

APPROVED BY  
BUREAU OF EXPLOSIVES

*James H. [Signature]*

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# LOADING AND BRACING IN SIDE OPENING ISO CONTAINERS OF BLU-109 OR BLU-116 BOMBS ON MHU-212 PALLETS

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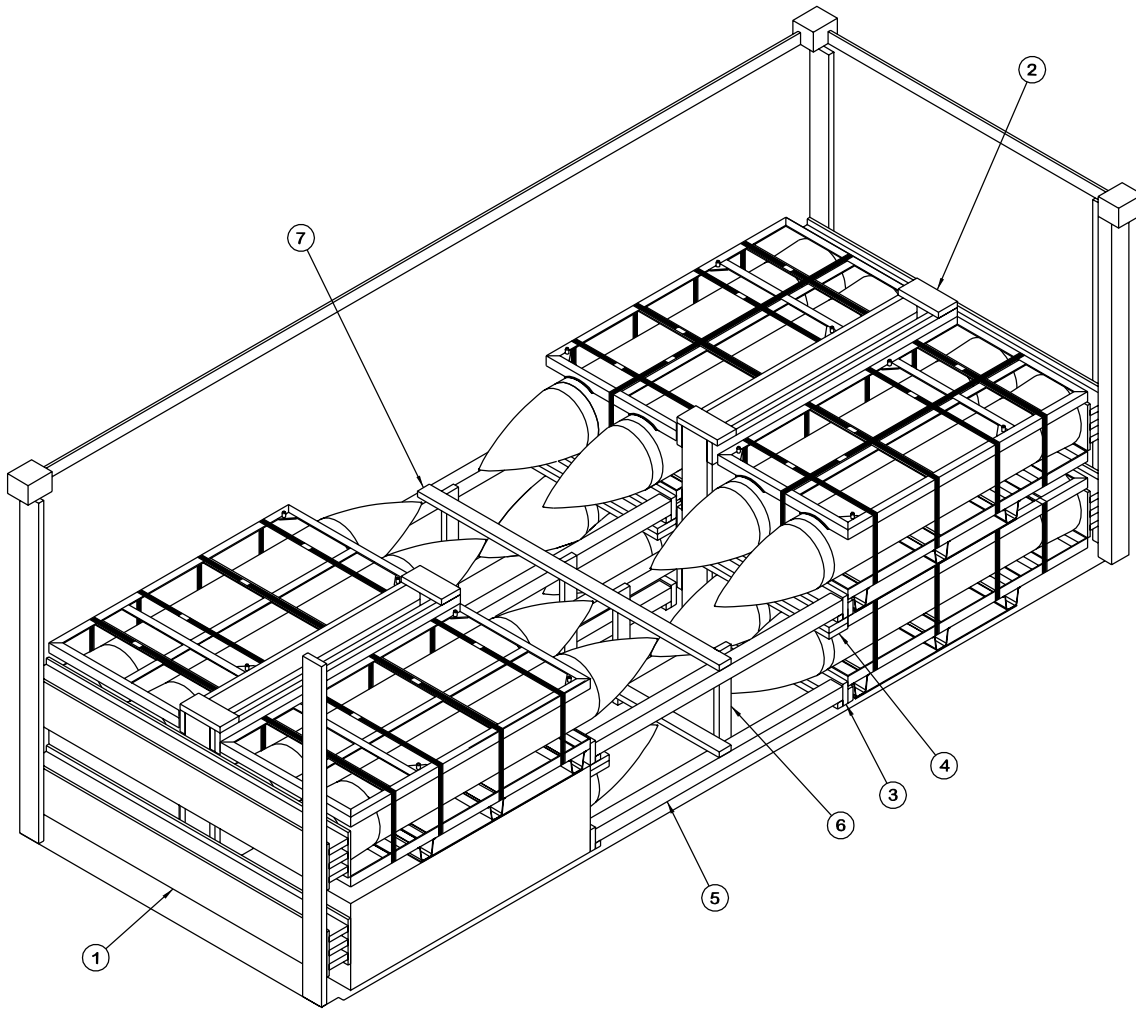
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LOADING AND BRACING SPECIFICATIONS SET FORTH WITHIN THIS DRAWING ARE APPLICABLE TO LOADS THAT ARE TO BE SHIPPED BY TRAILER/CONTAINER-ON-FLATCAR (T/COFC) RAIL CARRIER SERVICE. THESE SPECIFICATIONS MAY ALSO BE USED FOR LOADS THAT ARE TO BE MOVED BY MOTOR OR WATER CARRIERS.

