# LOADING AND BRACING IN 45 FOOT INTERMODAL CONTAINER OF 105MM HOWITZER, M119

# INDEX

<u>11611</u>	PAGE(S)
GENERAL NOTES AND MATERIAL SPECIFICATIONS	2
BOX DETAILS	6-7
DUNNAGE DETAILS	8-10

U.S. ARMY MATERIEL COMMAND DRAWING							
APPROVED, U.S. ARMY ARMAMENT, MUNITIONS AND	DRAFTSMAN		TECHNICIAN	ENGINEER			
CHEMICAL COMMAND	S. WILSON			G. WILLIS			
J. H. D. Zac							
APPROVED BY ORDER OF COMMANDING GENERAL, U.S.	VALIDATION ENGINEERING DIVISION		TRANSPORTATION ENGINEERING DIVISION	LOGISTICS ENGINEERING OFFICE			
ARMY MATERIEL COMMAND	(	MAL	w. French	- WFEnct			
John L. Depri	JULY 1994						
U.S. ARMY DEFENSE AMMUNITION CENTER AND SCHOOL	CLASS	OIZIVIO	N DRAWING	FILE			
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#### GENERAL NOTES

- THIS DOCUMENT HAS BEEN PREPARED AND ISSUED IN ACCORDANCE WITH AR 740-1 AND AUGMENTS TM 743-200-1 (CHAPTER 5).
- THE LOAD AS SHOWN IS BASED ON A 45'-0" LONG BY 8'-0" WIDE BY 9'-6" HIGH END OPENING TYPE INTERMODAL CONTAINER WITH INSIDE DIMENSIONS OF 44'-4" LONG BY 92" WIDE BY 105" HIGH AND A TARE WEIGHT OF 8,800 POUNDS. THE LOAD AS SHOWN CAN BE SHIPPED BY RAIL IN A TRAILER-ON-FLATCAR (TOFC) OR CONTAINER-ON-FLATCAR (COFC) CONFIGURATION AND IS ALSO ACCEPTABLE FOR SHIPMENT BY HIGHWAY AND WATER MODES OF TRANSPORT.
- C. LADING DATA (AS CONFIGURED FOR SHIPPING):

ITEM DIMENSIONS - - 16'-4" LONG BY 6'-0" WIDE BY 53" HIGH.

ITEM GROSS WEIGHT - 4,350 POUNDS (APPROX).

- ONLY SERVICEABLE CONTAINERS CAPABLE OF SAFELY TRANSPORTING THE LADING TO DESTINATION WITHOUT DAMAGE WILL BE SELECTED. CONTAINERS SELECTED MUST HAVE "SOUND" FLOORS WHICH PROVIDE NAIL RETENTION PROPERTIES EQUAL TO OR BETTER THAN THE SPECIFIED DUNNAGE LUMBER.
- THE NUMBER OF LADING UNITS MAY BE ADJUSTED TO FIT THE SIZE OF THE CONTAINER TO BE LOADED OR THE QUANTITY TO BE SHIPPED. HOWEVER, THE APPROVED METHODS SHOWN MUST BE FOLLOWED AS CLOSELY AS POSSIBLE FOR BLOCKING, BRACING, AND STAYING OF THE DESIGNATED ITEMS. ADDITIONALLY, THE LADING STAYING OF THE DESIGNATED ITEMS. ADDITIONALLY, THE LADING ITEMS MUST BE POSITIONED SO THE LOAD WEIGHT IS DISTRIBUTED AS EVENLY AS POSSIBLE WITHIN THE CONTAINER.
- OTHER TYPES OF LADING UNITS MAY BE LOADED IN A CONTAINER WHICH IS PARTIALLY LOADED WITH THE DESIGNATED ITEM, PROVIDED THE TOTAL LOAD IS COMPATIBLE, EXISTING DIRECTIVES ARE NOT VIOLATED, AND THE OTHER LADING ITEMS ARE BLOCKED AND BRACED TO EQUAL THE BLOCKING AND BRACING CRITERIA SPECIFIED. CAUTION: REGARDLESS OF THE QUANTITY OF LADING ITEMS TO BE SHIPPED, THE "MAXIMUM GROSS WEIGHT" OF THE CONTAINER INCLUDING LADING AND DUNNAGE MUST NOT BE EXCEEDED.

