

# ICC-ES Evaluation Report

## ESR-1146

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This report is subject to re-examination in two years.

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**DIVISION: 07—THERMAL AND MOISTURE PROTECTION**  
**Section: 07410—Metal Roof and Wall Panels**

### REPORT HOLDER:

**MD ENTERPRISES, INC.**  
 1720 EAST LOCUST STREET  
 ONTARIO, CALIFORNIA 91761  
 (909) 947-2276  
[www.mdbarns.com](http://www.mdbarns.com)

### EVALUATION SUBJECT:

#### MD STRUCTURAL WALL PANEL

#### 1.0 EVALUATION SCOPE

##### Compliance with the following codes:

- 2006 *International Building Code*® (IBC)
- 1997 *Uniform Building Code*™ (UBC)

##### Properties evaluated:

Structural

#### 2.0 USES

The MD Structural Wall Panels are limited to use as exterior walls of stables or barns used for agricultural storage in Group U Occupancies under the IBC, and Group U, Division 1, Occupancies under the UBC.

#### 3.0 DESCRIPTION

##### 3.1 General:

The MD Structural Wall Panel is a factory-assembled, nonbearing exterior wall panel. Each panel measures 12 feet (3658 mm) in length by 8 feet (2438 mm) in height, and is constructed from three 4-foot-long-by-8-foot-high (1219 mm by 2438 mm) plywood panels laminated on both sides with sheet metal. The plywood panels and facings are joined by steel splines and are encased in a steel C-channel perimeter frame to form the 12-by-8-foot (3658 by 2438 mm) panel. Drainage of moisture in contact with the laminated plywood is achieved by weep holes in the bottom channel of the perimeter frame.

##### 3.2 Materials:

**3.2.1 Plywood Panels:** Plywood panels are nominally  $\frac{3}{4}$ -inch-thick (19.1 mm), five-layer, C-C Exterior Grade panels with a span rating of 48/24 and complying with DOC PS-1 -95 as referenced in IBC Section 2301.1.4 or UBC Standard 23-2, as applicable.

**3.2.2 Steel Frame and Splines:** The steel frame and splines are galvanized C-channels manufactured from No. 14 gage [0.072 inch (1.83 mm) base-metal thickness] steel conforming to ASTM A 653, SS Grade 50, Class 1 or better, having a G90 galvanized coating designation. The channels have the following dimensions:  $\frac{1}{4}$ -inch-deep (44.5 mm) web, 2-inch-wide (51 mm) flanges,  $\frac{1}{2}$ -inch (12.7 mm) first return lip and  $\frac{3}{8}$ -inch (9.5 mm) second return lip. The splines that join the 4-by-8-foot (1219 by 2438 mm) panels together are spot-welded back-to-back at 8 inches (203 mm) on center.

**3.2.3 Connector Column Assembly:** The connector column assembly is used to connect 12-by-8-foot (3658 by 2438 mm) wall panels together and to transfer loads from the panels to the foundation. A connector column assembly primarily consists of the following components: a main C-channel (known as the connector column) having a minimum 2-inch-deep (51 mm) web and,  $1\frac{1}{2}$ -inch-wide (38 mm) flanges; and a closure-piece C-channel having the same dimensions as the main channel, except with minimum  $\frac{1}{2}$ -inch (12.7 mm) flanges. The channels are manufactured from minimum No. 14 gage [0.072 inch (1.83 mm) base-metal thickness] steel conforming to ASTM A 653, SS Grade 50, Class 1 or better, having a G90 galvanized coating designation. At the bottom of the main channel, a minimum No. 4 gage [0.2242 inch (5.7 mm)] base plate is shop-welded at the bottom of the channel to anchor the connector column assembly to the foundation. Vertical steel plates or C-shaped bend plates, having the same minimum thickness as the main channel, are shop-welded to interior flange walls of the main channel for closure-channel attachment. Welding must be in accordance with the approved quality control manual. Steel base plates are manufactured from ASTM A 36 steel with a minimum yield strength of 36 ksi (250 MPa), or ASTM A 569 steel, Grade 30, with a minimum yield strength of 30 ksi (208 MPa). See details C and D of Figure 1.

