APPROVED BY
BUREAU OF EXPLOSIVES

DATE 12/10/92

PATRIOT

LOADING AND BRACING● ON ISO FLATRACK CONTAINERS OF COMPLETE ROUNDS PACKED IN MISSILE CANISTERS (SHIPPING, STORAGE AND LAUNCH CONTAINERS)

INDEX

● 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 MISSILE COMMAND

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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. THE OUTLOADING PROCEDURES SPECIFIED IN THIS DRAWING ARE APPLICABLE TO THE PATRIOT COMPLETE ROUND IN MISSILE CANISTER. SUBSEQUENT REFERENCE TO CANISTER HEREIN MEANS THE CANISTER WITH MISSILE COMPONENTS. CAUTION: REGARDLESS OF THE QUANTITY OF CANISTERS TO BE SHIPPED, THE "MAXIMUM GROSS WEIGHT" OF THE FLATRACK MUST NOT BE EXCEEDED.

C. 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.

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. FOR DETAIL OF THE MISSILE CANISTER, SEE DRAWING NO. 11450000 AND PAGE 3.

CANISTER DIMENSIONS - - 216" LONG BY 42-3/8" WIDE BY 38-3/4" HIGH
GROSS WEIGHT - - - - - 3,750 POUNDS (APPROX)
CUBE - - - - - - - - - 205.3 CUBIC FEET

F. THE OUTLOADING PROCEDURES SPECIFIED HEREIN CAN ALSO BE UTILIZED FOR THE SHIPMENT OF THE DEPICTED CANISTERS WHEN THEY ARE LOADED WITH AN ITEM WHICH IS IDENTIFIED DIFFERENTLY BY NOMENCLATURE THAN THE ITEM DESIGNATED IN THE DRAWING TITLE.

G. WHEN LOADING THE MISSILE CANISTERS, THEY ARE TO BE POSITIONED SO AS TO ACHIEVE A TIGHT LOAD. ALTHOUGH A TOTAL OF ONE INCH 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 ONE-HALF INCH (1/2"). CARE MUST BE TAKEN WHEN POSITIONING THE STOP PIECES SO AS TO AVOID ANY UNBLOCKED SPACE.

H. 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" 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. PORTIONS OF ONE OF THE FLATRACK ENDWALLS DEPICTED WITHIN THIS DRAWING HAVE NOT BEEN SHOWN IN THE LOAD VIEW FOR CLARITY PURPOSES.

L. WHEN INSTALLING BLOCKING ASSEMBLIES, THE ASSEMBLIES MUST BE POSITIONED SO AS TO BE SUPPORTED AND IN LINE WITH THE STRONG POINTS OF THE FLATRACK ENDWALLS.

M. 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 6 FOR GUIDANCE.

N. 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.

(CONTINUED AT RIGHT)

(GENERAL NOTES CONTINUED)

O. 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.

P. 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.

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, 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.

