

# LOADING AND BRACING\* ON FLATRACK ISO CONTAINERS OF CHARGE, DEMOLITION, LINEAR, HE, M58A3/A4 AND PRACTICE, M68A2, IN METAL SHIPPING AND STORAGE CONTAINERS

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## U.S. ARMY MATERIEL COMMAND DRAWING

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U.S. ARMY DEFENSE AMMUNITION CENTER		EXPLOSIVE SAFETY DIRECTORATE			4301	15J1006

## 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 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 LINEAR DEMOLITION CHARGES, HE M58A3/A4 AND PRACTICE M68A2, PACKED IN METAL SHIPPING AND STORAGE CONTAINERS. SEE PAGE 3 AND DRAWING 5854656 FOR DETAILS OF THE CONTAINER. **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 5,700 POUND 20' LONG BY 8' WIDE FLATRACK ISO CONTAINER WITH FULL HEIGHT ENDWALLS, AND INSIDE DIMENSIONS OF 19'-4" LONG BY 86" WIDE. 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.
- 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.
- 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. 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 END WALL GATES TO PROVIDE A UNIFORM LOAD BEARING SURFACE. NAIL THESE FILL PIECES TO THE END WALL GATES W/1 APPROPRIATELY SIZED NAIL EVERY SIX INCHES. THESE PIECES ARE NOT REQUIRED IF THE ENDWALL IS SMOOTH (IF THE HINGES DO NOT PROTRUDE).
- J. 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.
- K. 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.
- L. 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.

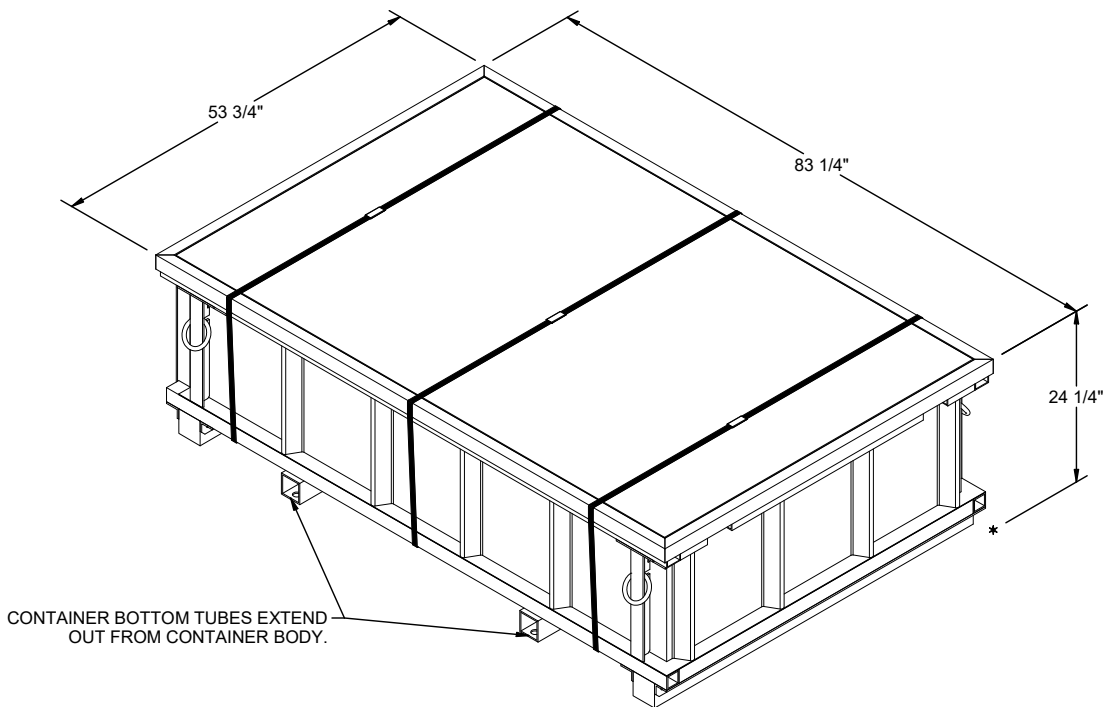
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## (GENERAL NOTES CONTINUED)

- M. 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.
- N. PORTIONS OF THE FLATRACK DEPICTED WITHIN THIS DRAWING, SUCH AS THE ENDWALL, HAVE NOT BEEN SHOWN IN THE LOAD VIEWS FOR CLARITY PURPOSES.
- O. **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.
- P. 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.
- Q. 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.
- R. THE LOAD AS SHOWN ON PAGE 4 MAY BE REDUCED BY ONE LAYER FOR A SHIPMENT OF FOUR CONTAINERS, IF DESIRED.
- S. 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.
- T. 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.

