UNITIZATION PROCEDURES FOR M67 ROCKET MOTOR IN WOODEN CRATE, UNITIZED 30 ROCKET MOTORS PER WOODEN CRATE

INDEX

ITEM	PAGE(S)
GENERAL NOTES AND MATERIAL SPECIFICATIONS	2
PALLET BOX DETAIL	3
DETAILS	4-8

DISTRIBUTION STATEMENT A:

APPROVED FOR PUBLIC RELEASE DISTRIBUTION IS UNLIMITED.

U.S. ARMY MATERIEL COMMAND DRAWING

APPROVED, U.S. ARMY RESEARCH, DEVELOPMENT AND ENGINEERING COMMAND
PENNOCK.AMANDA.C.1380042157 Digitally signed by PENNOCK.AMANDA.C.1380042157 Date: 2019.02.04 10:34:39 -06'00'
RDAR-EIL-TP

APPROVED, U.S. ARMY JOINT MUNITIONS COMMAND
RUS.ALLEN.J.1230354282 Digitally signed by RUS.ALLEN.J.1230354282 Date: 2019.03.06 08:25:29 -06'00'
AMSJM-MMT

APPROVED BY ORDER OF COMMANDING GENERAL, U.S. ARMY MATERIEL COMMAND
THOMAS.CARL.ANTHONY.11046213722 Digitally signed by THOMAS.CARL.ANTHONY.1104621372 Date: 2019.03.06 12:15:25 -06'00'
U.S. ARMY DEFENSE AMMUNITION CENTER

CAUTION: VERIFY PRIOR TO USE AT HTTPS://MHP.REDSTONE.ARMY.MIL THAT THIS IS THE MOST CURRENT VERSION OF THIS DOCUMENT. THIS IS PAGE 1 OF 8.

DO NOT SCALE

JULY 2016

DESIGN ENGINEER	BASIC	SPENCER HOVEY
	REV.	SPENCER HOVEY
ENGINEERING DIVISON	FIEFFER.LAURA.A.1230375727 Digitally signed by FIEFFER.LAURA.A.1230375727 Date: 2019.01.15 10:05:48 -06'00'	
TEST ENGINEER	FELICIANO.ADIN.1259200373 Digitally signed by FELICIANO.ADIN.1259200373 Date: 2018.12.13 14:53:08 -06'00'	
TEST REPORT	18-04	
EXPLOSIVE SAFETY DIRECTORATE	FAIRHURST.ROBERT.JOHN.1015766880 Digitally signed by FAIRHURST.ROBERT.JOHN.1015766880 Date: 2019.01.16 08:41:44 -06'00'	

REVISION NO. 2 | **DECEMBER 2018**

SEE THE REVISION LISTING ON PAGE 2

CLASS	DIVISION	DRAWING	FILE
19	48	4579	CB20P1

PROJECT CB 99-16

GENERAL NOTES

A. THIS DOCUMENT HAS BEEN PREPARED AND ISSUED IN ACCORDANCE WITH AR 740-1, AND AUGMENTS TM 743-200-1 (CHAPTER 5) AND CONFORMS TO MIL-STD-1660.

B. FOR DETAILS OF THE ROCKET MOTOR, SEE ARMY CHEMICAL CORPS DRAWING 90-3-47. CONTACT BLUE GRASS CHEMICAL AGENT DESTRUCTION PILOT PLANT GOVERNMENT FIELD OFFICE (QASAS) FOR ROCKET MOTOR SAFETY AND HANDLING PROCEDURES PRIOR TO LOADING.

ROCKET MOTOR DIMENSIONS:
OUTSIDE DIAMETER - - - - - - 4-7/8"
OVERALL LENGTH - - - - - - - 47"
GROSS WEIGHT - - - - - - - - 50 LBS

C. UNLESS OTHERWISE SPECIFIED, A MANUFACTURING TOLERANCE OF PLUS-OR-MINUS 1/4" IS ALLOWED ON ALL DIMENSIONS. HOWEVER, SIMILAR PIECES IN AN ASSEMBLY MUST BE WITHIN 1/8" OF THE SAME DIMENSION.

D. DIMENSIONAL LUMBER SPECIFIED THROUGHOUT THE DRAWING IS OF NOMINAL SIZE. FOR EXAMPLE, 2" X 4" MATERIAL IS ACTUALLY 1-1/2" THICK BY 3-1/2" WIDE.

E. WHEN ASSEMBLING A PALLET BOX, CARE SHALL BE TAKEN TO ENSURE THAT THE PALLET BOX OPENINGS ARE EVENLY ALIGNED HORIZONTALLY AND VERTICALLY.

F. DIMENSIONS GIVEN FOR PALLET BOX ASSEMBLIES WILL BE FIELD CHECKED PRIOR TO THEIR ASSEMBLY. MOTORS MUST FIT ADEQUATELY IN THE PALLET BOX. THIS GUIDANCE MUST BE APPLIED PRIOR TO BEGINNING A CRATING OPERATION.

G. WHEN ASSEMBLING THE PALLET BOX WITH ROCKET MOTORS, CARE SHOULD BE EXERCISED TO PRECLUDE INTERFERENCE WITH THE PALLET BOX OPENINGS. FILL EACH 5-WIDE ROW COMPLETELY PRIOR TO STARTING AN ADDITIONAL ROW.

H. FOR LESS-THAN-FULL PALLET UNITS BEGIN LOADING ROCKET MOTORS ALONG THE PERIMETER OF THE BOX, AND THEN BEGIN TO FILL THE CENTER. THE ROCKET MOTORS MUST BE LOADED IN THE PALLET BOX IN SUCH A WAY AS TO BALANCE THE FINAL LOAD. WHEN UNLOADING THE ROCKET MOTORS, IF THEY ARE IN A VERTICAL POSITION, UNLOAD THEM IN THE SAME MANNER AS WHEN THEY WERE LOADED SO AS TO MAINTAIN A BALANCED LOAD. IF THE ROCKET MOTORS ARE IN A HORIZONTAL POSITION, UNLOAD THE TOP MOTORS FIRST AND CONTINUE TO THE BOTTOM.

