LOADING AND BRACING WITH WOODEN
DUNNAGE IN SIDE OPENING ISO
CONTAINERS OF MXU-650/B AND
MXU-651/B AIRFOIL GROUPS PACKAGED
IN METAL DRUMS (PALLETIZED AND
UNPALLETIZED)

● LOADING AND BRACING SPECIFICATIONS SET FORTH WITHIN THIS DRAWING ARE APPLICABLE TO LOADS THAT ARE TO BE SHIPPED BY TRAILER/CONTAINER-ON-FLATCAR (T/COFC) RAIL CARRIER SERVICE. THESE SPECIFICATIONS MAY ALSO BE USED FOR LOADS THAT ARE TO BE MOVED BY MOTOR OR WATER CARRIERS. SEE GENERAL NOTE "M" ON PAGE 2.

	U.S. ARMY MATERIEL COMMAND DRAWING				
	APPROVED, U.S. ARMY INDUSTRIAL OPERATIONS COMMAND	DRAFT:	SMAN	TECHNICIAN	ENGINEER
	Dain & Oterfunk			R. HAYNES	
	APPROVED BY ORDER OF COMMANDING GENERAL, U.S.	VALIDAT ENGINEE DIVISI	RING	TRANSPORTATION ENGINEERING DIVISION	LOGISTICS ENGINEERING OFFICE
	ARMY MATERIEL COMMAND		W.	w. French	2 07. milil
V	Jary William		NOV	EMBER 199	5
	U.S. ARMY DEPENSE AMMUNITION CENTER AND SCHOOL	CLASS	DIVIZIO	N DRAWING	FILE
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DO NOT SCALE

GENERAL NOTES

- THIS DOCUMENT HAS BEEN PREPARED AND ISSUED IN ACCORDANCE WITH AR 740-1 AND AUGMENTS TM 743-200-1 (CHAPTER 5).
- THE OUTLOADING PROCEDURES SPECIFIED IN THIS DRAWING ARE APPLICABLE TO LOADS OF MXU-650/B AIRFOIL GROUPS PACKAGED IN 55-GALLON METAL DRUMS AND MXU-651/B AIRFOIL GROUPS IN 55-GALLON METAL DRUMS AND MXU-6517B AIRHUIL GROUPS
 PACKAGED IN 80-GALLON METAL DRUMS (UNPALLETIZED AND
 PALLETIZED). THESE PROCEDURES WILL ALSO APPLY TO OTHER
 ITEMS WHEN PACKAGED IN THE 55-GALLON OR 80-GALLON METAL
 DRUMS. FOR CONTAINER DETAILS, SEE USAF TPO 00-427-9099
 AND THE CONTAINER DETAILS ON PAGE 3. CAUTION: REGARDLESS
 OF QUANTITY OF UNITS TO BE SHIPPED, THE "MAXIMUM GROSS WEIGHT" OF THE SIDE OPENING ISO CONTAINER MUST NOT BE EXCEEDED.
- THE LOADS AS SHOWN ARE BASED ON 6,050 POUND 20' LONG BY 8' WIDE BY 8'-6" HIGH SIDE OPENING ISO CONTAINER WITH INSIDE DIMENSIONS OF 19'-4" LONG BY 89" WIDE BY 88" HIGH AND A MAXIMUM GROSS WEIGHT OF 52,910 POUNDS. THE LOAD IS DESIGNED FOR TRAILER/CONTAINER-ON-FLATCAR (T/COFC) SHIPMENT, HOWEVER, THE LOAD AS DESIGNED CAN ALSO BE MOVED BY MOTOR OR WATER CARRIERS. NOTICE: OTHER CONTAINERS OF THE SAME DESIGN CONFIGURATION CAN ALSO BE USED.
- WHEN LOADING THE DRUMS, THEY ARE TO BE POSITIONED SO AS TO ACHIEVE A TIGHT LOAD (TIGHT AGAINST THE DUNNAGE ASSEMBLIES). THE UNBLOCKED SPACE ACROSS THE WIDTH OF A LOAD BAY IS NOT TO EXCEED 1-1/2". EXCESSIVE SLACK CAN BE ELIMINATED FROM A LOAD BY LAMINATING ADDITIONAL PIECES OF APPROPRIATE THICKNESS TO THE END BLOCKING ASSEMBLIES. NAI EACH ADDITIONAL PIECE TO THE VERTICAL PIECE W/1 APPROPRIATELY SIZED NAIL EVERY 12". ADDITIONALLY, THE THICKNESS AND QUANTITY OF THE DUNNAGE LUMBER USED MAY BE ADJUSTED AS REQUIRED TO FACTITIATE VARTANCE IN THE STYFE ADJUSTED AS REQUIRED TO FACILITATE VARIANCE IN THE SIZE OF THE CONTAINER.
- DUNNAGE LUMBER SPECIFIED 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.
- A STAGGERED NAILING PATTERN WILL BE USED WHENEVER POSSIBLE WHEN NAILS ARE DRIVEN INTO JOINTS OF DUNNAGE POSSIBLE WHEN NAILS ARE DRIVEN INTO SOLID MADE.

