Intertek

TEST REPORT

REPORT NUMBER: 101177096TOR-002
ORIGINAL ISSUE DATE: June 28, 2013

EVALUATION CENTER

Intertek Testing Services Ltd.
6225 Kenway Drive
Mississauga, Ontario L5T 2L3

RENDERED TO

1792418 Ontario Inc.
108 Allingham Gardens
Toronto, Ontario M4H 1Y2

PRODUCT EVALUATED
EZ SIPS Insulated 8'×8' Shear Wall

EVALUATION PROPERTY
Shear Resistance

Report of Testing on EZ SIPS Insulated 8'×8' Shear Wall in accordance with ASTM E564-06 "*Standard Practice for Static Load Test for Shear Resistance of Framed Walls for Buildings*"

1 Table of Contents

2 Introduction

Intertek has conducted testing for 1792418 Ontario Inc on three EZ-SIPS (EZ Structural Insulated Panels) Insulated 8'×8' Shear Walls. Testing was conducted in accordance with ASTM E564-06 "*Standard Practice for Static Load Test for Shear Resistance of Framed Walls for Buildings*". This evaluation began on May 9, 2013 and was completed on May 17, 2013.

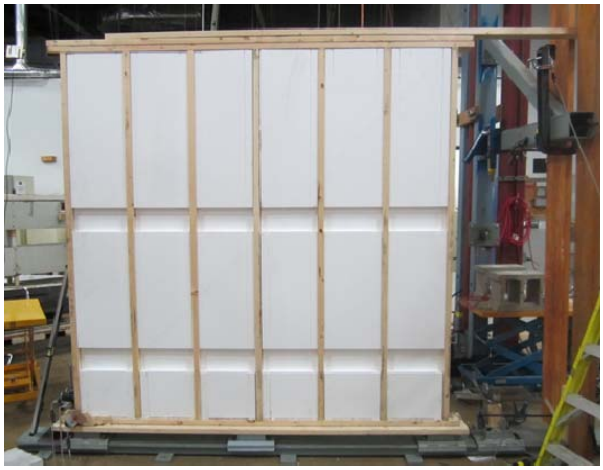
3 Test Samples

3.1. SPECIMEN SELECTION

The EPS specimens were submitted to Intertek directly from the client and were not independently selected for testing. Samples were received at the Evaluation Center on April 11, 2013 and May 9, 2013 in apparent good condition.

3.2. EZ SIPS DESCRIPTION

A symmetrical standard 96" × 96" structural wall was constructed using ten 2×6 SPF studs. Seven were vertical, spaced 16" apart on centre. The top plate was comprised of two 2×6 SPF studs fastened together and oriented perpendicular to the vertical studs. The sole plate was comprised of a single 2×6 SPF stud. Each vertical stud was fastened to the top plate and sole plate with three pneumatically-driven 3-1/4"×0.120" framing nails per end.



Two EPS foam panels each measuring 48" × 96" were fit into the wall frame. The EPS foam panels contained breakaway cuts to facilitate it's installation into a stud wall.

The shear wall was faced with the application of two 7/16" OSB 4'×8' boards fastened in a vertical orientation to the shear wall using pneumatically-driven 3-1/4"×0.120" framing nails spaced every 6" on the perimeter of the wall panel and every 12" on each of the infill vertical beams.

Drawings of the EPS panel and photographs of the completed wall section are appended to this report.

4 Testing and Evaluation Methods

4.1. Specimen Preparation

The shear wall assemblies were constructed at the Intertek laboratory in Mississauga, Ontario by a representative of 1792418 Ontario Inc.

The wall assembly was affixed to the SPF sill plate with hand-driven 3-1/4"×0.120" framing nails driven into the sole plate in locations where the EPS is broken away and at the centre of the stud cavity. Essentially there were three fasteners per 16" frame cavity.

Guides were also installed to the test apparatus so as to minimize any twisting of the test assembly, so that the shear component of the wall was analyzed.

Please see photographs in Appendix B for reference.

4.2. Conditioning

There was no specific conditioning required prior to testing. Testing was performed in ambient lab conditions.

4.3. Reference Standard

ASTM E564-06 "*Standard Practice for Static Load Test for Shear Resistance of Framed Walls for Buildings*"

4.4. Test Procedures

A total of three wall assemblies were constructed and tested. However as per ASTM E5644-06, Section 7.1, results of the two weaker of the three wall systems is reported.

