

**FINAL REPORT
AUGUST 2006**

REPORT NO. 06-06



**TRANSPORTABILITY TESTING OF THE JOINT MODULAR
INTERMODAL CONTAINER (JMIC)
TP-94-01,
“TRANSPORTABILITY TESTING PROCEDURES”**

Prepared for:

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REPORT NO. 06-06
TRANSPORTABILITY TESTING OF THE
JOINT MODULAR INTERMODAL CONTAINERS (JMIC),
TP-94-01, REV. 2, JUNE 2004, "TRANSPORTABILITY TESTING
PROCEDURES"

AUGUST 2006

ABSTRACT

The U.S. Army Defense Ammunition Center (DAC), Validation Engineering Division (SJMAG-DEV), was tasked by the Logistics Research and Development Activity (AMSRD-AAR-AIL-F), Picatinny Arsenal, NJ to conduct transportability testing on the Joint Modular Intermodal Containers (JMIC) manufactured by British Aerospace Engineering (BAE) and the Naval Packaging, Handling, Storage and Transportation (PHST) Center, Earle, NJ. The testing was conducted in accordance with TP-94-01, Revision 2, June 2004 "Transportability Testing Procedures."

The objective of the testing was to evaluate the BAE and Navy JMICs when transportability tested in accordance with TP-94-01, Revision 2, June 2004.

The following observations resulted from the testing of the BAE JMICs:

- a. If not properly set, the ratchets can back off and cause the top frame locking mechanisms to loosen. A secondary holdback of the ratchets is recommended.
- b. The locks that hold the top frame in position are difficult to engage/disengage.
- c. The BAE JMICs are difficult to load because the top frame must remain in place when loading cargo.
- d. Two BAE JMICs could not be locked onto the interface frames. Also, some of the BAE JMICs could not be secured to each other when stacked. This was because the BAE JMIC locks would not engage the provisions on the interlock frames or the JMIC provisions.
- e. Difficult to visually confirm if the BAE JMICs were properly secured to the interface frames or each other when stacked. Also, the BAE JMICs must be loaded in a particular sequence so that engagement of the locking mechanisms can be verified.
- f. The exterior of the BAE JMIC was susceptible to damage and delamination did occur.
- g. During testing, the BAE JMIC base frames bowed.
- h. The handles in the top move during testing and could disengage. Provisions to positively secure the handles to prevent disengagement of the top are recommended.

The BAE JMIC successfully completed the transportability testing. The BAE JMIC is acceptable for the transport of various wooden and metal boxes of ammunition when properly restrained. However, the problems with engagement

of the locking provisions need to be addressed prior to any fielding. Also, the problem with verifying that the locking mechanisms are properly engaged needs to be corrected prior to fielding.

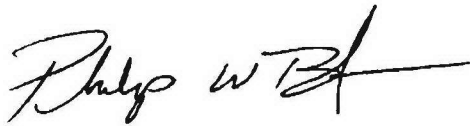
The following observations resulted from the testing of the Navy JMICs:

- a. The locking mechanism on the closed Navy JMIC was difficult to engage/disengage. The redesigned locking mechanism on the open frame Navy JMIC was much easier to engage/disengage.
- b. The locking mechanisms were not automatic and required manual engagement/disengagement.

Both of the Navy JMIC designs successfully completed the transportability testing. The Navy JMIC designs are acceptable for transport of various wooden and metal boxes of ammunition when properly restrained.

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U.S. ARMY DEFENSE AMMUNITION CENTER

VALIDATION ENGINEERING DIVISION
MCALESTER, OK 74501-9053

REPORT NO. 06-06

**Transportability Testing of the Joint Modular Intermodal Container (JMIC)
TP-94-01, Revision 2, June 2004 "Transportability Testing Procedures"**

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PART 1 – INTRODUCTION

A. BACKGROUND. The U.S. Army Defense Ammunition Center (DAC), Validation Engineering Division (SJMAC-DEV), was tasked by the Logistics Research and Development Activity (AMSRD-AAR-AIL-F), Picatinny Arsenal, NJ to conduct transportability testing on the Joint Modular Intermodal Containers (JMIC) manufactured by British Aerospace Engineering (BAE) and the Naval Packaging, Handling, Storage and Transportation (PHST) Center, Earle, NJ. The testing was conducted in accordance with TP-94-01, Revision 2, June 2004 “Transportability Testing Procedures.”

B. AUTHORITY. This test was conducted IAW mission responsibilities delegated by the U.S. Army Joint Munitions Command (JMC), Rock Island, IL. Reference is made to the following:

1. AR 740-1, 15 June 2001, Storage and Supply Activity Operation.

2. OSC-R, 10-23, Mission and Major Functions of U.S. Army Defense Ammunition Center (DAC) 21 Nov 2000.

C. OBJECTIVE. The objective of the testing was to evaluate the JMIC when transportability tested in accordance with TP-94-01, Revision 2, June 2004.

D. OBSERVATIONS.

1. The following observations resulted from the testing of the BAE JMICs:
 - a. If not properly set, the ratchets can back off and cause the top frame locking mechanisms to loosen. A secondary holdback of the ratchets is recommended.

- b. The locks that hold the top frame in position are difficult to engage/disengage.

- c. The BAE JMICs are difficult to load because the top frame must remain in place when loading cargo.

d. Two BAE JMICs could not be locked onto the interface frames. Also, some of the BAE JMICs could not be secured to each other when stacked. This was because the BAE JMIC locks would not engage the provisions on the interlock frames or the JMIC provisions.

e. Difficult to visually confirm if the BAE JMICs were properly secured to the interface frames or each other when stacked. Also, the BAE JMICs must be loaded in a particular sequence so that engagement of the locking mechanisms can be verified.

f. The exterior of the BAE JMIC was susceptible to damage and delamination did occur.

g. During testing, the BAE JMIC base frames bowed.

h. The handles in the top move during testing and could disengage. Provisions to positively secure the handles to prevent disengagement of the top are recommended.

2. The following observations resulted from the testing of the Naval PHST JMICs:

a. The locking mechanism on the closed JMIC was difficult to engage/disengage. The redesigned locking mechanism on the open frame JMIC was much easier to engage/disengage.

b. The locking mechanisms were not automatic and required manual engagement/disengagement.

E. CONCLUSION.

1. The BAE JMIC, successfully completed the transportability testing. The BAE JMIC, is acceptable for the transport of various wooden and metal boxes of ammunition when properly restrained. However, the problems with engagement of the locking provisions need to be fixed prior to any fielding. Also, the problem with verifying that the locking mechanisms are properly engaged needs to be corrected prior to fielding.

2. Both of the Navy JMIC designs successfully completed the transportability testing. The Navy JMIC designs are acceptable for transport of various wooden and metal boxes of ammunition when properly restrained.

PART 2 - ATTENDEES

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PART 3 - TEST EQUIPMENT

1. Joint Modular Intermodal Container

Manufactured by British Aerospace Engineering

Weight: 310 pounds

Length: 51-3/4 inches

Width: 43-3/4 inches

Height: 43-1/4 inches



Photo 1. BAE JMICs on the CROP

2. Joint Modular Intermodal Container

Manufactured by Naval PHST Center - Earle, NJ

Closed JMIC

Weight: 325 pounds

Length: 51-3/4 inches

Width: 43-3/4 inches

Height: 43 inches

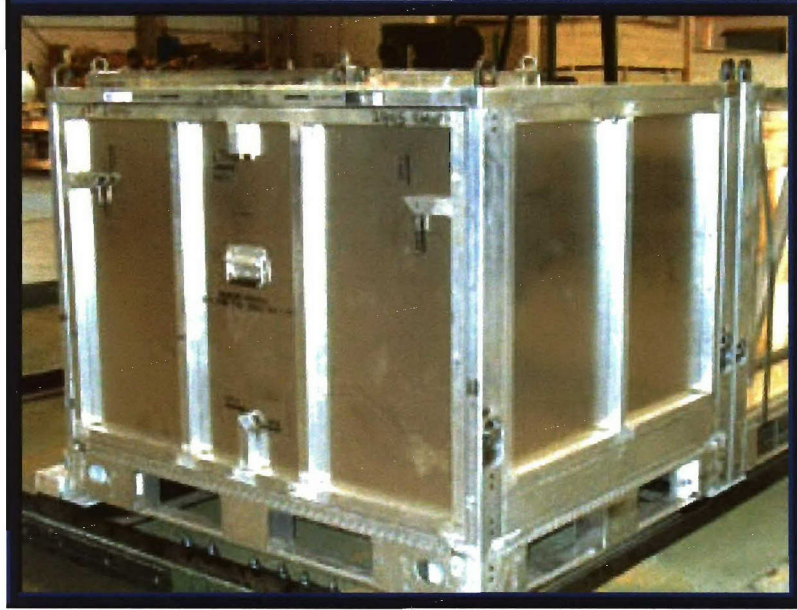


Photo 2. Navy Closed JMIC

3. Joint Modular Intermodal Container

Manufactured by Naval PHST Center – Earle, NJ

Open Framed JMIC

Weight: 285 pounds

Length: 51-3/4 inches

Width: 43-3/4 inches

Height: 43 inches

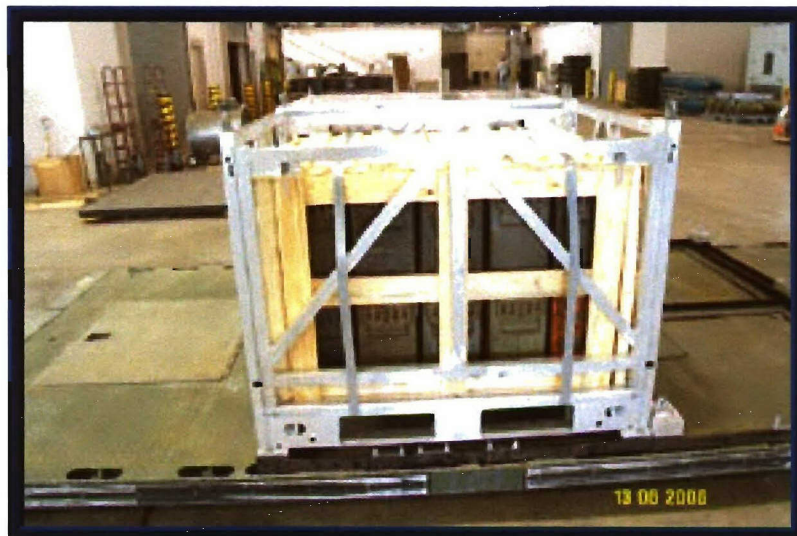


Photo 3. Navy Open Framed JMIC

4. Palletized Load System Truck
Model #: M1074
Manufactured by Oshkosh Truck Corporation, Oshkosh, WI
ID #: 10T2P1NH6N1044011
NSN: 2320-01-304-2277
Serial #: 44011
Curb Weight: 55,000 pounds

