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APPENDIX A

Tables A.1 – A.4 present the monotonic test results for each individual test as well as average values for each wall configuration. Values presented in the tables include load and deflection at maximum load resistance, yield, and failure. Values of elastic stiffness and ductility are also presented. If the test was performed according to ASTM E564, values of set recorded are presented.

Table A.1 – Monotonic Test Results for Wall A.

Property	Wall AM-1	AM-2	AM-3	AM-4	Average
F_{max} (lb)	2700	2750	3050	2400	2700
Δ_{max} (in)	0.68	1.08	1.43	0.72	0.98
$F_{failure}$ (lb)	2400	2700	3050	2400	2650
$\Delta_{failure}$ (in)	0.87	1.08	1.43	0.72	1.02
F_{yield} (lb)	2200	2200	2450	1950	2200
Δ_{yield} (in)	0.22	0.39	0.26	0.28	0.29
k_e (lb/in)	10200	5600	9300	7000	8000
Ductility	4.0	2.8	5.4	2.6	3.7
$\Delta_{1/3\ ult}$ (in)			0.07	0.08	0.07
$\Delta_{recov\ 1/3\ ult}$ (in)			0.02	0.02	0.02
Δ_{recov}/Δ			0.25	0.20	0.23
$\Delta_{2/3\ ult}$ (in)			0.20	0.39	0.30
$\Delta_{recov\ 2/3\ ult}$ (in)			0.04	0.14	0.09
Δ_{recov}/Δ			0.18	0.36	0.27

Table A.2 – Monotonic Test Results for Wall B.

Property	Wall BM-1	BM-2	BM-3	Average
F_{max} (lb)	2800	2650	2450	2650
Δ_{max} (in)	0.88	0.69	0.78	0.79
$F_{failure}$ (lb)	2800	2650	2450	2650
$\Delta_{failure}$ (in)	0.90	0.69	0.78	0.79
F_{yield} (lb)	2300	2200	1950	2150
Δ_{yield} (in)	0.13	0.16	0.25	0.18
k_e (lb/in)	18000	13900	8000	13300
Ductility	7.1	4.4	3.2	4.9
$\Delta_{1/3\ ult}$ (in)		0.05	0.08	0.06
$\Delta_{recov\ 1/3\ ult}$ (in)		0.00	0.01	0.01
Δ_{recov}/Δ		0.10	0.10	0.10
$\Delta_{2/3\ ult}$ (in)		0.15	0.30	0.22
$\Delta_{recov\ 2/3\ ult}$ (in)		0.03	0.09	0.06
Δ_{recov}/Δ		0.17	0.30	0.23

Table A.3 – Monotonic Test Results for Wall C.

Property	Wall CM-1	CM-2	CM-3	Average
F_{max} (lb)	4550	4650	4200	4450
Δ_{max} (in)	0.99	1.24	1.02	1.08
$F_{failure}$ (lb)	4300	4650	4200	4400
$\Delta_{failure}$ (in)	1.81	1.24	1.02	1.36
F_{yield} (lb)	4000	3700	3350	3700
Δ_{yield} (in)	0.28	0.32	0.30	0.30
k_e (lb/in)	14400	11600	11000	12400
Ductility	6.6	3.9	3.4	4.6
$\Delta_{1/3\ ult}$ (in)		0.12	0.11	0.11
$\Delta_{recov\ 1/3\ ult}$ (in)		0.00	0.02	0.01
Δ_{recov}/Δ		0.03	0.17	0.10
$\Delta_{2/3\ ult}$ (in)		0.40	0.46	0.43
$\Delta_{recov\ 2/3\ ult}$ (in)		0.12	0.14	0.13
Δ_{recov}/Δ		0.30	0.30	0.30

Table A.4 – Monotonic Test Results for Wall D.

Property	Wall DM-1	DM-2	Average
F_{max} (lb)	7450	6700	7050
Δ_{max} (in)	0.85	0.52	0.68
$F_{failure}$ (lb)	7450	6700	7050
$\Delta_{failure}$ (in)	0.85	0.52	0.68
F_{yield} (lb)	6300	5350	5850
Δ_{yield} (in)	0.21	0.19	0.20
k_e (lb/in)	29300	27800	28600
Ductility	4.0	2.7	3.3
$\Delta_{1/3\ ult}$ (in)	0.07	0.08	0.08
$\Delta_{recov\ 1/3\ ult}$ (in)	0.00	0.02	0.01
Δ_{recov}/Δ	0.02	0.22	0.12
$\Delta_{2/3\ ult}$ (in)	0.18	0.21	0.20
$\Delta_{recov\ 2/3\ ult}$ (in)	0.03	0.05	0.04
Δ_{recov}/Δ	0.16	0.26	0.21

APPENDIX B

Figures B.1 – B.44 present the total hysteresis loops, initial and stabilized hysteresis loops, and envelope (or backbone) curves for the cyclic tests. These plots are provided for future reference.

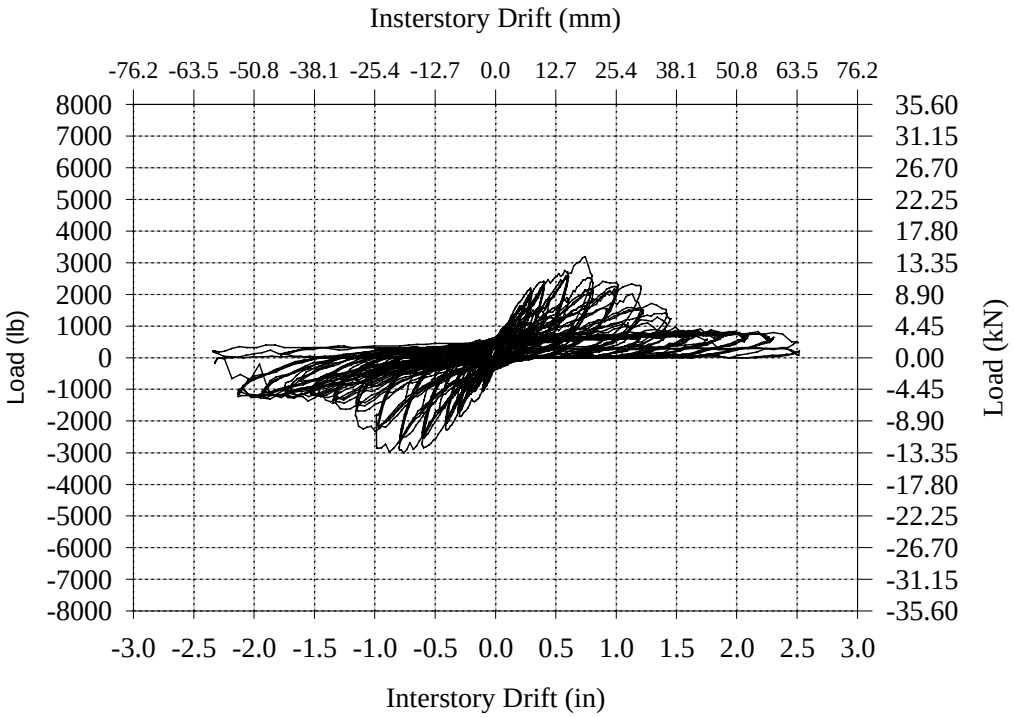


Figure B.1 – Total Hysteresis Curve for Wall AC-1.

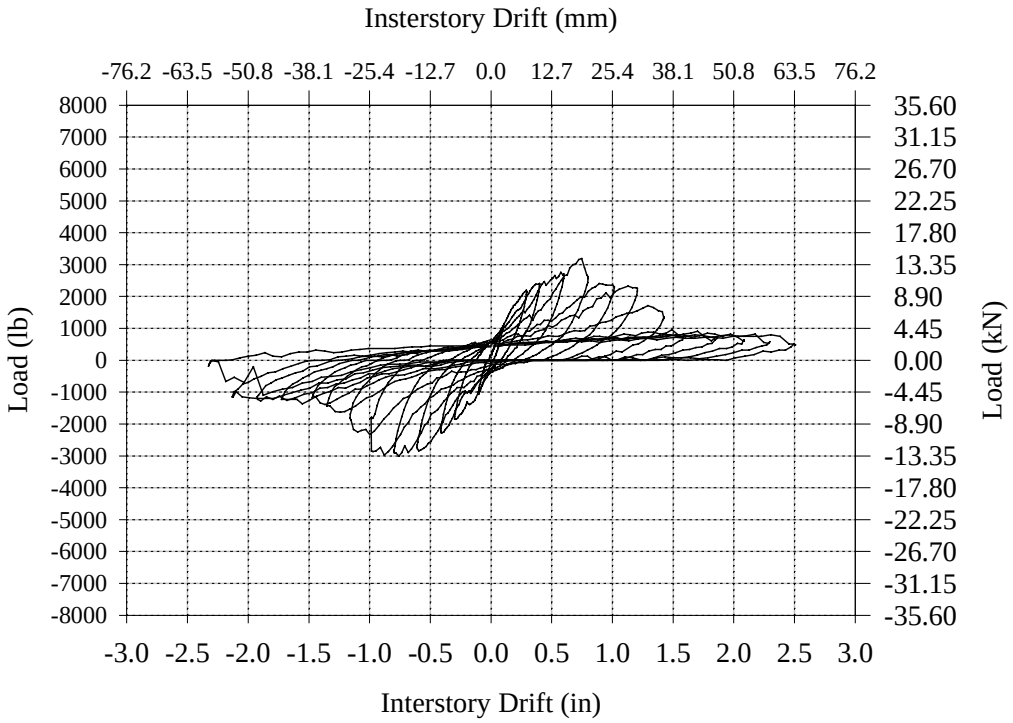


Figure B.2 – Initial Hysteresis Curve for Wall AC-1.

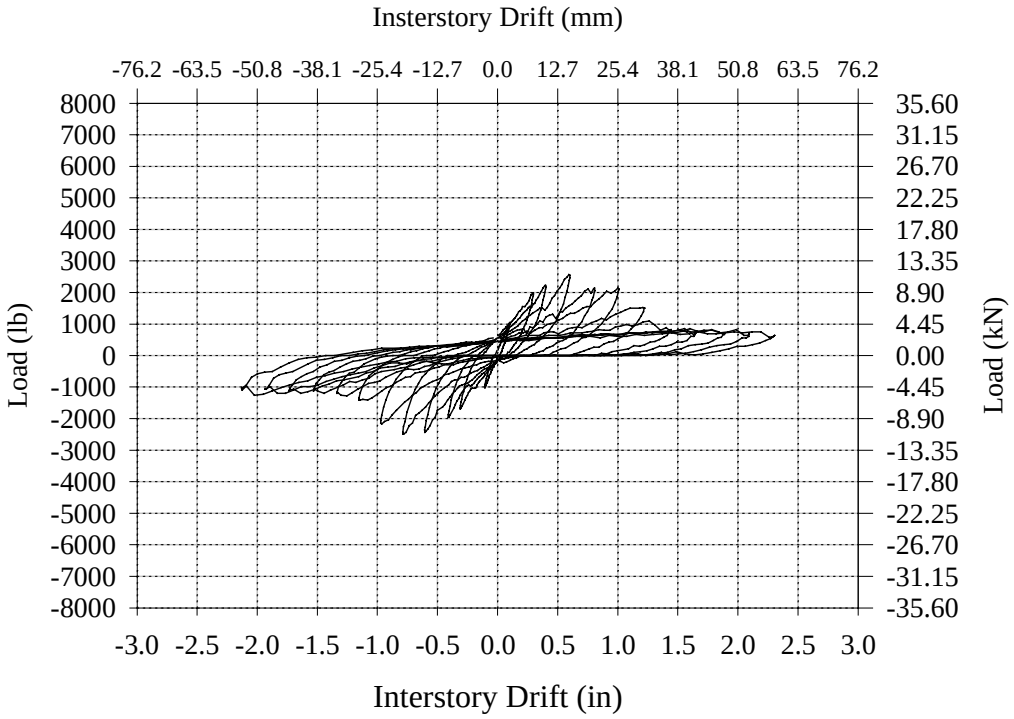


Figure B.3 – Stabilized Hysteresis Curve for Wall AC-1.

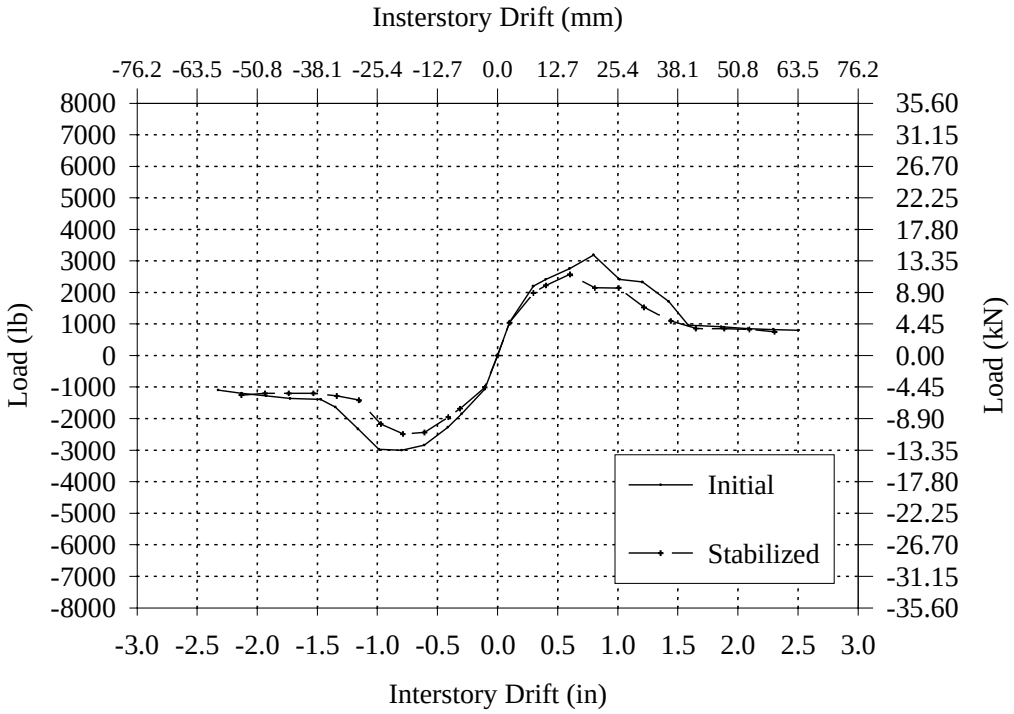


Figure B.4 – Cyclic Envelope Curve for Wall AC-1.

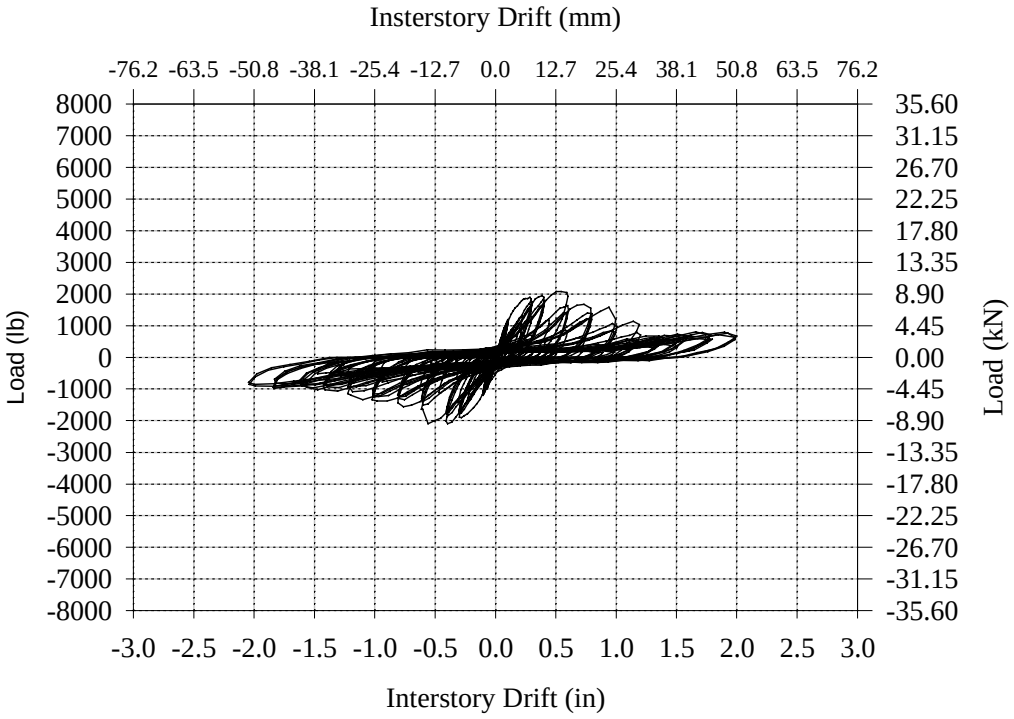


Figure B.5 – Total Hysteresis Curve for Wall AC-2.

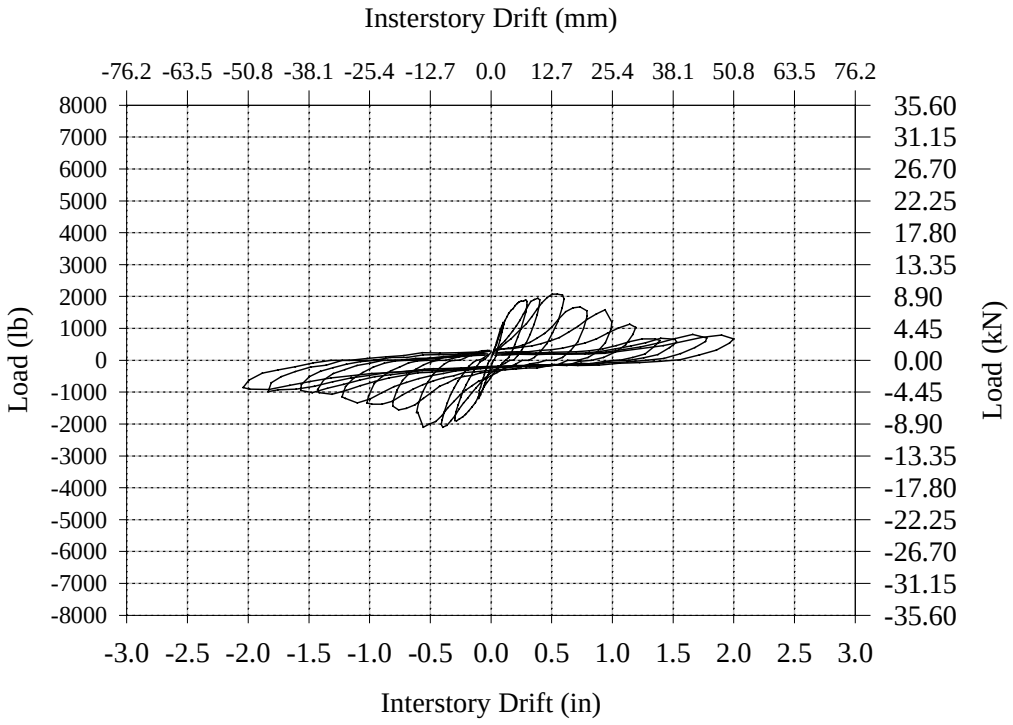


Figure B.6 – Initial Hysteresis Curve for Wall AC-2.

