LOADING AND BRACING* IN SIDE OPENING ISO CONTAINERS OF CBU-87, CBU-89, CBU-97, CBU-103, CBU-104, & CBU-105 SERIES CLUSTER BOMBS IN CNU-411 SERIES CONTAINERS

INDEX

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

U.S. ARMY MATERIEL COMMAND DRAWING

APPROVED, U.S. ARMY
JOINT MUNITIONS COMMAND

WARD.GINA.M.1369379808 Digitally signed by WARD.GINA.M.1369379808 Date: 2022.09.08 15:27:28 -05'00'

APPROVED BY ORDER OF COMMANDING GENERAL, U.S. ARMY MATERIEL COMMAND

BRAILSFORD.KEITH.ANTHONY.1028655661 Digitally signed by BRAILSFORD.KEITH.ANTHONY.1028655661 Date: 2022.09.08 17:42:54 -05'00'

DEFENSE AMMUNITION CENTER

CAUTION: VERIFY PRIOR TO USE AT https://www.dau.edu/cop/ammo/pages/default.aspx THAT THIS IS THE MOST CURRENT VERSION OF THIS DOCUMENT. THIS IS PAGE 1 OF 8.

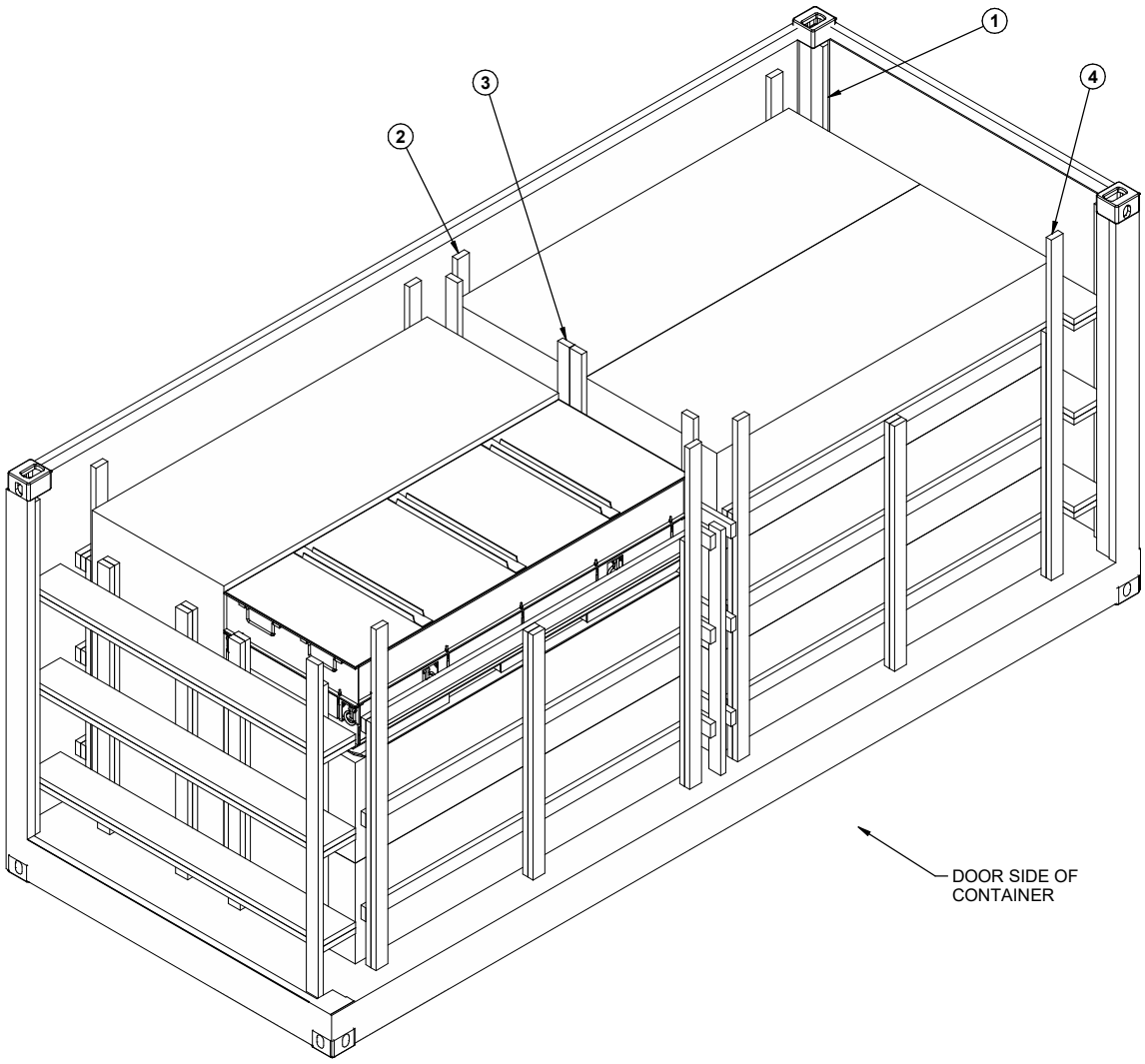
DO NOT SCALE

JANUARY 1993

DESIGN ENGINEER	BASIC	LAURA FIEFFER	
	REV.	RICHARD GARSIDE	REVISION NO. 3 / AUGUST 2022
ENGINEERING DIVISON		FIEFFER.LAURA.A.1230375727 Digitally signed by FIEFFER.LAURA.A.1230375727 Date: 2022.08.18 10:51:10 -05'00'	SEE THE REVISION LISTING ON PAGE 3
TEST ENGINEER		FELICIANO.ADIN.1259200373 Digitally signed by FELICIANO.ADIN.1259200373 Date: 2022.08.25 14:07:47 -05'00'	
TEST REPORT	NA		
EXPLOSIVE SAFETY DIRECTORATE		FIEFFER.LAURA.A.1230375727 Digitally signed by FIEFFER.LAURA.A.1230375727 Date: 2022.09.06 13:24:11 -05'00'	

