

APPROVED BY
 BUREAU OF EXPLOSIVES
J. W. Theissen
 DATE 4/14/91

LOADING AND BRACING¹ WITH WOODEN DUNNAGE IN HALF HIGH OPEN TOP INTERMODAL FREIGHT CONTAINERS OF SEPARATE LOADING PROJECTILES

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¹ LOADING AND BRACING SPECIFICATIONS SET FORTH WITHIN THIS DRAWING ARE APPLICABLE TO LOADS THAT ARE TO BE SHIPPED BY TRAILER/CONTAINER-ON-FLAT-CAR (T/COFC) RAIL CARRIER SERVICE. THESE SPECIFICATIONS MAY ALSO BE USED FOR LOADS THAT ARE TO BE MOVED BY MOTOR OR WATER CARRIERS.

DO NOT SCALE

REVISIONS		DRAWN	TYPED	CHECKED	TECHNICAL	ENGINEER
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APPROVED BY ORDER OF COMMANDING GENERAL, U.S. ARMY MATERIAL COMMAND (AMC)						
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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 FOR PALLETIZED UNITS OF 15MM AND 8 INCH SEPARATE LOADING PROJECTILES. SEE PAGE 3 FOR DETAILS OF THE PALLET UNITS. CAUTION: REGARDLESS OF THE QUANTITY OF PALLETIZED UNITS TO BE SHIPPED, THE "MAXIMUM GROSS WEIGHT" OF 44,800 POUNDS MUST NOT BE EXCEEDED.
- C. THE LOAD AS SHOWN IS BASED ON A 4,760 POUND 20' LONG BY 8' WIDE HALF HIGH OPEN TOP INTERMODAL COMMERCIAL CONTAINER WITH INSIDE DIMENSIONS OF 19'-5-1/2" LONG BY 91-1/2" WIDE BY 42-1/4" HIGH. THE LOAD IS DESIGNED FOR TRAILER/CONTAINER-OF-FLAT-CAR (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, THE PALLET UNITS ARE TO BE POSITIONED SO AS TO ACHIEVE A TIGHT LOAD (TIGHT AGAINST THE END AND SIDE DUNNAGE ASSEMBLIES). ALTHOUGH A TOTAL OF 1-1/2" OF UNBLOCKED SPACE ACROSS THE WIDTH OF A LOAD BAY IS PERMITTED, LATERAL VOIDS WITHIN THE LOAD ARE TO BE HELD TO A MINIMUM. EXCESSIVE SLACK CAN BE ELIMINATED FROM A LOAD BY LAMINATING ADDITIONAL PIECES OF APPROPRIATE THICKNESS TO THE SIDE FILL ASSEMBLIES AND/OR TOP-OF-LOAD ANTI-SWAY BRACE ASSEMBLIES ON ONE OR BOTH SIDES OF THE CONTAINER. NAIL EACH ADDITIONAL PIECE W/1 APPROPRIATELY SIZED NAIL EVERY 12" OR AS APPROPRIATE.
- 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. CAUTION: DO NOT NAIL DUNNAGE MATERIAL TO THE CONTAINER WALLS OR FLOOR. ALL NAILING WILL BE WITHIN THE DUNNAGE.
- H. PORTIONS OF THE CONTAINER DEPICTED WITHIN THIS DRAWING, SUCH AS A SIDEWALL AND THE END DOORS, HAVE NOT BEEN SHOWN IN THE LOAD VIEWS FOR CLARITY PURPOSES.

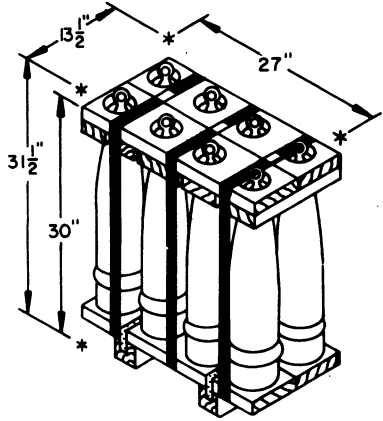
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(GENERAL NOTES CONTINUED)

- J. REQUIREMENT CITED WITHIN THE BUREAU OF EXPLOSIVES PAMPHLET 6C APPLY WHEN THE SHIPMENT MOVES BY TRAILER/CONTAINER-ON-FLAT-CAR (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.
- K. DURING INTRASTATE AND/OR INTERSTATE MOVES BY MOTOR CARRIER, A PROPER CHASSIS OR MODIFIED FLAT BED TRAILER MUST BE USED TO PRECLUDE VIOLATION OF ONE OR MORE "WEIGHT LAWS" APPLICABLE TO THE STATE OR STATES INVOLVED.
- L. 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 OUNCHE EQUALS 25.4MM AND ONE POUND EQUALS 0.454 KG.

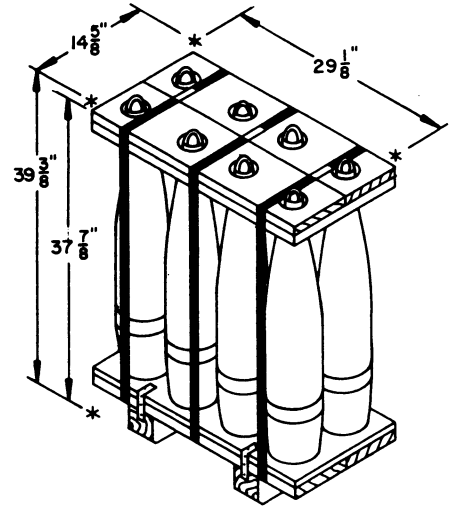
MATERIAL SPECIFICATIONS

- LUMBER-----: SEE TM 743-200-1 (DUNNAGE LUMBER) AND FED SPEC MM-L-751.
- NAILS-----: FED SPEC FF-N-105; COMMON.
- PLYWOOD-----: FED SPEC NN-P-530; GROUP B, CONSTRUCTION AND INDUSTRIAL PLYWOOD, INTERIOR WITH EXTERIOR GLUE, GRADE C-D. IF SPECIFIED GRADE IS NOT AVAILABLE, A BETTER INTERIOR OR AN EXTERIOR GRADE MAY BE SUBSTITUTED.
- STRAPPING, STEEL---: FED SPEC QQ-S-781; CLASS I, TYPE I OR IV, HEAVY DUTY, FINISH A, B (GRADE 2), OR C.
- SEAL, STRAP-----: FED SPEC QQ-S-781; TYPE D, STYLE I, II, OR IV, CLASS H, FINISH A, B (GRADE 2), OR C.
- WIRE-----: FED SPEC QQ-W-461.