Using a hydraulic ram affixed to the loading cell, a horizontal load was applied to the top of the wall in the central plane of the frame. Initially, a 120 lbf preload held for 5 minutes, then released and a zero reading was taken after 5 minutes of rest.

The wall was then loaded to 400 lbf and held for one minute, a deflection load was taken at 400lbf and a residual deflection 5 minutes after loading. The wall assembly was then loaded to 800lbf and held for 1 minute as a deflection was recorded. The load was released and a residual deflection was taken after 5 minutes. Deflections were also recorded at incremental loads of 100 lbf. The load was applied until product failure, where the ultimate load was determined.

4.4.1. Statement of Measurement Uncertainty

When determining the test result, measurement uncertainty has been considered.

5 Testing and Evaluation Results

5.1. RESULTS AND OBSERVATIONS

Table 1: Wall 2

LOAD (N)	Shear Deformation (Δ) (mm)	Internal Shear Stiffness (N/mm)	Global Shear Stiffness @ 0.33 × P_u (N/mm)	Ultimate Shear Strength N/m
1779	3.72	478	262	2554
3559	8.98	396		
5338	15.07	354		
6227 (ultimate)	25.11	248		

Failure Mode: Vertical studs pulled out from the sole plate

Table 2: Wall 3

LOAD (N)	Horizontal Displacement (mm)	Internal Shear Stiffness (N/mm)	Global Shear Stiffness @ 0.33 × P_u (N/mm)	Ultimate Shear Strength N/m
1779	5.19	343	182	2189
3559	12.96	275		
5338 (ultimate)	27.37	195		

Failure Mode: Vertical studs pulled out from the sole plate

Table 3: Average of Wall 2 and 3

Global Shear Stiffness @ 0.33 × P_u (N/mm)	Ultimate Shear Strength (N/m)
222	2372

6 Test Equipment

Calibration records and test results are kept on file for future reference. The calibration matrix of all equipment meets the requirements of ISO 17025.

Equipment Type	Equipment Number	Calibration Due Date
String Potentiometer 1	280-01-0956A	July 24, 2013
String Potentiometer 2	280-01-0956B	July 24, 2013
String Potentiometer 3	280-01-0956C	July 24, 2013
String Potentiometer 4	280-01-0956D	July 24, 2013
String Potentiometer 5	280-01-0956E	July 24, 2013
String Potentiometer 6	280-01-0956F	July 24, 2013
Admet digital readout	280-01-0696	Dec 19, 2013
10k Load Cell	280-01-0716	Dec 19, 2013

7 Conclusion

The EZ SIPS Insulated 8'×8' shear walls evaluated in this report have been tested in accordance with ASTM E564-06 "*Standard Practice for Static Load Test for Shear Resistance of Framed Walls for Buildings*". The test samples achieved an average Ultimate Shear Strength of 2372 N/m (13.5 lbf/in.)

The conclusions of this test report may not be used as part of the requirements for Intertek product certification. Authority to Mark must be issued for a product to become certified.

INTERTEK TESTING SERVICES NA LTD.

