




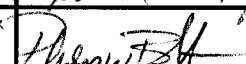
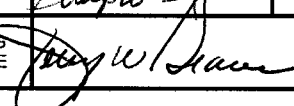
PATRIOT

MINIMUM REQUIREMENTS FOR THE HANDLING, STORAGE AND BRACING ABOARD SHIPS AND BARGES OF PATRIOT (PAC-3) MISSILES PACKED IN SHIPPING AND STORAGE CANISTERS

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U.S. ARMY MATERIEL COMMAND DRAWING

<p style="text-align: center;">APPROVED, U.S. ARMY AVIATION AND MISSILE COMMAND</p> <div style="text-align: center; font-size: 2em; font-family: cursive;">  </div>	<p>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 14.</p>									
<p style="text-align: center;">APPROVED BY ORDER OF COMMANDING GENERAL, U.S. ARMY MATERIEL COMMAND</p> <div style="text-align: center; font-size: 2em; font-family: cursive;">  </div> <p style="text-align: center; font-size: 0.8em;">U.S. ARMY DEFENSE AMMUNITION CENTER</p>	DO NOT SCALE			AUGUST 2007						
	ENGINEER OR TECHNICIAN	BASIC	MELVIN SIX							
	TRANSPORTATION ENGINEERING DIVISION									
	VALIDATION ENGINEERING DIVISION	TESTED								
ENGINEERING DIRECTORATE		CLASS	DIVISION	DRAWING	FILE	19	48	5787	GM18PA2	
										

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. THIS DRAWING DEPICTS MINIMUM PROCEDURES APPLICABLE TO HANDLING STOWAGE, AND BRACING ABOARD SHIPS AND BARGES OF THE 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. OTHER TYPES OF CARGO MAY BE STORED IN THE SAME HOLD OR TWEEN DECK PROVIDING THE ITEMS STOWED ARE COMPATIBLE WITH THE CANISTER SHOWN HEREIN. PERTINENT REQUIREMENT OF TITLE 49 CODE OF FEDERAL REGULATION, PART 176, MUST BE APPLIED.
- D. 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.
- E. 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 0.45 KG.
- F. PERTINENT PROVISIONS OF TITLE 49 CODE OF FEDERAL REGULATIONS APPLY.
- G. CANISTERS MUST BE HOIST LIFTED AS INDIVIDUAL UNITS AS DEPICTED ON PAGE 3. **CAUTION:** A TWO-HIGH STACK OF CANISTERS MUST NOT BE LIFTED USING A HOIST.
- H. THE HANDLING SLING SHOULD BE EQUIPPED WITH SAFETY TYPE HOOKS AND SHALL BE OF DESIGN AND CONFIGURATION TO LIFT THE ITEM IN SUCH A MANNER THAT THE CANISTER IS NOT DAMAGED.
- J. ALTHOUGH DESIRABLE, A LEVEL LIFT IS NOT MANDATORY. THE CENTER OF BALANCE OF THIS ITEM IS SHOWN ON PAGE 3 TO ASSIST IN DETERMINING CABLE LENGTHS TO ASSURE A SAFE LIFT.

STOWAGE AND BRACING:

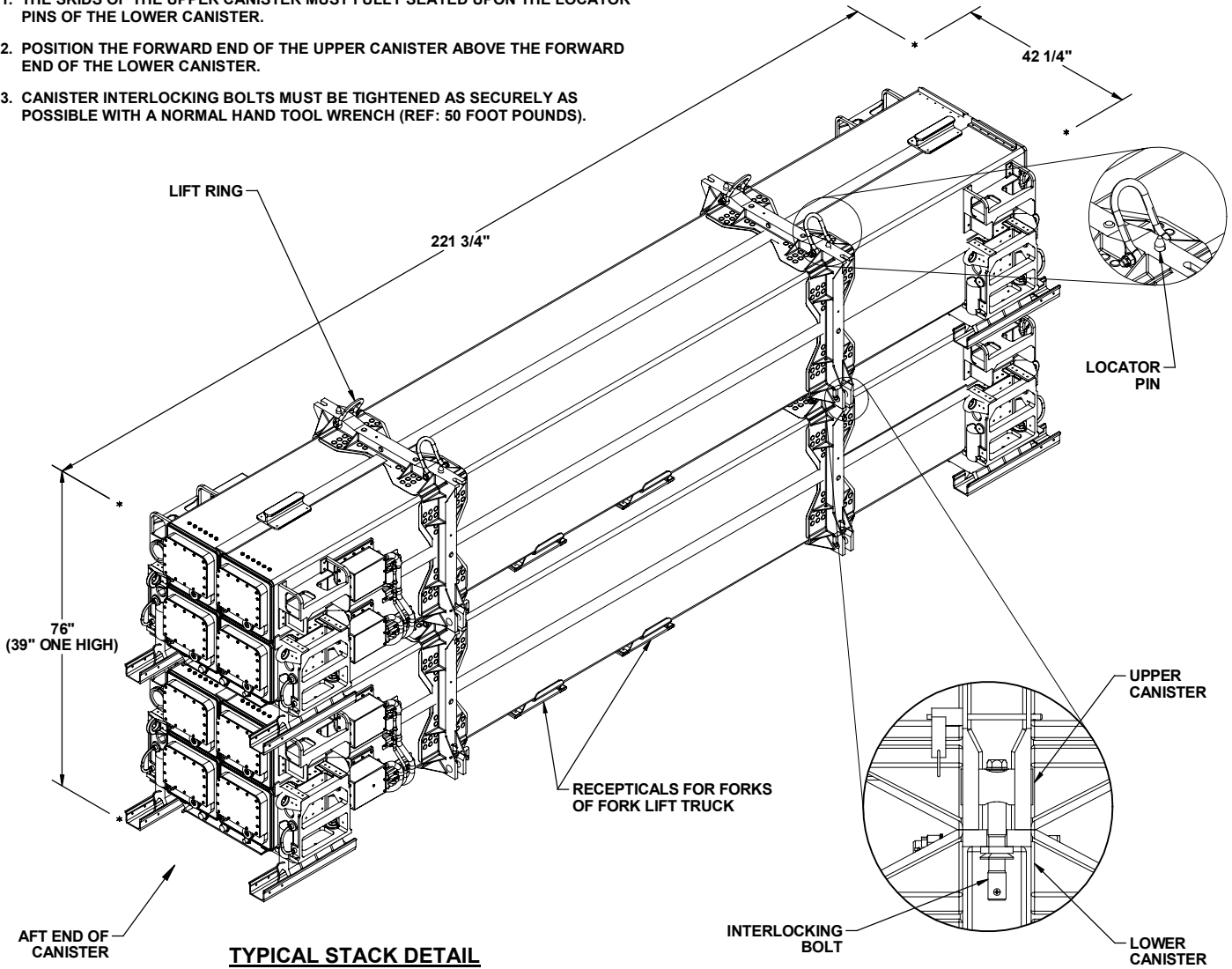
- K. STOWAGE OF THIS ITEM IS RESTRICTED TO FOUR LAYERS HIGH. ALSO, OTHER CARGO ITEMS MUST NOT BE STACKED OR STOWED ON TOP OF THE CANISTER.
- L. WHEN STOWING THE CANISTERS WITHIN THE HOLD, OR TWEEN DECK, BRACING SHALL ONLY BE APPLIED AGAINST THE SKIDS AND/OR STRONG POINTS. SEE NOTE "O" BELOW.
- M. ADJACENT CANISTERS MUST BE SEPARATED BY BRACING MEMBERS AND/OR ANTI-CHAFING MATERIAL TO AVOID DAMAGE TO ITEMS BY DIRECT CONTACT WITH EACH OTHER. TO PREVENT DISPLACEMENT OF THE ANTI-CHAFING MATERIAL, .0800" DIA WIRE OR OTHER SUITABLE MATERIAL WILL BE PASSED AROUND THE FRAMEWORK OF THE CANISTER AND AROUND THE ANTI-CHAFING PIECES.
- N. SPECIES, GRADE AND SIZE OF LUMBER TO BE USED WILL COMPLY WITH REQUIREMENTS OF CURRENT SHIPWRIGHT-CARPENTRY AND RELATED SERVICES CONTRACTS. BRACING METHODS AND LUMBER SIZES DEPICTED IN THIS DRAWING ARE CONSIDERED MINIMUM AND ARE NOT INTENDED TO CONFLICT WITH CONTRACT REQUIREMENTS.
- O. **CAUTION:** CARE MUST BE EXERCISED TO ENSURE THAT PRESSURE IS NOT APPLIED AGAINST THE ENDS, SIDES AND TOP OF THE CANISTER. ALSO, PERSONNEL SHALL NOT STAND OR WALK ON THE TOP OR THE CANISTER.

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).
- WIRE, CARBON STEEL - - - - - : ASTM A853; ANNEALED AT FINISH, BLACK OXIDE FINISH, 0.0800" DIA, GRADE 1006 OR BETTER.
- ANTI-CHAFING MATERIAL - - - - - : MIL-B-121 (OR EQUAL); NEUTRAL BARRIER MATERIAL.

STACKING CANISTER FOR UNITIZATION

1. THE SKIDS OF THE UPPER CANISTER MUST FULLY SEATED UPON THE LOCATOR PINS OF THE LOWER CANISTER.
2. POSITION THE FORWARD END OF THE UPPER CANISTER ABOVE THE FORWARD END OF THE LOWER CANISTER.
3. CANISTER INTERLOCKING BOLTS MUST BE TIGHTENED AS SECURELY AS POSSIBLE WITH A NORMAL HAND TOOL WRENCH (REF: 50 FOOT POUNDS).

