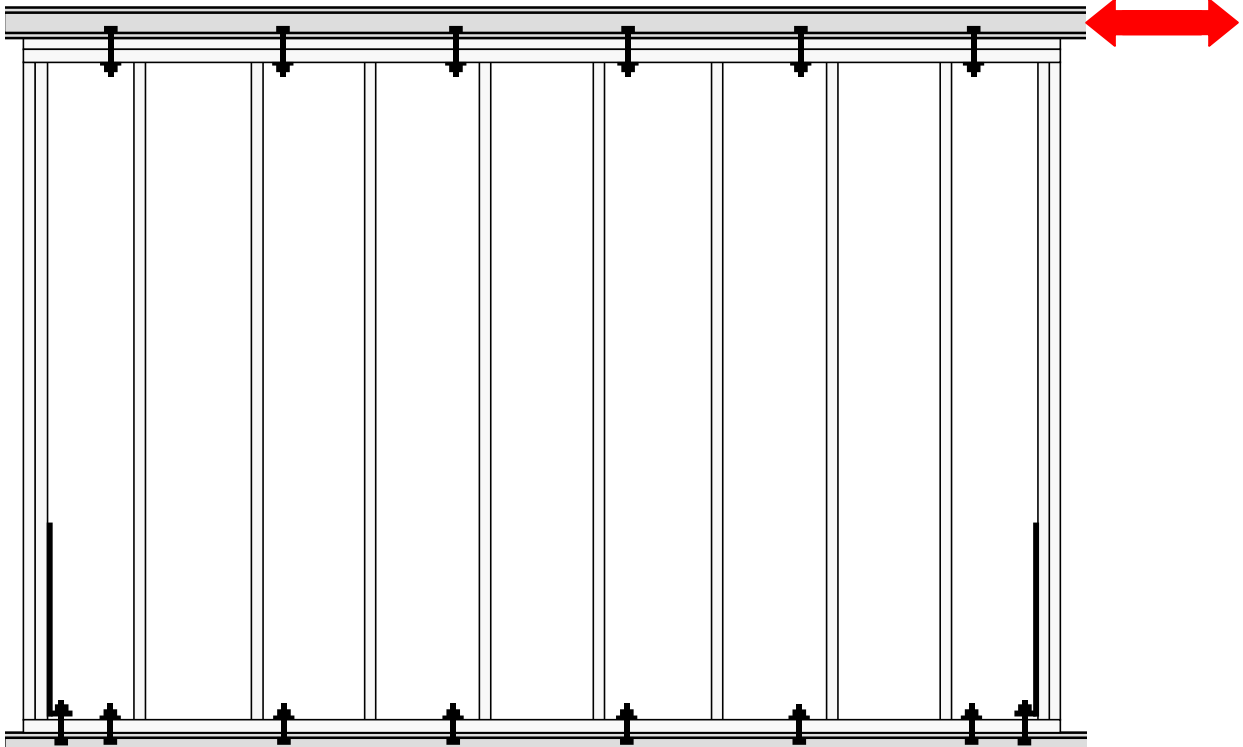


## Walls 12FAc



Walls:	12FAc1	12FAc2
<b>Manufactured:</b>	June 14, 1998 <sup>1</sup>	June 17, 1998 <sup>1</sup>
MOE data files:	12fac1p.prn 12fac1s.prn	12fam2p.prn 12fam2s.prn
MOE <sub>plates</sub> (10 <sup>6</sup> psi)	1.84	2.02
MOE <sub>studs</sub> (10 <sup>6</sup> psi)	1.28	1.66
Density <sub>plates</sub> (kg/m <sup>3</sup> )	505	578
Density <sub>studs</sub> (kg/m <sup>3</sup> )	456	490
<b>Date tested:</b>	August 4, 1998	August 4, 1998
Time tested:	14:44	10:53
LTC files:	30alex12	30alex12
Data files:	12FAc1.dat	12FAc2.dat
Excel files:	12FAc1_data 12FAc1_UTP	12FAc2_data 12FAc2_UTP
Photo files:	763-773	749-762

<sup>1</sup> Sheathing attached with ½ to ¾-in. edge distance along the top plate.

**Wall 12FAc1**

*Observations:* The initial elastic stiffness was significantly higher than the stabilized (approx. 30%), and the latter was just slightly lower than the elastic stiffness in the corresponding monotonic tests. The peak load (6977 lbf) was approximately 5% lower than that of 12FAM2 wall (7353 lbf.) and approximately 15% lower than 12FAM1 wall (8143 lbf.). The peak was reached early (between 1.5 and 1.8-in. amplitudes) and was maintained through the 2.1-in. amplitude excitation. Quick degradation and failure occurred during the 2.7-in. phase. Apart from the elastic stiffness, the initial envelope response was similar to the response of 12FAM2 wall, but it was significantly lower than the response of 12FAM1 wall.

