

# THAAD

## LOADING AND BRACING (TL & LTL) ON FLATBED TRAILER\* OF TERMINAL HIGH ALTITUDE AREA DEFENSE (THAAD) MISSILE ROUND (MR)

### INDEX

<u>ITEM</u>	<u>PAGE(S)</u>
GENERAL NOTES AND MATERIAL SPECIFICATIONS - - - - -	2
MR CONTAINER DETAIL - - - - -	3
THREE UNIT LOAD ON FLATBED TRAILER (WEB STRAP TIEDOWN) - - - - -	4
ONE UNIT LOAD ON FLATBED TRAILER (WEB STRAP TIEDOWN) - - - - -	5
DETAILS - - - - -	6

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\*THE PROCEDURES SHOWN HEREIN ARE APPLICABLE ONLY TO  
ON-POST MOVEMENT OF LOADS BY APPROVED FLATBED TRAILERS.

## U.S. ARMY MATERIEL COMMAND DRAWING

<p style="text-align: center;">APPROVED, U.S. ARMY AVIATION ANDMISSILE COMMAND</p> <p>HOLMES.PAMEL A.A.1063702931</p> <p style="font-size: small;">Digitally signed by HOLMES.PAMEL.A.A.1063702931 DN: c=US, o=U.S. Government, ou=DoD, ou=PKI, ou=USA, cn=HOLMES.PAMEL.A.A.1063702931 Date: 2015.05.28 15:05:19 -05'00'</p>	<p><b>CAUTION: VERIFY PRIOR TO USE AT <a href="https://mhp.redstone.army.mil">HTTPS://MHP.REDSTONE.ARMY.MIL</a> THAT THIS IS THE MOST CURRENT VERSION OF THIS DOCUMENT. THIS IS PAGE 1 OF 6.</b></p>		<p style="font-size: large; font-weight: bold;">JULY 2015</p>				
	<p style="font-weight: bold;">DO NOT SCALE</p>						
<p style="font-size: small;">DESIGN ENGINEER</p>	BASIC REV.	<p style="font-weight: bold;">RICHARD GARSIDE</p>					
<p style="text-align: center;">APPROVED BY ORDER OF COMMANDING GENERAL, U.S. ARMY MATERIEL COMMAND</p> <p>SHIMP.UPTON .R.1231257183</p> <p style="font-size: small;">Digitally signed by SHIMP.UPTON.R.1231257183 DN: c=US, o=U.S. Government, ou=DoD, ou=PKI, ou=USA, cn=SHIMP.UPTON.R.1231257183 Date: 2015.07.06 08:15:42 -05'00'</p>	<p style="font-size: small;">ENGINEERING DIVISON</p>	<p>FIEFFER.LAUR A.A.1230375727</p> <p style="font-size: small;">Digitally signed by FIEFFER.LAURA.A.1230375727 DN: c=US, o=U.S. Government, ou=DoD, ou=PKI, ou=USA, cn=FIEFFER.LAURA.A.1230375727 Date: 2015.04.14 11:26:34 -05'00'</p>		CLASS	DIVISION	DRAWING	FILE
<p style="font-size: small;">TEST REPORT</p>	<p style="font-weight: bold; font-size: large;">NA</p>	<p>FELICIANO.AD IN.1259200373</p> <p style="font-size: small;">Digitally signed by FELICIANO.ADIN.1259200373 DN: c=US, o=U.S. Government, ou=DoD, ou=PKI, ou=USA, cn=FELICIANO.ADIN.1259200373 Date: 2015.04.20 14:33:49 -05'00'</p>		<p style="font-size: large; font-weight: bold;">19</p>	<p style="font-size: large; font-weight: bold;">48</p>	<p style="font-size: large; font-weight: bold;">8236</p>	<p style="font-size: large; font-weight: bold;">GM11TH3</p>
<p style="font-size: small;">EXPLOSIVE SAFETY DIRECTORATE</p>	<p>TIRONE.JOSEPH.A NDREW.102668374 9</p> <p style="font-size: small;">Digitally signed by TIRONE.JOSEPH.ANDREW.102668374 DN: c=US, o=U.S. Government, ou=DoD, ou=PKI, ou=USA, cn=TIRONE.JOSEPH.ANDREW.102668374 Date: 2015.05.28 07:37:26 -05'00'</p>						
<p style="font-size: small;">U.S. ARMY DEFENSE AMMUNITION CENTER</p>							