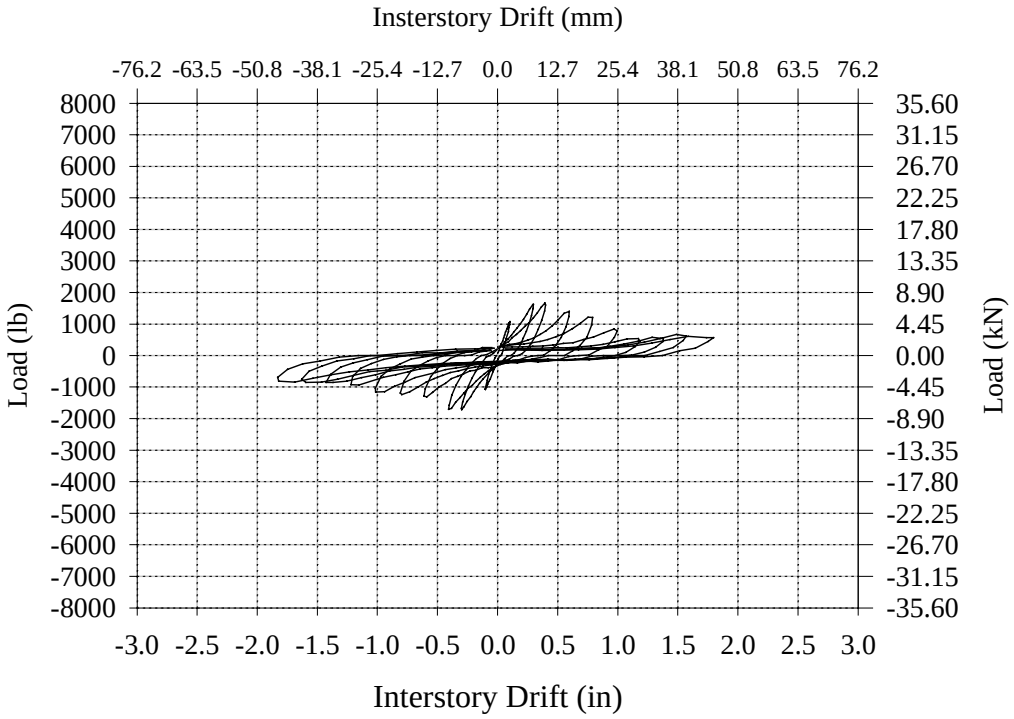


Figure B.7 – Stabilized Hysteresis Curve for Wall AC-2.

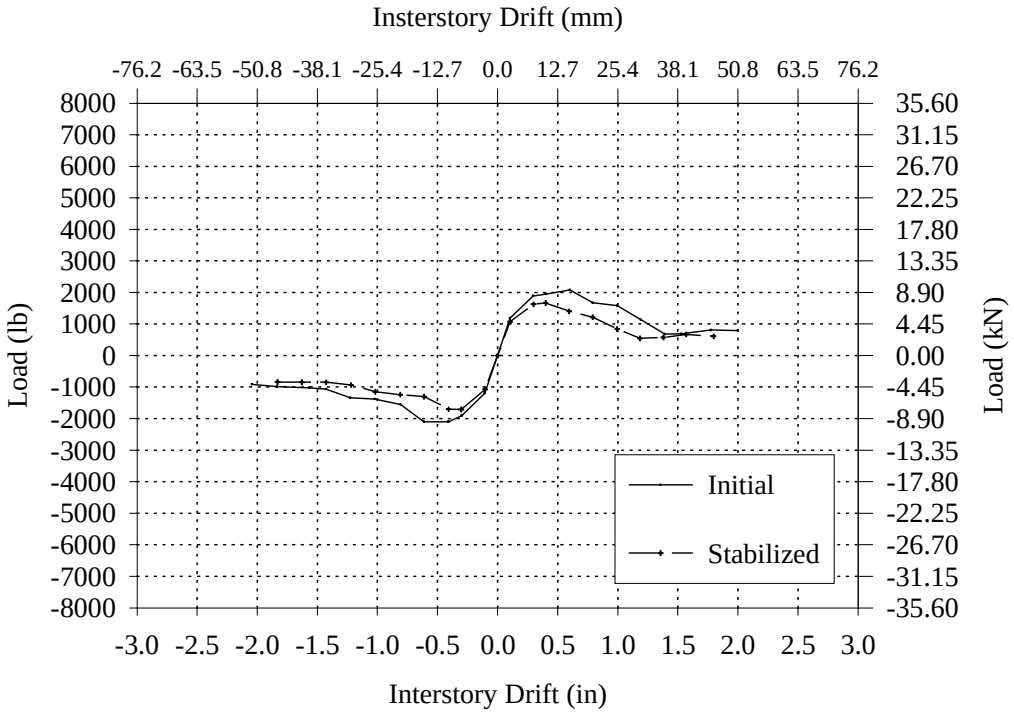


Figure B.8 – Cyclic Envelope Curve for Wall AC-2.

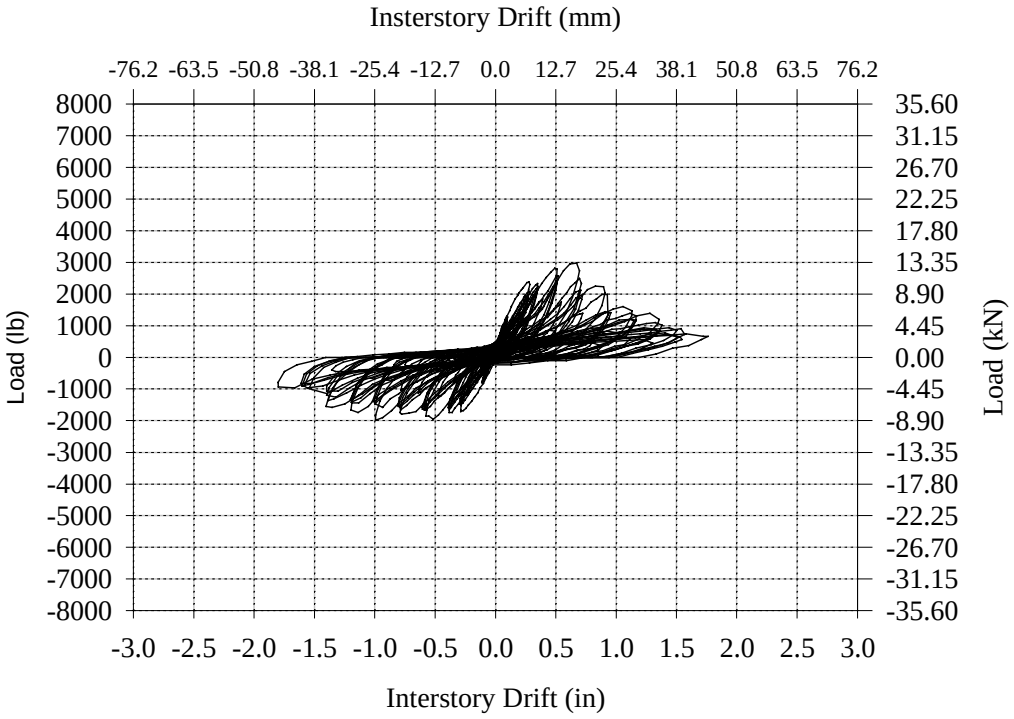


Figure B.9 – Total Hysteresis Curve for Wall AC-3.

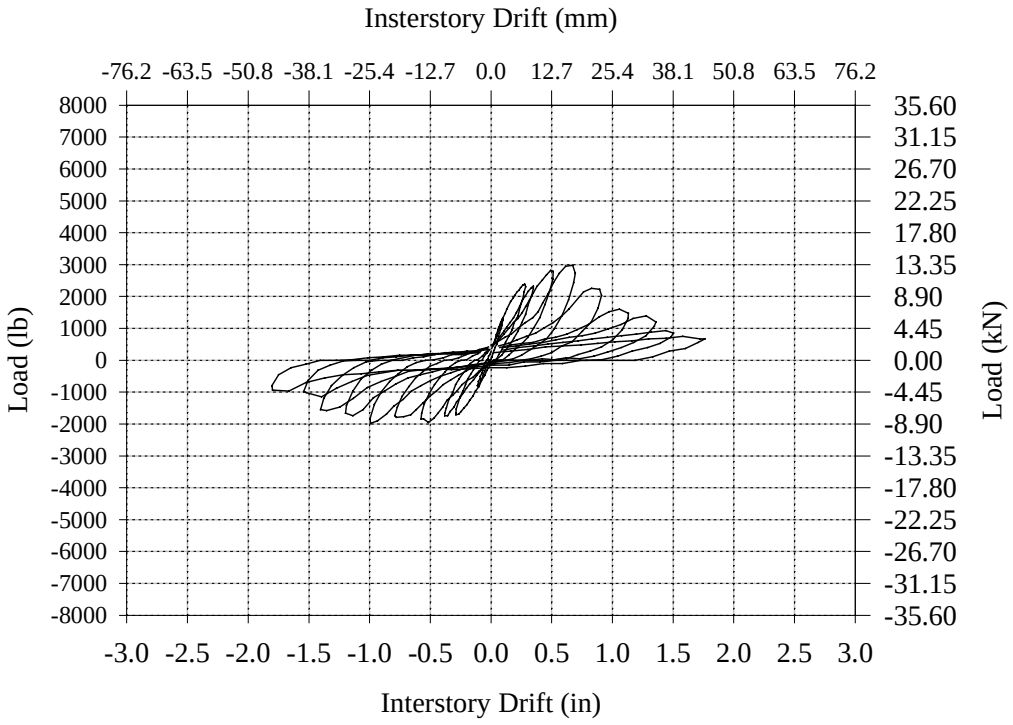


Figure B.10 – Initial Hysteresis Curve for Wall AC-3.

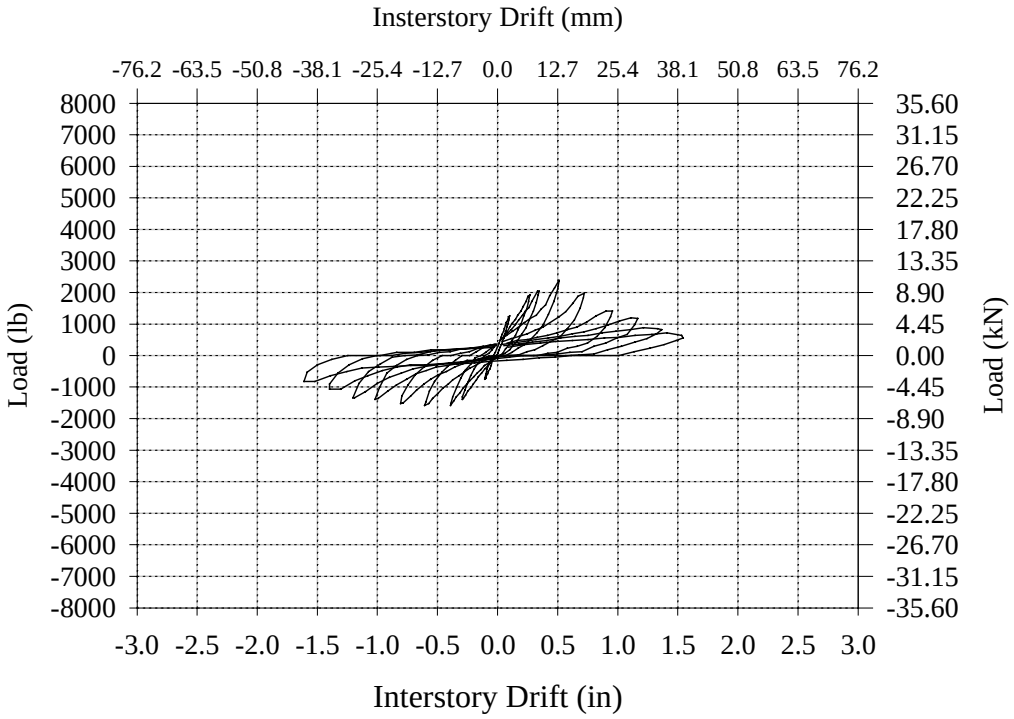


Figure B.11 – Stabilized Hysteresis Curve for Wall AC-3.

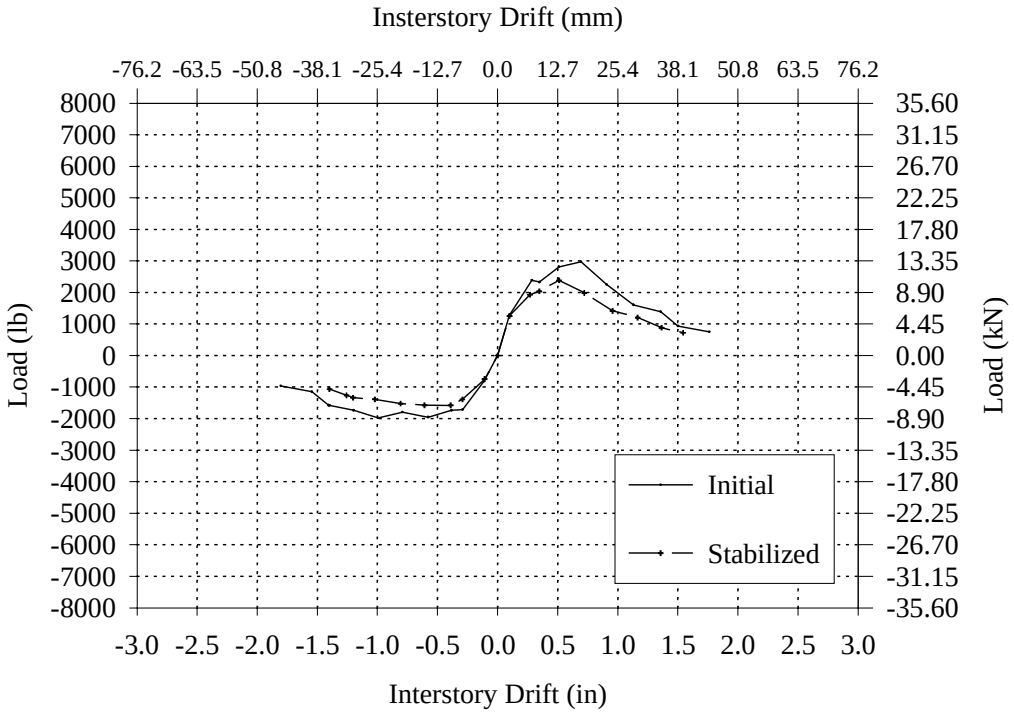


Figure B.12 – Cyclic Envelope Curve for Wall AC-3.

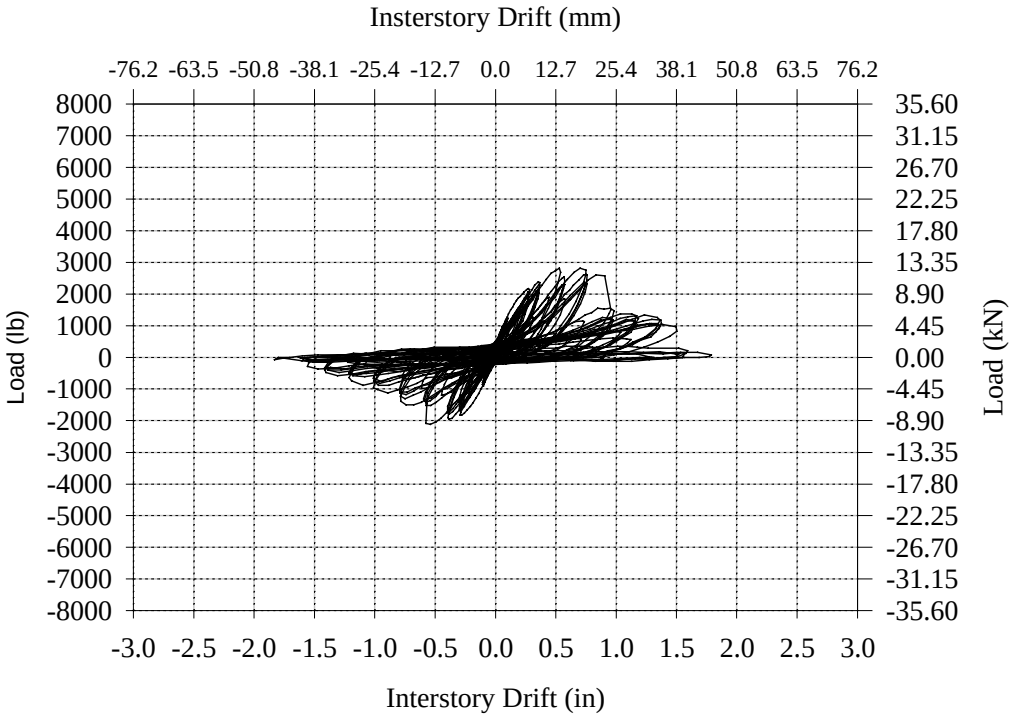


Figure B.13 – Total Hysteresis Curve for Wall BC-1.

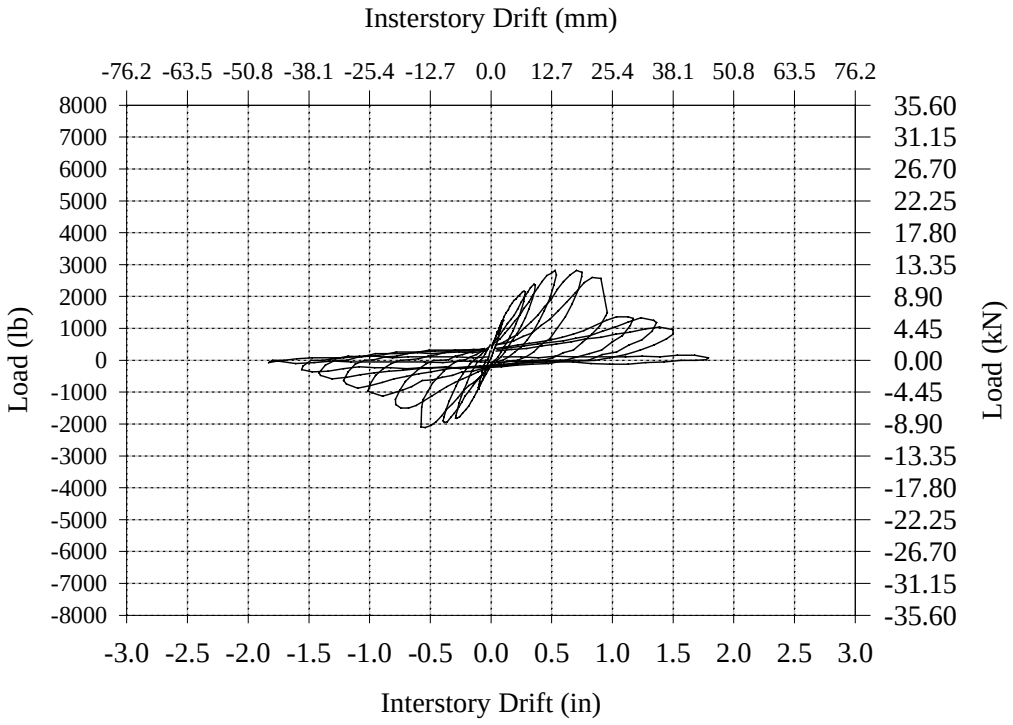


Figure B.14 – Initial Hysteresis Curve for Wall BC-1.

