

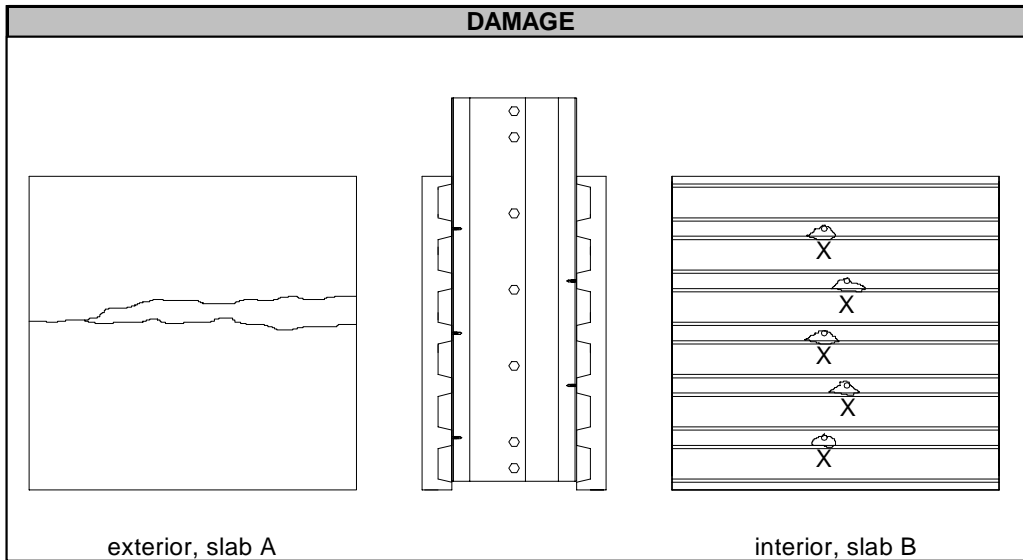
**APPENDIX A-1: Push-out Test Sample Data Pack (Alander et al. 1998b)**

**PUSHOUT TEST SUMMARY SHEET**

Test: D2-1 Test Date: 10-Jan-98  
 Test Designation: SC-8-3-0.109-1.5VL-3.25-1

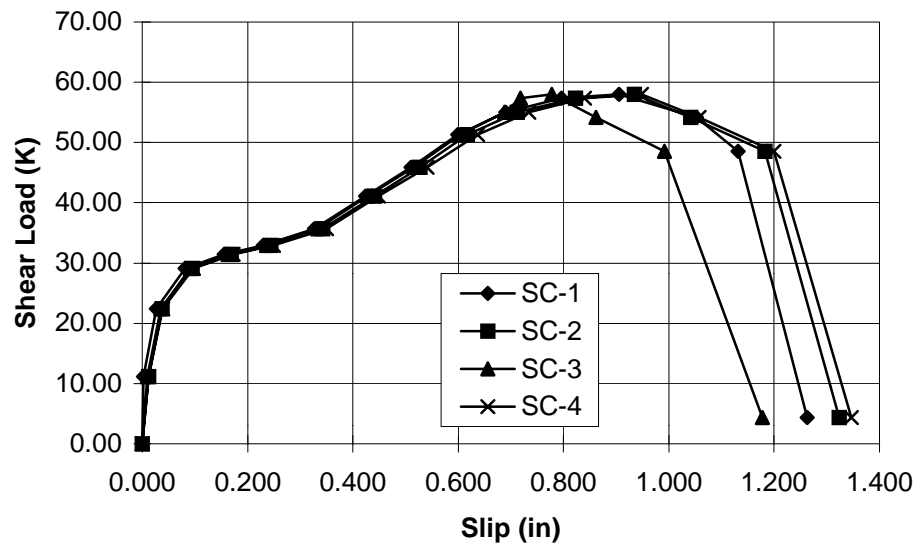
SPECIMEN DESCRIPTION		
<b>Screw:</b>	Height: <u>3.0 in.</u>	No. Per Specimen: <u>10</u>
<b>Deck:</b>	Type: <u>1.5VL, 22 ga</u>	Width: <u>36 in.</u> Length: <u>36 in.</u>
	F <sub>y</sub> : <u>51.2 ksi</u>	F <sub>u</sub> : <u>56.0 ksi</u>
<b>Base Member:</b>	Section: <u>2L 2x2x0.187</u>	
	F <sub>y</sub> : <u>60.7 ksi</u>	F <sub>u</sub> : <u>84.8 ksi</u>
<b>Slab:</b>	Thickness: <u>3.25 in.</u>	f' <sub>c</sub> : <u>3568 psi</u>
<b>Rebar:</b>	Size: <u>No. 4</u>	No. Per Specimen: <u>8</u>
		Height Above Deck: <u>0.75 in.</u>
<b>Mesh:</b>	Type: <u>6x6 W2.9xW2.9</u>	

