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PRODUCT TEST REPORT
ORIGINAL WATKINS HANGER

Prepared For:



RP Watkins LLC
5516 West Memorial Road,
Oklahoma City, OK 73142

Attention: Mr. Michael Summers

Project Number: FC09744.001-470

Report Number: 1617C (Rev. 1)

October 27, 2021



Product Test Report
Pullout Resistance Tension Testing
Original Watkins Hanger
CTL|T Project Number: FC09744.001-470

Per our agreement, product capacity testing was completed on the RP Watkins supplied Original Watkins Hangers precast in ICF concrete walls. At your request, the Original Watkins Hangers were tested in direct tension to determine pullout resistance. These tests were conducted in general accordance with ASTM D7147 (Standard Specification for Testing and Establishing Allowable Loads of Joist Hangers), with the deviations from the standard procedure listed below.

Test sample ICF sections were constructed by the client and shipped to our laboratory for testing. The concrete mix was reported to be a 2,500-psi design strength mix (Mix Number: RMT258N3). Actual concrete strength was unknown at the time of testing.

Products and testing included in this testing program include the following:

Manufacturer Identification	Test Type
Original Watkins Hanger	Pullout Resistance Test*

*The pullout resistance test was performed on single precast specimens pulled in direct tension.

We appreciate the opportunity to work with you on this project. If you have any questions regarding the information provided in this report, please do not hesitate to contact us.

Sincerely,
CTL|THOMPSON, INC.



Ryan S. Beck, P.E.
Associate Engineer
Accredited Laboratory Manager

Report Authorized for Release:

Revision Log

Date	Revision No.	Explanation	By
10.26.2021	0	Initial Issue	R. Beck, Manager
10.27.2021	1	Updated Shop Drawings	R. Beck, Manager



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SECTION 1:

GENERAL OVERVIEW

Product Descriptions

All products listed are for use in ICF (insulated concrete form) construction. Prior to concrete placement of an ICF wall, the hanger/bracket is either inserted through the insulation (foam form) or placed at the top of the wall. Reinforcing bars are added within the ICF wall section to secure the hanger/bracket in place. Concrete is then placed to complete the ICF section. See Shop Drawings for additional details. No reinforcing bar was used to secure the hangers for testing.

Original Watkins Hanger

The Original Watkins Hanger is a single piece of cold-formed steel that is used to connect wood joists or beams to an ICF wall section. Framing is later fastened to the bracket by nailing through the holes in the hanger product. See shop drawings below for additional detail.

Test Sample Descriptions

Pullout Resistance Test

The pullout tension tests, requested by the client, were performed on a single Original Watkins Hanger in direct tension. Each test sample consisted of one ICF wall section (20" x 24" x 9" thick), with a precast bracket installed. Specialized fixturing was created for the bracket. See Figure 1 below for test setup, tested for pullout resistance (tension). Blocking was used to resist the tension loading from the ICF wall section to the stationary crosshead, allowing the force to be applied directly to the hangers and brackets.