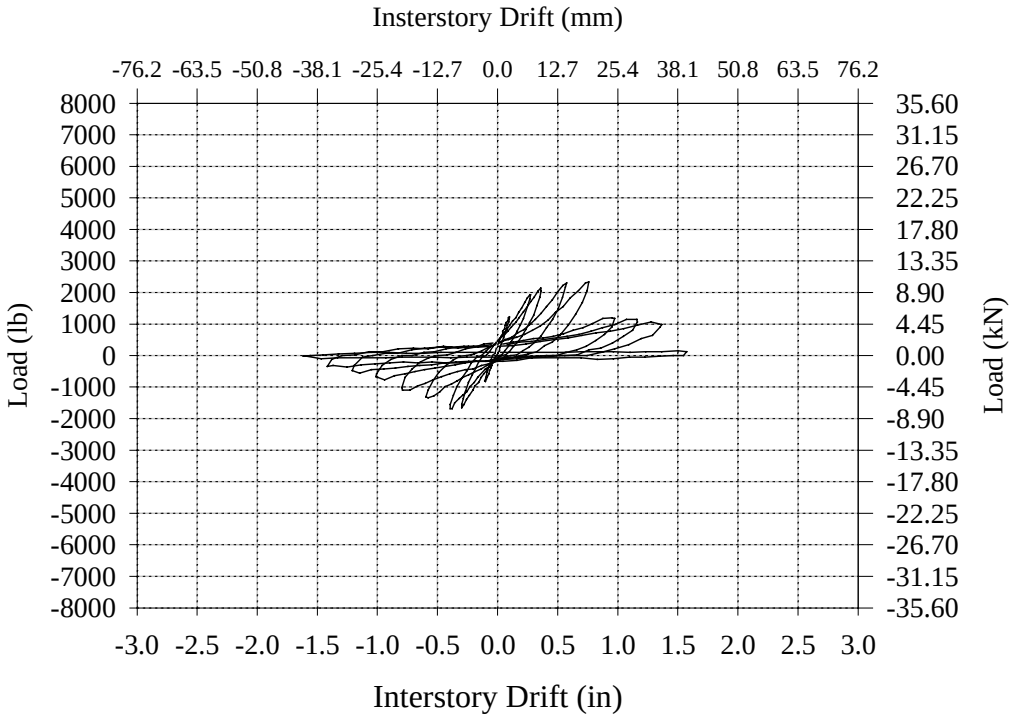


Figure B.15 – Stabilized Hysteresis Curve for Wall BC-1.

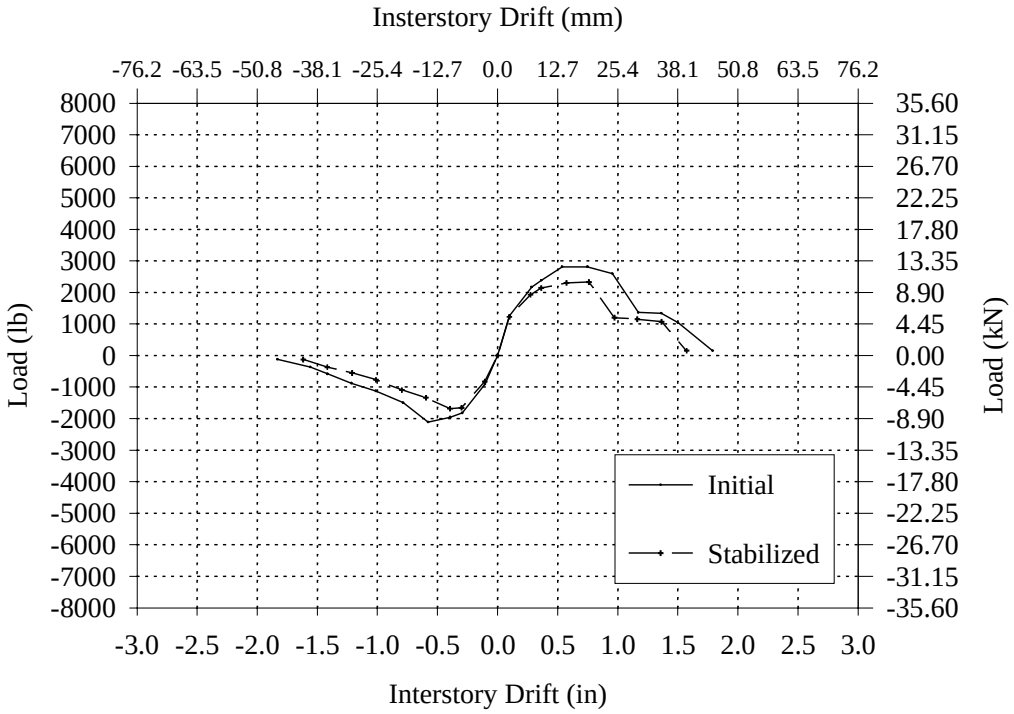


Figure B.16 – Cyclic Envelope Curve for Wall BC-1.

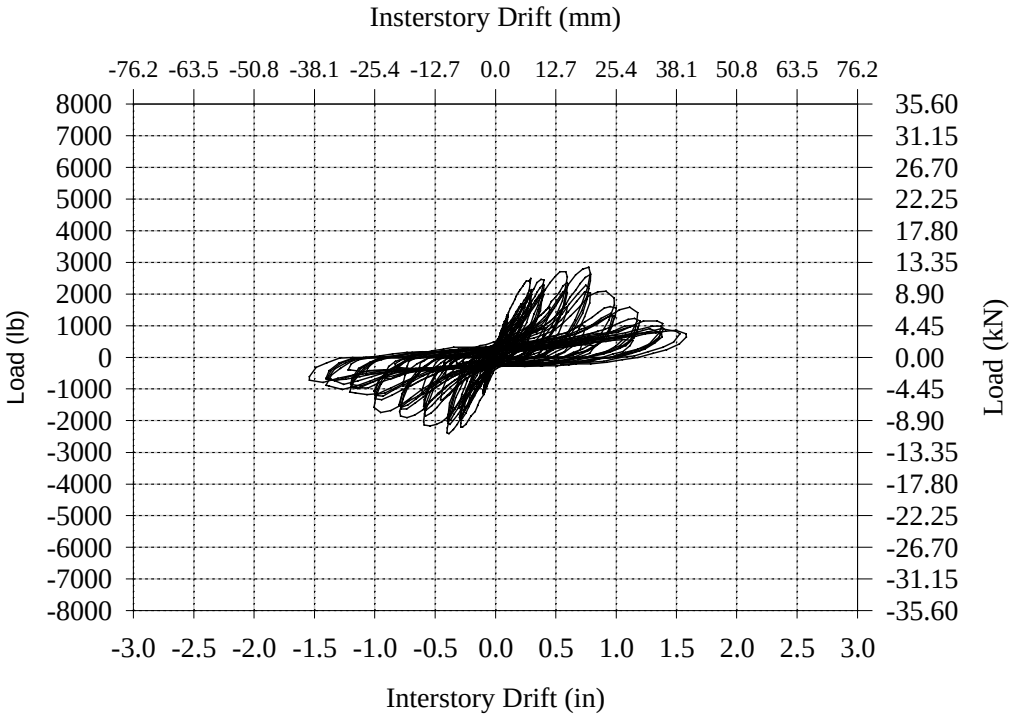


Figure B.17 – Total Hysteresis Curve for Wall BC-2.

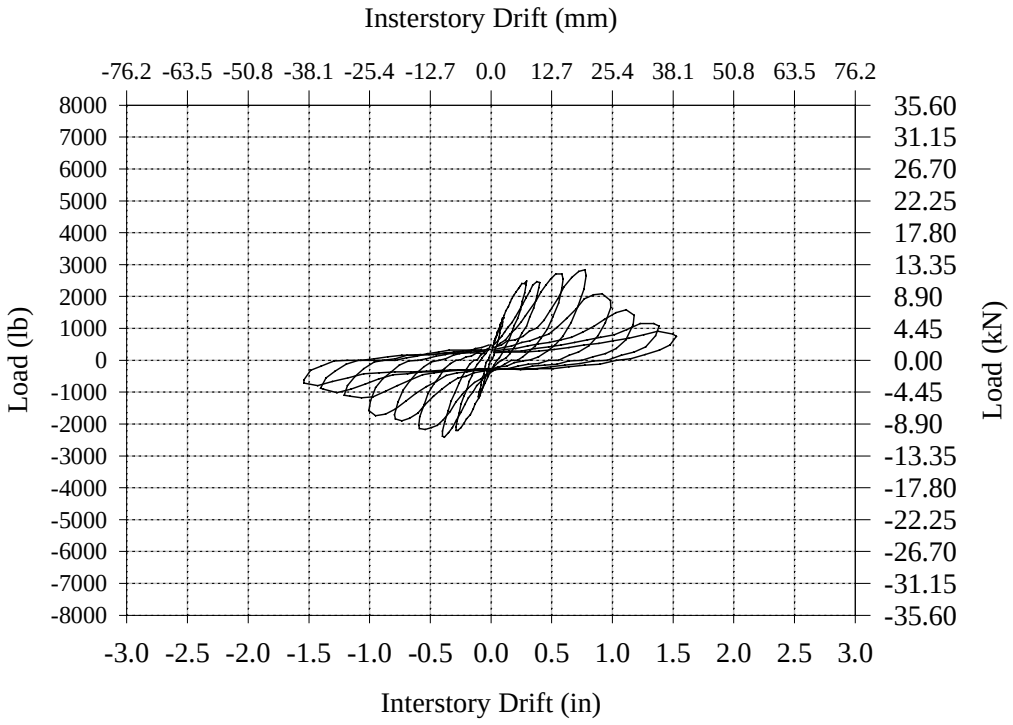


Figure B.18 – Initial Hysteresis Curve for Wall BC-2.

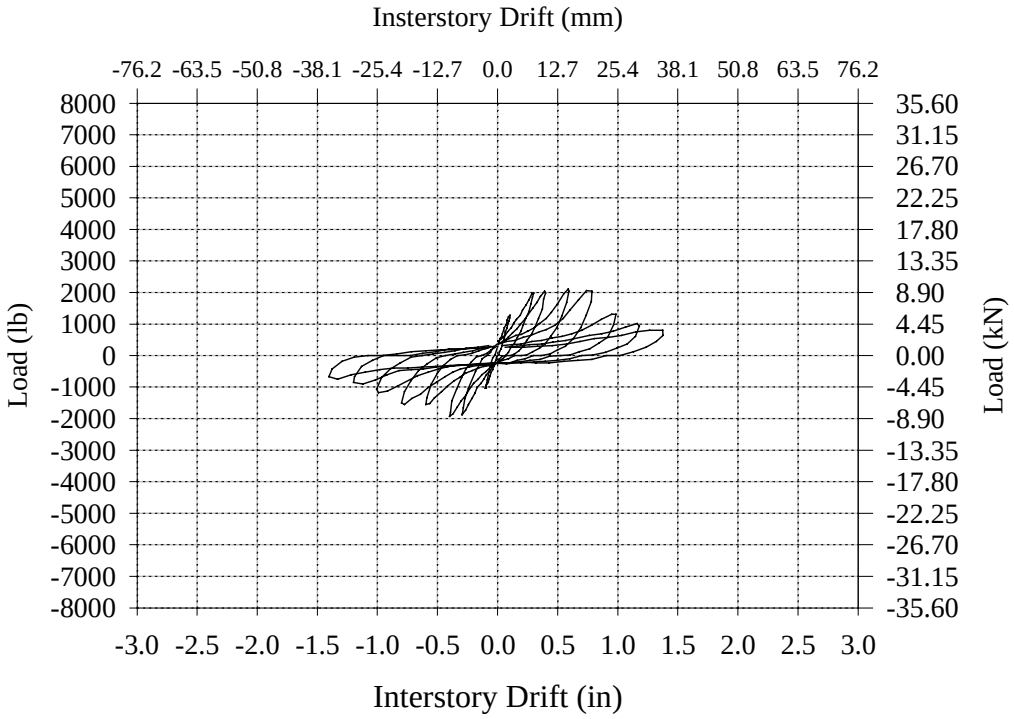


Figure B.19 – Stabilized Hysteresis Curve for Wall BC-2.

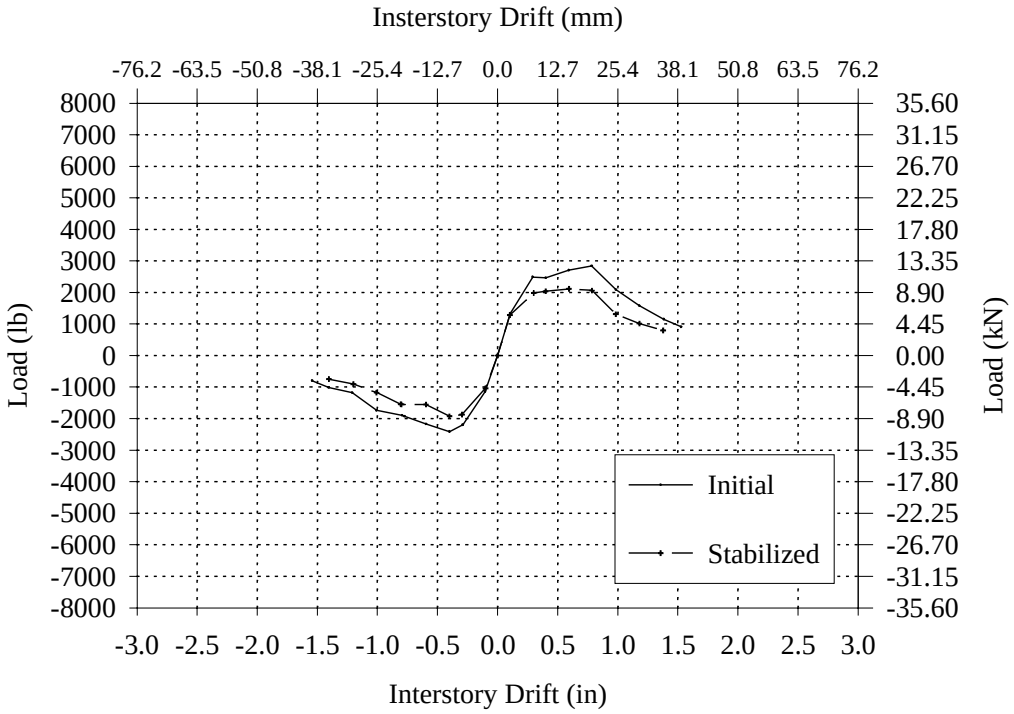


Figure B.20 – Cyclic Envelope Curve for Wall BC-2.

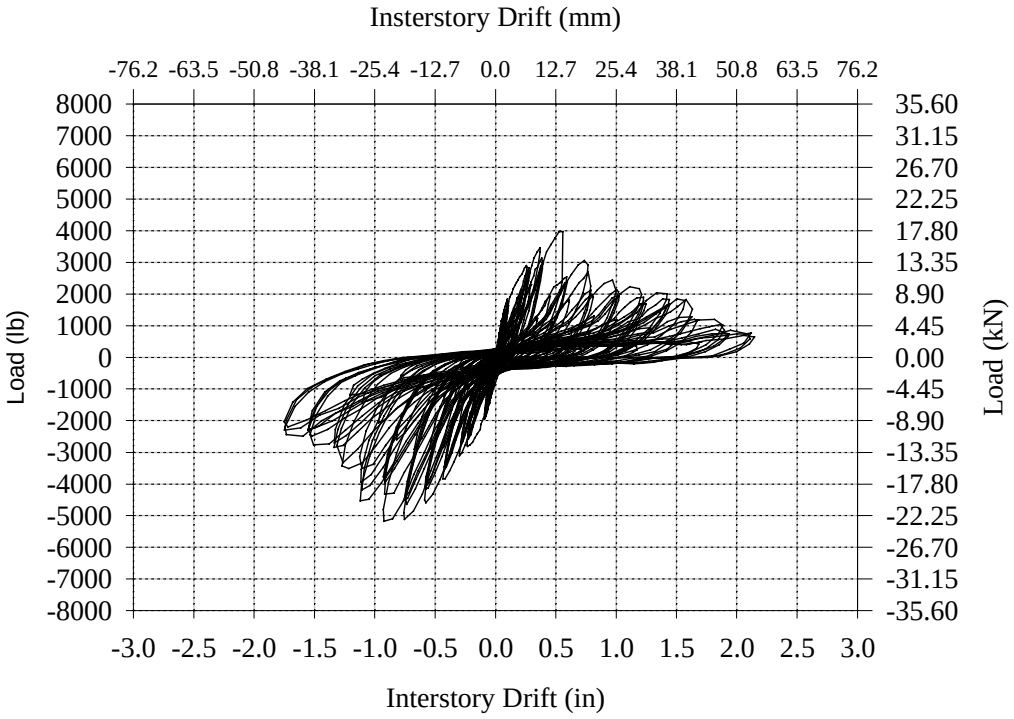


Figure B.21 – Total Hysteresis Curve for Wall CC-1.

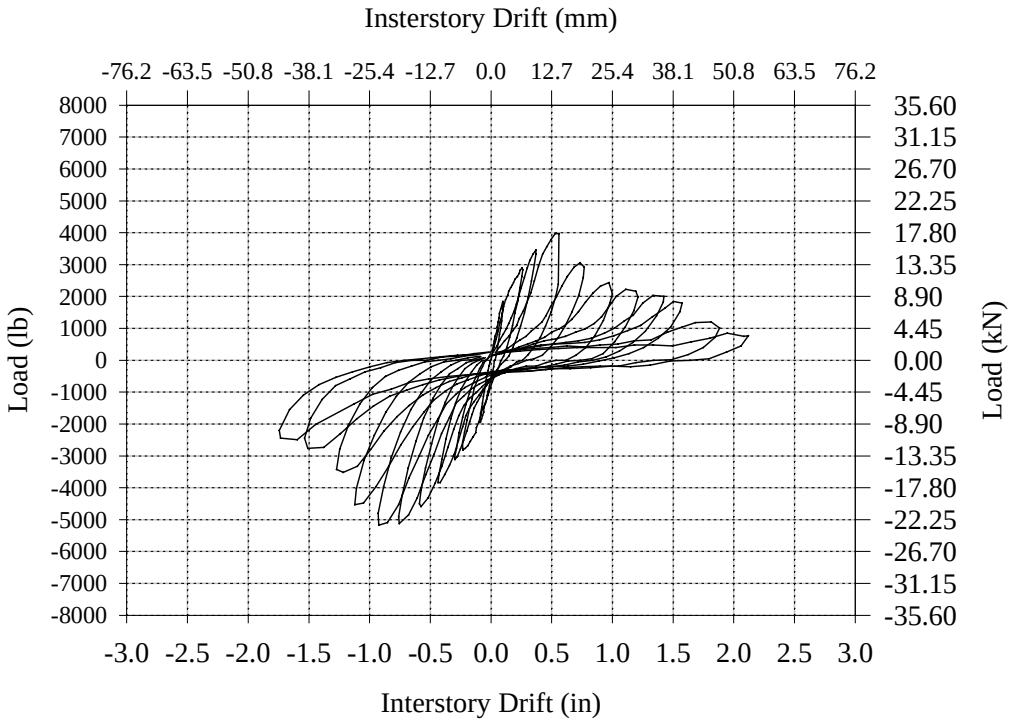


Figure B.22 – Initial Hysteresis Curve for Wall CC-1.

