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 HAZARDOUS MATERIALS SYSTEMS  
 (BOE) ASSOCIATION OF AMERICAN  
 RAILROADS  
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 DATE 2/29/90

# LOADING AND BRACING<sup>1</sup> ON COMMERCIAL FLATRACK CONTAINERS OF CBU-87/B & CBU-89/B CLUSTER BOMBS IN CNU-327/E SHIPPING AND STORAGE CONTAINERS

## INDEX

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

<sup>1</sup> 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. THIS SPECIFICATIONS MAY ALSO BE USED FOR LOADS THAT ARE TO BE MOVED BY MOTOR OR WATER CARRIERS. SEE GENERAL NOTE 'M' ON PAGE 2.

REVISIONS				DRAFTSMAN <i>WJW/tm</i>	DESIGN <i>WJW/WRF</i>
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				U.S. ARMY AMC DRAWING AUGUST 1990	
				CLASS	DIVISION
				DRAWING	FILE
				19	48
				7100	SP 15J8

DO NOT SCALE

## 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. 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 79-2; DOD 4500-32-R; DOD 5100.76-M; DOD 6095.9-STD; AS WELL AS ANY AND ALL OTHER APPLICABLE SERVICE REGULATIONS.
- C. THE SPECIFIED OUTLOADING PROCEDURES ARE APPLICABLE TO THE CBU-87/B (GATOR) AND CBU-89/B (CEM) CLUSTER BOMBS PACKED IN CNU-327/E SHIPPING AND STORAGE CONTAINERS. SUBSEQUENT REFERENCE TO CONTAINER HEREIN MEANS THE CNU-327/E CONTAINER WITH BOMBS INSTALLED. SEE PAGE 3 FOR DETAILS OF THE CONTAINER. **CAUTION:** REGARDLESS OF THE QUANTITY OF CONTAINERS TO BE SHIPPED, THE "MAXIMUM GROSS WEIGHT" OF THE FLATRACK INCLUDING LADING AND DUNNAGE MUST NOT BE EXCEEDED.
- D. THE LOAD AS SHOWN IS BASED ON A 20'-0" LONG BY 8'-0" WIDE COMMERCIAL FLATRACK CONTAINER WITH FULL HEIGHT END WALLS, AND INSIDE DIMENSIONS OF 19'-5" LONG BY 7'-10" WIDE. THE LOAD AS SHOWN CAN BE SHIPPED BY ANY FORM OF SURFACE TRANSPORTATION. **NOTICE:** OTHER FLATRACK CONTAINERS OF THE SAME DESIGN CONFIGURATION CAN ALSO BE USED.
- E. PORTIONS OF ONE OF THE FLATRACK ENDWALLS DEPICTED WITHIN THIS DRAWING HAVE NOT BEEN SHOWN IN THE LOAD VIEW FOR CLARITY PURPOSES.
- F. WHEN LOADING THE CNU-327/E CONTAINERS, THEY ARE TO BE POSITIONED TIGHTLY AGAINST THE END BLOCKING ASSEMBLY AND THE ADJACENT STACK OF CONTAINERS. LONGITUDINAL VOIDS WITHIN THE LOAD ARE TO BE HELD TO A MINIMUM, NOT EXCEEDING ONE-HALF INCH (1/2"). ALTHOUGH A TOTAL OF ONE INCH (1") OF UNBLOCKED SPACE ACROSS THE WIDTH OF A LOAD IS PERMITTED, LATERAL VOIDS SHOULD ALSO BE HELD TO A MINIMUM. EXCESSIVE LONGITUDINAL VOIDS CAN BE ELIMINATED BY INCREASING THE LENGTH OF THE STRUTS INSTALLED BETWEEN THE CENTER GATES. EXCESSIVE LATERAL VOIDS CAN BE ELIMINATED FROM A LOAD BY LAMINATING AN ADDITIONAL PIECE OF APPROPRIATE THICKNESS TO THE SIDE BLOCKING TO ACHIEVE A TIGHT FIT BETWEEN THE CONTAINERS AND THE STAKES. NAIL EACH ADDITIONAL PIECE W/1 APPROPRIATELY SIZED NAIL EVERY 12".
- G. WHEN INSTALLING THE END BLOCKING ASSEMBLIES, THE ASSEMBLIES MUST BE POSITIONED SO AS TO BE SUPPORTED AND IN LINE WITH THE STRONG POINTS AT THE BASE OF THE FLATRACK ENDWALLS, ON THE FACE OF THE CORNER POSTS, AND ON THE FACE OF THE ENDWALLS. **NOTE:** SOME FLATRACK ENDWALLS WILL REQUIRE ADJUSTMENTS IN QUANTITY AND/OR THICKNESS OF BUFFER PIECES TO BE INSTALLED ON THE END BLOCKING ASSEMBLY TO PROVIDE A UNIFORM LOAD BEARING SURFACE. NAIL THESE BUFFER PIECES TO THE PREVIOUS PIECE W/1 APPROPRIATELY SIZED NAIL EVERY 12" INCHES.
- H. DUNNAGE LUMBER SPECIFIED IS OF NOMINAL SIZE. FOR EXAMPLE, 2" X 4" MATERIAL IS ACTUALLY 1-1/2" THICK BY 3-1/2" WIDE AND 2" X 6" MATERIAL IS ACTUALLY 1-1/2" THICK BY 5-1/2" WIDE.
- J. 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.
- K. THE 2" STRAPPING USED FOR LOAD SECUREMENT, I.E., HOLD-DOWN STRAPS, WILL ONLY BE FASTENED TO THE FLATRACK CONTAINER BY UTILIZING TIE-DOWN PROVISIONS LOCATED ON THE TOP OR ALONG THE SIDE OF THE FLATRACK BOTTOM SIDE RAJLS. **CAUTION:** THE LOAD SECUREMENT STRAPS WILL NOT BE POSITIONED AROUND THE UNDERSIDE OR THROUGH THE FORKLIFT POCKETS OF THE FLATRACK CONTAINER. ADDITIONALLY, THE FLATRACK TIE-DOWN PROVISIONS MUST BE AT LEAST AS STRONG AS THE 2" LOAD SECUREMENT STRAPPING BEING USED; 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.
- L. 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.

