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| APPROVED BY<br>U.S. COAST GUARD<br><i>M D Mmm/Hr</i><br>DATE: <u>8/1/88</u> | APPROVED BY<br>HAZARDOUS MATERIALS SYSTEMS<br>(BOE) ASSOCIATION OF AMERICAN<br>RAILROADS<br><i>J. H. Heshman</i><br>DATE: <u>7/6/88</u> |
|---|---|

# LOADING AND BRACING<sup>1</sup> ON COMMERCIAL FLATRACK CONTAINERS OF THE HARM MISSILE IN CNU-355/E CONTAINERS

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<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. THESE SPECIFICATIONS MAY ALSO BE USED FOR LOADS THAT ARE TO BE MOVED BY MOTOR OR WATER CARRIERS. SEE GENERAL NOTE "L" ON PAGE 2.

| REVISIONS |  |  |  | DRAFTSMAN<br><i>sd</i>   | PROJ ENG<br><i>WRF</i>        |
|-----------|--|--|--|--|-------------------------------|
|           |  |  |  | CHECKER<br><i>GKS</i>  | LOG ENGR OFFICE<br><i>WRF</i> |
|           |  |  |  | APPROVED, U.S. ARMY ARMAMENT, MUNITIONS AND CHEMICAL COMMAND<br><i>Daniel E. Heskold</i>   |                               |
|           |  |  |  | APPROVED BY ORDER OF COMMANDING GENERAL, U.S. ARMY MATERIEL COMMAND (AMC)<br><i>William F. Ernst</i><br>U.S. ARMY DEFENSE AMMUNITION CENTER AND SCHOOL |                               |
|           |  |  |  | U.S. ARMY AMC DRAWING  |                               |
|           |  |  |  | SEPTEMBER 1988   |                               |
|           |  |  |  | CLASS  | DIVISION                      |
|           |  |  |  | DRAWING  | FILE                          |
|           |  |  |  | 19   | 48                            |
|           |  |  |  | 7090   | SP 15<br>J4                   |

**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 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 THE HARM MISSILE IN CNU-355/E CONTAINER. SUBSEQUENT REFERENCE TO CONTAINER HEREIN MEANS THE CNU-355/E CONTAINER WITH MISSILES 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. A STAGGERED NAILING PATTERN WILL BE USED WHEREVER POSSIBLE, WHEN NAILS ARE DRIVEN INTO THE 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.
- E. THE LOAD AS SHOWN IS BASED ON A 20'-0" LONG BY 8'-0" WIDE COMMERCIAL FLATRACK CONTAINER WITH FULL HEIGHT ENDWALLS, AND INSIDE DIMENSIONS OF 18'-8" 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.
- F. DUNNAGE LUMBER SPECIFIED IS OF A NOMINAL SIZE. FOR EXAMPLE, 1" X 6" MATERIAL IS ACTUALLY 3/4" THICK BY 5-1/2" WIDE AND 2" X 6" MATERIAL IS ACTUALLY 1-1/2" THICK BY 5-1/2" WIDE.
- G. WHEN LOADING THE CNU-355/E CONTAINERS, THEY ARE TO BE POSITIONED SO AS TO ACHIEVE A TIGHT LOAD BETWEEN THE LOAD BEARING GATE AND THE END WALL GATE. ALTHOUGH A TOTAL OF ONE INCH (1") OF UNBLOCKED SPACE ACROSS THE WIDTH OF THE LOAD IS PERMITTED, LONGITUDINAL VOIDS WITHIN THE LOAD ARE TO BE HELD TO A MINIMUM, NOT EXCEEDING ONE-HALF (1/2"). EXCESSIVE SLACK CAN BE REMOVED FROM A LOAD BY INCREASING THE LENGTH OF THE STRUT MEMBERS, AT ONE OR BOTH ENDS OF THE LOAD.
- H. PORTIONS OF THE FLATRACK ENDWALLS DEPICTED WITHIN THIS DRAWING HAVE NOT BEEN SHOWN IN THE LOAD VIEWS FOR CLARITY PURPOSES.
- J. WHEN INSTALLING THE END WALL GATES, THE GATE ASSEMBLY 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 VERTICAL FILL PIECES TO BE INSTALLED ON THE LOAD BEARING GATE TO PROVIDE A UNIFORM LOAD BEARING SURFACE. NAIL THESE FILL PIECES TO THE LOAD BEARING GATE W/1 APPROPRIATELY SIZED NAIL EVERY EIGHT INCHES (8").
- K. WHEN STEEL STRAPPING IS SEALED AT AN END-OVER-END LAP JOINT, A MINIMUM OF ONE (1) SEAL WITH TWO (2) PAIR OF NOTCHES WILL BE USED TO SEAL THE JOINT WHEN A NOTCH-TYPE SEALER IS BEING USED. A MINIMUM OF TWO (2) SEALS, BUTTED TOGETHER, WITH TWO (2) 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 7 FOR GUIDANCE.
- L. REQUIREMENTS CITED WITHIN THE BUREAU OF EXPLOSIVES PAMPHLET 6C APPLY WHEN THE SHIPMENT MOVES BY TRAILER/CONTAINER-ON-FLAT-CAR (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.