*Failure mode:* Right stud separated from the top plate. Sheathing unzipped at the top plate when most of nails withdrew from wood and tore through the edge. First panel also unzipped at the intermediate stud, nails withdrew and tore through. At the bottom plate: nail fatigue but did not separate completely. Second panel unzipped at the second intermediate stud; all nails in fatigue. Left end stud: nails fatigue near corners. Right end stud: some nails fatigue near corners.

**Wall 12FAc2**

*Observations:* This wall performed very similar to 12FAc1 wall. The average peak load (7528 lbf.) was 8% higher than that of 12FAc1 wall.

*Failure mode:* Right stud separated from the top plate. Sheathing unzipped at the top plate when most of nails withdrew from wood and tore through the edge. First panel also unzipped at the intermediate stud, nails withdrew and tore through. At the bottom plate: nail fatigue but did not separate completely. Second panel unzipped at the second intermediate stud; all nails in fatigue. Left end stud: nails fatigue near corners. Right end stud: some nails fatigue near corners.

**General**

From comparison with the results of the corresponding monotonic tests, it can be concluded that the cyclic loading caused withdrawal and fatigue of the sheathing nails and lead to significant ductility reduction. Among possible reasons for better response of 12FAc2 wall relative to 12FAc1 wall was the higher wood density of studs.

Table 12FAc1. Data summary.

Specimen		12FAc1	Per unit length	
Tie-Down Anchors			cyclic test	
Wall length			12.00ft.	3.657m
Date:	8-04-1998	Time:	14:44	
EEEP Parameters		units	initial	stabilized
Peak unit load, $v_{peak}$		Kip/ft.	0.570	0.496
		KN/m	8.321	7.238
Drift at peak load, $\Delta_{peak}$		in.	1.648	1.661
		mm	41.86	42.19
Yield unit load, $v_{yield}$		Kip/ft.	0.518	0.457
		KN/m	7.561	6.664
Drift at yield load, $\Delta_{yield}$		in.	0.369	0.442
		mm	9.38	11.24
Proportional limit, $0.4v_{peak}$		Kip/ft.	0.228	0.198
		KN/m	3.328	2.895
Drift at prop. limit, $\Delta@0.4v_{peak}$		in.	0.163	0.192
		mm	4.13	4.88
Unit load at failure or $0.8v_{peak}$		Kip/ft.	0.456	0.397
		KN/m	6.657	5.790
Drift at failure, $\Delta_{failure}$		in.	2.821	2.662
		mm	71.66	67.63
Shear modulus, G $@0.4v_{peak}$		Kip/in.	11.245	8.259
		KN/mm	1.969	1.446
Work until failure per unit length		Kip-ft./ft.	1.495	1.409
		KN-m/m	6.648	6.267
Unit load, $v_{1/300}$ $@ 0.32$ in. (8.13 mm)		Kips/ft.	0.335	0.318
		KN/m	4.889	4.634
Unit load, $v_{1/200}$ $@ 0.48$ in. (12.19 mm)		Kips/ft.	0.399	0.370
		KN/m	5.816	5.406
Unit load, $v_{1/100}$ $@ 0.96$ in. (24.38 mm)		Kips/ft.	0.522	0.467
		KN/m	7.612	6.817
Unit load, $v_{1/60}$ $@ 1.6$ in. (40.64 mm)		Kips/ft.	0.568	0.495
		KN/m	8.288	7.218
EVDR $@v_{peak}$			0.142	0.129

SEAOSC parameters		units	negative	positive	average
Yield Limit State	$v_{YLS}$	Kips/ft.	-0.331	0.280	0.305
		KN/m	-4.827	4.089	4.458
	$\Delta_{YLS}$	in.	-0.302	0.223	0.262
		mm	-7.67	5.66	6.66
Strength Limit State	$G'_{YLS}$	Kip/in.	8.767	10.064	9.318
		KN/mm	1.535	1.762	1.632
	$v_{SLS}$	Kips/ft.	-0.581	0.559	0.570
		KN/m	-8.485	8.152	8.318
Strength Limit State	$\Delta_{SLS}$	in.	-1.814	2.109	1.961
		mm	-46.06	53.58	49.82
	$G'_{SLS}$	Kip/in.	2.565	2.118	2.325
		KN/mm	0.449	0.371	0.407