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## MATERIAL SPECIFICATIONS

LUMBER -----SEE TM 743-200-1 (DUNNAGE LUMBER) AND FED SPEC MM-L-751.

NAILS -----FED SPEC FF-N-105; COMMON.

STRAPPING, STEEL ---FED SPEC QQ-5-781; CLASS 1, TYPE I OR IV, HEAVY DUTY, FINISH A, B (GRADE 2), OR C.

SEAL STRAP -----FED SPEC QQ-5-781; TYPE D, STYLE I, II, OR IV, CLASS H, FINISH A, B (GRADE 2), OR C.

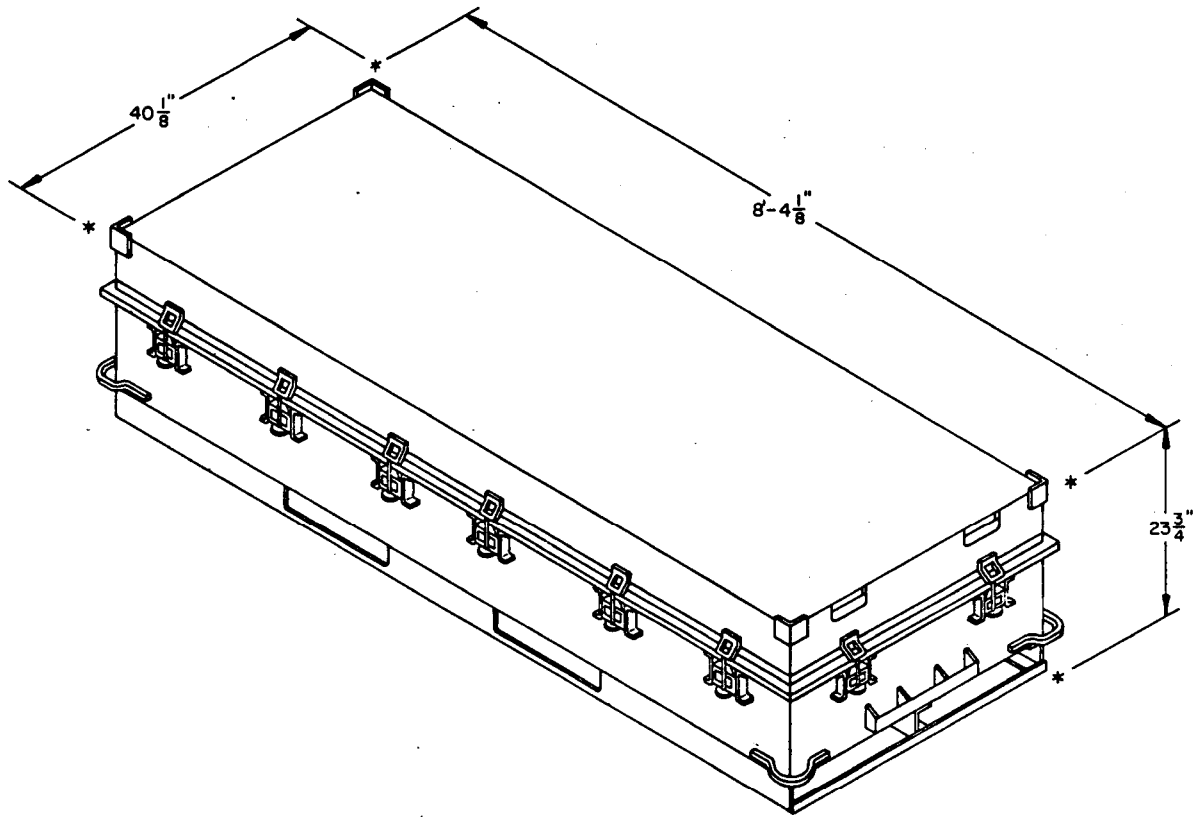
STAPLE -----FED SPEC FF-N-105; TYPE III, STYLE 3 (OR COMMERCIAL GRADE).