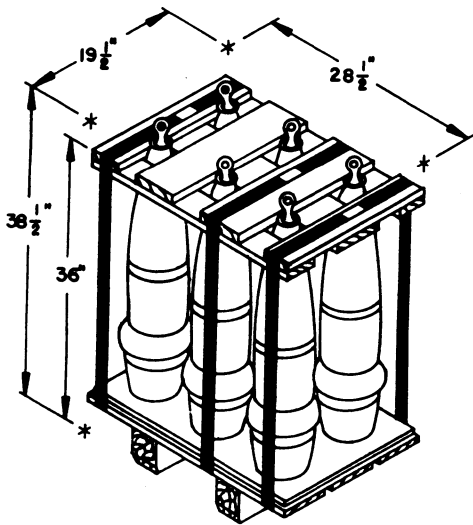
155MM, 8/PALLET (SMALL)

UNIT WEIGHT ----- 800 LBS (APPROX)
 CUBE ----- 6.6 CU FT



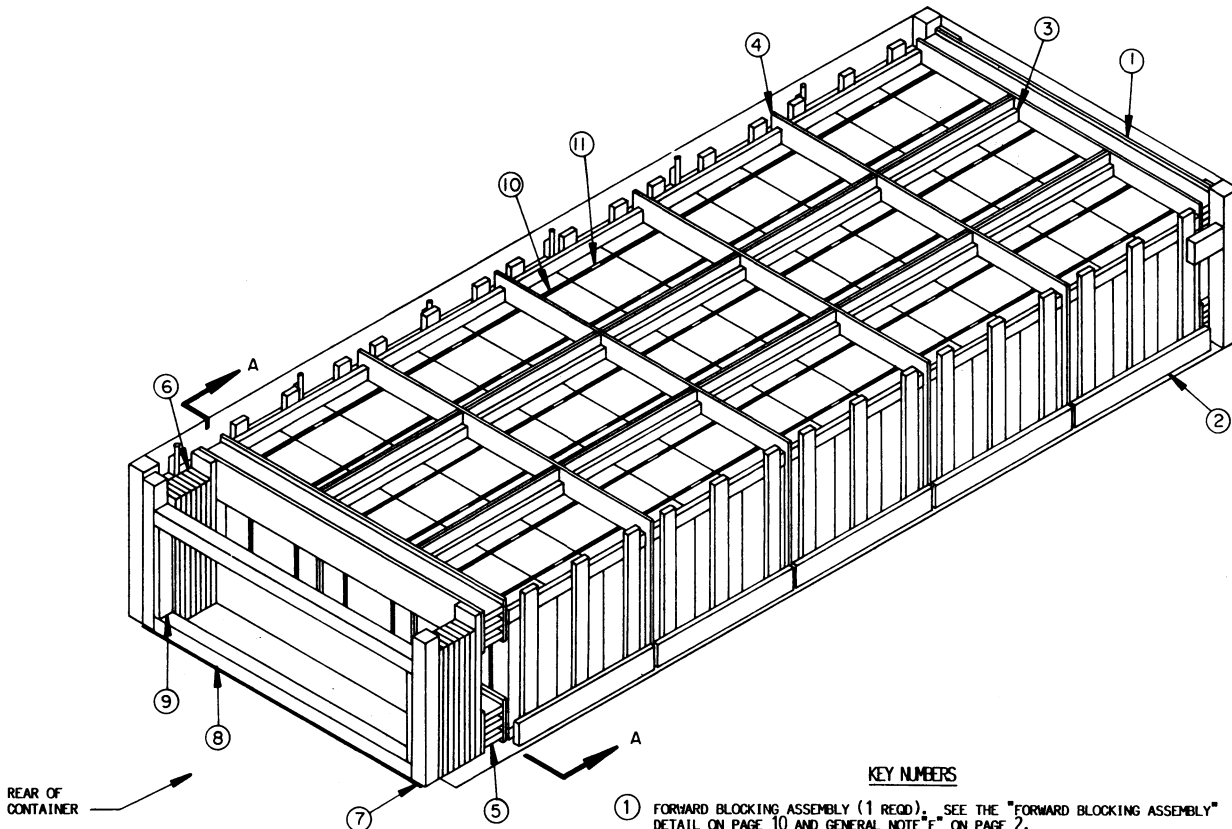
155MM, 8/PALLET (LARGE)

UNIT WEIGHT ----- 871 LBS (APPROX)
 CUBE ----- 9.7 CU FT



8', 6/PALLET

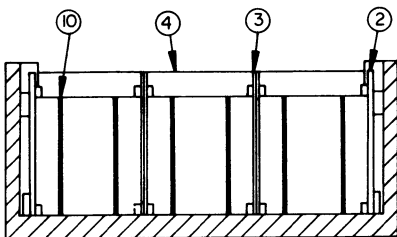
UNIT WEIGHT ----- 1,256 LBS (APPROX)
 CUBE ----- 12.4 CU FT