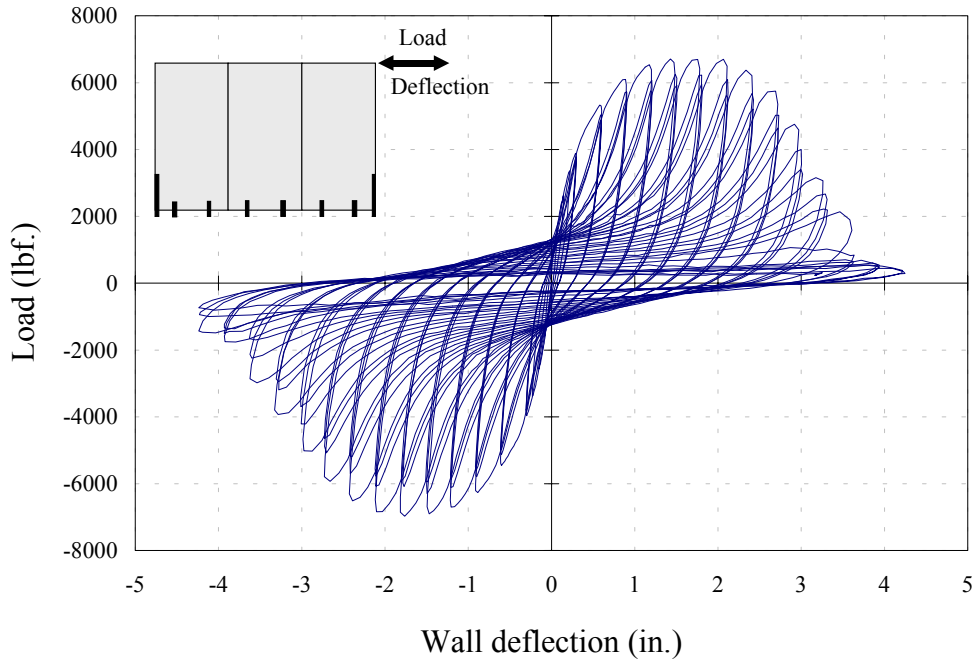


Figure 12FAc1- a. Observed load-deflection curve<sup>1</sup>.

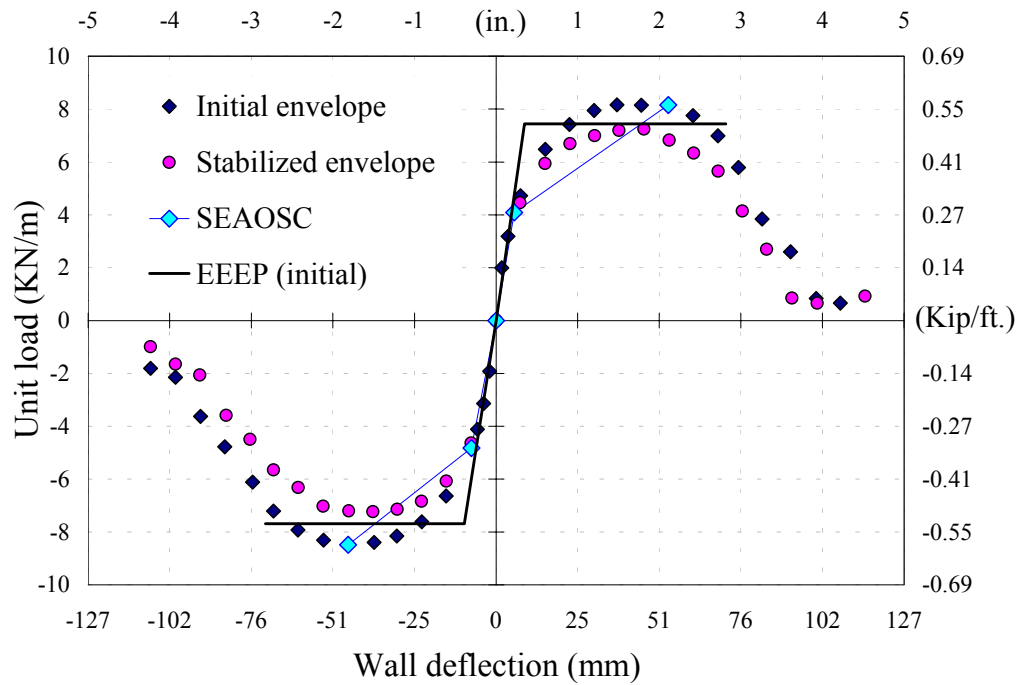


Figure 12FAc1- b. Envelopes, SEAOSC, and EEEP curves<sup>2</sup>.

<sup>1</sup> The scale of the graph varies between test series.

<sup>2</sup> The scale of the graph is uniform between test series for comparison purposes.

