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Structural Engineering and Materials

STRENGTH PREDICTION METHOD FOR SHEAR STUDS AND RESISTANCE FACTOR FOR COMPOSITE BEAMS

Volume II

by

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Table 5.24 VT Experimental Strengths and New Predicted Strengths

Program	Series	Test	Stud Layout	Q_e (k)	d/t	R_p	R_n	R_d	$A_s F_u$ (k)	Q_{sc} (k)	Q_e/Q_{sc}	Q_e ave. (k)	Q_e ave./ Q_{sc}
Rambo-Roddenberry	D1	D1	S	9.77	0.96	0.68	1.00	1.00	14.54	9.89	0.988	8.76	0.886
Rambo-Roddenberry	D1	D2	S	7.29	0.96	0.68	1.00	1.00	14.54	9.89	0.737		
Rambo-Roddenberry	D1	D3	S	9.23	0.96	0.68	1.00	1.00	14.54	9.89	0.934		
Rambo-Roddenberry	D2	D4	2S	8.95	0.96	0.68	0.84	1.00	14.54	8.30	1.078	8.29	0.998
Rambo-Roddenberry	D2	D5	2S	8.76	0.96	0.68	0.84	1.00	14.54	8.30	1.055		
Rambo-Roddenberry	D2	D6	2S	7.16	0.96	0.68	0.84	1.00	14.54	8.30	0.862		
Rambo-Roddenberry	D3	D7	W	5.81	0.96	0.48	1.00	1.00	14.54	6.98	0.833	6.69	0.959
Rambo-Roddenberry	D3	D8	W	7.44	0.96	0.48	1.00	1.00	14.54	6.98	1.066		
Rambo-Roddenberry	D3	D9	W	6.82	0.96	0.48	1.00	1.00	14.54	6.98	0.977		
Rambo-Roddenberry	D4	D10	S	12.53	1.20	0.68	1.00	1.00	22.28	15.15	0.827	13.87	0.916
Rambo-Roddenberry	D4	D11	S	13.54	1.20	0.68	1.00	1.00	22.28	15.15	0.894		
Rambo-Roddenberry	D4	D12	S	15.55	1.20	0.68	1.00	1.00	22.28	15.15	1.026		
Rambo-Roddenberry	D5	D13	W	11.81	1.20	0.48	1.00	1.00	20.56	9.87	1.197	10.45	1.059
Rambo-Roddenberry	D5	D14	W	9.99	1.20	0.48	1.00	1.00	20.56	9.87	1.012		
Rambo-Roddenberry	D5	D15	W	9.55	1.20	0.48	1.00	1.00	20.56	9.87	0.968		
Rambo-Roddenberry	D6	D16	2S	11.87	1.20	0.68	0.84	1.00	22.28	12.73	0.933	13.65	1.072
Rambo-Roddenberry	D6	D17	2S	15.42	1.20	0.68	0.84	1.00	22.28	12.73	1.211		
Rambo-Roddenberry	D7	D19	S	8.86	0.96	0.68	1.00	1.00	14.54	9.89	0.896	8.21	0.830
Rambo-Roddenberry	D7	D20	S	9.14	0.96	0.68	1.00	1.00	14.54	9.89	0.924		
Rambo-Roddenberry	D7	D21	S	6.63	0.96	0.68	1.00	1.00	14.54	9.89	0.671		
Rambo-Roddenberry	D8	D22	2S	9.23	0.96	0.68	0.84	1.00	14.54	8.30	1.111	10.33	1.244
Rambo-Roddenberry	D8	D23	2S	10.30	0.96	0.68	0.84	1.00	14.54	8.30	1.240		
Rambo-Roddenberry	D8	D24	2S	11.46	0.96	0.68	0.84	1.00	14.54	8.30	1.380		
Rambo-Roddenberry	D9	D25	W	7.85	0.96	0.48	1.00	1.00	14.54	6.98	1.125	7.35	1.053
Rambo-Roddenberry	D9	D26	W	7.32	0.96	0.48	1.00	1.00	14.54	6.98	1.049		
Rambo-Roddenberry	D9	D27	W	6.88	0.96	0.48	1.00	1.00	14.54	6.98	0.986		
Rambo-Roddenberry	D10	D28	S	20.01	1.44	0.68	1.00	1.00	29.08	19.77	1.012	20.18	1.021
Rambo-Roddenberry	D10	D29	S	18.72	1.44	0.68	1.00	1.00	29.08	19.77	0.947		
Rambo-Roddenberry	D10	D30	S	21.80	1.44	0.68	1.00	1.00	29.08	19.77	1.103		
Rambo-Roddenberry	D11	D32	2S	17.49	1.44	0.68	0.84	1.00	29.08	16.61	1.053	19.19	1.155

Table 5.24 VT Experimental Strengths and New Predicted Strengths

Program	Series	Test	Stud Layout	Q _e (k)	d/t	R _p	R _n	R _d	A _s F _u (k)	Q _{sc} (k)	Q _e /Q _{sc}	Q _e ave. (k)	Q _e ave./Q _{sc}
Rambo-Roddenberry	D11	D33	2S	20.89	1.44	0.68	0.84	1.00	29.08	16.61	1.258		
Rambo-Roddenberry	D12	D34	W	11.81	1.44	0.48	1.00	1.00	29.08	13.96	0.846	12.74	0.913
Rambo-Roddenberry	D12	D35	W	12.00	1.44	0.48	1.00	1.00	29.08	13.96	0.860		
Rambo-Roddenberry	D12	D36	W	14.42	1.44	0.48	1.00	1.00	29.08	13.96	1.033		
Rambo-Roddenberry	D13	D37	S	16.18	1.20	0.68	1.00	1.00	22.28	15.15	1.068	15.93	1.051
Rambo-Roddenberry	D13	D38	S	17.07	1.20	0.68	1.00	1.00	22.28	15.15	1.126		
Rambo-Roddenberry	D13	D39	S	14.53	1.20	0.68	1.00	1.00	22.28	15.15	0.959		
Rambo-Roddenberry	D14	D40	2S	14.70	1.20	0.68	0.84	1.00	22.28	12.73	1.155	16.36	1.285
Rambo-Roddenberry	D14	D41	2S	16.95	1.20	0.68	0.84	1.00	22.28	12.73	1.332		
Rambo-Roddenberry	D14	D42	2S	17.43	1.20	0.68	0.84	1.00	22.28	12.73	1.369		
Rambo-Roddenberry	D15	D43	W	8.78	1.20	0.48	1.00	1.00	22.28	10.70	0.821	9.45	0.883
Rambo-Roddenberry	D15	D44	W	9.64	1.20	0.48	1.00	1.00	22.28	10.70	0.901		
Rambo-Roddenberry	D15	D45	W	9.93	1.20	0.48	1.00	1.00	22.28	10.70	0.928		
Rambo-Roddenberry	D16	D46	S	5.89	0.72	0.68	1.00	1.00	8.75	5.95	0.990	5.48	0.921
Rambo-Roddenberry	D16	D47	S	5.18	0.72	0.68	1.00	1.00	8.75	5.95	0.871		
Rambo-Roddenberry	D16	D48	S	5.36	0.72	0.68	1.00	1.00	8.75	5.95	0.901		
Rambo-Roddenberry	D18	D52	W	4.05	0.72	0.48	1.00	1.00	8.75	4.20	0.965	4.47	1.064
Rambo-Roddenberry	D18	D53	W	4.54	0.72	0.48	1.00	1.00	8.75	4.20	1.081		
Rambo-Roddenberry	D18	D54	W	4.81	0.72	0.48	1.00	1.00	8.75	4.20	1.146		
Rambo-Roddenberry	D20	D58	S	6.03	0.72	0.68	1.00	1.00	8.53	5.80	1.039	7.88	1.358
Rambo-Roddenberry	D20	D59	S	8.10	0.72	0.68	1.00	1.00	8.53	5.80	1.396		
Rambo-Roddenberry	D20	D60	S	9.50	0.72	0.68	1.00	1.00	8.53	5.80	1.638		
Rambo-Roddenberry	D22	D64	W	5.40	0.72	0.48	1.00	1.00	8.53	4.09	1.319	6.18	1.509
Rambo-Roddenberry	D22	D65	W	6.68	0.72	0.48	1.00	1.00	8.53	4.09	1.631		
Rambo-Roddenberry	D22	D66	W	6.46	0.72	0.48	1.00	1.00	8.53	4.09	1.578		
Lyons	1	D2	S	21.91	1.44	0.68	1.00	0.88	29.41	17.60	1.245	20.00	1.136
Lyons	1	D3	S	18.08	1.44	0.68	1.00	0.88	29.41	17.60	1.027		
Lyons	2	D4	S	19.44	1.44	0.68	1.00	0.88	29.41	17.60	1.105	19.67	1.118
Lyons	2	D5	S	18.85	1.44	0.68	1.00	0.88	29.41	17.60	1.071		
Lyons	2	D6	S	20.73	1.44	0.68	1.00	0.88	29.41	17.60	1.178		

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Table 5.24 VT Experimental Strengths and New Predicted Strengths

Program	Series	Test	Stud Layout	Q_e (k)	d/t	R_p	R_n	R_d	$A_s F_u$ (k)	Q_{sc} (k)	Q_e/Q_{sc}	Q_e ave. (k)	Q_e ave./ Q_{sc}
Lyons	3	D7	S	21.18	1.44	0.68	1.00	0.88	29.41	17.60	1.204	21.00	1.194
Lyons	3	D8	S	20.37	1.44	0.68	1.00	0.88	29.41	17.60	1.158		
Lyons	3	D9	S	21.46	1.44	0.68	1.00	0.88	29.41	17.60	1.220		
Lyons	4	D10	S	20.62	1.44	0.68	1.00	0.88	28.74	17.20	1.199	21.20	1.233
Lyons	4	D11	S	21.02	1.44	0.68	1.00	0.88	28.74	17.20	1.222		
Lyons	4	D12	S	21.97	1.44	0.68	1.00	0.88	28.74	17.20	1.278		
Lyons	5	D13	S	19.84	1.44	0.68	1.00	0.88	28.69	17.17	1.156	20.48	1.193
Lyons	5	D14	S	20.14	1.44	0.68	1.00	0.88	28.69	17.17	1.173		
Lyons	5	D15	S	21.45	1.44	0.68	1.00	0.88	28.69	17.17	1.250		
Lyons	6	D52	S	17.39	1.44	0.68	1.00	1.00	29.41	20.00	0.870	16.78	0.839
Lyons	6	D53	S	14.61	1.44	0.68	1.00	1.00	29.41	20.00	0.731		
Lyons	6	D54	S	18.35	1.44	0.68	1.00	1.00	29.41	20.00	0.918		
Lyons	7	D55	S	18.21	1.44	0.68	1.00	1.00	28.74	19.54	0.932	17.33	0.887
Lyons	7	D56	S	15.49	1.44	0.68	1.00	1.00	28.74	19.54	0.793		
Lyons	7	D57	S	18.30	1.44	0.68	1.00	1.00	28.74	19.54	0.936		
Lyons	8	D58	S	18.67	1.44	0.68	1.00	1.00	28.69	19.51	0.957	18.57	0.952
Lyons	8	D59	S	19.60	1.44	0.68	1.00	1.00	28.69	19.51	1.005		
Lyons	8	D60	S	17.45	1.44	0.68	1.00	1.00	28.69	19.51	0.895		
Lyons	9	D16	STAG	11.48	1.44	0.52	1.00	0.88	29.41	13.46	0.853	12.59	0.936
Lyons	9	D17	STAG	14.22	1.44	0.52	1.00	0.88	29.41	13.46	1.057		
Lyons	9	D18	STAG	12.08	1.44	0.52	1.00	0.88	29.41	13.46	0.898		
Lyons	10	D19	STAG	15.49	1.44	0.52	1.00	0.88	29.41	13.46	1.151	15.29	1.137
Lyons	10	D20	STAG	15.28	1.44	0.52	1.00	0.88	29.41	13.46	1.136		
Lyons	10	D21	STAG	15.11	1.44	0.52	1.00	0.88	29.41	13.46	1.123		
Lyons	11	D22	STAG	12.91	1.44	0.52	1.00	0.88	29.41	13.46	0.959	14.16	1.052
Lyons	11	D23	STAG	15.35	1.44	0.52	1.00	0.88	29.41	13.46	1.141		
Lyons	11	D24	STAG	14.21	1.44	0.52	1.00	0.88	29.41	13.46	1.056		
Lyons	12	D25	STAG	11.47	1.44	0.52	1.00	0.88	28.74	13.15	0.872	13.55	1.030
Lyons	12	D26	STAG	15.08	1.44	0.52	1.00	0.88	28.74	13.15	1.147		
Lyons	12	D27	STAG	14.10	1.44	0.52	1.00	0.88	28.74	13.15	1.072		

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Table 5.24 VT Experimental Strengths and New Predicted Strengths

Program	Series	Test	Stud Layout	Q_e (k)	d/t	R_p	R_n	R_d	$A_s F_u$ (k)	Q_{sc} (k)	Q_e/Q_{sc}	Q_e ave. (k)	Q_e ave./ Q_{sc}
Lyons	13	D76	STAG	13.34	1.44	0.52	1.00	1.00	29.77	15.48	0.862	14.26	0.921
Lyons	13	D77	STAG	14.95	1.44	0.52	1.00	1.00	29.77	15.48	0.966		
Lyons	13	D78	STAG	14.50	1.44	0.52	1.00	1.00	29.77	15.48	0.937		
Lyons	14	D64	STAG	13.70	1.44	0.52	1.00	1.00	28.74	14.94	0.917	13.44	0.900
Lyons	14	D65	STAG	14.12	1.44	0.52	1.00	1.00	28.74	14.94	0.945		
Lyons	14	D66	STAG	12.51	1.44	0.52	1.00	1.00	28.74	14.94	0.837		
Lyons	15	D67	STAG	14.02	1.44	0.52	1.00	1.00	28.69	14.92	0.940	14.64	0.981
Lyons	15	D68	STAG	14.96	1.44	0.52	1.00	1.00	28.69	14.92	1.003		
Lyons	15	D69	STAG	14.94	1.44	0.52	1.00	1.00	28.69	14.92	1.002		
Lyons	16	D28	2S	15.50	1.44	0.68	0.84	0.88	29.41	14.78	1.049	15.71	1.063
Lyons	16	D29	2S	15.59	1.44	0.68	0.84	0.88	29.41	14.78	1.055		
Lyons	16	D30	2S	16.05	1.44	0.68	0.84	0.88	29.41	14.78	1.086		
Lyons	17	D31	2S	12.37	1.44	0.68	0.84	0.88	29.41	14.78	0.837	15.04	1.018
Lyons	17	D32	2S	14.46	1.44	0.68	0.84	0.88	29.41	14.78	0.978		
Lyons	17	D33	2S	18.30	1.44	0.68	0.84	0.88	29.41	14.78	1.238		
Lyons	18	D34	2S	17.86	1.44	0.68	0.84	0.88	29.41	14.78	1.208	16.95	1.147
Lyons	18	D35	2S	16.10	1.44	0.68	0.84	0.88	29.41	14.78	1.089		
Lyons	18	D36	2S	16.89	1.44	0.68	0.84	0.88	29.41	14.78	1.143		
Lyons	19	D37	2S	16.52	1.44	0.68	0.84	0.88	28.74	14.44	1.144	16.24	1.124
Lyons	19	D38	2S	17.76	1.44	0.68	0.84	0.88	28.74	14.44	1.230		
Lyons	19	D39	2S	14.43	1.44	0.68	0.84	0.88	28.74	14.44	0.999		
Lyons	20	D40	W	10.95	1.44	0.48	1.00	0.88	29.41	12.42	0.882	10.73	0.864
Lyons	20	D41	W	10.96	1.44	0.48	1.00	0.88	29.41	12.42	0.882		
Lyons	20	D42	W	10.29	1.44	0.48	1.00	0.88	29.41	12.42	0.828		
Lyons	21	D43	W	11.09	1.44	0.48	1.00	1.00	29.41	14.12	0.786	12.17	0.862
Lyons	21	D44	W	11.75	1.44	0.48	1.00	1.00	29.41	14.12	0.832		
Lyons	21	D45	W	13.66	1.44	0.48	1.00	1.00	29.41	14.12	0.968		
Lyons	22	D46	W	10.67	1.44	0.48	1.00	1.05	29.41	14.82	0.720	12.74	0.860
Lyons	22	D47	W	14.19	1.44	0.48	1.00	1.05	29.41	14.82	0.957		
Lyons	22	D48	W	13.36	1.44	0.48	1.00	1.05	29.41	14.82	0.901		

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Table 5.24 VT Experimental Strengths and New Predicted Strengths

Program	Series	Test	Stud Layout	Q_e (k)	d/t	R_p	R_n	R_d	$A_s F_u$ (k)	Q_{sc} (k)	Q_e/Q_{sc}	$Q_{e,ave.}$ (k)	$Q_{e,ave.}/Q_{sc}$
Lyons	23	D49	W	15.02	1.44	0.48	1.00	1.11	29.41	15.67	0.959	13.48	0.860
Lyons	23	D50	W	11.71	1.44	0.48	1.00	1.11	29.41	15.67	0.747		
Lyons	23	D51	W	13.70	1.44	0.48	1.00	1.11	29.41	15.67	0.874		
Lyons	24	D61	STAG	14.13	1.44	0.52	1.00	0.88	29.41	13.46	1.050	14.75	1.096
Lyons	24	D62	STAG	15.32	1.44	0.52	1.00	0.88	29.41	13.46	1.138		
Lyons	24	D63	STAG	14.81	1.44	0.52	1.00	0.88	29.41	13.46	1.101		
Lyons	25	D79	STAG	16.13	1.44	0.52	1.00	0.88	29.77	13.62	1.184	16.24	1.193
Lyons	25	D80	STAG	15.50	1.44	0.52	1.00	0.88	29.77	13.62	1.138		
Lyons	25	D81	STAG	17.10	1.44	0.52	1.00	0.88	29.77	13.62	1.255		
Lyons	26	D70	STAG	14.01	1.44	0.52	1.00	0.88	28.74	13.15	1.065	14.26	1.084
Lyons	26	D71	STAG	15.21	1.44	0.52	1.00	0.88	28.74	13.15	1.157		
Lyons	26	D72	STAG	13.56	1.44	0.52	1.00	0.88	28.74	13.15	1.031		
Lyons	27	D73	2S	15.79	1.44	0.68	0.84	0.88	29.41	14.78	1.068	15.46	1.046
Lyons	27	D74	2S	14.99	1.44	0.68	0.84	0.88	29.41	14.78	1.014		
Lyons	27	D75	2S	15.61	1.44	0.68	0.84	0.88	29.41	14.78	1.056		
Lyons	28	D82	2S	16.92	1.44	0.68	0.84	0.88	28.66	14.41	1.175	17.29	1.200
Lyons	28	D83	2S	19.42	1.44	0.68	0.84	0.88	28.66	14.41	1.348		
Lyons	28	D84	2S	15.53	1.44	0.68	0.84	0.88	28.66	14.41	1.078		
Lyons	29	D85	2S	18.88	1.44	0.68	0.84	0.88	29.77	14.96	1.262	20.16	1.347
Lyons	29	D86	2S	20.92	1.44	0.68	0.84	0.88	29.77	14.96	1.398		
Lyons	29	D87	2S	20.67	1.44	0.68	0.84	0.88	29.77	14.96	1.381		
Sublett	1	1A	S	18.83	2.40	0.68	1.00	1.00	28.72	19.53	0.964	19.57	1.002
Sublett	1	1B	S	20.30	2.40	0.68	1.00	1.00	28.72	19.53	1.040		
Sublett	2	2A	W	14.20	2.40	0.48	1.00	1.00	28.72	13.78	1.030	14.45	1.048
Sublett	2	2B	W	14.70	2.40	0.48	1.00	1.00	28.72	13.78	1.066		
Sublett	3	3A	S	19.47	2.40	0.68	1.00	1.00	28.72	19.53	0.997	18.94	0.970
Sublett	3	3B	S	18.40	2.40	0.68	1.00	1.00	28.72	19.53	0.942		
Sublett	4	4A	W	13.52	2.40	0.48	1.00	1.00	28.72	13.78	0.981	13.64	0.989
Sublett	4	4B	W	13.75	2.40	0.48	1.00	1.00	28.72	13.78	0.998		
Sublett	5	5A	M	10.39	2.40		1.00	1.00	28.72	12.22	1.176	11.07	0.905

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Table 5.24 VT Experimental Strengths and New Predicted Strengths

Program	Series	Test	Stud Layout	Q_e (k)	d/t	R_p	R_n	R_d	$A_s F_u$ (k)	Q_{sc} (k)	Q_e/Q_{sc}	$Q_{e\text{ ave.}}$ (k)	$Q_{e\text{ ave.}}/Q_{sc}$
Sublett	5	5B	M	11.74	2.40		1.00	1.00	28.72	12.22	1.041		
Sublett	8	8B	S	21.29	2.00	0.68	1.00	1.00	28.72	19.53	1.090	21.29	1.090
Sublett	9	9A	S	18.54	3.00	0.68	1.00	1.00	28.72	19.08	0.972	18.67	0.979
Sublett	9	9B	S	18.80	3.00	0.68	1.00	1.00	28.72	19.08	0.985		
Sublett	10	10A	S	17.11	3.43	0.68	1.00	1.00	28.72	18.43	0.928	17.85	0.968
Sublett	10	10B	S	18.59	3.43	0.68	1.00	1.00	28.72	18.43	1.008		
Sublett	11	11A	S	16.55	4.00	0.68	1.00	1.00	28.72	17.58	0.942	16.99	0.967
Sublett	11	11B	S	17.43	4.00	0.68	1.00	1.00	28.72	17.58	0.992		
Sublett	12	12A	W	15.31	2.40	0.48	1.00	1.00	28.72	13.78	1.111	15.08	1.094
Sublett	12	12B	W	14.85	2.40	0.48	1.00	1.00	28.72	13.78	1.077		
Sublett	13	13A	S	18.28	2.40	0.68	1.00	1.00	28.72	19.53	0.936	19.41	0.994
Sublett	13	13B	S	20.53	2.40	0.68	1.00	1.00	28.72	19.53	1.051		
Sublett	14	14A	S	23.48	2.40	0.68	1.00	1.00	28.72	19.53	1.202	22.69	1.162
Sublett	14	14B	S	21.89	2.40	0.68	1.00	1.00	28.72	19.53	1.121		
Sublett	15	15A	S	18.03	2.00	0.68	1.00	1.00	28.72	19.53	0.923	18.85	0.965
Sublett	15	15B	S	19.66	2.00	0.68	1.00	1.00	28.72	19.53	1.007		
Sublett	16	16A	W	13.66	2.00	0.48	1.00	1.00	28.72	13.78	0.991	13.25	0.961
Sublett	16	16B	W	12.84	2.00	0.48	1.00	1.00	28.72	13.78	0.932		
Sublett	17	17A	S	14.48	2.00	0.68	1.00	1.00	28.72	19.53	0.742	16.62	0.851
Sublett	17	17B	S	18.76	2.00	0.68	1.00	1.00	28.72	19.53	0.961		
Sublett	18	18A	W	12.92	2.00	0.48	1.00	1.00	28.72	13.78	0.937	13.57	0.984
Sublett	18	18B	W	14.22	2.00	0.48	1.00	1.00	28.72	13.78	1.032		
Diaz	T1	T1-1	M	3.49	3.05		1.00		5.60	3.51	1.005	3.64	1.038
Diaz	T1	T1-2	M	3.56	3.05		1.00		5.60	3.51	0.985		
Diaz	T1	T1-3	M	3.87	3.05		1.00		5.60	3.51	0.906		
Diaz	T2	T2-1	M	3.83	2.42		1.00		5.60	4.03	1.052	3.85	0.955
Diaz	T2	T2-2	M	3.78	2.42		1.00		5.60	4.03	1.066		
Diaz	T2	T2-3	M	3.93	2.42		1.00		5.60	4.03	1.025		
Diaz	T3	T3-1	2M	3.38	2.42		0.85		5.60	3.43	1.013	3.49	1.018
Diaz	T3	T3-2	2M	3.48	2.42		0.85		5.60	3.43	0.984		

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Table 5.24 VT Experimental Strengths and New Predicted Strengths

Program	Series	Test	Stud Layout	Q_e (k)	d/t	R_p	R_n	R_d	$A_s F_u$ (k)	Q_{sc} (k)	Q_e/Q_{sc}	$Q_{e,ave.}$ (k)	$Q_{e,ave.}/Q_{sc}$
Diaz	T3	T3-3	2M	3.60	2.42		0.85		5.60	3.43	0.951		
Diaz	T4	T4-1	M	6.67	2.94		1.00		15.57	6.14	0.921	6.47	1.054
Diaz	T4	T4-2	M	6.78	2.94		1.00		15.57	6.14	0.906		
Diaz	T4	T4-3	M	5.97	2.94		1.00		15.57	6.14	1.029		
Diaz	T5	T5-1	M	7.09	2.44		1.00		15.57	6.50	0.917	6.90	1.062
Diaz	T5	T5-2	M	7.18	2.44		1.00		15.57	6.50	0.906		
Diaz	T5	T5-3	M	6.44	2.44		1.00		15.57	6.50	1.010		
Diaz	T6	T6-1	2M	5.88	2.44		0.85		15.57	5.53	0.940	5.55	1.005
Diaz	T6	T6-2	2M	5.50	2.44		0.85		15.57	5.53	1.005		
Diaz	T6	T6-3	2M	5.28	2.44		0.85		15.57	5.53	1.047		
Diaz	T7	T7-1	M	9.62	3.05		1.00		23.78	9.12	0.948	9.37	1.028
Diaz	T7	T7-2	M	9.39	3.05		1.00		23.78	9.12	0.971		
Diaz	T7	T7-3	M	9.11	3.05		1.00		23.78	9.12	1.001		
Diaz	T8	T8-1	M	10.25	2.50		1.00		23.78	9.64	0.941	9.99	1.036
Diaz	T8	T8-2	M	9.46	2.50		1.00		23.78	9.64	1.019		
Diaz	T8	T8-3	M	10.25	2.50		1.00		23.78	9.64	0.941		
Diaz	T9	T9-1	M	11.14	3.05		1.00		23.78	9.12	0.819	11.23	1.231
Diaz	T9	T9-2	M	11.18	3.05		1.00		23.78	9.12	0.816		
Diaz	T9	T9-3	M	11.36	3.05		1.00		23.78	9.12	0.803		
Diaz	T10	T10-1	M	12.21	2.50		1.00		23.78	9.64	0.790	12.22	1.267
Diaz	T10	T10-2	M	12.33	2.50		1.00		23.78	9.64	0.782		
Diaz	T10	T10-3	M	12.12	2.50		1.00		23.78	9.64	0.796		

Easterday 7/7

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Research Report

**STRENGTH PREDICTION METHOD FOR SHEAR STUDS AND
RESISTANCE FACTOR FOR COMPOSITE BEAMS**

Volume II

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STRENGTH PREDICTION METHOD FOR SHEAR STUDS AND RESISTANCE FACTOR FOR COMPOSITE BEAMS: Volume II

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INTRODUCTION

Volume II contains the information related to the push-out tests and beam tests that is too voluminous to include in Volume I. Appendix A reports specimen measurements and a layout for each push-out test specimen. Appendix B reports material properties for the shear studs, concrete, and steel tees used in the push-out test specimens. Data packs are given for the solid slab push-out tests in Appendix C and for the composite slab push-out tests in Appendix D. Composite slab beam test parameters, predictions, and results are reported in Appendix E.

APPENDIX A

SPECIMEN MEASUREMENTS AND LAYOUT

A.1 General

Push-out test specimen measurements, organized by stud position, are reported herein. For each specimen half, the following data is given: the nominal stud diameter, the stud heat reference number, concrete pour number, tee lot, and deck lot. Also given are the measured locations of the studs in the specimen and the heights of the studs after welding. **The locations of these measurements are shown in the "Push-Out Test Layout & Cracking Sheet" for each test.** They are also defined below.

- A = Distance from bottom of slab to bottom stud
- B = Distance from bottom of slab to top stud
- a = Distance from the longitudinal axis of the bottom stud to the deck rib, measured at the bottom flange of the deck on the load-bearing side of the stud
- b = Distance from the longitudinal axis of the top stud to the deck rib, measured at the bottom flange of the deck on the load-bearing side of the stud
- s = Spacing of studs, measured transversely to longitudinal axis of steel beam
- Hs-A = Height of the bottom stud after welding
- Hs-B = Height of the top stud after welding

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A.2 Specimen Measurements of Solid Slab Tests

Slab	Stud Dia. D _s (in.)	Stud Heat	Conc. Pour	Tee Lot	"A" (in.)	Hs-A (in.)	"B" (in.)	Hs-B (in.)
1A	3/4	A80102	1	X	10 1/2	4 1/8	28 1/2	4 1/8
1B	3/4	A80102	1	X	11 1/4	4 1/8	28 7/8	4 1/8
2A	3/4	A80102	1	X	10 5/8	4 1/8	28 1/2	4 1/8
2B	3/4	A80102	1	X	10 5/8	4 1/8	28 3/4	4 1/8
3A	3/4	A80102	1	X	10 5/8	4 1/8	28 5/8	4 1/8
3B	3/4	A80102	1	X	10 5/8	4 1/8	28 5/8	4 1/8
4A	3/4	A80102	1	X	10 1/2	4 1/8	28 1/2	4 1/8
4B	3/4	A80102	1	X	10 3/4	4 1/8	28 3/4	4 1/8
5A	3/4	A80102	1	X	10 5/8	4 1/8	28 3/4	4 1/8
5B	3/4	A80102	1	X	10 1/2	4 1/8	28 5/8	4 1/8
6A	3/4	A80102	1	X	10 1/4	4 1/8	28 1/2	4 1/8
6B	3/4	A80102	1	X	10 3/4	4 1/8	28 1/2	4 1/8
7A	3/4	A80102	1	Y	10 5/8	4 1/8	28 5/8	4 1/8
7B	3/4	A80102	1	Y	10 5/8	4 1/8	28 5/8	4 1/8
8A	3/4	A80102	1	Y	10 3/8	4 1/8	28 1/4	4 1/8
8B	3/4	A80102	1	Y	10 1/2	4 1/8	28 1/2	4 1/8
9A	3/4	A80102	1	Y	10 1/2	4 1/8	28 1/2	4 1/8
9B	3/4	A80102	1	Y	10 3/4	4 1/8	28 5/8	4 1/8
10A	3/4	A80102	1	Z	10 3/4	4 1/8	28 3/4	4 1/8
10B	3/4	A80102	1	Z	10 3/4	4 1/8	28 3/4	4 1/8
11A	3/4	A80102	1	Z	10 5/8	4 1/8	28 5/8	4 1/8
11B	3/4	A80102	1	Z	10 1/2	4 1/8	28 5/8	4 1/8
12A	3/4	A80102	1	Z	10 3/4	4 1/8	28 7/8	4 1/8
12B	3/4	A80102	1	Z	10 1/2	4 1/8	28 1/2	4 1/8
13A	3/4	A80102	2	X	9	4 1/8	27	4 1/8
13B	3/4	A80102	2	X	9 1/2	4 1/8	27 1/2	4 1/8
14A	3/4	A80102	2	X	9	4 1/8	27	4 1/8
14B	3/4	A80102	2	X	9	4 1/8	27	4 1/8
15A	3/4	A80102	2	X	8 3/4	4 1/8	26 3/4	4 1/8
15B	3/4	A80102	2	X	9	4 1/8	27	4 1/8
16A	3/4	A80102	2	X	8 5/8	4 1/8	26 3/4	4 1/8
16B	3/4	A80102	2	X	8 7/8	4 1/8	27	4 1/8
17A	3/4	A80102	2	X	9	4 1/8	27	4 1/8
17B	3/4	A80102	2	X	8 7/8	4 1/8	26 3/4	4 1/8
18A	3/4	A80102	2	X	8 5/8	4 1/8	26 3/4	4 1/8
18B	3/4	A80102	2	X	8 7/8	4 1/8	27	4 1/8
19A	3/4	A80102	3	X	9 1/8	4 1/8	27 1/8	4 1/8
19B	3/4	A80102	3	X	9 1/4	4 1/8	27	4 1/8
20A	3/4	A80102	3	X	9 1/4	4 1/8	27	4 1/8
20B	3/4	A80102	3	X	9	4 1/8	27	4 1/8

A.2 Specimen Measurements of Solid Slab Tests

Slab	Stud Dia. D _s (in.)	Stud Heat	Conc. Pour	Tee Lot	"A" (in.)	Hs-A (in.)	"B" (in.)	Hs-B (in.)
21A	3/4	A80102	3	X	9	4 1/8	27 1/8	4 1/8
21B	3/4	A80102	3	X	9 1/8	4 1/8	27 1/8	4 1/8
22A	3/4	A80102	3	X	9 1/4	4 1/8	27 1/8	4 1/8
22B	3/4	A80102	3	X	9 1/4	4 1/8	27 1/4	4 1/8
23A	3/4	A80102	3	X	9 1/8	4 1/8	27 1/8	4 1/8
23B	3/4	A80102	3	X	9	4 1/8	27	4 1/8
24A	3/4	A80102	3	X	9 1/8	4 1/8	27 1/8	4 1/8
24B	3/4	A80102	3	X	9 1/4	4 1/8	27 1/8	4 1/8

A.3 Specimen Measurements of Deck Tests (Stud Position "S")

Slab	Stud Dia. D _s (in.)	Stud Heat	Conc Pour	Tee Lot	Deck Lot	"A" (in.)	"a" (in.)	Hs-A (in.)	"B" (in.)	"b" (in.)	Hs-B (in.)
D1A	0.5	V47279	5	X	2G20	13 7/8	4	4	25 7/8	3 3/4	4
D1B	0.5	V47279	5	X	2G20	13 1/4	3 7/8	4	25 1/4	3 7/8	4
D2A	0.5	V47279	5	X	2G20	13 3/8	3 3/4	4	25 1/2	3 7/8	4
D2B	0.5	V47279	5	X	2G20	13 5/8	3 7/8	4	25 3/4	3 7/8	4
D3A	0.5	V47279	5	X	2G20	13 3/4	4	4	25 3/4	3 7/8	4
D3B	0.5	V47279	5	X	2G20	13 5/8	3 7/8	4	25 5/8	3 7/8	4
D10A	0.625	8979373	4	X	2G20	13 1/2	4	4	25 3/8	3 3/4	4
D10B	0.625	8979373	4	X	2G20	13 3/4	3 7/8	4	25 3/4	3 5/8	4
D11A	0.625	8979373	4	X	2G20	13 5/8	3 3/4	4	25 3/4	4	4
D11B	0.625	8979373	4	X	2G20	13 5/8	3 7/8	4	25 5/8	3 3/4	4
D12A	0.625	8979373	4	X	2G20	13 7/8	4 1/8	4	26	4	4
D12B	0.625	8979373	4	X	2G20	13 3/4	4	4	25 7/8	4	4
D19A	0.5	V47279	6	X	2G20	13 7/8	4	4	25 1/2	3 3/4	4
D19B	0.5	V47279	6	X	2G20	13 1/2	4	4	25 1/4	3 3/4	4
D20A	0.5	V47279	6	X	2G20	13 1/4	3 3/4	4	25 1/2	4	4
D20B	0.5	V47279	6	X	2G20	13 3/8	3 7/8	4	25 1/2	4	4
D21A	0.5	V47279	6	X	2G20	13 1/4	4	4	25 1/4	4	4
D21B	0.5	V47279	6	X	2G20	13 1/4	4	4	25 3/8	4	4
D28A	0.75	A25033	7	X	2G20	13 3/4	3 7/8	4	25 3/4	3 7/8	4
D28B	0.75	A25033	7	X	2G20	13 3/4	4	4	25 3/4	3 3/4	4
D29A	0.75	A25033	7	X	2G20	14	4 1/4	4	25 5/8	3 5/8	4
D29B	0.75	A25033	7	X	2G20	13 1/2	3 3/4	4	25 1/2	3 3/4	4
D30A	0.75	A25033	7	X	2G20	13 3/4	4	4	25 7/8	4	4
D30B	0.75	A25033	7	X	2G20	13 3/4	4	4	25 3/8	4	4
D37A	0.625	8979373	8	X	2G20	13 7/8	4	4	25 3/4	3 3/4	4
D37B	0.625	8979373	8	X	2G20	13 1/2	3 3/4	4	25 3/8	3 5/8	4
D38A	0.625	8979373	8	X	2G20	13 1/4	3 7/8	4	25 1/4	3 3/4	4
D38B	0.625	8979373	8	X	2G20	13 1/8	3 3/4	4	25 3/8	4	4
D39A	0.625	8979373	8	X	2G20	13 3/4	3 7/8	4	25 7/8	3 7/8	4
D39B	0.625	8979373	8	X	2G20	13 1/2	3 5/8	4	25 5/8	3 3/4	4
D46A	0.375	V48734	9	X	2G20	13 7/8	3 7/8	4	26	4 1/8	4
D46B	0.375	V48734	9	X	2G20	13 1/4	3 7/8	4	25 1/4	3 7/8	4
D47A	0.375	V48734	9	X	2G20	13 3/4	3 7/8	4	25 3/4	3 3/4	4
D47B	0.375	V48734	9	X	2G20	13 1/4	3 7/8	4	25 3/8	4	4
D48A	0.375	V48734	9	X	2G20	13 1/4	3 3/4	4	25 3/8	3 7/8	4
D48B	0.375	V48734	9	X	2G20	13 1/8	3 3/4	4	25	3 3/4	4
D49A	0.875	A23550	9	X	2G20	13 3/4	3 7/8	4	25 5/8	3 7/8	4
D49B	0.875	A23550	9	X	2G20	13 3/4	4	4	25 3/4	4	4
D50A	0.875	A23550	9	X	2G20	13 5/8	4	4	25 3/4	4	4
D50B	0.875	A23550	9	X	2G20	14	4	4	25 7/8	4	4

A.3 Specimen Measurements of Deck Tests (Stud Position "S")

Slab	Stud Dia. D _s (in.)	Stud Heat	Conc Pour	Tee Lot	Deck Lot	"A" (in.)	"a" (in.)	Hs-A (in.)	"B" (in.)	"b" (in.)	Hs-B (in.)
D51A	0.875	A23550	9	X	2G20	13 3/4	3 7/8	4	25 3/4	3 7/8	4
D51B	0.875	A23550	9	X	2G20	13 3/4	4	4	25 1/2	3 5/8	4
D58A	0.375	V48737	10	X	3G20	14 1/4	3 7/8	5	26 1/4	3 7/8	5
D58B	0.375	V48737	10	X	3G20	14	3 7/8	5	26 1/4	4	5
D59A	0.375	V48737	10	X	3G20	14 1/2	4	5	26 5/8	4	5
D59B	0.375	V48737	10	X	3G20	14 3/8	3 7/8	5	26 3/8	4	5
D60A	0.375	V48737	10	X	3G20	14 3/8	4 1/8	5	26 5/8	4 1/8	5
D60B	0.375	V48737	10	X	3G20	14 1/8	3 7/8	5	26 1/4	4	5
D61A	0.875	B27921	10	X	3G20	14 1/8	4	5	26 1/4	3 7/8	5
D61B	0.875	B27921	10	X	3G20	13 7/8	3 7/8	5	26	3 3/4	5
D62A	0.875	B27921	10	X	3G20	14 1/8	3 7/8	5	26 1/4	3 7/8	5
D62B	0.875	B27921	10	X	3G20	14 1/4	4	5	26 1/4	3 3/4	5
D63A	0.875	B27921	10	X	3G20	14 1/8	3 7/8	5	26 1/4	4	5
D63B	0.875	B27921	10	X	3G20	14	3 7/8	5	26 3/8	4 1/8	5
D76A	0.75	A25033	11	X	2G20	13 3/8	3 7/8	4	25 1/4	3 7/8	4
D76B	0.75	A25033	11	X	2G20	14 1/4	4 1/8	4	26	4	4
D77A	0.75	A25033	11	X	2G20	14	4	4	26	4	4
D77B	0.75	A25033	11	X	2G20	14	3 7/8	4	26	3 7/8	4
D78A	0.75	A25033	11	X	2G20	13 7/8	4	4	25 3/4	3 7/8	4
D78B	0.75	A25033	11	X	2G20	13 3/4	4	4	25 3/4	4	4
D79A	0.75	A25033	11	X	2G20	14	4	4	26	4	4
D79B	0.75	A25033	11	X	2G20	13 1/2	3 7/8	4	25 3/4	4	4
D80A	0.75	A25033	11	X	2G20	13 5/8	3 7/8	4	25 5/8	4	4
D80B	0.75	A25033	11	X	2G20	13 1/2	3 7/8	4	25 5/8	3 7/8	4
D81A	0.75	A25033	11	X	2G20	14	3 7/8	4	25 7/8	3 3/4	4
D81B	0.75	A25033	11	X	2G20	13 3/8	4	4	25 5/8	4	4
D88A	0.75	A25033	12	X	2G20	13 3/8	3 7/8	3 3/8	25 1/2	4	3 3/8
D88B	0.75	A25033	12	X	2G20	13 3/8	3 7/8	3 3/8	25 3/8	3 3/4	3 3/8
D89A	0.75	A25033	12	X	2G20	13 1/2	4	3 3/8	25 3/8	3 3/4	3 3/8
D89B	0.75	A25033	12	X	2G20	13 1/2	3 7/8	3 3/8	25 1/2	4	3 3/8
D90A	0.75	A25033	12	X	2G20	13 1/2	3 7/8	3 3/8	25 3/8	3 7/8	3 3/8
D90B	0.75	A25033	12	X	2G20	13 3/8	4	3 3/8	25 3/8	4	3 3/8

A.4 Specimen Measurements of Deck Tests (Stud Position "W")

Slab	Stud Dia. D _s (in.)	Stud Heat	Conc Pour	Tee Lot	Deck Lot	"A" (in.)	"a" (in.)	Hs-A (in.)	"B" (in.)	"b" (in.)	Hs-B (in.)
D7A	0.5	V47279	5	X	2G20	11	1	4	23 1/8	1	4
D7B	0.5	V47279	5	X	2G20	10 7/8	1	4	22 3/4	1	4
D8A	0.5	V47279	5	X	2G20	10 3/4	1	4	22 3/4	7/8	4
D8B	0.5	V47279	5	X	2G20	10 7/8	1	4	22 7/8	7/8	4
D9A	0.5	V47279	5	X	2G20	10 3/4	7/8	4	22 3/4	7/8	4
D9B	0.5	V47279	5	X	2G20	10 3/4	1	4	22 7/8	7/8	4
D13A	0.625	63288	4	X	2G20	11	1	3 1/2	23	1	3 1/2
D13B	0.625	63288	4	X	2G20	10 3/4	3/4	3 1/2	23	1	3 1/2
D14A	0.625	63288	4	X	2G20	10 5/8	7/8	3 1/2	22 7/8	7/8	3 1/2
D14B	0.625	63288	4	X	2G20	10 3/4	7/8	3 1/2	22 3/4	1	3 1/2
D15A	0.625	63288	4	X	2G20	10 3/4	1	3 1/2	22 7/8	1	3 1/2
D15B	0.625	63288	4	X	2G20	10 5/8	7/8	3 1/2	22 7/8	1	3 1/2
D25A	0.5	V47279	6	X	2G20	10 3/4	1	4	22 7/8	7/8	4
D25B	0.5	V47279	6	X	2G20	10 1/8	3/4	4	22 1/4	7/8	4
D26A	0.5	V47279	6	X	2G20	10 3/4	7/8	4	22 1/2	3/4	4
D26B	0.5	V47279	6	X	2G20	10 1/4	7/8	4	22 1/4	7/8	4
D27A	0.5	V47279	6	X	2G20	10 1/2	3/4	4	22 3/4	7/8	4
D27B	0.5	V47279	6	X	2G20	10 1/4	7/8	4	22 1/4	7/8	4
D34A	0.75	A25033	7	X	2G20	10 1/4	7/8	4	22 3/8	3/4	4
D34B	0.75	A25033	7	X	2G20	10 5/8	7/8	4	22 7/8	1	4
D35A	0.75	A25033	7	X	2G20	10 3/8	3/4	4	22 1/2	7/8	4
D35B	0.75	A25033	7	X	2G20	10 1/4	7/8	4	22 1/4	3/4	4
D36A	0.75	A25033	7	X	2G20	10 3/4	7/8	4	23	1	4
D36B	0.75	A25033	7	X	2G20	10 1/4	1	4	22 1/4	1	4
D43A	0.625	8979373	8	X	2G20	10 1/8	3/4	4	22 1/4	7/8	4
D43B	0.625	8979373	8	X	2G20	10 1/2	7/8	4	22 3/4	1	4
D44A	0.625	8979373	8	X	2G20	10 3/8	7/8	4	22 3/8	7/8	4
D44B	0.625	8979373	8	X	2G20	10 3/4	1	4	22 3/4	7/8	4
D45A	0.625	8979373	8	X	2G20	10 3/8	7/8	4	22 1/4	3/4	4
D45B	0.625	8979373	8	X	2G20	10 3/8	7/8	4	22 1/2	1 1/8	4
D52A	0.375	V48734	9	X	2G20	10 3/8	1	4	22 3/8	1 1/8	4
D52B	0.375	V48734	9	X	2G20	10 3/8	1	4	22 3/8	1	4
D53A	0.375	V48734	9	X	2G20	10 1/2	1	4	22 1/2	1	4
D53B	0.375	V48734	9	X	2G20	10 1/2	1	4	22 1/4	1	4
D54A	0.375	V48734	9	X	2G20	10 3/8	1	4	22 3/8	7/8	4
D54B	0.375	V48734	9	X	2G20	10 3/8	7/8	4	22 5/8	1 1/8	4
D55A	0.875	A23550	9	X	2G20	10 7/8	1 1/8	4	22 3/4	3/4	4
D55B	0.875	A23550	9	X	2G20	11 1/8	1 1/8	4	22 7/8	1 1/8	4
D56A	0.875	A23550	9	X	2G20	11 1/8	1 1/8	4	23 1/8	1 1/8	4
D56B	0.875	A23550	9	X	2G20	11	1 1/8	4	23	3/4	4

A.4 Specimen Measurements of Deck Tests (Stud Position "W")

Slab	Stud Dia. D _s (in.)	Stud Heat	Conc Pour	Tee Lot	Deck Lot	"A" (in.)	"a" (in.)	Hs-A (in.)	"B" (in.)	"b" (in.)	Hs-B (in.)
D57A	0.875	A23550	9	X	2G20	10 3/4	1 1/8	4	23	1	4
D57B	0.875	A23550	9	X	2G20	10 7/8	7/8	4	23 3/8	1 1/8	4
D64A	0.375	V48737	10	X	3G20	11 1/4	1	5	23 5/8	1 1/4	5
D64B	0.375	V48737	10	X	3G20	11 3/8	1	5	23 1/2	1 1/8	5
D65A	0.375	V48737	10	X	3G20	11 1/4	1	5	23 1/4	1 1/8	5
D65B	0.375	V48737	10	X	3G20	11 1/4	1 1/8	5	23 3/8	1 1/8	5
D66A	0.375	V48737	10	X	3G20	11 1/2	1 1/8	5	23 1/4	1	5
D66B	0.375	V48737	10	X	3G20	11 5/8	1 1/8	5	23 3/8	1 1/8	5
D67A	0.875	B27921	10	X	3G20	11 5/8	1	5	23 5/8	7/8	5
D67B	0.875	B27921	10	X	3G20	11 1/2	1	5	23 1/2	7/8	5
D68A	0.875	B27921	10	X	3G20	11 3/8	7/8	5	23 5/8	7/8	5
D68B	0.875	B27921	10	X	3G20	11 1/2	7/8	5	23 3/4	7/8	5
D69A	0.875	B27921	10	X	3G20	11 7/8	1 1/4	5	23 3/4	7/8	5
D69B	0.875	B27921	10	X	3G20	11 1/2	7/8	5	23 5/8	7/8	5
D82A	0.75	A25033	12	X	2G20	10 1/2	1 1/8	4	22 1/8	3/4	4
D82B	0.75	A25033	12	X	2G20	10 1/2	1	4	22 1/4	7/8	4
D83A	0.75	A25033	12	X	2G20	10 1/2	1	4	22 1/2	1	4
D83B	0.75	A25033	12	X	2G20	10 1/2	7/8	4	22 1/2	1	4
D84A	0.75	A25033	12	X	2G20	10 5/8	1	4	22 5/8	1	4
D84B	0.75	A25033	12	X	2G20	10 3/8	7/8	4	22 1/4	7/8	4
D85A	0.75	A25033	12	X	2G20	10 1/2	7/8	4	22 3/8	7/8	4
D85B	0.75	A25033	12	X	2G20	10 5/8	7/8	4	22 3/8	7/8	4
D86A	0.75	A25033	12	X	2G20	10 1/2	1	4	22 1/2	1	4
D86B	0.75	A25033	12	X	2G20	10 5/8	1	4	22 3/8	7/8	4
D87A	0.75	A25033	12	X	2G20	10 1/2	1	4	22 3/8	7/8	4
D87B	0.75	A25033	12	X	2G20	10 1/4	3/4	4	22 3/8	7/8	4
D91A	0.75	A25033	12	X	2G20	10 1/2	7/8	3 3/8	22 3/8	7/8	3 3/8
D91B	0.75	A25033	12	X	2G20	10 1/2	1	3 3/8	22 1/2	1	3 3/8
D92A	0.75	A25033	12	X	2G20	10 7/8	1	3 3/8	23	1	3 3/8
D92B	0.75	A25033	12	X	2G20	10 3/8	7/8	3 3/8	22 1/4	7/8	3 3/8
D93A	0.75	A25033	12	X	2G20	10 3/8	3/4	3 3/8	22 3/8	7/8	3 3/8
D93B	0.75	A25033	12	X	2G20	10 1/2	3/4	3 3/8	22 1/2	7/8	3 3/8

A.5 Specimen Measurements of Deck Tests (Stud Position "2S")

Slab	Stud Dia. D _s (in.)	Stud Heat	Conc Pour	Tee Lot	Deck Lot	"A" (in.)	"a" (in.)	Hs-A (in.)	"B" (in.)	"b" (in.)	Hs-B (in.)	"s" (in.)
D4A	0.5	V47279	5	X	2G20	25 5/8	4	4	25 3/4	3 7/8	4	3 1/2
D4B	0.5	V47279	5	X	2G20	26	4	4	26	3 7/8	4	3 1/4
D5A	0.5	V47279	5	X	2G20	25 7/8	3 7/8	4	25 3/4	3 3/4	4	3 3/8
D5B	0.5	V47279	5	X	2G20	25 1/4	3 3/4	4	25 3/8	3 7/8	4	3 3/8
D6A	0.5	V47279	5	X	2G20	26	3 3/4	4	25 7/8	3 3/4	4	3 1/8
D6B	0.5	V47279	5	X	2G20	25 1/2	3 3/4	4	25 3/8	3 3/4	4	3 1/4
D16A	0.625	8979373	4	X	2G20	26	4	4	26	4	4	3 1/8
D16B	0.625	8979373	4	X	2G20	25 7/8	4	4	26	4	4	3 1/4
D17A	0.625	8979373	4	X	2G20	25 7/8	3 7/8	4	25 7/8	3 7/8	4	3
D17B	0.625	8979373	4	X	2G20	25 3/4	3 7/8	4	25 3/4	3 7/8	4	3 1/4
D18A	0.625	8979373	4	X	2G20	25 3/4	4	4	25 3/4	3 7/8	4	3 1/8
D18B	0.625	8979373	4	X	2G20	25 1/2	4	4	25 1/2	4	4	3 1/4
D22A	0.5	V47279	6	X	2G20	25 1/2	3 7/8	4	25 1/2	3 7/8	4	3 1/8
D22B	0.5	V47279	6	X	2G20	25 3/8	4	4	25 1/4	3 7/8	4	3 1/8
D23A	0.5	V47279	6	X	2G20	25 1/2	4	4	25 3/8	3 3/4	4	3 3/8
D23B	0.5	V47279	6	X	2G20	25 3/4	4	4	25 3/4	3 7/8	4	3 1/4
D24A	0.5	V47279	6	X	2G20	25 1/2	3 7/8	4	25 3/8	3 7/8	4	3 3/8
D24B	0.5	V47279	6	X	2G20	25 3/4	4	4	25 3/4	3 7/8	4	3 1/4
D31A	0.75	A25033	7	X	2G20	25 1/2	4	4	25 3/8	3 7/8	4	3 3/8
D31B	0.75	A25033	7	X	2G20	26 1/8	4	4	26	3 7/8	4	3 1/4
D32A	0.75	A25033	7	X	2G20	25 3/4	3 3/4	4	25 3/4	3 3/4	4	3 1/4
D32B	0.75	A25033	7	X	2G20	25 3/8	4	4	25 3/8	3 7/8	4	3 1/2
D33A	0.75	A25033	7	X	2G20	25 1/4	3 7/8	4	25 1/8	3 3/4	4	3 1/4
D33B	0.75	A25033	7	X	2G20	25 1/2	3 7/8	4	25 1/2	3 3/4	4	3 1/4
D40A	0.625	8979373	8	X	2G20	25 5/8	4	4	25 1/2	3 7/8	4	3 1/8
D40B	0.625	8979373	8	X	2G20	25 5/8	4 1/8	4	25 3/8	4	4	2 7/8
D41A	0.625	8979373	8	X	2G20	25 7/8	4	4	25 7/8	4	4	3 1/2
D41B	0.625	8979373	8	X	2G20	26	4 1/4	4	25 3/4	3 7/8	4	3 1/8
D42A	0.625	8979373	8	X	2G20	25 3/4	3 3/4	4	25 3/4	3 7/8	4	3 1/4
D42B	0.625	8979373	8	X	2G20	25 3/8	3 7/8	4	25 1/4	3 3/4	4	3 3/8

A.6 Specimen Measurements of Deck Tests (Stud Position "M")

Slab	Stud Dia. D _s (in.)	Stud Heat	Conc. Pour	Tee Lot	Deck Lot	"A" (in.)	"a" (in.)	Hs-A (in.)	"B" (in.)	"b" (in.)	Hs-B (in.)
D70A	0.75	A22585	11	X	4.5G16	12 3/8	1 5/8	6	24 5/8	1 5/8	6
D70B	0.75	A22585	11	X	4.5G16	11 7/8	1 3/8	6	24	1 1/2	6
D71A	0.75	A22585	11	X	4.5G16	11 7/8	1 1/2	6	24	1 1/2	6
D71B	0.75	A22585	11	X	4.5G16	12 1/4	1 5/8	6	24 1/2	1 7/8	6
D72A	0.75	A22585	11	X	4.5G16	12 1/4	1 1/2	6	24 3/8	1 1/2	6
D72B	0.75	A22585	11	X	4.5G16	12 3/8	1 5/8	6	24 3/8	1 3/8	6
D73A	0.75	A25033	11	X	6G16	12 5/8	1 5/8	7 3/4	25 1/8	2	7 3/4
D73B	0.75	A25033	11	X	6G16	11 1/2	1	7 3/4	23 3/4	1 1/4	7 3/4
D74A	0.75	A25033	11	X	6G16	12 5/8	1 3/4	7 3/4	25 1/2	2 1/2	7 3/4
D74B	0.75	A25033	11	X	6G16	12 5/8	1 5/8	7 3/4	24 7/8	1 5/8	7 3/4
D75A	0.75	A25033	11	X	6G16	12 7/8	1 7/8	7 3/4	25 3/8	1 7/8	7 3/4
D75B	0.75	A25033	11	X	6G16	12 1/8	1 1/4	7 3/4	24 3/4	1 3/4	7 3/4

APPENDIX B
MATERIAL PROPERTIES

B.1 General

The properties of the materials used in the push-out test specimens are reported herein. The materials used in each specimen are given in Appendix A. The stud properties are listed by the stud heat reference number, the concrete properties are listed by the concrete pour number, and the properties of the steel beams are listed by tee lot.