J. 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.

K. WHEN APPLYING ANY STRAP, CARE MUST BE EXERCISED TO ASSURE THAT THE END OF THE STRAP ON THE UNDERSIDE OF THE JOINT EXTENDS AT LEAST 6" BEYOND THE SEAL. THIS EXTRA MINIMUM LENGTH OF STRAP IS REQUIRED TO PERMIT SUBSEQUENT TIGHTENING OF LOOSENED STRAPPING. RETENSIONING CAN BE ACCOMPLISHED WITHOUT REPLACING STRAPPING OR SPLICING STRAPPING THROUGH THE USE OF A MANUAL OR PNEUMATIC FEEDWHEEL TYPE TENSIONING TOOL AND THE APPLICATION OF ONE ADDITIONAL SEAL.

L. IN ORDER TO OBTAIN COMPACT AND SOUND UNITS, ALL STRAPS SHALL BE LOCATED IN PROPER ALIGNMENT AND TENSIONED UNTIL THEY CUT INTO THE EDGE OF THE TOP UNIT ASSEMBLY AND THE BOTTOM ASSEMBLY. AFTER TENSIONING, ALL STRAPS WILL BE SECURED USING ONE SEAL AND TWO PAIR OF NOTCHES PER SEAL.

M. COOLER NAILS MAY BE SUBSTITUTED FOR THE COMMON NAILS AS SPECIFIED BY APPLYING THE FOLLOWING GUIDANCE. THE NUMBER OF COOLER NAILS TO BE USED WILL BE THE NUMBER OF COMMON NAILS MULTIPLIED BY 1.2 AND ROUNDED UP TO THE NEXT WHOLE NUMBER. THE SIZE OF THE COOLER NAILS TO BE USED WILL BE THE SAME AS SPECIFIED FOR THE COMMON NAILS (4d, 6d, 10d, ETC.) BUT WILL CONFORM TO THE SIZE AND WEIGHT TOLOERANCES SPECIFIED WITHIN ASTM F1667 FOR COOLER NAILS.

N. PALLET BOX ASSEMBLY INSTRUCTIONS (REFER ALSO TO PAGES 6 AND 8):

1. BUILD BOTTOM ASSEMBLY, SIDEWALL ASSEMBLIES, BOTTOM ENDWALL ASSEMBLY, TOP ENDWALL ASSEMBLY, TOP LID ASSEMBLY, AND SPACER ASSEMBLY.

2. PLACE TOP ENDWALL ASSEMBLY ON GROUND WITH ENDWALL LEDGERS FACING UP. USE THE TOP ENDWALL ASSEMBLY AS A GUIDE TO CORRECTLY POSITION THE BOTTOM ASSEMBLY AND SIDEWALL ASSEMBLIES. NAIL THE BOTTOM ASSEMBLY TO THE SIDEWALL ASSEMBLIES AND REPOSITION SUCH THAT THE BOTTOM ASSEMBLY IS RESTING ON THE FLOOR.

3. NAIL THE TOP ENDWALL ASSEMBLY TO THE SIDEWALL ASSEMBLIES.

4. PLACE POLYETHYLENE FOAM 1/8" IN THE INTERIOR OF BOX (INCLUDING INTERIOR OF LID) AT LOCATIONS WHERE BARRIER MATERIAL WILL COME IN CONTACT WITH THE BOX

5. CUT THE BARRIER MATERIAL TO FIT THE INSIDE DIMENSIONS OF THE PALLET BOX AND SEAL EDGES TO CREATE A BOUNDARY AROUND ROCKET MOTORS, SPACER ASSEMBLY, AND HONEYCOMB PADS. KEEP THE TOP AND SIDE OF THE BAG OPEN TO ALLOW FOR ACCESS.

(CONTINUED AT RIGHT)

(GENERAL NOTES CONTINUED)

6. PLACE HONEYCOMB PADS AROUND THE INSIDE SURFACE OF THE BARRIER BAG LEAVING THE TOP AND OPEN SIDE CLEAR FOR ACCESS.

7. PLACE THE SPACER ASSEMBLY INSIDE THE BARRIER BAG, RESTING AGAINST HONEYCOMB PADS.

8. PLACE THE REMANING SIDE HONEYCOMB PAD IN THE BARRIER BAG AND SEAL THE SIDE OF THE BARRIER BAG.

9. NAIL THE BOTTOM ENDWALL ASSEMBLY TO THE SIDEWALL ASSEMBLIES.

10. BEFORE LOADING ENSURE FINS ARE TAPED AND IGNITER CABLE (NEAR FINS) IS SHUNTED. LOAD THE ROCKET MOTORS INTO THE SPACER ASSEMBLY WITH NOSE ENDS POINTING ALL IN THE SAME DIRECTION.

11. PLACE A TOP HONEYCOMB PAD ON THE ROCKET MOTORS AND SEAL THE TOP OF THE BARRIER BAG.

12. PLACE THE TOP LID ASSEMBLY ON THE PALLET BOX.

13. TENSION AND SEAL THE LOAD STRAPS, LOCATING THE STRAPS AS SHOWN.

14. ADD STAPLES AS SHOWN TO SECURE STRAPPING.

15. APPLY MARKINGS IAW ACV00561 TO INCLUDE "NOSE END" ON TWO ADJACENT SIDES OF THE PALLET BOX AND POP MARKING. THE IDENTIFICATION MARKINGS ON THE PALLET BOX SHALL INCLUDE THE FOLLOWING:

A) PART NUMBER
B) QTY/NOMENCLATURE
C) LOT NUMBER
D) GROSS WEIGHT
E) PROPER SHIPPING NAME AND IDENTIFICATION NUMBER
F) POP MARKING