CLASS	DIVISION	DRAWING	FILE
19	48	7151	SP15J21

PROJECT SP 203-92



ISOMETRIC VIEW

KEY NUMBERS

① END BLOCKING ASSEMBLY (2 REQD). SEE THE DETAIL ON PAGE 5.

② FAR WALL FILL ASSEMBLY (2 REQD). SEE THE DETAIL ON PAGE 6. INSTALL THE ASSEMBLIES WITH THE HORIZONTAL PIECES AGAINST THE WALL OF THE CONTAINER.

③ CENTER FILL ASSEMBLY (2 REQD). SEE THE DETAIL ON PAGE 5. INSTALL WITH THE RETAINER PIECE AGAINST EITHER THE CONTAINER FAR WALL OR DOOR SIDE.

④ DOOR SIDE FILL ASSEMBLY (2 REQD). SEE THE DETAIL ON PAGE 6. INSTALL THE ASSEMBLIES WITH THE HORIZONTAL PIECES AGAINST THE SIDE OF THE CNU-411 CONTAINERS.

BILL OF MATERIAL		
LUMBER	LINEAR FEET	BOARD FEET
2" X 4" 2" X 10"	540 87	360 145
NAILS	NO. REQD	POUNDS
10d (3")	534	8-1/4

LOAD AS SHOWN FOR CBU-103 (EA85/EA86)

SEE TABLE ON PAGE 4 FOR ADDITIONAL LOADS.

ITEM	QUANTITY	WEIGHT (APPROX)
CNU-411 CONTAINER	12	28,680 LBS
DUNNAGE		1,018 LBS
CONTAINER		6,050 LBS
TOTAL WEIGHT		35,748 LBS

PROJECT SP 203-92

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 OUTLOADING PROCEDURES SPECIFIED IN THIS DRAWING ARE APPLICABLE TO LOADS OF CBU-87, CBU-89, CBU-97, CBU-103, CBU-104, AND CBU-105 SERIES ITEMS PACKED IN CNU-411A/E, CNU-411B/E, CNU-411C/E OR CNU-411/E CONTAINERS. SUBSEQUENT REFERENCE TO CONTAINER HEREIN MEANS THE CONTAINER WITH CBU ITEMS. SEE PAGE 4 FOR DETAILS OF THE CONTAINER. **CAUTION**: REGARDLESS OF THE QUANTITY OF UNITS TO BE SHIPPED, THE "MAXIMUM GROSS WEIGHT" OF THE SIDE OPENING ISO CONTAINER MUST NOT BE EXCEEDED.

C. THE LOAD AS SHOWN ARE 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 AND 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-ON-FLATCAR (T/COFC) SHIPMENT. HOWEVER, THE LOAD AS DESIGNED CAN ALSO BE MOVED BY MOTOR OR WATER CARRIERS. **NOTICE**: OTHER CONTAINERS OF THE SAME DESIGN CONFIGURATION CAN ALSO BE USED.

D. WHEN LOADING THE 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 SIDE FILL ASSEMBLIES. NAIL EACH ADDITIONAL PIECE TO THE VERTICAL PIECE W/1 APPROPRIATELY SIZED NAIL EVERY 12". ADDITIONALLY, THE THICKNESS AND QUANTITY OF THE DUNNAGE LUMBER USED MAY BE ADJUSTED AS REQUIRED TO FACILITATE VARIANCE IN THE SIZE OF THE CONTAINER. THE LOAD MUST BE AS TIGHT AS POSSIBLE LONGITUDINALLY, BUT THE VOID MUST NOT EXCEED 3/4" OVERALL. EXCESSIVE SLACK CAN BE ELIMINATED BY LAMINATING ADDITIONAL HORIZONTAL PIECES TO THE CENTER FILL ASSEMBLIES W/4-10d NAILS.

E. DUNNAGE LUMBER SPECIFIED IS OF NOMINAL SIZE. FOR EXAMPLE, 1" X 6" MATERIAL IS ACTUALLY 3/4" THICK BY 5-1/2" WIDE AND 2" X 6" MATERIAL IS ACTUALLY 1-1/2" THICK BY 5-1/2" WIDE.

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 ENDWALLS. PIECES OF DUNNAGE MATERIAL MUST BE LAMINATED TO THE BUFFER PIECES ON THE END BLOCKING ASSEMBLIES TO PROVIDE A FLAT SURFACE FOR THE BUFFER PIECES. A PIECE OF 2" X 4", 2" X 3" OR A SPECIAL WIDTH PIECE CUT-TO-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 ENDWALLS 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 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. PORTIONS OF THE CONTAINER DEPICTED WITHIN THIS DRAWING, SUCH AS THE SIDE DOORS, HAVE NOT BEEN SHOWN IN THE LOAD VIEW FOR CLARITY PURPOSES.

K. 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 OTHER WEIGHT RESTRICTIONS IMPOSED ON THE INTERMODAL CONTAINER SYSTEM.