## 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 THAAD MISSILE PACKED IN MISSILE ROUND (MR) CONTAINER. SUBSEQUENT REFERENCE TO CONTAINER HEREIN MEANS CONTAINER WITH THAAD MISSILE. SEE PAGE 3 AND LOCKHEED MARTIN DRAWING 13551475 FOR DETAILS OF THE MR CONTAINER.
- C. THE LOADS AS SHOWN HEREIN ARE BASED ON 45'-0" LONG BY 8'-0" WIDE FLAT-BED TRAILERS. TRAILERS OF OTHER LENGTHS AND WIDTHS MAY BE USED. TRAILERS MUST HAVE WOOD OR WOOD AND METAL FLOORS. TRAILERS HAVING ALL-METAL FLOORS CANNOT BE USED. **CAUTION:** IF THE TRAILER FLOOR IS EQUIPPED WITH EXPOSED METAL DECKING ABOVE THE BOGIE ASSEMBLY, OR ELSEWHERE, FIELD MEASUREMENTS SHOULD BE MADE TO ENSURE THAT THE METAL DECKING DOES NOT INTERFERE WITH THE PROPER POSITIONING AND NAILING OF THE DUNNAGE AS SPECIFIED BY THE PROCEDURES SHOWN HEREIN.
- D. SELECTION OF A VEHICLE FOR THE TRANSPORT OF THE DESIGNATED ITEM IS THE RESPONSIBILITY OF THE ORIGINATING CARRIER AND THE SHIPPER. ONLY VEHICLES IN ACCORDANCE WITH THE REQUIREMENTS OF THE APPLICABLE REGULATORY DOCUMENTS WILL BE SELECTED FOR USE.
- E. GROSS WEIGHT AND AXLE DISTRIBUTION OF WEIGHT FOR A LOAD WILL BE THE RESPONSIBILITY OF THE CARRIER. THE CARRIER WILL ADVISE THE SHIPPER OF APPLICABLE LOADING REQUIREMENTS, AND THE SHIPPER WILL LOAD ACCORDINGLY.
- F. THE APPROVED METHODS SHOWN HEREIN ARE BASED ON THE MOVEMENT OF MISSILES UNDER CONTROLLED CONDITIONS. THE ON-DEPOT AND/OR INTRAPLANT ENVIRONMENT, WITH RESTRICTED SPEEDS, LESS TRAFFIC, AND EXPERIENCED DRIVERS, SAFELY ALLOWS RELAXATION OF THE MORE STRINGENT OFF-INSTALLATION REQUIREMENTS. IT IS ONLY WHEN THESE CONTROLLED CONDITIONS EXIST AND ARE STRICTLY ADHERED TO THAT THE BLOCKING AND BRACING PROCEDURES CAN BE MINIMIZED. **NOTICE:** A SHIPMENT WILL BE POSITIONED ON A TRAILER CONSISTENT WITH STATE WEIGHT LAWS.
- G. SELECTION OF A VEHICLE USED TO TRANSPORT THE DESIGNATED ITEM MUST COMPLY WITH AR 55-355, CHAPTER 29, FOR EXPLOSIVES AND OTHER DANGEROUS ARTICLES, IN FULL.
- H. THESE PROCEDURES CAN ALSO BE UTILIZED FOR THE SHIPMENT OF THE CONTAINERS WHEN THEY ARE LOADED WITH AN ITEM WHICH IS IDENTIFIED DIFFERENTLY BY NOMENCLATURE THAN THE ITEM IDENTIFIED IN THE DRAWING TITLE, OR WHEN THEY ARE EMPTY.