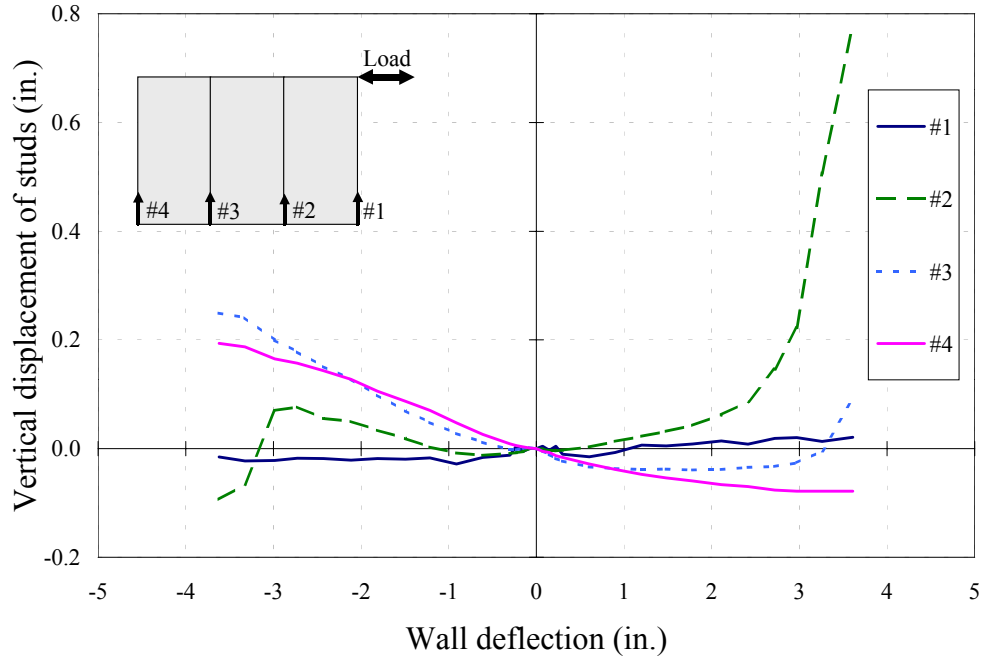


Figure 12FAc1- c. Vertical displacement of studs (initial envelope).

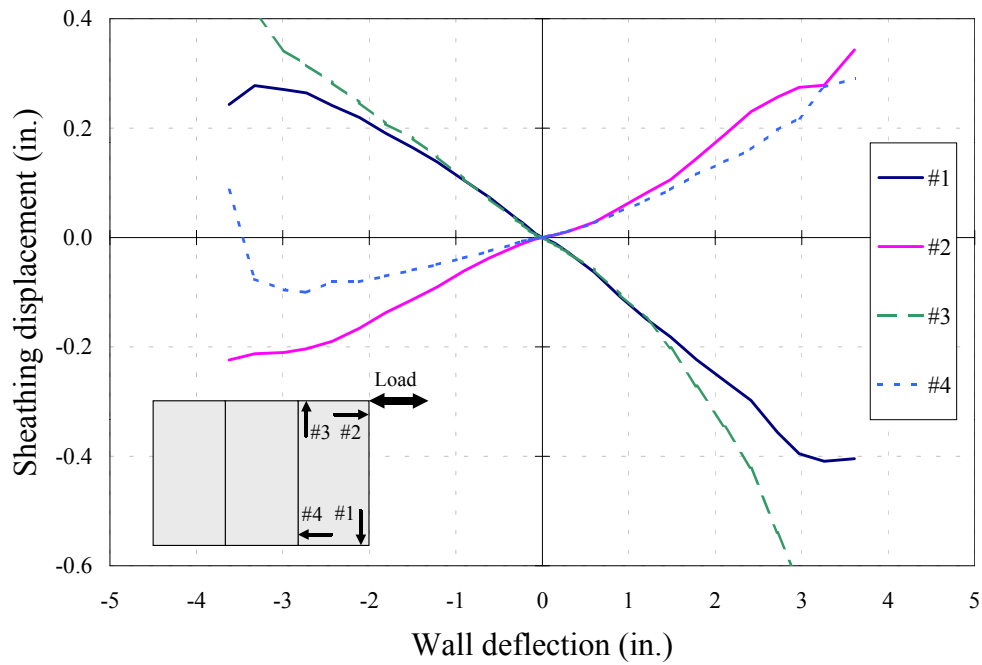


Figure 12FAc1- d. Sheathing displacement (initial envelope).

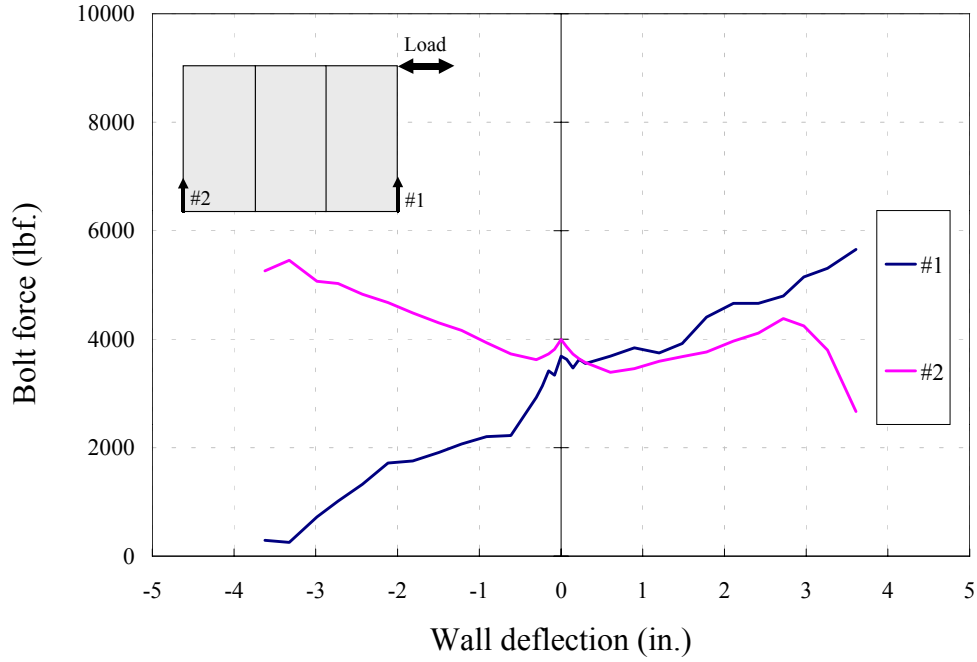


Figure 12FAc1- e. Forces in anchor bolts (initial envelope).

