

# PATRIOT

## LOADING AND BRACING (TL & LTL) IN VAN TRAILERS\* OF PATRIOT (PAC-3) PACKED IN SHIPPING AND STORAGE CANISTERS

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\* **CAUTION:** THE PROCEDURES SHOWN HEREIN ARE ONLY APPLICABLE FOR HIGHWAY MOVEMENTS; NOT FOR TRAILER-ON-FLATCAR (TOFC) MOVEMENTS.

### U.S. ARMY MATERIEL COMMAND DRAWING

<p style="text-align: center; font-size: small;">APPROVED, U.S. ARMY AVIATION AND MISSILE COMMAND</p> <div style="text-align: center; font-size: 2em; font-family: cursive;">P. Klee</div>	<b>CAUTION: VERIFY PRIOR TO USE AT WWW.DAC.ARMY.MIL THAT THIS IS THE MOST CURRENT VERSION OF THIS DOCUMENT. THIS IS PAGE 1 OF 20.</b>			
<p style="text-align: center; font-size: small;">APPROVED BY ORDER OF COMMANDING GENERAL, U.S. ARMY MATERIEL COMMAND</p> <div style="text-align: center; font-size: 2em; font-family: cursive;">Gary B. Carney</div> <p style="text-align: center; font-size: x-small;">U.S. ARMY DEFENSE AMMUNITION CENTER</p>	DO NOT SCALE		SEPTEMBER 2007	
	ENGINEER OR TECHNICIAN	BASIC REV.	MELVIN SIX	
	TRANSPORTATION ENGINEERING DIVISION	Laura A. Fife		
VALIDATION ENGINEERING DIVISION	TESTED	CLASS	DIVISION	DRAWING
ENGINEERING DIRECTORATE	TESTED	19	48	8219
				FILE
				GM11PA3

**GENERAL NOTES**

(GENERAL NOTES CONTINUED)

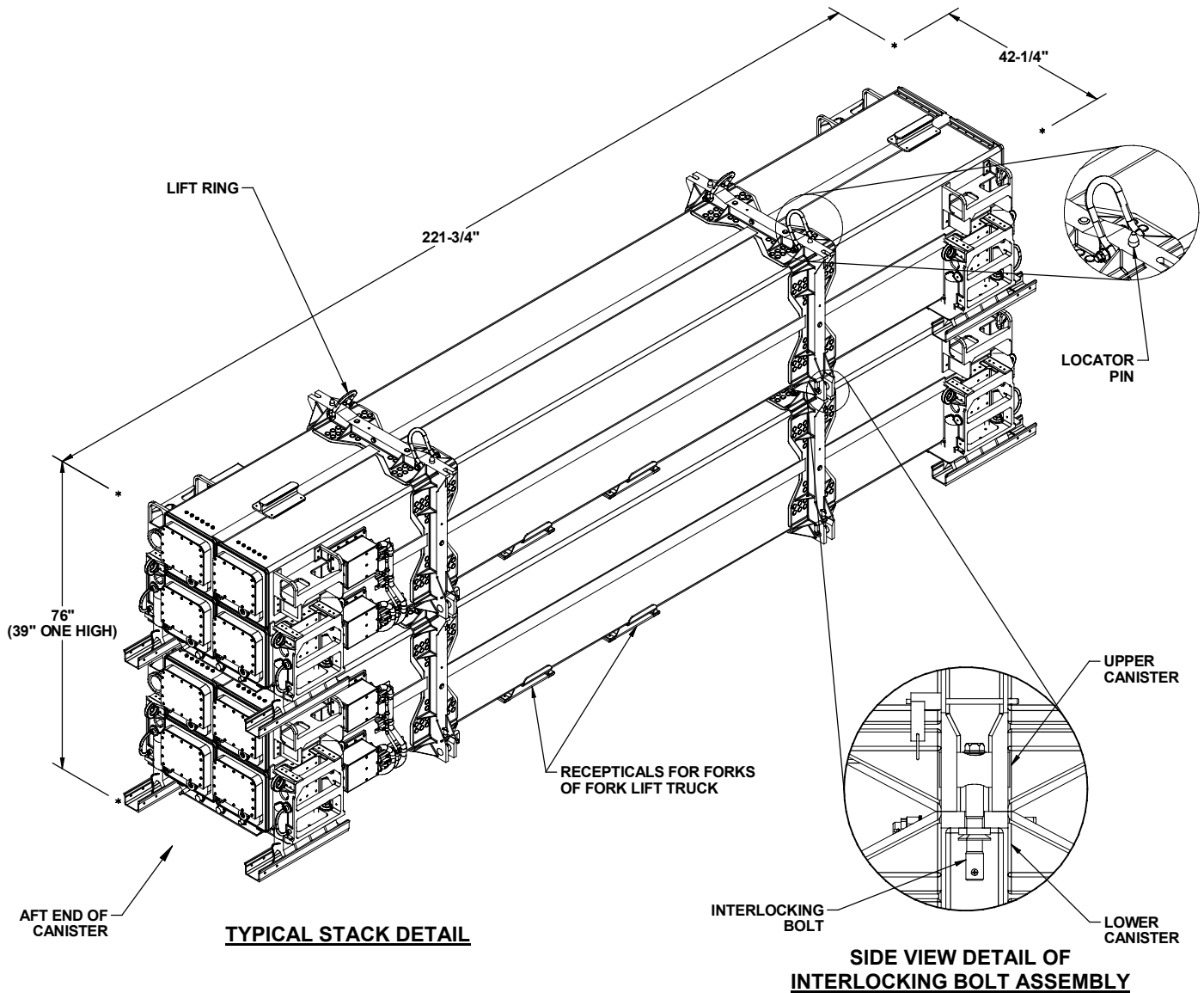
- A. THIS DOCUMENT HAS BEEN PREPARED AND ISSUED IN ACCORDANCE WITH AR 740-1 AND AUGMENTS TM 743-200-1 (CHAPTER 5).
- B. THE OUTLOADING PROCEDURES SPECIFIED IN THIS DRAWING ARE APPLICABLE TO PATRIOT ADVANCED CAPABILITY-3 (PAC-3) COMPLETE ROUND, WHEN PACKED IN THE MISSILE CANISTER (SHIPPING, STORAGE AND LAUNCH CANISTER). SEE PAGE 3 AND LOCKHEED-MARTIN DRAWING 13506000 FOR DETAILS OF THE CANISTER.
- C. THE OUTLOADING PROCEDURES DEPICTED WITHIN THIS DOCUMENT ARE APPLICABLE FOR SHIPMENTS IN CONVENTIONAL TYPE VAN TRAILERS AND APPLY TO TRAILERS HAVING WOOD, OR WOOD AND METAL, OR ALL METAL FLOORS. REGARDLESS OF THE DIMENSIONS OF THE VAN TRAILERS SHOWN, THE PROCEDURES ARE ALSO APPLICABLE FOR TRAILERS WHICH ARE 89" THRU 101" IN WIDTH AND FOR TRAILERS OF OTHER LENGTHS FROM THE SHORTEST TO THE LONGEST AVAILABLE (REF: 24' TO 53'), AND FOR STRAIGHT TRUCK VANS. THE SPECIFIED BRACING IS ADEQUATE FOR LOADS WEIGHING UP TO AND INCLUDING THE MAXIMUM WEIGHTS PERMITTED BY LAW.
- D. 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. THE TOTAL WEIGHT OF THE LADING, OF THE DUNNAGE, OF THE TRACTOR, AND OF THE SEMITRAILER CARRYING THE LADING MUST NOT EXCEED THE MAXIMUM GROSS WEIGHT ALLOWED FOR THE STATE OR STATES THRU WHICH THE LOAD IS TO BE TRANSPORTED BY MOTOR CARRIER. LIKEWISE, THE GROSS WEIGHT ON A SINGLE OR TANDEM AXLE MUST NOT EXCEED THE MAXIMUM ALLOWABLE WEIGHT. IF THERE IS ANY DOUBT AS TO WHETHER THE TOTAL GROSS WEIGHT OR AXLE WEIGHT EXCEEDS THE MAXIMUM ALLOWED, WEIGHT SHOULD BE VERIFIED BY ACTUALLY WEIGHING THE LOADED VEHICLE.
- E. **NOTICE:** A SHIPMENT WILL BE POSITIONED IN THE TRAILER CONSISTENT WITH STATE WEIGHT LAWS. THE NUMBER OF LADING UNITS MAY BE ADJUSTED TO FIT THE SIZE OF THE TRAILER TO BE LOADED OR THE QUANTITY TO BE SHIPPED. COMBINATIONS OF THE OUTLOADING PROCEDURES SPECIFIED MAY BE USED, HOWEVER, THE APPROVED METHODS SHOWN MUST BE FOLLOWED AS CLOSELY AS POSSIBLE FOR BLOCKING, BRACING, AND STAYING OF THE DESIGNATED ITEMS.
- F. THE "LOAD AS SHOWN" FOR MOST OF THE FULL LOADS DEPICTED HEREIN IS BASED ON AN APPROXIMATE LADING WEIGHT OF 36,000 POUNDS. THE SPECIFIED BLOCKING AND BRACING FOR THE FULL LOADS IS ADEQUATE FOR THE RETENTION OF LOADS, UP TO 45,000 POUNDS, IF IT IS DESIRED TO INCREASE THE LADING WEIGHT.
- G. OTHER TYPES OF LADING ITEMS MAY BE LOADED INTO TRAILERS WHICH ARE PARTIALLY LOADED WITH CANISTERS, PROVIDING 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 HEREIN.
- H. SOME LOADS ARE SHOWN IN TRAILERS HAVING ROUNDED CORNERS AT THE FORWARD END. IF THE CONVENTIONAL VAN TRAILER BEING USED IS EQUIPPED WITH A SQUARE FRONT OR WITH AN INSTALLED BULKHEAD, OMIT THE FORWARD BLOCKING ASSEMBLY AND POSITION THE CANISTERS DIRECTLY AGAINST THE FORWARD PORTION OF THE TRAILER.
- J. DUNNAGE LUMBER SPECIFIED THROUGHOUT THIS PROCEDURAL DRAWING IS OF NOMINAL SIZE. FOR EXAMPLE, 2" X 4" MATERIAL IS ACTUALLY 1-1/2" THICK BY 3-1/2" WIDE AND 2" X 6" MATERIAL IS ACTUALLY 1-1/2" THICK BY 5-1/2" WIDE.

- K. **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 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 ONTO OR RIGHT BESIDE A NAIL IN A LOWER PIECE.
- L. POWER DRIVEN STAPLES MAY BE USED AS ALTERNATIVE FASTENERS FOR NAILS WHEN CONSTRUCTING DUNNAGE ASSEMBLIES 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 ASTM F1667 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. **NOTE:** STAPLES WILL NOT BE SUBSTITUTED FOR NAILS IN ANY LOAD RESTRAINING FLOOR DUNNAGE APPLICATION.
- M. PORTIONS OF THE TRAILERS, SUCH AS SIDEWALLS, ENDWALLS, AND ROOFS, HAVE NOT BEEN SHOWN IN THE LOAD VIEWS FOR CLARITY PURPOSES.
- N. THE UNBLOCKED SPACE ACROSS THE WIDTH OF A LOAD BAY IS NOT TO EXCEED 6". EXCESSIVE SLACK CAN BE ELIMINATED FROM A LOAD BY INCREASING THE LENGTH OF THE STRUTS ON THE CRIB FILL ASSEMBLIES.
- O. IF THE SPACE AT THE REAR OF THE LOAD, BETWEEN THE CANISTERS AND THE REAR DOOR MEASURES 1-1/2" OR LESS REAR BLOCKING IS NOT REQUIRED. IF THE SPACE AT THE REAR OF THE LOAD IS GREATER THAN 1-1/2" BUT LESS THE 9", USE THE "REAR BLOCKING ASSEMBLY C" AS DEPICTED ON PAGE 20. IF THE VOID AT THE REAR OF THE LOAD IS 9" OR GREATER, USE THE REAR BLOCKING ASSEMBLY "A", OR "B", AS SHOWN ON PAGE 19. **NOTE:** REAR BLOCKING ASSEMBLIES MAY BE REPLACED WITH NAILED HEADERS AT THE REAR OF THE LOAD, PROVIDED THE TRAILER IS CONFIGURED SUCH AS TO ALLOW NAILING IN THE AREA IN QUESTION. REFER TO THE REAR HEADER ON PAGE 4 AND THE HEADER NAILING CHARTS ON PAGE 5 FOR GUIDANCE. **CAUTION:** THE NAILED HEADER METHOD IS REQUIRED WHEN LOADING VAN TRAILERS EQUIPPED WITH ROLL-UP TYPE DOORS.
- P. **CAUTION:** WHEN POWER OR PNEUMATIC NAILERS ARE BEING USED IN THE APPLICATION OF NAILED FLOORLINE BLOCKING OR BRACING, CANISTERS BEING LOADED INTO THE CONVEYANCE MUST BE POSITIONED TO ALLOW A CLEAR PATH OF EXIT FOR THE OPERATOR AT ALL TIMES, SHOULD AN EMERGENCY EXIT BECOME NECESSARY.
- Q. THESE PROCEDURES CAN ALSO BE UTILIZED FOR THE SHIPMENT OF CANISTERS WHEN THEY ARE LOADED WITH AN ITEM OTHER THAN THE SPECIFIED SIDEWINDER MISSILES, OR WHEN THEY ARE EMPTY.
- 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. ANTI-CHAFING MATERIAL MAY BE INSTALLED AT POINTS OF CONTACT BETWEEN CANISTERS AND THE VAN TRAILER OR BETWEEN INDIVIDUAL CANISTERS, IF DESIRED, TO PREVENT CHAFING DAMAGE TO CANISTERS.