TEST RESULTS		
<b>Peak Shear Load:</b>	<u>40.89 kips</u>	
<b>Peak Shear Load Per Screw:</b>	<u>4.09 kips</u>	
<b>Slip at Peak Shear Load:</b>	SC1: <u>0.732 in.</u>	SC5: <u>0.781 in.</u>
	SC2: <u>0.798 in.</u>	SC6: <u>0.684 in.</u>
	SC3: <u>0.804 in.</u>	SC7: <u>0.773 in.</u>
	SC4: <u>0.786 in.</u>	SC8: <u>0.717 in.</u>

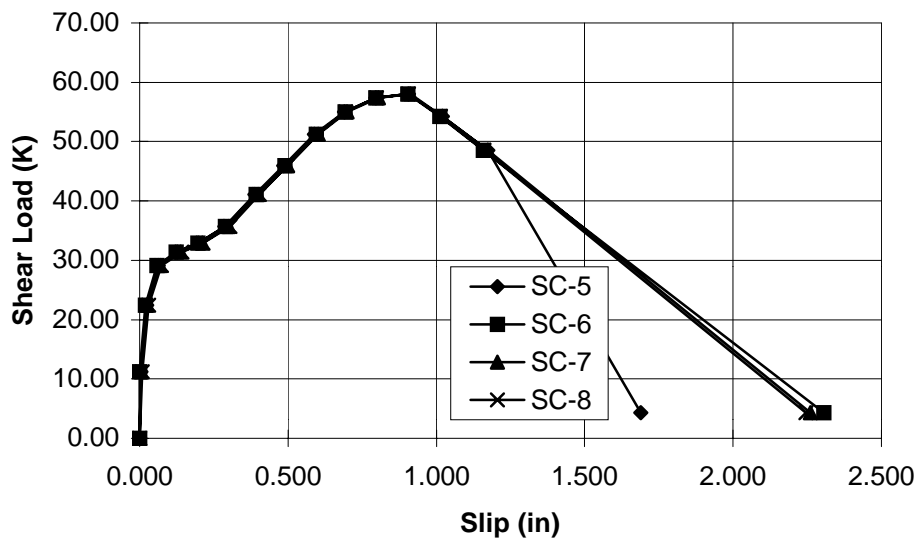


COMMENTS
Failure mode: screw shear. X=screw sheared off. Screw Rotation $\cong$ 45°. Deck debonded; bulges in deck below screws.

Test D2-1: Load vs. Slip (A)



Test D2-1: Load vs. Slip (B)



TEST D2-1 DATA

Shear Load (kips)	Normal Load (kips)	Slips (in)							
		SC-1	SC-2	SC-3	SC-4	SC-5	SC-6	SC-7	SC-8
0.00	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
11.18	1.17	0.003	0.012	0.010	0.012	0.005	0.001	0.005	0.008
22.42	2.11	0.026	0.038	0.035	0.039	0.023	0.018	0.027	0.031
29.08	2.92	0.081	0.095	0.091	0.097	0.063	0.058	0.068	0.073
31.41	3.30	0.156	0.169	0.163	0.173	0.126	0.124	0.138	0.142
32.91	3.51	0.229	0.245	0.235	0.249	0.198	0.197	0.210	0.214
35.68	3.49	0.327	0.343	0.333	0.350	0.288	0.289	0.300	0.305
41.08	4.08	0.424	0.441	0.428	0.449	0.387	0.392	0.400	0.403
45.92	4.82	0.511	0.528	0.516	0.541	0.485	0.490	0.497	0.499
51.26	5.29	0.599	0.617	0.604	0.636	0.590	0.595	0.602	0.599
55.03	5.61	0.690	0.713	0.688	0.734	0.691	0.692	0.698	0.694
57.41	6.44	0.796	0.822	0.718	0.840	0.797	0.795	0.805	0.798
58.04	6.22	0.906	0.934	0.777	0.948	0.907	0.904	0.912	0.906
54.21	6.36	1.053	1.042	0.862	1.057	1.020	1.012	1.021	1.015
48.56	6.51	1.132	1.183	0.991	1.200	1.173	1.159	1.174	1.161
4.33	5.57	1.262	1.323	1.178	1.347	1.689	2.305	2.261	2.244