ISOMETRIC VIEW

KEY NUMBERS

- ① FORWARD BLOCKING ASSEMBLY (1 REQD.). SEE THE "FORWARD BLOCKING ASSEMBLY" DETAIL ON PAGE 10 AND GENERAL NOTE "F" ON PAGE 2.
- ② SIDE FILL ASSEMBLY (10 REQD.). SEE THE "SIDE FILL ASSEMBLY" DETAIL ON PAGE 11.
- ③ SEPARATOR GATE A (20 REQD.). SEE THE "SEPARATOR GATE A" DETAIL ON PAGE 11 AND GENERAL NOTE "D" ON PAGE 2.
- ④ LOAD BEARING GATE (4 REQD.). SEE THE "LOAD BEARING GATE" DETAIL ON PAGE 11.
- ⑤ REAR BLOCKING ASSEMBLY (1 REQD.). SEE THE "REAR BLOCKING ASSEMBLY" DETAIL ON PAGE 10.
- ⑥ FILLER PIECE, 2" x 5" x 32" (AS REQD.). LAMINATE THE FIRST PIECE TO THE SUFFER PIECE OF THE REAR BLOCKING ASSEMBLY W/4-10D NAILS. LAMINATE EACH ADDITIONAL PIECE IN A LIKE MANNER.
- ⑦ DOOR POST VERTICAL, 4" x 4" x 36" (2 REQD.).
- ⑧ DOOR SPANNER, 4" x 4" MATERIAL, CUT TO A LENGTH THAT WILL PROVIDE FOR A DRIVE FIT (REF: 6'-4-1/8") (2 REQD.). TOENAIL TO THE 4" x 4" DOOR POST VERTICALS W/2-12D NAILS AT EACH END.
- ⑨ DOOR SPANNER SUPPORT PIECE, 2" x 4" x 23" (2 REQD.). NAIL TO A DOOR POST VERTICAL W/4-10D NAILS AFTER THE DOOR SPANNER PIECES ARE IN POSITION.
- ⑩ BUNDLING STRAP, 1-1/4" x .031" OR .035" BY A LENGTH TO SUIT (REF: 12'-6") (30 REQD.). POSITION TO ENCIRCLE THREE PALLET UNITS AS SHOWN.
- ⑪ SEAL FOR 1-1/4" STRAPPING (30 REQD., ONE PER STRAP). CRIMP EACH SEAL WITH TWO PAIR OF NOTCHES.



SECTION A-A

SPECIAL NOTES:

1. A 45-UNIT LOAD OF 155MM PROJECTILES (SMALL UNIT) IS SHOWN IN A MARINE CORPS HALF HIGH OPEN TOP CONTAINER. SEE THE PALLET UNIT DETAIL ON PAGE 3.
2. THE THICKNESS OF THE SIDE FILL ASSEMBLIES AS DEPICTED ON EACH SIDE OF THE LOAD MAY BE ADJUSTED, AS REQUIRED, TO PROVIDE FOR A TIGHT LOAD ACROSS THE WIDTH OF THE CONTAINER. SEE GENERAL NOTE "D" ON PAGE 2.

RECOMMENDED SEQUENTIAL LOADING PROCEDURES:

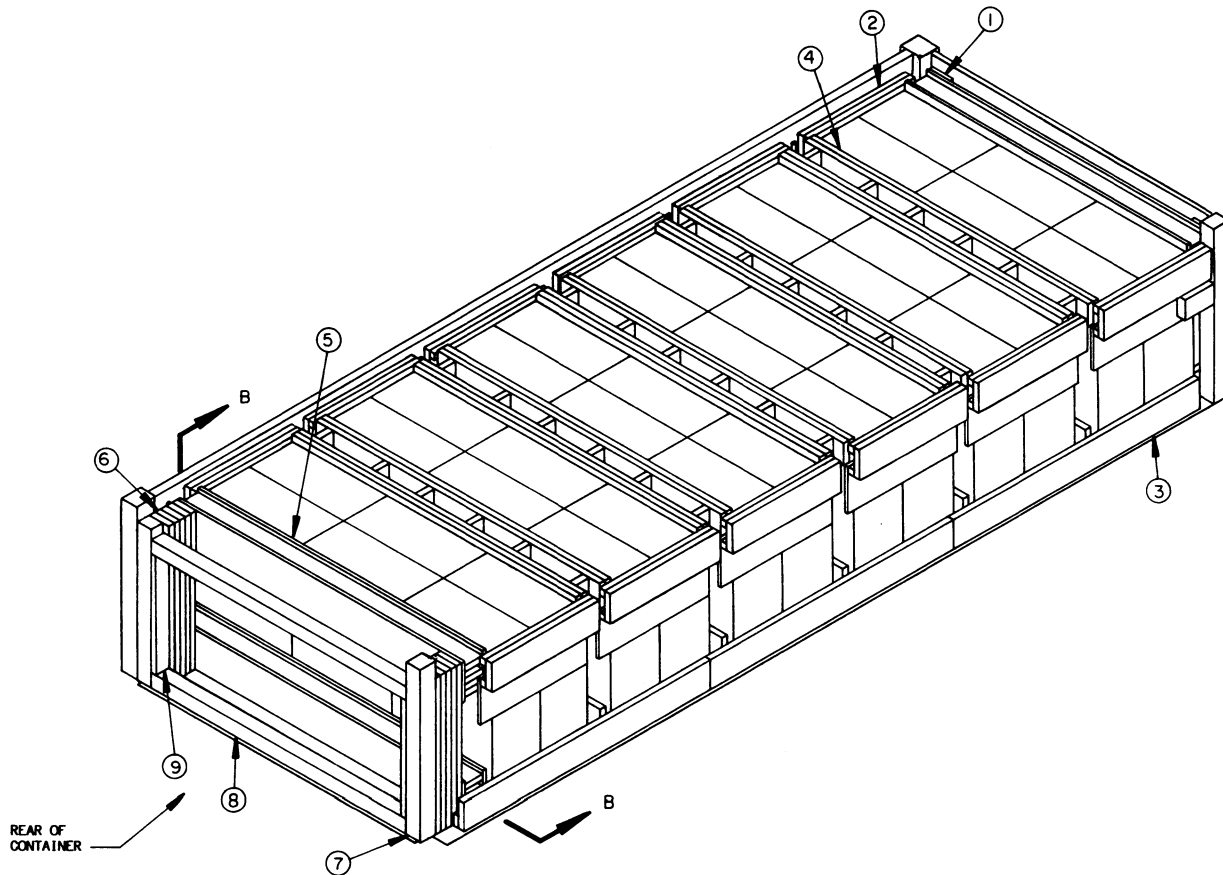
1. PREFABRICATE ONE FORWARD BLOCKING ASSEMBLY, ONE REAR BLOCKING ASSEMBLY, FOUR LOAD BEARING GATES, TWENTY SEPARATOR GATES A, AND TEN SIDE FILL ASSEMBLIES.
2. INSTALL THE FORWARD BLOCKING ASSEMBLY.
3. INSTALL TWO SIDE FILL ASSEMBLIES A AND LOAD SIX PALLET UNITS.
4. INSTALL FOUR SEPARATOR GATES A AND LOAD THREE PALLET UNITS.
5. INSTALL ONE LOAD BEARING GATE.
6. REPEAT STEPS 3, 4, AND 5 UNTIL CONTAINER IS FULLY LOADED.
7. INSTALL REAR BLOCKING ASSEMBLY.
8. INSTALL THE FILL MATERIAL AS NECESSARY.
9. INSTALL THE TWO DOOR POST VERTICALS AND THE LOWER DOOR SPANNER.
10. INSTALL THE TWO DOOR SPANNER SUPPORT PIECES AND THE UPPER DOOR SPANNER.