16. THE POP MARKING TO BE USED IS AS FOLLOWS:

UN POP MARKING

u
n

50D/Y/** **/USA/
DOD/DEV/3462/962

** ** Denotes month and year of manufacturer

REVISION

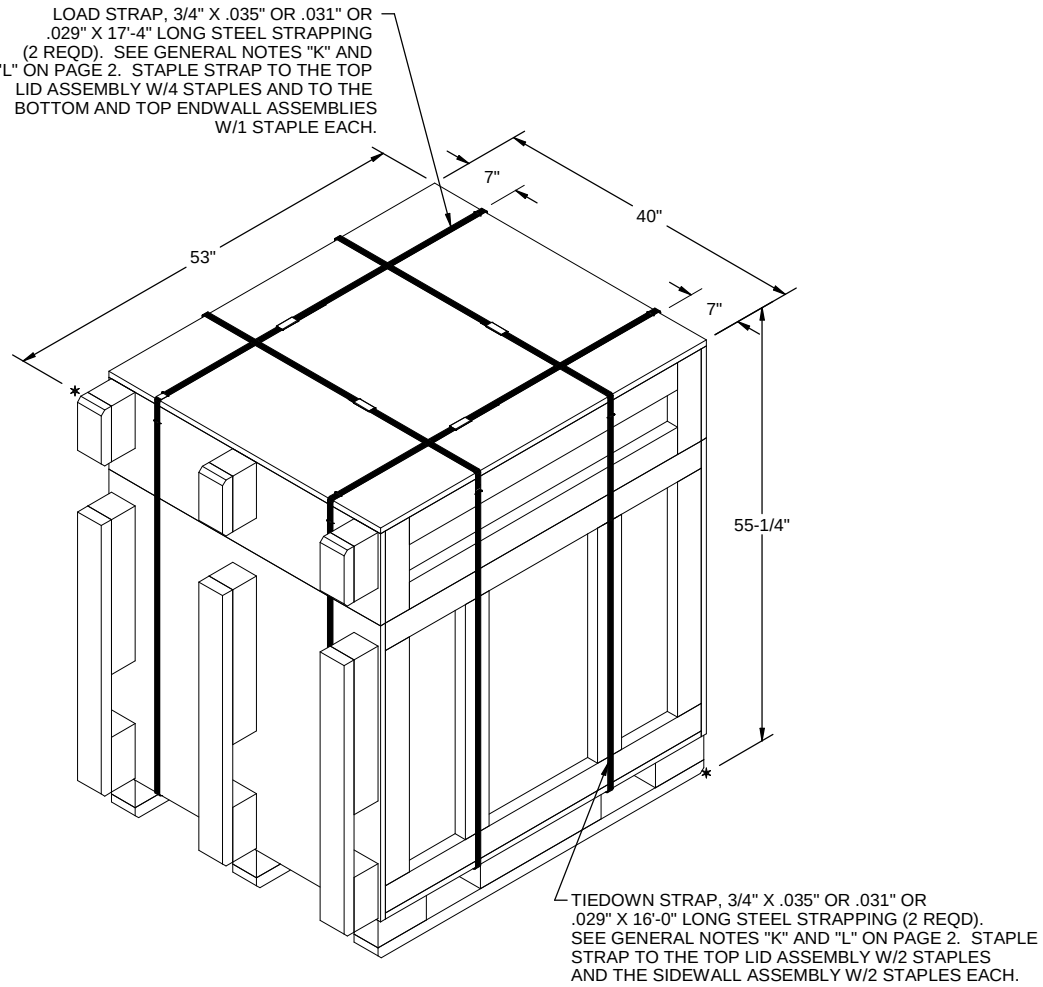
REVISION NO. 1, DATED APRIL 2018, CONSISTS OF:
1. UPDATING GENERAL NOTES
2. UPDATING MATERIAL SPECIFICATIONS
3. UPDATING PALLET UNIT INFORMATION AND BILL OF MATERIAL
4. UPDATING ASSEMBLIES

REVISION NO. 2, DATED DECEMBER 2018, CONSISTS OF:

UPDATING PALLET UNIT INFORMATION

MATERIAL SPECIFICATIONS

HONEYCOMB FILLER - -:	FIBERBOARD, FACING PAPER WEIGHT 69 POUNDS/1,000 SQURE FEET, CORE PAPER WEIGHT 33 POUNDS/1,000 SQUARE FEET, ½" CORE CELL CENTERS, INTERNATIONAL HONEYCOMB CORP, (OR EQUAL).
POLYETHYLENE FOAM - :	A-A-59135 CLASS 2 GRADE B
HEAVY DUTY DUCT TAPE:	3M 3939
BARRIER BAG - - - -:	MIL-PRF-81705E TYPE I CLASS I
LUMBER - - - - - - -:	SEE TM 743-200-1 (DUNNAGE LUMBER) AND VOLUNTARY PRODUCT STANDARD PS 20.
NAILS - - - - - - -:	ASTM F1667; COMMON STEEL NAIL (NLCMS OR NLCMMS). ALT: UNDERLAYMENT NAIL (NLUL), PALLET NAIL (NLPL), OR COOLER NAIL (NLCL) OF SAME SIZE. SEE GENERAL NOTE "M".
PLYWOOD - - - - - -:	COMMERCIAL ITEM DESCRIPTION A-A-55057, 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.
STRAPPING, STEEL - -:	ASTM D3953; FLAT STRAPPING, TYPE 1, HEAVY DUTY, FINISH A, B (GRADE 2), OR C.
SEAL, STRAP - - - -:	ASTM D3953; CLASS H, FINISH A, B (GRADE 2), OR C, DOUBLE NOTCH TYPE, STYLE I, II, OR IV.
STAPLE - - - - - - -:	ASTM F1667; STFCS-189 OR STFCS-207, 15/16" OR 1" CROWN WIDTH X 3/4" LEG LENGTH FOR 3/4" STRAPPING.



PALLET UNIT

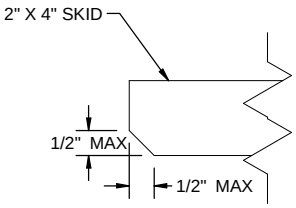
SEE ASSEMBLY DETAIL ON PAGE 8.