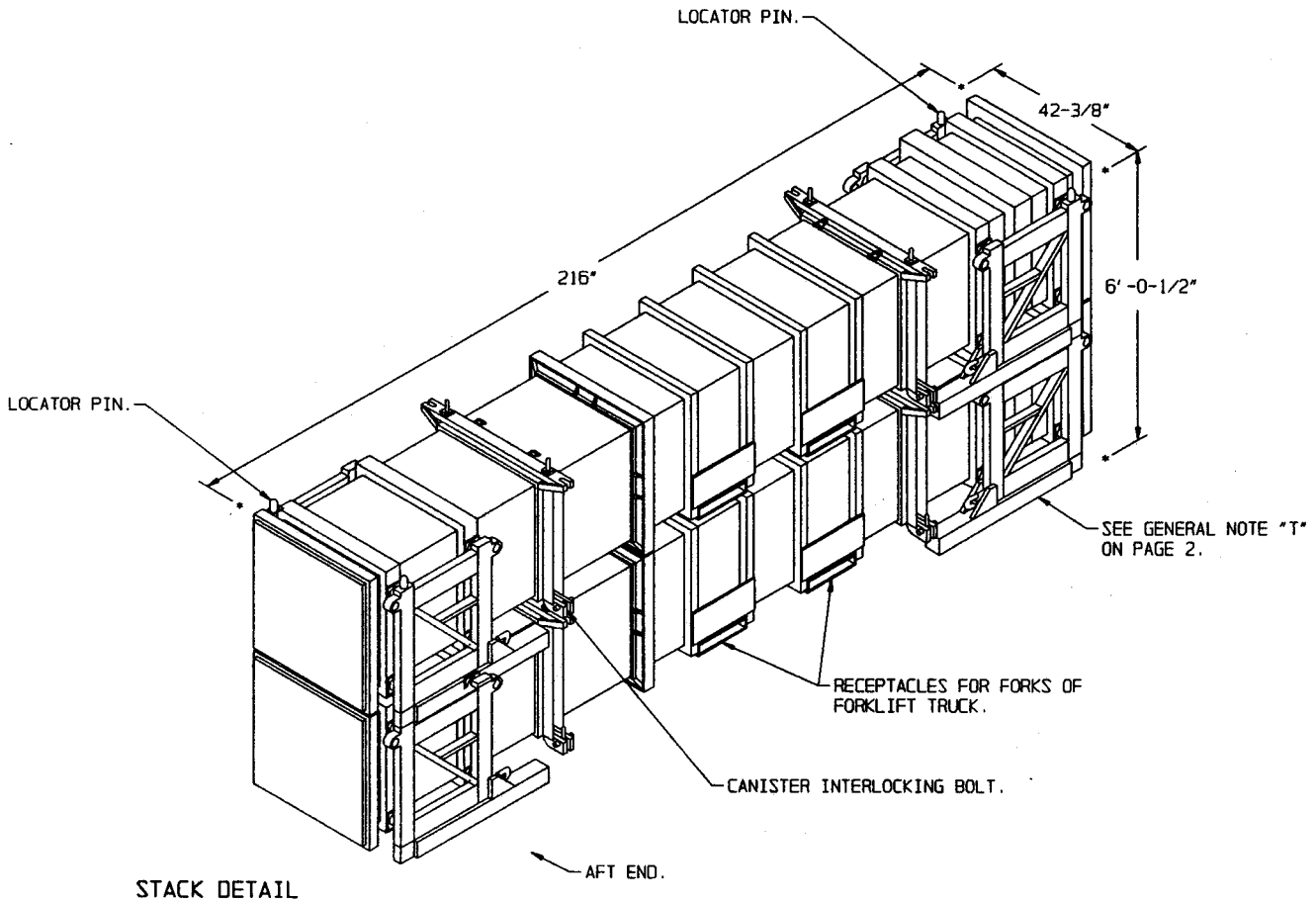
R. CONVERSION TO METRIC EQUIVALENTS: DIMENSIONS WITHIN THIS DOCUMENT ARE EXPRESSED IN INCHES AND WEIGHTS ARE EXPRESSED IN POUNDS. WHEN NECESSARY, THE METRIC EQUIVALENTS MAY BE COMPUTED ON THE BASIS OF ONE INCH EQUALS 25.4MM AND ONE POUND EQUALS 0.454 KG.

S. THE QUANTITY OF CONTAINERS SHOWN IN THE LOAD ON PAGE 4 MAY BE REDUCED FOR SHIPMENT, IF DESIRED. WHEN A CONTAINER IS TO BE 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. THE LOAD DEPICTED ON PAGE 4 MAY BE REDUCED BY TWO OR THREE CANISTERS, FOR LOADS OF TWO OR ONE CANISTER(S), RESPECTIVELY.

T. FOR SHIPMENT OF THE MISSILE CANISTERS ON A FLATRACK IT IS NECESSARY THAT THE SHOCK ISOLATION FRAMES AND SKIDS BE IN THE REVERSE POSITION, (THE WOODEN SKIDS EXTENDING UNDER THE BODY OF THE CANISTER RATHER THAN PROTRUDING), THE OVERALL LENGTH OF THE CANISTER WILL BE REDUCED FROM 234" TO 216".

