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Technical Report

PIONEER POLAR STRUCTURES -
JAMESWAY BUILDING DIVIDER

May 1965

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U. S. NAVAL CIVIL ENGINEERING LABORATORY
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by

G. E. Sherwood

ABSTRACT

A building divider was developed for the Jamesway polar shelter to separate two facilities located in the same building. The divider is constructed of tongue-and-groove panels of wood framing and plywood. It can be placed across the building width under any arch rib. The panels are insulated for soundproofing. A door included with the divider can be placed in any of three positions. The divider was in-service tested at the NCEL experimental camp near McMurdo, Antarctica. It was concluded that it satisfies the requirements for separating spaces in a Jamesway and should be used as a standard accessory for the Jamesway.

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The Laboratory invites comment on this report, particularly on the
results obtained by those who have applied the information.
This work sponsored by the Defense Atomic Support Agency.

INTRODUCTION

Efficient use of buildings in pioneer polar camps often requires that the same building house more than one facility. Certain facilities, such as the camp administrative office, do not require an entire building by themselves. Other related facilities — e.g., those using a great deal of water and those for water production and storage — need to be in the same building for convenience. It is also desirable to separate the lounge from the sleeping area in quarters buildings, because the sleeping schedule of individuals may vary considerably, and light sleepers are disturbed by activities in the lounge. Curtain partitions provide visual privacy, but in many cases, a solid, relatively soundproof partition is required.

This report presents the development of a prefabricated building divider for the Jamesway shelter and describes an in-service test at the NCEL experimental camp near McMurdo, Antarctica.

BACKGROUND

In 1962, the design was completed for a packaged 25-man polar camp^{1,2} with a life of 3 months to 2 years. This design was based on existing knowledge of polar habitation requirements and limited field tests. Standard Navy stock items and readily available commercial items were utilized where possible. The basic building selected for the camp was the Army Quartermaster Corps Tent, frame type, insulated, commonly called the Jamesway.³ This building consists of wooden arch ribs spaced 4 feet apart and mounted on insulated, wooden floor boxes; they are covered with insulated canvas blankets. The building is 16 feet wide and can be made any length by adding 4-foot modules.

During the austral summer of 1962-63, NCEL began constructing an experimental camp on the Ross Ice Shelf near McMurdo, Antarctica, in order to test components of the pioneer camp. The resulting facilities were used to house technical and support personnel conducting snow compaction investigations, sea ice studies, and other studies relating to construction in polar regions. This presented an excellent opportunity for technical personnel to observe deficiencies and limitations in the camp design and to experiment with improvements in the field. The camp was occupied by varying numbers of military and civilian personnel during the subsequent summer seasons, which extend from mid-October through February.

Although curtain partitions were used in the camp, it soon became apparent that a solid partition was needed for the Jamesway, particularly in buildings housing two facilities. In January 1964, a 64-foot-long building was erected in the experimental camp. Half of it was used as a mess hall and galley; the other half was used for water production and storage, showers, and washroom. These two facilities were placed in the same building to avoid the necessity of outdoor water distribution lines. They were separated by a field-fabricated divider of two-by-four framing and masonite. The framing was nailed to the arch rib and the floor. The masonite was then cut to size and nailed to the framing. Installation time was approximately 30 manhours. In order to reduce future installation time and improve quality, a prefabricated building divider was developed, and a prototype was shipped to the NCEL experimental camp in November 1964 for in-service testing.