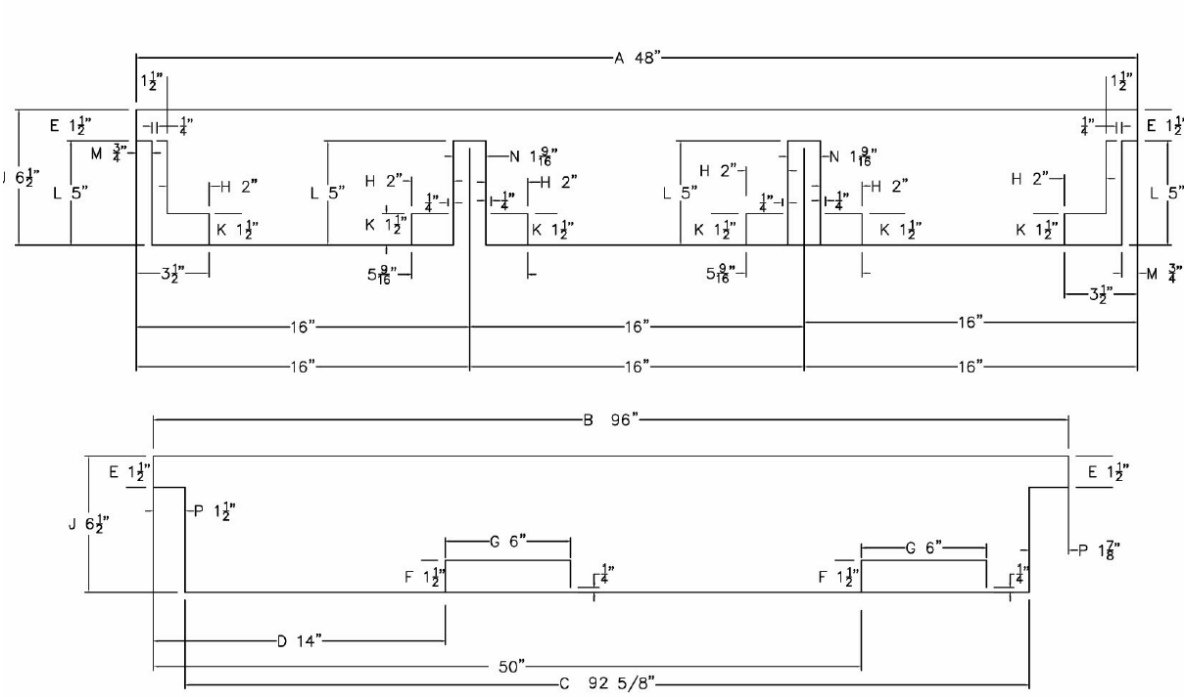
Reported by: Signature on file

Gabriel Fernandes
Technician, Building Products

Reviewed by:

Claudio Sacilotto
Senior Project Engineer, Building Products

8 Appendix A: Product Drawings



8' PANEL

9 Appendix B: Pictures

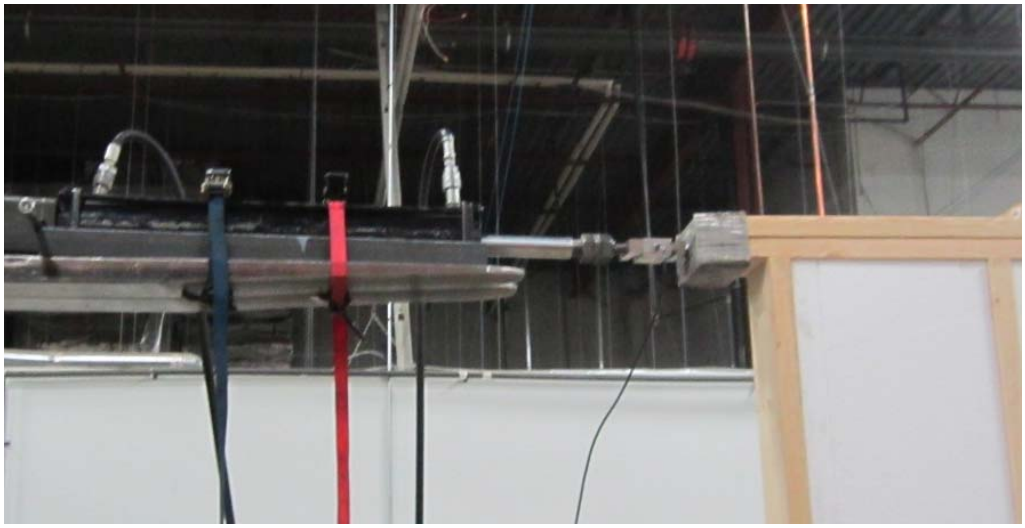


Photo 1. Hydraulic ram and load cell applying horizontal load to test assembly

Photo 2. Guides installed to prevent twisting of test wall assembly during testing