(CONTINUED AT RIGHT)

**MATERIAL SPECIFICATIONS**

- LUMBER** - - - - - : SEE TM 743-200-1 (DUNNAGE LUMBER) AND VOLUNTARY PRODUCT STANDARD PS 20.
- NAILS** - - - - - : ASTM F1667; COMMON STEEL NAIL (NLCMS OR NLCMMS).
- ANTI-CHAFING MATERIAL** - - - - - : MIL-PRF-121 (OR EQUAL); NEUTRAL BARRIER MATERIAL.
- WIRE, CARBON STEEL** - - : ASTM A853; ANNEALED AT FINISH, BLACK OXIDE FINISH, 0.0800" DIA, GRADE 1006 OR BETTER.



**TYPICAL STACK DETAIL**

**SIDE VIEW DETAIL OF INTERLOCKING BOLT ASSEMBLY**

**PATRIOT PAC-3 DETAIL**

GROSS WEIGHT - - - - - 4,399 LBS (APPROX)  
 CUBE - - - - - 209.2 CU FT (APPROX)

**UNITIZATION AND HANDLING PROCEDURAL GUIDANCE**

(PROCEDURAL GUIDANCE CONTINUED)

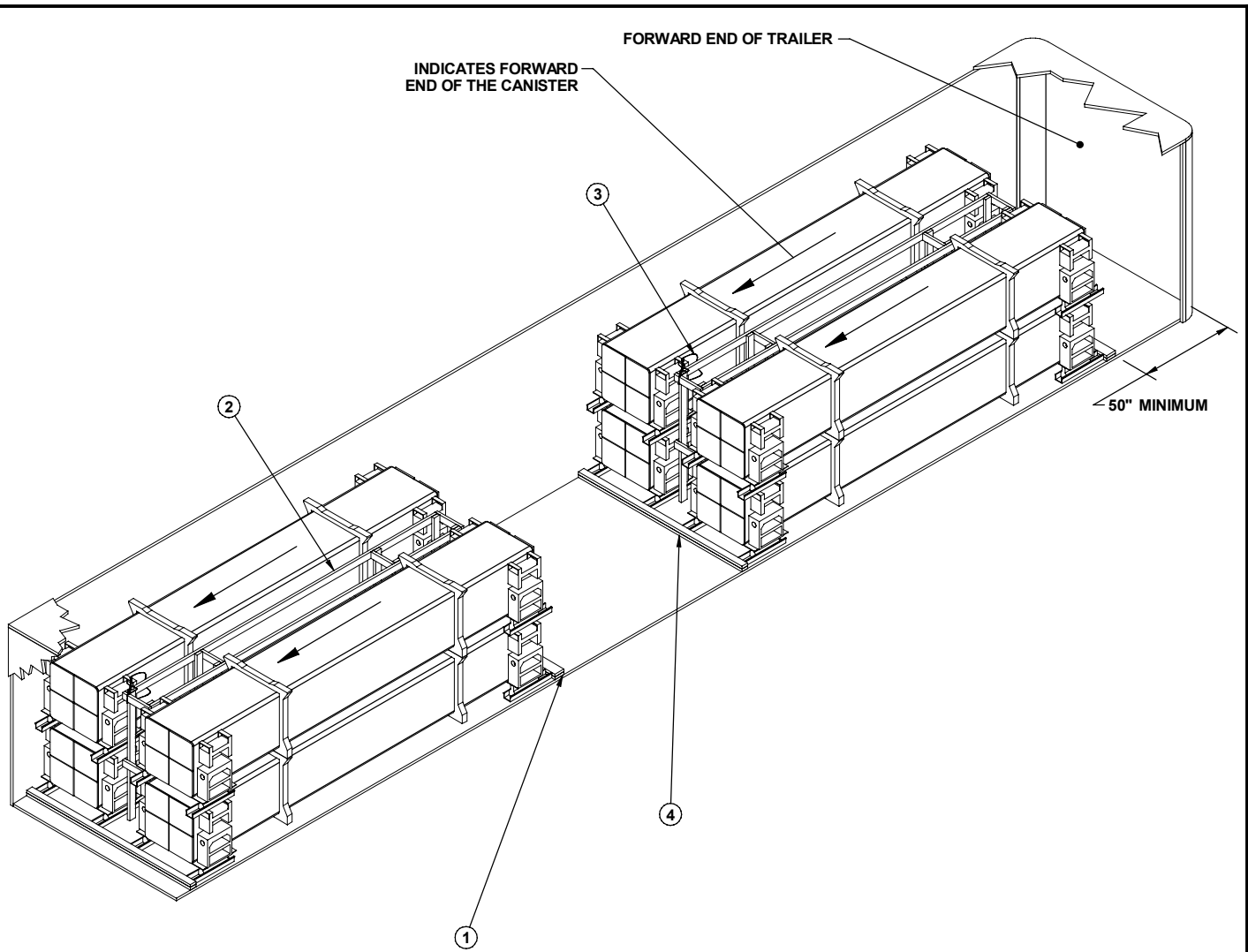
1. STACKING CANISTER FOR UNITIZATION.
  - A. THE UPPER CANISTER STACK FRAME MUST BE FULLY SEATED UPON THE LOCATOR PINS OF THE LOWER CANISTER.
  - B. POSITION THE FORWARD END OF THE UPPER CANISTER ABOVE THE FORWARD END OF THE LOWER CANISTER.
  - C. CANISTER INTERLOCKING BOLTS MUST BE TIGHTENED AS SECURELY AS POSSIBLE WITH A NORMAL HAND TOOL WRENCH (REF: 60 FOOT POUNDS).
2. CANISTER OR CANISTER STACK HANDLING.

- A. ONLY APPROVED AND APPROPRIATELY SIZED MATERIALS HANDLING EQUIPMENT WILL BE USED FOR HANDLING THE DEPICTED CANISTERS.
- B. IF HANDLING IS ACCOMPLISHED WITH A FORK 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 FORKLIFT TINES OR THE FORKLIFT PACKAGE GUARD. FOR VERY SHORT "INCHING" SPEED MOVEMENTS, SUCH AS WILL BE EXPERIENCED DURING CONTAINER LOADING, A TWO-HIGH CANISTER STACK MAY BE HANDLED BY INSERTING THE FORKS OF THE FORKLIFT TRUCK INTO THE FORK RECEPTACLES OF THE UPPER CANISTER.
- C. SLINGING OF A CANISTER OR A CANISTER STACK WILL BE IN ACCORDANCE WITH APPROVED PROCEDURES.

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.

(CONTINUED AT RIGHT)



**ISOMETRIC VIEW**

**KEY NUMBERS**

- ① FORWARD HEADER, 2" X 6" BY TRAILER WIDTH MINUS 1/2" (DOUBLED) (2 REQD). NAIL THE FIRST PIECE TO THE TRAILER FLOOR W/6-10d NAILS. NAIL THE SECOND PIECE TO THE FIRST PIECE W/6-20d NAILS. SEE THE HEADER NAILING CHARTS ON PAGE 5 AND SPECIAL NOTE 2 ON PAGE 5.
- ② CRIB FILL ASSEMBLY A (2 REQD). SEE THE DETAIL ON PAGE 15 AND SPECIAL NOTE 3 ON PAGE 5.
- ③ TIE WIRE, .0800" DIA 24" LONG (4 REQD, 2 PER CRIB FILL ASSEMBLY). INSTALL THE WIRE TO FORM A COMPLETE LOOP AROUND THE CRIB FILL ASSEMBLY END STRUT AND THE CANISTER. BRING BOTH ENDS TOGETHER AND TWIST TAUT.
- ④ REAR HEADER, 2" X 4" BY TRAILER WIDTH MINUS 1/2" (DOUBLED) (2 REQD). NAIL THE FIRST PIECE TO THE TRAILER FLOOR W/8-10d NAILS. NAIL THE SECOND PIECE TO THE FIRST PIECE W/8-10d NAILS. SEE THE HEADER NAILING CHARTS ON PAGE 5 AND SPECIAL NOTE 4 ON PAGE 5.

FORWARD HEADER NAILING CHART*	
#NAILS	MAX. LOAD WEIGHT (LBS)
3	15,000
4	20,000
5	25,000
6	30,000
7	35,000
8	40,000
9	45,000

• HEADERS AT THE FRONT END OF A LOAD OR AT THE FRONT END OF A DIVIDED LOAD WILL BE DOUBLED 2" X 6" MATERIAL. THE NUMBER OF NAILS INDICATED ABOVE REFERS TO THE NUMBER OF NAILS USED IN EACH LAMINATION OF A HEADER, FOR EXAMPLE 8 NAILS MEANS THE FIRST BOARD IS NAILED TO THE TRAILER FLOOR W/8-10d NAILS, AND THE SECOND BOARD IS LAMINATED TO THE FIRST W/8-20d NAILS, FOR A TOTAL OF 8-10d AND 8-20d NAILS PER HEADER. A MINIMUM OF 6 PAIRS OF NAILS WILL BE USED FOR TRAILER WIDTH HEADERS.

REAR HEADER NAILING CHART*	
#NAILS	MAX. LOAD WEIGHT (LBS)
6	15,000
7	17,500
8	20,000
9	22,500
10	25,000
11	27,500
12	30,000
13	32,500
14	35,000
15	37,500
16	40,000
17	42,500
18	45,000

\* HEADERS AT THE REAR OF A FULL LOAD OR AT THE REAR END OF A DIVIDED LOAD WILL BE DOUBLED 2" X 4" MATERIAL. THE NUMBER OF NAILS INDICATED ABOVE REFERS TO THE NUMBER OF NAILS USED IN EACH LAMINATION OF A HEADER, FOR EXAMPLE 8 NAILS MEANS THE FIRST BOARD IS NAILED TO THE TRAILER FLOOR W/8-10d NAILS, AND THE SECOND BOARD IS LAMINATED TO THE FIRST W/8-10d NAILS, FOR A TOTAL OF 16-10d NAILS. A MINIMUM OF 6 PAIRS OF NAILS WILL BE USED FOR TRAILER WIDTH HEADERS. NOTE: REAR HEADERS MAY BE HANDLED IN THE SAME MANNER AS FORWARD HEADERS, USING 2" X 6" MATERIAL WITH 10d AND 20d NAILS, IF DESIRED.

