

APPROVED BY
BUREAU OF EXPLOSIVES

Q L

DATE 6/4/2000

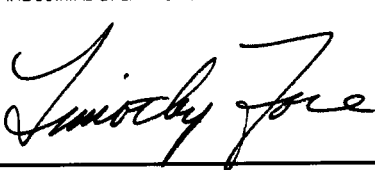

LOADING AND BRACING WITH WOODEN DUNNAGE ON FLATRACK ISO CONTAINERS OF CBU ITEMS PACKED IN CNU-147/E (TWIN PACK) SHIPPING AND STORAGE CONTAINERS

INDEX

ITEM	PAGE(S)
GENERAL NOTES AND MATERIAL SPECIFICATIONS	2
CONTAINER DETAIL	3
TYPICAL LOADING PROCEDURES	4, 5
DETAILS	6-8

- 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 INDUSTRIAL OPERATIONS COMMAND 	ENGINEER	BASIC	MICHAEL SARDONE	DO NOT SCALE			
		REV.		WEBSITE: HTTP://WWW.DAC.ARMY.MIL			
	TECHNICIAN	BASIC		JUNE 1999			
	REV.						
	DRAFTSMAN	BASIC					
		REV.					
APPROVED BY ORDER OF COMMANDING GENERAL, U.S. ARMY MATERIEL COMMAND  DEFENSE AMMUNITION CENTER	TRANSPORTATION ENGINEERING DIVISION		<i>w. ...</i>				
	VALIDATION ENGINEERING DIVISION		<i>...</i>	CLASS	DIVISION	DRAWING	FILE
	LOGISTICS ENGINEERING OFFICE		<i>William Ernest</i>	19	48	8619	SP15A4

PROJECT SP 317-95

GENERAL NOTES

(GENERAL NOTES CONTINUED)

- A. THIS DOCUMENT HAS BEEN PREPARED AND ISSUED IN ACCORDANCE WITH AR 740-1 AND AUGMENTS TM 743-200-1 (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 5100.76-M; DOD 6055.9-STD; AS WELL AS ANY AND ALL OTHER APPLICABLE SERVICE REGULATIONS.
- C. THE SPECIFIED OUTLOADING PROCEDURES ARE APPLICABLE TO LOADS OF CBU ITEMS PACKED IN TWIN PACK CNU-147/E CONTAINERS. SUBSEQUENT REFERENCE TO CONTAINER HEREIN MEANS THE CONTAINER WITH CBU ITEMS. SEE PAGE 3 FOR DETAILS OF THE CONTAINERS. CAUTION: REGARDLESS OF THE QUANTITY OF CONTAINERS TO BE SHIPPED, THE "MAXIMUM GROSS WEIGHT" OF THE FLATRACK ISO CONTAINER 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 SLACK 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 GATE.
- 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 FILL 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).

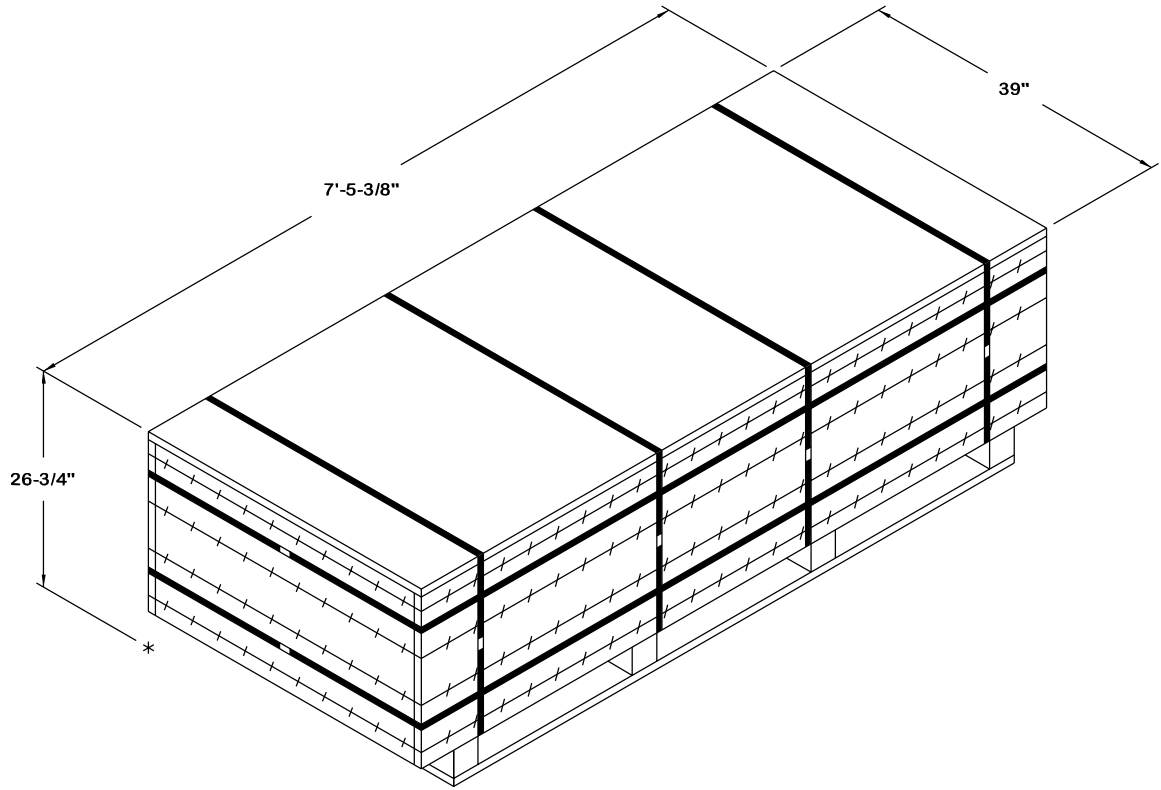
(CONTINUED AT RIGHT)