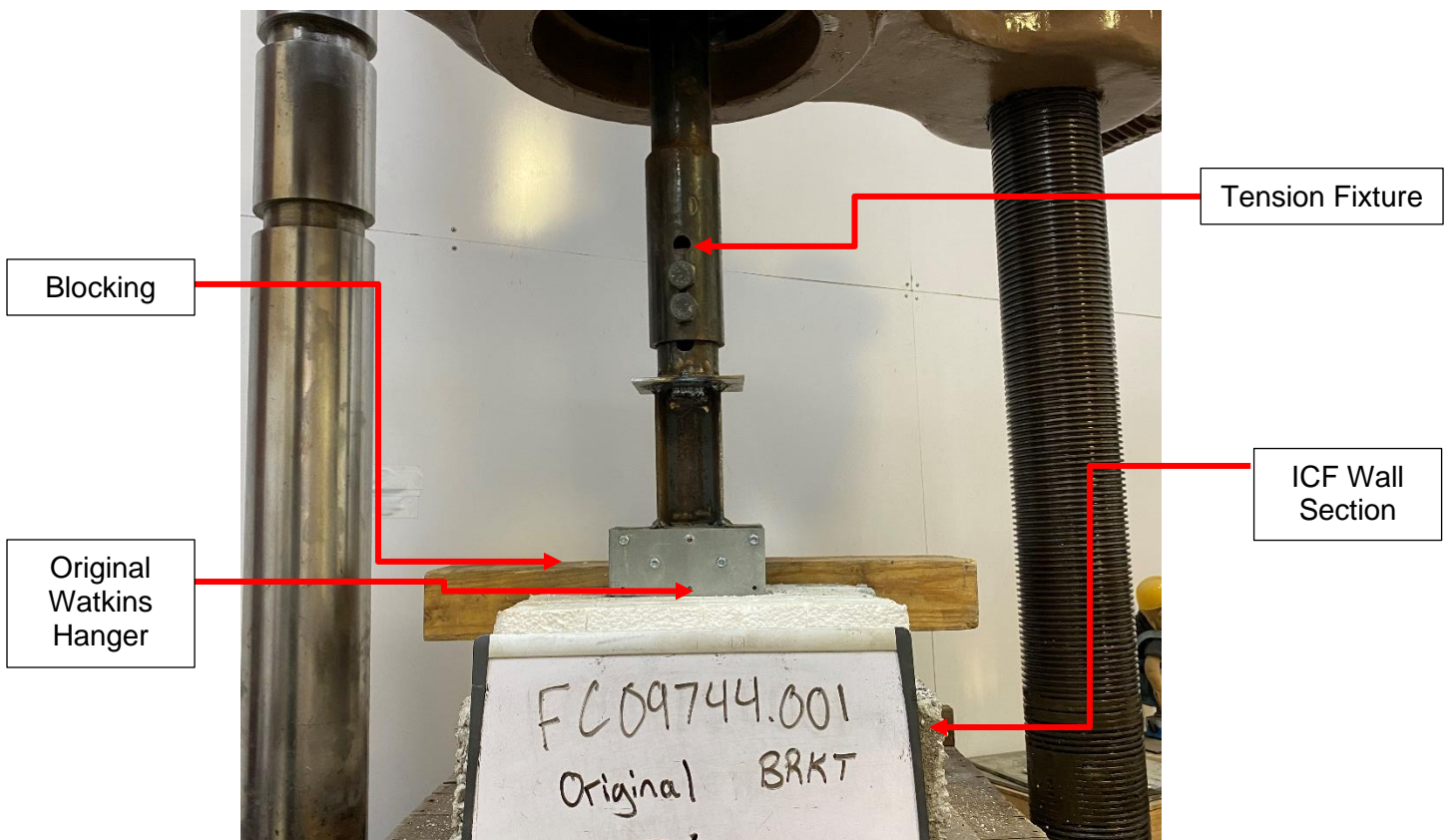


Figure 1. Pullout Resistance Test – Original Watkins Hanger

Testing Procedure Descriptions

The tests were conducted using a calibrated universal testing machine. Samples were tested per client's instructions and in general accordance with procedures outlined in ASTM D7147. A preload of 200 – 500 lbf was applied prior to testing. Testing was terminated when concrete failure, hanger/bracket pullout or failure occurred.

Pullout Resistance Test

For testing, a constant load was applied at a rate of 0.2 inches per minute. Fixtures were connected directly to the hanger/bracket. The Original Watkins Hanger were connected to the fixture with Teks #14 x 2-1/2" diameter self-drilling screws.

Deviations from Standard Procedure

The testing requirements and procedures presented in ASTM D7147 were followed where possible. Deviations from the ASTM procedure include:

- Pullout resistance tension testing is not represented in the ASTM. The load rate and general failure criteria of the samples was used to maintain consistent reporting for the hangers and brackets.
- Determination of yield and ultimate loads were modified as the very strict requirements of the ASTM standard apply to vertical deflections and do not apply properly direct pullout resistance. Determination of these points is described below.
- Readings were taken from the machine rather than directly from the sample due to spacing limitations for the Pullout Resistance Testing. Deflection data may be skewed due to the compression of the ICF form insulation material.