ANTI-CHAFING

MATERIAL -----MIL-B-121; NEUTRAL BARRIER MATERIAL (OR EQUAL).

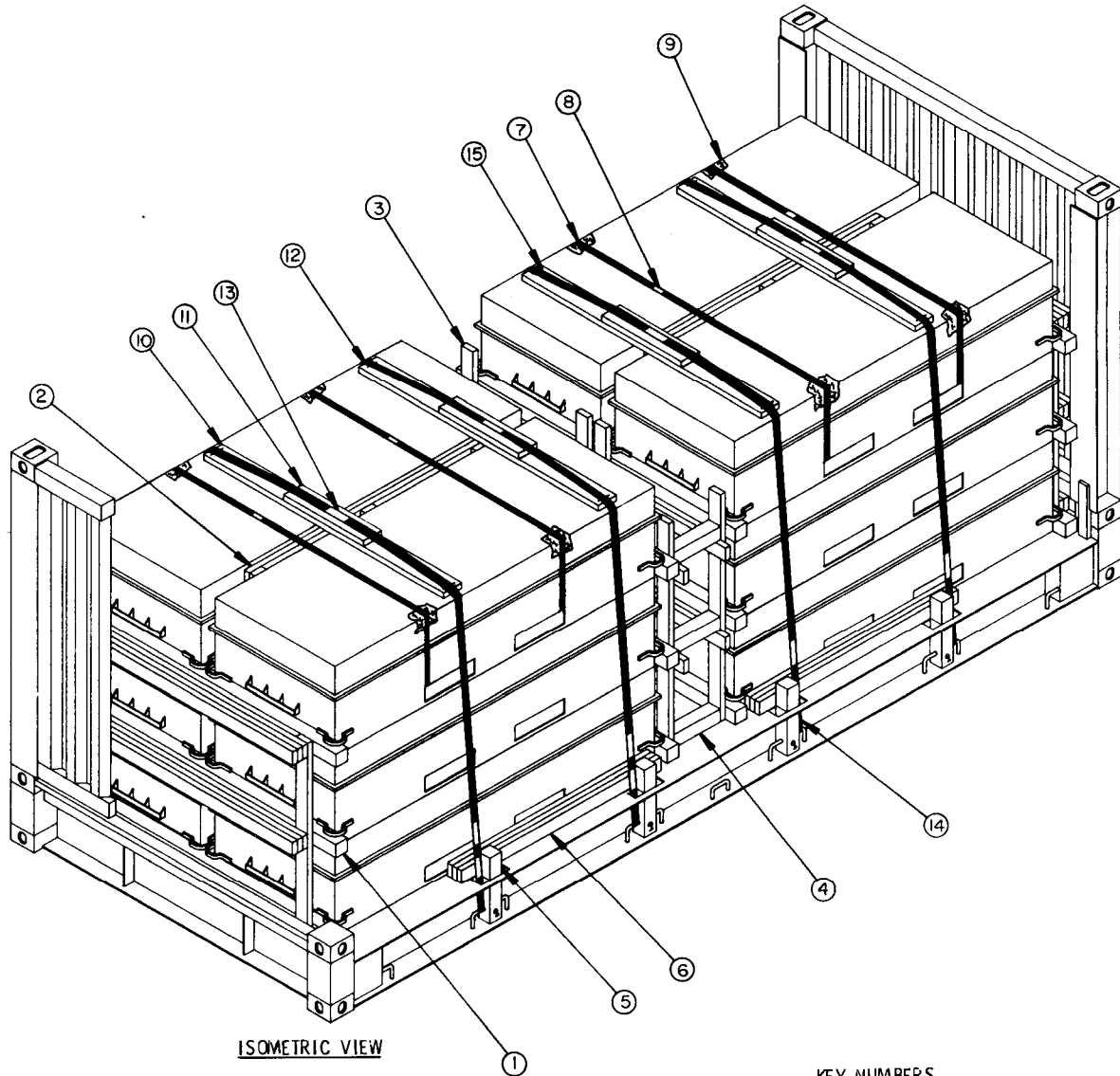
## (GENERAL NOTES CONTINUED)

