

APPROVED BY
BUREAU OF EXPLOSIVES

Jan 1/2

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PATRIOT

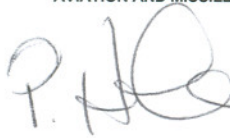

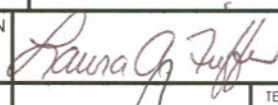
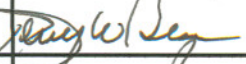

LOADING AND BRACING* IN END OPENING ISO CONTAINERS OF PA- TRIBUT (PAC-3) PACKED IN SHIPPING AND STORAGE CANISTERS

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*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 AVIATION AND MISSILE 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.							
		DO NOT SCALE			AUGUST 2006				
		ENGINEER OR TECHNICIAN	BASIC REV.	MELVIN SIX					
APPROVED BY ORDER OF COMMANDING GENERAL, U.S. ARMY MATERIEL COMMAND 		TRANSPORTATION ENGINEERING DIVISION							
		VALIDATION ENGINEERING DIVISION			TESTED	CLASS	DIVISION	DRAWING	FILE
U.S. ARMY DEFENSE AMMUNITION CENTER 		ENGINEERING DIRECTORATE				19	48	8221	GM15PA5

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 PATRIOT ADVANCED CAPABILITY-3 (PAC-3) COMPLETE ROUND, WHEN PACKED IN THE MISSILE CANISTER (SHIPPING, STORAGE AND LAUNCH CANISTER). SEE PAGE 3 AND LOCKHEED-MARTIN DRAWING 13506000 FOR DETAILS OF THE CANISTER. **CAUTION:** REGARDLESS OF THE QUANTITY OF CANISTERS TO BE SHIPPED, THE "MAXIMUM GROSS WEIGHT" OF THE END OPENING ISO CONTAINER MUST NOT BE EXCEEDED.
- C. THE LOAD AS SHOWN IS BASED ON A 4,700 POUND 20' LONG BY 8' WIDE BY 8'-6" HIGH END OPENING ISO CONTAINER WITH INSIDE DIMENSIONS OF 19'-4" LONG BY 92" WIDE BY 93" HIGH, WITH A MAXIMUM GROSS WEIGHT OF 52,910 POUNDS. OLDER/OTHER CONTAINERS MAY HAVE A TOTAL INSIDE HEIGHT OF 95", BUT A CLEAR HEIGHT UNDER THE ROOF BOWS OF 93". VERIFY INSIDE CONTAINER HEIGHT 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 OTHER SURFACE MODES OF TRANSPORT. **NOTICE:** OTHER CONTAINERS OF THE SAME DESIGN CONFIGURATION CAN BE USED.
- D. WHEN LOADING MISSILE CANISTERS, 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". THE LENGTH OF THE STRUTS IN THE CRIB FILL ASSEMBLY OR SIDE SPACER ASSEMBLY MAY BE ADJUSTED AS REQUIRED TO FACILITATE VARIANCE IN THE SIZE OF THE CANISTER.
- 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 THE SIDEWALL, HAVE NOT BEEN SHOWN IN THE LOAD VIEWS FOR CLARITY PURPOSES.
- J. **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.
- K. 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.