5. Truck, Tractor, MTV, M1088 A1
ID #: J0231
NSN: 2320 01 447 3893
VSN: NL1FR5
MFG Serial #: T-018447EFJM
Weight: 19,340 pounds

6. Semitrailer, flatbed, breakbulk/container transporter, 34 ton
Model #: M872A1
Manufactured by Heller Truck Body Corporation, Hillsdale, NJ
ID #: 11-1505 NX05NZ
NSN: 2330 01 109 8006
Weight: 19,240 pounds

7. Container Roll-In/Out Platform (CROP)
Model Number: M3A1
Manufactured by Hyundai Precision America
Tare Weight: 4,000 pounds

8. Intermodal Container
ID # CMCU 200006-8
Date of Manufacture: 06/99
Manufactured by Charleston Marine Containers, Charleston, SC
Tare Weight: 4,870 pounds
Maximum Gross Weight: 67,200 pounds

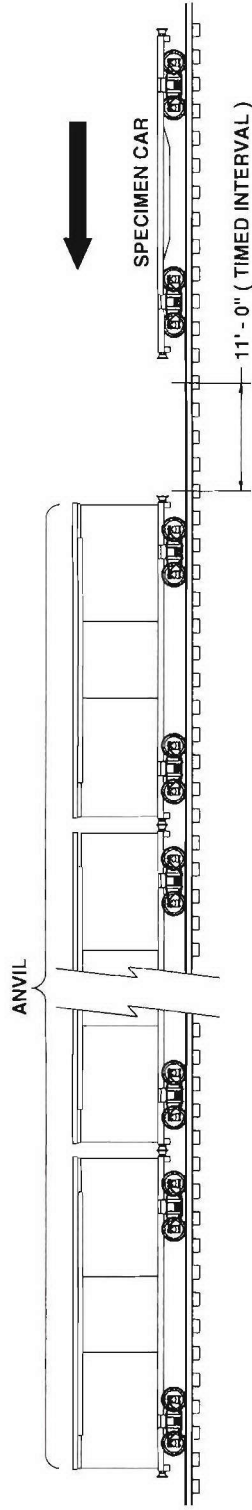
PART 4 - TEST PROCEDURES

The test procedures outlined in this section were extracted from TP-94-01, "Transportability Testing Procedures," Revision 2, June 2004, for validating tactical vehicles and outloading procedures used for shipping munitions by tactical truck, railcar, and ocean-going vessel.

The rail impact will be conducted with the loaded intermodal container secured directly to the railcar. Inert (non-explosive) items were used to build the load. The test loads were prepared using the blocking and bracing procedures proposed for use with munitions (**see Part 6 for procedures**). The weight and physical characteristics (weights, physical dimensions, center of gravity, etc.) of the test loads were similar to live (explosive) ammunition.

A. RAIL TEST. RAIL IMPACT TEST METHOD. The test load or vehicle will be secured to a flatcar. The equipment needed to perform the test will include the specimen (hammer) car, four empty railroad cars connected together to serve as the anvil, and a railroad locomotive. The anvil cars will be positioned on a level section of track with air and hand brakes set and with draft gears compressed. The locomotive unit will push the specimen car toward the anvil at a predetermined speed, then disconnect from the specimen car approximately 50 yards away from the anvil cars allowing the specimen car to roll freely along the track until it strikes the anvil. This will constitute an impact. Impacting will be accomplished at speeds of 4, 6, and 8.1 mph in one direction and at a speed of 8.1 mph in the reverse direction. The tolerance for the speeds is plus 0.5 mph, minus 0.5 mph for the 4 mph and 6 mph impacts, and plus 0.5 mph, minus 0 mph for the 8.1 mph impacts. The impact speeds will be determined by using an electronic counter to measure the time for the specimen car to traverse an 11-foot distance immediately prior to contact with the anvil cars (see Figure 1).

**ASSOCIATION OF AMERICAN RAILROADS (AAR)
STANDARD TEST PLAN**



**4 BUFFER CARS (ANVIL)
WITH DRAFT GEAR
COMPRESSED AND AIR BRAKES IN A SET
POSITION**

ANVIL CAR TOTAL WT. 250,000 LBS (APPROX)

**SPECIMEN CAR IS RELEASED BY SWITCH ENGINE
TO**

- ATTAIN: IMPACT NO. 1 @ 4 MPH**
- IMPACT NO. 2 @ 6 MPH**
- IMPACT NO. 3 @ 8.1 MPH**

**THEN THE CAR IS REVERSED AND RELEASED BY
SWITCH ENGINE TO ATTAIN:**

IMPACT NO. 4 @ 8.1 MPH

Figure 1. Rail Impact Sketch

B. ON/OFF ROAD TEST.

1. **HAZARD COURSE.** The test load or vehicle will be transported over the 200-foot-long segment of concrete-paved road consisting of two series of railroad ties projecting 6 inches above the level of the road surface. The hazard course will be traversed two times (see Figure 2).

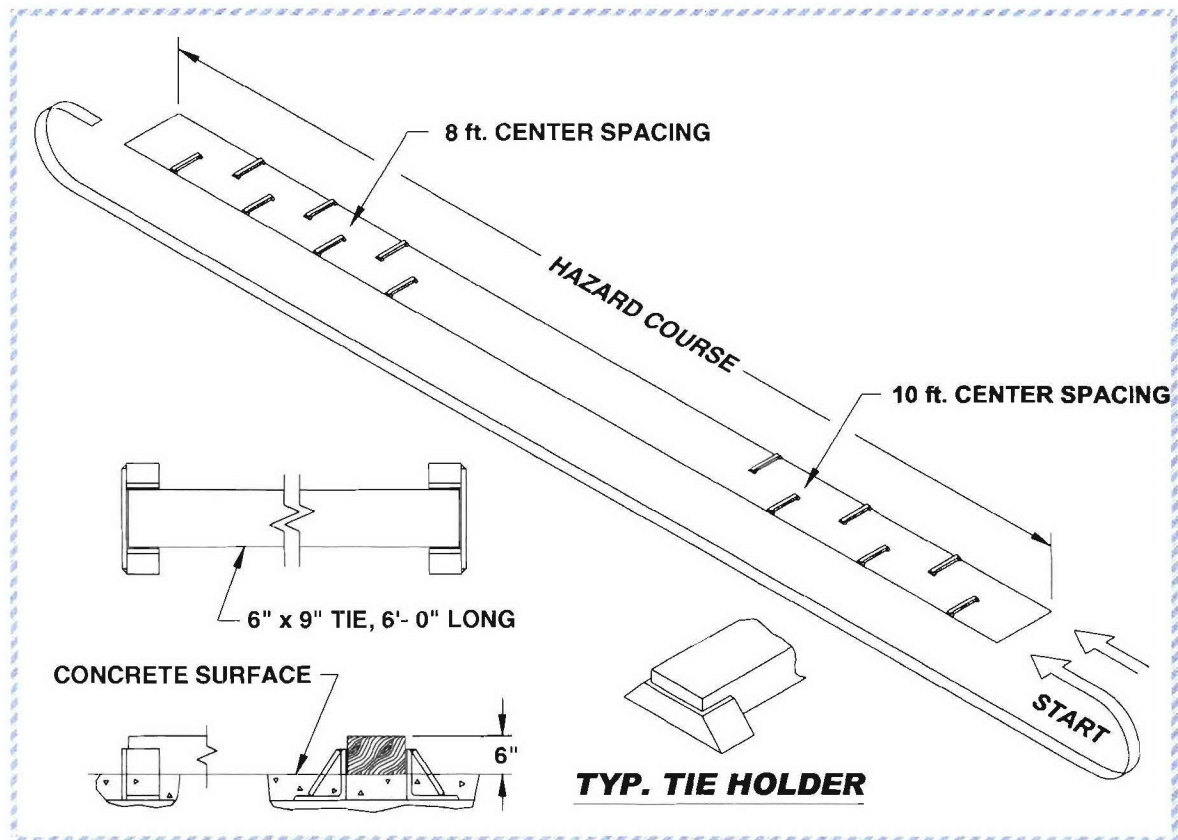


Figure 2. Hazard Course Sketch

- a. The first series of 6 ties are spaced on 10-foot centers and alternately positioned on opposite sides of the road centerline for a distance of 50 feet.
- b. Following the first series of ties, a paved roadway of 75 feet separates the first and second series of railroad ties.

c. The second series of 7 ties are spaced on 8-foot centers and alternately positioned on opposite sides of the road centerline for a distance of 48 feet.

d. The test load is driven across the hazard course at speeds that will produce the most violent vertical and side-to-side rolling reaction obtainable in traversing the hazard course (approximately 5 mph).

2. ROAD TRIP. The test load or vehicle will be transported for a distance of 30 miles over a combination of roads surfaced with gravel, concrete, and asphalt. The test route will include curves, corners, railroad crossings and stops and starts. The test load or vehicle will travel at the maximum speed for the particular road being traversed, except as limited by legal restrictions.

3. PANIC STOPS. During the road trip, the test load or vehicle will be subjected to three (3) full airbrake stops while traveling in the forward direction and one in the reverse direction while traveling down a 7 percent grade. The first three stops are at 5, 10, and 15 mph while the stop in the reverse direction is approximately 5 mph. This testing will not be required if the Rail Impact Test is performed.

4. WASHBOARD COURSE. The test load or vehicle will be driven over the washboard course at a speed that produces the most violent response in the vertical direction.

C. OCEAN-GOING VESSEL TEST. Shipboard Transportation Simulator.

The Shipboard Transportation Simulator (STS) is used for testing loads in 8-foot-wide by 20-foot-long intermodal freight containers. The specimen shall be positioned onto the STS and securely locked in place using the cam lock at each corner. Using the procedure detailed in the operating instructions, the STS shall begin oscillating at an angle of 30 degrees, plus or minus 2 degrees, either side of vertical center and a frequency of 2 cycles-per-minute (30 seconds, plus or

minus 2 seconds) for a duration of two (2) hours. This frequency shall be observed for apparent defects that could cause a safety hazard. The frequency of oscillation shall then be increased to 4 cycles-per-minute (15 seconds, plus or minus one second per cycle) and the apparatus operated for two (2) hours. If an inspection of the load does not indicate an impending failure, the frequency of oscillation shall be further increased to 5 cycles-per-minute (12 seconds, plus or minus one second per cycle), and the apparatus operated for four (4) hours. The operation does not necessarily have to be continuous; however, no changes or adjustments to the load or load restraints shall be permitted at any time during the test. After once being set in place, the test load (specimen) shall not be removed from the apparatus until the test has been completed or is terminated.