- M. REQUIREMENTS CITED WITHIN THE BUREAU OF EXPLOSIVES PAMPHLET 6C 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 FLAT BED TRAILER MUST BE USED TO PRECLUDE VIOLATION OF ONE OR MORE "WEIGHT LAWS" APPLICABLE TO THE STATE OR STATES INVOLVED.
- O. 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, 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.
- P. THE OUTLOADING PROCEDURES SPECIFIED HEREIN CAN ALSO BE UTILIZED FOR THE SHIPMENT OF THE DEPICTED CNU-327/E CONTAINERS WHEN THEY ARE LOADED WITH AN ITEM WHICH IS IDENTIFIED DIFFERENTLY BY NOMENCLATURE THAN THE ITEM DESIGNATED WITHIN THE DRAWING TITLE, PROVIDED THE GROSS WEIGHT OF THE CONTAINER DOES NOT EXCEED 2,500 POUNDS.
- Q. 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 0.454KG.



CNU-327/E CONTAINER DETAIL

CUBE ————— 55.2 CUBIC FEET ( APPROX )  
 GROSS WEIGHT ( CBU-87/B ) ————— 2,486 LBS ( APPROX )  
 GROSS WEIGHT ( CBU-89/B ) ————— 1,886 LBS ( APPROX )



ISOMETRIC VIEW

(KEY NUMBERS CONTINUED)

