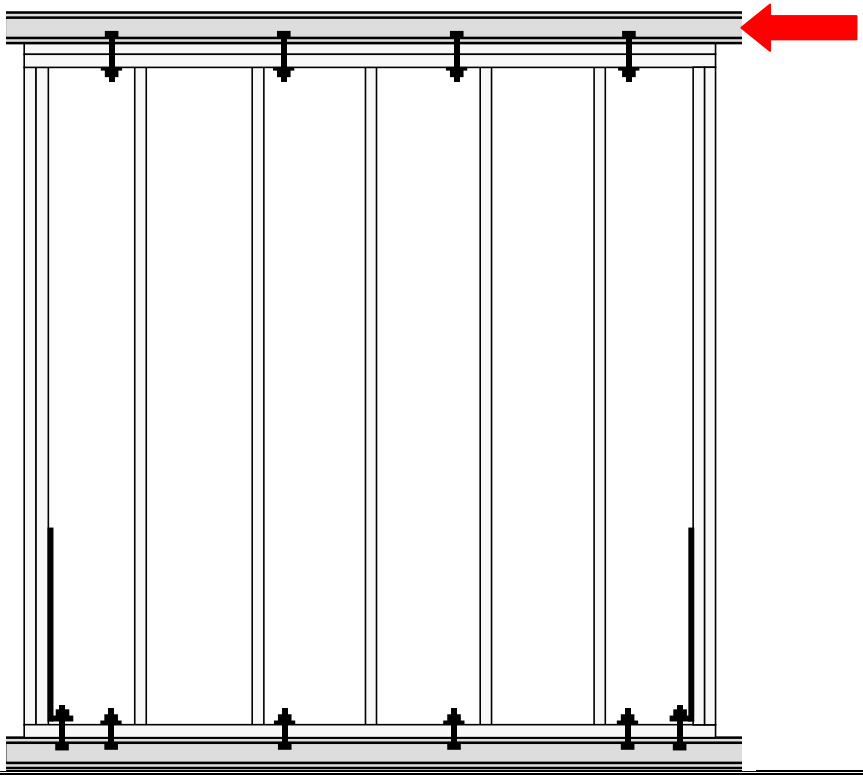
Walls 08FAm



Walls:	08FAm1	08FAm2
Manufactured:	**June 15, 1998**[1]	**June 15, 1998**[1]
MOE data files:	8fam1p.prn 8fam1s.prn	8fam2p.prn 8fam2s.prn
MOE_{plates} (10^6 psi)	1.79	1.64
MOE_{studs} (10^6 psi)	1.57	1.67
$Density_{plates}$ (kg/m^3)	540	571
$Density_{studs}$ (kg/m^3)	512	494
Date tested:	**July 4, 1998**	**July 6, 1998**[2]
Time tested:	15:04	17:07
LTC files:	UTP16POT	UTP16
Data files:	08FAm1.dat	08FAm2.dat
Excel files:	08FAm1_data	08FAm2_data
Photo files:	276-293	326-337

[1] Sheathing attached to the bottom plate with ¾-in. edge distance.

[2] Tie-down anchor at the right stud was re-nailed closer to the bottom before the test because the instrumented bolt was too short.

Wall 08FAm1

Observations: The wall exhibited a rigid behavior with well-developed plastic region. The peak load (5559 lbf.) was observed at 3.2-in. deflection. Then, the resistance decreased gradually, until a quick load drop at 4.2-in. deflection. Photo 292 illustrates the racking of sheathing panels. Figure 08FAm1-d reveals that the right-bottom corner separated from the framing faster than the other three corners, which lead to the panel separation from the bottom plate.

Failure mode: The first sheathing panel unzipped from the bottom plate and the right end stud, which caused the quick load drop at 4.2-in. deflection. Sheathing nails tore through the edge at the bottom and pulled through at the end stud (see Photos 292, 293).