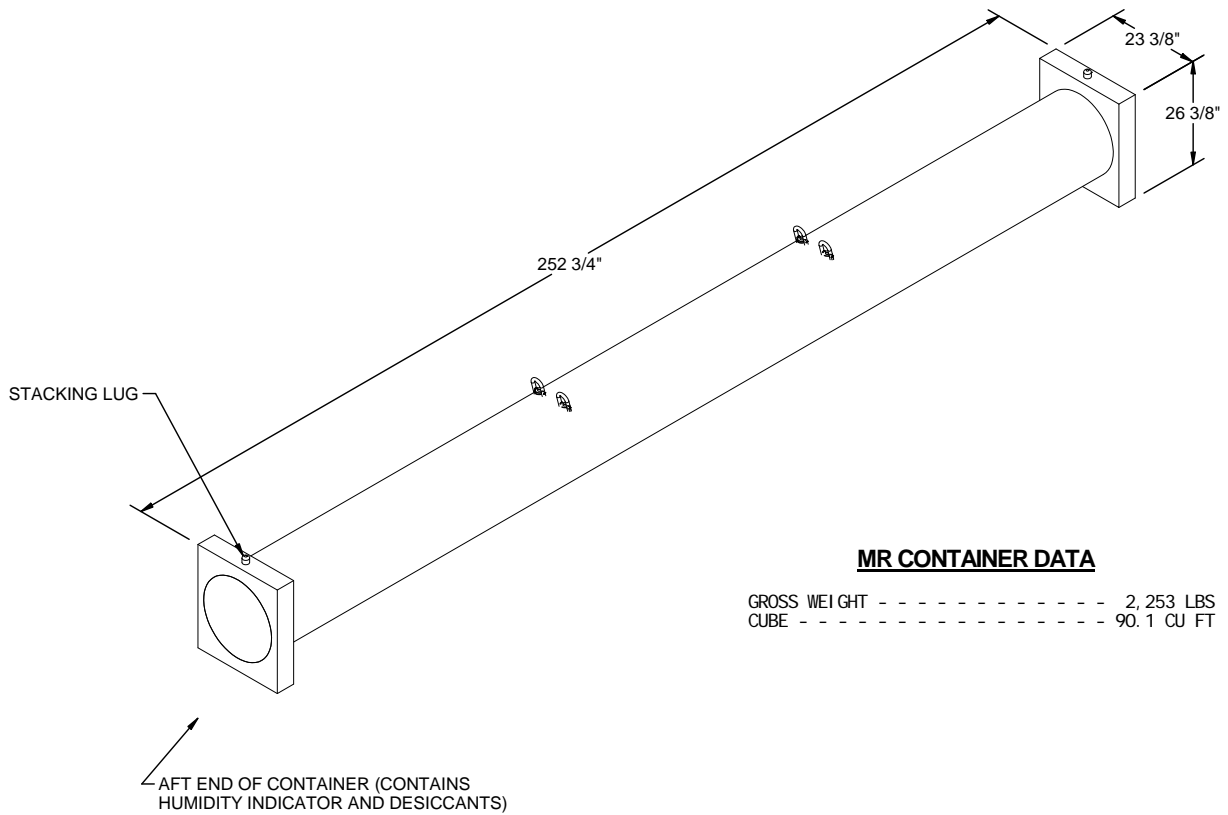
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## (GENERAL NOTES CONTINUED)

- J. **CAUTION:** REGARDLESS OF THE TYPE OF TRAILER INVOLVED, ONLY THOSE TRAILERS HAVING TIEDOWN ANCHORING FACILITIES WHICH PROVIDE HOLDING STRENGTH EQUAL TO OR GREATER THAN THE STRENGTH OF THE HOLD-DOWN STRAPS OR CHAINS, AND WHICH ALIGN NEAR THE INDICATED LOCATIONS SHOULD BE USED.
- K. 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 TRANSPORTING VEHICLE, 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 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 THE PIECE ON TO OR RIGHT BESIDE A NAIL IN A LOWER PIECE.
- L. THE QUANTITIES SHOWN IN THE DEPICTED LOADS ARE TYPICAL. THE NUMBER OF LADING UNITS MAY BE ADJUSTED TO FIT THE SIZE OF THE TRANSPORT VEHICLE BEING LOADED OR THE QUANTITY TO BE MOVED. HOWEVER, THE APPROVED METHODS SPECIFIED HEREIN MUST BE FOLLOWED AS CLOSELY AS POSSIBLE FOR BLOCKING, BRACING, AND STAYING OF THE UNITS. THREE AND ONE UNIT LOADS ARE SHOWN ON PAGES 4 AND 5. IF A TWO UNIT LOAD IS REQUIRED, THE PROCEDURES WILL BE SIMILAR TO THOSE SHOWN ON PAGE 4, EXCEPT THE LENGTH OF THE BASE SUPPORT BLOCKS WILL BE REDUCED TO 48" NAILED W/6-10d NAILS, AND THE "STRAPPING ASSEMBLY - TWO UNIT LOAD", AS DEPICTED ON PAGE 6, WILL BE SUBSTITUTED FOR THE "STRAPPING ASSEMBLY - THREE UNIT LOAD".
- M. THE TRANSPORTING VEHICLE OPERATOR SHOULD BE INSTRUCTED TO PERIODICALLY INSPECT THE WEB STRAP ASSEMBLIES DURING TRANSIT AND TIGHTEN IF NECESSARY.
- N. 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.
- O. 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

- STRAP, WEB, COMMERCIAL - - - - -: WEB SLING AND TIEDOWN ASSOCIATION RECOMMENDED STANDARD SPECIFICATION FOR SYNTHETIC WEB TIEDOWNS, WSTDA-T-1, REVISED 2005.
- LUMBER - - - - -: SEE TM 743-200-1 (DUNNAGE LUMBER) AND VOLUNTARY PRODUCT STANDARD PS 20.
- NAILS - - - - -: ASTM F1667; COMMON STEEL NAIL (NLCMS OR NLCMMS).