KEY NUMBERS

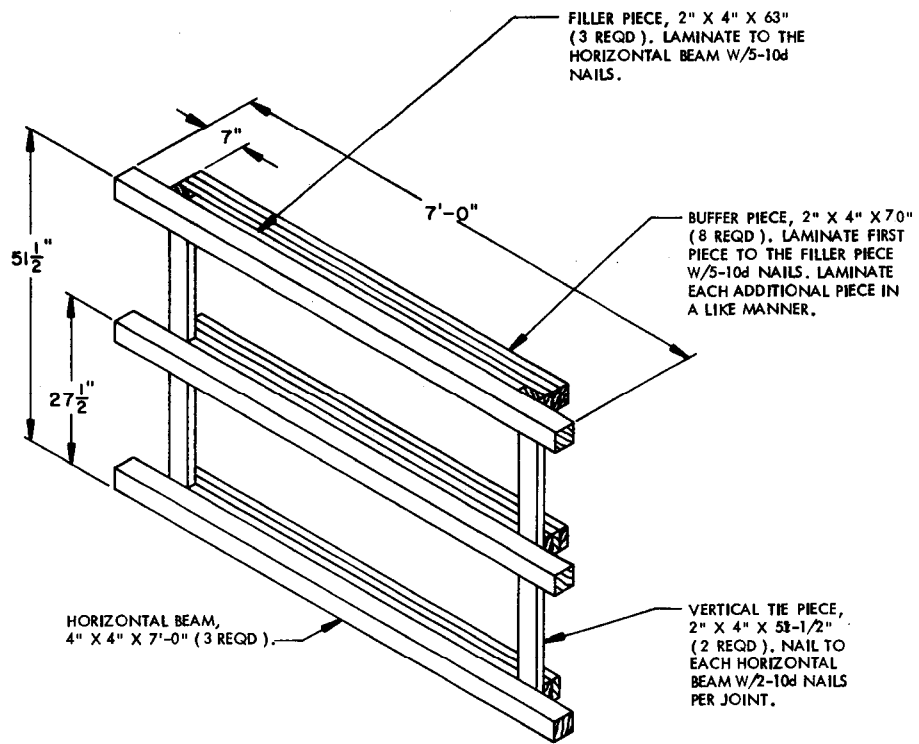
- ⑧ SEAL FOR 1-1/4" STRAPPING (4 REQD, 1 PER STRAP). FASTEN EACH BUNDLING STRAP, PIECE MARKED ⑦, WITH ONE SEAL, CRIMPED WITH TWO PAIR OF NOTCHES. SEE GENERAL NOTE "L" ON PAGE 2.
- ⑨ ANTI-CHAFING, NEUTRAL BARRIER MATERIAL (AS REQD). POSITION UNDER THE BUNDLING STRAPS, PIECES MARKED ⑦, AT POINTS OF CONTACT WITH EDGES OF THE CONTAINERS, EXCEPT AT OPENINGS TO THE FORKLIFT POCKETS.
- ⑩ STRAPPING BOARD, 2" X 6" X 6'-0" (4 REQD), POSITION THE STRAPPING BOARDS VERTICALLY IN LINE WITH THE FLATRACK TIEDOWN POINTS AND ON THE FLAT SURFACE OF THE CONTAINER LIDS.
- ⑪ PURCHASE BOARD, 2" X 6" X 24" (4 REQD). CENTER ON THE STRAPPING BOARD, PIECE MARKED ⑩, AND NAIL W/3-10d NAILS. CAUTION: NAIL TO STRAPPING BOARD BEFORE POSITIONING THE STRAPPING BOARD ON TOP OF THE CONTAINERS.
- ⑫ HOLD-DOWN STRAP, 2" X .050" BY A LENGTH TO SUIT (REF: 24'-0") (4 REQD). INSTALL EACH STRAP FROM TWO 12'-0" LONG PIECES FASTENED TO THE TIEDOWN PROVISIONS AS SHOWN. JOIN AND TENSION ON TOP OF THE LOAD. SEE GENERAL NOTE "K" AND "O" ON PAGE 2.
- ⑬ SEAL FOR 2" STRAPPING (20 REQD, 5 PER STRAP). FASTEN EACH HOLD-DOWN STRAP, PIECE MARKED ⑫, AT THREE LOCATIONS WITH ONE SEAL CRIMPED WITH TWO PAIR OF NOTCHES AT EACH LOCATION. FASTEN EACH STRAPPING PAD, PIECE MARKED ⑭, WITH ONE SEAL CRIMPED WITH ONE PAIR OF NOTCHES. SEE GENERAL NOTE "L" ON PAGE 2.
- ⑭ PAD, STRAPPING, 2" X .050" X 18" (8 REQD). PRE-POSITION THE PAD BETWEEN THE HOLD-DOWN STRAP, PIECE MARKED ⑫, AND THE FLATRACK TIEDOWN PROVISION AND SECURE WITH ONE SEAL CRIMPED WITH ONE PAIR OF NOTCHES. SEE THE "TIEDOWN DETAIL" ON PAGE 8.
- ⑮ STAPLE, 2-1/8" CROWN WIDTH X 1" LEG LENGTH (6 REQD). FASTEN HOLD-DOWN STRAP, PIECE MARKED ⑫, TO THE STRAPPING BOARD, PIECE MARKED ⑩, WITH ONE STAPLE NEAR EACH END.
- ① END BLOCKING ASSEMBLY (2 REQD). SEE THE "END BLOCKING ASSEMBLY" DETAIL ON PAGE 6. INSTALL WITH THE HORIZONTAL BEAMS FLAT AGAINST THE FACE OF THE CORNER POSTS AND SO THE BUFFER PIECES ARE IN UNIFORM CONTACT WITH THE BASE OF THE FLATRACK ENDWALL AND THE FACE OF THE ENDWALL PANEL. SEE GENERAL NOTES "F" AND "G" ON PAGE 2.
- ② ANTI-CHAFING ASSEMBLY (2 REQD). SEE THE "ANTI-CHAFING ASSEMBLY" DETAIL ON PAGE 6. POSITION AS SHOWN ABOVE SO AS TO BE CENTERED BETWEEN THE CONTAINER STACKS AND SO THE BUFFER PIECES ARE IN FLAT CONTACT WITH THE SURFACE OF THE CONTAINER BODIES.
- ③ CENTER GATE ASSEMBLY (2 REQD). SEE THE "CENTER GATE ASSEMBLY" DETAIL ON PAGE 7. POSITION AS SHOWN ABOVE SO AS TO BE CENTERED ON THE END OF THE CONTAINER STACKS AND SO THE HORIZONTAL BEAMS ARE IN FLAT CONTACT WITH THE BASE OF THE CONTAINER BODIES AND BENEATH THE CONTAINER BUMPERS.
- ④ STRUT, 4" X 4" BY A LENGTH TO SUIT (REF: 14") (12 REQD). INSTALL WITH A TIGHT FIT INTO POSITIONS AS SHOWN ABOVE. TOENAIL TO THE CENTER GATE W/2-12d NAILS AT EACH END. SEE GENERAL NOTE "F" ON PAGE 2.
- ⑤ STAKE, 4" X 4" X 18" (8 REQD). INSTALL THE STAKES 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). TOENAIL TO THE SIDE BLOCKING, PIECE MARKED ⑥, W/2-12d NAILS ON EACH SIDE OF THE STAKE. NAIL 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 AGAINST THE STAKE POCKET.
- ⑥ SIDE BLOCKING, 2" X 4" X 60" (AS REQD). CENTER EACH PIECE BETWEEN A PAIR OF STAKES, PIECES MARKED ⑤, AS SHOWN ABOVE. LAMINATE EACH ADDITIONAL PIECE TO THE PREVIOUS W/5-10d NAILS. SEE GENERAL NOTE "F" ON PAGE 2.
- ⑦ BUNDLING STRAP, 1-1/4" X .035" OR .031" BY A LENGTH TO SUIT (REF: 18'-0") (4 REQD). POSITION EACH BUNDLING STRAP TO ENCIRCLE THE TOP LAYER OF LATERALLY ADJACENT CONTAINERS AND TO PASS THROUGH THE FORKLIFT POCKETS AS SHOWN ABOVE.