Wall 08FAm2

Observations: Comparison of load-deflection curves of walls 08FAm1 and 08FAm2 showed that until 2.5-in. deflection, the walls performed similarly. In elastic region, wall 08FAm2 was 11% stiffer than wall 08FAm1. However, wall 08FAm2 reached the peak load at 2.6-in deflection and started gradual degradation, while wall 08FAm1 increased resistance until 3.2-in. Nevertheless, due to the gradual degradation, wall 08FAm2 maintained more than 80% of the peak load until 4.3-in. deflection.

Failure mode: First sheathing panel unzipped at the top plate and the middle stud (on opposite sides from wall 8FAm1). Nails tore through edge at the top plate and pulled through sheathing along the studs (Photos 336, 337). Second panel racked but did not unzip. Panel edges crashed from contact with each other. The noise on the load-deflection graph indicates that the friction between the panel edges contributed the resistance.

General

Overall, it can be concluded that both walls performed in the same manner and slight differences were due to variation of material properties. The excellent performance of these specimens was likely due to the high quality of sheathing connections (3/4-in. edge) and high density of framing lumber (more than 500 kg/m^3).

Instrumentation: For sheathing displacement measurements, pots PA-2 were used. This system appeared to be not reliable: 1) Vertical displacement of sheathing relative to studs interferes with measurements of horizontal component (see photo 289). The decline from the horizon becomes significant before the peak load is reached. 2) When sheathing is not secured from falling after it unzipped, the string of the pot pulls out and the instrument is destroyed. This happened with POT at channel #3 (see Photo 334).

Load transfer: This was the first test with the hinged connection between the ram and the distribution beam. A device including rod-end bearing with 1.0-in. eye and 1 ¾ -in. connection thread was designed and manufactured for this purpose. It allowed free rotation in horizontal plane with 14 degrees misalignment angle.

Table 08FAm1. Data summary.

Specimen **08FAm1**	**Per unit length**	
Tie-down Anchors	**monotonic test**	
Wall length	**8.00ft.**	**2.438m**
Date: 7-04-1998.	**Time:**	15:04
	units	**08FAm1**
Peak unit load, v_{peak}	Kip/ft. KN/m	0.695 10.140
Drift at peak load, Δ_{peak}	in. mm	3.196 81.19
Yield unit load, v_{yield}	Kip/ft. KN/m	0.608 8.875
Drift at yield load, Δ_{yield}	in. mm	0.558 14.17
Proportional limit, $0.4v_{peak}$	Kip/ft. KN/m	0.278 4.056
Drift at prop. limit, $\Delta@0.4v_{peak}$	in. mm	0.255 6.47
Unit load at failure or $0.8v_{peak}$	Kip/ft. KN/m	0.554 8.083
Drift at failure, $\Delta_{failure}$	in. mm	4.222 107.23
Shear modulus, G $@0.4v_{peak}$	Kip/in. KN/mm	8.723 1.528
Work until failure per unit length	Kip·ft./ft. KN·m/m	0.200 0.889
Unit load, $v_{1/300}$ @ 0.32 in. (8.13 mm)	Kips/ft. KN/m	0.316 4.620
Unit load, $v_{1/200}$ @ 0.48 in.(12.19 mm)	Kips/ft. KN/m	0.383 5.605
Unit load, $v_{1/100}$ @ 0.96 in. (24.38 mm)	Kips/ft. KN/m	0.487 7.128
Unit load, $v_{1/60}$ @ 1.6 in. (40.64 mm)	Kips/ft. KN/m	0.584 8.554