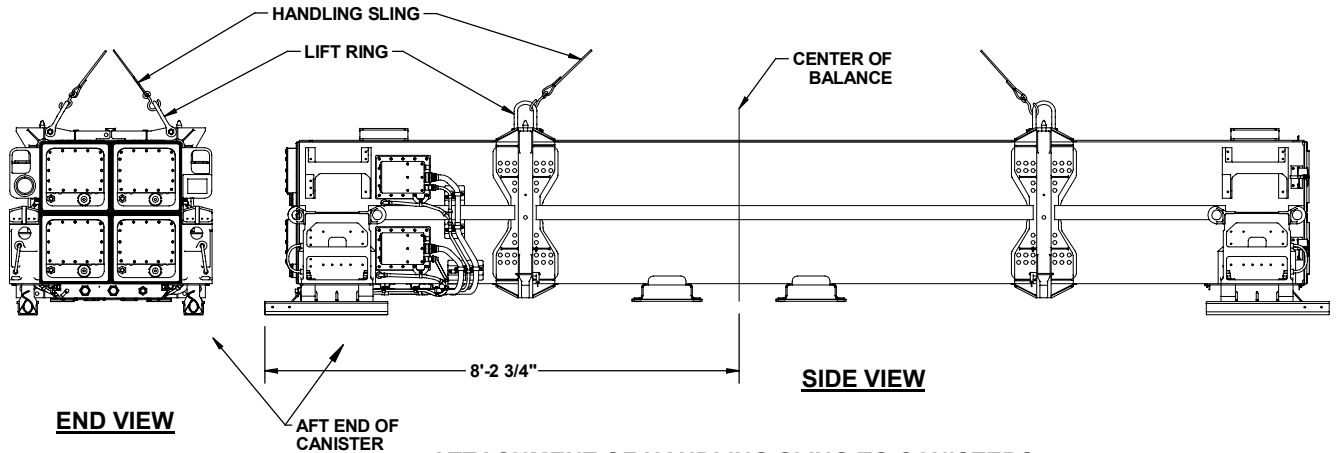


TYPICAL STACK DETAIL

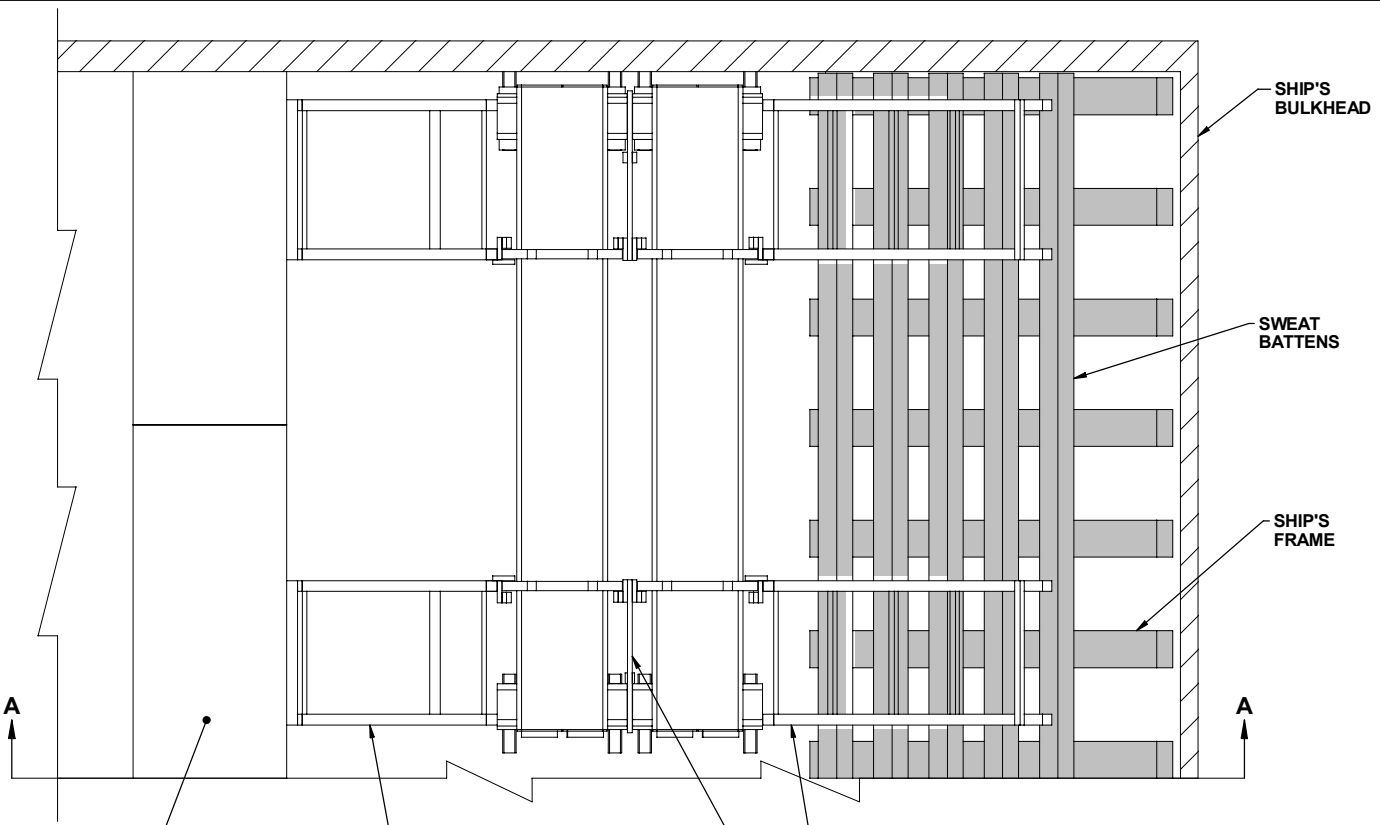
SIDE VIEW DETAIL OF INTERLOCKING BOLT ASSEMBLY

PATRIOT PAC-3 DETAIL

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



ATTACHMENT OF HANDLING SLING TO CANISTERS



PLANVIEW

ADJACENT CARGO

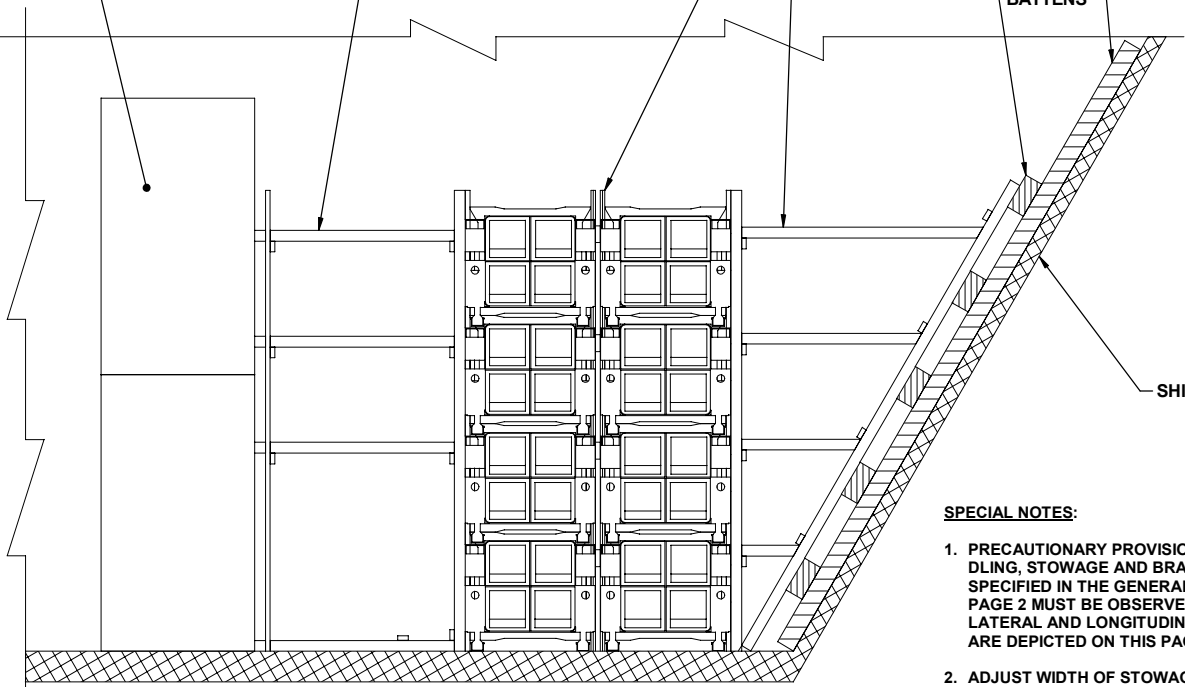
SIDE BRACING AGAINST ADJACENT CARGO. SEE DETAIL "B" ON PAGE 9.

CENTER FILL ASSEMBLY. SEE DETAIL ON PAGE 12.

BRACING AT SIDE OF SHIP. SEE DETAIL "A" ON PAGE 9.

