APPROVED BY

BUREAU OF EXPLOSIVES

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DATE 4/28/10

# LOADING AND BRACING IN VAN TYPE TRAILERS OF PALLETIZED MEDIUM CALIBER PROJECTILES FOR TRAILER-ON-FLAT-CAR (TOFC) SHIPMENT UTILIZING PALLA-GARD DEVICES

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LOADING AND BRACING SPECIFICATIONS SET FORTH WITHIN THIS DRAWH?
ING ARE APPLICABLE TO LOADS THAT ARE TO BE SHIPPED BY TRAILER-ONFLAT-CAR (TOFC) RAIL CARRIER SERVICE. THESE SPECIFICATIONS MAY
ALSO BE USED FOR LOADS THAT ARE TO BE MOVED BY MOTOR CARRIERS.
SEE GENERAL NOTE "C" ON PAGE 2.

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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 HEREIN ARE APPLICABLE TO MEDIUM CALIBER PROJECTILES AND PROJECTILE METAL PARTS, FROM 2,75 INCH THRU 165 MM, WHEN PALLETIZED. SUBSEQUENT REFERENCE TO UNIT HEREIN MEANS THE PALLET UNIT WITH CONTENTS.
- C. THE LOADS AS SHOWN ARE BASED UPON TRAILERS WHICH ARE 40"-0" LONG BY 7"-8" WIDE (INSIDE DIMENSION), UNLESS OTHERWISE SPECIFIED. THE TRAILERS, ADDITIONALLY, MUST BE OF THE TYPE SPECIFICALLY DESIGNED FOR TRAILER-ON-HAT-CAR (TOPC) RAIL CARRIER SERVICE. I.E., THE TRAILER CONSTRUCTION MUST BE SUCH THAT THE FORWARD END WALL IS CAPABLE OF RESTRAINING A FULL LOAD DURING NORMAL TOPC TRANS-PORTATION AND HANDLING. THE TRAILERS MUST ALSO HAVE WOOD ON WOODD AND METAL FLOORS WHICH WILL ARLOW FOR TROPBE INSTALLATION-AND PLACEMENT OF THE PALLA-GARD. LOAD RESTRAINING DEVICES. FORTOF SHIPMENTS, ONLY RAILGARS. WHICH ARE SPECIFIED BY BUREAU GF EXPLOREDES PAMPHIET 6C; WITLLBE UTILIZED.
- D. POR DETAILS OF THE BOXED-TYPE PALLET UNIT, SEE ORDNANCE CORPS DRAWING NO. F-7548604 AND THE PICTORIAL VIEW ON PAGE 3.
- E. FOR DETAILS OF THE "OPEN-TYPE" PALLET UNIT, SEE PICATINNY ARSENAL DRAWING NO. F-8837835 AND THE PICTORIAL VIEW ON PAGE 3.
- F. SELECTION OF A VEHICLE TO BE USED FOR TRANSPORTING THE DESIGNATED ITEM MUST COMPLY WITH AR 55-355, CHAPTER 213, FOR EXPLOSIVES AND OTHER DANGEROUS ARTICLES, IN FULL.
- G. THE GROSS WEIGHT AND AXLE DISTRIBUTION OF WEIGHT FOR A LOAD WILL BE THE RESPONSIBILITY OF THE CARRIER. THE CARRIER WILL ADVISE THE SHIPPER OF THE APPLICABLE LOADING REQUIREMENTS, AND THE SHIPPER WILL LOAD ACCORDINGLY. NOTICE: A LOAD WILL BE POSITIONED IN A TRAILER CONSISTENT WITH THE WEIGHT LAWS OF THE STATE OR STATES THROUGH WHICH THE TRAILER WILL BE TRANSPORTED BY HIGHWAY (MOTOR CARRIER).
- H. THE NUMBER OF LADING UNITS MAY BE ADJUSTED TO FIT THE SIZE OF THE TRAILER TO BE LOADED OR THE QUANTITY TO BE SHIPPED; HOWEVER, THE APPROVED METHODS SHOWN HEREIN MUST BE FOLLOWED AS CLOSELY AS POSSIBLE FOR THE BLOCKING AND BRACING OF THE DESIGNATED ITEM.
- J. OTHER TYPES OF LADING ITEMS MAY BE LOADED INTO TRAILERS WHICH ARE PARTIALLY LOADED WITH THE DEPICTED ITEM, PROVIDING THE TOTAL LOAD IS COMPATIBLE, EXISTING DIRECTIVES ARE NOT VIOLATED, AND THE OTHER LADING ITEMS ARE BLOCKED AND BRACED TO FQUAL THE BLOCKING AND BRACING CRITERIA SPECIFIED HEREIN.
- K. DUNNAGE LUMBER SPECIFIED IS OF A NOMINAL SIZE. FOR EXAMPLE, 2" X 4" MATERIAL IS ACTUALLY 1-1/2" THICK BY 3-1/2" WIDE AND 2" X 6" WATERIAL IS ACTUALLY 1-1/2" THICK BY 5-1/2" WIDE.
- L. CAUTION: DO NOT NAIL DUNNAGE MATERIAL TO THE TRAILER WALLS OR FLOOR. ALL NAILING WILL BE WITHIN THE DUNNAGE.
- M. PORTIONS OF THE TRAILERS DEPICTED WITHIN THIS DRAWING, SUCH AS ONE OF THE SIDE WALLS, HAVE NOT BEEN SHOWN IN THE LOAD VIEWS FOR CHARTY PROOFS.
- N. A STAGGERED MAILING PATTERN WILL BE USED WHEREVER POSSIBLE WHEN NAILS ARE DRIVEN INTO JOINTS OF DUNNAGE ASSEMBLIES. OR WHEN LAM-INATING 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.
- REQUIREMENTS CITED WITHIN THE BUREAU OF EXPLOSIVES PAMPHLET 6C APPLY WHEN THE SHIPMENT MOVES BY TOFC. SPECIAL TOFC NOTE FOLLOWS.