MATERIAL SPECIFICATIONS

- LUMBER - - - - - : SEE TM 743-200-1 (DUNNAGE LUMBER) AND VOLUNTARY PRODUCT STANDARD PS 20.
- NAILS - - - - - : ASTM F1667; COMMON STEEL NAIL (NLCMS OR NLCMMS).
- STRAPPING, STEEL - - : ASTM D3953; FLAT STRAPPING, TYPE 1, HEAVY DUTY, FINISH A, B (GRADE 2), OR C.
- SEAL, STRAP - - - - : ASTM D3953; CLASS H, FINISH A, B (GRADE 2), OR C, DOUBLE NOTCH TYPE, STYLE I, II, OR IV.
- STAPLE, STRAP - - - : COMMERCIAL GRADE.

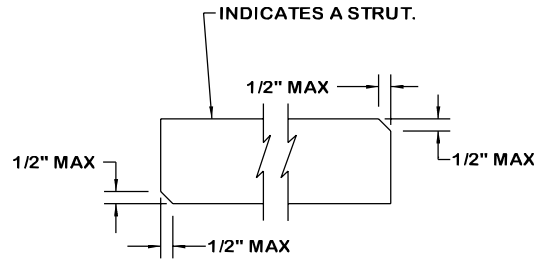
- K. WHEN STEEL STRAPPING IS SEALED IN AN END-OVER-END LAP JOINT, A MINIMUM OF ONE SEAL WITH TWO PAIR OF NOTCHES WILL BE USED TO SEAL THE JOINT WHEN A NOTCH-TYPE SEALER IS BEING USED. A MINIMUM OF TWO SEALS, BUTTED TOGETHER WITH TWO PAIR OF CRIMPS PER SEAL, WILL BE USED TO SEAL THE JOINT WHEN A CRIMP-TYPE 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 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. 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 POCKETS 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 GOVERNING THE LOADING OF COMMODITIES ON OPEN TOP CARS" FOR APPLICABLE LOADING RULES AS FOLLOWS: PREFACE, 1, 2, 3, 5, 7, 10, 12, 13, 14, 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. 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.
- S. THE LOAD AS SHOWN ON PAGE 4 MAY BE REDUCED BY ONE OR TWO LAYERS FOR A SHIPMENT OF FOUR OR EIGHT CONTAINERS, IF DESIRED.
- T. 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.