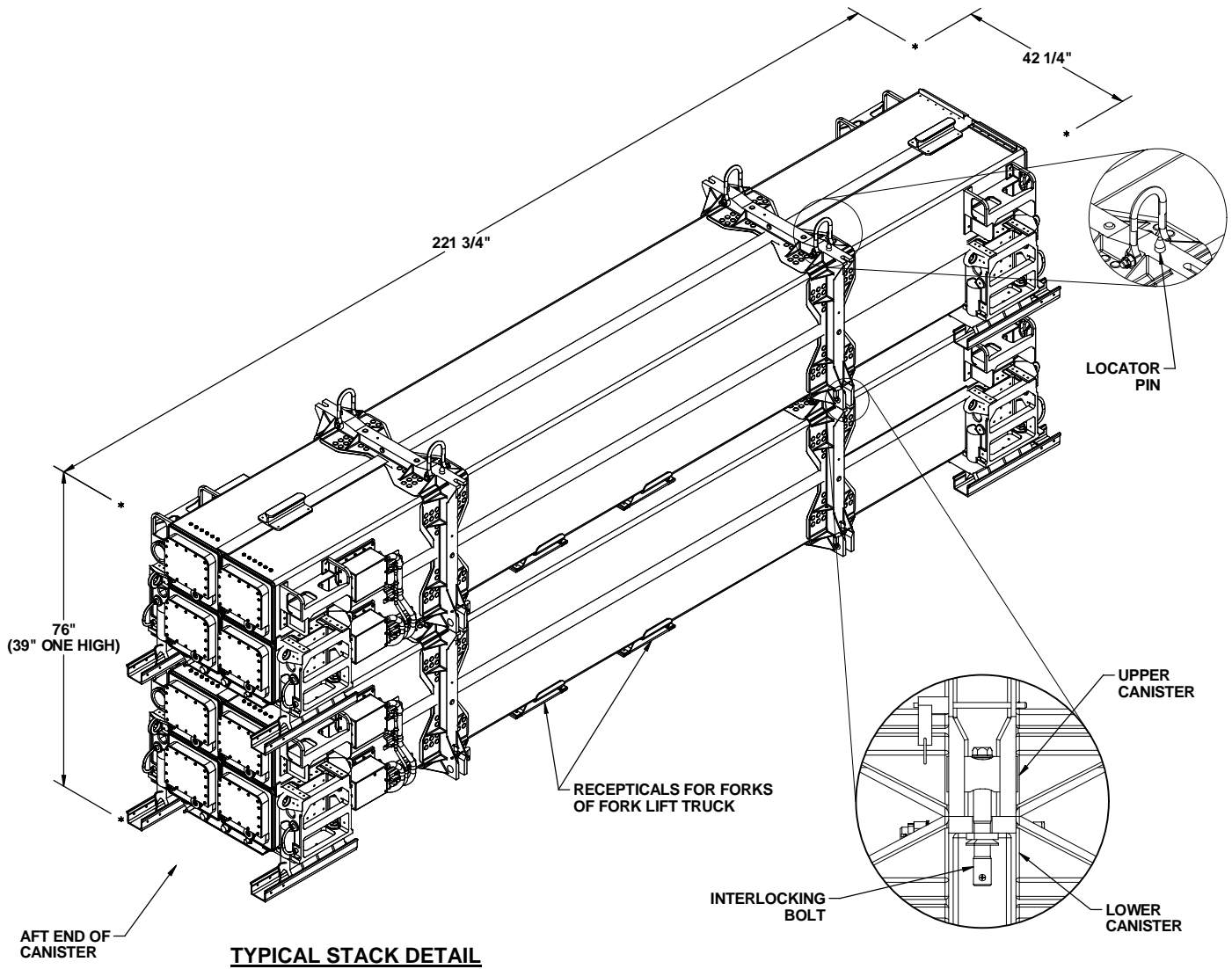
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(GENERAL NOTES CONTINUED)

- L. 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.
- M. 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.
- N. THE QUANTITY OF CANISTERS SHOWN IN THE LOADS ON PAGES 4 AND 5 MAY BE REDUCED FOR SHIPMENT, IF DESIRED.
- O. FOUR UNIVERSAL LOAD RETAINERS, AS DEPICTED IN THE LOADS ON PAGES 4 AND 5, ARE REQUIRED WHEN LOADING TWO LAYERS OF CANISTERS, AND TWO ARE REQUIRED WHEN LOADING ONE LAYER OF CANISTERS. REFER TO DAC DRAWING ACV00682 FOR DETAILS OF THE UNIVERSAL LOAD RETAINER CONSTRUCTION, AND TO DEPARTMENT OF THE ARMY DRAWING DA-116 FOR DETAILS FOR INSTALLATION TO THE DOOR POST VERTICAL, PLACEMENT INTO THE CONTAINER, AND FOR OTHER METHODS OF REAR-OF-LOAD RESTRAINT.
- P. 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.

MATERIAL SPECIFICATIONS

LUMBER	- - - - -	SEE TM 743-200-1 (DUNNAGE LUMBER) AND VOLUNTARY PRODUCT STANDARD PS 20.
NAILS	- - - - -	ASTM F1667; COMMON STEEL NAIL (NLCMS OR NLCMS).
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 AN EXTERIOR GRADE MAY BE SUBSTITUTED.
STEEL, STRUCTURAL	-	ASTM A36; 36,000 PSI MINIMUM YIELD OR BETTER.