**APPENDIX A-2: Full-Scale Test Sample Data Pack (Mujagic et al. 2000b)**

**NUCOR COMPOSITE JOIST TEST SUMMARY SHEET**

**TEST DESIGNATION:** CSJ-12

**TEST DATE:** 4 April 2000

**TEST DESCRIPTION**

<b>Joist:</b>	Span: 30'-0"	Weight: 9.43 lb/ft/joist
	Depth: 20"	Spacing: 3'-4"
	Top Chord: 2L-1.50x1.50x0.138	$F_y = 58.5$ ksi $F_u = 80.6$ ksi
	Bottom Chord: 2L-1.75x1.75x0.170	$F_y = 60.8$ ksi $F_u = 81.5$ ksi
<b>Deck:</b>	Type: 1.0Cga26	$F_y = 94.4$ ksi $F_u = 94.4$ ksi
<b>Slab:</b>	Total Depth: 3.5"	$w_c = 151$ pcf $f'_c = 5100$ psi
<b>Shear Connector:</b>	Type: ELCO Grade 8, 5/16" dia. x 2.5" long standoff screw	
	Quantity: 15 per half-span per joist	

**THEORETICAL CALCULATIONS**

Theoretical Applied Load per Joist at Failure:	30.68 kips (including load distribution system)
Theoretical Total Load per Joist at Failure:	34.88 kips
Transformed Moment of Inertia:	363.73 in. <sup>4</sup>
Theoretical Elastic Stiffness:	21.56 k/in.
Elastic Deflection at Yield:	2.009 in.

**TEST RESULTS**

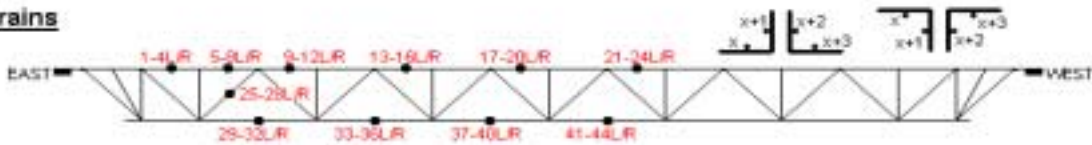
Applied Load per Joist at Failure:	31.24 kips (including load distribution system)
Total Load per Joist at Failure:	35.45 kips
Midspan Deflection at Failure:	15.645 in. (average of two joist)
Maximum Slip at Failure and Location:	0.434 in., SC-North-(12/12)
Mode of Failure:	Bottom chord yielding

