APPROVED BY
BUREAU OF EXPLOSIVES

DATE 8/8/2006

PATRIOT

LOADING AND BRACING^{*} IN SIDE OPENING ISO CONTAINERS OF PATRIOT (PAC-3) PACKED IN SHIP-PING 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 CAUTION: VERIFY PRIOR TO USE AT WWW.DAC.ARMY.MIL THAT THIS IS AVIATION AND MISSILE COMMAND THE MOST CURRENT VERSION OF THIS DOCUMENT. THIS IS PAGE 1 OF 8. DO NOT SCALE **MAY 2006 ENGINEER MELVIN SIX** BASIC OR REV **TECHNICIAN** TRANSPORTATION APPROVED BY ORDER OF COMMANDING **ENGINEERING** GENERAL, U.S. ARMY MATERIEL COMMAND DIVISON TESTED CLASS DIVISION DRAWING FILE VALIDATION ENGINEERING DIVISON 19 8224 GM15PA8 48 ENGINEERING DIRECTORATE U.S. ARMY DEFENSE AMMUNITION CENTER

PROJECT

GM 901-01

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 CONTAINER. <u>CAUTION</u>: 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 LOADS 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'-5-1/4" LONG BY 89-3/4" WIDE BY 88" 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-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". EXCESSIVE SLACK CAN BE ELIMINATED FROM A LOAD BY LAMINATING ADDITIONAL PIECES OF APPROPRIATE THICKNESS TO THE HORIZONTAL PIECES ON THE SIDE FILL ASSEMBLIES. NAIL EACH ADDITIONAL PIECE WI1 APPROPRIATELY SIZED NAIL EVERY 12". ADDITIONALLY, THE THICKNESS OF THE PIECES IN THE CRIB FILL 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. IN SOME CONTAINERS THERE IS A SLOT AT THE CORNERS OF THE END-WALLS. PIECES OF DUNNAGE MATERIAL MUST BE LAMINATED TO THE VERTICAL POSTS 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 FORWARD WALL ARE SMOOTH AND FLAT.
- H. <u>CAUTION</u>: 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 PUR-POSES.
- K. 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.

- 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:
 - 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 PRE-CLUDE VIOLATION OF ONE OR MORE "WEIGHT LAWS" APPLICABLE TO THE STATE OR STATES INVOLVED.
- N. 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.
- O. THE QUANTITY OF CANISTERS SHOWN IN THE LOADS ON PAGES 4 AND 5 MAY BE REDUCED FOR SHIPMENT, IF DESIRED.
- P. RECOMMENDED SEQUENTIAL LOADING PROCEDURES:
 - PREFABRICATE THE AFT AND FORWARD BLOCKING ASSEMBLIES, TWO SIDE FILL ASSEMBLIES (ONE LEFT AND ONE RIGHT) AND ONE CRIB FILL ASSEMBLY.
 - INSTALL THE VERTICAL POSTS, SPREADER PIECES AND REAR SIDE FILL ASSEMBLY.
 - 3. INSTALL THE FORWARD BLOCKING ASSEMBLY.
 - 4. LOAD TWO CANISTERS (1 STACK OF CANISTERS).
 - 5. INSTALL THE CRIB FILL ASSEMBLY.
 - 6. INSTALL THE AFT BLOCKING ASSEMBLY.
 - 7. INSTALL SIDE FILL ASSEMBLY.