TYPICAL STACK DETAIL

SIDE VIEW DETAIL OF INTERLOCKING BOLT ASSEMBLY

PATRIOT PAC-3 DETAIL

GROSS WEIGHT - - - - - 4,399 LBS (APPROX)
 CUBE - - - - - 209.2 CU FT (APPROX)

UNITIZATION AND HANDLING PROCEDURAL GUIDANCE

(PROCEDURAL GUIDANCE CONTINUED)

- 1. STACKING CANISTER FOR UNITIZATION.
 - A. THE UPPER CANISTER STACK FRAME MUST BE FULLY SEATED UPON THE LOCATOR PINS OF THE LOWER CANISTER.
 - B. POSITION THE FORWARD END OF THE UPPER CANISTER ABOVE THE FORWARD END OF THE LOWER CANISTER.
 - C. CANISTER INTERLOCKING BOLTS MUST BE TIGHTENED AS SECURELY AS POSSIBLE WITH A NORMAL HAND TOOL WRENCH (REF: 60 FOOT POUNDS).

- A. ONLY APPROVED AND APPROPRIATELY SIZED MATERIALS HANDLING EQUIPMENT WILL BE USED FOR HANDLING THE DEPICTED CANISTERS.
- B. IF HANDLING IS ACCOMPLISHED WITH A FORK TRUCK, THE CANISTERS SHOULD BE HANDLED FROM A SIDE POSITION AS MUCH AS POSSIBLE. CARE MUST BE EXERCISED WHEN INSERTING FORKS UNDER A CANISTER, TO PREVENT DAMAGE TO THE CANISTER BY THE FORKLIFT TINES OR THE FORKLIFT PACKAGE GUARD. FOR VERY SHORT "INCHING" SPEED MOVEMENTS, SUCH AS WILL BE EXPERIENCED DURING CONTAINER LOADING, A TWO-HIGH CANISTER STACK MAY BE HANDLED BY INSERTING THE FORKS OF THE FORKLIFT TRUCK INTO THE FORK RECEPTACLES OF THE UPPER CANISTER.

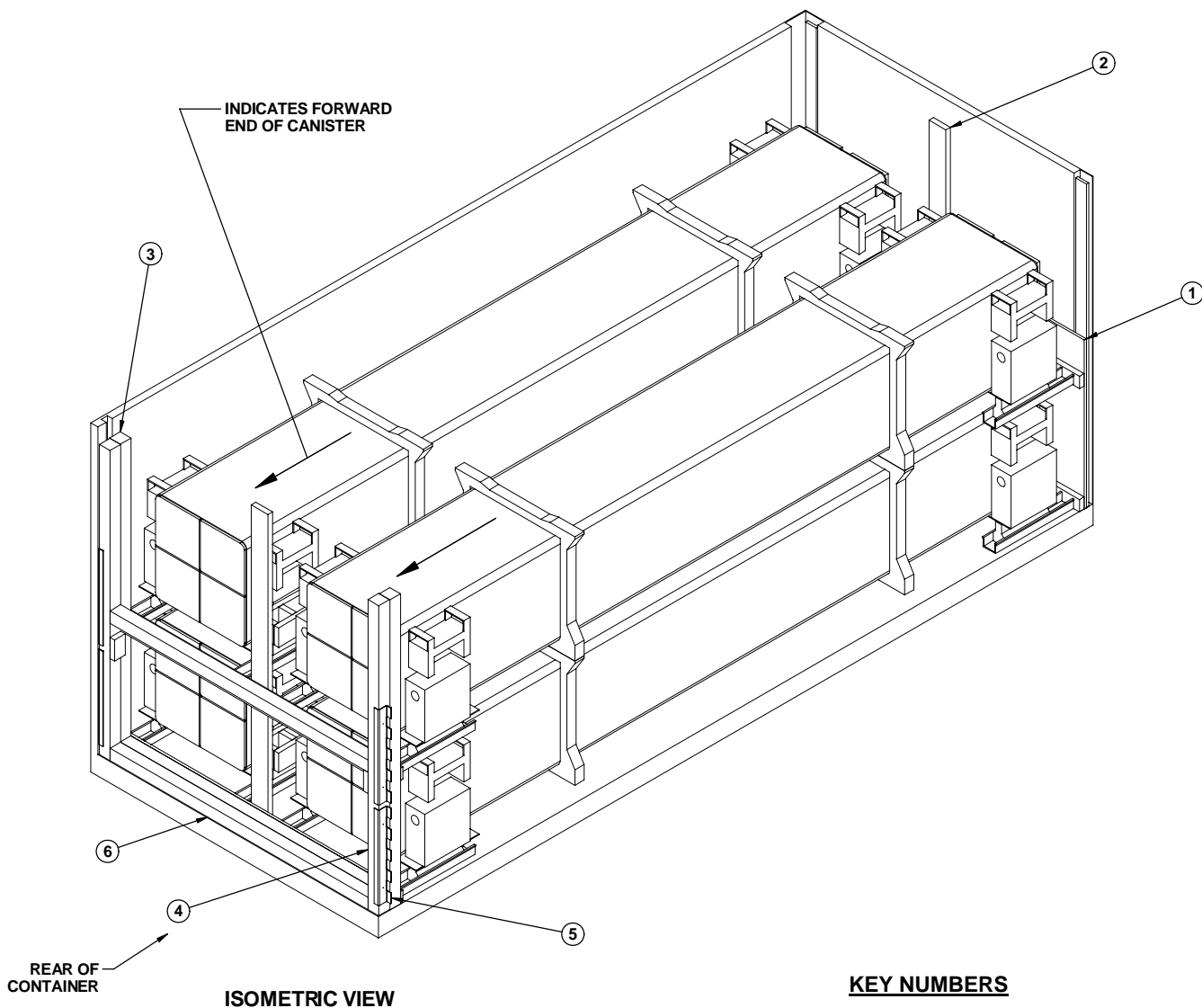
- 2. CANISTER OR CANISTER STACK HANDLING.