THE LOAD LIMIT OF A TOPE RAIL MUST MOT 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.

- P. CONVERSION TO METRIC EQUIVALENTS: DIMENSIONS WITHIN THIS DOCU-MENT ARE EXPRESSED IN INCHES AND WEIGHTS ARE EXPRESSED IN POUNDS. WHEN MECESSARY, THE METRIC EQUIVALENTS MAY BE COMPUTED ON THE BASIS OF ONE INCH EQUALS 25,4MM AND ONE POUND EQUALS 0,454 KG.
- Q. WHEN ANY STRAP IS SEALED AT AN END-OVER-END LAP JOINT, ONE SEAL, CRIMPED WITH TWO PAIR OF NOTCHES, WILL BE USED TO SEAL THE JOINT.

#### ("CONJINUED AT RIGHT)

#### MATERIAL SPECIFICATIONS

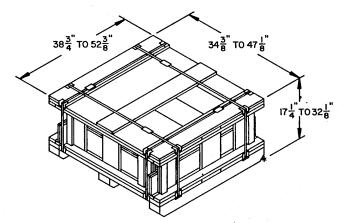
STRAPPING, STEEL -----: FED SPEC QQ-S-781; CLASS 1, TYPE I OR IV, HEAVY DUTY, FINISH A, B ( GRADE 2 ), OR C.

SEAL, STRAP ------: FED SPEC QQ-S-781; TYPE D, STYLE I, II, OR IY, CLASS H, FINISH A, B ( GRADE 2 ), OR C.

### PAGE 2

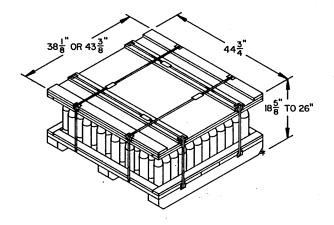
#### ( GENERAL NOTES CONTINUED )