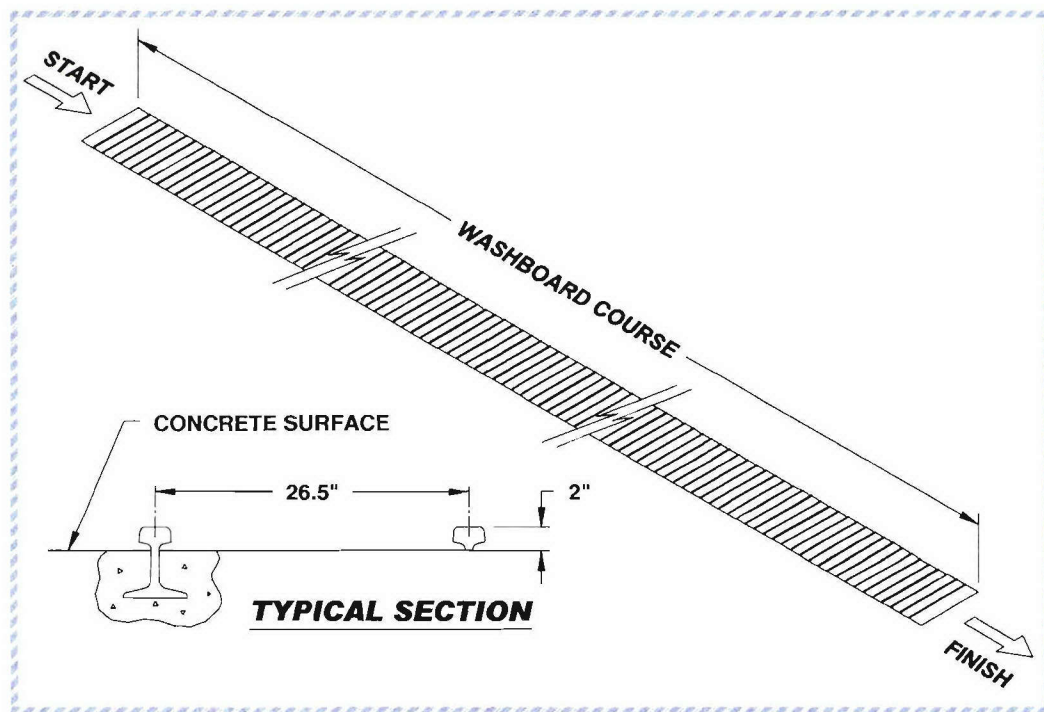


Figure 3. Washboard Course Sketch

PART 5 - TEST RESULTS

5.1

Payload: 2 BAE JMIC Containers on Hyundai CROP.

Testing Date: 6-7 June 2006

JMIC Weights: 2,965 pounds, 2,975 pounds

Gross Weight: 15,300 pounds (Including intermodal container, CROP, interface frames and JMICs).

Note: The locking mechanisms on only two of the four supplied BAE JMICs would engage the interface frames. Therefore, testing was conducted with only 2 BAE JMICs. See Photo A.

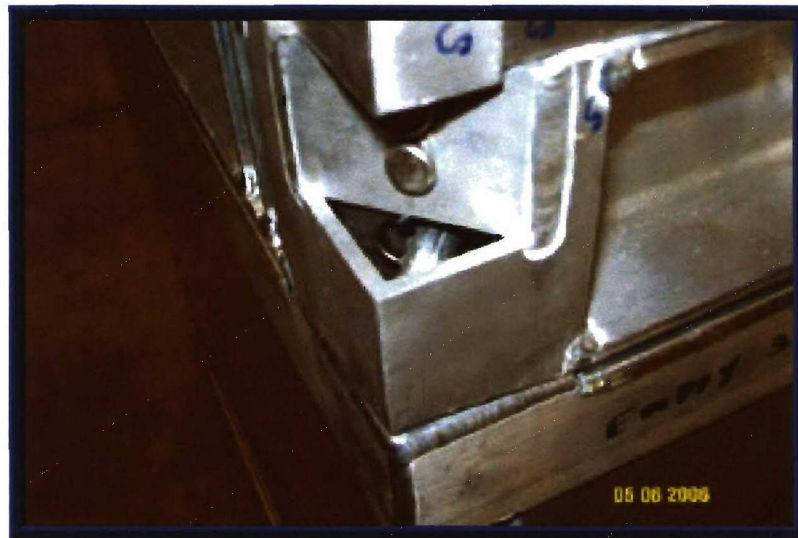


Photo A. Locking mechanism (hook) not fully engaged.



Photo 4. Loading of the BAE JMICs onto the PLS Truck

A. RAIL TEST.



Photo 5. Rail Impact Testing of the BAE JMICs (Prior to Testing)

Description	Weight
Flatcar Number: DODX 42353	85,000 lbs.
BAE JMICs on the Hyundai CROP	15,300 lbs.
M1 Flatrack with MLRS Pods	28,265 lbs.
Total Specimen Wt.	128,565 lbs.
Buffer Car (four cars)	257,900 lbs.

Figure 4.

Remarks: Figure 4 lists the test components and weights of the items used during the Rail Impact Tests.

Impact Number	Avg. Velocity (mph)
1	3.5
2	5.9
3	8.1
4	9.0

Figure 5.

Remarks:

1. Figure 5 lists the average speeds of the specimen car immediately prior to impact with the anvil. Impact #4 is the reverse impact.
2. Following Impact #4 the JMIC on the passenger side disengaged from the interface frame and lifted up and then reengaged. Therefore, the JMIC locking mechanism did not adequately restrain the JMIC to the interface frame. The interface frame moved 0.125 inches in the direction of impact.

B. ON/OFF ROAD TESTS.

1. HAZARD COURSE.



Photo 6. Hazard Course Testing of the BAE JMICs

Pass No.	Elapsed Time	Avg. Velocity (mph)
1	25 Seconds	6.1
2	25 Seconds	6.1

Figure 6.

Remarks:

1. Figure 6 lists the average speeds of the test load through the Hazard Course.
2. Inspection following Pass #1 revealed that the bottom beams of the JMIC had deflected 0.125 inches.
3. Inspection did not reveal any damage or movement of the interface frames.

2. ROAD TRIP:

Remarks:

1. The Road Trip was conducted between the Road Hazard Course Passes #2 and #3.
2. Inspection following the Road Trip revealed no damage to the BAE JMICs or the interface frames or movement of the interface frames.

3. PANIC STOPS: Testing was not required since the load was rail impact tested.

4. HAZARD COURSE:

Pass No.	Elapsed Time	Avg. Velocity (mph)
3	28 Seconds	5.4
4	28 Seconds	5.4

Figure 7.

Remarks:

1. Figure 7 lists the average speeds of the test load through the Hazard Course.
2. Inspection following Pass #3 revealed that one of the handles on the lid was in the upright position. The handle was still engaged.
3. Inspection did not reveal any damage or movement of the interface frames.



Photo 7. Handle of the Top in Upright Position.

5. WASHBOARD COURSE:

Remarks:

Inspection following the Washboard Course revealed no damage to the BAE JMICs or the interface frames or movement of the interface frames.



Photo 8. Washboard Course Testing BAE JMICs

C. SHIPBOARD TRANSPORTATION SIMULATION (STS).

Remarks:

Inspection following the STS revealed no damage to the BAE JMICs or the interface frames or movement of the interface frames.

D. OBSERVATIONS:

1. If not properly set, the ratchets can back off and cause the top frame locking mechanisms to loosen. A secondary holdback of the ratchets is recommended. See Photo B.



Photo B. Ratchets can back off.

2. The locks that hold the top frame in position are difficult to engage/disengage.

3. The BAE JMICs are difficult to load because the top frame must remain in place when loading cargo. See Photo C.



Photo C. Difficult to load due to top frame.

4. Two BAE JMICs could not be locked onto the interface frames. Also, some of the BAE JMICs could not be secured to each other when stacked. This was because the BAE JMIC locks would not engage the provisions on the interlock frames or the JMIC provisions.

5. Difficult to visually confirm if the BAE JMICs were properly secured to the interface frames or each other when stacked. Also, the BAE JMICs must be loaded in a particular sequence so that engagement of the locking mechanisms can be verified.

6. The exterior of the BAE JMIC was susceptible to damage and delamination did occur.

7. During testing, the BAE JMIC base frames bowed.

8. The handles in the top move during testing and could disengage.

Provisions to positively secure the handles to prevent disengagement of the top are recommended.

D. CONCLUSION: The BAE JMIC successfully completed the On/Off Road (Hazard Course, Road Trip, and Washboard Course) testing and the Shipboard Transportation Simulator testing. The BAE JMIC did **not** successfully complete the Rail Impact test of 6 June 2006. The BAE JMIC was modified and Rail Impact testing was successfully completed on 14 June 2006 (Section Part 5.4).

Therefore, the BAE JMIC successfully completed the transportability testing. The BAE JMIC, is acceptable for the transport of various wooden and metal boxes of ammunition when properly restrained. However, the problems with engagement of the locking provisions need to be fixed prior to any fielding. Also, the problem with verifying that the locking mechanisms are properly engaged needs to be corrected prior to any fielding.

5.2

Payload: 4 BAE JMICs on a Hyundai CROP.

Testing Date: 7 June 2006

JMIC Weights: 2,965 pounds, 2,975 pounds, 2,970 pounds, 2,970 pounds

Gross Weight: 16,330 pounds (including the JMICs, interface frames and the CROP)



Photo 9. BAE JMICs on the PLS Truck

A. ON/OFF ROAD TESTS.

1. HAZARD COURSE.

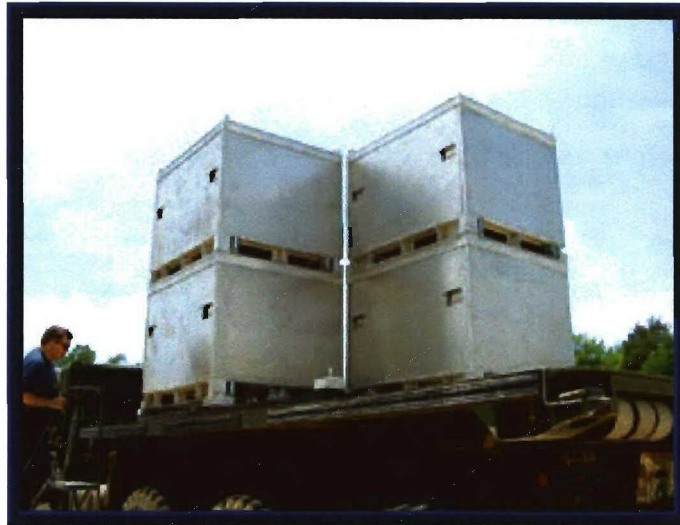


Photo 10. Hazard Course Testing of the BAE JMICs on the PLS Truck

Pass No.	Elapsed Time	Avg. Velocity (mph)
1	22 Seconds	6.3
2	21 Seconds	6.6

Figure 8.