**MR CONTAINER DATA**

GROSS WEIGHT - - - - - 2,253 LBS  
 CUBE - - - - - 90.1 CU FT

**SPECIAL PROVISIONS FOR WEB STRAP TIEDOWN**

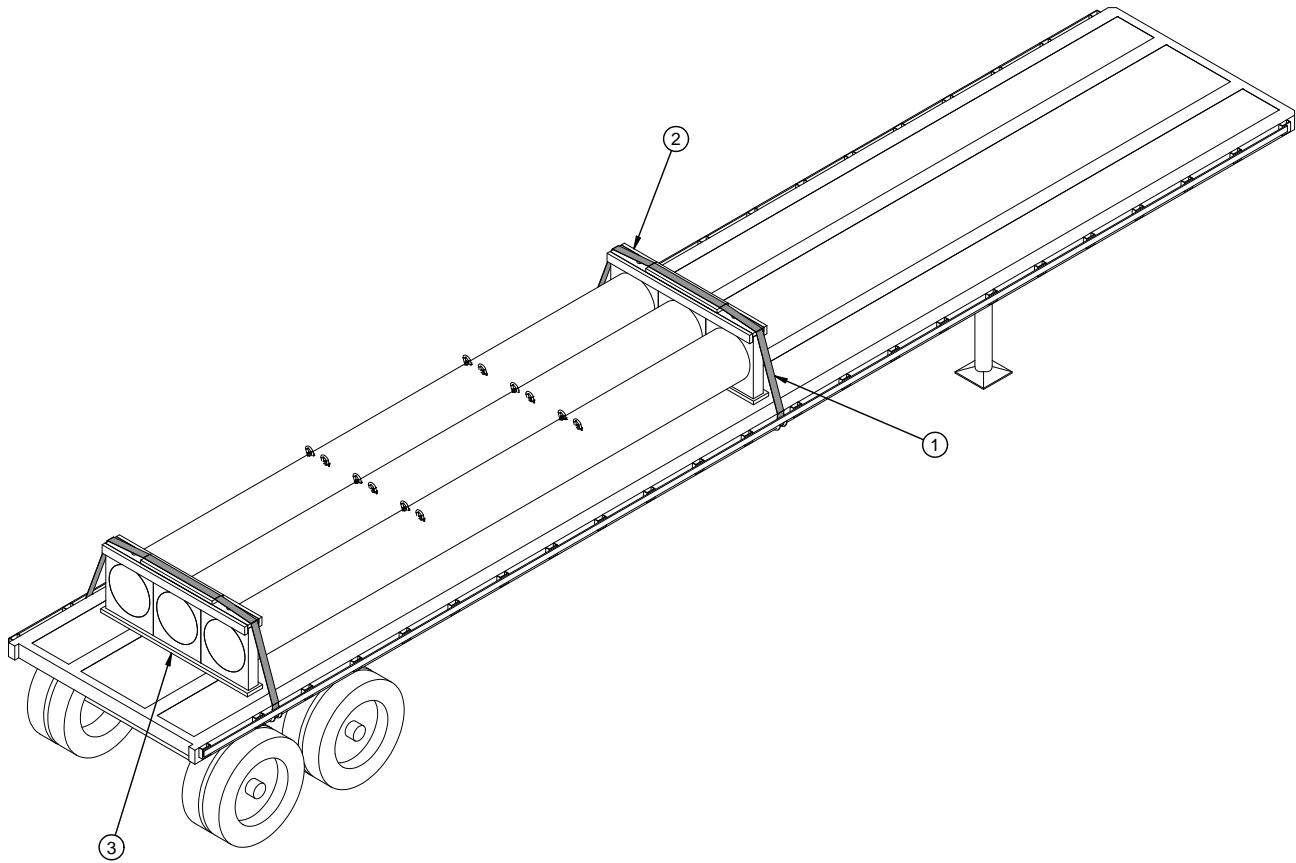
LADING MAY BE SECURED TO A FLATBED TRAILER BY WEB STRAP ASSEMBLIES IN LIEU OF STEEL STRAPPING OR CHAINS AND LOAD BINDERS, PROVIDED THE FOLLOWING CONDITIONS ARE MET.