## U.S. ARMY MATERIEL COMMAND DRAWING

APPROVED, U.S. ARMY JOINT MUNITIONS COMMAND		CAUTION: VERIFY PRIOR TO USE AT WWW.DAC.ARMY.MIL THAT THIS IS THE MOST CURRENT VERSION OF THIS DOCUMENT. THIS IS PAGE 1 OF 8.							
<i>[Signature]</i>		DO NOT SCALE			OCTOBER 2003				
		ENGINEER OR TECHNICIAN	BASIC REV.	PATRICK DOUGHERTY					
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		ENGINEERING DIRECTORATE	<i>[Signature]</i>			19	48	8769	SP15PB15

PROJECT SP 468-02



**ISOMETRIC VIEW**

**KEY NUMBERS**

**LOAD AS SHOWN**

ITEM	QUANTITY	WEIGHT (APPROX)
PALLET UNIT	8	34,584 LBS
DUNNAGE		963 LBS
CONTAINER		6,050 LBS
TOTAL WEIGHT		41,597 LBS (APPROX)

- ① END BLOCKING ASSEMBLY (2 REQD). SEE DETAIL ON PAGE 5. POSITION AT EACH END OF THE CONTAINER AS SHOWN.
- ② CRIB FILL ASSEMBLY (2 REQD). SEE DETAIL ON PAGE 5. INSTALL BETWEEN PALLET UNITS AS SHOWN WITH THE HOLD DOWN CLEATS TOWARDS THE NOSE END OF THE BOMBS. NAIL THROUGH THE VERTICAL PIECE OF THE CRIB FILL ASSEMBLY INTO THE END BLOCKING ASSEMBLY W/2-10d NAILS INTO EACH BEAM ASSEMBLY.
- ③ CENTER GATE (8 REQD). SEE DETAIL ON PAGE 6. PLACE AGAINST THE PALLET UNITS WITH THE 2" X 4" HOLD DOWN CLEAT POSITIONED UNDER THE PALLET.
- ④ SOLID FILL 2" X 6" X 38" (AS NEEDED TO FILL VOID BETWEEN THE TOP OF THE BOMBS IN THE BOTTOM LAYER AND THE BASE OF THE TOP PALLET) (4 REQD). LAMINATE THE FIRST LAYER TO THE SECOND LAYER W/4-10d NAILS. LAMINATE ADDITIONAL LAYERS IN A SIMILAR MANNER. TOENAIL THE CENTER GATE IN THE TOP LAYER TO FILL MATERIAL W/4-10d NAILS.
- ⑤ STRUT, 4" X 4" BY LENGTH TO SUIT (REF: 6'-0-1/2") (8 REQD). POSITION BETWEEN THE CENTER GATES. TOENAIL TO THE CENTER GATES W/2-12d NAILS AT EACH END. SEE "BEVEL-CUT" DETAIL ON PAGE 4.
- ⑥ VERTICAL SUPPORT, 2" X 4" X 30" (4 REQD). POSITION AS SHOWN AND NAIL TO EACH STRUT W/2-10d NAILS AT EACH LOCATION.
- ⑦ HORIZONTAL SUPPORT, 2" X 4" BY INSIDE CONTAINER WIDTH MINUS 1" (REF: 7'-4") (2 REQD). PLACE ALONG THE TOP AND BOTTOM ROW OF STRUTS AND NAIL TO THE STRUTS W/2-10d NAILS AT EACH LOCATION.

**BILL OF MATERIAL**

LUMBER	LINEAR FEET	BOARD FEET
2" X 2"	25	8
2" X 4"	81	54
2" X 6"	275	275
2" X 8"	15	20
4" X 4"	48	64
NAILS	NO. REQD	POUNDS
6d (2")	264	1-3/4
10d (3")	282	4
12d (3-1/4")	32	1/2
PLYWOOD, 3/4"	55.58 SQ FT REQD	114.63 LBS

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 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 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.

N. 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.

O. 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.

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 7. THE OMITTED UNIT ASSEMBLY SHALL BE LOCATED AT THE DOOR SIDE AND ON TOP OF THE LOAD AS SHOWN ON PAGE 7.