Determination of Test Results

Pullout Resistance Test (Table 1)

The capacity selection criteria in ASTM 7147 are intended for vertical load arrangements involving two (2) hangers/brackets and is not well suited for direct tension applications on individual hangers and brackets. Therefore, an allowable load for each sample is reported. The allowable load is based on general engineering practice. The allowable load is reported as the lowest value between the yield load and ultimate load. Determination of these loads are described below.

Yield Load, P_y : For this testing arrangement, the yield load shown is approximately when the load-deflection curve no longer linear, and the system had reached a state of plastic deformation, or the system began to fail. Several samples did not exhibit a well-defined yield curve; therefore, the allowable load was based on the maximum test load recorded.

Ultimate Load, P_u : In general, the ultimate load applied is the maximum recorded test load for test samples. The maximum recorded test load was achieved when failure within the system occurred.



Summary of Test Results

Table 1. Summary of Test Results – Original Watkins Hanger

Sample	Yield Load P_y (lbs) ¹	Ultimate Load P_u (lbs) ²	Allowable Load (lbs) ³	Deviation from Mean (%)	Average Allowable Load (lbs)	Failure Mode
T4	N.A.	14,158	7,079	+14.23%	6,197	Bracket Pullout
T5	N.A.	10,582	5,291	-14.62%		Concrete Failure
T6	10,836	12,444	6,222	+0.40%		Concrete and Bracket Failure

¹ Yield Load is approximately when the load-deflection curve is no longer linear.

² Ultimate Test Load is the maximum recorded test load

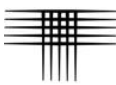
³ The Allowable Load is the lesser value of $0.6P_y$ or $0.5P_u$

SECTION 2:

PULLOUT RESISTANCE TEST DATA



ORIGINAL WATKINS HANGER

	ACCREDITED TESTING GROUP REPORT CTL Thompson, Inc. – Fort Collins		Issue Date: 10.27.2021	Rev: 0
	Title: PULLOUT RESISTANCE TEST		Report No. 1617C	Page #: 1 of 4

Client:	RP Watkins LLC
Job Number:	FC09744.001
Product:	Original Watkins Hanger

Reference Method

Tests were conducted according to client's instructions and in general accordance with ASTM D7147.

Deviations from Standard Procedure

Test samples were arranged and connected per client's instructions. Products were pulled in direct tension. Yield and ultimate loads were assessed based on general engineering practice.

Standard Procedure

The Original Watkins Hanger is a single piece of cold-formed steel that is used to connect wood members to the ICF wall section. Wood members are fastened to the bracket by nails or screws through the predrilled holes in the bracket. Product dimensions were verified to design drawings for all specimens. Both applied load and deflection were recorded. Load was applied at a uniform rate of 0.2 inches per minute. Testing was terminated concrete failure, bracket pullout or bracket failure occurred.

Summary of Results

Sample	Yield Load P_y (lbs) ¹	Ultimate Load P_u (lbs) ²	Allowable Load (lbs) ³	Deviation from Mean (%)	Average Allowable Load (lbs)	Failure Mode
T4	N.A.	14,158	7,079	+14.23%	6,197	Bracket Pullout
T5	N.A.	10,582	5,291	-14.62%		Concrete Failure
T6	10,836	12,444	6,222	+0.40%		Concrete and Bracket Failure

¹ Yield Load is approximately when the load-deflection curve is no longer linear.