B.2 Concrete Properties

The properties for each concrete pour are reported below. Concrete strength was determined from 4"x8" cylinders, which were cured in the same manner as the concrete in the push-out test specimens. The cylinders were loaded with a 400,000 lb capacity hydraulic testing machine at the Virginia Tech Structures and Materials Laboratory. The load was applied at a rate of 500 lb/s. Three cylinders were broken when the push-out test specimens were stripped, at 14 days after casting, and at 21 days after casting. Six cylinders were broken on push-out test day. The concrete weight was determined by weighing two 4"x8" cylinders on test day.

Conc. Pour	Design Mix (psi)WT	Slump (in.)	Strip Day* (psi)	14 Day (psi)	21 Day (psi)	Test Day (psi)	Conc. Wt. (pcf)
1	3500NW	5 1/2	2350 [7]	3365	3600	3435	138.88
2	3500NW	4 3/4	3365 [7]	3845	4495	4665	144.39
3	3500NW	3 1/2	3975 [7]	4555	4610	4880	144.39
4	3500NW	3 3/4	1045 [2]	2785	2845	2915	140.95
5	3500NW	3 1/2	3515 [7]	4345	4245	4430	143.01
6	6000NW	4 1/2	4335 [7]	5265	5685	5890	150.4
7	6000NW	3 1/2	5900 [7]	6075	6365	7080	151.26
8	6000NW	4 3/4	3115 [7]	4050	4760	4710	144.04
9	3500NW	5 1/2	3210 [7]	--	3875	3930	146.45
10	3500NW	4 3/4	2405 [5]	4315	--	5240	141.81
11	3500NW	4	3950 [12]	4525	4395	5000	142.32
12	3500NW	5 1/2	3410 [7]	3925	--	4690	144.73

* [] denotes the number of days after casting that the cylinders were stripped.

B.3 Stud Properties

The properties of the studs used in the push-out tests are reported below. They were obtained from TRW Nelson Stud Welding Division. Studs were welded to a low-grade steel bar and subjected to tensile testing until failure occurred. All failures were located in the shank of the stud, away from the weld collar. The testing fixture was as outlined in AWS D1.1 Structural Welding Code, Section 7, Stud Welding. Testing procedures followed ASTM A-370 specifications.

Stud Heat	Shank Diameter (in.)	Length Before Welding (in.)	Yield Stress (psi)	Ultimate Stress (psi)	Reduction in Area (%)	Elongation in 2in. (%)
63288	5/8	3 11/16	55,467	67,022	57	28
8979373	5/8	4 3/16	59,429	72,635	49	26
A22585	3/4	6 3/16	51,000	62,500	65	28
A23550	7/8	4 3/16	50,603	64,451	56	35
A25033	3/4	4 3/16	54,530	65,813	63	36
A25033	3/4	8 3/16	52,507	65,634	57	39
A80102	3/4	4 3/16	59,014	64,868	64.6	40.4
B27921	7/8	5 3/16	50,603	63,767	56	48
V47279	1/2	4 1/8	68,435	74,049	64.1	21.7
V48734	3/8	4 1/8	64,082	79,192	55	21
V48737	3/8	5 1/8	61,498	77,238	53	21

B.4 Tee Properties

Material properties for each structural tee lot used in the push-out test specimens are reported herein. Coupons were made from the flanges and the web of each lot. Specimens were cut to dimensions specified in ASTM A-370, Section 7.1. Tee specimens were machined to an 8 in. reduced length and a 1 ½ in. reduced width. Gage marks were etched in 1 in. increments along the centerline of the specimen. Specimens were subjected to tensile testing until failure in accordance with ASTM A-370 specifications. A 300,000 lb capacity universal testing machine at the Virginia Tech Structures and Materials Laboratory was used to test the coupons.

Tee Lot X Test	Flange/ Web	Width (in.)	Thick- ness (in.)	Elon- gation (%)	Yield Stress (ksi)	Ultimate Stress (ksi)
1	Flange	0.51	1.501	9.31	45.4	63.7
Ave.	Flange	0.51	1.501	9.31	45.4	63.7
2	Web	0.292	1.503	9.328	46.500	65.800
Ave.	Web	0.292	1.503	9.328	46.500	65.800

Tee Lot Y Test	Flange/ Web	Width (in.)	Thick- ness (in.)	Elon- gation (%)	Yield Stress (ksi)	Ultimate Stress (ksi)
3	Flange	0.365	1.502	8.894	47.000	73.100
4	Flange	0.371	1.501	8.960	46.800	72.100
Ave. 3,4	Flange	0.368	1.502	8.927	46.900	72.600
5	Web	0.243	1.500	8.747	52.800	77.200
6	Web	0.244	1.503	8.737	52.800	77.300
Ave. 5,6	Web	0.244	1.502	8.742	52.800	77.250

Tee Lot Z Test	Flange/ Web	Width (in.)	Thick- ness (in.)	Elon- gation (%)	Yield Stress (ksi)	Ultimate Stress (ksi)
7	Flange	0.641	1.501	9.365	53.300	69.300
8	Flange	0.625	1.501	9.276	53.000	70.000
Ave. 7,8	Flange	0.633	1.501	9.321	53.150	69.650
9	Web	0.384	1.503	9.150	56.600	70.200
10	Web	0.386	1.502	9.125	56.700	69.700
Ave. 9,10	Web	0.385	1.503	9.138	56.650	69.950

B.5 Deck Properties

Material properties for each deck lot used in the push-out test specimens are reported herein. Coupons were made from the flange of each lot. Specimens were cut to dimensions specified in ASTM A-370, Section 7.1. Deck specimens were machined to either a 2 in. or an 8 in. reduced length and either a ½ in. or a 1 ½ in. reduced width. Gage marks were etched along the centerline of each specimen in order to measure the elongation. Specimens were subjected to tensile testing until failure in accordance with ASTM A-370 specifications. A 300,000 lb capacity universal testing machine at the Virginia Tech Structures and Materials Laboratory was used to test the coupons.

Deck Lot	Coupon #	Designation	Width (in.)	Thickness (in.)	Initial Gage	Final Gage	Elongation (%)	Yield Stress (ksi)	Ultimate Stress (ksi)
2G20	3	2USDG20	0.4995	0.0345	2.000	2.755	37.7	44.392	56.172
3G20	6	3USDG20	0.4950	0.0350	1.998	2.780	39.1	44.444	55.411
4.5G16	9	4.5USDG16	1.4970	0.0585	8.061	10.351	28.4	42.821	53.326
6G16	12	6USDG16	1.4970	0.0580	7.917	10.071	27.2	42.541	55.303

APPENDIX C

SOLID SLAB PUSH-OUT TEST DATA PACKS

C.1 General

The solid slab push-out test data packs are contained in Section C.2. For each push-out test performed, a test summary sheet, a test layout and cracking sheet, and data table are given. The "Push-Out Test Summary Sheet" contains relevant test parameters such as concrete strength and stud diameter and also a summary of the test results. A plot of the applied axial load versus the measured slips is also included. The "Push-Out Test Layout & Cracking Sheet" contains information such as the stud layout and nominal slab dimensions, as well as the cracks that were observed when testing was completed. The "Data" table contains the axial loads and slips that were measured, along with observations made, during testing.

C.2 Solid Slab Push-Out Test Data Packs

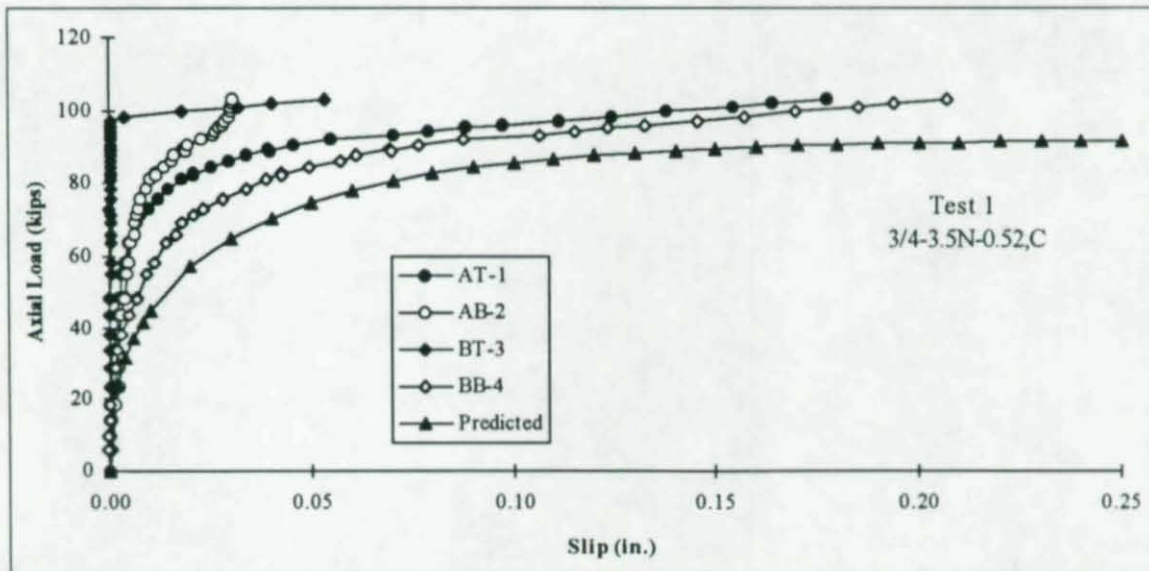
PUSH-OUT TEST SUMMARY SHEET

Test:	1	Deck Type:	None
Designation:	3/4-3.5N-0.52,C	Flange Thickness:	0.52 in.
Date of Test:	10/23/96		
Concrete Strength:	3435 psi	Weld Location:	C
Concrete Weight:	138.88 pcf	Stud Size:	3/4 in. x 4 in.
Concrete Thickness:	5 3/4 in.	Stud Tensile Strength:	64.868 ksi
Maximum Applied Load:	103.05 kips		
Applied Load Per Stud:	25.76 kips		

Concrete Slip at Failure:

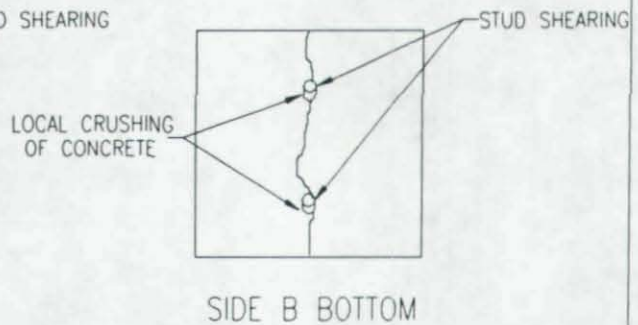
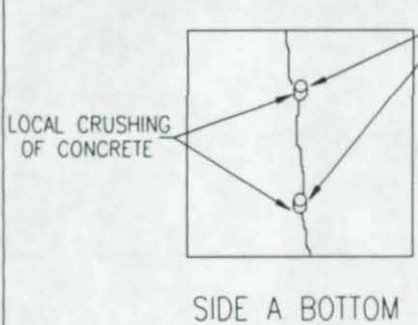
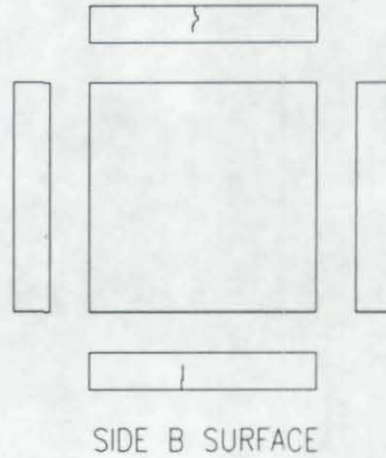
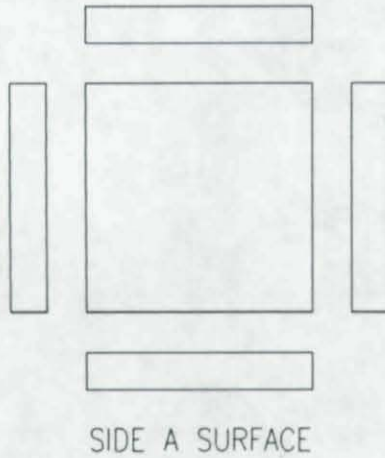
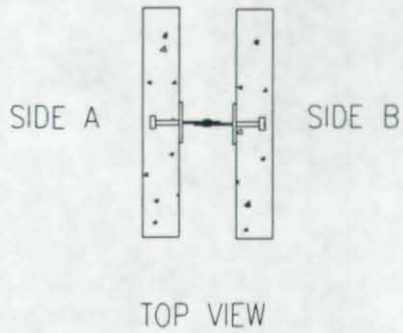
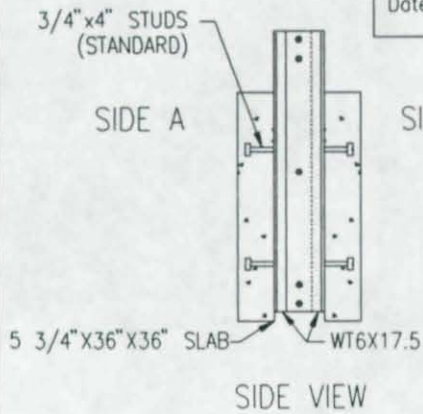
Pot. AT-1: 0.1774 in.	Pot. BT-3: 0.0532 in.
Pot. AB-2: 0.0306 in.	Pot. BB-4: 0.2072 in.
Avg. Side A: 0.1040 in.	Avg. Side B: 0.1302 in.
Avg.: 0.1171 in.	

Comments: 10% Normal Load
Stud Shearing Failure on Sides A & B



PUSH-OUT TEST LAYOUT & CRACKING SHEET

Test:	1
Designation:	3/4-3.5N-0.52,C
Date:	10/23/96



Test I Data

Axial Load (kips)	Slips (in.)				Test Comments
	Pot. AT-1	Pot. AB-2	Pot. BT-3	Pot. BB-4	
0.00	0.0000	0.0000	0.0000	0.0000	BEGIN TEST
5.81	0.0000	0.0000	0.0006	-0.0006	
9.81	0.0000	0.0000	0.0000	-0.0006	
14.31	0.0000	0.0006	0.0000	0.0000	
18.81	0.0000	0.0012	0.0000	0.0000	
23.23	0.0006	0.0024	0.0000	0.0012	
28.87	0.0006	0.0024	0.0000	0.0012	
33.78	0.0006	0.0018	0.0000	0.0018	
38.20	0.0018	0.0024	0.0000	0.0031	
43.68	0.0018	0.0031	0.0000	0.0049	
48.58	0.0024	0.0037	0.0000	0.0067	
47.85	0.0031	0.0037	0.0000	0.0067	
54.96	0.0031	0.0043	0.0006	0.0092	
58.56	0.0037	0.0049	0.0006	0.0110	
63.55	0.0049	0.0055	0.0006	0.0141	
65.76	0.0061	0.0061	0.0006	0.0165	
69.11	0.0067	0.0061	0.0006	0.0177	
71.32	0.0080	0.0067	0.0006	0.0208	
73.20	0.0098	0.0073	0.0000	0.0232	
75.98	0.0122	0.0080	0.0006	0.0281	
78.68	0.0147	0.0092	0.0006	0.0336	
81.22	0.0177	0.0104	0.0006	0.0385	
82.85	0.0208	0.0116	0.0006	0.0428	
82.61	0.0208	0.0116	0.0006	0.0428	
84.81	0.0251	0.0135	0.0006	0.0495	
86.29	0.0294	0.0153	0.0006	0.0568	
87.84	0.0336	0.0159	0.0006	0.0611	
89.31	0.0391	0.0183	0.0006	0.0691	

Test 1 Data

Axial Load (kips)	Slips (in.)				Test Comments
	Pot. AT-1	Pot. AB-2	Pot. BT-3	Pot. BB-4	
89.07	0.0398	0.0190	0.0006	0.0697	
90.79	0.0453	0.0196	0.0006	0.0764	
92.26	0.0544	0.0226	0.0006	0.0874	
93.40	0.0703	0.0257	0.0006	0.1063	
94.38	0.0789	0.0263	0.0006	0.1149	
95.28	0.0881	0.0269	0.0006	0.1235	
96.02	0.0973	0.0281	0.0006	0.1326	
97.33	0.1113	0.0287	0.0006	0.1455	
98.39	0.1242	0.0294	0.0037	0.1571	
99.70	0.1376	0.0300	0.0177	0.1699	
101.17	0.1541	0.0300	0.0318	0.1852	
101.74	0.1639	0.0306	0.0404	0.1937	
103.05	0.1774	0.0306	0.0532	0.2072	BANG. STUD SHEARING SIDES A & B

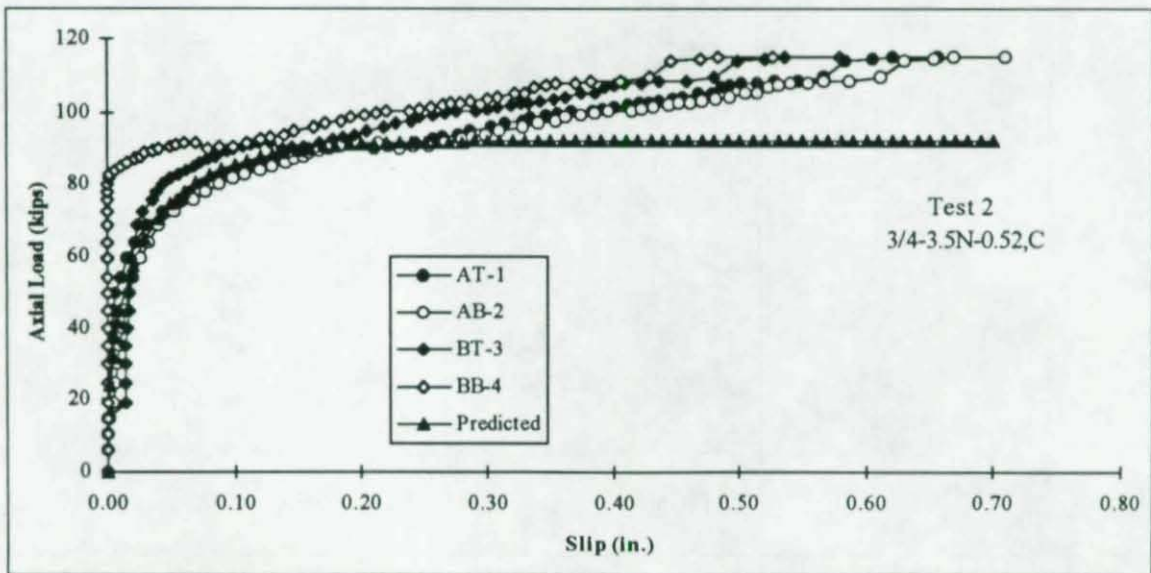
PUSH-OUT TEST SUMMARY SHEET

Test:	2	Deck Type:	None
Designation:	3/4-3.5N-0.52,C	Flange Thickness:	0.52 in.
Date of Test:	10/24/96		
Concrete Strength:	3435 psi	Weld Location:	C
Concrete Weight:	138.88 pcf	Stud Size:	3/4 in. x 4 in.
Concrete Thickness:	5 3/4 in.	Stud Tensile Strength:	64.868 ksi
Maximum Applied Load:	115.32 kips		
Applied Load Per Stud:	28.83 kips		

Concrete Slip at Failure:

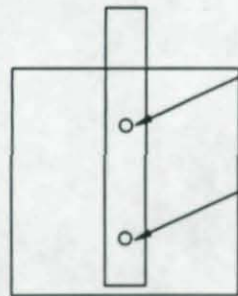
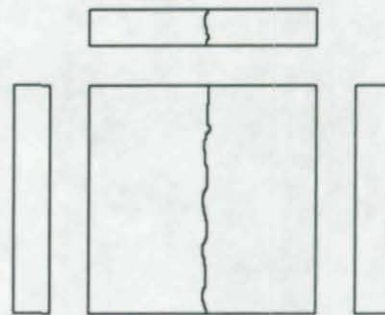
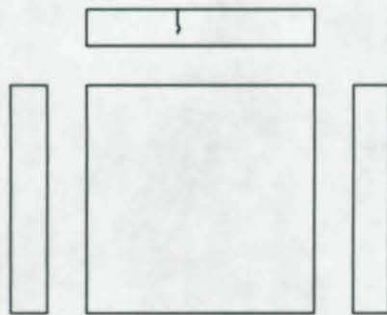
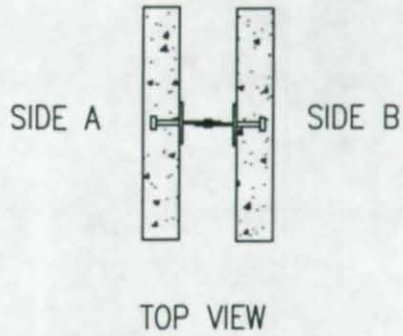
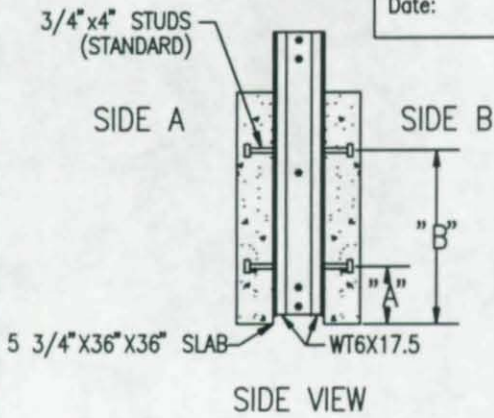
Pot. AT-1:	0.6563 in.	Pot. BT-3:	0.5793 in.
Pot. AB-2:	0.7094 in.	Pot. BB-4:	0.5262 in.
Avg. Side A:	0.6829 in.	Avg. Side B:	0.5528 in.
Avg.: 0.6178 in.			

Comments: 10% Normal Load
Stud Shearing Failure on Side B

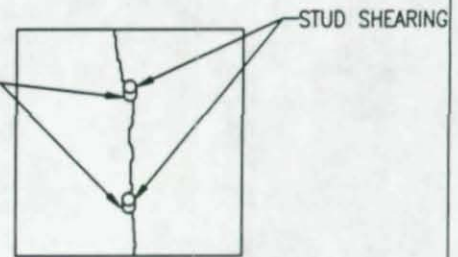


PUSH-OUT TEST LAYOUT & CRACKING SHEET

Test:	<u>2</u>
Designation:	<u>3/4-3.5N-0.52,C</u>
Date:	<u>10/24/96</u>



STUD SHEARING
LOCAL CRUSHING
OF CONCRETE
STUD REMAINED
ATTACHED TO TEE
AFTER FAILURE



Test 2 Data

Axial Load (kips)	Slips (in.)				Test Comments
	Pot. AT-1	Pot. AB-2	Pot. BT-3	Pot. BB-4	
0.00	-0.0006	0.0000	0.0000	0.0000	BEGIN TEST
5.89	-0.0006	0.0000	0.0000	0.0000	
10.14	-0.0006	0.0000	0.0000	0.0000	
14.72	-0.0006	0.0012	0.0000	0.0000	
19.06	0.0012	0.0043	0.0141	0.0000	
18.89	0.0012	0.0043	0.0141	0.0000	
24.54	0.0012	0.0055	0.0141	0.0000	
30.10	0.0012	0.0073	0.0141	0.0000	
34.76	0.0012	0.0092	0.0141	0.0000	
39.75	0.0037	0.0116	0.0159	0.0000	
39.59	0.0037	0.0116	0.0159	0.0000	
44.82	0.0049	0.0147	0.0165	0.0000	
49.73	0.0067	0.0171	0.0177	0.0000	
53.90	0.0104	0.0196	0.0184	0.0006	
59.38	0.0159	0.0257	0.0190	0.0006	
63.79	0.0220	0.0324	0.0220	0.0006	
68.70	0.0306	0.0410	0.0239	0.0006	
72.38	0.0428	0.0532	0.0275	0.0006	
75.74	0.0569	0.0679	0.0349	0.0006	
77.94	0.0648	0.0771	0.0379	0.0006	
79.99	0.0752	0.0875	0.0434	0.0006	
81.71	0.0862	0.0991	0.0502	0.0012	
82.93	0.0954	0.1089	0.0551	0.0018	
84.24	0.1058	0.1211	0.0624	0.0055	
85.22	0.1168	0.1303	0.0679	0.0104	
86.37	0.1242	0.1400	0.0734	0.0159	
87.02	0.1327	0.1474	0.0789	0.0220	
87.92	0.1395	0.1547	0.0856	0.0257	

Test 2 Data

Axial Load (kips)	Slips (in.)				Test Comments
	Pot. AT-1	Pot. AB-2	Pot. BT-3	Pot. BB-4	
88.66	0.1443	0.1590	0.0875	0.0287	
89.23	0.1511	0.1670	0.0942	0.0354	
89.89	0.1584	0.1749	0.0991	0.0409	
90.70	0.1670	0.1835	0.1064	0.0489	
91.28	0.1749	0.1914	0.1126	0.0538	
91.85	0.1817	0.1988	0.1193	0.0611	
91.77	0.1945	0.2128	0.1278	0.0703	
90.05	0.2110	0.2312	0.1370	0.0788	
90.38	0.2214	0.2416	0.1462	0.0880	
90.79	0.2318	0.2532	0.1554	0.0984	
91.85	0.2434	0.2660	0.1664	0.1100	
92.58	0.2575	0.2795	0.1774	0.1204	
93.16	0.2648	0.2880	0.1853	0.1283	
94.06	0.2765	0.2990	0.1957	0.1387	
94.71	0.2856	0.3094	0.2049	0.1473	
96.02	0.3034	0.3284	0.2184	0.1626	
96.84	0.3138	0.3400	0.2276	0.1717	
97.90	0.3278	0.3541	0.2398	0.1840	
98.56	0.3346	0.3626	0.2465	0.1919	
99.37	0.3468	0.3743	0.2563	0.2023	
99.95	0.3566	0.3853	0.2655	0.2115	
100.52	0.3664	0.3969	0.2753	0.2200	
100.27	0.3835	0.4146	0.2912	0.2383	
100.68	0.3921	0.4232	0.3003	0.2463	
101.42	0.4012	0.4324	0.3077	0.2548	
101.91	0.4116	0.4446	0.3187	0.2646	
102.40	0.4202	0.4525	0.3260	0.2713	
102.81	0.4282	0.4611	0.3334	0.2787	

Test 2 Data

Axial Load (kips)	Slips (in.)				Test Comments
	Pot. AT-1	Pot. AB-2	Pot. BT-3	Pot. BB-4	
103.14	0.4361	0.4703	0.3413	0.2866	
103.63	0.4477	0.4819	0.3529	0.2995	
104.44	0.4557	0.4917	0.3627	0.3086	
105.10	0.4679	0.5039	0.3737	0.3215	
105.43	0.4783	0.5143	0.3848	0.3300	
107.06	0.4856	0.5223	0.3927	0.3380	
107.55	0.4924	0.5308	0.4000	0.3471	
107.88	0.5009	0.5400	0.4080	0.3551	
108.21	0.5138	0.5534	0.4221	0.3691	
108.45	0.5272	0.5669	0.4361	0.3826	
108.70	0.5456	0.5871	0.4575	0.4052	
109.84	0.5670	0.6109	0.4802	0.4284	
114.26	0.5829	0.6293	0.4979	0.4461	
114.59	0.6043	0.6531	0.5206	0.4681	
115.32	0.6202	0.6684	0.5358	0.4834	
115.16	0.6563	0.7094	0.5793	0.5262	BANG. STUD SHEARING SIDE B

PUSH-OUT TEST SUMMARY SHEET

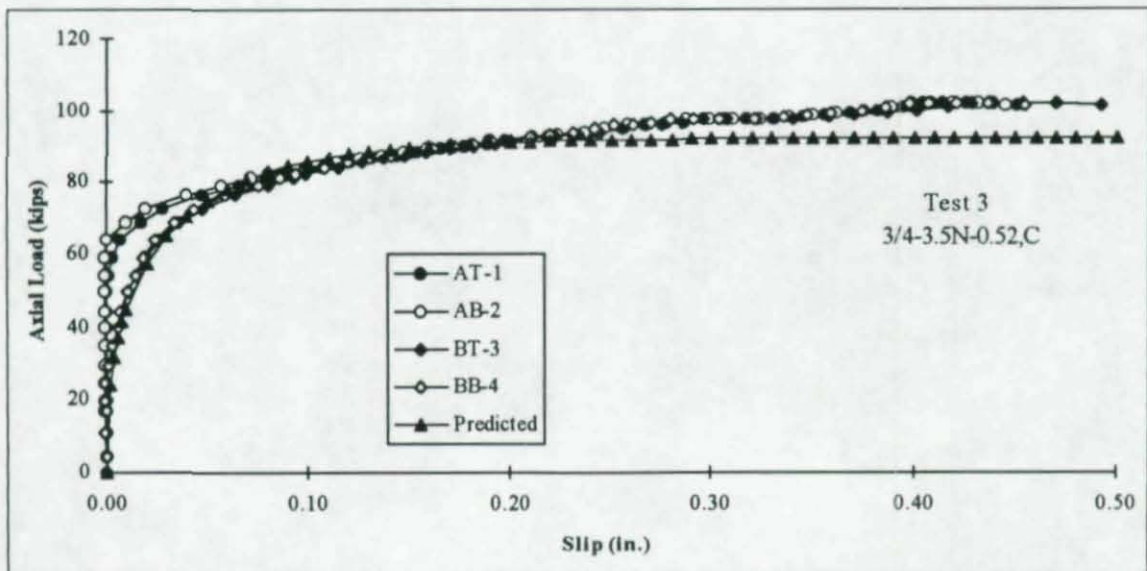
Test:	3	Deck Type:	None
Designation:	3/4-3.5N-0.52,C	Flange Thickness:	0.52 in.
Date of Test:	10/25/96		
Concrete Strength:	3435 psi	Weld Location:	C
Concrete Weight:	138.88 pcf	Stud Size:	3/4 in. x 4 in.
Concrete Thickness:	5 3/4 in.	Stud Tensile Strength:	64.868 ksi
Maximum Applied Load:	102.24 kips		
Applied Load Per Stud:	25.56 kips		

Concrete Slip at Failure:

Pot. AT-1: 0.4508 in.	Pot. BT-3: 0.4918 in.
Pot. AB-2: 0.4452 in.	Pot. BB-4: 0.4547 in.
Avg. Side A: 0.4480 in.	Avg. Side B: 0.4733 in.

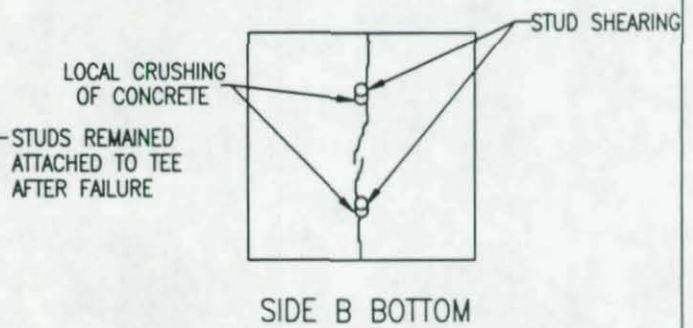
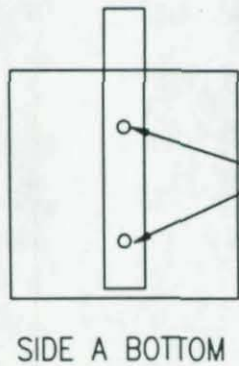
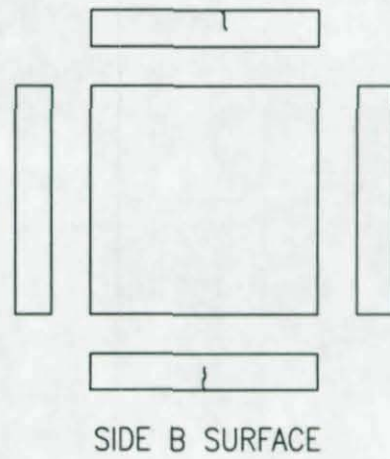
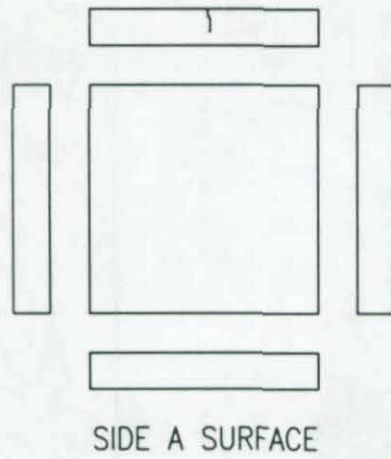
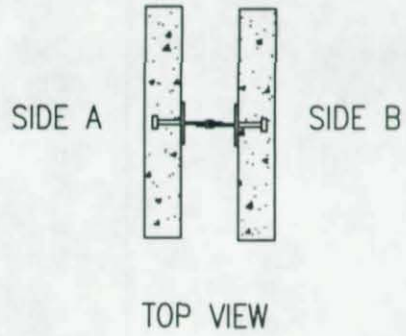
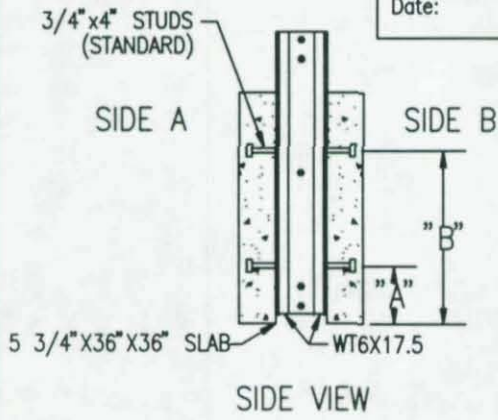
Avg.: 0.4606 in.

Comments: 10% Normal Load
Stud Shearing Failure on Side B



PUSH-OUT TEST LAYOUT & CRACKING SHEET

Test: 3
Designation: 3/4-3.5N-0.52,C
Date: 10/25/96



Test 3 Data

Axial Load (kips)	Slips (in.)				Test Comments
	Pot. AT-1	Pot. AB-2	Pot. BT-3	Pot. BB-4	
0.00	0.0000	0.0000	0.0000	0.0000	BEGIN TEST
4.42	0.0000	0.0000	0.0000	0.0000	
10.96	0.0000	0.0000	0.0000	-0.0006	
16.77	0.0000	-0.0006	0.0000	0.0000	
19.79	0.0000	-0.0006	0.0000	-0.0006	
24.62	0.0000	-0.0006	0.0000	-0.0006	
29.61	0.0000	-0.0006	0.0012	0.0012	
34.76	0.0000	-0.0006	0.0031	0.0031	
40.08	0.0000	-0.0006	0.0055	0.0055	
44.33	0.0000	-0.0006	0.0073	0.0067	
49.73	0.0000	-0.0006	0.0104	0.0104	
54.06	0.0006	-0.0006	0.0141	0.0141	
59.05	0.0024	-0.0006	0.0196	0.0183	
63.63	0.0067	0.0000	0.0257	0.0244	
68.87	0.0171	0.0098	0.0355	0.0336	
72.38	0.0281	0.0196	0.0471	0.0434	
76.47	0.0471	0.0397	0.0636	0.0593	
79.09	0.0654	0.0575	0.0807	0.0758	
81.05	0.0795	0.0715	0.0924	0.0862	
82.44	0.0881	0.0801	0.0991	0.0941	
83.91	0.1070	0.0985	0.1150	0.1082	
85.47	0.1205	0.1137	0.1266	0.1198	
86.61	0.1315	0.1254	0.1376	0.1302	
87.51	0.1437	0.1364	0.1480	0.1412	
88.41	0.1541	0.1474	0.1584	0.1510	
89.23	0.1658	0.1584	0.1707	0.1613	
90.13	0.1774	0.1700	0.1823	0.1723	
90.70	0.1884	0.1810	0.1927	0.1815	

Test 3 Data

Axial Load (kips)	Slips (in.)				Test Comments
	Pot. AT-1	Pot. AB-2	Pot. BT-3	Pot. BB-4	
91.77	0.1969	0.1896	0.2006	0.1901	
92.91	0.2184	0.2104	0.2227	0.2102	
93.32	0.2312	0.2232	0.2337	0.2200	
93.89	0.2440	0.2366	0.2447	0.2310	
94.87	0.2563	0.2470	0.2557	0.2420	
95.77	0.2673	0.2587	0.2667	0.2512	
96.18	0.2759	0.2678	0.2753	0.2610	
96.76	0.2863	0.2776	0.2851	0.2701	
97.49	0.2960	0.2874	0.2961	0.2799	
97.66	0.3070	0.2990	0.3071	0.2915	
97.74	0.3174	0.3100	0.3218	0.3037	
97.90	0.3309	0.3241	0.3407	0.3209	
98.15	0.3450	0.3382	0.3578	0.3355	
98.72	0.3560	0.3498	0.3707	0.3471	
99.29	0.3682	0.3614	0.3872	0.3587	
99.78	0.3817	0.3755	0.4013	0.3740	
100.85	0.3945	0.3883	0.4166	0.3862	
101.74	0.4043	0.3987	0.4282	0.3972	
101.99	0.4141	0.4079	0.4392	0.4076	
102.24	0.4251	0.4189	0.4539	0.4205	
102.15	0.4373	0.4311	0.4698	0.4357	
101.50	0.4508	0.4452	0.4918	0.4547	SOFT BANG. STUD SHEARING SIDE B

PUSH-OUT TEST SUMMARY SHEET

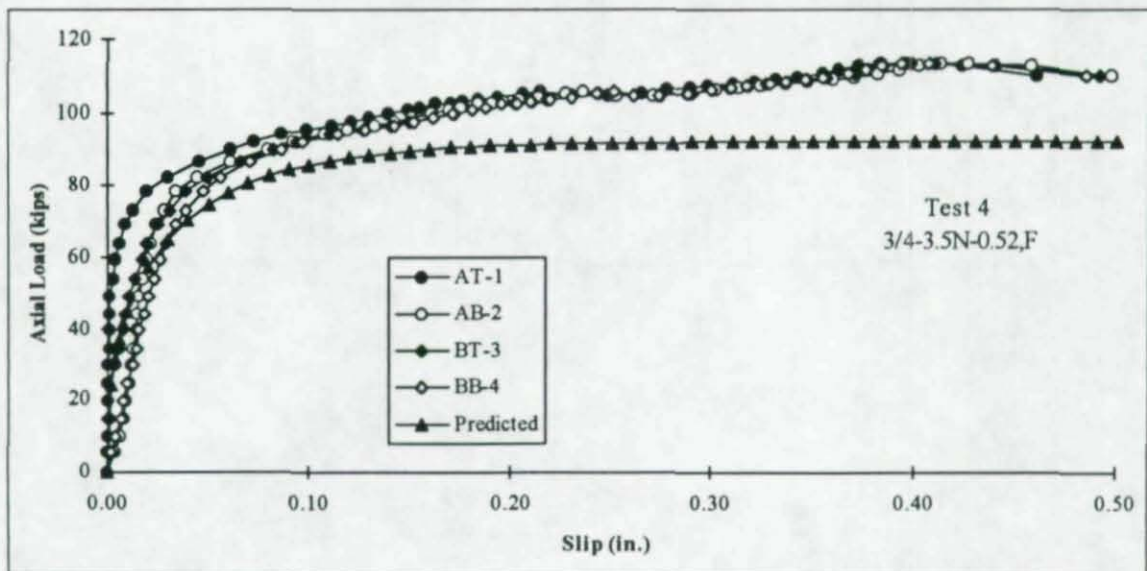
Test:	4	Deck Type:	None
Designation:	3/4-3.5N-0.52,F	Flange Thickness:	0.52 in.
Date of Test:	10/27/96		
Concrete Strength:	3435 psi	Weld Location:	F
Concrete Weight:	138.88 pcf	Stud Size:	3/4 in. x 4 in.
Concrete Thickness:	5 3/4 in.	Stud Tensile Strength:	64.868 ksi
Maximum Applied Load:	113.69 kips		
Applied Load Per Stud:	28.42 kips		

Concrete Slip at Failure:

Pot. AT-1: 0.4606 in.	Pot. BT-3: 0.4912 in.
Pot. AB-2: 0.4966 in.	Pot. BB-4: 0.4847 in.
Avg. Side A: 0.4786 in.	Avg. Side B: 0.4880 in.

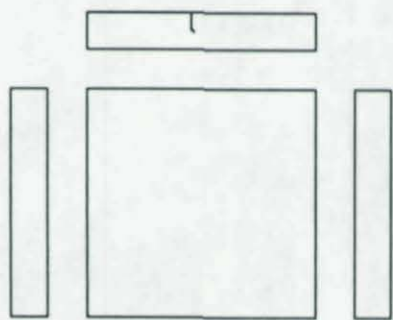
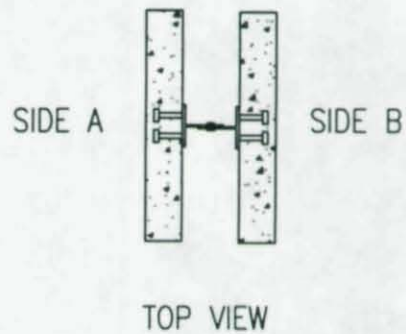
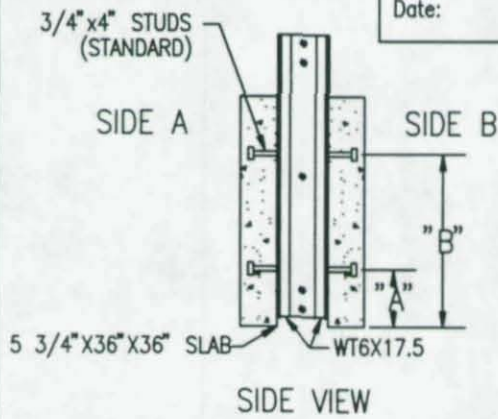
Avg.: 0.4833 in.

Comments: 10% Normal Load
Stud Shearing Failure of Bottom Studs on Both Sides

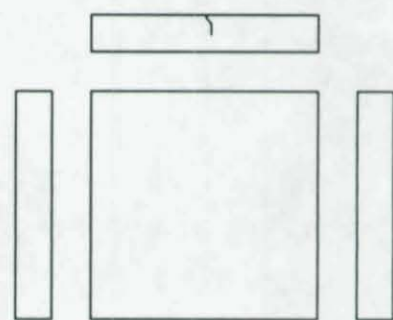


PUSH-OUT TEST LAYOUT & CRACKING SHEET

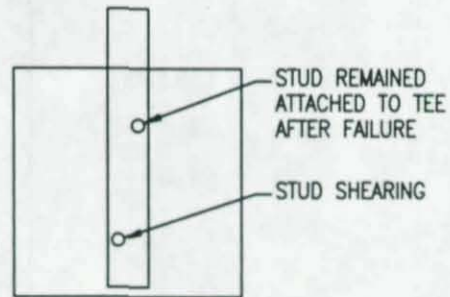
Test: 4
Designation: 3/4-3.5N-0.52,F
Date: 10/27/96



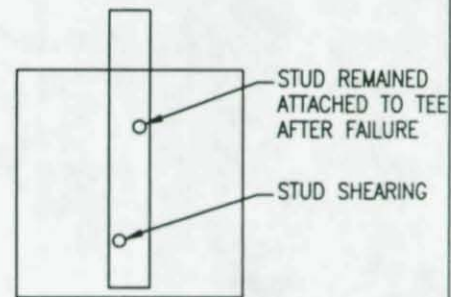
SIDE A SURFACE



SIDE B SURFACE



SIDE A BOTTOM



SIDE B BOTTOM

Test 4 Data

Axial Load (kips)	Slips (in.)				Test Comments
	Pot. AT-1	Pot. AB-2	Pot. BT-3	Pot. BB-4	
0.00	0.0000	0.0000	0.0000	0.0000	BEGIN TEST
5.56	0.0000	0.0037	0.0000	0.0018	
9.73	0.0000	0.0055	0.0000	0.0043	
14.80	0.0006	0.0073	0.0000	0.0067	
19.87	0.0000	0.0092	0.0000	0.0079	
24.70	0.0000	0.0104	0.0000	0.0098	
29.77	0.0000	0.0116	0.0037	0.0122	
34.51	0.0006	0.0128	0.0055	0.0141	
39.75	0.0006	0.0141	0.0073	0.0159	
44.17	0.0006	0.0147	0.0086	0.0183	
48.91	0.0012	0.0159	0.0110	0.0208	
53.90	0.0024	0.0171	0.0135	0.0232	
59.46	0.0043	0.0196	0.0171	0.0263	
63.55	0.0055	0.0208	0.0196	0.0287	
69.11	0.0086	0.0245	0.0251	0.0342	
73.20	0.0128	0.0281	0.0306	0.0391	
78.60	0.0196	0.0342	0.0385	0.0477	
82.52	0.0300	0.0446	0.0495	0.0562	
86.78	0.0459	0.0612	0.0661	0.0703	
90.05	0.0612	0.0789	0.0826	0.0862	
92.09	0.0722	0.0917	0.0936	0.0972	
94.22	0.0862	0.1070	0.1107	0.1143	
95.37	0.0985	0.1193	0.1266	0.1278	
96.67	0.1113	0.1321	0.1401	0.1424	
97.82	0.1211	0.1419	0.1499	0.1516	
98.88	0.1297	0.1505	0.1615	0.1614	
99.95	0.1395	0.1602	0.1719	0.1711	
100.93	0.1486	0.1688	0.1804	0.1809	

Test 4 Data

Axial Load (kips)	Slips (in.)				Test Comments
	Pot. AT-1	Pot. AB-2	Pot. BT-3	Pot. BB-4	
101.58	0.1547	0.1755	0.1872	0.1877	
102.32	0.1627	0.1835	0.1951	0.1956	
102.73	0.1700	0.1902	0.2018	0.2035	
103.14	0.1755	0.1963	0.2104	0.2097	
103.54	0.1835	0.2043	0.2177	0.2194	
104.36	0.1933	0.2141	0.2300	0.2298	
105.51	0.2055	0.2269	0.2434	0.2427	
106.00	0.2147	0.2361	0.2514	0.2512	
104.61	0.2300	0.2520	0.2612	0.2610	
104.53	0.2483	0.2709	0.2746	0.2738	
105.43	0.2648	0.2887	0.2899	0.2885	
106.16	0.2777	0.3021	0.2997	0.3001	
106.82	0.2887	0.3137	0.3089	0.3093	
107.39	0.2979	0.3241	0.3181	0.3172	
108.04	0.3101	0.3364	0.3266	0.3289	
108.78	0.3211	0.3474	0.3376	0.3368	
109.27	0.3321	0.3596	0.3468	0.3460	
109.84	0.3419	0.3706	0.3566	0.3551	
110.58	0.3554	0.3822	0.3707	0.3680	
111.89	0.3627	0.3926	0.3774	0.3759	
112.70	0.3725	0.4024	0.3853	0.3839	
113.20	0.3829	0.4134	0.3982	0.3936	
113.69	0.3957	0.4263	0.4104	0.4071	
112.87	0.4233	0.4575	0.4398	0.4377	
110.41	0.4606	0.4966	0.4912	0.4847	BANG. STUD SHEARING BOTH SIDES

PUSH-OUT TEST SUMMARY SHEET

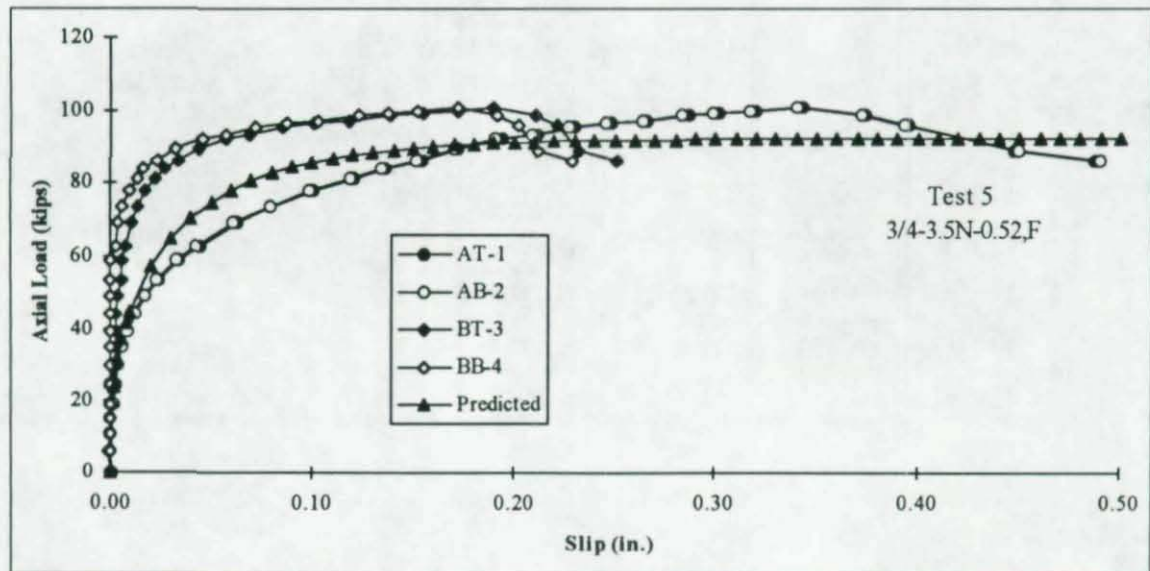
Test:	5	Deck Type:	None
Designation:	3/4-3.5N-0.52,F	Flange Thickness:	0.52 in.
Date of Test:	10/28/96		
Concrete Strength:	3435 psi	Weld Location:	F
Concrete Weight:	138.88 pcf	Stud Size:	3/4 in. x 4 in.
Concrete Thickness:	5 3/4 in.	Stud Tensile Strength:	64.868 ksi
Maximum Applied Load:	100.76 kips		
Applied Load Per Stud:	25.19 kips		

Concrete Slip at Failure:

Pot. AT-1: 0.4875 in.	Pot. BT-3: 0.2514 in.
Pot. AB-2: 0.4899 in.	Pot. BB-4: 0.2292 in.
Avg. Side A: 0.4887 in.	Avg. Side B: 0.2403 in.