L. 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 FOLLOW:

1. A LOADED CONTAINER MUST BE ON A CHASSIS EQUIPPED WITH TWO BOGIE ASSEMBLIES WHEN BEING MOVED IN TOFC SERVICE.

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.

(CONTINUED AT RIGHT)

(GENERAL NOTES CONTINUED)

M. DURING INTRASTATE AND/OR INTERSTATE MOVES BY MOTOR CARRIER, A PROPER CHASSIS OR MODIFIED FLATBED TRAILER MUST BE USED TO PRECLUDE VIOLATION OF ONE OR MORE "WEIGHT LAWS" APPLICABLE TO THE STATE OR STATES INVOLVED.

N. WHEN STEEL STRAPPING IS SEALED IN AN END-OVER-END LAP JOINT, A MINIMUM OF ONE SEAL WITH TWO PAIR OF NOTCHES WILL BE USED TO SEAL THE JOINT WHEN A NOTCH-TYPE SEALER 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 8 FOR GUIDANCE.

O. THE LOAD SHOWN ON PAGE 2 MAY BE REDUCED FOR SHIPMENT. WEIGHTS FOR A REDUCED LAYER SHIPMENT OF EIGHT OR FOUR CONTAINERS ARE SHOWN ON THE CHART ON PAGE 4. SEE THE “OMITTED CONTAINER PROCEDURE” DETAIL AND SPECIAL NOTES ON PAGE 7 FOR REDUCING LOAD BY 1, 2, OR 3 CONTAINERS.

P. ANTI-CHAFING MATERIAL, CONSISTING OF NEUTRAL BARRIER MATERIAL, PLYWOOD, OR HARDBOARD, MAY BE INSTALLED AT POINTS OF CONTACT BETWEEN THE LADING AND THE CNU CONTAINER, IF DESIRED, TO PREVENT CHAFING DAMAGE TO CONTAINER PAINT AND MARKINGS.

Q. 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 25.4 MM AND ONE POUND EQUALS 0.454 KG

MATERIAL SPECIFICATIONS

LUMBER	SEE TM 743-200-1 (DUNNAGE LUMBER) AND VOLUNTARY PRODUCT STANDARD PS 20.
NAILS	ASTM F1667; COMMON STEEL NAIL (NLCMS OR NLCMMS).
ANTI-CHAFING MATERIAL	MIL-PRF-121 (OR EQUAL); NEUTRAL BARRIER MATERIAL.
HARDBOARD	ANSI/AHA A135.4, CLASS 1.
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.

REVISIONS

REVISION NO. 1, DATED JUNE 2001, CONSISTS OF:

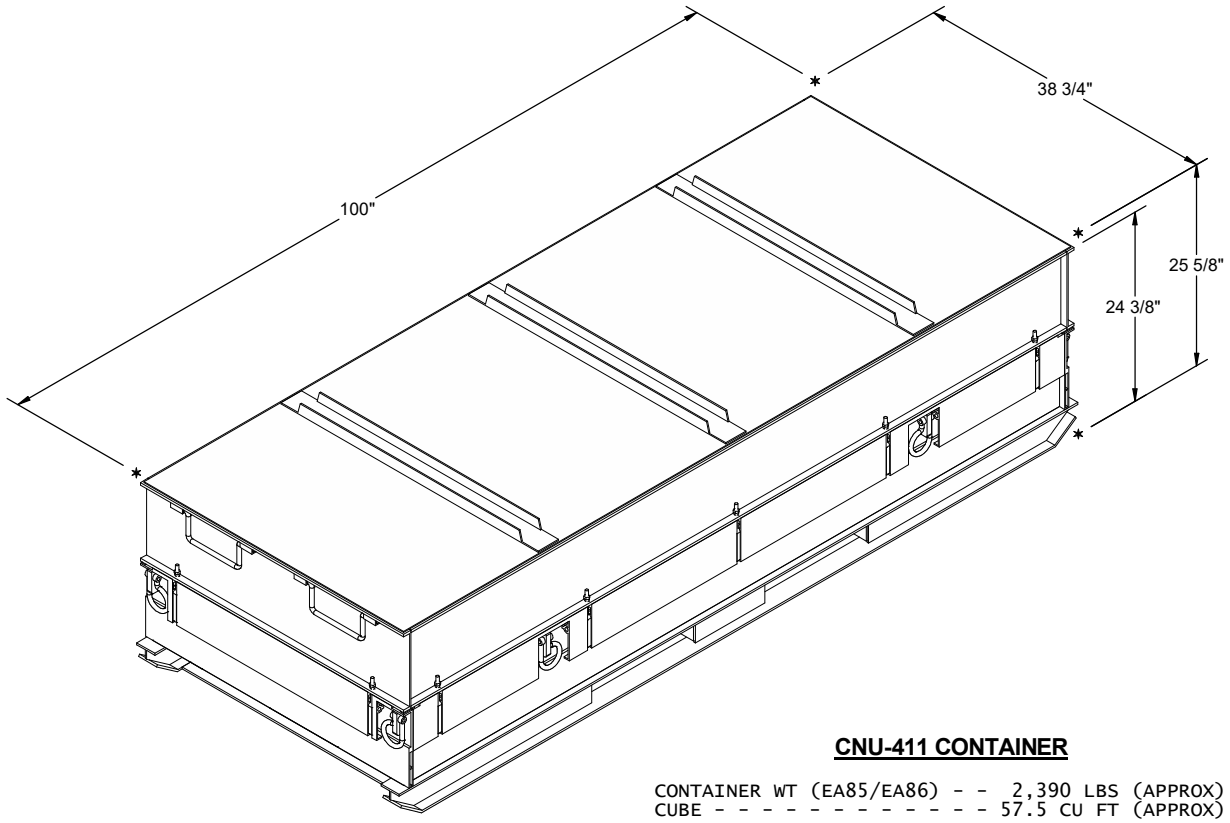
ADDING ADDITIONAL CBU ITEMS AND WEIGHTS.

