LOADING AND BRACING® IN SIDE OPENING ISO CONTAINERS OF MK82 SERIES, 500 POUND BOMB, PACKED ON MHU-122 METAL PALLET

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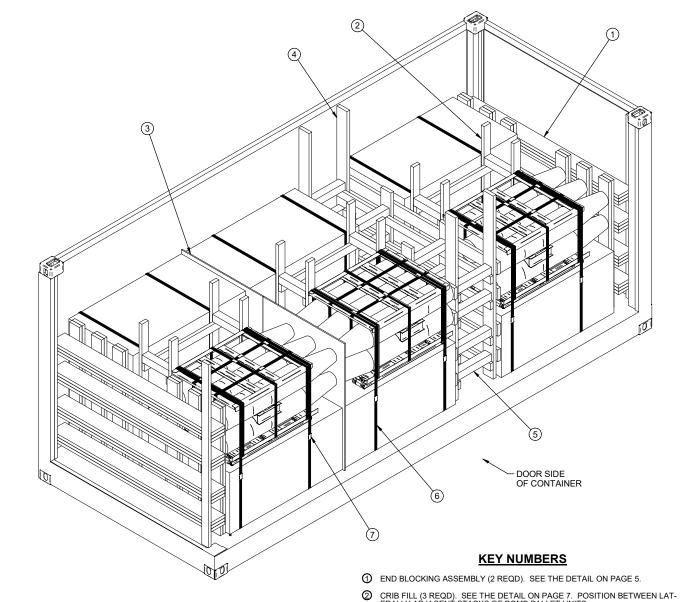
DISTRIBUTION STATEMENT A:

APPROVED FOR PUBLIC RELEASE DISTRIBUTION IS UNLIMITED.

* THE PROCEDURES SHOWN HEREIN ARE APPLICABLE TO LOADS THAT ARE TO BE SHIPPED BY TRAILER/CONTAINER-ON-FLATCAR (T/COFC) RAIL, MOTOR, OR WATER CARRIERS.

U.S. ARMY MATERIEL COMMAND DRAWING

APPROVED, U.S. ARMY CAUTION: VERIFY PRIOR TO USE AT HTTPS://www.dau.mil/cop/ammo/Pages/Default.aspx JOINT MUNITIONS COMMAND THAT THIS IS THE MOST CURRENT VERSION OF THIS DOCUMENT. THIS IS PAGE 1 OF 10. WARD.GINA. Digitally signed by WARD.GINA.M.1369379808 M.1369379808 - Date: 2023.03.27 12:22:27 - 0:500 DO NOT SCALE **FEBRUARY 2023** BASIC **MADELINE BANKS** DESIGN ENGINEER RE\/ APPROVED BY ORDER OF COMMANDING FIEFFER.LAUR Digitally signed by FIEFFER.LAURA.A.1230375727 Date: 2023.01.26 14:51:35-06'00 **ENGINEERING** GENERAL, U.S. ARMY MATERIEL COMMAND DIVISON BRAILSFORD.KEIT Digitally signed by H.ANTHONY.10286 BRAILSFORD.KEITH.ANTHONY. 1028655661 1028655661 CLASS DIVISION DRAWING FILE TEST ENGINEER FELICIANO.AD Digitally signed by FELICIANO.ADIN.1259200373 IN.1259200373 Date: 2023.02.03 14:02:28 NA REPORT Date: 2023 03 29 07:14:49 -05'00' 15PB1016 **EXPLOSIVE** 19 48 4356 CUMMINS.PAU Digitally signed by CUMMINS.PAUL.A.1231883122 Date: 2023.03.22 06:39:42 -0500 DIRECTORATE DEFENSE AMMUNITION CENTER



ISOMETRIC VIEW

BILL OF MATERIAL				
LUMBER	LINEAR FEET	BOARD FEET		
2" x 4"	233	155		
2" x 6"	247	247		
2" x 8"	174	232		
4" × 4"	48	64		
NAILS	NO. REQD	POUNDS		
10d (3")	856	13-1/4		
12d(3-1/4")	136	2-1/4		
DL VI//OOD 1 /2"	27 00 CO ET DEOL	D FO 43 LBC		