**COMPARISON OF ACTUAL TO THEORETICAL**

Applied Load per Joist/Theoretical Applied Load per Joist: 1.02

**INSTRUMENTATION LOCATIONS**

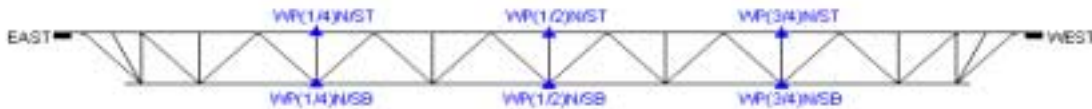
**Strains**



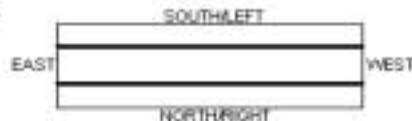
**Slips**



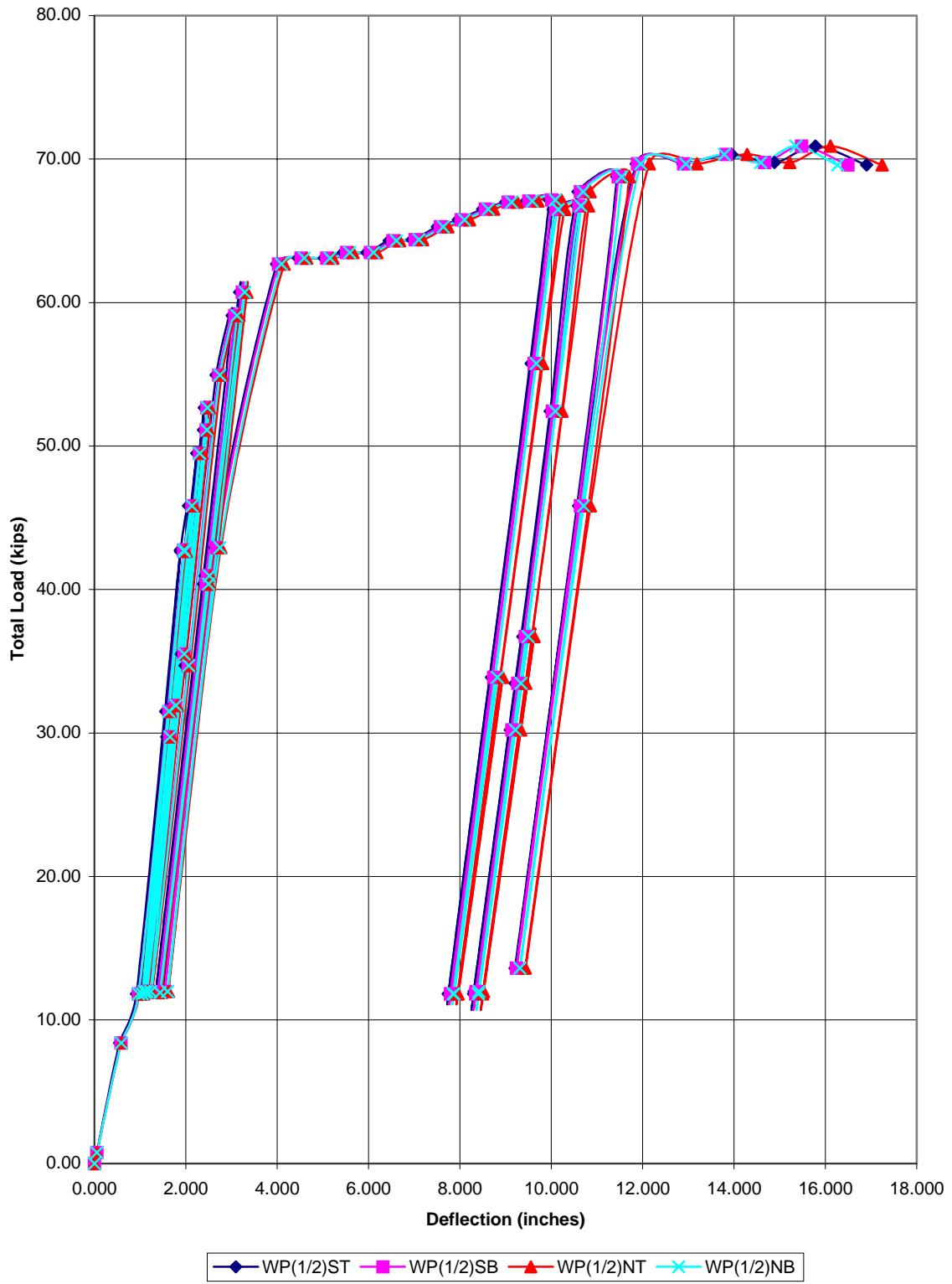
**Deflections**



**Specimen Orientation**



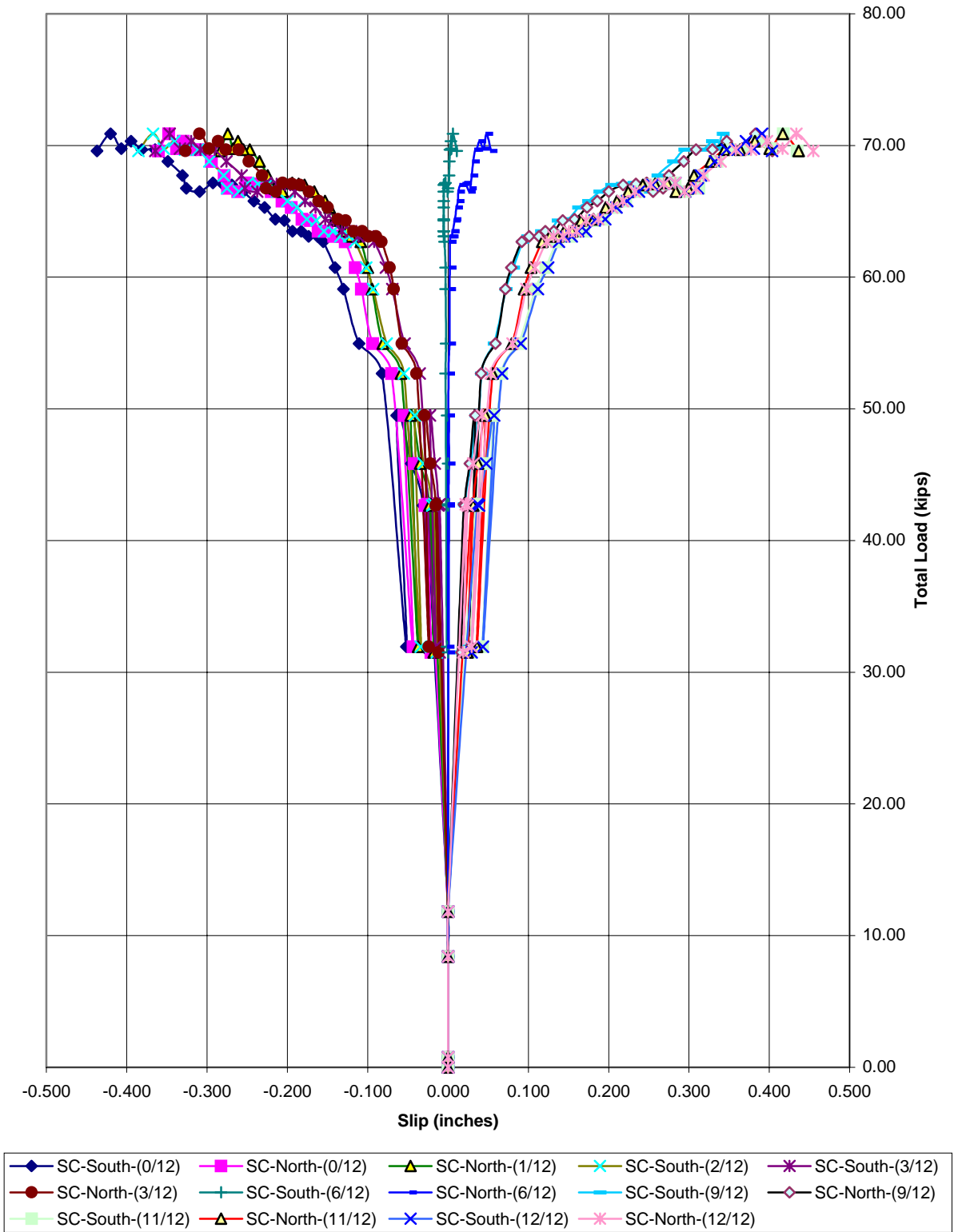
Total Load vs. Deflection (1/2 Span)



## CSJ-12 Deflection

Total Load	WP(1/2)ST	WP(1/2)SB	WP(1/2)NT	WP(1/2)NB
<i>kips</i>	<i>in</i>	<i>in</i>	<i>in</i>	<i>in</i>
0.00	0.000	0.000	0.000	0.000
0.76	0.050	0.052	0.053	0.053
8.41	0.550	0.579	0.586	0.586
11.82	0.919	0.958	0.976	0.966
42.74	1.884	1.950	1.994	1.962
11.82	1.001	1.049	1.076	1.049
31.52	1.558	1.627	1.667	1.632
42.66	1.879	1.959	2.003	1.967
45.84	2.058	2.132	2.180	2.133
11.99	1.040	1.090	1.108	1.090
29.73	1.584	1.645	1.680	1.651
49.50	2.240	2.296	2.353	2.306
11.91	1.062	1.108	1.135	1.113
31.92	1.710	1.773	1.812	1.781
52.67	2.401	2.460	2.512	2.475
11.99	1.097	1.145	1.167	1.148
35.50	1.897	1.959	2.003	1.965
51.13	2.388	2.446	2.498	2.462
11.99	1.175	1.218	1.253	1.232
34.69	1.979	2.050	2.094	2.062
54.95	2.662	2.719	2.785	2.742
59.10	3.014	3.070	3.158	3.118
11.91	1.340	1.390	1.462	1.437