REVISION NO. 2, DATED JUNE 2020, CONSISTS OF:

1. UPDATING LOAD, BILL OF MATERIAL AND LOAD AS SHOWN ON PAGE 2.
2. UPDATING LOAD WEIGHT CHART ON PAGE 4.
3. UPDATING CENTER FILL ASSEMBLY ON PAGE 5.
4. UPDATING LESS-THAN-FULL LOAD ON PAGE 7.
5. UPDATING DRAWING TO CURRENT STANDARDS.

REVISION NO. 3, DATED AUGUST 2022, CONSISTS OF:

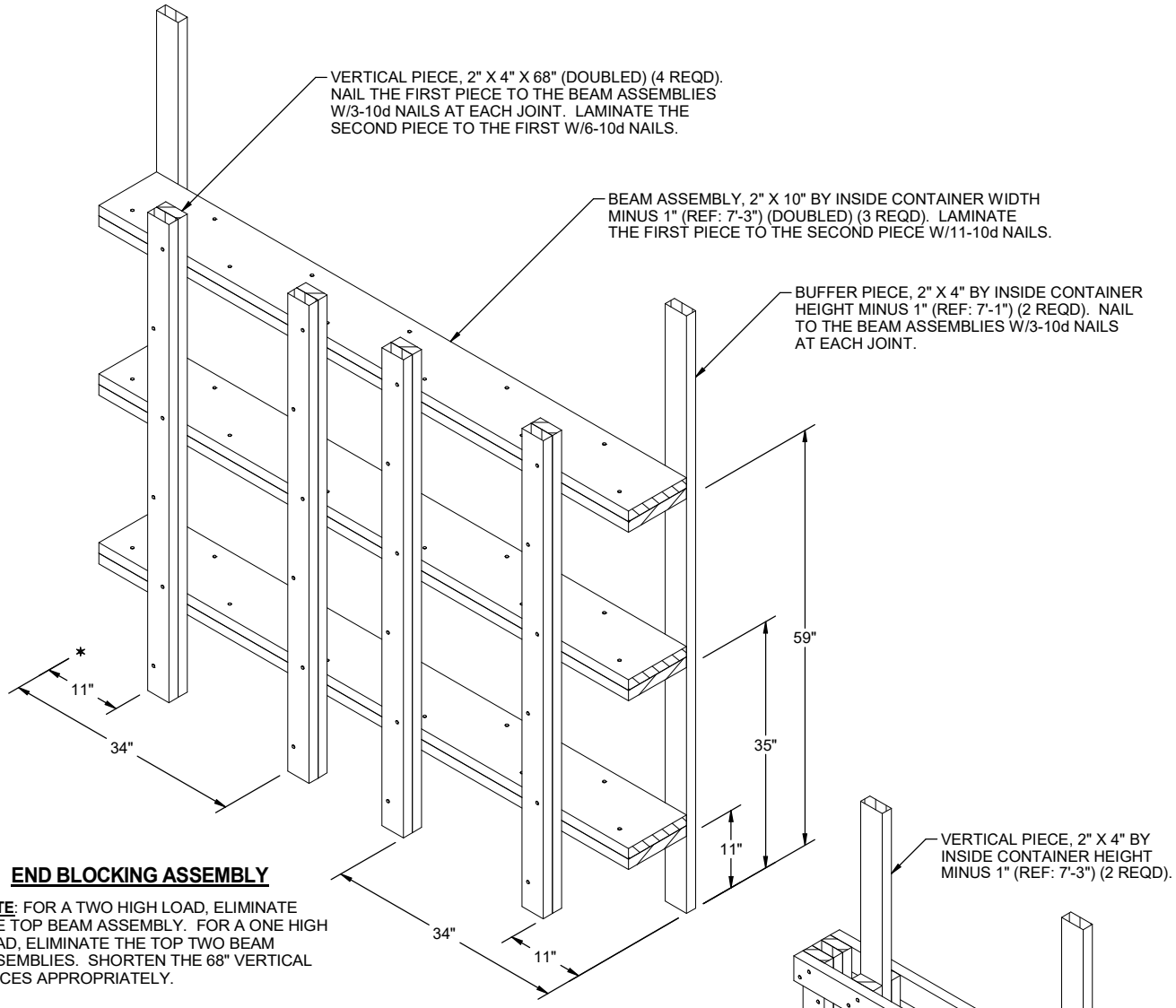
ADDING “DISTRIBUTION STATEMENT A” TO COVER PAGE.