PLYWOOD, 1/2" - - 37.00 SQ FT REQD - - 50.42 LBS STEEL STRAPPING, 1-1/4" -198' REQD - - 28.29 LBS SEAL FOR 1-1/4" STRAPPING - 4 REQD - - 0.54 LBS

- ② CRIB FILL (3 REQD). SEE THE DETAIL ON PAGE 7. POSITION BETWEEN LATERALLY ADJACENT STACKS OF BOMB PALLET UNITS.
- 3 SEPARATOR GATE (1 REQD). SEE THE DETAIL ON PAGE 8.
- 4 CENTER GATE (2 REQD). SEE THE DETAIL ON PAGE 6.
- (5) STRUT, 4" X 4" BY CUT-TO-FIT (REF: 19-3/4") (16 REQD). TOENAIL TO THE CENTER GATES W/2-12d NAILS AT EACH END. SEE THE "BEVEL-CUT" DETAIL ON PAGE 6.
- (6) UNITIZING STRAP, 1-1/4" X .035" OR .031" OR .029" X 16'-0" LONG STEEL STRAPPING (12 REQD). INSTALL SO AS TO ENCIRCLE TWO PALLET UNITS AS SHOWN.
- SEAL FOR 1-1/4" STEEL STRAPPING (12 REQD, 1 PER STRAP). CRIMP EACH SEAL WITH TWO PAIR OF NOTCHES. SEE GENERAL NOTE "Q" ON PAGE 3.

LOAD AS SHOWN

ITEM	QUANTITY	WEIGHT (APPROX)
DUNNAGE	12	37,116 LBS 1,490 LBS 6,050 LBS

TOTAL WEIGHT - - - - - 44,656 LBS (APPROX)