SHIP'S FRAME

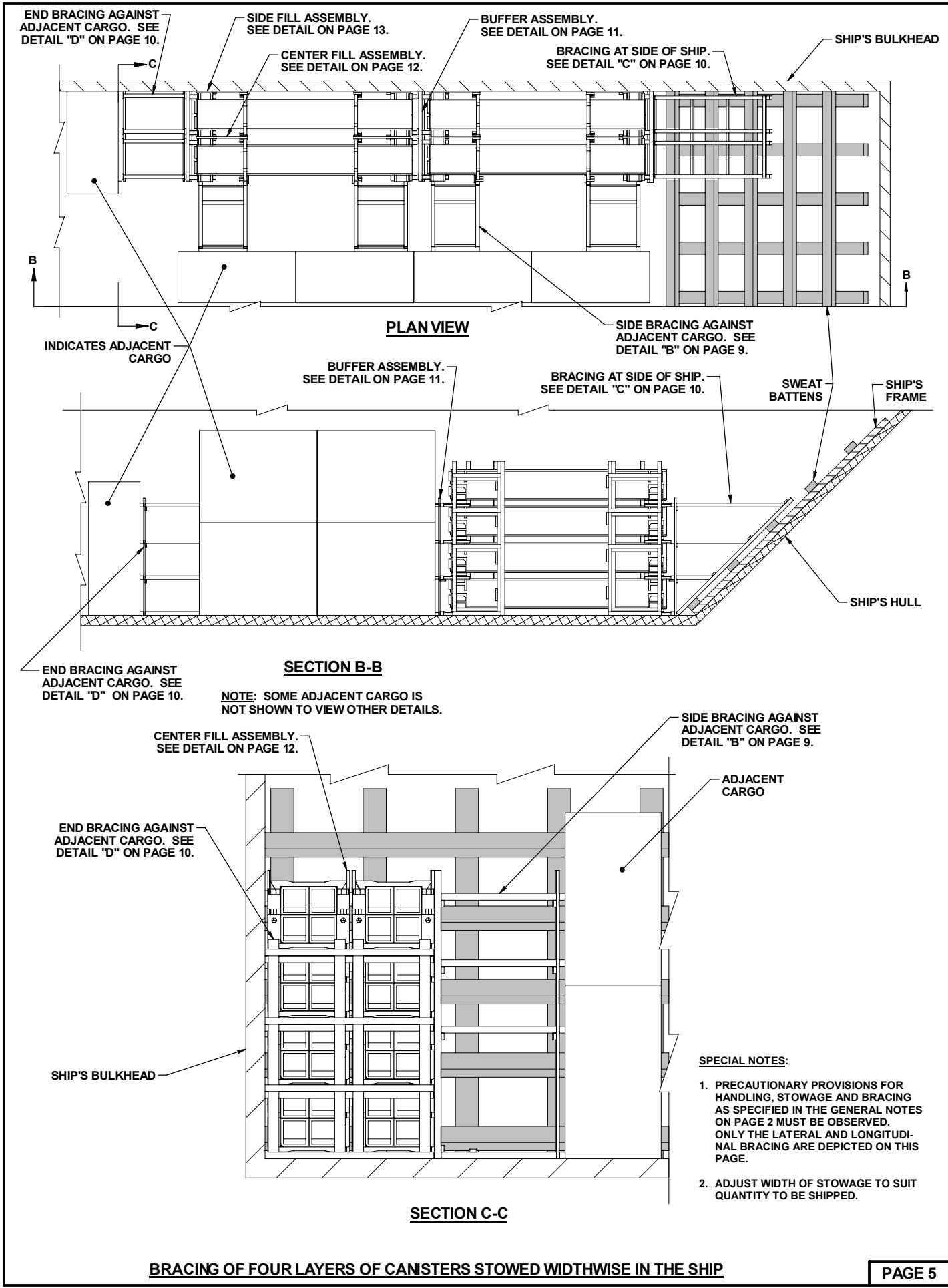
SWEAT BATTENS



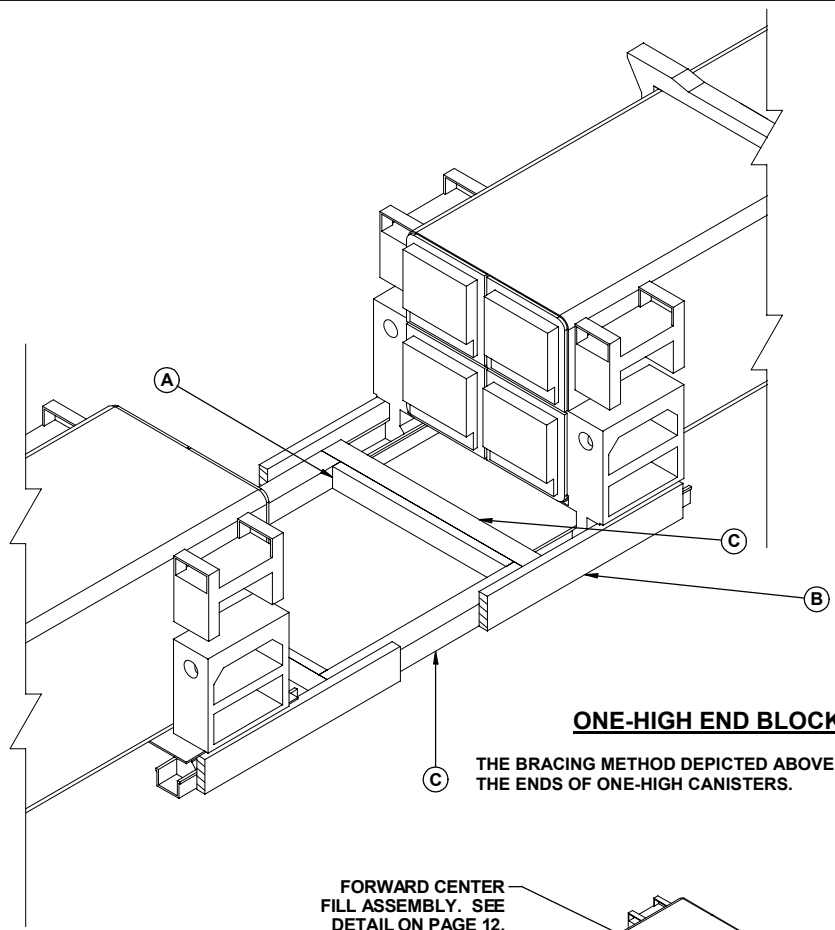
SECTION A-A

SPECIAL NOTES:

1. PRECAUTIONARY PROVISIONS FOR HANDLING, STOWAGE AND BRACING AS SPECIFIED IN THE GENERAL NOTES ON PAGE 2 MUST BE OBSERVED. ONLY THE LATERAL AND LONGITUDINAL BRACING ARE DEPICTED ON THIS PAGE.
2. ADJUST WIDTH OF STOWAGE TO SUIT QUANTITY TO BE SHIPPED.



BRACING OF FOUR LAYERS OF CANISTERS STOWED WIDTHWISE IN THE SHIP



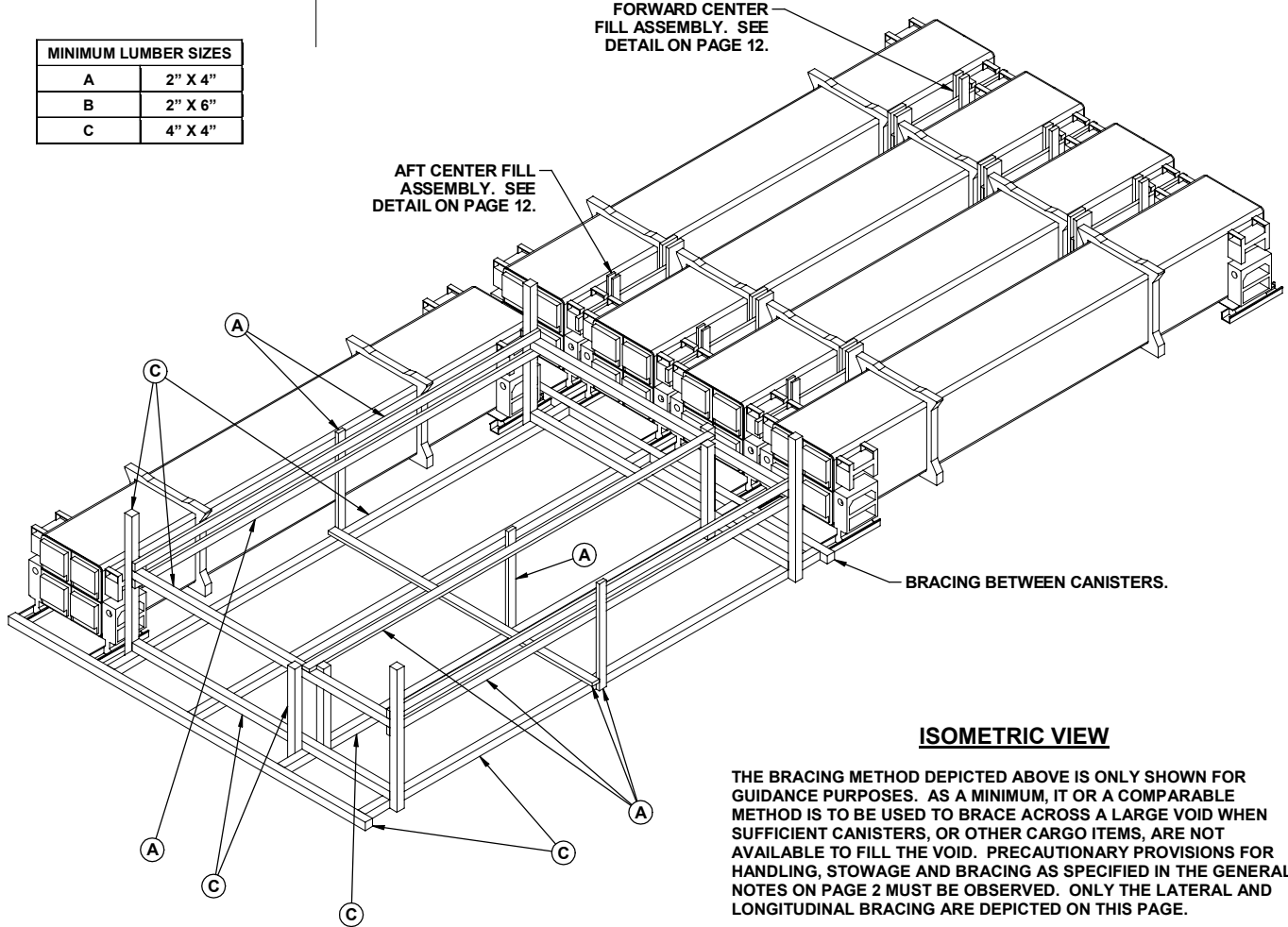
ONE-HIGH END BLOCKING DETAIL

THE BRACING METHOD DEPICTED ABOVE IS FOR BRACING BETWEEN THE ENDS OF ONE-HIGH CANISTERS.