## 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).
- 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.
- ANTI-CHAFING MATERIAL** - - - - - : MIL-PRF-121 (OR EQUAL); NEUTRAL BARRIER MATERIAL.



### SHIPPING AND STORAGE CONTAINER

GROSS WEIGHT	-----	2,900 LBS (APPROX)
WITH HE COMP C4 M58A3 CHARGE, DODIC M913	-	2,900 LBS
WITH HE COMP C4 M58A4 CHARGE, DODIC M913	-	2,900 LBS
WITH PRACTICE M68A2 CHARGE, DODIC M914	-	2,900 LBS
CUBE	-----	62.9 CU FT

**NOTE:** CONTAINERS CANNOT BE STACKED UNLESS COVER SPANNER ASSEMBLIES ARE PROVIDED UNDER SKIDS BETWEEN LAYERS

### UNITIZATION AND HANDLING GUIDANCE

#### 1. STACKING CONTAINERS FOR UNITIZING:

- A. AN UPPER CONTAINER SHOULD BE PLACED AS CLOSE AS POSSIBLE IN VERTICAL ALIGNMENT WITH THE NEXT LOWER CONTAINER.
- B. POSITION THE AFT END OF AN UPPER CONTAINER ABOVE THE AFT END OF THE NEXT LOWER CONTAINER.
- C. THE CONTAINER SKIDS OF AN UPPER CONTAINER SHOULD BE FULLY SEATED UPON TWO COVER SPANNER ASSEMBLIES THAT ARE PLACED ON THE COVER OF THE LOWER CONTAINER.