1. ONLY WEB STRAPS OF GOOD QUALITY WILL BE USED. ALL WEB STRAPS AND ASSOCIATED HARDWARE SHALL CONFORM TO THE WEB SLING & TIEDOWN ASSOCIATION RECOMMENDED STANDARD SPECIFICATION FOR SYNTHETIC WEB TIEDOWNS, WSTDA-T-1, REVISED 2005.
2. ALL WEB STRAP TIEDOWN ASSEMBLIES SHALL BE PERMANENTLY LABELED WITHIN 18" OF ONE END TO SHOW:
  - A. NAME OR TRADEMARK OF MANUFACTURER
  - B. WORKING LOAD LIMIT (WLL)
3. WEB STRAP ASSEMBLY MINIMUM BREAKING STRENGTH WILL BE AT LEAST THREE TIMES THE WLL MARKED ON THE STRAP.
4. THE TOTAL MINIMUM BREAKING STRENGTH (MBS) OF THE STRAPS USED TO RESTRAIN AMMUNITION ITEMS WILL BE AT LEAST 1-1/2 TIMES THE TOTAL WEIGHT OF THE ITEMS, WITH A MINIMUM OF TWO STRAPS POSITIONED OVER EACH LOAD UNIT ON A TRAILER. THE CARRIER SHALL PROVIDE WRITTEN PROOF OF THE MBS OF THE STRAPS TO THE SHIPPING ACTIVITY IF REQUESTED.
5. CARRIERS MUST COMPLY WITH ALL FEDERAL, STATE, AND LOCAL REGULATIONS APPLICABLE TO CARGO RESTRAINT USING WEB STRAPS.
6. WHEN USING STRAPS AND WINCHES FOR CARGO RESTRAINT, THE STRAPS WILL BE TENSIONED UNTIL TIGHT WITHOUT CAUSING DAMAGE TO THE CARGO. ONLY WINCH BARS WILL BE USED FOR OPERATING THE STRAP WINCHES.
7. BEFORE AND DURING INSTALLATION, THE WEB STRAP ASSEMBLIES SHALL BE INSPECTED FOR DEFECTS. STRAPS HAVING ANY OF THE FOLLOWING DEFECTS WILL NOT BE USED FOR THE RESTRAINT OF ANY AMMUNITION LOAD, WITH THE EXCEPTION OF ONE WITH FRAYED ENDS. A STRAP HAVING FRAYED ENDS CAN BE USED IF THE FRAYED END IS TRIMMED AND MELTED WITH HEAT OR FLAME UNTIL ALL STRANDS ARE SEIZED.

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**(SPECIAL PROVISIONS FOR WEB STRAP TIEDOWN CONTINUED)**

- A. STRAP ASSEMBLY HARDWARE: SHALL BE INSPECTED FOR BENT HOOKS, GOUGES, CORROSION, SIGNS OF REPAIR, BENT RATCHETS OR WINCHES, WEAR, OR ANY OTHER NOTICEABLE DEFECTS.
- B. STRAP WEBBING: SHALL BE INSPECTED FOR KNOTS, EXCESSIVE ABRASIVE WEAR, TEARS, PUNCTURES, CUTS, ACID OR CAUSTIC BURNS, BROKEN STITCHES, FRAYED ENDS, OIL OR GREASE SPOTS EXCEEDING 6 SQUARE INCHES, BLEACHING OF COLOR, INCREASED STIFFNESS, SPLICES, VISIBLE WEAR INDICATOR THREADS, OR ANY OTHER NOTICEABLE DEFECTS.
8. RATCHET HANDLES MUST BE IN THE LOCKED POSITION AND/OR WINCH LOCKING DEVICES MUST BE FULLY SEATED IN THE TEETH OF THE WINCH.
9. IF THE WINCHES BEING USED ARE THE REMOVABLE TYPE HAVING BOLTS FOR ATTACHMENT TO THE TRAILER, CARE MUST BE EXERCISED WHEN ATTACHING THE WINCHES TO THE TRAILER. IF EXCESSIVE FORCE IS EXERTED ON THE BOLT DURING TENSIONING, DEFORMATION OF THE WINCH BRACKET MAY OCCUR, AND SUBSEQUENTLY CAUSE FAILURE OF THE WINCH BRACKET DURING TRANSPORT. WINCHES MUST BE FASTENED TO THE TRAILER WITH A MINIMUM OF TWO BOLTS.
10. DRIVERS MUST BE INSTRUCTED TO PERIODICALLY CHECK THE TIGHTNESS OF THE WEB STRAP ASSEMBLIES AND RE-TIGHTEN, IF NECESSARY.
11. IF PROVIDED ON OR WITH THE WEB STRAP ASSEMBLIES, SCUFF SLEEVES/WEB PROTECTORS WILL BE USED WHEREVER THE STRAP PASSES OVER A SHARP CORNER OR IRREGULAR SURFACE. IF NOT PROVIDED, ANTI-CHAFING MATERIAL OF A SUITABLE THICKNESS WILL BE USED TO ENSURE THAT THE STRAP WEBBING IS NOT DAMAGED DURING TRANSPORT OF THE LOAD.
12. THE HARDWARE FITTING OF THE TIEDOWN ASSEMBLIES MUST BE ATTACHED TO THE TRAILER IN SUCH A MANNER THAT THEY WILL REMAIN IN PLACE IF SLACK DEVELOPS IN THE STRAP DURING TRANSPORT.