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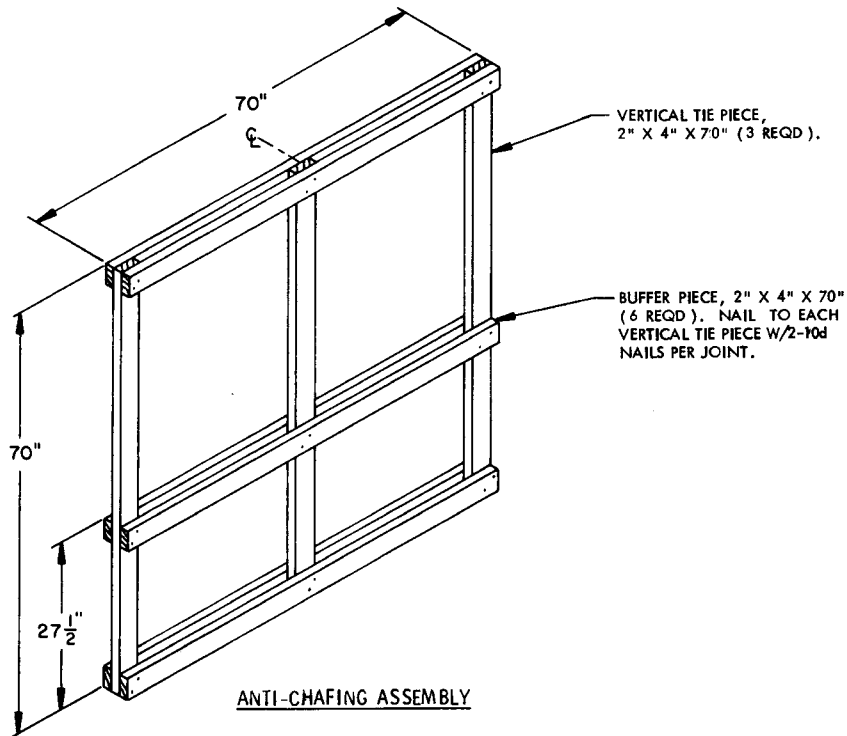
BILL OF MATERIAL		
LUMBER	LINEAR FEET	BOARD FEET
2" X 4"	375	250
4" X 4"	114	152
2" X 6"	32	32
NAILS	NO. REQD	POUNDS
10d (3")	346	5-1/4
12d (3-1/4")	80	1-1/4
20d (4")	8	1/4
STEEL STRAPPING, 1-1/4" X .035" OR .031" -- 72' REQD --10-1/4 LBS		
SEAL FOR 1-1/4" STRAPPING ----- 4 REQD ----- NIL		
STEEL STRAPPING, 2" X .050" -----108' REQD -----36 LBS		
SEAL FOR 2" STRAPPING ----- 20 REQD ----- 4 LBS		
STAPLE, 2-1/8" X 1" ----- 8 REQD ----- NIL		
ANTI-CHAFING, NEUTRAL BARRIER MATERIAL-- AS REQD ----- NIL		