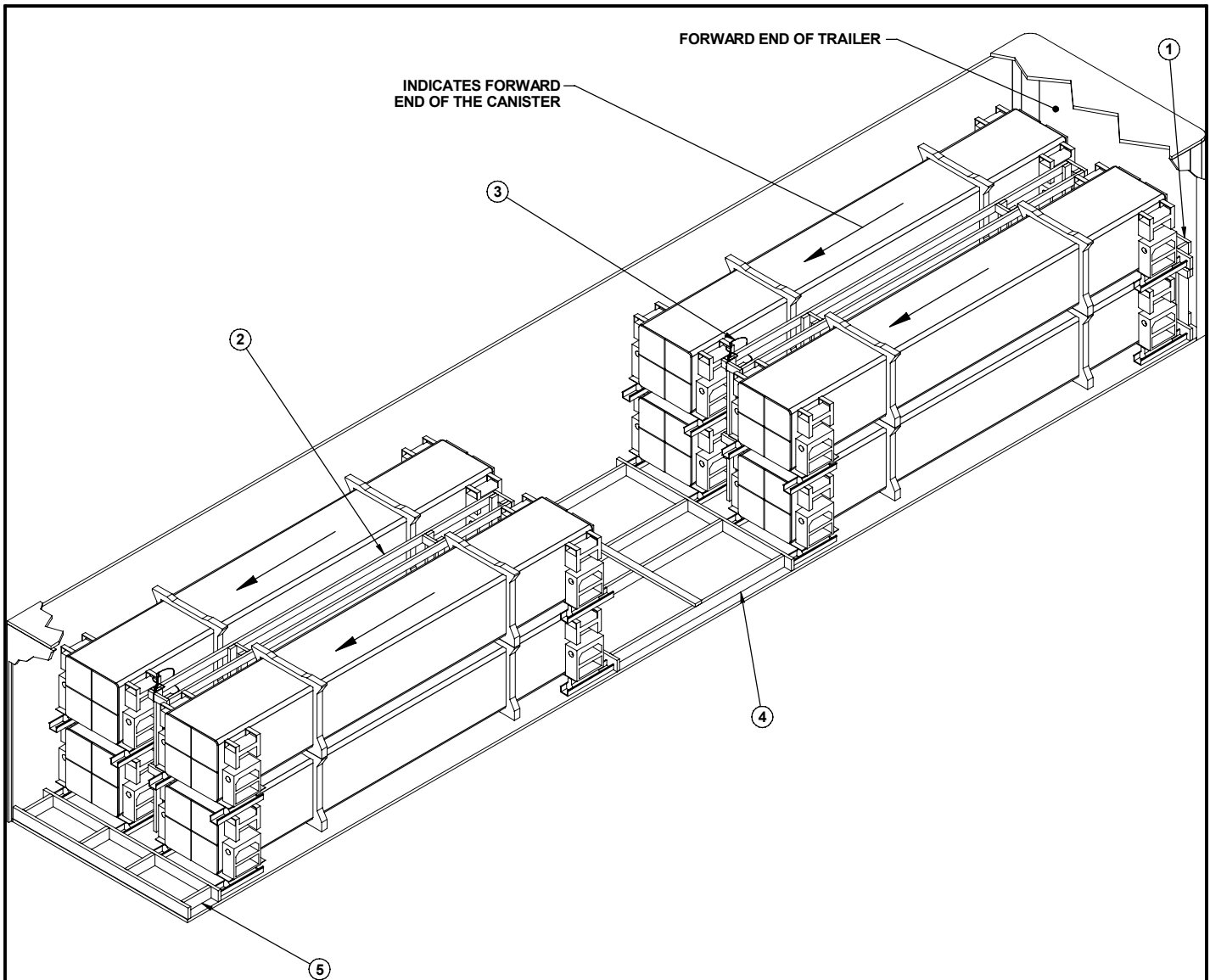
**SPECIAL NOTES:**

1. A 53'-0" LONG BY 8'-5" WIDE (INSIDE DIMENSION) VAN TRAILER WITH ROUNDED FRONT CORNERS IS SHOWN. TRAILERS OF OTHER DIMENSIONS CAN BE USED.
2. THE 50" MINIMUM FROM THE FRONT OF THE TRAILER TO THE FORWARD HEADER IS REQUIRED TO PROVIDE AN ALLOWABLE AXLE WEIGHT DISTRIBUTION IN AN AVERAGE TRAILER. THE FORWARD HEADER MAY BE OMITTED IN ACCORDANCE WITH GENERAL NOTE "H" ON PAGE 2 IF THE RESULTANT AXLE WEIGHT DISTRIBUTION OF THE LOADED TRAILER WILL BE IN ACCORDANCE WITH STATE WEIGHT LAWS.
3. CRIB FILL ASSEMBLIES MAY BE OMITTED WHEN THE SPACE BETWEEN LATERALLY ADJACENT CANISTERS IS 6" OR LESS. ANTI-CHAFING MATERIAL MAY BE PLACED BETWEEN ADJACENT CONTAINERS.
4. IF THE SPACE AT THE REAR OF THE LOAD, BETWEEN THE CANISTERS AND THE REAR DOOR IS 1-1/2" OR LESS, REAR BLOCKING IS NOT REQUIRED. IF THE TRAILER IS EQUIPPED WITH A METAL THRESHOLD PLATE AND IT INTERFERES WITH THE NAILING OF THE REAR HEADER, ONE OF THE REAR BLOCKING ASSEMBLIES DESCRIBED BELOW MUST BE INSTALLED. IF THE SPACE AT THE REAR OF THE LOAD IS GREATER THAN 1-1/2" BUT LESS THAN 9", USE THE "REAR BLOCKING ASSEMBLY C" AS DETAILED ON PAGE 20. IF THE SPACE AT THE REAR OF THE LOAD IS 9" OR GREATER, USE THE "REAR BLOCKING ASSEMBLY A" AS DETAILED ON PAGE 19.
5. THE SPLIT IN THE LOAD CONFIGURATION ON PAGE 4 IS SHOWN AS TYPICAL ONLY. CANISTERS MAY BE SHIFTED FORE OR AFT, THE QUANTITY IN EACH LOAD BAY MAY BE ADJUSTED OR TO SUIT THE WEIGHT OF THE UNIT BEING LOADED OR THE SUPPLIED EQUIPMENT. THE CENTER VOID BETWEEN THE LOAD BAYS MAY BE REDUCED BUT THE INTERMEDIATE FORWARD AND REAR HEADERS ARE REQUIRED.

BILL OF MATERIAL		
LUMBER	LINEAR FEET	BOARD FEET
2" X 4"	272	181
2" X 6"	34	34
NAILS	NO. REQD	POUNDS
10d (3")	172	2-3/4
20d (4")	12	1/2
WIRE, .0800" DIA	8' REQD	1/4 LB

**LOAD AS SHOWN**

ITEM	QUANTITY	WEIGHT (APPROX)
CANISTER	8	35,192 LBS
DUNNAGE		433 LBS
<b>TOTAL WEIGHT</b>		<b>35,625 LBS (APPROX)</b>



**ISOMETRIC VIEW**

**KEY NUMBERS**

- ① FORWARD BLOCKING ASSEMBLY A (1 REQD). SEE DETAILS ON PAGE 16 AND SPECIAL NOTE 1 ON PAGE 7.
- ② CRIB FILL ASSEMBLY A (2 REQD). SEE THE DETAIL ON PAGE 15 AND SPECIAL NOTE 2 ON PAGE 7.
- ③ TIE WIRE, .0800" DIA 24" LONG (4 REQD, 2 PER CRIB FILL ASSEMBLY). INSTALL THE WIRE TO FORM A COMPLETE LOOP AROUND THE CRIB FILL ASSEMBLY END STRUT AND THE CANISTER. BRING BOTH ENDS TOGETHER AND TWIST TAUT.
- ④ CENTER SPACER ASSEMBLY A (1 REQD). SEE DETAILS ON PAGE 14 AND SPECIAL NOTE 4 ON PAGE 7.
- ⑤ REAR BLOCKING ASSEMBLY A (1 REQD). SEE THE DETAIL ON PAGE 19 AND SPECIAL NOTE 3 ON PAGE 7.

**SPECIAL NOTES:**

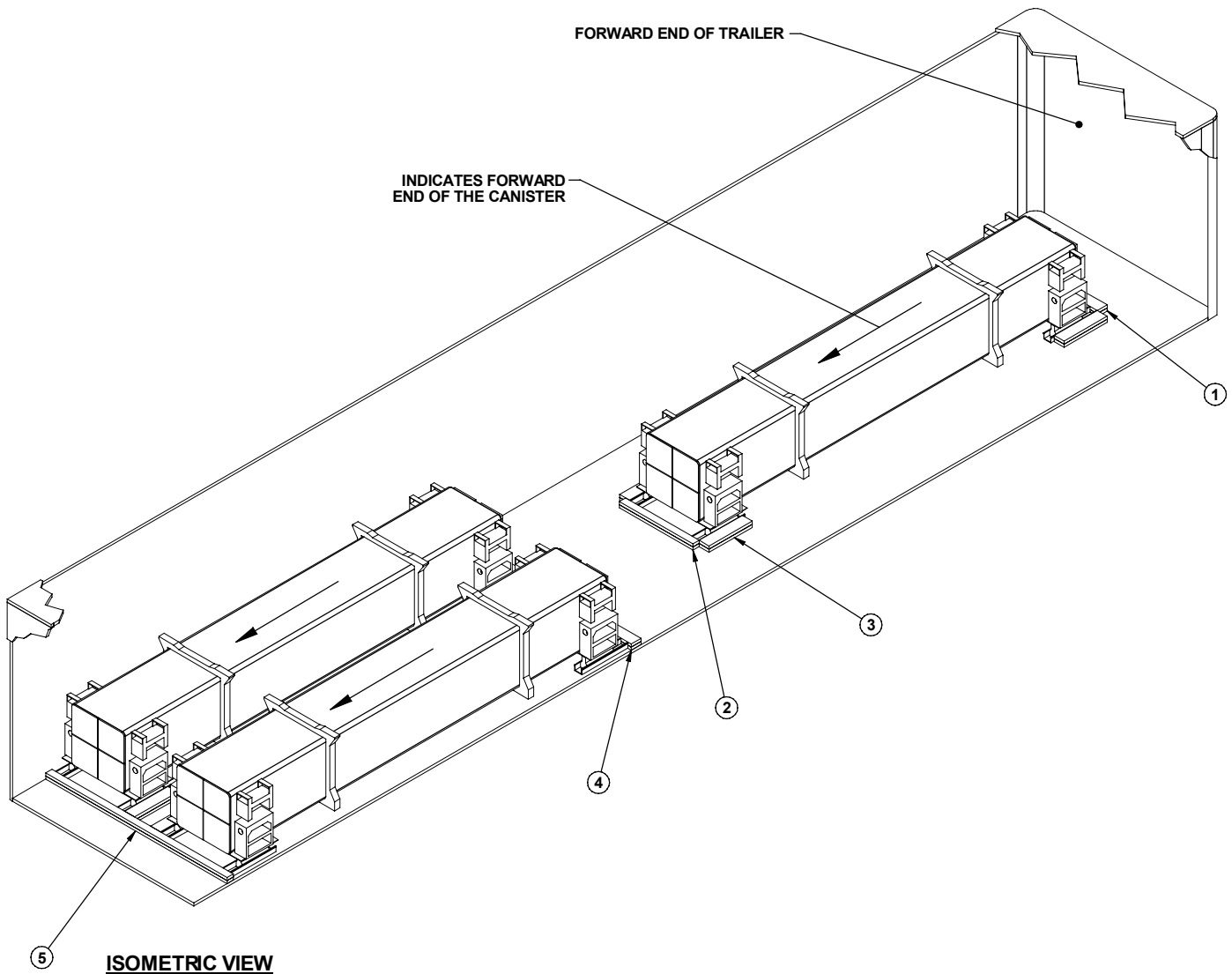
1. A 48'-0" LONG BY 8'-2" WIDE (INSIDE DIMENSION) VAN TRAILER WITH ROUND FRONT CORNERS IS SHOWN. IF A TRAILER WITH SQUARE FRONT CORNERS IS TO BE LOADED, THE "FORWARD BLOCKING ASSEMBLY A" MAY BE OMITTED. TRAILERS OF OTHER DIMENSIONS CAN BE USED.
- CRIB FILL ASSEMBLIES MAY BE OMITTED WHEN THE SPACE BETWEEN LATERALLY ADJACENT CANISTERS IS 6" OR LESS. ANTI-CHAFING MATERIAL MAY BE PLACED BETWEEN ADJACENT CONTAINERS.
- 2.
  3. IF THE SPACE AT THE REAR OF THE LOAD BETWEEN THE CANISTERS AND THE REAR DOOR IS 9" OR GREATER, USE THE "REAR BLOCKING ASSEMBLY A" AS SHOWN. IF THE SPACE AT THE REAR OF THE LOAD IS GREATER THAN 1-1/2" BUT LESS THAN 9", USE THE "REAR BLOCKING ASSEMBLY C" AS DETAILED ON PAGE 20. IF THE SPACE AT THE REAR OF THE LOAD IS 1-1/2" OR LESS, REAR BLOCKING IS NOT REQUIRED. NOTE: REAR BLOCKING ASSEMBLIES MAY BE REPLACED WITH NAILED HEADERS AT THE REAR OF THE LOAD, PROVIDED THE TRAILER IS CONFIGURED SUCH AS TO ALLOW NAILING IN THE AREA IN QUESTION. REFER TO THE REAR HEADER ON PAGE 4 AND THE HEADER NAILING CHARTS ON PAGE 5 FOR GUIDANCE.
  4. IF THE TRAILER BEING LOADED IS EQUIPPED WITH A WOOD OR WOOD AND METAL FLOOR, AND IF DESIRED, NAILED HEADERS MAY BE USED IN LIEU OF CENTER SPACER ASSEMBLIES. SEE THE LOAD ON PAGE 4 FOR DETAILS.
  5. THE SPLIT IN THE LOAD CONFIGURATION ON PAGE 6 IS SHOWN AS TYPICAL ONLY. CANISTERS MAY BE SHIFTED FORE OR AFT, THE QUANTITY IN EACH LOAD BAY MAY BE ADJUSTED OR TO SUIT THE WEIGHT OF THE UNIT BEING LOADED OR THE SUPPLIED EQUIPMENT. THE CENTER VOID BETWEEN THE LOAD BAYS MAY BE REDUCED BUT THE CENTER SPACER ASSEMBLY IS REQUIRED.