Remarks:

1. Figure 8 lists the average speeds of the test load through the Hazard Course.
2. Inspection following the Hazard Course revealed no damage to the BAE JMICs or the interface frames or movement of the interface frames.

2. ROAD TRIP:

Remarks:

1. The Road Trip was conducted between the Road Hazard Course Passes #2 and #3.
2. Inspection following the Road Trip revealed no damage to the BAE JMICs or the interface frames or movement of the interface frames.

3. PANIC STOPS: Testing was not required since the JMICs were previously rail impact tested.

4. HAZARD COURSE:

Pass No.	Elapsed Time	Avg. Velocity (mph)
3	21 Seconds	6.6
4	18 Seconds	7.7

Figure 9.

Remarks:

1. Figure 9 lists the average speeds of the test load through the Hazard Course.
2. Inspection following the Hazard Course revealed no damage to the BAE JMICs or the interface frames or movement of the interface frames.

5. WASHBOARD COURSE:

Remark:

Inspection following the Washboard Course revealed no damage to the BAE JMICs or the interface frames or movement of the interface frames.



**Photo 11. Washboard Course Testing of the BAE JMICs
on the PLS Truck**

B. CONCLUSION: The BAE JMIC successfully completed the transportability testing. The BAE JMIC is acceptable for the transport of various wooden and metal boxes of ammunition when properly restrained.

5.3

Payload: 4 BAE JMICs on a Hyundai CROP.

Testing Date: 8 June 2006

JMIC Weights: 2,965 pounds, 2,975 pounds, 2,970 pounds, 2,970 pounds

Gross Weight: 16,330 pounds (including the JMICs, interface frames and the CROP)

Note: This testing was for evaluation only.



Photo 12. BAE JMICs Secured to the M872 Trailer

A. ON/OFF ROAD TESTS.

1. HAZARD COURSE.



Photo 13. Hazard Course Testing of the BAE JMICs on the M872 Trailer

Pass No.	Elapsed Time	Avg. Velocity (mph)
1	28 Seconds	5.4
2	27 Seconds	5.6

Figure 11.

Remarks:

1. Figure 11 lists the average speeds of the test load through the Hazard Course.
2. Inspection following the Hazard Course revealed no damage to the BAE JMICs or the interface frames or movement of the interface frames.

2. **WASHBOARD COURSE:**



Photo 14. Washboard Course Testing of the BAE JMICs on the PLS Truck

B. CONCLUSION: The BAE JMIC successfully completed the transportability testing. However, this sequence of testing was for evaluation only and not certification.

5.4

Payload: 2 Navy JMIC Containers on Hyundai CROP.

Testing Date: 14-15 June 2006

JMIC Weights: Navy - Closed – 2,945 pounds, Open Framed – 2,905 pounds

BAE – 2,970 pounds, 2,970 pounds

Gross Weight: 21,110 pounds (Including intermodal container, CROP, interface frames and JMICs).

Note: The BAE JMICs were rail impact tested again due to the previous disengagement of the locking mechanism from the interface frame. A stiffer spring was installed on the paddle that controls the locking mechanism.

A. RAIL TEST.



**Photo15. Rail Impact Testing of the Navy and BAE JMICs
(Prior to Testing)**

Description	Weight
Flatcar Number: DODX 42353	85,000 lbs.
BAE and Navy JMICs on the Hyundai CROP	21,110 lbs.
M1 Flatrack with MLRS Pods	28,265 lbs.
Total Specimen Wt.	134,375 lbs.
Buffer Car (four cars)	257,900 lbs.

Figure 12.

Remarks: Figure 12 lists the test components and weights of the items used during the Rail Impact Tests.

Impact Number	Avg. Velocity (mph)
1	3.8
2	6.2
3	8.4
4	9.3

Figure 13.

Remarks:

1. Figure 13 lists the average speeds of the specimen car immediately prior to impact with the anvil. Impact #4 is the reverse impact.
2. Inspection following the Rail Impact Test revealed no damage to the Navy or BAE JMICs or the interface frames or movement of the interface frames. The BAE JMICs locking mechanism did not disengage from the interface frame.
3. Following completion of the Rail Impact Testing the BAE JMICs were removed from the CROP. The BAE JMICs successfully completed the testing.
4. The Navy JMICs were repositioned on the CROP and testing continued.

B. ON/OFF ROAD TESTS.

1. HAZARD COURSE.



Photo 16. Hazard Course Testing of the Navy JMICs

Pass No.	Elapsed Time	Avg. Velocity (mph)
1	21 Seconds	6.6
2	21 Seconds	6.6

Figure 14.

Remarks:

1. Figure 14 lists the average speeds of the test load through the Hazard Course.
2. Inspection following the Hazard Course revealed no damage to the Navy JMICs or the interface frames or movement of the interface frames.

2. ROAD TRIP:

Remarks:

1. The Road Trip was conducted between the Road Hazard Course Passes #2 and #3.
2. Inspection following the Road Trip revealed no damage to the Navy JMICs or the interface frames or movement of the interface frames.

3. PANIC STOPS: Testing was not required since the load was rail impact tested.

4. HAZARD COURSE:

Pass No.	Elapsed Time	Avg. Velocity (mph)
3	22 Seconds	6.3
4	24 Seconds	5.8

Figure 15.

Remarks:

1. Figure 15 lists the average speeds of the test load through the Hazard Course.
2. Inspection following the Hazard Course revealed no damage to the Navy JMICs or the interface frames or movement of the interface frames.

5. WASHBOARD COURSE:

Remarks:

Inspection following the Washboard Course revealed no damage to the Navy JMICs or the interface frames or movement of the interface frames.



Photo 17. Washboard Course Testing Navy JMICs

C. SHIPBOARD TRANSPORTATION SIMULATION (STS).

Remarks:

Inspection following completion of the STS revealed no damage to the Navy JMICs or the interface frames or movement of the interface frames.

D. OBSERVATIONS:

1. The locking mechanism on the closed Navy JMIC was difficult to engage/disengage. The redesigned locking mechanism on the open frame Navy JMIC was easier to engage/disengage.

2. The locking mechanisms on both Navy JMICs were not automatic and required manual engagement/disengagement.

E. CONCLUSION:

1. The BAE JMIC, successfully completed the Rail Impact Test retest and therefore successfully completed the transportability testing.

2. Both Navy JMIC designs successfully completed the transportability testing. The Navy JMIC designs are acceptable for transport of various wooden and metal boxes of ammunition when properly restrained.

5.5

Payload: 2 Navy JMICs and 2 BAE JMICs on a Hyundai CROP.

Testing Date: 16 June 2006

JMIC Weights: Navy - Closed - 2945 pounds, Open Framed - 2905 pounds

BAE – 2,970 pounds, 2,970 pounds

Gross Weight: 16,240 pounds (including the JMICs, interface frames and the CROP)

Note: The BAE JMICs were used as ballast.

A. ON/OFF ROAD TESTS.

1. HAZARD COURSE.



Photo 18. Hazard Course Testing of the Navy JMICs on the PLS Truck

Pass No.	Elapsed Time	Avg. Velocity (mph)
1	26 Seconds	5.3
2	27 Seconds	5.1

Figure 16.

Remarks:

1. Figure 16 lists the average speeds of the test load through the Hazard Course.
2. Inspection following the Hazard Course revealed no damage to the Navy JMICs or the interface frames or movement of the interface frames.

2. ROAD TRIP:

Remarks:

1. The Road Trip was conducted between the Road Hazard Course Passes #2 and #3.
2. Inspection following the Road Trip revealed no damage to the Navy JMICs or the interface frames or movement of the interface frames.

3. PANIC STOPS: Testing was not required since the Navy JMICs were previously rail impact tested.

4. HAZARD COURSE:

Pass No.	Elapsed Time	Avg. Velocity (mph)
3	25 Seconds	5.5
4	24 Seconds	5.8

Figure 17.

Remarks:

1. Figure 17 lists the average speeds of the test load through the Hazard Course.
2. Inspection following the Hazard Course revealed no damage to the Navy JMICs or the interface frames or movement of the interface frames.

5. WASHBOARD COURSE:

Remark:

Inspection following the Washboard Course revealed no damage to the Navy JMICs or the interface frames or movement of the interface frames.



Photo 19. Washboard Course Testing of the Navy JMICs on the PLS Truck

B. CONCLUSION: Both Navy JMIC designs successfully completed the transportability testing. The Navy JMIC designs are acceptable for transport of various wooden and metal boxes of ammunition when properly restrained.

5.6

Payload: 2 Navy JMICs and 2 BAE JMICs on a Hyundai CROP.

Testing Date: 16 June 2006

JMIC Weights: Navy - Closed – 2,945 pounds, Open Framed – 2,905 pounds

BAE – 2,970 pounds, 2,970 pounds

Gross Weight: 16,240 pounds (including the JMICs, interface frames and the CROP)

Note: 1. The BAE JMICs were used as ballast.

2. This testing was conducted for evaluation only.

A. ON/OFF ROAD TESTS.

1. HAZARD COURSE.



Photo 20. Hazard Course Testing of the Navy JMICs on the M872 Trailer

Pass No.	Elapsed Time	Avg. Velocity (mph)
1	19 Seconds	8.0
2	22 Seconds	6.9

Figure 18.

Remarks:

1. Figure 18 lists the average speeds of the test load through the Hazard Course.
2. Inspection following the Hazard Course revealed no damage to the Navy JMICs or the interface frames or movement of the interface frames.

2. WASHBOARD COURSE:



Photo 21. Washboard Course Testing of the Navy JMICs on the M872 Trailer

B. CONCLUSION: The Navy JMIC successfully completed the transportability testing. However, this sequence of testing was for evaluation only and not certification.

PART 6 – DRAWINGS

The following drawing represents the load configuration that was subjected to the test criteria. The drawing can be accessed at:

<http://www.dac.army.mil/DET/dapam/toc.html>

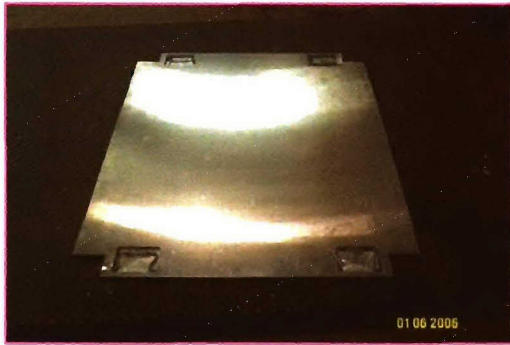
TEST SKETCH

UNITIZATION PROCEDURES FOR METAL M548 BOXES IN BAE ALU- MINUM JOINT MODULAR INTERMO- DAL CONTAINER (JMIC)

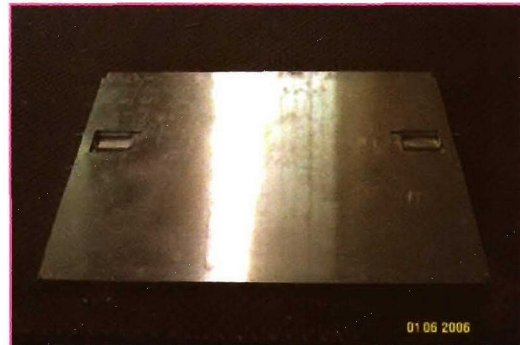
THIS SIX PAGE DOCUMENT DEPICTS M548 SERIES METAL CONTAINER UNITIZED 20 BOXES PER BAE JMIC FOR TRANSPORTABILITY SERIES TESTING. OVERALL DIMENSIONS OF 51-3/4" L X 43-3/4" W X 43-1/4" H.