- R. FOR ADDITIONAL GUIDANCE, ATTENTION IS DIRECTED TO THE "SPECIAL NOTES" SECTIONS WHICH ARE ADJACENT TO THE DEPICTED OUTLOADING METHODS.
- S. POWER DRIVEN STAPLES MAY BE USED AS ALTERNATIVE FASTEMERS FOR MAILS. WHEN CONSTRUCTING DUNNAGE WHICH ARE TO BE USED IN THE DELINEATED TRAILER LOADS SHOWN THROUGHOUT THIS DRAWING. THE STAPLES TO BE USED MUST BE EQUAL IN LENGTH TO THE SPECIFIED NAIL SIZE AND MUST BE SUBSTITUTED ON A ONE STAPLE FOR ONE NAIL BASIS. STAPLES WHICH ARE 2-1/2" OR LESS IN LENGTH SHOULD BE IN ACCORDANCE WITH FEDERAL SPECIFICATION FF-N-105 AS NEARLY AS PRACTICABLE. STAPLES WHICH ARE LONGER THAN 2-1/2" WILL BE A COMMERCIAL GRADE, OF A QUALITY EQUIVALENT TO THOSE MANUFACTURED BY SENCO PRODUCTS INCORPORATED.
- T. TRAILERS HAVING WIDTH AND LENGTH DIMENSIONS DIFFERENT THAN THOSE SPECIFIED WITHIN THIS DOCUMENT MAY BE USED FOR SHIPMENT OF THE DEPICTED PALLET UNITS PROVIDED THAT THE TRAILERS CONFORM TO THE GUIDANCE CONTAINED IN GENERAL NOTE "C" AT LEFT. WHEN USING TRAILERS OF A LENGTH DIFFERENT THAN THOSE DEPICTED IN THE LOAD VIEWS, CARE MUST BE TAKEN TO INSURE THAT THERE IS AT LEAST A 12" VOID FROM THE REAR OF THE PALLA-GARD UNITS TO THE METAL THRESHOLD OF THE TRAILER. THIS 12" VOID WILL PERMIT PROPER ENGAGEMENT OF THE PALLA-GARD DEVICES INTO THE WOOD FLOOR OF THE TOP. TRAILER WHEN THE LOAD INCURS FORCES INCIDENT TO NORMAL TRANSPORTATION.



### TYPICAL BOXED-TYPE PALLET UNIT

THIS PALLET IS DETAILED BY ORDANCE CORPS DRAWING NO. F-7548604. THE PALLET IS DESIGNED FOR SHIPMENT OF THE DESIGNATED 2.75 INCH, 75MM, 76MM, 81MM, 90MM, 105MM, 106MM, AND 120MM AMMUNITION ITEMS. THE PALLET UNITS RANGE IN WEIGHT FROM 473 POUNDS TO 2,821 POUNDS. OUTLOADING PROCEDURES FOR BOXED-TYPE PALLET UNITS ARE SHOWN ON PAGES 4 AND 5.