 ASSEMBLIES OR WHEN LAMINATING DUNNAGE. ADDITIONALLY, THAILING 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.
- IN SOME CONTAINERS THERE IS A SLOT AT THE CORNERS OF THE FORWARD WALL. PIECES OF DUNNAGE MATERIAL MUST BE LAMINATED TO THE BUFFER PIECES ON THE FORWARD BLOCKING LAMINATED TO THE BUFFER PIECES ON THE FORWARD BLOCKING ASSEMBLY TO PROVIDE A FLAT SURFACE FOR THE BUFFER PIECES. A PIECE OF 2" X 4", 2" X 3" OR A SPECIAL WIDTH PIECE CUT-TO-FIT CAN BE USED. THIS FILL PIECE WILL BE NAILED WITH ONE APPROPRIATELY SIZED NAIL EVERY 12". NOTE THAT SOME CONTAINERS ARE EQUIPPED WITH "TIE-BARS" IN THE CORNER SLOT, WHICH PRECLUDE THE USE OF A FULL HEIGHT FILL PIECE. WHEN "TIE-BARS" ARE PRESENT, THE FILL PIECE MUST BE INSTALLED IN SEGMENTS DESIGNED TO FIT BETWEEN THE "TIE-BARS" VERTICALLY. THE FILL PIECE(S) IS NOT REQUIRED WHEN THE CORNER PORTIONS OF THE CONTAINER FORWARD WALL ARE SMOOTH AND FLAT. DO NOT ALLOW ANY DUNNAGE ASSEMBLY TO CONTACT THE CONTAINER FORWARD WALL, ONLY THE CORNER POSTS OF THE CONTAINER SHOULD BE USED FOR FORWARD LONGITUDINAL BLOCKING. LONGITUDINAL BLOCKING.
- DO NOT NAIL DUNNAGE MATERIAL TO THE CONTAINER CAUTION: DO NOT NAIL DUNNAGE MATERIAL TO THE CONTAINER WALLS OR FLOOR. ALL NAILING WILL BE WITHIN THE DUNNAGE.

(CONTINUED AT RIGHT)

MATERIAL SPECIFICATIONS

LUMBER - - - - - -: SEE TM 743-200-1 (DUNNAGE LUMBER) AND FED SPEC MM-L-751.

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

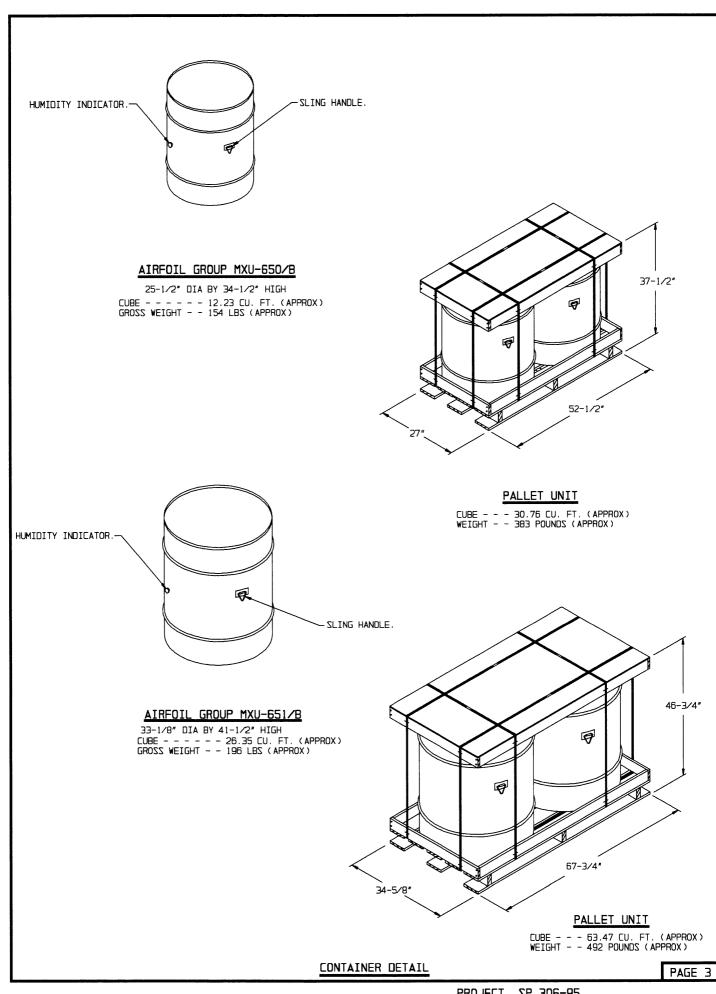
PLYWOOD - - - - - : COMMERCIAL ITEM DESCRIPTION
A-A-55057, TYPE A, CONSTRUCTION AND
INDUSTRIAL PLYWOOD, INTERIOR WITH
EXTERIOR GLUE, GRADE C-D. IF
SPECIFIED GRADE IS NOT AVAILABLE, A
BETTER INTERIOR OR AN EXTERIOR GRADE
MAY BE SUBSTITUTED.