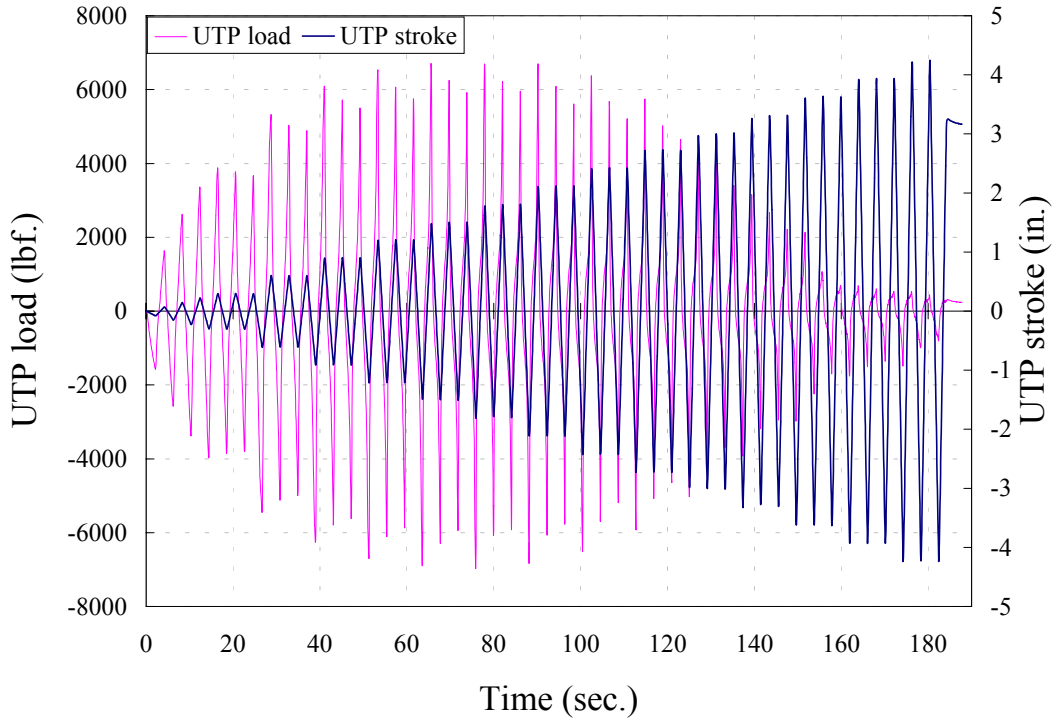


Figure 12FAc1- f. Load- and displacement-time record.

Table 12FAc2. Data summary.

Specimen		12FAc2	Per unit length	
Tie-Down Anchors		cyclic test		
Wall length		12.00ft.	3.657m	
Date:	8-04-1998	Time:	10:53	
EEEP Parameters		units	initial	stabilized
Peak unit load, $v_{peak}$	Kip/ft.	0.627	0.543	
	KN/m	9.154	7.930	
Drift at peak load, $\Delta_{peak}$	in.	1.797	1.805	
	mm	45.65	45.84	
Yield unit load, $v_{yield}$	Kip/ft.	0.567	0.499	
	KN/m	8.270	7.277	
Drift at yield load, $\Delta_{yield}$	in.	0.385	0.465	
	mm	9.79	11.81	
Proportional limit, $0.4v_{peak}$	Kip/ft.	0.251	0.217	
	KN/m	3.662	3.172	
Drift at prop. limit, $\Delta@0.4v_{peak}$	in.	0.171	0.203	
	mm	4.33	5.15	
Unit load at failure or $0.8v_{peak}$	Kip/ft.	0.502	0.435	
	KN/m	7.323	6.344	
Drift at failure, $\Delta_{failure}$	in.	2.752	2.543	
	mm	69.90	64.60	
Shear modulus, G $@0.4v_{peak}$	Kip/in.	11.900	8.582	
	KN/mm	2.084	1.503	
Work until failure per unit length	Kip-ft./ft.	1.604	1.522	
	KN-m/m	7.132	6.772	
Unit load, $v_{1/300}$ $@ 0.32$ in. (8.13 mm)	Kips/ft.	0.350	0.331	
	KN/m	5.101	4.834	
Unit load, $v_{1/200}$ $@ 0.48$ in.(12.19 mm)	Kips/ft.	0.421	0.390	
	KN/m	6.144	5.687	
Unit load, $v_{1/100}$ $@ 0.96$ in. (24.38 mm)	Kips/ft.	0.562	0.500	
	KN/m	8.195	7.302	
Unit load, $v_{1/60}$ $@ 1.6$ in. (40.64 mm)	Kips/ft.	0.623	0.541	
	KN/m	9.087	7.896	
EVDR $@v_{peak}$			0.139	0.128