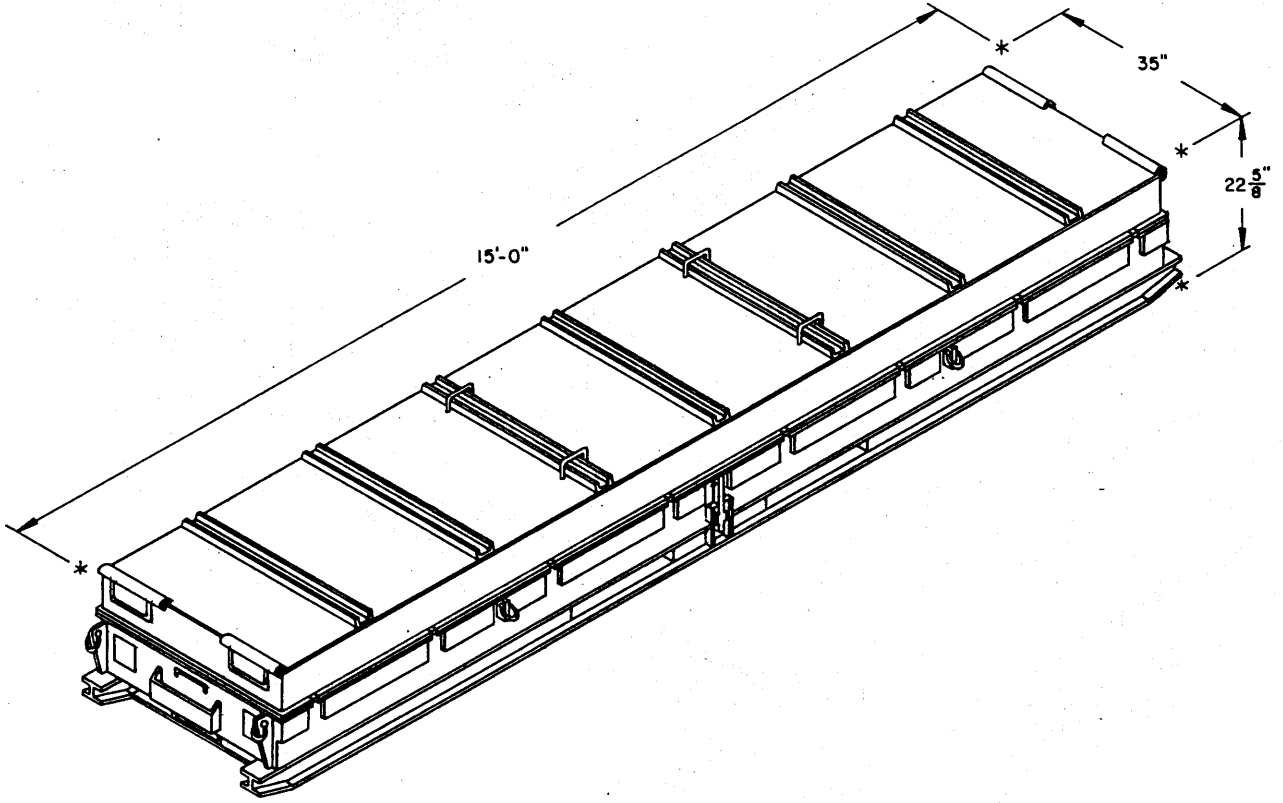
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## ( GENERAL NOTES CONTINUED )

- M. 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; 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.
- N. THE OUTLOADING PROCEDURES SPECIFIED HEREIN CAN ALSO BE UTILIZED FOR THE SHIPMENT OF THE DEPICTED CNU-355/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 2,400 POUNDS.
- 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. 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.
- Q. 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.