40.39	2.388	2.442	2.521	2.498
40.96	2.418	2.469	2.539	2.513
60.73	3.179	3.238	3.335	3.289
11.99	1.492	1.541	1.617	1.602
42.91	2.636	2.674	2.767	2.745
62.68	3.988	4.030	4.148	4.093
63.09	4.462	4.521	4.644	4.590
63.09	5.023	5.081	5.217	5.154
63.49	5.444	5.518	5.658	5.590
63.49	5.962	6.041	6.180	6.109
64.31	6.453	6.533	6.680	6.606
64.39	6.957	7.020	7.185	7.103
65.28	7.505	7.570	7.735	7.636
65.77	7.966	8.030	8.208	8.101
66.50	8.496	8.553	8.735	8.619
66.99	9.001	9.054	9.253	9.131
67.07	9.453	9.504	9.708	9.583
67.15	9.957	10.009	10.221	10.086
11.82	7.749	7.793	7.948	7.852
33.87	8.692	8.740	8.935	8.818
11.82	7.749	7.802	7.958	7.870
55.76	9.561	9.622	9.812	9.672
66.50	10.040	10.096	10.298	10.149
66.74	10.561	10.605	10.812	10.652
11.82	8.296	8.344	8.498	8.401
30.21	9.101	9.136	9.330	9.214
36.72	9.374	9.427	9.621	9.494
11.99	8.309	8.357	8.512	8.414
33.47	9.209	9.263	9.439	9.335
52.42	9.974	10.023	10.230	10.089
67.72	10.587	10.637	10.848	10.696
68.78	11.435	11.465	11.703	11.541
13.61	9.209	9.236	9.430	9.311
45.83	10.596	10.637	10.857	10.709
69.67	11.857	11.889	12.144	11.958
69.67	12.879	12.894	13.189	12.945
70.32	13.944	13.827	14.285	13.790
69.75	14.883	14.665	15.217	14.585
70.89	15.783	15.475	16.107	15.356
69.59	16.904	16.489	17.244	16.266