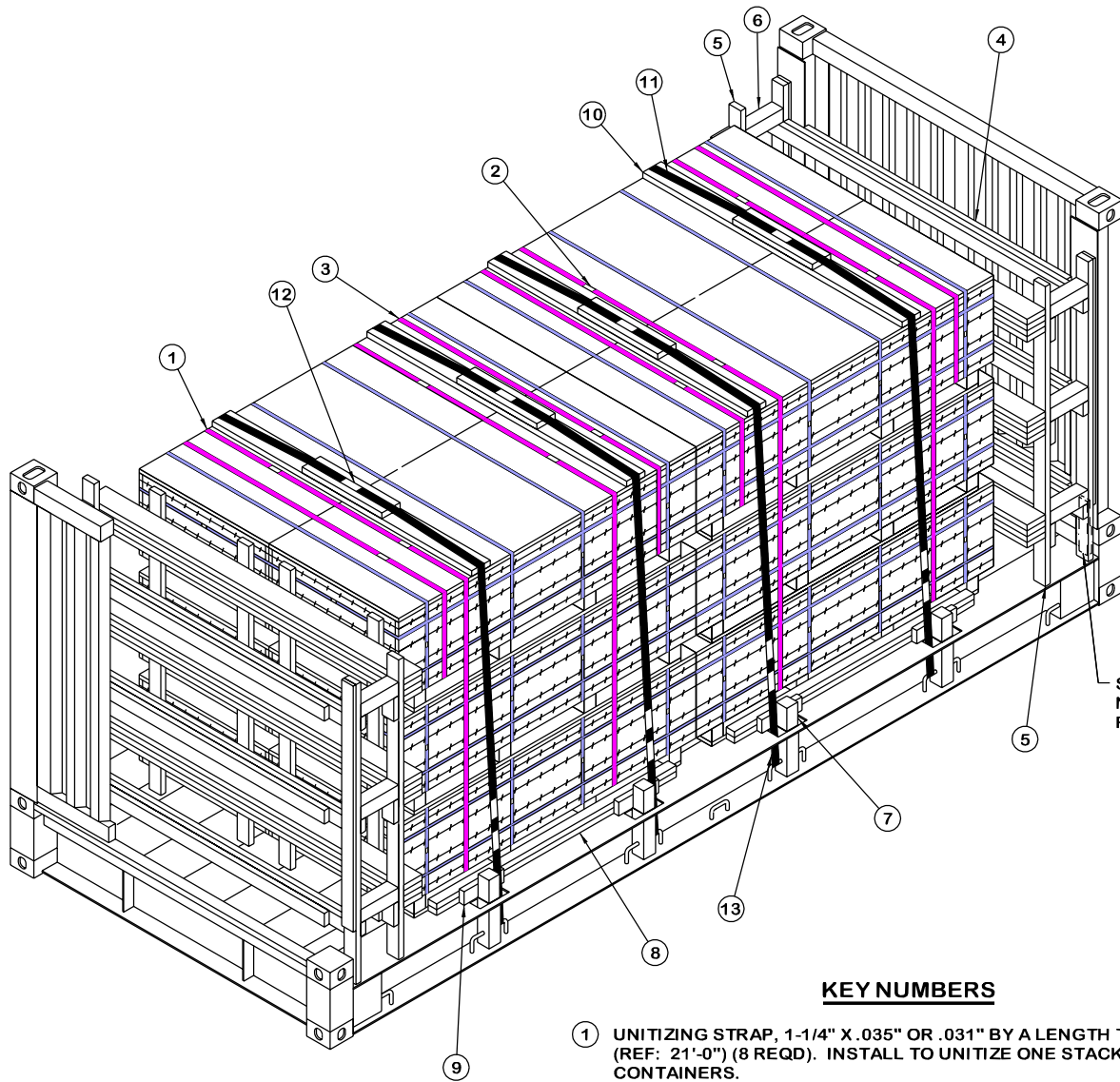
CNU-147/E CONTAINER

GROSS WEIGHT - - - - - 1,855 POUNDS (APPROX)
 CUBE - - - - - 54.0 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 END OF LOAD FIT.



SEE SPECIAL NOTE 1 ON PAGE 5.

ISOMETRIC VIEW

(KEY NUMBERS CONTINUED)

- ⑩ STRAPPING BOARD ASSEMBLY (4 REQD). SEE THE DETAIL ON PAGE 6.
- ⑪ HOLD-DOWN STRAP, 2" x .050" OR .044" BY A LENGTH TO SUIT (REF: 26'-0") (4 REQD). INSTALL EACH STRAP FROM TWO 13'-0" LONG PIECES.
- ⑫ SEAL FOR 2" STRAPPING (20 REQD, 5 PER STRAP). FASTEN PIECE MARKED ⑪ WITH ONE SEAL AT EACH LOCATION CRIMPED WITH TWO PAIR OF NOTCHES. FASTEN PIECE MARKED ⑬ WITH ONE SEAL CRIMPED WITH ONE PAIR OF NOTCHES. SEE THE "TIEDOWN DETAIL" ON PAGE 8.
- ⑬ PAD, STRAPPING, 2" X .050" OR .044" X 18" (8 REQD). PRE-POSITION THE PAD BETWEEN THE HOLD-DOWN STRAP, PIECE MARKED ⑪, AND THE FLATRACK TIEDOWN PROVISIONS. FASTEN WITH ONE SEAL CRIMPED WITH ONE PAIR OF NOTCHES. SEE THE "TIEDOWN DETAIL" ON PAGE 8.