GENERAL NOTES

- A. THIS DOCUMENT HAS BEEN PREPARED AND ISSUED IN ACCORDANCE WITH AR 740-1 AND AUGMENTS TM 743-200-1 (CHAPTER 5).
- B. THE SPECIFIED OUTLOADING PROCEDURES ARE APPLICABLE TO LOADS OF THE MK82 (500 POUND) BOMB ON THE MHU-122 METAL PALLET. SUBSEQUENT REFERENCE TO PALLET UNIT HEREIN MEANS THE PALLET UNIT WITH AMMUNITION ITEMS. SEE PAGE 4 AND THE NAVAL AIR SYSTEMS COMMAND DRAWING 6214275 FOR DETAILS OF THE PALLET UNIT. CAUTION: REGARDLESS OF THE QUANTITY OF CONTAINERS TO BE SHIPPED, THE "MAXIMUM GROSS WEIGHT" OF THE SIDE OPENING ISO CONTAINER MUST NOT BE EXCEEDED.
- C. THE LOAD AS SHOWN IS BASED ON A 6,050 POUND 20' LONG BY 8' WIDE BY 8'-6" HIGH SIDE OPENING ISO CONTAINER WITH INSIDE DIMENSIONS OF 19'-6-1/4" LONG BY 90" WIDE BY 89" HIGH, WITH A MAXIMUM GROSS WEIGHT OF 52,910 POUNDS. OLDER/OTHER CONTAINERS MAY HAVE DIFFERENT INSIDE MEASUREMENTS, VERIFY INSIDE CONTAINER DIMENSIONS PRIOR TO FABRICATING DUNNAGE. THE LOAD IS DESIGNED FOR TRAILER/CONTAINER-ONFLATCAR (T/COFC) SHIPMENT, HOWEVER, THE LOAD AS DESIGNED CAN ALSO BE MOVED BY OTHER SURFACE MODES OF TRANSPORT. NOTICE: OTHER CONTAINERS OF THE SAME DESIGN CONFIGURATION CAN BE USED.
- D. WHEN LOADING PALLET UNITS, THEY ARE TO BE POSITIONED SO AS TO ACHIEVE A TIGHT LOAD (TIGHT AGAINST THE DUNNAGE ASSEMBLIES). THE UNBLOCKED SPACE ACROSS THE WIDTH OF A LOAD BAY IS NOT TO EXCEED 1-1/2". EXCESSIVE SLACK CAN BE ELIMINATED FROM A LOAD BY LAMINATING ADDITIONAL PIECES OF APPROPRIATE THICKNESS TO THE VERTICAL PIECES ON THE CRIB FILL ASSEMBLIES. NAIL EACH ADDITIONAL PIECE W/1 APPROPRIATELY SIZED NAIL EVERY 12". THE LENGTH OF THE STRUTS IN THE CRIB FILL ASSEMBLIES MAY BE ADJUSTED AS REQUIRED TO FACILITATE VARIANCE IN THE SIZE OF THE PALLET UNIT. THE LOADS MUST BE AS TIGHT AS POSSIBLE LONGITUDINALLY, BUT THE VOID MUST NOT EXCEED 3/4" OVERALL.
- E. THIS DRAWING DEPICTS A 12-PALLET UNIT MAXIMUM CONFIGURATION, WITH A LADING WEIGHT OF 44,656 POUNDS. DUE TO RESTRICTIONS ENACTED BY THE SURFACE DEPLOYMENT AND DISTRIBUTION COMMAND AND THE JOINT MUNITIONS COMMAND, ANY ISO CONTAINER DESTINED TO BE MOVED OVER CONS HIGHWAYS CAN NOT EXCEED 40,000 POUNDS GROSS WEIGHT. IN ORDER TO COMPLY WITH THIS RESTRICTION, TWO PALLET UNITS MUST BE ELIMINATED FROM THE 12-PALLET UNIT MAXIMUM LOAD. THIS WILL RESULT IN AN 10-PALLET UNIT LOAD WITH A GROSS WEIGHT OF 38,470 POUNDS. SEE THE "LESS-THAN-FULL" LOAD PROCEDURES ON PAGE 10 FOR DETAILS.
- F. A STAGGERED NAILING PATTERN WILL BE USED WHENEVER POSSIBLE WHEN NAILS ARE DRIVEN INTO JOINTS OF DUNNAGE ASSEMBLIES OR WHEN LAMINATING DUNNAGE. ADDITIONALLY, THE NAILING PATTERN FOR AN UPPER PIECE OF LAMINATED DUNNAGE WILL BE ADJUSTED AS REQUIRED SO THAT A NAIL FOR THAT PIECE WILL NOT BE DRIVEN THROUGH ONTO OR RIGHT BESIDE A NAIL IN A LOWER PIECE.
- G. IN SOME CONTAINERS THERE IS A SLOT AT THE CORNERS OF THE ENDWALL. PIECES OF DUNNAGE MATERIAL MUST BE LAMINATED TO THE BUFFER PIECES ON THE END BLOCKING ASSEMBLY TO PROVIDE A FLAT SURFACE FOR THE BUFFER PIECES. A PIECE OF 2" X 4", 2" X 3" OR A SPECIAL WIDTH PIECE CUTTO-FIT CAN BE USED. THIS FILL PIECE WILL BE NAILED WITH ONE APPROPRIATELY SIZED NAIL EVERY 12". NOTE THAT SOME CONTAINERS ARE EQUIPPED WITH "TIE-BARS" IN THE CORNER SLOT, WHICH PRECLUDE THE USE OF A FULL HEIGHT FILL PIECE. WHEN "TIE-BARS" ARE PRESENT, THE FILL PIECE MUST BE INSTALLED IN SEGMENTS DESIGNED TO FIT BETWEEN THE "TIE-BARS" VERTICALLY. THE FILL PIECE(S) IS NOT REQUIRED WHEN THE CORNER PORTIONS OF THE CONTAINER FORWARD WALL ARE SMOOTH AND FLAT. DO NOT ALLOW ANY DUNNAGE ASSEMBLY TO CONTACT THE CONTAINER ENDWALLS, ONLY THE CORNER POSTS OF THE CONTAINER SHOULD BE USED FOR FORWARD LONGITUDINAL BLOCKING.
- H. WHETHER A CONTAINER IS FULL OR IS LOADED WITH A REDUCED QUANTITY OF LADING UNITS, THE LENGTHWISE CENTER OF GRAVITY OF THE LOAD MUST BE WITHIN 12", IN EITHER DIRECTION, OF THE MID-POINT OF THE CONTAINER.
- J. CAUTION: DO NOT NAIL DUNNAGE MATERIAL TO THE CONTAINER WALLS OR FLOOR, ALL NAILING WILL BE WITHIN THE DUNNAGE.
- K. PORTIONS OF THE CONTAINER DEPICTED WITHIN THIS DRAWING, SUCH AS THE SIDEWALL, HAVE NOT BEEN SHOWN IN THE LOAD VIEWS FOR CLARITY PURPOSES