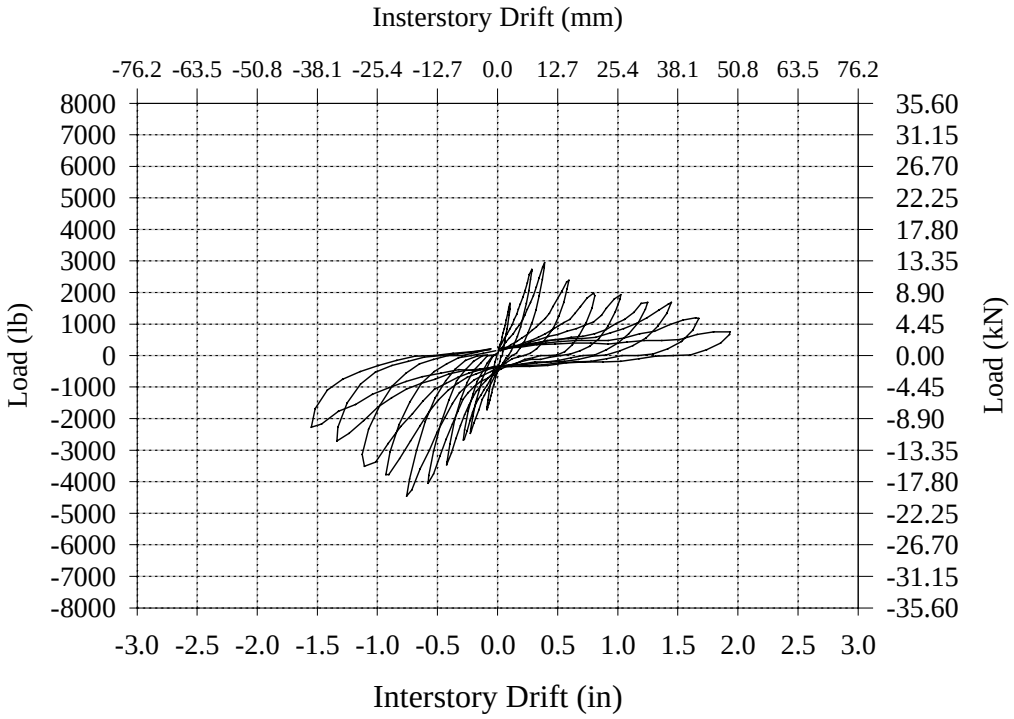
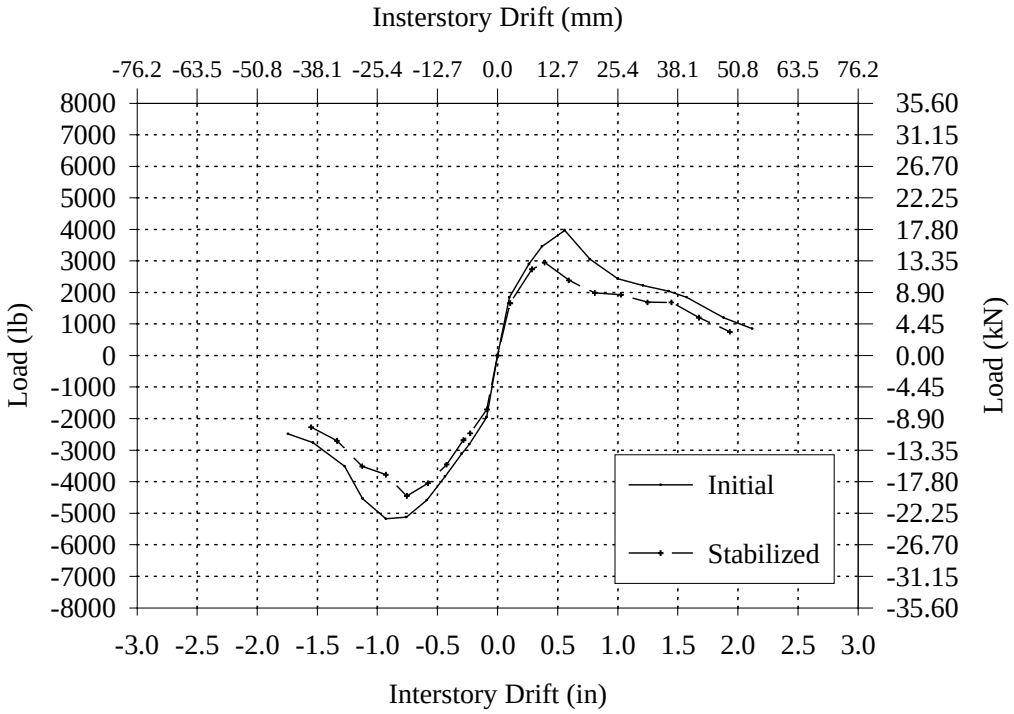


Figure B.23 – Stabilized Hysteresis Curve for Wall CC-1.



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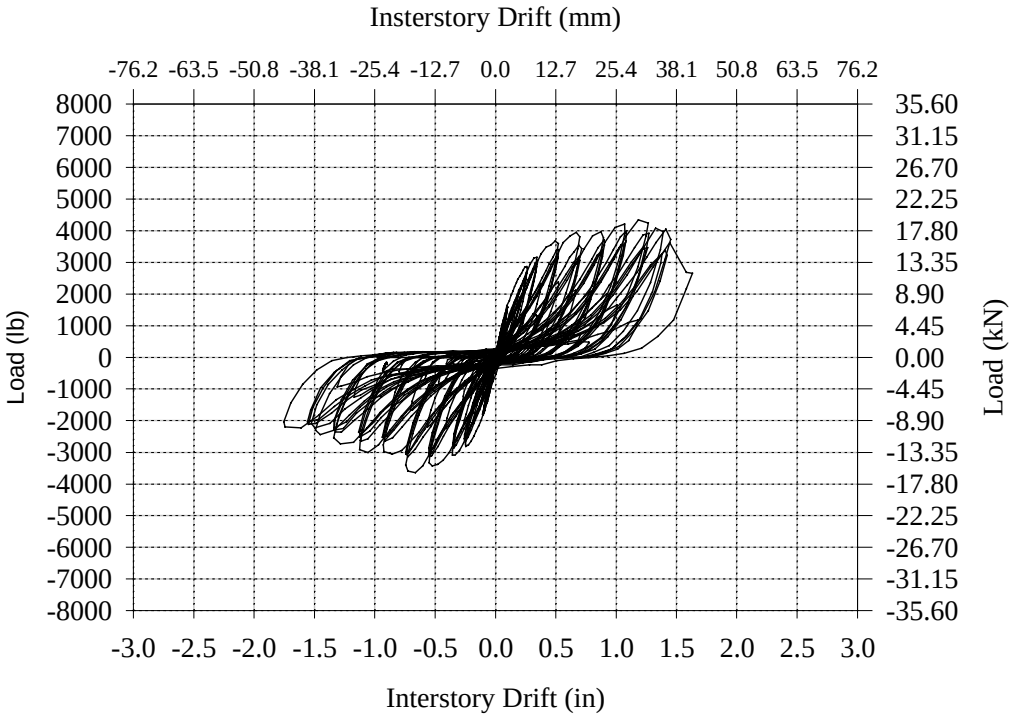


Figure B.25 – Total Hysteresis Curve for Wall CC-2.

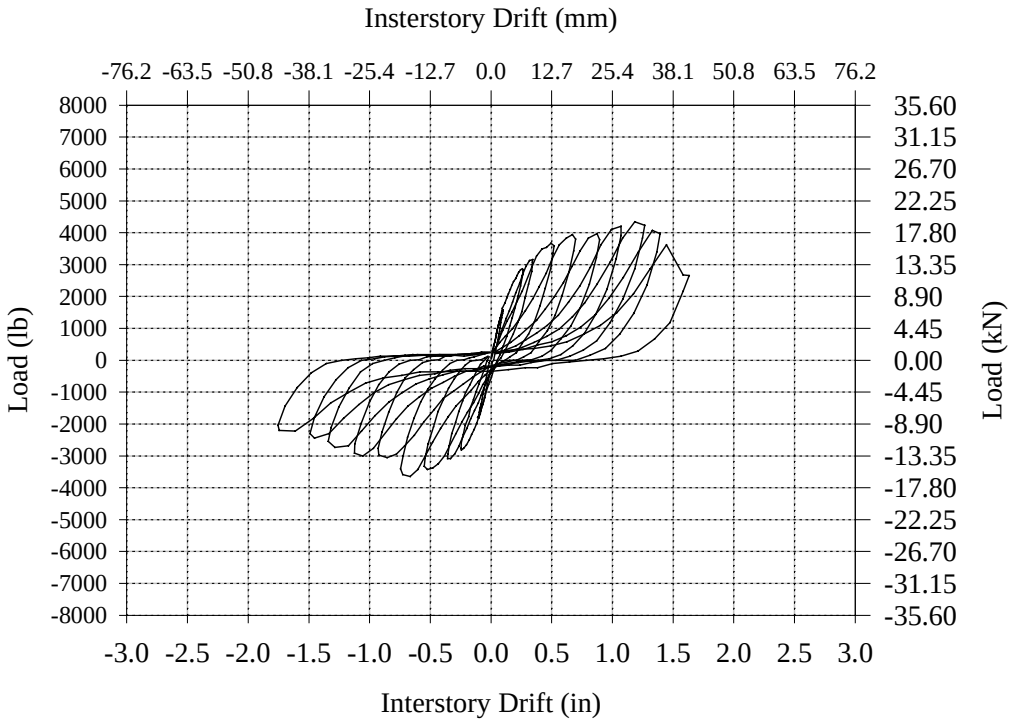


Figure B.26 – Initial Hysteresis Curve for Wall CC-2.

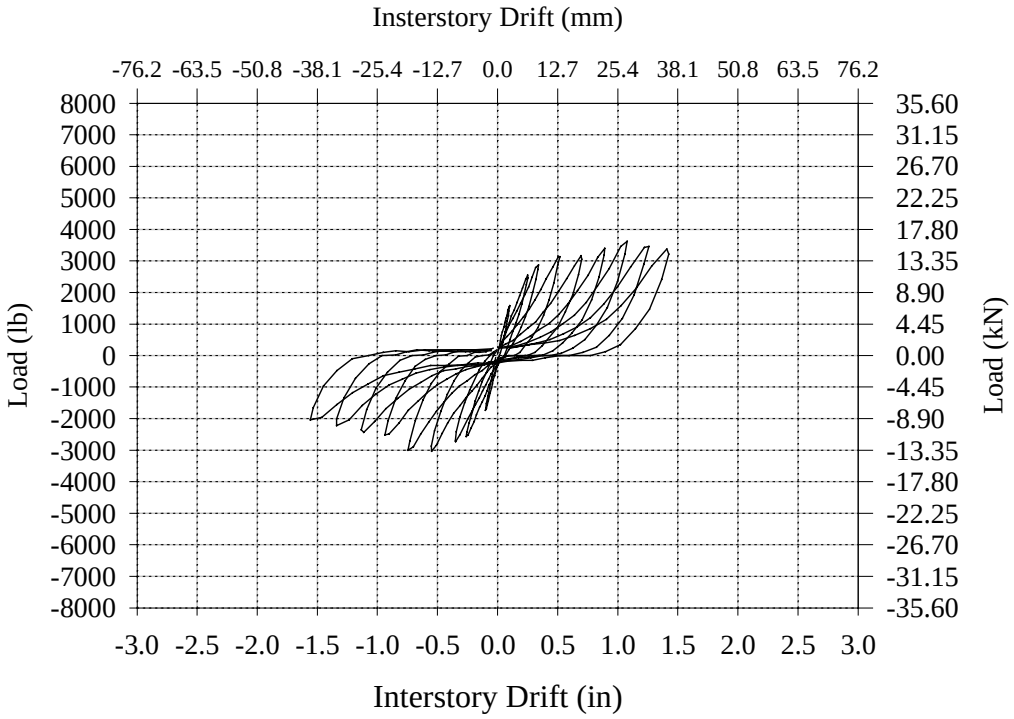


Figure B.27 – Stabilized Hysteresis Curve for Wall CC-2.

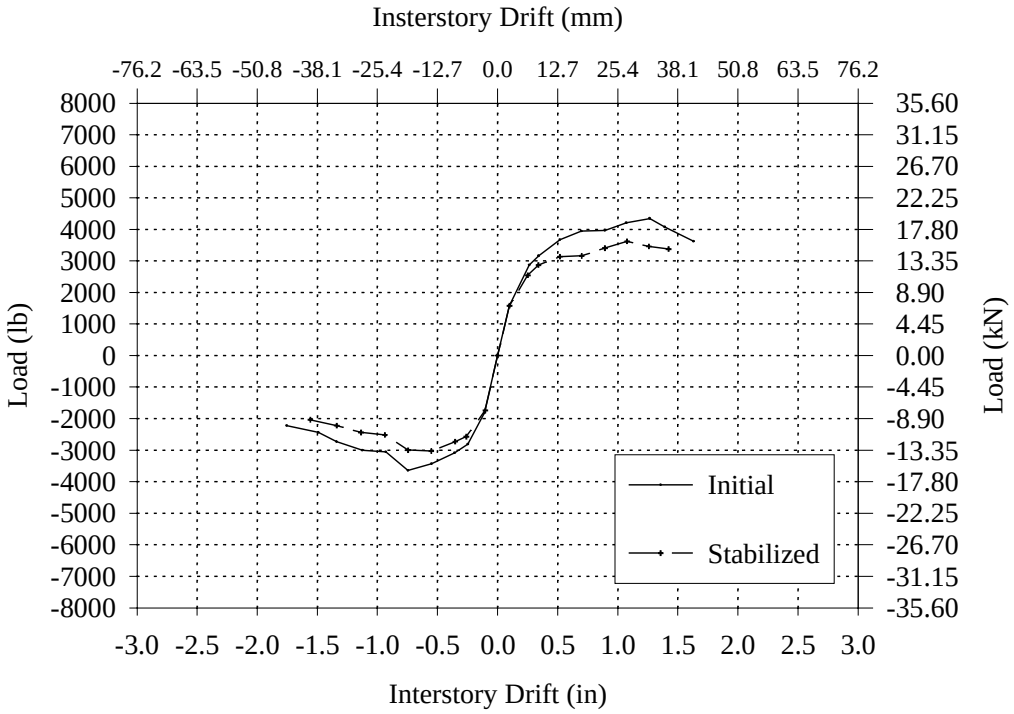


Figure B.28 – Cyclic Envelope Curve for Wall CC-2.

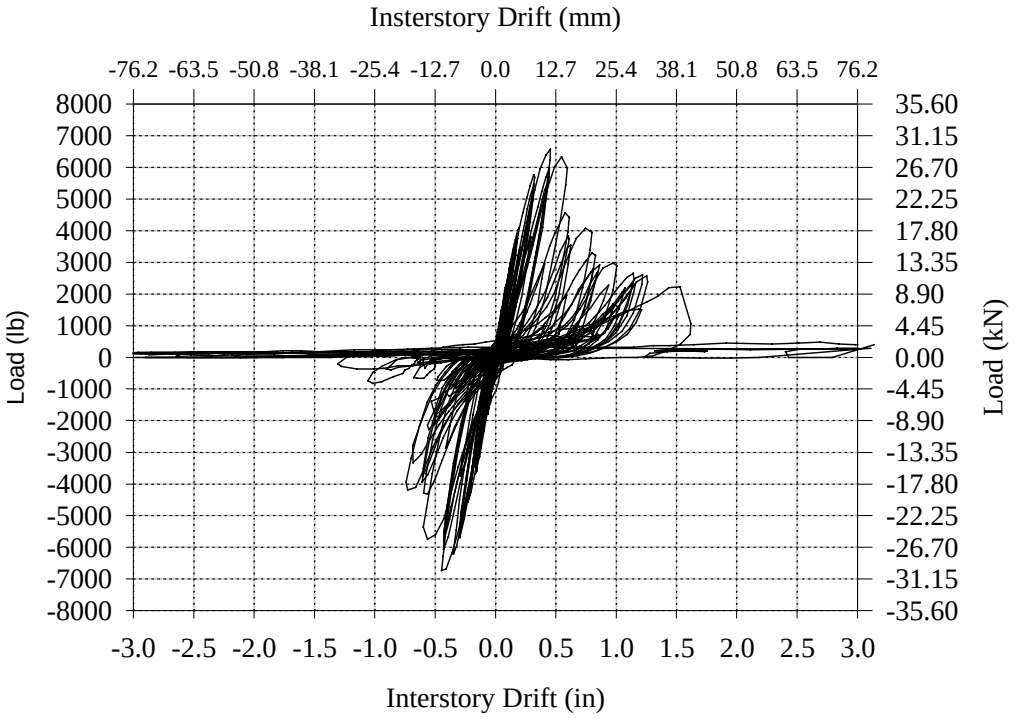


Figure B.29 – Total Hysteresis Curve for Wall DC-1.

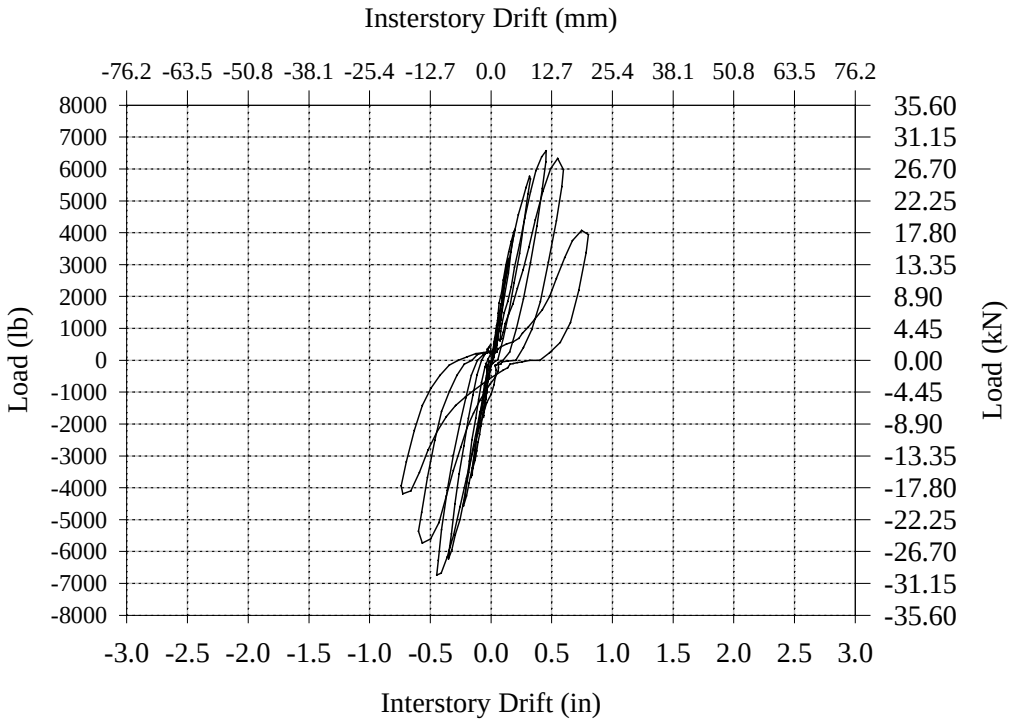


Figure B.30 – Initial Hysteresis Curve for Wall DC-1.