CNU-411 CONTAINER

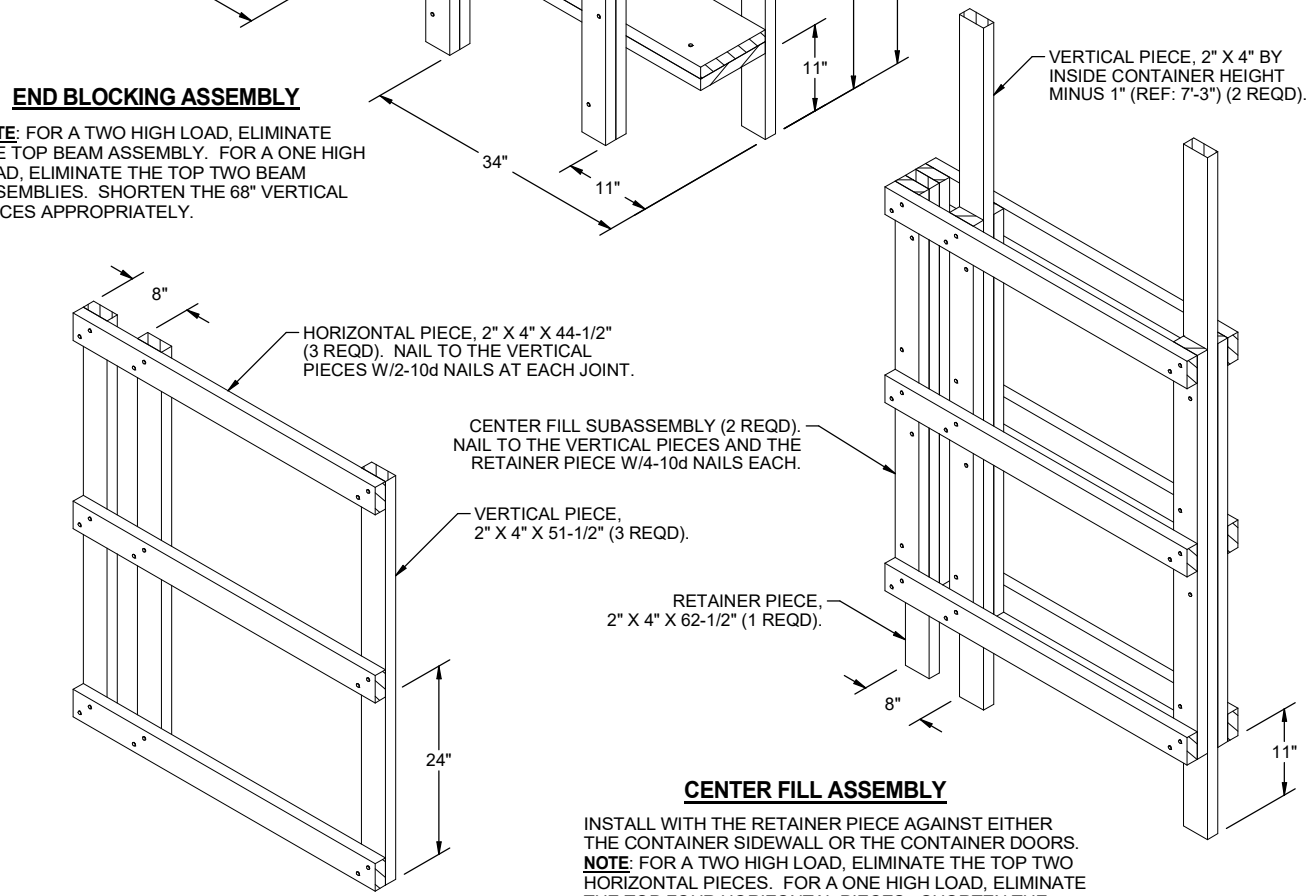
CONTAINER WT (EA85/EA86) - - 2,390 LBS (APPROX)
CUBE - - - - - - - - - - - - - 57.5 CU FT (APPROX)

LOAD WEIGHT (APPROX)					
DODIC	NOMENCLATURE	CONTAINER	QTY/WT LBS		
			4	8	12
E890	CBU-87	CNU-411	15,937	25,723	35,508
E891	CBU-87	CNU-411	15,937	25,723	35,508
E909	CBU-97	CNU-411	15,925	25,699	35,472
EA51	CBU-97	CNU-411	15,925	25,699	35,472
EA85	CBU-103	CNU-411	16,017	25,883	35,748
EA86	CBU-103	CNU-411	16,017	25,883	35,748
EA87	CBU-105	CNU-411	15,937	25,723	35,508
EA88	CBU-105	CNU-411	15,937	25,723	35,508
EA89	CBU-105	CNU-411	15,937	25,723	35,508
EB24	CBU-105	CNU-411	15,937	25,723	35,508
J005	CBU-104	CNU-411	14,017	21,883	29,748
K132	CBU-89	CNU-411	14,505	22,859	31,212
K290	CBU-89	CNU-411	13,817	21,483	29,148
K299	CBU-89	CNU-411	14,177	22,203	30,228