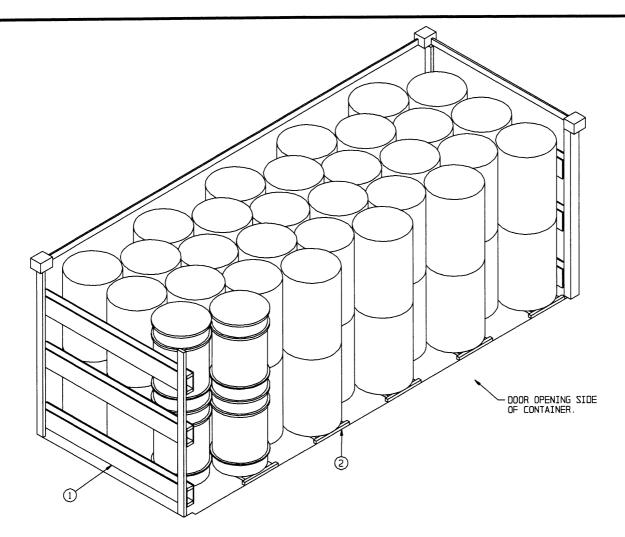
(GENERAL NOTES CONTINUED)

- J. PORTIONS OF THE CONTAINER DEPICTED WITHIN THIS DRAWING, SUCH AS THE SIDE DOORS, HAVE NOT BEEN SHOWN IN THE LOAD VIEW FOR CLARITY PURPOSES.
- K. 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 0.454 KG.
- L. MAXIMUM LOAD WEIGHT CRITERIA:

THE MAXIMUM LOAD WEIGHTS ARE CONTROLLED BY EQUIPMENT THE MAXIMUM LOAD WEIGHTS ARE CONTROLLED BY EQUIPMENT CAPABILITY FACTORS. ALTHOUGH THE HEAVIEST MAXIMUM LOADS ARE DELINEATED IN THE LOAD VIEWS, PROVISIONS ARE INCLUDED WITHIN THIS DRAWING SO THAT THE BASIC LOADS CAN BE ADJUSTED TO SATISFY A LESSER QUANTITY OF LADING UNITS. DEPENDING ON TRANSPORTATION ROUTING, IT MAY BE NECESSARY TO REDUCE THE LOAD WEIGHT TO SATISFY "WEIGHT LAWS" OF CERTAIN STATES. ALSO, IT MAY BE NECESSARY TO REDUCE THE LOAD WEIGHT TO SATISFY OTHER WEIGHT RESTRICTIONS IMPOSED ON THE INTERMODAL CONTAINER SYSTEM. ON THE INTERMODAL CONTAINER SYSTEM.

- M. REQUIREMENTS CITED WITHIN THE BUREAU OF EXPLOSIVES PAMPHLET 6C APPLY WHEN THE SHIPMENT MOVES BY TRAILER/CONTAINER-ON-FLATCAR (T/COFC). SPECIAL T/COFC NOTES FOLLOW:
 - 1. A LOADED CONTAINER MUST BE ON A CHASSIS EQUIPPED WITH TWO BOGIE ASSEMBLIES WHEN BEING MOVED IN TOFC
 - THE LOAD LIMIT OF A T∕COFC RAILCAR MUST NOT 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.
- N. DURING INTRASTATE AND/OR INTERSTATE MOVES BY MOTOR CARRIER, A PROPER CHASSIS OR MODIFIED FLATBED TRAILER MUST BE USED TO PRECLUDE VIOLATION OF ONE OR MORE "WE: "WEIGHT LAWS" APPLICABLE TO THE STATE OR STATES INVOLVED.
- O. WHETHER A CONTAINER IS FULL OR IS LOADED WITH A REDUCED QUANTITY OF LADING UNITS, THE LENGTHWISE CENTER OF GRAVITY OF THE LOAD MUST BE WITHIN 12", IN EITHER DIRECTION, OF THE MID-POINT OF THE CONTAINER.
- P. THE 55-GALLON METAL DRUM IS DESIGNED TO "NEST" WHEN STACKED, THEREFORE NO DECKING IS REQUIRED BETWEEN
 LAYERS. THE 80-GALLON DRUM IS AN OPEN HEAD TYPE AND
 WILL NOT NEST. DECKING IS REQUIRED WHEN STACKING THIS DRUM.