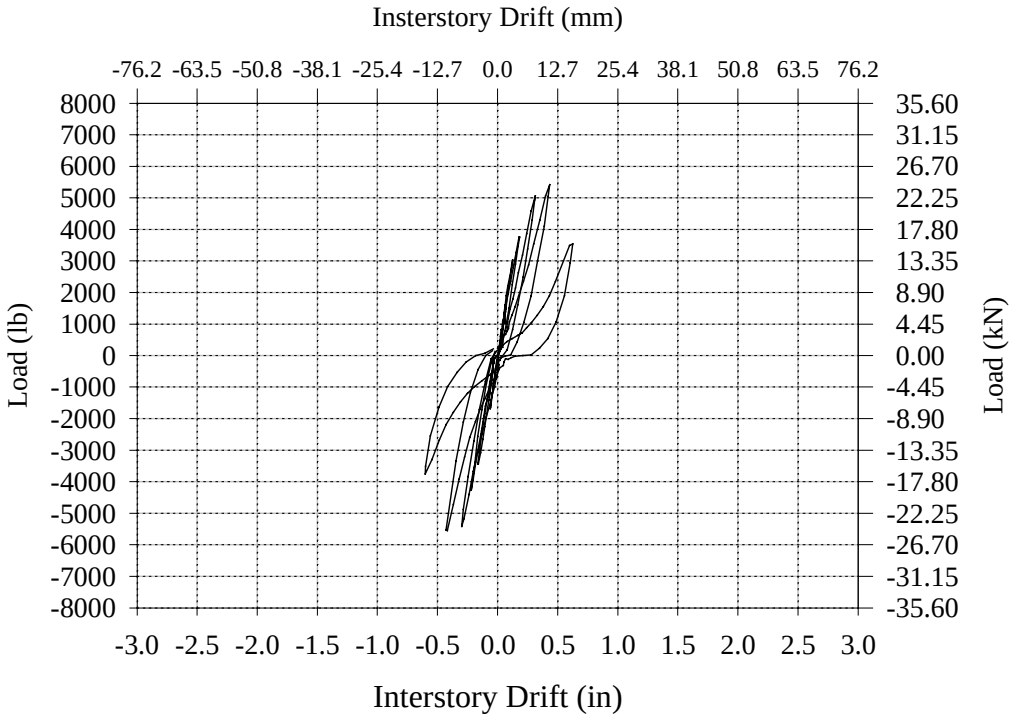


Figure B.31 – Stabilized Hysteresis Curve for Wall DC-1.

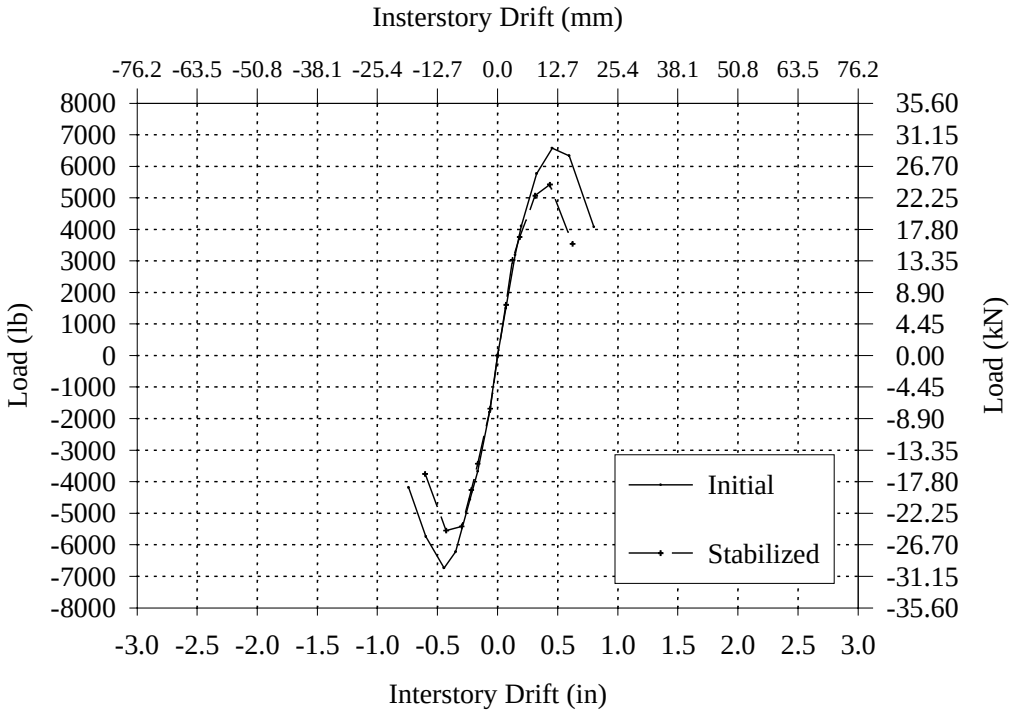


Figure B.32 – Cyclic Envelope Curve for Wall DC-1.

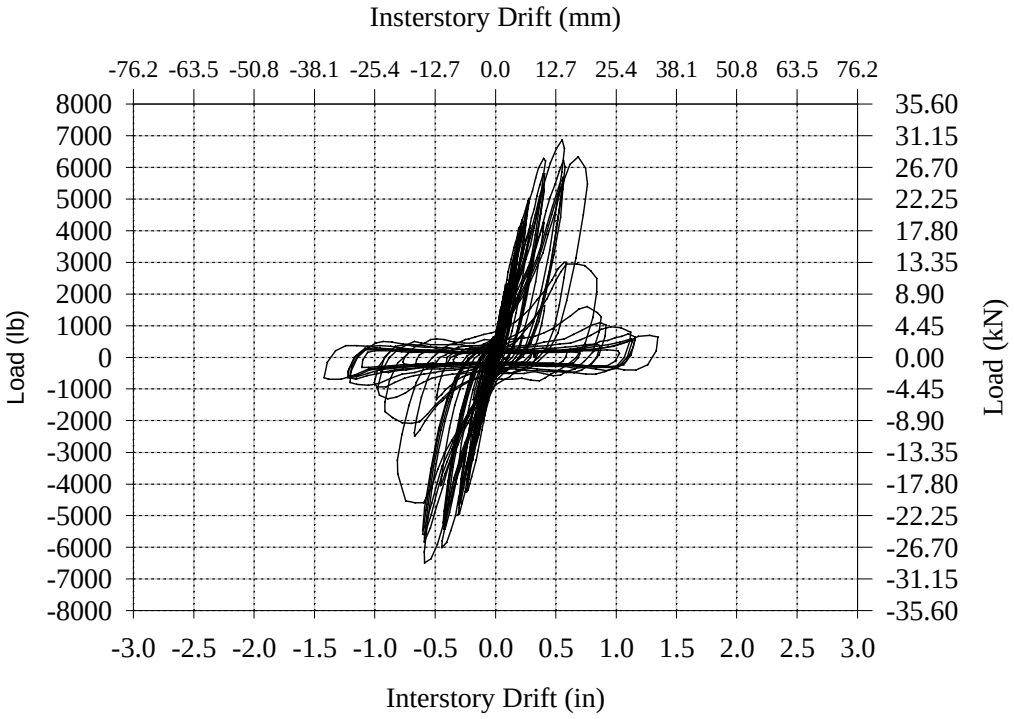


Figure B.33 – Total Hysteresis Curve for Wall DC-2.

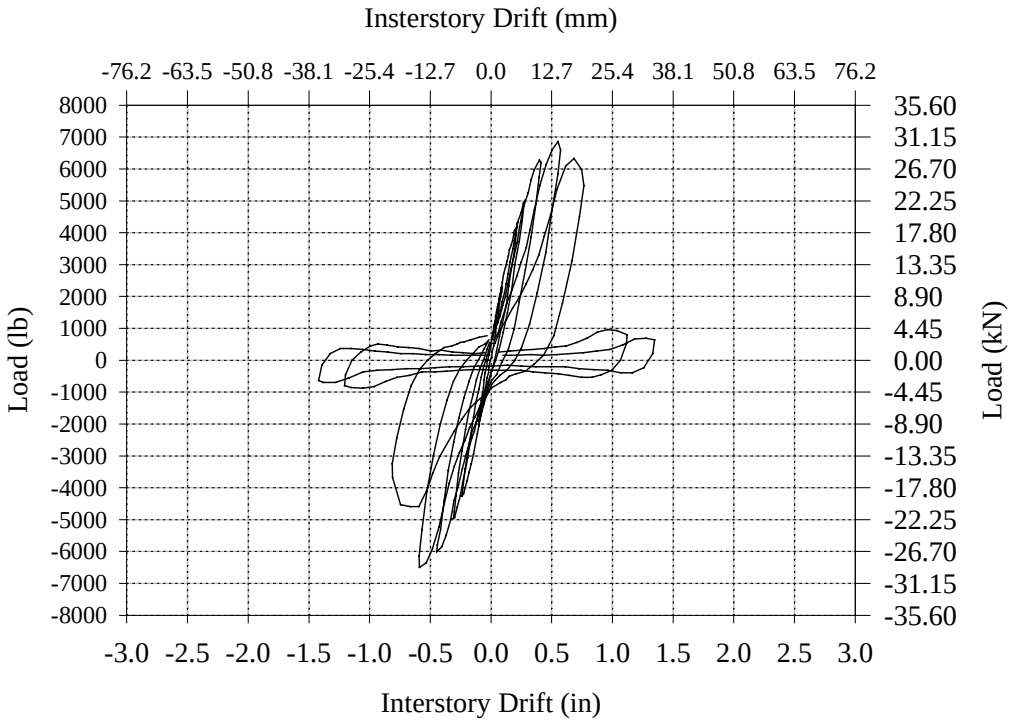


Figure B.34 – Initial Hysteresis Curve for Wall DC-2.

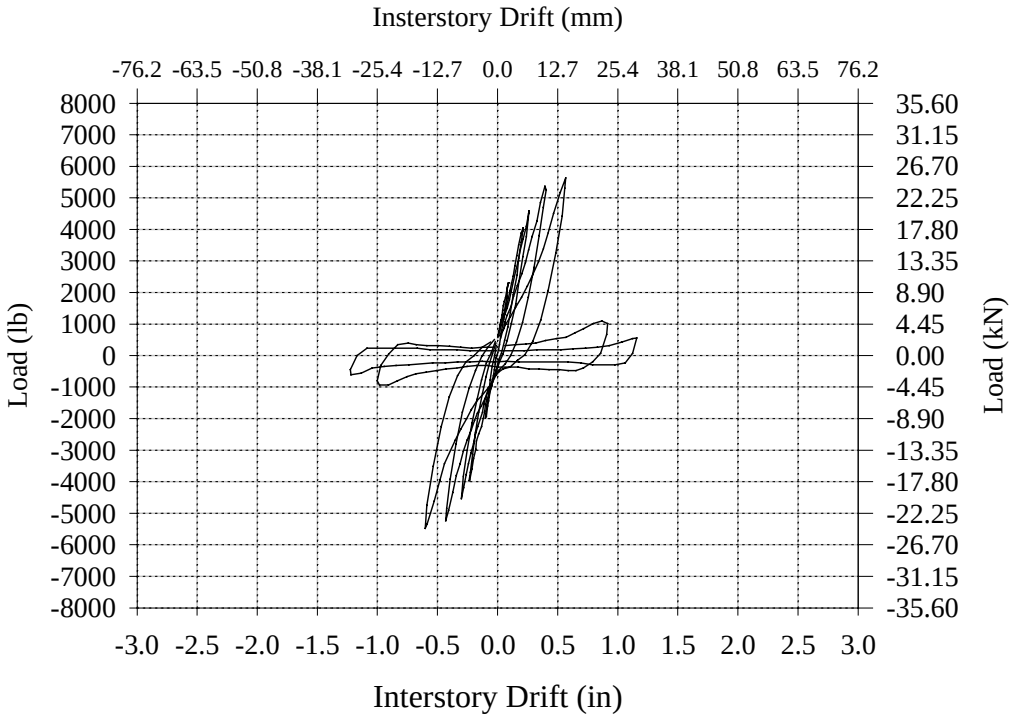


Figure B.35 – Stabilized Hysteresis Curve for Wall DC-2.

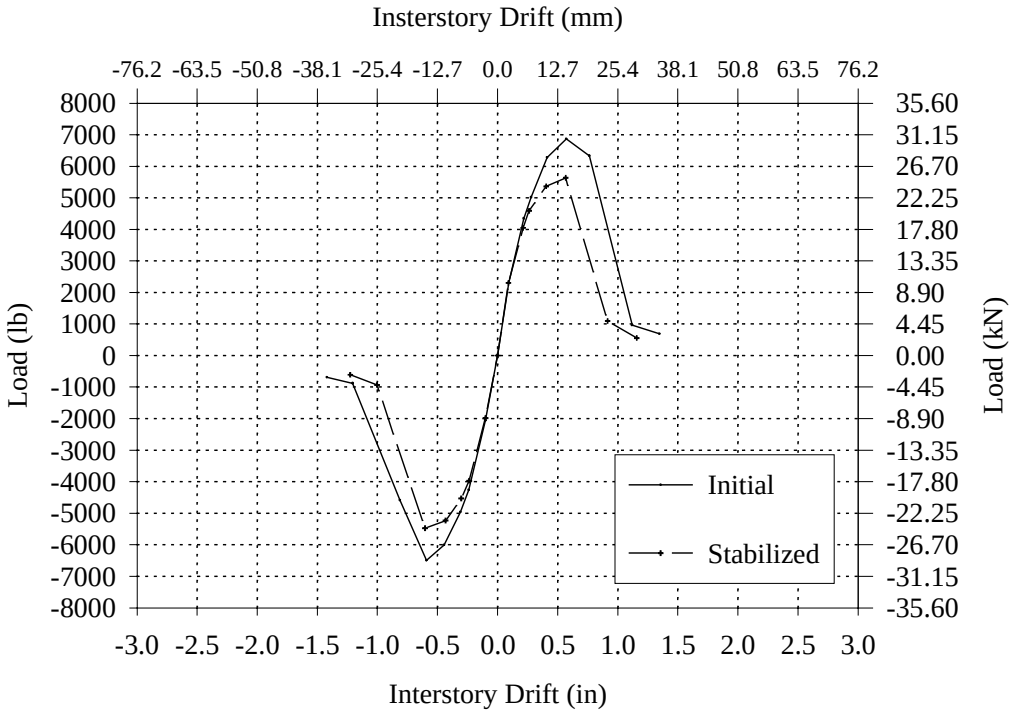


Figure B.36 – Cyclic Envelope Curve for Wall DC-2.

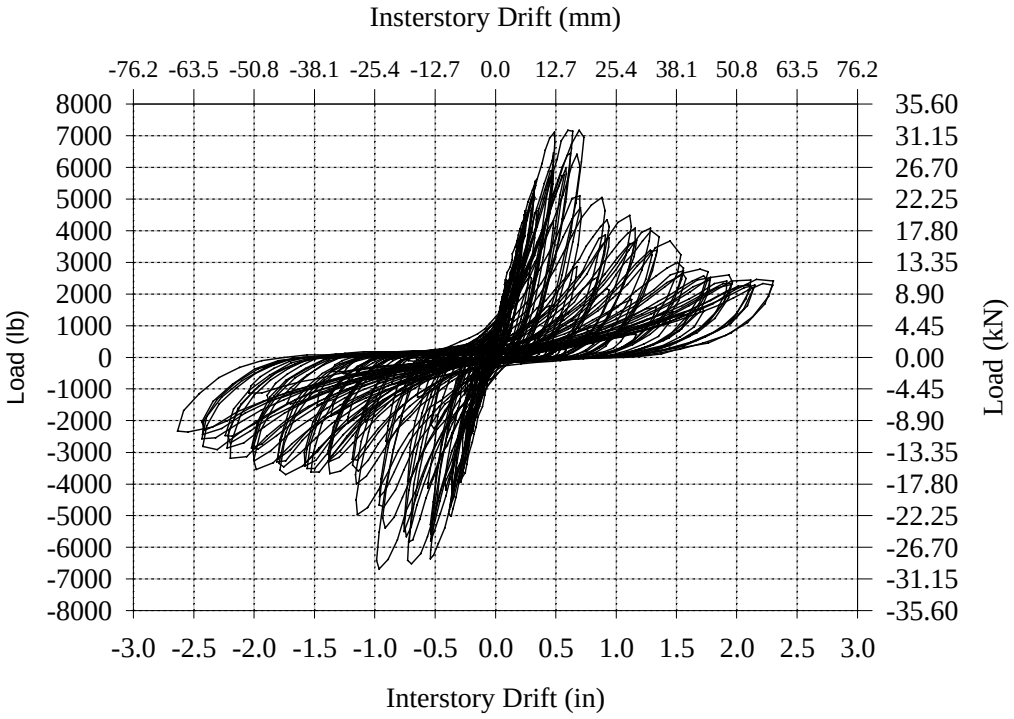


Figure B.37 – Total Hysteresis Curve for Wall EC-1.

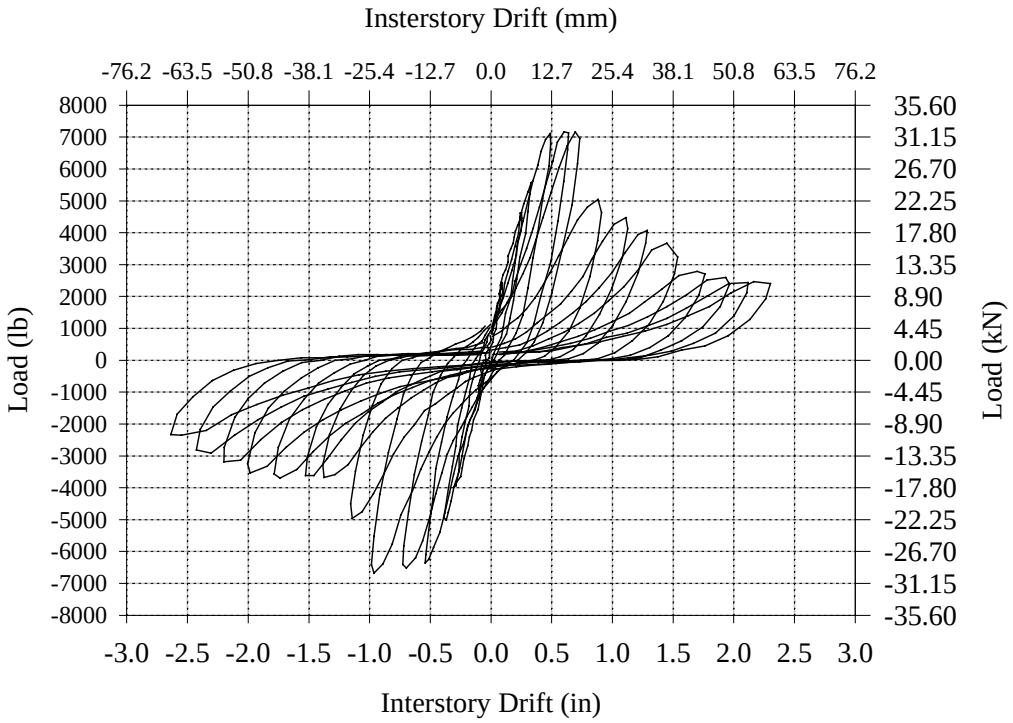


Figure B.38 – Initial Hysteresis Curve for Wall EC-1.