PREPARED DURING JUNE 2006 BY:
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LAURAA FIEFFER
CHIEF, TRANSPORTATION ENGINEERING DIVISION



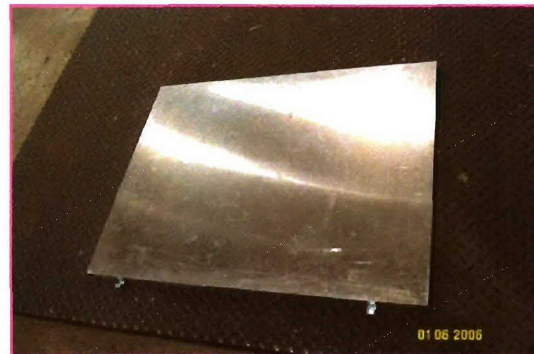
TOP LID - 20 LBS - 1 REQD



FRONT/REAR PANEL - 20 LBS - 2 REQD



TOP FRAME - 40 LBS - 1 REQD



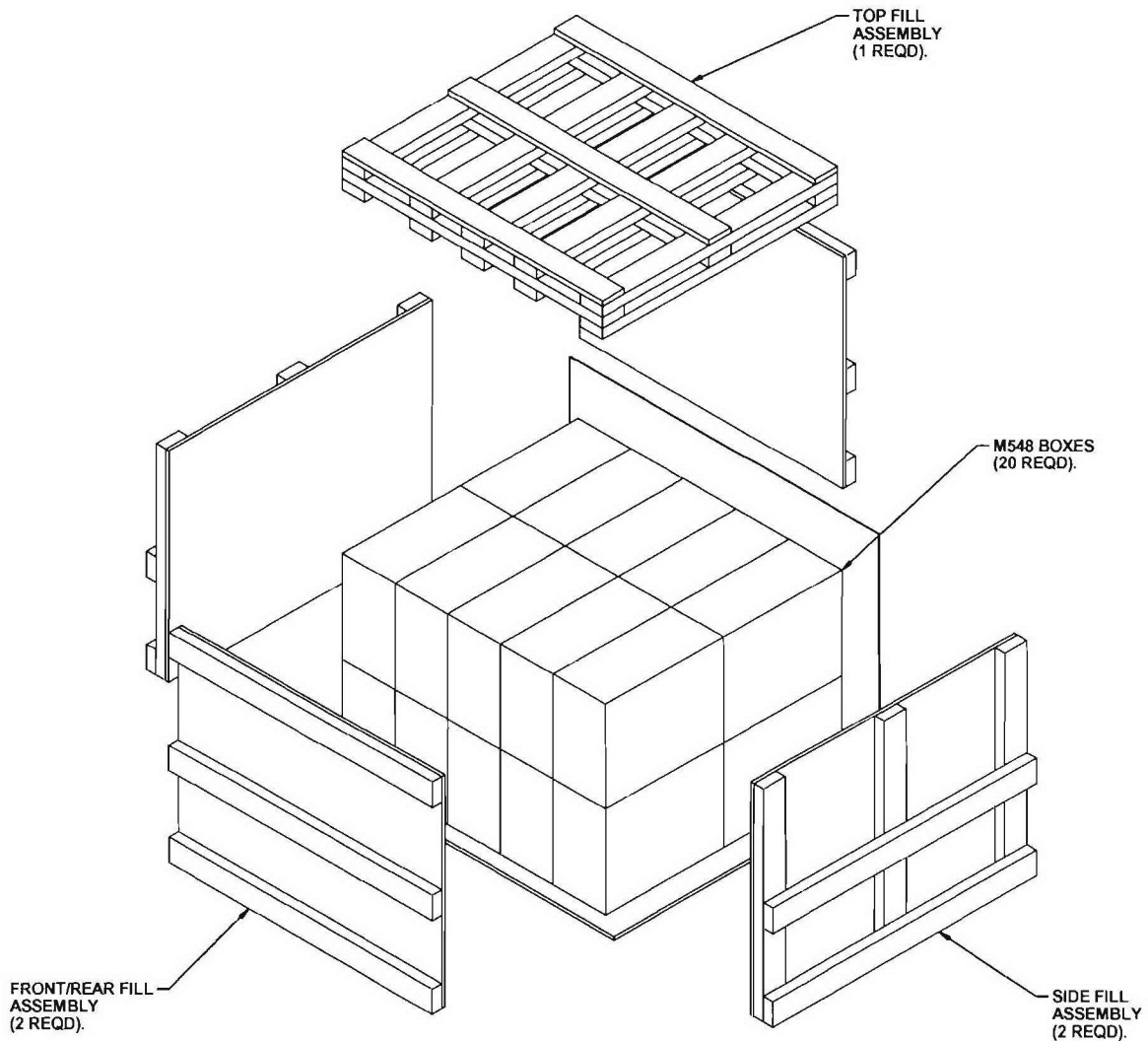
SIDE PANEL - 35 LBS - 2 REQD



BASE - 130 LBS - 1 REQD



RACHETS TO SECURE
TOP LID TO SIDE WALLS.

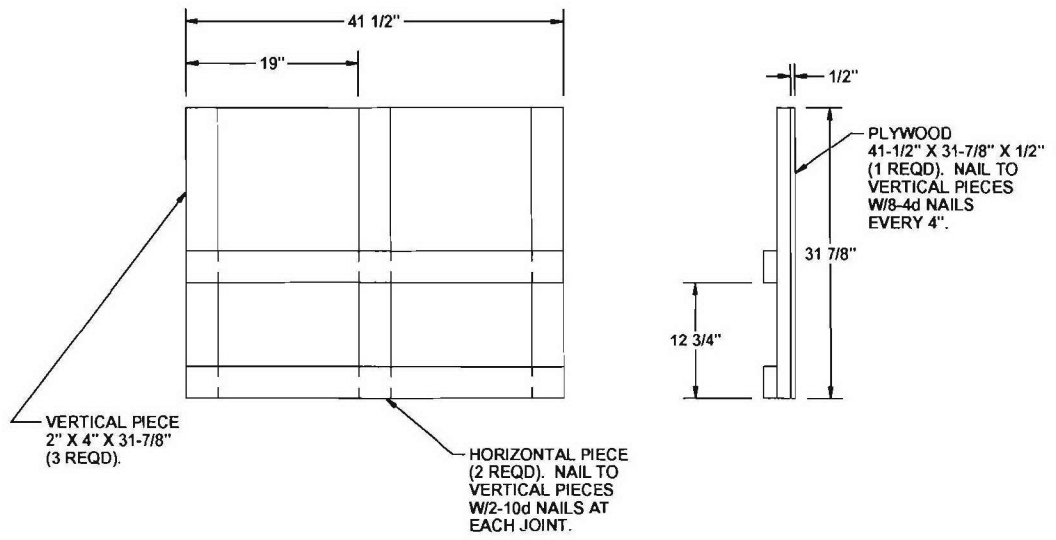


BAE JMIC UNIT

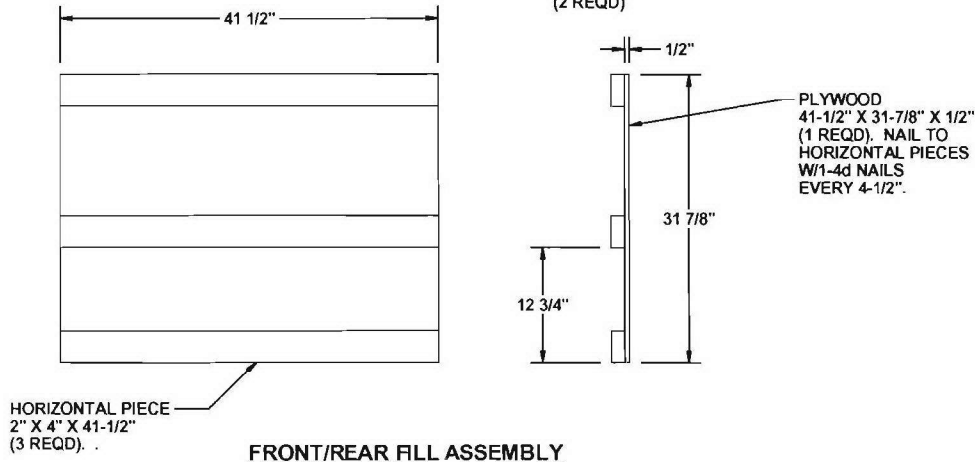
20 M548 BOXES @ 126 LBS - - - - - 2,500 LBS
 DUNNAGE - - - - - 184 LBS
 BAE JMIC - - - - - 310 LBS

TOTAL WEIGHT - - - - - 2,994 LBS (APPROX)
 CUBE - - - - - 56.7 CU FT (APPROX)