**3.2.4 Sheet Metal:** Sheet metal facings, used for weather protection, are galvanized No. 26 gage [0.0109 inch (2.8 mm) base-metal thickness] steel sheets conforming to ASTM A 792, Grade 50, AZ50 or better. The sheet metal, sized to match the dimensions of each plywood panel, is bonded on both sides of the panel in accordance with the approved quality control manual.

#### 4.0 DESIGN AND INSTALLATION

##### 4.1 Design:

The allowable load capacities in Table 1 of this report are for use in allowable stress design. Anchorage of the connector columns to the foundation must be designed to

resist the applied loads. If the connector column–panel assemblies are required to be attached to other structural members, fasteners must be adequate to transfer or resist the required loading.

An analysis in accordance with IBC Section 1606.4 must be submitted to the code official for each project, showing that the panel system (including fasteners, anchor bolts and connector columns) provides a complete load path capable of transferring all loads and forces from the point of origin to load-resisting elements.

#### 4.2 Installation:

Panels are field-installed with vertical connector columns. The panels are fastened, at the ends and along the height, to the connector columns with a minimum of three  $\frac{1}{2}$ -inch-diameter (12.7 mm) galvanized steel bolts manufactured in accordance with ASTM A 370, having a minimum yield strength of 36 ksi (250 MPa); and a nut, to match the thread of the bolt, welded to the web (interior side) of the C-channel frame. The connector column must be anchored to the foundation with approved anchor bolts. The closure-piece channel is fastened to the connector column with  $\frac{1}{4}$ -inch-diameter (6.4 mm), corrosion-resistant sheet metal screws. See Figure 1 for typical wall panel installation details for two different building configurations.

#### 4.3 Special Inspection:

Based on Section 1704.3.1 of the IBC, welding inspections for jobsite welding must be in compliance with AWS D1.1, and the basis for welding inspector qualification must be AWS D1.1. For use under the UBC, welding performed at the jobsite requires continuous special inspection in accordance with paragraph 5 of section 1701.5 of the UBC. Before proceeding, the welder must demonstrate the ability to produce the prescribed weld to the special inspector's satisfaction. The inspector's other duties include verification of materials, weld preparation, welding procedures and welding processes.

#### 5.0 CONDITIONS OF USE

The MD Structural Wall Panel system described in this report complies with those codes listed in Section 1.0 of this report, subject to the following conditions:

- 5.1 Panel erection is in accordance with this report and the manufacturer's instructions, a copy of which shall be available on the jobsite during construction. Where a conflict exists between this report and the manufacturer's instructions, this report governs.
- 5.2 The design loads do not exceed those shown in Table 1 of this report.
- 5.3 The panels must be limited to exterior wall applications as described in Section 2.0 of this report.
- 5.4 When used as shearwalls, Exception 3 of IBC Section 1613.1 excludes agricultural storage structures from the seismic load resistance design provisions.
- 5.5 Structural calculations and plans, demonstrating compliance with this report, are submitted to the building official for each project.
- 5.6 The remaining portions of the structure are designed and constructed in accordance with the codes referenced in Section 1.0 of this report.
- 5.7 Special inspection is provided for job-site welding in accordance with Section 4.3 of this report.
- 5.8 The panels and connector columns are fabricated by MD Enterprises, Inc., at their facility located in Ontario, California, under a quality control program with inspections by Smith-Emery Company (AA-554).

#### 6.0 EVIDENCE SUBMITTED

Data in accordance with the ICC-ES Acceptance Criteria for Wall Panels with a Welded Steel Perimeter Frame Used in Agricultural Storage Structures (AC390), dated May 2008.

#### 7.0 IDENTIFICATION

Each panel is stamped with the manufacturer's name (MD Enterprises, Inc.), the name of the inspection agency (Smith-Emery Company), and the evaluation report number (ESR-1146). Connector columns are identified similarly to the panels.

TABLE 1—ALLOWABLE PANEL CAPACITY

TYPE OF LOAD	ALLOWABLE LOAD <sup>3</sup>
Transverse uniform load <sup>1</sup>	13 psf
Racking shear <sup>2</sup>	4 kips

For SI: 1 psf = 47.8 Pa, 1 kip = 1000 lbf = 4.45 kN.

<sup>1</sup>Maximum wall panel size is 8 feet high by 12 feet long. The panel must be supported in accordance with this report.

