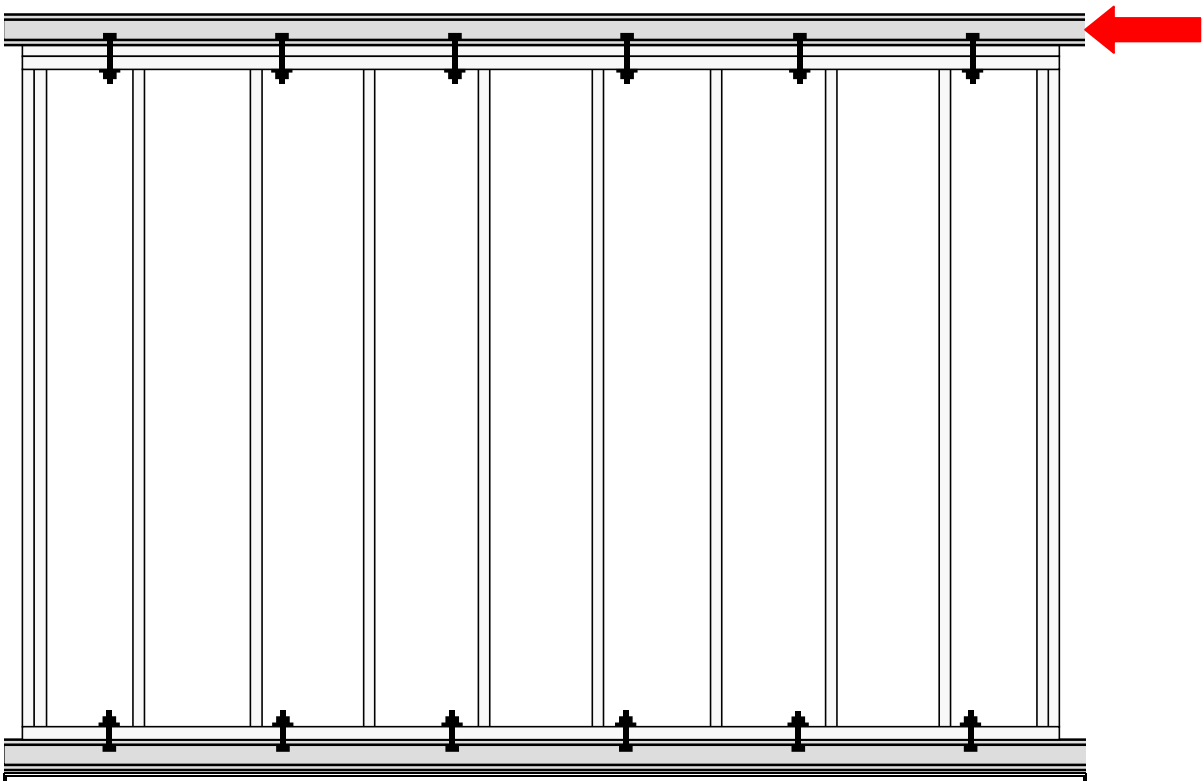
Walls 12IAm



Walls:	12IAm1	12IAm2
Manufactured:	**June 17, 1998**[1]	**June 17, 1998**[1]
MOE data files:	12iam1p.prn 12iam1s.prn	12iam2p.prn 12iam2s.prn
MOE_{plates} (10^6 psi)	2.00	1.95
MOE_{studs} (10^6 psi)	1.65	1.53
$Density_{plates}$ (kg/m^3)	607	585
$Density_{studs}$ (kg/m^3)	477	484
Date tested:	**July 10, 1998**	**July 10, 1998**
Time tested:	12:23	15:40
LTC files:	utp-alex	utp-alex
Data files:	12IAm1.dat	12IAm2.dat
Excel files:	12IAm1_data	12IAm2_data
Photo files:	377-394	395-398

[1] Sheathing attached to the top and bottom plates with ¾-in. edge distance.

Walls 12IAm1 and 12IAm2

Observations: Both walls exhibited a very similar performance. The peak loads (5000 and 4920 lbf.) were observed at the same deflection (1.33-in.). Then, the resistance dropped quickly. The 20% load reduction was observed at 1.7-in. deflection. Sheathing unzipped from the bottom plate and the rest of the wall rocked away from the foundation as a rigid body as shown in Photo 395. The sheathing moved relative to the studs and top plate less than 0.05 in. as the graphs show.