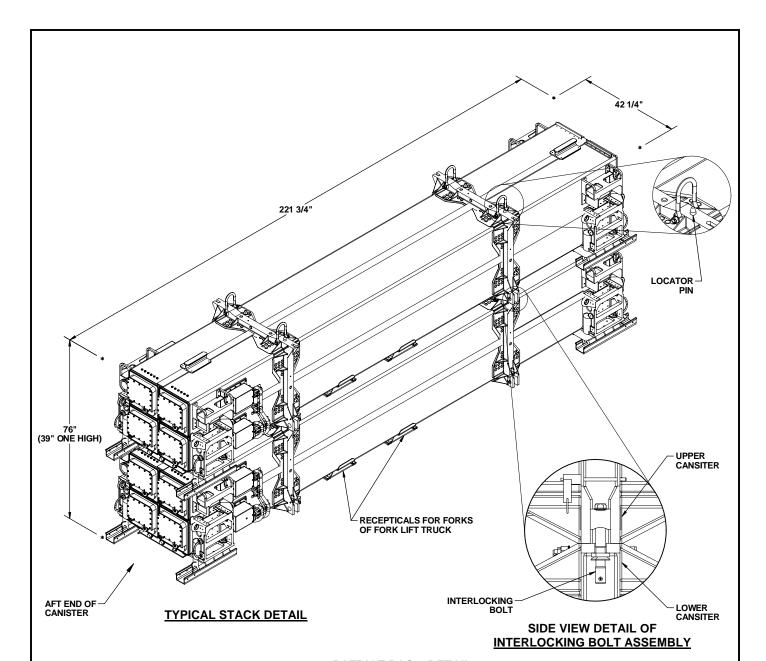
MATERIAL SPECIFICATIONS

LUMBER - - - - - : SEE TM 743-200-1 (DUNNAGE LUMBER) AND VOL-UNTARY PRODUCT STANDARD PS 20.

 $\underbrace{\mathsf{NAILS}}_{}$ - - - - - -: ASTM F1667; COMMON STEEL NAIL (NLCMS OR NLCMMS).

PLYWOOD - - - - - : 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 EXTERIOR GRADE MAY BE SUBSTITUTED.

<u>WIRE, CARBON STEEL</u> -: ASTM A853; ANNEALED AT FINISH, BLACK OXIDE FINISH, 0.0800" DIA, GRADE 1006 OR BETTER.



PATRIOT PAC-3 DETAIL

GROSS WEI GHT - - - - - - - 4, 399 LBS (APPROX) CUBE - - - - - - - - - 209. 2 CU FT (APPROX)

UNITIZATION AND HANDLING PROCEDURAL GUIDANCE

- 1. STACKING CANISTER FOR UNITIZATION.
 - A. THE SKIDS OF THE UPPER CANISTER MUST 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: 50 FOOT POUNDS).
- 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.

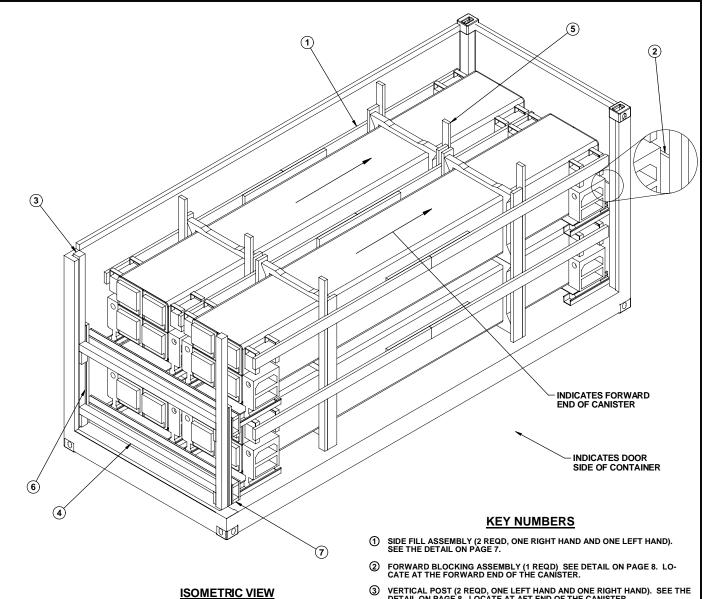
(2) PRECAUTIONARY HANDLING TECHNIQUES NORMALLY EMPLOYED OR AS SPECIFIED FOR THE TYPE OF COMMODITY INVOLVED WILL BE OBSERVED.

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(PROCEDURAL GUIDANCE CONTINUED)

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

PAGE 3



- ③ VERTICAL POST (2 REQD, ONE LEFT HAND AND ONE RIGHT HAND). SEE THE DETAIL ON PAGE 8. LOCATE AT AFT END OF THE CANISTER.
- (4) SPREADER PIECE, 4" X 4" CUT TO A LENGTH THAT WILL PROVIDE A DRIVE FIT (REF: 6'-9-3/4") (2 REQD). TOENAIL TO THE VERTICAL POSTS W/2-12d NAILS AT EACH END.
- (5) CRIB FILL ASSEMBLY (1 REQD). SEE THE DETAIL ON PAGE 7.
- (6) FILL MATERIAL, 1" OR 2" X 50" (AS REQD). NAIL FIRST PIECE TO VERTICAL POST W/5 NAILS OF SUITABLE SIZE (6d FOR 1" MATERIAL OR 10d FOR 2" MA-TERIAL). LAMINATE ADDITIONAL PIECES TO FIRST W/6 NAILS OF SUITABLE SIZE.
- (7) AFT BLOCKING ASSEMBLY (1 REQD). SEE THE DETAIL ON PAGE 8. NAIL VERTICAL PIECE TO FILL MATERIAL W/4-10d NAILS EACH.