NOTES: (1) APPROVED MATERIALS HANDLING EQUIPMENT (MHE) IS SPECIFIED IN OTHER DOCUMENTS. MHE IS INTENDED TO MEAN EQUIPMENT SUCH AS FORKLIFT TRUCKS, CRANES, HAND TRUCKS, DOLLIES, ROLLER ASSEMBLIES, SLINGS, AND SPREADER BARS.

(2) PRECAUTIONARY HANDLING TECHNIQUES NORMALLY EMPLOYED OR AS SPECIFIED FOR THE TYPE OF COMMODITY INVOLVED WILL BE OBSERVED.

- C. SLINGING OF A CANISTER OR A CANISTER STACK WILL BE IN ACCORDANCE WITH APPROVED PROCEDURES.

(CONTINUED AT RIGHT)



KEY NUMBERS

- ① FORWARD BLOCKING ASSEMBLY (1 REQD). SEE DETAIL ON PAGE 8.
- ② CRIB FILL ASSEMBLY (2 REQD). SEE THE DETAIL ON PAGE 7. NAIL VERTICAL PIECE TO FORWARD AND REAR BLOCKING ASSEMBLY BUFFER PIECES W/2-10d NAILS AT EACH JOINT.
- ③ REAR BLOCKING ASSEMBLY (1 REQD). SEE THE DETAIL ON PAGE 8.
- ④ DOOR POST VERTICAL (2 REQD). SEE THE DETAIL ON PAGE 7, "DETAIL A" ON PAGE 7, AND GENERAL NOTE "O" ON PAGE 2. TOENAIL TO THE REAR BLOCKING ASSEMBLY W/3-12d NAILS EACH.
- ⑤ UNIVERSAL LOAD RETAINER (4 REQD, 2 PER SIDE). NAIL THROUGH THE HOLES INTO THE DOOR POST VERTICAL W/2-10d NAILS. SEE DEPARTMENT OF ARMY DRAWING DA-116, "DETAIL A" ON PAGE 7, AND GENERAL NOTE "O" ON PAGE 2. THE QUANTITY OF UNIVERSAL LOAD RETAINERS (4 REQD) AS NOTED ABOVE IS AN EXCEPTION TO ARMY DRAWING DA-116 AND IS AUTHORIZED FOR USE IN THE LOAD AS SHOWN ON THIS PAGE.
- ⑥ DOOR SPANNER, 4" X 4" MATERIAL CUT TO A LENGTH THAT WILL PROVIDE A DRIVE FIT (REF: 7'-1-1/4") (2 REQD). TOENAIL TO THE DOOR POST VERTICAL W/2-12d NAILS AT EACH END. SEE THE "BEVEL-CUT" DETAIL ON PAGE 7.