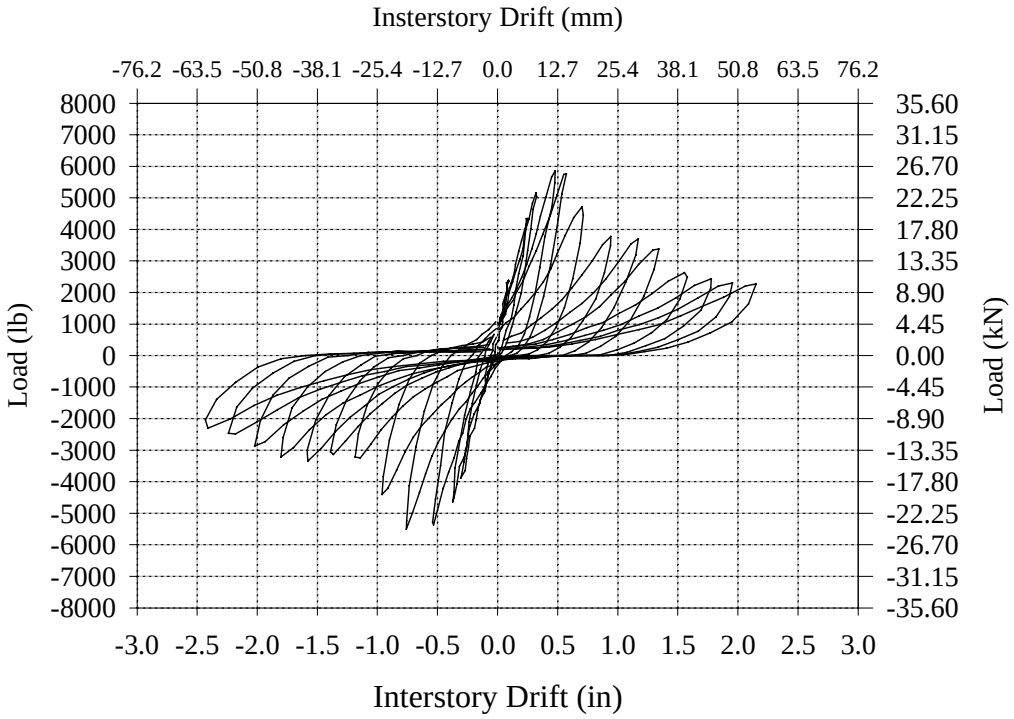


Figure B.39 – Stabilized Hysteresis Curve for Wall EC-1.

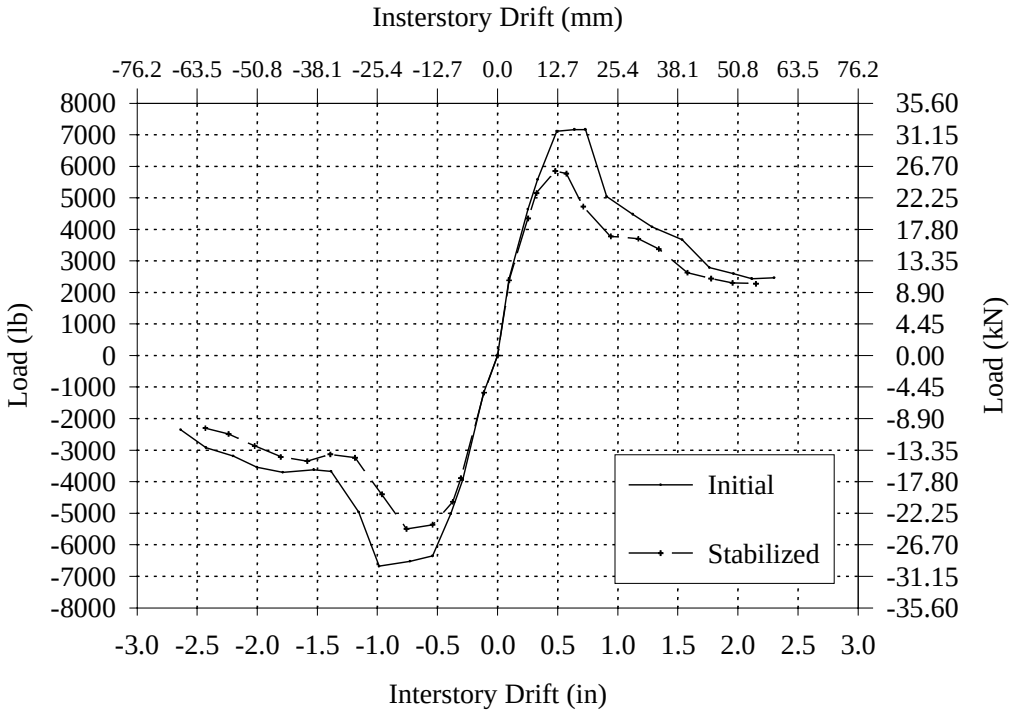


Figure B.40 – Cyclic Envelope Curve for Wall EC-1.

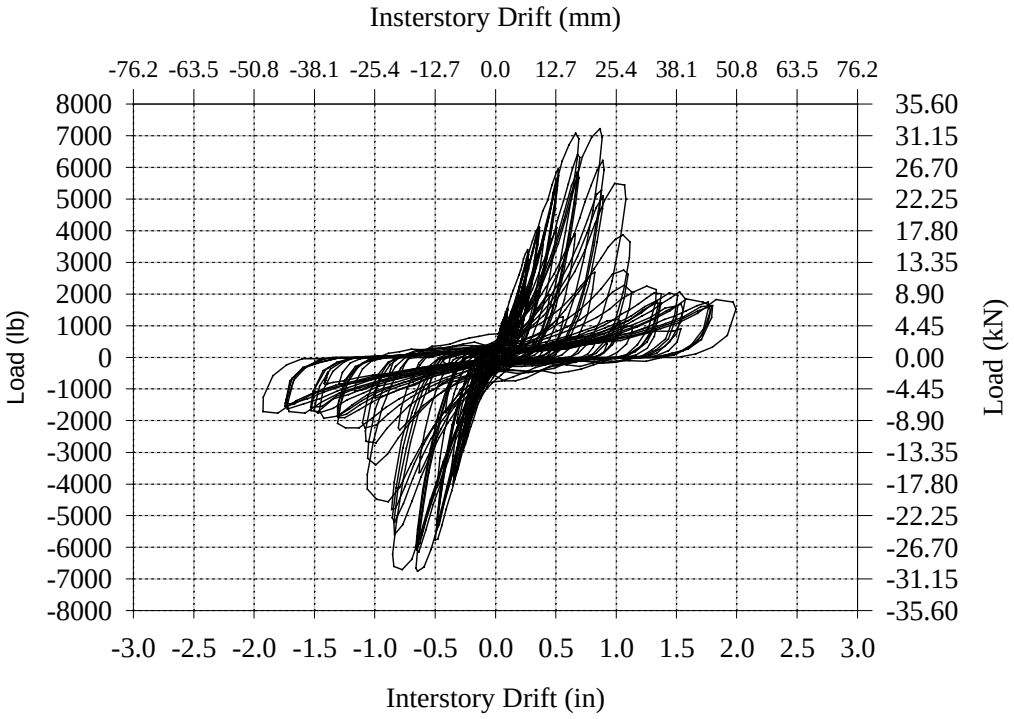


Figure B.41 – Total Hysteresis Curve for Wall EC-2.

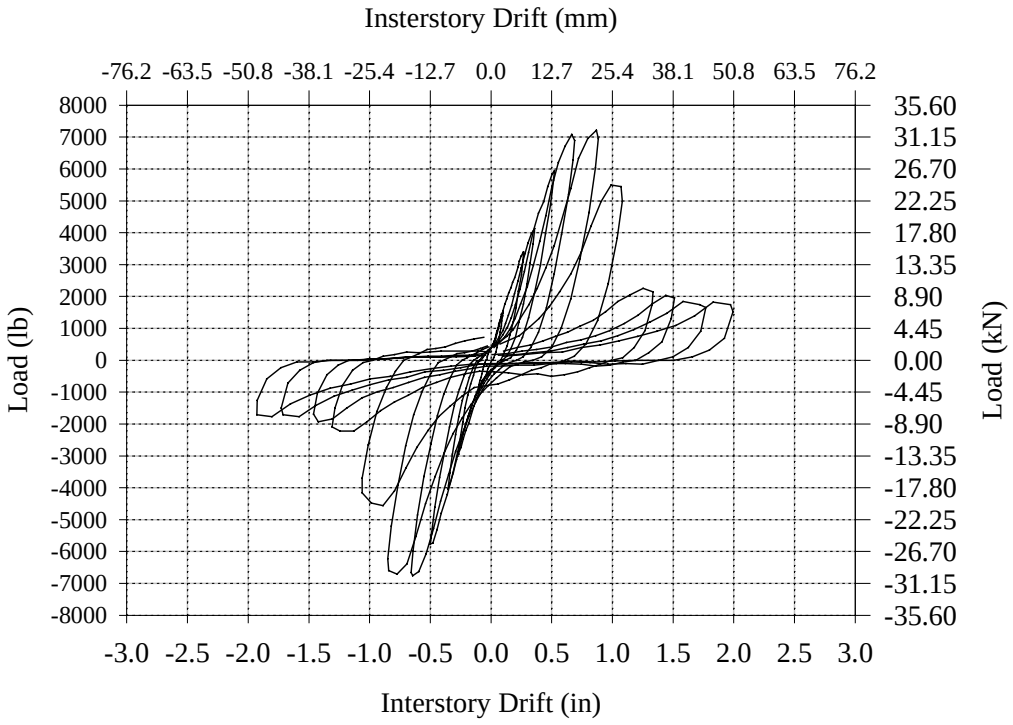


Figure B.42 – Initial Hysteresis Curve for Wall EC-2.

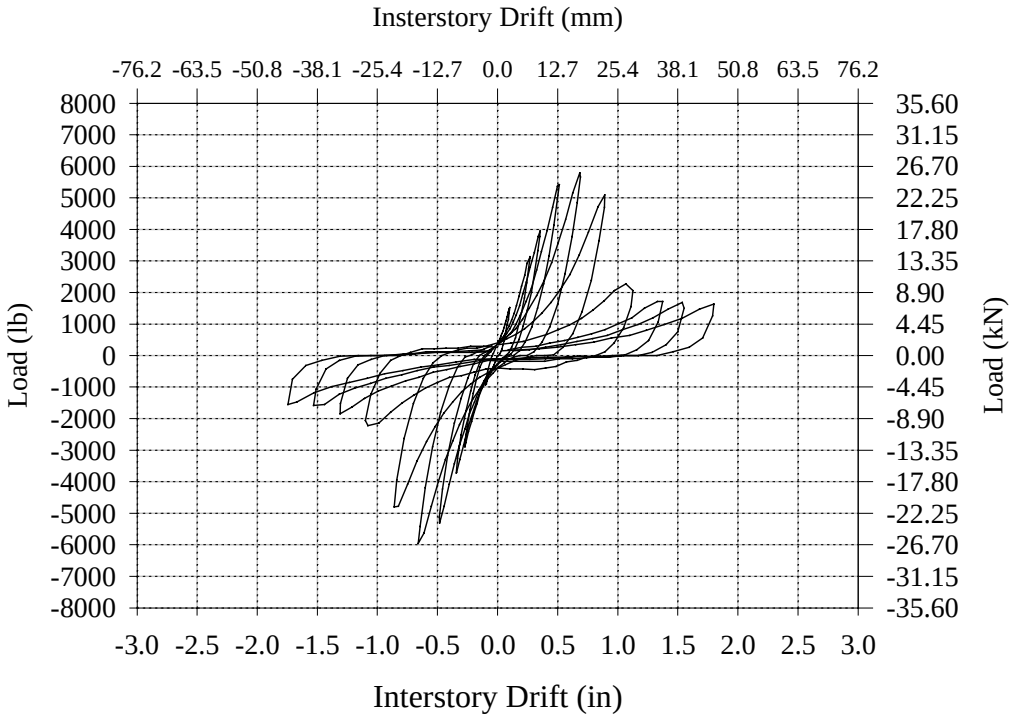


Figure B.43 – Stabilized Hysteresis Curve for Wall EC-2.

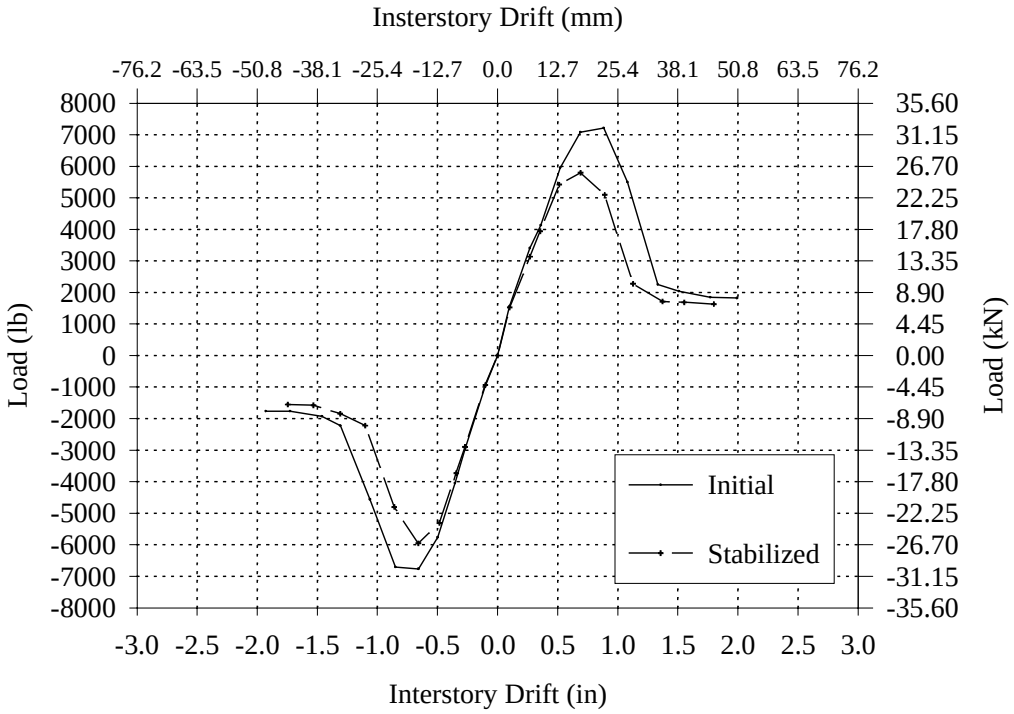


Figure B.44 – Cyclic Envelope Curve for Wall EC-2.

APPENDIX C

Tables C.1 – C.5 present the values obtained from the envelope curve analysis of the cyclic tests for Walls A – D as well as Wall E. The values presented in the tables include load and deflection at maximum load resistance, yield, and failure for both positive and negative, initial and stabilized cyclic envelope curves. The values of elastic stiffness and ductility are also presented in the same manner.

Table C.1 – Cyclic Envelope Curve Results for Wall A.

Property	Initial Wall AC-1	AC-2	AC-3	Average	Stabilized Wall AC-1	AC-2	AC-3	Average
F_{max} (-) (lb)	3000	2100	2000		2500	1700	1600	
F_{max} (+)	3200	2100	3000		2550	1650	2400	
F_{max} avg	3100	2100	2500	2550	2550	1700	2000	2050
Δ_{max} (-) (in)	0.80	0.61	0.99		0.79	0.30	0.61	
Δ_{max} (+)	0.80	0.60	0.70		0.60	0.40	0.51	
Δ_{max} avg	0.80	0.61	0.84	0.75	0.70	0.35	0.56	0.54
$F_{failure}$ (-) (lb)	3000	2100	1600		2500	1700	1250	
$F_{failure}$ (+)	3200	2100	2950		2550	1650	2400	
$F_{failure}$ avg	3100	2100	2250	2500	2550	1700	1800	2000
$\Delta_{failure}$ (-) (in)	0.99	0.61	1.40		0.79	0.41	1.26	
$\Delta_{failure}$ (+)	0.80	0.60	0.70		0.60	0.40	0.51	
$\Delta_{failure}$ avg	0.89	0.61	1.05	0.85	0.70	0.40	0.88	0.66
F_{yield} (-) (lb)	2650	1900	1800		2050	1350	1450	
F_{yield} (+)	2600	1850	2500		2100	1500	1950	
F_{yield} avg	2600	1900	2150	2200	2050	1400	1700	1750
Δ_{yeild} (-) (in)	0.31	0.17	0.25		0.21	0.13	0.21	
Δ_{yeild} (+)	0.21	0.16	0.19		0.20	0.14	0.16	
Δ_{yield} avg	0.26	0.17	0.22	0.21	0.21	0.14	0.18	0.18
k_e (-) (lb/in)	8600	11300	7300		9500	10400	6900	
k_e (+)	9300	11500	13000		10300	10400	12600	
k_e avg	9000	11400	10200	10200	9900	10400	9800	10000
Ductility (-)	3.2	3.6	5.7		3.7	3.1	6.0	
Ductility (+)	2.9	3.7	3.6		4.0	2.8	3.3	
Ductility avg	3.0	3.7	4.6	3.8	3.8	2.9	4.7	3.8

Table C.2 – Cyclic Envelope Curve Results for Wall B.

Property	Initial Wall BC-1	BC-2	Average	Stabilized Wall BC-1	BC-2	Average
F_{max} (-) (lb)	2100	2400		1700	1950	
F_{max} (+)	2800	2850		2350	2100	
F_{max} avg	2450	2650	2550	2000	2000	2000
Δ_{max} (-) (in)	0.58	0.40		0.40	0.40	
Δ_{max} (+)	0.75	0.79		0.76	0.60	
Δ_{max} avg	0.66	0.59	0.63	0.58	0.50	0.54
$F_{failure}$ (-) (lb)	2100	1950		1700	1550	
$F_{failure}$ (+)	2800	2850		2350	2050	
$F_{failure}$ avg	2450	2400	2400	2000	1800	1900
$\Delta_{failure}$ (-) (in)	0.58	0.77		0.40	0.81	
$\Delta_{failure}$ (+)	0.75	0.79		0.76	0.79	
$\Delta_{failure}$ avg	0.66	0.78	0.72	0.58	0.80	0.69
F_{yield} (-) (lb)	1850	2100		1500	1650	
F_{yield} (+)	2450	2250		2100	1950	
F_{yield} avg	2150	2200	2150	1800	1800	1800
Δ_{yeild} (-) (in)	0.21	0.19		0.19	0.16	
Δ_{yeild} (+)	0.19	0.18		0.17	0.16	
Δ_{yield} avg	0.20	0.19	0.19	0.18	0.16	0.17
k_e (-) (lb/in)	8800	11100		7800	10300	
k_e (+)	12700	12600		12500	12500	
k_e avg	10700	11900	11300	10100	11400	10800
Ductility (-)	2.8	4.0		2.1	5.0	
Ductility (+)	3.9	4.4		4.5	5.0	
Ductility avg	3.3	4.2	3.8	3.3	5.0	4.1

Table C.3 – Cyclic Envelope Curve Results for Wall C.

Property	Initial Wall CC-1	CC-2	Average	Stabilized Wall CC-1	CC-2	Average
F_{max} (-) (lb)	5200	3650		4450	3050	
F_{max} (+)	3950	4350		2950	3600	
F_{max} avg	4550	4000	4300	3700	3300	3500
Δ_{max} (-) (in)	0.93	0.74		0.76	0.55	
Δ_{max} (+)	0.56	1.27		0.39	1.08	
Δ_{max} avg	0.74	1.01	0.87	0.57	0.81	0.69
$F_{failure}$ (-) (lb)	5200	3650		4450	3000	
$F_{failure}$ (+)	3950	4350		2950	3600	
$F_{failure}$ avg	4550	4000	4300	3700	3300	3500
$\Delta_{failure}$ (-) (in)	0.93	0.74		0.76	0.74	
$\Delta_{failure}$ (+)	0.56	1.27		0.39	1.08	
$\Delta_{failure}$ avg	0.74	1.01	0.87	0.57	0.91	0.74
F_{yield} (-) (lb)	4200	3150		3550	2750	
F_{yield} (+)	3200	3800		2500	3100	
F_{yield} avg	3700	3500	3600	3050	2900	3000
Δ_{yeild} (-) (in)	0.23	0.19		0.20	0.16	
Δ_{yeild} (+)	0.17	0.26		0.16	0.20	
Δ_{yield} avg	0.20	0.22	0.21	0.18	0.18	0.18
k_e (-) (lb/in)	18700	16800		17700	17100	
k_e (+)	18600	14600		15900	15700	
k_e avg	18600	15700	17200	16800	16400	16600
Ductility (-)	4.1	4.0		3.8	4.6	
Ductility (+)	3.2	4.9		2.5	5.5	
Ductility avg	3.7	4.4	4.0	3.1	5.0	4.1

Table C.4 – Cyclic Envelope Curve Results for Wall D.