Failure mode: Sheathing unzipped at the bottom plate and fell down on the floor (first two panels separated completely). The end of bottom plate was split under the nails before test due to inadequate end distance. The first nail at the bottom plate cracked the wood (Photo 389) at capacity (see video record). Past capacity and until failure sheathing nails pulled through sheathing. Due to high wall uplift and narrow edge distance, the nails tear through the sheathing edge at larger deflections. Photo 397 shows that sheathing rotated about one foot from the left end stud. Figures 12IAm1-c and 12IAm2-c support this observation. Photos 393 and 394 show tracks of casters during the test.

Ductility: Load-drift curves of all walls without tie-down anchors reveal that there is a very small plastic region in wall performance. Past capacity, the load drops quickly: failure occurs within 0.3 – 0.6 in. past peak load. The obvious reason for the quick wall degradation can be found looking at the graphs of sheathing displacement. The peak load is reached as soon as the first sheathing nails tear through the edge of the panel. The wall response entirely depends on the row of nails along the bottom plate.

Instrumentation: Load range on UTP controller was setup at 11000 lbs. LabTech file *utp_alex.ltc* includes calibrations of POTs..

Table 12IAm1. Data summary.

Specimen	**12IAm1**	**Per unit length**	
Shear Bolts		**monotonic test**	
Wall length		**12.00ft.**	**3.657m**
Date:	7-10-1998.	**Time:**	12:23
		units	**12IAm1**
Peak unit load, v_{peak}		Kip/ft. KN/m	0.417 6.080
Drift at peak load, Δ_{peak}		in. mm	1.333 33.86
Yield unit load, v_{yield}		Kip/ft. KN/m	0.367 5.362
Drift at yield load, Δ_{yield}		in. mm	0.394 10.01
Proportional limit, $0.4v_{peak}$		Kip/ft. KN/m	0.167 2.432
Drift at prop. limit, $\Delta@0.4v_{peak}$		in. mm	0.179 4.54
Unit load at failure or $0.8v_{peak}$		Kip/ft. KN/m	0.333 4.860
Drift at failure, $\Delta_{failure}$		in. mm	1.685 42.79
Shear modulus, G $@0.4v_{peak}$		Kip/in. KN/mm	7.461 1.307
Work until failure per unit length		Kip·ft./ft. KN·m/m	0.046 0.203
Unit load, $v_{1/300}$ @ 0.32 in. (8.13 mm)		Kips/ft. KN/m	0.240 3.515
Unit load, $v_{1/200}$ @ 0.48 in.(12.19 mm)		Kips/ft. KN/m	0.298 4.359
Unit load, $v_{1/100}$ @ 0.96 in. (24.38 mm)		Kips/ft. KN/m	0.390 5.701
Unit load, $v_{1/60}$ @ 1.6 in. (40.64 mm)		Kips/ft. KN/m	**0.373** **5.458**

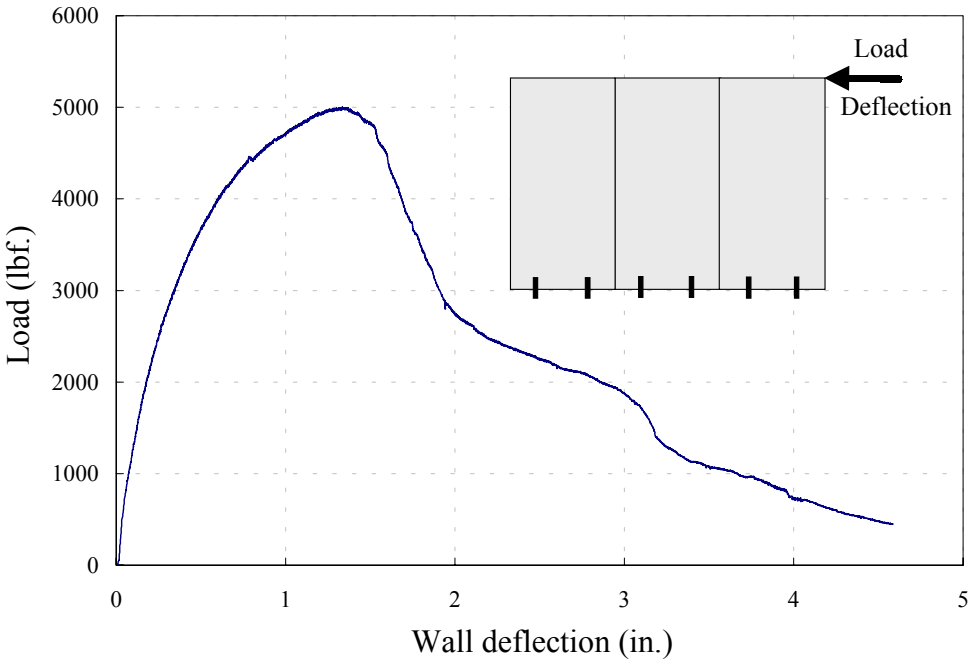


Figure 12IAm1- a. Observed load-deflection curve[1].