CSJ-12: Total Load vs. Slip Envelope

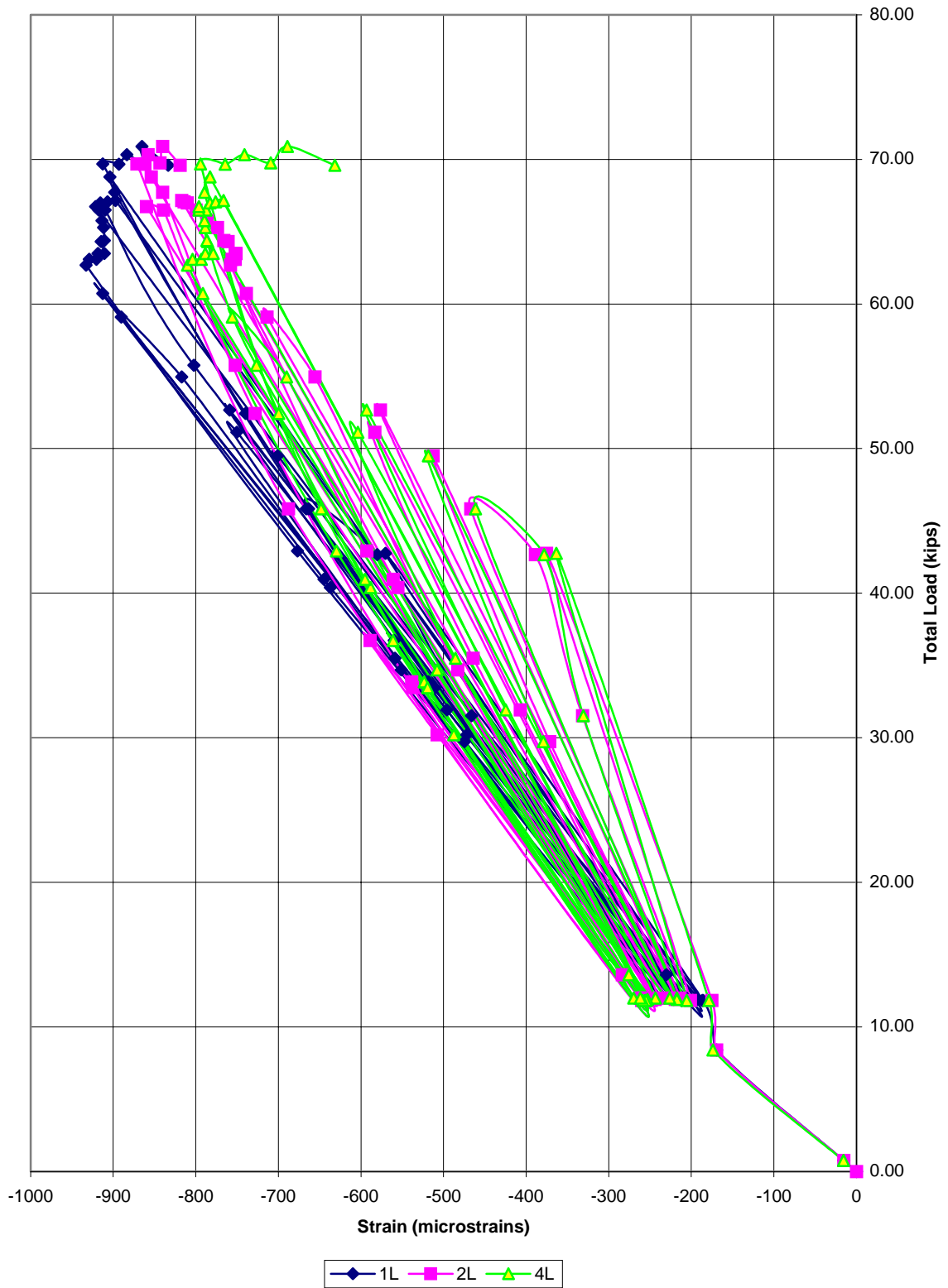


### CSJ-12 Slip Data

Total Load	SC-South-(0/12)	SC-North-(0/12)	SC-North-(1/12)	SC-South-(2/12)	SC-South-(3/12)	SC-North-(3/12)
<i>kips</i>	<i>in</i>	<i>in</i>	<i>in</i>	<i>in</i>	<i>in</i>	<i>in</i>
0.00	0.000	0.000	0.000	0.000	0.000	0.000
0.76	0.000	0.000	0.000	0.000	0.000	0.000
8.41	0.000	0.000	0.000	0.000	0.000	0.000
11.82	0.000	0.000	0.000	0.000	0.000	0.000
42.74	-0.027	-0.025	-0.021	-0.017	-0.010	-0.014
11.82	-0.018	-0.018	-0.010	-0.011	-0.010	-0.008
31.52	-0.023	-0.021	-0.018	-0.014	-0.010	-0.012
42.66	-0.031	-0.028	-0.023	-0.020	-0.012	-0.015
45.84	-0.046	-0.042	-0.035	-0.030	-0.016	-0.022
11.99	-0.028	-0.024	-0.015	-0.016	-0.012	-0.010
29.73	-0.038	-0.032	-0.027	-0.023	-0.012	-0.016
49.50	-0.064	-0.055	-0.046	-0.041	-0.023	-0.029
11.91	-0.033	-0.026	-0.017	-0.019	-0.012	-0.012
31.92	-0.052	-0.044	-0.037	-0.034	-0.016	-0.024
52.67	-0.082	-0.070	-0.059	-0.055	-0.035	-0.039
11.99	-0.038	-0.030	-0.020	-0.023	-0.014	-0.014
35.50	-0.069	-0.058	-0.050	-0.048	-0.026	-0.032
51.13	-0.086	-0.073	-0.062	-0.058	-0.037	-0.042
11.99	-0.044	-0.035	-0.024	-0.030	-0.019	-0.018
34.69	-0.083	-0.070	-0.062	-0.059	-0.037	-0.044
54.95	-0.111	-0.094	-0.081	-0.076	-0.054	-0.057
59.10	-0.130	-0.108	-0.095	-0.093	-0.069	-0.068
11.91	-0.050	-0.038	-0.027	-0.037	-0.023	-0.020
40.39	-0.107	-0.087	-0.078	-0.077	-0.052	-0.055
40.96	-0.108	-0.088	-0.078	-0.077	-0.052	-0.055
60.73	-0.141	-0.116	-0.100	-0.102	-0.077	-0.072
11.99	-0.055	-0.042	-0.030	-0.043	-0.027	-0.023
42.91	-0.120	-0.096	-0.087	-0.087	-0.062	-0.061
62.68	-0.155	-0.128	-0.109	-0.116	-0.092	-0.083