L. MAXIMUM LOAD WEIGHT CRITERIA:

THE MAXIMUM LOAD WEIGHTS ARE CONTROLLED BY EQUIPMENT CAPABILITY FACTORS. ALTHOUGH THE HEAVIEST MAXIMUM LOADS ARE DELINEATED IN THE LOAD VIEWS, PROVISIONS ARE INCLUDED WITHIN THIS DRAWING SO THAT THE BASIC LOADS CAN BE ADJUSTED TO SATISFY A LESSER QUANTITY OF LADING UNITS. DEPENDING ON TRANSPORTATION ROUTING, IT MAY BE NECESSARY TO REDUCE THE LOAD WEIGHT TO SATISFY "WEIGHT LAWS" OF CERTAIN STATES. ALSO, IT MAY BE NECESSARY TO REDUCE THE LOAD WEIGHT TO SATISFY "WEIGHT LAWS" OF CERTAIN STATES. ALSO, IT MAY BE NECESSARY TO REDUCE THE LOAD WEIGHT TO SATISFY OTHER WEIGHT RESTRICTIONS IMPOSED ON THE INTERMODAL CONTAINER SYSTEM

- M. REQUIREMENTS CITED WITHIN THE ASSOCIATION OF AMERICAN RAILROADS (AAR) INTERMODAL LOADING GUIDE APPLY WHEN THE SHIPMENT MOVES BY TRAILER/CONTAINER-ON-FLATCAR (T/COFC). SPECIAL T/COFC NOTES FOL-LOW:
 - A LOADED CONTAINER MUST BE ON A CHASSIS EQUIPPED WITH TWO BO-GIE ASSEMBLIES WHEN BEING MOVED IN TOFC SERVICE.

(GENERAL NOTES CONTINUED)