MINIMUM LUMBER SIZES	
A	2" X 4"
B	2" X 6"
C	4" X 4"

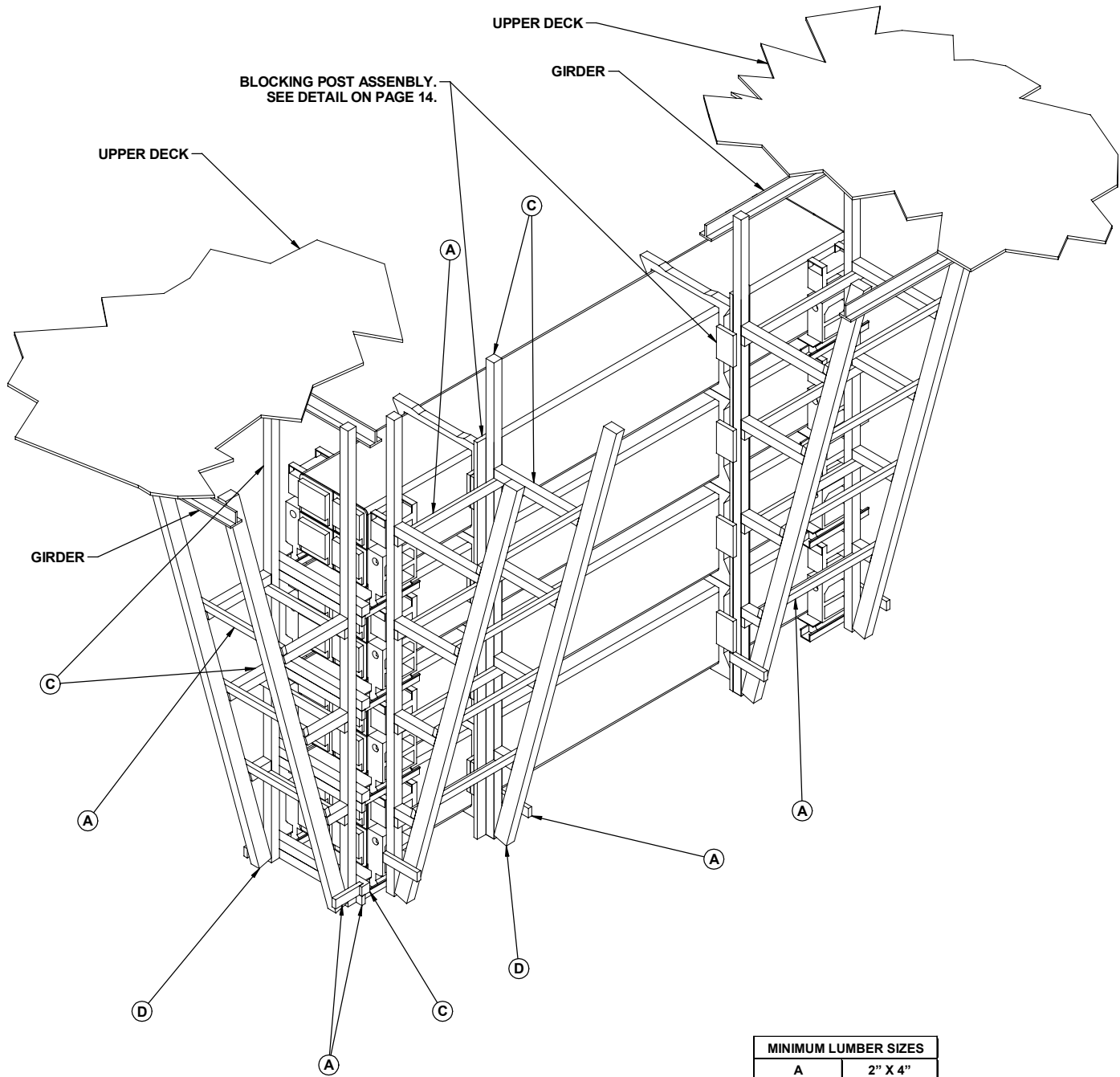
FORWARD CENTER FILL ASSEMBLY. SEE DETAIL ON PAGE 12.

AFT CENTER FILL ASSEMBLY. SEE DETAIL ON PAGE 12.



ISOMETRIC VIEW

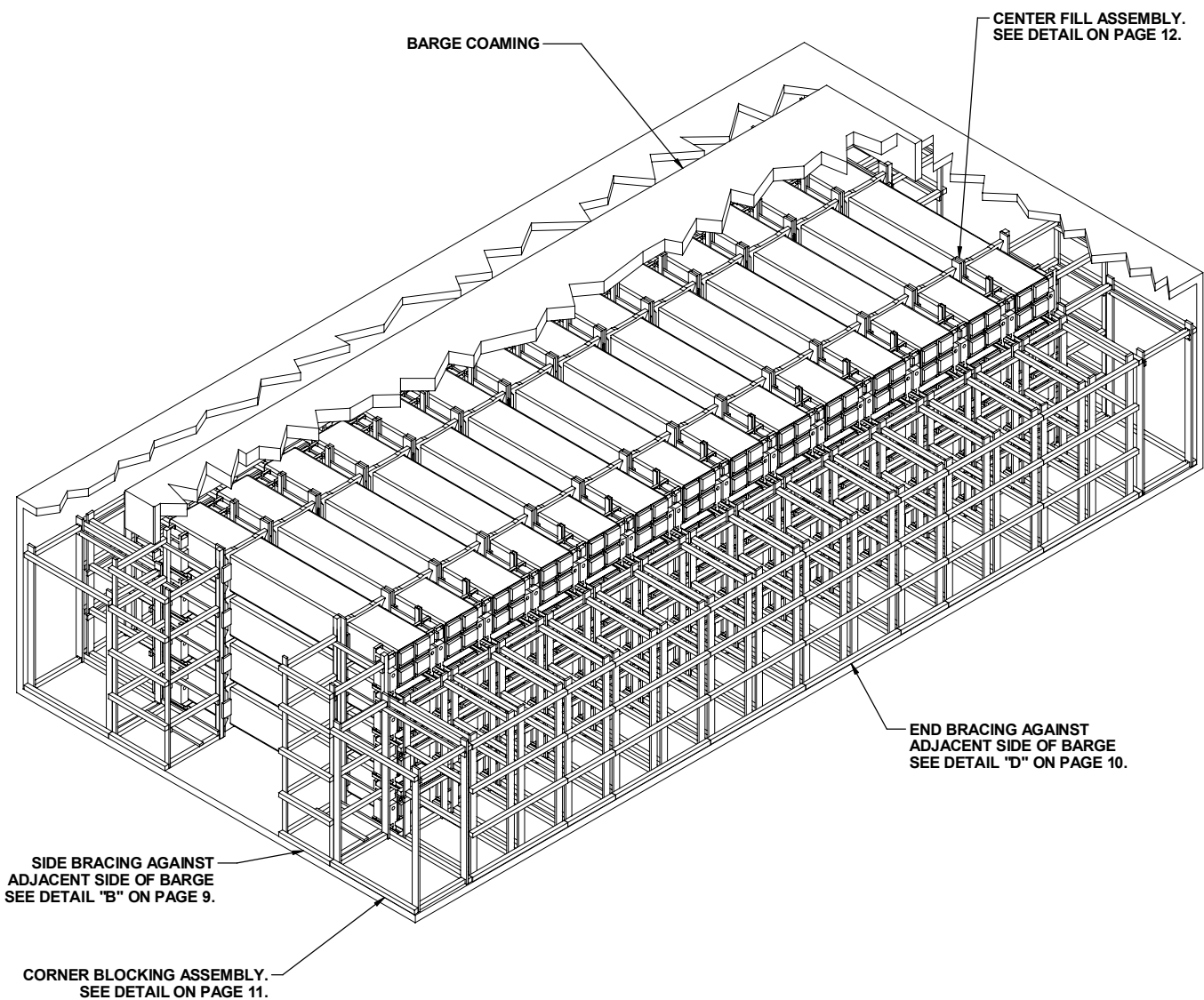
THE BRACING METHOD DEPICTED ABOVE IS ONLY SHOWN FOR GUIDANCE PURPOSES. AS A MINIMUM, IT OR A COMPARABLE METHOD IS TO BE USED TO BRACE ACROSS A LARGE VOID WHEN SUFFICIENT CANISTERS, OR OTHER CARGO ITEMS, ARE NOT AVAILABLE TO FILL THE VOID. PRECAUTIONARY PROVISIONS FOR HANDLING, STOWAGE AND BRACING AS SPECIFIED IN THE GENERAL NOTES ON PAGE 2 MUST BE OBSERVED. ONLY THE LATERAL AND LONGITUDINAL BRACING ARE DEPICTED ON THIS PAGE.



ISOMETRIC VIEW

THE BRACING METHOD DEPICTED ABOVE DEPICTS LATERAL AND END BRACING OF FOUR LAYERS OF CANISTERS AGAINST THE SIDE OR END BULKHEAD OF A SHIP. PRECAUTIONARY PROVISIONS FOR HANDLING, STOWAGE AND BRACING AS SPECIFIED IN THE GENERAL NOTES ON PAGE 2 MUST BE OBSERVED. ONLY THE LATERAL AND LONGITUDINAL BRACING ARE DEPICTED ON THIS PAGE.