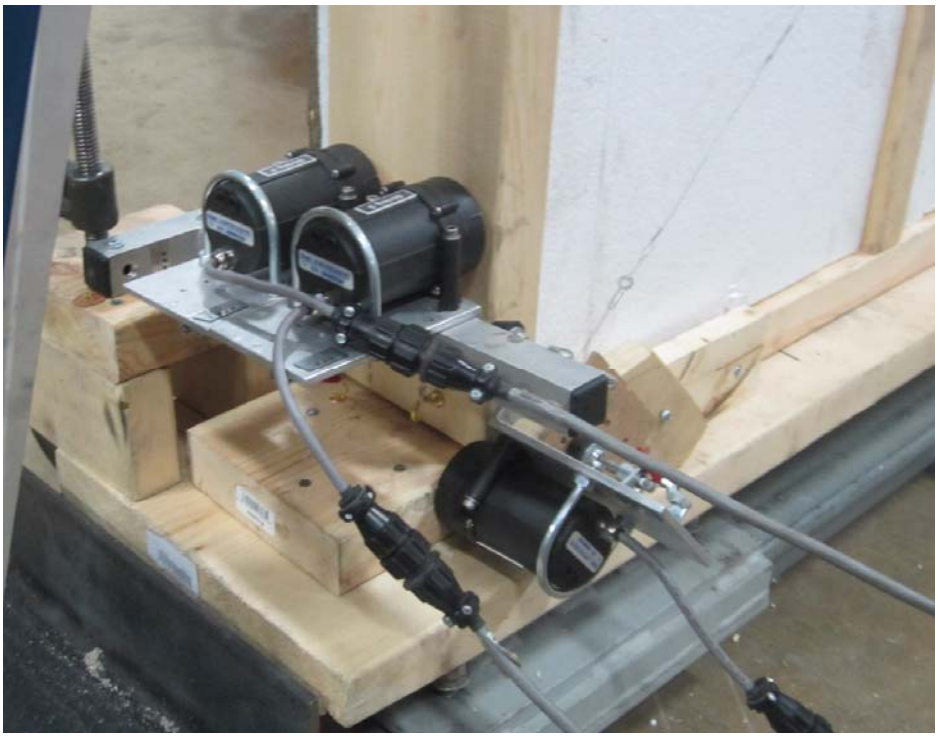


Photo 3. String Potentiometers for measuring deflections installed at bottom corner of test assembly

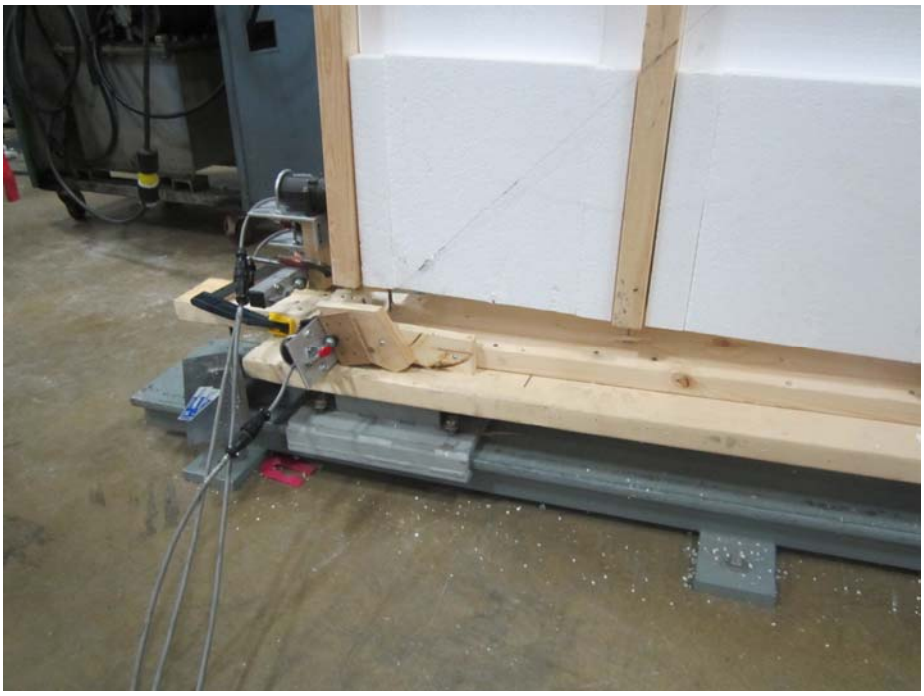


Photo 4. Ultimate failure of shear wall at the end of the test. Vertical stud uplifted from the sole plate.

10 Appendix C: Data Sheets

Intertek

Test: **Static Loading for Shear Resistance of Framed Walls for Buildings**
Date: 2013-05-31
Project No: G101177096
Client: 1792418 Ontario Inc.
Sample/Specimen: 8'x8' Insulated Shear Wall # 2
Standards: ASTM E564-06
Procedure: Clause 7
Conditioning: None
Equipment:

Item	ID	Cal Due Date
String Potentiometer 1	280-01-0956	24-Jul-13
String Potentiometer 2	280-01-0956	24-Jul-13
String Potentiometer 3	280-01-0956	24-Jul-13
String Potentiometer 4	280-01-0956	24-Jul-13
String Potentiometer 5	280-01-0956	24-Jul-13
String Potentiometer 6	280-01-0956	24-Jul-13
Admet digital readout	280-01-0696	19-Dec-13
10k Load Cell	280-01-0716	19-Dec-13