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



STACK DETAIL

UNITIZING AND HANDLING PROCEDURAL GUIDANCE

1. STACKING CANISTERS FOR OUTLOADING PURPOSES.

   A. THE SKIDS OF THE UPPER CANISTER MUST BE FULLY SEATED UPON THE LOCATOR PINS OF THE LOWER CANISTER.

   B. POSITION THE FORWARD END OF THE UPPER CANISTER ABOVE THE FORWARD END OF THE LOWER CANISTER.

   C. CANISTER INTERLOCKING BOLTS MUST BE TIGHTENED AS SECURELY AS POSSIBLE WITH A NORMAL SIZE HAND TOOL WRENCH (REF: 60 FOOT-POUNDS).

2. CANISTER OR CANISTER STACK HANDLING.

   NOTES: (1) APPROVED MATERIALS HANDLING EQUIPMENT (MHE) IS SPECIFIED IN OTHER DOCUMENTS. MHE IS INTENDED TO MEAN EQUIPMENT SUCH AS FORKLIFT TRUCKS, CRANES, HAND TRUCKS, DOLLIES, ROLLER ASSEMBLIES, SLINGS AND SPREADER BARS.

   (2) PRECAUTIONARY HANDLING TECHNIQUES NORMALLY EMPLOYED OR AS SPECIFIED FOR THE TYPE OF COMMODITY INVOLVED WILL BE OBSERVED.

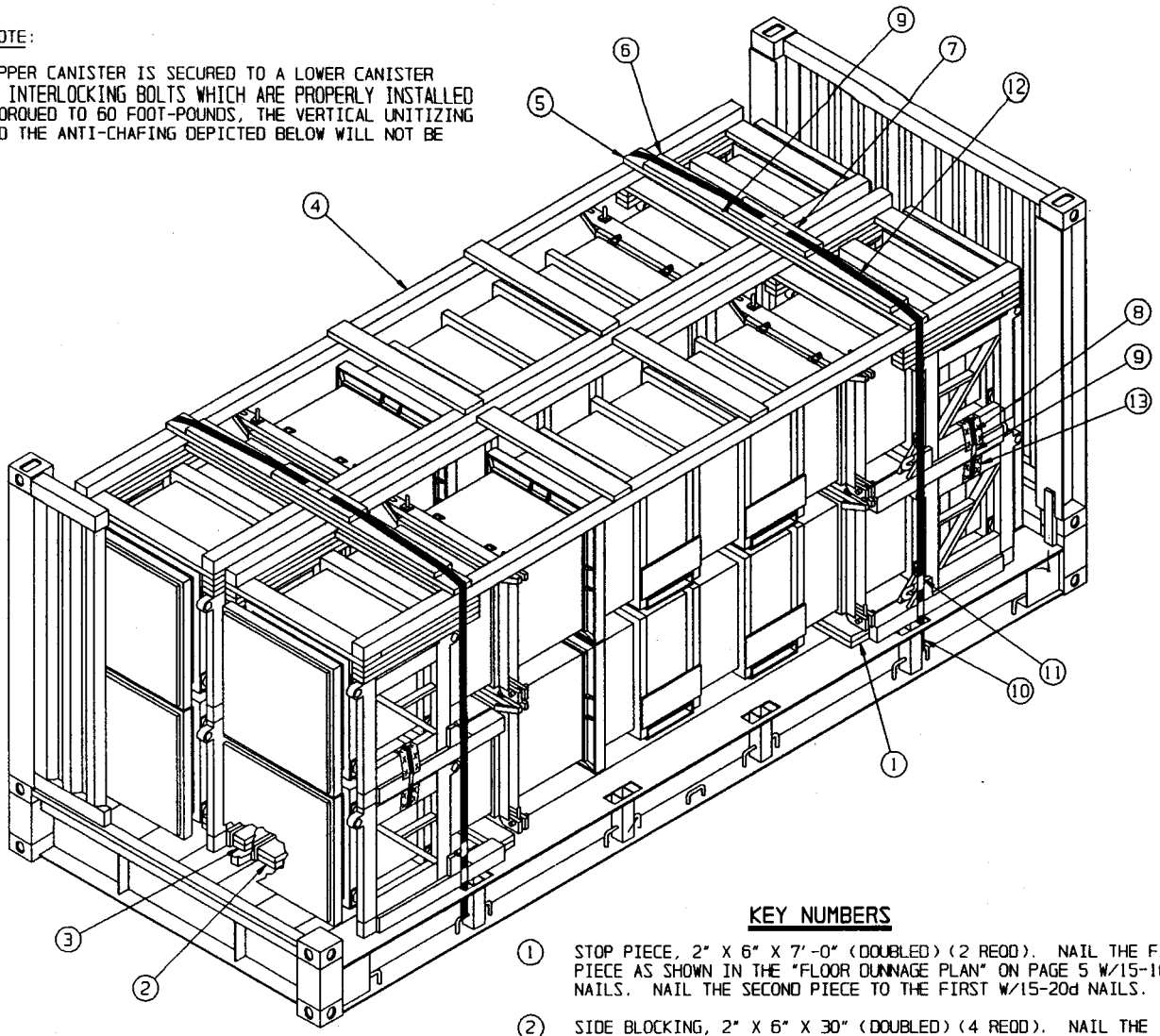
   A. ONLY APPROVED AND APPROPRIATELY SIZED MATERIALS HANDLING EQUIPMENT WILL BE USED FOR HANDLING THE DEPICTED CANISTERS.