#### 2. UNITIZING PROCEDURE USING 1-1/4" BANDING STRAPS:

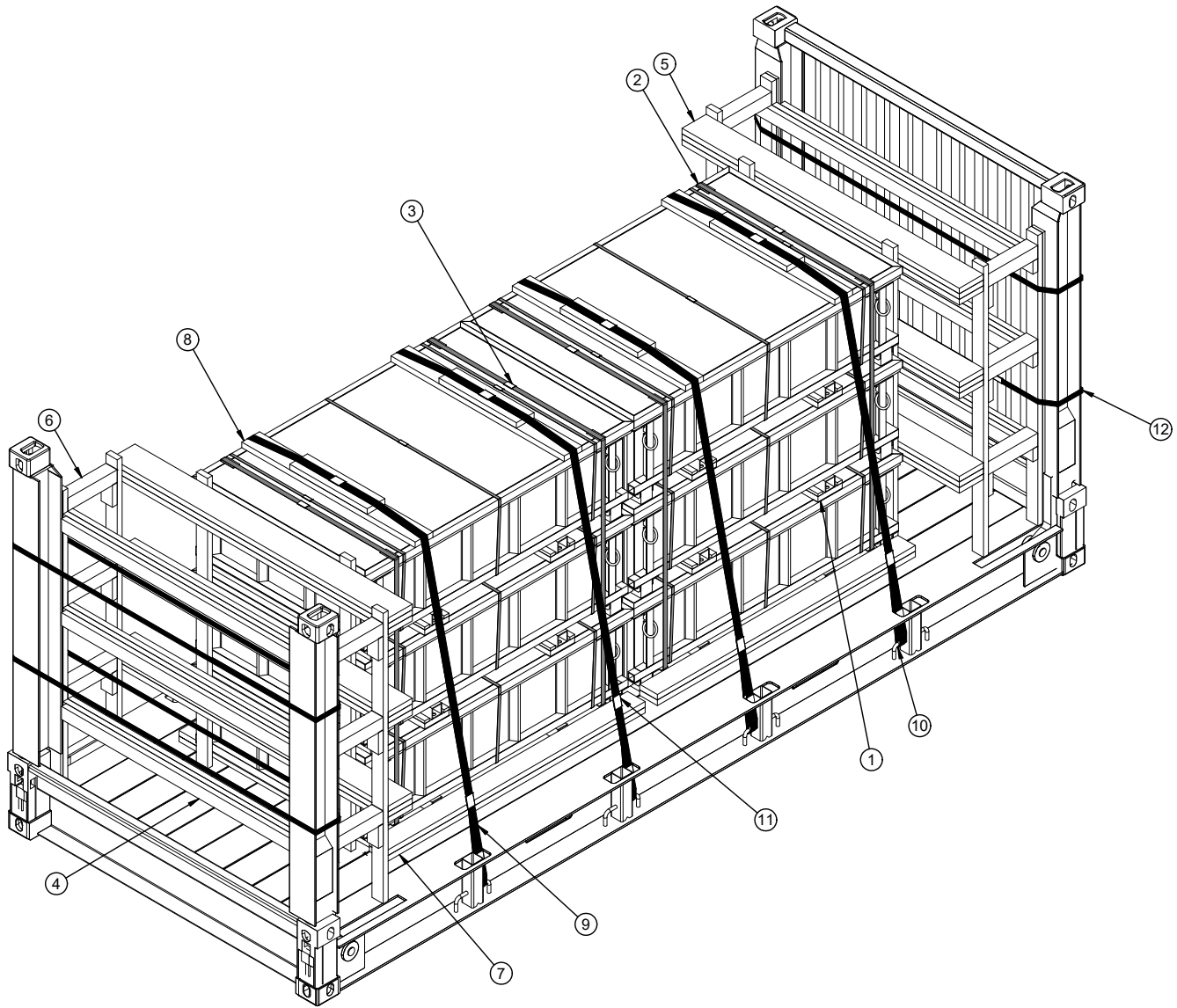
- A. STACK THREE CONTAINERS WITH COVER SPANNER ASSEMBLIES. BE SURE TO ALIGN THE STACKING FEATURES.
- B. TENSION AND SECURE EACH STRAP WITH ONE DOUBLE-NOTCHED SEAL.

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### (UNITIZATION AND HANDLING GUIDANCE CONTINUED)

#### 3. CONTAINER OR CONTAINER STACK HANDLING:

- A. ONLY APPROVED AND APPROPRIATELY SIZED MATERIAL HANDLING EQUIPMENT WILL BE USED FOR HANDLING THE DEPICTED CONTAINERS. APPROVED MATERIAL HANDLING EQUIPMENT (FORKLIFT TRUCKS, CRANES, HAND TRUCKS, DOLLIES, ROLLER ASSEMBLIES, SLINGS, SPREADER BARS, ETC.) IS SPECIFIED ELSEWHERE.
- B. PRECAUTIONARY HANDLING TECHNIQUES NORMALLY EMPLOYED OR AS SPECIFIED FOR THE TYPE OF COMMODITY INVOLVED WILL BE OBSERVED.
- C. IF HANDLING IS ACCOMPLISHED WITH A FORKLIFT TRUCK, THE CONTAINERS SHOULD BE HANDLED FROM A SIDE POSITION AS MUCH AS POSSIBLE. CARE MUST BE EXERCISED WHEN INSERTING FORKS UNDER A CONTAINER, TO PREVENT DAMAGE TO THE CONTAINER BY THE FORK TINES OR THE FORKLIFT PACKAGE GUARD. IF ONE CONTAINER IS HANDLED BY SLINGING, THE SLING MAY BE ATTACHED TO THE LIFTING POINTS ON THE CONTAINER. DO NOT HANDLE STACKED CONTAINERS WITH A SLING.