**BILL OF MATERIAL**

LUMBER	LINEAR FEET	BOARD FEET
2" X 4"	262	175
2" X 6"	113	113
NAILS	NO. REQD	POUNDS
10d (3")	249	4
WIRE, .0800" DIA	8' REQD	1/4 LB

**LOAD AS SHOWN**

ITEM	QUANTITY	WEIGHT (APPROX)
CANISTER	8	35,192 LBS
DUNNAGE		579 LBS
<b>TOTAL WEIGHT</b>		<b>35,771 LBS (APPROX)</b>



**KEY NUMBERS**

- ① FORWARD HEADER, 2" X 6" X 42" (DOUBLED) (1 REQD). NAIL THE FIRST PIECE TO THE TRAILER FLOOR W/3-10d NAILS. NAIL THE SECOND PIECE TO THE FIRST PIECE W/3-20d NAILS. SEE THE HEADER NAILING CHARTS ON PAGE 5.
- ② REAR HEADER, 2" X 4" X 42" (DOUBLED) (1 REQD). NAIL THE FIRST PIECE TO THE TRAILER FLOOR W/3-10d NAILS. NAIL THE SECOND PIECE TO THE FIRST PIECE W/3-10d NAILS. SEE THE HEADER NAILING CHARTS ON PAGE 5 AND SPECIAL NOTE 3 ON PAGE 9.
- ③ SIDE BLOCKING, 2" X 6" X 24" (DOUBLED) (8 REQD). NAIL THE FIRST PIECE TO THE TRAILER FLOOR W/3-10d NAILS. NAIL THE SECOND PIECE TO THE FIRST W/3-10d NAILS. SEE SPECIAL NOTE 2 ON PAGE 9.
- ④ FORWARD HEADER, 2" BY TRAILER WIDTH MINUS 1/2" (DOUBLED) (1 REQD). NAIL THE FIRST PIECE TO THE TRAILER FLOOR W/6-10d NAILS. NAIL THE SECOND PIECE TO THE FIRST PIECE W/6-20d NAILS. SEE THE HEADER NAILING CHARTS ON PAGE 5.
- ⑤ REAR HEADER, 2" X 4" BY TRAILER WIDTH MINUS 1/2" (DOUBLED) (2 REQD). NAIL THE FIRST PIECE TO THE TRAILER FLOOR W/6-10d NAILS. NAIL THE SECOND PIECE TO THE FIRST PIECE W/6-10d NAILS. SEE THE HEADER NAILING CHARTS ON PAGE 5 AND SPECIAL NOTE 3 ON PAGE 9.



SPECIAL NOTES:

1. A 48'-0" LONG BY 8'-5" WIDE (INSIDE DIMENSION) VAN TRAILER WITH ROUNDED FRONT CORNERS IS SHOWN. TRAILERS OF OTHER DIMENSIONS CAN BE USED.
2. SIDE BLOCKING OR CRIB FILL ASSEMBLIES MAY BE OMITTED WHEN THE SPACE BETWEEN LATERALLY ADJACENT CANISTERS ARE 6" OR LESS. ANTI-CHAFING MATERIAL MAY BE PLACED BETWEEN ADJACENT CONTAINERS.
3. IF THE SPACE AT THE REAR OF THE LOAD, BETWEEN THE CANISTERS AND THE REAR DOOR IS 1-1/2" OR LESS, REAR BLOCKING IS NOT REQUIRED. IF THE TRAILER IS EQUIPPED WITH A METAL THRESHOLD PLATE AND IT INTERFERES WITH THE NAILING OF THE REAR HEADER, ONE OF THE REAR BLOCKING ASSEMBLIES DESCRIBED BELOW MUST BE INSTALLED. IF THE SPACE AT THE REAR OF THE LOAD IS GREATER THAN 1-1/2" BUT LESS THAN 9", USE THE "REAR BLOCKING ASSEMBLY C" AS DETAILED ON PAGE 20. IF THE SPACE AT THE REAR OF THE LOAD IS 9" OR GREATER, USE THE "REAR BLOCKING ASSEMBLY A" AS DETAILED ON PAGE 19.
4. CRIB FILL ASSEMBLY "B" MAY BE SUBSTITUTED FOR THE SIDE BLOCKING DEPICTED BETWEEN THE REAR TWO CONTAINERS, IF DESIRED. SEE THE DETAIL ON PAGE 15.
5. THE DEPICTED LOAD CAN BE ADJUSTED TO SUIT THE QUANTITY TO BE SHIPPED, OR TO SUIT THE WEIGHT OF THE UNIT BEING LOADED.

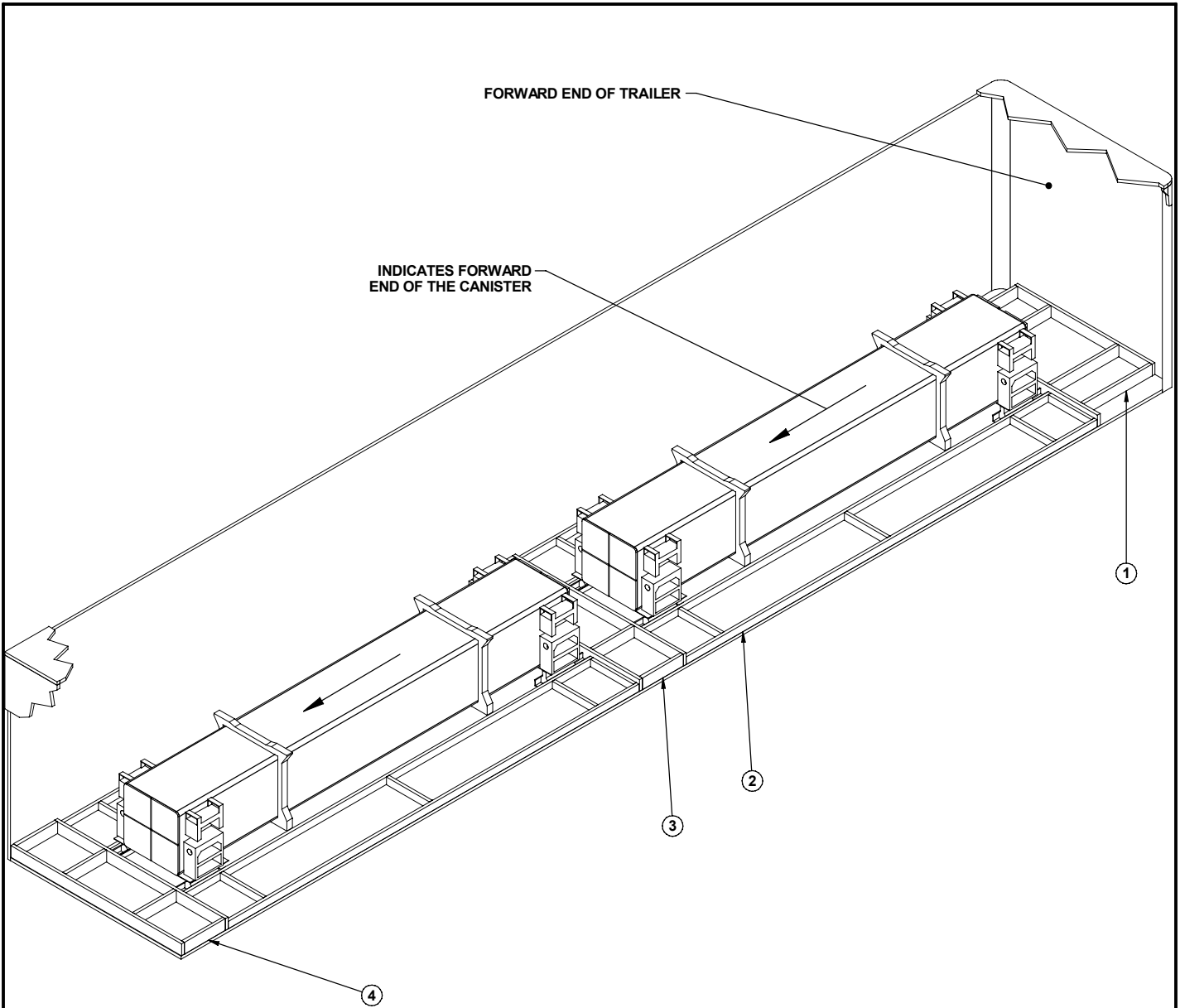
**BILL OF MATERIAL**

LUMBER	LINEAR FEET	BOARD FEET
2" X 4"	17	12
2" X 6"	56	56
NAILS	NO. REQD	POUNDS
10d (3")	85	1-1/2
20d (4")	9	1/2

LOAD AS SHOWN

ITEM	QUANTITY	WEIGHT (APPROX)
CANISTER - - - - -	3 - - - - -	13,197 LBS

**THREE-UNIT LOAD IN A 48'-0" LONG BY 8'-5" WIDE VAN TRAILER**



**ISOMETRIC VIEW**

**KEY NUMBERS**

- ① FORWARD BLOCKING ASSEMBLY B (1 REQD). SEE DETAILS ON PAGE 17.
- ② SIDE FILL ASSEMBLY (4 REQD). SEE THE DETAIL ON PAGE 15.
- ③ CENTER SPACER ASSEMBLY B (1 REQD). SEE DETAILS ON PAGE 14.
- ④ REAR BLOCKING ASSEMBLY B (1 REQD). SEE THE DETAIL ON PAGE 19 AND SPECIAL NOTE 2 ON PAGE 11.

**SPECIAL NOTES:**

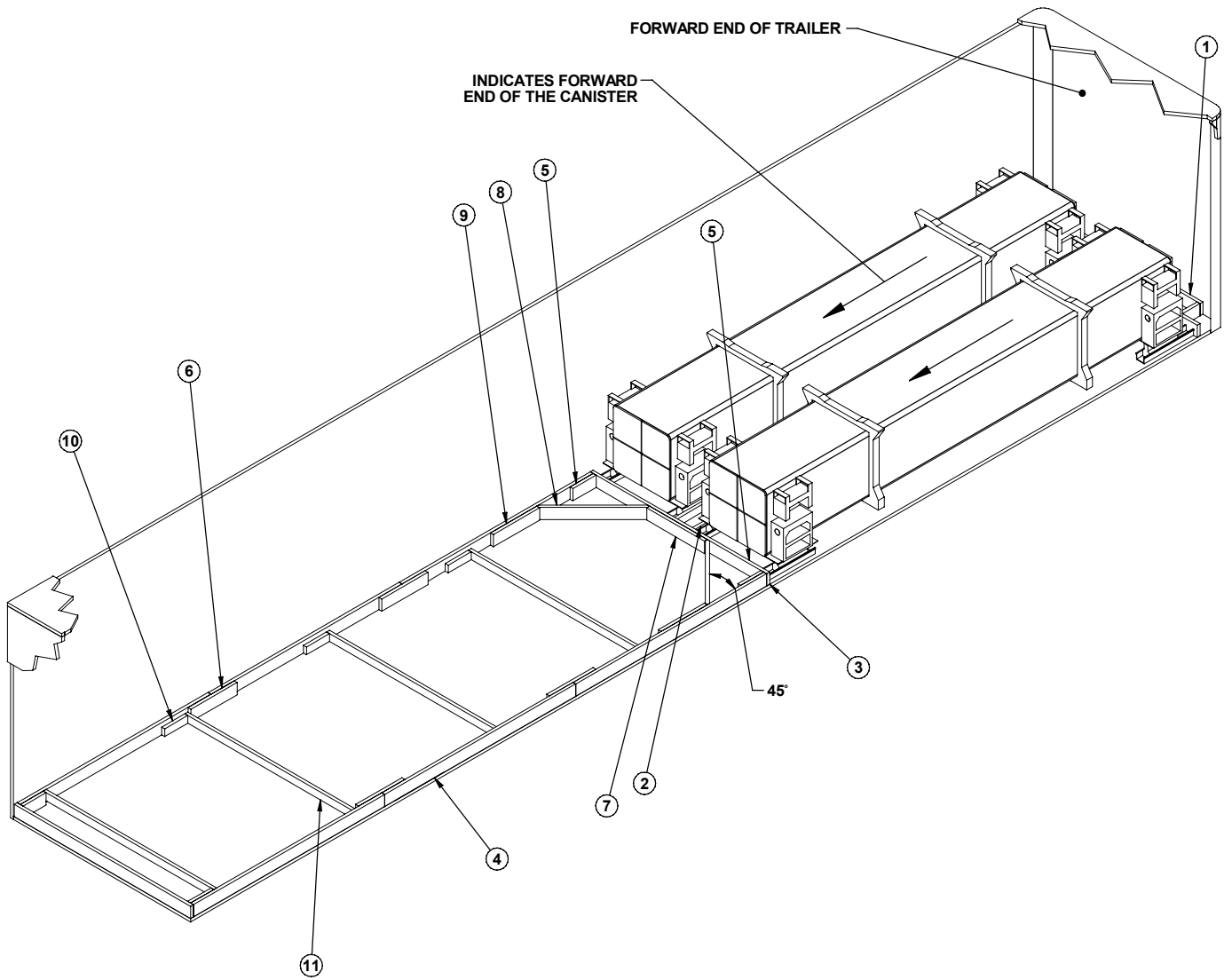
1. A 45'-0" LONG BY 7'-8" WIDE (INSIDE DIMENSION) VAN TRAILER WITH ROUNDED FRONT CORNERS IS SHOWN. TRAILERS OF OTHER DIMENSIONS CAN BE USED.
2. IF THE SPACE AT THE REAR OF THE LOAD BETWEEN THE CANISTERS AND THE REAR DOOR IS 9" OR GREATER, USE THE "REAR BLOCKING ASSEMBLY B" AS SHOWN. IF THE SPACE AT THE REAR OF THE LOAD IS GREATER THAN 1-1/2" BUT LESS THAN 9", USE THE "REAR BLOCKING ASSEMBLY C" AS DETAILED ON PAGE 20. IF THE SPACE AT THE REAR OF THE LOAD IS 1-1/2" OR LESS, REAR BLOCKING IS NOT REQUIRED. NOTE: REAR BLOCKING ASSEMBLIES MAY BE REPLACED WITH NAILED HEADERS AT THE REAR OF THE LOAD, PROVIDED THE TRAILER IS CONFIGURED SUCH AS TO ALLOW NAILING IN THE AREA IN QUESTION. REFER TO THE REAR HEADER ON PAGE 4 AND THE HEADER NAILING CHARTS ON PAGE 5 FOR GUIDANCE.
3. THE DEPICTED LOAD CAN BE ADJUSTED TO SUIT THE QUANTITY TO BE SHIPPED, OR TO SUIT THE WEIGHT OF THE UNIT BEING LOADED.