Q. RECOMMENDED SEQUENTIAL LOADING PROCEDURES:

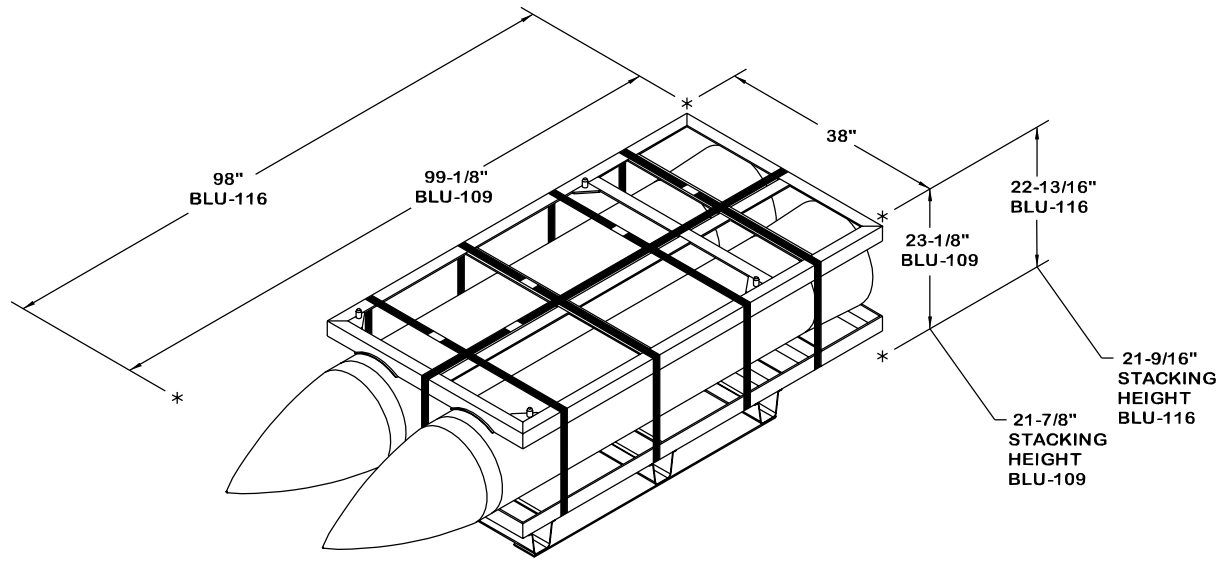
1. PREFABRICATE TWO END BLOCKING ASSEMBLIES, TWO CRIB FILL ASSEMBLIES, AND EIGHT CENTER GATES.
2. INSTALL THE END BLOCKING ASSEMBLIES.
3. LOAD TWO STACKS OF TWO PALLET UNITS AT THE FAR WALL.
4. INSTALL FOUR CENTER GATES, FOUR STRUTS, AND SOLID FILL AS NEEDED.
5. INSTALL THE TWO CRIB FILL ASSEMBLIES.
6. REPEAT STEPS 3 AND 4 AT THE DOOR SIDE.
7. INSTALL FOUR VERTICAL AND TWO HORIZONTAL SUPPORTS.

- 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 BLU-109 OR BLU-116 BOMBS ON MHU-212 METAL PALLETS. SUBSEQUENT REFERENCE TO THE PALLET UNIT HEREIN MEANS THE MHU-212 METAL PALLET WITH THE BOMBS INSTALLED. SEE PAGE 4 FOR DETAIL OF THE PALLET UNIT. CAUTION: REGARDLESS OF THE QUANTITY OF PALLET UNITS 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'-4" LONG BY 89" WIDE BY 88" HIGH AND A MAXIMUM GROSS WEIGHT OF 52,910 POUNDS. 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 BOMB 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 BEARING PIECES ON THE CRIB FILL ASSEMBLIES. NAIL EACH ADDITIONAL PIECE W/1 APPROPRIATELY SIZED NAIL EVERY 12". ADDITIONALLY, THE WIDTH OF THE VERTICAL PIECES IN THE CRIB FILL ASSEMBLIES MAY BE ADJUSTED AS REQUIRED TO FACILITATE VARIANCE IN THE SIZE OF THE CONTAINER.
- E. 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.
- 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. CAUTION: DO NOT NAIL DUNNAGE MATERIAL TO THE CONTAINER WALLS OR FLOOR. ALL NAILING WILL BE WITHIN THE DUNNAGE.
- J. PORTIONS OF THE CONTAINER DEPICTED WITHIN THIS DRAWING, SUCH AS THE SIDEWALL, HAVE NOT BEEN SHOWN IN THE LOAD VIEWS FOR CLARITY PURPOSES.
- K. 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.