**ISOMETRIC VIEW**

**(KEY NUMBERS CONTINUED)**

- ⑧ STRAPPING BOARD ASSEMBLY (4 REQD). POSITION VERTICALLY IN LINE WITH THE FLATRACK TIEDOWN POINTS AND ON THE FLAT SURFACE OF THE CONTAINER LIDS. SEE THE DETAIL ON PAGE 6.
- ⑨ HOLD-DOWN STRAP, 2" X .050" OR .044" X 19'-6" LONG STEEL STRAPPING (2 REQD). INSTALL EACH STRAP FROM TWO 9'-9" LONG PIECES. STAPLE TO STRAPPING BOARD ASSEMBLY W/2 STAPLES EACH.
- ⑩ PAD, STRAPPING, 2" X .050" OR .044" X 18" (8 REQD). PRE-POSITION THE PAD BETWEEN THE HOLD-DOWN STRAP AND THE FLATRACK TIEDOWN PROVISIONS. SEE THE "TIEDOWN DETAIL" ON PAGE 8.
- ⑪ SEAL FOR 2" STRAPPING (20 REQD, 5 PER STRAP). FASTEN 2" HOLD DOWN STRAP WITH ONE SEAL AT EACH LOCATION NOTCHED WITH TWO PAIR OF NOTCHES. FASTEN PAD WITH ONE SEAL NOTCHED WITH ONE PAIR OF NOTCHES. SEE THE "TIEDOWN DETAIL" ON PAGE 8.
- ⑫ GATE STRAP, 1-1/4" X .031" OR .035" BY A LENGTH TO SUIT (REF: 20'-0") (4 REQD). INSTALL STRAPPING AROUND ENDWALL AND ENDWALL GATE AS SHOWN.

**KEY NUMBERS**

- ① COVER SPANNER ASSEMBLY (8 REQD). POSITION UNDER THE SKIDS OF ALL CONTAINERS EXCEPT THOSE IN THE BOTTOM LAYER, WITH THE STOP PIECES ON THE UPPER SIDE. SEE THE DETAIL ON PAGE 7.
- ② UNITIZING STRAP, 1-1/4" X .035" OR .031" X 21'-4" (4 REQD). INSTALL TO ENCIRCLE ALL THREE CONTAINERS IN ONE STACK.
- ③ SEAL FOR 1-1/4" STRAPPING (4 REQD, 1 PER STRAP). NOTCH EACH SEAL WITH TWO PAIR OF NOTCHES.
- 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: 15") (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 8.
- ⑦ SIDE BLOCKING, 2" x 6" x 6'-8" (DOUBLED) (4 REQD). POSITION AS SHOWN. NAIL THE FIRST PIECE TO THE FLOOR W/8-16d NAILS. NAIL THE SECOND PIECE TO THE FIRST W/8-16d 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 PIECE 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 FOUR OR TWO CONTAINERS.

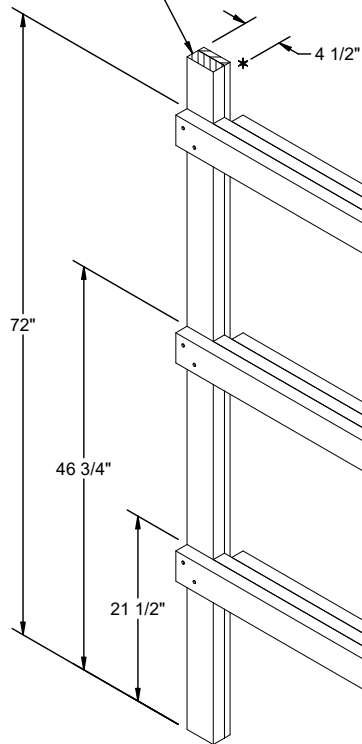
**BILL OF MATERIAL**

LUMBER	LINEAR FEET	BOARD FEET
1" x 2"	71	12
1" x 4"	26	9
2" x 4"	205	137
2" x 6"	79	79
2" x 8"	165	220
4" x 4"	15	20
NAILS	NO. REQD	POUNDS
6d (2")	152	1-1/2
10d (3")	346	5-1/2
12d (3-1/4")	48	1
16d (3-1/2")	64	1-1/2
STEEL STRAPPING, 1-1/4" - 92' REQD - - 13.14 LBS		
STEEL STRAPPING, 2" - - - 78' REQD - - 26.00 LBS		
SEAL FOR 1-1/4" STRAPPING - 4 REQD - - 0.18 LBS		
SEAL FOR 2" STRAPPING - - - 10 REQD - - 2.00 LBS		