**BILL OF MATERIAL**

LUMBER	LINEAR FEET	BOARD FEET
2" X 4"	186	124
2" X 6"	72	72
NAILS	NO. REQD	POUNDS
10d (3")	152	2-1/2

**LOAD AS SHOWN**

ITEM	QUANTITY	WEIGHT (APPROX)
CANISTER - - - - -	2 - - - - -	8,798 LBS
DUNNAGE - - - - -	- - - - -	393 LBS
<b>TOTAL WEIGHT - - - - -</b>		<b>9,191 LBS (APPROX)</b>



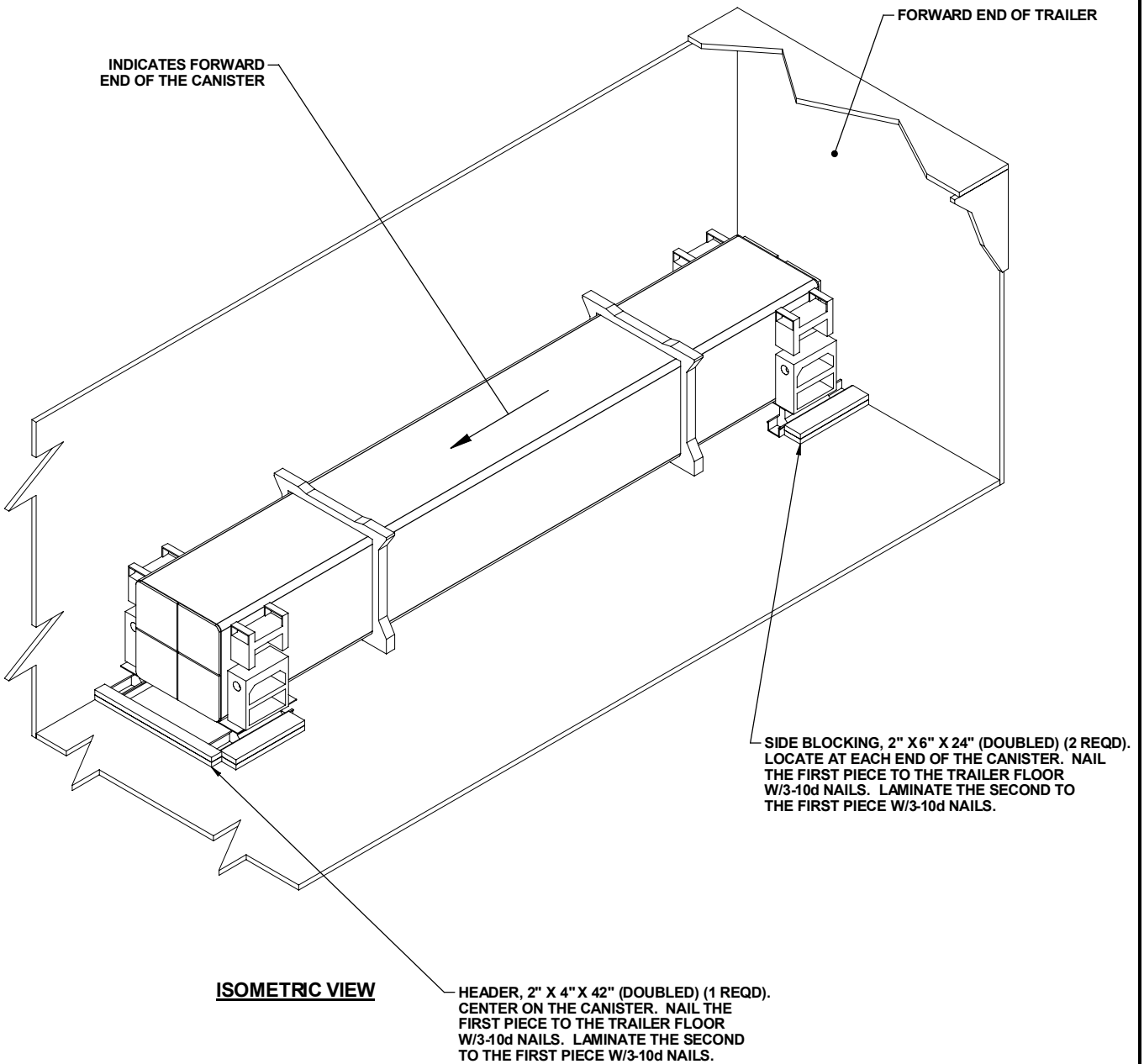
**ISOMETRIC VIEW**

**KEY NUMBERS**

**SPECIAL NOTES:**

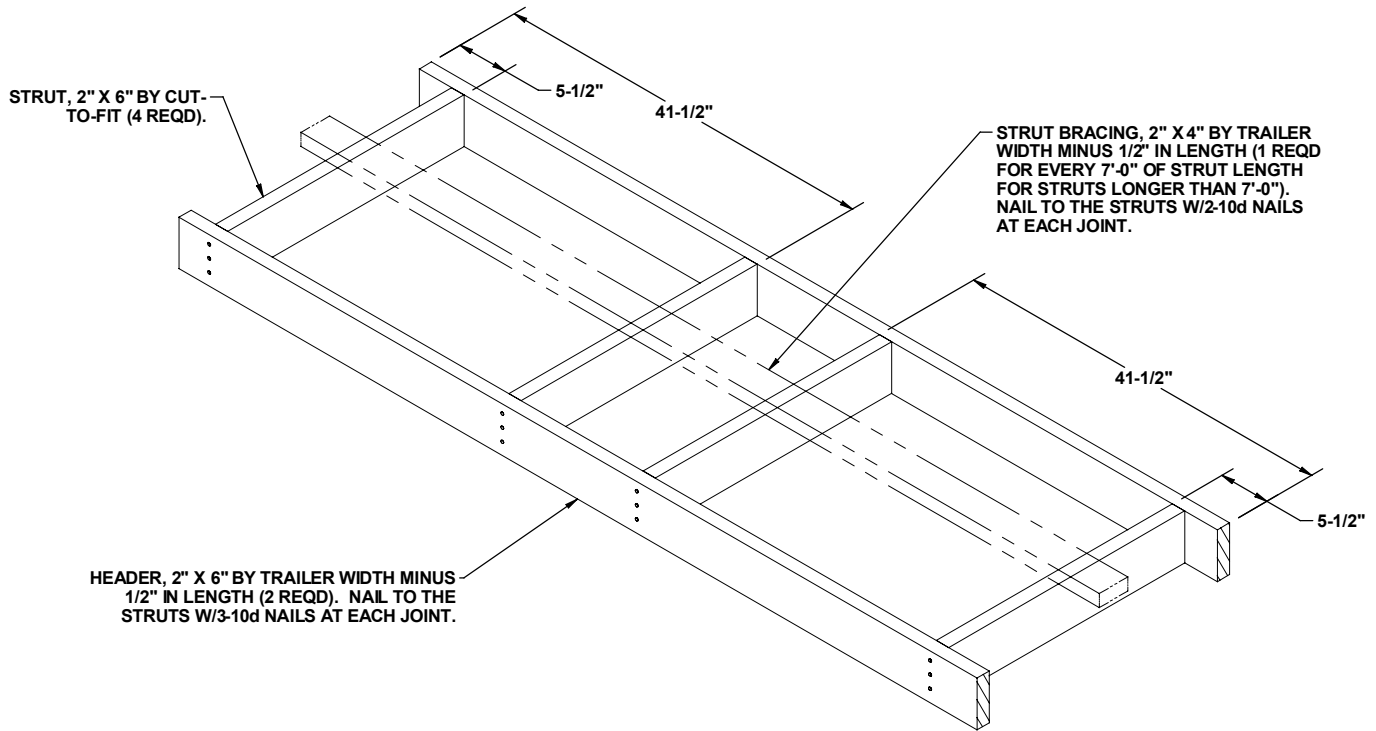
1. A 7'-8" WIDE (INSIDE DIMENSION) VAN TRAILER IS SHOWN. TRAILERS OF OTHER WIDTHS CAN BE USED.
2. CRIB FILL ASSEMBLIES MAY BE OMITTED WHEN THE SPACE BETWEEN LATERALLY ADJACENT CANISTERS 6" OR LESS. ANTI-CHAFING MATERIAL MAY BE PLACED BETWEEN ADJACENT CONTAINERS.
3. DEPENDING ON THE NUMBER OF UNITS BEING LOADED, EACH OF THE SIDE STRUTS MAY NEED TO BE FORMED FROM MORE THAN ONE PIECE OF MATERIAL. IF SUCH IS THE CASE, THE SIDE STRUTS MUST BE SPLICED. SPLICING CAN BE ACCOMPLISHED BY CENTERING A 2" X 6" X 24" PIECE ON THE JOINT OF THE SIDE STRUTS AND NAILING IT TO THE SIDE STRUTS W/4-10d NAILS AT EACH END.
4. ALL LTL LOADS, REGARDLESS OF THEIR SIZE, REQUIRE ONE STRUT BRACE POSITIONED AT THE REAR OF THE TRAILER AND NAILED TO POCKET CLEAT. IF THE SIDE STRUTS ARE LONGER THAN 7'-0", AN ADDITIONAL STRUT BRACE AND TWO STRUT BRACE RETAINING CLEATS MUST BE APPLIED FOR EVERY 7'-0" OF SIDE STRUT LENGTH.
5. THE "K-BRACE" BLOCKING IS ADEQUATE FOR RETAINING A MAXIMUM LTL LOAD OF 20,000 POUNDS.
6. TRAILERS EQUIPPED WITH ROLL-UP TYPE DOORS MAY BE USED; HOWEVER, THE NAILED-HEADER METHOD OF REAR BLOCKING MUST BE INSTALLED IN LIEU OF THE "K-BRACE" TYPE BLOCKING. REFER TO PAGE 4 AND THE HEADER NAILING CHARTS ON PAGE 5 FOR GUIDANCE. NOTE THAT THE NAILED-HEADER METHOD OF REAR BLOCKING MAY ALSO BE USED IN TRAILERS EQUIPPED WITH HINGED DOORS AND NAILABLE FLOORS.

- ① FORWARD BLOCKING ASSEMBLY C (1 REQD). SEE THE DETAIL ON PAGE 18.
- ② CRIB FILL ASSEMBLY B (1 REQD). SEE THE DETAIL ON PAGE 15.
- ③ HEADER, 2" X 6" BY TRAILER WIDTH MINUS 1/2" IN LENGTH (2 REQD).
- ④ SIDE STRUT, 2" X 6" BY CUT TO FIT BETWEEN THE FORWARD AND REAR HEADERS (2 REQD). SEE SPECIAL NOTE 3 AT LEFT.
- ⑤ POCKET CLEAT, 2" X 6" X 12" (4 REQD). NAIL TO A SIDE STRUT W/3-10d NAILS. TOENAIL TO THE ADJACENT HEADER W/3-12d NAILS.
- ⑥ SPLICE PIECE, 2" X 6" X 24" (AS REQD). CENTER ON THE JOINT OF A SIDE STRUT AND NAIL W/4-10d NAILS AT EACH END.
- ⑦ CENTER CLEAT, 2" X 6" X 30" (1 REQD). NAIL TO A HEADER W/6-10d NAILS.
- ⑧ DIAGONAL BRACE, 2" X 6" BY CUT TO FIT (2 REQD). DOUBLE BEVEL EACH END WITH 45° CUTS. INSTALL AT A 45° ANGLE AS SHOWN AND TOENAIL TO THE ADJACENT HEADER AND SIDE STRUT W/2-16d NAILS AT EACH END.
- ⑨ BACK-UP CLEAT, 2" X 6" X 24" (2 REQD). NAIL TO A SIDE STRUT W/8-10d NAILS.
- ⑩ STRUT BRACE RETAINING CLEAT, 2" X 4" X 12" (AS REQD). NAIL TO A SIDE STRUT W/3-10d NAILS.
- ⑪ STRUT BRACE, 2" X 4" BY TRAILER WIDTH MINUS 3" IN LENGTH (MINIMUM OF ONE REQUIRED). NAIL TO THE POCKET CLEATS AND/OR TO THE STRUT BRACE RETAINING CLEATS W/2-12d NAILS AT EACH END. SEE SPECIAL NOTE 4 AT LEFT.