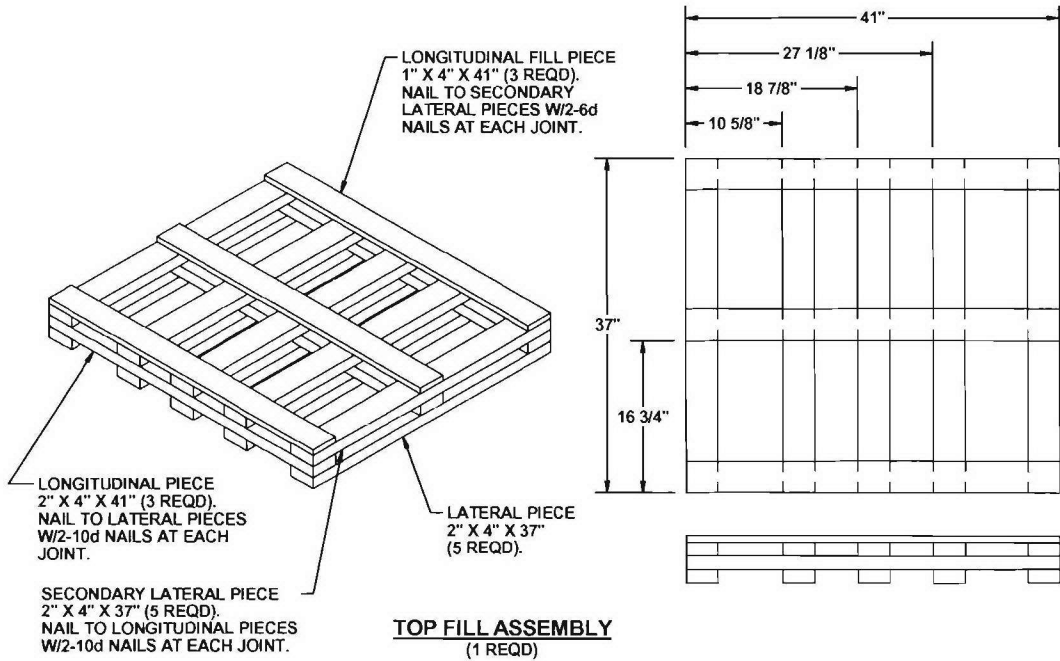
BILL OF MATERIAL		
LUMBER	LINEAR FEET	BOARD FEET
1" x 4"	9.25	3.09
2" x 4"	94	62.67
NAILS	NO. REQD	POUNDS
4d (1-1/2")	24	1/8
6d (2")	30	3/16
10d (3")	68	1
BAE JMIC - - - - -	1 REQD - - - - -	310 LBS
1/2 PLYWOOD - - - - -	37 SQ FT - - - - -	51 LBS



SIDE FILL ASSEMBLY
(2 REQD)

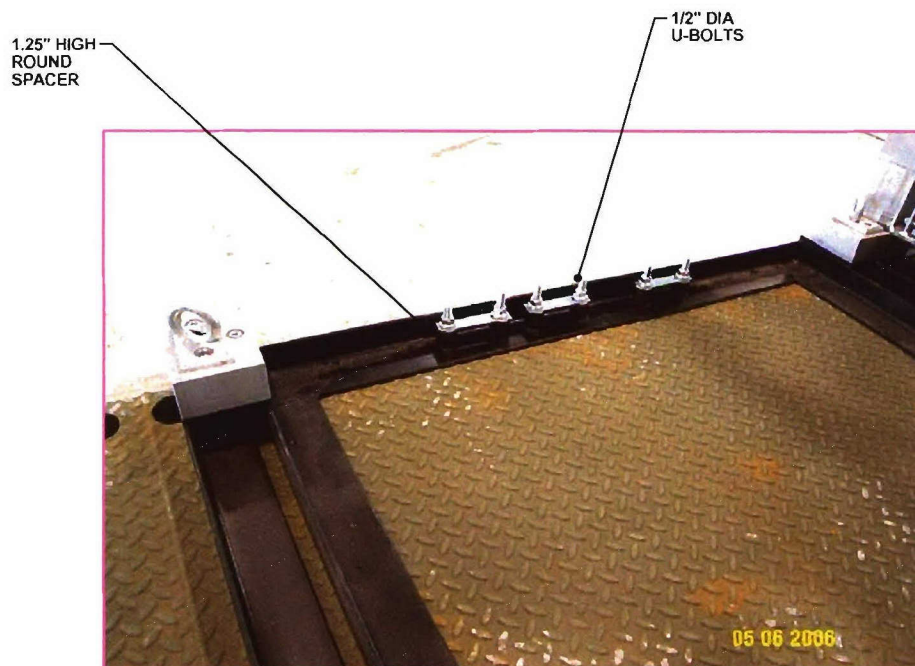


FRONT/REAR FILL ASSEMBLY
(2 REQD)

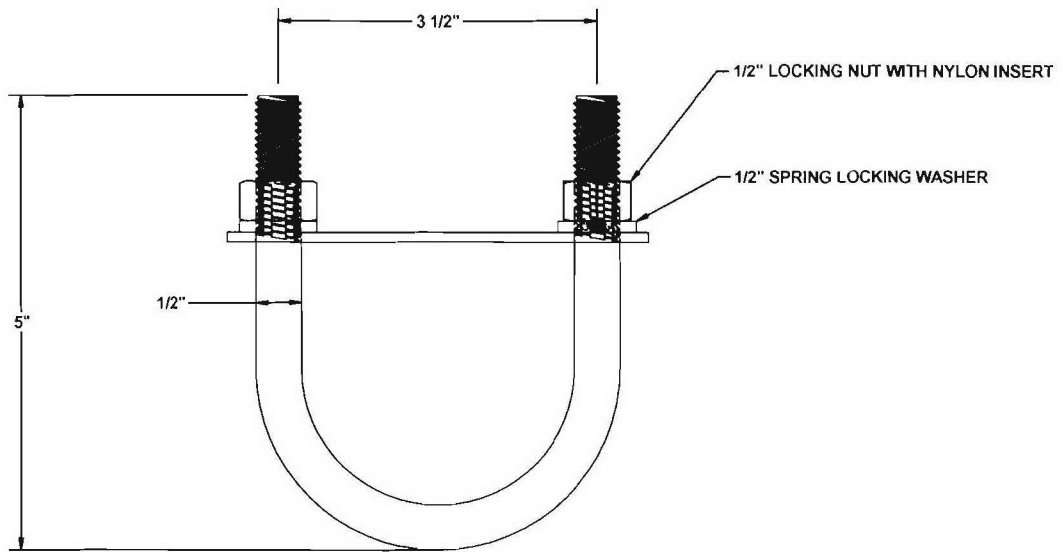




TWO BAE INTERFACE FRAMES MOUNTED TO THE CENTER OF THE CROP WITH ONE BAE JMIC.



SIX 1/2" DIA U-BOLTS PER FRAME WERE USED WITH A 1.25" HIGH SPACER.



U-BOLTS - MCMASTER CARR#3043T92

ZINC PLATED STEEL - 2,020 LBS WORK LOAD LIMIT
6 REQD PER FRAME



BAE CENTER AND END INTERFACE LOCKS
(2 CENTER AND 4 END INTERFACE LOCK REQD PER INTERFACE FRAME)

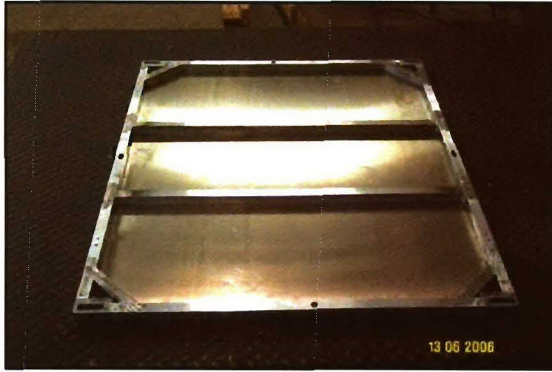
TEST SKETCH

UNITIZATION PROCEDURES FOR METAL M548 BOXES IN NAVY ALU- MINUM JOINT MODULAR INTERMO- DAL CONTAINER (JMIC)

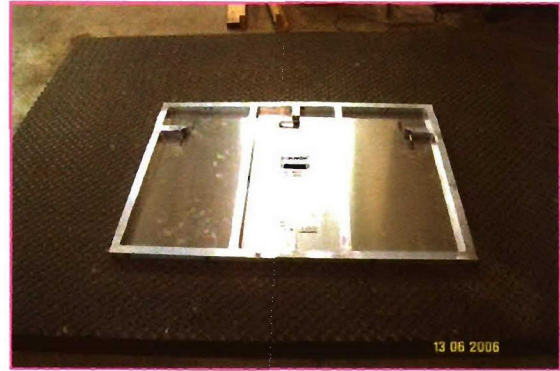
THIS 8 PAGE DOCUMENT DEPICTS M548 SERIES
METAL CONTAINER UNITIZED 20 BOXES PER NAVY
JMIC FOR TRANSPORTABILITY SERIES TESTING.
OVERALL DIMENSIONS FOR CLOSED FRAME: 51
3/4" L X 43 3/4" W X 43" H.

PREPARED DURING JUNE 2006 BY:
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CHEIF, TRANSPORTATION ENGINEERING DIVISION



TOP LID, CLOSED PANEL JMIC - 35 LBS - 1 REQD



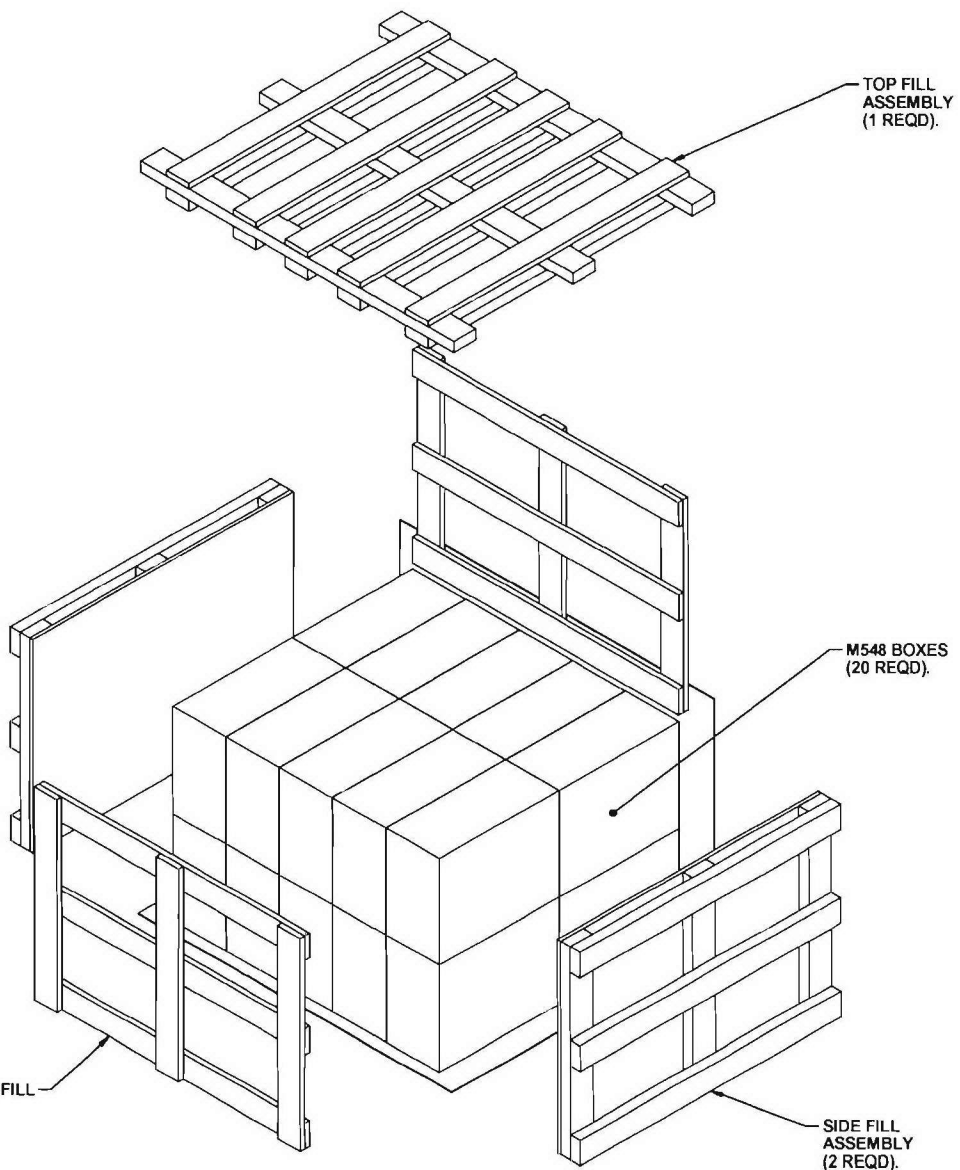
FRONT/REAR PANEL, CLOSED PANEL JMIC - 20 LBS - 2 REQD