**LOAD AS SHOWN**

ITEM	QUANTITY	WEIGHT (APPROX)
CONTAINER - - - - -	6 - - - - -	17,400 LBS
DUNNAGE - - - - -	- - - - -	1,002 LBS
FLATRACK - - - - -	- - - - -	5,700 LBS
TOTAL WEIGHT - - - - -		24,102 LBS (APPROX)

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



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

STOP PIECE, 2" X 4" X 6'-5"  
(3 REQD). LAMINATE TO THE SPREADER PIECE  
W/6-10d NAILS.

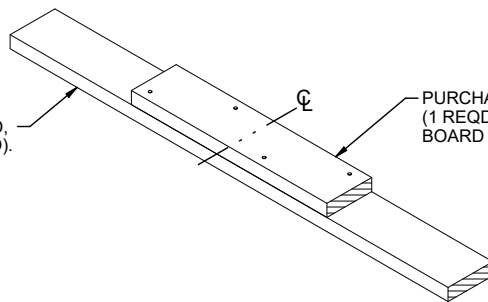
FILL PIECE, 1" X 4" X 6'-6"  
(2 REQD). LAMINATE TO  
THE VERTICAL PIECES  
W/6-6d NAILS. SEE  
NOTE BELOW.

STRUT LEDGER, 2" X 4" X 7'-2"  
(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 53-3/4" (1 REQD).



PURCHASE BOARD, 2" X 6" X 24"  
(1 REQD). NAIL TO THE STRAPPING  
BOARD W/4-10d NAILS.