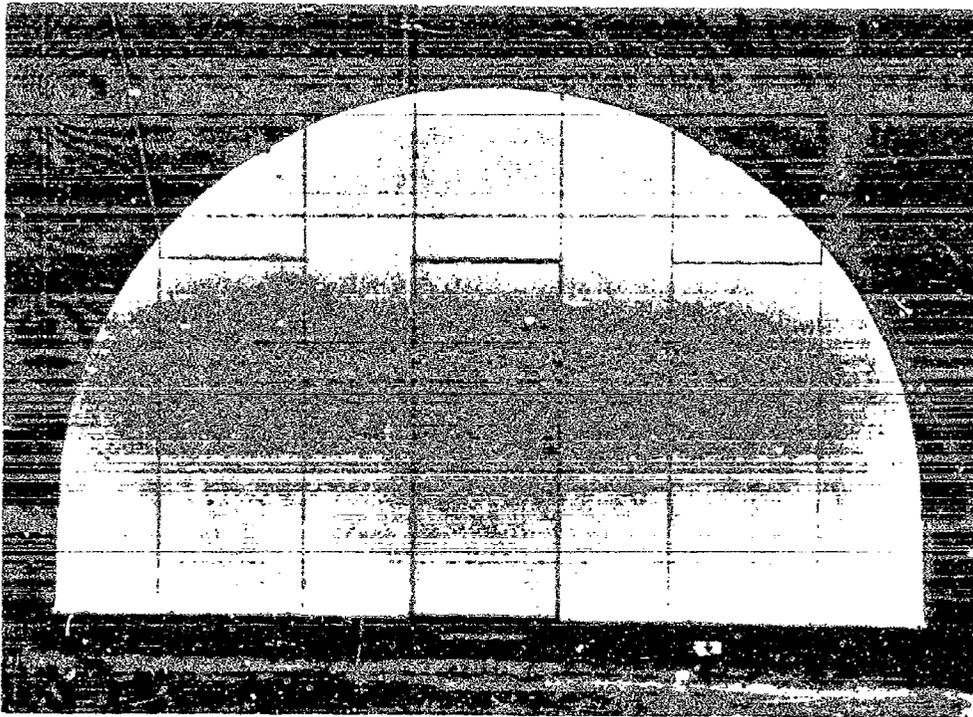
BUILDING-DIVIDER CRITERIA

The criteria established for the design of the building divider were based on the criteria for other Jamesway accessories.^{3,4} The requirements for the divider were as follows:

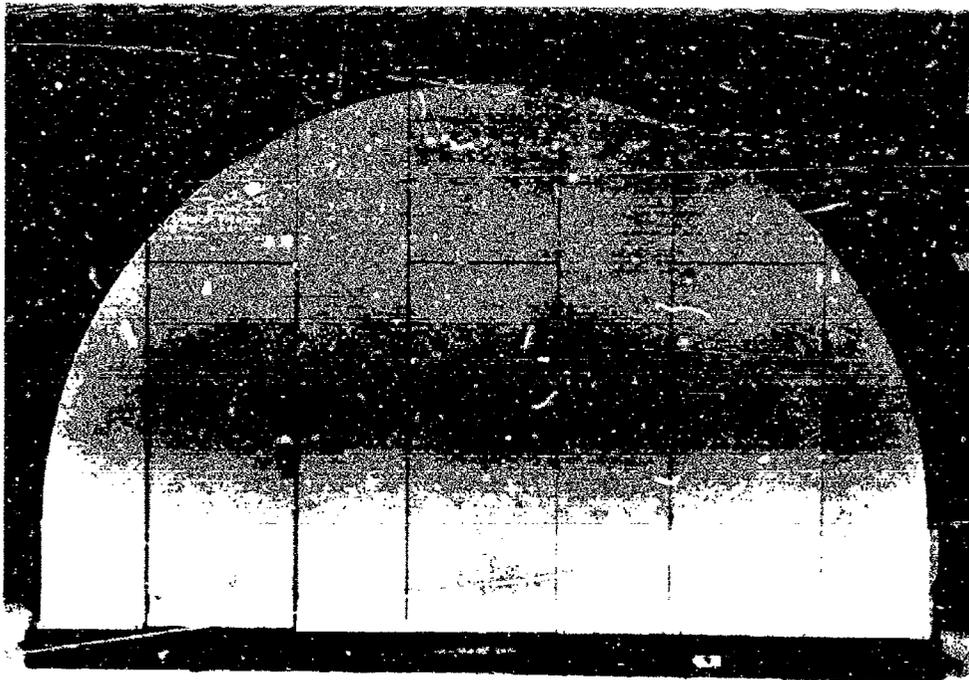
1. Installation under any Jamesway arch rib with a minimum of alterations to the building.
2. Fast and easy installation with no special skills or tools.
3. Lightweight for air transport.
4. Fabrication in small shops.
5. As soundproof as possible consistent with simplicity and economy.
6. Versatility in placing the door at the center or near either sidewall.
7. Adjustable to the large tolerances of Jamesway construction.
8. Adaptable to utilities such as heating ducts and electrical conduit which must pass through the divider.
9. As thin as feasible, requiring a minimum of floor space.

DESCRIPTION

The Jamesway building divider (Figure 1) is detailed in Y&D Drawing No. 936954. Copies of this drawing are available from NCEL. Specifications and a reduced scale drawing are presented in the Appendix.



(a)



(b)

Figure 1. Jamesway building divider with (a) center door and (b) side door.