BILL OF MATERIAL

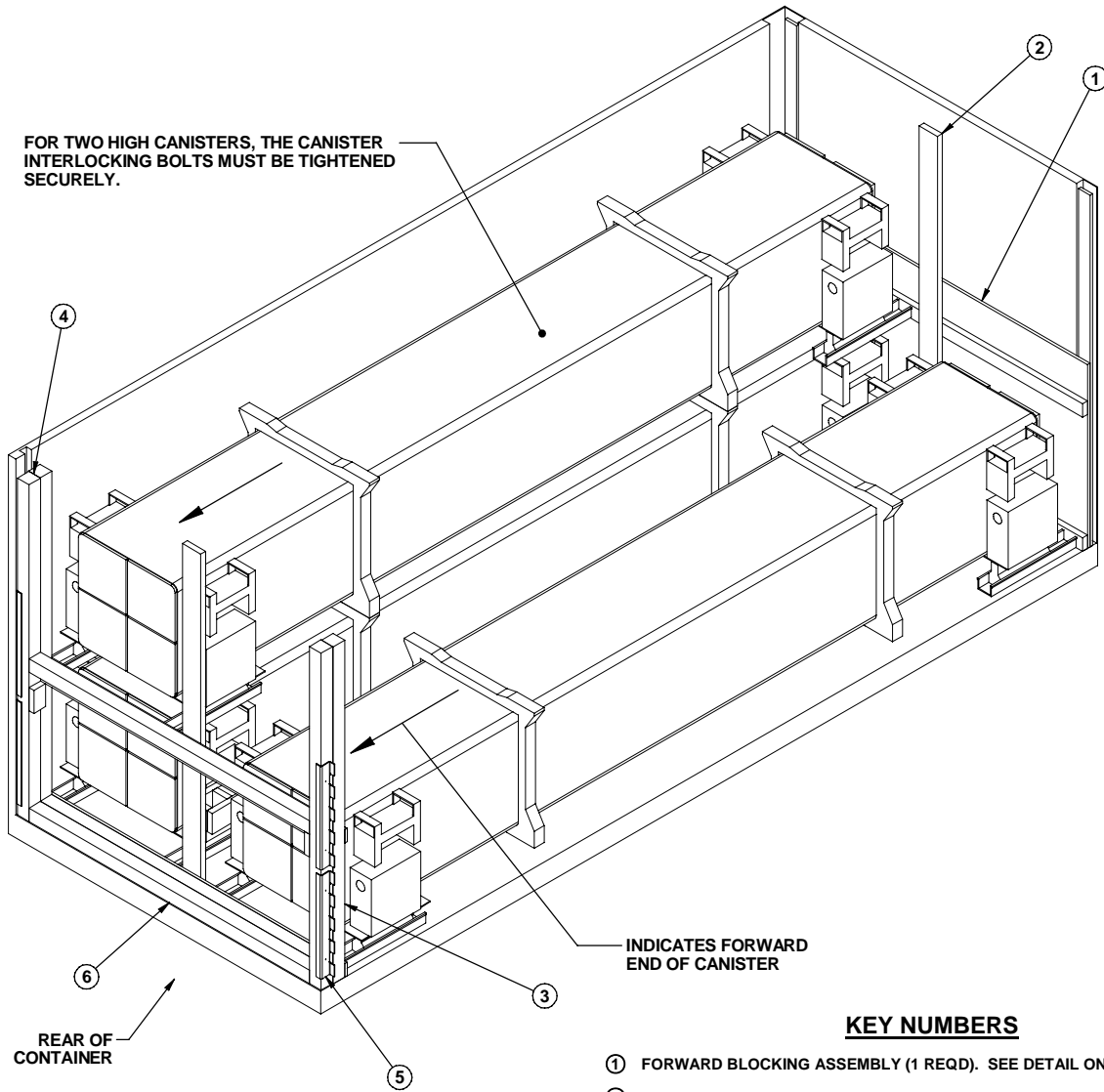
LUMBER	LINEAR FEET	BOARD FEET
1" X 4"	31	11
2" X 4"	17	11
2" X 6"	43	43
4" X 4"	58	77
NAI LS	NO. REQD	POUNDS
6d (2")	28	NIL
8d (2-1/2")	22	NIL
10d (3")	112	1-3/4
12d (3-1/4")	16	1/2
PLYWOOD, 3/4"	30.33 SQ FT REQD	63 LBS
UNI VERSAL LOAD RETAI NER	4 REQD	26 LBS

LOAD AS SHOWN

ITEM	QUANTITY	WEIGHT (APPROX)
CANI STER	4	17,356 LBS
DUNNAGE		373 LBS
CONTAI NER		4,700 LBS

TOTAL WEIGHT - - - - - 22,429 LBS (APPROX)

FOR TWO HIGH CANISTERS, THE CANISTER INTERLOCKING BOLTS MUST BE TIGHTENED SECURELY.