KEY NUMBERS

ISOMETRIC VIEW

- (1) END BLOCKING ASSEMBLY (2 REOD). SEE THE "END BLOCKING ASSEMBLY A" DETAIL ON PAGE 12. SEE SPECIAL NOTE 2 ON PAGE 5 AND GENERAL NOTES "F" AND "G" ON PAGE 2.
- (2) RISER ASSEMBLY (5 REQD). SEE THE DETAIL ON PAGE 14 AND SPECIAL NOTE 3 ON PAGE 5.

RECOMMENDED SEQUENTIAL LOADING PROCEDURES:

- PREFABRICATE TWO END BLOCKING ASSEMBLIES AND FIVE RISER ASSEMBLIES.
- 2. INSTALL THE END BLOCKING ASSEMBLIES.
- 3. LOAD DRUMS AND RISERS FROM BOTH DIRECTIONS TOWARDS CENTER OF CONTAINER.
- 4. TWO LOAD BAYS NEAR THE CENTER OF THE LOAD WILL HAVE TO BE LOADED SIMULTANEOUSLY SO AS TO PROPERLY "NEST" AS SHOWN IN THE ISOMETRIC VIEW ON PAGE 4.

SPECIAL NOTES:

- A 60-CONTAINER (DRUM) LOAD IS SHOWN IN A SIDE OPENING ISO CONTAINER.
- 2. FILL PIECES MAY BE LAMINATED TO THE BUFFER PIECES ON END BLOCKING ASSEMBLY A TO PROVIDE FOR A TIGHT LOAD.
- 3. IF DESIRED, THE "ALTERNATIVE RISER ASSEMBLY" SHOWN ON PAGE 16 MAY BE USED IN LIEU OF THE "RISER ASSEMBLY" SHOWN IN THE LOAD ON PAGE 4.

BILL OF MATERIAL			
LUMBER	LINEAR FEET	BOARD FEET	
2" X 2" 2" X 4"	17 187	6 125	
ZJIAN	NO. REQD	ZDNUOP	
6d (2°) 10d (3°)	264 88	1-1/2 1-1/4	
PLYWOOD, 1/2" 69 SQ ET REQD 95 LBS			

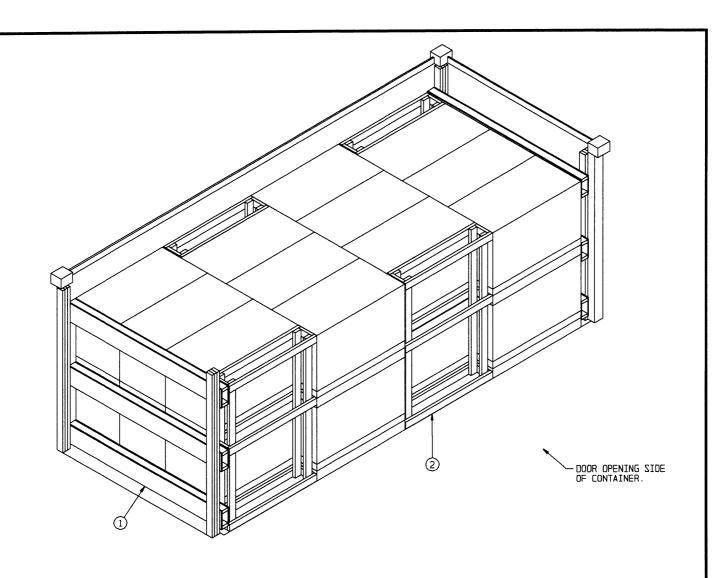
NWOHZ ZA DAOJ

ITEM	QUANTITY	WEIGHT (APPROX)
55 GALLON DRUM DUNNAGE CONTAINER		360 LBS

TOTAL WEIGHT - - - - - - 15,650 LBS (APPROX)

55-GALLON DRUMS (UNPALLETIZED)

PAGE 5



ISOMETRIC VIEW

KEY NUMBERS

- (1) END BLOCKING ASSEMBLY (2 REOD). SEE THE "END BLOCKING ASSEMBLY B" DETAIL ON PAGE 12. SEE SPECIAL NOTE 2 ON PAGE 7 AND GENERAL NOTES "F" AND "G" ON PAGE 2.
- (2) CRIB FILL (4 REOD). SEE THE "CRIB FILL A" DETAIL ON PAGE 15. SEE SPECIAL NOTE 3 ON PAGE 7.