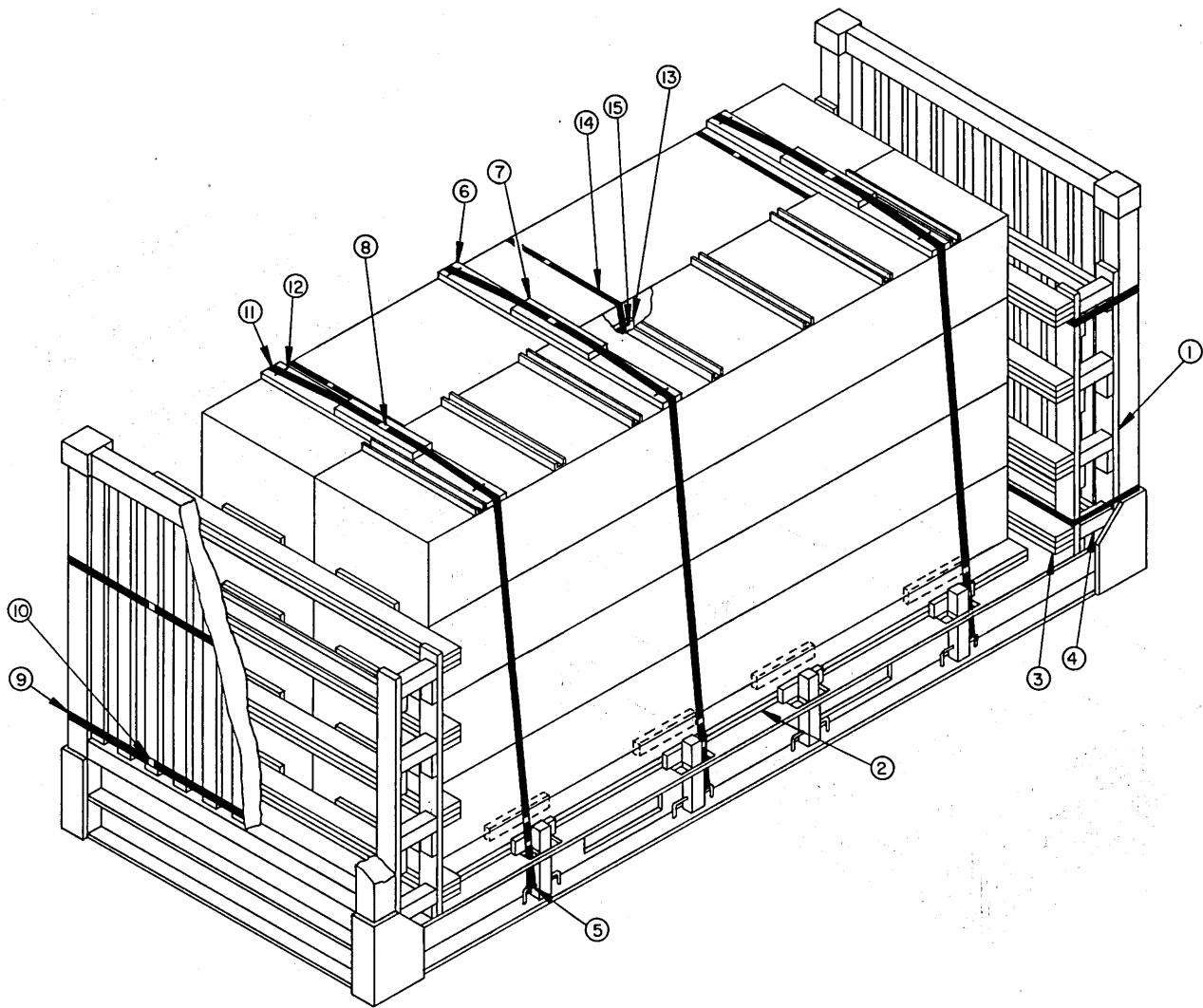
## MATERIAL SPECIFICATIONS

- LUMBER -----: SEE TM 743-200-1, DUNNAGE. FED SPEC MM-L-751.
- NAILS -----: COMMON, FED SPEC FF-N-105.
- STRAPPING, STEEL -----: CLASS 1, TYPE I OR IV, HEAVY DUTY, FINISH A, B ( GRADE 2 ), OR C, FED SPEC QQ-5-781.
- STRAP SEAL -----: TYPE D, STYLE I, II, OR IV, CLASS H, FINISH A, B ( GRADE 2 ), OR C, FED SPEC QQ-5-781.
- STRAP STAPLE -----: COMMERCIAL GRADE.



CNU-355/E CONTAINER DETAIL

|              |       |                     |
|--------------|-------|---------------------|
| CONTAINER    | ----- | 820 LBS (APPROX)    |
| CUBE         | ----- | 82.5 CU FT (APPROX) |
| GROSS WEIGHT | ----- | 2,400 LBS (APPROX)  |



ISOMETRIC VIEW

(KEY NUMBERS CONTINUED)

- ⑩ SEAL FOR 1-1/4" STRAPPING (7 REQD, 1 PER STRAP). FASTEN PIECES MARKED ⑨ AND ⑭ WITH ONE SEAL CRIMPED WITH TWO PAIR OF NOTCHES. SEE GENERAL NOTE "K" ON PAGE 2.
- ⑪ HOLD-DOWN STRAP, 2" X .050" BY A LENGTH TO SUIT (REF: 30'-0") (3 REQD). POSITION OVER THE LOAD AS SHOWN ABOVE. SEE GENERAL NOTE "M" ON PAGE 2.
- ⑫ STAPLE, 2-1/8" X 3/4" LEG LENGTH (6 REQD). FASTEN PIECE MARKED ⑪ TO PIECE MARKED ⑥ AS SHOWN ABOVE.
- ⑬ ANTI-CHAFING BOARD, 1" X 4" X 75" (3 REQD). POSITION AS SHOWN ABOVE. SEE SPECIAL NOTE 2 ON PAGE 5 AND THE "ANTI-CHAFING PLACEMENT" DETAIL ON PAGE 8.
- ⑭ BUNDLING STRAP, 1-1/4" X .031" OR .035" BY A LENGTH TO SUIT (REF: 22'-0") (3 REQD). PRE-POSITION THE BUNDLING STRAP UNDER ONE LOAD UNIT AND AROUND PIECE MARKED ⑬. SEE SPECIAL NOTE 2 ON PAGE 5.
- ⑮ STAPLE, 1-17/32" X 3/4" LEG LENGTH (6 REQD). FASTEN PIECE MARKED ⑭ TO PIECE MARKED ⑬ WITH 2 STAPLES, ONE AT THE TOP AND ONE AT THE BOTTOM OF THE ANTI-CHAFING BOARD.