MINIMUM LUMBER SIZES	
A	2" X 4"
C	4" X 4"
D	4" X 6"

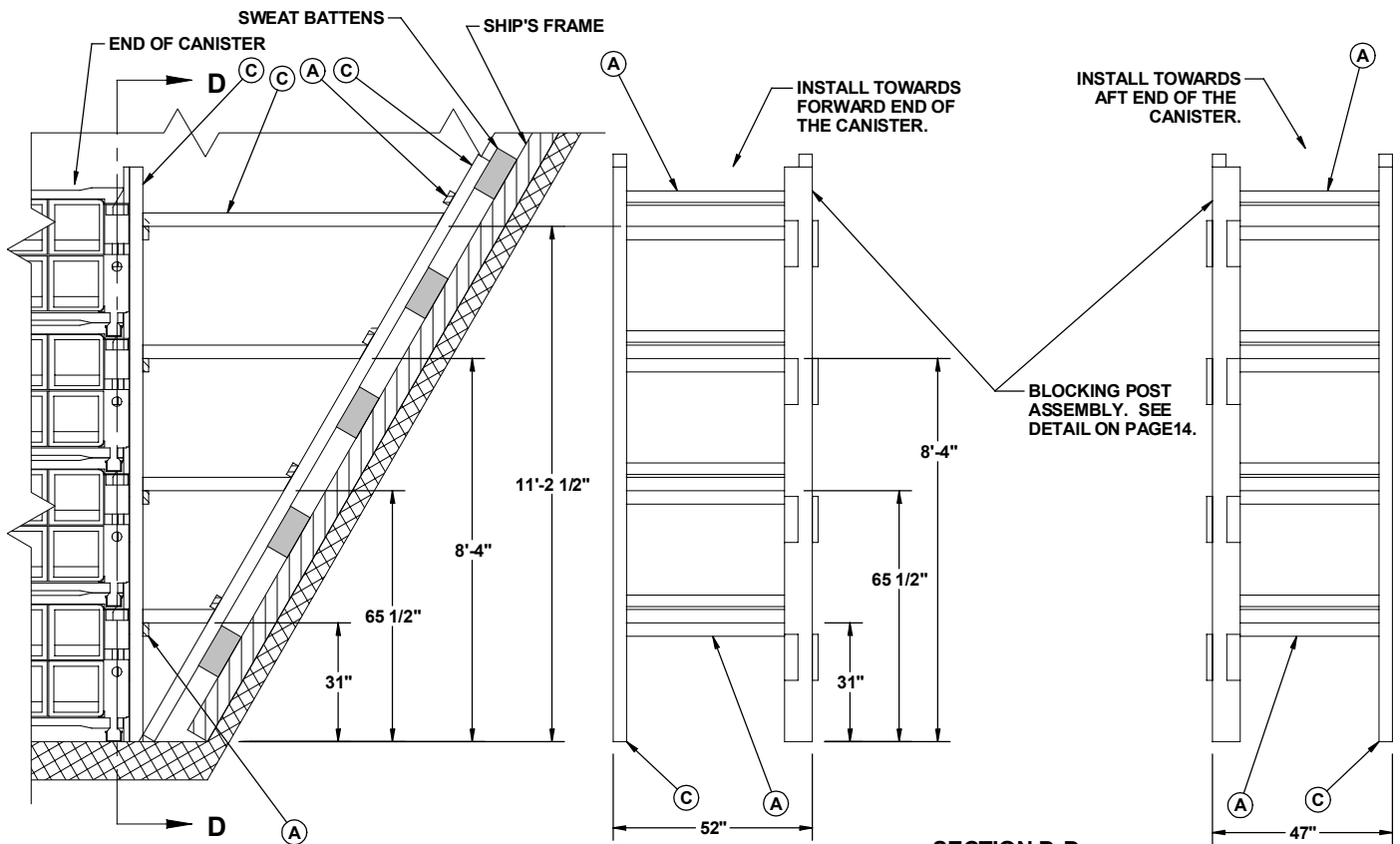


ISOMETRIC VIEW

THE VIEW SHOWN ABOVE DEPICTS A TYPICAL LOAD OF 56 PATRIOT MISSILE (PAC-3). SEE SPECIAL NOTE 2 BELOW.

SPECIAL NOTES:

1. INCREASING THE THICKNESS OF THE CENTER FILL MATERIAL CAN ELIMINATE A SMALL LATERAL VOID.
2. THE QUANTITY OF CANISTERS IN THE FOURTH LAYER MAY NEED TO BE ADJUSTED TO ACCOMMODATE THE INSIDE HEIGHT OF THE BARGE AND THE SIZE OF THE OPENING.



SIDE VIEW

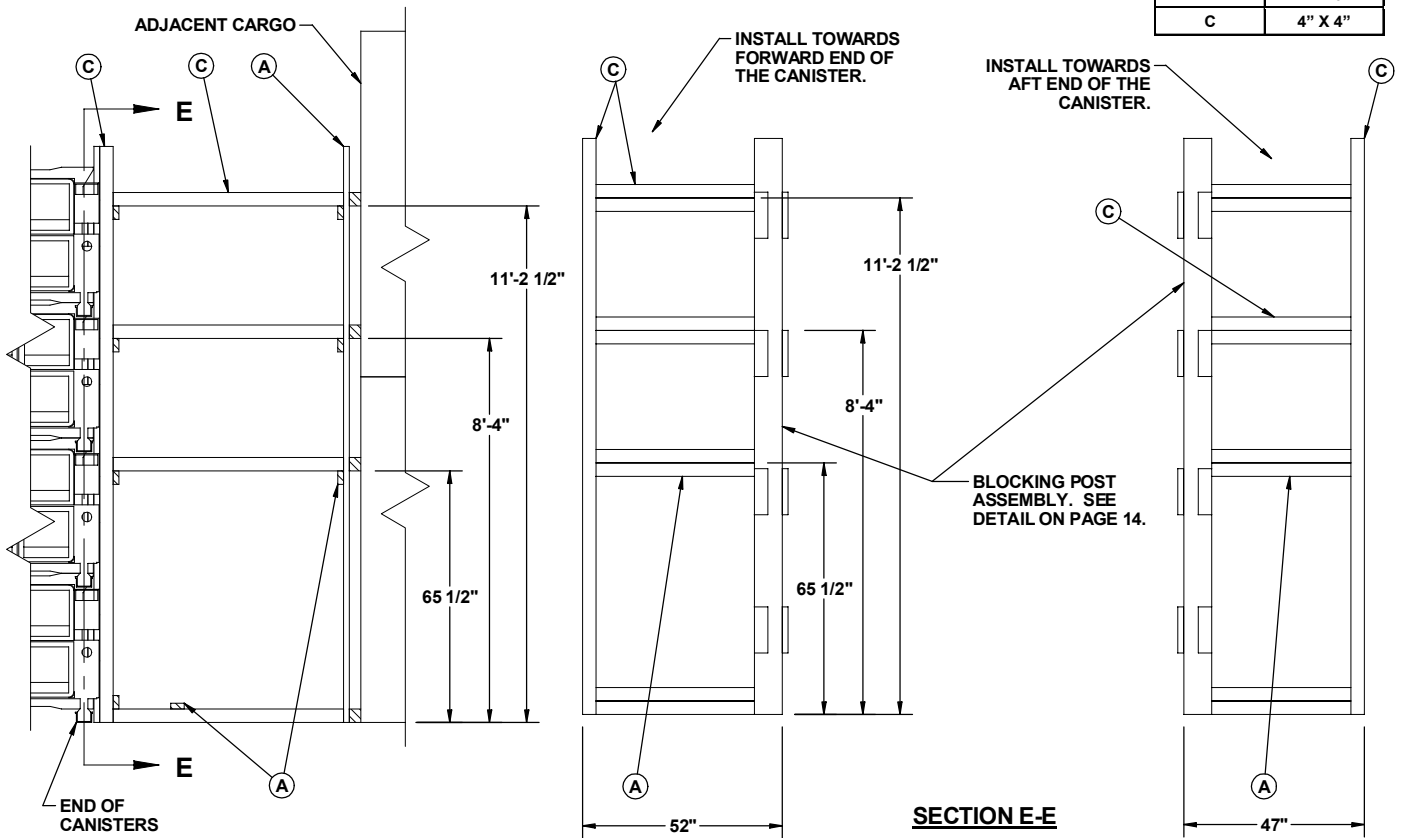
DETAIL A

SECTION D-D

DEPICTED ABOVE IS A SUGGESTED METHOD OF BRACING BETWEEN THE SIDES OF THE CANISTERS STACKED LAYERS HIGH AND THE SIDE OF THE SHIP.

NOTE: ADJACENT CANISTERS AND SHIP ARE NOT SHOWN .

MINIMUM LUMBER SIZES	
A	2" X 4"
B	2" X 6"
C	4" X 4"



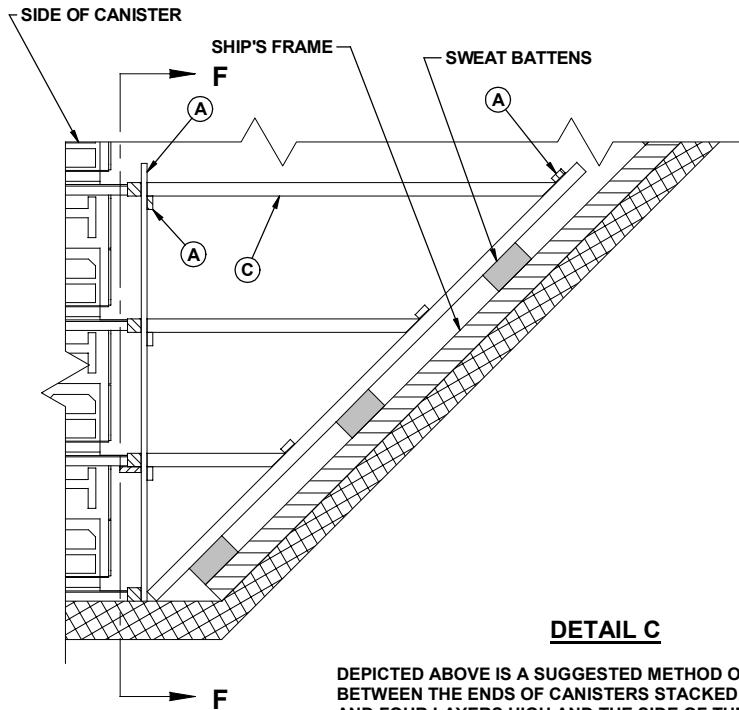
END VIEW

DETAIL B

SECTION E-E

DEPICTED ABOVE IS A SUGGESTED METHOD OF BRACING BETWEEN THE SIDE OF CANISTERS STACKED FOUR HIGH AND LONGITUDINALLY ADJACENT CARGO OR BULKHEADS.