- 2. THE LOAD LIMIT OF A T/COFC RAILCAR MUST NOT BE EXCEEDED, NOR WILL A CAR BE LOADED SO THAT THE TRUCK UNDER ONE END OF THE CAR CARRIES MORE THAN ONE-HALF OF THE LOAD LIMIT FOR THAT CAR.
- N. DURING INTRASTATE AND/OR INTERSTATE MOVES BY MOTOR CARRIER, A PROPER CHASSIS OR MODIFIED FLATBED TRAILER MUST BE USED TO PRE-CLUDE VIOLATION OF ONE OR MORE "WEIGHT LAWS" APPLICABLE TO THE STATE OR STATES INVOLVED.
- O. CONVERSION TO METRIC EQUIVALENTS: DIMENSIONS WITHIN THIS DOCUMENT ARE EXPRESSED IN INCHES AND WEIGHTS ARE EXPRESSED IN POUNDS. WHEN NECESSARY, THE METRIC EQUIVALENTS MAY BE COMPUTED ON THE BASIS OF ONE INCH EQUALS 25.4MM AND ONE POUND EQUALS 0.454 KG.
- P. THE QUANTITY OF PALLET UNITS SHOWN IN THE LOAD ON PAGE 2 MAY BE REDUCED FOR SHIPMENT, IF DESIRED. SEE THE "LESS-THAN-FULL LOAD PROCEDURE" ON PAGE 10.
 - IF A LOAD IS REDUCED BY ONLY A SMALL AMOUNT (ONE, TWO OR THREE LADING UNITS), LADING UNITS NORMALLY MAY BE ELIMINATED FROM THE CENTER OF THE LOAD.
 - 2. IF A LOAD IS REDUCED BY A LARGE AMOUNT (MORE THAN THREE LAD-ING UNITS), LADING UNITS SHOULD BE ELIMINATED AS REQUIRED AND THE VOID IN THE LONGITUDINAL CENTER OF THE CONTAINER SHIFTED FORE OR AFT, AS NECESSARY, TO ACHIEVE A SYMMETRICAL WEIGHT DISTRIBUTION. THE DEPICTED PROCEDURES WILL BE FOLLOWED AS CLOSELY AS POSSIBLE, MAKING ONLY THOSE ADJUSTMENTS TO THE DUNNAGE WHICH ARE REQUIRED TO ACCOMMODATE THE NUMBER OF UNITS TO BE SHIPPED.
- Q. WHEN STEEL STRAPPING IS SEALED AT AN END-OVER-END LAP JOINT, A MIN-IMUM OF ONE SEAL WITH TWO PAIR OF NOTCHES WILL BE USED TO SEAL THE JOINT WHEN A NOTCH TYPE SEAL IS BEING USED. A MINIMUM OF TWO SEALS, BUTTED TOGETHER WITH TWO PAIR OF CRIMPS PER SEAL WILL BE USED TO SEAL THE JOINT WHEN A CRIMP TYPE SEALER IS BEING USED. REFER TO THE "STRAP JOINT A" AND "STRAP JOINT B" DETAILS ON PAGE 5 FOR GUIDANCE.
- R. DUNNAGE LUMBER SPECIFIED IS OF NOMINAL SIZE. FOR EXAMPLE, 1" X 4" MATERIAL IS ACTUALLY 3/4" THICK BY 3-1/2" WIDE AND 2" X 6" MATERIAL IS ACTUALLY 1-1/2" THICK BY 5-1/2" WIDE.
- S. LOAD-BLOCKING STRUTS WHICH ARE 48" OR LONGER MUST BE STIFFENED BY THE APPLICATION OF HORIZONTAL AND VERTICAL STRUT BRACING AS SHOWN IN THE "TYPICAL STRUT BRACING" DETAIL ON PAGE 73 OF DRAW-ING AMC 19-48-4267-15PA1009. BRACING IS NOT REQUIRED IF THE STRUTS FOR THE LOAD BEING SHIPPED ARE SHORTER THAN 48". THE LENGTH OF THE LOAD-BLOCKING STRUTS SHOULD BE KEPT AS SHORT AS POSSIBLE (APPROX 18" MINIMUM), BUT IN THE EVENT IT IS NECESSARY TO USE STRUTS WHICH ARE 8'-0" OR MORE IN LENGTH, IT WILL BE NECESSARY TO APPLY AN ADDITIONAL SET OF HORIZONTAL AND VERTICAL STRUT BRACING PIECES. STRUT BRACING SHOULD BE APPLIED SO AS TO PROVIDE NEARLY EQUAL SPACES BETWEEN THE BRACING PIECES AND THE CENTER GATES AND/OR BETWEEN ADJACENT STRUT BRACING PIECES. NOTE THAT HORIZONTAL STRUT BRACING PIECES FOR THE UPPER LEVEL OF STRUTS FOR ALL BUT THE UPPERMOST TIER OF A LOAD MAY BE DIFFICULT TO APPLY TO THE TOP SURFACES OF THE STRUT AS DEPICTED. STRUT BRACING WILL BE EQUALLY EFFECTIVE IF APPLIED TO THE UNDER SIDE OF THOSE STRUTS
- T. ANTI-CHAFING MATERIAL MAY BE INSTALLED AT POINTS OF CONTACT BETWEEN PALLET UNITS AND THE SIDE OPENING CONTAINER, AND BETWEEN PALLET UNITS AND STEEL STRAPPING, IF DESIRED, TO PREVENT CHAFING DAMAGE TO CONTAINER PAINT AND MARKINGS.