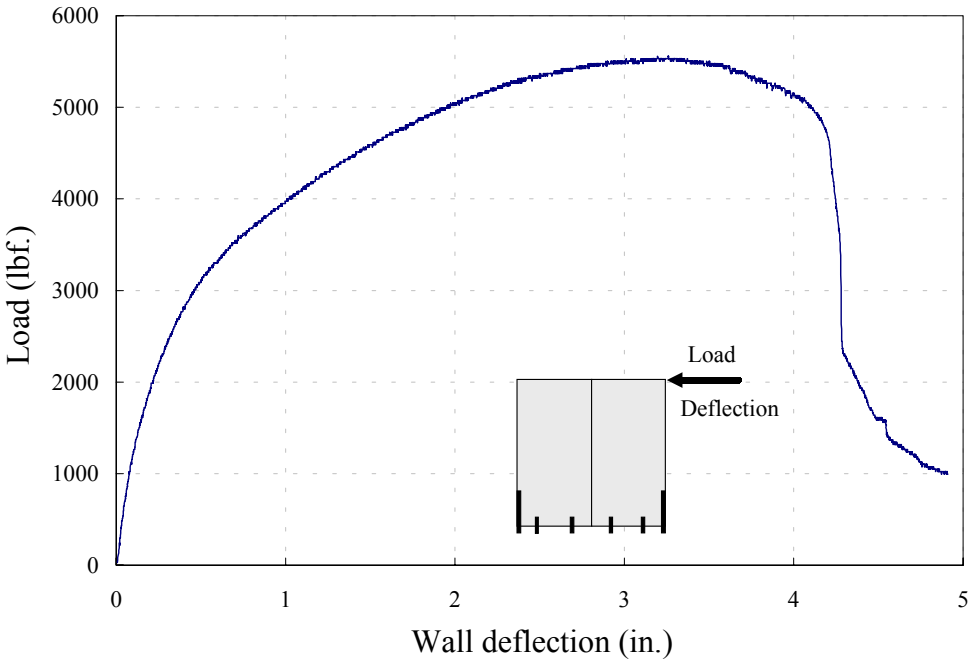


Figure 08FAm1- a. Observed load-deflection curve[1].

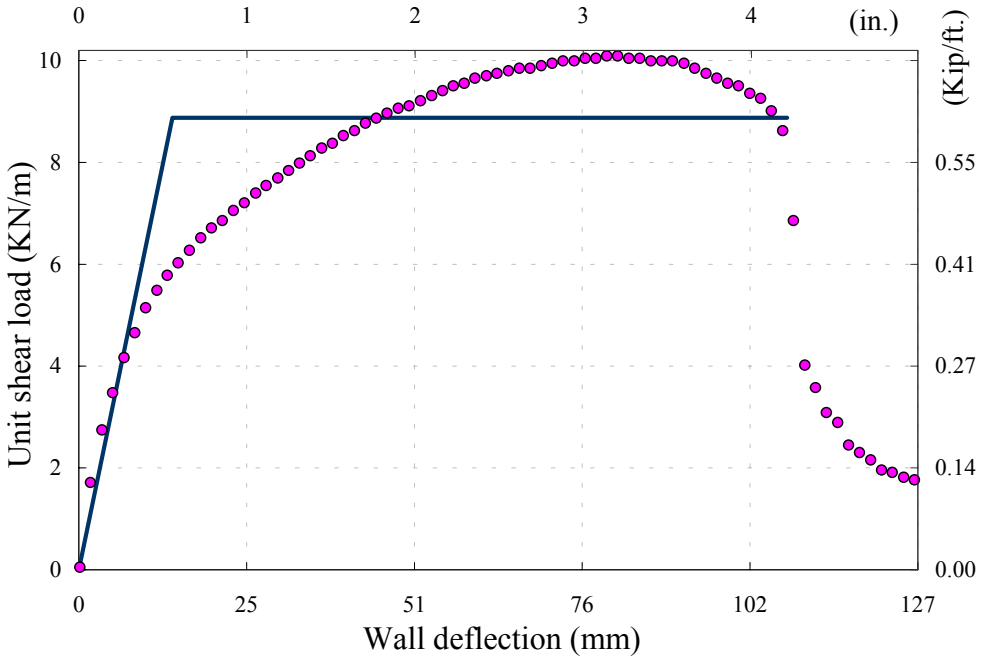


Figure 08FAm1- b. Unit load-deflection and EEEP curves[2].