   B. IF HANDLING IS ACCOMPLISHED WITH A FORKLIFT TRUCK, THE CANISTERS SHOULD BE HANDLED FROM A SIDE POSITION AS MUCH AS POSSIBLE. CARE MUST BE EXERCISED WHEN INSERTING FORKS UNDER A CANISTER, TO PREVENT DAMAGE TO THE CANISTER BY THE FORK TINES OR THE FORKLIFT PACKAGE GUARD. FOR VERY SHORT "INCHING" SPEED MOVEMENTS, SUCH AS WILL BE EXPERIENCED DURING FLATRACK LOADING, A TWO-HIGH CANISTER STACK MAY BE HANDLED BY INSERTING THE FORKS OF A FORKLIFT TRUCK INTO THE FORK RECEPTACLES OF THE UPPER CANISTER.

   C. SLINGING OF A CANISTER OR CANISTER STACK WILL BE ACCOMPLISHED IN ACCORDANCE WITH APPROVED PROCEDURES.

SPECIAL NOTE:

WHEN AN UPPER CANISTER IS SECURED TO A LOWER CANISTER WITH FOUR INTERLOCKING BOLTS WHICH ARE PROPERLY INSTALLED AND ARE TORQUED TO 60 FOOT-POUNDS, THE VERTICAL UNITIZING STRAPS AND THE ANTI-CHAFING DEPICTED BELOW WILL NOT BE REQUIRED.



ISOMETRIC VIEW

LOAD AS SHOWN

ITEM	QUANTITY	WEIGHT (APPROX)
MISSILE CANISTER	4	15,000 LBS
DUNNAGE		603 LBS
FLATRACK		5,700 LBS
TOTAL WEIGHT		21,303 LBS (APPROX)

BILL OF MATERIAL		
LUMBER	LINEAR FEET	BOARD FEET
1" X 4"	13	5
2" X 4"	99	66
2" X 6"	123	123
4" X 4"	68	91
NAILS	NO. REQD	POUNDS
6d (2")	32	1/4
10d (3")	322	5
20d (4")	60	2-1/4
STEEL STRAPPING, 1-1/4"	28' REQD	4 LBS
SEAL FOR 1-1/4" STRAPPING	8 REQD	NIL
STEEL STRAPPING, 2"	54' REQD	18 LBS
SEAL FOR 2" STRAPPING	12 REQD	3 LBS
ANTI-CHAFING MATERIAL	AS REQD	NIL

KEY NUMBERS

(1) STOP PIECE, 2" X 6" X 7'-0" (DOUBLED) (2 REQD). NAIL THE FIRST PIECE AS SHOWN IN THE "FLOOR DUNNAGE PLAN" ON PAGE 5 W/15-10d NAILS. NAIL THE SECOND PIECE TO THE FIRST W/15-20d NAILS.