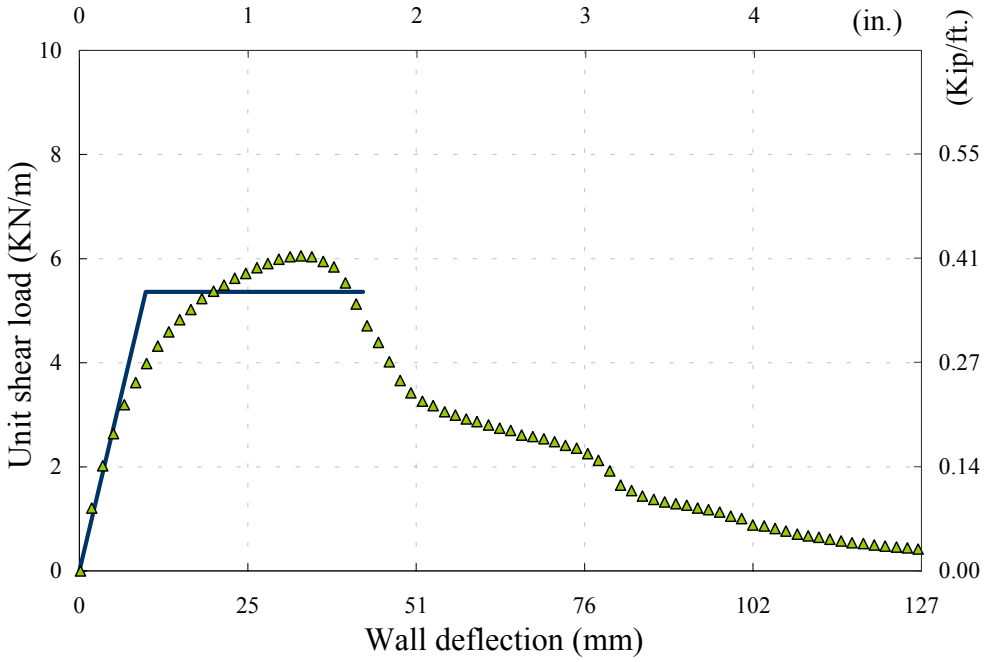


Figure 12IAm1- b. Unit load-deflection and EEEP curves[2].

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

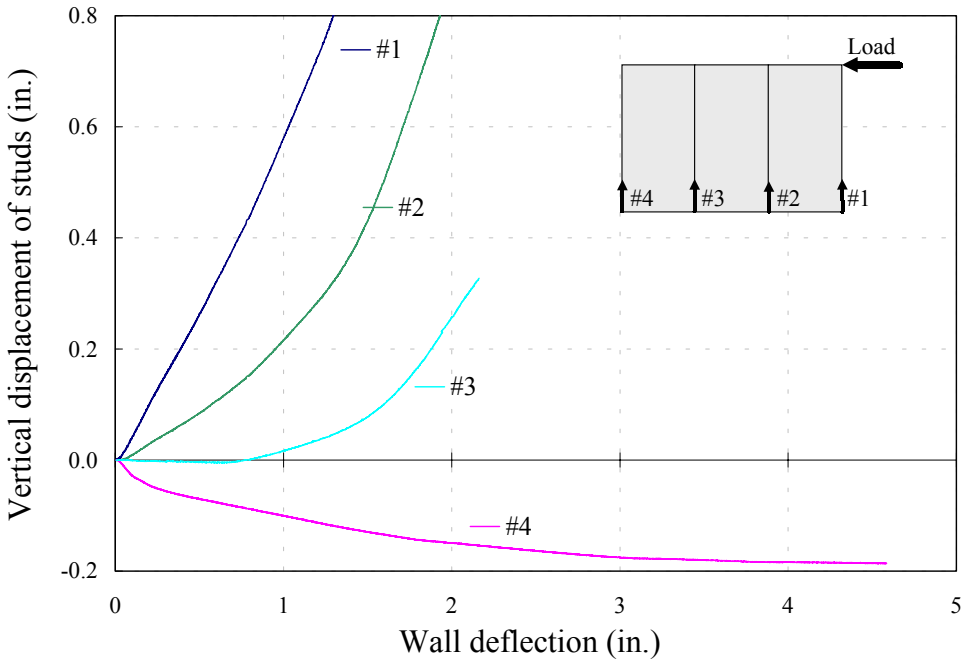


Figure 12IAm1- c. Vertical displacement of studs.