ISOMETRIC VIEW

KEY NUMBERS

- ① FORWARD BLOCKING ASSEMBLY (1 REQD). SEE DETAIL ON PAGE 8.
- ② CRIB FILL ASSEMBLY (2 REQD). SEE THE DETAIL FOR ONE HIGH CANISTER LOADS ON PAGE 7. NAIL VERTICAL PIECE TO FORWARD AND REAR BLOCKING ASSEMBLY BUFFER PIECES W/2-10d NAILS AT EACH JOINT.
- ③ REAR BLOCKING ASSEMBLY (1 REQD). SEE THE DETAIL ON PAGE 8.
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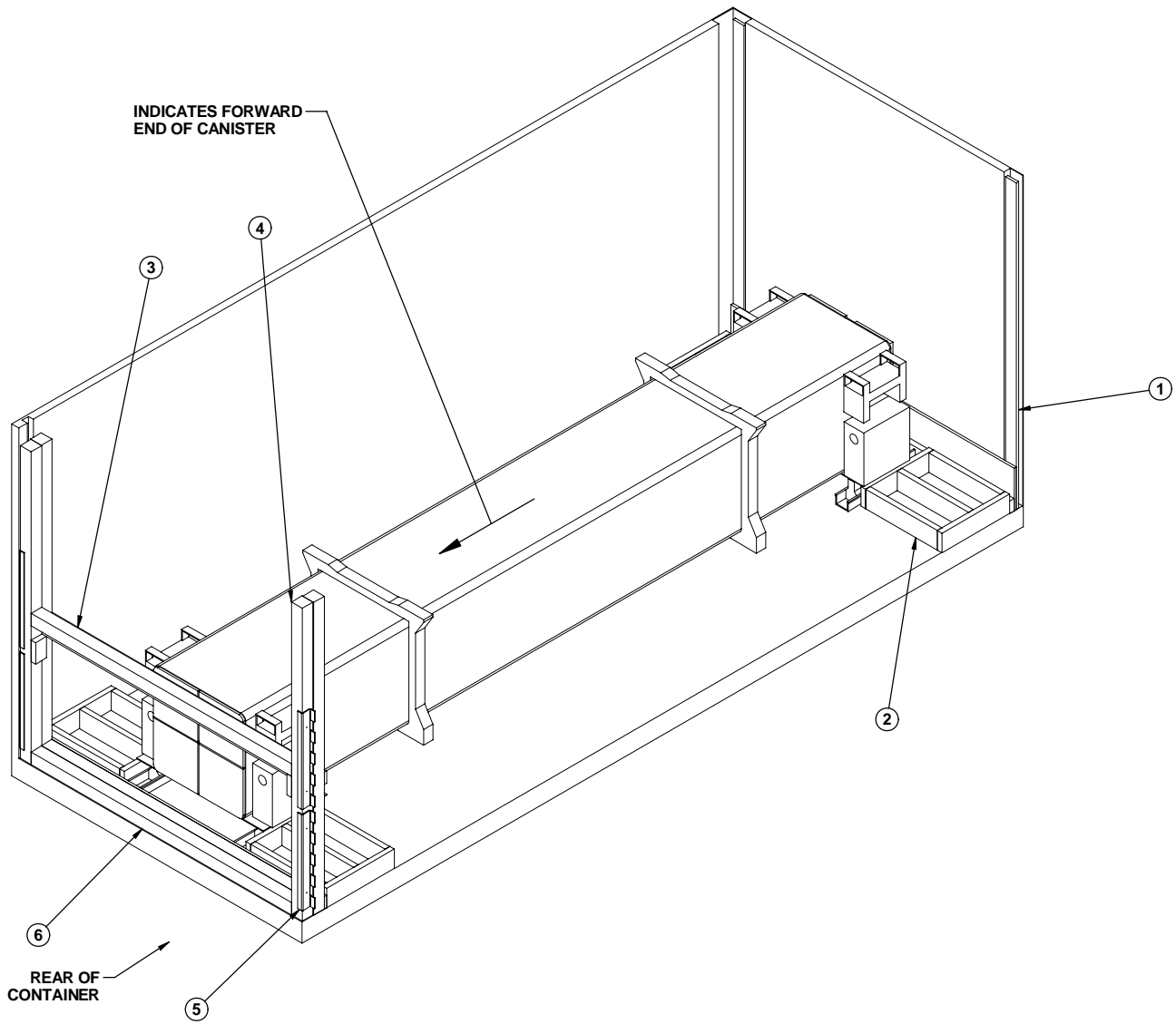
BILL OF MATERIAL

LUMBER	LINEAR FEET	BOARD FEET
1" X 4"	31	11
2" X 4"	17	11
2" X 6"	28	28
4" X 4"	58	77
NAI LS	NO. REQD	POUNDS
6d (2")	28	NI L
8d (2-1/2")	22	NI L
10d (3")	76	1-1/4
12d (3-1/4")	16	1/2
PLYWOOD, 3/4"	30.33 SQ FT REQD	63 LBS
UNI VERSAL LOAD RETAI NER	4 REQD	26 LBS