[1] The scale of the graph varies between test series.
[2] The scale of the graph is uniform between test series for comparison purposes.

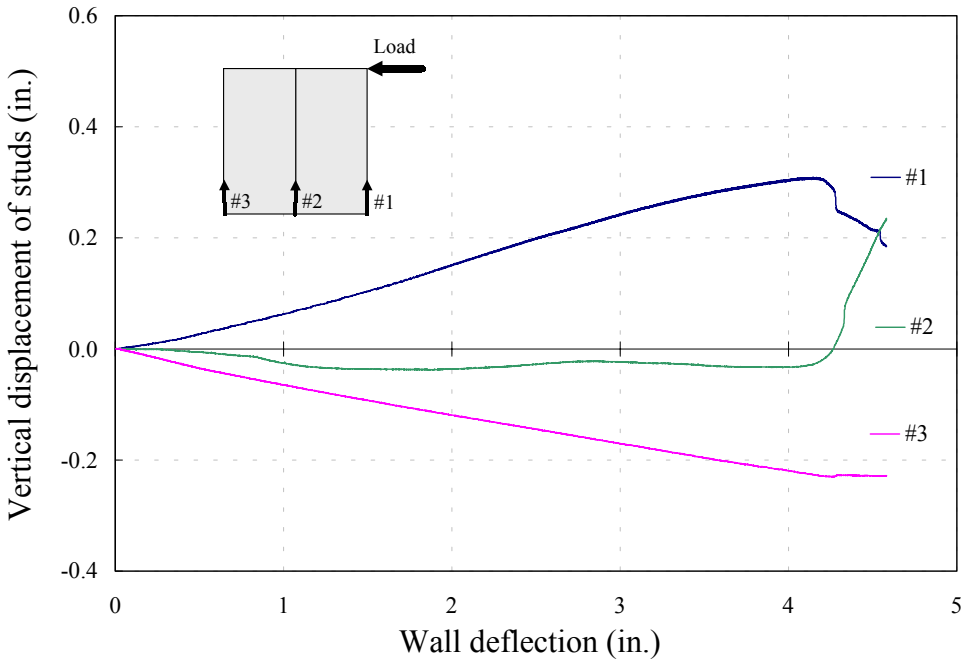


Figure 08FAm1- c. Vertical displacement of studs.