**KEY NUMBERS**

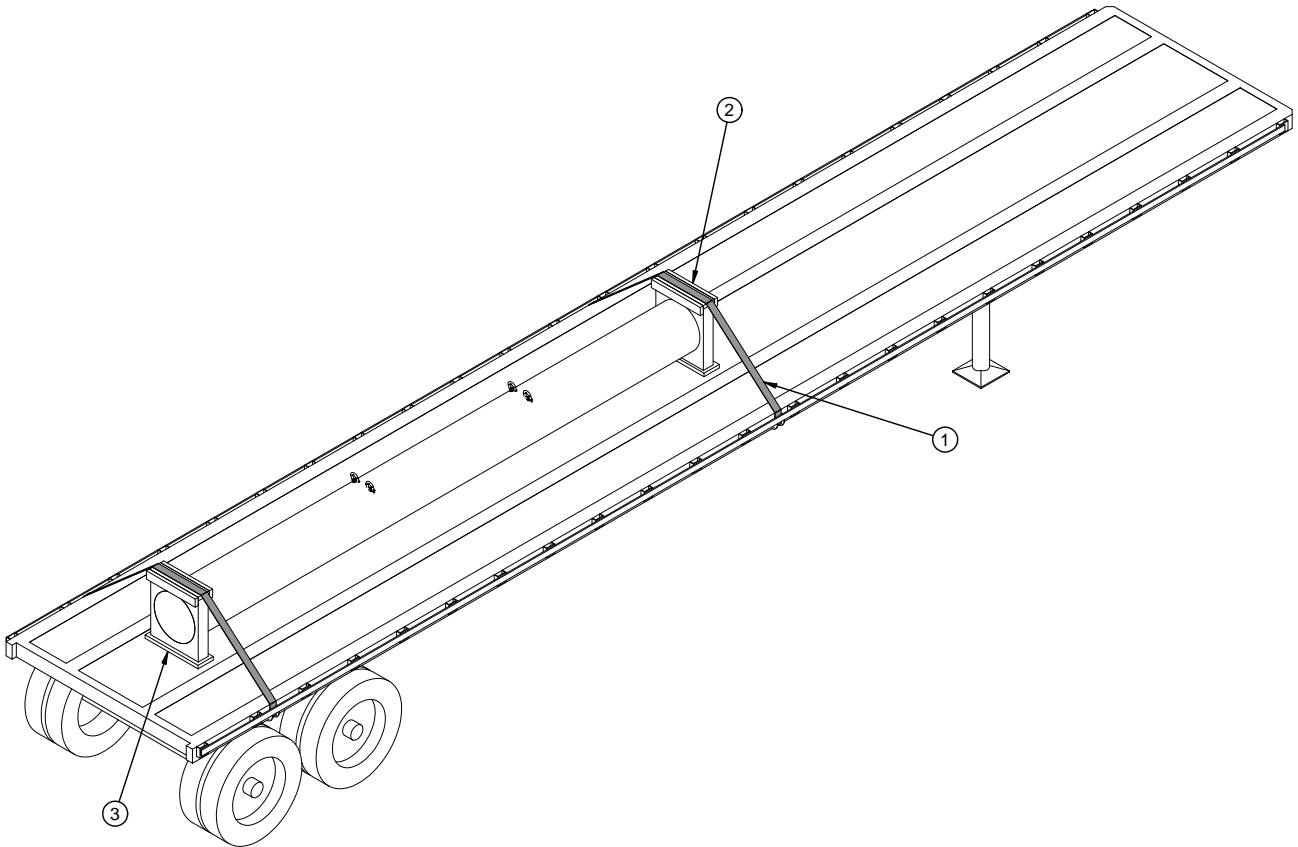
- ① STRAP, WEB, COMMERCIAL (2 REQD). INSTALL STRAP ACROSS STRAPPING ASSEMBLY AS SHOWN. SEE THE "SPECIAL PROVISIONS FOR WEB STRAP TIEDOWN" ON PAGE 3.
- ② STRAPPING ASSEMBLY - THREE UNIT LOAD (2 REQD). INSTALL ASSEMBLY OVER THE MR END SUPPORTS AS SHOWN. SEE DETAIL ON PAGE 6.
- ③ BASE SUPPORT BLOCK, 2" X 8" X 6'-0" MIN (2 REQD). PLACE ON TRAILER BEFORE LOADING MISSILE ROUNDS. CENTER BLOCKS Laterally ACROSS THE WIDTH OF THE TRAILER. SPACE BLOCKS LONGITUDINALLY TO BE CENTERED UNDER MISSILE ROUND FLANGES (REF: 20'-1" INSIDE DIMENSION BETWEEN BLOCKS). NAIL TO TRAILER W/9-10d NAILS.