Name Initial
Eng/Tech: Gabriel F.
Reviewer: C. Sacilotto

Wall 2

Load	Newtons	Base Slip (Displacement 1) (mm) (measured)	Vertical Displacement (Displacement 4) (mm) (measured)	Top Plate Horiz. Displacement (Displacement 3) (mm) (measured)	Base Uplift (Displacement 2) (mm) (measured)	Stud Uplift (mm) (measured)	Diagonal Elongation δ (mm) (measured)	a (mm)	b (mm)	c (mm)	S_u (Equation 5) (N/m)	(lbf/in.)	Internal Shear Deformation Δint (Equation 4) (mm) (calculated)	Internal Shear Displacement Δint Equation 3 (mm) (calculated)	Global Shear Stiffness G' (Equation 1) (N/mm) (calculated)	(lb/in.) (calculated)	Internal Shear Stiffness G_{int} (Equation 2) (N/mm) (calculated)	(lb/in.) (calculated)
100	445	0	0.04	-1.37	-0.14	-0.33	0.63	2438	2438	3448			0.89	1.08	325	1854	412	2352
200	890	-0.01	0.06	-2.68	-0.38	-0.93	1.38	2438	2438	3448			1.95	1.80	332	1896	494	2822
300	1334	-0.03	0.11	-6.59	-1.08	-3.11	3.8	2438	2438	3448			5.38	3.56	202	1156	375	2140
400	1779	-0.03	0.11	-6.79	-1.1	-3.15	3.9	2438	2438	3448			5.52	3.72	262	1496	478	2731
400 residual		0	0.01	-0.47	-0.23	-0.54	0.11	2438	2438	3448			0.16	-0.06	0	0	0	0
500	2224	-0.06	0.14	-9.36	-1.51	-5.06	5.47	2438	2438	3448			7.74	4.38	238	1357	508	2900
600	2669	-0.07	0.17	-12.51	-1.95	-6.71	7.51	2438	2438	3448			10.63	5.90	213	1218	452	2583
700	3114	-0.09	0.19	-15.17	-2.26	-8.05	9.25	2438	2438	3448			13.10	7.22	205	1172	431	2463
800	3559	-0.1	0.21	-18.33	-2.58	-9.46	11.33	2438	2438	3448			16.05	8.98	194	1109	396	2263
800 residual		0	0.04	-2.88	-0.84	-2.78	1.64	2438	2438	3448			2.32	0.14	0	0	0	0
900	4003	-0.13	0.24	-22.79	-3.27	-12.51	14.19	2438	2438	3448			20.11	10.39	176	1003	385	2200
1000	4448	-0.14	0.26	-25.7	-3.76	-13.92	16.04	2438	2438	3448			22.74	11.90	173	988	374	2134
1100	4893	-0.16	0.27	-28.45	-4.29	-15.26	17.84	2438	2438	3448			25.30	13.30	172	982	368	2101
1200	5338	-0.18	0.3	-31.86	-4.97	-16.91	20.04	2438	2438	3448			28.42	15.07	168	957	354	2023
1300	5783	-0.2	0.33	-36.35	-5.75	-19.2	22.96	2438	2438	3448			32.58	17.28	159	908	335	1911
1400	6227	-0.23	0.41	-51.77	-10.21	-26.84	34.02	2438	2438	3448	2554	14.6	48.35	25.11	120	687	248	1416
1420	6316																	

Ultimate at 1420 lbf

Highlighted row indicates the 0.33 × P_u reference load value

Intertek

Test:	**Static Loading for Shear Resistance of Framed Walls for Buildings**		Name Initial
Date:	2013-05-31	Eng/Tech:	Gabriel F.
Project No:	G101177096		
Client:	1792418 Ontario Inc.		
Sample/Specimen:	8'x8' Insulated Shear Wall #3	Reviewer:	C. Sacilotto
Standards:	ASTM E564-06		
Procedure:	Clause 7		
Conditioning:	None		

Equipment:

Item		*ID*	*Cal Due Date*
String Potentiometer 1		280-01-0956	24-Jul-13
String Potentiometer 2		280-01-0956	24-Jul-13
String Potentiometer 3		280-01-0956	24-Jul-13
String Potentiometer 4		280-01-0956	24-Jul-13
String Potentiometer 5		280-01-0956	24-Jul-13
String Potentiometer 6		280-01-0956	24-Jul-13
Admet digital readout		280-01-0696	19-Dec-13
10k Load Cell		280-01-0716	19-Dec-13