(2) SIDE BLOCKING, 2" X 6" X 30" (DOUBLED) (4 REQD). NAIL THE FIRST PIECE AS SHOWN IN THE "FLOOR DUNNAGE PLAN" ON PAGE 5 W/5-10d NAILS. NAIL THE SECOND PIECE TO THE FIRST W/5-20d NAILS.

(3) SPACER PIECE, 2" X 4" X 30" (DOUBLED) (2 REQD). NAIL THE FIRST PIECE AS SHOWN IN THE "FLOOR DUNNAGE PLAN" ON PAGE 5 W/5-10d NAILS. NAIL THE SECOND PIECE TO THE FIRST W/5-20d NAILS.

(4) HOLD-DOWN ASSEMBLY (2 REQD). SEE THE DETAIL ON PAGE 5. POSITION AS SHOWN SO AS TO REST ON THE SHOCK ISOLATION FRAMES.

(5) TIE PIECE, 2" X 6" X 7'-5" (2 REQD). LOCATE ON TOP OF THE HOLD-DOWN ASSEMBLY, SO AS TO BE IN LINE WITH A FLATRACK TIEDOWN POINT AND AS CLOSE AS POSSIBLE TO THE CONTAINER SHOCK ISOLATION FRAMES. NAIL TO THE HOLD-DOWN ASSEMBLY W/3-10d NAILS AT EACH JOINT.

(6) PURCHASE BOARD, 2" X 6" X 6'-6" (2 REQD). CENTER ON THE LENGTH OF AND NAIL TO PIECE MARKED (5) W/7-10d NAILS.

(7) PURCHASE BOARD, 2" X 6" X 24" (2 REQD). CENTER ON THE LENGTH OF AND NAIL TO PIECE MARKED (6) W/4-10d NAILS.

(8) VERTICAL UNITIZING STRAP, 1-1/4" X .035" OR .031" X 42" LONG STEEL STRAPPING (8 REQD). INSTALL STRAPS AROUND THE SHOCK ISOLATION FRAMES OF AN UPPER AND LOWER CONTAINER AS SHOWN. SEE THE SPECIAL NOTE ABOVE.

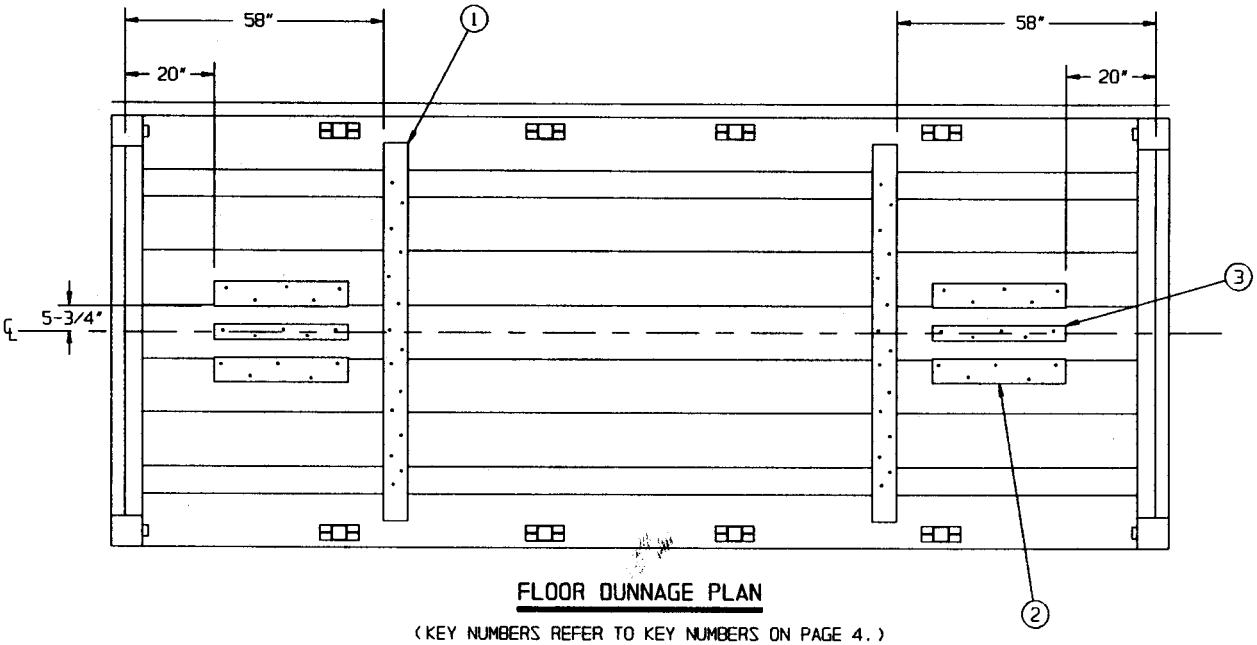
(9) SEAL FOR 1-1/4" STEEL STRAPPING (8 REQD, 1 PER STRAP).