(CONTINUED AT LEFT)

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).
- PLYWOOD - - - - - : COMMERCIAL ITEM DESCRIPTION A- A-55057, INDUSTRIAL PLYWOOD, INTERIOR WITH EXTERIOR GLUE, GRADE C-D, IF SPECIFIED GRADE IS NOT AVAILABLE, A BETTER INTERIOR OR EXTERIOR GRADE MAY BE SUBSTITUTED.

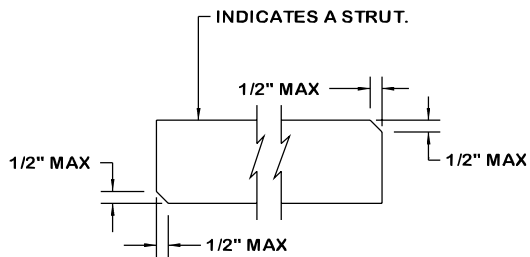


**BLU-109 BOMBS ON MHU-212/E PALLET**

GROSS WEIGHT - - - - - 4,323 LBS (APPROX)  
 CUBE - - - - - 47.7 CU FT (APPROX)

**BLU-116 BOMBS ON MHU-212A/E PALLET**

GROSS WEIGHT - - - - - 4,168 LBS (APPROX)  
 CUBE - - - - - 46.5 CU FT (APPROX)



**BEVEL-CUT**

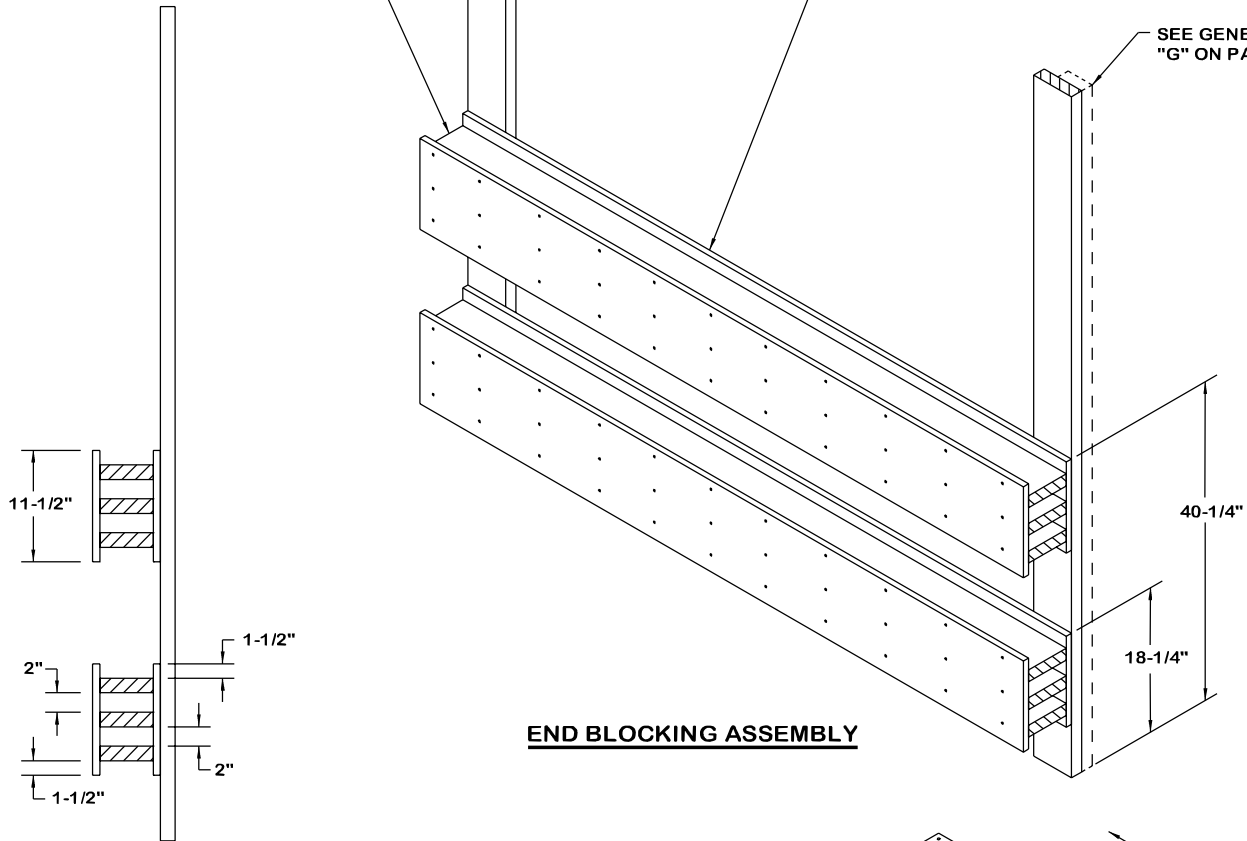
IF DESIRED, EACH END OF A STRUT  
 MAY BE BEVEL-CUT AS SHOWN ABOVE  
 TO FACILITATE THE ACHIEVEMENT OF  
 A TIGHT CENTER GATE FIT.