55-GALLON DRUMS (PALLETIZED)

RECOMMENDED SEQUENTIAL LOADING PROCEDURES:

- PREFABRICATE TWO END BLOCKING ASSEMBLIES AND FOUR CRIB FILL ASSEMBLIES.
- 2. INSTALL ONE END BLOCKING ASSEMBLY.
- 3. LOAD SIX PALLET UNITS AND ONE CRIB FILL ASSEMBLY.
- 4. INSTALL THE OTHER END BLOCKING ASSEMBLY.
- 5. LOAD SIX PALLET UNITS AND ONE CRIB FILL ASSEMBLY.
- 6. LOAD THE REMAINING TWELVE PALLET UNITS AND TWO CRIB FILL ASSEMBLIES.

SPECIAL NOTES:

- A 24-PALLET UNIT LOAD OF DRUMS IS SHOWN IN A SIDE OPENING ISO CONTAINER.
- 2. ADDITIONAL FILL PIECES MAY BE LAMINATED TO THE END BLOCKING ASSEMBLY B TO PROVIDE FOR A TIGHT LOAD.
- 3. THE WIDTH OF THE CRIB FILL ASSEMBLY A MAY BE ADJUSTED AS NECESSARY TO PROVIDE FOR A TIGHT LOAD ACROSS THE WIDTH OF A LOAD BAY.

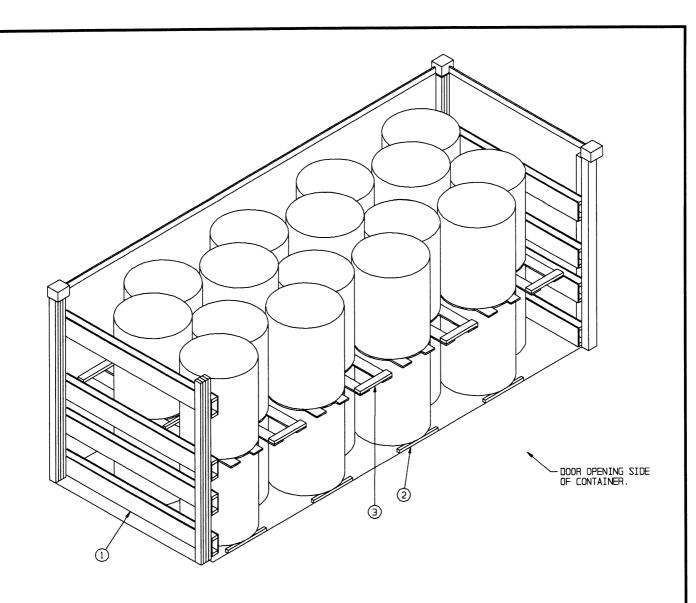
BILL OF MATERIAL			
LUMBER	LINEAR FEET	BOARD FEET	
2" X 4"	385	257	
NAILS	NO. REOD	SONDO	
10d (3")	296	4-1/2	
PLYWOOD, 1/2" 69 SQ FT REQD 95 LBS			

NWOHZ ZA DAOL

ITEM	<u>QUANTITY</u>	WEIGHT (APPROX)
PALLET UNIT DUNNAGE CONTAINER		615 LBS

TOTAL WEIGHT - - - - - - 15,857 LBS (APPROX)

55-GALLON DRUMS (PALLETIZED)



ISOMETRIC VIEW

KEY NUMBERS

- (1) END BLOCKING ASSEMBLY (2 REQD). SEE THE "END BLOCKING ASSEMBLY C" DETAIL ON PAGE 13. SEE SPECIAL NOTE 2 ON PAGE 9 AND GENERAL NOTES "F" AND "G" ON PAGE 2.
- (2) RISER ASSEMBLY (4 REOD). SEE THE DETAIL ON PAGE 14 AND SPECIAL NOTE 3 ON PAGE 9.
- ① DECK ASSEMBLY (8 REOD). SEE THE DETAIL ON PAGE 14 AND GENERAL NOTE "P" ON PAGE 2.

80-GALLON DRUMS (UNPALLETIZED)

RECOMMENDED -SEQUENTIAL LOADING PROCEDURES:

- PREFABRICATE TWO END BLOCKING ASSEMBLIES, FOUR RISER ASSEMBLIES, AND EIGHT DECK ASSEMBLIES.
- 2. INSTALL THE END BLOCKING ASSEMBLIES.
- 3. LOAD DRUMS, RISER ASSEMBLIES, AND DECK ASSEMBLIES FROM BOTH DIRECTIONS TOWARDS CENTER OF CONTAINER.
- 4. THE TWO LOAD BAYS NEAR THE CENTER OF THE LOAD WILL HAVE TO BE LOADED SIMULTANEOUSLY SO AS TO PROPERLY "NEST" AS SHOWN IN THE ISOMETRIC VIEW ON PAGE B.