KEY NUMBERS

- ① END WALL GATE (2 REQD). SEE THE "END WALL GATE" DETAIL ON PAGE 6. POSITION AGAINST THE FLATRACK END WALL AS SHOWN ABOVE. SEE GENERAL NOTE "J" ON PAGE 2.
- ② SIDE BLOCKING (2 REQD). SEE "SIDE BLOCKING" DETAIL ON PAGE 7. POSITION AS SHOWN ABOVE. SEE SPECIAL NOTE 3 ON PAGE 5.
- ③ LOAD BEARING GATE (2 REQD). SEE "LOAD BEARING GATE" DETAIL ON PAGE 6. POSITION AGAINST THE CONTAINERS AND IN LINE WITH THE END WALL GATE AS SHOWN ABOVE.
- ④ STRUT, 4" X 4" BY A LENGTH TO SUIT (REF: 10") (16 REQD). TOENAIL TO THE LOAD BEARING GATE AND END WALL GATE W/2-12d NAILS AT EACH END. SEE GENERAL NOTE "G" ON PAGE 2.
- ⑤ PAD, STRAPPING, 2" X .050" X 18" (6 REQD). PRE-POSITION THE PAD BETWEEN THE HOLD-DOWN STRAP, PIECE MARKED ⑪, AND THE FLATRACK TIEDOWN POINT AND SECURE WITH ONE SEAL CRIMPED WITH ONE PAIR OF NOTCHES.
- ⑥ STRAPPING BOARD, 2" X 6" X 70" (3 REQD). POSITION THE STRAPPING BOARD APPROXIMATELY EIGHTEEN INCHES (18") FROM EACH END OF THE CONTAINER AND IN THE CENTER OF THE CONTAINER AS SHOWN ABOVE. SEE SPECIAL NOTE 4 ON PAGE 5.
- ⑦ PURCHASE BOARD, 2" X 6" X 25" (3 REQD). CENTER ON THE STRAPPING BOARD, PIECE MARKED ⑥, AND NAIL W/3-10d NAILS. SEE GENERAL NOTE "D" ON PAGE 2.
- ⑧ SEAL FOR 2" STRAPPING (15 REQD, 5 PER STRAP). FASTEN PIECE MARKED ⑤ WITH ONE SEAL, CRIMPED WITH ONE PAIR OF NOTCHES. FASTEN PIECE MARKED ⑪ WITH ONE SEAL CRIMPED WITH TWO PAIR OF NOTCHES AT EACH JOINT. SEE "TIEDOWN DETAIL" ON PAGE 8 AND GENERAL NOTE "K" ON PAGE 2.
- ⑨ GATE STRAP, 1-1/4" X .031" OR .035" BY A LENGTH TO SUIT (REF: 21'-0") (4 REQD). POSITION AROUND PIECE MARKED ③ AND THE FLATRACK ENDWALL AS SHOWN ABOVE.