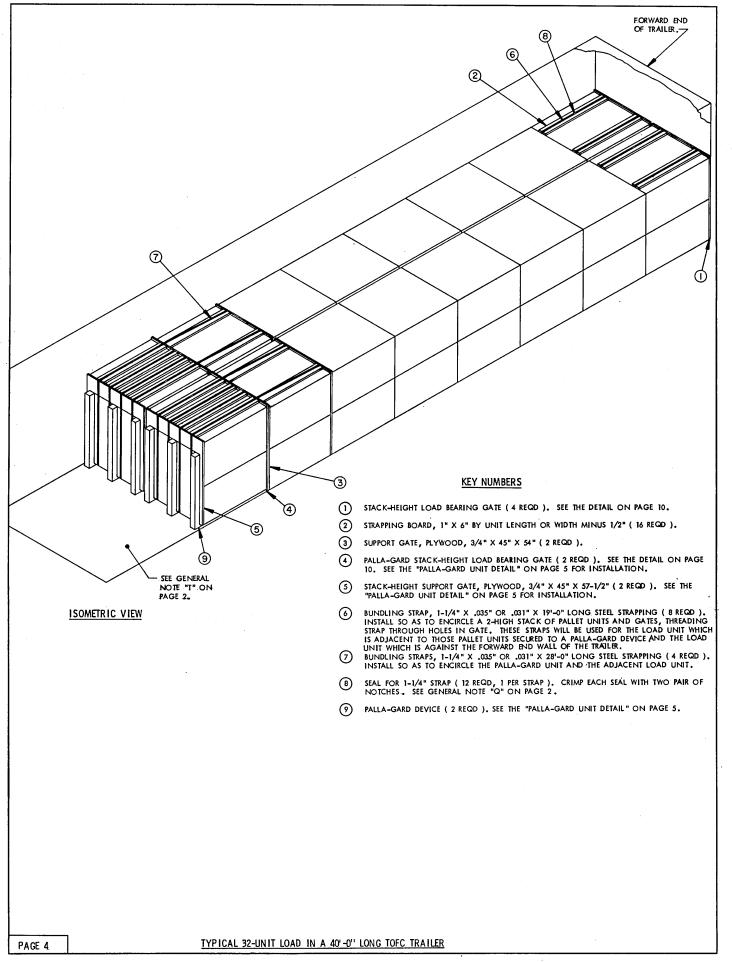


# TYPICAL "OPEN-TYPE" PALLET UNIT

THIS PALLET IS DETAILED BY PICATINNY ARSENAL DRAWING NO. F-8837835. THE PALLET IS DESIGNED FOR SHIPMENT OF THE DESIGNATED 2,75 INCH, 75MM, 76MM, 90MM, 105MM, 106MM, 120MM, 152MM, 155MM, AND 165MM AMMUNITION.ITEMS. THE PALLET UNITS RANGE IN WEIGHT FROM 912 POUNDS 10'3,225 POUNDS. DUTLOADING PROCEDURES FOR "OPEN-TYPE" PALLET UNITS ARE SHOWN ON PAGES 6. THRU 9.

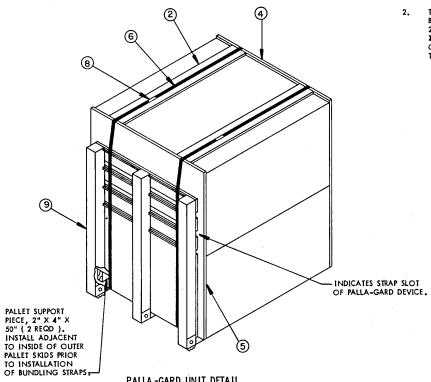
UNIT DETAILS

PAGE 3



### SPECIAL NOTES:

- A 40'-0" LONG BY 7'-8" WIDE ( INSIDE DIMENSION ) TOFC VAN TRAILER IS SHOWN. TRAILERS OF OTHER DIMENSIONS CAN BE USED, SEE GENERAL NOTES "C" AND "T" ON PAGE 2.
- THE TYPICAL PALLET UNIT SHOWN IN THE ISOMETRIC VIEW IS A BOXED-TYPE PALLET UNIT MEASURING 50" LONG BY 45" WIDE BY 28-1/2" HIGH AND WEIGHING 1,200 POUNDS. THE ACTUAL QUANTITY THAT CAN BE SHIPPED WILL DEPEND UPON THE WEIGHT AND/OR SIZE OF THE ITEM BEING LOADED AND THE CAPACITY OF THE TRAILER BEING USED.



PALLA -GARD UNIT DETAIL

INDICATES A TWO-HIGH STACK OF 105MM METAL PARTS PALLET UNITS. NOTE: STACK IS TO BE CENTERED. LATERALLY ON PALLA-GARD DEVICE.