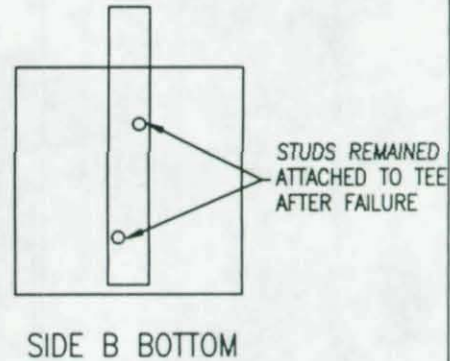
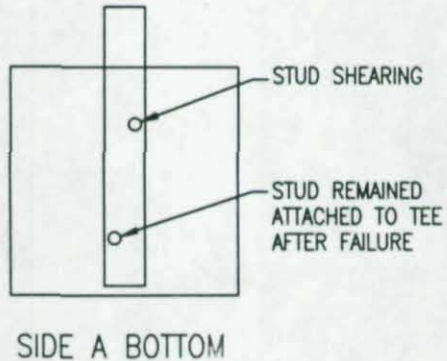
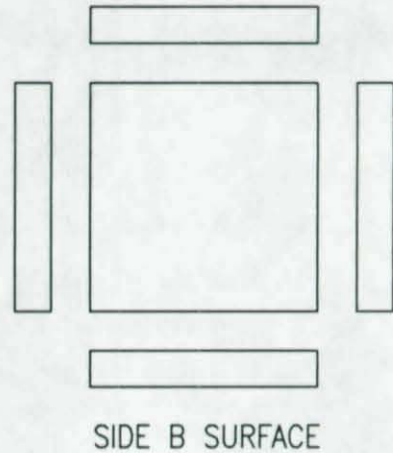
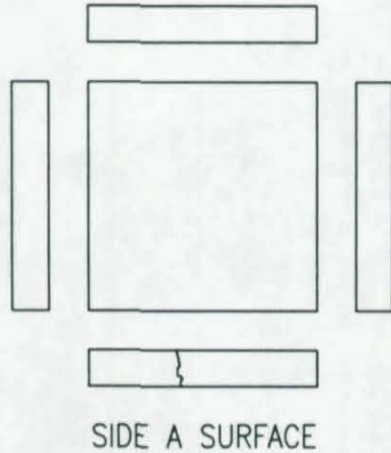
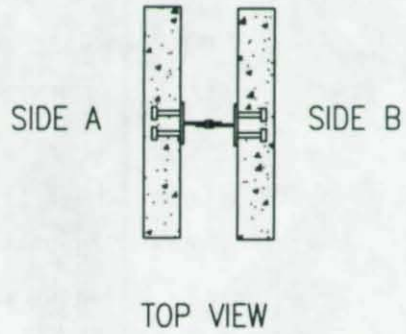
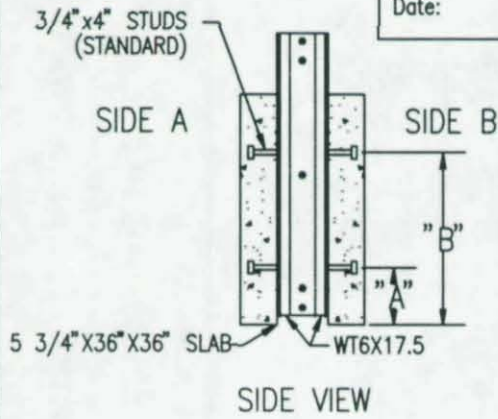
Avg.: 0.3645 in.

Comments: 10% Normal Load
Stud Shearing Failure of Top Stud on Side A



PUSH-OUT TEST LAYOUT & CRACKING SHEET

Test: 5
Designation: 3/4-3.5N-0.52,F
Date: 10/28/96



Test 5 Data

Axial Load (kips)	Slips (in.)				Test Comments
	Pot. AT-1	Pot. AB-2	Pot. BT-3	Pot. BB-4	
0.00	0.0000	0.0000	0.0000	0.0000	BEGIN TEST
-0.08	0.0000	0.0006	0.0000	0.0000	
0.00	0.0000	0.0006	0.0000	0.0000	
5.89	0.0000	0.0000	-0.0006	0.0000	
10.80	0.0000	0.0000	0.0000	0.0000	
15.13	0.0000	0.0000	0.0000	0.0000	
19.30	0.0000	0.0018	0.0000	0.0000	
24.70	0.0000	0.0024	0.0018	0.0000	
29.77	0.0006	0.0043	0.0018	0.0000	
35.17	0.0037	0.0061	0.0024	0.0000	
39.09	0.0067	0.0092	0.0024	0.0000	
44.08	0.0110	0.0128	0.0031	0.0000	
48.99	0.0171	0.0171	0.0043	0.0000	
53.49	0.0239	0.0232	0.0055	0.0000	
58.72	0.0343	0.0324	0.0061	0.0000	
62.73	0.0440	0.0428	0.0080	0.0031	
69.03	0.0624	0.0605	0.0104	0.0043	
73.36	0.0795	0.0789	0.0135	0.0061	
78.19	0.1003	0.0985	0.0171	0.0098	
81.54	0.1211	0.1193	0.0220	0.0134	
84.00	0.1364	0.1346	0.0269	0.0165	
86.37	0.1547	0.1517	0.0336	0.0232	
89.23	0.1725	0.1700	0.0434	0.0318	
91.93	0.1945	0.1908	0.0569	0.0452	
93.48	0.2116	0.2092	0.0691	0.0568	
95.45	0.2300	0.2269	0.0850	0.0715	
96.35	0.2489	0.2452	0.1003	0.0868	
97.16	0.2661	0.2636	0.1180	0.1027	

Test 5 Data

Axial Load (kips)	Slips (in.)				Test Comments
	Pot. AT-1	Pot. AB-2	Pot. BT-3	Pot. BB-4	
98.88	0.2869	0.2832	0.1382	0.1229	STUD SHEARING SIDE A
99.54	0.3015	0.2985	0.1547	0.1369	
100.03	0.3199	0.3174	0.1719	0.1522	
100.76	0.3431	0.3400	0.1896	0.1724	
98.72	0.3743	0.3725	0.2104	0.1919	
96.26	0.3957	0.3939	0.2214	0.2017	
88.66	0.4477	0.4501	0.2318	0.2121	
86.04	0.4875	0.4899	0.2514	0.2292	

PUSH-OUT TEST SUMMARY SHEET

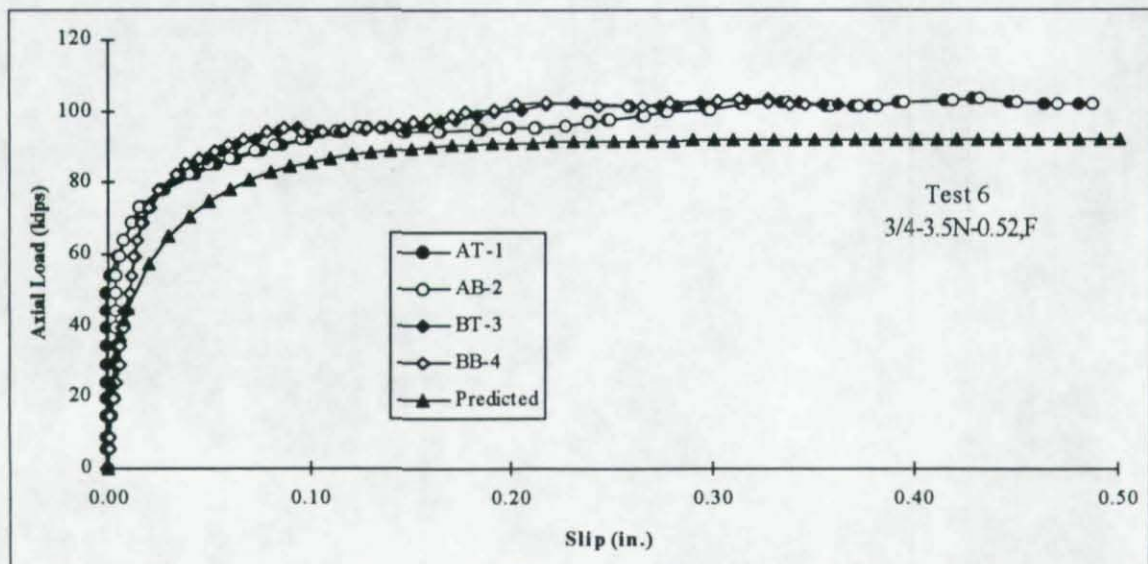
Test:	6	Deck Type:	None
Designation:	3/4-3.5N-0.52,F	Flange Thickness:	0.52 in.
Date of Test:	10/28/96		
Concrete Strength:	3435 psi	Weld Location:	F
Concrete Weight:	138.88 pcf	Stud Size:	3/4 in. x 4 in.
Concrete Thickness:	5 3/4 in.	Stud Tensile Strength:	64.868 ksi
Maximum Applied Load:	103.38 kips		
Applied Load Per Stud:	25.85 kips		

Concrete Slip at Failure:

Pot. AT-1:	0.4801 in.	Pot. BT-3:	0.3615 in.
Pot. AB-2:	0.4868 in.	Pot. BB-4:	0.3447 in.
Avg. Side A:	0.4835 in.	Avg. Side B:	0.3531 in.

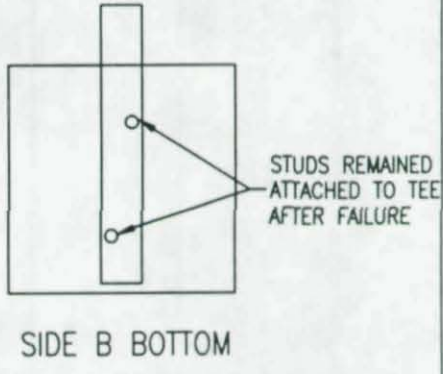
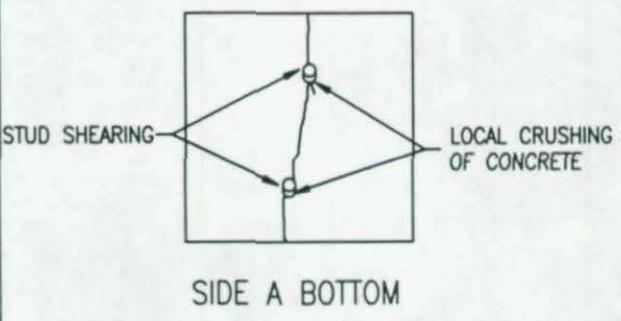
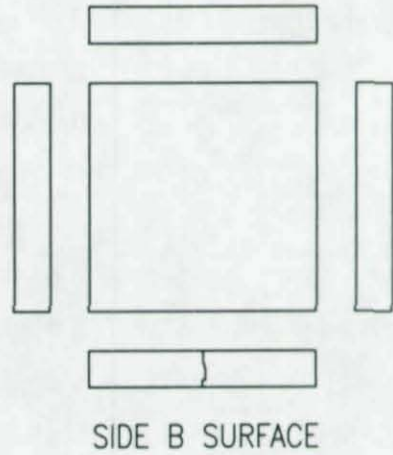
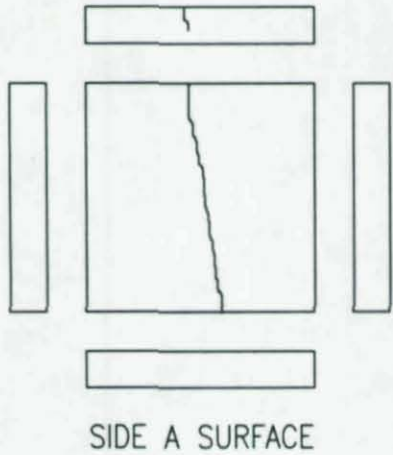
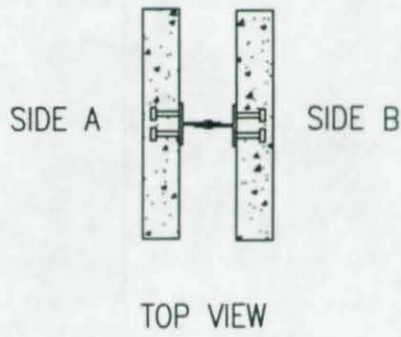
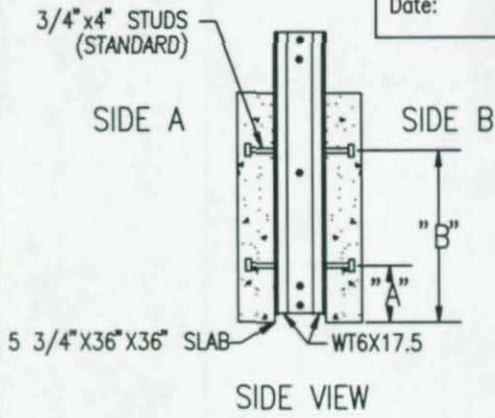
Avg.: 0.4183 in.

Comments: 10% Normal Load
Stud Shearing Failure of Both Studs on Side A



PUSH-OUT TEST LAYOUT & CRACKING SHEET

Test:	6
Designation:	3/4-3.5N-0.52,F
Date:	10/28/96



Test 6 Data

Axial Load (kips)	Slips (in.)				Test Comments
	Pot. AT-1	Pot. AB-2	Pot. BT-3	Pot. BB-4	
0.00	0.0000	0.0000	-0.0006	0.0000	BEGIN TEST
5.23	-0.0006	0.0006	-0.0006	0.0006	
8.83	-0.0006	0.0012	-0.0006	0.0006	
14.48	-0.0006	0.0018	0.0000	0.0012	
19.63	-0.0006	0.0031	0.0006	0.0024	
24.21	-0.0006	0.0031	0.0018	0.0037	
29.12	-0.0006	0.0037	0.0037	0.0055	
34.35	-0.0006	0.0037	0.0043	0.0061	
39.18	-0.0006	0.0037	0.0067	0.0079	
44.00	-0.0006	0.0037	0.0080	0.0092	
49.15	-0.0006	0.0037	0.0104	0.0104	
53.82	0.0012	0.0043	0.0116	0.0116	
59.46	0.0049	0.0061	0.0135	0.0128	
64.04	0.0073	0.0073	0.0147	0.0147	
68.95	0.0110	0.0110	0.0171	0.0165	
73.28	0.0171	0.0153	0.0214	0.0202	
78.03	0.0275	0.0257	0.0269	0.0251	
82.44	0.0428	0.0398	0.0355	0.0330	
84.90	0.0532	0.0495	0.0416	0.0385	
86.94	0.0630	0.0599	0.0483	0.0452	
88.90	0.0758	0.0728	0.0557	0.0526	
90.29	0.0856	0.0819	0.0630	0.0593	
92.09	0.0985	0.0954	0.0722	0.0666	
94.14	0.1162	0.1125	0.0844	0.0788	
95.53	0.1284	0.1248	0.0936	0.0874	
94.14	0.1468	0.1455	0.1040	0.0959	
94.30	0.1645	0.1633	0.1144	0.1057	
94.96	0.1841	0.1829	0.1272	0.1167	

Test 6 Data

Axial Load (kips)	Slips (in.)				Test Comments
	Pot. AT-1	Pot. AB-2	Pot. BT-3	Pot. BB-4	
95.69	0.1988	0.1981	0.1370	0.1277	
95.20	0.2122	0.2116	0.1462	0.1351	
95.94	0.2269	0.2269	0.1560	0.1436	
97.00	0.2385	0.2385	0.1645	0.1509	
97.82	0.2477	0.2489	0.1719	0.1589	
98.80	0.2648	0.2660	0.1823	0.1699	
99.70	0.2765	0.2776	0.1908	0.1766	
100.52	0.2973	0.2984	0.2049	0.1913	
101.74	0.3132	0.3143	0.2165	0.2017	
102.48	0.3340	0.3364	0.2312	0.2169	
101.25	0.3554	0.3578	0.2594	0.2426	
101.66	0.3688	0.3718	0.2734	0.2573	
101.58	0.3774	0.3804	0.2820	0.2652	
102.48	0.3908	0.3938	0.2936	0.2787	
103.22	0.4141	0.4177	0.3169	0.3019	
103.38	0.4275	0.4311	0.3273	0.3129	
102.32	0.4453	0.4495	0.3419	0.3269	
102.15	0.4630	0.4691	0.3536	0.3373	
101.99	0.4801	0.4868	0.3615	0.3447	STUD SHEARING SIDE A

PUSH-OUT TEST SUMMARY SHEET

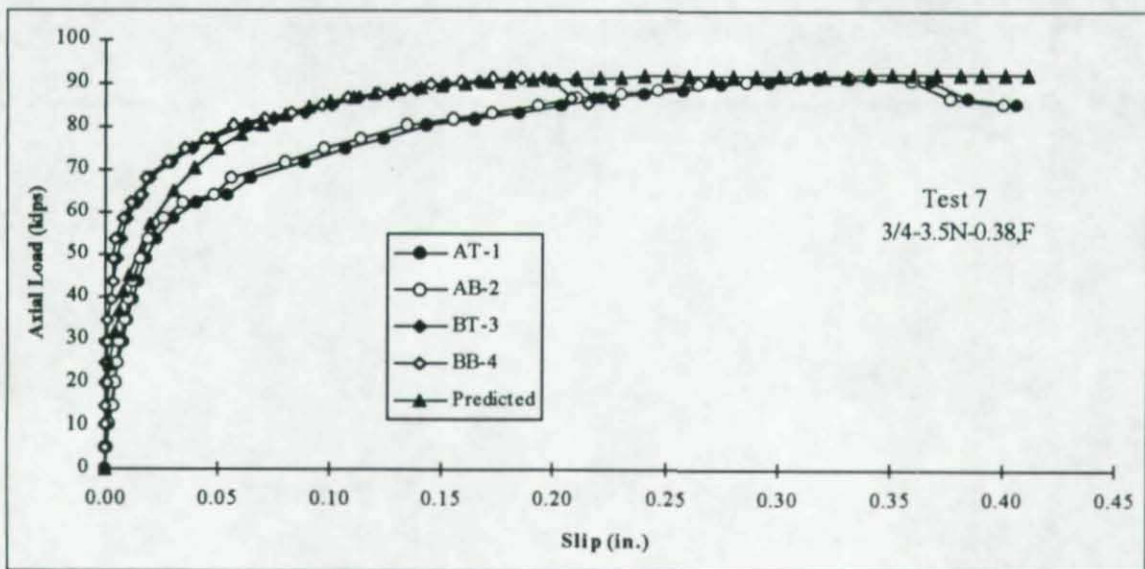
Test:	7	Deck Type:	None
Designation:	3/4-3.5N-0.38,F	Flange Thickness:	0.38 in.
Date of Test:	10/29/96		
Concrete Strength:	3435 psi	Weld Location:	F
Concrete Weight:	138.88 pcf	Stud Size:	3/4 in. x 4 in.
Concrete Thickness:	5 3/4 in.	Stud Tensile Strength:	64.868 ksi
Maximum Applied Load:	91.52 kips		
Applied Load Per Stud:	22.88 kips		

Concrete Slip at Failure:

Pot. AT-1: 0.4055 in.	Pot. BT-3: 0.2263 in.
Pot. AB-2: 0.3994 in.	Pot. BB-4: 0.2151 in.
Avg. Side A: 0.4025 in.	Avg. Side B: 0.2207 in.

Avg.: 0.3116 in.

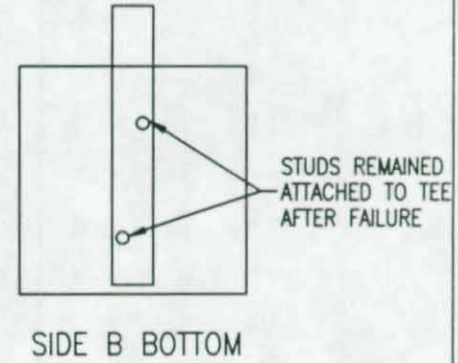
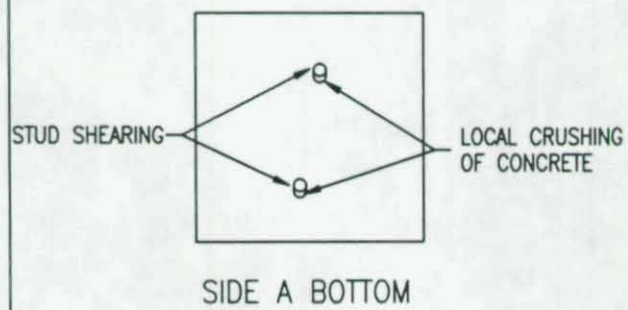
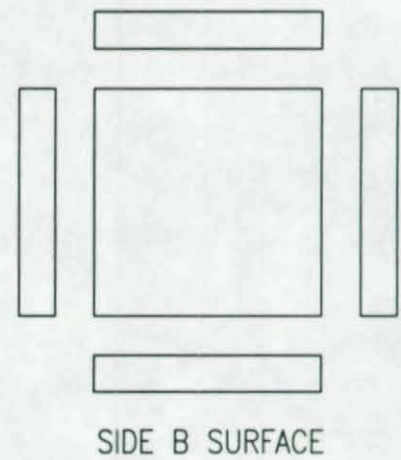
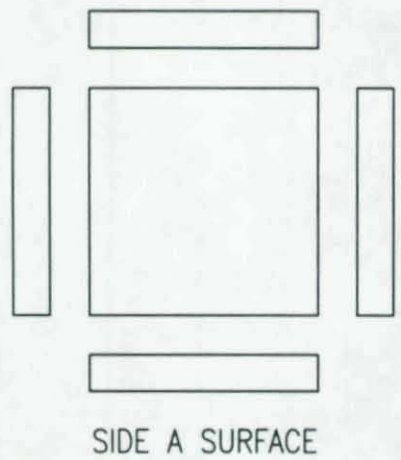
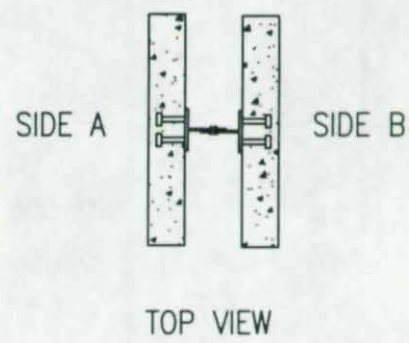
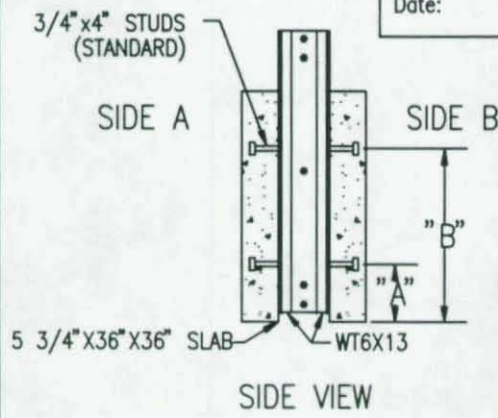
Comments: 10% Normal Load
Stud Shearing Failure of Both Studs on Side A



002057

PUSH-OUT TEST LAYOUT & CRACKING SHEET

Test:	<u>7</u>
Designation:	<u>3/4-3.5N-0.38,F</u>
Date:	<u>10/29/96</u>



Test 7 Data

Axial Load (kips)	Slips (in.)				Test Comments
	Pot. AT-1	Pot. AB-2	Pot. BT-3	Pot. BB-4	
0.00	0.0000	0.0000	0.0000	0.0000	BEGIN TEST
5.15	0.0000	0.0012	0.0000	0.0000	
10.47	0.0012	0.0018	0.0000	0.0000	
14.48	0.0024	0.0031	0.0000	0.0000	
19.87	0.0043	0.0043	0.0000	0.0006	
24.62	0.0049	0.0055	0.0000	0.0006	
29.69	0.0073	0.0061	0.0000	0.0012	
34.51	0.0098	0.0086	0.0012	0.0012	
39.67	0.0122	0.0104	0.0024	0.0024	
43.84	0.0147	0.0122	0.0031	0.0031	
49.24	0.0183	0.0153	0.0049	0.0037	
53.49	0.0226	0.0190	0.0067	0.0043	
58.56	0.0300	0.0257	0.0092	0.0079	
62.40	0.0404	0.0342	0.0141	0.0110	
64.12	0.0538	0.0483	0.0165	0.0153	
68.13	0.0642	0.0563	0.0196	0.0177	
71.81	0.0887	0.0801	0.0294	0.0275	
75.00	0.1064	0.0972	0.0391	0.0354	
77.13	0.1242	0.1138	0.0477	0.0446	
80.32	0.1431	0.1339	0.0624	0.0568	
81.87	0.1645	0.1547	0.0752	0.0703	
83.10	0.1841	0.1725	0.0887	0.0825	
84.98	0.2031	0.1927	0.1009	0.0960	
86.70	0.2208	0.2098	0.1126	0.1076	
87.76	0.2398	0.2293	0.1272	0.1210	
88.66	0.2575	0.2465	0.1382	0.1326	
90.13	0.2746	0.2642	0.1511	0.1442	
90.54	0.2960	0.2856	0.1658	0.1583	

002058

Test 7 Data

Axial Load (kips)	Slips (in.)				Test Comments
	Pot. AT-1	Pot. AB-2	Pot. BT-3	Pot. BB-4	
91.36	0.3174	0.3082	0.1805	0.1723	BANG. STUD SHEARING SIDE A
91.52	0.3407	0.3315	0.1951	0.1852	
90.70	0.3670	0.3590	0.2092	0.1992	
86.94	0.3835	0.3761	0.2178	0.2078	
85.39	0.4055	0.3994	0.2263	0.2151	

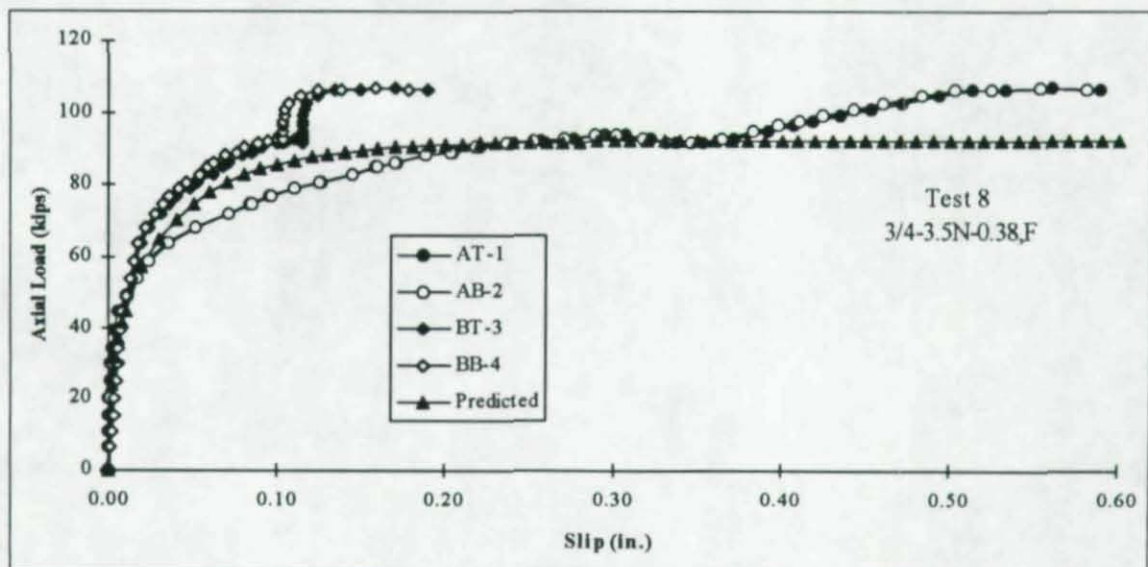
PUSH-OUT TEST SUMMARY SHEET

Test:	8	Deck Type:	None
Designation:	3/4-3.5N-0.38,F	Flange Thickness:	0.38 in.
Date of Test:	10/29/96		
Concrete Strength:	3435 psi	Weld Location:	F
Concrete Weight:	138.88 pcf	Stud Size:	3/4 in. x 4 in.
Concrete Thickness:	5 3/4 in.	Stud Tensile Strength:	64.868 ksi
Maximum Applied Load:	106.65 kips		
Applied Load Per Stud:	26.66 kips		

Concrete Slip at Failure:

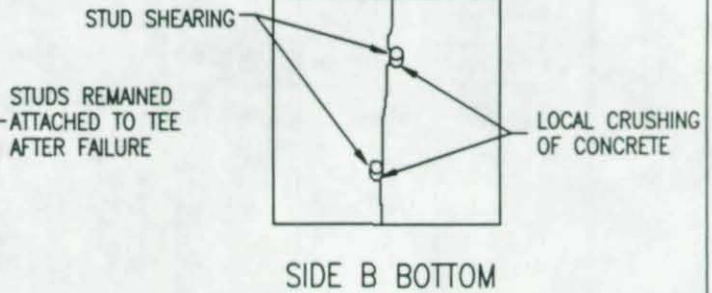
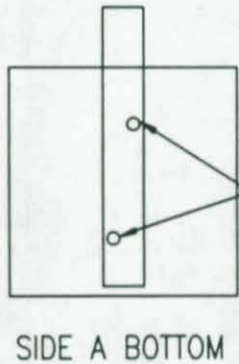
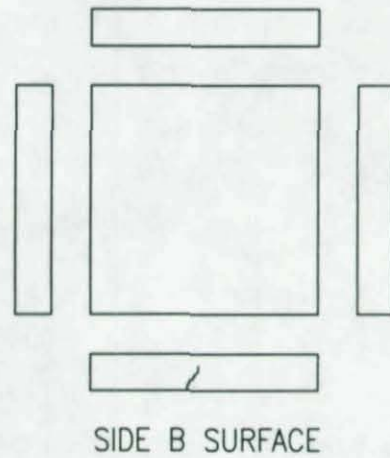
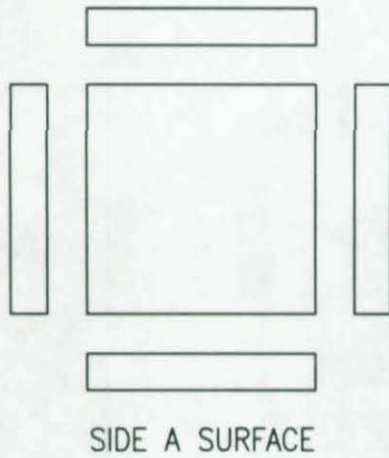
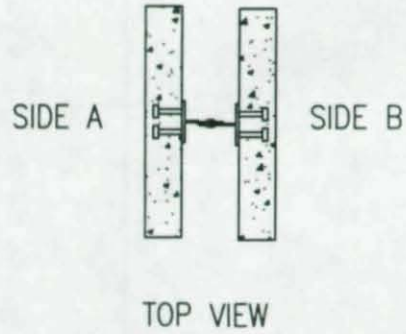
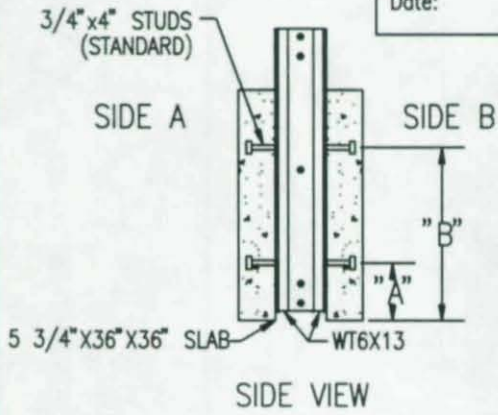
Pot. AT-1: 0.5884 in.	Pot. BT-3: 0.1896 in.
Pot. AB-2: 0.5809 in.	Pot. BB-4: 0.1778 in.
Avg. Side A: 0.5847 in.	Avg. Side B: 0.1837 in.
Avg.: 0.3842 in.	

Comments: 10% Normal Load
Stud Shearing Failure of Both Studs on Side B



PUSH-OUT TEST LAYOUT & CRACKING SHEET

Test:	8
Designation:	3/4-3.5N-0.38,F
Date:	10/29/96



Test 8 Data

Axial Load (kips)	Slips (in.)				Test Comments
	Pot. AT-1	Pot. AB-2	Pot. BT-3	Pot. BB-4	
0.00	0.0000	0.0000	0.0006	-0.0006	BEGIN TEST
6.30	0.0000	0.0000	0.0006	0.0012	
10.88	0.0000	0.0000	0.0000	0.0018	
15.21	0.0000	0.0000	0.0012	0.0031	
20.45	0.0000	0.0006	0.0031	0.0037	
24.86	0.0006	0.0018	0.0031	0.0043	
30.18	0.0012	0.0024	0.0043	0.0055	
34.60	0.0024	0.0043	0.0061	0.0061	
39.42	0.0037	0.0061	0.0067	0.0073	
44.57	0.0061	0.0079	0.0092	0.0079	
48.99	0.0098	0.0116	0.0104	0.0104	
54.14	0.0153	0.0177	0.0135	0.0122	
59.13	0.0226	0.0238	0.0159	0.0147	
63.79	0.0349	0.0361	0.0196	0.0177	
68.21	0.0520	0.0520	0.0239	0.0214	
72.22	0.0716	0.0715	0.0306	0.0275	
74.75	0.0832	0.0844	0.0361	0.0318	
76.72	0.0954	0.0960	0.0404	0.0361	
79.01	0.1101	0.1101	0.0477	0.0409	
80.64	0.1260	0.1254	0.0532	0.0464	
82.69	0.1450	0.1443	0.0618	0.0538	
85.14	0.1584	0.1590	0.0673	0.0587	
86.45	0.1706	0.1700	0.0710	0.0623	
88.17	0.1884	0.1877	0.0795	0.0684	
88.90	0.2043	0.2030	0.0850	0.0752	
90.38	0.2202	0.2183	0.0911	0.0807	
91.68	0.2398	0.2360	0.0997	0.0880	
92.01	0.2569	0.2519	0.1058	0.0941	

Test 8 Data

Axial Load (kips)	Slips (in.)				Test Comments
	Pot. AT-1	Pot. AB-2	Pot. BT-3	Pot. BB-4	
92.99	0.2765	0.2709	0.1101	0.0996	
93.89	0.2948	0.2886	0.1138	0.1014	
93.97	0.3077	0.3021	0.1144	0.1027	
92.91	0.3223	0.3174	0.1144	0.1033	SIDE A WEB CRIPPLED UNDER LOAD
91.68	0.3376	0.3320	0.1144	0.1033	RAM SLIGHTLY OFF PLUMB
91.60	0.3529	0.3467	0.1144	0.1033	
92.50	0.3719	0.3645	0.1144	0.1033	
94.87	0.3927	0.3834	0.1144	0.1033	
96.43	0.4067	0.3981	0.1144	0.1033	
97.41	0.4190	0.4103	0.1144	0.1033	
99.13	0.4349	0.4250	0.1144	0.1039	
100.93	0.4526	0.4427	0.1156	0.1039	
102.40	0.4710	0.4605	0.1168	0.1063	
104.93	0.4930	0.4831	0.1236	0.1131	
106.57	0.5126	0.5026	0.1340	0.1241	
106.49	0.5327	0.5241	0.1486	0.1381	
106.65	0.5603	0.5534	0.1694	0.1583	
106.33	0.5884	0.5809	0.1896	0.1778	STUD SHEARING SIDE B

PUSH-OUT TEST SUMMARY SHEET

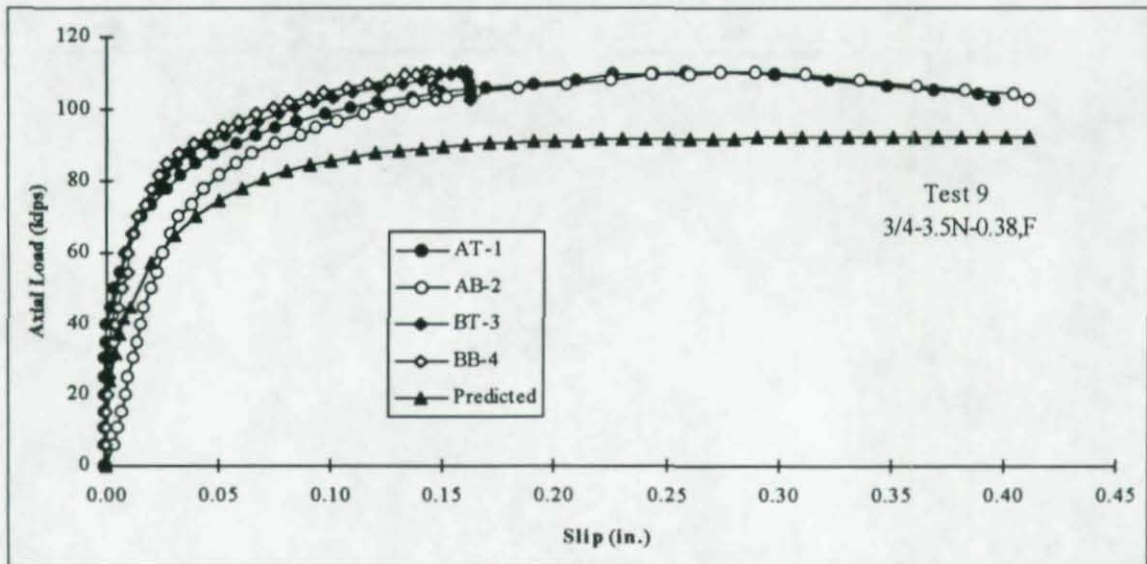
Test:	9	Deck Type:	None
Designation:	3/4-3.5N-0.38,F	Flange Thickness:	0.38 in.
Date of Test:	11/3/96		
Concrete Strength:	3435 psi	Weld Location:	F
Concrete Weight:	138.88 pcf	Stud Size:	3/4 in. x 4 in.
Concrete Thickness:	5 3/4 in.	Stud Tensile Strength:	64.868 ksi
Maximum Applied Load:	110.05 kips		
Applied Load Per Stud:	27.51 kips		

Concrete Slip at Failure:

Pot. AT-1: 0.3951 in.	Pot. BT-3: 0.1615 in.
Pot. AB-2: 0.4105 in.	Pot. BB-4: 0.1461 in.
Avg. Side A: 0.4028 in.	Avg. Side B: 0.1538 in.

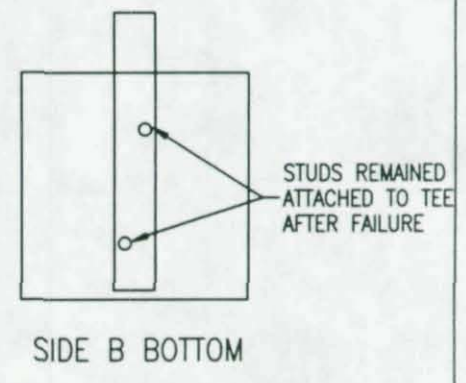
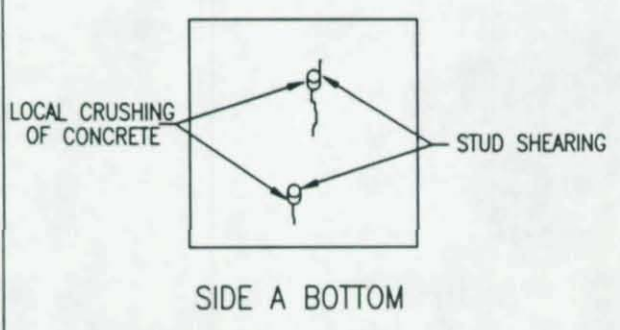
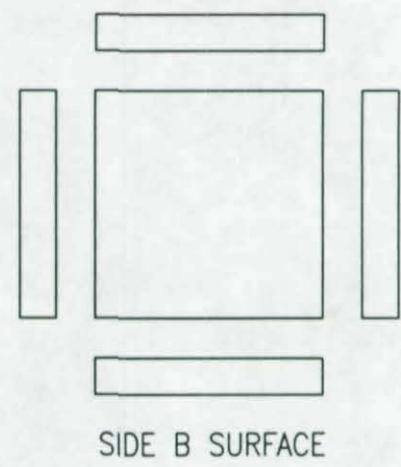
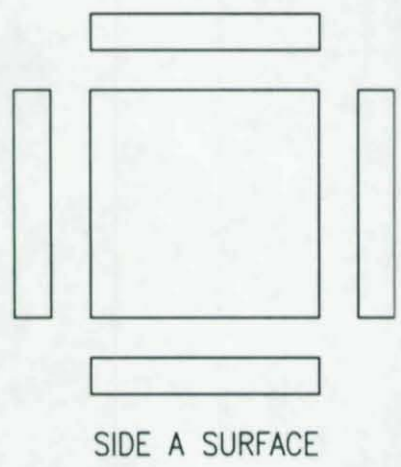
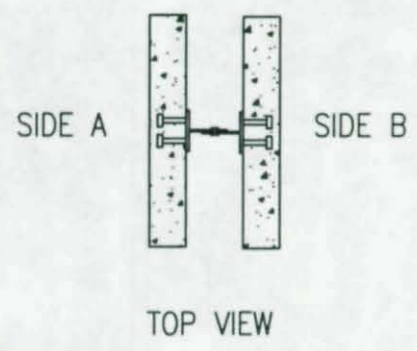
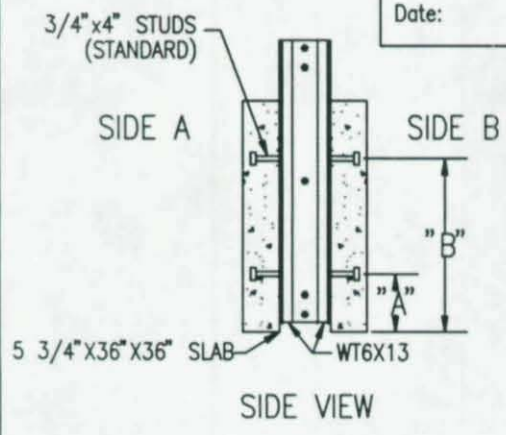
Avg.: 0.2783 in.

Comments: 10% Normal Load
Stud Shearing Failure of Both Studs on Side A



PUSH-OUT TEST LAYOUT & CRACKING SHEET

Test:	9
Designation:	3/4-3.5N-0.38,F
Date:	11/3/96



Test 9 Data

Axial Load (kips)	Slips (in.)				Test Comments
	Pot. AT-1	Pot. AB-2	Pot. BT-3	Pot. BB-4	
0.00	-0.0006	0.0000	0.0000	0.0000	BEGIN TEST
6.03	-0.0006	0.0031	0.0000	0.0000	
10.68	-0.0006	0.0055	0.0000	0.0000	
15.45	-0.0006	0.0067	0.0000	0.0000	
20.35	-0.0006	0.0086	0.0000	0.0006	
25.25	-0.0006	0.0098	0.0006	0.0018	
30.40	-0.0006	0.0122	0.0012	0.0024	
35.18	0.0000	0.0135	0.0018	0.0037	
40.08	0.0000	0.0153	0.0024	0.0043	
44.97	0.0018	0.0165	0.0031	0.0055	
50.13	0.0037	0.0196	0.0043	0.0067	
54.77	0.0061	0.0226	0.0061	0.0098	LOUD POP. NORMAL LOAD FELL 20%
59.92	0.0086	0.0251	0.0080	0.0098	
65.20	0.0122	0.0288	0.0110	0.0122	
70.23	0.0153	0.0318	0.0141	0.0141	
73.62	0.0196	0.0379	0.0190	0.0171	
78.14	0.0263	0.0434	0.0220	0.0202	
81.91	0.0330	0.0502	0.0257	0.0232	
85.05	0.0398	0.0575	0.0306	0.0269	
87.81	0.0477	0.0648	0.0367	0.0318	
90.58	0.0575	0.0752	0.0440	0.0385	
92.96	0.0667	0.0856	0.0526	0.0452	
94.85	0.0746	0.0930	0.0593	0.0514	
96.73	0.0844	0.1022	0.0673	0.0581	
98.62	0.0972	0.1144	0.0764	0.0660	
100.25	0.1083	0.1254	0.0838	0.0740	
101.76	0.1205	0.1370	0.0924	0.0807	
103.02	0.1358	0.1517	0.1009	0.0893	

Test 9 Data

Axial Load (kips)	Slips (in.)				Test Comments
	Pot. AT-1	Pot. AB-2	Pot. BT-3	Pot. BB-4	
104.52	0.1492	0.1646	0.1089	0.0966	
105.90	0.1688	0.1829	0.1211	0.1064	
107.04	0.1902	0.2049	0.1315	0.1162	
108.04	0.2092	0.2245	0.1407	0.1253	
109.42	0.2257	0.2429	0.1480	0.1327	LEANING TO SIDE B
109.67	0.2434	0.2600	0.1535	0.1376	
110.05	0.2581	0.2735	0.1572	0.1418	
110.05	0.2734	0.2887	0.1596	0.1431	CREAKING NOISES
109.42	0.2978	0.3114	0.1602	0.1443	
107.79	0.3217	0.3352	0.1608	0.1449	
106.53	0.3474	0.3609	0.1615	0.1455	
105.28	0.3682	0.3817	0.1615	0.1455	
104.40	0.3878	0.4038	0.1615	0.1461	
102.51	0.3951	0.4105	0.1615	0.1461	STUD SHEARING SIDE A

PUSH-OUT TEST SUMMARY SHEET

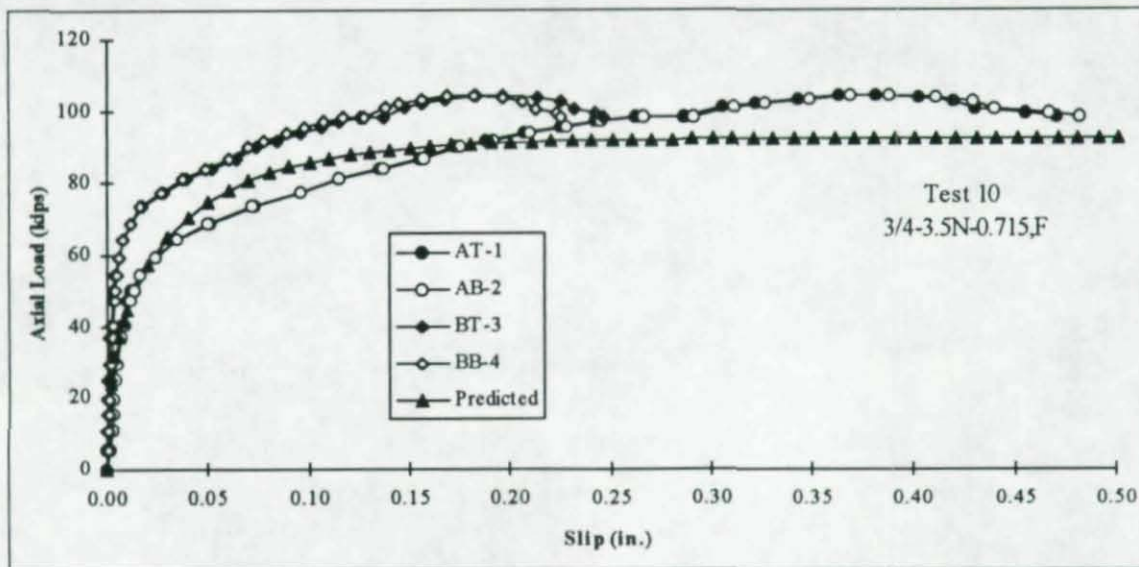
Test:	10	Deck Type:	None
Designation:	3/4-3.5N-0.715,F	Flange Thickness:	0.715 in.
Date of Test:	10/30/96		
Concrete Strength:	3435 psi	Weld Location:	F
Concrete Weight:	138.88 pcf	Stud Size:	3/4 in. x 4 in.
Concrete Thickness:	5 3/4 in.	Stud Tensile Strength:	64.868 ksi
Maximum Applied Load:	104.12 kips		
Applied Load Per Stud:	26.03 kips		

Concrete Slip at Failure:

Pot. AT-1: 0.4691 in.	Pot. BT-3: 0.2459 in.
Pot. AB-2: 0.4812 in.	Pot. BB-4: 0.2249 in.
Avg. Side A: 0.4752 in.	Avg. Side B: 0.2354 in.