**BILL OF MATERIAL**

LUMBER	LINEAR FEET	BOARD FEET
2" X 4"	23	16
2" X 6"	18	18
2" X 8"	12	16
NAI LS	NO. REQD	POUNDS
10d (3")	58	1
STRAP, WEB, COMMERCIAL - - 2 REQD - - - - -		20.8 LBS

**LOAD AS SHOWN**

ITEM	QUANTITY	WEIGHT (APPROX)
THAAD MR	3	7,275 LBS
DUNNAGE		120 LBS
<b>TOTAL WEIGHT</b>		<b>7,395 LBS</b>



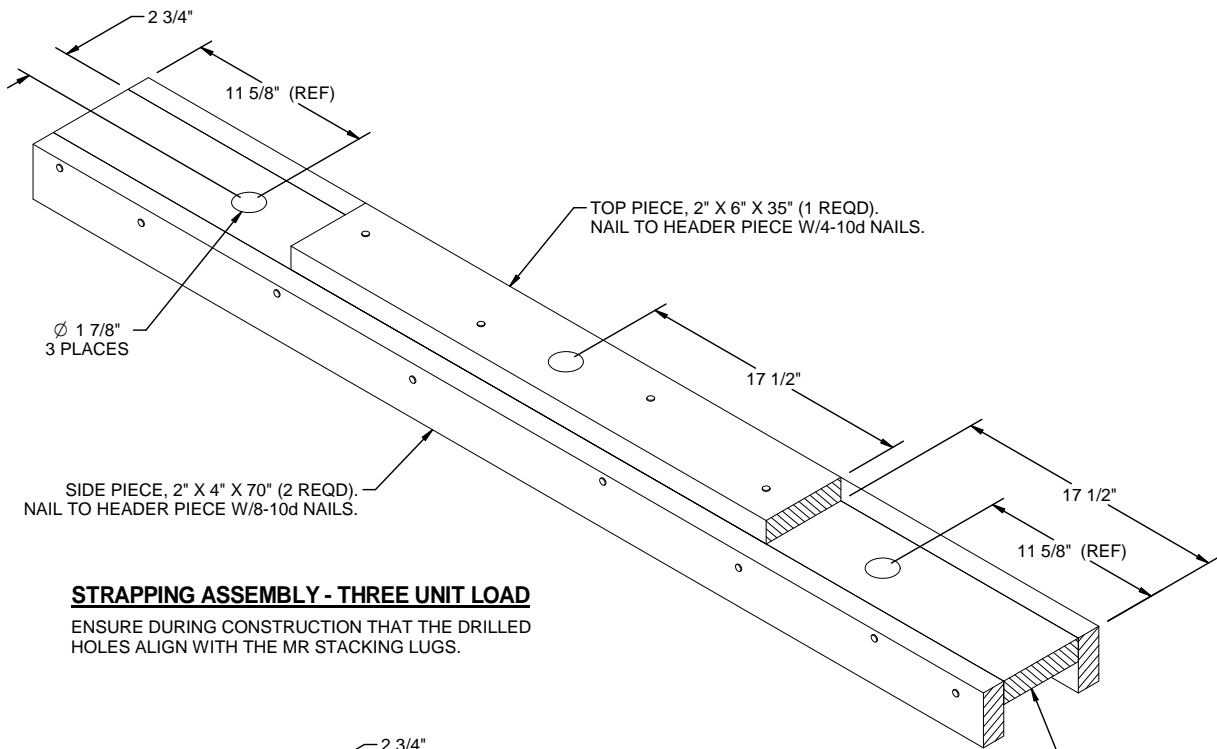
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- ① STRAP, WEB, COMMERCIAL (2 REQD). INSTALL STRAP ACROSS STRAPPING ASSEMBLY AS SHOWN. SEE THE "SPECIAL PROVISIONS FOR WEB STRAP TIEDOWN" ON PAGE 3.
- ② STRAPPING ASSEMBLY – ONE UNIT LOAD (2 REQD). INSTALL ASSEMBLY OVER THE MR END SUPPORTS AS SHOWN. SEE DETAIL ON PAGE 6.
- ③ BASE SUPPORT BLOCK, 2" X 8" X 26" MIN (2 REQD). PLACE ON TRAILER BEFORE LOADING MISSILE ROUNDS. CENTER BLOCKS Laterally ACROSS THE WIDTH OF THE TRAILER. SPACE BLOCKS LONGITUDINALLY TO BE CENTERED UNDER MISSILE ROUND FLANGES (REF: 20'-1" INSIDE DIMENSION BETWEEN BLOCKS). NAIL TO TRAILER W/3-10d NAILS.