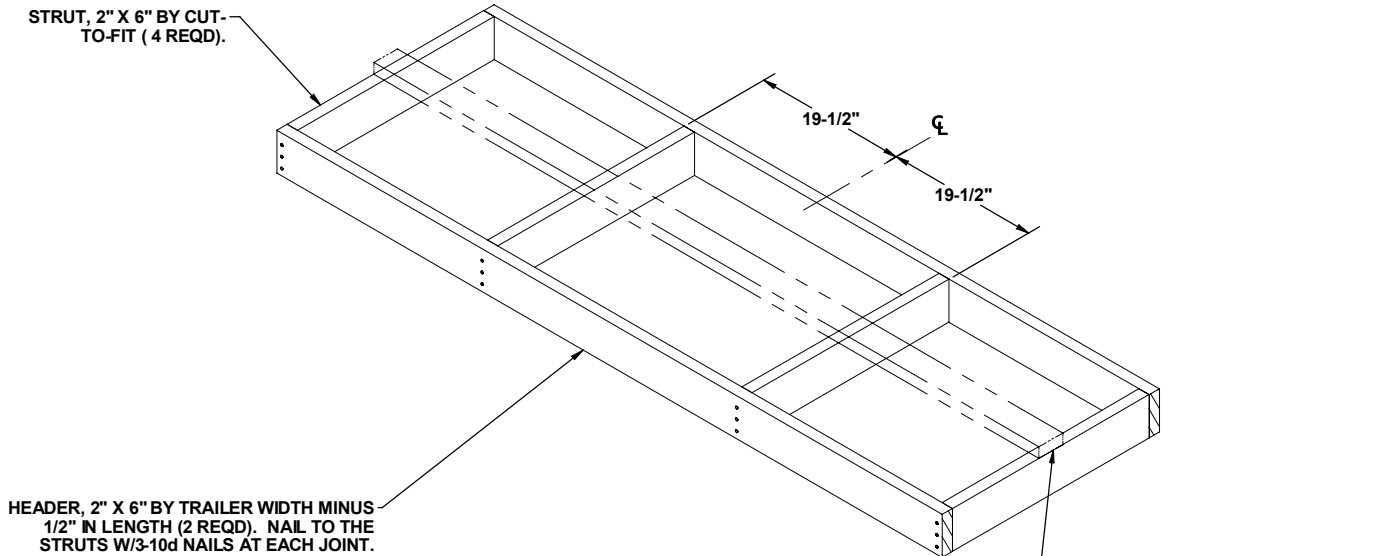
**SPECIAL NOTES:**

1. AN 8'-2" WIDE (INSIDE DIMENSION) VAN TRAILER WHICH HAS A SQUARE FRONT AND NAILABLE FLOOR IS SHOWN. TRAILERS OF OTHER WIDTHS CAN BE USED.
2. THE POSITIONING OF A UNIT IS OPTIONAL. UNITS MAY BE LOCATED IN THE CORNER OF THE TRAILER. IF THE TRAILER DOES NOT HAVE A SQUARE FRONT, A FORWARD BLOCKING ASSEMBLY MUST BE INSTALLED WHEN POSITIONING A UNIT IN THE CORNER OF THE TRAILER. SEE THE DETAILS ON PAGES 16, 17 AND 18.
3. MORE THAN ONE CANISTER CAN BE SHIPPED. THE LOAD SHOULD BE FORMED IN ROWS, WITH THE CANISTERS POSITIONED AGAINST OPPOSITE SIDEWALLS. THE PROPER CRIB FILL OR SIDE BLOCKING WILL BE INSTALLED BETWEEN THE LATERALLY ADJACENT CANISTERS. SEE THE DETAILS ON PAGES 8 AND 15.
4. THE HEADER AS APPLIED ABOVE FOR LONGITUDINAL BRACING WILL SUPPORT 7,500 POUNDS OF LADING; A TRAILER WIDTH HEADER WILL SUPPORT UP TO A FULL TRAILER LOAD OF CANISTERS. SEE THE HEADER NAILING CHARTS ON PAGE 5.



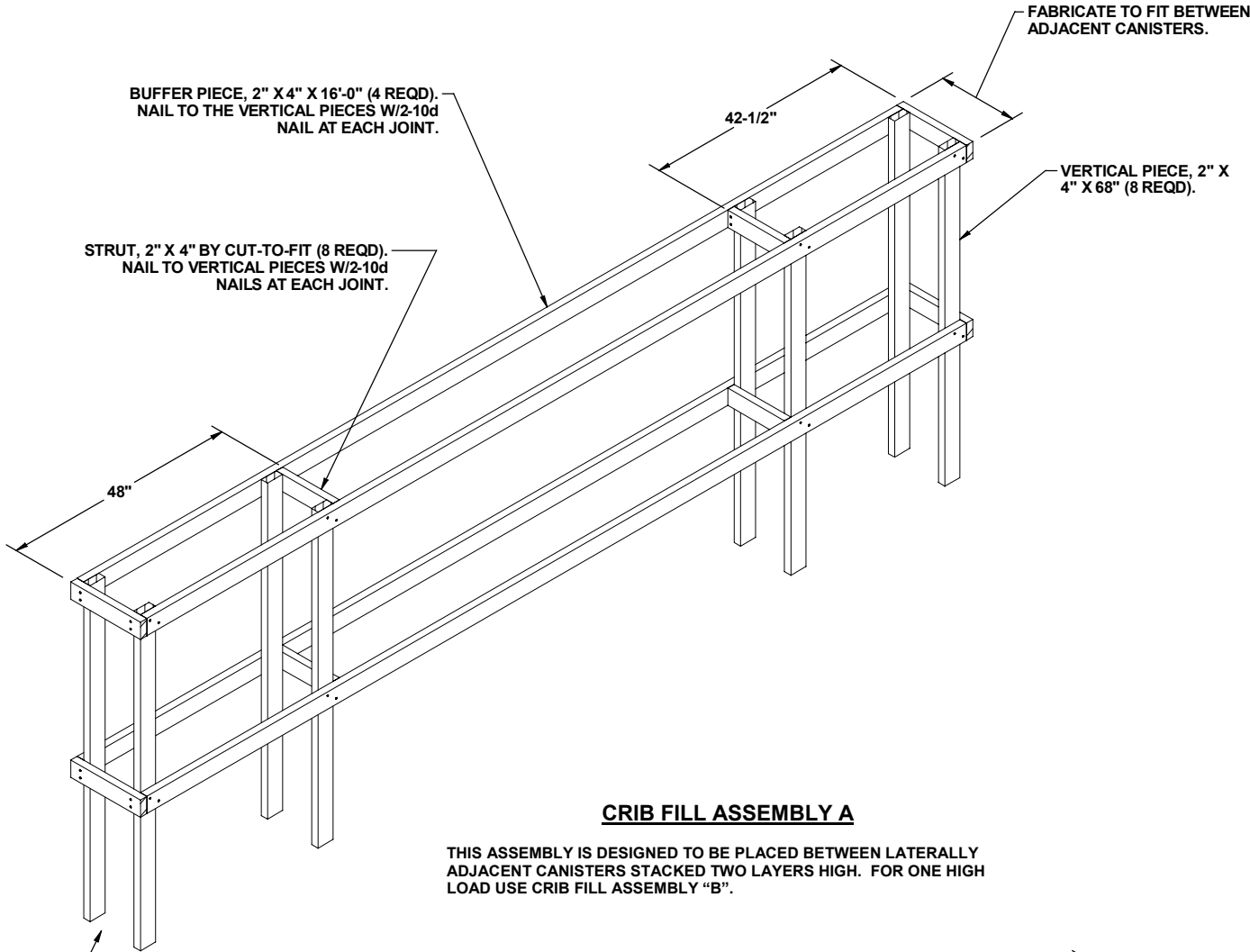
**CENTER SPACER ASSEMBLY A**

THIS CENTER SPACER ASSEMBLY IS DESIGNED FOR USE WITH TWO STACKS OF CANISTERS POSITIONED AGAINST THE TRAILER WALLS.



**CENTER SPACER ASSEMBLY B**

THIS CENTER SPACER ASSEMBLY IS DESIGNED FOR USE WITH CANISTERS LOADED AS A SINGLE STACK LOCATED DOWN THE CENTER OF THE TRAILER.



**BUFFER PIECE, 2" X 4" X 16'-0" (4 REQD).  
NAIL TO THE VERTICAL PIECES W/2-10d  
NAIL AT EACH JOINT.**

**STRUT, 2" X 4" BY CUT-TO-FIT (8 REQD).  
NAIL TO VERTICAL PIECES W/2-10d  
NAILS AT EACH JOINT.**

**FABRICATE TO FIT BETWEEN  
ADJACENT CANISTERS.**

**VERTICAL PIECE, 2" X  
4" X 68" (8 REQD).**

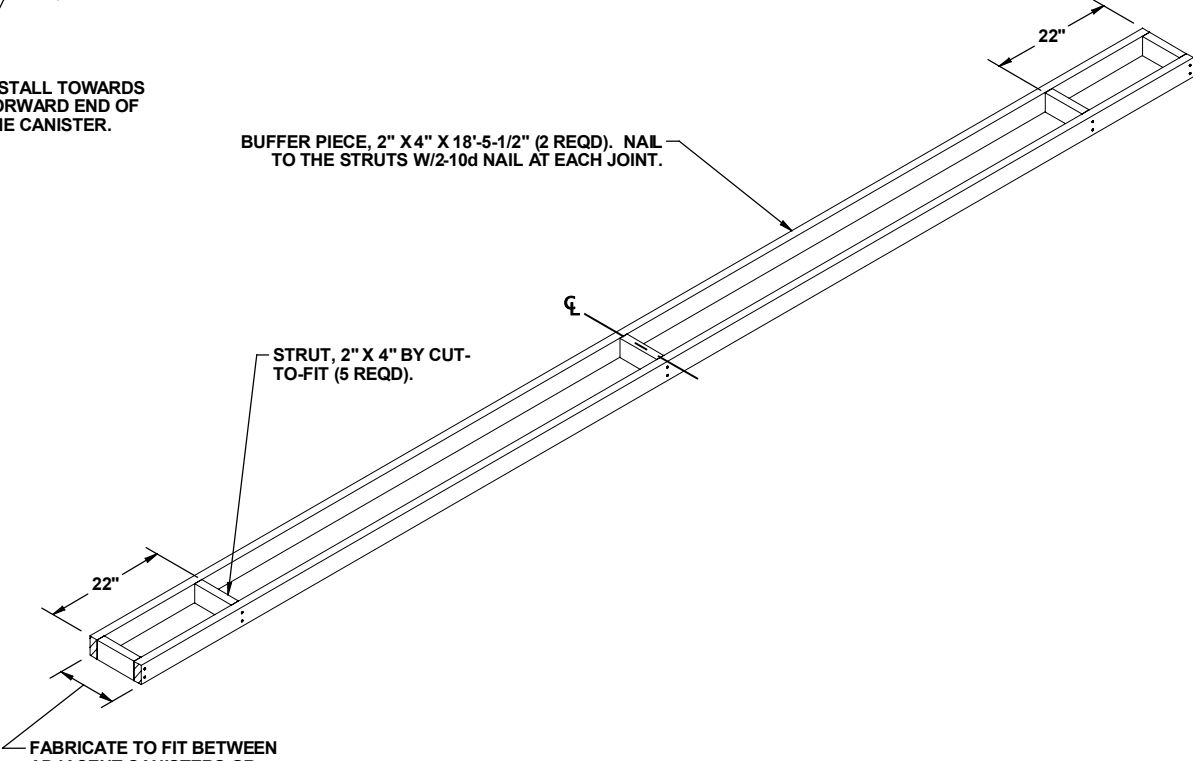
42-1/2"

48"

**CRIB FILL ASSEMBLY A**

**THIS ASSEMBLY IS DESIGNED TO BE PLACED BETWEEN LATERALLY  
ADJACENT CANISTERS STACKED TWO LAYERS HIGH. FOR ONE HIGH  
LOAD USE CRIB FILL ASSEMBLY "B".**

