

APPROVED BY
BUREAU OF EXPLOSIVES

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LOADING AND BRACING WITH WOODEN DUNNAGE ON FLATRACK ISO CONTAINERS OF SHRIKE (AGM-45) MISSILES PACKED IN CNU-449/E SHIPPING AND STORAGE CONTAINERS

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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/COPC) 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

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GENERAL NOTES

- A. THIS DOCUMENT HAS BEEN PREPARED AND ISSUED IN ACCORDANCE WITH AR 740-1 AND SUPPLEMENTS TM 745-200-1 (CHAPTER 5).
- B. ALL LOADS SHIPPED BY THE PROCEDURES DEPICTED IN THIS DRAWING MUST BE IN ACCORDANCE WITH THE REQUIREMENTS SET FORTH IN TITLE 49, THE UNITED STATES CODE OF FEDERAL REGULATIONS: AR 55-355/AFM 75-2; DOD 4500.32-R; DOD 5100.75-W; DOD 6055.9-STD; AS WELL AS ANY AND ALL OTHER APPLICABLE SERVICE REGULATIONS.
- C. THE SPECIFIED OUTLOADING PROCEDURES ARE APPLICABLE TO THE SHRIKE (AGM-45) MISSILE PACKED IN THE CHU-449/9 CONTAINER. SUBSEQUENT REFERENCE TO CONTAINER HEREIN MEANS THE CHU-449/9 CONTAINER WITH MISSILES INSTALLED. SEE PAGE 2 FOR DETAILS OF THE CONTAINER. CAUTION: REGARDLESS OF THE QUANTITY OF CONTAINERS TO BE SHIPPED, THE "MAXIMUM GROSS WEIGHT" OF THE FLATRACK IS CONTAINED MUST NOT BE EXCEEDED.
- D. THE LOAD AS SHOWN IS BASED ON A 20'-0" LONG BY 8'-0" WIDE FLATRACK ISO CONTAINER WITH FULL HEIGHT ENDWALLS, AND INSIDE DIMENSIONS OF 19'-4" LONG BY 7'-2" WIDE. THE LOAD AS SHOWN CAN BE SHIPPED BY ANY FORM OF SURFACE TRANSPORTATION. NOTICE: OTHER CONTAINERS OF THE SAME DESIGN CONFIGURATION CAN ALSO BE USED.
- E. WHEN LOADING CONTAINERS, THEY ARE TO BE POSITIONED SO AS TO ACHIEVE A TIGHT LOAD BETWEEN THE END BLOCKING ASSEMBLY AND THE LADING. ALTHOUGH A TOTAL OF 1" OF UNBLOCKED SPACE ACROSS THE WIDTH OF A LOAD IS PERMITTED, LONGITUDINAL VOIDS WITHIN THE LOAD ARE TO BE HELD TO A MINIMUM, NOT EXCEEDING 1/2". EXCESSIVE SPACE CAN BE ELIMINATED FROM A LOAD BY INCREASING THE LENGTH OF THE STRUTS. THE STRUTS SHOULD BE CUT TO FIT THE VOID BETWEEN THE END BLOCKING ASSEMBLY AND THE ENDWALL CASE.
- F. 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.
- G. 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.
- H. PORTIONS OF ONE OF THE FLATRACK ENDWALLS DEPICTED WITHIN THIS DRAWING HAVE NOT BEEN SHOWN IN THE LOAD VIEW FOR CLARITY PURPOSES.
- J. WHEN INSTALLING END BLOCKING ASSEMBLIES AND ENDWALL GATES, THE ASSEMBLIES MUST BE POSITIONED SO AS TO BE SUPPORTED AND IN LINE WITH THE STRONG POINTS OF THE FLATRACK ENDWALLS. NOTE: SOME FLATRACK ENDWALLS WILL REQUIRE FULL PIECES TO BE INSTALLED ON THE ENDWALL GATES TO PROVIDE A UNIFORM LOAD BEARING SURFACE. AS DEPICTED IN THE DETAIL ON PAGE 6. THESE PIECES ARE NOT REQUIRED IF THE ENDWALL IS SMOOTH (IF THE HINGES DO NOT PROTRUDE).