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**SPECIAL NOTES:**

1. THE LOAD AS SHOWN ON PAGE 4 MAY BE REDUCED BY AN EVEN NUMBER OF CONTAINERS SUCH AS TWO OR FOUR UNITS FROM THE TOP LAYERS OF THE LOAD. NOTICE: THE PROCEDURES DEPICTED HEREIN ARE NOT APPLICABLE FOR THE SHIPMENT OF AN ODD NUMBER OF CONTAINERS SUCH AS FIVE OR SEVEN.
2. THE ANTI-CHAFING BOARDS SHOULD BE POSITIONED ON ONE LOAD STACK IN THE FOLLOWING MANNER. POSITION THREE BUNDLING STRAPS UNDER ONE LOAD STACK APPROXIMATELY TWO FEET FROM EACH END OF THE CONTAINER AND ONE STRAP IN THE CENTER OF THE CONTAINER AS SHOWN IN THE LOAD ON PAGE 4. POSITION THE ANTI-CHAFING BOARDS, PIECE MARKED (13), BETWEEN THE BUNDLING STRAPS, PIECE MARKED (14) AND THE CONTAINERS, AND FASTEN WITH ONE 1-1/4" SEAL CRIMPED WITH TWO PAIR OF NOTCHES. NOTE: THE ANTI-CHAFING BOARDS SHOULD BE POSITIONED NEXT TO OR ALONG SIDE OF THE CONTAINER LID FASTENERS. A 3-HIGH LOAD REQUIRES A 52-1/2" LONG ANTI-CHAFING BOARD; 30" FOR A 2-HIGH LOAD. SEE GENERAL NOTE "K" ON PAGE 2.
3. FOR FLATRACKS HAVING A NAILABLE FLOOR AT LEAST 82" WIDE, THE SIDE BLOCKING CAN BE NAILED DIRECTLY TO THE FLOOR WITH FILL PIECES AND SIDE STAKES BEING ELIMINATED. NAIL THE FIRST PIECE TO THE FLOOR W/1-10d NAIL EVERY 6". NAIL THE SECOND PIECE TO THE FIRST IN A LIKE MANNER. SEE PAGE 7 FOR THE INSTALLATION OF LONGITUDINAL FILL PIECES WHICH ARE REQUIRED ON ALL LOADS. SEE GENERAL NOTE "D" ON PAGE 2.
4. POSITION THE STRAPPING BOARDS, PIECES MARKED (6) AND THE HOLD-DOWN STRAPS, PIECES MARKED (11) SO AS TO BE VERTICALLY IN LINE WITH THE FLATRACK TIEDOWN POINTS AND PERPENDICULAR TO THE FLATRACK FLOOR WHEN VIEWED FROM THE SIDE OF THE FLATRACK.

**BILL OF MATERIAL**

| LUMBER                                   | LINEAR FEET | BOARD FEET |
|--|-------------|------------|
| 1" X 4"                                  | 19          | 7          |
| 2" X 4"                                  | 115         | 77         |
| 2" X 6"                                  | 318         | 318        |
| 4" X 4"                                  | 26          | 34         |
| NAILS                                    | NO. REQD    | POUNDS     |
| 10d (3")                                 | 585         | 9          |
| 12d (3-1/4")                             | 80          | 1-1/2      |
| 30d (4-1/2")                             | 8           | 1/2        |
| STEEL STRAPPING, 2" X .050"              | 99' REQD    | 33 LBS     |
| STEEL STRAPPING, 1-1/4" X .035" OR .031" | 150' REQD   | 21-1/2 LBS |
| SEAL FOR 2" STRAPPING                    | 15 REQD     | 3 LBS      |
| SEAL FOR 1-1/4" STRAPPING                | 7 REQD      | 3/4 LB     |
| STAPLE, 2-1/8" X 3/4"                    | 6 REQD      | NIL        |
| STAPLE, 1-17/32" X 3/4"                  | 6 REQD      | NIL        |

**LOAD AS SHOWN**

| ITEM                | QUANTITY | WEIGHT (APPROX)   |
|---------------------|----------|-------------------|
| CONTAINER           | 8        | 19,200 LBS        |
| DUNNAGE             |          | 942 LBS           |
| FLAT RACK CONTAINER |          | 5,732 LBS         |
| <b>TOTAL WEIGHT</b> |          | <b>25,874 LBS</b> |

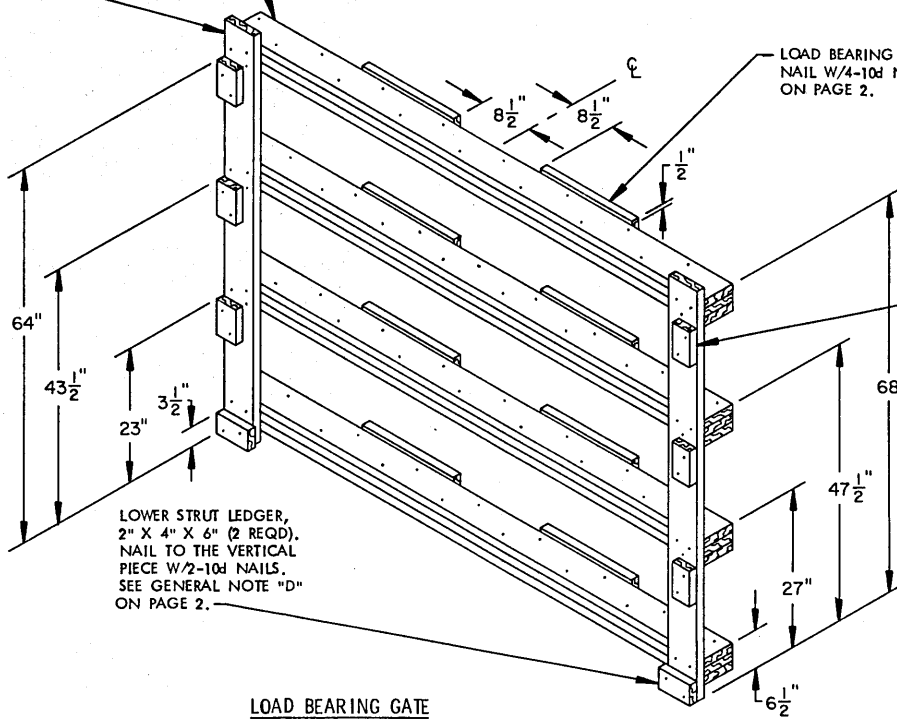
VERTICAL PIECE, 2" X 6" X 70" FOR A 4-HIGH LOAD, 49-1/2" FOR A 3-HIGH LOAD, AND 29" FOR A 2-HIGH LOAD (2 REQD). NAIL W/3-10d NAILS PER BEAM ASSEMBLY. SEE GENERAL NOTE "D" ON PAGE 2.