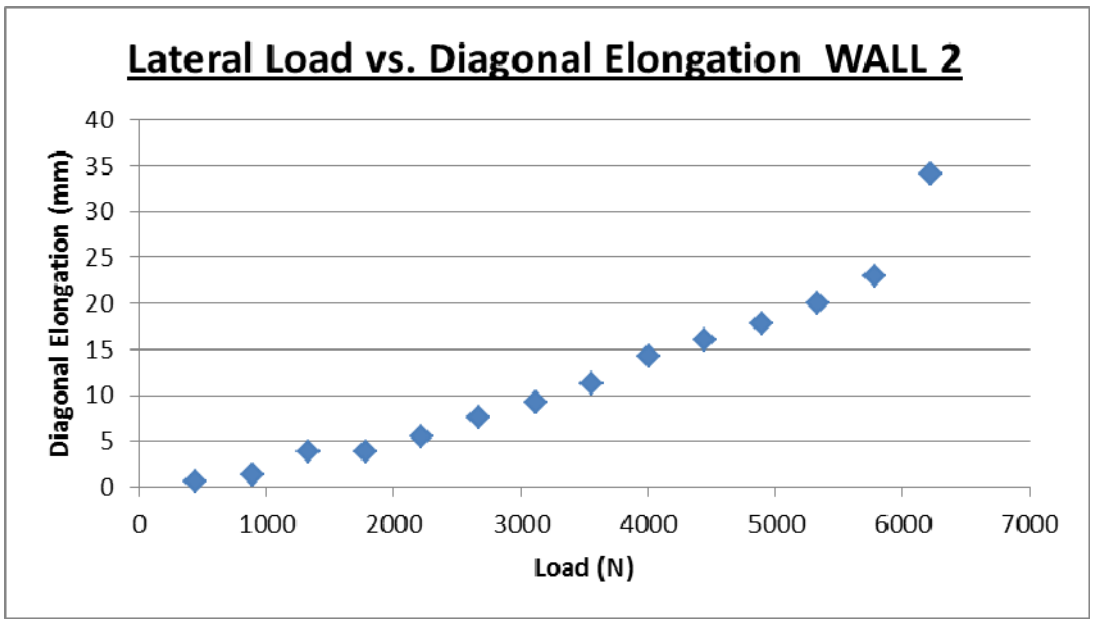
Wall 3

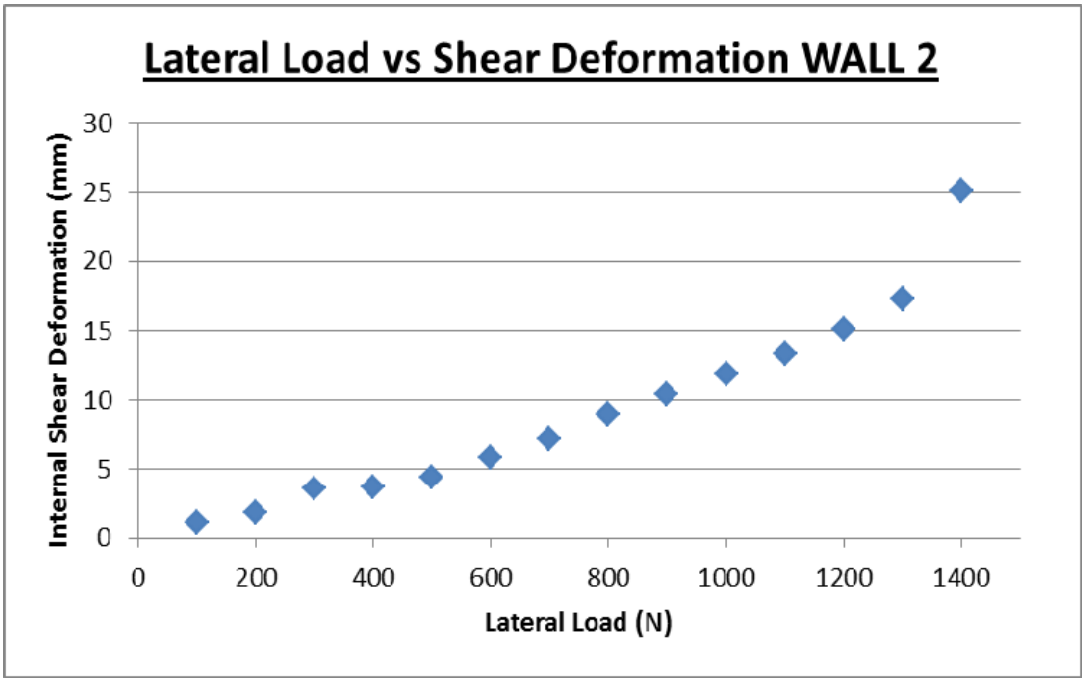
Load		Newtons	Base Slip (Displacement 1) (mm) (measured)	Vertical Displacement (Displacement 4) (mm) (measured)	Top Plate Horiz. Displacement (Displacement 3) (mm) (measured)	Base Uplift (Displacement 2) (mm) (measured)	Stud Uplift (mm) (measured)	Diagonal Elongation δ (mm) (measured)	a (mm)	b (mm)	c (mm)	S_u (Equation 5) (N/m)	(lbf/in.)	Internal Shear Deformation Δint (Equation 4) (mm) (calculated)	Internal Shear Displacement Δint Equation 3 (mm) (calculated)	Global Shear Stiffness G' (Equation 1) (N/mm) (calculated)	(lb/in.) (calculated)	Internal Shear Stiffness G_{int} (Equation 2) (N/mm) (calculated)	(lb/in.) (calculated)
100	100	445	-0.01	0.04	-1.08	0	-0.57	0.46	2438	2438	3448			0.65	0.54	412	2352	824	4704
200	200	890	-0.03	0.07	-2.54	0.01	-1.31	1.17	2438	2438	3448			1.65	1.27	350	2000	701	4000
300	300	1334	-0.06	0.13	-5.45	0.03	-2.52	2.69	2438	2438	3448			3.81	3.00	245	1398	445	2540