<sup>2</sup>The shear walls are 8 feet high by 12 feet long. Value is based on the panel's capacity and connection of the panel to the connector columns at each end of the panel. Anchorage to foundation must be designed to resist or transfer the required loads. Shear wall must be continuously supported by a rigid foundation.

<sup>3</sup>No load increase is permitted for wind loading.

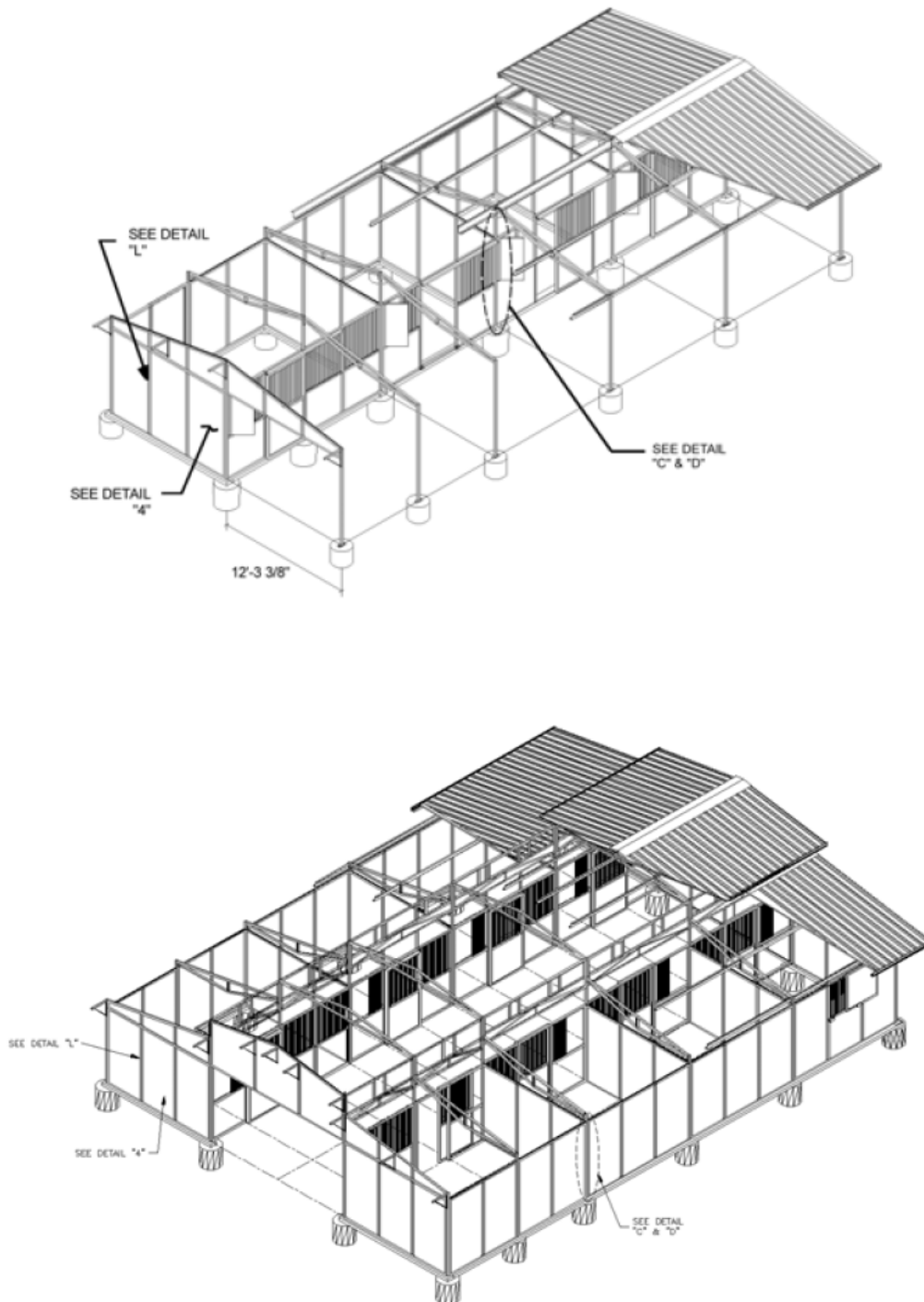


FIGURE 1—DETAILS