LOAD AS SHOWN

ITEM	QUANTITY	WEIGHT (APPROX)
CANI STER	3	13,017 LBS
DUNNAGE		342 LBS
CONTAI NER		4,700 LBS

TOTAL WEIGHT - - - - - 18,059 LBS (APPROX)



ISOMETRIC VIEW

KEY NUMBERS

- ① FORWARD BLOCKING ASSEMBLY (1 REQD). SEE DETAIL ON PAGE 8.
- ② SIDE SPACER ASSEMBLY (4 REQD). SEE DETAIL ON PAGE 7. NAIL TO FORWARD AND REAR BLOCKING ASSEMBLY BUFFER PIECES W/3-10d NAILS.
- ③ REAR BLOCKING ASSEMBLY (1 REQD). SEE DETAIL ON PAGE 8.
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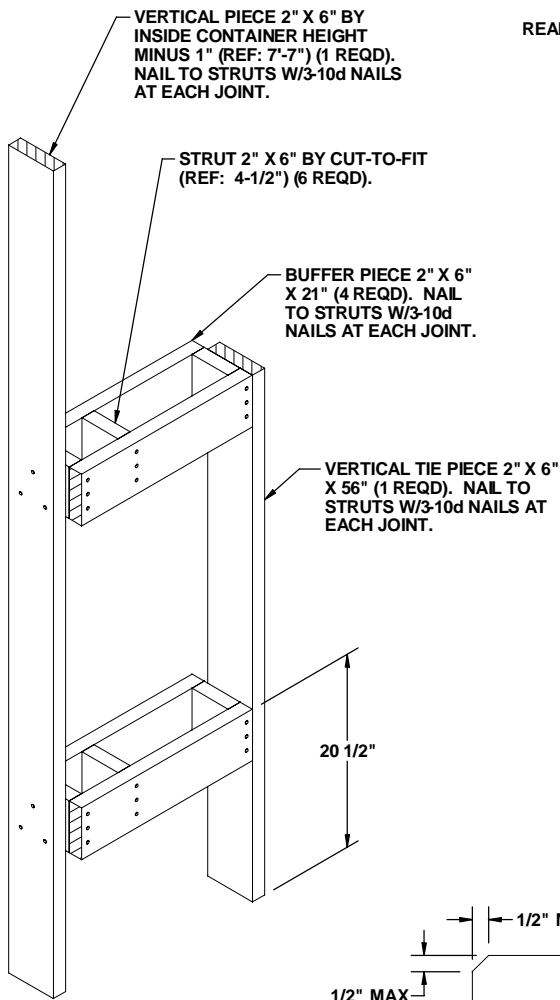
BILL OF MATERIAL

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1" X 4"	31	11
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2" X 6"	32	32
4" X 4"	58	77
NAI LS	NO. REQD	POUNDS
6d (2")	15	NIL
8d (2-1/2")	22	NIL
10d (3")	100	1-3/4
12d (3-1/4")	16	1/2
PLYWOOD, 3/4"	7.58 SQ FT REQD	16 LBS
UNIVERSAL LOAD RETAI NER	4 REQD	26 LBS

LOAD AS SHOWN

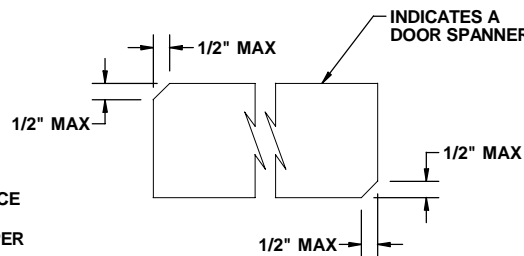
ITEM	QUANTITY	WEIGHT (APPROX)
CANISTER	1	4,339 LBS
DUNNAGE		293 LBS
CONTAINER		4,700 LBS

TOTAL WEIGHT - - - - - 9,332 LBS (APPROX)



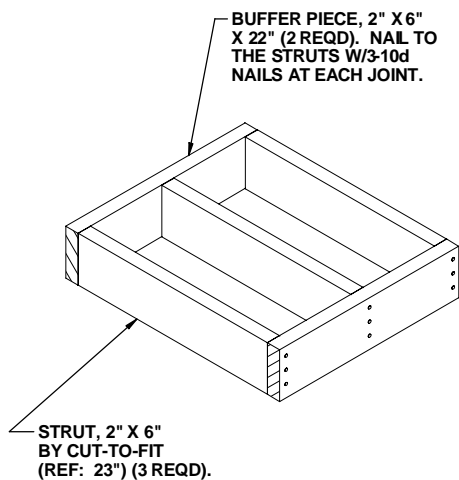
CRIB FILL ASSEMBLY

FOR A ONE HIGH CANISTER LOAD, REDUCE THE VERTICAL TIE PIECE FROM 56" HIGH TO 20-1/2" HIGH AND ELIMINATE THE UPPER BUFFER PIECES AND STRUTS.