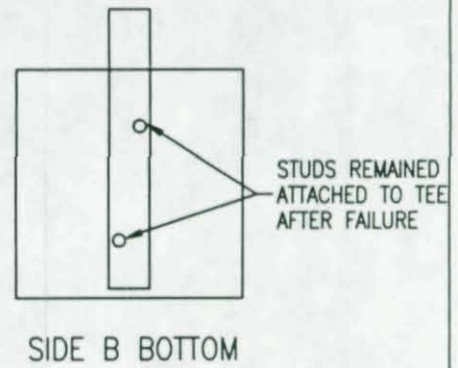
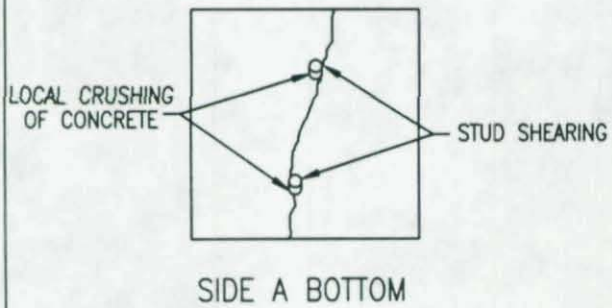
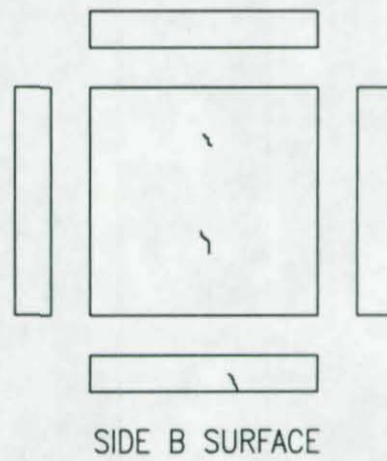
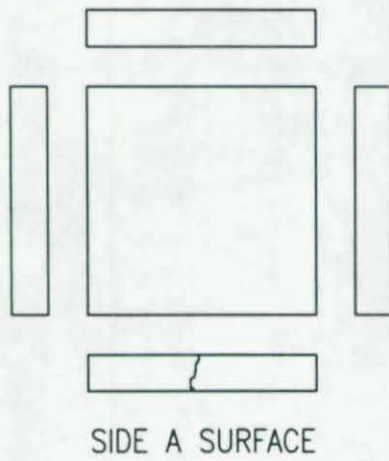
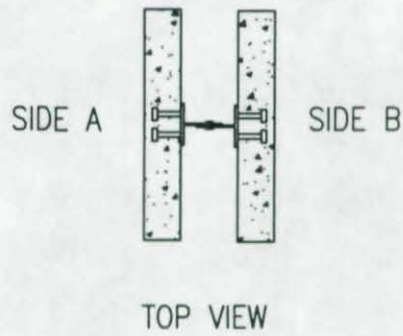
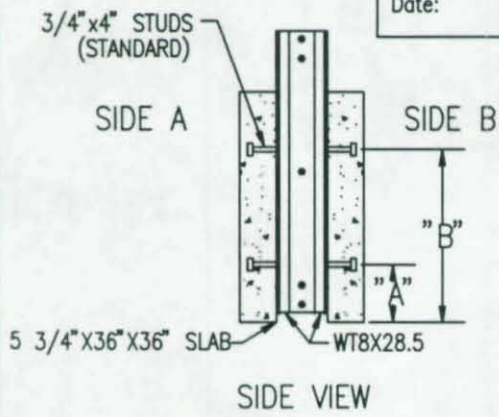
Avg.: 0.3553 in.

Comments: 10% Normal Load
Stud Shearing Failure of Both Studs on Side A



PUSH-OUT TEST LAYOUT & CRACKING SHEET

Test:	10
Designation:	3/4-3.5N-0.715,F
Date:	10/30/96



Test 10 Data

Axial Load (kips)	Pot. AT-1 (in.)	Pot. AB-2 (in.)	Pot. BT-3 (in.)	Pot. BB-4 (in.)	Test 10 Comments
0.00	0.0000	0.0000	0.0000	0.0000	BEGIN TEST
5.48	0.0000	0.0018	0.0000	0.0012	
10.96	0.0024	0.0024	0.0000	0.0012	
15.46	0.0024	0.0031	0.0000	0.0012	
19.63	0.0024	0.0031	0.0000	0.0012	
25.19	0.0031	0.0043	0.0000	0.0018	
29.53	0.0037	0.0049	0.0006	0.0018	
36.97	0.0055	0.0067	0.0012	0.0024	
40.16	0.0067	0.0086	0.0018	0.0031	
47.52	0.0098	0.0116	0.0024	0.0037	
50.38	0.0116	0.0135	0.0031	0.0043	
54.80	0.0165	0.0165	0.0037	0.0049	
59.46	0.0239	0.0238	0.0055	0.0061	
64.37	0.0343	0.0342	0.0073	0.0079	
68.78	0.0508	0.0501	0.0110	0.0116	
73.36	0.0728	0.0715	0.0171	0.0159	
77.62	0.0954	0.0960	0.0281	0.0269	
81.05	0.1144	0.1143	0.0391	0.0373	
83.83	0.1346	0.1364	0.0520	0.0489	
86.53	0.1547	0.1565	0.0642	0.0599	
89.89	0.1719	0.1749	0.0740	0.0697	
91.68	0.1878	0.1908	0.0838	0.0770	
93.73	0.2067	0.2097	0.0960	0.0886	
95.28	0.2245	0.2275	0.1058	0.0978	
96.84	0.2416	0.2452	0.1150	0.1069	
98.06	0.2618	0.2654	0.1248	0.1167	
98.39	0.2856	0.2905	0.1364	0.1271	
100.93	0.3052	0.3106	0.1468	0.1375	

Test 10 Data

Axial Load (kips)	Pot. AT-1 (in.)	Pot. AB-2 (in.)	Pot. BT-3 (in.)	Pot. BB-4 (in.)	Test 10 Comments
101.91	0.3211	0.3259	0.1554	0.1448	
102.89	0.3425	0.3479	0.1676	0.1558	
103.95	0.3621	0.3681	0.1823	0.1687	
104.12	0.3804	0.3871	0.1957	0.1815	
103.54	0.4019	0.4097	0.2129	0.1956	
102.73	0.4190	0.4280	0.2245	0.2059	
100.27	0.4294	0.4391	0.2312	0.2121	
99.45	0.4538	0.4653	0.2422	0.2224	
98.31	0.4691	0.4812	0.2459	0.2249	STUD SHEARING SIDE A

PUSH-OUT TEST SUMMARY SHEET

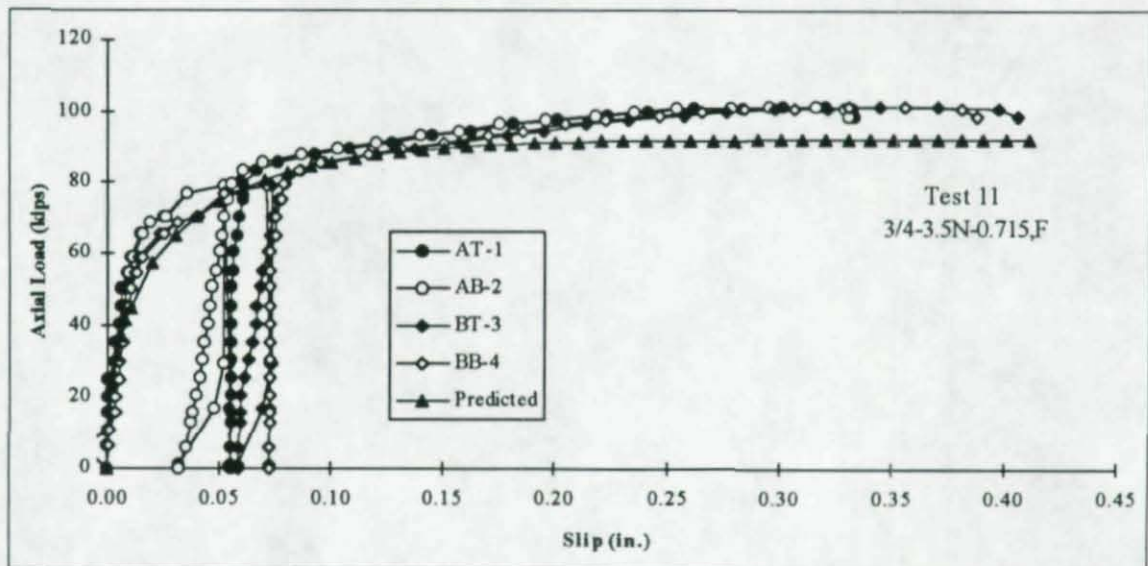
Test:	11	Deck Type:	None
Designation:	3/4-3.5N-0.715,F	Flange Thickness:	0.715 in.
Date of Test:	10/31/96		
Concrete Strength:	3435 psi	Weld Location:	F
Concrete Weight:	138.88 pcf	Stud Size:	3/4 in. x 4 in.
Concrete Thickness:	5 3/4 in.	Stud Tensile Strength:	64.868 ksi
Maximum Applied Load:	101.63 kips		
Applied Load Per Stud:	25.41 kips		

Concrete Slip at Failure:

Pot. AT-1: 0.3333 in.	Pot. BT-3: 0.4049 in.
Pot. AB-2: 0.3303 in.	Pot. BB-4: 0.3875 in.
Avg. Side A: 0.3318 in.	Avg. Side B: 0.3962 in.

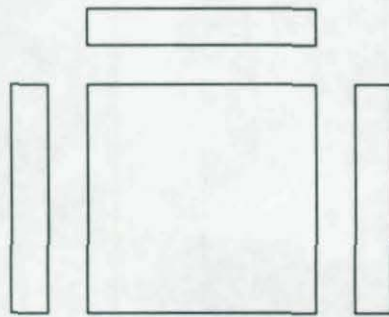
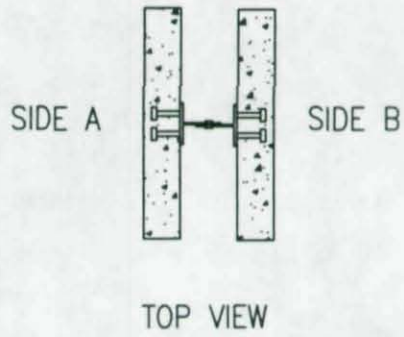
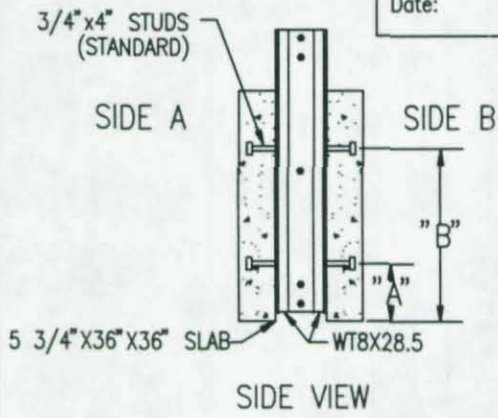
Avg.: 0.3640 in.

Comments: 10% Normal Load
Stud Shearing Failure of Both Studs on Side B

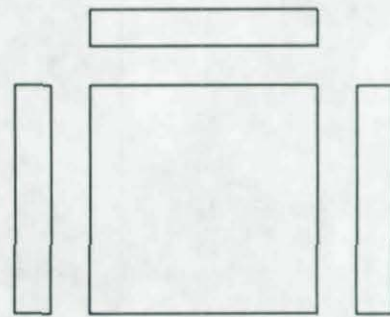


PUSH-OUT TEST LAYOUT & CRACKING SHEET

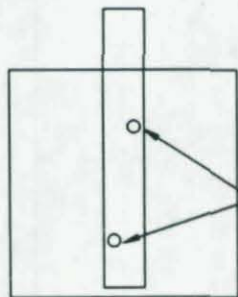
Test:	11
Designation:	3/4-3.5N-0.715,F
Date:	10/31/96



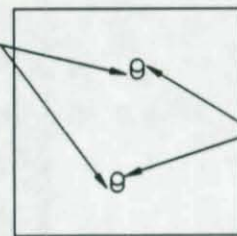
SIDE A SURFACE



SIDE B SURFACE



STUDS REMAINED ATTACHED TO TEE AFTER FAILURE



LOCAL CRUSHING OF CONCRETE

STUD SHEARING

Test 11 Data

Axial Load (kips)	Slips (in.)				Test Comments
	Pot. AT-1	Pot. AB-2	Pot. BT-3	Pot. BB-4	
0.00	0.0000	0.0000	0.0000	0.0000	BEGIN TEST
6.38	0.0000	-0.0104	0.0000	0.0006	
11.04	0.0000	0.0000	0.0000	0.0006	
15.95	0.0000	0.0012	0.0000	0.0031	
20.28	0.0000	0.0018	0.0012	0.0031	
25.11	0.0000	0.0031	0.0018	0.0055	
30.26	0.0031	0.0037	0.0024	0.0055	
35.25	0.0031	0.0049	0.0031	0.0067	
40.16	0.0049	0.0055	0.0049	0.0067	
45.07	0.0061	0.0073	0.0080	0.0098	
50.05	0.0061	0.0073	0.0080	0.0104	
54.80	0.0086	0.0092	0.0116	0.0128	
58.64	0.0104	0.0110	0.0141	0.0153	
65.43	0.0147	0.0153	0.0232	0.0251	
68.54	0.0190	0.0190	0.0306	0.0306	
70.26	0.0251	0.0257	0.0398	0.0403	
76.96	0.0349	0.0355	0.0520	0.0513	
79.33	0.0520	0.0520	0.0728	0.0703	LOAD CELL MALFUNCTIONED
29.36	0.0544	0.0520	0.0728	0.0721	UNLOADED
17.09	0.0544	0.0477	0.0685	0.0721	
1.23	0.0550	0.0318	0.0581	0.0721	
0.65	0.0544	0.0318	0.0581	0.0721	
0.00	0.0550	0.0318	0.0587	0.0721	REPLACED LOAD CELL
5.78	0.0550	0.0349	0.0587	0.0721	
13.07	0.0550	0.0373	0.0593	0.0721	
15.95	0.0550	0.0379	0.0593	0.0721	
20.60	0.0550	0.0398	0.0593	0.0721	
25.63	0.0550	0.0410	0.0612	0.0721	

002066

Test 11 Data

Axial Load (kips)	Slips (in.)				Test Comments
	Pot. AT-1	Pot. AB-2	Pot. BT-3	Pot. BB-4	
30.40	0.0550	0.0422	0.0624	0.0721	
35.55	0.0550	0.0434	0.0642	0.0721	
40.33	0.0550	0.0446	0.0661	0.0721	
45.23	0.0550	0.0459	0.0667	0.0721	
50.50	0.0550	0.0465	0.0679	0.0721	
55.15	0.0557	0.0483	0.0691	0.0721	
60.30	0.0557	0.0495	0.0716	0.0721	
65.08	0.0575	0.0508	0.0722	0.0746	
70.10	0.0587	0.0520	0.0734	0.0752	
75.38	0.0599	0.0532	0.0759	0.0770	
79.77	0.0606	0.0550	0.0789	0.0782	
83.29	0.0667	0.0605	0.0862	0.0856	
85.80	0.0758	0.0691	0.0960	0.0947	
87.56	0.0924	0.0862	0.1193	0.1161	
89.45	0.1076	0.1027	0.1370	0.1308	
91.33	0.1266	0.1193	0.1566	0.1497	
93.09	0.1450	0.1394	0.1780	0.1693	
94.60	0.1621	0.1566	0.1945	0.1852	
96.61	0.1804	0.1749	0.2135	0.2035	
97.61	0.2006	0.1951	0.2324	0.2219	
98.99	0.2233	0.2177	0.2569	0.2463	
99.75	0.2410	0.2349	0.2765	0.2646	
100.75	0.2612	0.2538	0.2979	0.2842	
100.88	0.2832	0.2777	0.3211	0.3062	
101.51	0.3015	0.2954	0.3438	0.3307	
101.63	0.3205	0.3156	0.3701	0.3551	
101.01	0.3321	0.3290	0.3964	0.3802	
98.87	0.3333	0.3303	0.4049	0.3875	STUD SHEARING SIDE B

PUSH-OUT TEST SUMMARY SHEET

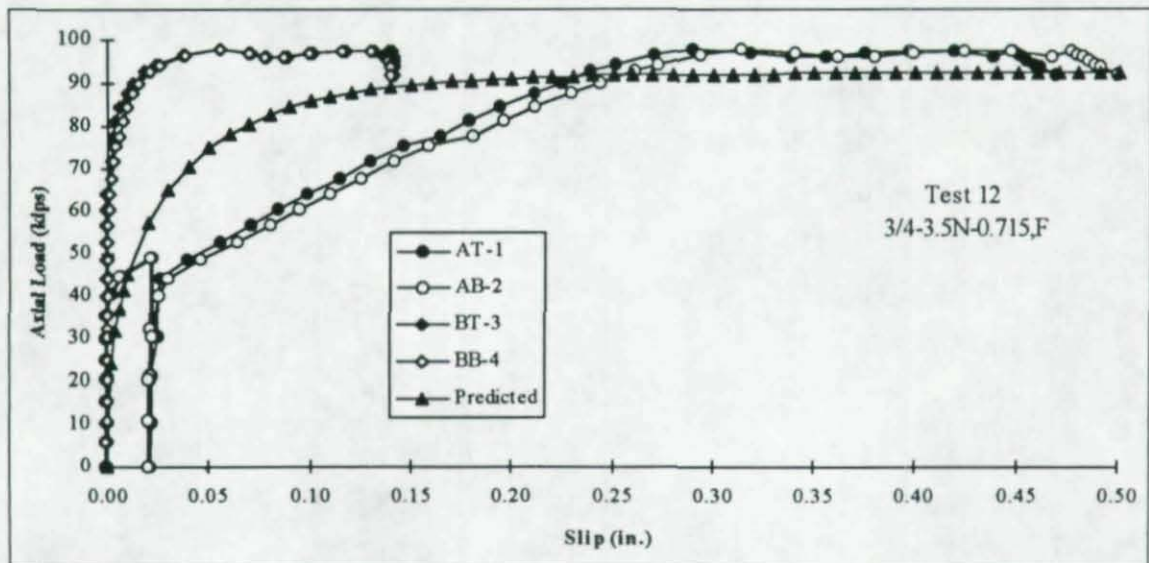
Test:	12	Deck Type:	None
Designation:	3/4-3.5N-0.715,F	Flange Thickness:	0.715 in.
Date of Test:	11/2/96		
Concrete Strength:	3435 psi	Weld Location:	F
Concrete Weight:	138.88 pcf	Stud Size:	3/4 in. x 4 in.
Concrete Thickness:	5 3/4 in.	Stud Tensile Strength:	64.868 ksi
Maximum Applied Load:	97.61 kips		
Applied Load Per Stud:	24.40 kips		

Concrete Slip at Failure:

Pot. AT-1: 0.4685 in.	Pot. BT-3: 0.1419 in.
Pot. AB-2: 0.4986 in.	Pot. BB-4: 0.1394 in.
Avg. Side A: 0.4836 in.	Avg. Side B: 0.1407 in.

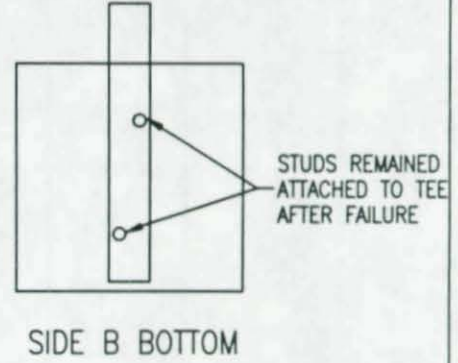
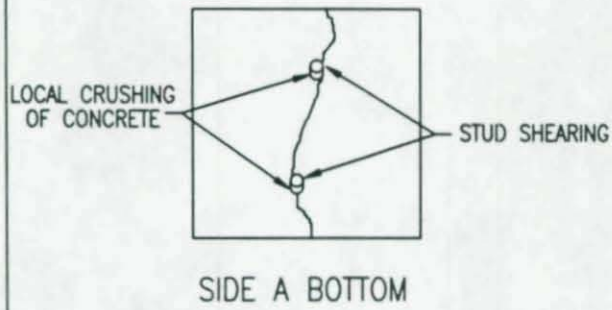
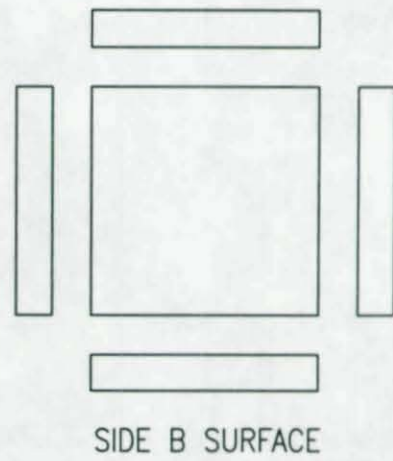
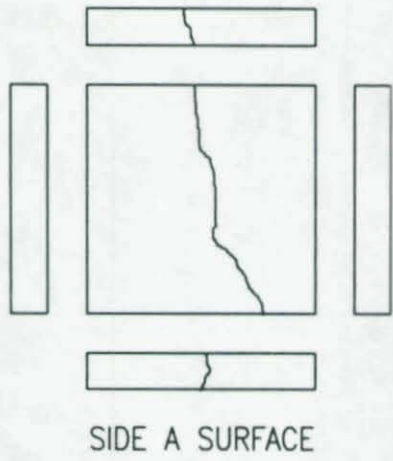
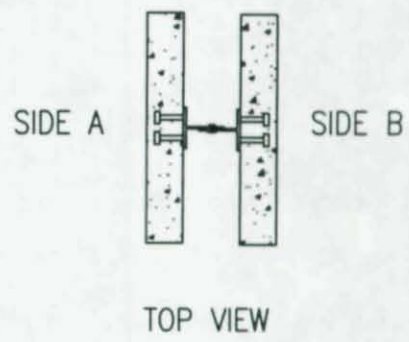
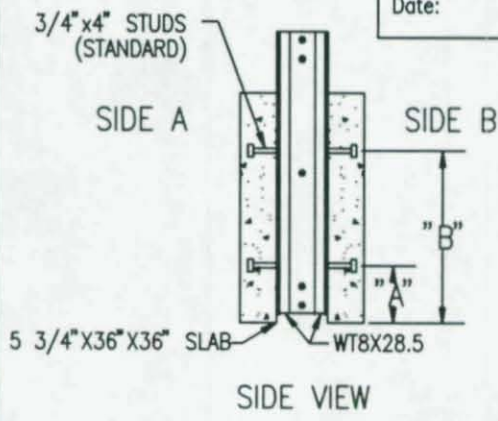
Avg.: 0.3121 in.

Comments: 10% Normal Load
Stud Shearing Failure of Both Studs on Side A



PUSH-OUT TEST LAYOUT & CRACKING SHEET

Test:	12
Designation:	3/4-3.5N-0.715,F
Date:	11/2/96



Test 12 Data

Axial Load (kips)	Slips (in.)				Test
	Pot. AT-1	Pot. AB-2	Pot. BT-3	Pot. BB-4	Comments
0.00	-0.0006	0.0000	0.0000	-0.0006	BEGIN TEST
5.78	-0.0006	0.0000	0.0000	-0.0006	
10.68	0.0000	0.0000	0.0000	-0.0006	
15.45	-0.0006	0.0000	0.0000	0.0000	
20.73	0.0000	0.0000	-0.0006	0.0000	
24.87	-0.0006	0.0000	0.0000	0.0000	
30.15	-0.0006	0.0000	-0.0006	-0.0006	
35.30	-0.0006	0.0000	0.0000	0.0000	
40.33	0.0018	0.0006	0.0000	0.0000	BANG
44.47	0.0067	0.0055	0.0000	0.0000	
49.25	0.0220	0.0208	0.0000	0.0000	
32.29	0.0220	0.0208	0.0000	0.0000	UNLOADED. RAM NOT PLUMB
21.36	0.0220	0.0208	0.0000	0.0000	
10.30	0.0220	0.0208	0.0000	0.0000	
-0.13	0.0214	0.0202	0.0000	0.0000	
10.93	0.0214	0.0202	0.0000	0.0000	
20.35	0.0214	0.0202	-0.0006	0.0000	
30.28	0.0251	0.0220	-0.0006	0.0000	
39.82	0.0251	0.0245	-0.0006	0.0000	
44.10	0.0257	0.0300	-0.0006	0.0000	
48.74	0.0391	0.0459	-0.0006	0.0000	
52.89	0.0550	0.0636	-0.0006	0.0000	
56.78	0.0710	0.0801	-0.0006	0.0000	
60.30	0.0844	0.0942	-0.0006	0.0006	
63.94	0.0985	0.1095	-0.0006	0.0012	
67.71	0.1150	0.1254	0.0018	0.0018	
71.61	0.1297	0.1419	0.0018	0.0031	
75.25	0.1462	0.1591	0.0024	0.0043	EVERYTHING IS PLUMB & LEVEL

Test 12 Data

Axial Load (kips)	Slips (in.)				Test Comments
	Pot. AT-1	Pot. AB-2	Pot. BT-3	Pot. BB-4	
77.89	0.1645	0.1805	0.0024	0.0055	
81.28	0.1786	0.1964	0.0037	0.0073	
84.42	0.1939	0.2111	0.0055	0.0092	SOFT POP
87.69	0.2110	0.2294	0.0092	0.0128	
90.08	0.2245	0.2441	0.0122	0.0153	
92.71	0.2392	0.2606	0.0177	0.0208	SOFT POP
94.10	0.2514	0.2728	0.0239	0.0257	
96.23	0.2710	0.2936	0.0373	0.0385	
97.61	0.2899	0.3132	0.0550	0.0550	
96.98	0.3181	0.3407	0.0703	0.0697	
95.85	0.3382	0.3609	0.0783	0.0776	
96.11	0.3560	0.3793	0.0887	0.0874	
96.86	0.3743	0.3982	0.1009	0.0990	
97.49	0.3970	0.4233	0.1174	0.1162	
97.24	0.4184	0.4466	0.1315	0.1296	
95.98	0.4379	0.4668	0.1382	0.1363	
97.24	0.4471	0.4765	0.1407	0.1382	
96.48	0.4502	0.4790	0.1407	0.1388	
95.85	0.4520	0.4814	0.1413	0.1388	
94.97	0.4545	0.4851	0.1413	0.1388	
94.22	0.4575	0.4876	0.1419	0.1394	
93.47	0.4612	0.4906	0.1419	0.1394	
91.71	0.4685	0.4986	0.1419	0.1394	BANG. STUD SHEARING SIDE A

PUSH-OUT TEST SUMMARY SHEET

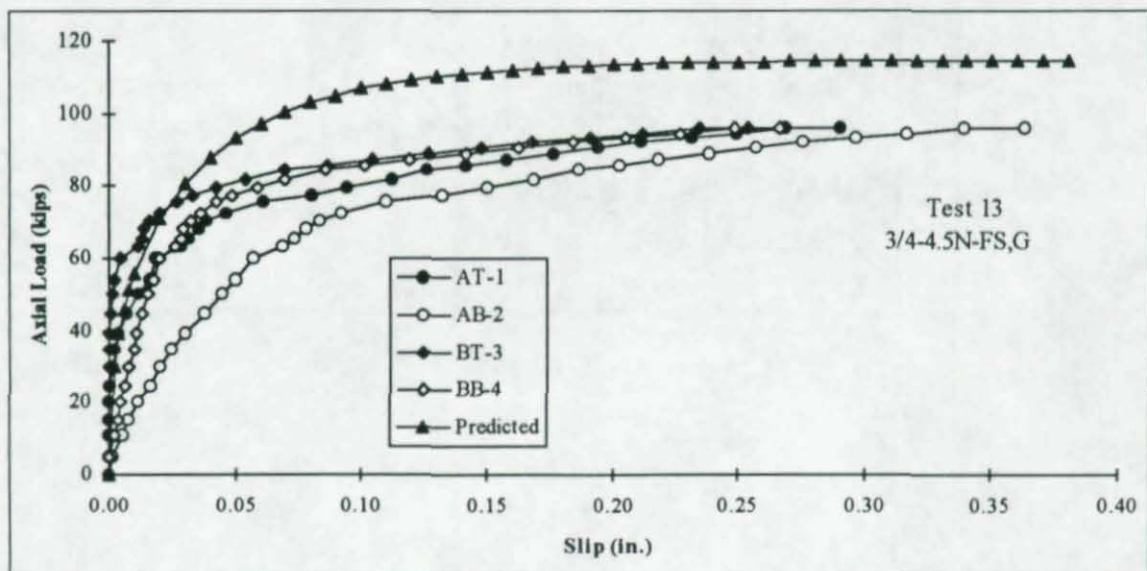
Test:	13	Deck Type:	Flat Sheet Metal (Greased)
Designation:	3/4-4.5N-FS,G		
Date of Test:	11/16/96	Flange Thickness:	0.52 in.
Concrete Strength:	4665 psi	Weld Location:	C
Concrete Weight:	144.39 pcf	Stud Size:	3/4 in. x 4 in.
Concrete Thickness:	5 3/4 in.	Stud Tensile Strength:	64.868 ksi
Maximum Applied Load:	96.11 kips		
Applied Load Per Stud:	24.03 kips		

Concrete Slip at Failure:

Pot. AT-1: 0.2905 in.	Pot. BT-3: 0.2538 in.
Pot. AB-2: 0.3627 in.	Pot. BB-4: 0.2665 in.
Avg. Side A: 0.3266 in.	Avg. Side B: 0.2602 in.

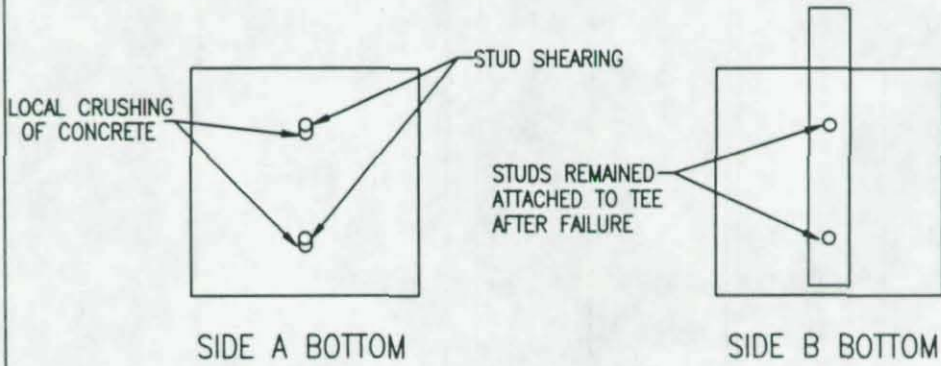
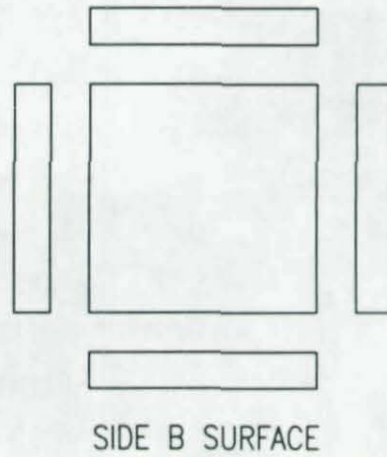
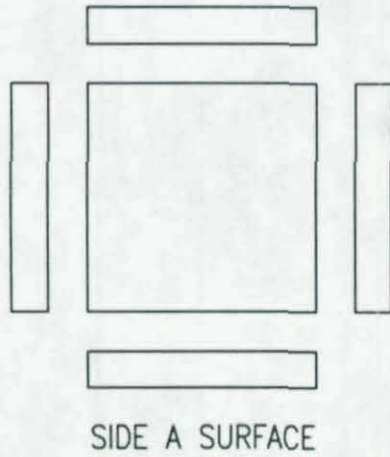
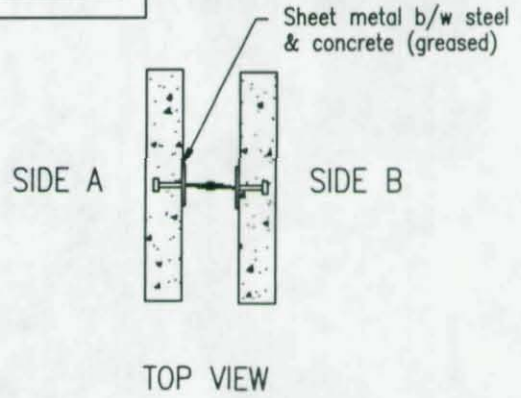
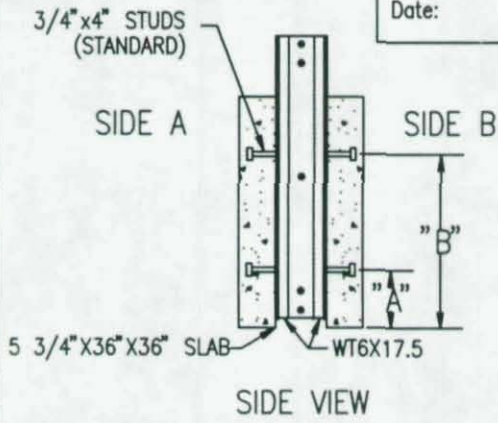
Avg.: 0.2934 in.

Comments: 10% Normal Load
Stud Shearing Failure of Both Studs on Side A



PUSH-OUT TEST LAYOUT & CRACKING SHEET

Test:	13
Designation:	3/4-4.5N-FS,G
Date:	11/16/96



Test 13 Data

Axial Load (kips)	Slips (in.)				Test Comments
	Pot. AT-1	Pot. AB-2	Pot. BT-3	Pot. BB-4	
0.00	0.0000	0.0000	0.0000	0.0000	BEGIN TEST
5.03	0.0000	0.0012	0.0000	0.0000	
10.68	0.0000	0.0055	0.0000	0.0024	
15.20	0.0000	0.0080	0.0000	0.0037	
19.97	0.0000	0.0116	0.0000	0.0049	
24.50	0.0000	0.0159	0.0000	0.0061	
29.90	0.0012	0.0202	0.0000	0.0079	
34.80	0.0024	0.0251	0.0000	0.0098	
39.32	0.0037	0.0300	0.0000	0.0110	
44.97	0.0067	0.0379	0.0006	0.0134	
50.38	0.0116	0.0447	0.0012	0.0153	
54.27	0.0159	0.0502	0.0024	0.0177	
59.92	0.0183	0.0575	0.0049	0.0202	
63.19	0.0287	0.0691	0.0116	0.0263	
65.70	0.0318	0.0734	0.0135	0.0287	
68.09	0.0355	0.0783	0.0141	0.0293	
70.35	0.0385	0.0832	0.0165	0.0324	
72.49	0.0465	0.0917	0.0202	0.0361	
75.75	0.0612	0.1101	0.0269	0.0422	
77.64	0.0801	0.1321	0.0330	0.0489	
79.90	0.0942	0.1499	0.0422	0.0587	
82.04	0.1119	0.1688	0.0544	0.0697	
84.30	0.1260	0.1866	0.0697	0.0856	
85.55	0.1413	0.2025	0.0869	0.1015	
87.31	0.1578	0.2184	0.1046	0.1192	
88.94	0.1761	0.2379	0.1266	0.1418	
90.45	0.1939	0.2569	0.1480	0.1626	
91.96	0.2110	0.2752	0.1682	0.1840	

Test 13 Data

Axial Load (kips)	Slips (in.)				Test Comments
	Pot. AT-1	Pot. AB-2	Pot. BT-3	Pot. BB-4	
93.22	0.2312	0.2960	0.1914	0.2054	BANG. STUD SHEARING SIDE A
94.60	0.2489	0.3162	0.2122	0.2268	
95.73	0.2685	0.3389	0.2343	0.2482	
96.11	0.2905	0.3627	0.2538	0.2665	

PUSH-OUT TEST SUMMARY SHEET

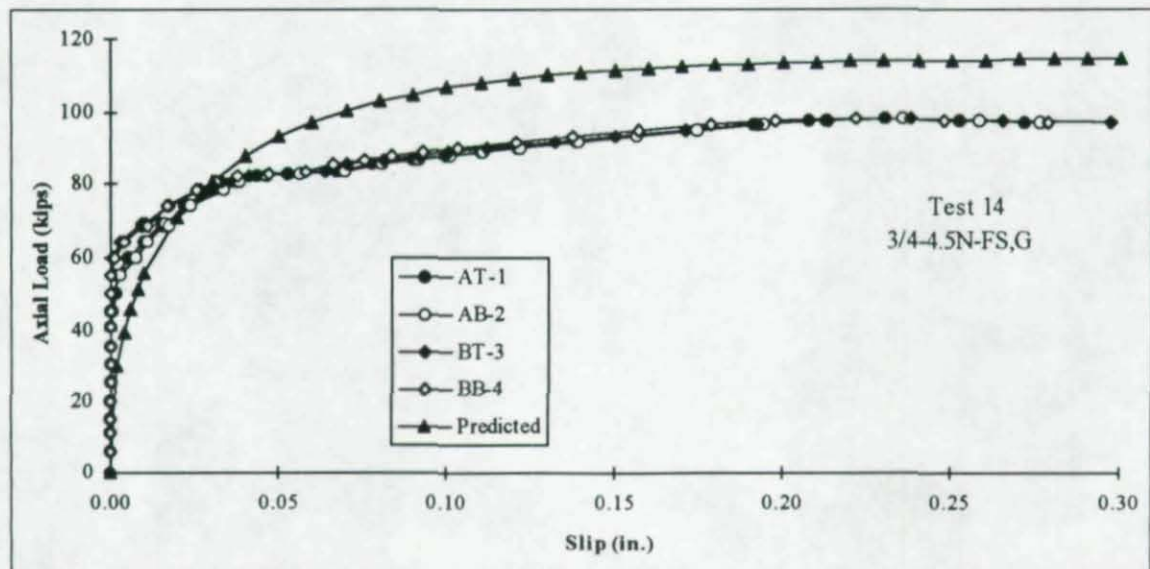
Test:	14	Deck Type:	Flat Sheet Metal (Greased)
Designation:	3/4-4.5N-FS,G		
Date of Test:	11/17/96	Flange Thickness:	0.52 in.
Concrete Strength:	4665 psi	Weld Location:	C
Concrete Weight:	144.39 pcf	Stud Size:	3/4 in. x 4 in.
Concrete Thickness:	5 3/4 in.	Stud Tensile Strength:	64.868 ksi
Maximum Applied Load:	98.37 kips		
Applied Load Per Stud:	24.59 kips		

Concrete Slip at Failure:

Pot. AT-1:	0.2715 in.	Pot. BT-3:	0.2973 in.
Pot. AB-2:	0.2765 in.	Pot. BB-4:	0.2788 in.
Avg. Side A:	0.2740 in.	Avg. Side B:	0.2881 in.

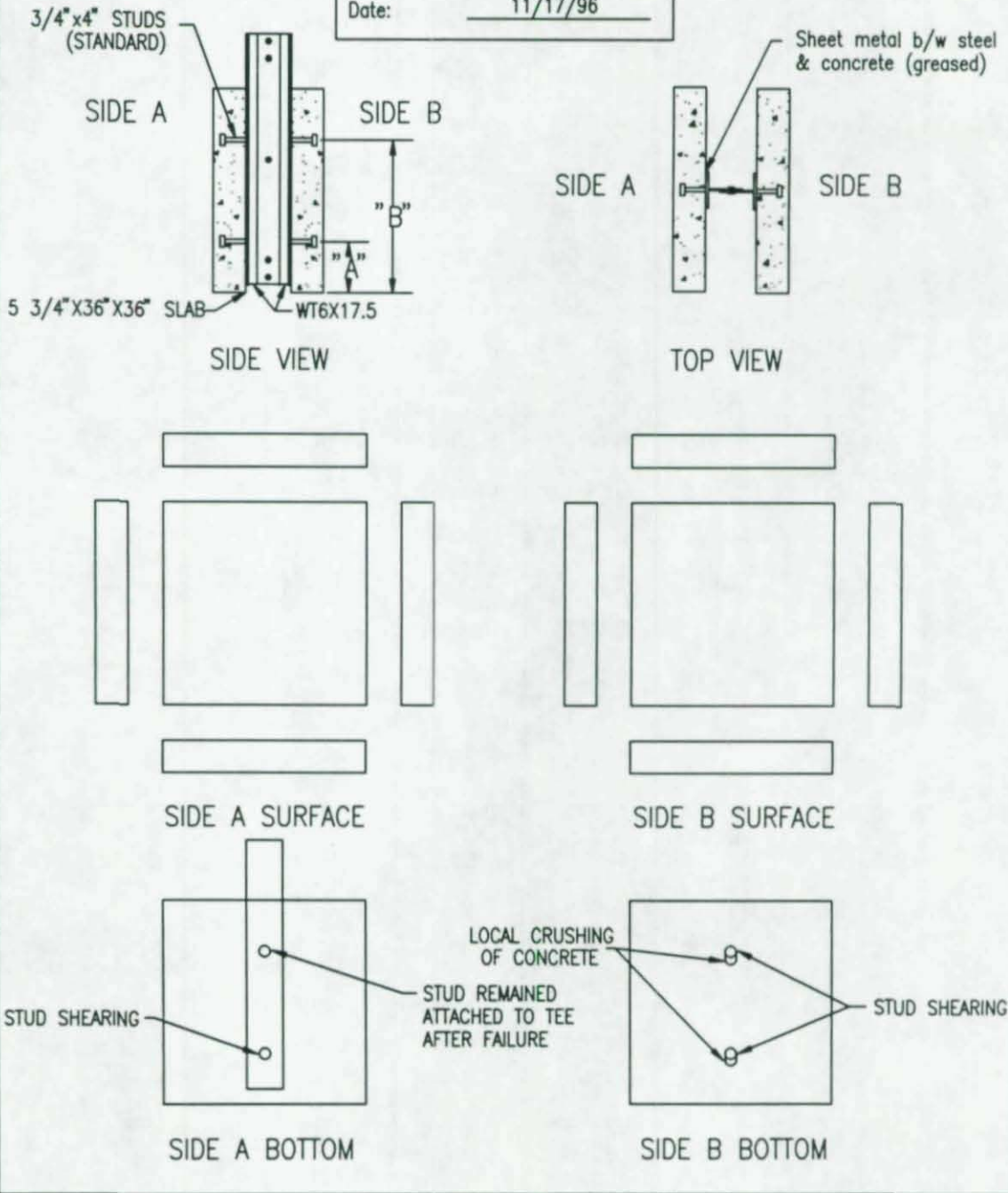
Avg.: 0.2811 in.

Comments: 10% Normal Load
Stud Shearing Failure of Bottom Stud on Side A and Both Studs on Side B



PUSH-OUT TEST LAYOUT & CRACKING SHEET

Test:	14
Designation:	3/4-4.5N-FS,G
Date:	11/17/96



Test 14 Data

Axial Load (kips)	Slips (in.)				Test Comments
	Pot. AT-1	Pot. AB-2	Pot. BT-3	Pot. BB-4	
0.00	0.0000	0.0000	0.0000	0.0000	BEGIN TEST
6.16	0.0000	0.0000	0.0000	0.0000	
11.31	0.0000	0.0000	0.0000	0.0000	
15.20	0.0000	0.0000	0.0000	0.0000	
20.10	0.0000	0.0000	0.0000	0.0000	
25.63	0.0000	0.0000	0.0000	0.0000	
30.78	0.0000	0.0000	0.0000	0.0000	
35.30	0.0000	0.0000	0.0000	0.0000	
40.95	0.0000	0.0000	0.0000	0.0000	
45.23	0.0006	0.0000	0.0000	0.0000	
50.25	0.0018	0.0006	0.0000	0.0000	
54.90	0.0018	0.0031	0.0000	0.0000	
60.05	0.0055	0.0073	0.0006	0.0012	
64.32	0.0098	0.0110	0.0031	0.0043	
69.47	0.0153	0.0165	0.0092	0.0104	
68.97	0.0159	0.0171	0.0092	0.0110	
74.25	0.0220	0.0239	0.0171	0.0171	
78.52	0.0306	0.0336	0.0269	0.0257	
80.53	0.0373	0.0385	0.0330	0.0312	
82.41	0.0434	0.0465	0.0410	0.0379	
83.17	0.0526	0.0563	0.0520	0.0471	
83.67	0.0673	0.0697	0.0636	0.0581	
85.55	0.0777	0.0807	0.0703	0.0660	
86.81	0.0899	0.0918	0.0813	0.0752	
87.94	0.0997	0.1009	0.0917	0.0838	
88.94	0.1101	0.1107	0.1003	0.0929	
89.82	0.1211	0.1217	0.1119	0.1033	
91.71	0.1388	0.1395	0.1321	0.1204	

Test 14 Data

Axial Load (kips)	Slips (in.)				Test Comments
	Pot. AT-1	Pot. AB-2	Pot. BT-3	Pot. BB-4	
93.22	0.1566	0.1566	0.1505	0.1376	BANG. STUD SHEARING SIDE A&B
94.85	0.1749	0.1749	0.1713	0.1571	
96.48	0.1914	0.1945	0.1927	0.1785	
97.49	0.2079	0.2129	0.2135	0.1981	
98.37	0.2306	0.2355	0.2379	0.2219	
97.86	0.2526	0.2581	0.2655	0.2476	
96.86	0.2715	0.2765	0.2973	0.2788	

PUSH-OUT TEST SUMMARY SHEET

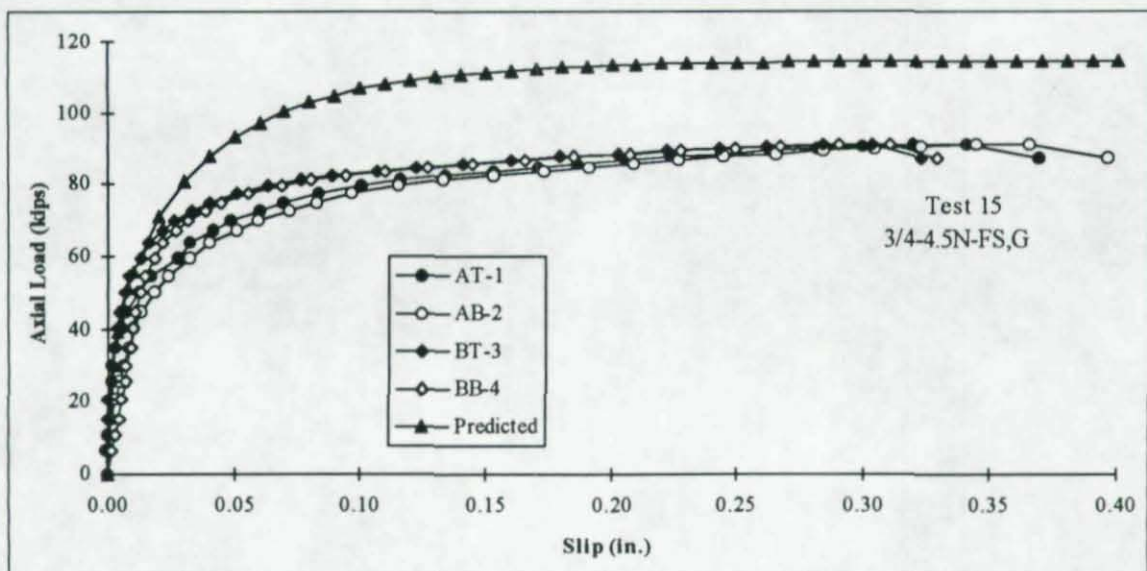
Test:	15	Deck Type:	Flat Sheet Metal (Greased)
Designation:	3/4-4.5N-FS,G		
Date of Test:	11/16/96	Flange Thickness:	0.52 in.
Concrete Strength:	4665 psi	Weld Location:	C
Concrete Weight:	144.39 pcf	Stud Size:	3/4 in. x 4 in.
Concrete Thickness:	5 3/4 in.	Stud Tensile Strength:	64.868 ksi
Maximum Applied Load:	90.95 kips		
Applied Load Per Stud:	22.74 kips		

Concrete Slip at Failure:

Pot. AT-1:	0.3694 in.	Pot. BT-3:	0.3223 in.
Pot. AB-2:	0.3965 in.	Pot. BB-4:	0.3290 in.
Avg. Side A:	0.3830 in.	Avg. Side B:	0.3257 in.

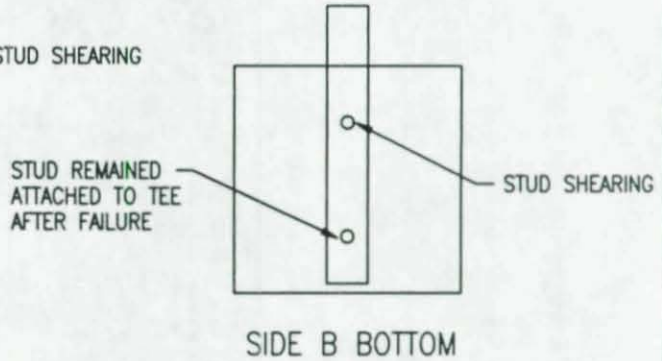
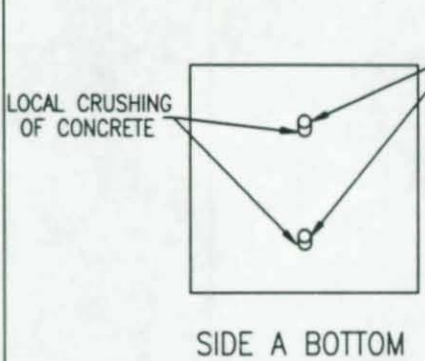
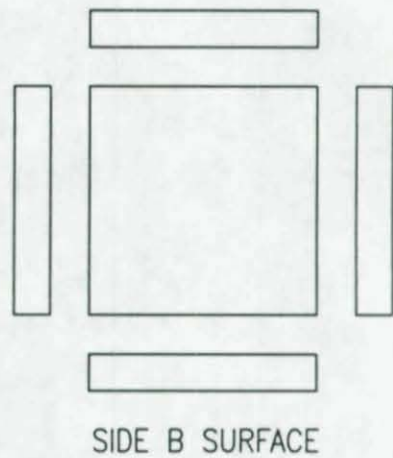
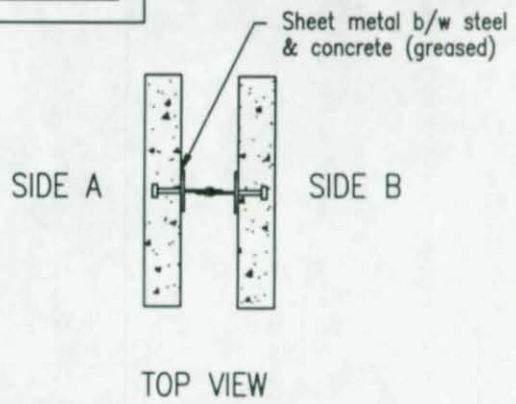
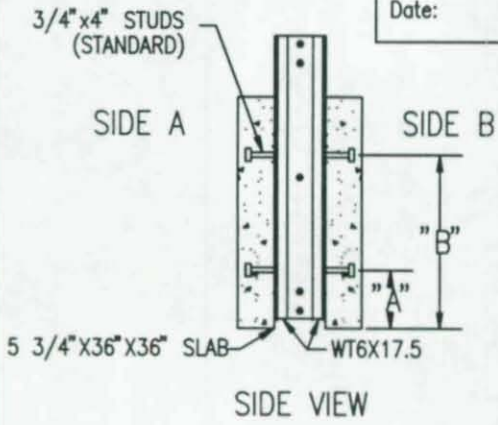
Avg.: 0.3544 in.