BEAM ASSEMBLY, 2" X 6" BY END WALL WIDTH MINUS 1/2" (TRIPLED) (4 REQD). NAIL THE FIRST MEMBER TO THE SECOND W/1-10d NAIL EVERY 6". LAMINATE THE REMAINING MEMBER TO THE FIRST TWO IN A LIKE MANNER. SEE GENERAL NOTE "D" ON PAGE 2.

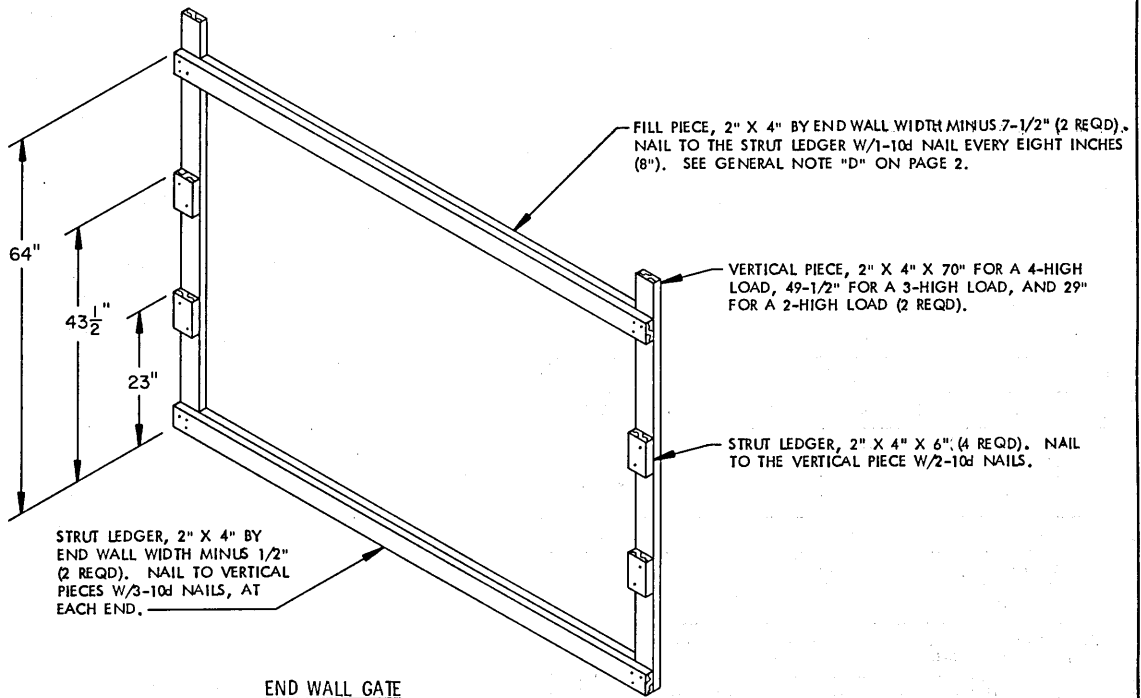
LOAD BEARING PIECE, 2" X 6" X 18" (8 REQD). NAIL W/4-10d NAILS. SEE GENERAL NOTE "D" ON PAGE 2.

STRUT LEDGER, 2" X 4" X 6" (6 REQD). NAIL TO THE VERTICAL PIECE W/2-10d NAILS. SEE GENERAL NOTE "D" ON PAGE 2.