END BLOCKING ASSEMBLY

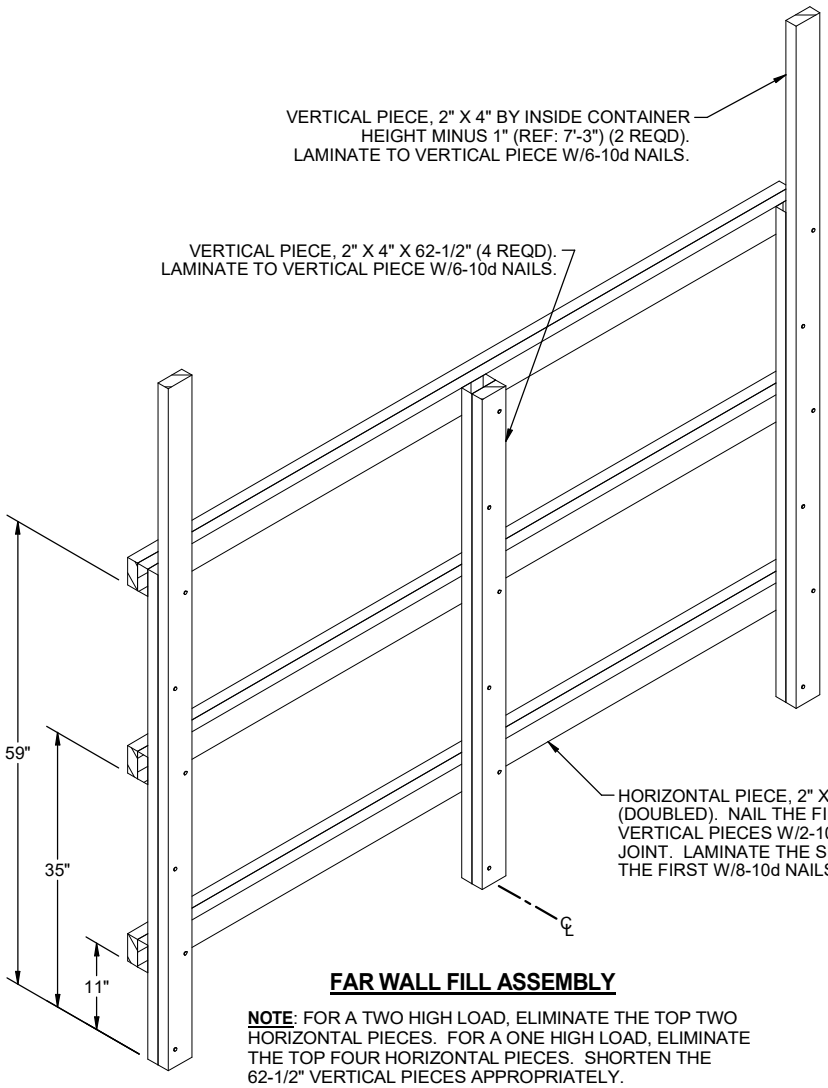
NOTE: FOR A TWO HIGH LOAD, ELIMINATE THE TOP BEAM ASSEMBLY. FOR A ONE HIGH LOAD, ELIMINATE THE TOP TWO BEAM ASSEMBLIES. SHORTEN THE 68" VERTICAL PIECES APPROPRIATELY.