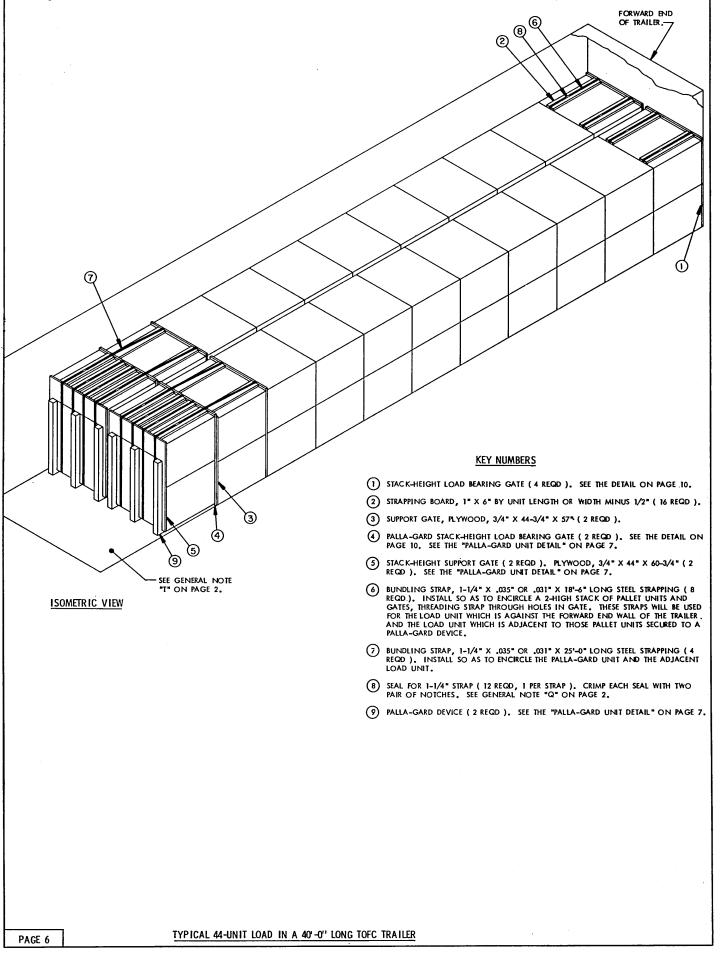
LUMBER	LINEAR FEET	BOARD FEET	
1" X 6"	64	32	
2" X 4"	17	12	
PLYWOOD, 3/4	" THICK 179 SQ	FT RECAD 369 LBS	
STEEL STRAPPIN	G, 1-1/4" 264' REG	CAD 38 LBS	
SEAL FOR 1-1/4	I" STRAPPING 12 REG	CAD 1/2	

# LOAD AS SHOWN

ITEM QUANTITY WEIGHT ( APPROX ) M735, 105MM PALLET UNIT --DUNNA GE -------- 35,840 LBS

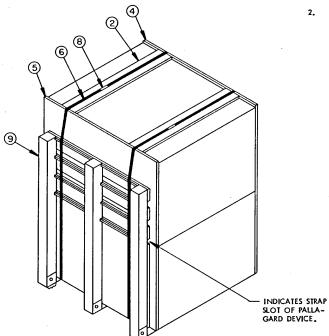
TYPICAL 32-UNIT LOAD IN A 40'-0" LONG TOFC TRAILER

TOTAL WEIGHT ----- 36,956 LBS





- A 40"-0" LONG BY 7"-8" WIDE (INSIDE DIMENSION) TOFC VAN TRAILER IS SHOWN. TRAILERS OF OTHER DIMENSIONS CAN BE USED. SEE GENERAL NOTES "C" AND "I" ON PAGE 2.
- 2. THE TYPICAL PALLET UNIT SHOWN IN THE ISOMETRIC VIEW IS AN "OPEN-TYPE" PALLET UNIT MEASURING 38-1/2" LONG BY 44-3/4" WIDE BY 30" HIGH AND ... WEIGHING 912 POUNDS, THE ACTUAL QUANTITY THAT CAN BE SHIPPED WILL DEPEND UPON THE WEIGHT AND/OR SIZE OF THE ITEM BEING LOADED AND THE CAPACITY OF THE TRAILER BEING USED.



### PALLA-GARD UNIT DETAIL

INDICATES A TWO-HIGH STACK OF 165MM PALLET UNITS. <u>NOTE:</u> STACK IS TO BE CENTERED LATERALLY ON A PALLA-GARD DEVICE.