BILL OF MATERIAL

LUMBER	LINEAR FEET	BOARD FEET
2" x 2"	6	2
2" x 3"	200	100
2" x 4"	96	64
2" x 6"	163	163
4" x 4"	19	25
NAILS	NO. REQD	POUNDS
6d (2")	384	2-1/2
8d (2-1/2")	240	2-1/2
10d (3")	336	5-1/4
12d (3-1/4")	8	1/4
PLYWOOD, 1/2"-----	285.6 SQ FT REQD	393 LBS
PLYWOOD, 3/4"-----	46.6 SQ FT REQD	96 LBS
STRAPPING, 1/4" x .031" OR .035"---	375' REQD	54 LBS
SEAL FOR 1/4" STRAPPING-----	30 REQD	1-1/4 LBS

LOAD AS SHOWN

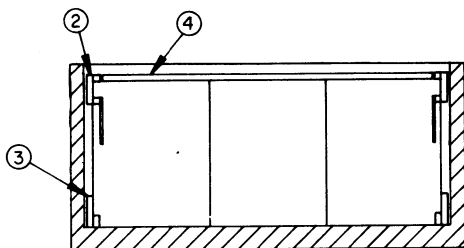
ITEM	QUANTITY	WEIGHT (APPROX)
155MM PALLET UNIT, 8/SMALL PALLET-45-----		36,000 LBS
DUNNAGE-----		1,719 LBS
CONTAINER-----		4,760 LBS
TOTAL WEIGHT-----		42,479 LBS



ISOMETRIC VIEW

KEY NUMBERS

- ① FORWARD BLOCKING ASSEMBLY (1 REQD). SEE THE "FORWARD BLOCKING ASSEMBLY" DETAIL ON PAGE 10 AND SEE GENERAL NOTE "F" ON PAGE 2.
- ② UPPER SIDE FILL ASSEMBLY (12 REQD). SEE THE "UPPER SIDE FILL ASSEMBLY" DETAIL ON PAGE 12. SEE SPECIAL NOTE 2 ON PAGE 7.
- ③ LOWER SIDE FILL ASSEMBLY (6 REQD). SEE THE "LOWER SIDE FILL ASSEMBLY A" DETAIL ON PAGE 12.
- ④ SPACER ASSEMBLY (5 REQD). SEE THE "SPACER ASSEMBLY" DETAIL ON PAGE 12.
- ⑤ REAR BLOCKING ASSEMBLY (1 REQD). SEE THE "REAR BLOCKING ASSEMBLY" DETAIL ON PAGE 10.
- ⑥ FILLER PIECE, 2" x 6" x 40" (AS REQD). LAMINATE THE FIRST PIECE TO THE VERTICAL PIECE OF THE REAR BLOCKING ASSEMBLY W/4-10D NAILS. LAMINATE EACH ADDITIONAL PIECE TO THE PREVIOUS IN A LIKE MANNER.
- ⑦ DOOR POST VERTICAL, 4" x 4" x 40" (2 REQD).
- ⑧ DOOR SPANNER, 4" x 4" MATERIAL, CUT TO A LENGTH THAT WILL PROVIDE FOR A DRIVE FIT (REF: 6'-4-1/8") (2 REQD). TOENAIL TO THE 4" x 4" DOOR POST VERTICALS W/2-12D NAILS AT EACH END.
- ⑨ DOOR SPANNER SUPPORT PIECE, 2" x 4" x 23" (2 REQD). NAIL TO A DOOR POST VERTICAL W/4-10D NAILS AFTER THE DOOR SPANNER PIECES ARE IN POSITION.



SECTION B-B

SPECIAL NOTES:

1. A 36-UNIT LOAD OF 155MM PROJECTILES (LARGE UNIT) IS SHOWN IN A MARINE CORPS HALF HIGH OPEN TOP CONTAINER. SEE THE PALLET UNIT DETAIL ON PAGE 3.
2. ANTI-CHAFING MATERIAL SUCH AS LIGHT WEIGHT CARDBOARD, ETC., ATTACHED TO THE "UPPER SIDE FILL ASSEMBLIES", AS SHOWN, SHALL BE USED TO PREVENT THE PROJECTILES FROM CONTACTING THE WALL OR LONGITUDINAL BEAM OF THE CONTAINER.

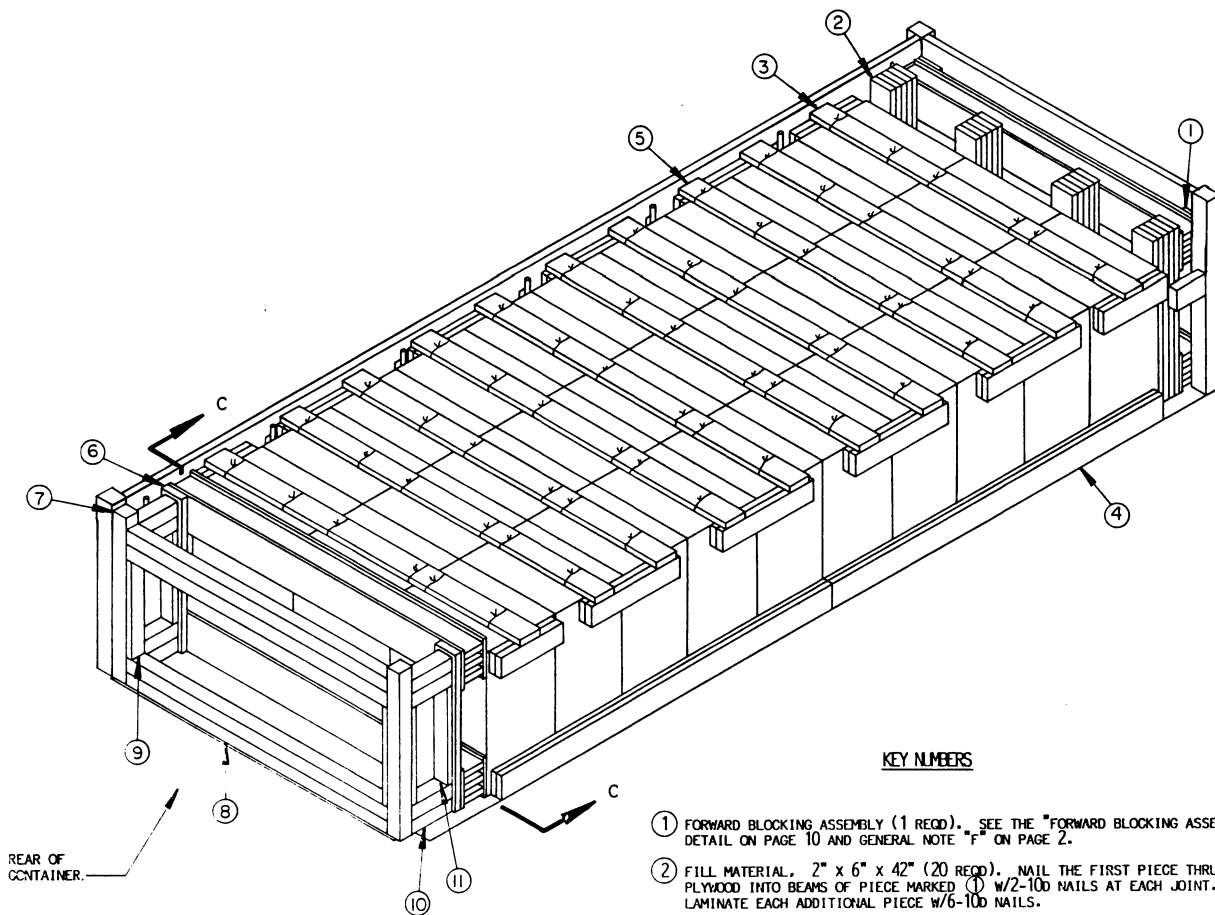
RECOMMENDED SEQUENTIAL LOADING PROCEDURES:

1. PREFABRICATE ONE FORWARD BLOCKING ASSEMBLY, ONE REAR BLOCKING ASSEMBLY, TWELVE UPPER SIDE FILL ASSEMBLIES, SIX LOWER SIDE FILL ASSEMBLIES, AND FIVE SPACER ASSEMBLIES.
2. INSTALL THE FORWARD BLOCKING ASSEMBLY AND TWO LOWER SIDE FILL ASSEMBLIES.
3. LOAD SIX PALLET UNITS AND TWO UPPER SIDE FILL ASSEMBLIES.
4. INSTALL ONE SPACER ASSEMBLY.
5. REPEAT STEP 3.
6. REPEAT STEP 4.
7. INSTALL TWO LOWER SIDE FILL ASSEMBLIES.
8. REPEAT STEP 3.
9. REPEAT STEP 4.
10. REPEAT STEP 3.
11. REPEAT STEP 4.
12. REPEAT STEP 7.
13. REPEAT STEP 3.
14. REPEAT STEP 4.
15. REPEAT STEP 3.
16. INSTALL REAR BLOCKING ASSEMBLY.
17. INSTALL THE TWO DOOR POST VERTICALS AND THE LOWER DOOR SPANNER.
18. INSTALL THE TWO DOOR SPANNER SUPPORT PIECES AND THE UPPER DOOR SPANNER.
19. INSTALL THE FILL MATERIAL AS NECESSARY.

BILL OF MATERIAL		
LUMBER	LINEAR FEET	BOARD FEET
2" x 2"	154	52
2" x 3"	56	28
2" x 4"	5	4
2" x 6"	163	163
2" x 8"	138	184
4" x 4"	19	26
NAILS	NO. REQD	POUNDS
6d (2")	180	1
10d (3")	588	9
12d (3-1/4")	8	1/4
PLYWOOD, 3/4" -----	46.6 SQ FT REQD -----	96 LBS
ANTI-CHAFING MATERIAL -----	AS REQD -----	NIL

LOAD AS SHOWN

ITEM	QUANTITY	WEIGHT (APPROX)
155MM PALLET UNIT.		
8/LARGE PALLET -----	36 -----	31,356 LBS
DUNNAGE -----		1,085 LBS
CONTAINER -----		4,760 LBS
TOTAL WEIGHT -----		37,201 LBS

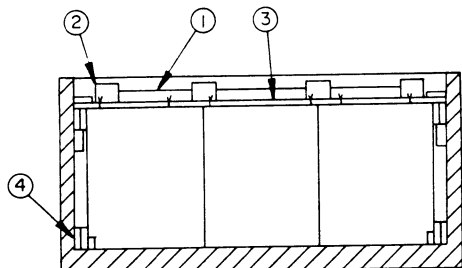


REAR OF CONTAINER.