CENTER FILL SUBASSEMBLY

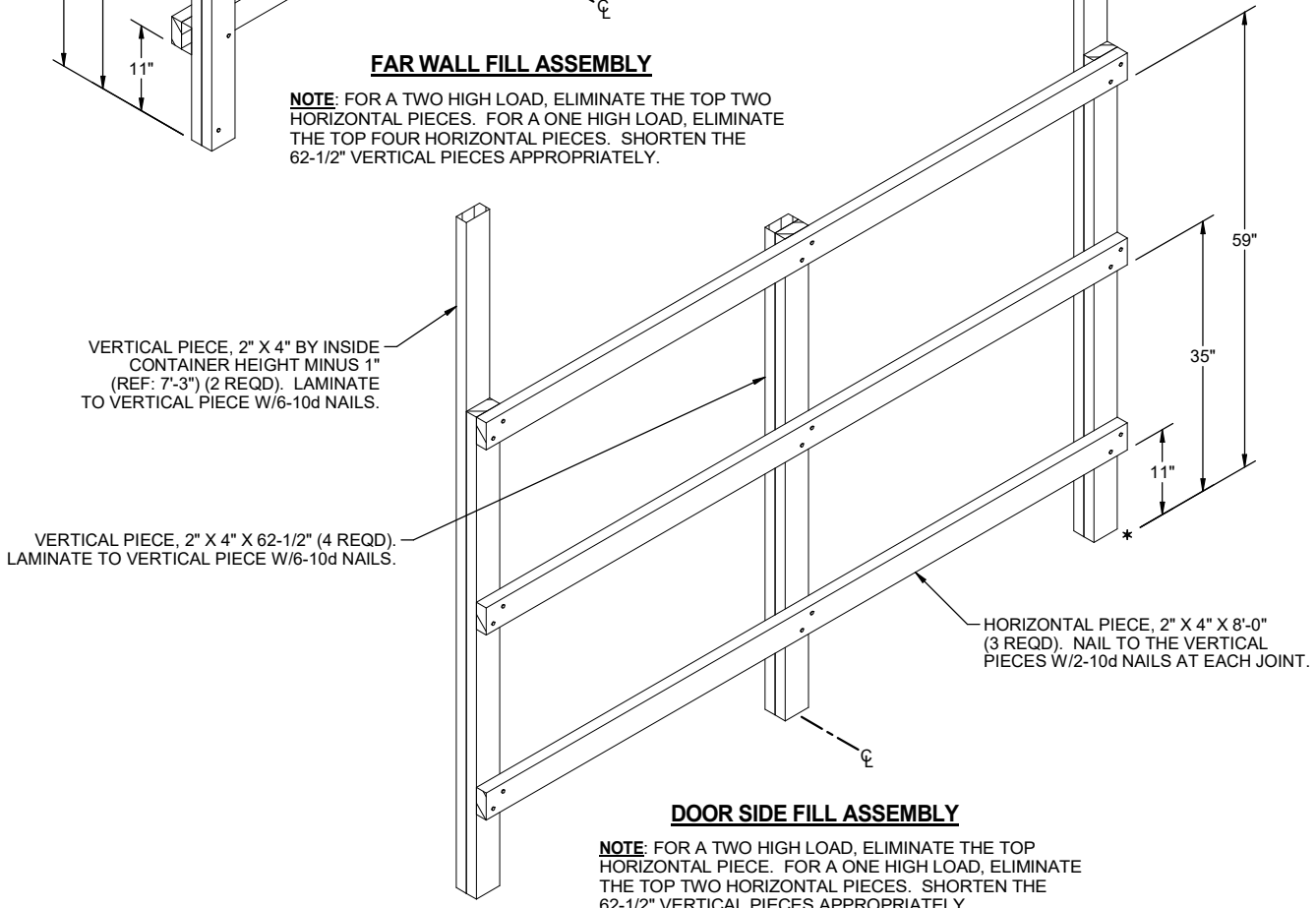
CENTER FILL ASSEMBLY

INSTALL WITH THE RETAINER PIECE AGAINST EITHER THE CONTAINER SIDEWALL OR THE CONTAINER DOORS.
NOTE: FOR A TWO HIGH LOAD, ELIMINATE THE TOP TWO HORIZONTAL PIECES. FOR A ONE HIGH LOAD, ELIMINATE THE TOP FOUR HORIZONTAL PIECES. SHORTEN THE 51-1/2" VERTICAL PIECES APPROPRIATELY.



FAR WALL FILL ASSEMBLY

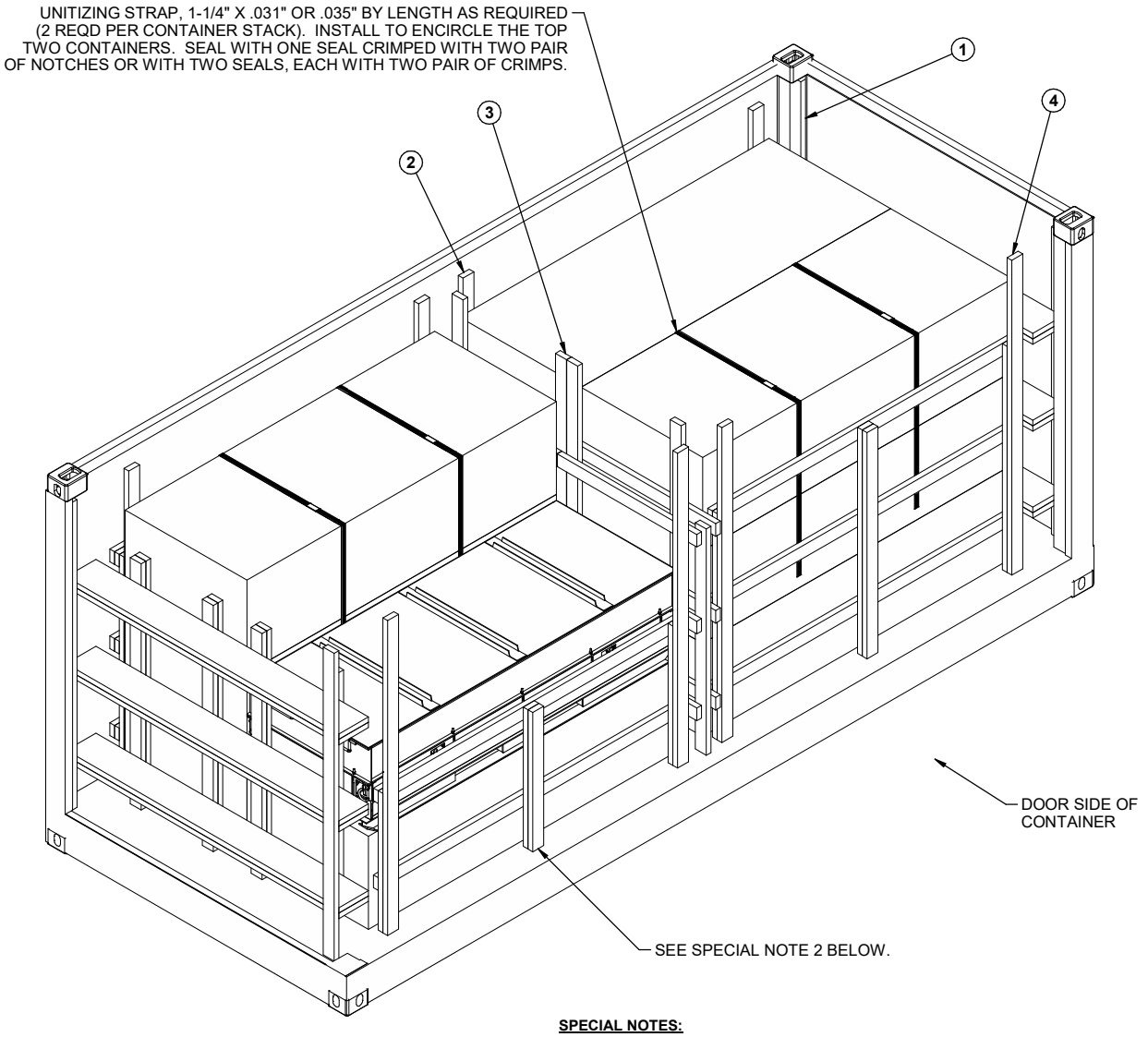
NOTE: FOR A TWO HIGH LOAD, ELIMINATE THE TOP TWO HORIZONTAL PIECES. FOR A ONE HIGH LOAD, ELIMINATE THE TOP FOUR HORIZONTAL PIECES. SHORTEN THE 62-1/2" VERTICAL PIECES APPROPRIATELY.