BEAM, 2" X 6" BY INSIDE CONTAINER WIDTH MINUS 1" (REF: 7'-3") (6 REQD).

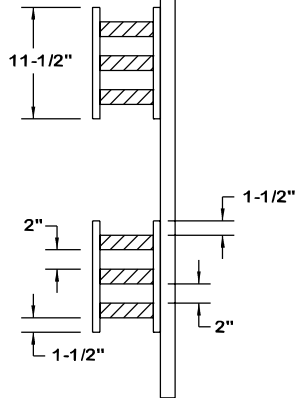
BUFFER PIECE, 2" X 6" BY INSIDE CONTAINER HEIGHT MINUS 1" (REF: 7'-1") (2 REQD). NAIL THROUGH THE PLYWOOD INTO THE BEAM ASSEMBLIES W/2-10d NAILS AT EACH LOCATION.

PLYWOOD, 3/4" X 11-1/2" BY INSIDE CONTAINER WIDTH MINUS 1" (REF: 7'-3") (4 REQD). NAIL TO THE BEAMS W/1-6d NAIL EVERY 6".

SEE GENERAL NOTE "G" ON PAGE 3.



**END BLOCKING ASSEMBLY**



**VIEW A**

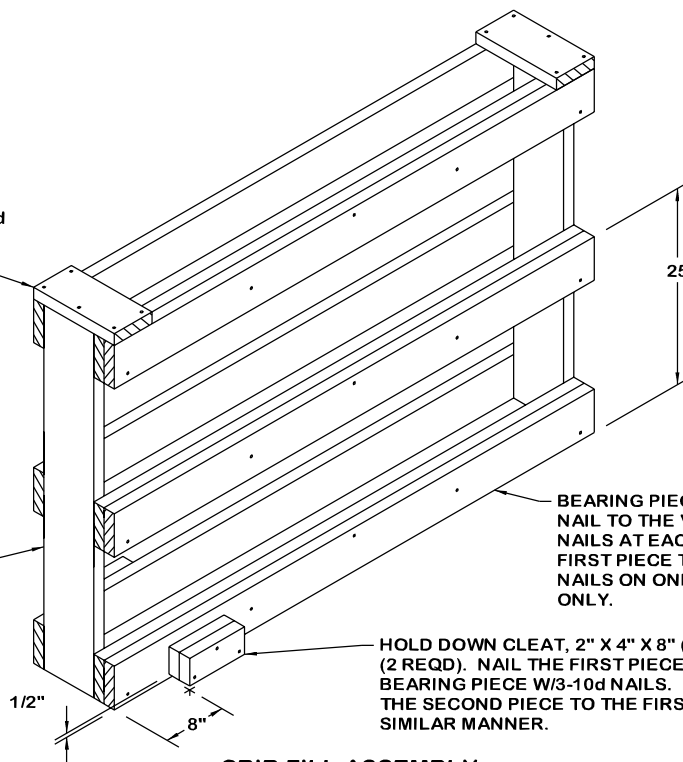
**VIEW A**

TIE PIECE, 2" X 6" X 11-3/4" (2 REQD). NAIL TO THE BEARING PIECES W/2-10d NAILS AT EACH END AND TO THE VERTICAL PIECE W/1-10d NAIL.

VERTICAL PIECE, 2" X 8" X 46" (2 REQD).