SPECIAL NOTES:

- A 32-CONTAINER (DRUM) LOAD IS SHOWN IN A SIDE OPENING ISO CONTAINER.
- 2. ADDITIONAL FILL PIECES MAY BE LAMINATED TO THE END BLOCKING ASSEMBLY C TO PROVIDE FOR A TIGHT LOAD.
- 3. IF DESIRED, THE "ALTERNATIVE RISER ASSEMBLY" SHOWN ON PAGE 16 MAY BE USED IN LIEU OF THE "RISER ASSEMBLY" SHOWN IN THE LOAD ON PAGE 8.

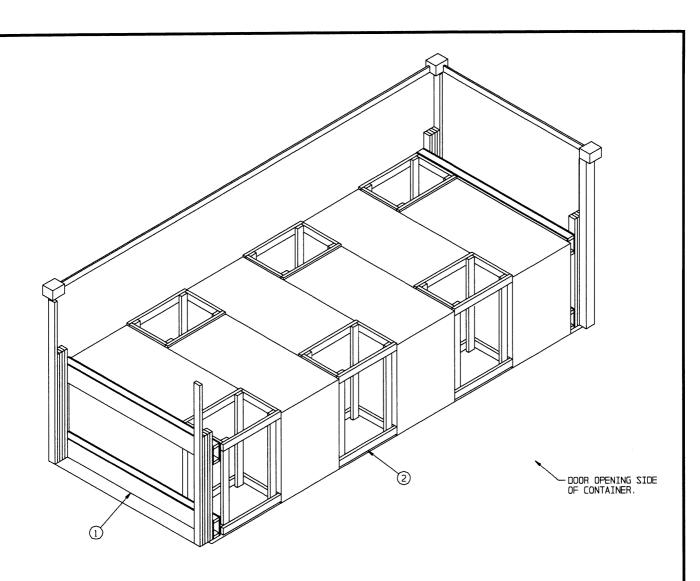
BILL OF MATERIAL			
LUMBER	LINEAR FEET	BOARD FEET	
1" X 6" 2" X 2" 2" X 4"	119 27 298	60 9 199	
NAILS	NO. REQD	POUNDS	
6d (2°) lOd (3°)	448 180	2-3/4 2-3/4	
PLYWOOD, 1/2" 92 SO ET REOD127 LBS			

NWOHZ ZA DAOJ

ITEM	QUANTITY	WEIGHT (APPROX)
80 GALLON DRUM DUNNAGE CONTAINER		669 LBZ
TOTAL WEIG	HT	12,994 LBS (APPROX)

80-GALLON DRUMS (UNPALLETIZED)

PAGE 9



ISOMETRIC VIEW

KEY NUMBERS

- (1) END BLOCKING ASSEMBLY (2 REQD). SEE THE "END BLOCKING ASSEMBLY D" DETAIL ON PAGE 13. SEE SPECIAL NOTE 2 ON PAGE 11 AND GENERAL NOTES "F" AND "G" ON PAGE 2.
- (2) CRIB FILL (6 REOD). SEE THE "CRIB FILL B" DETAIL ON PAGE 15. SEE SPECIAL NOTE 3 ON PAGE 11.

80-GALLON DRUMS (PALLETIZED)

RECOMMENDED SEQUENTIAL LOADING PROCEDURES:

- PREFABRICATE TWO END BLOCKING ASSEMBLIES AND SIX CRIB FILL ASSEMBLIES.
- 2. INSTALL ONE END BLOCKING ASSEMBLY.
- 3. LOAD ONE PALLET UNIT AND ONE CRIB FILL ASSEMBLY.
- 4. INSTALL THE OTHER END BLOCKING ASSEMBLY.
- 5. LOAD ONE PALLET UNIT AND ONE CRIB FILL ASSEMBLY.
- 6. LOAD THE REMAINING FOUR PALLET UNITS AND FOUR CRIB FILL ASSEMBLIES.

SPECIAL NOTES:

- A 6-PALLET UNIT LOAD OF DRUMS IS SHOWN IN A SIDE OPENING ISO CONTAINER.
- 2. ADDITIONAL FILL PIECES MAY BE LAMINATED TO THE END BLOCKING ASSEMBLY D TO PROVIDE FOR A TIGHT LOAD.
- 3. THE WIDTH OF THE CRIB FILL ASSEMBLY B MAY BE ADJUSTED AS NECESSARY TO PROVIDE FOR A TIGHT LOAD ACROSS THE WIDTH OF A LOAD BAY.