The divider is for use in Jamesways with wall extensions. It consists of one door and nine tongue-and-groove panels. The door and two of the panels are interchangeable, so that the door can be placed at the center of the divider or near either side as shown in Figures 1(a) and 1(b). The door can be mounted on either jamb to swing into the space desired. The door can also be inverted for left-handed swing, as the latch is centered vertically.

The panels are secured to the arch by fitting over $3/4 \times 1-5/8$ -inch wood keepers 4 feet 4 inches long (Figure 2). The keepers are scored on one side $3/8$ inch deep at 4-inch intervals so that they can be flexed to conform to the curve of the arch. They are nailed to the inner face of the arch with double-headed nails. The last keeper placed is field-cut to length. Panel edges are grooved to fit over the keepers. The bases of the panels are secured by nailing a one-by-two baseboard to the floor on both sides of the divider. The divider is plumbed under the arch before it is secured in position at the base.

Panels are $2-1/8$ inches thick. All framing is $3/4 \times 1-5/8$ inches. Plywood, $1/4$ inch thick, is glued and nailed to both sides of the framing, and the cavity is filled with fiberglass insulation for soundproofing. The tongues in the panels are created by extending the framing beyond the plywood faces and beveling the sides of the protruding framing (Figure 3). Grooves are created by recessing the framing 1 inch from the edge of the panel, so that the plywood extends to form the sides of the groove (Figure 3).

Based on the expenditure in building a prototype at NCEL in 1964, one building divider costs \$420. Net weight of the divider is 410 pounds. Packaged for shipment, it weighs 832 pounds and occupies 60 cubic feet.

EVALUATION

An erection study was made at Port Hueneme to assure proper fit of components and to establish erection techniques. The prototype divider was installed in a mock-up of a Jamesway arch rib mounted on 2-foot sidewall extensions (Figure 1). Two men erected the divider in 1 hour, or 2 manhours. The Jamesway arch had enough sag at the crown to require a hydraulic jack and a two-by-four stretcher to lift the crown of the arch into its proper configuration before the panels could be installed. The panels, placed in position while the jack was supporting the arch at the crown, held the arch in position after the jack was released, and the center panel was installed with no difficulty.

The prototype building divider was shipped to McMurdo, Antarctica, in November 1964 for in-service testing at the experimental camp on the Ross Ice Shelf. It was installed in a Jamesway which had been erected the previous summer season. The building had been used as quarters for 12 men. Four of the bedrooms were eliminated at one end of the building to provide space for a 16-foot-square office. The divider was used to separate the quarters from the office.