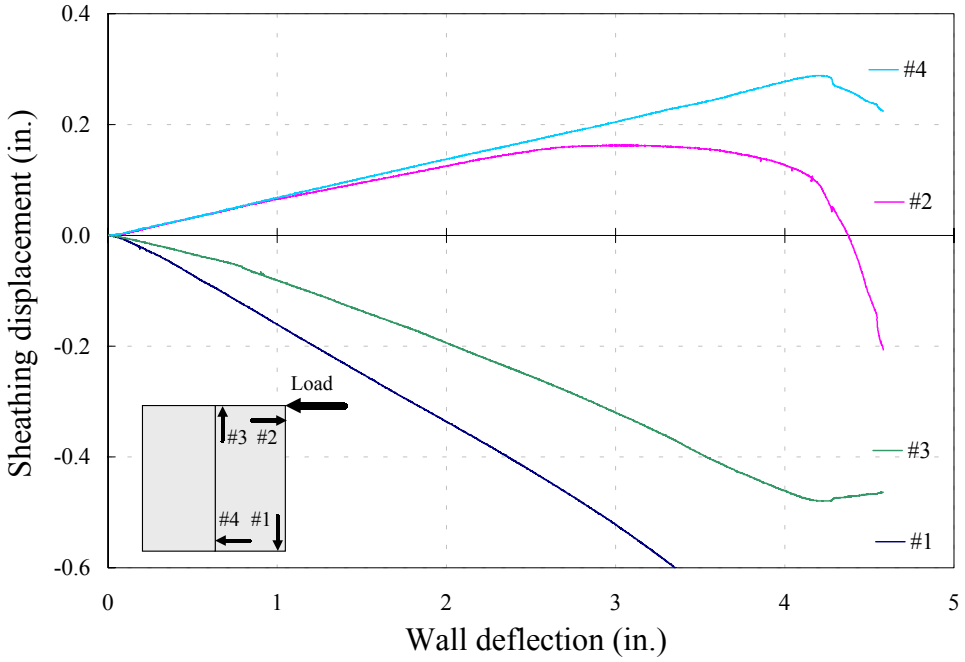


Figure 08FAm1- d. Sheathing displacement.

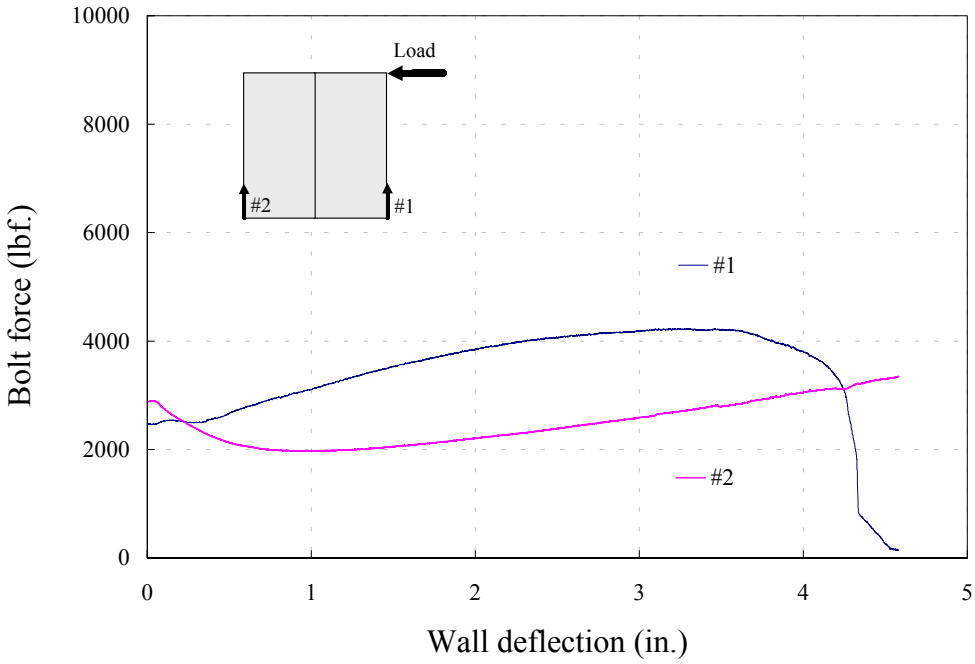


Figure 08FAm1- e. Forces in anchor bolts.

Table 08FAm2. Data summary.

Specimen **08FAm2**	**Per unit length**	
Tie-down Anchors	**monotonic test**	
Wall length	**8.00ft.**	**2.438m**
Date: 7-06-1998.	**Time:**	17:07
	units	**08FAm2**
Peak unit load, v_{peak}	Kip/ft. KN/m	0.668 9.748
Drift at peak load, Δ_{peak}	in. mm	2.581 65.56
Yield unit load, v_{yield}	Kip/ft. KN/m	0.596 8.697
Drift at yield load, Δ_{yield}	in. mm	0.487 12.38
Proportional limit, $0.4v_{peak}$	Kip/ft. KN/m	0.267 3.899
Drift at prop. limit, $\Delta@0.4v_{peak}$	in. mm	0.219 5.55
Unit load at failure or $0.8v_{peak}$	Kip/ft. KN/m	0.534 7.789
Drift at failure, $\Delta_{failure}$	in. mm	4.219 107.16
Shear modulus, G $@0.4v_{peak}$	Kip/in. KN/mm	9.781 1.713
Work until failure per unit length	Kip·ft./ft. KN·m/m	0.197 0.878
Unit load, $v_{1/300}$ @ 0.32 in. (8.13 mm)	Kips/ft. KN/m	0.322 4.719
Unit load, $v_{1/200}$ @ 0.48 in.(12.19 mm)	Kips/ft. KN/m	0.396 5.801
Unit load, $v_{1/100}$ @ 0.96 in. (24.38 mm)	Kips/ft. KN/m	0.520 7.620
Unit load, $v_{1/60}$ @ 1.6 in. (40.64 mm)	Kips/ft. KN/m	0.608 8.898