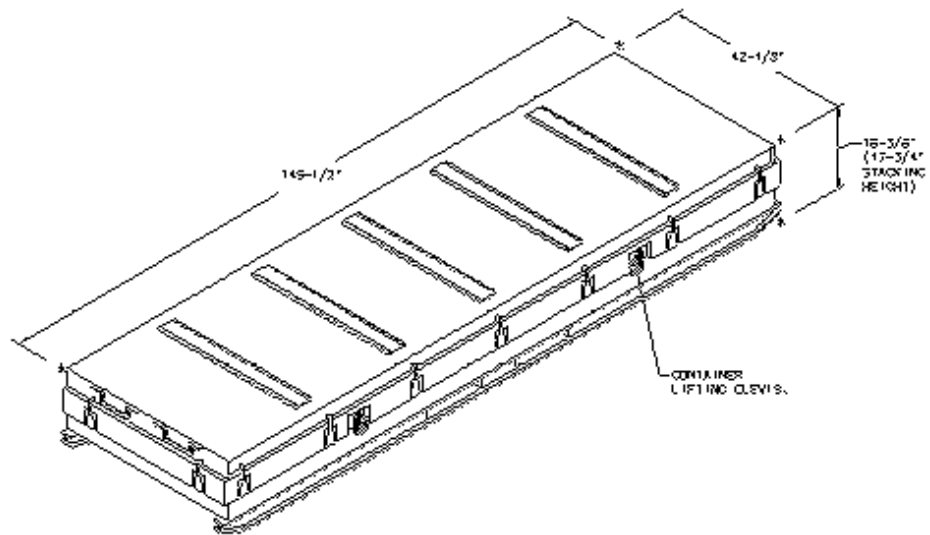
(CONTINUED AT RIGHT)

MATERIAL SPECIFICATIONS

LUMBER	SEE TM 745-200-1 (DUNNAGE LUMBER) AND FED SPEC MM-L-721.
NAILS	FED SPEC FF-N-105; COMMON.
STRAPPING, STEEL	ASTM 03955; FLAT STRAPPING, TYPE 1, HEAVY DUTY, FINISH A, B (GRADE 2), OR C.
SEAL, STRAP	ASTM 03955; CLASS H, FINISH A, B (GRADE 2), OR C, DOUBLE NOTCH TYPE, STYLE I, II, OR IV.
STAPLE, STRAP	COMMERCIAL GRADE.
ANTI-CHAFING MATERIAL	MIL-B-121 (OR EQUAL); NEUTRAL BARRIER MATERIAL.

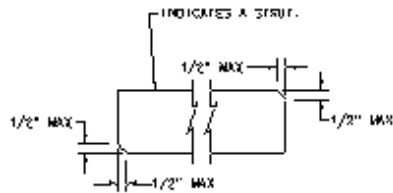
(GENERAL NOTES CONTINUED)