BEARING PIECE, 2" X 6" X 70" (9 REQD). NAIL TO THE VERTICAL PIECES W/2-10d NAILS AT EACH END. LAMINATE THE FIRST PIECE TO THE SECOND W/5-10d NAILS ON ONE SIDE OF THE ASSEMBLY ONLY.

HOLD DOWN CLEAT, 2" X 4" X 8" (DOUBLED) (2 REQD). NAIL THE FIRST PIECE TO THE BEARING PIECE W/3-10d NAILS. LAMINATE THE SECOND PIECE TO THE FIRST IN A SIMILAR MANNER.



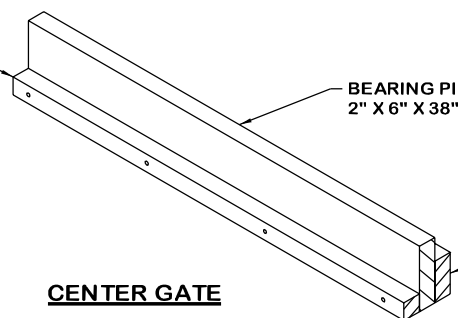
**CRIB FILL ASSEMBLY**

STRUT LEDGER, 2" X 2" X 38" (1 REQD). NAIL TO THE BEARING PIECE W/4-10d NAILS.

BEARING PIECE, 2" X 6" X 38" (1 REQD).

CLEAT, 2" X 4" X 38" (1 REQD). NAIL TO THE BEARING PIECE W/4-10d NAILS.

**CENTER GATE**



TIE PIECE, 2" X 6" X 38" (3 REQD). NAIL TO THE STRUTS W/2 OR 3-10d NAILS AT EACH LOCATION AS SHOWN AND TO THE TOP BEARING PIECE W/5-10d NAILS.

VERTICAL SUPPORT, 2" X 4" X 15-1/2" (4 REQD).

THIS TIE PIECE SHOWN IN PHANTOM LINES FOR CLARITY.

STRUT, 2" X 6" X 67" (6 REQD). NAIL TO THE VERTICAL SUPPORTS W/3-10d NAILS AT EACH END.

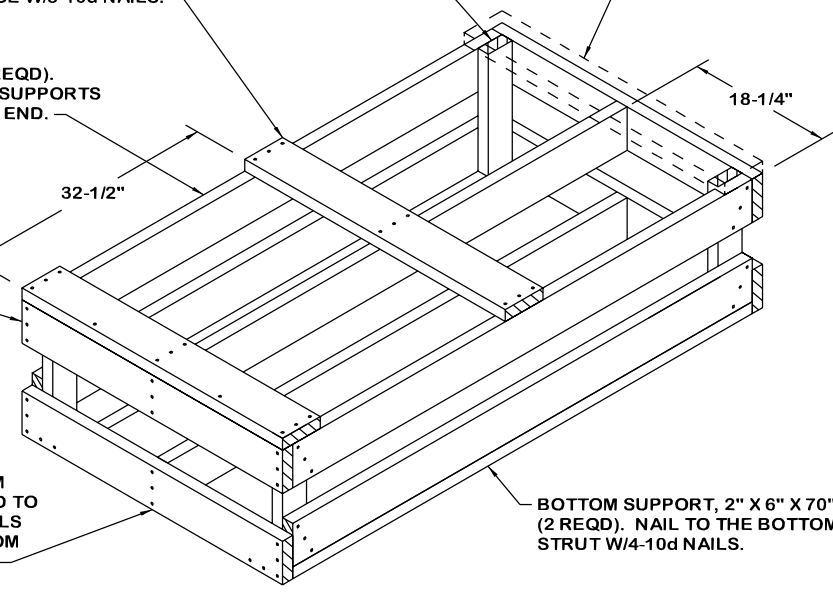
18-1/4"

32-1/2"