Comments: 10% Normal Load
Stud Shearing Failure of Both Studs on Side A and Top Stud on Side B



PUSH-OUT TEST LAYOUT & CRACKING SHEET

Test:	15
Designation:	3/4-4.5N-FS,G
Date:	11/16/96



Test 15 Data

Axial Load (kips)	Slips (in.)				Test Comments
	Pot. AT-1	Pot. AB-2	Pot. BT-3	Pot. BB-4	
0.00	0.0000	0.0000	0.0000	0.0000	BEGIN TEST
6.41	0.0000	-0.0006	0.0000	0.0012	
10.68	0.0000	0.0000	0.0000	0.0031	
15.45	0.0006	0.0012	0.0000	0.0043	
20.73	0.0006	0.0031	0.0000	0.0055	
25.38	0.0012	0.0049	0.0012	0.0067	
30.03	0.0018	0.0061	0.0018	0.0073	
35.05	0.0031	0.0086	0.0024	0.0092	
40.33	0.0055	0.0104	0.0037	0.0104	
44.85	0.0073	0.0128	0.0049	0.0110	
50.00	0.0122	0.0184	0.0067	0.0128	
54.40	0.0171	0.0239	0.0086	0.0147	
59.42	0.0281	0.0324	0.0128	0.0183	
63.57	0.0324	0.0404	0.0165	0.0220	
67.09	0.0416	0.0508	0.0214	0.0269	
69.85	0.0489	0.0594	0.0263	0.0318	
72.61	0.0605	0.0722	0.0330	0.0385	
74.62	0.0697	0.0826	0.0404	0.0453	
77.51	0.0838	0.0967	0.0514	0.0557	
79.90	0.1003	0.1150	0.0636	0.0685	
81.16	0.1162	0.1334	0.0764	0.0807	
82.41	0.1339	0.1530	0.0893	0.0942	
83.67	0.1529	0.1732	0.1064	0.1101	
84.80	0.1712	0.1909	0.1223	0.1266	
85.55	0.1865	0.2087	0.1407	0.1443	
86.68	0.2055	0.2264	0.1602	0.1657	
87.69	0.2232	0.2441	0.1792	0.1847	
88.44	0.2434	0.2656	0.2024	0.2073	

Test 15 Data

Axial Load (kips)	Slips (in.)				Test Comments
	Pot. AT-1	Pot. AB-2	Pot. BT-3	Pot. BB-4	
89.32	0.2630	0.2839	0.2220	0.2275	BANG. STUD SHEARING SIDES A&B
89.82	0.2819	0.3041	0.2428	0.2489	
90.45	0.2997	0.3225	0.2611	0.2672	
90.95	0.3199	0.3445	0.2838	0.2899	
90.95	0.3400	0.3653	0.3033	0.3101	
87.06	0.3694	0.3965	0.3223	0.3290	

PUSH-OUT TEST SUMMARY SHEET

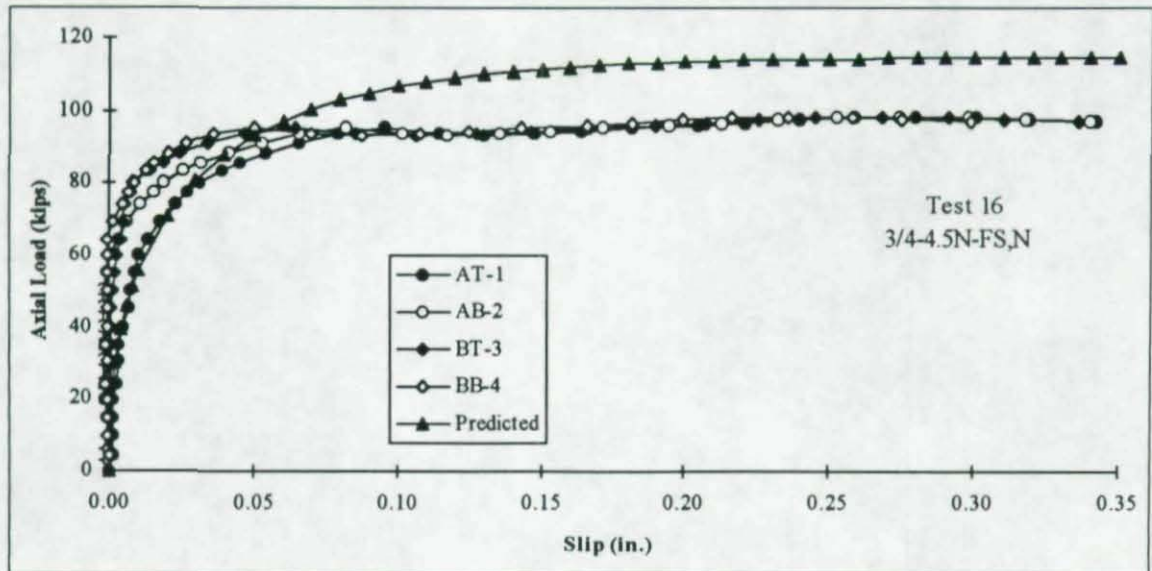
Test:	16	Deck Type:	Flat Sheet Metal (Non-Greased)
Designation:	3/4-4.5N-FS,N		
Date of Test:	11/17/96	Flange Thickness:	0.52 in.
Concrete Strength:	4665 psi	Weld Location:	C
Concrete Weight:	144.39 pcf	Stud Size:	3/4 in. x 4 in.
Concrete Thickness:	5 3/4 in.	Stud Tensile Strength:	64.868 ksi
Maximum Applied Load:	98.37 kips		
Applied Load Per Stud:	24.59 kips		

Concrete Slip at Failure:

Pot. AT-1: 0.3419 in.	Pot. BT-3: 0.3358 in.
Pot. AB-2: 0.3400 in.	Pot. BB-4: 0.2983 in.
Avg. Side A: 0.3410 in.	Avg. Side B: 0.3171 in.

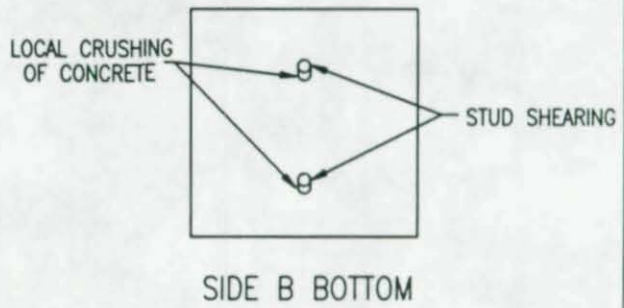
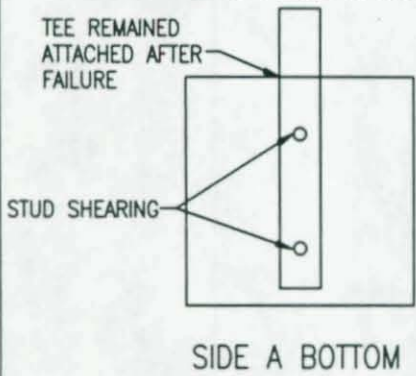
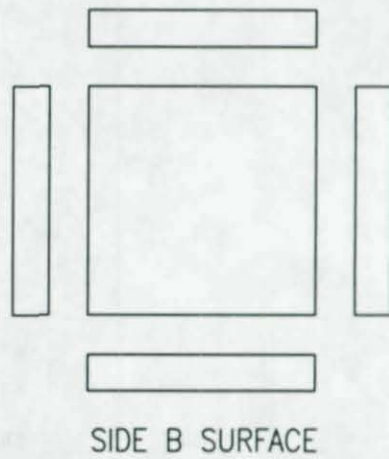
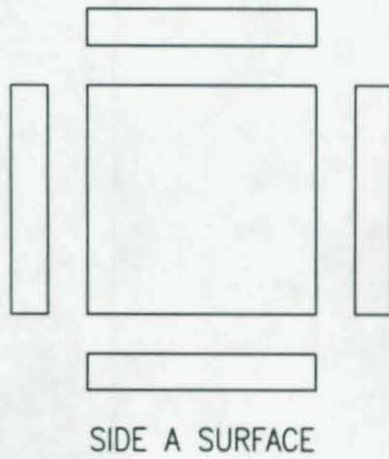
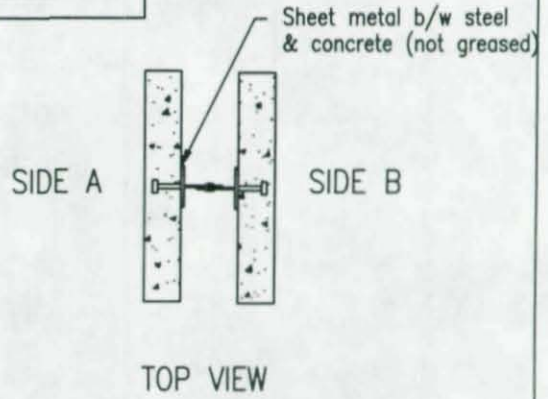
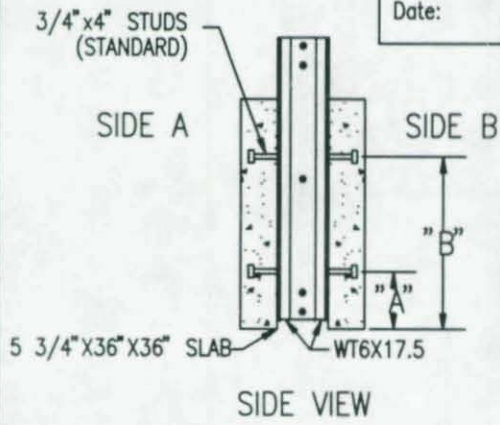
Avg.: 0.3291 in.

Comments: 10% Normal Load
Stud Shearing Failure of All Studs on Sides A and B



PUSH-OUT TEST LAYOUT & CRACKING SHEET

Test:	16
Designation:	3/4-4.5N-FS,N
Date:	11/17/96



Test 16 Data

Axial Load (kips)	Slips (in.)				Test Comments
	Pot. AT-1	Pot. AB-2	Pot. BT-3	Pot. BB-4	
0.00	0.0000	0.0000	0.0000	0.0000	BEGIN TEST
4.27	0.0012	-0.0037	0.0000	0.0000	
9.80	0.0012	0.0006	0.0000	-0.0006	
14.95	0.0012	-0.0006	0.0000	-0.0006	
19.72	0.0012	-0.0012	0.0006	-0.0006	
24.25	0.0024	-0.0018	0.0006	-0.0012	
30.28	0.0031	-0.0018	0.0006	-0.0006	
35.18	0.0037	-0.0018	0.0006	-0.0012	
40.08	0.0049	-0.0018	0.0006	-0.0006	
45.10	0.0067	-0.0018	0.0006	-0.0006	
50.00	0.0073	-0.0018	0.0012	-0.0006	
55.28	0.0086	-0.0006	0.0018	-0.0006	
60.05	0.0104	0.0000	0.0024	-0.0006	
64.45	0.0135	0.0031	0.0043	-0.0006	
69.22	0.0177	0.0061	0.0049	0.0012	
74.25	0.0232	0.0110	0.0055	0.0049	
77.39	0.0269	0.0153	0.0073	0.0067	
80.28	0.0312	0.0190	0.0080	0.0086	
83.29	0.0391	0.0257	0.0141	0.0128	
85.55	0.0453	0.0318	0.0190	0.0159	
88.44	0.0544	0.0410	0.0245	0.0202	
91.21	0.0654	0.0526	0.0336	0.0263	
93.72	0.0789	0.0654	0.0465	0.0361	
95.60	0.0954	0.0820	0.0642	0.0501	
93.97	0.1144	0.1015	0.0850	0.0697	
93.34	0.1297	0.1174	0.1064	0.0874	
93.72	0.1474	0.1352	0.1272	0.1076	
94.22	0.1639	0.1529	0.1462	0.1247	

Test 16 Data

Axial Load (kips)	Slips (in.)				Test Comments
	Pot. AT-1	Pot. AB-2	Pot. BT-3	Pot. BB-4	
95.23	0.1816	0.1712	0.1664	0.1430	BANG. STUD SHEARING SIDES A&B
95.85	0.2043	0.1945	0.1896	0.1656	
96.73	0.2208	0.2128	0.2074	0.1815	
97.49	0.2397	0.2324	0.2257	0.1993	
98.12	0.2587	0.2526	0.2453	0.2158	
98.37	0.2795	0.2740	0.2679	0.2353	
98.12	0.3009	0.2978	0.2912	0.2579	
97.61	0.3186	0.3174	0.3101	0.2751	
97.11	0.3419	0.3400	0.3358	0.2983	

PUSH-OUT TEST SUMMARY SHEET

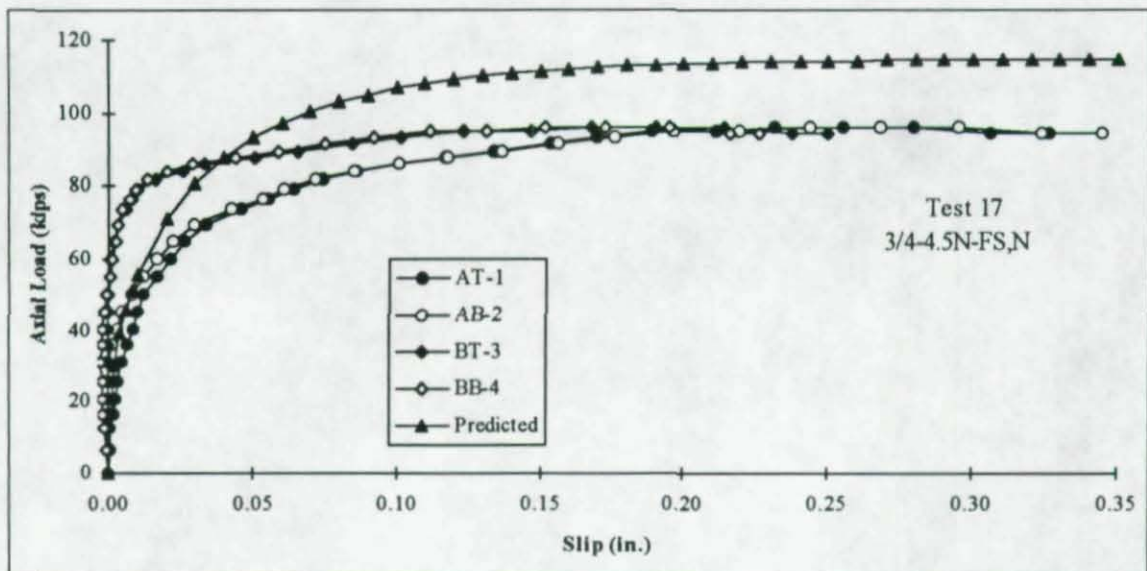
Test:	17	Deck Type:	Flat Sheet Metal (Non-Greased)
Designation:	3/4-4.5N-FS,N		
Date of Test:	11/18/96	Flange Thickness:	0.52 in.
Concrete Strength:	4665 psi	Weld Location:	C
Concrete Weight:	144.39 pcf	Stud Size:	3/4 in. x 4 in.
Concrete Thickness:	5 3/4 in.	Stud Tensile Strength:	64.868 ksi
Maximum Applied Load:	96.11 kips		
Applied Load Per Stud:	24.03 kips		

Concrete Slip at Failure:

Pot. AT-1: 0.3260 in.	Pot. BT-3: 0.2495 in.
Pot. AB-2: 0.3445 in.	Pot. BB-4: 0.2262 in.
Avg. Side A: 0.3353 in.	Avg. Side B: 0.2379 in.

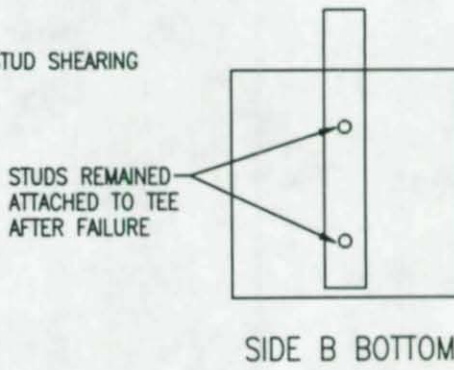
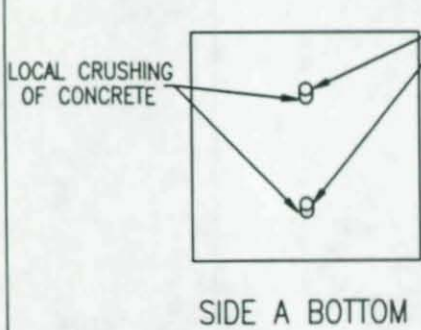
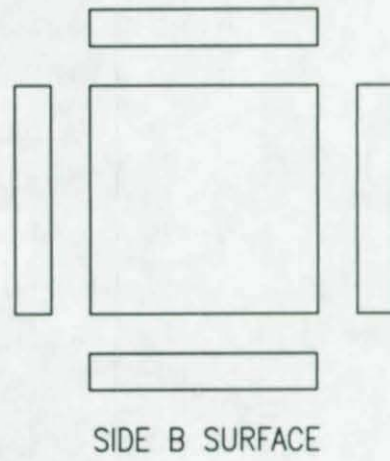
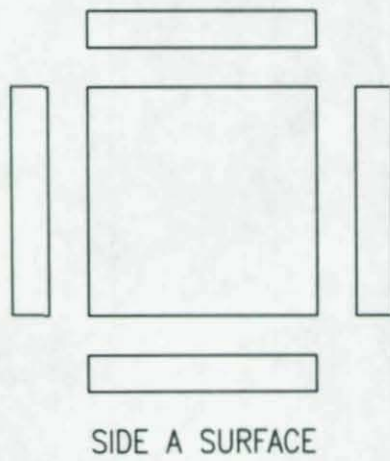
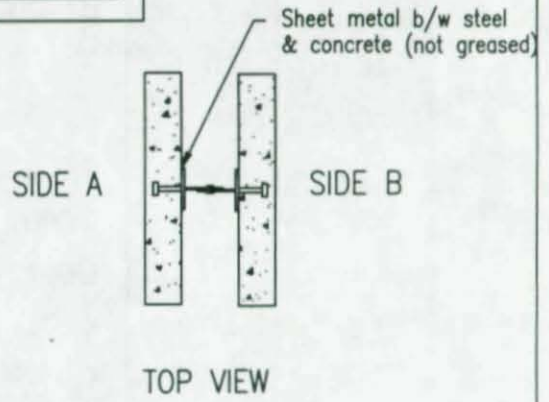
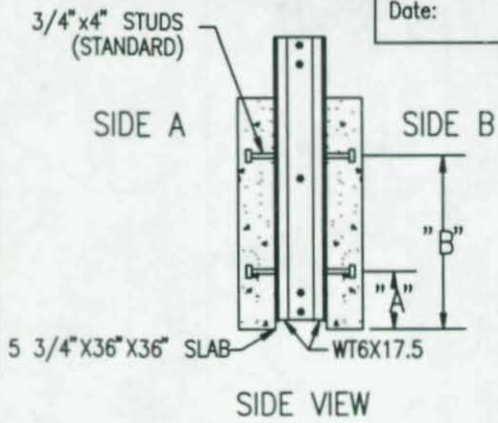
Avg.: 0.2866 in.

Comments: 10% Normal Load
Stud Shearing Failure of Both Studs on Side A



PUSH-OUT TEST LAYOUT & CRACKING SHEET

Test:	17
Designation:	3/4-4.5N-FS,N
Date:	11/18/96



Test 17 Data

Axial Load (kips)	Slips (in.)				Test Comments
	Pot. AT-1	Pot. AB-2	Pot. BT-3	Pot. BB-4	
0.00	0.0000	0.0000	0.0000	0.0000	BEGIN TEST
6.28	0.0006	0.0000	0.0000	-0.0006	
12.31	0.0006	0.0000	0.0000	-0.0012	
16.58	0.0018	0.0000	0.0000	-0.0018	
20.98	0.0024	0.0000	0.0000	-0.0018	
25.75	0.0037	0.0000	0.0000	-0.0018	
30.90	0.0049	0.0000	0.0000	-0.0024	
35.93	0.0067	0.0012	0.0000	-0.0018	
40.45	0.0086	0.0031	0.0000	-0.0018	
45.35	0.0104	0.0049	0.0000	-0.0012	
50.38	0.0122	0.0080	0.0000	-0.0006	
55.28	0.0171	0.0122	0.0006	0.0006	
59.92	0.0214	0.0171	0.0006	0.0012	
64.82	0.0263	0.0226	0.0018	0.0024	
69.47	0.0336	0.0300	0.0037	0.0037	
73.37	0.0459	0.0428	0.0061	0.0049	
76.26	0.0557	0.0532	0.0080	0.0073	
79.02	0.0642	0.0612	0.0104	0.0092	
81.66	0.0746	0.0716	0.0165	0.0135	
83.92	0.0862	0.0850	0.0257	0.0202	
86.43	0.1009	0.1010	0.0330	0.0293	
87.69	0.1168	0.1181	0.0508	0.0440	
89.57	0.1339	0.1364	0.0654	0.0587	
91.46	0.1535	0.1566	0.0844	0.0752	
93.47	0.1700	0.1762	0.1015	0.0923	
94.97	0.1890	0.1964	0.1235	0.1119	
95.10	0.2110	0.2197	0.1468	0.1315	
96.11	0.2318	0.2435	0.1676	0.1516	

Test 17 Data

Axial Load (kips)	Slips (in.)				Test Comments
	Pot. AT-1	Pot. AB-2	Pot. BT-3	Pot. BB-4	
96.11	0.2550	0.2680	0.1902	0.1724	BANG. STUD SHEARING SIDE A
95.98	0.2795	0.2949	0.2140	0.1951	
94.10	0.3058	0.3237	0.2379	0.2158	
94.47	0.3260	0.3445	0.2495	0.2262	

PUSH-OUT TEST SUMMARY SHEET

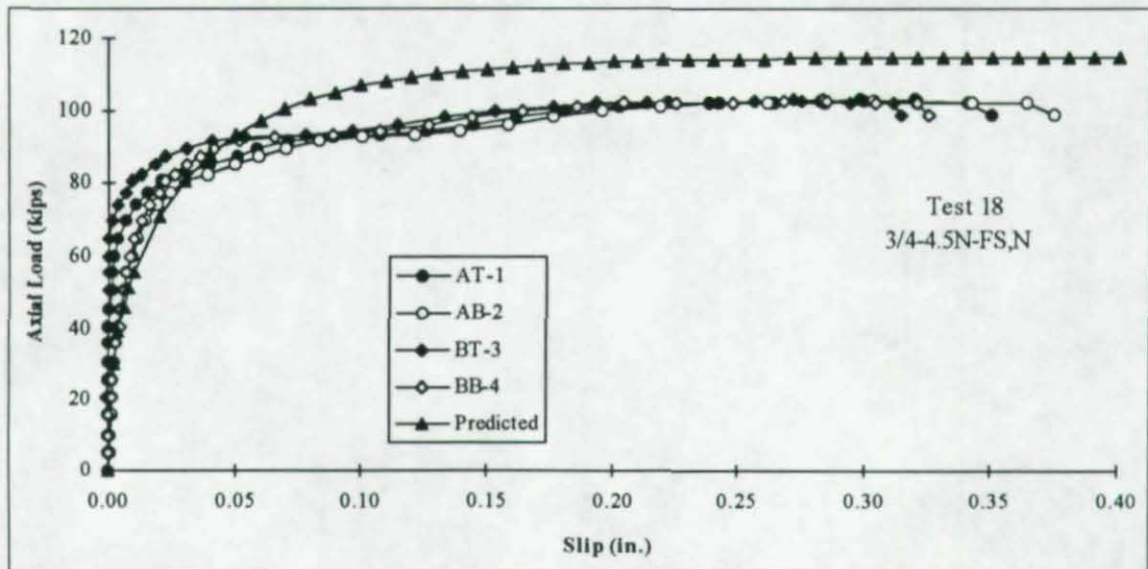
Test:	18	Deck Type:	Flat Sheet Metal (Non-Greased)
Designation:	3/4-4.5N-FS,N		
Date of Test:	11/18/96	Flange Thickness:	0.52 in.
Concrete Strength:	4665 psi	Weld Location:	C
Concrete Weight:	144.39 pcf	Stud Size:	3/4 in. x 4 in.
Concrete Thickness:	5 3/4 in.	Stud Tensile Strength:	64.868 ksi
Maximum Applied Load:	103.02 kips		
Applied Load Per Stud:	25.76 kips		

Concrete Slip at Failure:

Pot. AT-1: 0.3498 in.	Pot. BT-3: 0.3138 in.
Pot. AB-2: 0.3743 in.	Pot. BB-4: 0.3246 in.
Avg. Side A: 0.3621 in.	Avg. Side B: 0.3192 in.

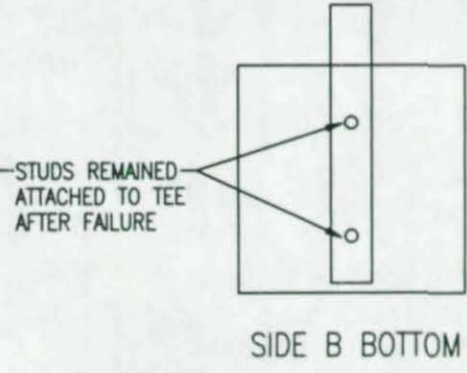
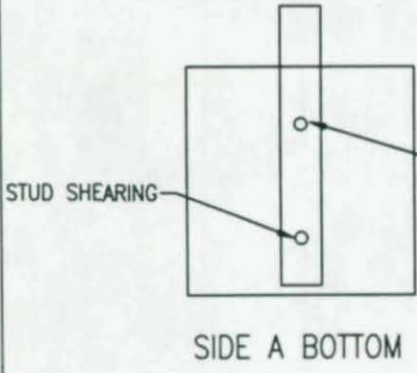
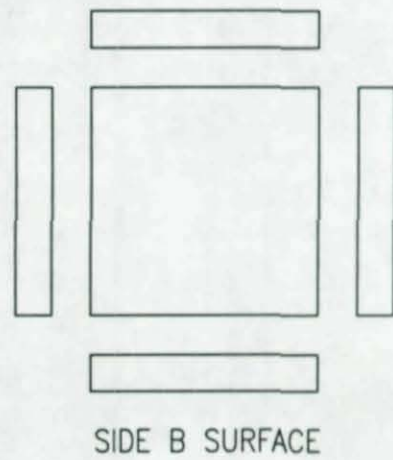
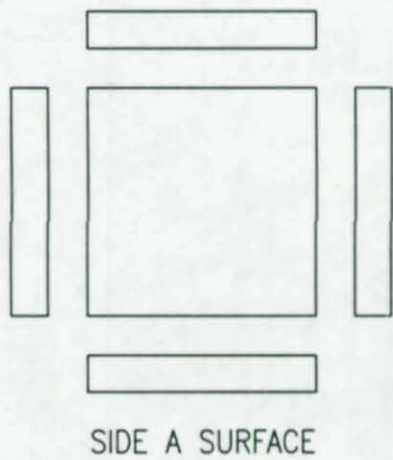
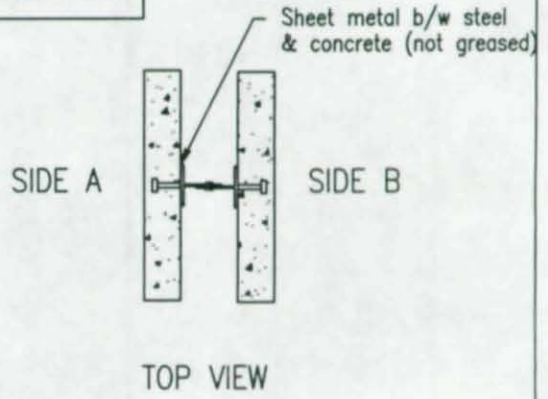
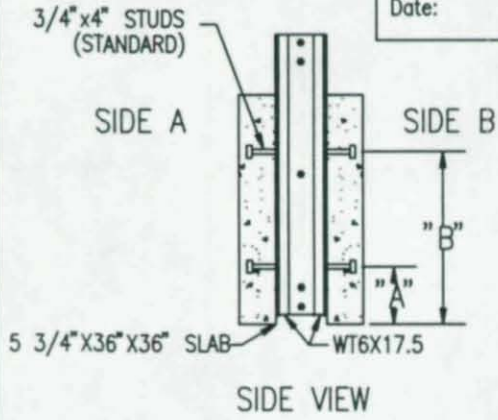
Avg.: 0.3407 in.

Comments: 10% Normal Load
Stud Shearing Failure of Bottom Stud on Side A



PUSH-OUT TEST LAYOUT & CRACKING SHEET

Test:	18
Designation:	3/4-4.5N-FS,N
Date:	11/18/96



Test 18 Data

Axial Load (kips)	Slips (in.)				Test Comments
	Pot. AT-1	Pot. AB-2	Pot. BT-3	Pot. BB-4	
0.00	0.0000	0.0000	0.0000	0.0000	BEGIN TEST
4.77	0.0000	0.0006	0.0000	0.0000	
10.05	0.0000	0.0006	0.0000	0.0000	
15.70	0.0000	0.0012	0.0000	0.0000	
20.73	0.0000	0.0018	-0.0006	0.0012	
25.75	0.0000	0.0018	0.0000	0.0018	
30.40	0.0000	0.0024	0.0000	0.0024	
35.80	0.0000	0.0031	0.0000	0.0031	
40.58	0.0000	0.0037	0.0000	0.0043	
45.48	0.0000	0.0043	0.0000	0.0049	
50.63	0.0012	0.0061	0.0000	0.0061	
55.40	0.0018	0.0073	0.0000	0.0073	
60.18	0.0024	0.0092	0.0000	0.0086	
64.82	0.0037	0.0116	0.0000	0.0104	
69.60	0.0073	0.0147	0.0012	0.0134	
73.99	0.0110	0.0196	0.0037	0.0165	
77.64	0.0153	0.0251	0.0067	0.0202	
80.53	0.0208	0.0300	0.0092	0.0226	
82.54	0.0294	0.0398	0.0128	0.0263	
85.05	0.0404	0.0502	0.0183	0.0312	
87.19	0.0508	0.0599	0.0226	0.0361	
89.32	0.0587	0.0703	0.0312	0.0416	
91.46	0.0716	0.0832	0.0410	0.0520	
92.84	0.0887	0.1003	0.0538	0.0660	
93.09	0.1076	0.1211	0.0783	0.0886	
94.47	0.1260	0.1395	0.0966	0.1076	
96.23	0.1443	0.1584	0.1144	0.1271	
98.12	0.1615	0.1762	0.1333	0.1443	

Test 18 Data

Axial Load (kips)	Slips (in.)				Test Comments
	Pot. AT-1	Pot. AB-2	Pot. BT-3	Pot. BB-4	
99.62	0.1810	0.1957	0.1535	0.1638	
100.75	0.2024	0.2190	0.1768	0.1858	
101.88	0.2220	0.2385	0.1933	0.2042	
102.01	0.2422	0.2612	0.2135	0.2249	
102.26	0.2636	0.2838	0.2379	0.2476	
102.39	0.2826	0.3034	0.2563	0.2677	
103.02	0.2978	0.3193	0.2716	0.2830	
102.51	0.2991	0.3205	0.2746	0.2848	
102.26	0.3205	0.3419	0.2942	0.3044	
101.76	0.3407	0.3639	0.3113	0.3203	
98.74	0.3498	0.3743	0.3138	0.3246	BANG. STUD SHEARING SIDE A

PUSH-OUT TEST SUMMARY SHEET

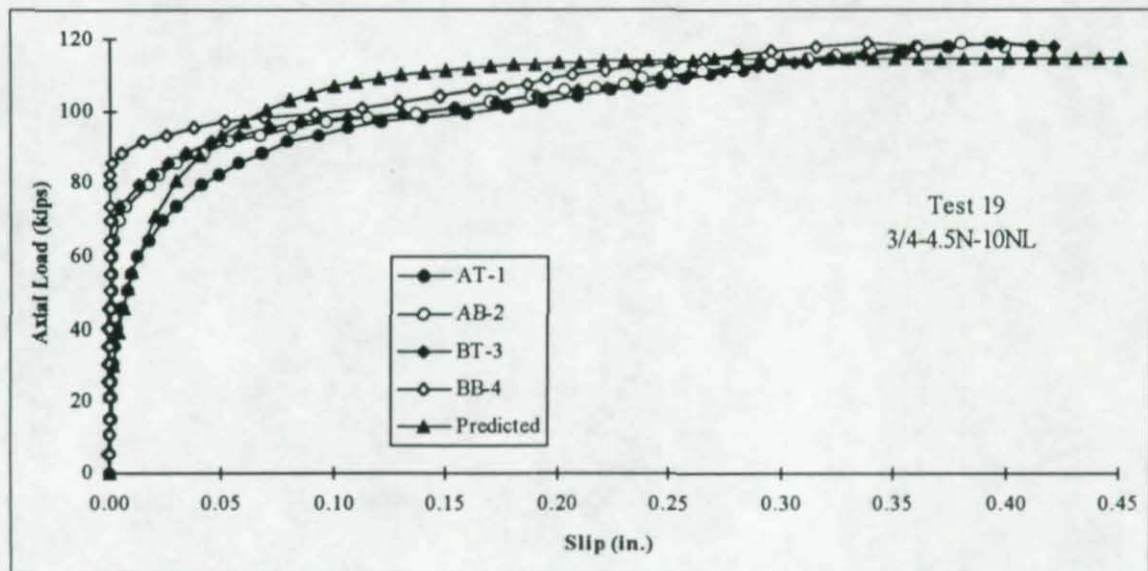
Test:	19	Deck Type:	None
Designation:	3/4-4.5N-10NL	Normal Load:	10%
Date of Test:	1/16/97	Flange Thickness:	0.52 in.
Concrete Strength:	4880 psi	Weld Location:	C
Concrete Weight:	144.39 pcf	Stud Size:	3/4 in. x 4 in.
Concrete Thickness:	5 3/4 in.	Stud Tensile Strength:	64.868 ksi
Maximum Applied Load:	118.84 kips		
Applied Load Per Stud:	29.71 kips		

Concrete Slip at Failure:

Pot. AT-1:	0.4110 in.	Pot. BT-3:	0.4208 in.
Pot. AB-2:	0.3988 in.	Pot. BB-4:	0.3601 in.
Avg. Side A:	0.4049 in.	Avg. Side B:	0.3905 in.

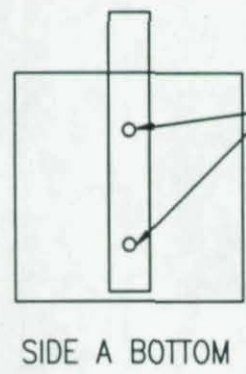
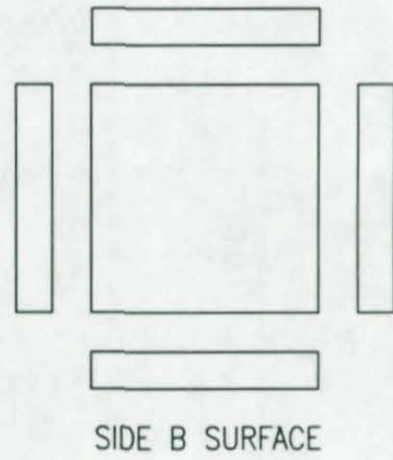
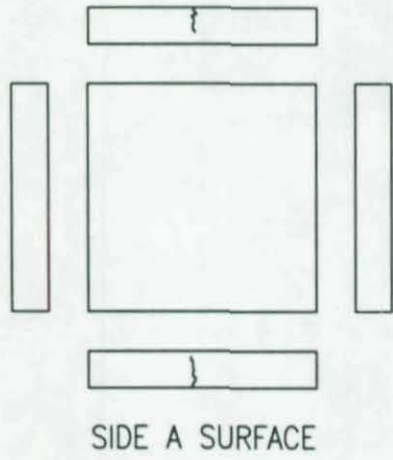
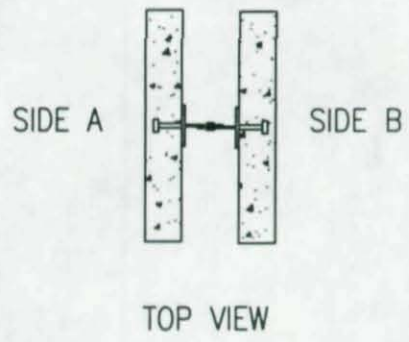
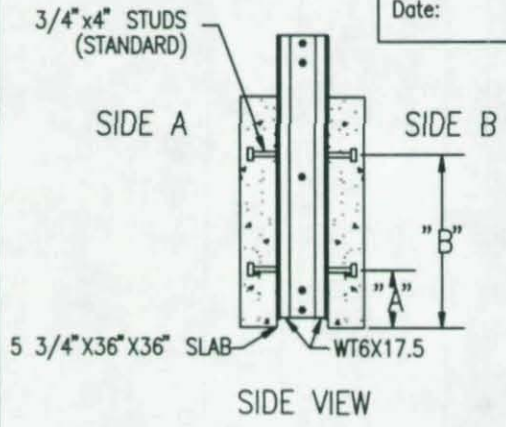
Avg.: 0.3977 in.

Comments: 10% Normal Load
Stud Shearing Failure of Both Studs on Side B



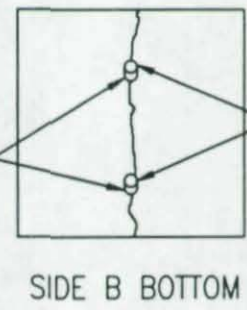
PUSH-OUT TEST LAYOUT & CRACKING SHEET

Test:	19
Designation:	3/4-4.5N-10NL
Date:	1/16/97



STUDS REMAINED ATTACHED TO TEE AFTER FAILURE

LOCAL CRUSHING OF CONCRETE



STUD SHEARING

Test 19 Data

Axial Load (kips)	Slips (in.)				Test Comments
	Pot. AT-1	Pot. AB-2	Pot. BT-3	Pot. BB-4	
0.00	0.0000	0.0000	0.0000	0.0000	BEGIN TEST
5.40	0.0000	0.0000	-0.0006	0.0000	
11.06	0.0000	0.0000	0.0000	0.0000	
15.45	0.0006	0.0000	0.0000	0.0000	
21.23	0.0012	0.0000	0.0000	0.0000	
25.38	0.0012	0.0000	-0.0006	0.0000	
30.65	0.0018	0.0000	-0.0006	0.0000	
35.68	0.0024	0.0000	-0.0006	0.0000	
40.45	0.0037	0.0006	-0.0006	0.0000	
45.60	0.0055	0.0006	-0.0006	0.0000	
50.75	0.0080	0.0006	0.0000	0.0000	
55.15	0.0092	0.0006	0.0000	0.0000	
59.92	0.0122	0.0012	0.0000	0.0000	
64.57	0.0171	0.0018	0.0000	0.0000	
69.85	0.0239	0.0043	0.0006	0.0000	
73.62	0.0300	0.0073	0.0043	0.0000	
79.90	0.0410	0.0171	0.0128	0.0000	
82.54	0.0489	0.0214	0.0190	0.0000	
85.43	0.0575	0.0300	0.0257	0.0012	
88.32	0.0679	0.0422	0.0342	0.0055	
91.46	0.0789	0.0532	0.0453	0.0147	
93.47	0.0930	0.0673	0.0575	0.0251	
95.60	0.1064	0.0814	0.0709	0.0373	
97.11	0.1211	0.0966	0.0856	0.0514	
98.37	0.1388	0.1150	0.1058	0.0691	
99.50	0.1596	0.1364	0.1303	0.0911	
100.88	0.1774	0.1541	0.1529	0.1119	
102.51	0.1933	0.1694	0.1725	0.1290	

Test 19 Data

Axial Load (kips)	Slips (in.)				Test Comments
	Pot. AT-1	Pot. AB-2	Pot. BT-3	Pot. BB-4	
104.15	0.2092	0.1884	0.1908	0.1467	
105.78	0.2238	0.2031	0.2086	0.1626	
106.53	0.2361	0.2172	0.2220	0.1749	
107.54	0.2465	0.2294	0.2349	0.1865	
108.92	0.2569	0.2373	0.2459	0.1951	
110.18	0.2685	0.2490	0.2587	0.2061	
111.06	0.2826	0.2643	0.2740	0.2207	
112.56	0.2954	0.2795	0.2887	0.2354	
113.69	0.3119	0.2954	0.3058	0.2519	
114.57	0.3254	0.3114	0.3217	0.2654	
115.45	0.3394	0.3242	0.3364	0.2800	
116.46	0.3541	0.3395	0.3523	0.2947	
117.84	0.3737	0.3597	0.3743	0.3149	
118.84	0.3926	0.3793	0.3969	0.3381	
118.09	0.4110	0.3988	0.4208	0.3601	BANG. STUD SHEARING SIDE B

PUSH-OUT TEST SUMMARY SHEET

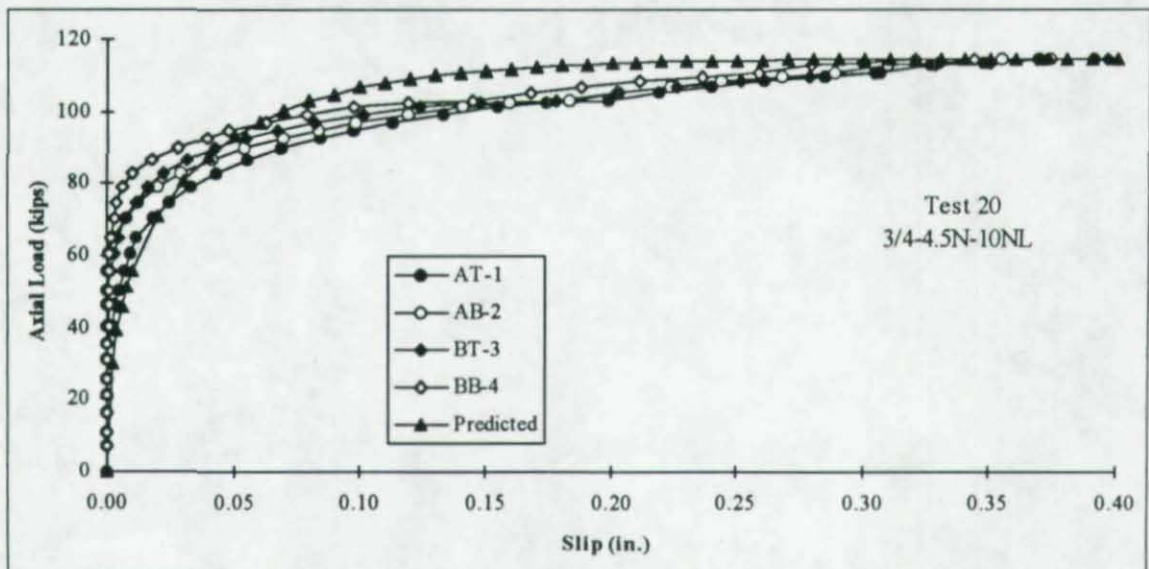
Test:	20	Deck Type:	None
Designation:	3/4-4.5N-10NL	Normal Load:	10%
Date of Test:	1/17/97	Flange Thickness:	0.52 in.
Concrete Strength:	4880 psi	Weld Location:	C
Concrete Weight:	144.39 pcf	Stud Size:	3/4 in. x 4 in.
Concrete Thickness:	5 3/4 in.	Stud Tensile Strength:	64.868 ksi
Maximum Applied Load:	114.57 kips		
Applied Load Per Stud:	28.64 kips		

Concrete Slip at Failure:

Pot. AT-1: 0.3908 in.	Pot. BT-3: 0.3963 in.
Pot. AB-2: 0.3738 in.	Pot. BB-4: 0.3436 in.
Avg. Side A: 0.3823 in.	Avg. Side B: 0.3700 in.

Avg.: 0.3761 in.