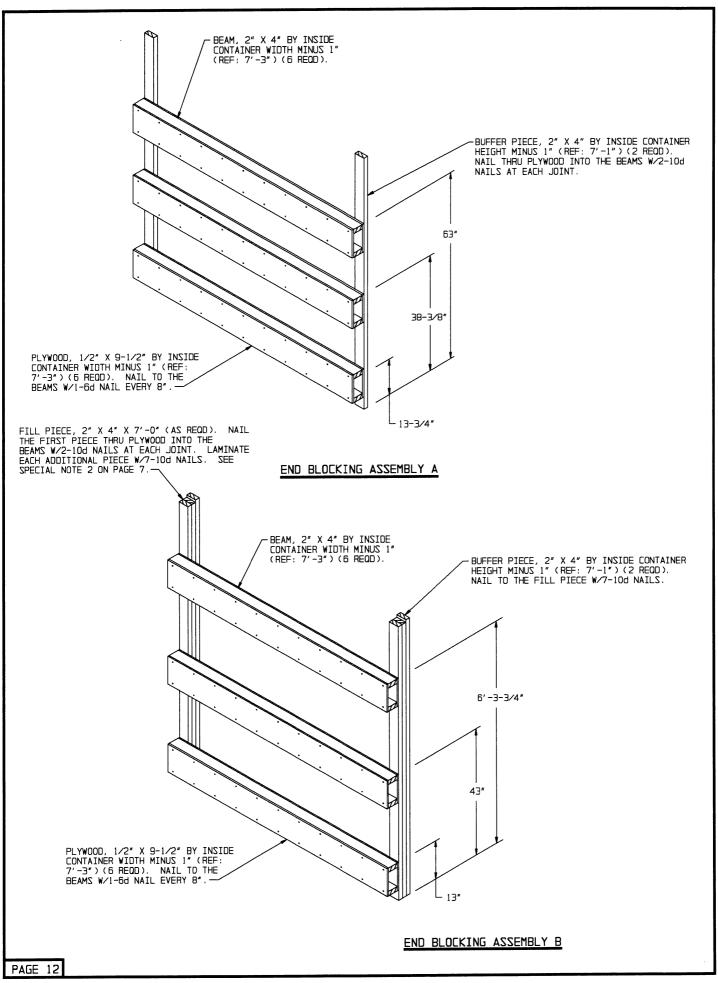
BILL OF MATERIAL			
LUMBER	LINEAR FEET	BOARD FEET	
2" X 4"	360	240	
NAILS	NO. REQD	POUNDS	
6d (2") 10d (3")	176 204	1 3	
PLYWOOD, 1/2" 46 SQ FT REQD 63 LB			

