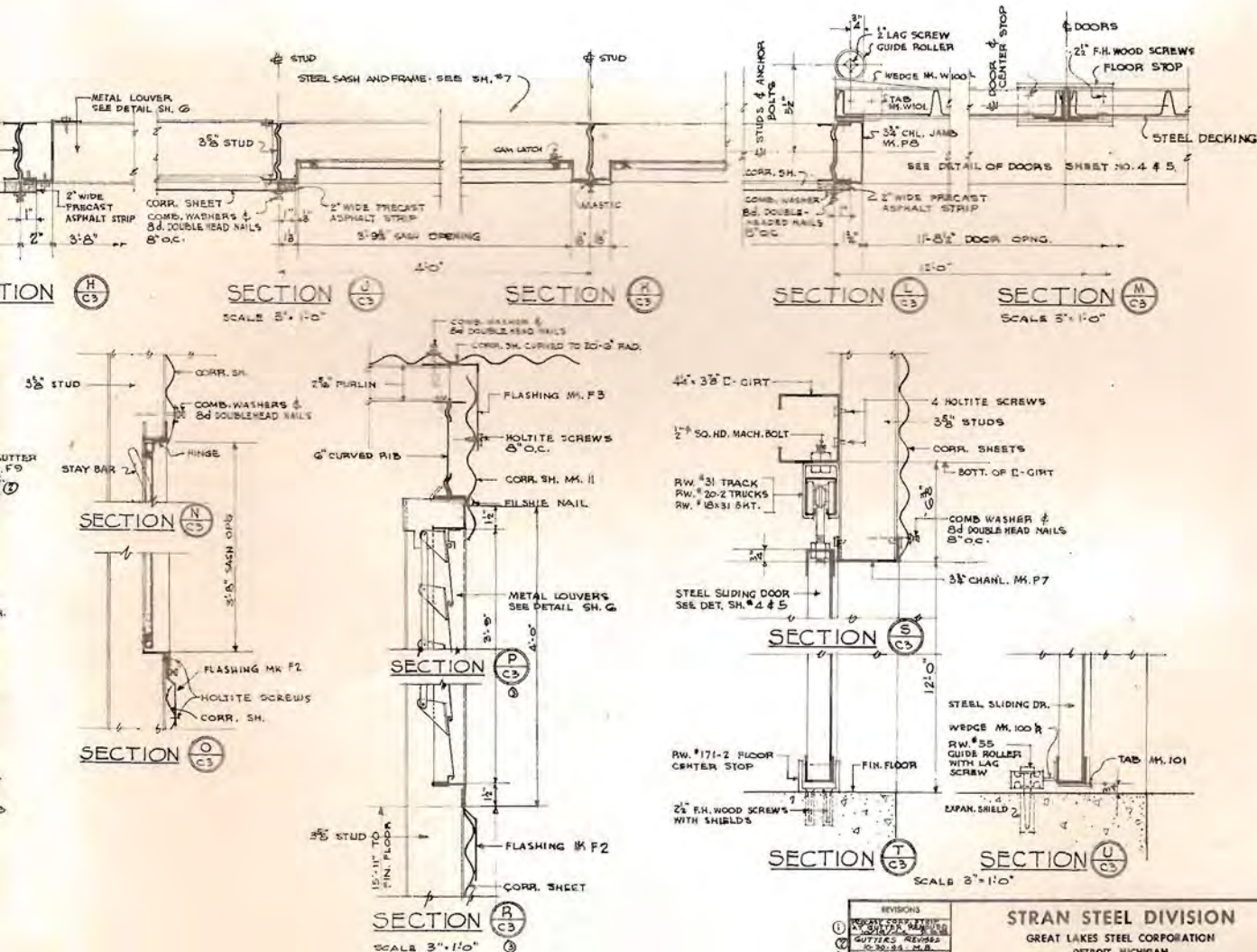
ELEVATION OF BULKHEAD

SCALE 1/4" = 1'-0"

NOTE: CROSS MATCHED SHEETS INDICATE NEW CORR.
SHEETS REQUIRED FOR THIS ADAPTATION.

NOTE: ALL BULKHEAD CORR. SHEETS
TO BE OF SIZE SHOWN - 26" CORR.
26 GA.
ALL ROOFING SHEETS TO BE
OF SIZE SHOWN - 26" CORR.
24 GA. CURVED TO 20'-0" RADIUS.

ELEVATION SHOWING KEYING CORR. SHEETS OF TWO UNITS.



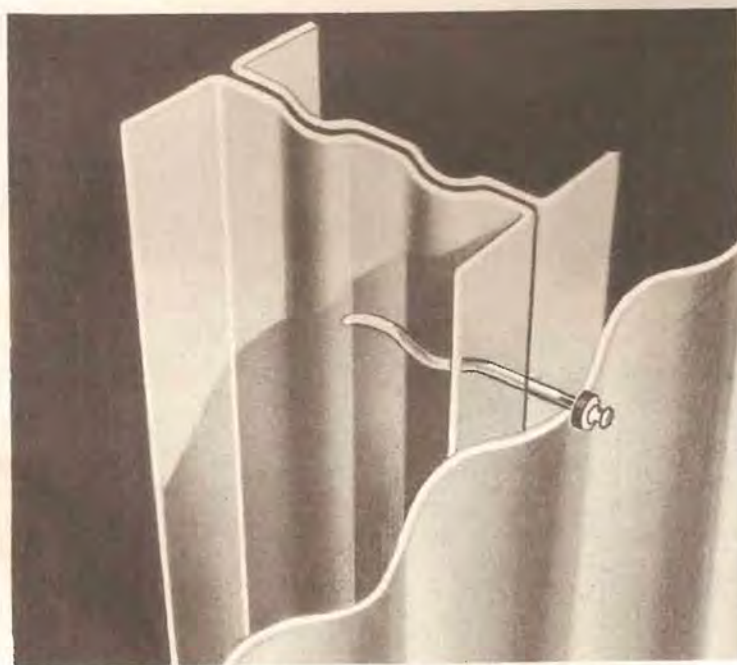
REVISIONS			
1	NOTES FOR ADAPTATION		
2	GUTTERS REVISION		
3	REVISION FOR ADAPTATION		
STRAN STEEL DIVISION			
GREAT LAKES STEEL CORPORATION			
DETROIT, MICHIGAN			
S.S.A.R. UTILITY BUILDING			
ADAPTATION			
"A" UNIT			
R.O.P. PLAN & BULKHEAD			
DATE 9-30-44	DRAWN RES	CHECKED	JOB NO.
SCALE	CUSTOMER ORDER	ESTIMATE NUMBER	2730
NOTED	1-C-17112		C3

INDEX

BASIC UNIT	Page
Erection Sequence	1
Foundation	2 and 3
Bulkhead Framing	6 and 7
Bulkhead Covering, Doors and Windows	8 and 9
Side and Roof Covering	10 and 11
Scaffolding	12
Suggestions to Erector	13
Working Drawings	14, 15, 16, 17, and 18

ADAPTATION

Erection Sequence	19
Foundation	20 and 21
Columns, Girders and Struts	22, 23, 24, and 25
Ribs and Purlins	26 and 27
Bulkheads	28 and 29
Exterior Covering	30 and 31
Additional Material for Conversion	32 and 33
Working Drawings	34, 35, 36, and 37



PHANTOM VIEW SHOWING NAIL IN NAILING GROOVE

THE STRAN-STEEL NAILING GROOVE

The distinctive feature of Stran-Steel is the nailing groove. 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.