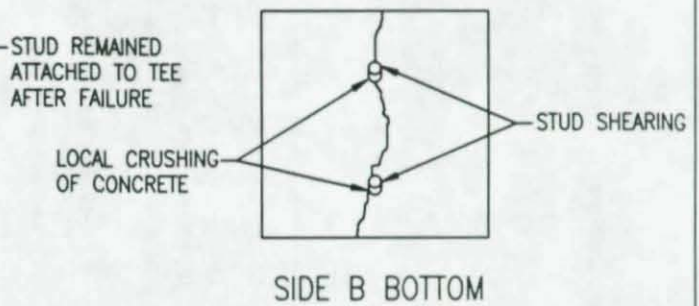
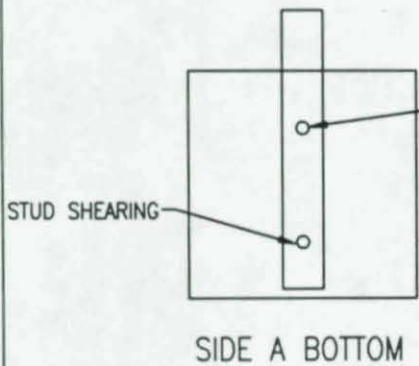
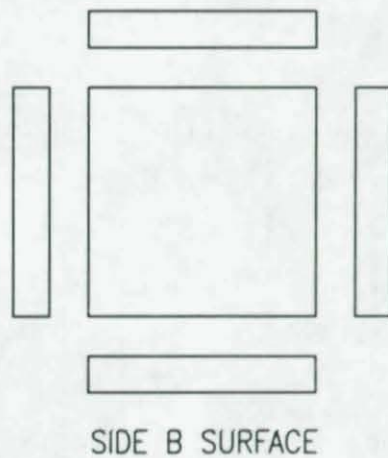
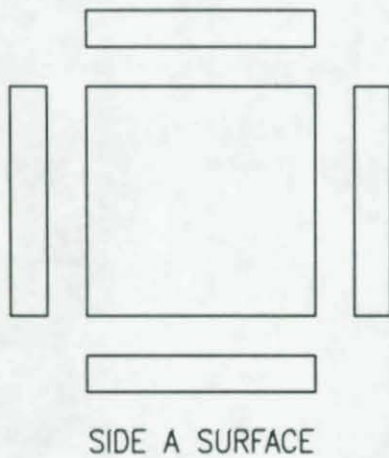
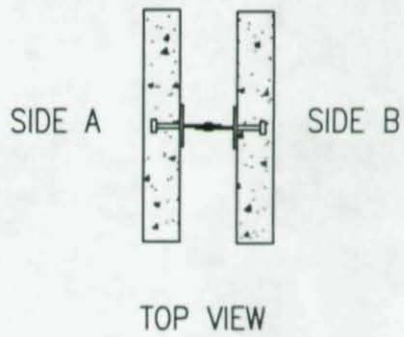
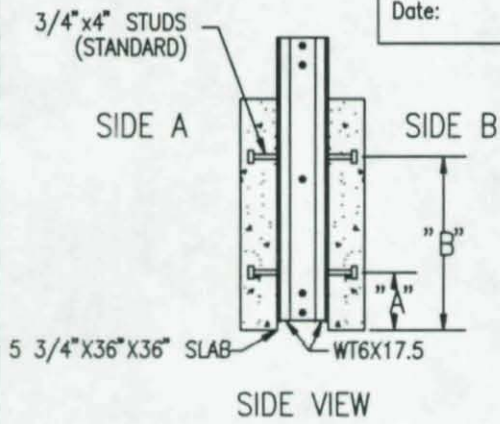
Comments: 10% Normal Load
Stud Shearing Failure of Bottom Stud on Side A and Both Studs on Side B



002003

PUSH-OUT TEST LAYOUT & CRACKING SHEET

Test:	20
Designation:	3/4-4.5N-10NL
Date:	1/17/97



Test 20 Data

Axial Load (kips)	Slips (in.)				Test Comments
	Pot. AT-1	Pot. AB-2	Pot. BT-3	Pot. BB-4	
0.00	0.0000	0.0000	0.0000	0.0000	BEGIN TEST
6.91	0.0000	0.0000	0.0000	0.0000	
11.06	0.0000	0.0000	0.0000	0.0000	
16.33	0.0000	0.0000	0.0000	0.0000	
21.11	0.0000	0.0000	0.0000	0.0000	
25.63	0.0000	0.0000	0.0000	0.0000	
31.28	0.0000	0.0000	0.0000	0.0000	
35.43	0.0000	0.0000	0.0000	0.0000	
40.58	0.0024	0.0000	0.0000	0.0006	
46.11	0.0031	0.0000	0.0000	0.0006	
50.13	0.0049	0.0000	0.0000	0.0006	
55.78	0.0067	0.0000	0.0018	0.0006	
60.68	0.0092	0.0006	0.0031	0.0006	
65.08	0.0116	0.0024	0.0049	0.0018	
70.35	0.0183	0.0080	0.0073	0.0031	
74.50	0.0245	0.0122	0.0116	0.0037	
79.15	0.0336	0.0202	0.0165	0.0061	
82.66	0.0434	0.0294	0.0226	0.0104	
86.56	0.0557	0.0416	0.0318	0.0177	
89.95	0.0691	0.0544	0.0428	0.0281	
92.84	0.0844	0.0697	0.0550	0.0391	
94.97	0.0979	0.0838	0.0673	0.0483	
96.98	0.1131	0.0979	0.0820	0.0624	
99.37	0.1327	0.1193	0.1015	0.0789	
101.38	0.1547	0.1407	0.1235	0.0978	
102.76	0.1743	0.1591	0.1474	0.1192	
102.89	0.1988	0.1835	0.1780	0.1449	
105.15	0.2190	0.2025	0.2018	0.1681	

Test 20 Data

Axial Load (kips)	Slips (in.)				Test Comments
	Pot. AT-1	Pot. AB-2	Pot. BT-3	Pot. BB-4	
106.91	0.2397	0.2233	0.2263	0.1883	BANG. STUD SHEARING SIDES A&B
108.67	0.2605	0.2435	0.2514	0.2109	
109.55	0.2850	0.2679	0.2789	0.2360	
110.93	0.3064	0.2887	0.3040	0.2580	
112.81	0.3266	0.3095	0.3278	0.2794	
113.44	0.3474	0.3297	0.3498	0.2996	
114.57	0.3694	0.3542	0.3725	0.3204	
114.57	0.3908	0.3738	0.3963	0.3436	

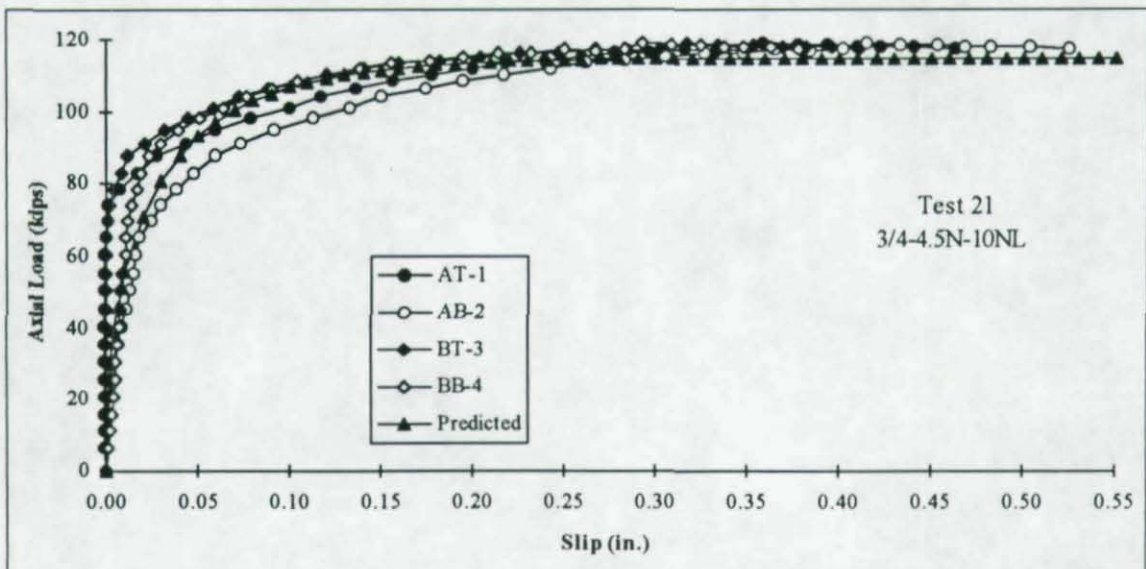
PUSH-OUT TEST SUMMARY SHEET

Test:	21	Deck Type:	None
Designation:	3/4-4.5N-10NL	Normal Load:	10%
Date of Test:	1/24/97	Flange Thickness:	0.52 in.
Concrete Strength:	4880 psi	Weld Location:	C
Concrete Weight:	144.39 pcf	Stud Size:	3/4 in. x 4 in.
Concrete Thickness:	5 3/4 in.	Stud Tensile Strength:	64.868 ksi
Maximum Applied Load:	118.84 kips		
Applied Load Per Stud:	29.71 kips		

Concrete Slip at Failure:

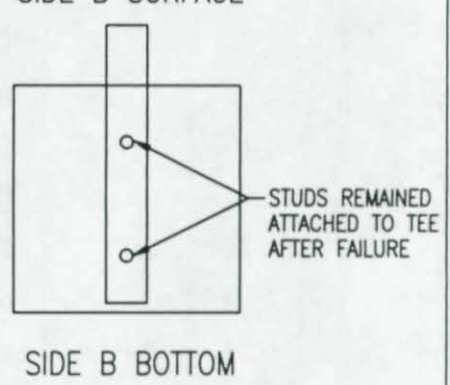
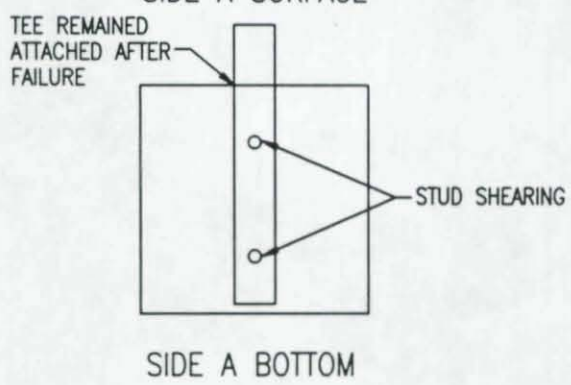
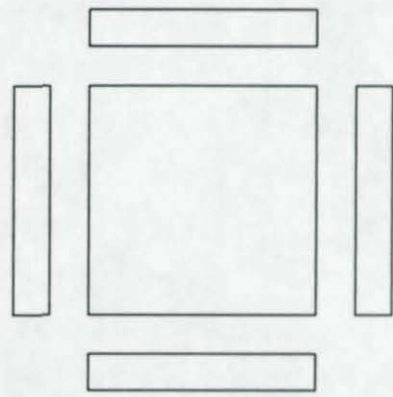
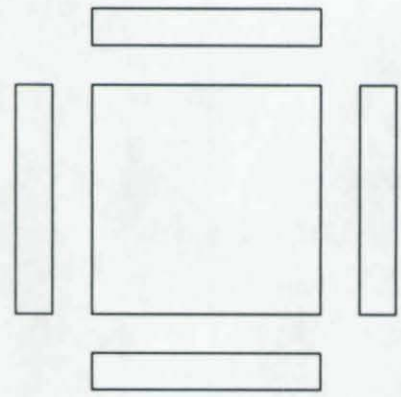
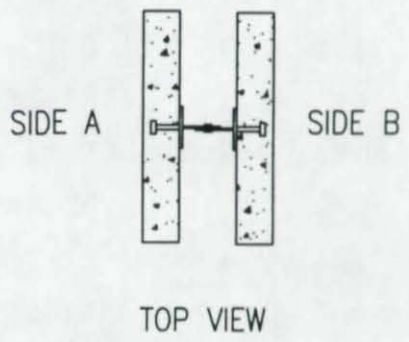
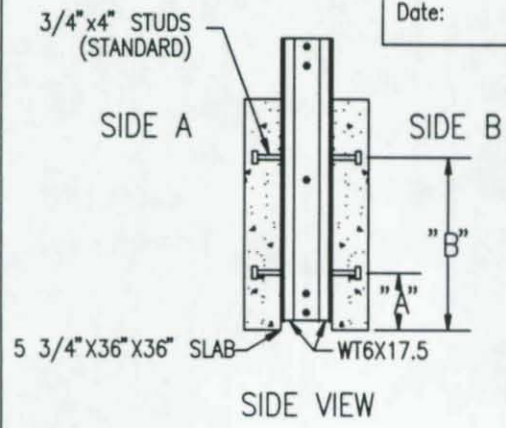
Pot. AT-1: 0.4624 in.	Pot. BT-3: 0.4110 in.
Pot. AB-2: 0.5249 in.	Pot. BB-4: 0.3773 in.
Avg. Side A: 0.4937 in.	Avg. Side B: 0.3942 in.
Avg.: 0.4439 in.	

Comments: 10% Normal Load
Stud Shearing Failure of Both Studs on Side A



PUSH-OUT TEST LAYOUT & CRACKING SHEET

Test:	21
Designation:	3/4-4.5N-10NL
Date:	1/24/97



Test 21 Data

Axial Load (kips)	Slips (in.)				Test Comments
	Pot. AT-1	Pot. AB-2	Pot. BT-3	Pot. BB-4	
0.00	0.0000	0.0000	0.0000	0.0000	BEGIN TEST
6.53	-0.0006	0.0000	0.0000	0.0012	
11.56	-0.0006	0.0000	0.0000	0.0024	
15.95	-0.0006	0.0000	0.0000	0.0031	
20.98	-0.0006	0.0024	0.0000	0.0043	
25.75	-0.0006	0.0043	0.0000	0.0049	
30.40	-0.0006	0.0043	0.0000	0.0055	
35.68	-0.0006	0.0067	0.0000	0.0067	
40.45	-0.0006	0.0086	0.0000	0.0073	
45.48	-0.0006	0.0104	0.0000	0.0079	
50.50	-0.0006	0.0122	0.0000	0.0079	
55.28	-0.0006	0.0147	0.0000	0.0086	
60.30	-0.0006	0.0159	0.0000	0.0104	
65.20	0.0000	0.0184	0.0000	0.0110	
69.60	0.0006	0.0245	0.0006	0.0122	
74.25	0.0012	0.0294	0.0018	0.0135	
78.77	0.0080	0.0379	0.0043	0.0165	
83.17	0.0171	0.0477	0.0086	0.0190	
87.81	0.0281	0.0600	0.0122	0.0232	
91.33	0.0434	0.0734	0.0214	0.0294	
94.72	0.0599	0.0912	0.0318	0.0397	
98.12	0.0783	0.1126	0.0446	0.0508	
101.13	0.0997	0.1328	0.0581	0.0642	
104.02	0.1168	0.1505	0.0722	0.0764	
106.16	0.1358	0.1744	0.0881	0.0905	
108.29	0.1566	0.1952	0.1040	0.1046	
110.05	0.1774	0.2166	0.1205	0.1205	
111.56	0.2000	0.2423	0.1407	0.1388	

Test 21 Data

Axial Load (kips)	Slips (in.)				Test Comments
	Pot. AT-1	Pot. AB-2	Pot. BT-3	Pot. BB-4	
113.57	0.2183	0.2618	0.1596	0.1553	
114.07	0.2391	0.2833	0.1823	0.1761	
115.08	0.2593	0.3053	0.2043	0.1951	
115.95	0.2777	0.3267	0.2251	0.2140	
116.33	0.2966	0.3475	0.2465	0.2324	
117.09	0.3156	0.3652	0.2673	0.2501	
116.96	0.3327	0.3836	0.2850	0.2672	
117.34	0.3480	0.4026	0.3021	0.2825	
118.84	0.3590	0.4148	0.3168	0.2929	
118.59	0.3774	0.4332	0.3345	0.3082	
118.22	0.3939	0.4527	0.3535	0.3241	
118.09	0.4098	0.4680	0.3694	0.3375	
117.96	0.4226	0.4821	0.3816	0.3479	
117.71	0.4403	0.5029	0.3957	0.3626	
117.46	0.4624	0.5249	0.4110	0.3773	BANG. STUD SHEARING SIDE A

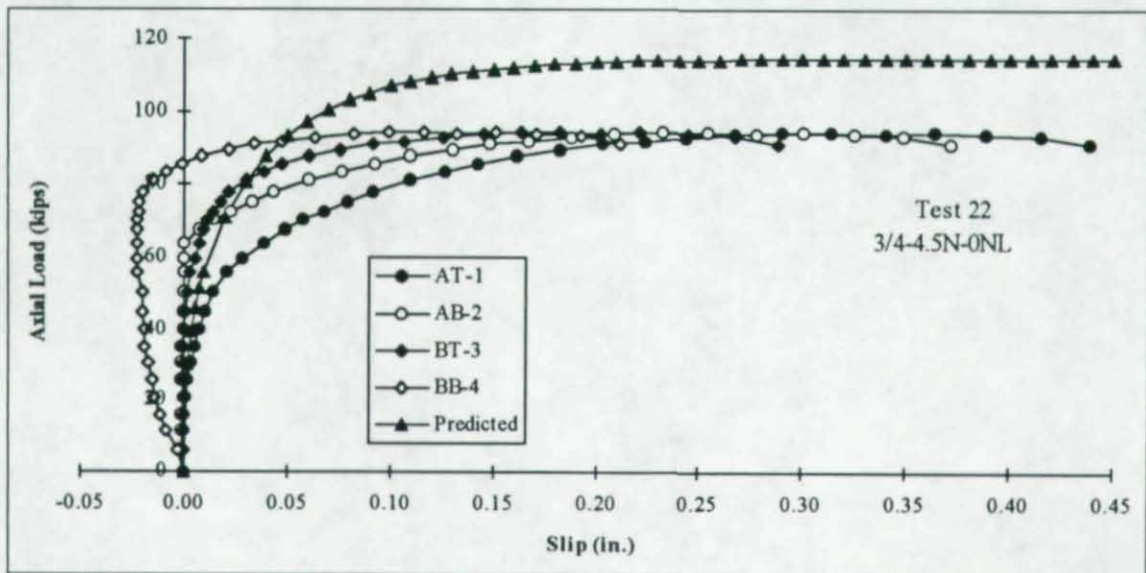
PUSH-OUT TEST SUMMARY SHEET

Test:	22	Deck Type:	None
Designation:	3/4-4.5N-0NL	Normal Load:	0%
Date of Test:	1/19/97	Flange Thickness:	0.52 in.
Concrete Strength:	4880 psi	Weld Location:	C
Concrete Weight:	144.39 pcf	Stud Size:	3/4 in. x 4 in.
Concrete Thickness:	5 3/4 in.	Stud Tensile Strength:	64.868 ksi
Maximum Applied Load:	94.35 kips		
Applied Load Per Stud:	23.59 kips		

Concrete Slip at Failure:

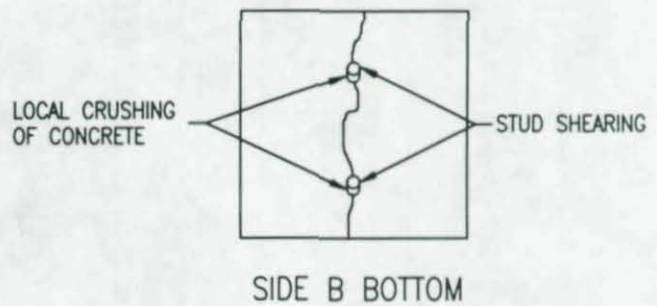
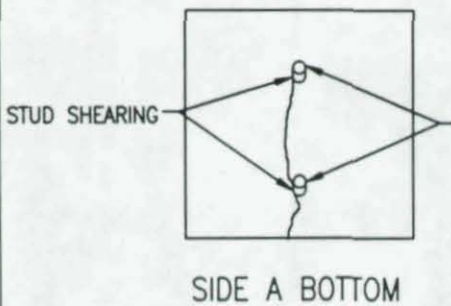
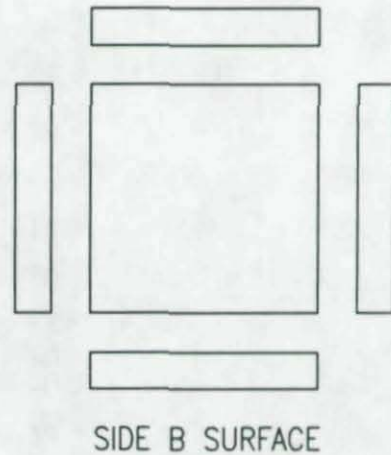
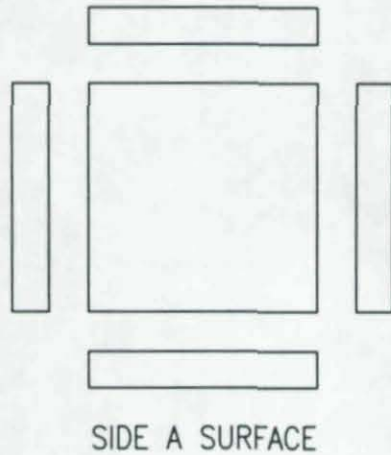
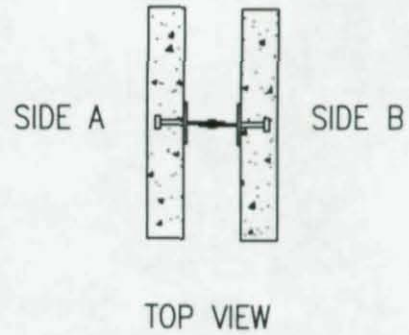
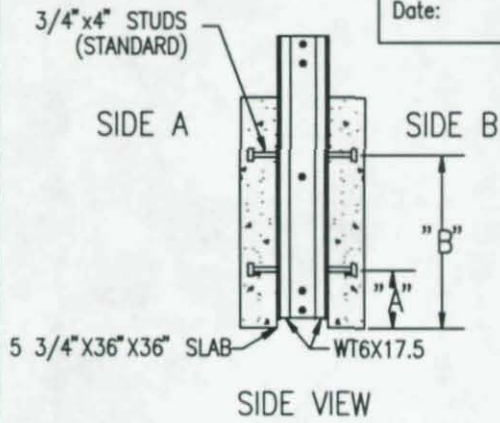
Pot. AT-1: 0.4385 in.	Pot. BT-3: 0.2887 in.
Pot. AB-2: 0.3714 in.	Pot. BB-4: 0.2116 in.
Avg. Side A: 0.4050 in.	Avg. Side B: 0.2502 in.
Avg.: 0.3276 in.	

Comments: No Normal Load
Stud Shearing Failure of All Studs on Sides A and B



PUSH-OUT TEST LAYOUT & CRACKING SHEET

Test:	22
Designation:	3/4-4.5N-ONL
Date:	1/19/97



Test 22 Data

Axial Load (kips)	Slips (in.)				Test Comments
	Pot. AT-1	Pot. AB-2	Pot. BT-3	Pot. BB-4	
0.00	0.0000	0.0000	0.0000	0.0000	BEGIN TEST
6.03	-0.0006	-0.0006	0.0000	-0.0031	
11.68	0.0000	-0.0006	0.0000	-0.0080	
15.83	0.0000	-0.0006	0.0000	-0.0110	
20.60	0.0012	0.0000	0.0000	-0.0141	
25.38	0.0018	-0.0006	0.0000	-0.0153	
30.40	0.0037	-0.0006	0.0000	-0.0171	
35.18	0.0055	-0.0006	0.0000	-0.0183	
39.82	0.0073	0.0000	0.0000	-0.0190	
44.60	0.0104	0.0000	0.0006	-0.0202	
50.25	0.0147	0.0000	0.0018	-0.0202	
55.53	0.0208	0.0000	0.0031	-0.0226	
59.30	0.0281	0.0000	0.0055	-0.0226	
63.82	0.0385	0.0000	0.0073	-0.0226	
67.71	0.0495	0.0073	0.0098	-0.0226	
70.10	0.0575	0.0141	0.0110	-0.0226	
72.74	0.0679	0.0226	0.0141	-0.0220	
75.38	0.0795	0.0330	0.0177	-0.0220	
78.27	0.0917	0.0434	0.0220	-0.0196	
81.03	0.1095	0.0606	0.0300	-0.0147	
83.29	0.1266	0.0765	0.0385	-0.0080	
85.68	0.1431	0.0924	0.0477	-0.0012	
87.56	0.1621	0.1095	0.0605	0.0086	
89.32	0.1823	0.1303	0.0758	0.0214	
90.83	0.2037	0.1481	0.0917	0.0342	
91.58	0.2238	0.1676	0.1070	0.0477	
92.71	0.2440	0.1878	0.1254	0.0636	
93.72	0.2673	0.2086	0.1455	0.0819	

Test 22 Data

Axial Load (kips)	Slips (in.)				Test Comments
	Pot. AT-1	Pot. AB-2	Pot. BT-3	Pot. BB-4	
94.35	0.2905	0.2325	0.1639	0.0991	BANG. STUD SHEARING SIDES A & B
94.10	0.3144	0.2545	0.1829	0.1162	
93.72	0.3400	0.2784	0.2024	0.1321	
94.22	0.3639	0.3010	0.2214	0.1511	
93.84	0.3890	0.3249	0.2452	0.1712	
93.34	0.4147	0.3488	0.2672	0.1932	
90.95	0.4385	0.3714	0.2886	0.2116	

PUSH-OUT TEST SUMMARY SHEET

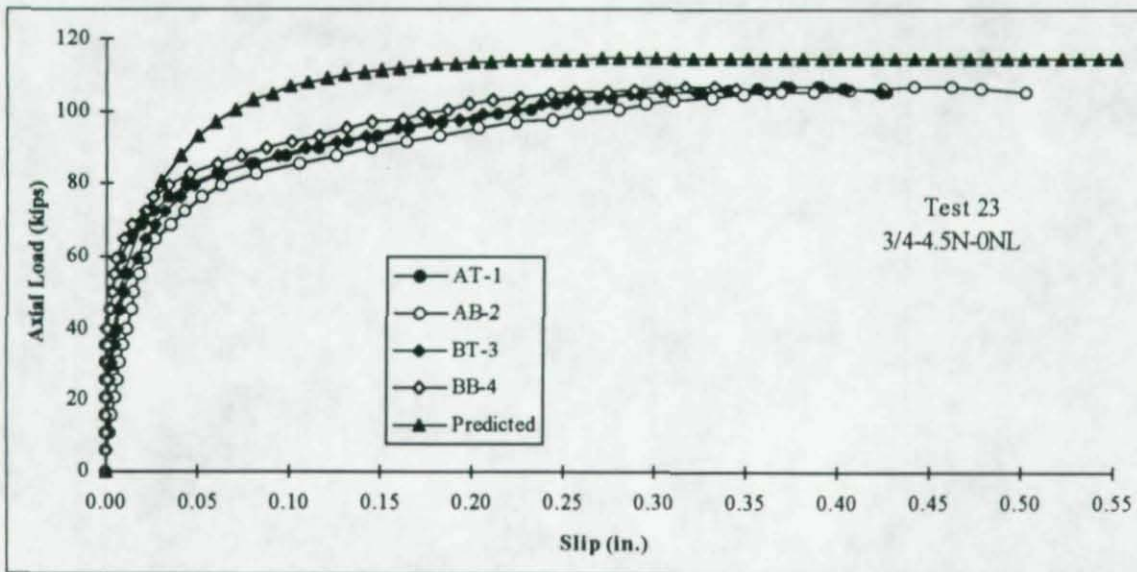
Test:	23	Deck Type:	None
Designation:	3/4-4.5N-0NL	Normal Load:	0%
Date of Test:	1/20/97	Flange Thickness:	0.52 in.
Concrete Strength:	4880 psi	Weld Location:	C
Concrete Weight:	144.39 pcf	Stud Size:	3/4 in. x 4 in.
Concrete Thickness:	5 3/4 in.	Stud Tensile Strength:	64.868 ksi
Maximum Applied Load:	106.66 kips		
Applied Load Per Stud:	26.67 kips		

Concrete Slip at Failure:

Pot. AT-1: 0.4251 in.	Pot. BT-3: 0.4220 in.
Pot. AB-2: 0.5011 in.	Pot. BB-4: 0.3608 in.
Avg. Side A: 0.4631 in.	Avg. Side B: 0.3914 in.

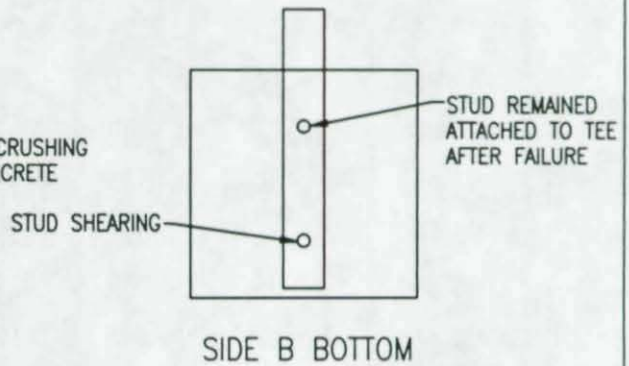
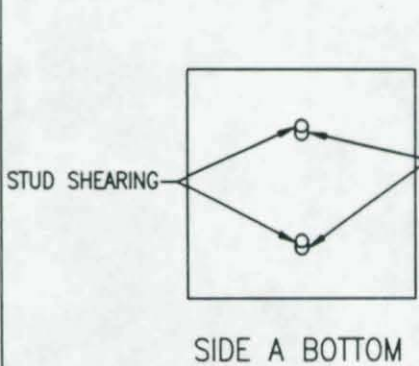
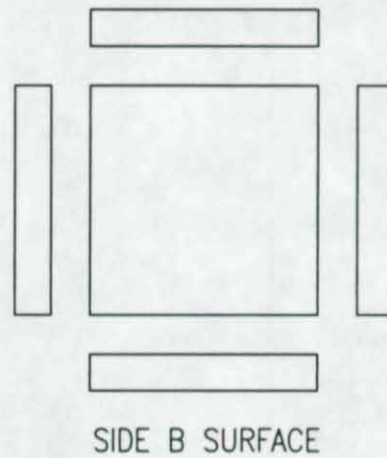
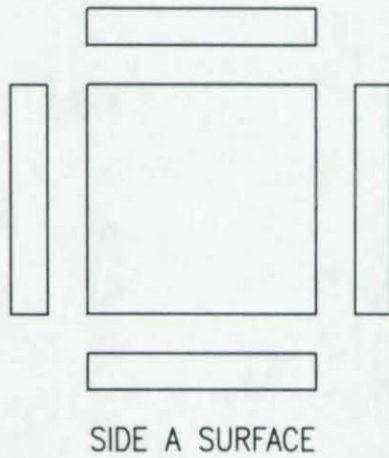
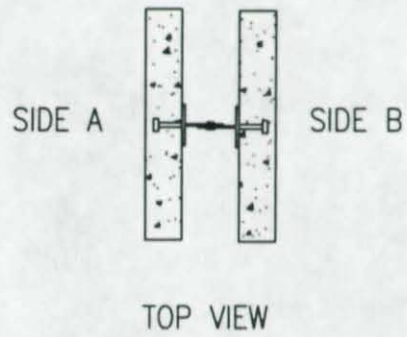
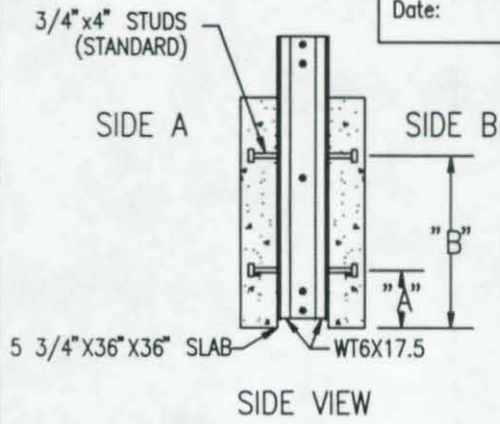
Avg.: 0.4273 in.

Comments: No Normal Load
Stud Shearing Failure of Both Studs on Side A and Bottom Stud on Side B



PUSH-OUT TEST LAYOUT & CRACKING SHEET

Test:	23
Designation:	3/4-4.5N-0NL
Date:	1/20/97



Test 23 Data

Axial Load (kips)	Pot. AT-1 (in.)	Pot. AB-2 (in.)	Pot. BT-3 (in.)	Pot. BB-4 (in.)	Test 23 Comments
0.00	0.0000	0.0000	0.0000	0.0000	BEGIN TEST
5.90	0.0000	0.0000	0.0000	0.0000	
11.06	0.0000	0.0018	0.0000	0.0000	
15.70	0.0000	0.0037	0.0000	0.0000	
20.48	0.0000	0.0049	0.0006	0.0000	
25.63	0.0000	0.0067	0.0018	0.0006	
30.53	0.0000	0.0080	0.0031	0.0006	
35.30	0.0000	0.0098	0.0049	0.0006	
40.08	0.0006	0.0116	0.0061	0.0012	
45.35	0.0018	0.0135	0.0073	0.0018	
50.13	0.0031	0.0153	0.0098	0.0031	
54.90	0.0049	0.0184	0.0122	0.0043	
59.67	0.0080	0.0208	0.0165	0.0049	
64.70	0.0128	0.0263	0.0208	0.0092	
68.97	0.0196	0.0355	0.0269	0.0141	
72.49	0.0257	0.0422	0.0324	0.0208	
76.13	0.0342	0.0526	0.0404	0.0257	
79.77	0.0440	0.0630	0.0483	0.0336	
82.66	0.0612	0.0820	0.0624	0.0453	
85.55	0.0807	0.1052	0.0783	0.0605	
87.94	0.0979	0.1254	0.0936	0.0734	
89.95	0.1156	0.1450	0.1089	0.0875	
91.58	0.1321	0.1640	0.1254	0.1015	
93.47	0.1480	0.1823	0.1413	0.1156	
95.23	0.1651	0.2031	0.1590	0.1309	
96.86	0.1835	0.2239	0.1761	0.1443	
97.86	0.2012	0.2441	0.1926	0.1615	
99.25	0.2141	0.2576	0.2055	0.1725	

002090

Test 23 Data

Axial Load (kips)	Pot. AT-1 (in.)	Pot. AB-2 (in.)	Pot. BT-3 (in.)	Pot. BB-4 (in.)	Test 23 Comments
100.50	0.2318	0.2796	0.2232	0.1859	
101.76	0.2459	0.2949	0.2373	0.1982	
103.02	0.2587	0.3096	0.2507	0.2104	
103.89	0.2758	0.3304	0.2685	0.2251	
104.77	0.2911	0.3475	0.2862	0.2422	
105.28	0.3064	0.3677	0.3033	0.2556	
105.53	0.3241	0.3867	0.3223	0.2734	
106.03	0.3394	0.4057	0.3406	0.2887	
106.53	0.3553	0.4234	0.3565	0.3021	
106.66	0.3700	0.4399	0.3730	0.3162	
106.66	0.3884	0.4601	0.3902	0.3321	
106.53	0.4018	0.4766	0.4030	0.3437	
105.15	0.4251	0.5011	0.4220	0.3608	BANG. STUD SHEARING SIDES A&B

PUSH-OUT TEST SUMMARY SHEET

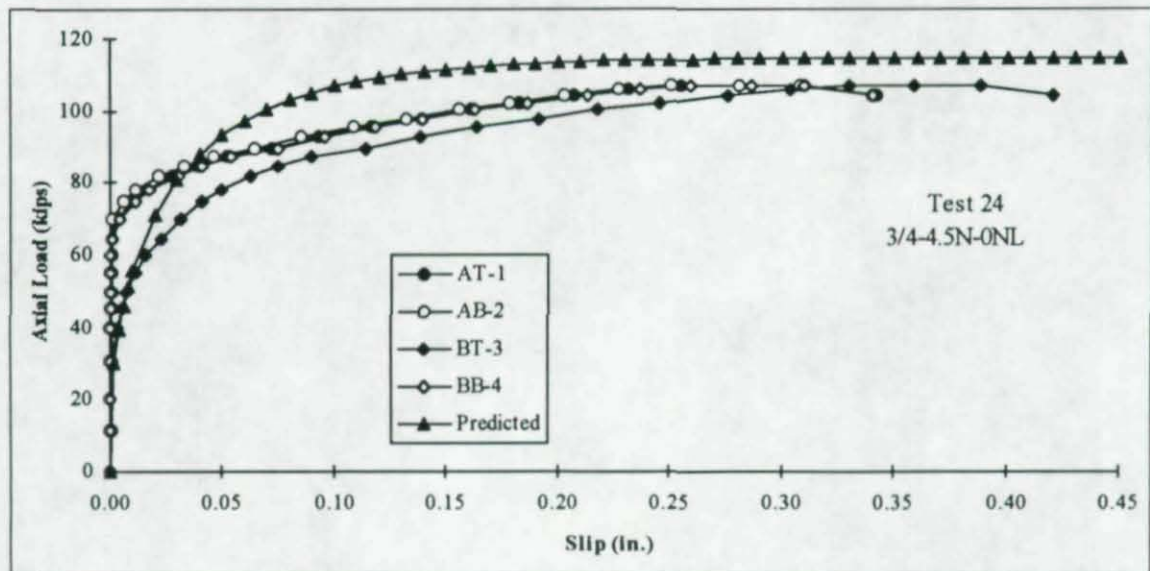
Test:	24	Deck Type:	None
Designation:	3/4-4.5N-0NL	Normal Load:	0%
Date of Test:	1/21/97	Flange Thickness:	0.52 in.
Concrete Strength:	4880 psi	Weld Location:	C
Concrete Weight:	144.39 pcf	Stud Size:	3/4 in. x 4 in.
Concrete Thickness:	5 3/4 in.	Stud Tensile Strength:	64.868 ksi
Maximum Applied Load:	107.16 kips		
Applied Load Per Stud:	26.79 kips		

Concrete Slip at Failure:

Pot. AT-1:	0.3425 in.	Pot. BT-3:	0.4202 in.
Pot. AB-2:	0.3401 in.	Pot. BB-4:	0.3400 in.
Avg. Side A:	0.3413 in.	Avg. Side B:	0.3801 in.

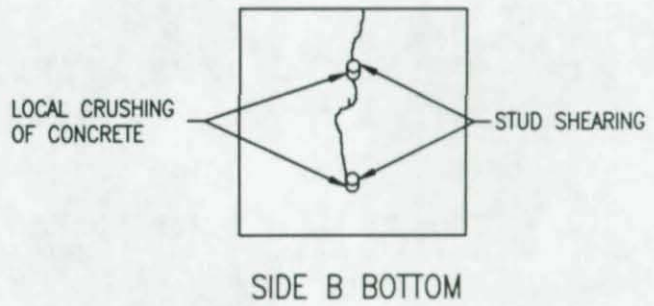
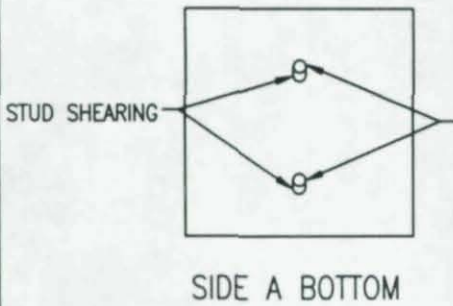
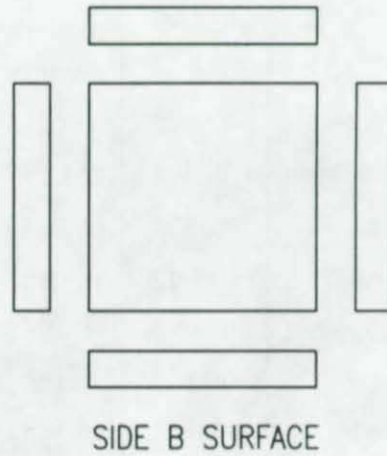
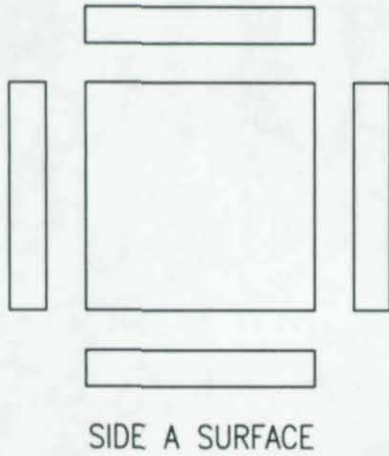
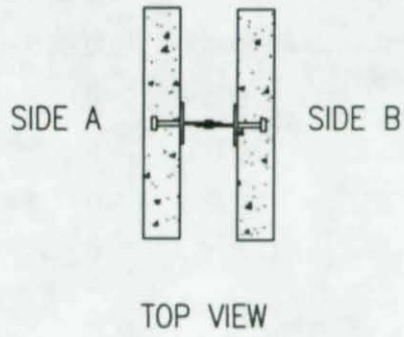
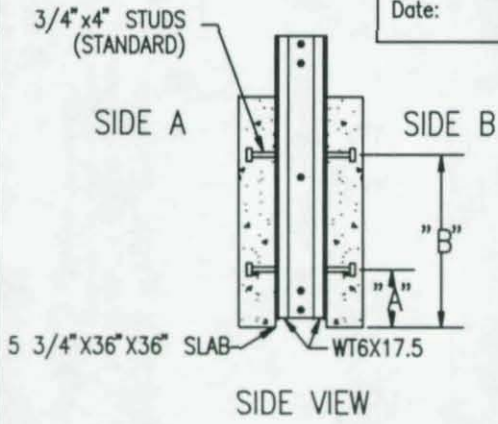
Avg.: 0.3607 in.

Comments: No Normal Load
Stud Shearing Failure of All Studs on Sides A and B



PUSH-OUT TEST LAYOUT & CRACKING SHEET

Test:	24
Designation:	3/4-4.5N-0NL
Date:	1/21/97



Test 24 Data

Axial Load (kips)	Slips (in.)				Test Comments
	Pot. AT-1	Pot. AB-2	Pot. BT-3	Pot. BB-4	
0.00	0.0000	0.0000	0.0000	0.0000	BEGIN TEST
11.31	0.0000	0.0006	0.0000	0.0000	
20.35	0.0000	0.0000	0.0000	0.0000	
30.28	0.0000	0.0006	0.0012	0.0000	
40.08	0.0000	0.0006	0.0037	0.0000	
45.10	0.0000	0.0006	0.0049	0.0000	
49.87	0.0000	0.0006	0.0073	0.0000	
55.03	0.0000	0.0006	0.0110	0.0000	
59.80	0.0006	0.0006	0.0159	0.0000	
64.57	0.0012	0.0006	0.0226	0.0012	
69.97	0.0037	0.0006	0.0312	0.0043	
74.50	0.0092	0.0061	0.0410	0.0116	
78.02	0.0165	0.0116	0.0495	0.0177	
81.91	0.0275	0.0214	0.0624	0.0306	
84.80	0.0391	0.0330	0.0746	0.0410	
87.06	0.0526	0.0465	0.0893	0.0538	
89.45	0.0722	0.0642	0.1138	0.0746	
92.46	0.0930	0.0850	0.1382	0.0954	
95.48	0.1162	0.1089	0.1639	0.1180	
97.86	0.1394	0.1321	0.1914	0.1394	
100.25	0.1608	0.1554	0.2177	0.1626	
102.14	0.1829	0.1786	0.2453	0.1859	
104.15	0.2073	0.2025	0.2759	0.2134	
105.65	0.2312	0.2270	0.3040	0.2366	
107.04	0.2550	0.2508	0.3297	0.2593	
107.16	0.2813	0.2808	0.3584	0.2862	
107.04	0.3101	0.3077	0.3884	0.3100	
104.40	0.3425	0.3401	0.4202	0.3400	BANG. STUD SHEARING SIDES A & B

APPENDIX D

COMPOSITE SLAB PUSH-OUT TEST DATA PACKS

D.1 General

The composite slab push-out test data packs are contained in Section D.2. For each push-out test performed, a test summary sheet, a test layout and cracking sheet, and data table are given. The "Push-Out Test Summary Sheet" contains relevant test parameters such as concrete strength and stud diameter and also a summary of the test results. A plot of the applied axial load versus the measured slips is also included. The "Push-Out Test Layout & Cracking Sheet" contains information such as the stud layout and nominal slab dimensions, as well as the cracks that were observed when testing was completed. The "Data" table contains the axial loads and slips that were measured, along with observations made, during testing.

D.2 COMPOSITE SLAB PUSH-OUT TEST DATA PACKS

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PUSH-OUT TEST SUMMARY SHEET

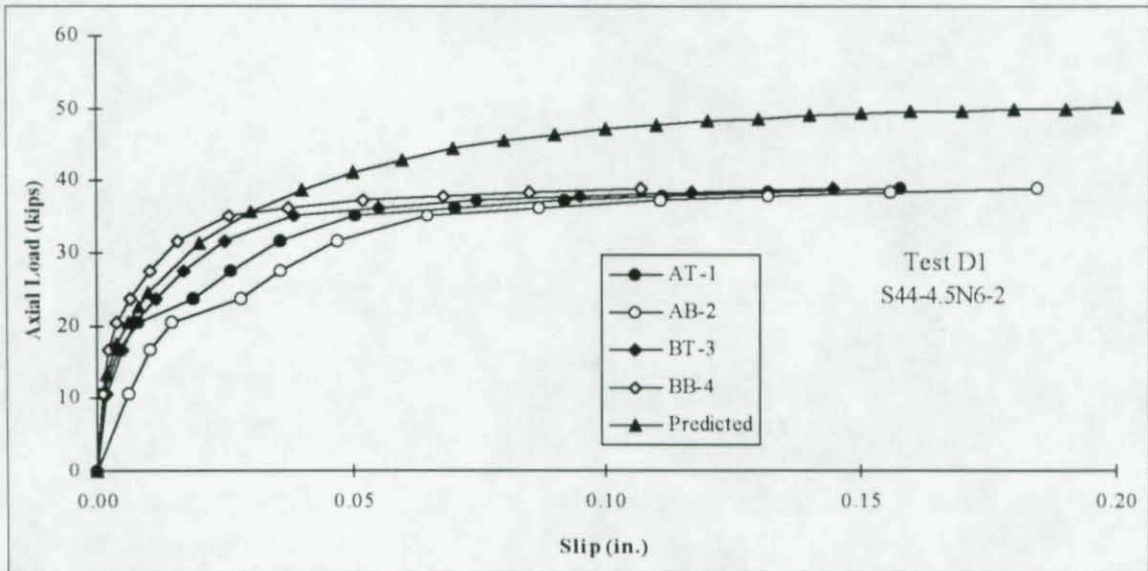
Test:	D	Deck Type:	2" USD, 20 ga.
Designation:	S44-4.5N6-2		
Date of Test:	4/22/97		
Concrete Strength:	4430 psi	Stud Position:	S
Concrete Weight:	143.01 pcf	Stud Size:	1/2 in. x 4 in.
Concrete Thickness:	6 in.	Stud Tensile Strength:	74.049 ksi
Maximum Applied Load:	39.07 kips		
Applied Load Per Stud:	9.77 kips		

Concrete Slip at Failure:

Pot. AT-1:	0.1578 in.	Pot. BT-3:	0.1450 in.
Pot. AB-2:	0.1847 in.	Pot. BB-4:	0.1070 in.
Avg. Side A:	0.1713 in.	Avg. Side B:	0.1260 in.

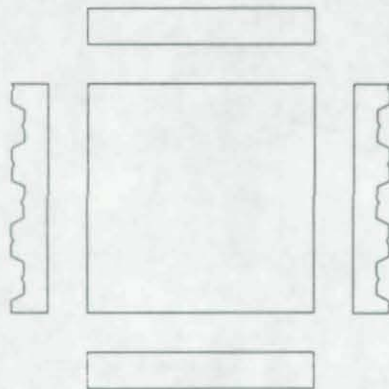
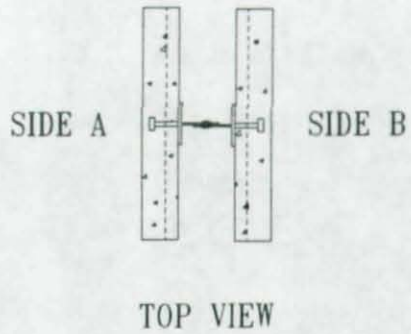
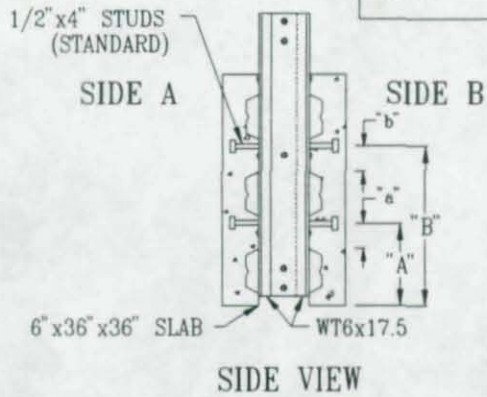
Avg.: 0.1486 in.

Comments: 10% Normal Load
Stud Shearing Failure of Top Stud on Side A

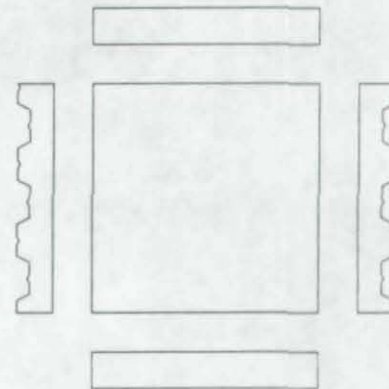


PUSH-OUT TEST LAYOUT & CRACKING SHEET

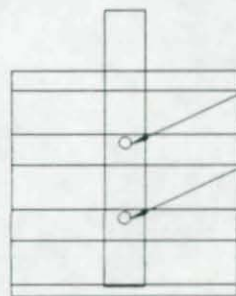
Test:	D1
Designation:	S44-4.5N6-2
Date:	4/22/97



SIDE A SURFACE



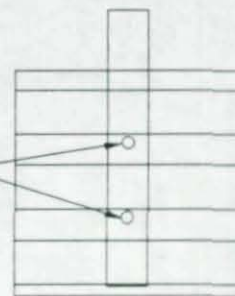
SIDE B SURFACE



SIDE A BOTTOM

STUD SHEARING
& WELD POROSITY

STUDS REMAINED
ATTACHED TO TEE
AFTER FAILURE



SIDE B BOTTOM

Test D1 Data

Axial Load (kips)	Slips (in.)				Test Comments
	Pot. AT-1	Pot. AB-2	Pot. BT-3	Pot. BB-4	
0.00	0.0000	0.0000	0.0000	0.0000	BEGIN TEST
10.55	0.0012	0.0061	0.0018	0.0012	
16.71	0.0043	0.0104	0.0049	0.0024	
20.48	0.0080	0.0147	0.0073	0.0037	SLIGHT DECK/CONC. SEPARATION
23.62	0.0190	0.0281	0.0116	0.0067	HAD TO REAPPLY NORMAL LOAD
27.51	0.0263	0.0361	0.0171	0.0104	
31.66	0.0361	0.0471	0.0251	0.0159	
35.05	0.0508	0.0648	0.0385	0.0257	
36.18	0.0703	0.0869	0.0550	0.0373	
37.44	0.0917	0.1107	0.0746	0.0520	
37.94	0.1113	0.1321	0.0948	0.0679	
38.57	0.1321	0.1560	0.1168	0.0850	
39.07	0.1578	0.1847	0.1450	0.1070	NO NOISES WHEN FAILED

PUSH-OUT TEST SUMMARY SHEET

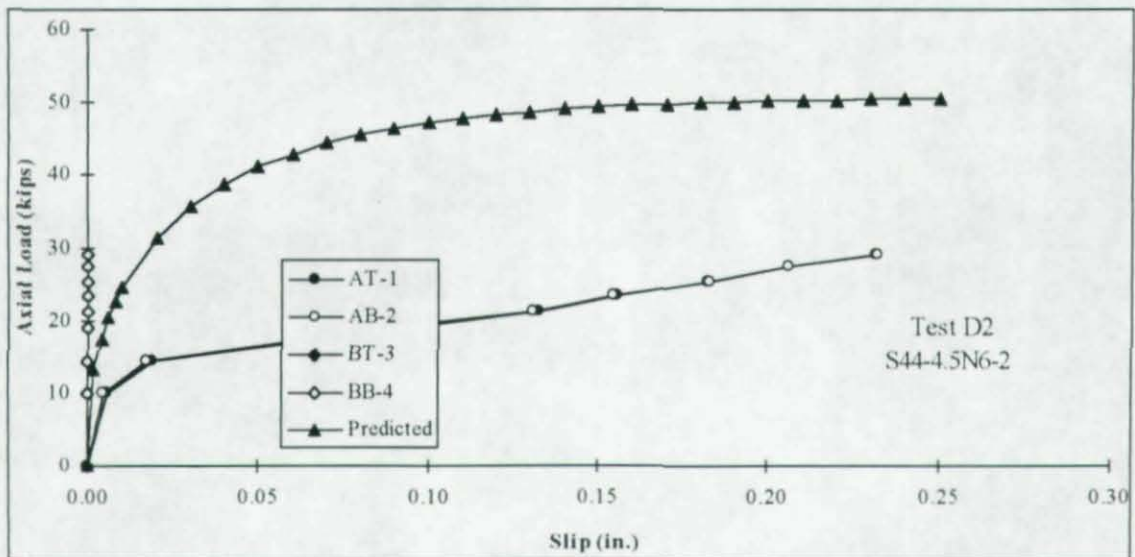
Test:	D2	Deck Type:	2" USD, 20 ga.
Designation:	S44-4.5N6-2		
Date of Test:	4/22/97		
Concrete Strength:	4430 psi	Stud Position:	S
Concrete Weight:	143.01 pcf	Stud Size:	1/2 in. x 4 in.
Concrete Thickness:	6 in.	Stud Tensile Strength:	74.049 ksi
Maximum Applied Load:	29.15 kips		
Applied Load Per Stud:	7.29 kips		

Concrete Slip at Failure:

Pot. AT-1:	0.2318 in.	Pot. BT-3:	0 in.
Pot. AB-2:	0.2324 in.	Pot. BB-4:	0 in.
Avg. Side A:	0.2321 in.	Avg. Side B:	0 in.

Avg.: 0.1161 in.