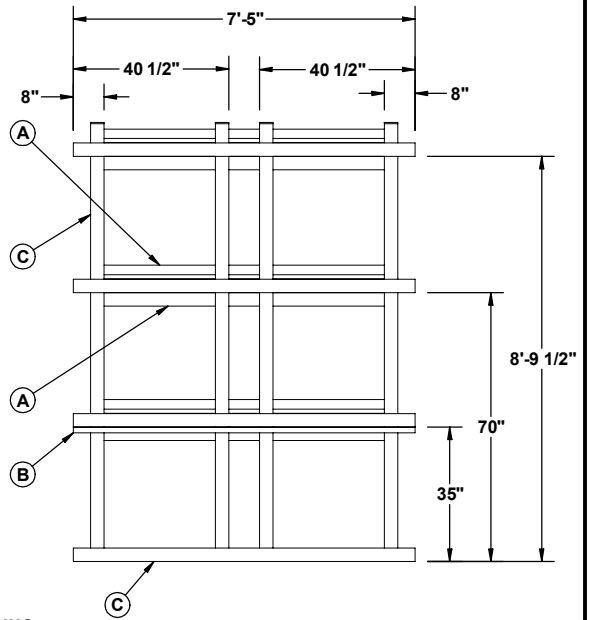
NOTE: ADJACENT CARGO AND CANISTERS ARE NOT SHOWN .



SIDE VIEW

DETAIL C

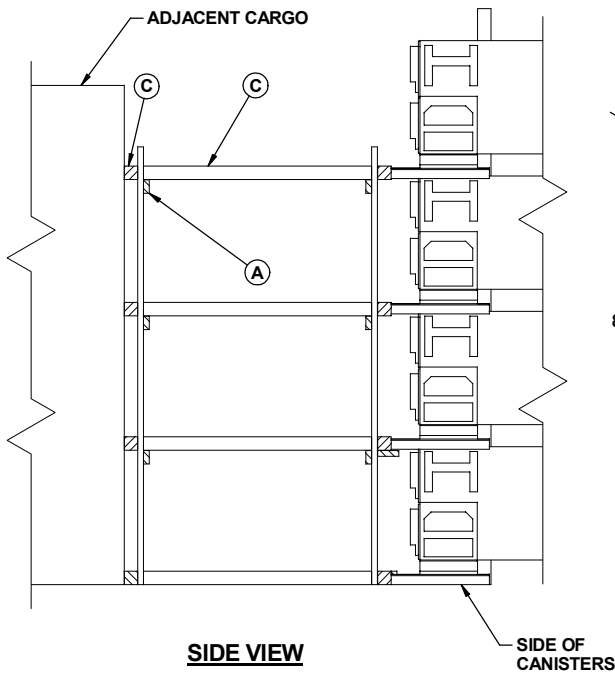
DEPICTED ABOVE IS A SUGGESTED METHOD OF BRACING BETWEEN THE ENDS OF CANISTERS STACKED TWO WIDE AND FOUR LAYERS HIGH AND THE SIDE OF THE SHIP. FOR BRACING OF ONE WIDE STACK OF CANISTERS REDUCE THE LENGTH OF HORIZONTAL BOARDS SHOWN IS SECTION "F-F" FROM 7'-5" LONG TO 44-1/2" LONG.



SECTION F-F

NOTE: ADJACENT CANISTERS AND SHIP ARE NOT SHOWN .

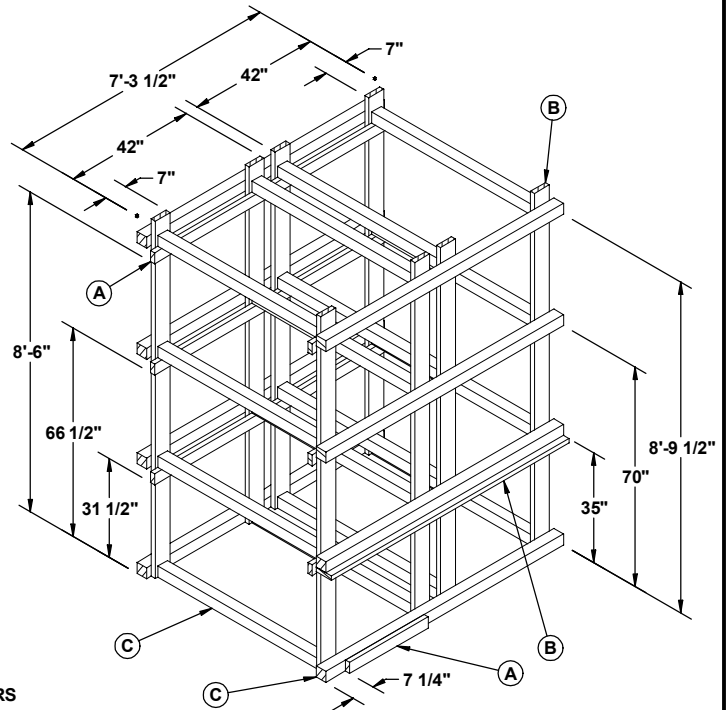
MINIMUM LUMBER SIZES	
A	2" X 4"
B	2" X 6"
C	4" X 4"



SIDE VIEW

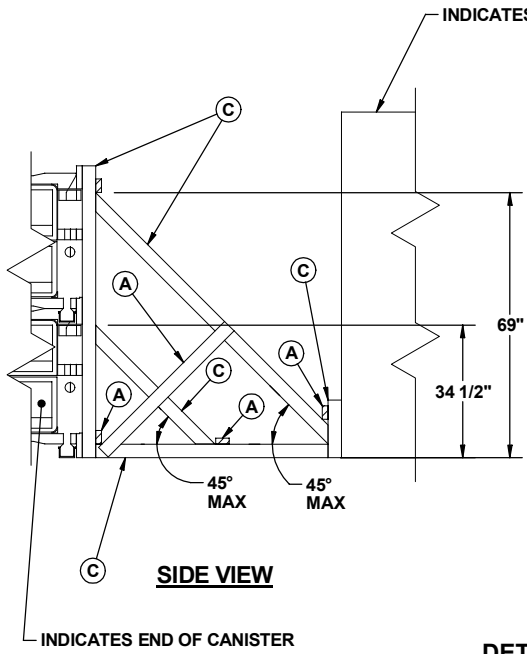
DETAIL D

DEPICTED ABOVE IS A SUGGESTED METHOD OF BRACING BETWEEN THE END OF CANISTERS STACKED TWO WIDE BY FOUR HIGH AND LONGITUDINALLY ADJACENT CARGO OR BULKHEADS. FOR BRACING OF ONE WIDE STACK OF CANISTERS REDUCE THE LENGTH OF HORIZONTAL BOARDS SHOWN IN SECTION "G-G" FROM 7'-3-1/2" LONG TO 43-3/4" LONG.

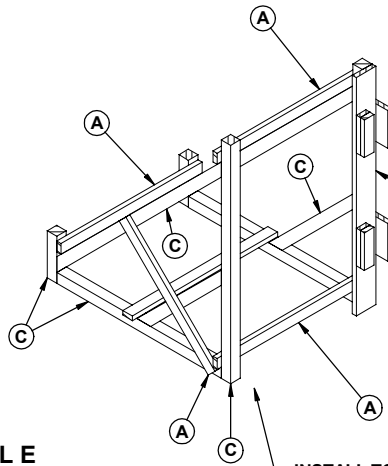


ISOMETRIC VIEW

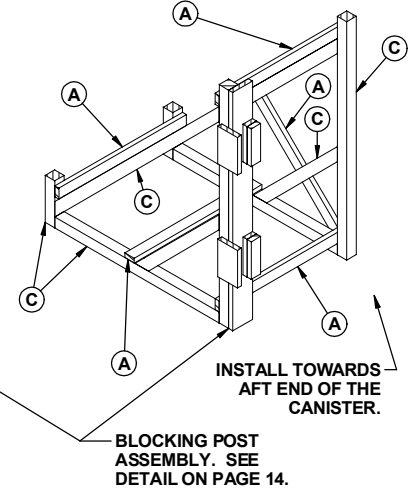
NOTE: ADJACENT CARGO AND CANISTERS ARE NOT SHOWN .