(CONTINUED AT RIGHT)

### MATERIAL SPECIFICATIONS

FED SPEC MM-L-751; DOUGLAS FIR OR COMPARABLE LUMBER WITH STRAIGHT GRAIN LUMBER - - - - - -: AND FREE FROM MATERIAL DEFECTS.

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

COMMERCIAL ITEM DESCRIPTION A-A-55057, PLYW000 - - - - -:

TYPE A, CONSTRUCTION AND INDUSTRIAL PLYWOOD, INTERIOR WITH EXTERIOR GLUE GRADE C-D. IF SPECIFIED GRADE IS NOT AVAILABLE, A BETTER INTERIOR OR AN EXTERIOR GRADE MAY BE SUBSTITUTED.

ASTM D3953; FLAT STRAPPING, TYPE 1, STRAPPING, STEEL - -: 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

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

COMMERCIAL GRADE; PRESSURE SENSITIVE TAPE - - - - - - :

FIBER TAPE.

FED SPEC PPP-B-1055; WATERPROOFED, BARRIER MATERIAL - -:

FLEXIBLE, CLASS M1.

STRAP ANCHOR PLATE : NSN 5340-00-252-3014 (FOR 1-1/4" STRAP).

STRAP ANCHOR

NSN 5340-00-290-7140; SIGNODE MICROLOCK NAIL, NO. 225, 2-1/4" LONG, 7 GAGE (OR PLATE NAIL - - - -:

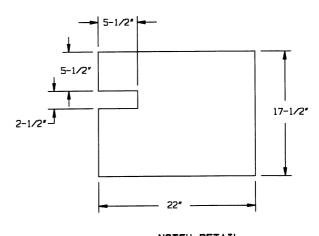
WEB STRAP WEBBING, UNIVERSAL TIEDOWN, TIEDOWN ASSEMBLY - -:

NSN 5340-00-980-9277, PN10900880, OR NSN 1670-00-725-1437, PN1376-013, OR NSN 5340-01-089-4997, PN11669588, OR NSN 5340-01-204-3009, PN9392419.

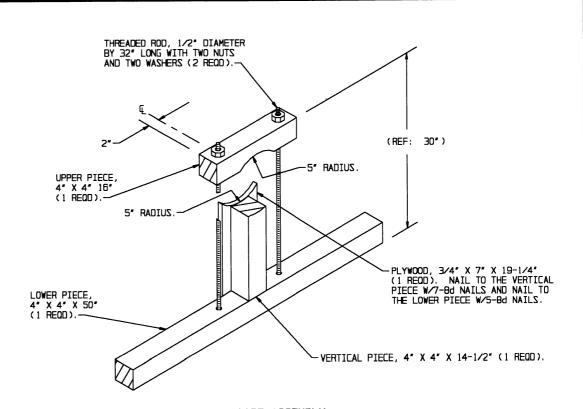
THREADED ROD, NUTS, WASHERS AND STAPLES -: COMMERCIAL GRADE.