Comments: 10% Normal Load
Stud Shearing Failure of Both Studs on Side A



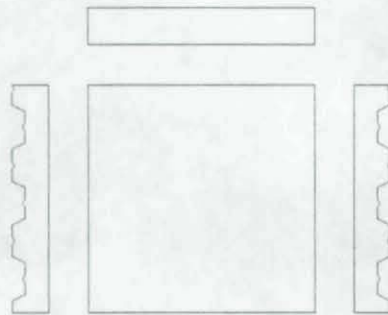
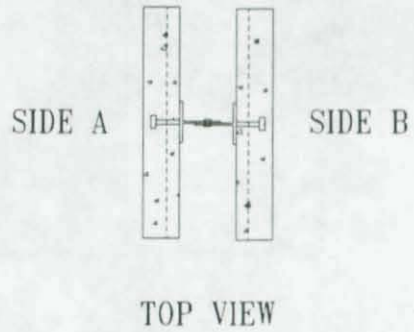
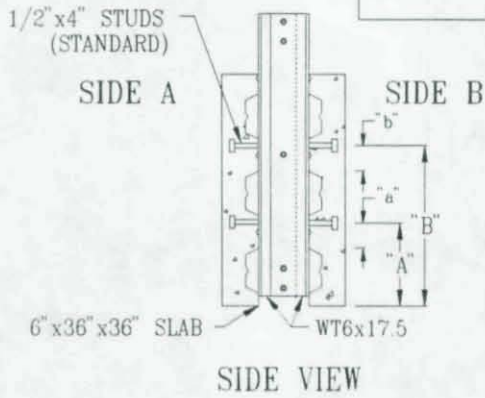
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PUSH-OUT TEST LAYOUT & CRACKING SHEET

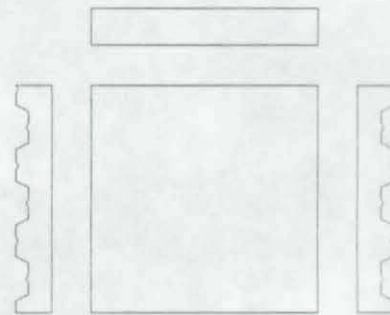
Test: D2

Designation: S44-4.5N6-2

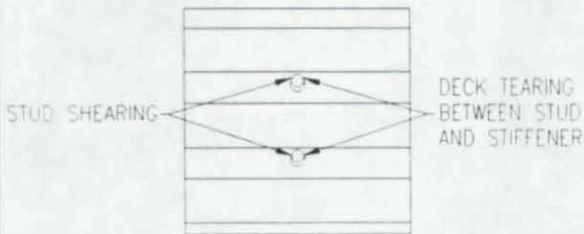
Date: 4/22/97



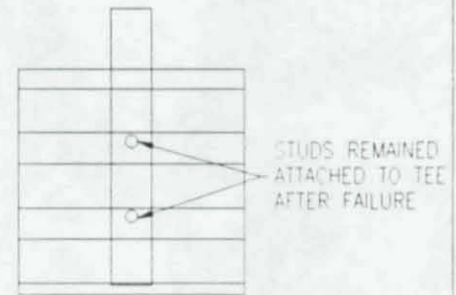
SIDE A SURFACE



SIDE B SURFACE



SIDE A BOTTOM



SIDE B BOTTOM

Test D2 Data

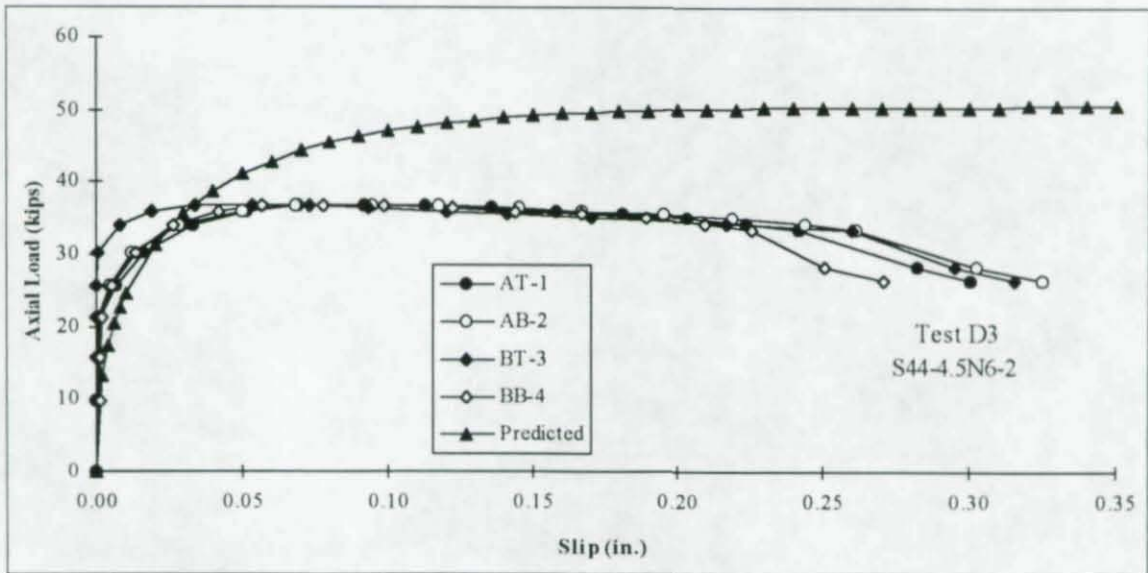
Axial Load (kips)	Slips (in.)				Test Comments
	Pot. AT-1	Pot. AB-2	Pot. BT-3	Pot. BB-4	
0.00	0.0000	0.0000	0.0000	0.0000	BEGIN TEST
10.18	0.0055	0.0049	0.0000	0.0000	
14.57	0.0190	0.0171	0.0000	0.0000	
18.97	0.0948	0.0893	0.0000	0.0000	
21.36	0.1327	0.1309	0.0000	0.0000	
23.37	0.1560	0.1548	0.0000	0.0000	
25.38	0.1823	0.1829	0.0000	0.0000	
27.51	0.2061	0.2061	0.0000	0.0000	
29.15	0.2318	0.2324	0.0000	0.0000	

PUSH-OUT TEST SUMMARY SHEET

Test:	D3	Deck Type:	2" USD, 20 ga.
Designation:	S44-4.5N6-2		
Date of Test:	4/23/97		
Concrete Strength:	4430 psi	Stud Position:	S
Concrete Weight:	143.01 pcf	Stud Size:	1/2 in. x 4 in.
Concrete Thickness:	6 in.	Stud Tensile Strength:	74.049 ksi
Maximum Applied Load:	36.93 kips		
Applied Load Per Stud:	9.23 kips		
Concrete Slip at Failure:			

Pot. AT-1: 0.3009 in.	Pot. BT-3: 0.3156 in.
Pot. AB-2: 0.3249 in.	Pot. BB-4: 0.2709 in.
Avg. Side A: 0.3129 in.	Avg. Side B: 0.2933 in.
Avg.: 0.3031 in.	

Comments: 10% Normal Load
Stud Shearing Failure of All Four Studs

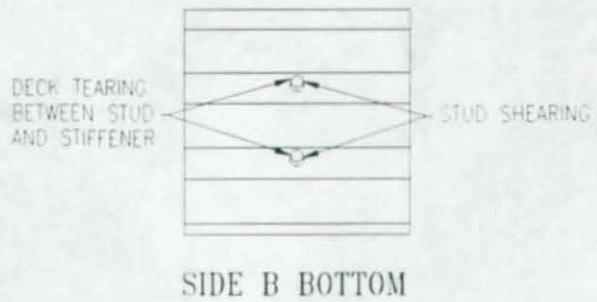
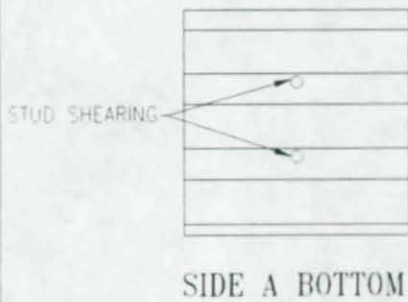
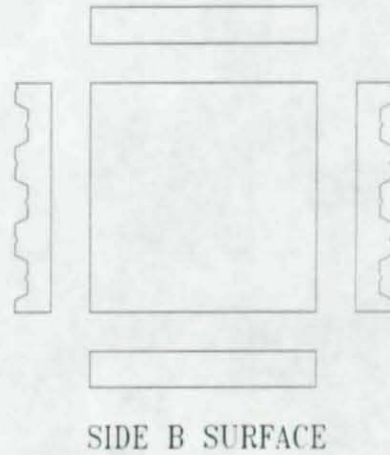
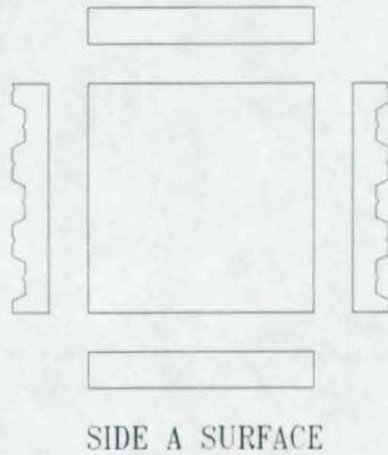
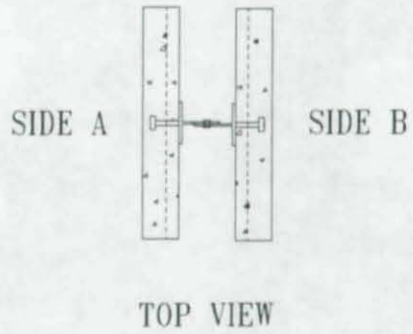
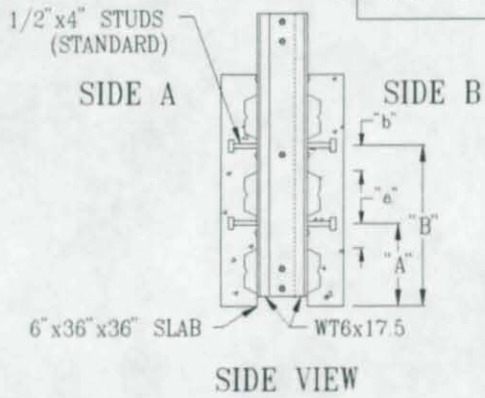


PUSH-OUT TEST LAYOUT & CRACKING SHEET

Test: D3

Designation: S44-4.5N6-2

Date: 4/23/97



Test D3 Data

Axial Load (kips)	Slips (in.)				Test Comments
	Pot. AT-1	Pot. AB-2	Pot. BT-3	Pot. BB-4	
0.00	0.0000	0.0000	0.0000	0.0000	BEGIN TEST
9.92	0.0006	0.0000	0.0000	0.0012	
15.70	0.0006	0.0006	0.0000	0.0012	
21.36	0.0012	0.0006	0.0000	0.0018	
25.75	0.0067	0.0049	0.0000	0.0055	
30.15	0.0165	0.0122	0.0006	0.0135	
34.17	0.0330	0.0281	0.0080	0.0263	
36.06	0.0514	0.0502	0.0190	0.0416	
36.68	0.0691	0.0685	0.0336	0.0569	
36.68	0.0917	0.0948	0.0532	0.0777	
36.93	0.1125	0.1175	0.0728	0.0985	
36.56	0.1358	0.1450	0.0936	0.1223	
36.06	0.1578	0.1670	0.1205	0.1437	
35.68	0.1810	0.1952	0.1413	0.1670	
35.05	0.2037	0.2190	0.1700	0.1890	
34.30	0.2238	0.2441	0.2171	0.2091	
33.54	0.2416	0.2613	0.2599	0.2257	
28.27	0.2826	0.3029	0.2954	0.2507	
26.51	0.3009	0.3249	0.3156	0.2709	BANG

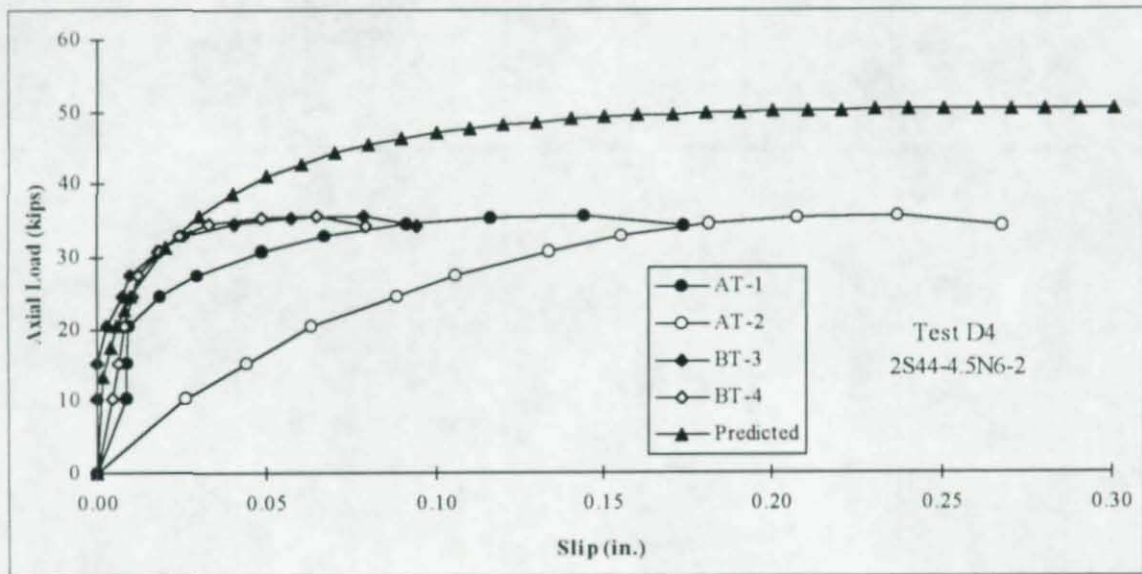
PUSH-OUT TEST SUMMARY SHEET

Test:	D4	Deck Type:	2" USD, 20 ga.
Designation:	2S44-4.5N6-2		
Date of Test:	4/24/97		
Concrete Strength:	4430 psi	Stud Position:	2S
Concrete Weight:	143.01 pcf	Stud Size:	1/2 in. x 4 in.
Concrete Thickness:	6 in.	Stud Tensile Strength:	74.049 ksi
Maximum Applied Load:	35.80 kips		
Applied Load Per Stud:	8.95 kips		

Concrete Slip at Failure:

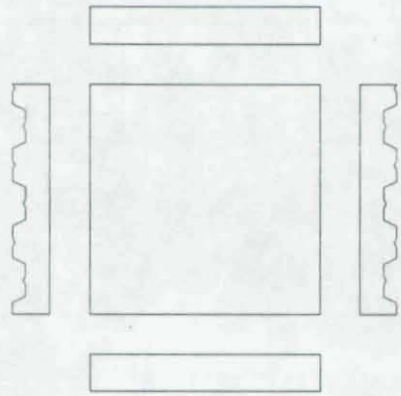
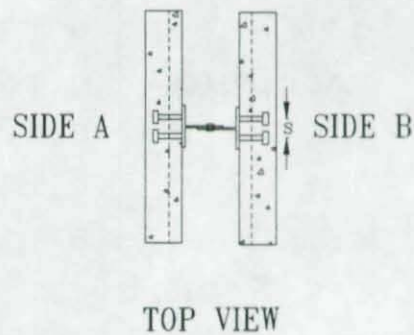
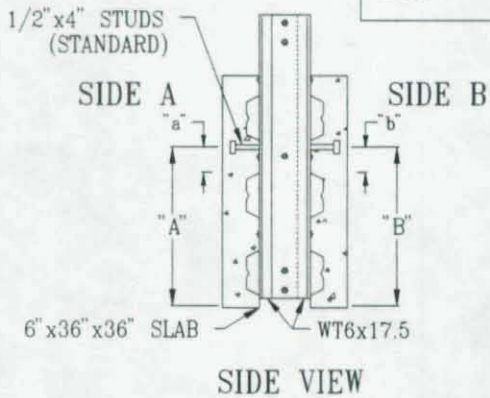
Pot. AT-1: 0.1737 in.	Pot. BT-3: 0.0942 in.
Pot. AT-2: 0.2673 in.	Pot. BT-4: 0.0795 in.
Avg. Side A: 0.2205 in.	Avg. Side B: 0.0869 in.
Avg.: 0.1537 in.	

Comments: 10% Normal Load
Stud Shearing Failure of Both Studs on Side A

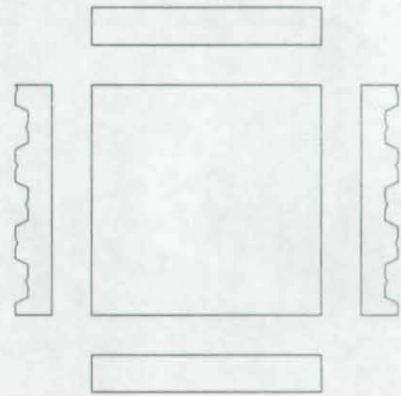


PUSH-OUT TEST LAYOUT & CRACKING SHEET

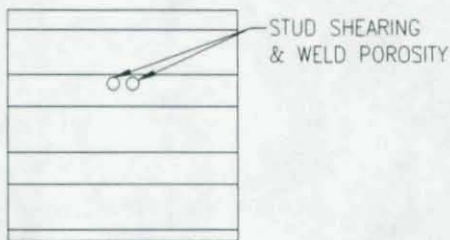
Test:	D4
Designation:	2S44-4.5N6-2
Date:	4/24/97



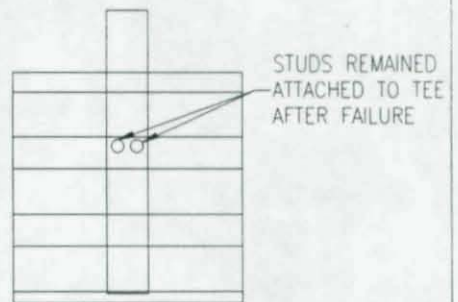
SIDE A SURFACE



SIDE B SURFACE



SIDE A BOTTOM



SIDE B BOTTOM

Test D4 Data

Axial Load (kips)	Slips (in.)				Test Comments
	Pot. AT-1	Pot. AT-2	Pot. BT-3	Pot. BT-4	
0.00	0.0000	0.0000	0.0000	0.0000	BEGIN TEST
10.43	0.0086	0.0263	0.0000	0.0049	
15.33	0.0086	0.0440	0.0000	0.0061	
20.48	0.0092	0.0630	0.0031	0.0079	
24.50	0.0183	0.0887	0.0073	0.0104	
27.64	0.0294	0.1058	0.0098	0.0122	
30.78	0.0489	0.1340	0.0177	0.0183	
33.04	0.0673	0.1554	0.0257	0.0245	
34.55	0.0917	0.1811	0.0404	0.0330	
35.55	0.1162	0.2074	0.0575	0.0489	
35.80	0.1443	0.2367	0.0789	0.0648	
34.30	0.1737	0.2673	0.0942	0.0795	POP

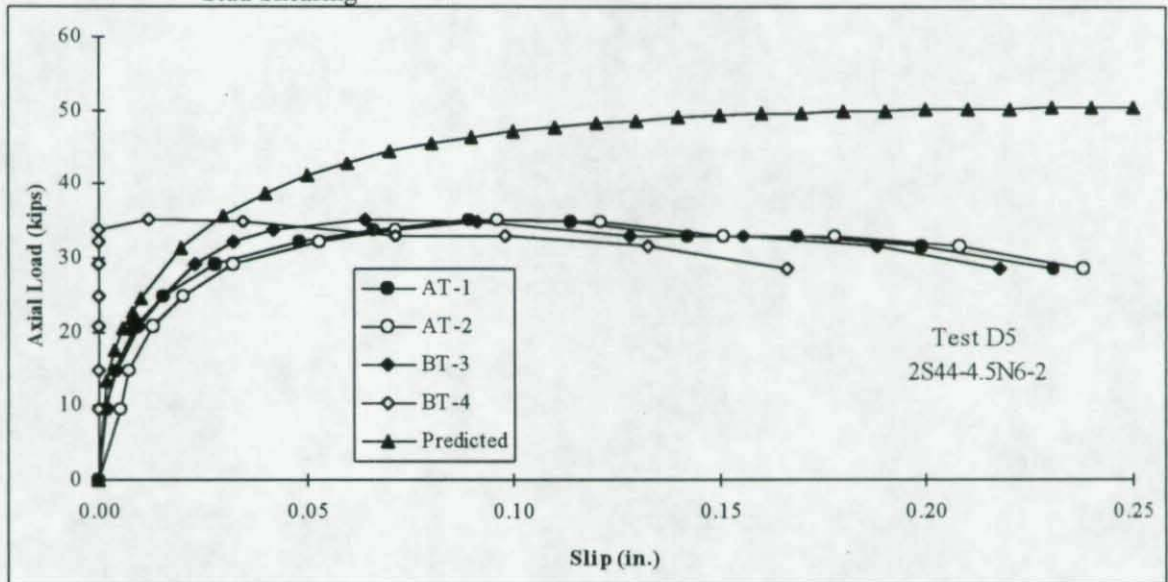
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PUSH-OUT TEST SUMMARY SHEET

Test:	D5	Deck Type:	2" USD, 20 ga.
Designation:	2S44-4.5N6-2		
Date of Test:	4/24/97		
Concrete Strength:	4430 psi	Stud Position:	2S
Concrete Weight:	143.01 pcf	Stud Size:	1/2 in. x 4 in.
Concrete Thickness:	6 in.	Stud Tensile Strength:	74.049 ksi
Maximum Applied Load:	35.05 kips		
Applied Load Per Stud:	8.76 kips		
Concrete Slip at Failure:			

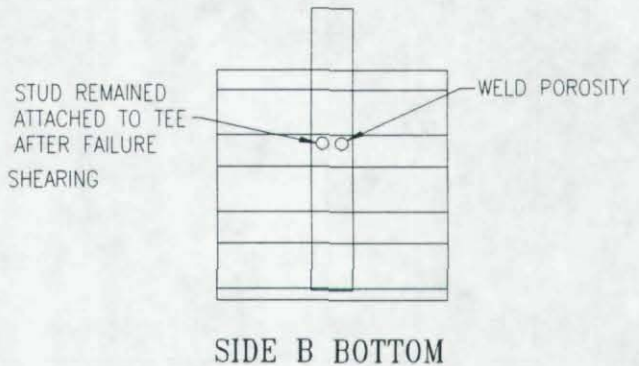
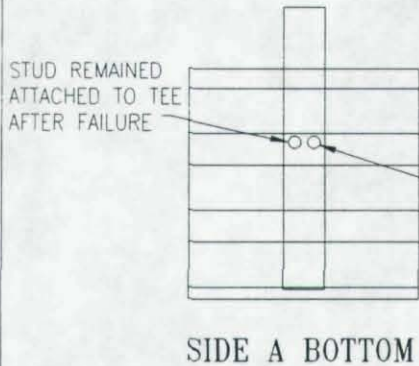
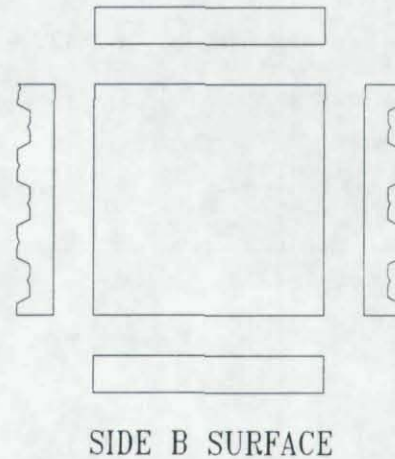
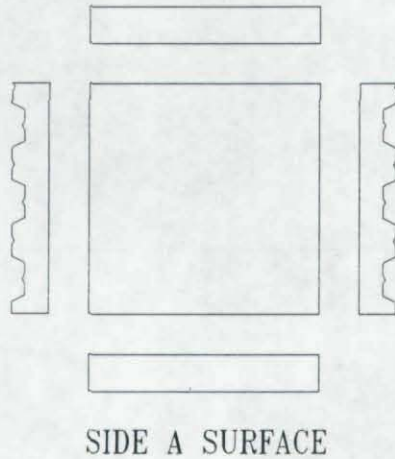
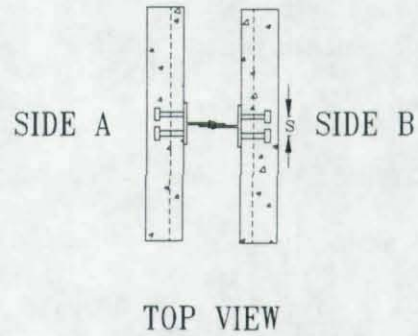
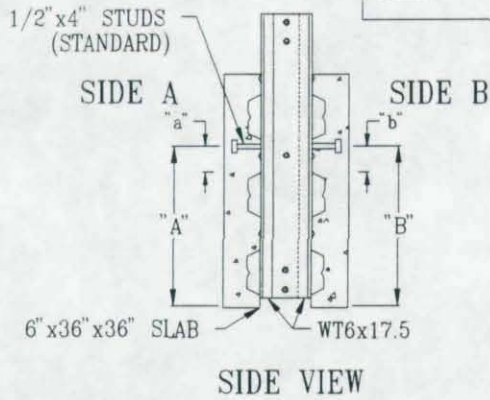
Pot. AT-1:	0.2306 in.	Pot. BT-3:	0.2177 in.
Pot. AT-2:	0.2380 in.	Pot. BT-4:	0.1663 in.
Avg. Side A:	0.2343 in.	Avg. Side B:	0.1920 in.
Avg.: 0.2132 in.			

Comments: 10% Normal Load
Weld Porosity
Stud Shearing



PUSH-OUT TEST LAYOUT & CRACKING SHEET

Test:	D5
Designation:	2S44-4.5N6-2
Date:	4/24/97



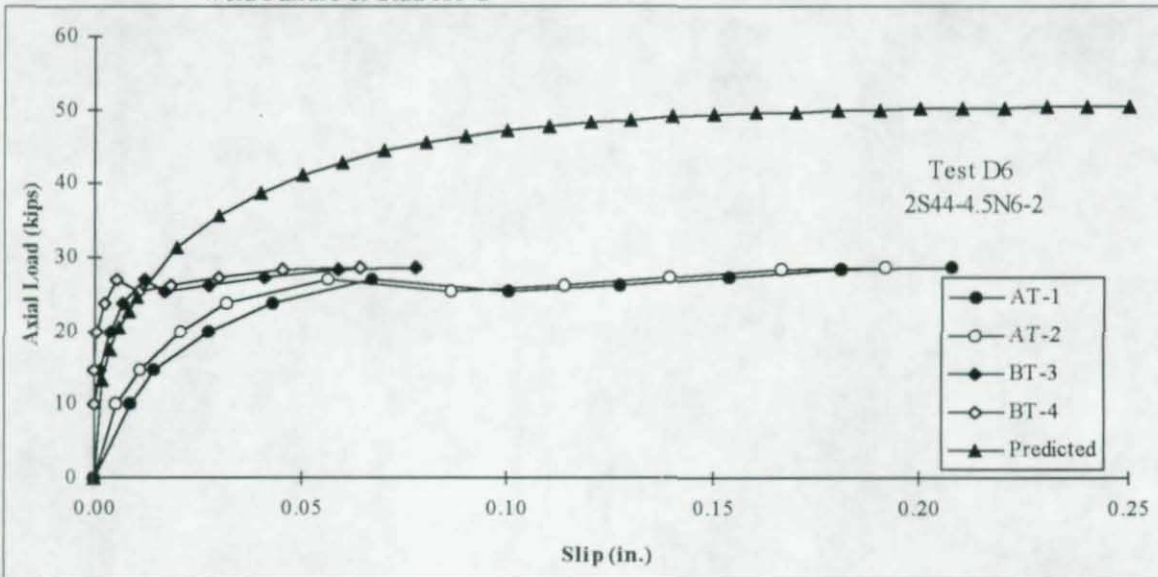
Test D5 Data

Axial Load (kips)	Slips (in.)				Test Comments	
	Pot. AT-1	Pot. AT-2	Pot. BT-3	Pot. BT-4		
0.00	0.0000	0.0000	0.0000	0.0000	BEGIN TEST	
9.42	0.0018	0.0055	0.0012	0.0000		
14.82	0.0037	0.0073	0.0043	0.0000		
20.60	0.0086	0.0128	0.0098	0.0000		
24.87	0.0153	0.0202	0.0153	0.0000		
29.15	0.0281	0.0324	0.0232	0.0000		
32.16	0.0483	0.0532	0.0324	0.0000		
33.92	0.0661	0.0716	0.0422	0.0000		
35.05	0.0893	0.0960	0.0642	0.0122		
34.92	0.1138	0.1211	0.0911	0.0348		
33.04	0.1425	0.1511	0.1284	0.0715		
32.91	0.1688	0.1780	0.1560	0.0978		
31.53	0.1988	0.2080	0.1884	0.1327		
28.64	0.2306	0.2380	0.2177	0.1663		BANG

PUSH-OUT TEST SUMMARY SHEET

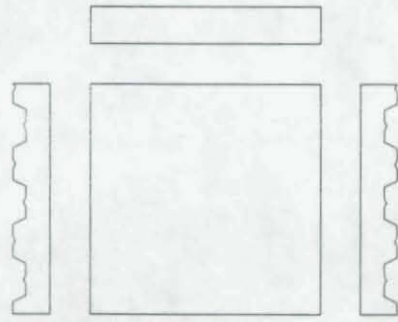
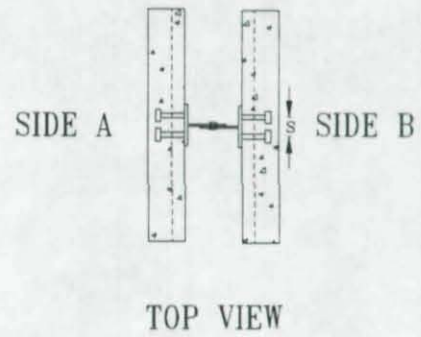
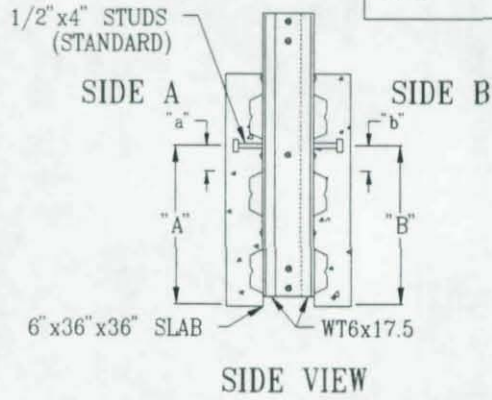
Test:	D6	Deck Type:	2" USD, 20 ga.
Designation:	2S44-4.5N6-2		
Date of Test:	4/24/97		
Concrete Strength:	4430 psi	Stud Position:	2S
Concrete Weight:	143.01 pcf	Stud Size:	1/2 in. x 4 in.
Concrete Thickness:	6 in.	Stud Tensile Strength:	74.049 ksi
Maximum Applied Load:	28.64 kips		
Applied Load Per Stud:	7.16 kips		
Concrete Slip at Failure:			
Pot. AT-1:	0.2073 in.	Pot. BT-3:	0.0777 in.
Pot. AT-2:	0.1915 in.	Pot. BT-4:	0.0642 in.
Avg. Side A:	0.1994 in.	Avg. Side B:	0.0710 in.
	Avg.: 0.1352 in.		

Comments: 10% Normal Load
 Stud Shearing Failure of Stud AT-1
 Weld Failure of Stud AT-2

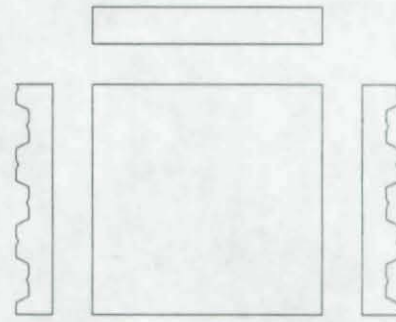


PUSH-OUT TEST LAYOUT & CRACKING SHEET

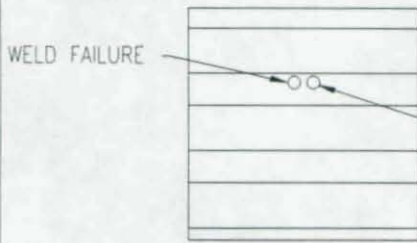
Test:	D6
Designation:	2S44-4.5N6-2
Date:	4/24/97



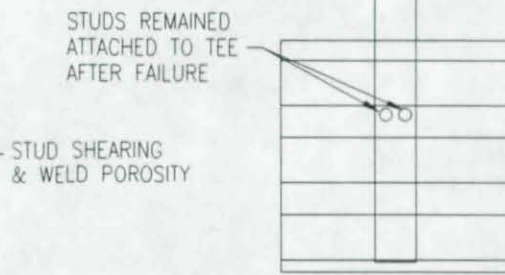
SIDE A SURFACE



SIDE B SURFACE



SIDE A BOTTOM



SIDE B BOTTOM

Test D6 Data

Axial Load (kips)	Slips (in.)				Test Comments	
	Pot. AT-1	Pot. AT-2	Pot. BT-3	Pot. BT-4		
0.00	0.0000	0.0000	0.0000	0.0000	BEGIN TEST	
10.18	0.0086	0.0055	0.0000	0.0000		
14.70	0.0147	0.0110	0.0012	0.0000		
19.85	0.0275	0.0208	0.0037	0.0006		
23.62	0.0428	0.0318	0.0067	0.0024		
26.88	0.0673	0.0563	0.0122	0.0055		
25.25	0.1003	0.0862	0.0171	0.0104		
26.13	0.1272	0.1138	0.0275	0.0183		
27.26	0.1541	0.1395	0.0410	0.0300		
28.39	0.1810	0.1664	0.0587	0.0452		
28.64	0.2073	0.1915	0.0777	0.0642		SOFT POP

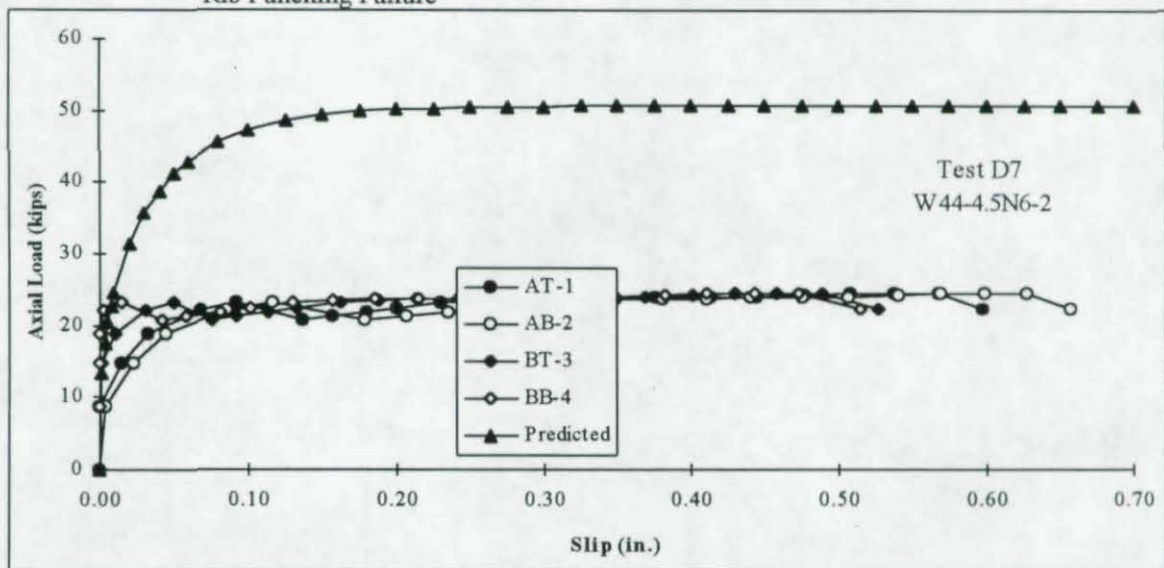
PUSH-OUT TEST SUMMARY SHEET

Test:	D7	Deck Type:	2" USD, 20 ga.
Designation:	W44-4.5N6-2		
Date of Test:	4/23/97		
Concrete Strength:	4430 psi	Stud Position:	W
Concrete Weight:	143.01 pcf	Stud Size:	1/2 in. x 4 in.
Concrete Thickness:	6 in.	Stud Tensile Strength:	74.049 ksi
Maximum Applied Load:	24.62 kips		
Applied Load Per Stud:	6.16 kips		

Concrete Slip at Failure:

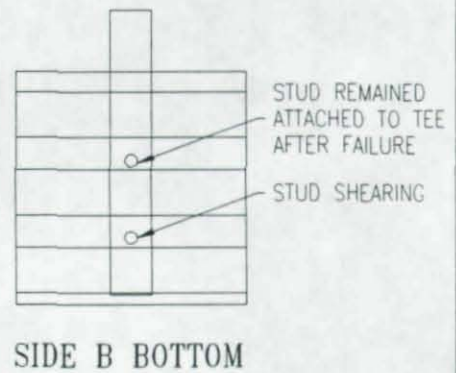
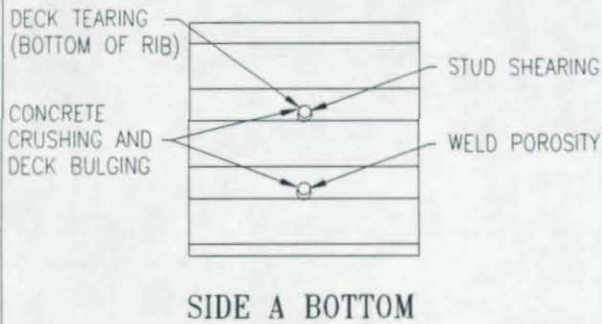
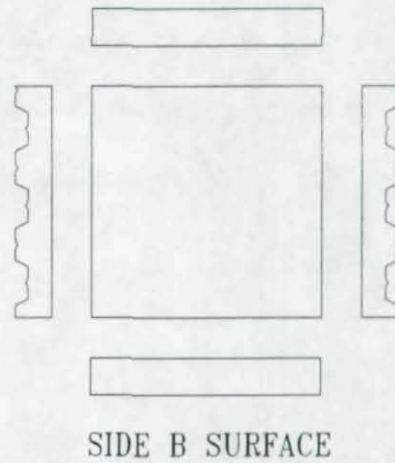
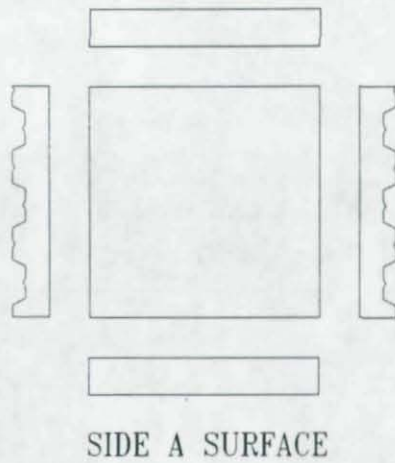
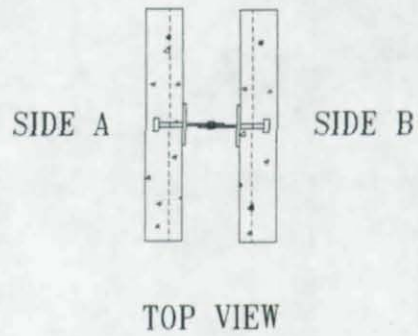
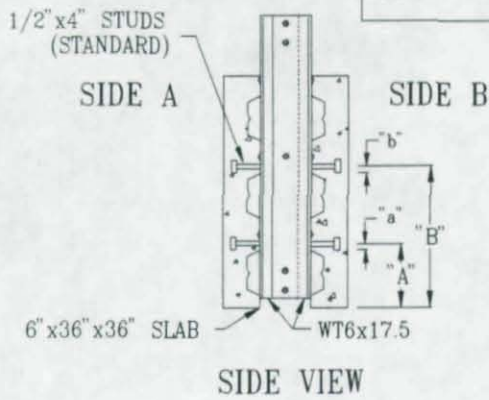
Pot. AT-1: 0.5969 in.	Pot. BT-3: 0.5272 in.
Pot. AB-2: 0.6563 in.	Pot. BB-4: 0.5148 in.
Avg. Side A: 0.6266 in.	Avg. Side B: 0.5210 in.
Avg.: 0.5738 in.	

Comments: 10% Normal Load
 Stud Shearing Failure of Top Stud on Side A and Bottom Stud on Side B
 Weld Porosity of Bottom Stud on Side A
 Rib Punching Failure



PUSH-OUT TEST LAYOUT & CRACKING SHEET

Test:	D7
Designation:	W44-4.5N6-2
Date:	4/23/97



Test D7 Data

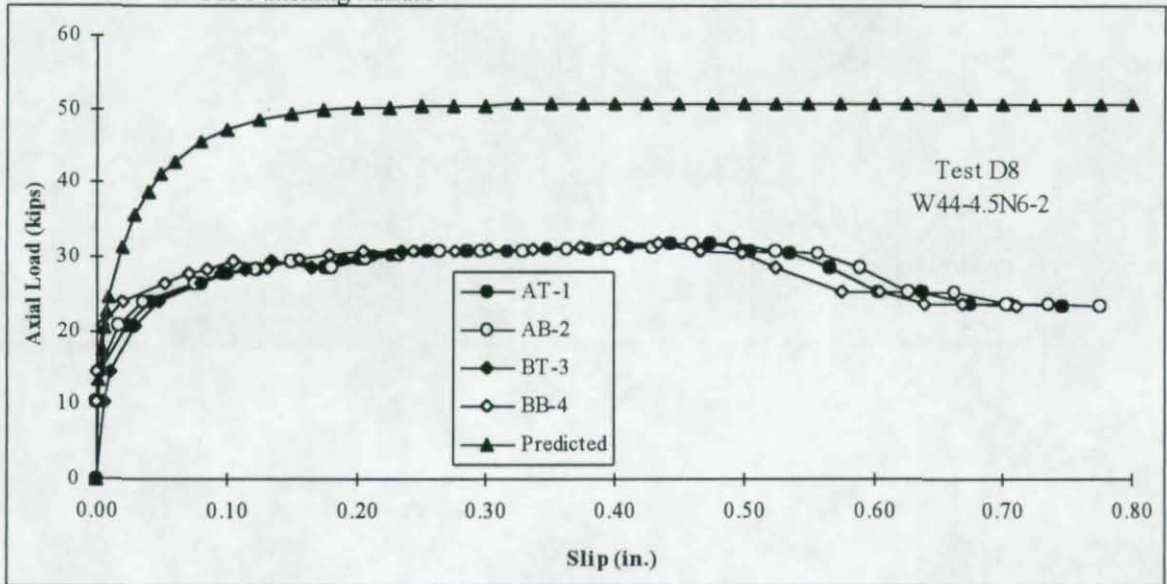
Axial Load (kips)	Slips (in.)				Test Comments
	Pot. AT-1	Pot. AB-2	Pot. BT-3	Pot. BB-4	
0.00	0.0000	0.0000	0.0000	0.0000	BEGIN TEST
8.79	0.0000	0.0043	0.0000	0.0000	
14.82	0.0147	0.0226	0.0018	0.0000	POPPING NOISES
18.84	0.0324	0.0447	0.0110	0.0000	
22.11	0.0673	0.0850	0.0306	0.0031	
23.24	0.0924	0.1156	0.0495	0.0147	
20.85	0.1364	0.1780	0.0758	0.0422	CRACKING NOISE
21.36	0.1566	0.2061	0.0917	0.0575	
21.86	0.1798	0.2355	0.1132	0.0813	
22.49	0.1994	0.2581	0.1327	0.1015	
23.12	0.2293	0.2912	0.1627	0.1296	
23.49	0.2550	0.3205	0.1872	0.1565	
23.62	0.2838	0.3493	0.2135	0.1853	DECK BULGING, TOP STUD, SIDE A
23.62	0.3150	0.3817	0.2422	0.2152	
23.62	0.3456	0.4111	0.2697	0.2439	
23.99	0.3761	0.4404	0.3009	0.2745	
23.99	0.4141	0.4753	0.3376	0.3143	
24.12	0.4440	0.5065	0.3694	0.3491	
24.25	0.4777	0.5407	0.4012	0.3827	
24.50	0.5076	0.5689	0.4294	0.4109	
24.62	0.5382	0.5989	0.4581	0.4439	
24.62	0.5676	0.6270	0.4887	0.4726	
22.49	0.5969	0.6563	0.5272	0.5148	BANG

PUSH-OUT TEST SUMMARY SHEET

Test:	D8	Deck Type:	2" USD, 20 ga.
Designation:	W44-4.5N6-2		
Date of Test:	4/23/97		
Concrete Strength:	4430 psi	Stud Position:	W
Concrete Weight:	143.01 pcf	Stud Size:	1/2 in. x 4 in.
Concrete Thickness:	6 in.	Stud Tensile Strength:	74.049 ksi
Maximum Applied Load:	32.04 kips		
Applied Load Per Stud:	8.01 kips		
Concrete Slip at Failure:			

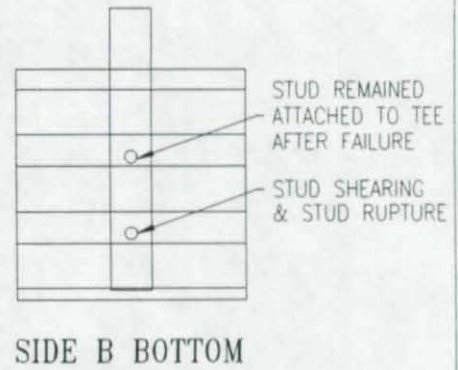
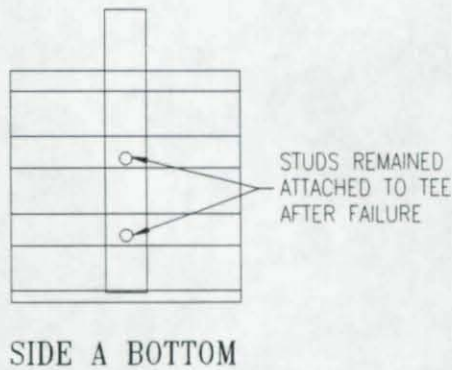
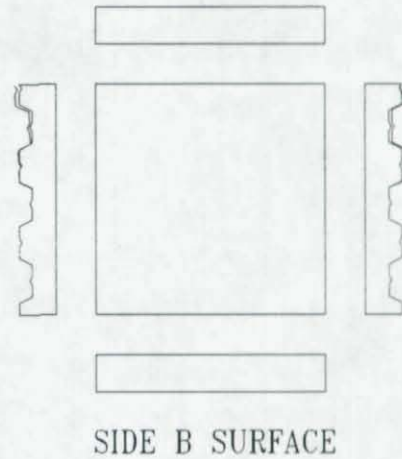
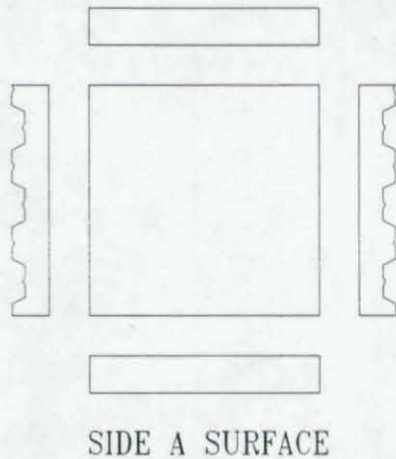
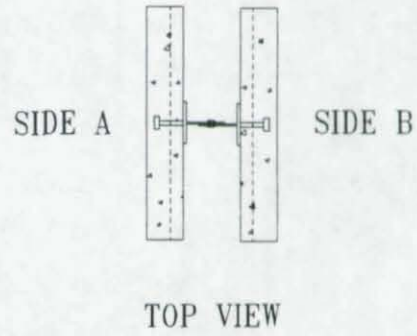
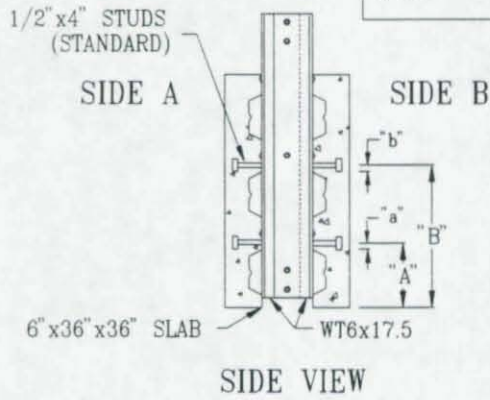
Pot. AT-1:	0.7461 in.	Pot. BT-3:	---
Pot. AB-2:	0.7758 in.	Pot. BB-4:	0.7105 in.
Avg. Side A:	0.7610 in.	Avg. Side B:	0.7105 in.
Avg.: 0.7357 in.			

Comments: 10% Normal Load
 Stud Shearing & Stud Rupture Failure of Bottom Stud on Side B
 Rib Punching Failure



PUSH-OUT TEST LAYOUT & CRACKING SHEET

Test:	D8
Designation:	W44-4.5N6-2
Date:	4/23/97



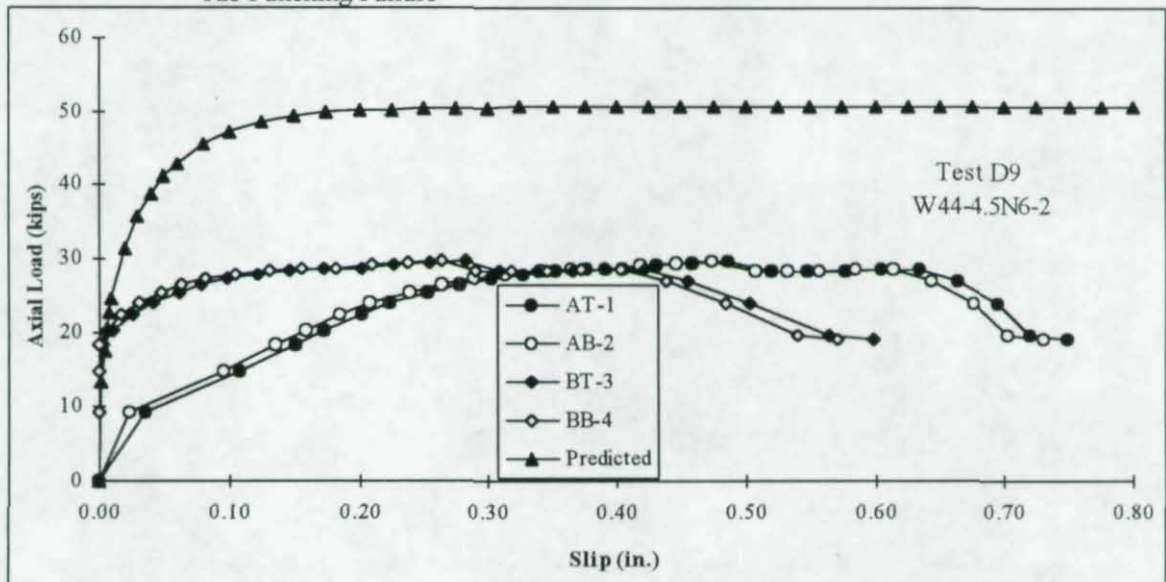
Test D8 Data

Axial Load (kips)	Slips (in.)				Test Comments
	Pot. AT-1	Pot. AB-2	Pot. BT-3	Pot. BB-4	
0.00	0.0000	0.0000	0.0000	0.0000	BEGIN TEST
10.43	0.0012	0.0000	0.0055	0.0006	
14.57	0.0037	0.0018	0.0110	0.0006	
20.73	0.0226	0.0171	0.0294	0.0043	
23.87	0.0416	0.0361	0.0477	0.0202	
26.38	0.0801	0.0753	0.0807	0.0526	
27.76	0.1003	0.0973	0.0960	0.0709	
28.39	0.1235	0.1217	0.1138	0.0850	
29.52	0.1505	0.1499	0.1346	0.1046	
28.77	0.1768	0.1811	0.1651	0.1315	
29.77	0.2024	0.2068	0.1896	0.1565	
30.40	0.2275	0.2337	0.2129	0.1792	
30.78	0.2544	0.2637	0.2349	0.2061	
30.78	0.2856	0.2961	0.2459	0.2440	SLIGHT DECK BULGING
30.90	0.3168	0.3291		0.2758	DECK INTERFERED W/ POT BT-3
31.16	0.3474	0.3622		0.3033	DECK DEBONDING SIDE B
31.16	0.3792	0.3958		0.3363	
31.41	0.4110	0.4295		0.3736	
31.91	0.4428	0.4607		0.4066	
32.04	0.4746	0.4931		0.4341	
30.78	0.5052	0.5249		0.4665	POP
30.53	0.5364	0.5573		0.4983	
28.52	0.5676	0.5898		0.5258	
25.38	0.6036	0.6277		0.5766	
25.38	0.6379	0.6626		0.6059	
23.62	0.6746	0.7023		0.6390	
23.62	0.7058	0.7348		0.6689	
23.49	0.7461	0.7758		0.7105	STOPPED TEST. DECK TEARING.

PUSH-OUT TEST SUMMARY SHEET

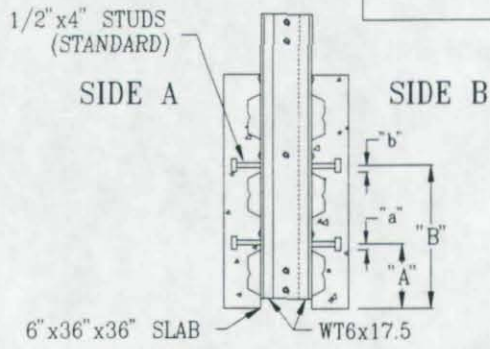
Test:	D9	Deck Type:	2" USD, 20 ga.
Designation:	W44-4.5N6-2		
Date of Test:	4/24/97		
Concrete Strength:	4430 psi	Stud Position:	W
Concrete Weight:	143.01 pcf	Stud Size:	1/2 in. x 4 in.
Concrete Thickness:	6 in.	Stud Tensile Strength:	74.049 ksi
Maximum Applied Load:	29.77 kips		
Applied Load Per Stud:	7.44 kips		
Concrete Slip at Failure:			
Pot. AT-1:	0.7492 in.	Pot. BT-3:	0.6000 in.
Pot. AB-2:	0.7311 in.	Pot. BB-4:	0.5717 in.
Avg. Side A:	0.7402 in.	Avg. Side B:	0.5859 in.
	Avg.:		0.6630 in.