KEY NUMBERS

- ① UNITIZING STRAP, 1-1/4" X .035" OR .031" BY A LENGTH TO SUIT (REF: 21'-0") (8 REQD). INSTALL TO UNITIZE ONE STACK OF THREE CONTAINERS.
- ② SEAL FOR 1-1/4" STRAPPING (12 REQD, 1 PER STRAP). CRIMP EACH SEAL WITH TWO PAIR OF NOTCHES.
- ③ BUNDLING STRAP, 1-1/4" X .035" OR .031" BY A LENGTH TO SUIT (REF: 20'-0") (4 REQD). INSTALL TO ENIRCLE THE UPPER LAYER OF CONTAINERS.
- ④ ENDWALL GATE (2 REQD). SEE THE DETAIL ON PAGE 6.
- ⑤ END BLOCKING ASSEMBLY (2 REQD). SEE THE DETAIL ON PAGE 7.
- ⑥ STRUT, 4" X 4" BY CUT-TO-FIT (REF: 11'-3/8") (12 REQD). TOENAIL TO THE BUFFER PIECES OF THE END BLOCKING ASSEMBLY AND THE ENDWALL GATE W/2-12d NAILS AT EACH END. SEE THE "BEVEL-CUT" DETAIL ON PAGE 3.
- ⑦ STAKE, 4" X 4" X 18" (8 REQD). INSTALL THE STAKE INTO THE FLATRACK STAKE POCKETS WITH A TIGHT (SNUG) FIT. NOTE: REFERENCE DIMENSIONS FOR A TIGHT FITTING STAKE ARE 3-1/4" (ACTUAL) X 3-1/4" (ACTUAL). NAIL A 1-20d NAIL THROUGH THE HOLE PROVIDED IN THE FACE OF THE FLATRACK STAKE POCKET AND INTO THE STAKE. BEND THE PROTRUDING HEAD OF THE NAIL OVER AND AGAINST THE STAKE POCKET.
- ⑧ SIDE BLOCKING, 2" X 3" X 72" (DOUBLED) (4 REQD). LAMINATE THE FIRST PIECE TO THE SECOND PIECE W/7-10d NAILS. INSTALL AS DEPICTED, AGAINST THE CNU-147/E CONTAINERS AND CENTERED BETWEEN THE TWO STAKES.
- ⑨ FILL PIECE, 1" OR 2" X 4" X 12" (AS REQD). POSITION BETWEEN THE STAKE AND THE SIDE BLOCKING AND NAIL TO THE SIDE BLOCKING WITH 3 APPROPRIATELY SIZED NAILS (6d FOR 1" MATERIAL, 10d FOR 2" MATERIAL). TOENAIL TO THE STAKE W/2-12d NAILS.

(CONTINUED AT LEFT)

SPECIAL NOTES:

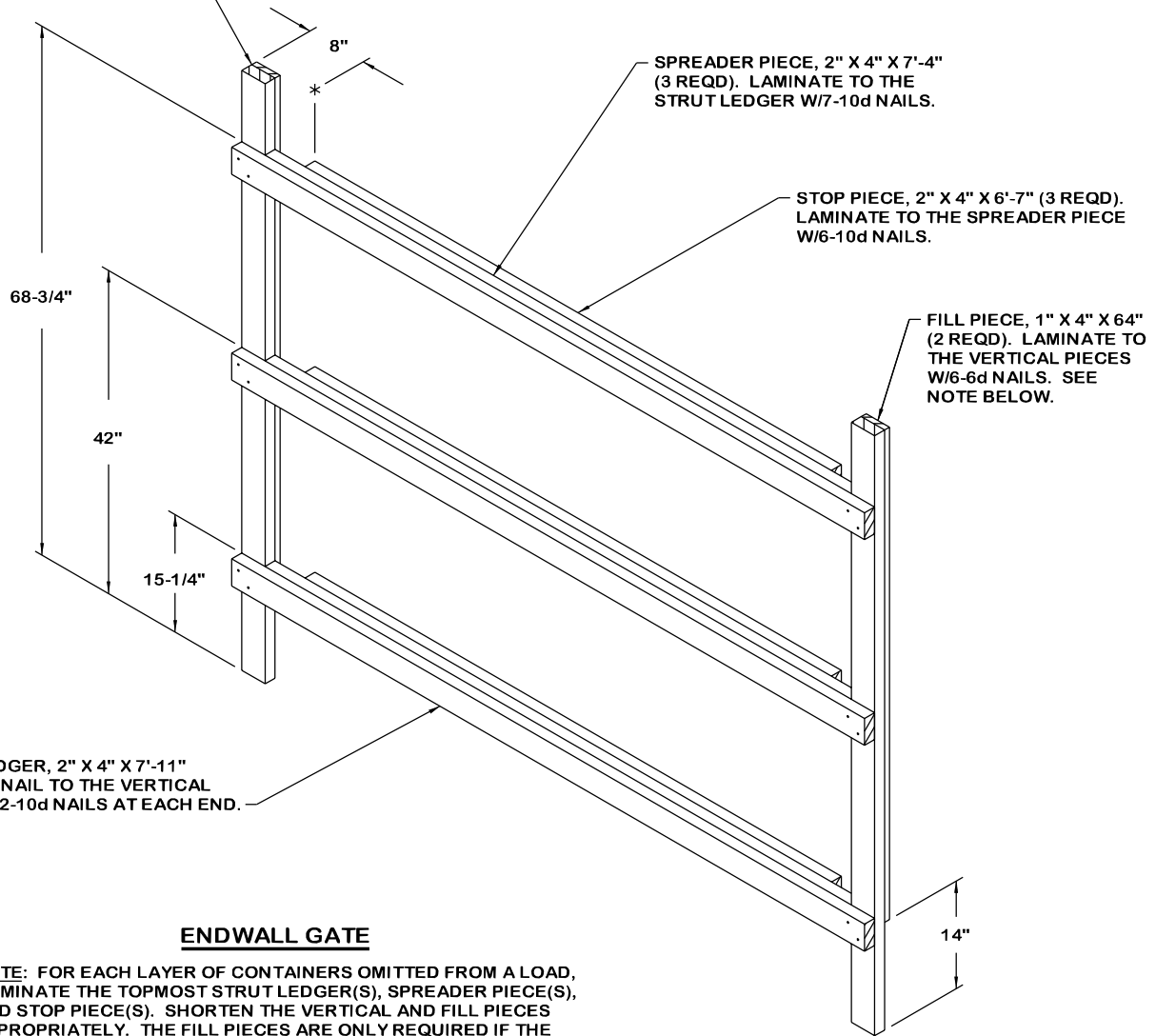
1. IF THE CORNER POSTS OF THE FLATRACK ARE SMOOTH, I.E., THE ENDWALL HINGE DOES NOT PROTRUDE FROM THE CORNER POST, THE FILL PIECES MAY BE ELIMINATED FROM THE ENDWALL GATES. ALSO, THE LENGTH OF THE FILL PIECES MUST BE ADJUSTED AS REQUIRED DEPENDING ON THE LENGTH OF THE PROTRUDING HINGE.
2. POSITION THE STRAPPING BOARD ASSEMBLIES AND THE HOLD-DOWN STRAPS SO AS TO BE VERTICALLY IN LINE WITH THE FLATRACK TIEDOWN POINTS.
3. THE LOAD AS SHOWN MAY BE REDUCED BY ONE OR TWO LAYERS, IF DESIRED FOR A SHIPMENT OF EIGHT OR FOUR CONTAINERS.