SIDE VIEW



DETAIL E

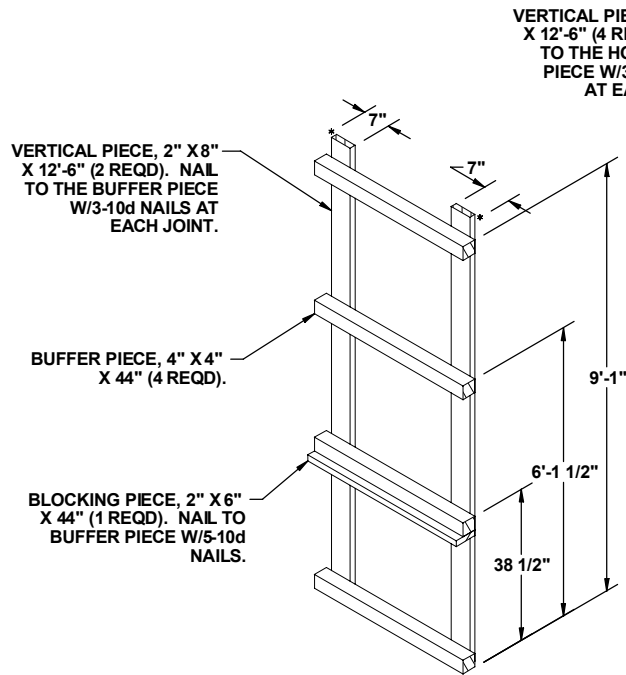


ISOMETRIC VIEW

NOTE: ADJACENT CANISTERS AND SHIP ARE NOT SHOWN .

MINIMUM LUMBER SIZES	
A	2" X 4"
C	4" X 4"

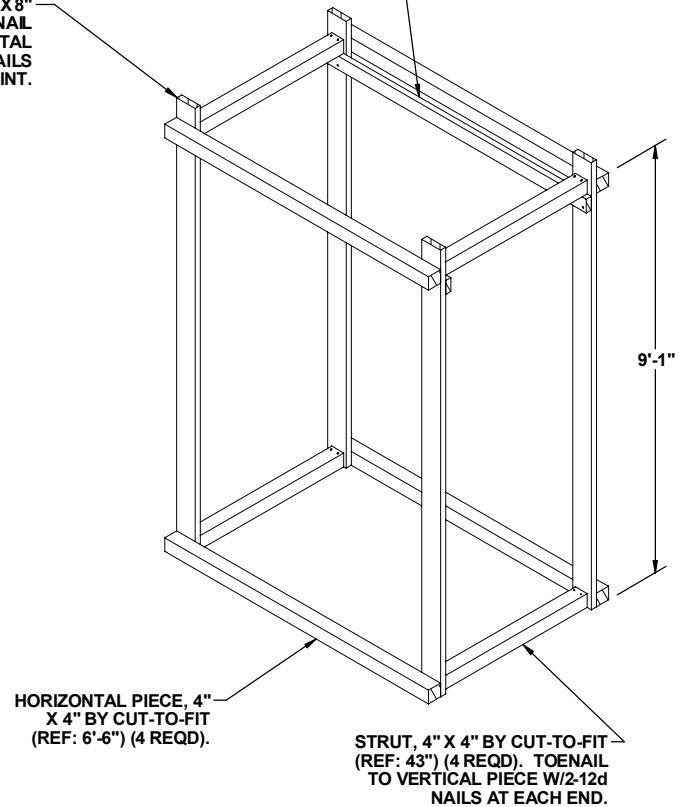
DEPICTED ABOVE IS A SUGGESTED METHOD OF DIAGONAL BRACING BETWEEN THE SIDES OF THE CANISTERS STACKED TWO LAYERS HIGH AND THE ADJACENT CARGO.



BUFFER ASSEMBLY

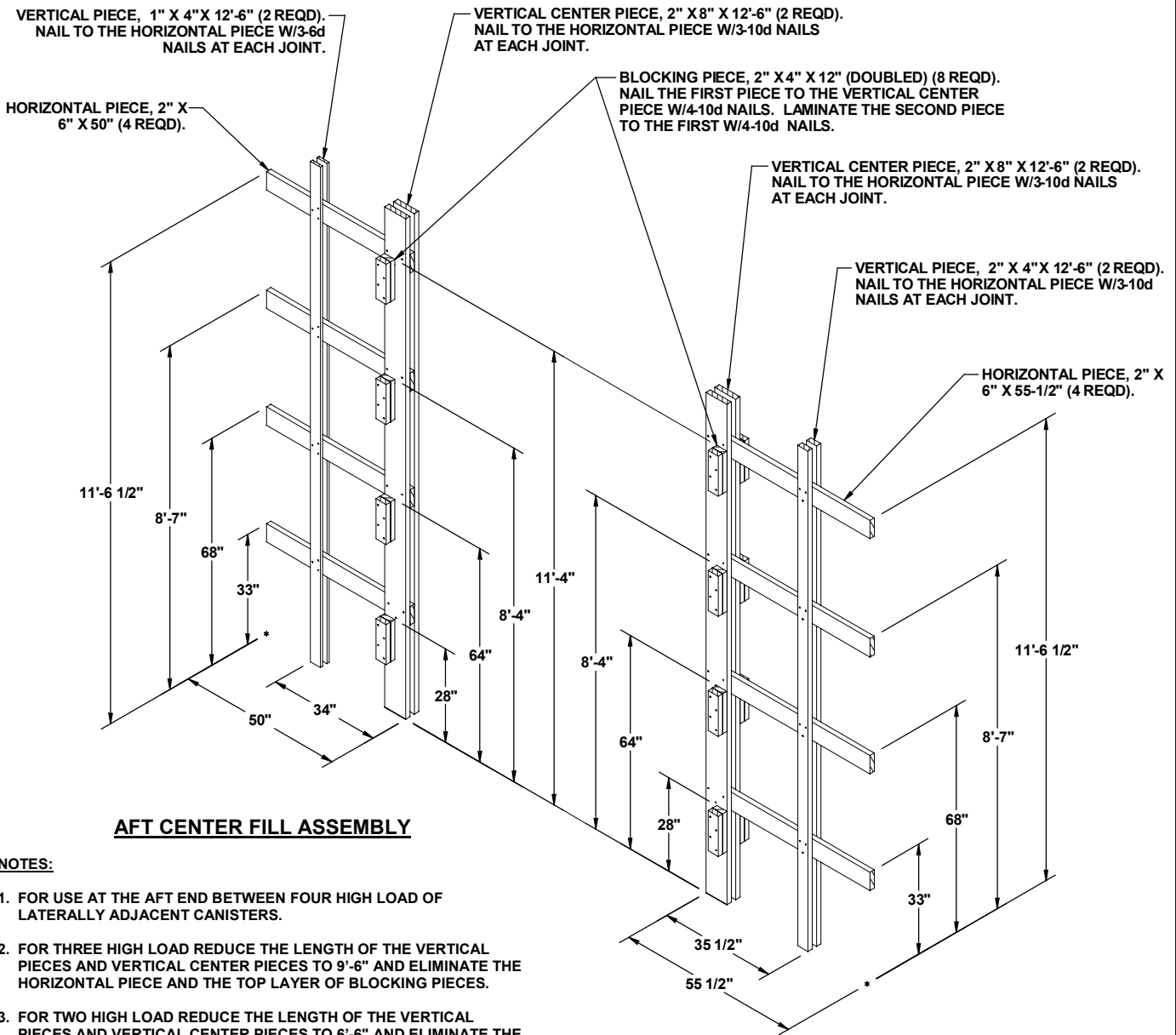
DEPICTED ABOVE IS A SUGGESTED METHOD OF BRACING BETWEEN THE ENDS OF CANISTERS STACKED FOUR HIGH AND THE ADJACENT CARGO.

VERTICAL PIECE, 2" X 8" X 12'-6" (4 REQD). NAIL TO THE HORIZONTAL PIECE W/3-10d NAILS AT EACH JOINT.



CORNER BLOCKING ASSEMBLY

FABRICATE TO FIT BETWEEN SIDE BRACING ASSEMBLIES AND THE END BRACING ASSEMBLIES.



AFT CENTER FILL ASSEMBLY

NOTES:

1. FOR USE AT THE AFT END BETWEEN FOUR HIGH LOAD OF
LATERALLY ADJACENT CANISTERS.
2. FOR THREE HIGH LOAD REDUCE THE LENGTH OF THE VERTICAL
PIECES AND VERTICAL CENTER PIECES TO 9'-6" AND ELIMINATE THE
HORIZONTAL PIECE AND THE TOP LAYER OF BLOCKING PIECES.
3. FOR TWO HIGH LOAD REDUCE THE LENGTH OF THE VERTICAL
PIECES AND VERTICAL CENTER PIECES TO 6'-6" AND ELIMINATE THE
TWO HORIZONTAL PIECE AND THE TOP TWO LAYERS OF BLOCKING
PIECES.
4. FOR ONE HIGH LOAD REDUCE THE LENGTH OF THE VERTICAL
PIECES AND VERTICAL CENTER PIECES TO 42" AND ELIMINATE THE
THREE HORIZONTAL PIECE AND THE TOP THREE LAYERS OF
BLOCKING PIECES.

FORWARD CENTER FILL ASSEMBLY

NOTES:

1. FOR USE AT THE FORWARD END BETWEEN FOUR HIGH LOAD OF
LATERALLY ADJACENT CANISTERS.
2. FOR THREE HIGH LOAD REDUCE THE LENGTH OF THE VERTICAL
PIECES AND VERTICAL CENTER PIECES TO 9'-6" AND ELIMINATE THE
HORIZONTAL PIECE AND THE TOP LAYER OF BLOCKING PIECES.
3. FOR TWO HIGH LOAD REDUCE THE LENGTH OF THE VERTICAL
PIECES AND VERTICAL CENTER PIECES TO 6'-6" AND ELIMINATE THE
TWO HORIZONTAL PIECE AND THE TOP TWO LAYERS OF BLOCKING
PIECES.
4. FOR ONE HIGH LOAD REDUCE THE LENGTH OF THE VERTICAL
PIECES AND VERTICAL CENTER PIECES TO 42" AND ELIMINATE THE
THREE HORIZONTAL PIECE AND THE TOP THREE LAYERS OF
BLOCKING PIECES.

VERTICAL PIECE, 1" X 4" X 12'-6" (1 REQD).
NAIL TO THE HORIZONTAL PIECE W/3-6d
NAILS AT EACH JOINT.