400	400	1779	-0.09	0.17	-9.78	0.03	-4.67	5.41	2438	2438	3448			7.66	5.19	182	1039	343	1958
400 residual			-0.03	0.06	-4.34	-0.03	-1.79	3.53	2438	2438	3448			4.99	2.58	0	0	0	0
500	500	2224	-0.13	0.2	-14.18	-0.1	-7.54	8.8	2438	2438	3448			12.46	6.71	157	896	331	1893
600	600	2669	-0.17	0.23	-18.63	-0.2	-10.3	11.44	2438	2438	3448			16.21	8.39	143	818	318	1816
700	700	3114	-0.23	0.24	-22.56	-0.33	-12.54	14.19	2438	2438	3448			20.11	10.03	138	788	310	1773
800	800	3559	-0.28	0.29	-29.89	-0.6	-16.94	19.35	2438	2438	3448			27.44	12.96	119	680	275	1568
800 residual			-0.06	0.1	-10.48	-0.38	-5.61	7.69	2438	2438	3448			10.89	4.91	0	0	0	0
900	900	4003	-0.33	0.3	-35.98	-0.84	-21.94	23.31	2438	2438	3448			33.08	14.01	111	635	286	1632
1000	1000	4448	-0.37	0.33	-42.17	-0.97	-25.77	27.68	2438	2438	3448			39.30	16.36	105	602	272	1553
1100	1100	4893	-0.44	0.38	-57.37	-1.18	-36.61	38.73	2438	2438	3448			55.08	20.70	85	487	236	1350
1200	1200	5338	-0.53	0.43	-86.25	-2.56	-58.78	59.39	2438	2438	3448	2189	12.5	84.72	27.37	2	13.5	195	1114
1220		5427																	