- K. WHEN STEEL STRAPPING IS JOINED IN AN 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.
- 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 BUREAU OF EXPLOSIVES PAMPHLET 8C APPLY WHEN THE SHIPMENT MOVES BY TRAILER/CONTAINER-ON-FLATRACK (T/COFC). SPECIAL T/COFC NOTES FOLLOW:
1. A LOADED CONTAINER MUST BE ON A CHASSIS EQUIPPED WITH TWO SHOCK 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 FLAT BED TRAILER MUST BE USED TO PRECLUDE VIOLATION OF ONE OR MORE "WEIGHT LAWS" APPLICABLE TO THE STATE OR STATES INVOLVED.
- O. THE 2" STRAPPING USED FOR LOAD SECUREMENT, I.E., HOLD-DOWN STRAPS, WILL ONLY BE FASTENED TO THE FLATRACK CONTAINER BY UTILIZING TIEDOWN PROVISIONS LOCATED ON THE TOP OR ALONG THE SIDE OF THE FLATRACK BOTTOM SIDE RAILS. CAUTION: THE LOAD SECUREMENT STRAPS WILL NOT BE POSITIONED AROUND THE UNDERSIDE OR THROUGH THE FORKLIFT SOCKETS OF THE FLATRACK CONTAINER. ADDITIONALLY, THE FLATRACK TIEDOWN PROVISIONS MUST BE AT LEAST AS STRONG AS THE 2" LOAD SECUREMENT STRAPPING BEING USED; AND BE OF A SUFFICIENT WIDTH TO RECEIVE THE 2" STRAPPING AND BE OF A DESIGN WHICH WILL PROVIDE A BEARING SURFACE ACROSS THE FULL WIDTH OF THE 2" STRAPPING SO THAT THE STRAPPING WILL NOT BE DEFORMED, ESPECIALLY AT ITS EDGES, WHEN PROPERLY TENSIONED.
- P. THE OUTLOADING PROCEDURES SPECIFIED HEREIN CAN ALSO BE UTILIZED FOR THE SHIPMENT OF THE DEPICTED CONTAINERS WHEN THEY ARE LOADED WITH AN ITEM WHICH IS IDENTIFIED DIFFERENTLY BY NOMENCLATURE THAN THE ITEM DESIGNATED IN THE DRAWING TITLE.
- Q. REFER TO ASSOCIATION OF AMERICAN RAILROADS MANUAL "GENERAL RULES CONCERNING THE LOADING OF COMMODITIES ON OPEN TOP CARS" FOR APPLICABLE LOADING RULES AS FOLLOWS: PARAGRAPH 1A, 2, 5, 10, AND 15. NOTE THAT ALL STRAPPING USED FOR LOAD SECUREMENT, I.E., HOLD-DOWN STRAPS, MUST BE MARKED AS SPECIFIED IN LOADING RULE 15.
- R. ANTI-CHAFING MATERIAL MAY BE INSTALLED AT POINTS OF CONTACT BETWEEN CONTAINERS AND BETWEEN CONTAINERS AND STEEL STRAPPING, IF DESIRED, TO PREVENT CHAFING DAMAGE TO CONTAINER PAINT AND MARKINGS.
- S. 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.
- T. THE LOAD AS SHOWN ON PAGE 4 MAY BE REDUCED BY ONE OR MORE LAYERS FOR A SHIPMENT OF EIGHT, SIX, FOUR, OR TWO CONTAINERS, IF DESIRED.
- U. 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.



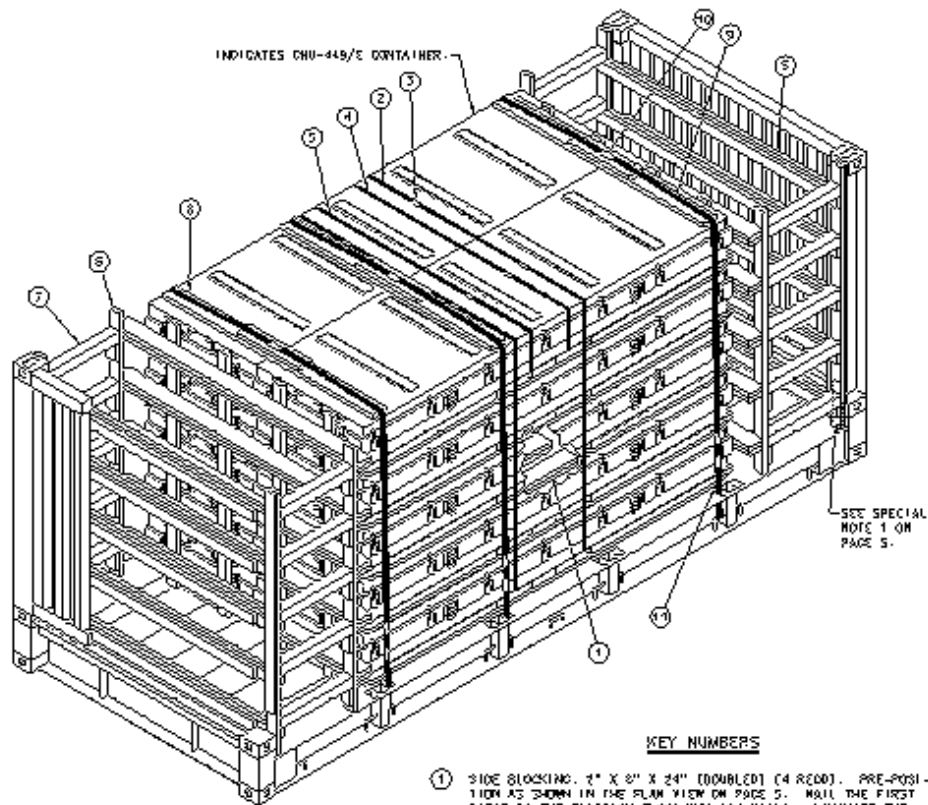
CNU-449/E CONTAINER

GROSS WEIGHT ----- 2,300 LBS (APPROX)
 CUBE ----- 65.2 CU FT (APPROX)