BILL OF MATERIAL		
LUMBER	LINEAR FEET	BOARD FEET
1" X 4"	22	8
2" X 3"	48	24
2" X 4"	259	173
2" X 6"	224	224
4" X 4"	24	32
NAILS	NO. REQD	POUNDS
6d (2")	24	1/4
10d (3")	520	8
12d (3-1/4")	48	1
20d (4")	8	1/2
STEEL STRAPPING, 1-1/4" - - 248' REQD - - 35-1/2 LBS		
SEAL FOR 1-1/4" STRAPPING - - 12 REQD - - 3/4 LB		
STEEL STRAPPING, 2" - - - - 116' REQD - - 38-3/4 LBS		
SEAL FOR 2" STRAPPING - - - - 20 REQD - - - - 5 LBS		
STAPLE FOR 2" STRAPPING - - - - 8 REQD - - - - - NIL		

LOAD AS SHOWN

<u>ITEM</u>	<u>QUANTITY</u>	<u>WEIGHT (APPROX)</u>
CNU-147/E - - - - -	12 - - - - -	22,260 LBS
DUNNAGE - - - - -	- - - - -	1,012 LBS
FLATRACK - - - - -	- - - - -	5,700 LBS
TOTAL WEIGHT - - - - -		28,972 LBS (APPROX)

VERTICAL PIECE, 2" X 4" X 6'-6" (2 REQD).



SPREADER PIECE, 2" X 4" X 7'-4" (3 REQD). LAMINATE TO THE STRUT LEDGER W/7-10d NAILS.

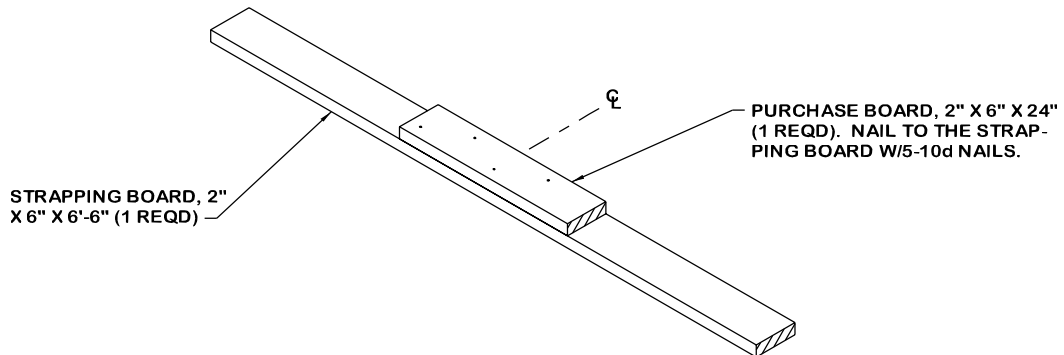
STOP PIECE, 2" X 4" X 6'-7" (3 REQD). LAMINATE TO THE SPREADER PIECE W/6-10d NAILS.

FILL PIECE, 1" X 4" X 64" (2 REQD). LAMINATE TO THE VERTICAL PIECES W/6-6d NAILS. SEE NOTE BELOW.

STRUT LEDGER, 2" X 4" X 7'-11" (3 REQD). NAIL TO THE VERTICAL PIECES W/2-10d NAILS AT EACH END.

ENDWALL GATE

NOTE: FOR EACH LAYER OF CONTAINERS OMITTED FROM A LOAD, ELIMINATE THE TOPMOST STRUT LEDGER(S), SPREADER PIECE(S), AND STOP PIECE(S). SHORTEN THE VERTICAL AND FILL PIECES APPROPRIATELY. THE FILL PIECES ARE ONLY REQUIRED IF THE ENDWALL HINGES PROTRUDE BEYOND THE SURFACE OF THE FLATRACK CORNER POSTS, ELIMINATE IF THE CONTACT SURFACE IS FLAT.



STRAPPING BOARD, 2" X 6" X 6'-6" (1 REQD)

PURCHASE BOARD, 2" X 6" X 24" (1 REQD). NAIL TO THE STRAPPING BOARD W/5-10d NAILS.