² Ultimate Test Load is the maximum recorded test load

³ The Allowable Load is the lesser value of $0.6P_y$ or $0.5P_u$

ICF Hanger Pullout Tension Test



Client: RP Watkins, LLC
 Job Number : FC09744.001
 Date Tested : 10.15.2021
 Technician: Ryan Beck

Load Device: UTM 400K
 Load Frame ID: 2563114
 Calibration Date: 05.26.2021

Specimen Specification

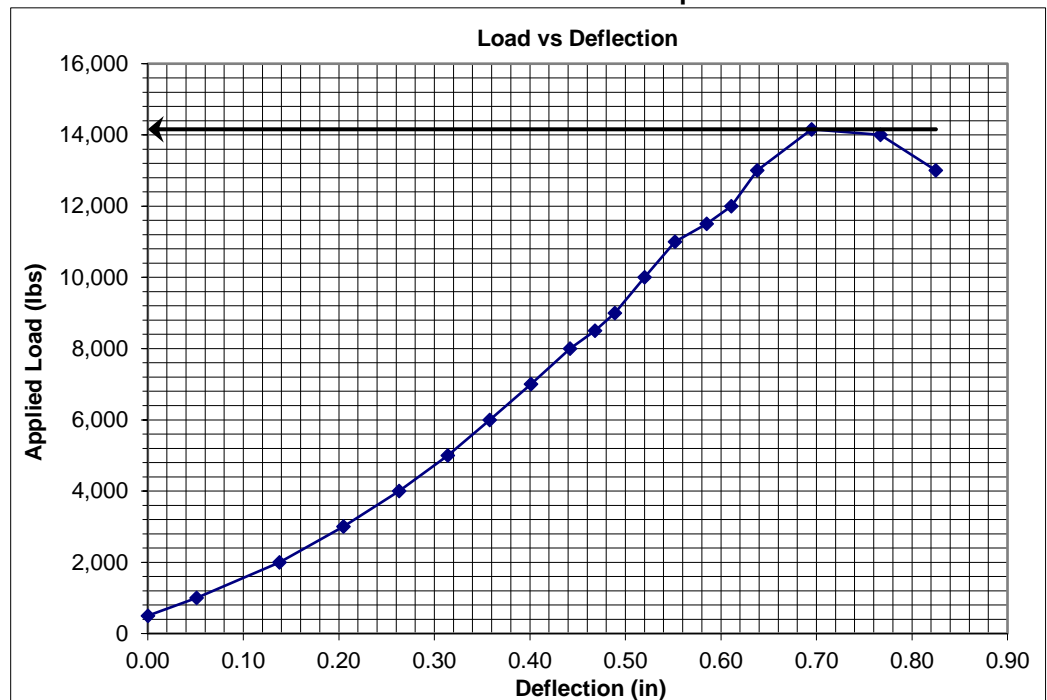
Specimen Number: T4
 Product Type: Original Watkins Hanger
 Applied Load Rate (in/min): 0.2



Measurements

Load (lbs)	Defl. (in)
500	0.000
1,000	0.051
2,000	0.138
3,000	0.205
4,000	0.263
5,000	0.314
6,000	0.358
7,000	0.401
8,000	0.442
8,500	0.468
9,000	0.489
10,000	0.520
11,000	0.552
11,500	0.585
12,000	0.611
13,000	0.638
14,158	0.695
14,000	0.767
13,000	0.825
0	0.000

Sample



Failure Mode: Bracket Pullout
 Yield Load, P_y (lbs)¹: N.A.
 Ultimate Load, P_u (lbs)²: 14,158
 Allowable Strength (lbs)³: 7,079

$0.6 \cdot P_y$ (lbs) : N.A.
 $0.5 \cdot P_{max}$ (lbs) : 7,079

Notes:

1. Yield Load is approximately when the load-deflection curve is no longer linear.
2. Maximum recorded test load.
3. The load-deflection curve did not exhibit a well defined yield point. Therefore, the allowable strength was determined base on the maximum test load.