30 M67 ROCKET MOTORS @ 50 LBS	1,500 LBS
PALLET BOX	620 LBS
TOTAL WEIGHT	2,120 LBS (APPROX)
CUBE	65.94 CU FT (APPROX)

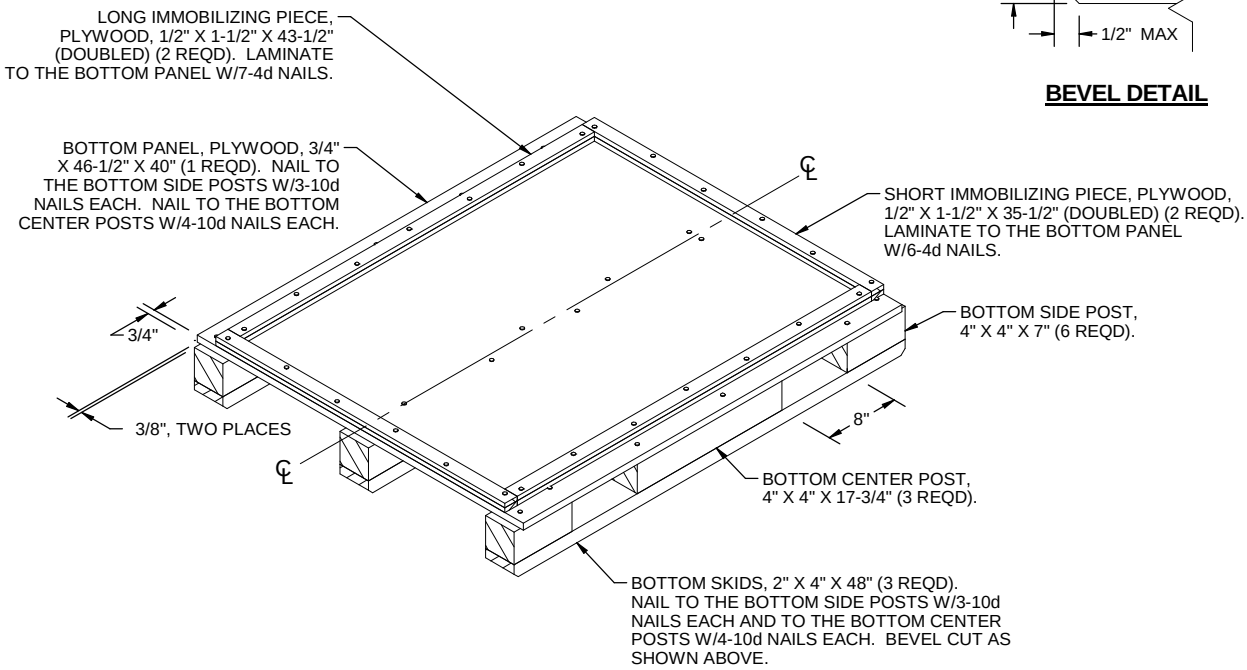
BILL OF MATERIAL

LUMBER	LINEAR FEET	BOARD FEET
1" X 4"	6	2
2" X 4"	101	68
4" X 4"	15	20
NAILS	**NO. REQD**	**POUNDS**
4d (1-1/2")	29	0.1
6d (2")	109	0.6
10d (3")	111	1.75

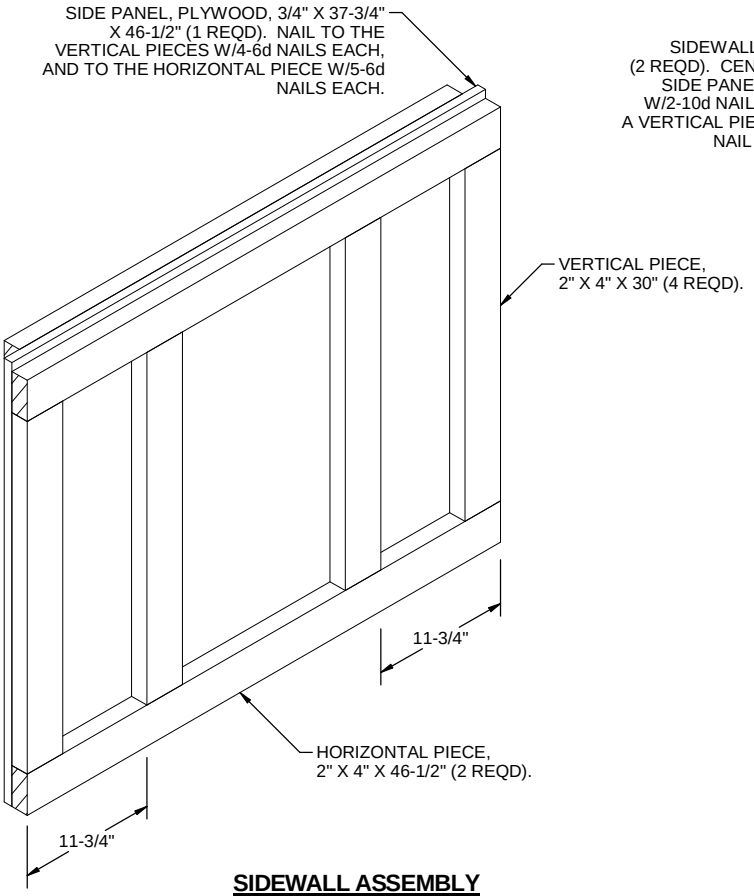
STAPLE, 15/16" X 3/4"	20 REQD	NIL
BARRIER BAG	63.03 SQFT REQD	NIL
POLYETHYLENE WRAP	16.94 SQFT REQD	NIL
TAPE	50.33' REQD	NIL
HONEYCOMB FILLER, 1/2"	58.75 SQFT REQD	8.7 LBS
STEEL STRAPPING, 3/4"	66.0' REQD	5.9 LBS
SEAL FOR 3/4" STRAPPING	4 REQD	NIL
PLYWOOD, 1/2"	245.48 SQFT REQD	337.5 LBS
PLYWOOD, 3/4"	85.07 SQFT REQD	175.5 LBS