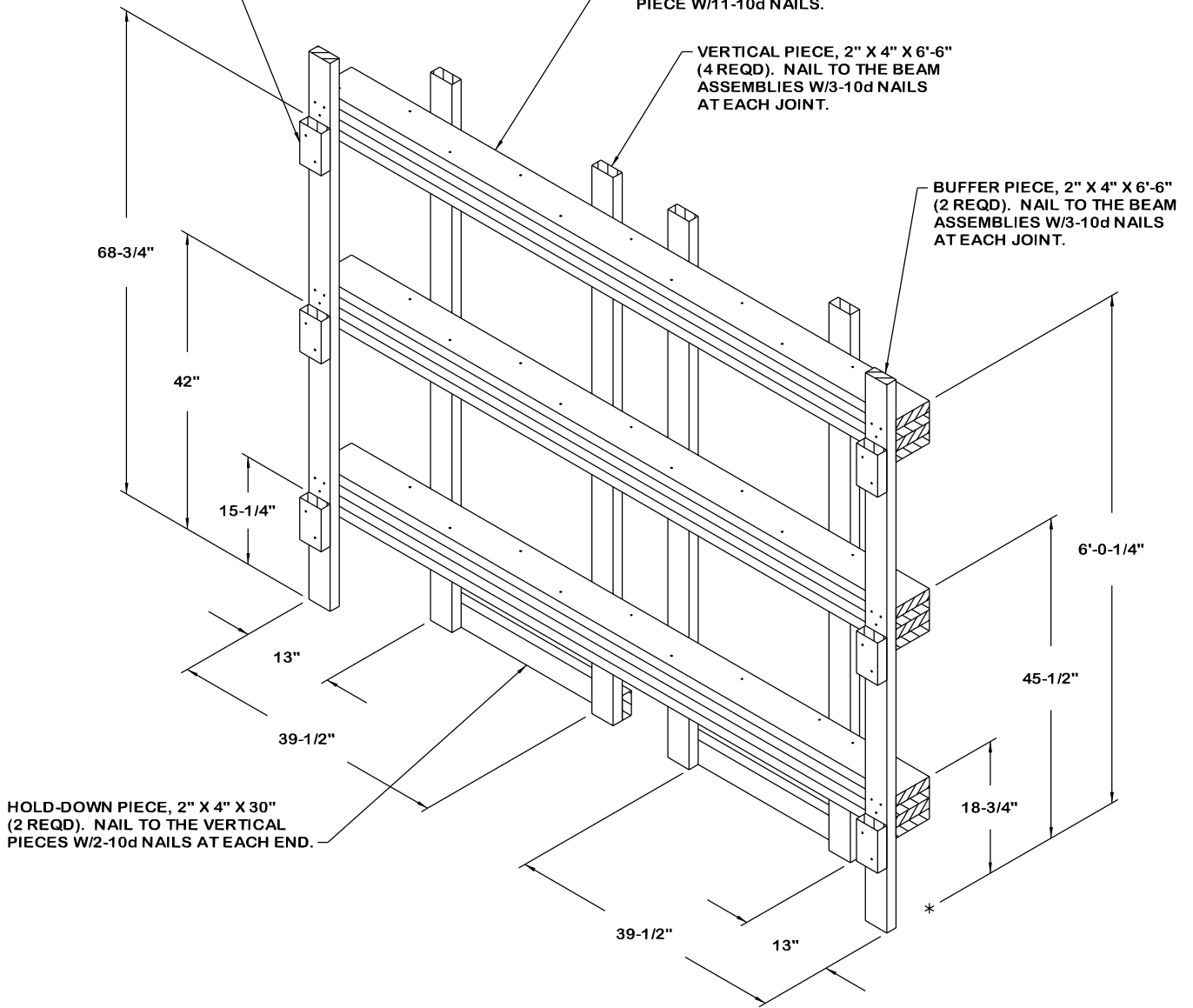
STRAPPING BOARD ASSEMBLY

STRUT LEDGER, 2" X 4" X 6" (6 REQD). NAIL TO THE BUFFER PIECE W/2-10d NAILS.

BEAM ASSEMBLY, 2" X 6" X 7'-11" (QUADRUPLED) (3 REQD). LAMINATE EACH PIECE TO THE PREVIOUS PIECE W/1-10d NAILS.

VERTICAL PIECE, 2" X 4" X 6'-6" (4 REQD). NAIL TO THE BEAM ASSEMBLIES W/3-10d NAILS AT EACH JOINT.