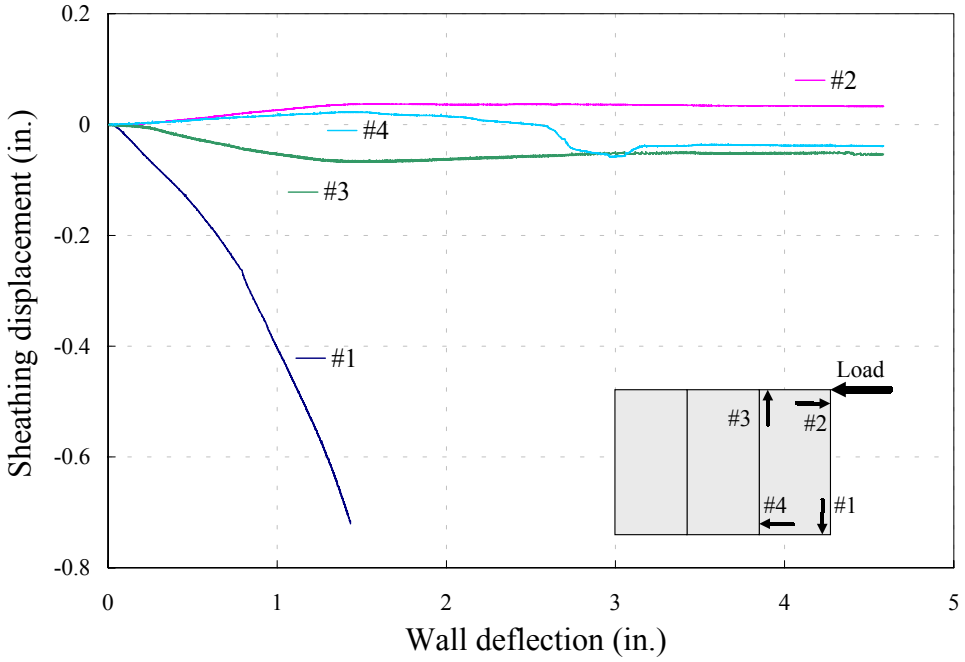


Figure 12IAm1- d. Sheathing displacement.

Table 12IAm2. Data summary.

Specimen	**12IAm2**	**Per unit length**	
Shear Bolts		**monotonic test**	
Wall length		**12.00ft.**	**3.657m**
Date:	8-18-1998.	**Time:**	14:25
		units	**12IAm2**
Peak unit load, v_{peak}		Kip/ft. KN/m	0.410 5.983
Drift at peak load, Δ_{peak}		in. mm	1.330 33.78
Yield unit load, v_{yield}		Kip/ft. KN/m	0.361 5.273
Drift at yield load, Δ_{yield}		in. mm	0.436 11.08
Proportional limit, $0.4v_{peak}$		Kip/ft. KN/m	0.164 2.393
Drift at prop. limit, $\Delta@0.4v_{peak}$		in. mm	0.198 5.03
Unit load at failure or $0.8v_{peak}$		Kip/ft. KN/m	0.328 4.782
Drift at failure, $\Delta_{failure}$		in. mm	1.690 42.94
Shear modulus, G $@0.4v_{peak}$		Kip/in. KN/mm	6.625 1.160
Work until failure per unit length		Kip·ft./ft. KN·m/m	0.044 0.197
Unit load, $v_{1/300}$ @ 0.32 in. (8.13 mm)		Kips/ft. KN/m	0.227 3.318
Unit load, $v_{1/200}$ @ 0.48 in.(12.19 mm)		Kips/ft. KN/m	0.283 4.143
Unit load, $v_{1/100}$ @ 0.96 in. (24.38 mm)		Kips/ft. KN/m	0.381 5.570
Unit load, $v_{1/60}$ @ 1.6 in. (40.64 mm)		Kips/ft. KN/m	**0.356** **5.210**