#### (GENERAL NOTES CONTINUED)

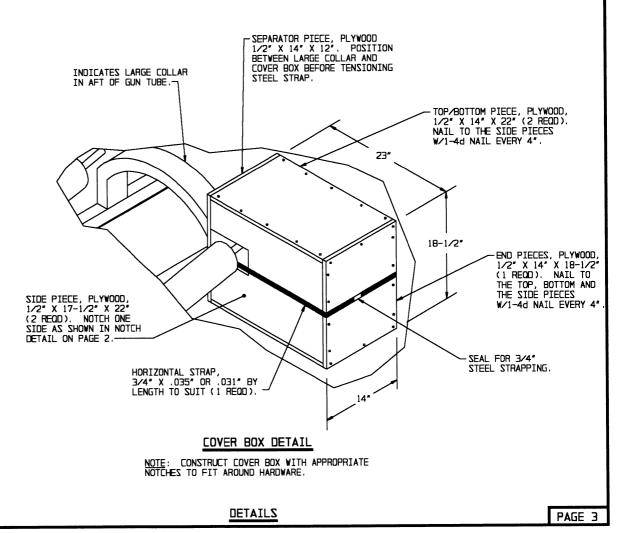
- G. HOLD-DOWN STRAPS WILL BE TENSIONED SUFFICIENTLY TO CAUSE SLIGHT DEPRESSION OF THE TRAILS. CAUTION: IT IS RECOMMENDED THAT THE HOLD-DOWN STRAPS BE INSTALLED TO APPROXIMATE THE ANGLE SHOWN; HOWEVER, IF RESTRICTED FLOOR SPACE OR THE LOCATION OF INTEGRAL TIEDOWN FACILITIES
  PREVENTS THIS, CARE MUST BE EXERCISED TO ENSURE THAT EACH
  PAIR OF HOLD-DOWN STRAPS ARE INSTALLED SO THEIR RETENTION
  FORCES ACT IN OPPOSING LONGITUDINAL DIRECTIONS.
- NOTICE: A STAGGERED NAILING PATTERN WILL BE USED WHEREVER POSSIBLE WHEN NAILS ARE DRIVEN INTO JOINTS OF DUNNAGE ASSEMBLIES. ALSO, A STAGGERED NAILING PATTERN WILL BE USED WHEN DUNNAGE IS NAILED TO THE FLOOR OF THE CONTAINER, OR WHEN LAMINATING DUNNAGE. THE NAILING PATTERN WILL BE ADJUSTED AS REQUIRED SO THAT A NAIL DOES NOT PENETRATE INTO OR NEAR A CRACK BETWEEN THE FLOOR BOARDS. 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.
- DUNNAGE LUMBER SPECIFIED THROUGHOUT THIS PROCEDURAL DRAWING IS OF NOMINAL SIZE UNLESS OTHERWISE DIMENSIONED. FOR EXAMPLE, 2" X 6" MATERIAL IS ACTUALLY 1-1/2" THICK BY 5-1/2" WIDE AND 2" X 10" MATERIAL IS ACTUALLY 1-1/2" THICK
- WHEN ANY STEEL STRAP IS SEALED AT 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 4 FOR GUIDANCE.
- L. IF THE CONTAINER FURNISHED FOR SHIPMENT OF THIS ITEM IS IF THE CONTAINER FURNISHED FOR SHIPMENT OF THIS ITEM IS EQUIPPED WITH INTEGRAL TIE DOWN FACILITIES EITHER IN THE PERIMETER OF THE FLOOR OR AT THE BASE OF THE SIDEWALLS, WEB STRAP TIEDOWN ASSEMBLIES MAY BE USED AS AN ALTERNATE TO THE STEEL HOLD-DOWN STRAPS AND ANCHOR PLATES. SEE SPECIAL NOTE 3 ON PAGE 7 AND THE MATERIAL SPECIFICATIONS FOR WEB STRAP TIEDOWN ASSEMBLIES ON PAGE 2. NOTE: TO BE ACCEPTABLE FOR USE, THE CONTAINER TIE DOWN FACILITIES MUST BE ABLE TO WITHSTAND A MINIMUM OF 2,000 POUNDS PULLING FORCE WITHOUT DEFORMING.
- 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 0.45 KG.
- FOR ADDITIONAL GUIDANCE, ATTENTION IS DIRECTED TO THE "SPECIAL NOTES" SECTION WHICH IS IMMEDIATELY ADJACENT TO THE DEPICTED OUTLOADING METHOD ON PAGE 7.