BEVEL-CUT

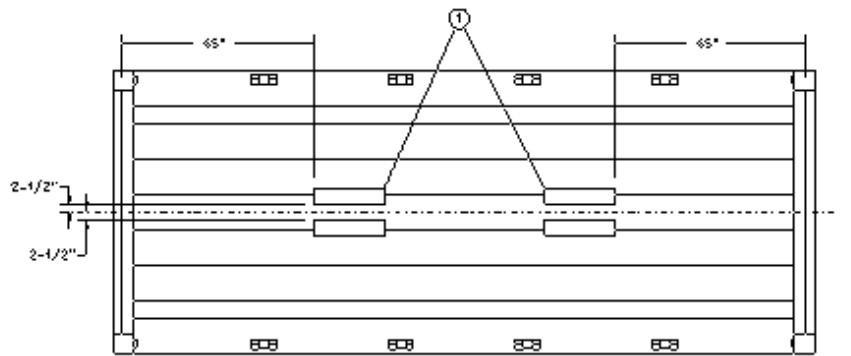
IF DESIRED, EACH END OF A STRUT MAY BE
 BEVEL-CUT AS SHOWN ABOVE TO FACILITATE
 THE ACHIEVEMENT OF A TIGHT FIT.



ISOMETRIC VIEW

KEY NUMBERS

- ① SIDE BLOCKING, 2" X 8" X 24" (DOUBLED) (4 REQD). PRE-POSITION AS SHOWN IN THE PLAN VIEW ON PAGE 5. NAIL THE FIRST PIECE TO THE FLATRACK FLOOR W/4-10d NAILS. LAMINATE THE SECOND PIECE TO THE FIRST PIECE W/4-10d NAILS.
- ② UNITIZING STRAP, 1-1/4" X .025" OR .031" BY A LENGTH TO SUIT (REF: 22'-0") (4 REQD). INSTALL TO UNITIZE ONE STACK OF FIVE CONTAINERS.
- ③ SEAL FOR 1-1/4" STRAPPING (6 REQD, 1 PER STRAP). CRIMP EACH SEAL WITH TWO PAIR OF NOTCHES.
- ④ SHACKLING STRAP, 1-1/4" X .036" OR .031" BY A LENGTH TO SUIT (REF: 17'-8") (2 REQD). INSTALL TO ENIRCLE THE UPPER LAYER OF CONTAINERS.
- ⑤ ENDWALL SAFE (2 REQD). SEE THE DETAIL ON PAGE 6.
- ⑥ END BLOCKING ASSEMBLY (2 REQD). SEE THE DETAIL ON PAGE 7.
- ⑦ STRUT, 4" X 4" BY CUT-TO-FIT (REF: 20-1/4") (20 REQD). TIEWALL TO THE SURFER PIECES OF THE END BLOCKING ASSEMBLY AND THE ENDWALL SAFE W/2-12d NAILS AT EACH END. SEE THE "BEVEL-CUT" DETAIL ON PAGE 5.
- ⑧ STRAPPING BOARD ASSEMBLY (3 REQD). SEE THE DETAIL ON PAGE 6.
- ⑨ HOLD-DOWN STRAP, 2" X .044" OR .050" BY A LENGTH TO SUIT (REF: 24'-0") (3 REQD). INSTALL EACH STRAP FROM TWO 14'-0" LONG PIECES. STAPLE TO THE STRAPPING BOARD W/2 STAPLES EACH.
- ⑩ SEAL FOR 2" STRAPPING (13 REQD). FASTEN PIECE MARKED ③ WITH ONE SEAL CRIMPED WITH TWO PAIR OF NOTCHES. FASTEN PIECE MARKED ④ WITH ONE SEAL CRIMPED WITH ONE PAIR OF NOTCHES. SEE THE "TIEDOWN DETAIL" ON PAGE 8.
- ⑪ PAD, STRAPPING, 2" X .044" OR .050" X 18" (8 REQD). PRE-POSITION THE PAD BETWEEN THE HOLD-DOWN STRAP, PIECE MARKED ③, AND THE FLATRACK TIEDOWN PROVISIONS. FASTEN WITH ONE SEAL CRIMPED WITH ONE PAIR OF NOTCHES. SEE THE "TIEDOWN DETAIL" ON PAGE 8.