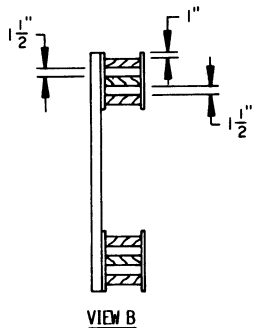
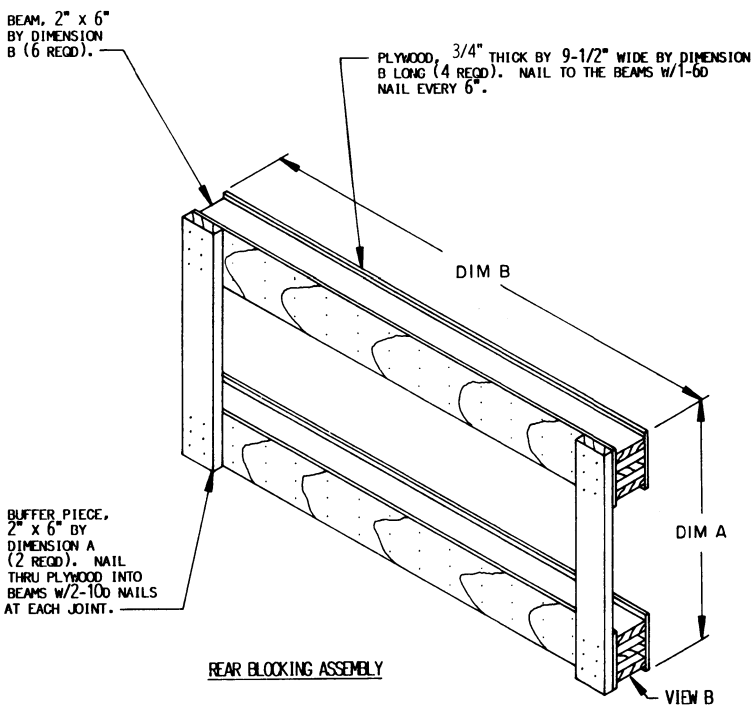
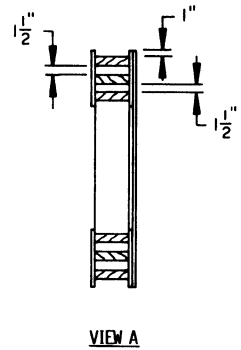
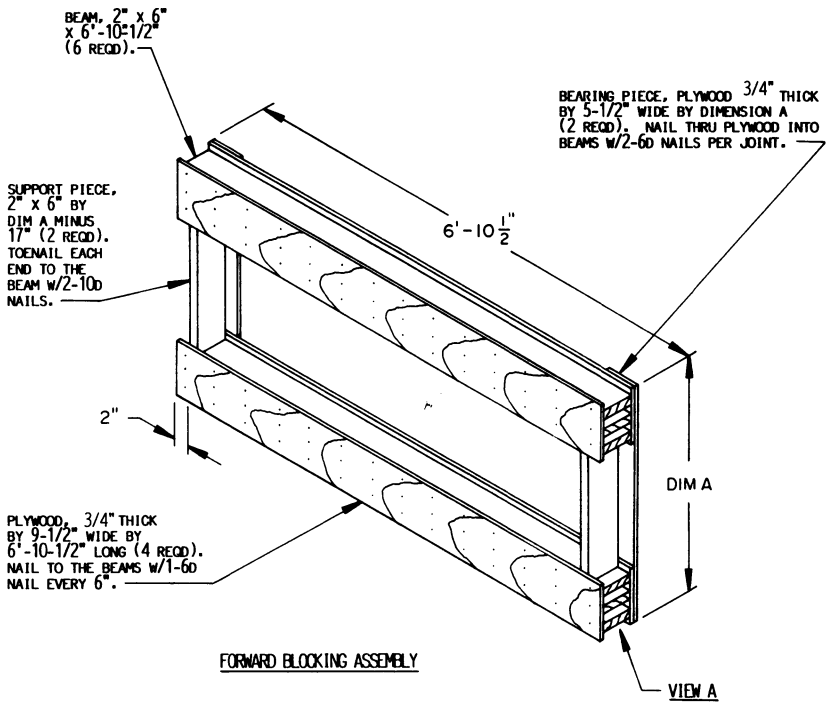
ISOMETRIC VIEW

KEY NUMBERS

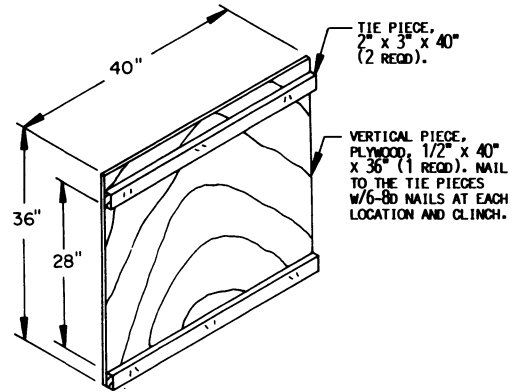
- ① FORWARD BLOCKING ASSEMBLY (1 REQD.). SEE THE "FORWARD BLOCKING ASSEMBLY" DETAIL ON PAGE 10 AND GENERAL NOTE "F" ON PAGE 2.
- ② FILL MATERIAL, 2" x 6" x 42" (20 REQD.). NAIL THE FIRST PIECE THRU PLYWOOD INTO BEAMS OF PIECE MARKED ① W/2-10D NAILS AT EACH JOINT. LAMINATE EACH ADDITIONAL PIECE W/6-10D NAILS.
- ③ TOP-OF-LOAD ANTI-SWAY ASSEMBLY (2 REQD.). SEE THE "TOP-OF-LOAD ANTI-SWAY ASSEMBLY A" DETAIL ON PAGE 13. WIRE TIE TO PALLET UNITIZING STRAPS W/6-18" LONG PIECES OF NO. 14 GAGE WIRE.
- ④ LOWER SIDE FILL ASSEMBLY (4 REQD.). SEE THE "LOWER SIDE FILL ASSEMBLY B" DETAIL ON PAGE 13.
- ⑤ TOP-OF-LOAD ANTI-SWAY ASSEMBLY (4 REQD.). SEE THE TOP-OF-LOAD ANTI-SWAY ASSEMBLY B" DETAIL ON PAGE 13. WIRE TIE TO PALLET UNITIZING STRAPS W/12-18" LONG PIECES OF NO. 14 GAGE WIRE.
- ⑥ REAR BLOCKING ASSEMBLY (1 REQD.). SEE THE "REAR BLOCKING ASSEMBLY" DETAIL ON PAGE 10.
- ⑦ DOOR POST VERTICAL, 4" x 4" x 42" (2 REQD.).
- ⑧ DOOR SPANNER, 4" x 4" BY CUT TO A LENGTH THAT WILL PROVIDE FOR A DRIVE FIT (REF: 6'-4-1/8") (4 REQD.). TOENAIL TO THE 4" x 4" DOOR POST VERTICALS W/2-12D NAILS AT EACH END.
- ⑨ DOOR SPANNER SUPPORT PIECE, 2" x 4" x 25" (2 REQD.). NAIL TO A DOOR POST VERTICAL W/4-10D NAILS AFTER THE DOOR SPANNER PIECES ARE IN POSITION.
- ⑩ STRUT, 4" x 4" BY CUT TO FIT (8 REQD.). TOENAIL TO THE BUFFER PIECE OF THE REAR BLOCKING ASSEMBLY AND THE DOOR POST VERTICAL W/2-12D NAILS AT EACH END.
- ⑪ STRUT SUPPORT PIECE, 2" x 4" x 25" (4 REQD.). NAIL TO THE BUFFER PIECE OF THE REAR BLOCKING ASSEMBLY AND THE DOOR POST VERTICAL W/4-10D NAILS AFTER THE LOWER STRUTS ARE IN POSITION.