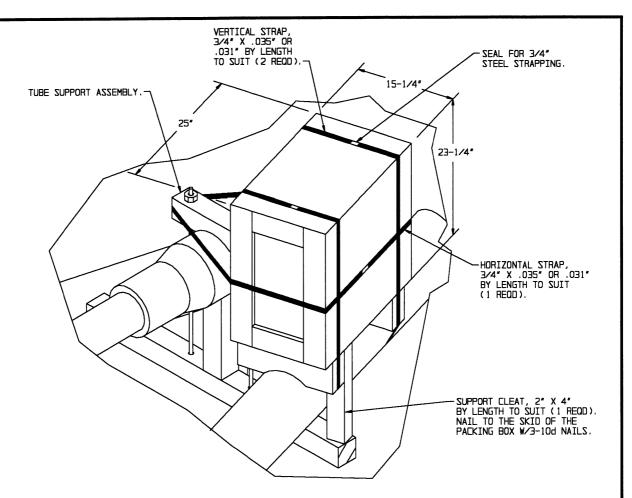


NOTCH DETAIL



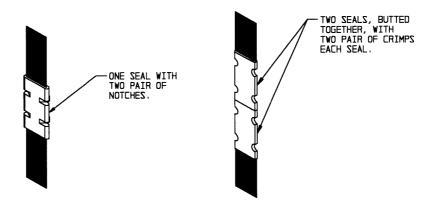
# TUBE SUPPORT ASSEMBLY





## SECUREMENT OF PACKING BOX

NOTE: WEIGHT OF PACKING BOX AND ITS CONTENTS IS INCLUDED IN THE ITEM GROSS WEIGHT IDENTIFIED IN NOTE "C" ON PAGE 2.



# STRAP JOINT A

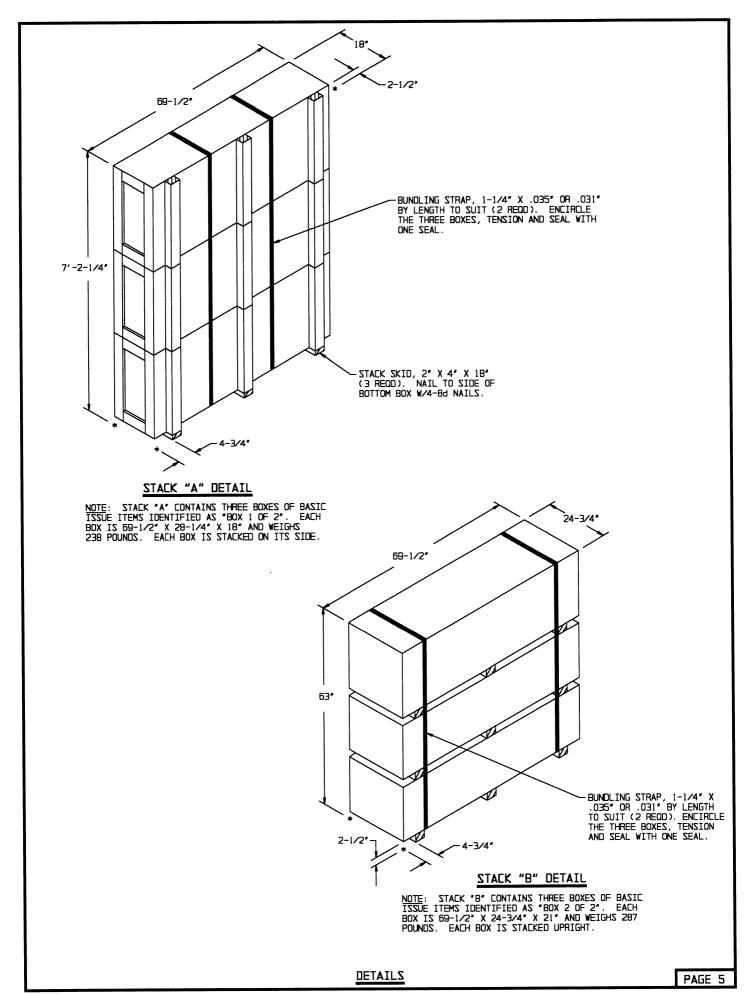
METHOD OF SECURING A STRAP JOINT WHEN USING A NOTCH-TYPE SEALER.