LOAD AS SHOWN

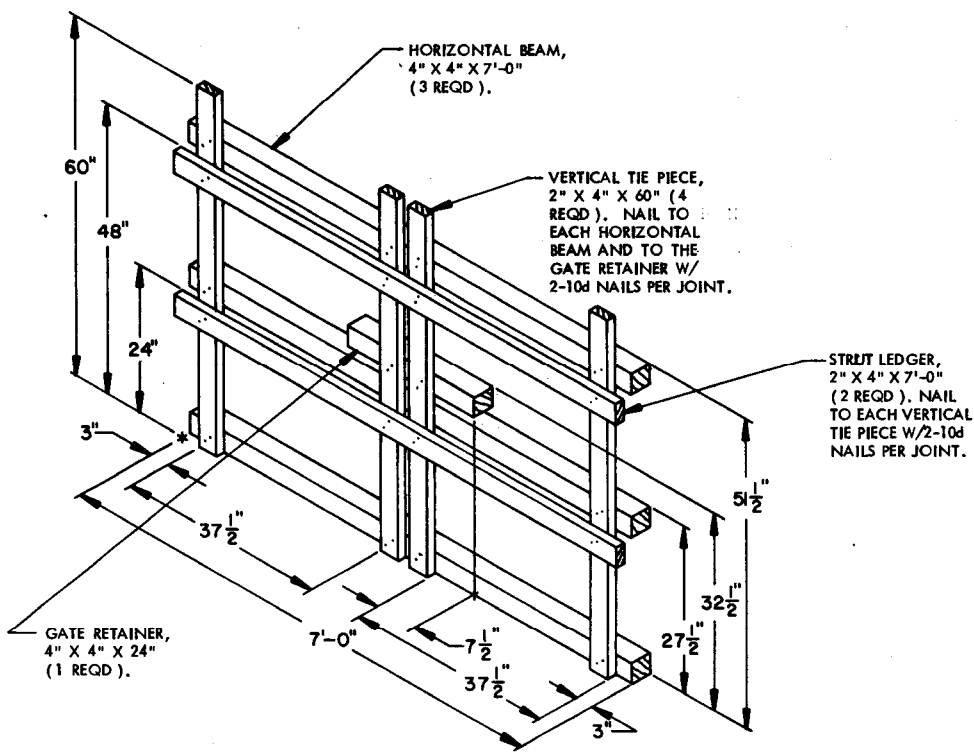
ITEM	QUANTITY	WEIGHT (APPROX)
CONTAINER	12 @ 2,486 LBS	29,832 LBS
DUNNAGE		925 LBS
FLATRACK		5,732 LBS
TOTAL WEIGHT		36,489 LBS