**INSTALL TOWARDS  
FORWARD END OF  
THE CANISTER.**



**BUFFER PIECE, 2" X 4" X 18'-5-1/2" (2 REQD). NAIL  
TO THE STRUTS W/2-10d NAIL AT EACH JOINT.**

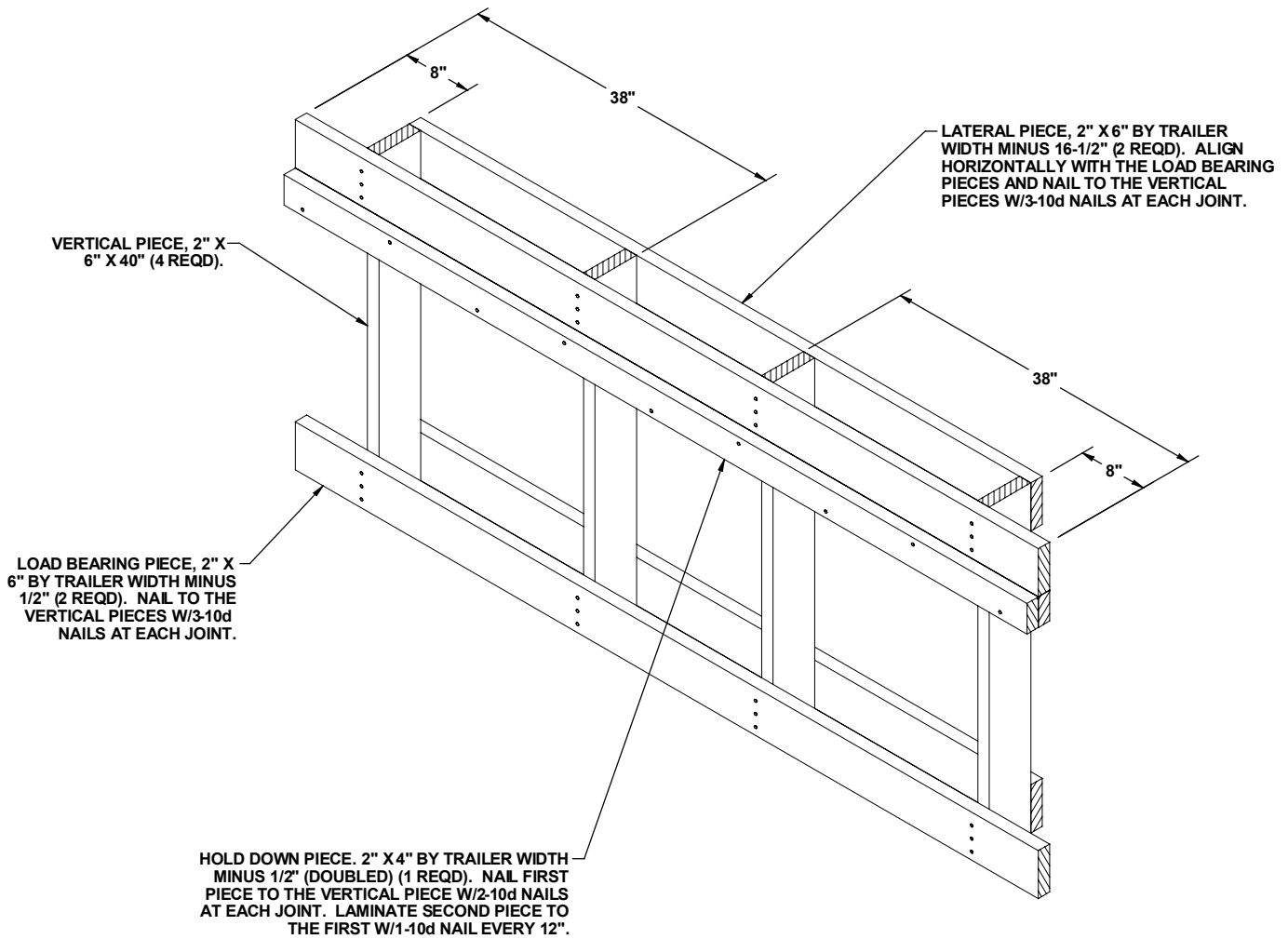
**STRUT, 2" X 4" BY CUT-  
TO-FIT (5 REQD).**

22"

22"

**FABRICATE TO FIT BETWEEN  
ADJACENT CANISTERS OR  
CANISTERS AND SIDE WALL.**

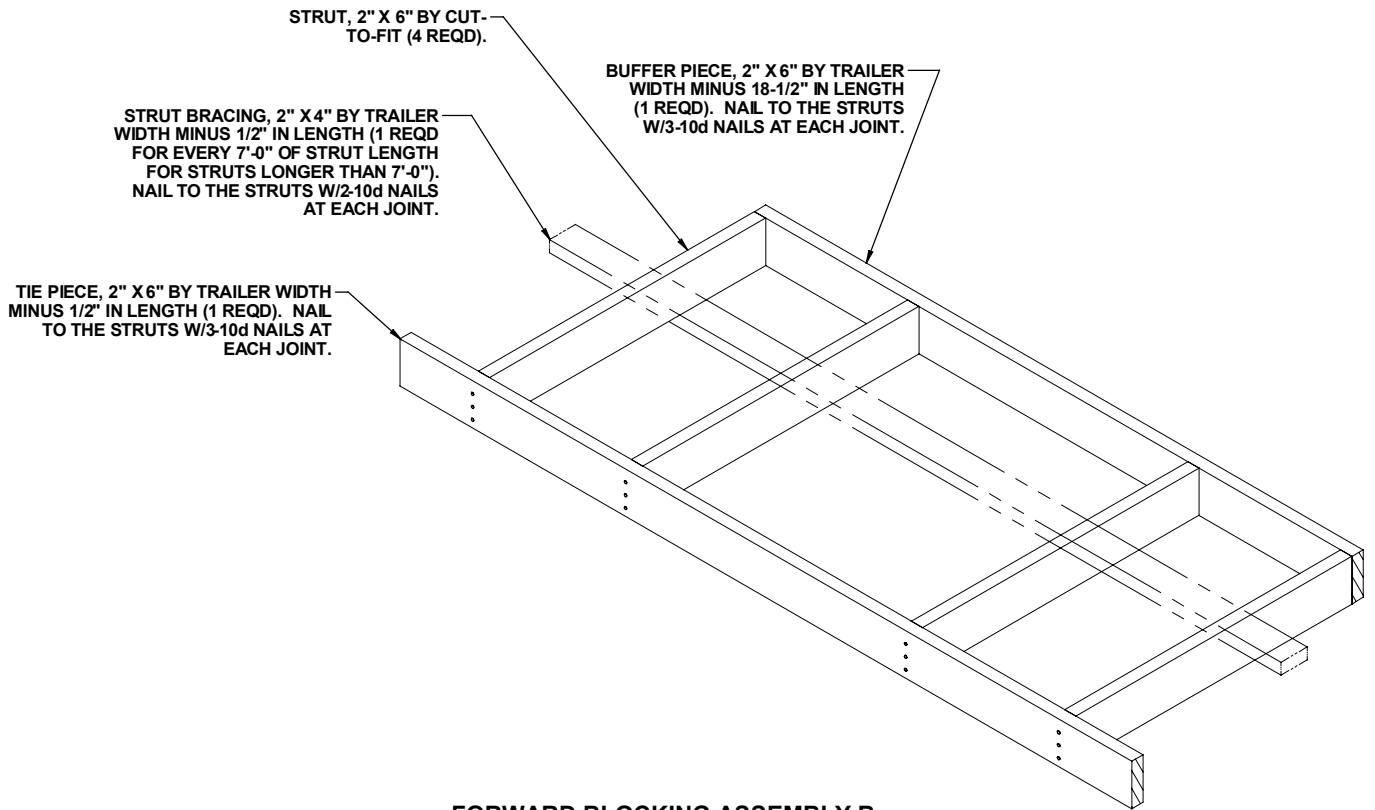
**CRIB FILL ASSEMBLY B/SIDE FILL ASSEMBLY**



### **FORWARD BLOCKING ASSEMBLY A**

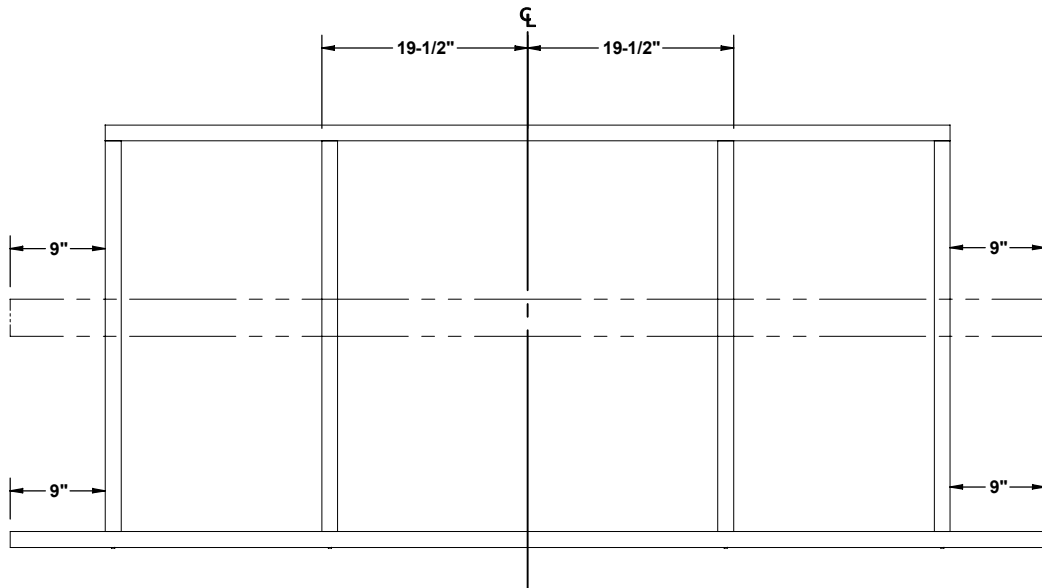
THIS ASSEMBLY IS DESIGNED FOR USE AT THE FRONT END OF A TRAILER HAVING ROUNDED CORNERS WHEN TWO ROWS OF CANISTERS ARE LOADED AT THE FRONT OF THE TRAILER, AND IS APPLICABLE FOR A CORNER RADIUS OF BETWEEN 6-1/2" AND 8". IF THE RADIUS IS LESS THAN 6-1/2", 2" X 4" VERTICAL PIECES WILL BE USED IN LIEU OF THE 2" X 6" PIECES. FOR ONE HIGH LOAD USE FORWARD BLOCKING ASSEMBLY "B" OR "C".



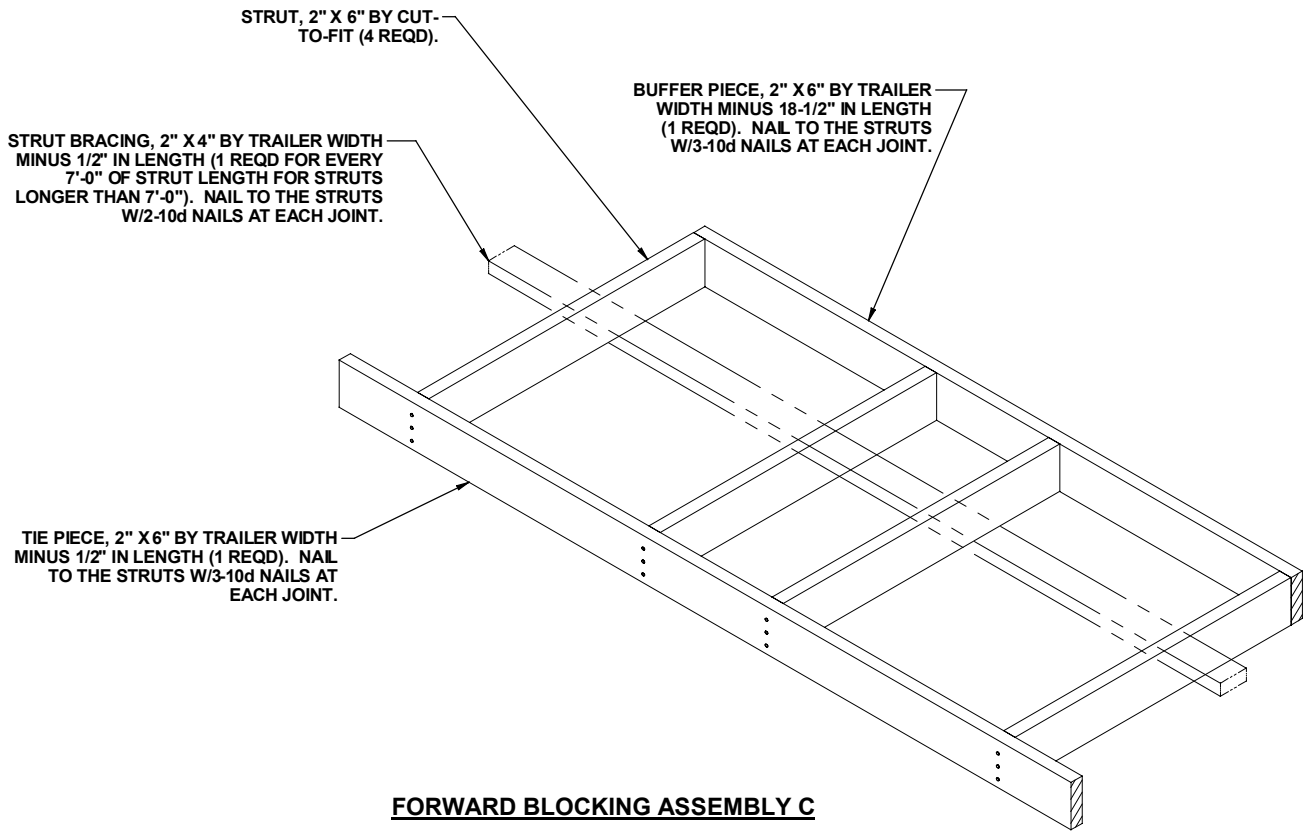


**FORWARD BLOCKING ASSEMBLY B**

THIS ASSEMBLY IS DESIGNED FOR USE AT THE FRONT OF THE LOAD WHEN ONE ROW OF CANISTERS IS LOADED AT THE FRONT OF THE TRAILER. **NOTE:** IF THE TRAILER TO BE LOADED HAS SQUARE INSIDE FRONT CORNERS, INCREASE THE BUFFER PIECE LENGTH TO "INSIDE TRAILER WIDTH MINUS 1/2 INCH". INSTALL THE OUTER STRUTS AT THE ENDS OF THE BUFFER AND TIE PIECES.