# STRAP JOINT B

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

## END-OVER-END LAP JOINT DETAILS

DETAILS



REFERENCE DIMENSIONS ARE MEASURED TO THE CENTER OF THE LUNETTE. (5) **(B)** (7)(0)(REF: 26'-4")-- (REF: 13'-6") ( REF : 22") Œ) (9) **(6)** ➂ ② **(**6) 3 (14) (1) 12 PLAN VIEW 3" MINIMUM CLEARANCE REQUIRED BETWEEN AFT

#### (KEY NUMBERS CONTINUED)

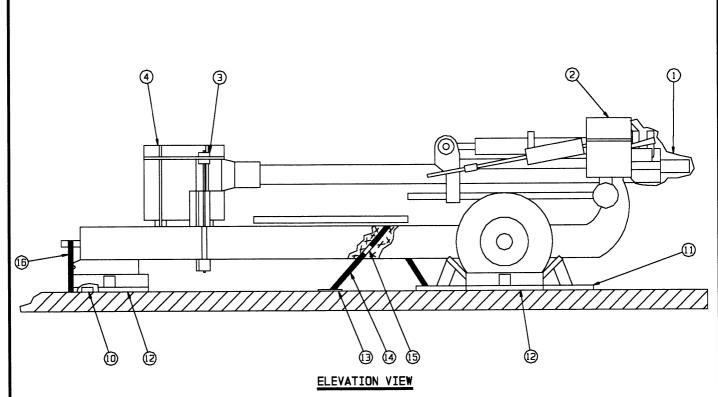
- (2) SIDE BLOCKING (12 REOD). SEE THE SIDE BLOCKING DETAIL ON PAGE 10. POSITION AGAINST SIDE OF A TIRE OR AGAINST SIDE OF TOWING HITCH AND NAIL FLOOR CLEAT TO THE CONTAINER FLOOR W/4-10d NAILS.
- (3) STRAP ANCHOR PLATE (5 REQD). ATTACH HOLD-DOWN STRAP TO THE STRAP ANCHOR PLATE. NAIL TO THE CONTAINER FLOOR W∕6 ANCHOR PLATE NAILS. SEE THE "STRAP ANCHOR PLATE" DETAIL ON PAGE 10.
- (4) HOLD-DOWN STRAP, 1-1/4" X .035" OR .031" BY LENGTH TO SUIT STEEL STRAPPING (6 REOD). ENCIRCLE TUBULAR TRAIL ARM OF HOWITZER, CONNECT AND TENSION ENDS OF STRAP. SEE GENERAL NOTE "G" ON PAGE 2 AND SPECIAL NOTES 2 AND 3 ON PAGE 7.
- (5) SEAL FOR 1-1/4" STRAPPING (6 REDD, 1 PER STRAP). CRIMP EACH SEAL WITH TWO PAIR OF NOTCHES. SEE GENERAL NOTE "K" ON PAGE 2.
- (6) STEEL STRAP, PERFORATED, 1-1/4" X .035" X 4'-0" (3 REDD).
  INSTALL THROUGH EYE OF LUNETTE AND NAIL EACH END TO
  CONTAINER FLOOR W/4 APPROPRIATELY SIZE ANNULAR RING LOCK

#### KEY NUMBERS

END OF HOWITZER AND STACK "B".