(10) PAD, STRAPPING, 2" X .050" X 18" (4 REQD). PRE-POSITION THE PAD BETWEEN THE HOLD-DOWN STRAP AND THE FLATRACK TIEDOWN POINT AND SECURE WITH ONE SEAL.

(11) SEAL FOR 2" STRAPPING (12 REQD, 6 PER STRAP).

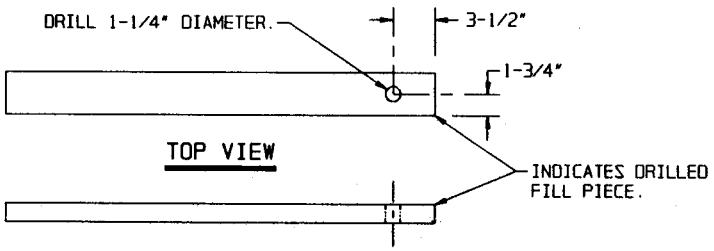
(12) HOLD-DOWN STRAP, 2" X .050" BY A LENGTH TO SUIT (REF: 24'-0") (2 REQD). FORM FROM TWO PIECES AND POSITION AS SHOWN ABOVE.

(13) ANTI-CHAFING, NEUTRAL BARRIER MATERIAL (AS REQD). POSITION UNDER STRAPPING AT ALL POINTS OF CONTACT WITH THE CONTAINER.



FLOOR DUNNAGE PLAN

(KEY NUMBERS REFER TO KEY NUMBERS ON PAGE 4.)