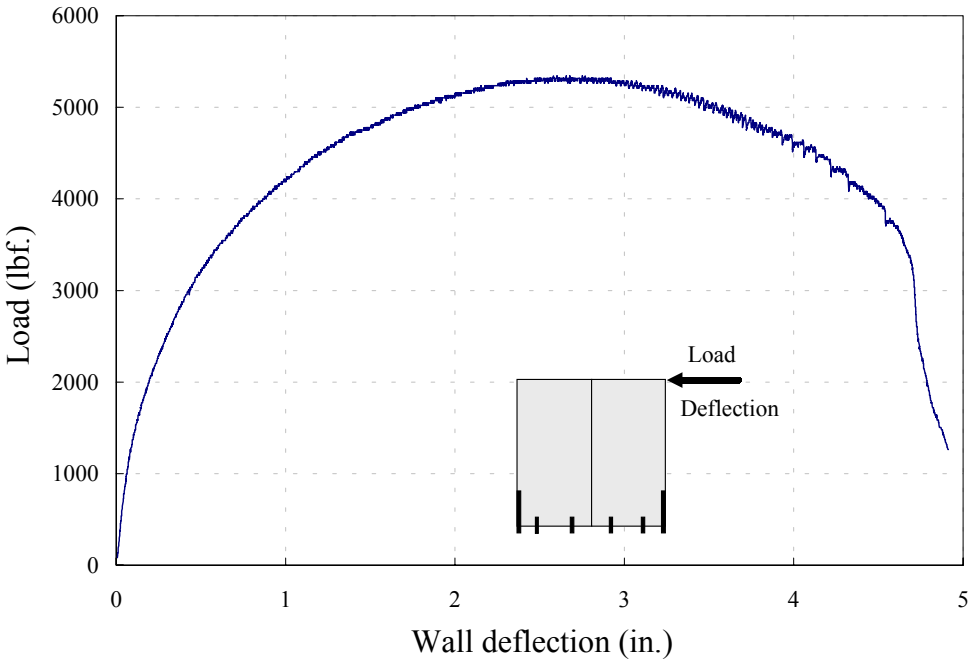


Figure 08FAm2- a. Observed load-deflection curve.