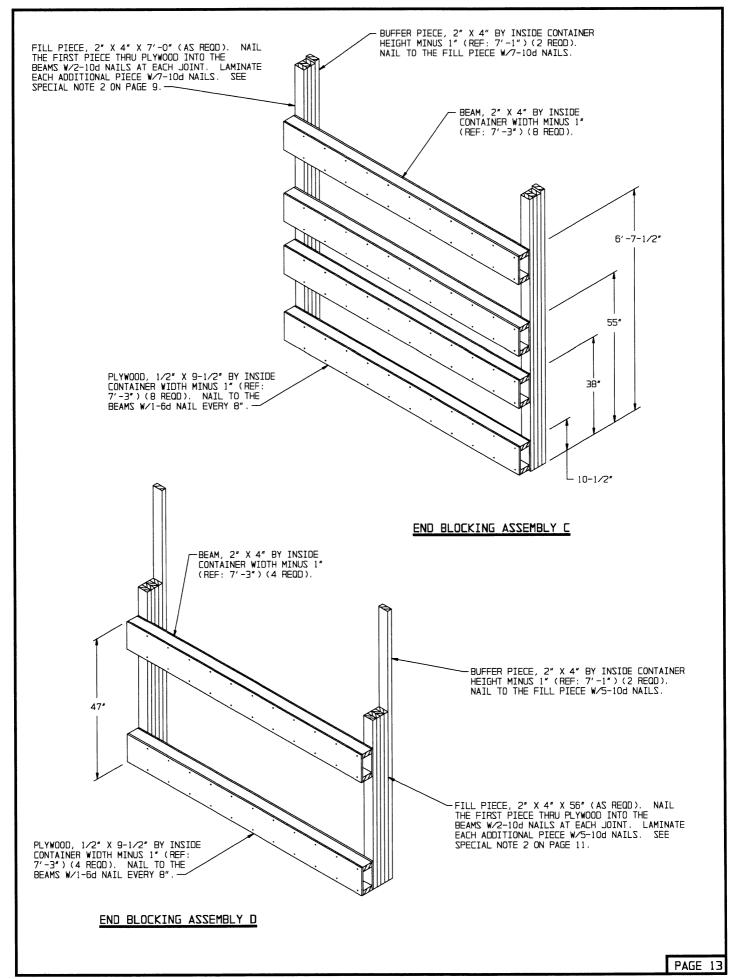
LOAD AS SHOWN

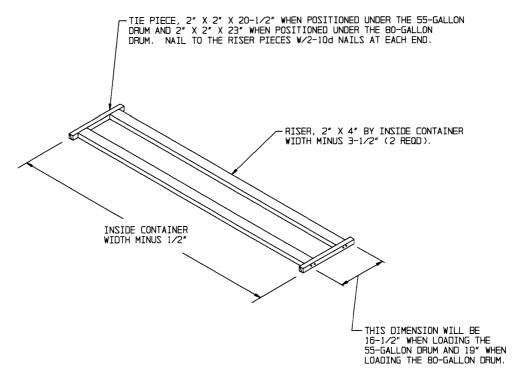
ITEM	QUANTITY	WEIGHT (APPROX)
80-GALLON DRUM (PALLETIZED) DUNNAGE CONTAINER		547 LBS
TOTAL WEIGH	1T	9,549 LBS (APPROX)

BO-GALLON DRUMS (PALLETIZED)

PAGE 11

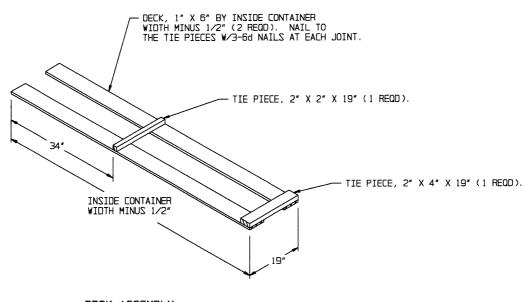






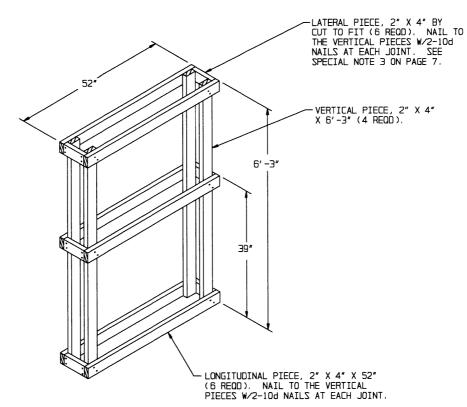
RISER ASSEMBLY

THIS RISER IS FOR USE WITH THE 55-GALLON DRUM OR THE BO-GALLON DRUM. WHEN FABRICATING THIS RISER FIELD CHECK DIMENSIONS WITHIN THE LOAD TO ASSURE A FIT BETWEEN ROWS OF DRUMS.

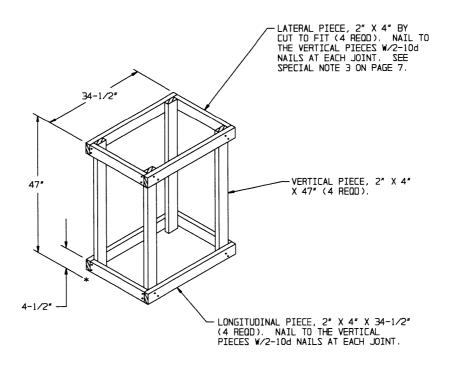


DECK ASSEMBLY

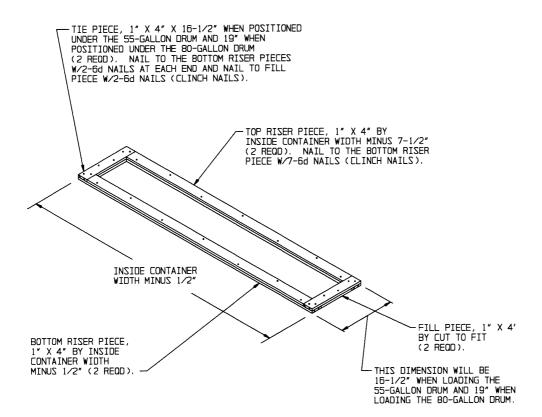
THIS ASSEMBLY IS FOR USE WITH THE 80-GALLON DRUM. WHEN FABRICATING THIS DECKING ASSEMBLY FIELD CHECK DIMENSIONS WITHIN THE LOAD TO ASSURE A FIT BETWEEN ROWS OF DRUMS.



CRIB FILL A



CRIB FILL B



ALTERNATIVE RISER ASSEMBLY

THIS RISER IS FOR USE WITH THE 55-GALLON DRUM OR THE 80-GALLON DRUM. WHEN FABRICATING THIS RISER FIELD CHECK DIMENSIONS WITHIN THE LOAD TO ASSURE A FIT BETWEEN ROWS OF DRUMS. THIS ALTERNATIVE RISER ASSEMBLY MAY BE USED IN LIEU OF THE "RISER ASSEMBLY A" IF DESIRED OR IF THE 2" X 2" TIE PIECE SPLITS WHEN NAILING.