Property	Initial Wall DC-1	DC-2	Average	Stabilized Wall DC-1	DC-2	Average
F_{max} (-) (lb)	6750	6500		5550	5450	
F_{max} (+)	6550	6850		5400	5650	
F_{max} avg	6650	6700	6650	5500	5550	5500
Δ_{max} (-) (in)	0.45	0.59		0.43	0.60	
Δ_{max} (+)	0.45	0.57		0.44	0.57	
Δ_{max} avg	0.45	0.58	0.52	0.43	0.59	0.51
$F_{failure}$ (-) (lb)	6750	6500		5550	5450	
$F_{failure}$ (+)	6350	6350		5400	5650	
$F_{failure}$ avg	6550	6400	6450	5500	5550	5500
$\Delta_{failure}$ (-) (in)	0.45	0.59		0.43	0.60	
$\Delta_{failure}$ (+)	0.60	0.76		0.44	0.57	
$\Delta_{failure}$ avg	0.52	0.68	0.60	0.43	0.59	0.51
F_{yield} (-) (lb)	5750	5700		5000	4900	
F_{yield} (+)	6050	6150		4800	4900	
F_{yield} avg	5900	5900	5900	4900	4900	4900
Δ_{yeild} (-) (in)	0.24	0.29		0.21	0.26	
Δ_{yeild} (+)	0.28	0.27		0.20	0.19	
Δ_{yield} avg	0.26	0.28	0.27	0.21	0.23	0.22
k_e (-) (lb/in)	23700	19300		24000	19100	
k_e (+)	21700	22700		23400	25400	
k_e avg	22700	21000	21900	23700	22300	23000
Ductility (-)	1.8	2.0		2.0	2.3	
Ductility (+)	2.1	2.8		2.1	2.9	
Ductility avg	2.0	2.4	2.2	2.1	2.6	2.4

Table C.5 – Cyclic Envelope Curve Results for Wall E.

Property	Initial Wall EC-1	EC-2	Average	Stabilized Wall EC-1	EC-2	Average
F_{max} (-) (lb)	6700	6750		5500	5950	
F_{max} (+)	7150	7200		5850	5800	
F_{max} avg	6900	7000	6950	5650	5900	5750
Δ_{max} (-) (in)	0.99	0.66		0.76	0.66	
Δ_{max} (+)	0.73	0.89		0.48	0.69	
Δ_{max} avg	0.86	0.77	0.82	0.62	0.68	0.65
$F_{failure}$ (-) (lb)	6700	6700		5500	5950	
$F_{failure}$ (+)	7150	7200		5750	5800	
$F_{failure}$ avg	6900	6950	6950	5650	5900	5750
$\Delta_{failure}$ (-) (in)	0.99	0.85		0.76	0.66	
$\Delta_{failure}$ (+)	0.73	0.89		0.57	0.69	
$\Delta_{failure}$ avg	0.86	0.87	0.86	0.67	0.68	0.67
F_{yield} (-) (lb)	6450	6900		5400	5900	
F_{yield} (+)	6450	6550		5050	5150	
F_{yield} avg	6450	6700	6600	5200	5550	5400
Δ_{yeild} (-) (in)	0.51	0.64		0.45	0.56	
Δ_{yeild} (+)	0.28	0.50		0.20	0.41	
Δ_{yield} avg	0.40	0.57	0.48	0.33	0.49	0.41
k_e (-) (lb/in)	12700	10900		11900	10500	
k_e (+)	22800	13100		24700	12500	
k_e avg	17700	12000	14900	18300	11500	14900
Ductility (-)	1.9	1.3		1.7	1.2	
Ductility (+)	2.6	1.8		2.8	1.7	
Ductility avg	2.3	1.6	1.9	2.2	1.4	1.8

APPENDIX D

Tables D.1 - D.22 present the cyclic data calculated for each cycle of the cyclic tests performed for different wall configurations. Parameters presented in the tables include cyclic stiffness, k_c; hysteretic energy, HE; potential energy, PE; and equivalent viscous damping ratio, EVDR. Values for the positive and negative cycles as well as the averages are presented at each initial and stabilized cycle for future reference

Table D.1 – Initial Cyclic Data for Wall AC-1.

Phase Number	Load (lb)	Drift (in)	Avg Drift (in)	kc (lb/in)	Avg. kc (lb/in)	HE (lb-in)	PE (lb-in)	Total PE (lb-in)	EVDR
1	1068	0.10	0.10	10599	10278	58	54	111	0.08
	-1068	-0.11		9958			57		
2	2196	0.30	0.30	7392	6792	514	326	602	0.14
	-1847	-0.30		6192			275		
3	2411	0.40	0.41	5980	5741	752	486	957	0.13
	-2276	-0.41		5503			471		
4	2760	0.60	0.61	4591	4624	1393	830	1696	0.13
	-2840	-0.61		4657			866		
5	3190	0.80	0.80	3991	3872	2016	1275	2475	0.13
	-3002	-0.80		3752			1200		
6	2411	1.02	1.00	2374	2692	2422	1224	2693	0.14
	-2975	-0.99		3010			1470		
7	2330	1.21	1.18	1933	1970	2488	1404	2757	0.14
	-2330	-1.16		2007			1353		
8	1712	1.42	1.39	1203	1205	2179	1219	2321	0.15
	-1632	-1.35		1208			1102		
9	961	1.59	1.53	605	775	1827	762	1786	0.16
	-1390	-1.47		944			1023		
10	907	1.86	1.79	487	639	1963	845	2020	0.15
	-1363	-1.72		791			1176		
11	853	2.09	2.01	409	538	2204	890	2125	0.17
	-1283	-1.93		666			1235		
12	826	2.30	2.21	360	462	2507	949	2229	0.18
	-1202	-2.13		565			1280		
13	799	2.51	2.42	319	395	2921	1002	2274	0.20
	-1095	-2.32		471			1273		

Table D.2 – Stabilized Cyclic Data for Wall AC-1.

Phase Number	Load (lb)	Drift (in)	Avg Drift (in)	kc (lb/in)	Avg. kc (lb/in)	HE (lb-in)	PE (lb-in)	Total PE (lb-in)	EVDR
1	1041	0.10	0.10	10332	9920	50	52	107	0.07
	-1014	-0.11		9508			54		
2	1981	0.30	0.31	6642	6015	409	295	559	0.12
	-1686	-0.31		5387			264		
3	2223	0.40	0.41	5522	5147	578	447	848	0.11
	-1954	-0.41		4771			400		
4	2572	0.60	0.61	4266	4139	983	775	1516	0.10
	-2438	-0.61		4011			741		
5	2142	0.81	0.80	2646	2903	1300	867	1849	0.11
	-2491	-0.79		3161			982		
6	2142	1.01	0.99	2124	2178	1574	1080	2134	0.12
	-2169	-0.97		2232			1054		
7	1524	1.22	1.19	1250	1239	1535	929	1747	0.14
	-1417	-1.15		1228			817		
8	1095	1.44	1.39	759	859	1626	790	1647	0.16
	-1283	-1.34		959			858		
9	853	1.65	1.59	517	651	1633	704	1625	0.16
	-1202	-1.53		785			921		
10	853	1.89	1.81	452	572	1875	805	1849	0.16
	-1202	-1.74		692			1044		
11	826	2.10	2.02	394	508	2159	866	2029	0.17
	-1202	-1.93		621			1163		
12	746	2.31	2.22	323	456	2272	860	2198	0.16
	-1256	-2.13		589			1338		

Table D.3 – Initial Cyclic Data for Wall AC-2.

Phase Number	Load (lb)	Drift (in)	Avg Drift (in)	kc (lb/in)	Avg. kc (lb/in)	HE (lb-in)	PE (lb-in)	Total PE (lb-in)	EVDR
1	1186	0.10	0.10	11459	11361	59	61	125	0.08
	-1197	-0.11		11262			64		
2	1890	0.30	0.30	6378	6401	540	280	563	0.15
	-1906	-0.30		6423			283		
3	1943	0.40	0.40	4844	4984	629	390	818	0.12
	-2094	-0.41		5124			428		
4	2078	0.60	0.61	3454	3435	1293	625	1267	0.16
	-2094	-0.61		3415			642		
5	1669	0.79	0.80	2108	2018	1314	661	1289	0.16
	-1557	-0.81		1929			628		
6	1584	1.00	1.01	1590	1472	1532	789	1496	0.16
	-1385	-1.02		1355			708		
7	1138	1.19	1.21	954	1024	1380	679	1501	0.15
	-1342	-1.23		1095			822		
8	676	1.39	1.41	485	615	1267	470	1228	0.16
	-1063	-1.43		745			757		
9	687	1.53	1.55	449	550	1287	525	1324	0.15
	-1020	-1.57		651			799		
10	805	1.78	1.81	453	495	1530	715	1621	0.15
	-987	-1.84		538			907		
11	794	2.00	2.02	397	423	1774	794	1731	0.16
	-918	-2.04		449			937		

Table D.4 – Stabilized Cyclic Data for Wall AC-2.

Phase Number	Load (lb)	Drift (in)	Avg Drift (in)	kc (lb/in)	Avg. kc (lb/in)	HE (lb-in)	PE (lb-in)	Total PE (lb-in)	EVDR
1	1073	0.10	0.10	10369	10378	50	56	111	0.07
	-1073	-0.10		10386			55		
2	1627	0.30	0.30	5436	5553	304	243	502	0.10
	-1712	-0.30		5671			259		
3	1664	0.40	0.40	4160	4168	475	333	679	0.11
	-1702	-0.41		4177			347		
4	1401	0.60	0.60	2352	2243	678	417	816	0.13
	-1304	-0.61		2134			399		
5	1213	0.79	0.80	1533	1532	892	480	982	0.14
	-1240	-0.81		1531			502		
6	842	1.00	1.01	846	991	977	419	1006	0.15
	-1154	-1.02		1135			587		
7	542	1.19	1.20	457	611	982	321	890	0.18
	-934	-1.22		765			570		
8	574	1.38	1.40	416	507	1044	396	1004	0.17
	-853	-1.43		598			608		
9	670	1.57	1.60	427	474	1223	526	1217	0.16
	-848	-1.63		520			690		
10	611	1.80	1.81	340	399	1396	550	1316	0.17
	-837	-1.83		457			766		

Table D.5 – Initial Cyclic Data for Wall AC-3.

Phase Number	Load (lb)	Drift (in)	Avg Drift (in)	kc (lb/in)	Avg. kc (lb/in)	HE (lb-in)	PE (lb-in)	Total PE (lb-in)	EVDR
1	1283	0.10	0.11	13028	10167	40	63	110	0.06
	-826	-0.11		7307			47		
2	2384	0.29	0.29	8346	7131	383	340	588	0.10
	-1712	-0.29		5917			248		
3	2330	0.35	0.37	6654	5604	382	408	740	0.08
	-1739	-0.38		4554			332		
4	2814	0.51	0.54	5494	4443	857	720	1283	0.11
	-1954	-0.58		3392			563		
5	2975	0.70	0.74	4277	3271	1209	1034	1744	0.11
	-1793	-0.79		2264			710		
6	2250	0.91	0.95	2475	2234	1341	1023	2007	0.11
	-1981	-0.99		1993			985		
7	1605	1.13	1.16	1420	1436	1473	907	1948	0.12
	-1739	-1.20		1453			1041		
8	1390	1.36	1.38	1023	1073	1576	944	2053	0.12
	-1578	-1.41		1123			1109		
9	934	1.50	1.52	621	683	1544	701	1588	0.15
	-1148	-1.54		744			886		
10	746	1.76	1.78	423	478	1736	657	1523	0.18
	-961	-1.80		533			866		

Table D.6 – Stabilized Cyclic Data for Wall AC-3.

Phase Number	Load (lb)	Drift (in)	Avg Drift (in)	kc (lb/in)	Avg. kc (lb/in)	HE (lb-in)	PE (lb-in)	Total PE (lb-in)	EVDR
1	1256	0.10	0.10	12606	9762	35	63	103	0.05
	-746	-0.11		6917			40		
2	1927	0.27	0.28	7114	5935	206	261	464	0.07
	-1390	-0.29		4756			203		
3	2035	0.35	0.37	5864	4950	319	353	662	0.08
	-1578	-0.39		4036			309		
4	2384	0.51	0.56	4655	3626	535	610	1090	0.08
	-1578	-0.61		2598			479		
5	1981	0.72	0.76	2743	2316	721	715	1331	0.09
	-1524	-0.81		1889			615		
6	1417	0.96	0.99	1481	1422	950	678	1387	0.11
	-1390	-1.02		1363			709		
7	1202	1.17	1.18	1031	1071	1115	701	1505	0.12
	-1336	-1.20		1111			804		
8	880	1.37	1.38	644	704	1237	601	1347	0.15
	-1068	-1.40		764			747		
9	719	1.55	1.58	465	489	1362	555	1221	0.18
	-826	-1.61		513			666		

Table D.7 – Initial Cyclic Data for Wall BC-1.

Phase Number	Load (lb)	Drift (in)	Avg Drift (in)	kc (lb/in)	Avg. kc (lb/in)	HE (lb-in)	PE (lb-in)	Total PE (lb-in)	EVDR
1	1256	0.10	0.10	12692	10739	41	62	109	0.06
	-907	-0.10		8785			47		
2	2169	0.28	0.29	7627	6931	413	308	574	0.11
	-1820	-0.29		6235			266		
3	2384	0.37	0.38	6516	5741	493	436	821	0.10
	-1954	-0.39		4966			384		
4	2814	0.54	0.56	5223	4444	1040	758	1368	0.12
	-2115	-0.58		3665			610		
5	2814	0.75	0.77	3755	2830	1297	1054	1642	0.13
	-1498	-0.79		1906			588		
6	2599	0.96	0.98	2717	1912	1818	1243	1811	0.16
	-1122	-1.01		1108			568		
7	1363	1.17	1.19	1164	944	1499	799	1333	0.18
	-880	-1.21		725			534		
8	1336	1.36	1.39	980	697	1557	911	1325	0.19
	-585	-1.41		413			414		
9	1041	1.50	1.53	693	465	1499	782	1070	0.22
	-370	-1.56		237			288		
10	155	1.79	1.81	86	78	533	139	256	0.33
	-128	-1.83		70			117		

Table D.8 – Stabilized Cyclic Data for Wall BC-1.

Phase Number	Load (lb)	Drift (in)	Avg Drift (in)	kc (lb/in)	Avg. kc (lb/in)	HE (lb-in)	PE (lb-in)	Total PE (lb-in)	EVDR
1	1229	0.10	0.10	12459	10121	38	61	104	0.06
	-826	-0.11		7784			44		
2	1927	0.27	0.29	7029	6290	276	264	512	0.09
	-1659	-0.30		5550			248		
3	2142	0.36	0.38	5902	5082	424	389	722	0.09
	-1686	-0.40		4262			333		
4	2303	0.57	0.59	4009	3126	683	662	1060	0.10
	-1336	-0.60		2242			398		
5	2330	0.76	0.78	3064	2219	990	886	1322	0.12
	-1095	-0.80		1374			436		
6	1202	0.97	0.99	1235	999	1017	585	976	0.17
	-773	-1.01		763			391		
7	1148	1.16	1.19	987	724	1146	668	1006	0.18
	-558	-1.21		461			338		
8	1068	1.37	1.39	782	522	1278	729	991	0.21
	-370	-1.42		261			262		
9	155	1.57	1.59	98	89	494	122	225	0.35
	-128	-1.62		79			103		

Table D.9 – Initial Cyclic Data for Wall BC-2.

Phase Number	Load (lb)	Drift (in)	Avg Drift (in)	kc (lb/in)	Avg. kc (lb/in)	HE (lb-in)	PE (lb-in)	Total PE (lb-in)	EVDR
1	1336	0.11	0.10	12631	11852	53	71	130	0.07
	-1148	-0.10		11073			60		
2	2491	0.29	0.29	8502	8048	501	365	682	0.12
	-2196	-0.29		7594			317		
3	2464	0.40	0.40	6122	6077	628	496	978	0.10
	-2411	-0.40		6033			482		
4	2706	0.59	0.59	4557	4101	1259	803	1449	0.14
	-2169	-0.59		3645			645		
5	2840	0.78	0.79	3620	3007	1467	1114	1869	0.12
	-1900	-0.79		2394			754		
6	2088	0.99	1.00	2119	1924	1804	1029	1904	0.15
	-1739	-1.01		1729			875		
7	1578	1.18	1.19	1339	1156	1746	930	1640	0.17
	-1175	-1.21		973			710		
8	1148	1.39	1.40	829	776	1695	795	1508	0.18
	-1014	-1.40		722			712		
9	907	1.53	1.53	593	556	1655	693	1309	0.20
	-799	-1.54		518			616		

Table D.10 – Stabilized Cyclic Data for Wall BC-2.

Phase Number	Load (lb)	Drift (in)	Avg Drift (in)	kc (lb/in)	Avg. kc (lb/in)	HE (lb-in)	PE (lb-in)	Total PE (lb-in)	EVDR
1	1283	0.10	0.10	12469	11399	47	66	118	0.06
	-1041	-0.10		10329			52		
2	1981	0.30	0.30	6603	6473	322	297	574	0.09
	-1874	-0.30		6344			277		
3	2035	0.40	0.40	5077	4948	498	408	793	0.10
	-1927	-0.40		4819			385		
4	2115	0.59	0.60	3557	3081	733	629	1091	0.11
	-1551	-0.60		2606			462		
5	2062	0.79	0.79	2625	2282	1067	810	1430	0.12
	-1551	-0.80		1938			621		
6	1310	0.98	1.00	1330	1249	1118	645	1237	0.14
	-1175	-1.01		1167			592		
7	1014	1.18	1.19	859	808	1243	599	1142	0.17
	-907	-1.20		756			544		
8	799	1.38	1.39	580	556	1375	551	1074	0.20
	-746	-1.40		531			523		

Table D.11 – Initial Cyclic Data for Wall CC-1.

Phase Number	Load (lb)	Drift (in)	Avg Drift (in)	kc (lb/in)	Avg. kc (lb/in)	HE (lb-in)	PE (lb-in)	Total PE (lb-in)	EVDR
1	1847	0.10	0.10	18584	19989	109	92	181	0.10
	-1954	-0.09		21393			89		
2	2894	0.26	0.25	11029	11497	560	380	711	0.13
	-2814	-0.24		11965			331		
3	3458	0.37	0.33	9350	9881	566	640	1104	0.08
	-3109	-0.30		10412			464		
4	3968	0.56	0.50	7108	7954	1320	1108	1943	0.11
	-3834	-0.44		8799			835		
5	3055	0.77	0.68	3975	5887	1421	1174	2522	0.09
	-4586	-0.59		7798			1348		
6	2438	1.00	0.88	2437	4589	1892	1219	3166	0.10
	-5123	-0.76		6740			1947		
7	2223	1.21	1.07	1836	3703	2268	1346	3751	0.10
	-5177	-0.93		5570			2406		
8	2035	1.42	1.27	1429	2734	2292	1448	3992	0.09
	-4532	-1.12		4038			2543		
9	1847	1.57	1.42	1174	1966	2499	1453	3688	0.11
	-3512	-1.27		2759			2235		
10	1202	1.88	1.71	638	1218	2813	1132	3252	0.14
	-2760	-1.54		1797			2119		
11	853	2.12	1.93	402	916	2685	904	3075	0.14
	-2491	-1.74		1430			2171		

Table D.12 – Stabilized Cyclic Data for Wall CC-1.