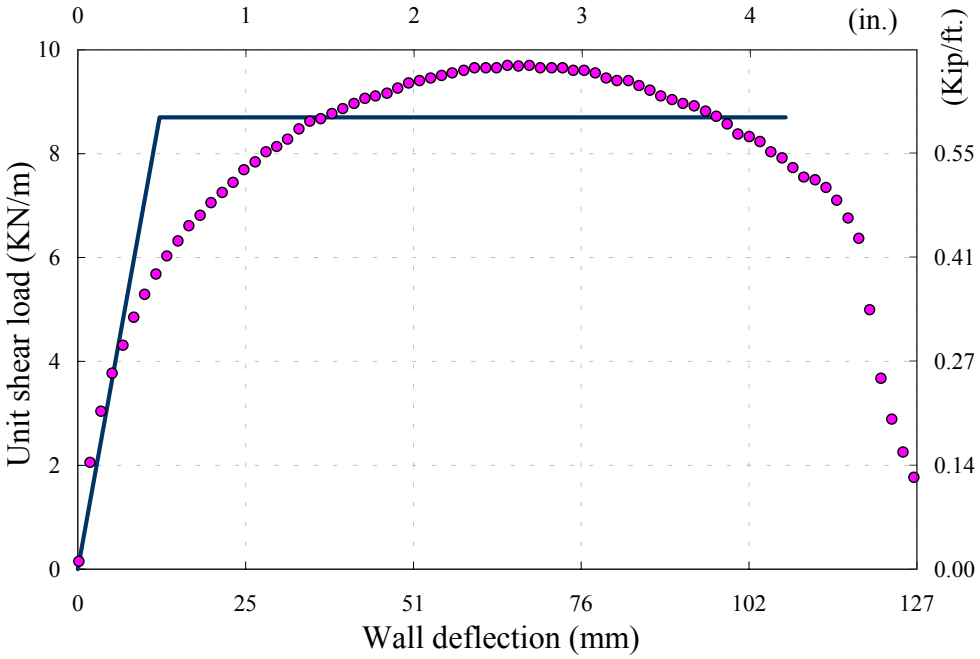


Figure 08FAm2- b. Unit load-deflection and EEEP curves.

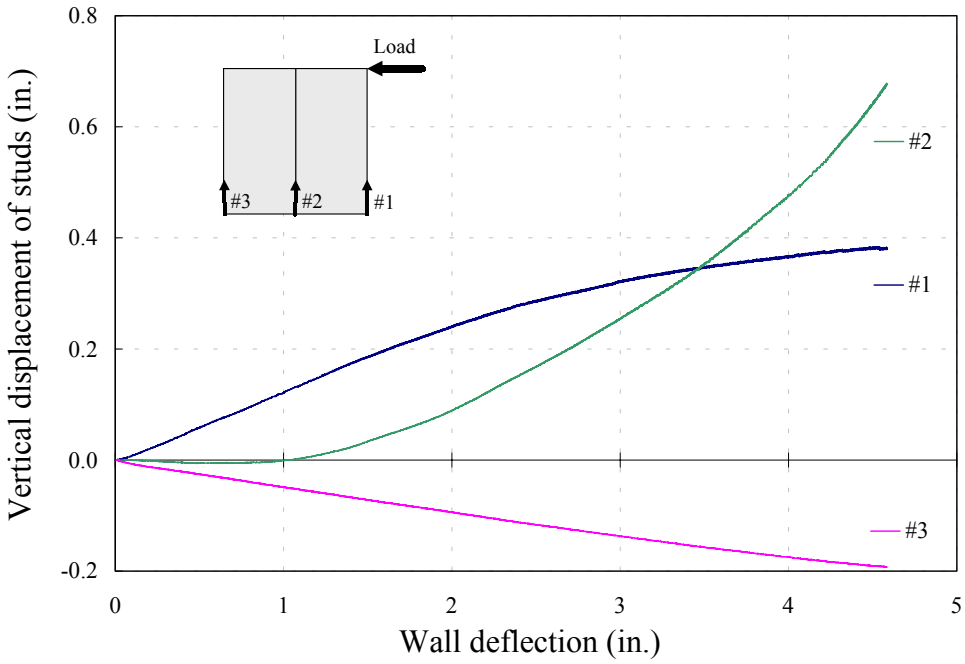


Figure 08FAm2- c. Vertical displacement of studs (initial envelope).