PRE-POSITIONED DUNNAGE PLAN VIEW
(KEY NUMBER REFERS TO KEY NUMBERS ON PAGE 4)

SPECIAL NOTES:

1. IF THE CORNER POSTS OF THE FLATRACK ARE SMOOTH, I.E., THE ENDWALL HINCE DOES NOT PROTRUDE FROM THE CORNER POST, THE FILL PIECES MAY BE ELIMINATED FROM THE ENDWALL GAPS. ALSO, THE LENGTH OF THE FILL PIECES MUST BE ADJUSTED AS REQUIRED DEPENDING ON THE LENGTH OF THE PROTRUDING HINCE.
2. POSITION THE STRAPPING BOARD ASSEMBLIES AND THE HOLD-DOWN STRAPS SO AS TO BE VERTICALLY IN LINE WITH THE FLATRACK TIEDOWN POINTS.
3. THE HEIGHT OF THE STACKED CONTAINERS PLUS THE STRAPPING BOARD ASSEMBLIES MUST NOT EXCEED THE HEIGHT OF THE FLATRACK ENDWALLS. IF THE CONTAINERS OR STRAPPING BOARD ASSEMBLIES EXTEND OUTSIDE THE ENVELOPE OF THE FLATRACK, EITHER ONE OR MORE LAYERS OF CONTAINERS MUST BE OMITTED, OR FIRE HOSE MUST BE SUBSTITUTED FOR THE STRAPPING BOARD ASSEMBLIES (SEE THE "PROVISIONS FOR THE USE OF FIRE HOSE" AT RIGHT). AS LONG AS THIS IS A SUFFICIENT REDUCTION IN HEIGHT.

PROVISIONS FOR THE USE OF FIRE HOSE IN LIEU OF STRAPPING BOARD ASSEMBLIES

FIRE HOSE THAT IS NO LONGER SUITABLE FOR USE IN FIRE FIGHTING APPLICATIONS CAN BE SUBSTITUTED FOR THE 2" X 6" STRAPPING BOARD ASSEMBLIES THAT ARE DEPICTED IN THE LOAD ON PAGE 4, PROVIDED THE FOLLOWING CONDITIONS ARE MET.

1. SUBSTITUTION AND APPLICATION GUIDANCE
 - A. FIRE HOSE MAY BE USED WHEREVER STRAPPING BOARD ASSEMBLY CONTACTS A RIGID SURFACE OF THE LOAD PROVIDED BULGING, SCRATCHING, CRACKING, SEAMING, CRUSHING, OR OTHER VISIBLE DAMAGE DOES NOT OCCUR TO THE LOAD.
 - B. ONE OR MORE SEGMENTS OF FIRE HOSE MAY BE USED TO REPLACE EACH STRAPPING BOARD ASSEMBLY PROVIDING LOAD PROTECTION DURING TENSIONING OF HOLD-DOWN STRAPS AND LOAD SHIPMENT; I.E., A STRAPPING BOARD ASSEMBLY NEED NOT BE REPLACED BY A SINGLE SEGMENT OF HOSE. MULTIPLE SEGMENTS MAY BE USED INSTEAD, AS LONG AS THEY ARE SECURELY FASTENED TO THE STRAP, REGARDLESS OF THE NUMBER OF SEGMENTS USED. THE HOSE LENGTH WILL BE SUCH THAT IT EXTENDS AT LEAST 6" BEYOND THE EDGE OF THE LOAD.