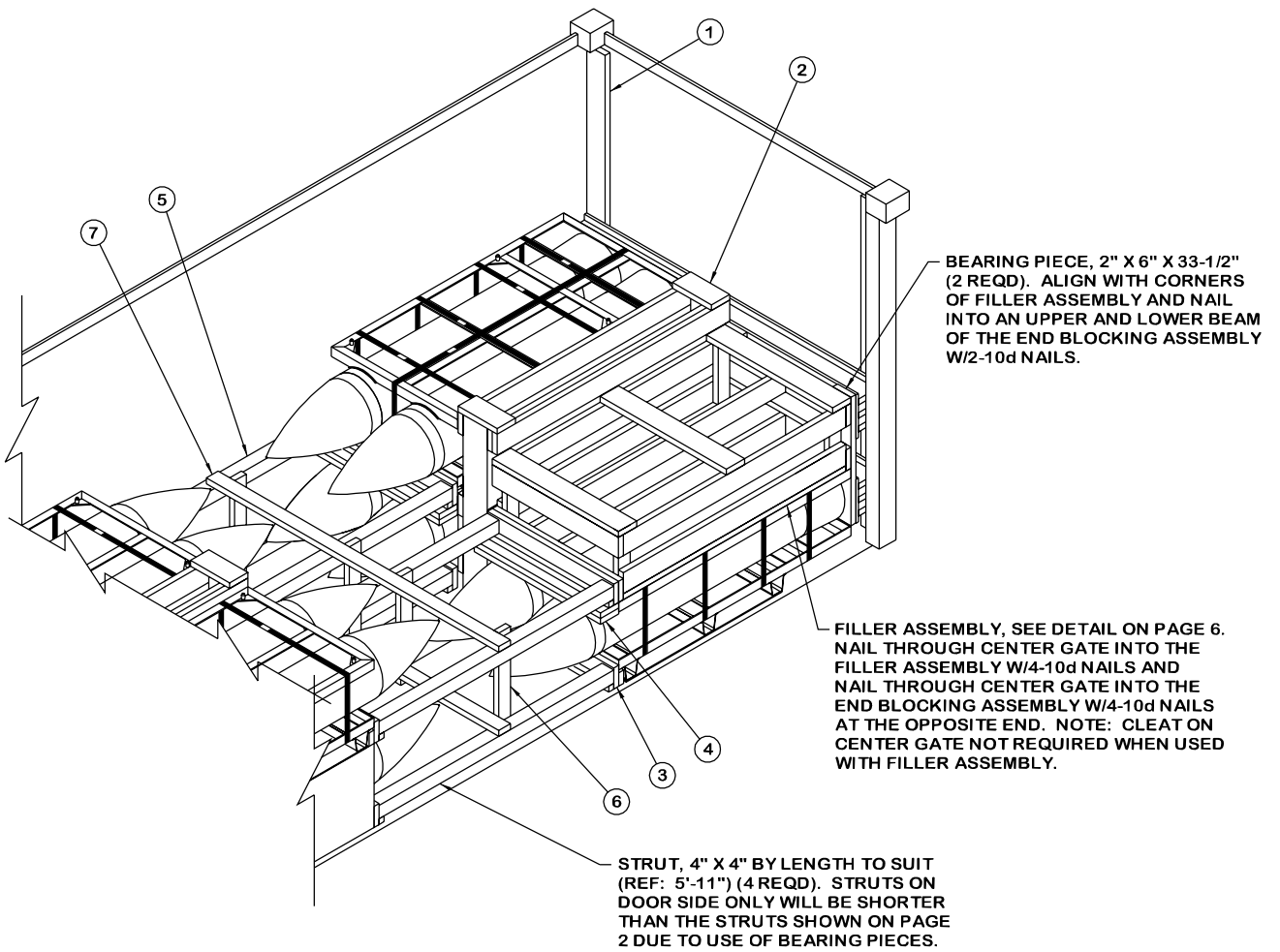
TOP BEARING PIECE, 2" X 6" X 38" (2 REQD). NAIL TO THE STRUTS W/3-10d NAILS AT EACH LOCATION.

BOTTOM BEARING PIECE, 2" X 6" X 38" (2 REQD). NAIL TO THE OUTSIDE BOTTOM STRUTS W/2-10d NAILS AT EACH END AND TO THE MIDDLE BOTTOM STRUT W/3-10d NAILS AT EACH LOCATION. NAIL TO THE BOTTOM SUPPORTS W/3-10d NAILS AT EACH END.

BOTTOM SUPPORT, 2" X 6" X 70" (2 REQD). NAIL TO THE BOTTOM STRUT W/4-10d NAILS.



**FILLER ASSEMBLY**



**LESS-THAN-FULL-LOAD PROCEDURE**

THE DETAIL ABOVE DEPICTS A BLOCKING METHOD TO BE USED IN A LESS-THAN-FULL CONTAINER LOAD (LESS THAN 8 UNITS). KEY NUMBERS REFER TO KEY NUMBERS ON PAGE 2. SEE GENERAL NOTE "O" ON PAGE 3.