- 1 FLEXIBLE BARRIER MATERIAL, GREASEPROOF AND WATERPROOF (3 REOD). FORM TO ENCIRCLE BREECH MECHANISMS AND TAPE IN PLACE. CUT 2" LONG SLIT IN MATERIAL AT LOWEST POINT UNDERNEATH TO PROVIDE DRAINAGE FOR CONDENSATION.
- (2) COVER BOX, 14" X 23" X 18-1/2" (3 REOD). SEE DETAIL ON PAGE 3. CONSTRUCT FROM 1/2" THICK PLYWOOD AND INSTALL TO PROTECT SIDE BRACKETS ON AFT END. SECURE IN PLACE WITH ONE 3/4" WIDE STEEL STRAP THREADED THROUGH LARGE COLLAR BRACKET AND AROUND THE COVER BOX.
- 3 TUBE SUPPORT ASSEMBLY (3 REQD), SEE DETAIL ON PAGE 3.
  AFTER ENGAGING TRAVEL LOCK, INSTALL TUBE SUPPORT BETWEEN
  MUZZLE AND TRAILS.
- PACKING BOX, 25" X 15-1/4" 23-1/4" (1 REQD). PACK WITH SIGHT COMPONENTS BELONGING WITH HOWITZER. SECURE IN PLACE WITH ONE HORIZONTAL 3/4" WIDE STEEL STRAP WRAPPED AROUND UPPER PIECE OF TUBE SUPPORT ASSEMBLY AND TWO VERTICAL 3/4" STEEL STRAPS WRAPPED AROUND THE TRAIL. SEE DETAIL ON PAGE 4 FOR SECUREMENT OF PACKING BOX.
- (5) STACK "A" (1 REQD). SEE STACK "A" DETAIL ON PAGE 5.
- (6) STACK "B" (1 REQD). SEE STACK "B" DETAIL ON PAGE 5.
- SPACER ASSEMBLY (1 REOD). SEE THE DETAIL ON PAGE 8. POSITION AGAINST STACK "A" BEFORE POSITIONING STACK "B".
- (B) RETAINER PIECE, 2" X 4" X 72" (2 REOD). POSITION TIGHT AGAINST STACK "B". NAIL FIRST PIECE TO BEARING PIECES OF THE SPACER ASSEMBLY W/2-10d NAILS AT EACH JOINT. NAIL SECOND PIECE TO THE FIRST W/6-10d NAILS.
- (9) KNEE BRACE (2 REOD). SEE THE DETAIL ON PAGE 8. POSITION TIGHT AGAINST A STACK OF BOXES. NAIL FLOOR CLEAT TO CONTAINER FLOOR W/6-10d NAILS.
- (1) SUPPORT PIECE, 2" X 4" X 24" (3 REOD). POSITION UNDER BASE OF TOWING HITCH. NAIL TO THE CONTAINER FLOOR W/1-10d NAIL AT EACH END.
- CHOCK BLOCK (12 REOD). SEE THE CHOCK BLOCK DETAIL ON PAGE 9. LOCATE THE BEVELED END OF BLOCK AGAINST A TIRE AND NAIL TO THE CONTAINER FLOOR W/5-10d NAILS. NOTE: SEE ALTERNATE CHOCK BLOCK DETAIL ON PAGE 9 IF RESTRICTED FLOOR SPACE PREVENTS PROPER INSTALLATION OF THE PREFERRED CHOCK BLOCK.

(CONTINUED AT LEFT)



(ONE HOWITZER SHOWN)