63.09	-0.163	-0.134	-0.115	-0.123	-0.099	-0.089
63.09	-0.174	-0.142	-0.121	-0.134	-0.111	-0.099
63.49	-0.183	-0.151	-0.126	-0.143	-0.121	-0.107
63.49	-0.194	-0.162	-0.132	-0.154	-0.132	-0.117
64.31	-0.204	-0.171	-0.137	-0.164	-0.143	-0.127
64.39	-0.215	-0.182	-0.141	-0.176	-0.153	-0.137
65.28	-0.228	-0.195	-0.148	-0.188	-0.165	-0.150
65.77	-0.242	-0.207	-0.153	-0.200	-0.178	-0.161
66.50	-0.255	-0.220	-0.166	-0.213	-0.191	-0.173
66.99	-0.269	-0.232	-0.179	-0.226	-0.203	-0.184
67.07	-0.281	-0.241	-0.186	-0.237	-0.213	-0.194
67.15	-0.293	-0.251	-0.194	-0.249	-0.227	-0.206
11.82	-0.180	-0.150	-0.124	-0.162	-0.152	-0.132
33.87	-0.244	-0.202	-0.179	-0.208	-0.190	-0.173
11.82	-0.181	-0.151	-0.126	-0.163	-0.155	-0.133
55.76	-0.288	-0.243	-0.201	-0.243	-0.222	-0.201
66.50	-0.309	-0.262	-0.206	-0.260	-0.238	-0.214
66.74	-0.326	-0.274	-0.216	-0.275	-0.253	-0.226
11.82	-0.200	-0.168	-0.140	-0.182	-0.172	-0.148
30.21	-0.254	-0.209	-0.187	-0.220	-0.200	-0.182
36.72	-0.274	-0.226	-0.202	-0.234	-0.214	-0.195
11.99	-0.200	-0.168	-0.139	-0.182	-0.173	-0.149
33.47	-0.262	-0.216	-0.193	-0.226	-0.205	-0.187
52.42	-0.306	-0.255	-0.219	-0.259	-0.238	-0.214
67.72	-0.331	-0.279	-0.224	-0.279	-0.257	-0.231
68.78	-0.349	-0.294	-0.235	-0.297	-0.276	-0.248
13.61	-0.225	-0.188	-0.160	-0.204	-0.195	-0.169
45.83	-0.318	-0.265	-0.237	-0.273	-0.252	-0.228
69.67	-0.365	-0.307	-0.247	-0.311	-0.291	-0.260
69.67	-0.381	-0.321	-0.255	-0.328	-0.308	-0.276
70.32	-0.395	-0.330	-0.262	-0.341	-0.320	-0.286
69.75	-0.407	-0.338	-0.268	-0.354	-0.334	-0.298
70.89	-0.420	-0.348	-0.274	-0.367	-0.347	-0.309
69.59	-0.437	-0.361	-0.284	-0.385	-0.364	-0.327