TWO SIDE PANELS AND BASE, CLOSED PANEL JMIC - 240 LBS



OPEN FRAME JMIC - 285 LBS

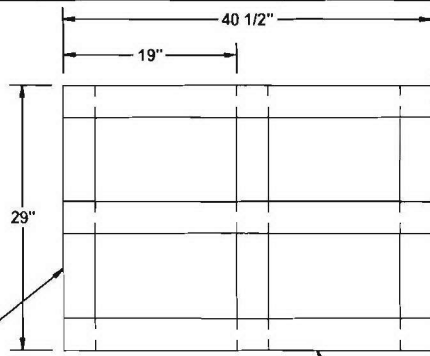


NAVY CLOSED PANEL JMIC UNIT

20 M548 BOXES @ 125 LBS ----- 2,500 LBS
 DUNNAGE ----- 146 LBS
 CLOSED PANEL NAVY JMIC ----- 325 LBS

TOTAL WEIGHT ----- 2,971 LBS (APPROX)
 CUBE ----- 56.4 CU FT (APPROX)

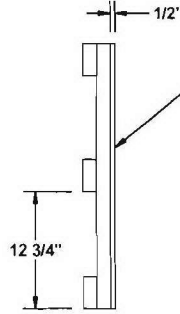
BILL OF MATERIAL		
LUMBER	LINEAR FEET	BOARD FEET
1" X 4"	52	18
2" X 4"	64	43
NAILS	NO. REQD	POUNDS
3d (1-1/4")	84	.16
6d (2")	60	.35
10d (3")	36	.54
NAVY PANEL JMIC -----	1 REQD -----	325 LBS
1/2 PLYWOOD -----	17 SQ FT -----	23 LBS



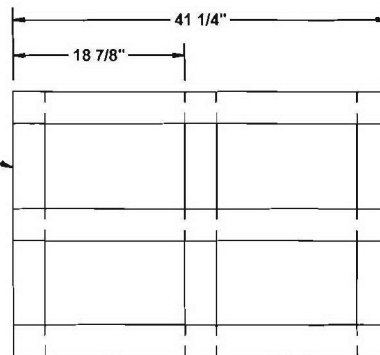
VERTICAL PIECE
2" X 4" X 29"
(3 REQD).

HORIZONTAL PIECE
2" X 4" X 40 1/2"
(3 REQD). NAIL TO
VERTICAL PIECES
W/2-10d NAILS AT
EACH JOINT.

SIDE FILL ASSEMBLY
(2 REQD)



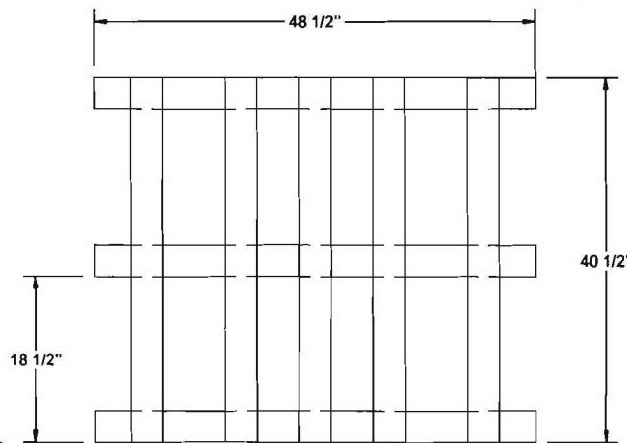
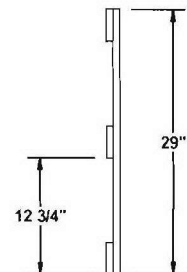
PLYWOOD
40-1/2" X 29" X 1/2"
(1 REQD). NAIL TO
VERTICAL PIECES
W/1-3d NAIL
EVERY 4".



VERTICAL PIECE
1" X 4" X 29"
(3 REQD). NAIL TO
HORIZONTAL PIECES
W/2-3d NAILS AT
EACH JOINT.

HORIZONTAL PIECE
1" X 4" X 41-1/4"
(3 REQD).

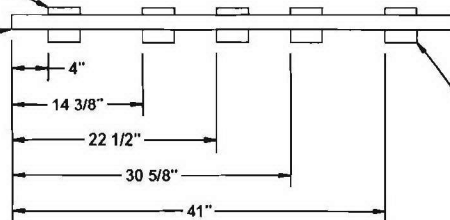
FRONT/REAR FILL ASSEMBLY
(2 REQD)



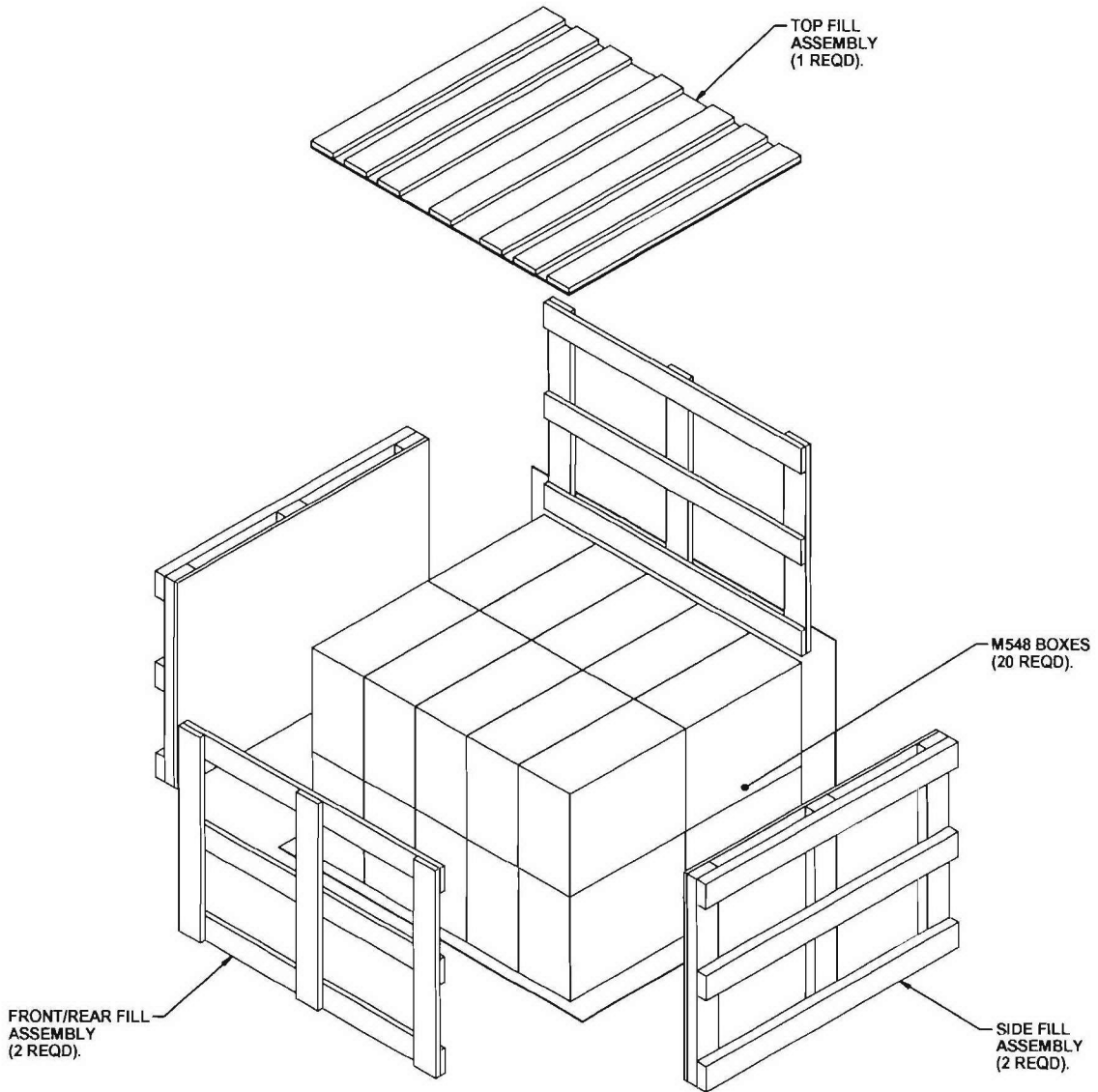
SECONDARY LONGITUDINAL
PIECE, 1" X 4" X 40 1/2"
(5 REQD). NAIL TO LATERAL
PIECES W/2-6d NAILS AT
EACH JOINT.

LATERAL PIECE
2" X 4" X 48-1/2"
(3 REQD). NAIL TO
LONGITUDINAL
PIECES W/2-6d NAILS
AT EACH JOINT.

LONGITUDINAL PIECE
2" X 4" X 40 1/2"
(5 REQD).