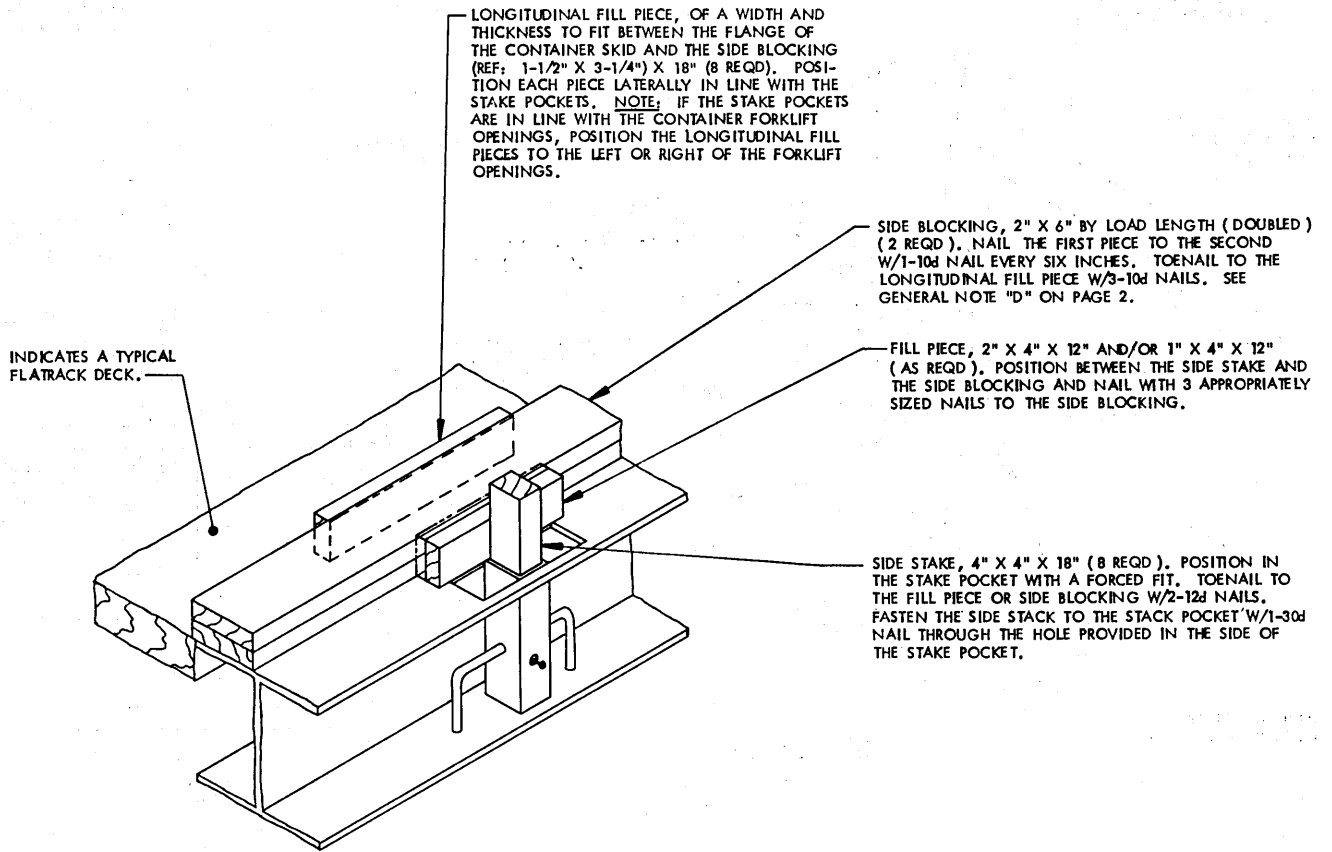
LOWER STRUT LEDGER, 2" X 4" X 6" (2 REQD). NAIL TO THE VERTICAL PIECE W/2-10d NAILS. SEE GENERAL NOTE "D" ON PAGE 2.