BILL OF MATERIAL		
LUMBER	LINEAR FEET	BOARD FEET
2" X 4"	8	5
2" X 6"	4	4
2" X 8"	4	6
NAI LS	NO. REQD	POUNDS
10d (3")	22	1/4
STRAP, WEB, COMMERCIAL -- 2 REQD ----- 20.8 LBS		

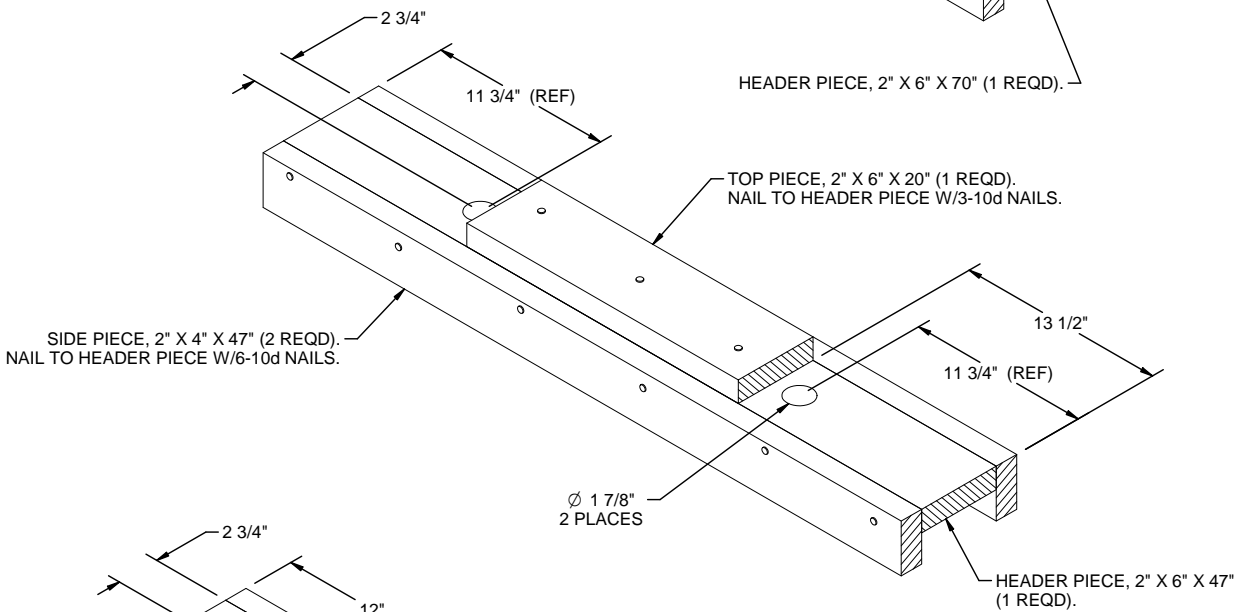
**LOAD AS SHOWN**

ITEM	QUANTITY	WEIGHT (APPROX)
THAAD MR	1	2,425 LBS
DUNNAGE		51 LBS
<b>TOTAL WEIGHT</b>		<b>2,476 LBS</b>



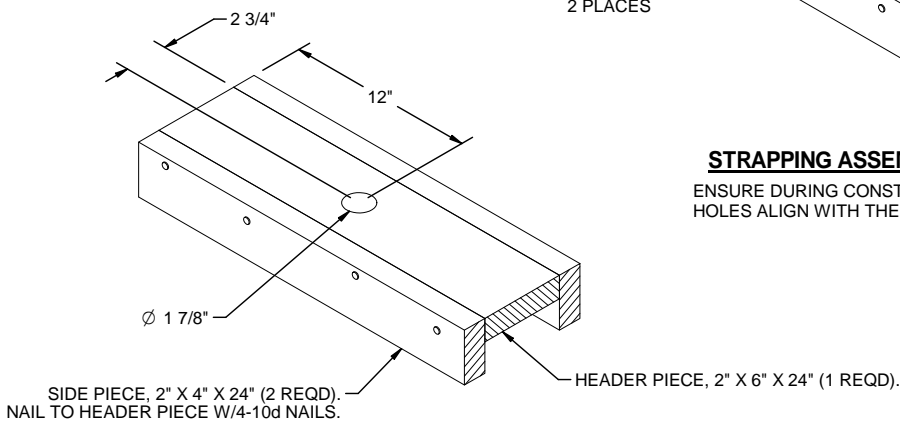
**STRAPPING ASSEMBLY - THREE UNIT LOAD**

ENSURE DURING CONSTRUCTION THAT THE DRILLED HOLES ALIGN WITH THE MR STACKING LUGS.



**STRAPPING ASSEMBLY - TWO UNIT LOAD**

ENSURE DURING CONSTRUCTION THAT THE DRILLED HOLES ALIGN WITH THE MR STACKING LUGS.



**STRAPPING ASSEMBLY - ONE UNIT LOAD**

ENSURE DURING CONSTRUCTION THAT THE DRILLED HOLES ALIGN WITH THE MR STACKING LUGS.