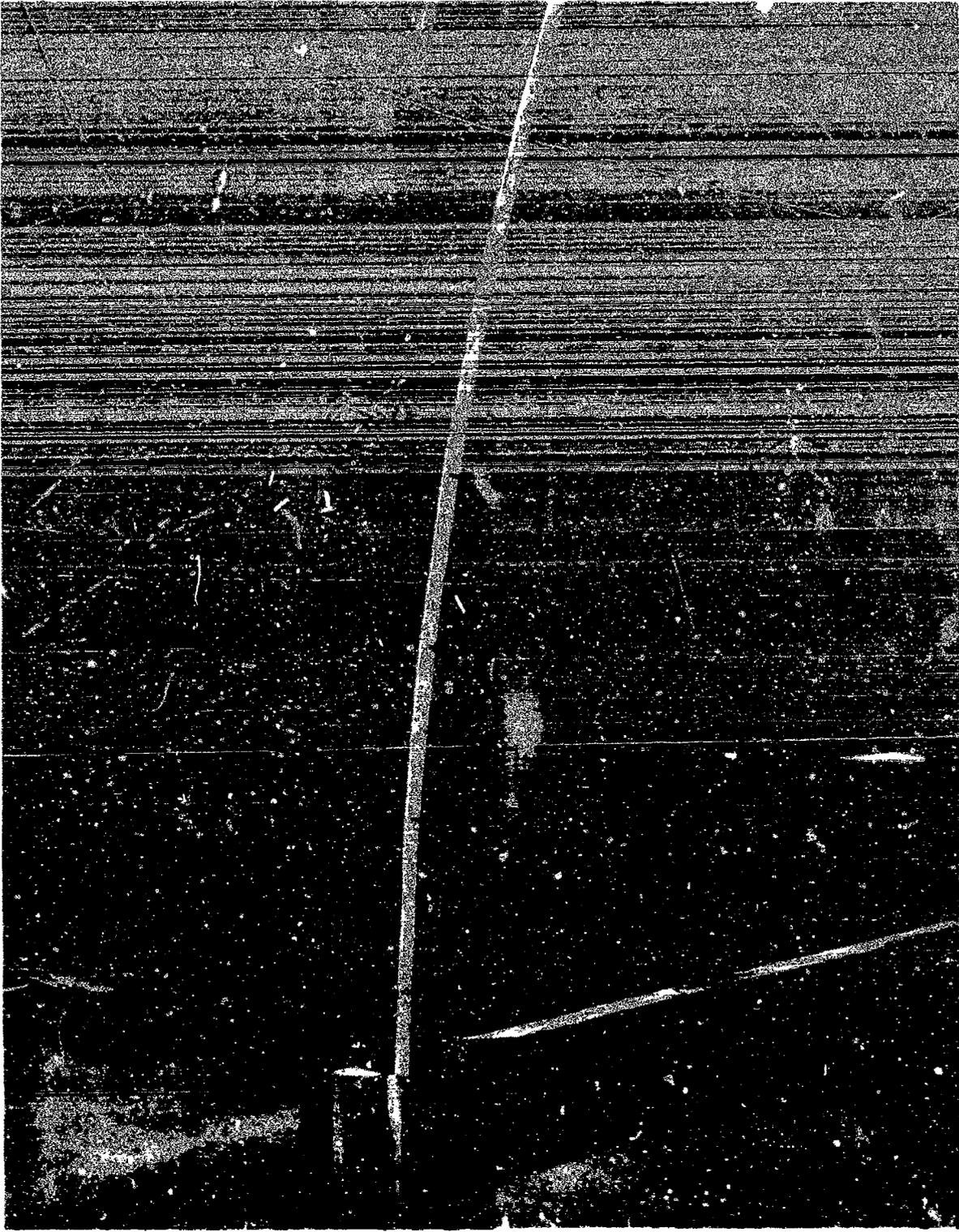


Figure 2. Keeper nailed to the inner face of the arch.

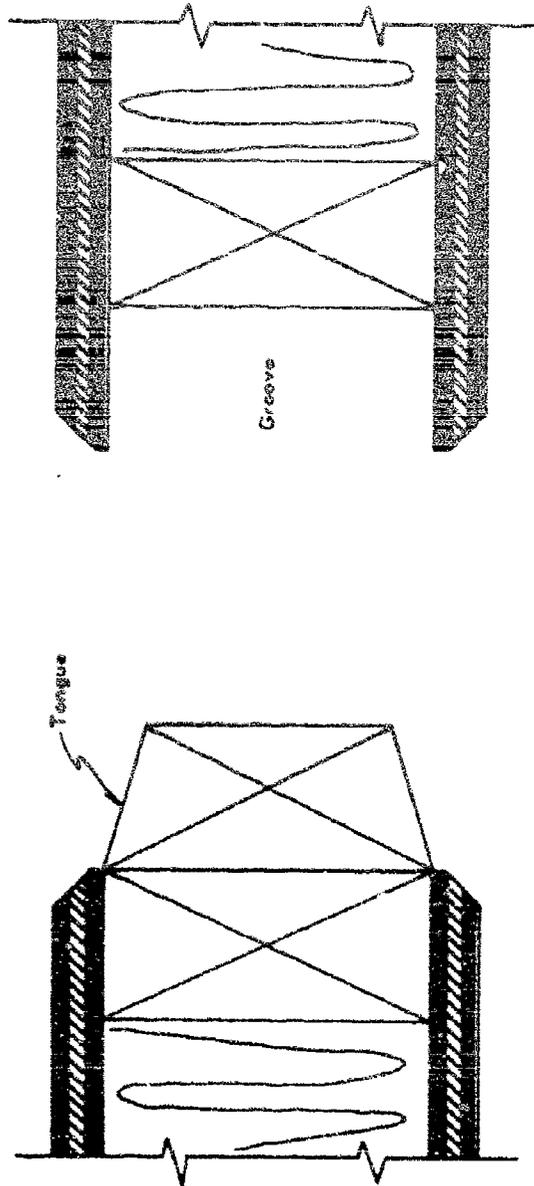


Figure 3. Cross section of tongue and groove in panel edges.

The electrical conduit along each sidewall and at the crown of the arch required that the panels be notched before installation at these locations. For most installations, the divider would be installed before the utilities, and holes would be drilled through the panels to admit electrical wiring as the conduit is installed.