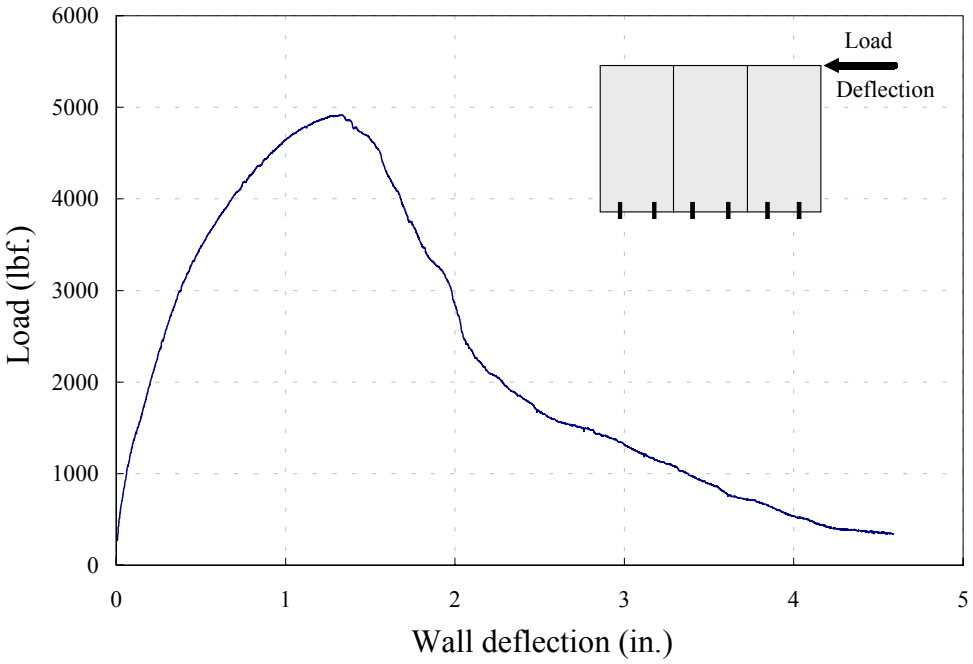


Figure 12IAm2- a. Observed load-deflection curve.

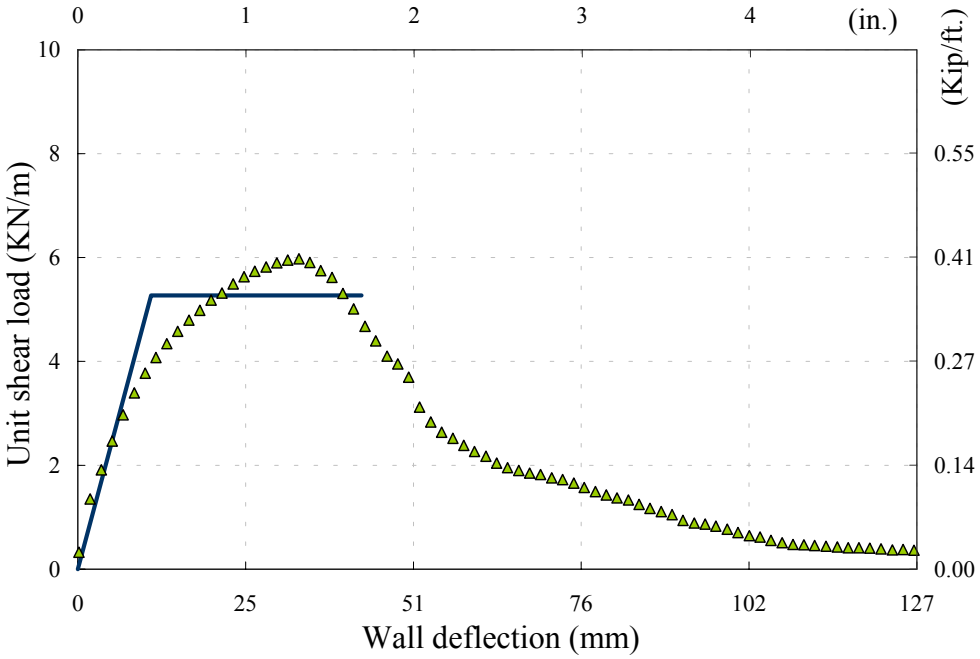


Figure 12IAm2- b. Unit load-deflection and EEEP curves.