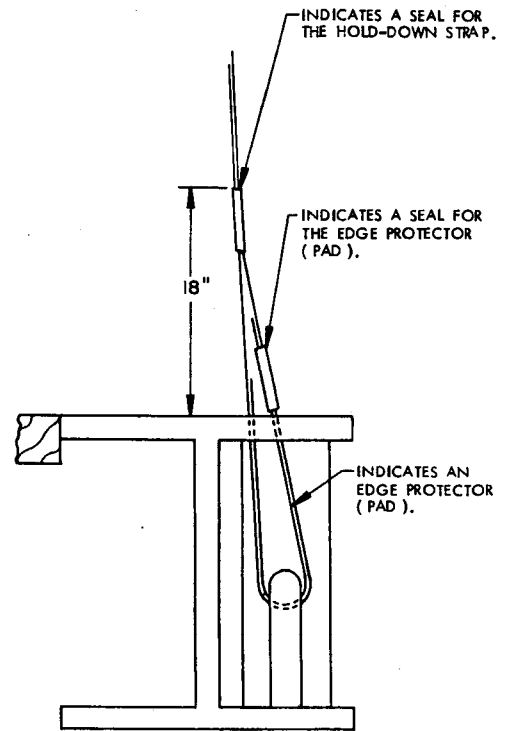
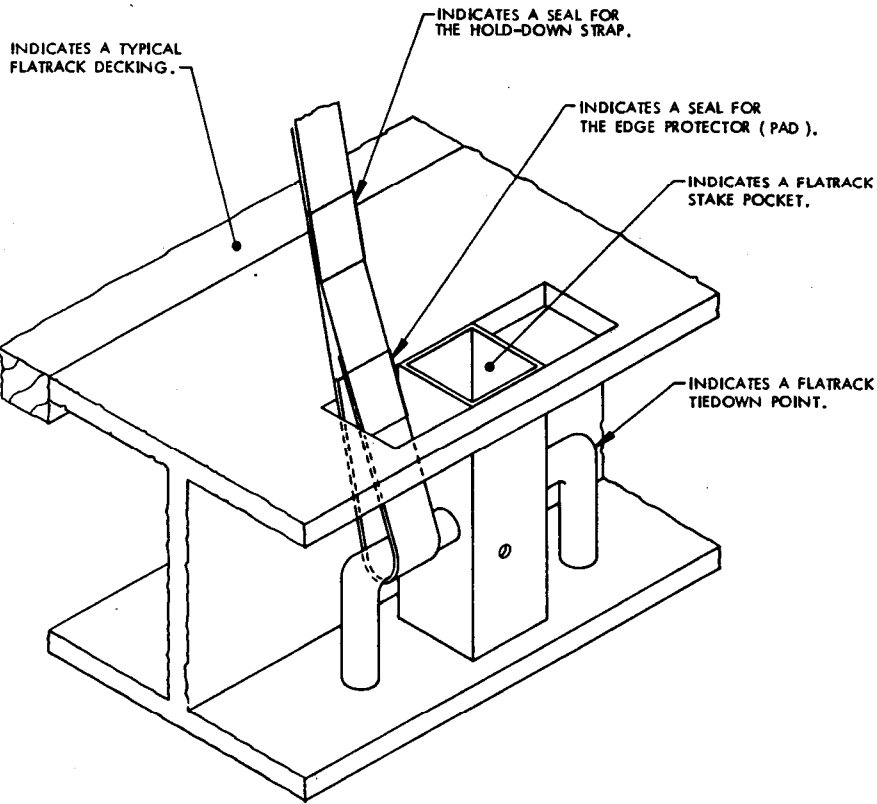
END BLOCKING ASSEMBLY



ANTI-CHAFING ASSEMBLY

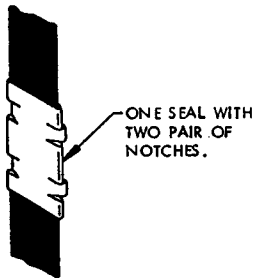


CENTER GATE ASSEMBLY



TIEDOWN DETAIL A

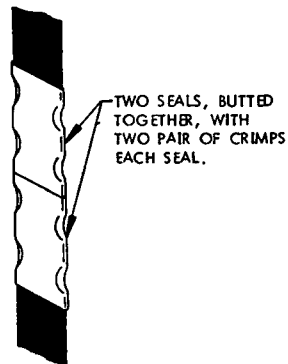
SIDE VIEW



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.

DETAILS