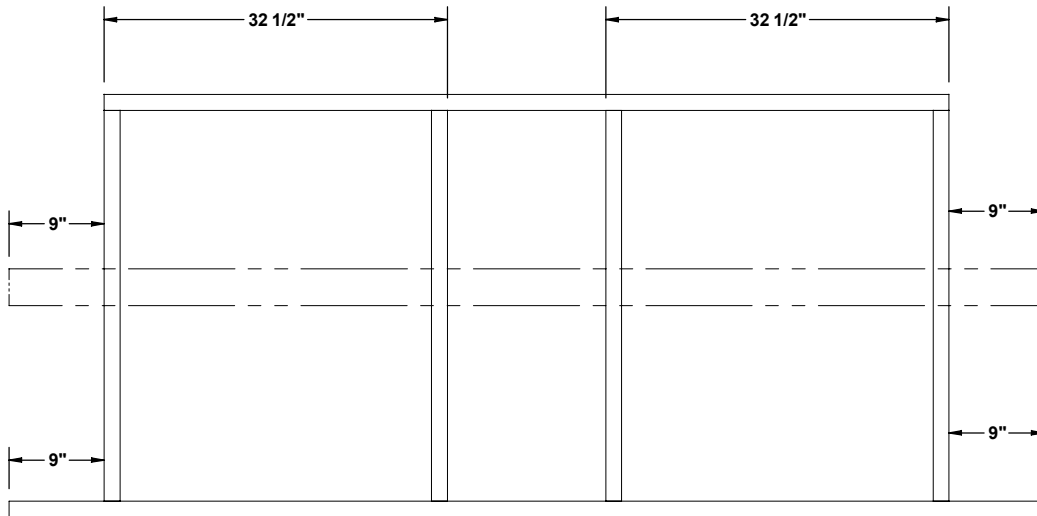


**TOP VIEW**

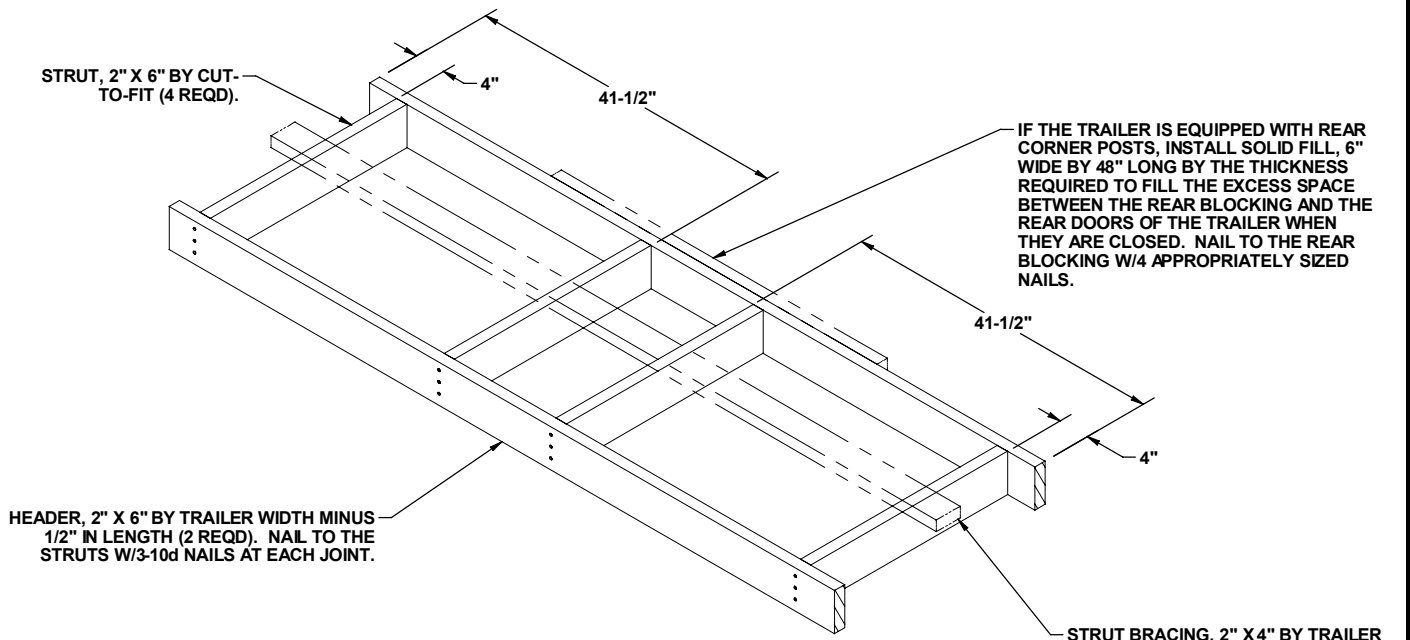


**FORWARD BLOCKING ASSEMBLY C**

THIS ASSEMBLY IS DESIGNED FOR USE AT THE FRONT OF A LOAD WHEN TWO ROWS OF CANISTERS ARE LOADED ADJACENT TO THE FRONT OF THE TRAILER.  
**NOTE:** IF THE TRAILER TO BE LOADED HAS SQUARE INSIDE FRONT CORNERS, INCREASE THE BUFFER PIECE LENGTH TO "INSIDE TRAILER WIDTH MINUS 1/2 INCH". INSTALL THE OUTER STRUTS AT THE ENDS OF THE BUFFER AND TIE PIECES.

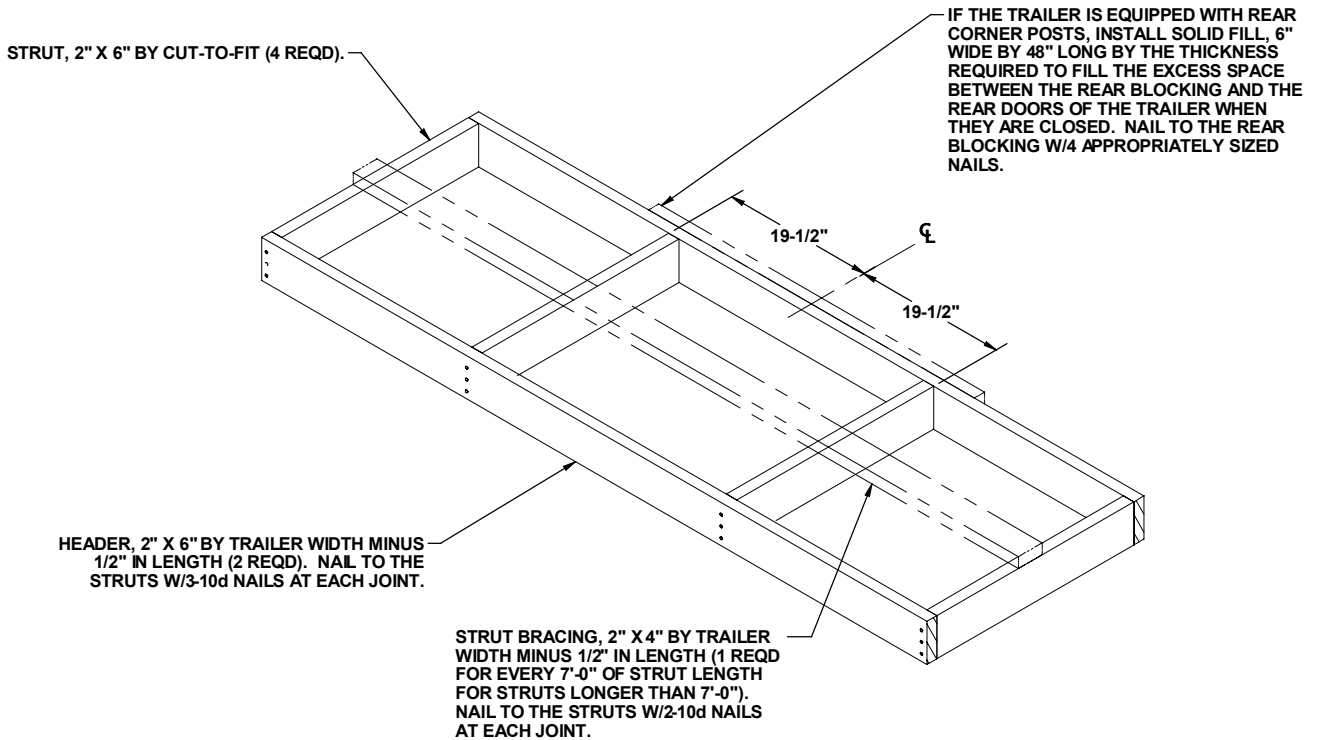


**TOP VIEW**



### REAR BLOCKING ASSEMBLY A

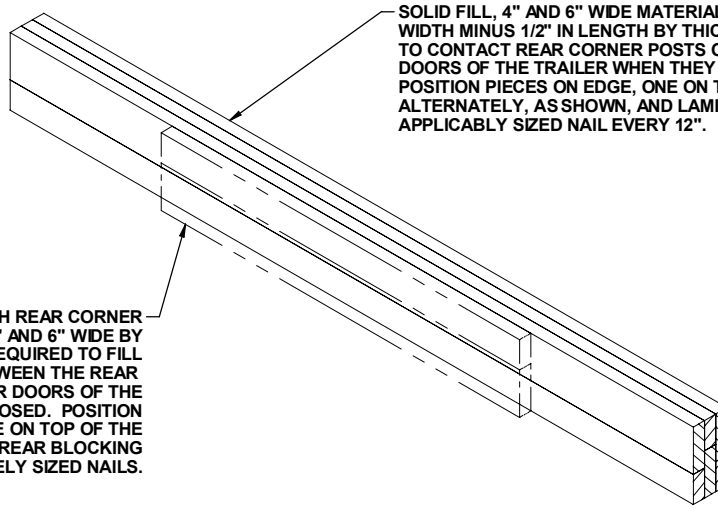
THIS ASSEMBLY IS DESIGNED FOR USE AT THE REAR OF A LOAD WHEN THE SPACE BETWEEN THE LADING AND THE TRAILER DOOR IS MORE THAN 9" AND TWO CANISTERS ARE LOADED ADJACENT TO THE TRAILER DOORS, AS SHOWN ON PAGE 6. NOTE THAT THE ABOVE VIEW IS ROTATED 180° FROM THE POSITION IN WHICH IT WILL BE INSTALLED.



### REAR BLOCKING ASSEMBLY B

THIS ASSEMBLY IS DESIGNED FOR USE AT THE REAR OF A LOAD WHEN THE SPACE BETWEEN THE LADING AND THE TRAILER DOOR IS MORE THAN 9" AND ONE ROW OF CANISTERS IS LOADED ADJACENT TO THE TRAILER DOORS, AS SHOWN ON PAGE 10. NOTE THAT THE ABOVE VIEW IS ROTATED 180° FROM THE POSITION IN WHICH IT WILL BE INSTALLED.

IF THE TRAILER IS EQUIPPED WITH REAR CORNER POSTS, INSTALL SOLID FILL, 4" AND 6" WIDE BY 48" LONG BY THE THICKNESS REQUIRED TO FILL THE EXCESS SPACE BETWEEN THE REAR BLOCKING AND THE REAR DOORS OF THE TRAILER WHEN THEY ARE CLOSED. POSITION PIECES ON THE EDGE, ONE ON TOP OF THE OTHER AS SHOWN. NAIL TO THE REAR BLOCKING W/4 APPROPRIATELY SIZED NAILS.



SOLID FILL, 4" AND 6" WIDE MATERIAL BY TRAILER WIDTH MINUS 1/2" IN LENGTH BY THICKNESS REQUIRED TO CONTACT REAR CORNER POSTS OR CONTACT REAR DOORS OF THE TRAILER WHEN THEY ARE CLOSED. POSITION PIECES ON EDGE, ONE ON TOP OF THE OTHER ALTERNATELY, AS SHOWN, AND LAMINATE W/1 APPLICABLY SIZED NAIL EVERY 12".

### **REAR BLOCKING ASSEMBLY C**

THIS ASSEMBLY (NOT SHOWN IN LOAD DRAWINGS) IS DESIGNED FOR USE AT THE REAR OF A LOAD WHEN THE SPACE BETWEEN THE LADING AND THE TRAILER DOOR IS GREATER THAN 1-1/2" BUT LESS THAN 9". NOTE THAT THE ABOVE VIEW IS ROTATED 180° FROM THE POSITION IN WHICH IT WILL BE INSTALLED.