#### SPECIAL NOTES:

- 1. CAUTION: BEFORE SHIPPING, ALL WHEEL BRAKES MUST BE FULLY SET AND ALL TRAVEL LOCKS MUST BE SECURELY ENGAGED.
- ANTI-CHAFING MATERIAL SHOULD BE USED BETWEEN STEEL STRAPPING AND POINTS OF CONTACT WITH THE LADING. ENSURE STRAIGHT ALIGNMENT OF STRAPPING AND AVOID CONTACT WITH ANY SHARP EDGES, BRACKETS, OR OTHER APPURTENANCES.
- 3. IF THE CONTAINER FURNISHED FOR SHIPMENT OF THIS ITEM IS EQUIPPED WITH INTEGRAL TIE DOWN FACILITIES, WEB STRAP TIEDOWN ASSEMBLIES MAY BE USED IN LIEU OF THE STEEL HOLDDOWN STRAPS AND ANCHOR PLATES, PIECES MARKED (3), (4) AND (5) ON PAGE 6. THE WEB STRAP ASSEMBLIES MUST CONFORM TO THE MATERIAL SPECIFICATIONS IDENTIFIED ON PAGE 2 AND THE CONTAINER TIE DOWN FACILITIES MUST BE CAPABLE OF WITHSTANDING A MINIMUM OF 2,000 POUNDS PULLING FORCE WITHOUT DEFORMING. WEB STRAP ASSEMBLIES MUST BE INSTALLED SO WEBBING LAYS FLATLY OVER THE LADING WITHOUT "TWISTS" AND/OR "KNOTS". NOTE: PRIOR TO RATCHETING THE STRAP ASSEMBLIES TIGHT, ENOUGH SLACK LENGTH OF WEBBING MUST REMAIN TO FORM AT LEAST ONE—HALF BUT NOT MORE THAN ONE AND ONE—HALF WRAPS OF WEBBING ON THE RATCHET TAKE—UP SPOOL, AFTER INITIAL WEB—TO—WEB CONTACT HAS BEEN MADE.

#### BILL OF MATERIAL LUMBER LINEAR FEET BOARD FEET 2" X 4" 2" X 6" 2" X 10" 4" X 4" 59 34 59 57 13 4" X 6" q 18 NO. REOD **ZONDO** NAILS 8d (2-1/2") 1-1/2104 10d (3°) 1-3/4 12d (3-1/4") 60 16d (3-1/2") 108 2-1/2

STEEL STRAPPING, 3/4" - - - 32' REOD - - 2-1/4 LBS
SEAL FOR 3/4" STRAPPING - - 4 REOD - - - - NIL
STEEL STRAPPING, 1-1/4" - - 108' REOD - - 15-1/2 LBS
SEAL FOR 1-1/4" STRAPPING - - 10 REOD - - 1/2 LB
PLYWOOD, 3/4" - - - 15.2 SO FT REOD - - 31-1/4 LBS
PLYWOOD, 1/2" - - - 13.4 SO FT REOD - - 18-1/2 LBS
STRAP ANCHOR PLATE - - - - 6 REOD - - 1-1/2 LBS
ANCHOR PLATE NAILS - - - - 36 REOD - - 1/4 LB

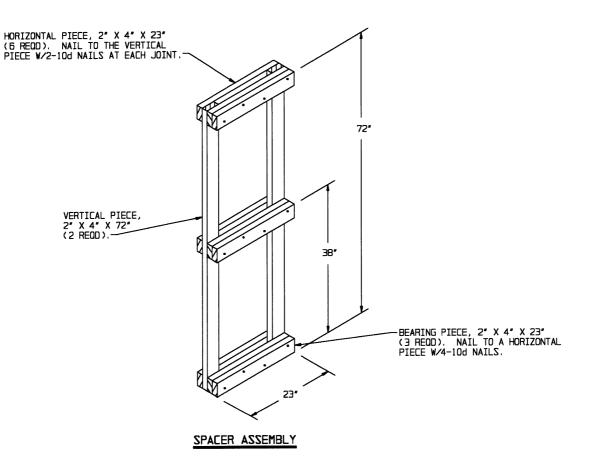
## NWOHZ ZA DAOJ

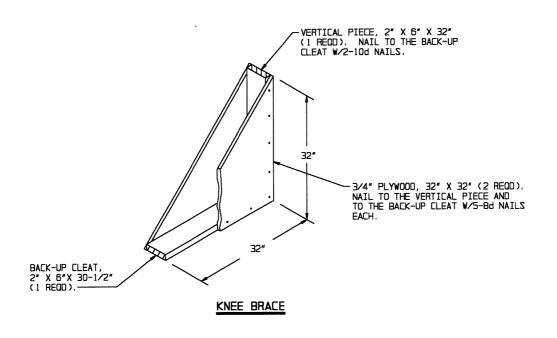
ITEM	QUANTITY	WEIGHT (AP	PROX )
M119 HOWITZER BOX 1 OF 2	- 3	714 LBS 861 LBS	
TOTAL METER	-	22 000 1 00	. / ADDDO