TOP VIEW

SIDE VIEW

HOLD-DOWN ASSEMBLY

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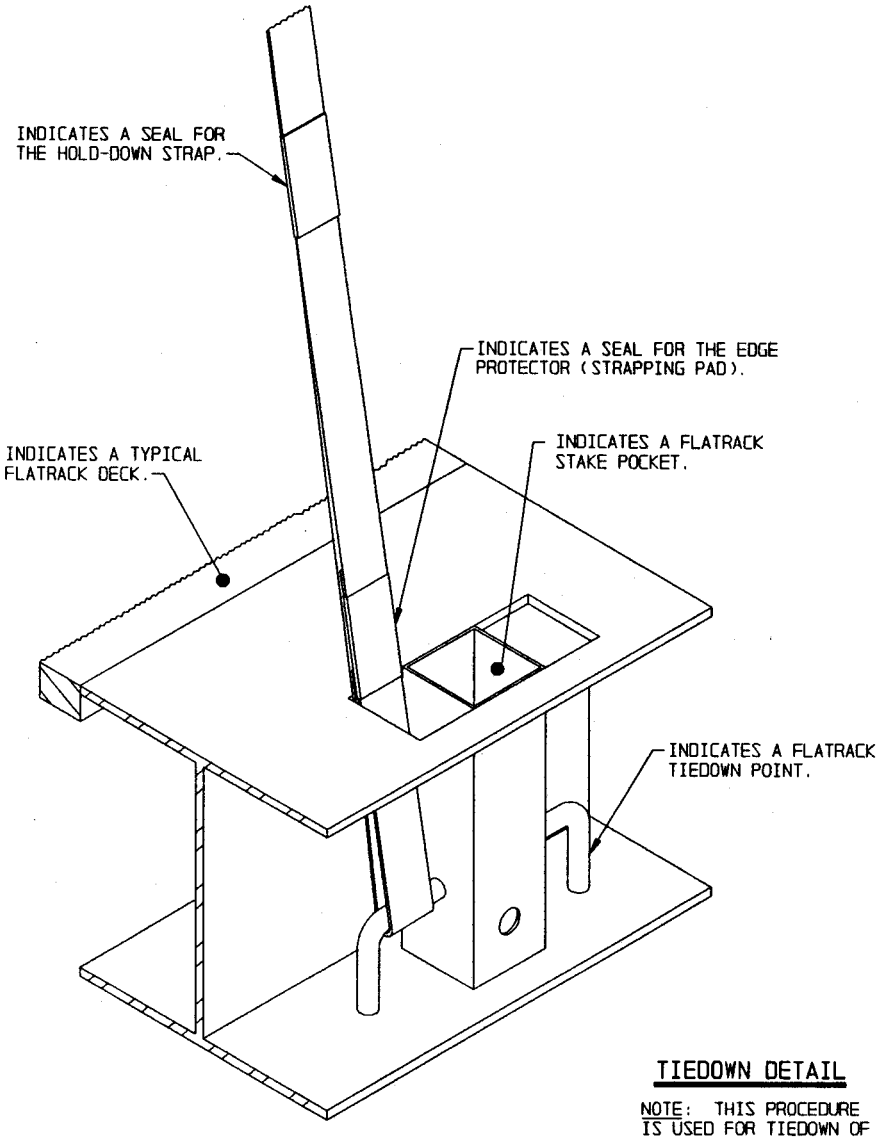
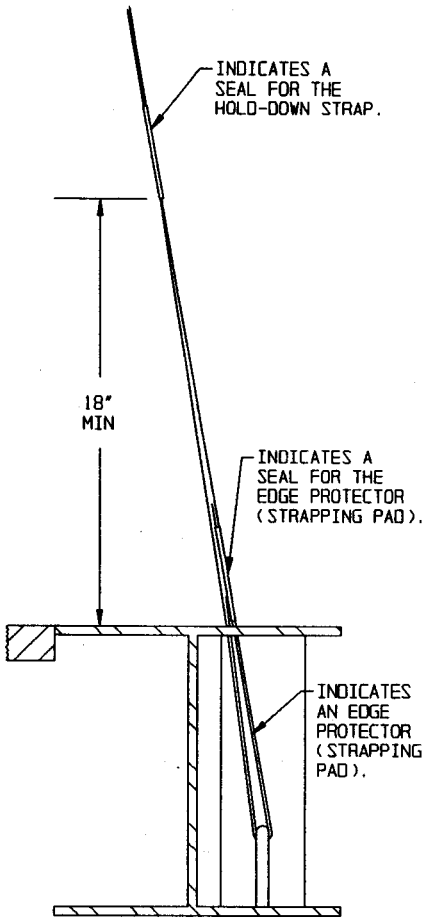


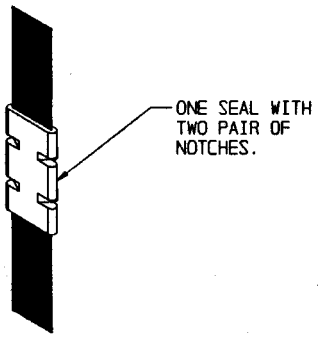
PARTIAL ISOMETRIC SECTION VIEW



PARTIAL SIDE VIEW

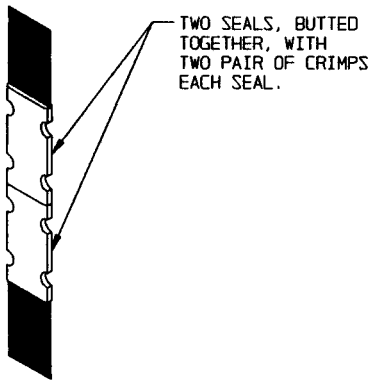
TIEDOWN DETAIL

NOTE: THIS PROCEDURE IS USED FOR TIEDOWN OF THE LOAD USING FLATRACK SIDE RAIL TIEDOWN POINTS. SEE GENERAL NOTE "P" 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