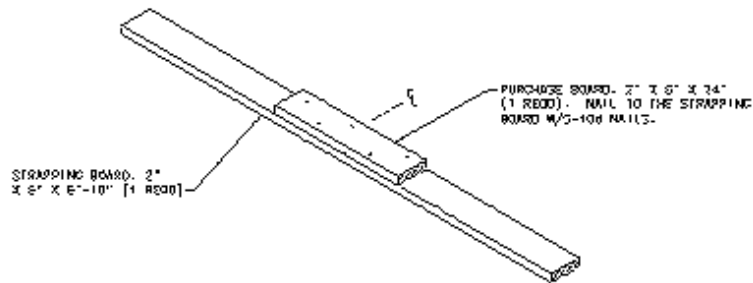
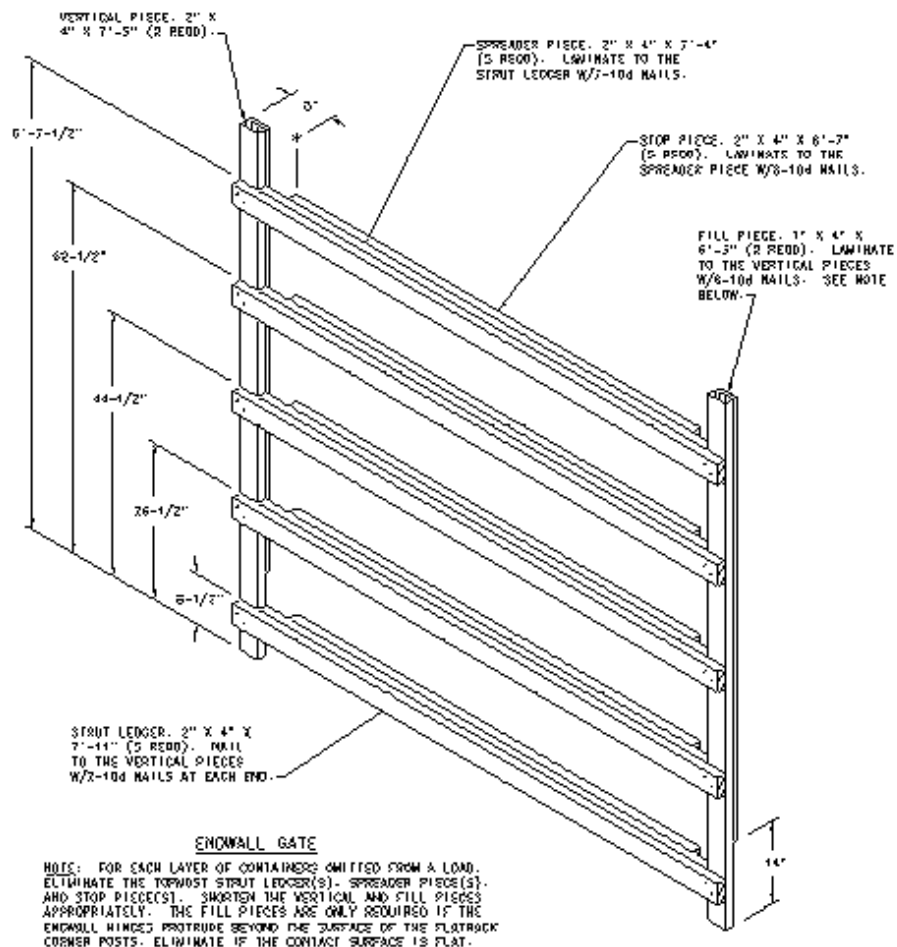
LOAD AS SHOWN

ITEM	QUANTITY	WEIGHT (APPROX)
CMA-440/E	10	22,000 LBS
DUNNAGE		1,085 LBS
CONTAINER		5,700 LBS
TOTAL WEIGHT		28,785 LBS (APPROX)