After the partition was installed, a 10-inch-diameter hole was cut in one panel to admit the heating duct for the forced-air heating system (Figure 4).

The only installation difficulty encountered was caused by a lateral shift in the building arches. While the camp was unoccupied during the winter months, the snow drifted against the east side almost to the top of the building. There was only minor accumulation of snow on the opposite side of the building, and it was removed when the camp was reopened as that side bordered on the courtyard. The lateral pressure caused by the snow on one side pushed the building into a slanting position. The panels adjacent to the sidewalls had to be planed about 1/2 inch to conform to the slant of the sidewalls.

The door did not fit properly due to the warped configuration of the arch rib under which the partition was placed. Although the final space was large enough for the panel above the door to be forced into place, it was not wide enough for the door to close freely; therefore, the panel adjacent to the door was notched and the hinges were set into the panel. This permitted the door to operate properly.

These difficulties should not be encountered if the divider is installed at the time the building is erected. Installation of the building divider, including notching and planing the panels and fitting the door, required two men working 4 hours, or 8 manhours.

The divider installed in the office-quarters building (Figure 5) was relatively soundproof and sufficiently sturdy to stand up under the abuse of polar camp life. A day sleeper whose room was adjacent to the divider was not disturbed by activities in the office, which included conversation and the operation of a typewriter and calculator, although he was disturbed when there was activity in the lounge, which had only curtains separating it from the bedrooms.

The partition was very attractive; however, the appearance and general atmosphere could be improved by using warm colors. No one color can be established, as it should vary with floor covering and furniture. Another possibility for finish is scoring the plywood vertically and applying a stain to give an appearance of paneling.

FINDINGS

1. The Jamesway building divider is relatively soundproof, sturdy, and attractive.

2. The partition is versatile for installation under any arch rib with the door placed in any of three locations and installed for right-hand or left-hand swing into either of the spaces separated.

3. The divider is easily installed with no special tools or equipment. Installation time ranges from 2 to 8 manhours, depending on the condition of the building and the amount of notching or other cutting required for utilities installed in the building before the divider.

4. Based on 1964 laboratory fabrication prices, the cost of the divider is \$420.

5. Packaged for shipment, the divider weighs 832 pounds and occupies 60 cubic feet.

CONCLUSION AND RECOMMENDATION

1. The building divider satisfies the need for separating spaces in the Jamesway.
2. The building divider should be used as a standard accessory for the Jamesway.

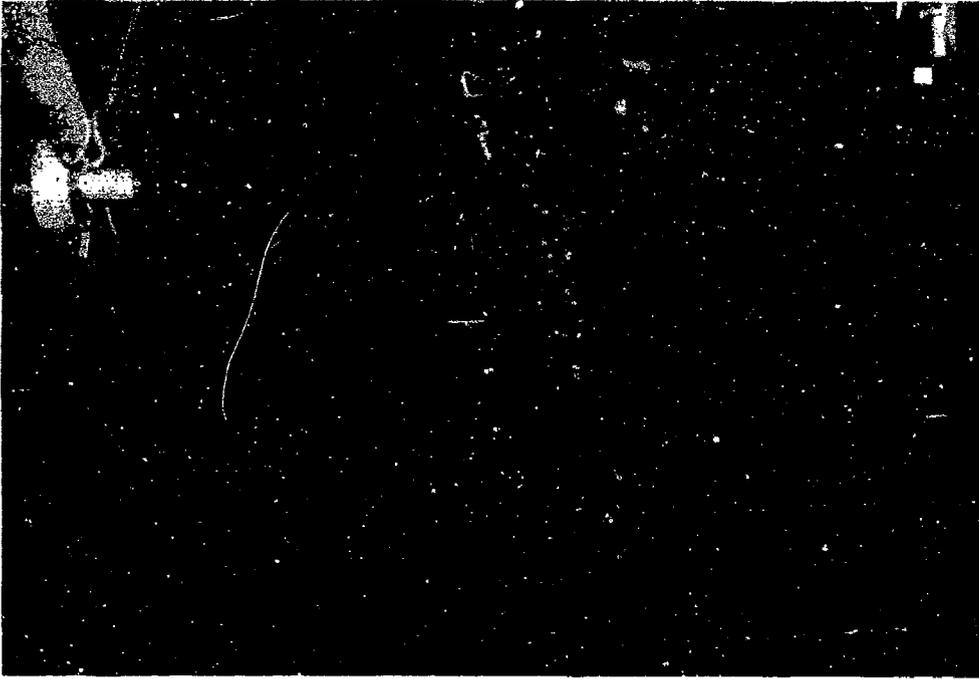


Figure 4. Hole cut in panel to admit heating duct.