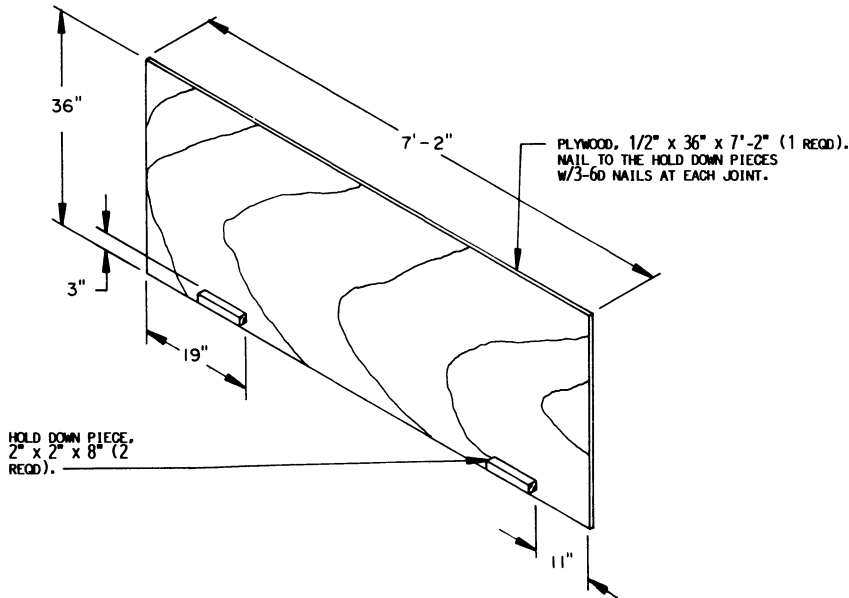
SECTION C-C



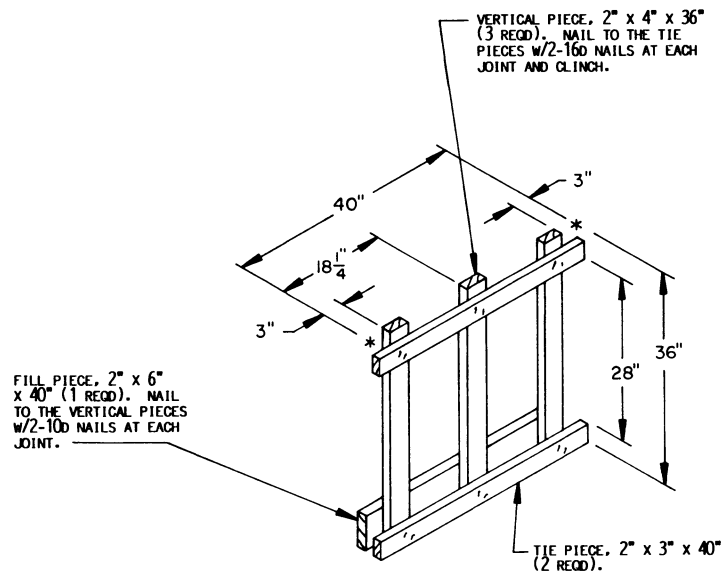
DIMENSION CHART		
UNIT	DIM A	DIM B
155MM PAGE 4	36"	6'-10-1/2"
155MM PAGE 6	40"	6'-10-1/2"
8" PAGE 8	40"	7'-1"