CSJ-12: Total Load vs. Strain Plot (1L - 4L)



## CSJ-12 Strain Data

Total Load	1L	2L	4L
<i>kips</i>	$\mu\epsilon$	$\mu\epsilon$	$\mu\epsilon$
0.00	0	0	1
0.76	-15	-15	-16
8.41	-169	-169	-174
11.82	-186	-175	-179
42.74	-570	-375	-364
11.82	-212	-201	-206
31.52	-466	-332	-331
42.66	-580	-389	-378
45.84	-663	-467	-461
11.99	-224	-214	-217
29.73	-475	-371	-379
49.50	-701	-513	-519
11.91	-214	-220	-217
31.92	-496	-407	-425
52.67	-759	-576	-593
11.99	-219	-226	-226
35.50	-559	-464	-486
51.13	-750	-583	-604
11.99	-218	-239	-243
34.69	-551	-483	-508
54.95	-817	-656	-690
59.10	-890	-714	-756
11.91	-221	-244	-253
40.39	-637	-555	-588
40.96	-645	-561	-595
60.73	-913	-739	-791
11.99	-235	-258	-270
42.91	-677	-593	-630
62.68	-933	-758	-810
63.09	-929	-756	-804
63.09	-920	-752	-793
63.49	-918	-752	-789
63.49	-911	-751	-779
64.31	-914	-761	-786
64.39	-911	-766	-787
65.28	-912	-774	-789
65.77	-914	-786	-790
66.50	-917	-800	-788
66.99	-915	-810	-783
67.07	-907	-814	-776
67.15	-897	-817	-766
11.82	-194	-249	-256
33.87	-518	-539	-523
11.82	-187	-252	-255
55.76	-802	-752	-727
66.50	-910	-839	-796
66.74	-921	-860	-796
11.82	-199	-260	-259
30.21	-472	-508	-488
36.72	-560	-589	-561
11.99	-206	-262	-262
33.47	-511	-538	-519
52.42	-740	-728	-700
67.72	-898	-840	-790
68.78	-904	-854	-783
13.61	-230	-283	-275
45.83	-666	-688	-648
69.67	-913	-871	-794
69.67	-893	-862	-764
70.32	-884	-858	-741
69.75	-864	-843	-709
70.89	-865	-840	-689
69.59	-833	-819	-632