LOAD BEARING GATE

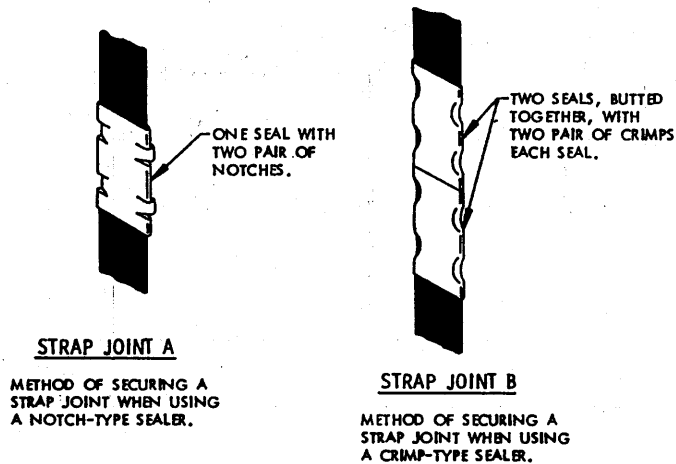


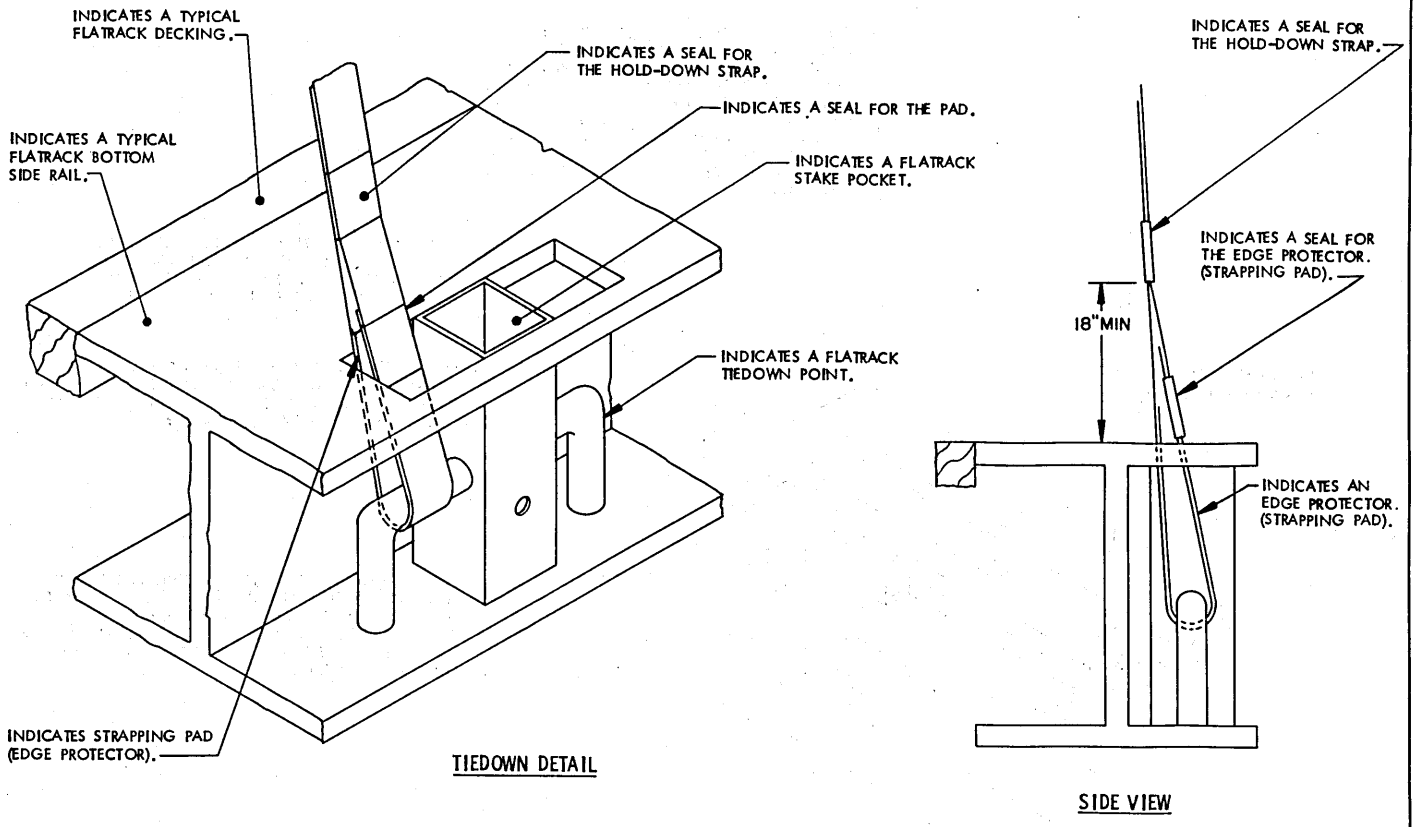
END WALL GATE



**SIDE BLOCKING DETAIL**

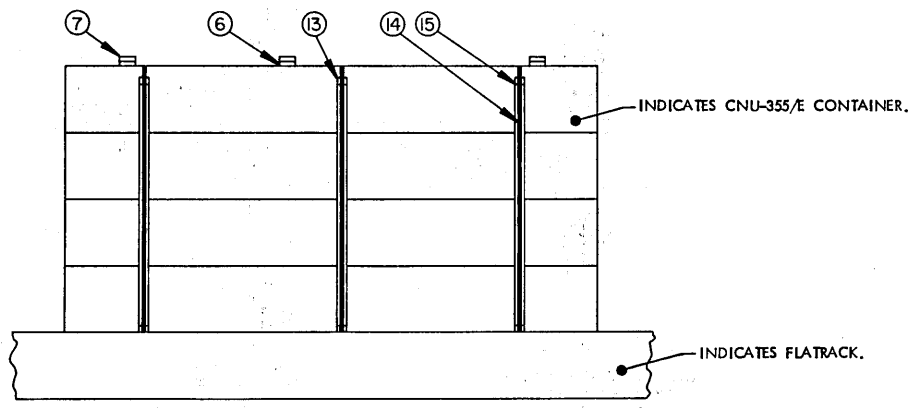
NOTE: CNU-355K CONTAINER OMITTED FOR CLARITY PURPOSES.





**TIEDOWN DETAIL**

**SIDE VIEW**



**ANTI-CHAFING PLACEMENT**

NOTE: LONGITUDINAL AND LATERAL BLOCKING, HOLD-DOWN STRAPS AND NEAR SIDE CONTAINER STACK OMITTED FOR CLARITY PURPOSES.

**DETAILS**