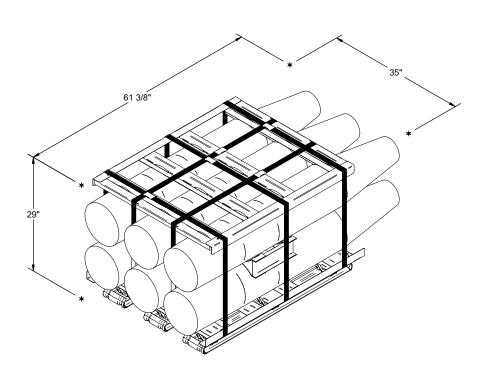
MATERIAL SPECIFICATIONS

MATERIAL OF LOTTIONS			
	<u>LUMBER</u> :	SEE TM $743-200-1$ (DUNNAGE LUMBER) AND VOLUNTARY PRODUCT STANDARD PS 20 .	
	<u>NAILS</u> :	ASTM F1667; COMMON STEEL NAIL NLCMS OR NLCMMS).	
	<u>PLYWOOD</u> :	COMMERCIAL ITEM DESCRIPTION A-A-55057, IN- DUSTRIAL PLYWOOD, INTERIOR WITH EXTERIOR GLUE, GRADE C-D. IF SPECIFIED GRADE IS NOT AVAILABLE, A BETTER INTERIOR OR AN EX- TERIOR GRADE MAY BE SUBSTITUTED.	
	STRAPPING, STEEL:	ASTM D3953; FLAT STRAPPING, TYPE 1, HEAVY DUTY, FINISH A, B (GRADE 2), OR C.	
	SEAL, STRAP:	ASTM D3953; CLASS H, FINISH A, B (GRADE 2), OR C, DOUBLE NOTCH TYPE, STYLE I, II, OR IV.	
	WIRE, CARBON STEEL -:	ASTM A853; ANNEALED AT FINISH, BLACK OXIDE FINISH, 0.0800° DIA, GRADE 1006 OR BETTER.	
	<u>STAPLE</u> :	ASTM F1667; STFCS-189 OR STFCS-207,15/16" OR 1" CROWN WIDTH X $3/4$ " LEG LENGTH FOR $3/4$ " STRAPPING, OR STFCS-224, $1-17/32$ " CROWN WIDTH X $3/4$ " LEG LENGTH FOR $1-1/4$ " STRAPPING.	
	ANTI-CHAFING		

- - - -: MIL-PRF-121 (OR EQUAL); NEUTRAL BARRIER

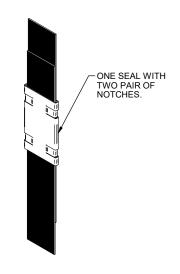
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MATERIAL -



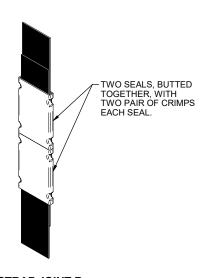
PALLET UNIT DATA

GROSS WEIGHT - - - - - - 3,093 LBS CUBE - - - - - - 36.1 CU FT



STRAP JOINT A

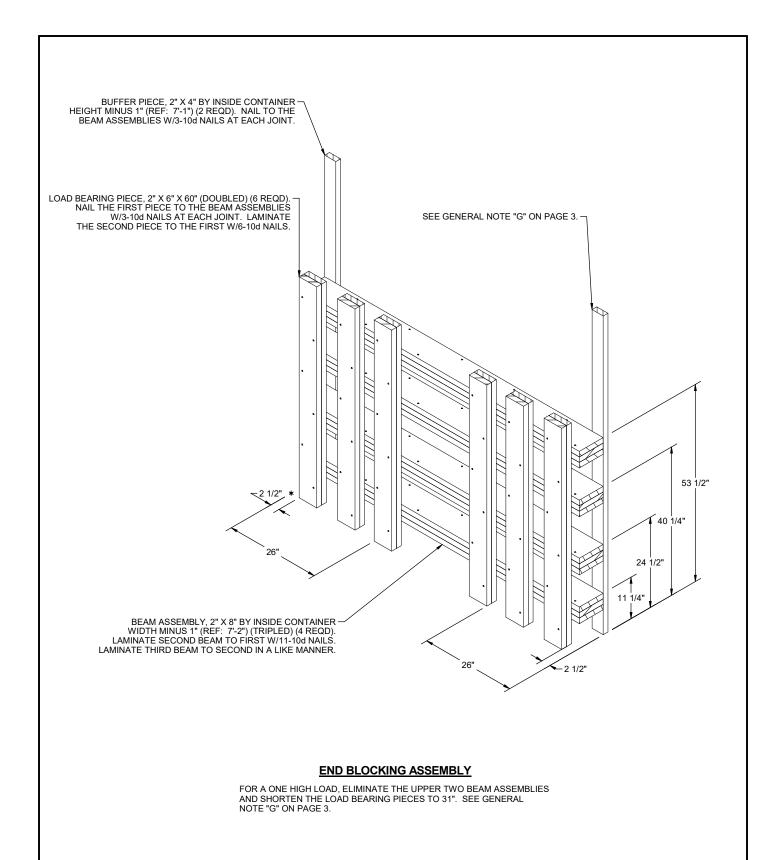
METHOD OF SECURING A STRAP JOINT WHEN USING A NOTCH-TYPE SEALER.