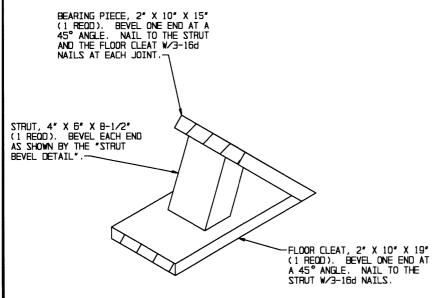
TOTAL WEIGHT - - - - - - 23,868 LBS (APPROX)

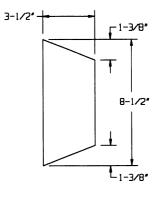
\* INCLUDES WEIGHT OF PACKING BOX AND ITS CONTENTS.

PAGE 7





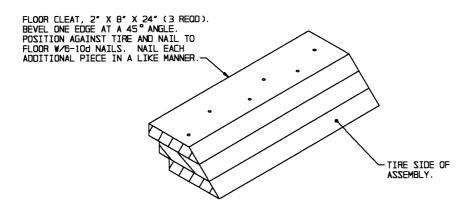




STRUT BEVEL DETAIL

## CHOCK BLOCK

NOTE: TWO 4" X 4" X 8-1/2" PIECES MAY BE SUBSTITUTED FOR EACH 4" X 6" X 8-1/2" STRUT.

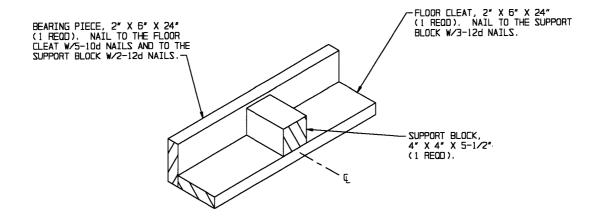


# ALTERNATE CHOCK BLOCK

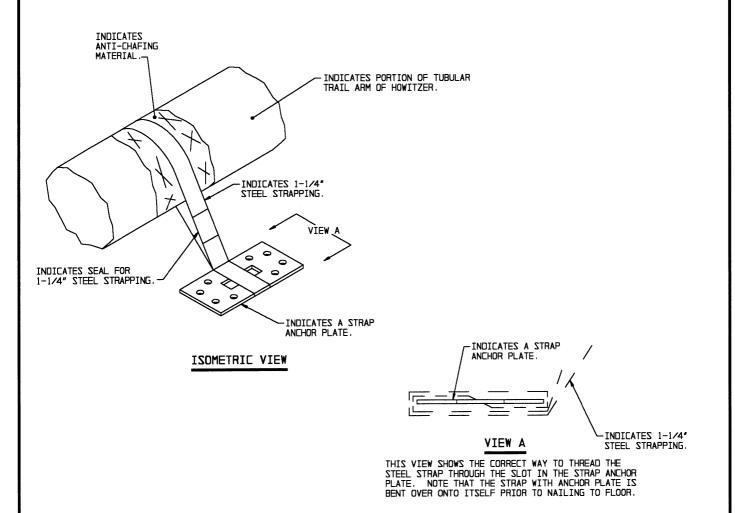
NOTE: THIS ALTERNATE CHOCK BLOCK IS TO BE USED ONLY WHEN RESTRICTED FLOOR SPACE PREVENTS PROPER INSTALLATION OF THE PREFERRED CHOCK BLOCK.

DETAILS

PAGE 9



# **SIDE BLOCKING**



# APPLICATION OF STRAPPING TO STRAP ANCHOR PLATE

PAGE 10 DETAILS