BILL OF MATERIAL						
LUMBER	LI NEAR FEET	BOARD FEET				
1" X 4"	9	3				
2" X 4"	98	66				
2" X 6"	136	136				
4" X 4"	22	29				
NAI LS	NO. REQD	POUNDS				
6d (2")	98	3/4				
10d (3")	190	3				
12d (3-1/4")	8	NI L				
PLYWOOD, 3/4" 51.21 SQ FT REQD 106 LBS						

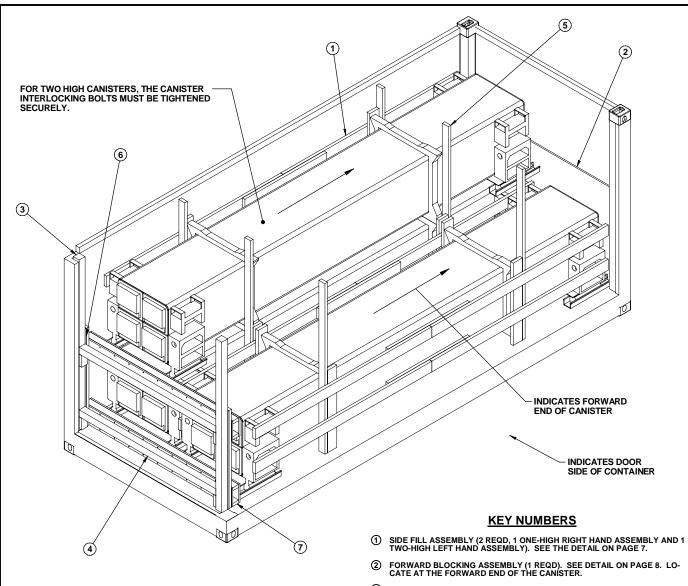
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<u>I TEM</u>	QUANTI TY	WEIGHT (APPROX)
DUNNAGE -	4	17, 356 LBS 574 LBS 6, 050 LBS

TOTAL WEIGHT - - - - - 23,980 LBS (APPROX)

PAGE 4

FOUR CANISTER LOAD



ISOMETRIC VIEW

- VERTICAL POST (2 REQD, ONE LEFT HAND AND ONE RIGHT HAND). SEE THE DETAIL ON PAGE 8. LOCATE AT AFT END OF THE CANISTER. 3
- SPREADER PIECE, 4" X 4" CUT TO A LENGTH THAT WILL PROVIDE A DRIVE FIT (REF: 6'-9-3/4") (2 REQD). TOENAIL TO THE VERTICAL POSTS W/2-12d NAILS AT EACH END.
- (5) CRIB FILL ASSEMBLY (1 REQD). SEE THE DETAIL ON PAGE 7.
- FILL MATERIAL, 1" OR 2" X 50" (AS REQD). NAIL FIRST PIECE TO VERTICAL POST W/5 NAILS OF SUITABLE SIZE (6d FOR 1" MATERIAL OR 10d FOR 2" MATERIAL). LAMINATE ADDITIONAL PIECES TO FIRST W/6 NAILS OF SUITABLE SIZE 6
- AFT BLOCKING ASSEMBLY (1 REQD). SEE THE DETAIL ON PAGE 8. NAIL VERTICAL PIECE TO FILL MATERIAL W/4-10d NAILS EACH.

BILL OF MATERIAL						
LUMBER	LI NEAR FEET	BOARD FEET				
1" X 4"	9	3				
2" X 4"	98	66				
2" X 6"	125	125				
4" X 4"	22	29				
NAI LS	NO. REQD	POUNDS				
6d (2")	98	3/4				
10d (3")	190	3				
12d (3-1/4")	8	NI L				
PLYWOOD, 3/4" 51.21 SQ FT REQD 106 LBS						