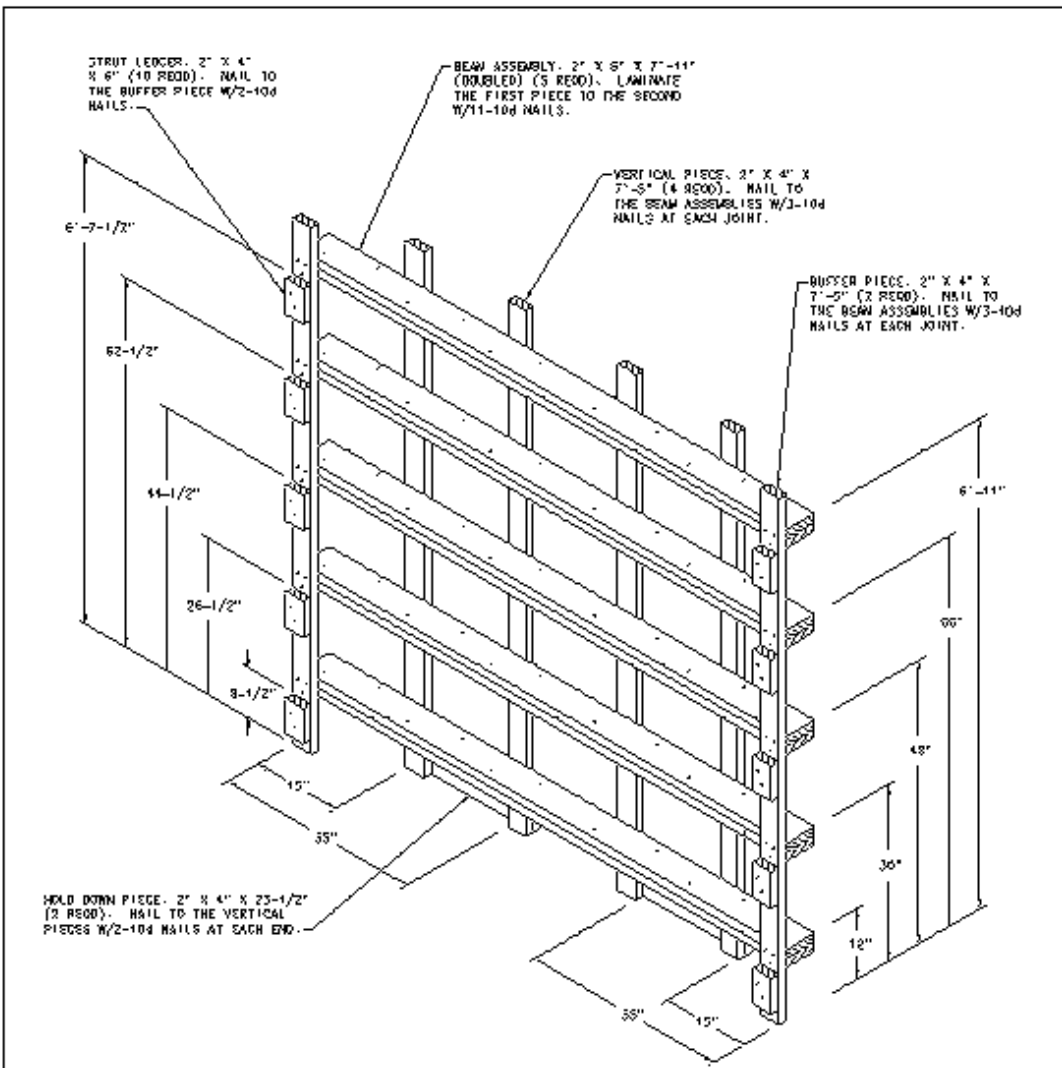
2. ACCEPTABLE FIRE HOSE
 - A. FIRE HOSE TO BE USED WILL BE A RUBBER LINED SINGLE OR DOUBLE JACKETED TYPE; I.E., IT MUST HAVE A RUBBER LINING INSIDE A SINGLE OR DOUBLED FABRIC (COTTON, LINEN, ETC.) JACKET.
 - B. THE COLLAPSED WIDTH OF THE HOSE MUST BE A MINIMUM OF 2-1/2".
 - C. THE HOSE SEGMENTS USED MUST NOT CONTAIN DEFECTS THAT WILL ALLOW DIRECT CONTACT OF THE STRAP WITH THE LOAD. THE HOSE THICKNESS MUST ALSO BE OF SUCH A THICKNESS THAT BENTING OR DAMAGE TO THE LOAD DOES NOT OCCUR DURING STRAP TENSIONING.

3. SECUREMENT TO STRAPS
 - A. THE SEGMENTS OF HOSE USED UNDER EACH STRAP WILL BE SECURED TO THE STRAP WITH ONE FASTENER EVERY 12" WITH A MINIMUM OF TWO FASTENERS REQUIRED PER HOSE SEGMENT.
 - B. FASTENERS CAN CONSIST OF PLASTIC ELECTRICAL TIES, NO. 14 GAGE WIRE, OR TAPE. REGARDLESS OF THE TYPE OF FASTENER USED, IT MUST PROVIDE A POSITIVE MEANS OF SECUREMENT OF THE HOSE TO THE STRAP AND MUST NOT DAMAGE THE SURFACE OF THE CONTAINER IT CONTACTS.