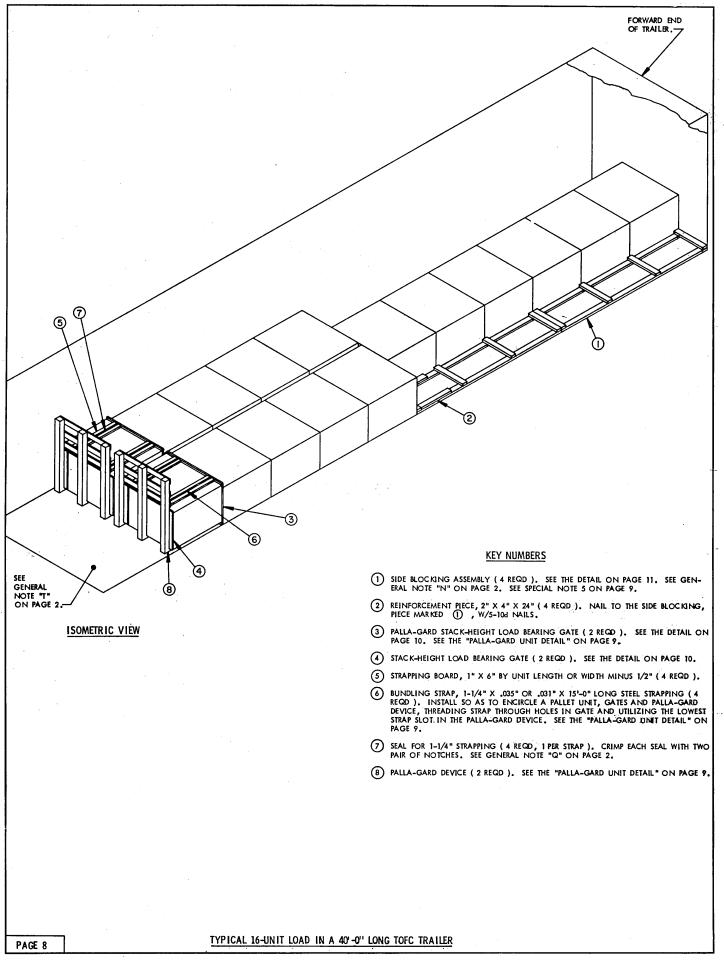
	BILL OF MATERIAL					
LUMBER	LINEAR FEET	BOARD FEET				
1" X 6"	51	26				
PLYWOOD, 3/4" THICK 185 SQ FT REQD 382 STEEL STRAPPING, 1-1/4" 248' REQD 35 SEAL FOR 1-1/4" STRAPPING 12 REQD						
PALLA-GARD D	PALLA-GARD DEVICE 2 REQD620 LBS					

## LOAD AS SHOWN

TOTAL WEIGHT =---- 41,218 LBS

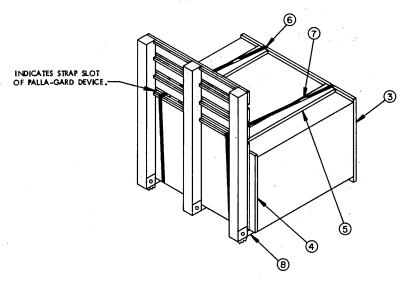
TYPICAL 44-UNIT LOAD IN A 40'-0" LONG TOFC TRAILER