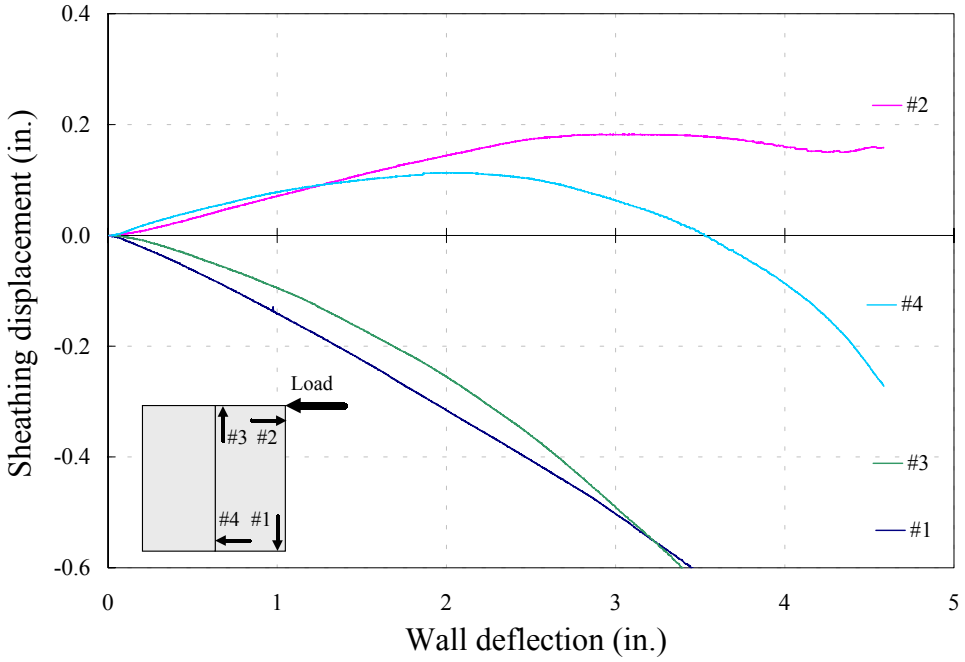


Figure 08FAm2- d. Sheathing displacement.

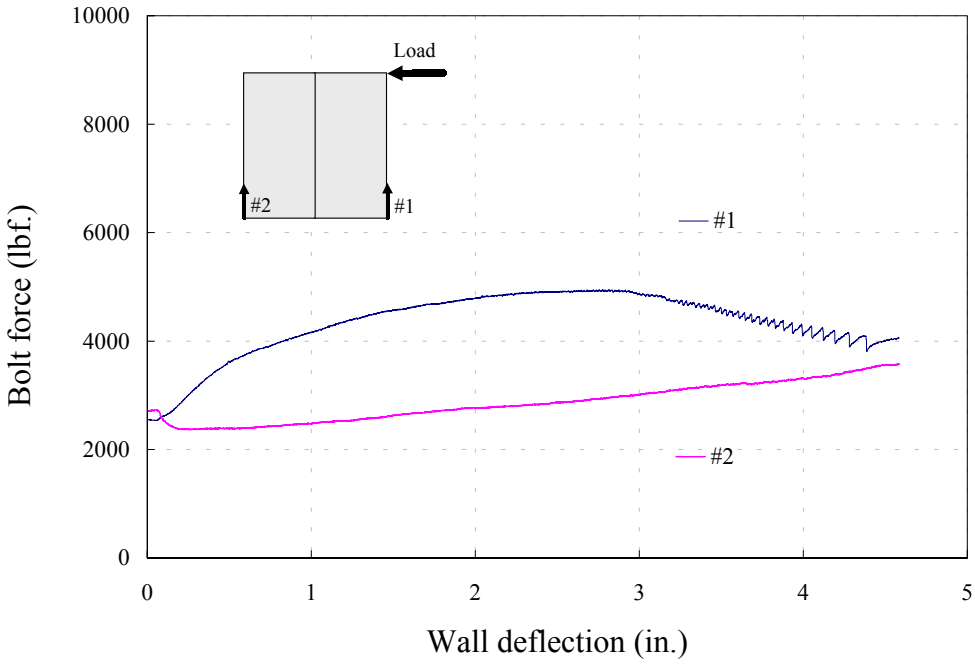


Figure 08FAc2- e. Forces in anchor bolts.