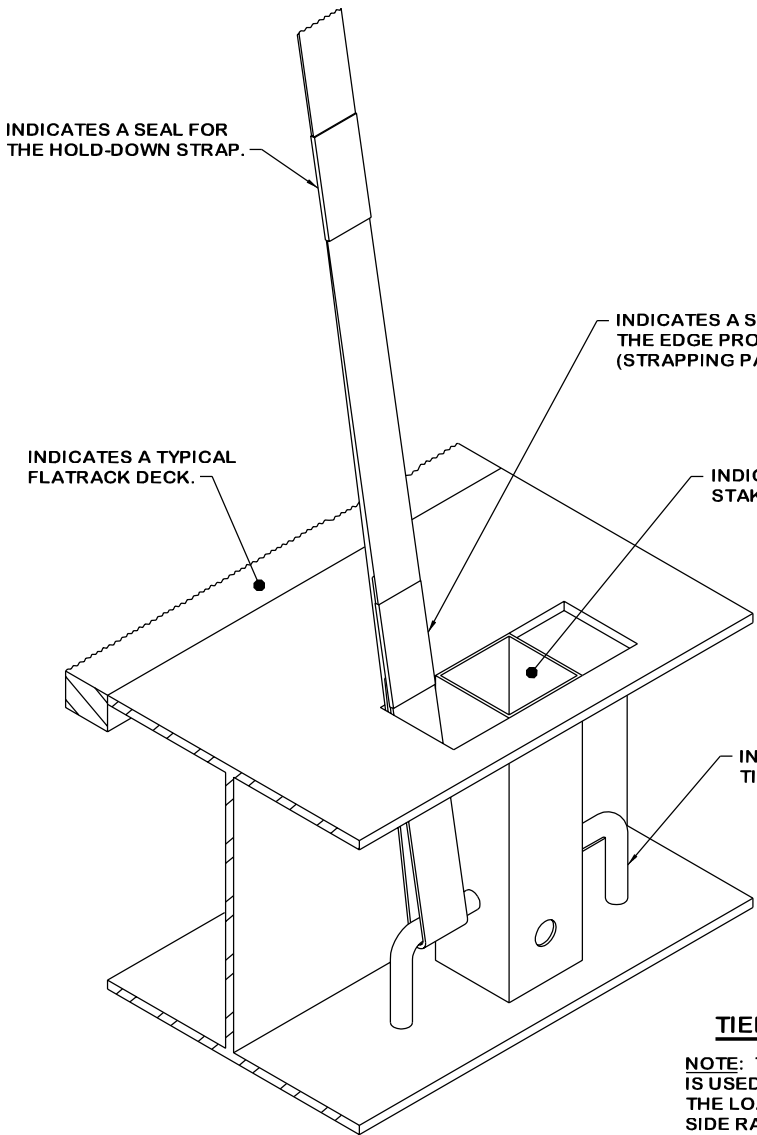
BUFFER PIECE, 2" X 4" X 6'-6" (2 REQD). NAIL TO THE BEAM ASSEMBLIES W/3-10d NAILS AT EACH JOINT.



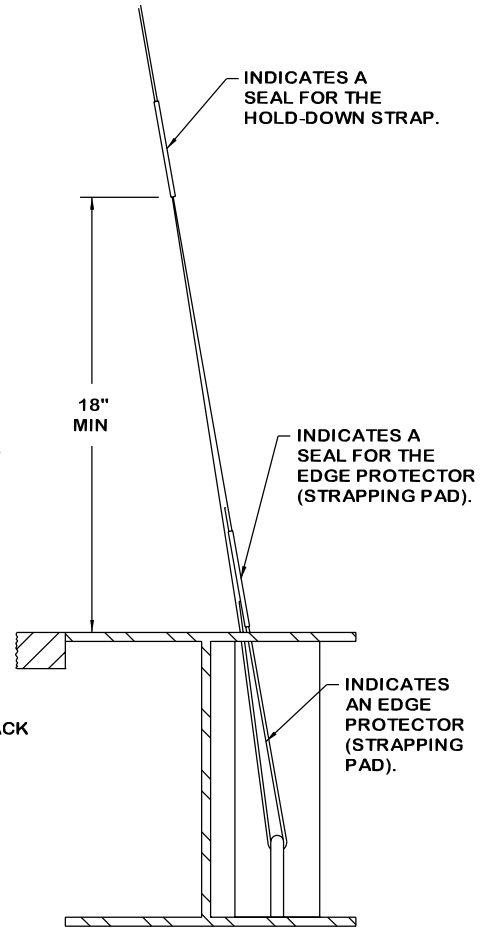
HOLD-DOWN PIECE, 2" X 4" X 30" (2 REQD). NAIL TO THE VERTICAL PIECES W/2-10d NAILS AT EACH END.

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 "O" ON PAGE 2.



ONE SEAL WITH TWO PAIR OF NOTCHES.

STRAP JOINT A

METHOD OF SECURING A STRAP JOINT WHEN USING A NOTCH-TYPE SEALER.



TWO SEALS, BUTTED TOGETHER, WITH TWO PAIR OF CRIMPS EACH SEAL.

STRAP JOINT B

METHOD OF SECURING A STRAP JOINT WHEN USING A CRIMP-TYPE SEALER.

STRAP/SEAL DETAIL