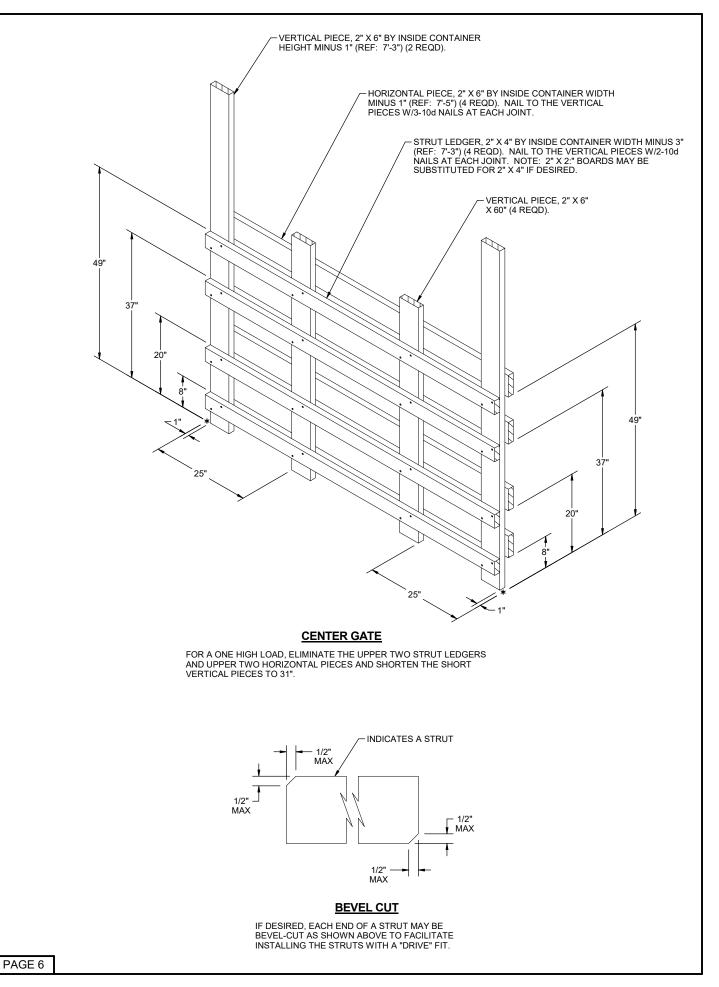


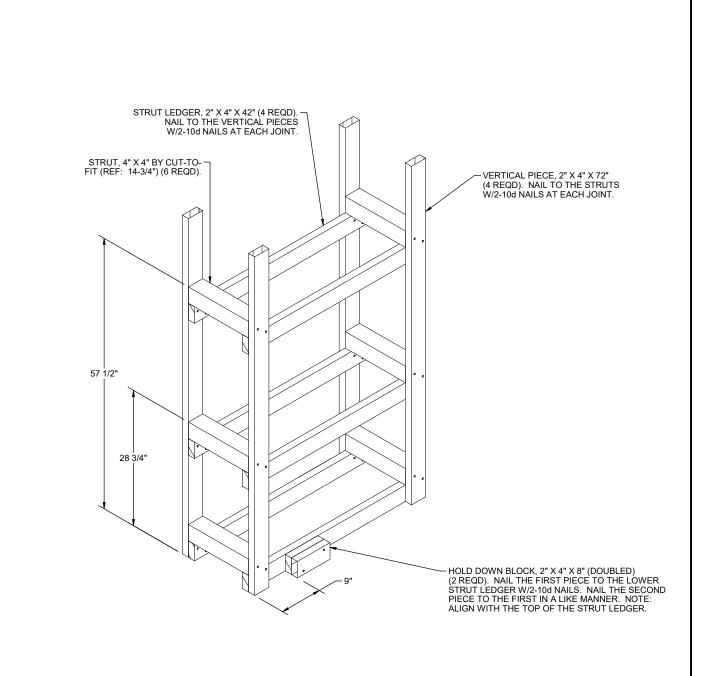
STRAP JOINT B

METHOD OF SECURING A STRAP JOINT WHEN USING A CRIMP-TYPE SEALER.