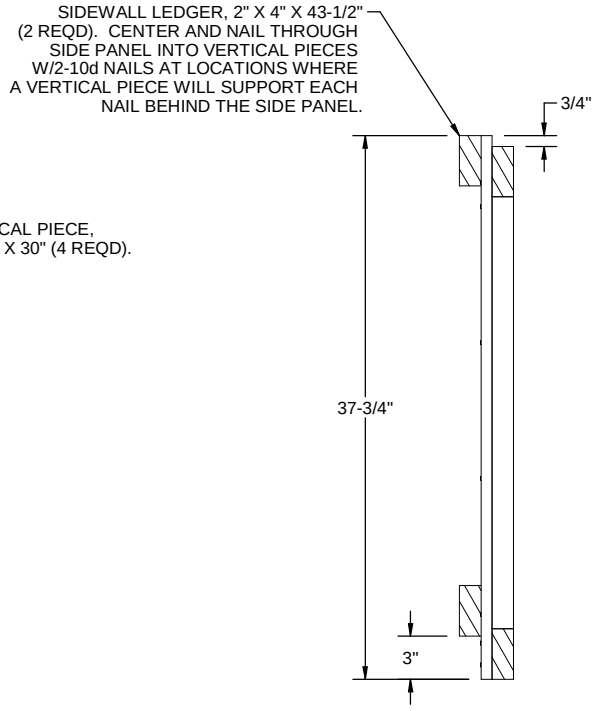
BEVEL DETAIL



BOTTOM ASSEMBLY

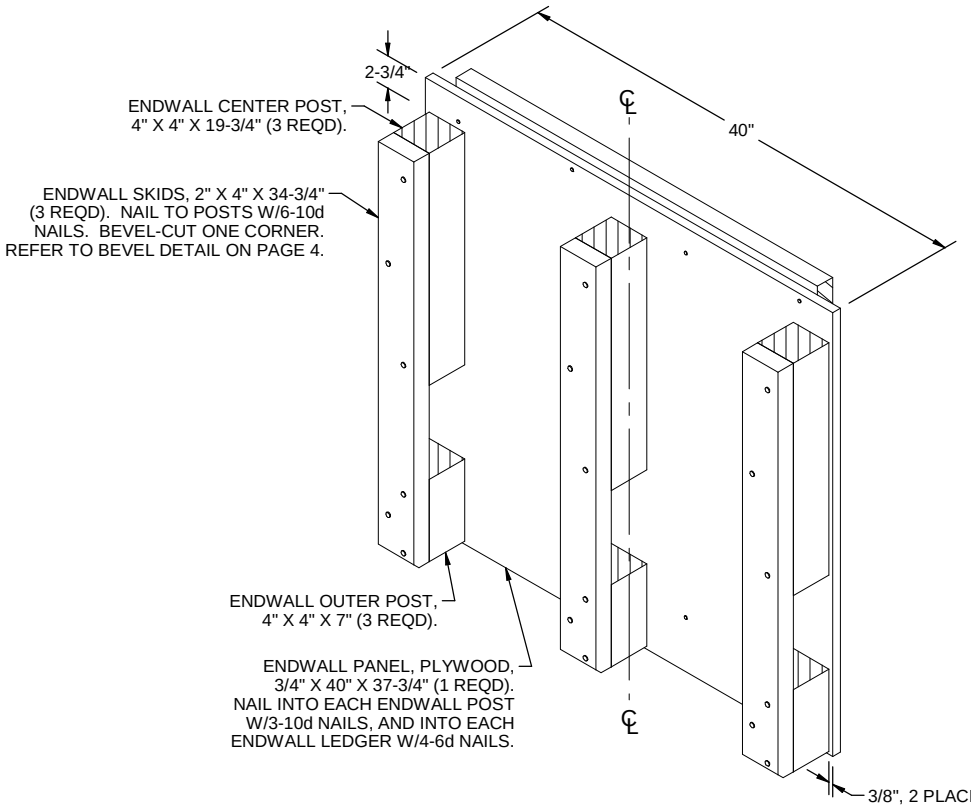


SIDEWALL ASSEMBLY

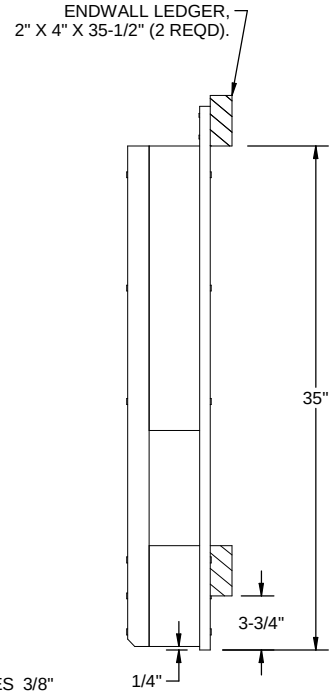


SIDEWALL ASSEMBLY SIDE VIEW

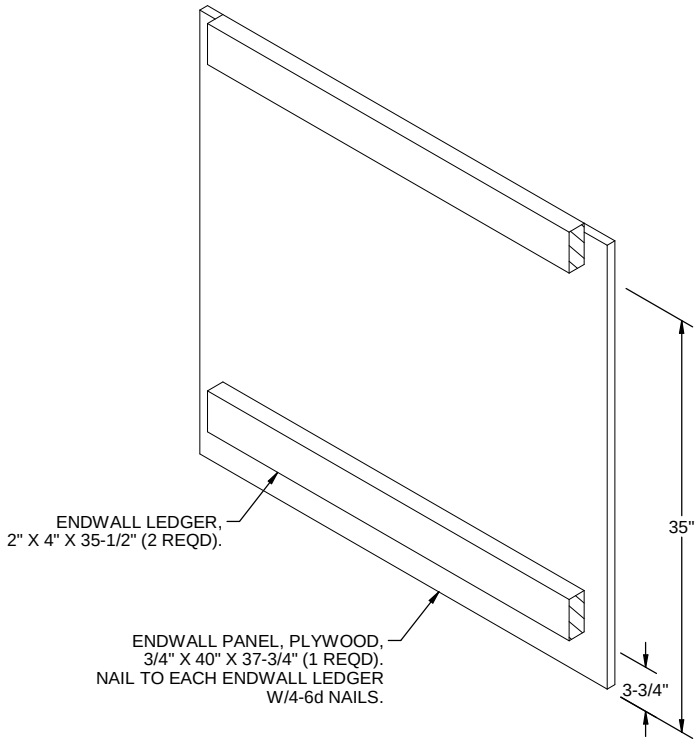
PROJECT CB 99-16



BOTTOM ENDWALL ASSEMBLY

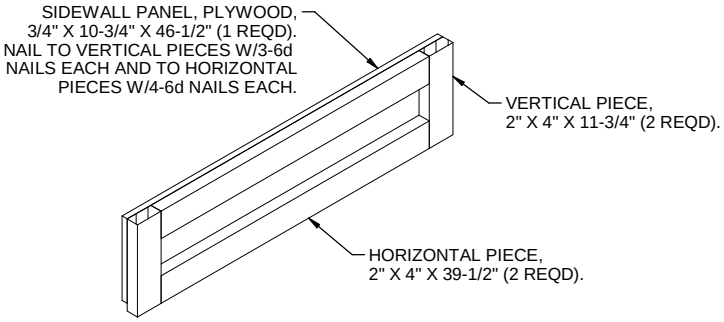


BOTTOM ENDWALL ASSEMBLY SIDE VIEW

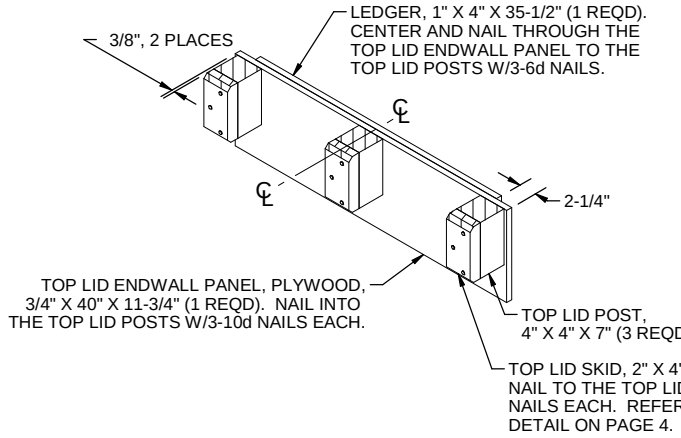


TOP ENDWALL ASSEMBLY