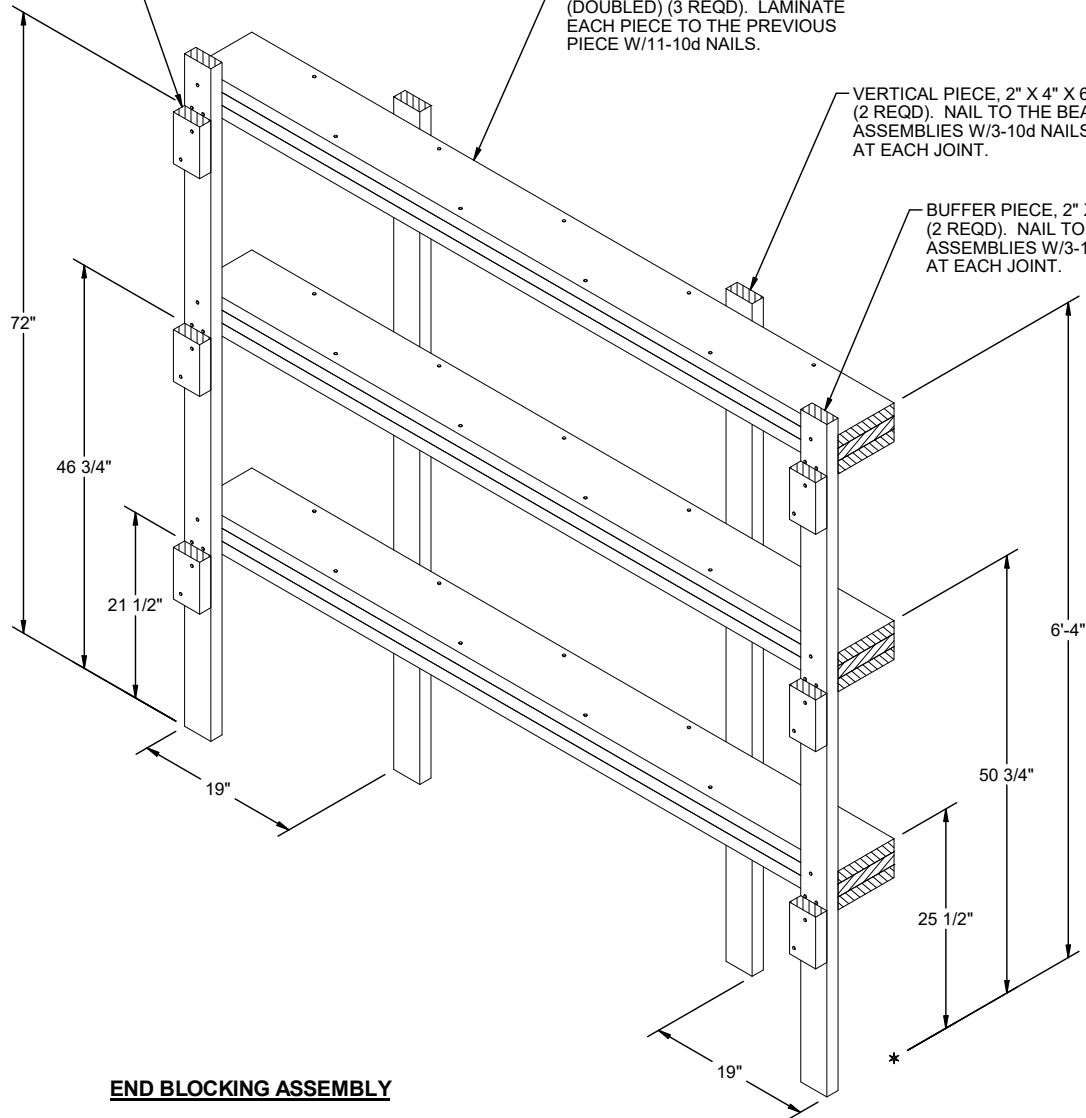
### **STRAPPING BOARD ASSEMBLY**

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

BEAM ASSEMBLY, 2" X 8" X 7'-2"  
(DOUBLED) (3 REQD). LAMINATE  
EACH PIECE TO THE PREVIOUS  
PIECE W/11-10d NAILS.

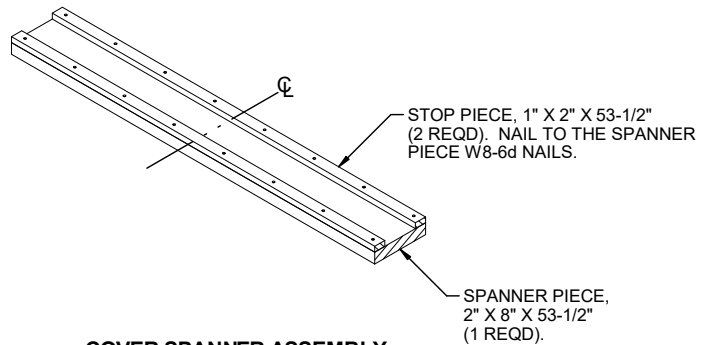
VERTICAL PIECE, 2" X 4" X 6'-6"  
(2 REQD). NAIL TO THE BEAM  
ASSEMBLIES W/3-10d NAILS  
AT EACH JOINT.