ICF Hanger Pullout Tension Test



Client: RP Watkins, LLC
 Job Number : FC09744.001
 Date Tested : 10.15.2021
 Technician: Ryan Beck

Load Device: UTM 400K
 Load Frame ID: 2563114
 Calibration Date: 05.26.2021

Specimen Specification

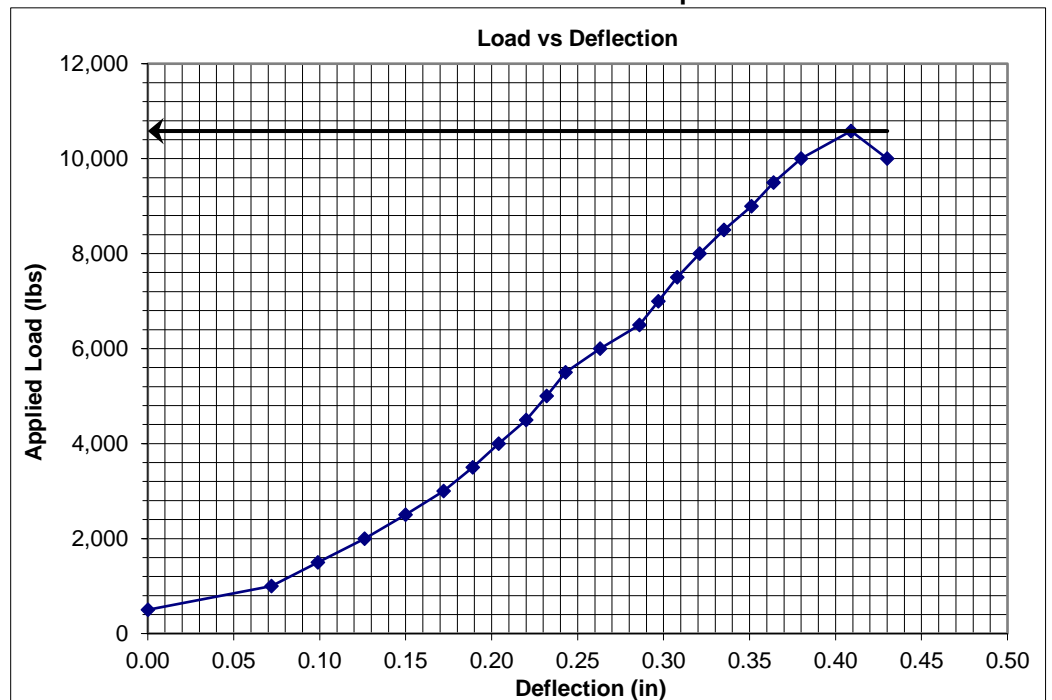
Specimen Number: T5
 Product Type: Original Watkins Hanger
 Applied Load Rate (in/min): 0.2



Measurements

Load (lbs)	Defl. (in)
500	0.000
1,000	0.072
1,500	0.099
2,000	0.126
2,500	0.150
3,000	0.172
3,500	0.189
4,000	0.204
4,500	0.220
5,000	0.232
5,500	0.243
6,000	0.263
6,500	0.286
7,000	0.297
7,500	0.308
8,000	0.321
8,500	0.335
9,000	0.351
9,500	0.364
10,000	0.380

Sample



Failure Mode: Concrete Failure
 Yield Load, P_y (lbs)¹: N.A.
 Ultimate Load, P_u (lbs)²: 10,582
 Allowable Strength (lbs)³: 5,291

$0.6 \cdot P_y$ (lbs) : N.A.
 $0.5 \cdot P_{max}$ (lbs) : 5,291

Notes:

1. Yield Load is approximately when the load-deflection curve is no longer linear.
2. Maximum recorded test load.
3. The load-deflection curve did not exhibit a well defined yield point. Therefore, the allowable strength was determined base on the maximum test load.