DOOR SIDE FILL ASSEMBLY

NOTE: FOR A TWO HIGH LOAD, ELIMINATE THE TOP HORIZONTAL PIECE. FOR A ONE HIGH LOAD, ELIMINATE THE TOP TWO HORIZONTAL PIECES. SHORTEN THE 62-1/2" VERTICAL PIECES APPROPRIATELY.

PROJECT SP 203-92



ISOMETRIC VIEW

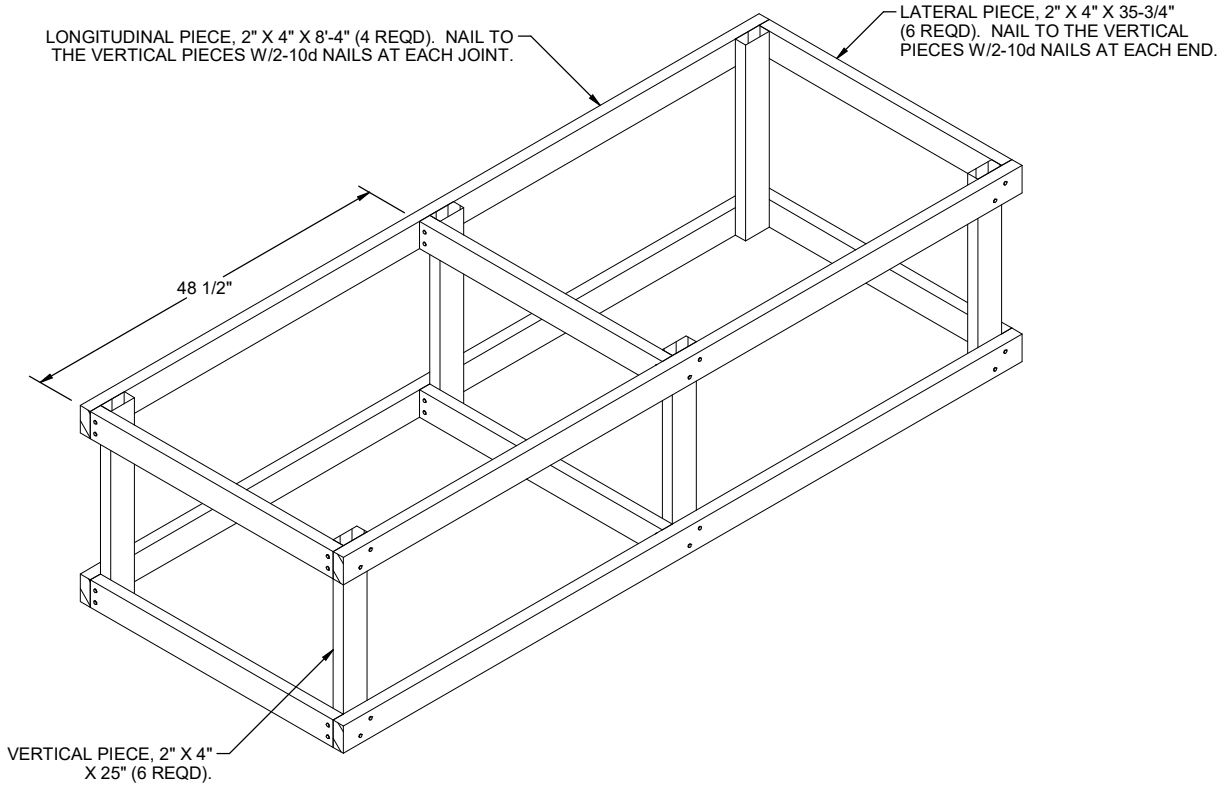
SPECIAL NOTES:

1. WHEN REDUCING A LOAD BY ONE OR MORE CONTAINERS, IT WILL BE NECESSARY TO UNITIZE THE CONTAINER STACKS WHICH ARE LATERALLY AND LONGITUDINALLY ADJACENT TO THE OMITTED CONTAINER AS DEPICTED IN THE LOAD ABOVE. SEE GENERAL NOTE "H" ON PAGE 3.

2. ASSEMBLIES THAT ONLY CONTACT REDUCED CONTAINER STACKS MAY BE REDUCED AS DETAILED IN THE ASSEMBLY DETAILS.

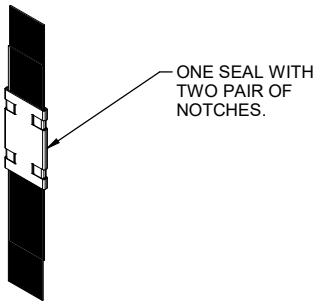
LESS-THAN-FULL LOAD PROCEDURES

NOTE: KEY NUMBERS REFER TO KEY NUMBERS ON PAGE 2.



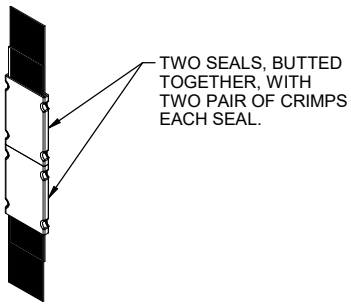
FILLER ASSEMBLY

USE TO REPLACE OMITTED UNITS IN LOADS OF 1, 2, OR 3 CNU CONTAINERS.



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

PROJECT SP 203-92