Phase Number	Load (lb)	Drift (in)	Avg Drift (in)	kc (lb/in)	Avg. kc (lb/in)	HE (lb-in)	PE (lb-in)	Total PE (lb-in)	EVDR
1	1659	0.10	0.10	15854	17675	86	87	162	0.08
	-1712	-0.09		19497			75		
2	2733	0.29	0.26	9531	10184	320	392	672	0.08
	-2464	-0.23		10838			280		
3	2948	0.39	0.34	7526	8480	416	577	958	0.07
	-2679	-0.28		9433			380		
4	2384	0.59	0.51	4013	6087	626	708	1441	0.07
	-3458	-0.42		8160			733		
5	1981	0.81	0.69	2447	4718	1014	802	1975	0.08
	-4049	-0.58		6989			1173		
6	1927	1.03	0.89	1877	3887	1276	990	2670	0.08
	-4452	-0.75		5898			1680		
7	1686	1.25	1.09	1351	2709	1550	1052	2808	0.09
	-3780	-0.93		4068			1756		
8	1686	1.45	1.29	1165	2142	2040	1219	3196	0.10
	-3512	-1.13		3119			1977		
9	1202	1.68	1.51	717	1371	2139	1008	2816	0.12
	-2706	-1.34		2025			1808		
10	746	1.93	1.74	386	926	2189	721	2487	0.14
	-2276	-1.55		1467			1766		

Table D.13 – Initial Cyclic Data for Wall CC-2.

Phase Number	Load (lb)	Drift (in)	Avg Drift (in)	kc (lb/in)	Avg. kc (lb/in)	HE (lb-in)	PE (lb-in)	Total PE (lb-in)	EVDR
1	1578	0.10	0.10	16076	16454	60	77	176	0.05
	-1820	-0.11		16832			98		
2	2867	0.26	0.26	10840	11121	447	379	726	0.10
	-2814	-0.25		11401			347		
3	3163	0.34	0.35	9216	8929	616	543	1092	0.09
	-3082	-0.36		8642			550		
4	3673	0.52	0.53	7069	6660	1405	954	1896	0.12
	-3431	-0.55		6251			942		
5	3941	0.70	0.72	5644	5272	1903	1376	2733	0.11
	-3646	-0.74		4900			1356		
6	3968	0.89	0.91	4436	3862	2255	1775	3194	0.11
	-3055	-0.93		3288			1419		
7	4210	1.07	1.10	3926	3296	2355	2258	3947	0.09
	-3002	-1.13		2667			1689		
8	4344	1.27	1.30	3430	2735	2706	2752	4582	0.09
	-2733	-1.34		2040			1831		
9	4076	1.39	1.44	2930	2282	2544	2835	4653	0.09
	-2438	-1.49		1634			1818		
10	3619	1.63	1.69	2218	1743	3236	2952	4901	0.11
	-2223	-1.75		1268			1949		

Table D.14 – Stabilized Cyclic Data for Wall CC-2.

Phase Number	Load (lb)	Drift (in)	Avg Drift (in)	kc (lb/in)	Avg. kc (lb/in)	HE (lb-in)	PE (lb-in)	Total PE (lb-in)	EVDR
1	1578	0.10	0.10	15700	16380	57	79	168	0.05
	-1739	-0.10		17060			89		
2	2545	0.25	0.26	10063	9990	263	322	655	0.06
	-2572	-0.26		9916			334		
3	2867	0.34	0.35	8440	8099	456	487	968	0.07
	-2733	-0.35		7759			481		
4	3136	0.52	0.54	6041	5769	845	814	1648	0.08
	-3028	-0.55		5497			834		
5	3163	0.70	0.72	4519	4276	1130	1107	2224	0.08
	-3002	-0.74		4032			1117		
6	3404	0.89	0.92	3810	3247	1392	1521	2702	0.08
	-2518	-0.94		2684			1181		
7	3619	1.08	1.11	3356	2751	1636	1951	3335	0.08
	-2438	-1.14		2147			1384		
8	3458	1.26	1.30	2745	2203	1871	2178	3666	0.08
	-2223	-1.34		1660			1488		
9	3378	1.42	1.49	2373	1840	2135	2404	3989	0.09
	-2035	-1.56		1306			1585		

Table D.15 – Initial Cyclic Data for Wall DC-1.

Phase Number	Load (lb)	Drift (in)	Avg Drift (in)	kc (lb/in)	Avg. kc (lb/in)	HE (lb-in)	PE (lb-in)	Total PE (lb-in)	EVDR
1	1498	0.07	0.07	21850	24349	7	51	111	0.01
	-1793	-0.07		26847			60		
2	3190	0.15	0.16	21716	21981	89	234	537	0.03
	-3673	-0.17		22246			303		
3	4103	0.20	0.21	20922	20373	230	402	926	0.04
	-4559	-0.23		19825			524		
4	5768	0.33	0.34	17710	17769	797	939	2026	0.06
	-6224	-0.35		17828			1086		
5	6573	0.45	0.45	14481	14784	1667	1492	2995	0.09
	-6734	-0.45		15087			1503		
6	6332	0.60	0.60	10619	10119	2474	1888	3601	0.11
	-5741	-0.60		9619			1713		
7	4076	0.80	0.77	5085	5368	2097	1633	3182	0.10
	-4183	-0.74		5651			1548		

Table D.16 – Stabilized Cyclic Data for Wall DC-1.

Phase Number	Load (lb)	Drift (in)	Avg Drift (in)	kc (lb/in)	Avg. kc (lb/in)	HE (lb-in)	PE (lb-in)	Total PE (lb-in)	EVDR
1	1605	0.07	0.07	22458	25140	1	57	108	0.00
	-1685	-0.06		27823			51		
2	3028	0.13	0.14	24197	22515	62	190	472	0.02
	-3431	-0.16		20833			283		
3	3754	0.18	0.20	20421	19995	160	345	809	0.03
	-4264	-0.22		19569			464		
4	5070	0.31	0.31	16183	17190	475	794	1601	0.05
	-5418	-0.30		18197			807		
5	5419	0.44	0.43	12446	12707	908	1180	2368	0.06
	-5553	-0.43		12969			1189		
6	3539	0.62	0.61	5669	5947	1115	1104	2236	0.08
	-3753	-0.60		6225			1132		

Table D.17 – Initial Cyclic Data for Wall DC-2.

Phase Number	Load (lb)	Drift (in)	Avg Drift (in)	kc (lb/in)	Avg. kc (lb/in)	HE (lb-in)	PE (lb-in)	Total PE (lb-in)	EVDR
1	2303	0.09	0.10	24587	22545	71	108	212	0.05
	-2062	-0.10		20504			104		
2	4344	0.22	0.23	19857	18819	443	475	986	0.07
	-4264	-0.24		17781			511		
3	5016	0.28	0.29	17870	16961	575	704	1471	0.06
	-4962	-0.31		16051			767		
4	6278	0.41	0.43	15182	14338	1424	1298	2636	0.09
	-6009	-0.45		13494			1338		
5	6869	0.57	0.58	11978	11482	2612	1969	3888	0.11
	-6493	-0.59		10985			1919		
6	6332	0.76	0.79	8283	6961	4394	2420	4285	0.16
	-4586	-0.81		5639			1865		
7	961	1.12	1.16	858	794	1933	538	1068	0.29
	-880	-1.21		730			530		
8	692	1.35	1.38	514	500	1481	466	957	0.25
	-692	-1.42		487			491		

Table D.18 – Stabilized Cyclic Data for Wall DC-2.

Phase Number	Load (lb)	Drift (in)	Avg Drift (in)	kc (lb/in)	Avg. kc (lb/in)	HE (lb-in)	PE (lb-in)	Total PE (lb-in)	EVDR
1	2303	0.09	0.10	25380	25380	60	105	204	0.05
	-1981	-0.10		19763			99		
2	4049	0.21	0.22	19017	17919	307	431	899	0.05
	-3968	-0.24		16822			468		
3	4586	0.26	0.28	17487	16239	459	601	1286	0.06
	-4532	-0.30		14991			685		
4	5365	0.40	0.42	13256	12675	1029	1086	2217	0.07
	-5231	-0.43		12093			1131		
5	5633	0.57	0.59	9925	9498	1784	1599	3249	0.09
	-5472	-0.60		9071			1651		
6	1095	0.92	0.96	1195	1063	1592	502	970	0.26
	-934	-1.00		931			468		
7	558	1.16	1.19	481	490	1095	323	698	0.25
	-611	-1.23		499			375		

Table D.19 – Initial Cyclic Data for Wall EC-1.

Phase Number	Load (lb)	Drift (in)	Avg Drift (in)	kc (lb/in)	Avg. kc (lb/in)	HE (lb-in)	PE (lb-in)	Total PE (lb-in)	EVDR
1	2438	0.09	0.11	25660	17908	46	116	187	0.04
	-1202	-0.12		10155			71		
2	4640	0.25	0.27	18294	15959	589	588	1159	0.08
	-3941	-0.29		13624			570		
3	5580	0.33	0.36	16675	14792	849	934	1908	0.07
	-5016	-0.39		12910			974		
4	7110	0.49	0.52	14438	13104	2080	1751	3468	0.10
	-6358	-0.54		11771			1717		
5	7164	0.64	0.68	11197	10085	3263	2292	4661	0.11
	-6520	-0.73		8972			2369		
6	7164	0.73	0.86	9788	8287	4191	2622	5911	0.11
	-6681	-0.98		6785			3289		
7	5043	0.91	1.03	5547	4922	3900	2292	5157	0.12
	-4962	-1.15		4297			2865		
8	4479	1.13	1.26	3978	3315	3445	2521	5064	0.11
	-3673	-1.38		2652			2543		
9	4076	1.29	1.41	3171	2769	2986	2619	5385	0.09
	-3619	-1.53		2368			2766		
10	3673	1.54	1.66	2391	2231	4101	2822	6126	0.11
	-3700	-1.79		2071			3304		
11	2787	1.76	1.88	1582	1674	4041	2455	5999	0.11
	-3539	-2.00		1766			3544		
12	2599	1.96	2.08	1323	1387	3765	2552	6057	0.10
	-3190	-2.20		1451			3506		
13	2438	2.12	2.27	1152	1178	3639	2579	6122	0.09
	-2921	-2.43		1204			3542		
14	2464	2.30	2.47	1070	982	3708	2837	5944	0.10
	-2357	-2.64		894			3107		

Table D.20 – Stabilized Cyclic Data for Wall EC-1.

Phase Number	Load (lb)	Drift (in)	Avg Drift (in)	kc (lb/in)	Avg. kc (lb/in)	HE (lb-in)	PE (lb-in)	Total PE (lb-in)	EVDR
1	2384	0.10	0.10	24709	17592	42	115	181	0.04
	-1175	-0.11		10476			66		
2	4344	0.25	0.28	17084	14906	421	552	1146	0.06
	-3888	-0.31		12727			594		
3	5150	0.32	0.35	15888	14164	673	835	1700	0.06
	-4640	-0.37		12440			865		
4	5848	0.48	0.51	12170	11045	1522	1405	2856	0.08
	-5365	-0.54		9919			1451		
5	5768	0.57	0.67	10069	8663	2224	1652	3735	0.09
	-5499	-0.76		7258			2083		
6	4720	0.71	0.84	6618	5596	2562	1683	3798	0.11
	-4398	-0.96		4574			2114		
7	3780	0.94	1.06	4009	3372	2264	1782	3705	0.10
	-3243	-1.19		2735			1923		
8	3700	1.17	1.28	3157	2705	2288	2168	4350	0.08
	-3136	-1.39		2253			2182		
9	3378	1.34	1.46	2517	2317	2589	2266	4918	0.08
	-3351	-1.58		2117			2652		
10	2626	1.58	1.69	1662	1723	2839	2074	4974	0.09
	-3216	-1.80		1783			2901		
11	2438	1.78	1.90	1371	1395	2833	2166	5065	0.09
	-2867	-2.02		1418			2898		
12	2303	1.95	2.10	1178	1145	2833	2251	5040	0.09
	-2491	-2.24		1113			2789		
13	2276	2.15	2.29	1058	1003	2850	2449	5249	0.09
	-2303	-2.43		947			2801		

Table D.21 – Initial Cyclic Data for Wall EC-2.

Phase Number	Load (lb)	Drift (in)	Avg Drift (in)	kc (lb/in)	Avg. kc (lb/in)	HE (lb-in)	PE (lb-in)	Total PE (lb-in)	EVDR
1	1551	0.10	0.10	15590	12634	78	77	128	0.10
	-987	-0.10		9678			50		
2	3404	0.27	0.27	12692	11805	511	457	855	0.10
	-2948	-0.27		10918			398		
3	4129	0.36	0.36	11461	11447	667	744	1461	0.07
	-4049	-0.35		11433			717		
4	5956	0.52	0.51	11396	11476	1338	1556	2995	0.07
	-5768	-0.50		11557			1439		
5	7084	0.69	0.67	10267	10271	2723	2444	4668	0.09
	-6761	-0.66		10276			2224		
6	7218	0.88	0.87	8160	8022	4146	3192	6045	0.11
	-6708	-0.85		7884			2853		
7	5499	1.08	1.07	5088	4691	4706	2972	5392	0.14
	-4559	-1.06		4294			2420		
8	2250	1.33	1.32	1686	1692	3196	1501	2955	0.17
	-2223	-1.31		1698			1455		
9	2035	1.51	1.49	1347	1333	2497	1537	2944	0.13
	-1927	-1.46		1320			1407		
10	1847	1.77	1.75	1043	1033	2630	1635	3159	0.13
	-1766	-1.73		1023			1525		
11	1820	1.99	1.96	913	914	2582	1815	3517	0.12
	-1766	-1.93		916			1703		

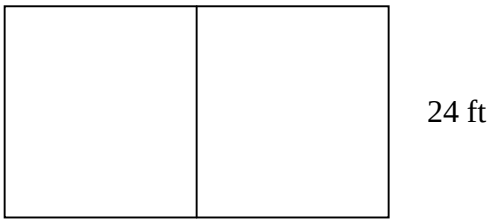
Table D.22 – Stabilized Cyclic Data for Wall EC-2.

Phase Number	Load (lb)	Drift (in)	Avg Drift (in)	kc (lb/in)	Avg. kc (lb/in)	HE (lb-in)	PE (lb-in)	Total PE (lb-in)	EVDR
1	1524	0.10	0.10	14967	12071	67	78	125	0.09
	-934	-0.10		9176			48		
2	3136	0.27	0.27	11601	11143	371	424	816	0.07
	-2894	-0.27		10685			392		
3	3941	0.36	0.35	11103	10978	529	700	1339	0.06
	-3727	-0.34		10854			640		
4	5419	0.51	0.50	10545	10754	992	1392	2679	0.06
	-5311	-0.48		10963			1287		
5	5794	0.69	0.67	8391	8711	1881	2001	3964	0.08
	-5956	-0.66		9031			1964		
6	5096	0.89	0.88	5709	5645	2534	2275	4339	0.09
	-4801	-0.86		5582			2065		
7	2276	1.13	1.11	2019	2019	2515	1283	2507	0.16
	-2223	-1.10		2019			1224		
8	1712	1.37	1.34	1247	1329	1891	1176	2385	0.13
	-1847	-1.31		1410			1209		
9	1686	1.55	1.54	1085	1058	1909	1309	2518	0.12
	-1578	-1.53		1031			1208		
10	1632	1.80	1.77	907	898	2019	1469	2823	0.11
	-1551	-1.75		889			1354		

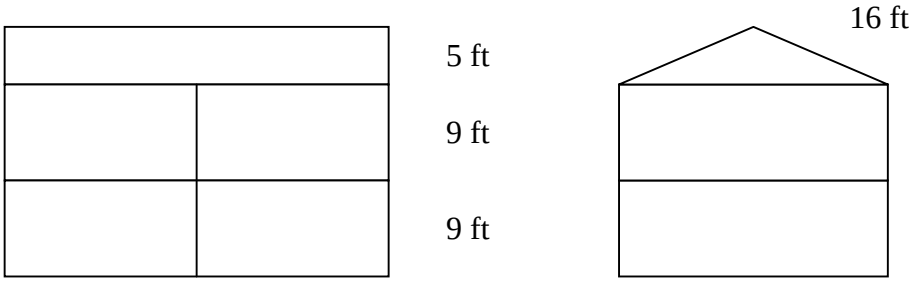
APPENDIX E

This Appendix presents a sample design of a typical 2-story residential home using SIPS in a high-seismic zone. This proves that the factor of safety is not adequate for these panels assuming a seismic response factor based on the low ductility and energy dissipation characteristics of the walls.

Plan View:



Elevation:



Design:

Reference - NEHRP 1997 Second Ballot Copy

Location – Hollywood, CA – Assume Site Class B

Seismic Use Group I

Importance Factor = 1.0

Spectral Accelerations: $S_S = 2.057g$

$S_1 = 0.741g$

(Obtained from USGS web site for seismic risk by zip code)

Maximum considered earthquake adjusted for site class:

$S_{MS} = F_a S_S = 1.0(2.057) = 2.057g$

$S_{M1} = F_v S_1 = 1.0(0.741) = 0.741g$

Design Spectral Response:

$S_{DS} = 2/3\ S_{MS} = 2/3(2.057) = 1.37g$

$S_{D1} = 2/3\ S_{M1} = 2/3(0.741) = 0.494g$

Seismic Design Category: D

Equivalent Lateral Force Procedure:

$V=C_s W$

Assume R=3.0

The response modification factor, R, is assumed to be on the low end of reinforced concrete shear walls and the mid range of reinforced masonry design since the SIPS shear walls are not as ductile or cannot dissipate as much energy as light-framed shear walls.

Assume floor loads and wall loads are 10 psf.

Assume roof load is 15 psf.

$W_{floor} = 2(10\ psf)(20\ ft \times 24\ ft) = 19200\ lb$

$W_{wall} = 2(9\ ft)[2(40\ ft)+3(24\ ft)](10\ psf) = 27360\ lb$

$W_{roof} = 15\ psf\ (40\ ft \times 32\ ft) = 23040\ lb$

$W = 19200+27360+23040 = 69600\ lb \approx 70\ k$

$$C_s = \frac{S_{DS}}{R/I} = \frac{1.37}{3/1} = 0.457 \leq \frac{S_{D1}}{T(R/I)} \leq \frac{0.494}{0.21(3)} = 0.784 \geq 0.044IS_{DS} = 0.060$$

Where: $T = C_T h_n^{3/4} = 0.02(23\text{ ft})^{3/4} = 0.21$ sec

$C_s = 0.457$

V = 0.457(70k) = 32 k

Length of shear walls resisting V, short side = 3(24 ft) = 72 ft (Assuming no openings)
Base shear, v = 32000 lb/ 72 ft = 444 plf

Ultimate Allowable Shear Load = 690 plf (Wall D – Stabilized Cyclic)

Factor of Safety = 690/444 = 1.5 – **NOT ACCEPTABLE**

VITA

The author was born in Roanoke, Virginia on January 19, 1973 to Jerry Jamison and Peggy Jamison. After completing high school, he attended Virginia Polytechnic Institute and State University from August 1991 until May 1996 at which time he received his Bachelor of Science degree in Civil Engineering. He began his graduate work at Virginia Polytechnic Institute and State University studying structural engineering in the department of Civil Engineering as a Charles E. Via Masters Fellow in August 1996. He received his Masters of Science degree in Civil Engineering in December 1997. He plans to design buildings for a structural engineering firm in Atlanta, Georgia upon completion of his research at Virginia Polytechnic Institute and State University.