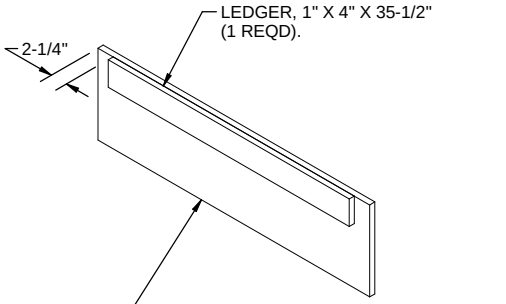
PROJECT CB 99-16



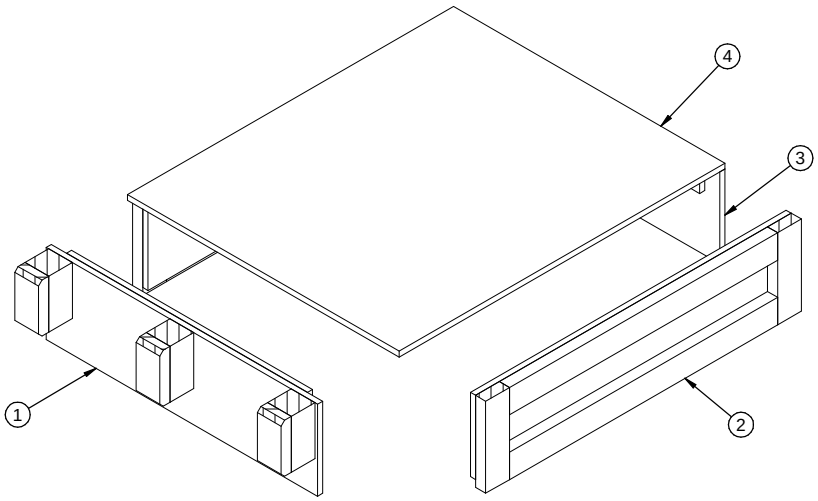
TOP LID SIDEWALL ASSEMBLY



TOP LID BOTTOM ENDWALL ASSEMBLY



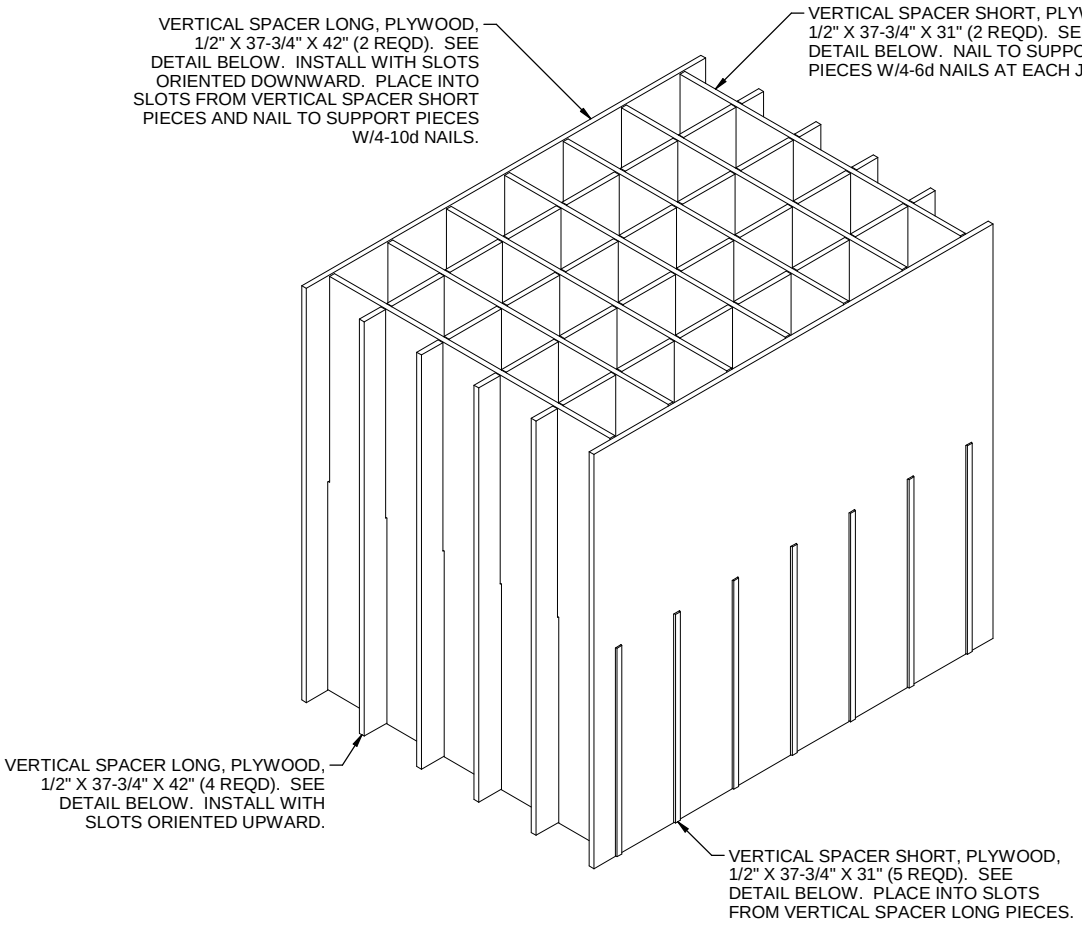
TOP LID ENDWALL ASSEMBLY



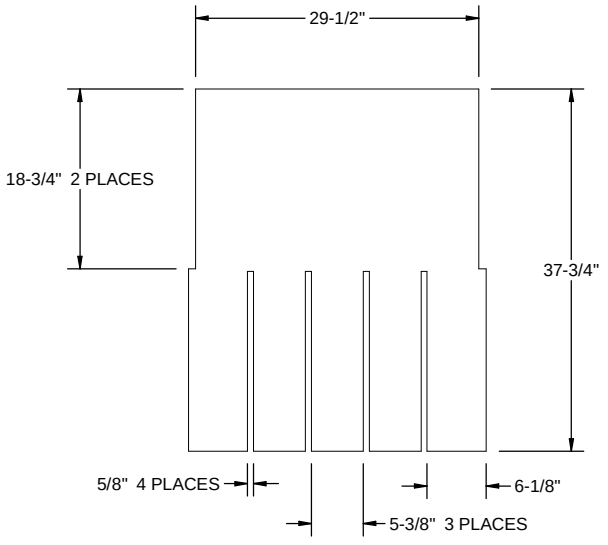
TOP LID ASSEMBLY

KEY NUMBERS

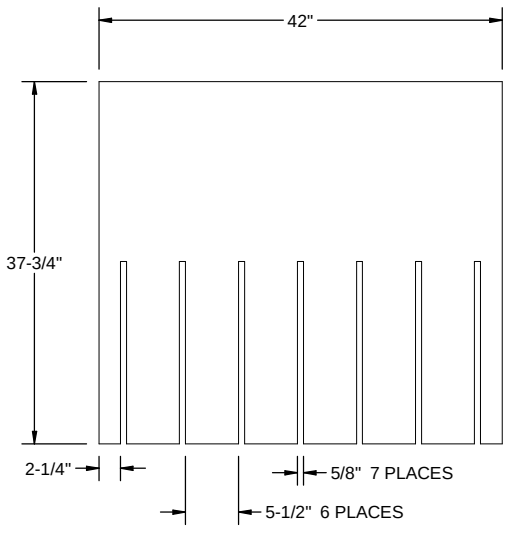
1. TOP LID BOTTOM ENDWALL ASSEMBLY (1 REQD). SEE DETAIL ABOVE. NAIL TO THE TOP LID SIDEWALL ASSEMBLY W/2-10d NAILS AT EACH END.
2. TOP LID SIDEWALL ASSEMBLY (2 REQD). SEE DETAIL ABOVE.
3. TOP LID ENDWALL ASSEMBLY (1 REQD). SEE DETAIL ABOVE. NAIL TO THE TOP LID SIDEWALL ASSEMBLY W/2-10d NAILS AT EACH END.
4. TOP PANEL, PLYWOOD, 3/4" X 40" X 48" (1 REQD). NAIL TO THE TOP LID SIDEWALL ASSEMBLIES, THE TOP LID BOTTOM ENDWALL ASSEMBLY AND THE TOP LID ENDWALL ASSEMBLY W/5-6d NAILS AT EACH JOINT.