SEAOSC parameters		units	negative	positive	average
Yield Limit State	$v_{YLS}$	Kips/ft.	-0.337	0.299	0.318
		KN/m	-4.912	4.363	4.638
	$\Delta_{YLS}$	in.	-0.305	0.223	0.264
		mm	-7.74	5.66	6.70
Strength Limit State	$G'_{YLS}$	Kip/in.	8.837	10.741	9.641
		KN/mm	1.548	1.881	1.688
	$v_{SLS}$	Kips/ft.	-0.634	0.620	0.627
KN/m		-9.248	9.047	9.147	
$\Delta_{SLS}$	in.	-1.814	2.103	1.958	
	mm	-46.06	53.43	49.75	
$G'_{SLS}$	Kip/in.	2.796	2.358	2.560	
	KN/mm	0.490	0.413	0.448	

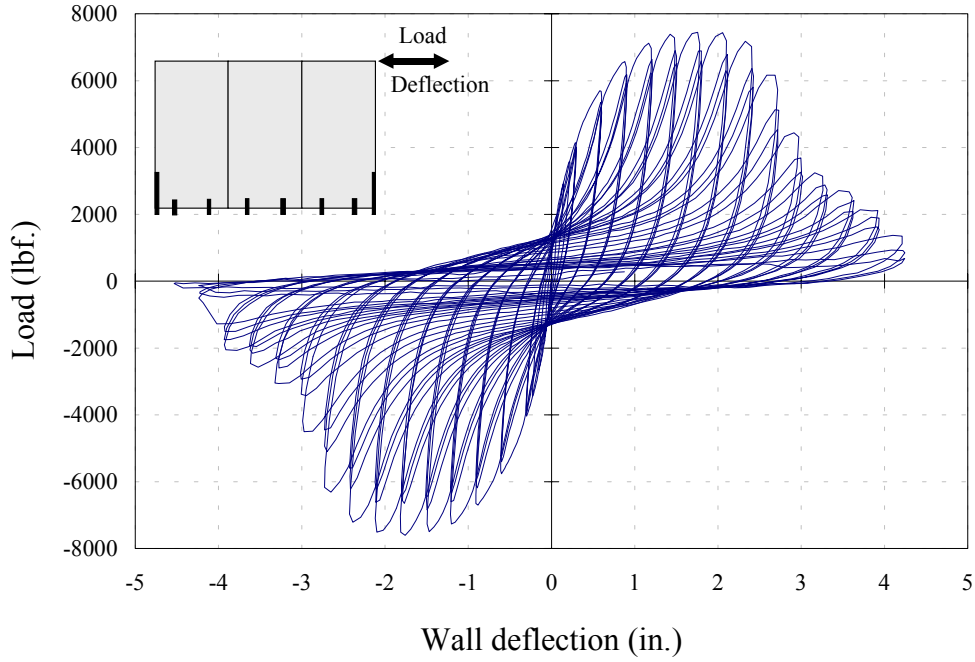


Figure 12FAc2- a. Observed load-deflection curve.