ICF Hanger Pullout Tension Test



Client: RP Watkins, LLC
 Job Number : FC09744.001
 Date Tested : 10.15.2021
 Technician: Ryan Beck

Load Device: UTM 400K
 Load Frame ID: 2563114
 Calibration Date: 05.26.2021

Specimen Specification

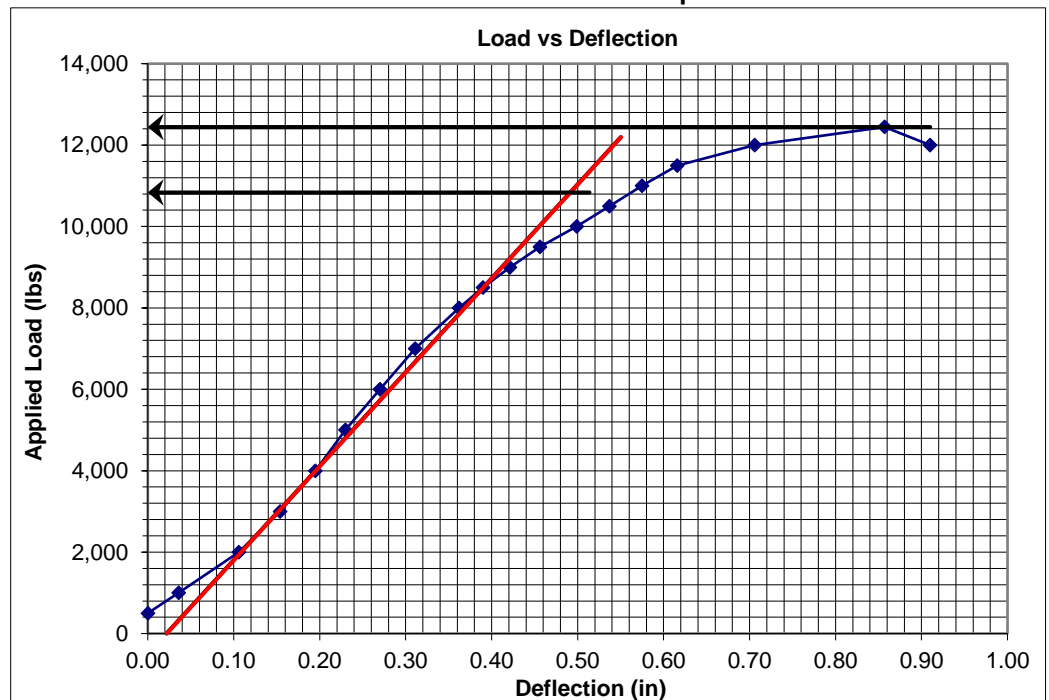
Specimen Number: T6
 Product Type: Original Watkins Hanger
 Applied Load Rate (in/min): 0.2



Sample

Measurements

Load (lbs)	Defl. (in)
500	0.000
1,000	0.036
2,000	0.106
3,000	0.154
4,000	0.195
5,000	0.230
6,000	0.270
7,000	0.311
8,000	0.362
8,500	0.390
9,000	0.421
9,500	0.456
10,000	0.499
10,500	0.537
11,000	0.575
11,500	0.616
12,000	0.706
12,444	0.857
12,000	0.910



Failure Mode: Concrete and Bracket Failure
 Yield Load, P_y (lbs)¹: 10,836
 Ultimate Load, P_u (lbs)²: 12,444
 Allowable Strength (lbs)³: 6,222