SPACER ASSEMBLY

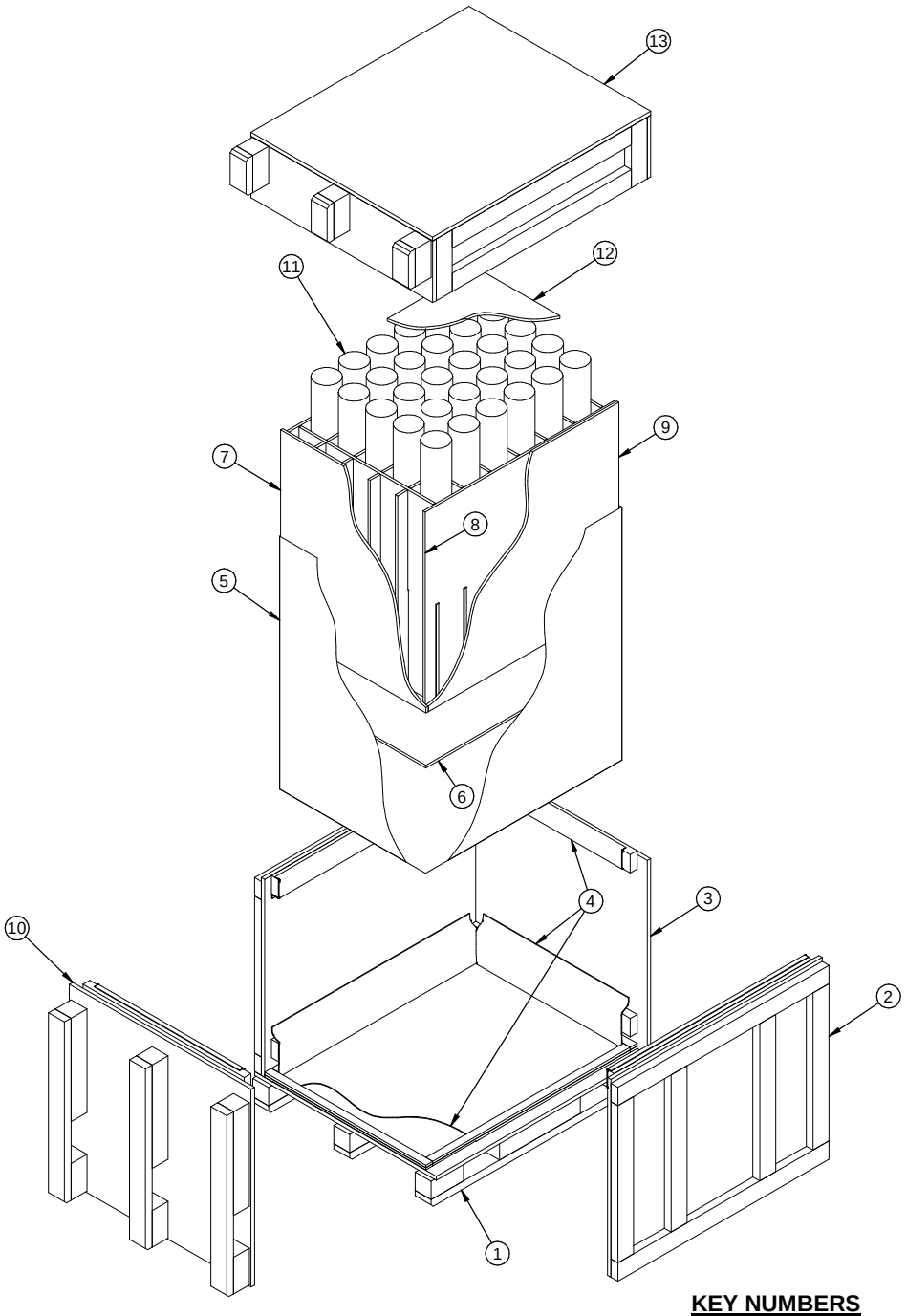


VERTICAL SPACER SHORT



VERTICAL SPACER LONG

PROJECT CB 99-16



KEY NUMBERS

7. END HONEYCOMB PAD, 32" X 38" X 1/2" THICK HONEYCOMB FILLER (2 REQD). CUT-TO-FIT AND PLACE INSIDE THE BARRIER BAG NEXT TO THE ENDWALL ASSEMBLIES.

8. SPACER ASSEMBLY (1 REQD). SEE DETAIL ON PAGE 7. PLACE ON TOP OF 1/2" THICK HONEYCOMB PAD.

9. SIDE HONEYCOMB PAD, 38" X 41-3/4" X 1/2" THICK HONEYCOMB FILLER (2 REQD). CUT-TO-FIT AND PLACE BESIDE THE SPACER ASSEMBLY, BETWEEN THE SPACER ASSEMBLY AND THE BARRIER BAG.

10. BOTTOM ENDWALL ASSEMBLY (1 REQD). SEE DETAIL ON PAGE 5. NAIL TO THE SIDEWALL ASSEMBLIES W/6-10d NAILS AT EACH END.

11. ROCKET MOTOR (30 SHOWN). SEE GENERAL NOTE "B" ON PAGE 2.

12. TOP HONEYCOMB PAD, 32" X 43" X 1/2" THICK HONEYCOMB FILLER (1 REQD). CUT-TO-FIT AND PLACE ON TOP OF ROCKET MOTORS INSIDE BARRIER MATERIAL.

13. TOP LID ASSEMBLY (1 REQD). SEE DETAIL ON PAGE 6. PLACE ON TOP OF PALLET BOX.

1. BOTTOM ASSEMBLY (1 REQD). SEE DETAIL ON PAGE 4. NAIL TO THE SIDEWALL ASSEMBLIES W/6-10d NAILS AT EACH JOINT. PLACE THE TOP ENDWALL ASSEMBLY ON THE GROUND AND USE AS A GUIDE TO NAIL THE SIDEWALL ASSEMBLIES TO THE BOTTOM ASSEMBLY.

2. SIDEWALL ASSEMBLY (2 REQD). SEE DETAIL ON PAGE 4.

3. TOP ENDWALL ASSEMBLY (1 REQD). SEE DETAIL ON PAGE 5. NAIL TO THE SIDEWALL ASSEMBLIES W/6-10d NAILS AT EACH END.

4. POLYETHYLENE WRAP, 1/8" THICK ANTI-STATIC POLYETHYLENE FOAM. PLACE IN THE INTERIOR OF BOX (INCLUDING INTERIOR OF LID) AT LOCATIONS WHERE BARRIER MATERIAL WILL COME IN CONTACT WITH THE BOX.

5. BARRIER MATERIAL. CUT TO FIT THE INSIDE DIMENSIONS OF PALLET BOX AND SEAL EDGES TO CREATE A BOUNDARY AROUND ROCKET MOTORS, SPACER ASSEMBLY, AND HONEYCOMB PAD. SEAL CLOSED ONCE KEY NUMBERS 1 THROUGH 12 ARE INSTALLED.

6. BOTTOM HONEYCOMB PAD, 32" X 43" X 1/2" THICK HONEYCOMB FILLER (1 REQD). CUT-TO-FIT AND PLACE ON TOP OF THE BOTTOM ASSEMBLY AND BARRIER MATERIAL. CENTER USING THE IMMOBILZING PIECES.