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



**END BLOCKING ASSEMBLY**

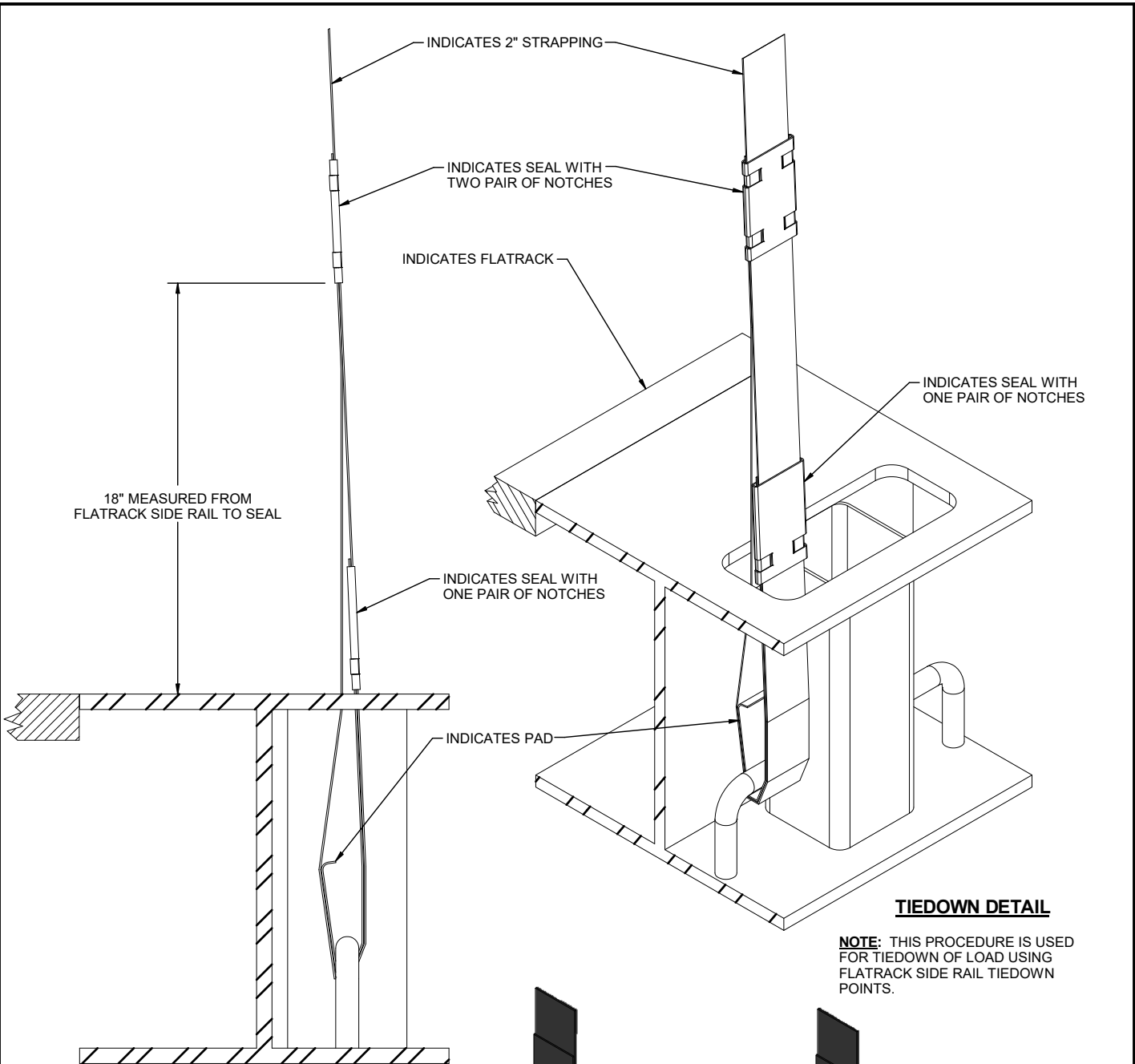
**NOTE:** FOR EACH LAYER OF CONTAINERS OMITTED FROM A LOAD, ELIMINATE THE TOPMOST BEAM ASSEMBLY(S) AND THE TOPMOST TWO (PER LAYER) STRUT LEDGERS. SHORTEN THE VERTICAL AND BUFFER PIECES APPROPRIATELY.



**COVER SPANNER ASSEMBLY**

STOP PIECE, 1" X 2" X 53-1/2"  
(2 REQD). NAIL TO THE SPANNER  
PIECE W/8-6d NAILS.

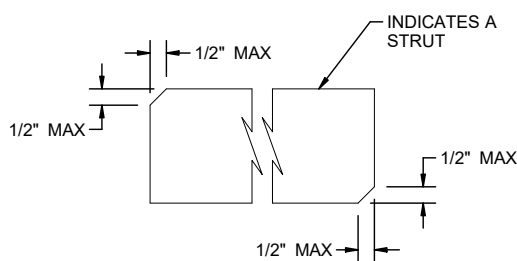
SPANNER PIECE,  
2" X 8" X 53-1/2"  
(1 REQD).



**TIEDOWN DETAIL**

**NOTE:** THIS PROCEDURE IS USED FOR TIEDOWN OF LOAD USING FLATRACK SIDE RAIL TIEDOWN POINTS.

**PARTIAL SIDE VIEW**



**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.



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.