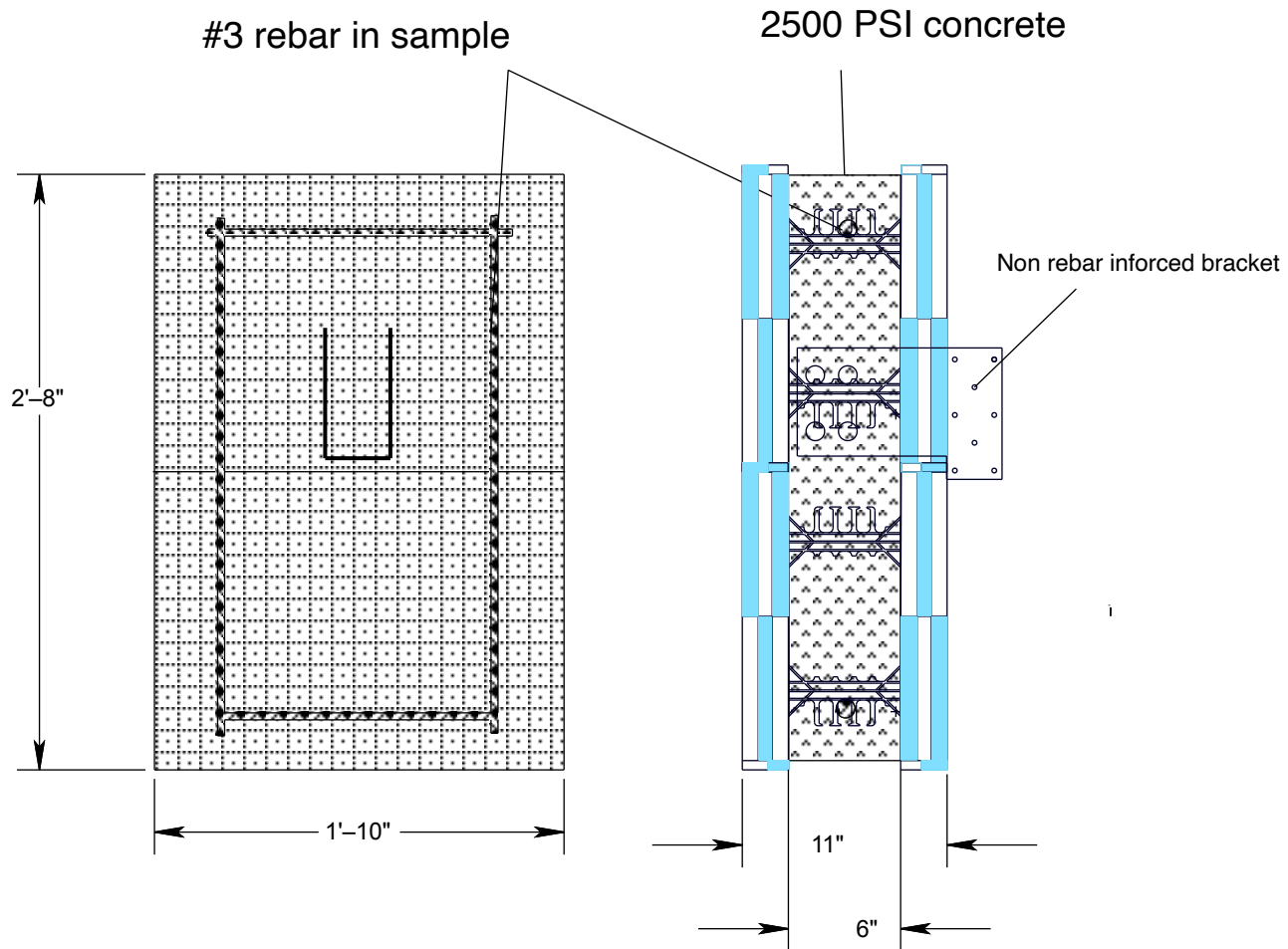
$0.6 \cdot P_y$ (lbs) : 6,501
 $0.5 \cdot P_{max}$ (lbs) : 6,222

Notes:

1. Yield Load is approximately when the load-deflection curve is no longer linear.
2. Maximum recorded test load.
3. Test results of $0.6P_y$ (6,501 pounds) is larger than $0.5P_{max}$ (6,222 pounds). The allowable strength is taken as the lower of the two values, or 6,222 pounds.

APPENDIX A:

SHOP DRAWINGS



General Notes

Original Watkins Hanger Pullout Test Sample Detail

No.	Revision/Issue	Date

Print Name and Address

RP Watkins LLC

405-664-0010

www.gpsmachbuildings.com

Project Name and Address

Project	Sheet
Date	
Scale	