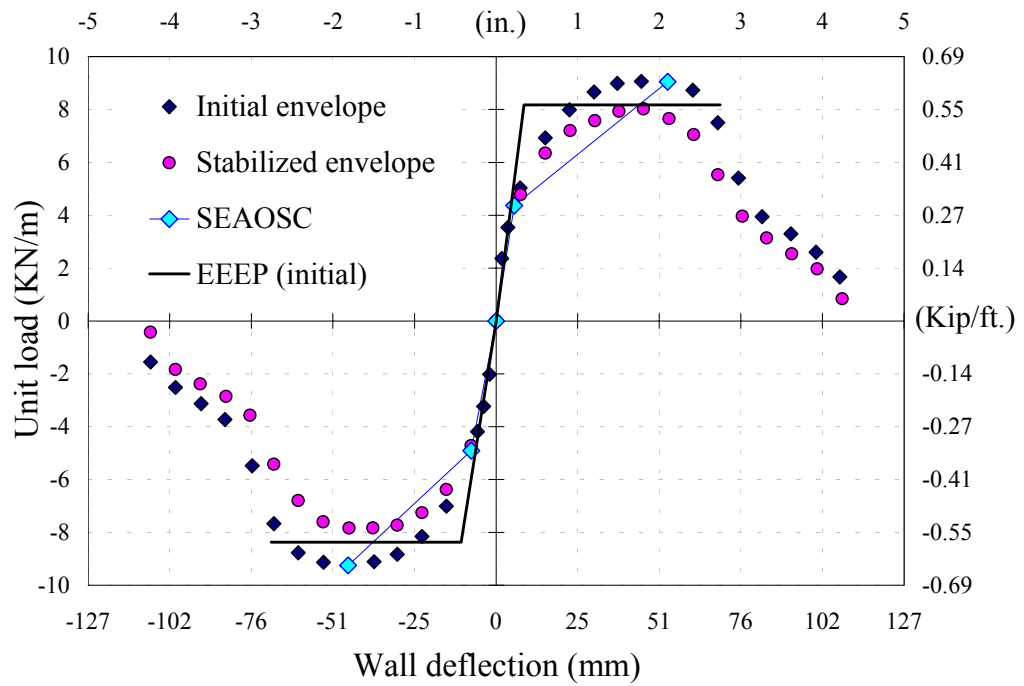


Figure 12FAc2- b. Envelopes, SEAOSC, and EEEP curves.

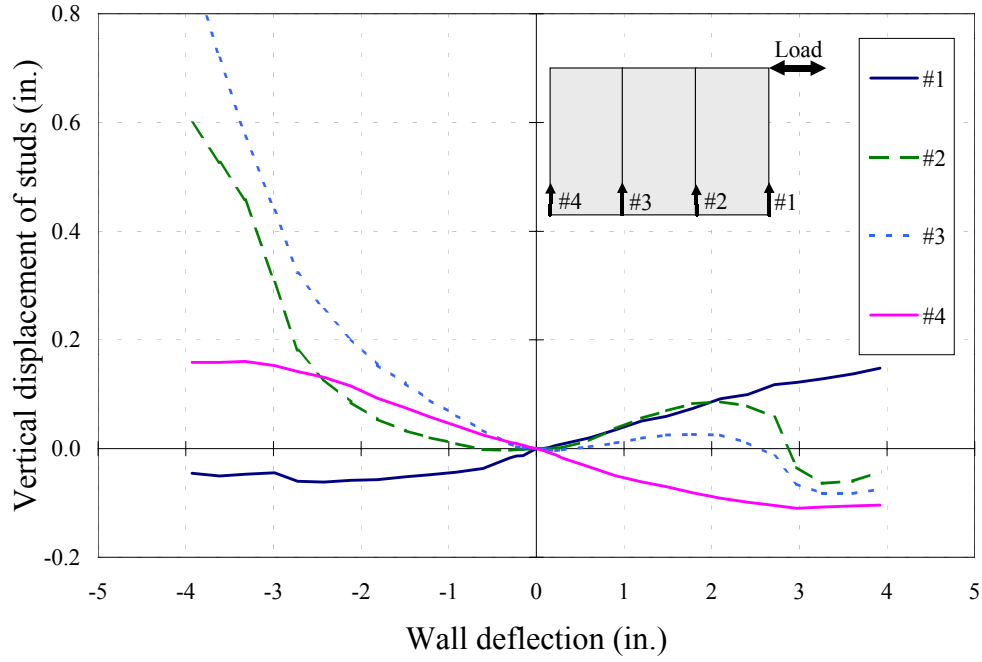


Figure 12FAc2- c. Vertical displacement of studs (initial envelope).

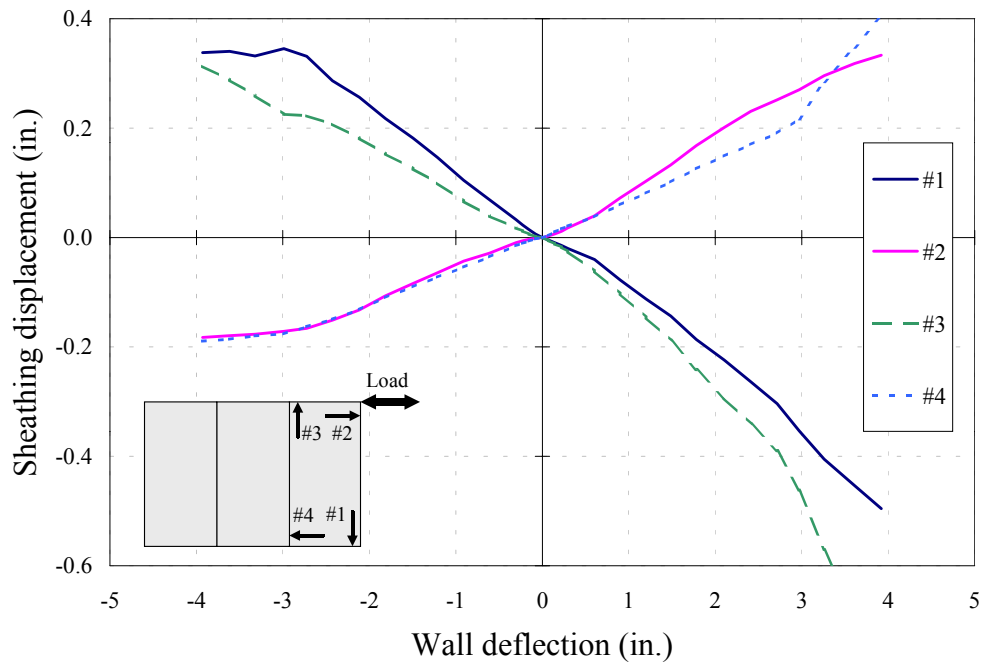


Figure 12FAc2- d. Sheathing displacement (initial envelope).