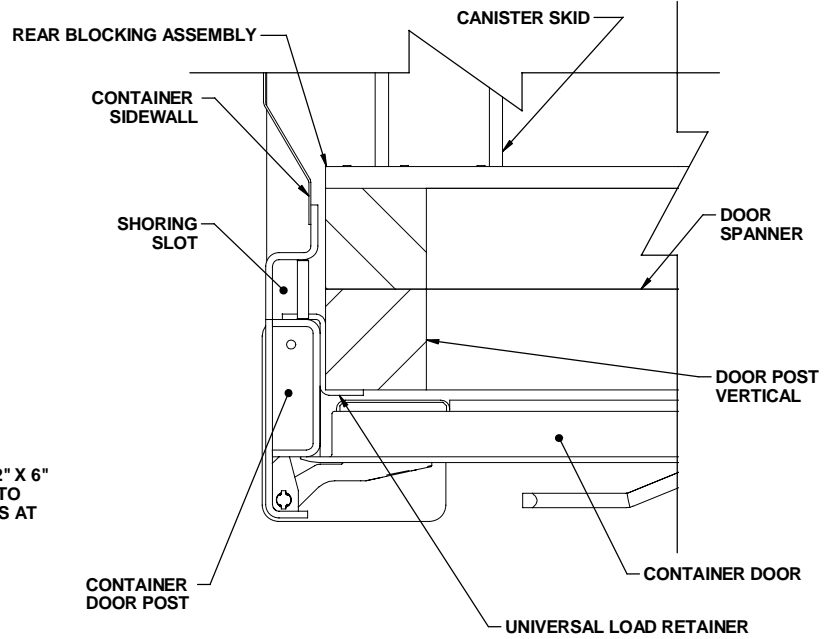


BEVEL CUT

IF DESIRED, EACH END OF A DOOR SPANNER MAY BE BEVEL-CUT AS SHOWN ABOVE TO FACILITATE THE ACHIEVEMENT OF A TIGHT END OF LOAD FIT.

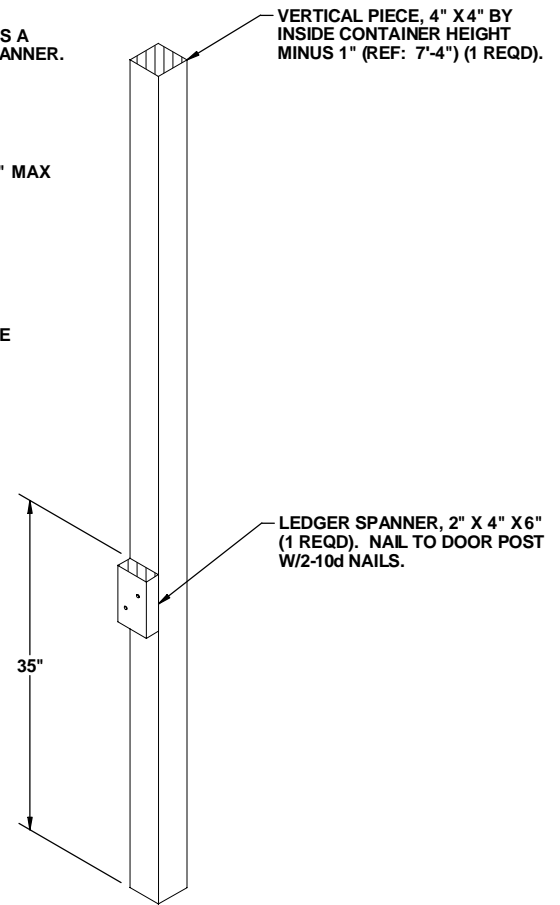


SIDE SPACER ASSEMBLY



DETAIL A

A PARTIAL PLAN VIEW OF THE LEFT REAR PORTION OF THE CONTAINER ON PAGES 4 THRU 6 IS SHOWN DEPICTING THE PROPER POSITION OF THE DOOR POST VERTICAL, UNIVERSAL LOAD RETAINER, AND ADJACENT DUNNAGE PIECES.



DOOR POST VERTICAL

