



Testing Engineers—San Diego

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July 23, 1987
Job No. 6544

J.P. Construction Inc.
29-250 Rio del Sol, P.O. Box 598
Thousand Palms, California 92276

Attention: Svend A.V. Peulicke
Duane Jackson

Subject: Strength Tests of Waffle-Crete Panels

Gentlemen:

We are pleased to present the results of our testing performed on samples of "Waffle-Crete" concrete panels. The purpose of this testing was to determine and evaluate certain structural properties of the segments for wall and roof construction.

Our test results indicate the strength of the panels to be in excess of the design structural loads, and expected seismic load values. The details of our test procedures and results are presented herein.

We appreciate this opportunity to be of service on this project. If you have any questions regarding this report please contact us at your convenience.

Respectfully Submitted

Reviewed by:

TESTING ENGINEERS-SAN DIEGO

Allison K. Morton
Associate Engineer

Thomas A. Gaeto
R.C.E. #CO40182

LEDGER BOLT PULL-OUT

DESIGN CRITERIA: Allowable load per bolt (3/4" dia.) = 2,000 lbs. based on previous tests.

TEST RESULT: Average load per bolt to create initial crack = 3,200 lbs.
(Test D) Average load per bolt to create concrete or bolt insert failure = 16,800 lbs.

PANEL SHEAR

DESIGN CRITERIA: Nominal shear strength to be computed per U.B.C. Section 2611(k) for the 2" skin of the panels and the welded wire fabric reinforcing. Factored shear force to be computed per U.B.C. Section 2677(a), using a load factor of 2.0.

$$V_u \leq \phi V_n$$

V_u = Factored shear force (Load factor = 2.0)

V_n = Nominal shear strength = $V_c + V_s$

$$\phi = 0.85$$

$$V_c = 2(f'_c)^{1/4} h d$$

$$f'_c = 4,000 \text{ psi}$$

$$h = 2"$$

$$d = 0.8 \text{ wall width} - \text{U.B.C. Section 2611(k)4}$$

$$V_s = A_v f_y d / S_2$$

$$A_v = 0.029 \text{ in}^2 \text{ for } 6 \times 6 - W 2.9 \times W 2.9$$

$$f_y = 65,000 \text{ psi (ASTM A 185)}$$

$$S_2 = 6"$$

Above equation yields a nominal shear strength of 4,600 lbs. per ft. or 36,800 lbs. for an 8 ft. wide panel.

TEST RESULT: Average load for 8 ft, wide panel to create initial crack = 56,000 lbs.
(Test E) Average load for 8 ft. wide panel to create concrete failure = 72,000 lbs.

PANEL BOLT IN SHEAR

DESIGN CRITERIA: Allowable load per bolt (3/4" dia., A 307) = 4,400 lbs. based on U.B.C. Section 2702(c) and AISC Section 1.5.2.

TEST RESULT: Average load per bolt to create initial crack in
(Test F) concrete = 13,200 lbs.
Average load per bolt to create failure in
concrete = 60,000+lbs.

PANEL BOLT IN TENSION

DESIGN CRITERIA: Allowable load per bolt (3/4" dia.) = 3,700 lbs.
based on bearing capacity of concrete against
1½" square tapered washers.

TEST RESULT: Average load per bolt to create initial crack =
(Test G) 11,500 lbs.
Average load per bolt to create concrete failure
= 14,500 lbs.

REMARKS:

1. Spacing of connectors for panel to panel, panel to foundation and ledger to panel connections shall not exceed 48"o.c. except that spacing of connectors for panel to foundation connection may alternate 72"o.c. and 24"o.c., averaging 48"o.c. in order to obtain equal distribution of base shear perpendicular to wall.
2. Ledger shall be spliced for diaphragm chord force.
3. Allowable load for connectors subjected to combined shear and tension forces shall be determined by the ratio of the actual shear to the allowable shear plus the ratio of the actual tension to the allowable tension, not exceeding 1.00
4. A 1/3 increase in allowable load for connectors is permitted for wind or seismic loading unless disallowed by Code or I.C.B.O. Report.

For further detail of the tests, please refer to "Report of Findings of Conducting Strength Tests of Waffle-Crete Panels" submitted earlier.

Respectfully submitted,

J.P. CONSTRUCTION INC.



Hassan Zarinejad, P.E.

WAFLE-CRETE"®

PRECAST CONCRETE PANEL
BUILDINGS AND SPECIALTIES
PATENT NO. 4,181,286

September 2, 1987

Department of Building & Safety
City of San Diego
1222 First Ave., MS 301
San Diego, CA 92101-4153

Gentlemen:

The following design criteria for bolted connections in "WAFLE-CRETE" buildings and a summary of test results, corresponding to each design criteria, performed by Testing Engineers-San Diego, on our premises on July 16th and 17th, 1987, is hereby submitted for your consideration and approval.

LEDGER DIAPHRAGM SHEAR

DESIGN CRITERIA: Allowable load per bolt (3/4" dia.) = 1,400 lbs. based on holding power of the bolt in a 4 by wood ledger per U.B.C. Section 2510 (Table 25-F).

TEST RESULT:
(Test A) Average load per bolt to create initial crack = 7,000 lbs.
Average load per bolt to create concrete or bolt insert failure = 9,400 lbs.

BASE SHEAR PARALLEL TO WALL

DESIGN CRITERIA: Allowable load per anchor = 3,050 lbs. based on I.C.B.O. Report No. 2156 for 3/4" dia. "Kwik-bolt" (3 1/2" embedment)

TEST RESULT:
(Test B) Average load per anchor to create initial crack = 11,500 lbs.
Average load per anchor to create concrete or anchor failure = 50,000+lbs.

BASE SHEAR PERPENDICULAR TO WALL

DESIGN CRITERIA: Allowable load per anchor = 2,880 lbs. based on I.C.B.O. Report No. 2156 for 3/4" dia. "Kwik-bolt" (3 1/2" embedment), adjusted for 4" edge distance.

TEST RESULT:
(Test C) Average load per anchor to create anchor or concrete (footings or panel) failure = 18,000 lbs. (0.75 x 24,000 lbs.)



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