END-OVER-END LAP JOINT DETAILS

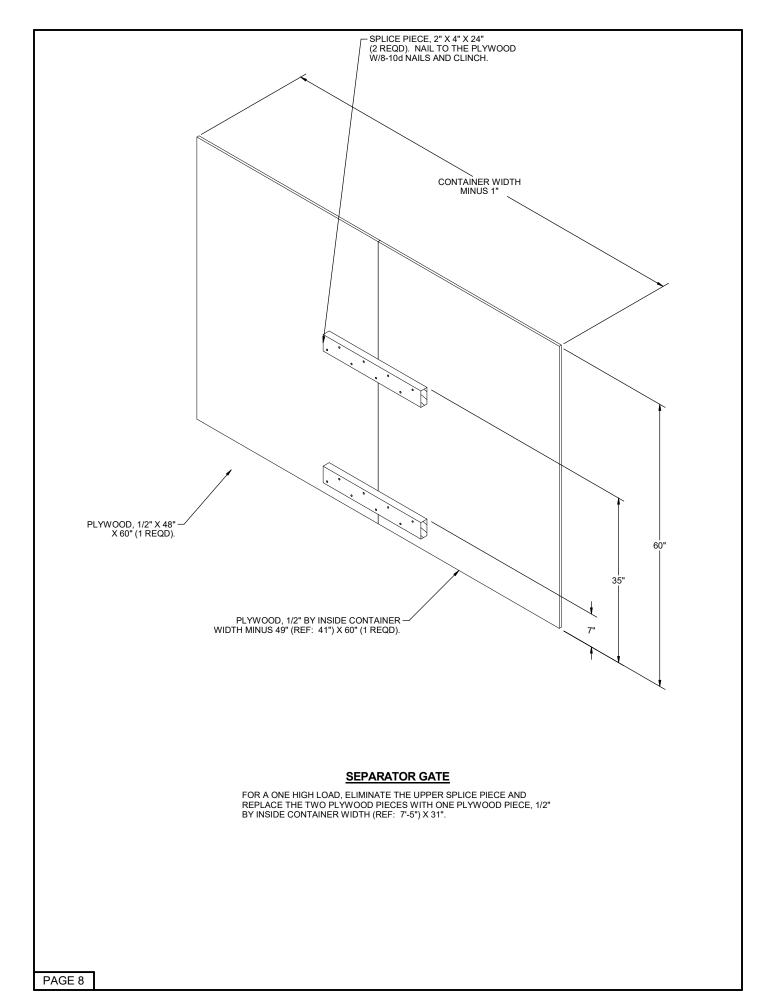


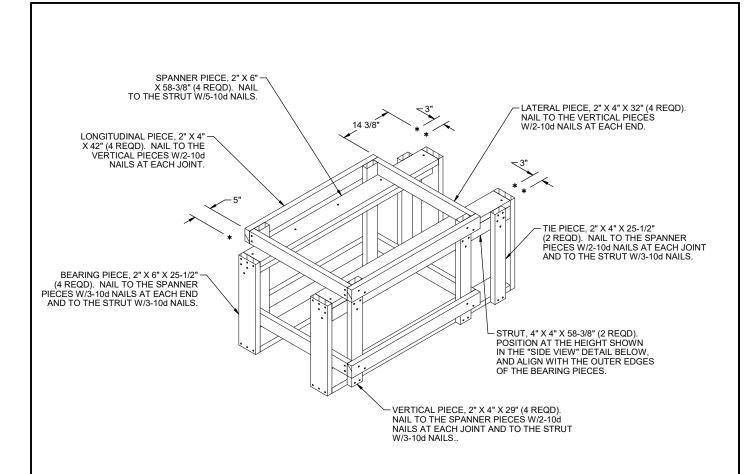




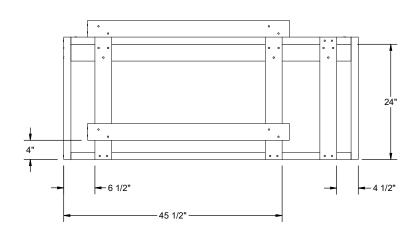
CRIB FILL ASSEMBLY

FOR A ONE HIGH LOAD, ELIMINATE THE UPPER TWO STRUT LEDGERS AND UPPER TWO STRUTS AND SHORTEN THE VERTICAL PIECES TO 42".





OMITTED UNIT ASSEMBLY



SIDE VIEW