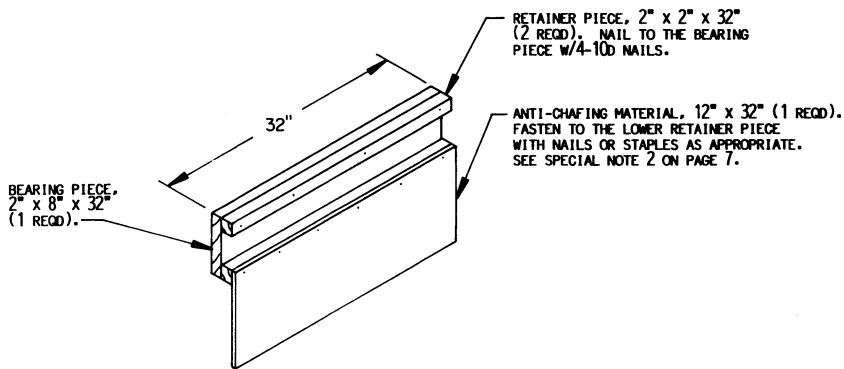
SEPARATOR GATE A



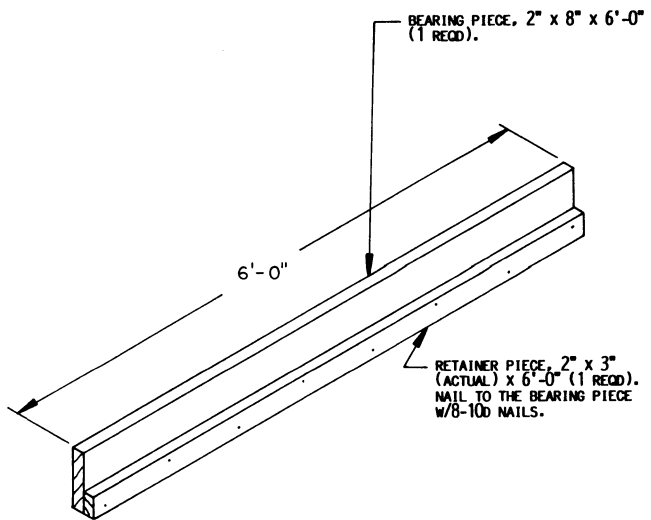
LOAD BEARING GATE



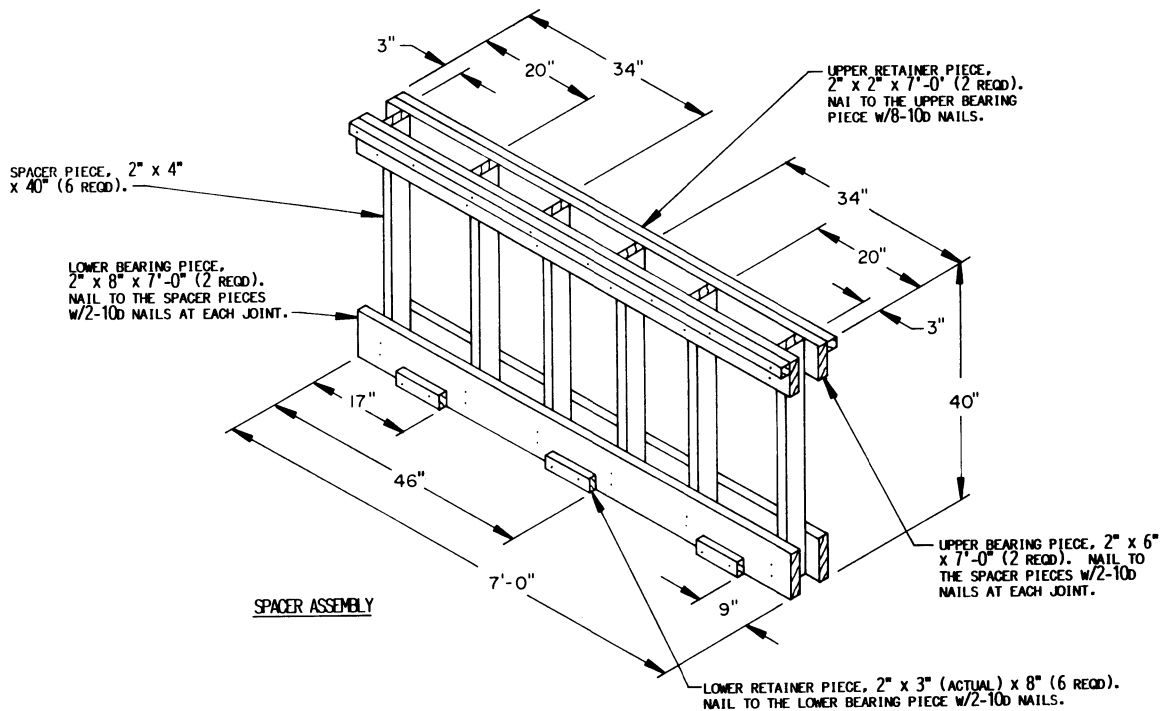
SIDE FILL ASSEMBLY



UPPER SIDE FILL ASSEMBLY

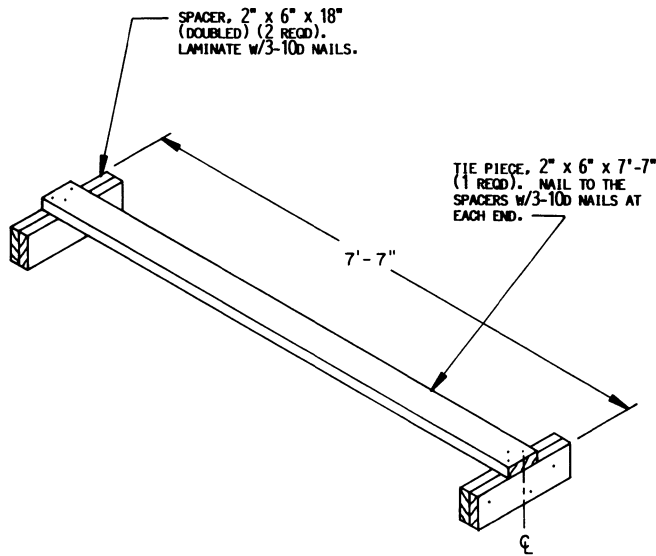


LOWER SIDE FILL ASSEMBLY A

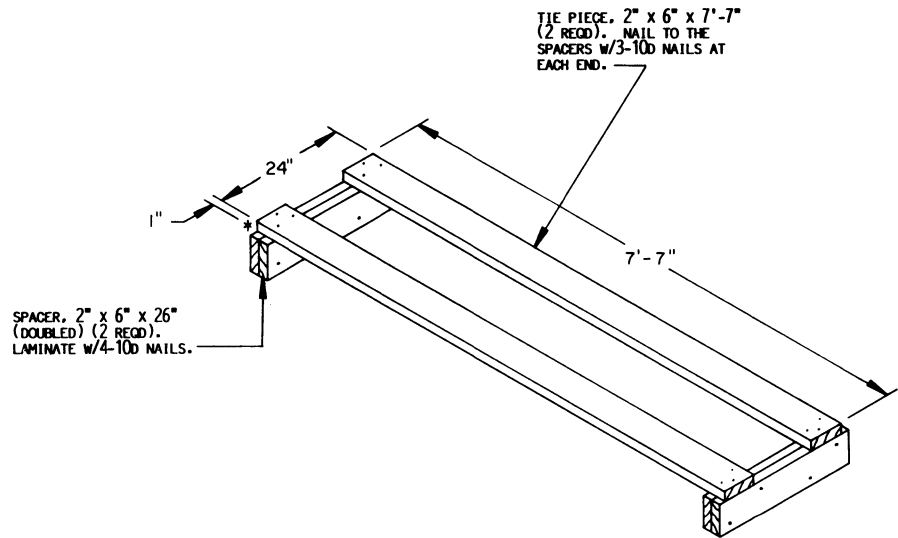


SPACER ASSEMBLY

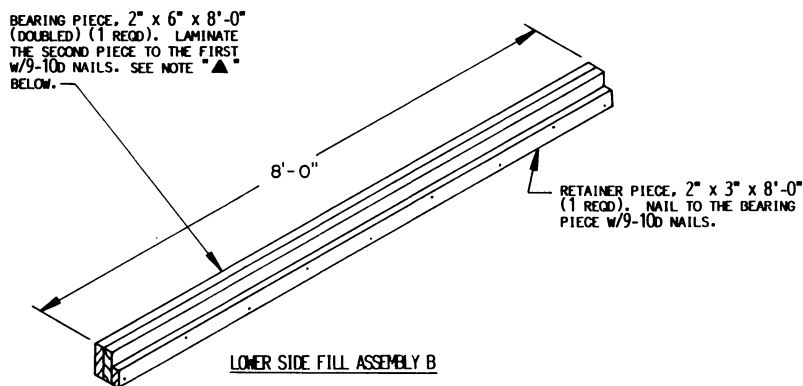
DETAILS



TOP-OF-LOAD ANTI-SWAY ASSEMBLY A



TOP-OF-LOAD ANTI-SWAY ASSEMBLY B



LOWER SIDE FILL ASSEMBLY B

NOTE ▲ :
 THE THICKNESS OF THE BEARING PIECES MAY BE
 ADJUSTED AS NECESSARY TO PROVIDE FOR A
 TIGHT LOAD ACROSS THE WIDTH OF THE CONTAINER.

DETAILS