BILL OF MATERIAL		
LUDBER	LINEAR FEET	BOARD FEET
1" X 4"	25	9
2" X 4"	355	257
2" X 6"	201	201
4" X 4"	48	84
NAILS	NO. REQD	POUNDS
6d (2")	24	1/4
10d (3")	565	9-3/4
12d (3-1/4")	30	1-1/2
STEEL STRAPPING, 1-1/4"	125' REQD	15 LBS
SEAL FOR 1-1/4" STRAPPING	6 REQD	NIL
STEEL STRAPPING, 2"	93' REQD	31 LBS
SEAL FOR 2" STRAPPING	15 REQD	3 LBS
STAPLE FOR 2" STRAPPING	6 REQD	NIL

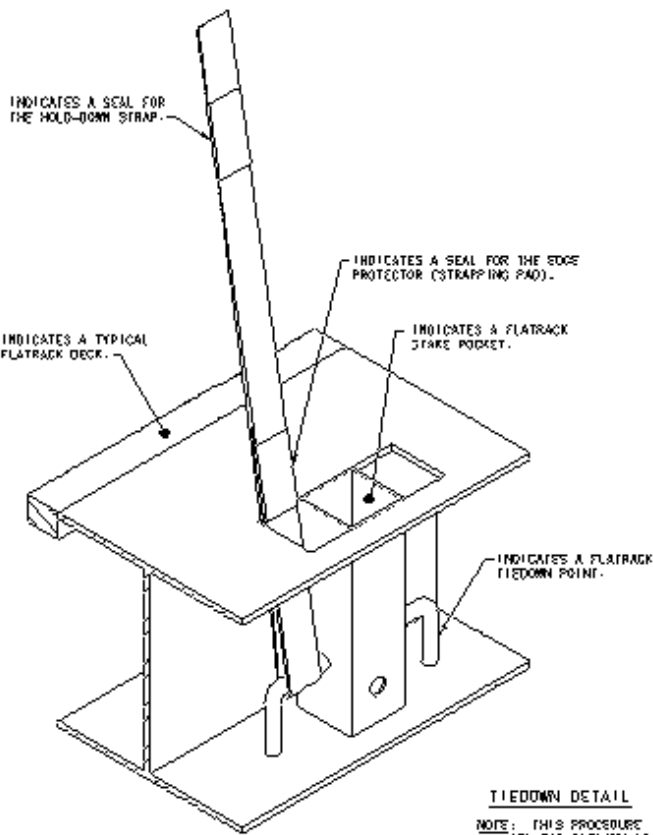


STRAPPING BOARD ASSEMBLY

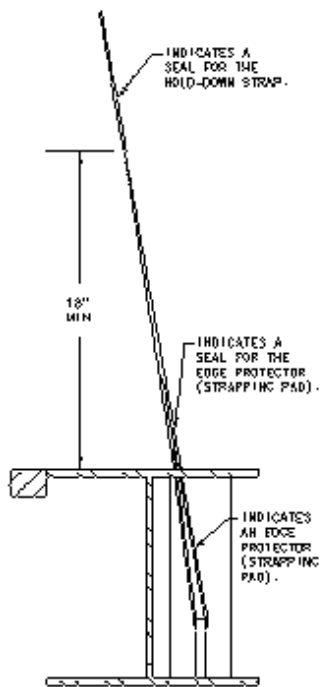


END BLOCKING ASSEMBLY

NOTE: FOR EACH LAYER OF CONTAINERS OMITTED FROM A LOAD, ELIMINATE THE TOPMOST BEAM ASSEMBLY(S), AND THE TOPMOST TWO (PER LAYER) STRUT LEDGERS. SHORTEN THE VERTICAL AND BUFFER PIECES APPROPRIATELY.



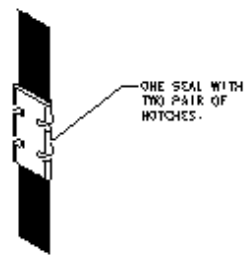
PARTIAL ISOMETRIC SECTION VIEW



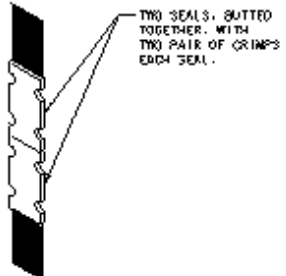
PARTIAL SIDE VIEW

TIEDOWN DETAIL

NOTE: THIS PROCEDURE IS USED FOR TIEDOWN OF THE LOAD USING FLATRACK SIDE RAIL TIEDOWN POINTS. SEE GENERAL NOTE 404 ON PAGE 2.



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.

STRAP/SEAL DETAIL

DETAILS