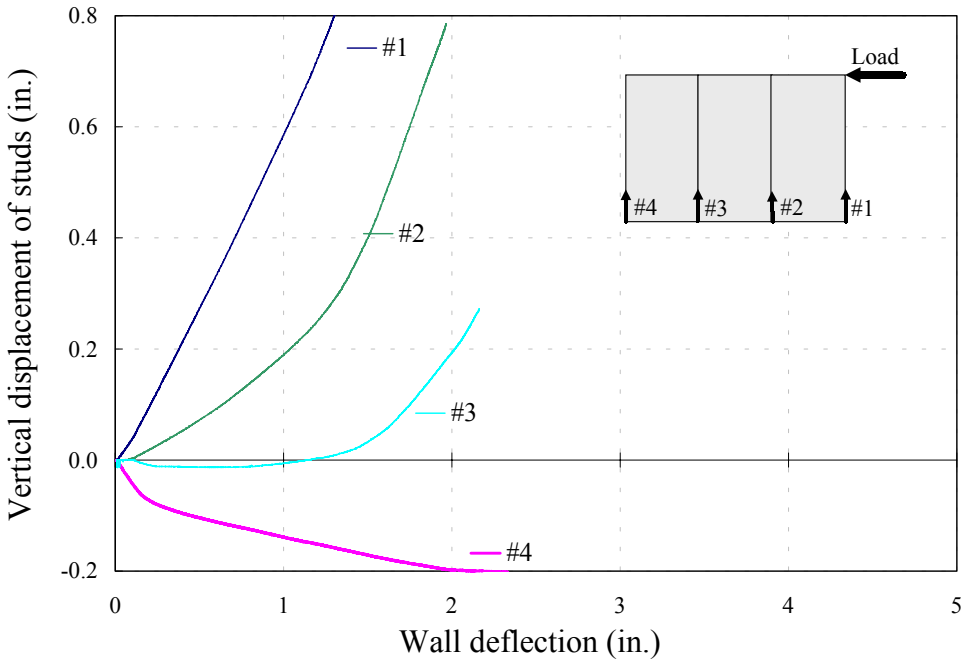


Figure 12IAm2- c. Vertical displacement of studs (initial envelope).

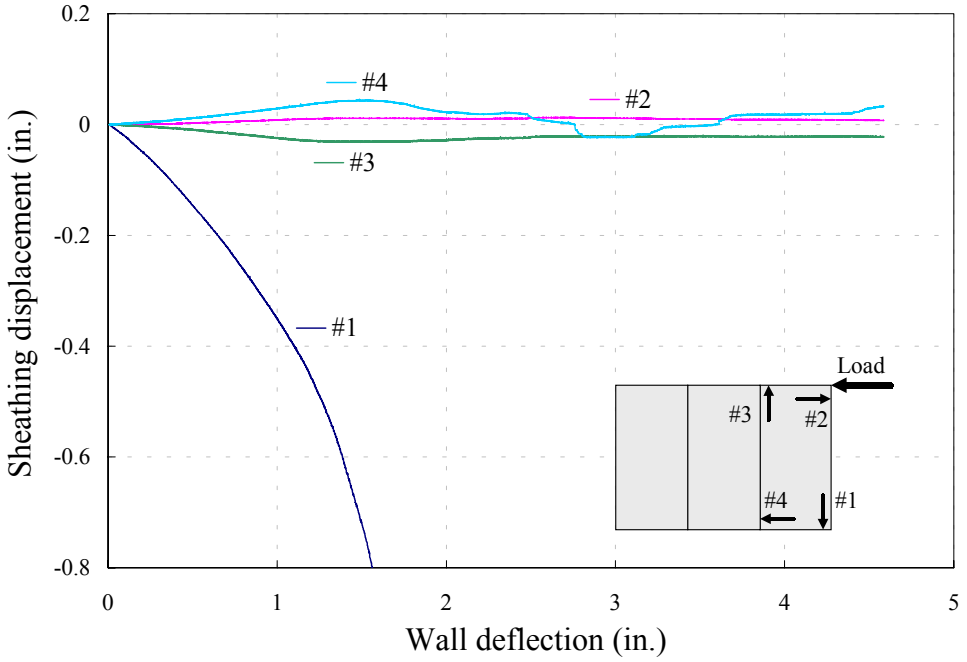


Figure 12IAm2- d. Sheathing displacement.