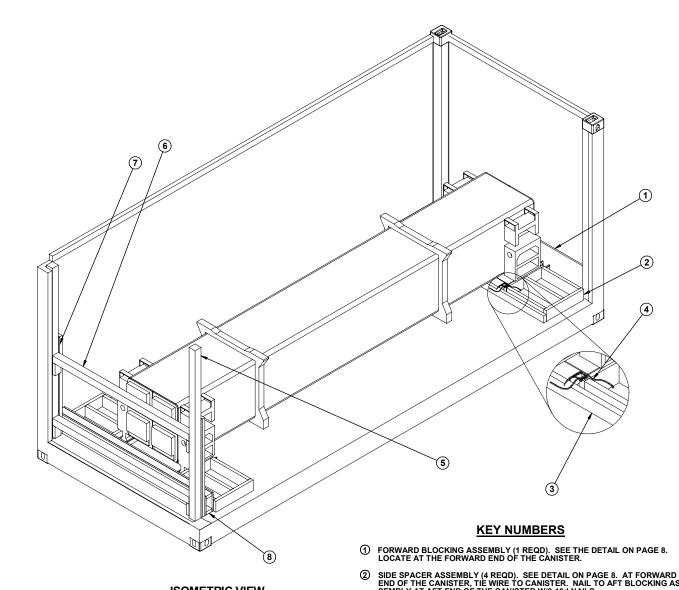
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<u>I TEM</u>					9	2U/	AN ⁻	Π.	ΓY					<u>WEIGHT</u> (APPROX)	
CANI STER DUNNAGE - CONTAI NER	-	-	-	-	-	-	-	-	-	-	-	-	-	13, 017 LBS 552 LBS 6, 050 LBS	

TOTAL WEIGHT - - - - - 19,619 LBS (APPROX)

THREE CANISTER LOAD

PAGE 5



ISOMETRIC VIEW

BILL OF MATERIAL						
LUMBER LINEAR FEET BOARD FEET						
1" X 4"	9	3				
2" x 4"	56	37				
2" X 6"	32	32				
4" X 4"	22	29				
NAILS	NO. REQD	POUNDS				
6d (2")	98	3/4				
10d (3")	150	2-1/2				
12d (3-1/4")	8	NIL				
PLYWOOD, 3/4" 29.77 SQ FT REQD 62 LBS WIRE, 0.0800" DIA 4' REQD NIL						

- ② SIDE SPACER ASSEMBLY (4 REQD). SEE DETAIL ON PAGE 8. AT FORWARD END OF THE CANISTER, TIE WIRE TO CANISTER. NAIL TO AFT BLOCKING ASSEMBLY AT AFT END OF THE CANISTER W/3-10d NAILS.
- (3) TIE PIECE, 2" X 4" X 7'-4" (1 REQD). NAIL TO SIDE SPACER ASSEMBLIES AT FORWARD END OF THE CANISTER W/3-10d NAILS AT EACH LOCATION.
- (4) TIE WIRE FOR SIDE SPACER ASSEMBLY, .0800" DIA 24" LONG (2 REQD). INSTALL THE WIRE TO FORM A COMPLETE LOOP FROM THE CANISTER GOING AROUND BUFFER PIECE OF THE SIDE SPACER ASSEMBLY.
- (§) VERTICAL POST (2 REQD, ONE LEFT HAND AND ONE RIGHT HAND). SEE THE DETAIL ON PAGE 8. LOCATE AT AFT END OF THE CANISTER.
- SPREADER PIECE, 4" X 4" CUT TO A LENGTH THAT WILL PROVIDE A DRIVE FIT (REF: 6'-9-3/4") (1 REQD). TOENAIL TO THE DOOR POST VERTICALS W/2-12d NAILS AT EACH END.
- FILL MATERIAL, 1" OR 2" X 50") (AS REQD). NAIL FIRST PIECE TO VERTICAL POST W/5 NAILS OF SUITABLE SIZE (6d FOR 1" MATERIAL OR 10d FOR 2" MATERIAL). LAMINATE ADDITIONAL PIECES TO FIRST W/6 NAILS OF SUITABLE SIZE.
- (8) AFT BLOCKING ASSEMBLY (1 REQD). SEE THE DETAIL ON PAGE 8. NAIL VERTICAL PIECE TO FILL MATERIAL W/4-10d NAILS EACH.

LOAD AS SHOWN

ITEM	QUANTITY	WEIGHT (APPROX)
DUNNAGE -	1	4,339 LBS 263 LBS 6,050 LBS

TOTAL WEIGHT - - - - - 10,652 LBS (APPROX)

PAGE 6

ONE CANISTER LOAD