VERTICAL CENTER PIECE, 2" X 8" X 12'-6" (1 REQD).
NAIL TO THE HORIZONTAL PIECE W/3-10d
NAILS AT EACH JOINT.

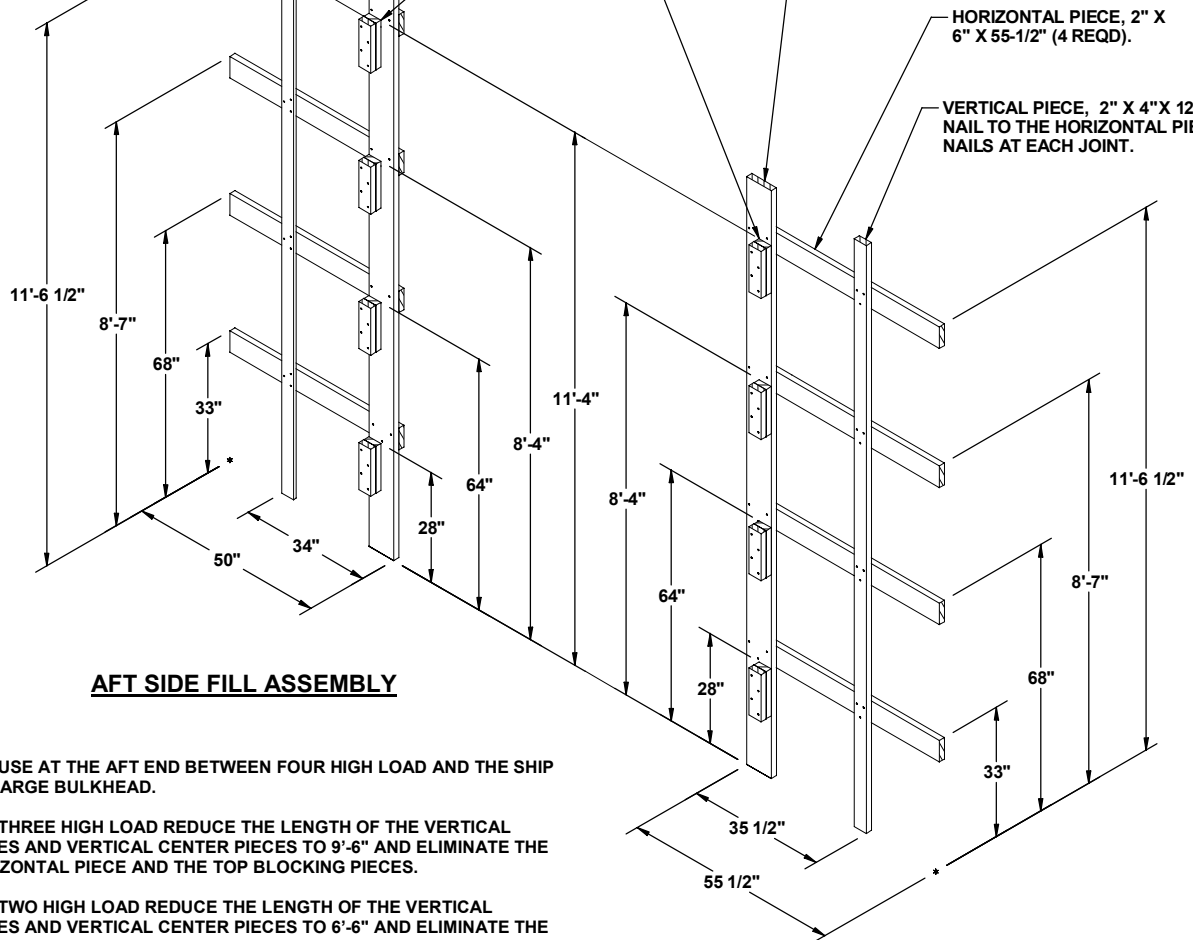
HORIZONTAL PIECE, 2" X
6" X 50" (4 REQD).

BLOCKING PIECE, 2" X 4" X 12" (DOUBLED) (4 REQD).
NAIL THE FIRST PIECE TO THE VERTICAL CENTER
PIECE W/4-10d NAILS. LAMINATE THE SECOND PIECE
TO THE FIRST W/4-10d NAILS.

VERTICAL CENTER PIECE, 2" X 8" X 12'-6" (1 REQD).
NAIL TO THE HORIZONTAL PIECE W/3-10d
NAILS AT EACH JOINT.

HORIZONTAL PIECE, 2" X
6" X 55-1/2" (4 REQD).

VERTICAL PIECE, 2" X 4" X 12'-6" (1 REQD).
NAIL TO THE HORIZONTAL PIECE W/3-10d
NAILS AT EACH JOINT.



AFT SIDE FILL ASSEMBLY

NOTES:

1. FOR USE AT THE AFT END BETWEEN FOUR HIGH LOAD AND THE SHIP OR BARGE BULKHEAD.
2. FOR THREE HIGH LOAD REDUCE THE LENGTH OF THE VERTICAL PIECES AND VERTICAL CENTER PIECES TO 9'-6" AND ELIMINATE THE HORIZONTAL PIECE AND THE TOP BLOCKING PIECES.
3. FOR TWO HIGH LOAD REDUCE THE LENGTH OF THE VERTICAL PIECES AND VERTICAL CENTER PIECES TO 6'-6" AND ELIMINATE THE TWO HORIZONTAL PIECE AND THE TOP TWO BLOCKING PIECES.
4. FOR ONE HIGH LOAD REDUCE THE LENGTH OF THE VERTICAL PIECES AND VERTICAL CENTER PIECES TO 42" AND ELIMINATE THE THREE HORIZONTAL PIECE AND THE TOP THREE BLOCKING PIECES.

FORWARD SIDE FILL ASSEMBLY

NOTES:

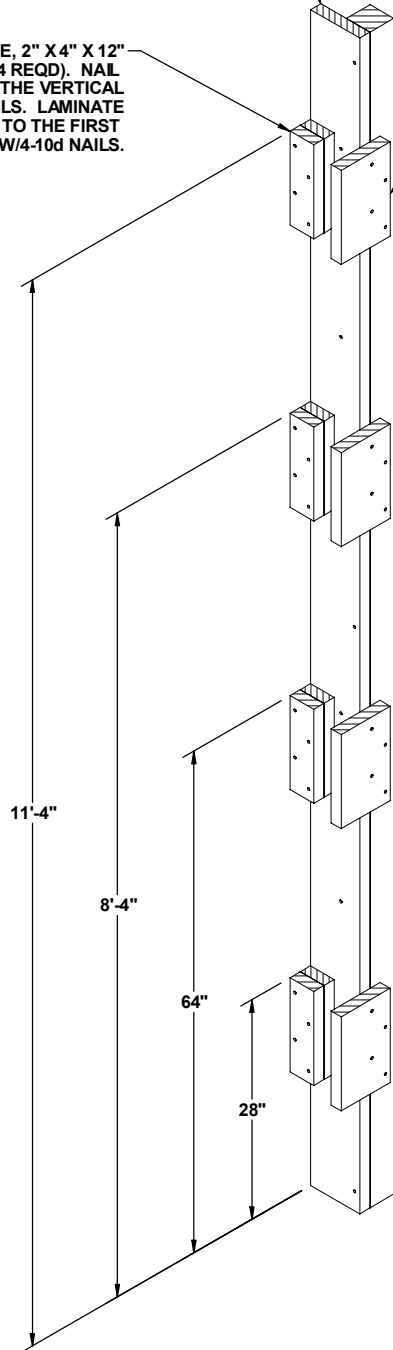
1. FOR USE AT THE FORWARD END BETWEEN FOUR HIGH LOAD AND THE SHIP OR BARGE BULKHEAD.
2. FOR THREE HIGH LOAD REDUCE THE LENGTH OF THE VERTICAL PIECES AND VERTICAL CENTER PIECES TO 9'-6" AND ELIMINATE THE HORIZONTAL PIECE AND THE TOP BLOCKING PIECES.
3. FOR TWO HIGH LOAD REDUCE THE LENGTH OF THE VERTICAL PIECES AND VERTICAL CENTER PIECES TO 6'-6" AND ELIMINATE THE TWO HORIZONTAL PIECE AND THE TOP TWO BLOCKING PIECES.
4. FOR ONE HIGH LOAD REDUCE THE LENGTH OF THE VERTICAL PIECES AND VERTICAL CENTER PIECES TO 42" AND ELIMINATE THE THREE HORIZONTAL PIECE AND THE TOP THREE BLOCKING PIECES.

VERTICAL PIECE, 2" X 8" X 12'-6" (1 REQD).
NAIL TO THE POST W/1-10d NAIL EVERY 12".

BLOCKING PIECE, 2" X 4" X 12"
(DOUBLED) (4 REQD). NAIL
FIRST PIECE TO THE VERTICAL
PIECE W/4-10d NAILS. LAMINATE
THE SECOND TO THE FIRST
W/4-10d NAILS.

BLOCKING PIECE, 2" X 8" X 12" (4 REQD). NAIL TO
THE POST AND VERTICAL PIECE W/2-10d NAILS EACH.

POST, 4" X 4" X 12'-6" (1 REQD).



BLOCKING POST ASSEMBLY

NOTES:

1. FOR THREE HIGH LOAD REDUCE THE LENGTH OF THE VERTICAL PIECE AND POST TO 9'-6" AND ELIMINATE THE TOP BLOCKING PIECES.
2. FOR TWO HIGH LOAD REDUCE THE LENGTH OF THE VERTICAL PIECE AND POST TO 6'-6" AND ELIMINATE THE TOP TWO LAYERS OF BLOCKING PIECES.
3. FOR ONE HIGH LOAD REDUCE THE LENGTH OF THE VERTICAL PIECE AND POST TO 42" AND ELIMINATE THE TOP THREE LAYERS OF BLOCKING PIECES.