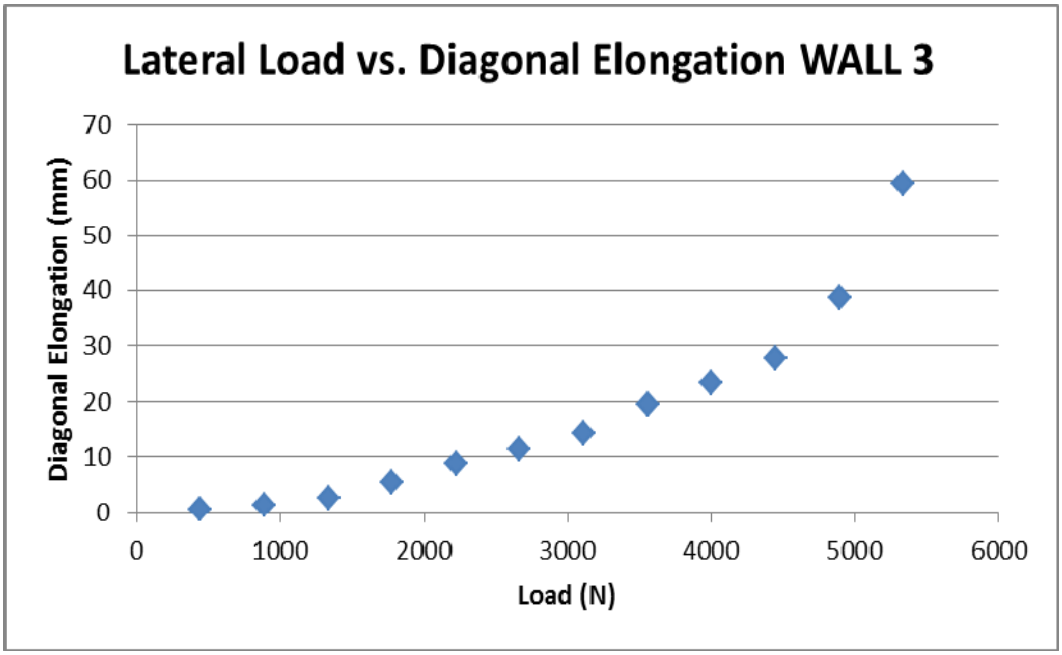
Ultimate at 1220 lbf

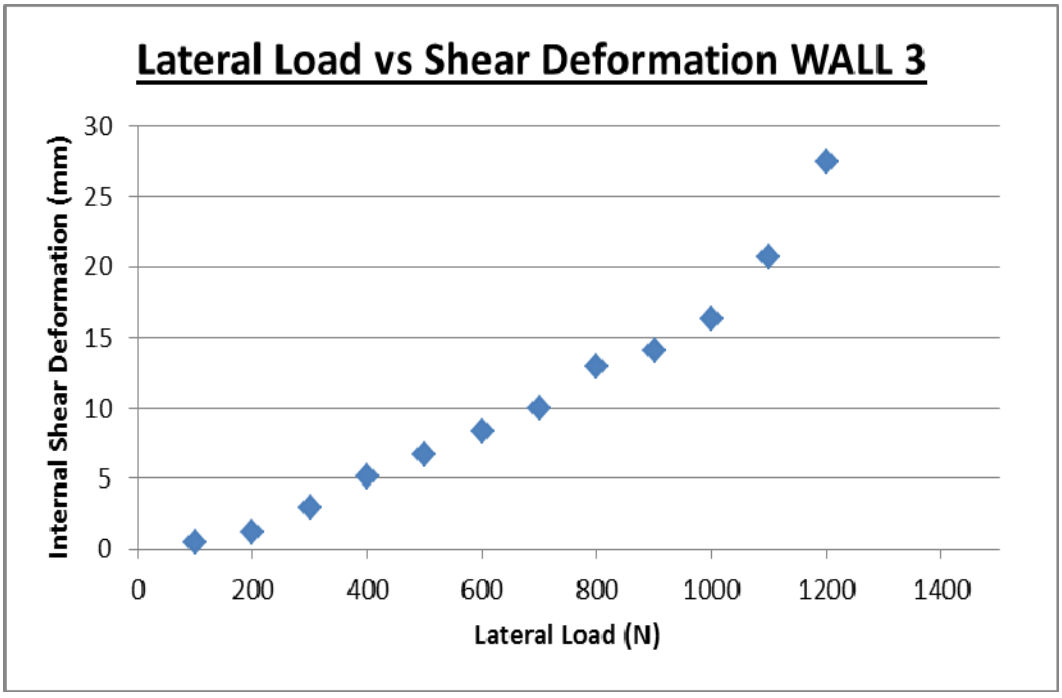
Highlighted row indicates the 0.33 × P_u reference load value

11 Appendix D: Load Deflection Curves






Lateral Load vs. Diagonal Elongation WALL 3
Diagonal Elongation (mm)
70
60
50
40
30
20
10
0
0
1000
2000
3000
4000
5000
6000
Load (N)


Lateral Load vs Shear Deformation WALL 3
Internal Shear Deformation (mm)
30
25
20
15
10
5
0
0
200
400
600
800
1000
1200
1400
Lateral Load (N)

12 Revision Page

Revision No.	Date	Changes	Author	Reviewer
0	May 31, 2013	First issue	Gabriel Fernandes	Claudio Sacilotto

END OF DOCUMENT