TOP FILL ASSEMBLY
(1 REQD)



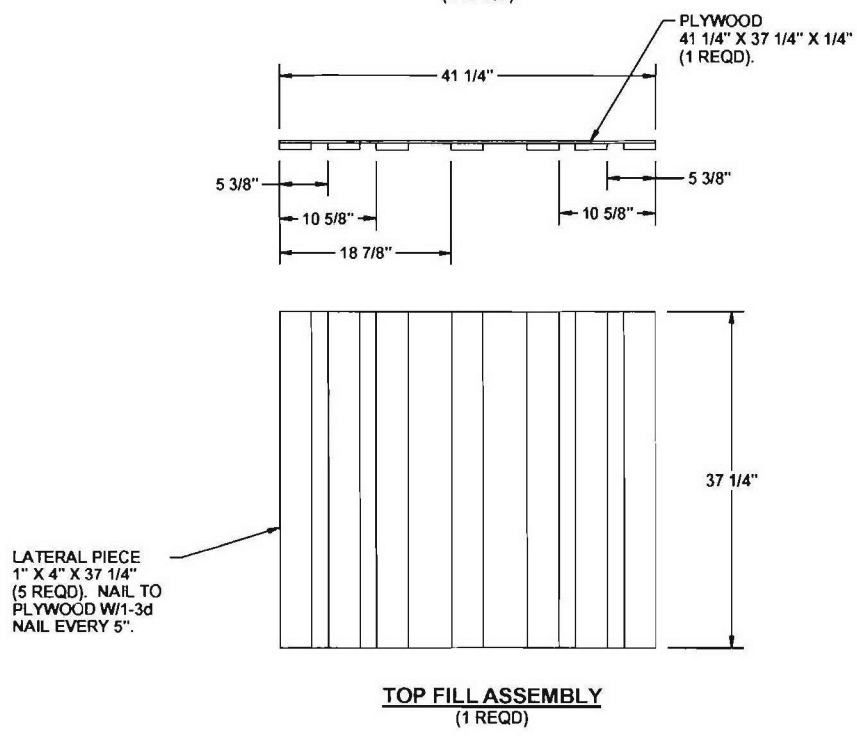
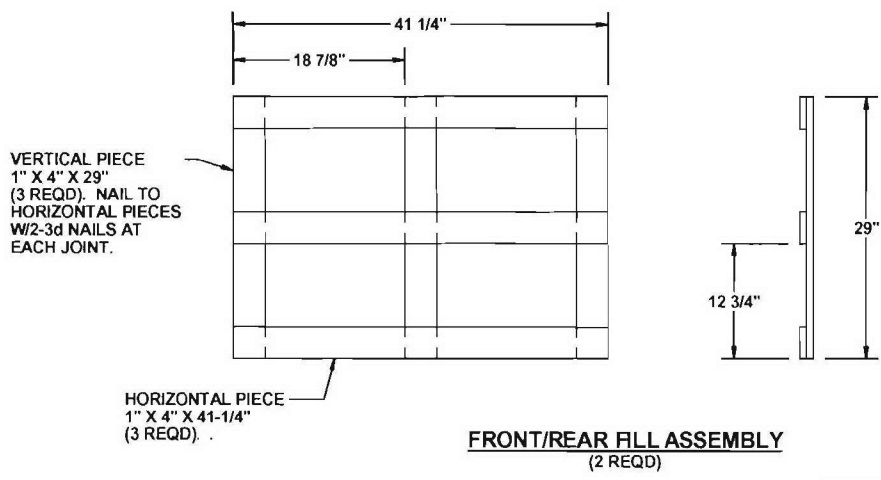
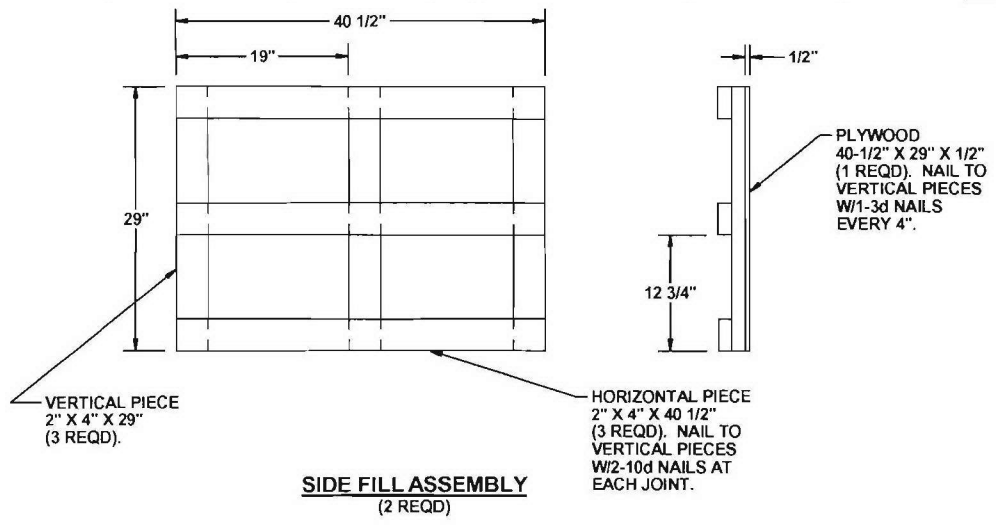
NAVY OPEN FRAME JMIC UNIT

STRAPPING NOT SHOWN, SEE STRAPPING DETAIL 1 & 2 ON PAGE 7 FOR FURTHER INFORMATION.

20 M548 BOXES @ 125 LBS - - - - - 2,500 LBS
 DUNNAGE - - - - - 127 LBS
 OPEN FRAME NAVY JMIC - - - - - 285 LBS

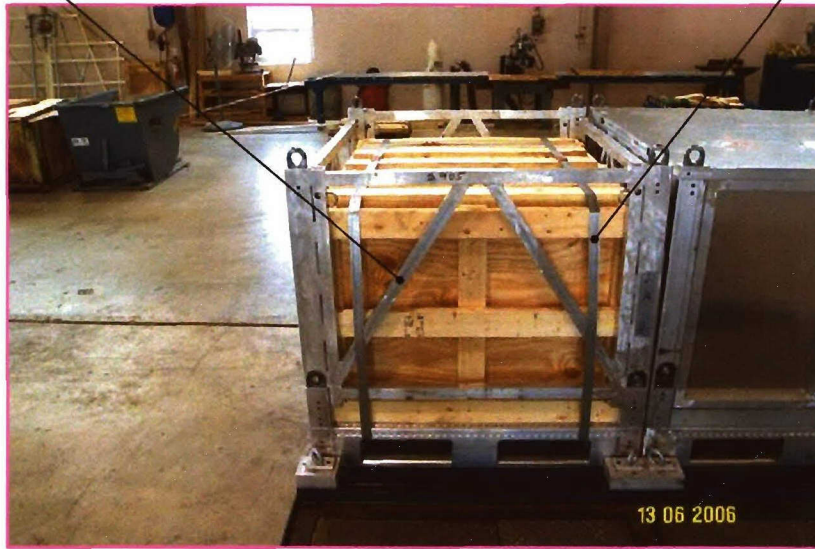
TOTAL WEIGHT - - - - - 2,912 LBS (APPROX)
 CUBE - - - - - 56.4 CU FT (APPROX)

BILL OF MATERIAL		
LUMBER	LINEAR FEET	BOARD FEET
1" X 4"	57	19
2" X 4"	35	24
NAILS	NO. REQD	POUNDS
3d (1-1/4")	126	.23
10d (3")	36	.55
NAVY OPEN FRAME JMIC - - -	1 REQD - - - - -	285 LBS
PLYWOOD, 1/4 - - - - -	11 SQ FT - - - - -	8 LBS
PLYWOOD, 1/2 - - - - -	17 SQ FT - - - - -	23 LBS
STEEL STRAPPING, 1-1/4" -	56' REQD - - - - -	9 LBS
SEAL FOR 1-1/4" STRAPPING-	4 REQD - - - - -	NIL



ANGLED SUPPORT
OPEN FRAME JMIC

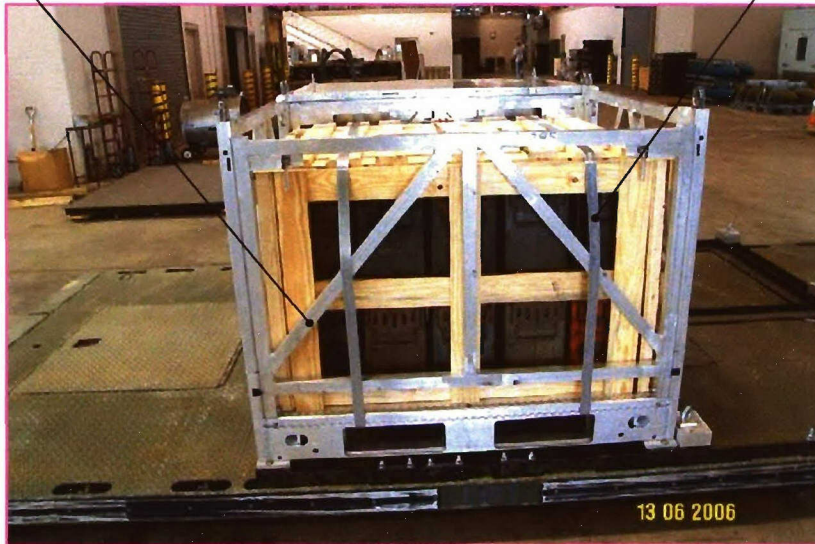
UNITIZING STRAP, 1-1/4"
X .031" OR .035" X 14'-8"
(2 REQD). FEED BOTH STRAPS
THRU THE JMIC FORKLIFT
POCKETS AND OVER ANGLED
SUPPORT AS SHOWN.



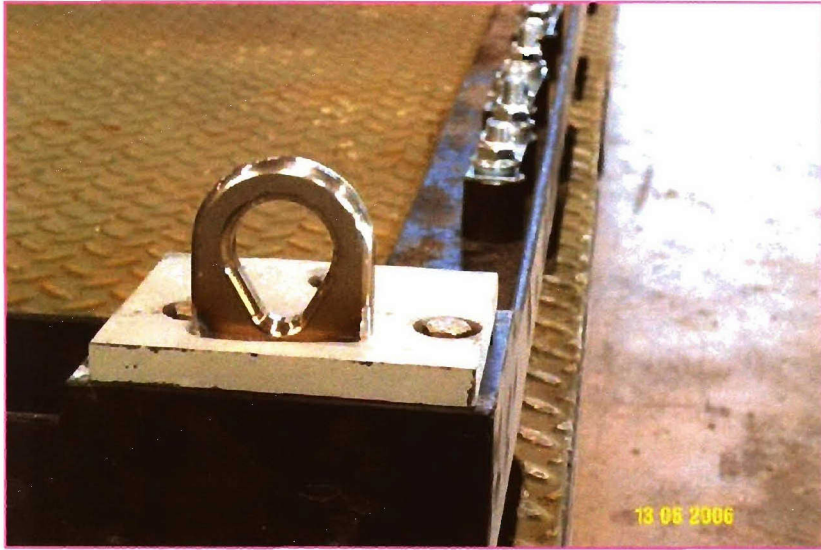
LOAD STRAPPING DETAIL 1

ANGLED SUPPORT
OPEN FRAME JMIC

UNITIZING STRAP, 1-1/4"
X .031" OR .035" X 13'-4"
(2 REQD). FEED BOTH STRAPS
THRU THE JMIC FORKLIFT
POCKETS AND OVER ANGLED
SUPPORT AS SHOWN.



LOAD STRAPPING DETAIL 2



NAVY INTERFACE LOCK