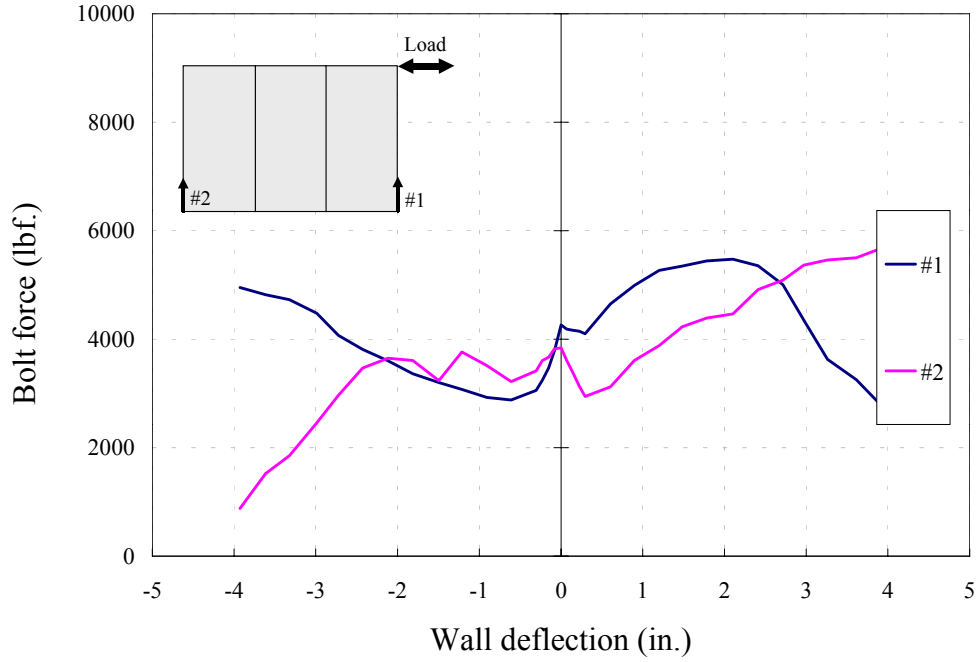


Figure 12FAc2- e. Forces in anchor bolts (initial envelope).

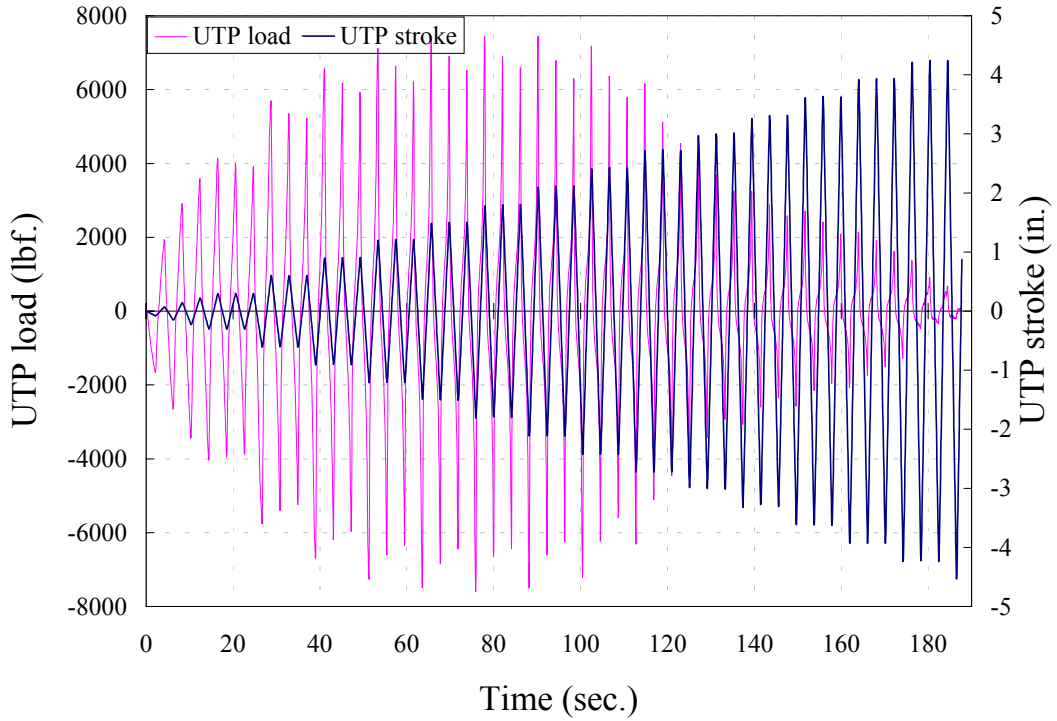


Figure 12FAc2- f. Load- and displacement-time record.