Figure 5. Jamesway building divider installed in the office - quarters building.

Appendix

SPECIFICATIONS FOR THE JAMESWAY BUILDING DIVIDERS

The standard specifications given in the following list or mentioned in the text shall govern in all cases where references to standard specifications are made. In case of difference between the listed standard specifications and the subsequent specification or its accompanying drawing, the subsequent specification or its accompanying drawing shall govern. Special care shall be exercised to refer to the standard specifications and to all modifications thereof in requests for quotations and in orders.

Military

MIL-A-46051	Nov 20, 1961	Adhesive, room temperature and intermediate temperature setting resin (phenol, resorcinol, and melamine base)
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Federal

FF-H-106b		Hardware, builder's; locks and door trim
FF-H-116c	July 3, 1957	Hinges, hardware, builder's
FF-N-105a	July 26, 1963	Nails; wire; and staples
FF-S-111b	May 15, 1961	Screws, wood
NN-P-530a	Nov. 2, 1961	Plywood, flat panel
TT-E-529a	Oct. 30, 1959	Enamel, alkyd, semigloss
TT-P-636b	Feb. 23, 1954	Primer coating, synthetic, wood and ferrous metal

Non-Government

All of the following specifications shall be of latest date unless indicated otherwise:

Douglas Fir Plywood Association

West Coast Lumbermen's Association Grading, Rules No. 15

1. **Scope.** The work shall include the furnishing of all material and equipment and performing of all labor for the complete fabrication of the items indicated on Y&D Drawing No. 936954 and described and specified herein. The contractor's proposal shall be based on the drawings and specifications herewith, and no deviations shall be accepted except as approved in writing by the Contracting Officer.

2. **Materials**

A. **Wood**

(1) **Lumber.** All lumber shall be kiln dried Douglas Fir, conforming to WCLA Grading Rules No. 15, Paragraph 184-b, flat grain.

(2) **Plywood.** Plywood shall be Douglas Fir, interior type, Grade A-D, and shall conform to Specification NN-P-530a.

B. **Fastenings**

(1) **Nails.** The nails shall be steel, cement coated, either standard or countersunk head and size as indicated on the drawings, and shall conform to Specification FF-N-105a.

(2) **Screws.** Wood screws shall be steel, of the size and type indicated on the drawings, and shall conform to Specification FF-S-111b.

(3) **Adhesive.** The adhesive used for adhering wood to wood (other than the manufacture of plywood) shall be "room temperature resorcinal glue" (synthetic resin type) applied in accordance with manufacturer's instructions, and shall conform to Specification MIL-A-46051.

C. **Insulation**

(1) **Panels.** Insulation shall be 2-inch-thick fiberglass blanket with a density of 3/4 pound per cubic foot.

D. **Hardware**

(1) **Hinges.** Hinges shall conform to Specification FF-H-116c, Type 2126.

(2) **Lock set.** The lock sets shall conform to Specification FF-H-106b, Type 2B-9.

E. **Paints**

(1) **Primer.** The primer shall conform to Specification TT-P-63c.

(2) **Enamel.** The enamel shall conform to Specification TT-E-529a,

Class A.

3. Fabrication. All wood joints in panels, keys, and door shall be glued and nailed. Holes shall be drilled where necessary to prevent splitting of wood. All exposed wood surfaces shall be painted with one coat of primer and two coats of enamel.

REFERENCES

1. U. S. Naval Civil Engineering Laboratory. Technical Report R-267: A 25-man pioneer polar camp, by G. E. Sherwood. Port Hueneme, Calif., 16 Oct. 1963.
2. ———. Technical Note N-500: Specifications for a 25-man pioneer polar camp, compiled by G. E. Sherwood. Port Hueneme, Calif., 28 June 1963
3. ———. Technical Report R-241: Pioneer polar structures - accessories for the Jamesway shelter, by G. E. Sherwood. Port Hueneme, Calif., 28 May 1963.
4. ———. Technical Note N-482: Pioneer polar structures - specifications for Jamesway shelter accessories, compiled by G. E. Sherwood. Port Hueneme, Calif., 15 April 1963.