PAGE 7



#### SPECIAL NOTES:

- 1. A 40'-0" LONG BY 7-8" WIDE ( INSIDE DIMENSION) TOPC VAN TRAILER IS SHOWN. TRAILERS OF OTHER DIMENSIONS CAN BE USED. SEE GENERAL NOTES "C" AND "T" ON PAGE 2.
- THE TYPICAL PALLET UNIT SHOWN IN THE ISOMETRIC VIEW IS AN "OPEN-TYPE" PALLET UNIT MEASURING 38-1/8" LONG BY 44-3/4" WIDE BY 25-5/8" HIGH AND WEIGHING 2,548 POUNDS. THE ACTUAL QUANTITY THAT CAN BE SHIPPED WILL DEPEND UPON THE WEIGHT OF THE ITEM BEING LOADED AND THE CAPACITY OF THE TRAILER BEING USED
- 3. THE TYPICAL LOAD SHOWN IS APPLICABLE FOR THE "OPEN-TYPE" PALLET UNITS AS DETAILED BY PICATINNY ARSENAL DRAWING NO., F-8837835. THE LOAD IS ALSO APPLICABLE FOR THE BOXED-TYPE PALLET UNITS AS DETAILED BY ORDNANCE CORPS DRAWING NO., F-7548604. THE PROCEDURES ARE APPLICABLE FOR LOADS WHICH CONSIST OF A FULL OR PARTIAL FIRST LAYER, AND WHICH MAY BE CLASSED EITHER AS A FULL LOAD OR AS AN LTL, DEPENDING UPON THE WEIGHT OF THE ITEM BEING LOADED.
- THE 2-WIDE PORTION OF A LOAD MAY BE DIVIDED, WITH SOME OF THE SIDE-BY-SIDE UNITS PLACED AT THE FORWARD END OF THE TRAILER, AS NECESSARY TO PROVIDE FOR PROPER WEIGHT DISTRIBUTION.
- THE SIDE BLOCKING ASSEMBLY SHOWN IS DESIGNED FOR THE BRACING OF THREE ( 3 ) PALLETS; THE ASSEMBLY MAY BE ADAPTED AS NECESSARY FOR BRACING AGAINST ONE OR TWO PALLET UNITS.



# PALEA-GARD UNIT DETAIL

INDICATES ONE PALLET UNIT OF 120MM PROJECTILES. NOTE: PALLET UNIT IS TO BE CENTERED LATERALLY ON A PALLAGARD DEVICE.

# LOAD AS SHOWN

QUANTITY

WEIGHT ( APPROX )

120MM PALLET UNIT -- 16 -----DUNNAGE --

TOTAL WEIGHT ----- 41,629 LBS

TYPICAL 16-UNIT LOAD IN A 40'-0' LONG TOFC TRAILER

. B DEL NOFT MATTER NATI. ("TYP.IOAL.)

LINEAR FEET

NO. REQD

12 113

106

PLYWOOD, 3/4" THICK ----- 35 SQ FT STEEL STRAPPING, 1-1/4" ---- 60' REQD SEAL FOR 1-1/4" STRAPPING - 4 REQD

LUMBER

1" X 6" 2" X 4"

NAILS

104 (3")

PALLA-GARD DEVICE --

BOARD FEET

6 75

POUNDS

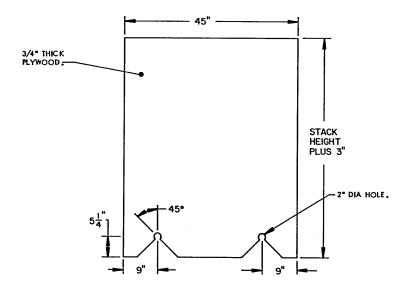
- AB LBS

NIL -620 LBS

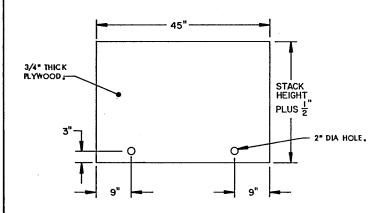
-- 35 SQ FT REQD ---

-- 2 REQD

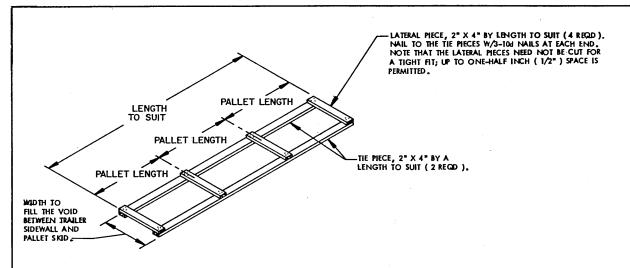
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PALLA-GARD STACK-HEIGHT LOAD BEARING GATE



STACK-HEIGHT LOAD BEARING GATE



## SIDE BLOCKING

THIS ASSEMBLY IS DESIGNED FOR THE BRACING OF THREE PALLET UNITS; THE ASSEMBLY MAY BE ADAPTED AS NECESSARY FOR BRACING AGAINST ONE OR TWO PALLET UNITS.

**DETAILS** 