Comments: 10% Normal Load
 Stud Shearing & Stud Rupture Failure of All Four Studs
 Rib Punching Failure

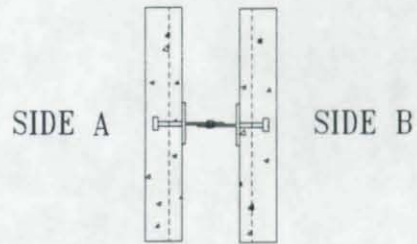


PUSH-OUT TEST LAYOUT & CRACKING SHEET

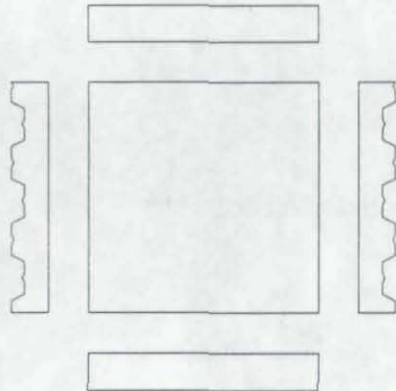
Test:	D9
Designation:	W44-4.5N6-2
Date:	4/24/97



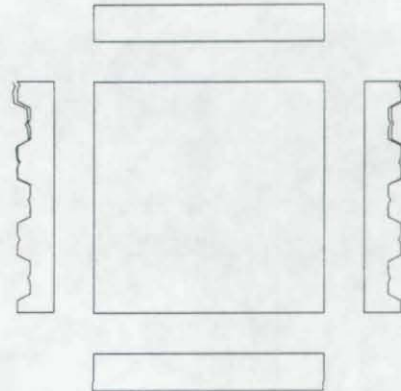
SIDE VIEW



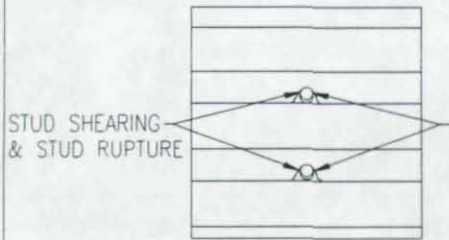
TOP VIEW



SIDE A SURFACE

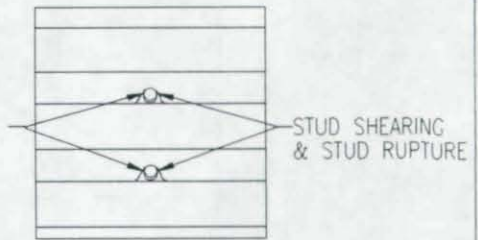


SIDE B SURFACE



SIDE A BOTTOM

CONCRETE CRUSHING,
DECK BULGING
AND TEARING



SIDE B BOTTOM

Test D9 Data

Axial Load (kips)	Slips (in.)				Test Comments
	Pot. AT-1	Pot. AB-2	Pot. BT-3	Pot. BB-4	
0.00	0.0000	0.0000	0.0000	0.0000	BEGIN TEST
9.30	0.0355	0.0226	0.0000	0.0000	
14.70	0.1089	0.0961	0.0000	0.0000	POPPING NOISES
18.22	0.1511	0.1364	0.0024	0.0006	
20.23	0.1737	0.1585	0.0110	0.0055	
22.36	0.2018	0.1860	0.0257	0.0171	
23.87	0.2245	0.2092	0.0410	0.0306	
25.25	0.2532	0.2392	0.0612	0.0483	
26.51	0.2777	0.2643	0.0789	0.0630	
27.26	0.3021	0.2888	0.0991	0.0826	
27.89	0.3278	0.3139	0.1223	0.1046	
28.39	0.3529	0.3414	0.1474	0.1309	
28.52	0.3774	0.3640	0.1725	0.1553	
28.64	0.4043	0.3909	0.2018	0.1828	
29.15	0.4312	0.4185	0.2275	0.2104	
29.40	0.4587	0.4466	0.2544	0.2373	DECK BULGING SIDE A
29.77	0.4862	0.4741	0.2819	0.2648	
28.27	0.5205	0.5078	0.3095	0.2911	
28.27	0.5486	0.5329	0.3376	0.3180	
28.39	0.5773	0.5580	0.3657	0.3461	
28.52	0.6055	0.5855	0.3920	0.3724	
28.77	0.6354	0.6149	0.4214	0.4036	
27.01	0.6636	0.6442	0.4563	0.4384	POP
23.87	0.6954	0.6760	0.5040	0.4843	
19.72	0.7205	0.7030	0.5645	0.5406	
19.22	0.7492	0.7311	0.6000	0.5717	SOFT BANG

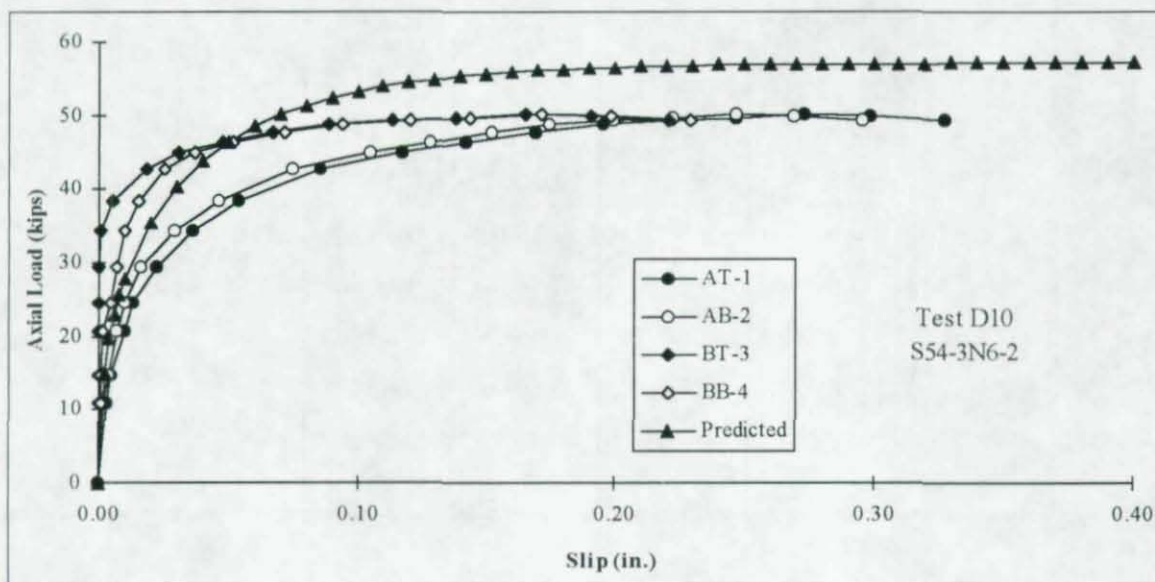
PUSH-OUT TEST SUMMARY SHEET

Test:	D10	Deck Type:	2" USD, 20 ga.
Designation:	S54-3N6-2		
Date of Test:	4/14/97		
Concrete Strength:	2915 psi	Stud Position:	S
Concrete Weight:	140.95 pcf	Stud Size:	5/8 in. x 4 in.
Concrete Thickness:	6 in.	Stud Tensile Strength:	72.635 ksi
Maximum Applied Load:	50.13 kips		
Applied Load Per Stud:	12.53 kips		
Concrete Slip at Failure:			

Pot. AT-1:	0.3272 in.	Pot. BT-3:	0.2208 in.
Pot. AB-2:	0.2961 in.	Pot. BB-4:	0.2293 in.
Avg. Side A:	0.3117 in.	Avg. Side B:	0.2251 in.

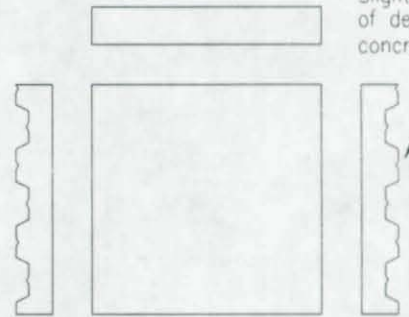
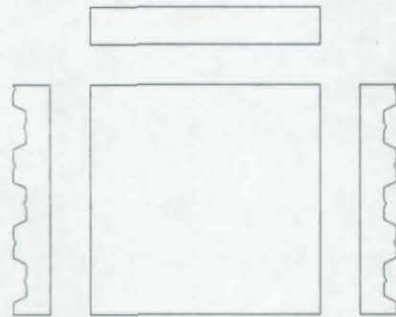
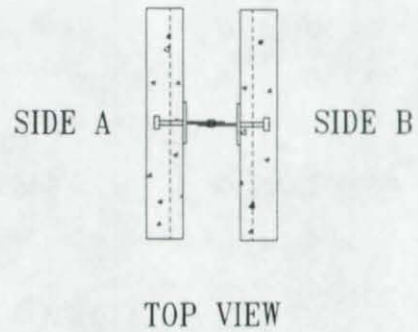
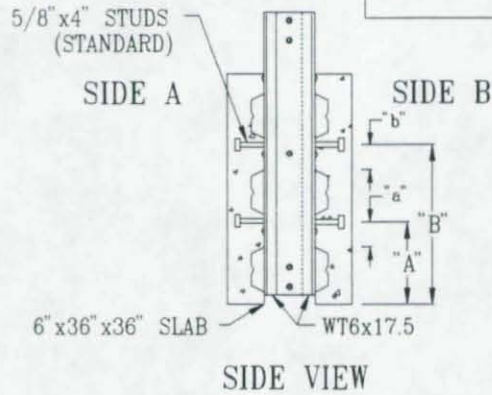
Avg.: 0.2684 in.

Comments: 10% Normal Load
Stud Shearing Failure of Top Stud on Side A and Bottom Stud on Side B



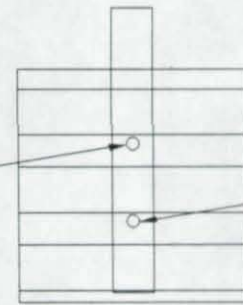
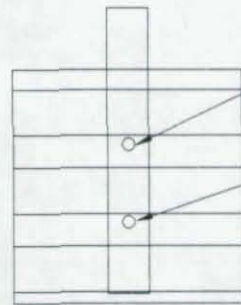
PUSH-OUT TEST LAYOUT & CRACKING SHEET

Test:	D10
Designation:	S54-3N6-2
Date:	4/14/97



SIDE A SURFACE

SIDE B SURFACE



SIDE A BOTTOM

SIDE B BOTTOM

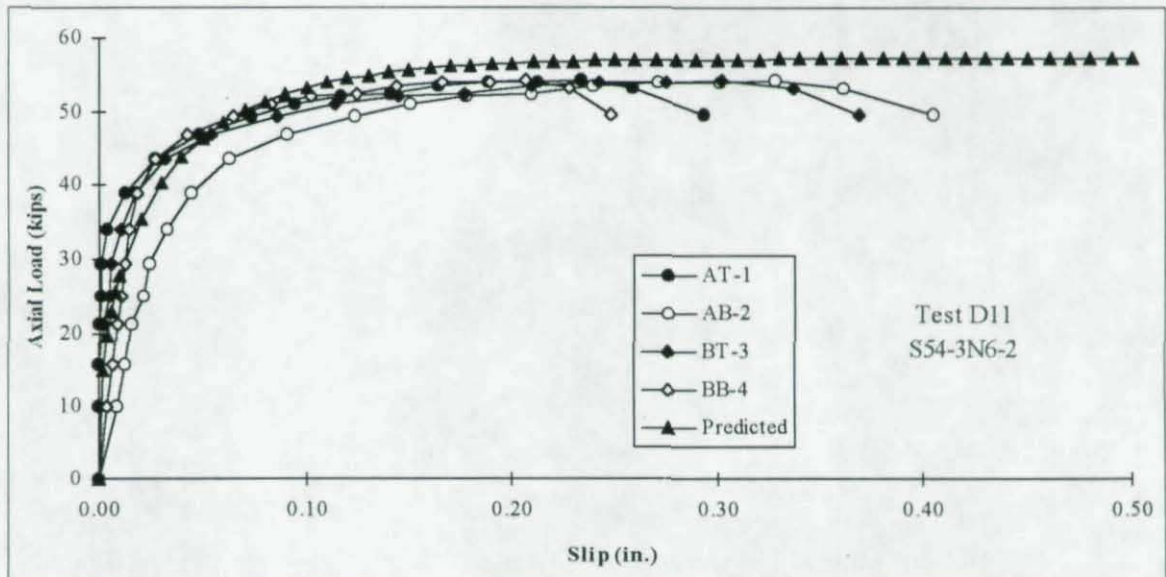
Test D10 Data

Axial Load (kips)	Slips (in.)				Test Comments
	Pot. AT-1	Pot. AB-2	Pot. BT-3	Pot. BB-4	
0.00	0.0000	0.0000	0.0000	0.0000	BEGIN TEST
10.93	0.0031	0.0018	0.0000	0.0006	
14.82	0.0049	0.0037	0.0000	0.0006	
20.60	0.0098	0.0067	0.0000	0.0018	QUIET "SLIPPING" NOISES
24.50	0.0135	0.0098	0.0000	0.0043	
29.40	0.0220	0.0165	0.0000	0.0067	
34.30	0.0361	0.0294	0.0006	0.0104	
38.57	0.0538	0.0465	0.0055	0.0153	
42.84	0.0856	0.0746	0.0183	0.0257	
45.10	0.1174	0.1052	0.0312	0.0373	
46.36	0.1419	0.1285	0.0477	0.0514	
47.74	0.1688	0.1523	0.0673	0.0715	
48.74	0.1951	0.1743	0.0887	0.0942	
49.37	0.2214	0.1994	0.1132	0.1204	POPPING NOISES
49.75	0.2471	0.2220	0.1382	0.1437	
50.13	0.2734	0.2471	0.1651	0.1718	
50.00	0.2985	0.2691	0.1908	0.1987	
49.25	0.3272	0.2961	0.2208	0.2293	POP

PUSH-OUT TEST SUMMARY SHEET

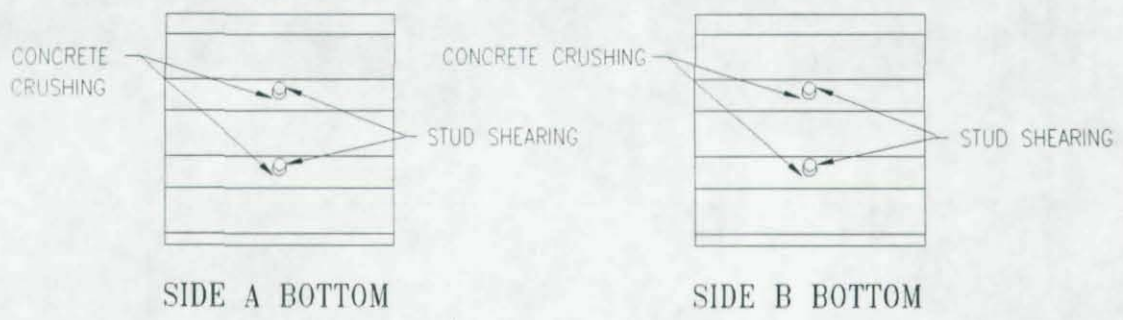
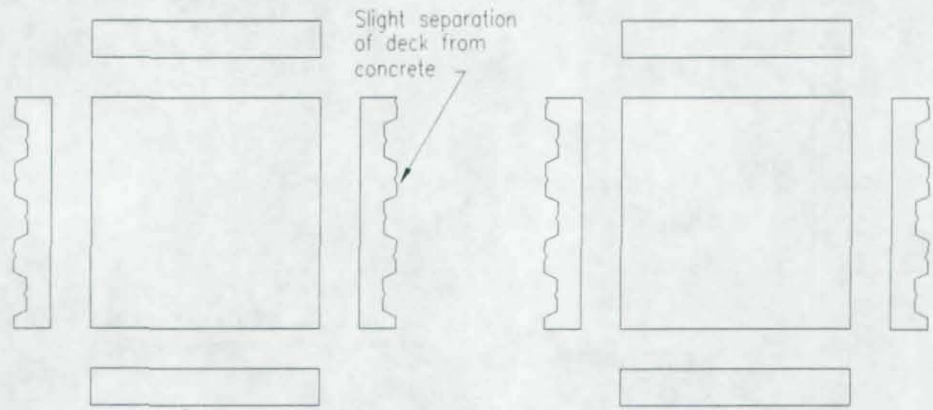
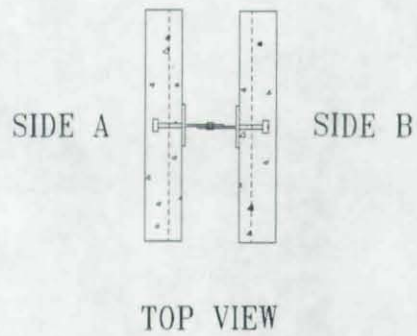
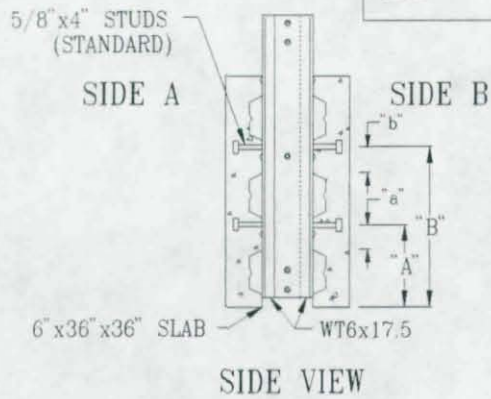
Test:	D11	Deck Type:	2" USD, 20 ga.
Designation:	S54-3N6-2		
Date of Test:	4/14/97		
Concrete Strength:	2915 psi	Stud Position:	S
Concrete Weight:	140.95 pcf	Stud Size:	5/8 in. x 4 in.
Concrete Thickness:	6 in.	Stud Tensile Strength:	72.635 ksi
Maximum Applied Load:	54.15 kips		
Applied Load Per Stud:	13.54 kips		
Concrete Slip at Failure:			
Pot. AT-1:	0.2930 in.	Pot. BT-3:	0.3688 in.
Pot. AB-2:	0.4043 in.	Pot. BB-4:	0.2482 in.
Avg. Side A:	0.3487 in.	Avg. Side B:	0.3085 in.
	Avg.: 0.3286 in.		

Comments: 10% Normal Load
Stud Shearing Failure of All Four Studs



PUSH-OUT TEST LAYOUT & CRACKING SHEET

Test:	D11
Designation:	S54-3N6-2
Date:	4/14/97



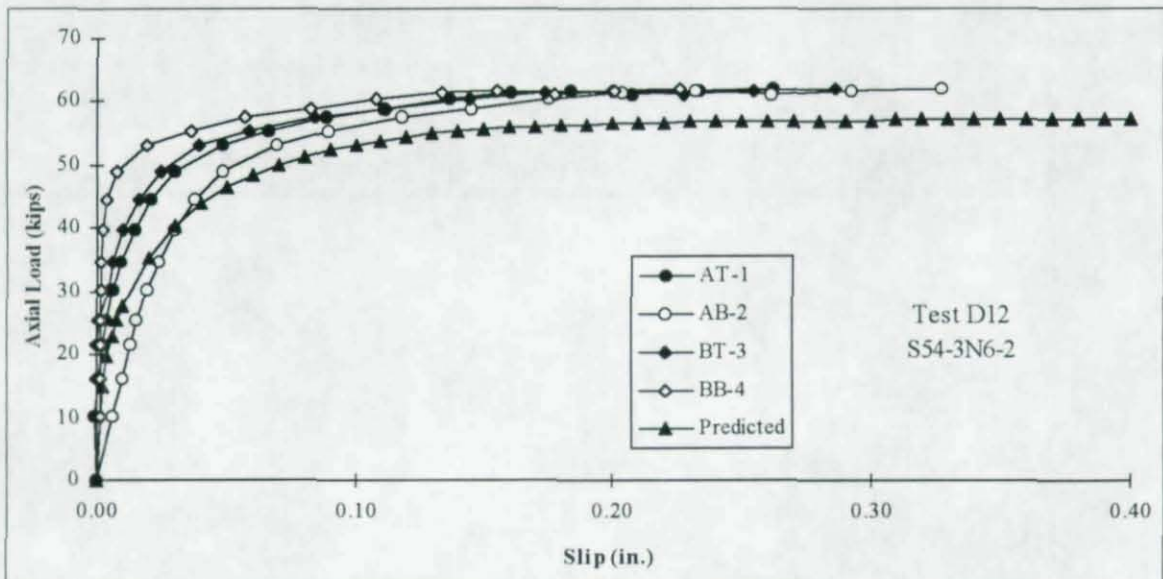
Test D11 Data

Axial Load (kips)	Slips (in.)				Test Comments
	Pot. AT-1	Pot. AB-2	Pot. BT-3	Pot. BB-4	
0.00	0.0000	0.0000	0.0000	0.0000	BEGIN TEST
10.18	0.0000	0.0086	0.0000	0.0043	
15.70	0.0000	0.0122	0.0000	0.0067	
21.23	0.0000	0.0159	0.0018	0.0086	
25.13	0.0006	0.0214	0.0049	0.0110	
29.40	0.0006	0.0245	0.0061	0.0122	
34.05	0.0043	0.0330	0.0104	0.0141	
38.94	0.0122	0.0447	0.0177	0.0183	
43.59	0.0269	0.0630	0.0318	0.0269	
46.86	0.0483	0.0911	0.0544	0.0428	
49.50	0.0734	0.1236	0.0862	0.0642	
50.88	0.0942	0.1505	0.1144	0.0825	
52.01	0.1168	0.1780	0.1443	0.1021	
52.39	0.1407	0.2098	0.1768	0.1241	
53.52	0.1639	0.2392	0.2092	0.1443	
54.02	0.1878	0.2716	0.2422	0.1657	
54.02	0.2122	0.3015	0.2752	0.1889	
54.15	0.2336	0.3285	0.3022	0.2066	
53.27	0.2587	0.3615	0.3364	0.2280	
49.62	0.2930	0.4043	0.3688	0.2482	LOUD BANG

PUSH-OUT TEST SUMMARY SHEET

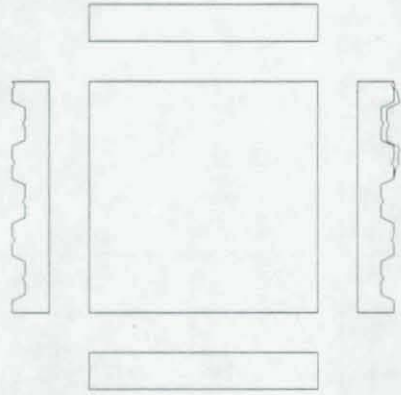
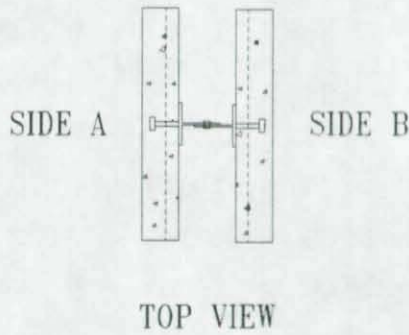
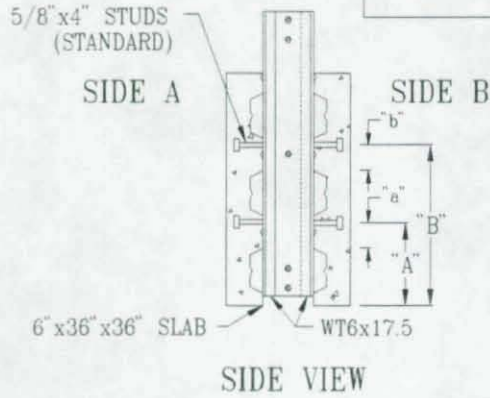
Test:	D12	Deck Type:	2" USD, 20 ga.
Designation:	S54-3N6-2		
Date of Test:	4/14/97		
Concrete Strength:	2915 psi	Stud Position:	S
Concrete Weight:	140.95 pcf	Stud Size:	5/8 in. x 4 in.
Concrete Thickness:	6 in.	Stud Tensile Strength:	72.635 ksi
Maximum Applied Load:	62.19 kips		
Applied Load Per Stud:	15.55 kips		
Concrete Slip at Failure:			
Pot. AT-1:	0.2624 in.	Pot. BT-3:	0.2869 in.
Pot. AB-2:	0.3272 in.	Pot. BB-4:	0.2262 in.
Avg. Side A:	0.2948 in.	Avg. Side B:	0.2566 in.
	Avg.: 0.2757 in.		

Comments: 10% Normal Load
Stud Shearing Failure of Bottom Stud on Side A

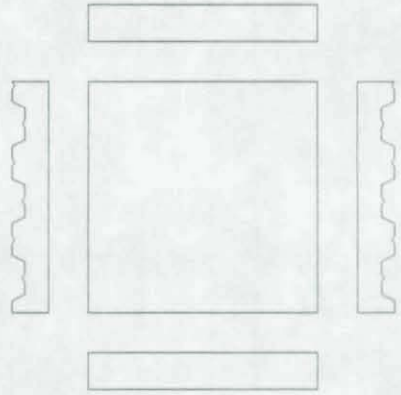


PUSH-OUT TEST LAYOUT & CRACKING SHEET

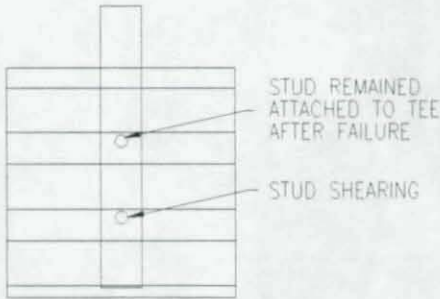
Test:	D12
Designation:	S54-3N6-2
Date:	4/14/97



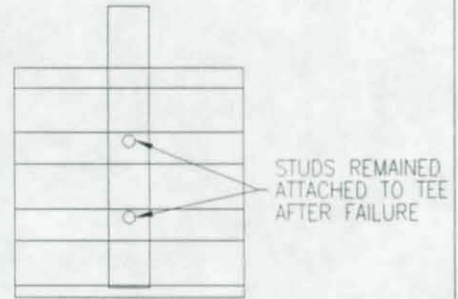
SIDE A SURFACE



SIDE B SURFACE



SIDE A BOTTOM



SIDE B BOTTOM

Test D12 Data

Axial Load (kips)	Slips (in.)				Test Comments
	Pot. AT-1	Pot. AB-2	Pot. BT-3	Pot. BB-4	
0.00	0.0000	0.0000	0.0000	0.0000	BEGIN TEST
10.05	-0.0006	0.0061	0.0000	0.0012	
16.08	0.0006	0.0104	0.0000	0.0012	
21.61	0.0024	0.0128	0.0000	0.0012	
25.38	0.0037	0.0153	0.0006	0.0012	
30.28	0.0061	0.0196	0.0043	0.0012	
34.80	0.0092	0.0239	0.0061	0.0012	
39.70	0.0147	0.0300	0.0098	0.0024	
44.60	0.0208	0.0379	0.0159	0.0037	
48.99	0.0300	0.0489	0.0251	0.0079	
53.27	0.0483	0.0691	0.0398	0.0190	
55.28	0.0661	0.0899	0.0587	0.0361	DECK DEBONDING SIDE A
57.54	0.0887	0.1180	0.0844	0.0575	
58.92	0.1113	0.1450	0.1119	0.0825	
60.43	0.1370	0.1749	0.1443	0.1082	
61.56	0.1608	0.2037	0.1737	0.1339	
61.68	0.1835	0.2324	0.2000	0.1553	
61.06	0.2079	0.2618	0.2275	0.1773	
61.68	0.2336	0.2924	0.2544	0.2011	
62.19	0.2624	0.3272	0.2869	0.2262	QUIET BANG

PUSH-OUT TEST SUMMARY SHEET

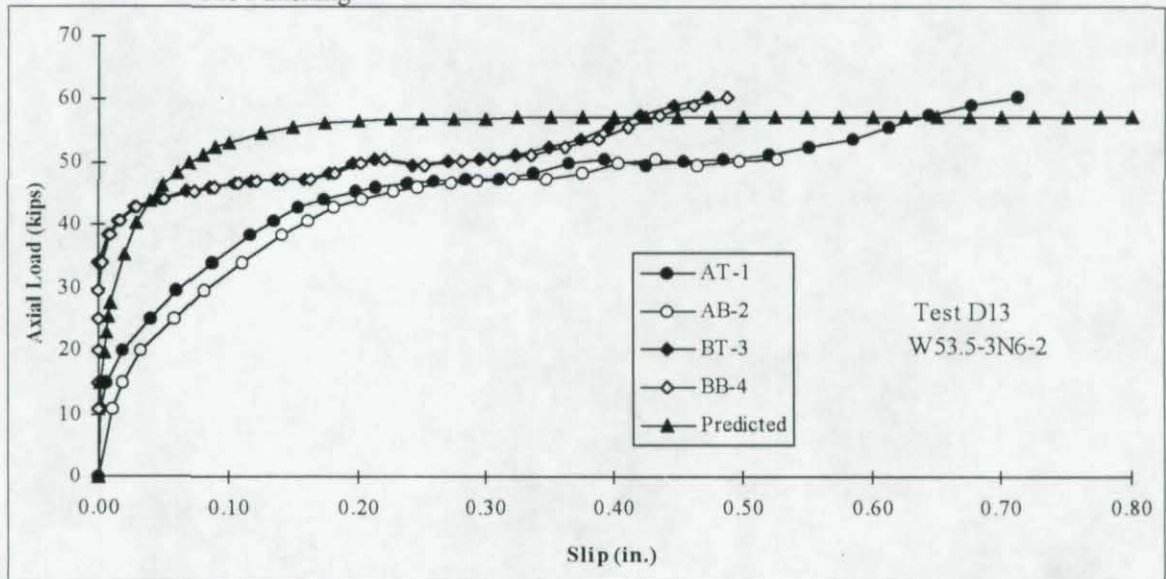
Test:	D13	Deck Type:	2" USD, 20 ga.
Designation:	W53.5-3N6-2		
Date of Test:	4/15/97		
Concrete Strength:	2915 psi	Stud Position:	W
Concrete Weight:	140.95 pcf	Stud Size:	5/8 in. x 3 1/2 in.
Concrete Thickness:	6 in.	Stud Tensile Strength:	67.022 ksi
Maximum Applied Load:	60.30 kips		
Applied Load Per Stud:	15.08 kips		

Concrete Slip at Failure:

Pot. AT-1: 0.7113 in.	Pot. BT-3: 0.4728 in.
Pot. AB-2: ---	Pot. BB-4: 0.4879 in.
Avg. Side A: 0.7113 in.	Avg. Side B: 0.4804 in.

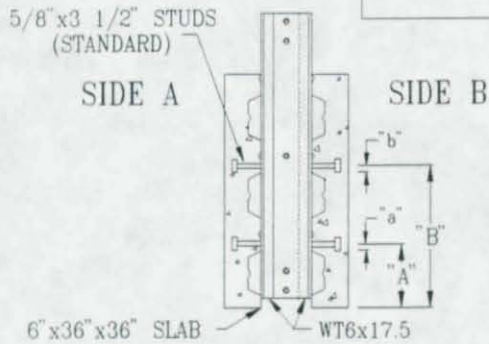
Avg.: 0.5958 in.

Comments: 10% Normal Load
 Stud Shearing Failure of Both Studs on Side A
 Rib Punching

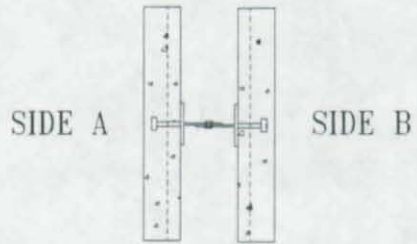


PUSH-OUT TEST LAYOUT & CRACKING SHEET

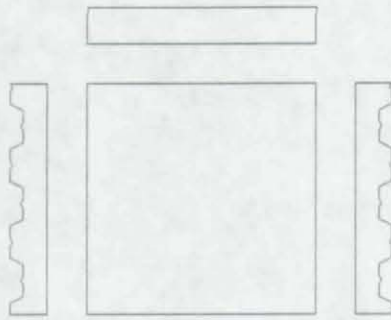
Test:	D13
Designation:	W53.5-3N6-2
Date:	4/15/97



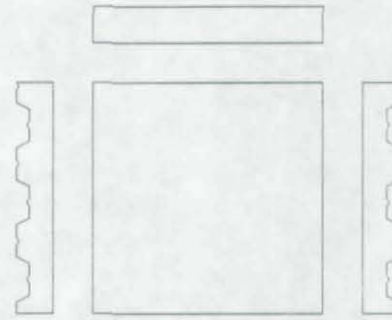
SIDE VIEW



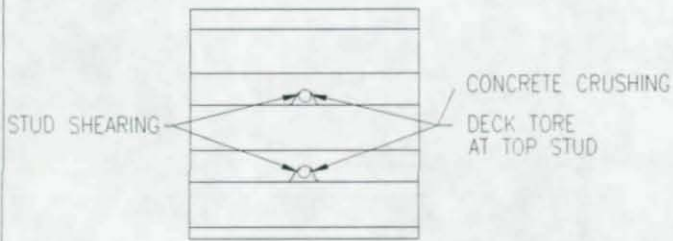
TOP VIEW



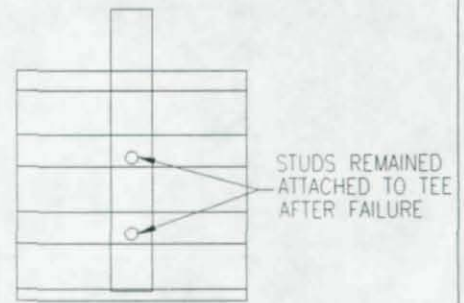
SIDE A SURFACE



SIDE B SURFACE



SIDE A BOTTOM



SIDE B BOTTOM

Test D13 Data

Axial Load (kips)	Slips (in.)				Test Comments
	Pot. AT-1	Pot. AB-2	Pot. BT-3	Pot. BB-4	
0.00	0.0000	0.0000	0.0000	0.0000	BEGIN TEST
10.93	0.0018	0.0110	0.0000	0.0000	
15.08	0.0067	0.0190	0.0000	0.0000	
19.97	0.0183	0.0330	0.0000	0.0000	
25.13	0.0398	0.0587	0.0000	0.0000	
29.52	0.0599	0.0820	-0.0006	0.0006	
34.17	0.0881	0.1119	0.0000	0.0024	
38.57	0.1174	0.1413	0.0080	0.0098	
40.83	0.1364	0.1621	0.0159	0.0177	DECK BULGING SIDE A
42.96	0.1547	0.1817	0.0275	0.0293	
44.10	0.1749	0.2037	0.0483	0.0508	
45.35	0.1988	0.2288	0.0685	0.0734	
46.11	0.2147	0.2465	0.0862	0.0899	
46.86	0.2391	0.2728	0.1052	0.1088	
47.24	0.2599	0.2936	0.1180	0.1217	
47.49	0.2844	0.3206	0.1376	0.1425	
47.49	0.3107	0.3475	0.1584	0.1633	
48.49	0.3364	0.3750	0.1774	0.1822	DECK BULGING SIDE B
49.87	0.3645	0.4038	0.1957	0.2018	DECK/CONC. SEPARATION SIDE A
50.50	0.3926	0.4325	0.2134	0.2207	
49.62	0.4244	0.4649	0.2428	0.2519	
50.13	0.4544	0.4967	0.2697	0.2807	
50.50	0.4844	0.5267	0.2948	0.3057	
51.38	0.5205		0.3235	0.3357	DECK INTERFERED W/ POT AB-2
52.51	0.5517		0.3486	0.3620	
53.77	0.5847		0.3731	0.3877	
55.65	0.6134		0.3957	0.4115	
57.54	0.6434		0.4202	0.4353	

Test D13 Data

Axial Load (kips)	Slips (in.)				Test Comments
	Pot. AT-1	Pot. AB-2	Pot. BT-3	Pot. BB-4	
59.30	0.6758		0.4465	0.4616	DECK BULGING
60.30	0.7113		0.4728	0.4879	SOFT BANG

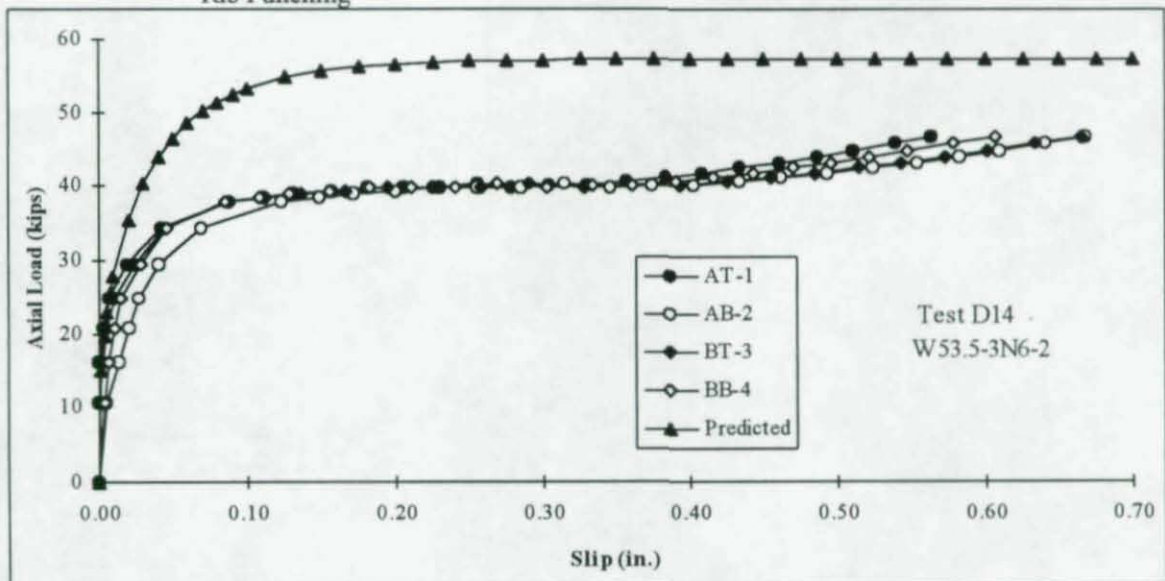
PUSH-OUT TEST SUMMARY SHEET

Test:	D14	Deck Type:	2" USD, 20 ga.
Designation:	W53.5-3N6-2		
Date of Test:	4/15/97		
Concrete Strength:	2915 psi	Stud Position:	W
Concrete Weight:	140.95 pcf	Stud Size:	5/8 in. x 3 1/2 in.
Concrete Thickness:	6 in.	Stud Tensile Strength:	67.022 ksi
Maximum Applied Load:	46.61 kips		
Applied Load Per Stud:	11.65 kips		
Concrete Slip at Failure:			

Pot. AT-1: 0.5639 in.	Pot. BT-3: 0.6649 in.
Pot. AB-2: 0.6674 in.	Pot. BB-4: 0.6071 in.
Avg. Side A: 0.6157 in.	Avg. Side B: 0.6360 in.

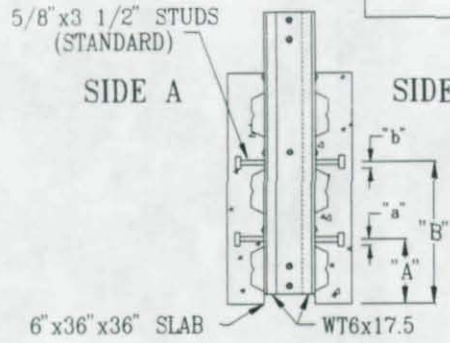
Avg.: 0.6258 in.

Comments: 10% Normal Load
 Stud Shearing & Stud Rupture Failure of Bottom Stud on Side B
 Rib Punching

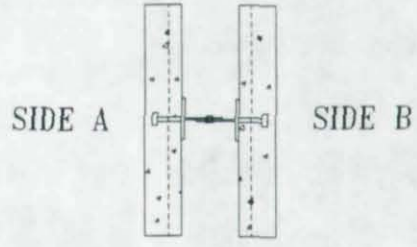


PUSH-OUT TEST LAYOUT & CRACKING SHEET

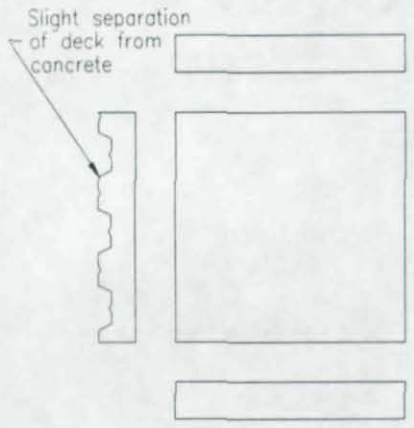
Test:	D14
Designation:	W53.5-3N6-2
Date:	4/15/97



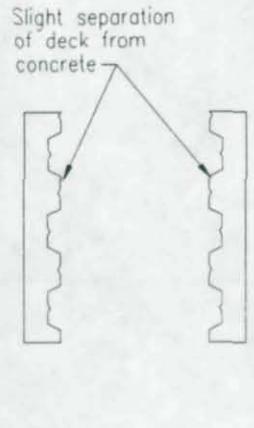
SIDE VIEW



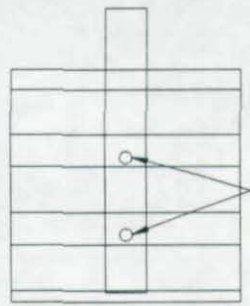
TOP VIEW



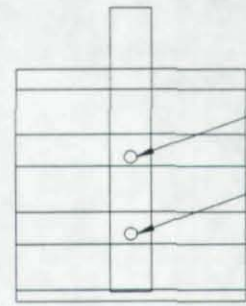
SIDE A SURFACE



SIDE B SURFACE



SIDE A BOTTOM



SIDE B BOTTOM

Test D14 Data

Axial Load (kips)	Slips (in.)				Test Comments
	Pot. AT-1	Pot. AB-2	Pot. BT-3	Pot. BB-4	
0.00	0.0000	0.0000	0.0000	0.0000	BEGIN TEST
10.55	-0.0006	0.0055	0.0006	0.0037	
16.21	0.0000	0.0141	0.0024	0.0073	
20.60	0.0024	0.0208	0.0055	0.0110	
24.87	0.0073	0.0275	0.0104	0.0147	DECK/CONC. SEPARATION
29.52	0.0190	0.0410	0.0245	0.0281	
34.30	0.0416	0.0685	0.0447	0.0465	
37.81	0.0881	0.1230	0.0875	0.0856	
38.44	0.1107	0.1480	0.1125	0.1076	
39.07	0.1315	0.1719	0.1364	0.1284	
39.32	0.1566	0.1994	0.1658	0.1553	
39.95	0.1816	0.2257	0.1951	0.1822	
39.95	0.2049	0.2551	0.2257	0.2103	SLIGHT DECK BULGING
39.82	0.2300	0.2851	0.2581	0.2403	
40.45	0.2550	0.3144	0.2899	0.2684	
39.82	0.2783	0.3456	0.3278	0.3033	
40.08	0.3046	0.3750	0.3615	0.3332	
40.20	0.3297	0.4031	0.3927	0.3607	
40.70	0.3572	0.4337	0.4251	0.3901	
41.21	0.3835	0.4624	0.4557	0.4164	
41.83	0.4085	0.4930	0.4850	0.4433	
42.59	0.4342	0.5242	0.5150	0.4708	
43.22	0.4605	0.5536	0.5431	0.4965	
43.84	0.4862	0.5823	0.5725	0.5221	
44.72	0.5113	0.6099	0.6012	0.5478	
45.73	0.5388	0.6404	0.6343	0.5790	
46.61	0.5639	0.6674	0.6649	0.6071	SOFT POP

PUSH-OUT TEST SUMMARY SHEET

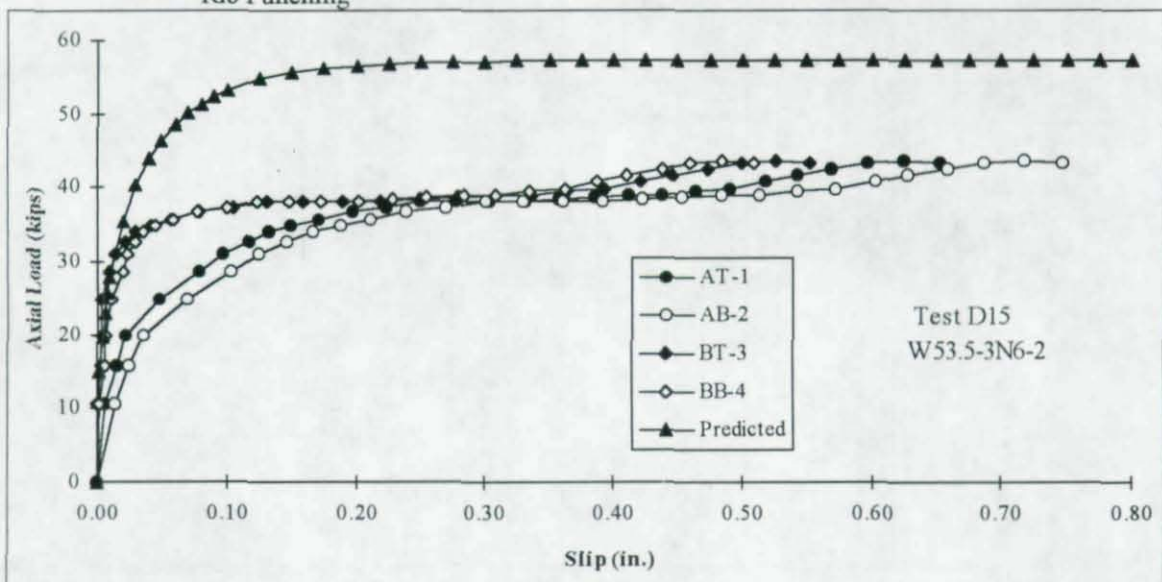
Test:	D15	Deck Type:	2" USD, 20 ga.
Designation:	W53.5-3N6-2		
Date of Test:	4/16/97		
Concrete Strength:	2915 psi	Stud Position:	W
Concrete Weight:	140.95 pcf	Stud Size:	5/8 in. x 3 1/2 in.
Concrete Thickness:	6 in.	Stud Tensile Strength:	67.022 ksi
Maximum Applied Load:	43.59 kips		
Applied Load Per Stud:	10.90 kips		

Concrete Slip at Failure:

Pot. AT-1: 0.6526 in.	Pot. BT-3: 0.5528 in.
Pot. AB-2: 0.7471 in.	Pot. BB-4: 0.5100 in.
Avg. Side A: 0.6999 in.	Avg. Side B: 0.5314 in.

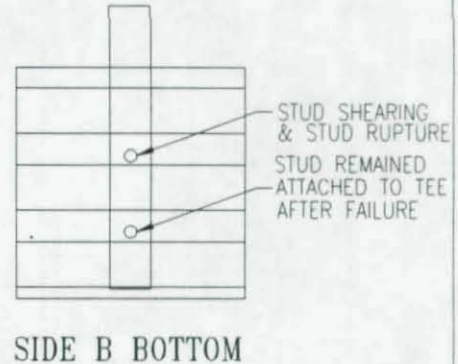
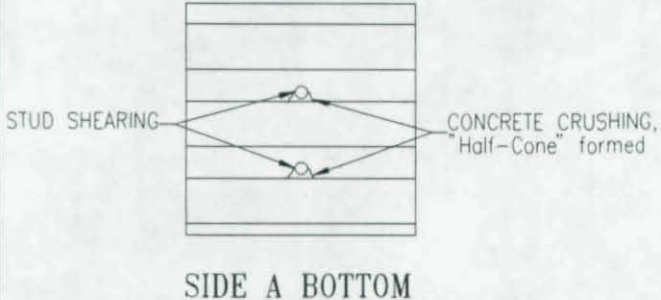
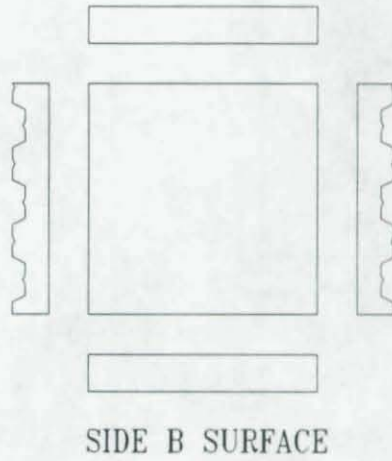
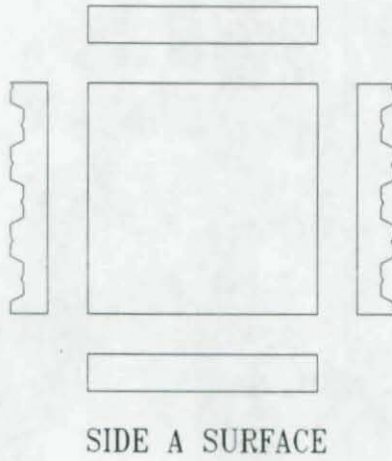
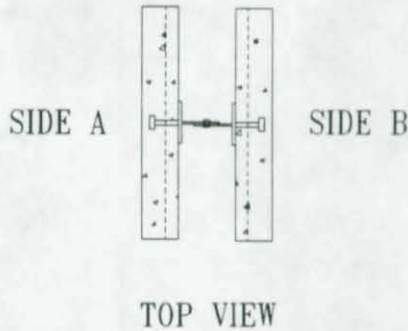
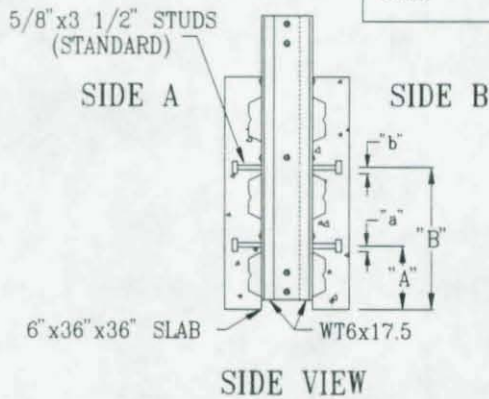
Avg.: 0.6156 in.

Comments: 10% Normal Load
 Stud Shearing Failure of Both Studs on Side A and Top Stud on Side B
 Rib Punching



PUSH-OUT TEST LAYOUT & CRACKING SHEET

Test:	<u>D15</u>
Designation:	<u>W53.5-3N6-2</u>
Date:	<u>4/16/97</u>



Test D15 Data

Axial Load (kips)	Slips (in.)				Test
	Pot. AT-1	Pot. AB-2	Pot. BT-3	Pot. BB-4	Comments
0.00	0.0000	0.0000	0.0000	0.0000	BEGIN TEST
10.68	0.0055	0.0135	-0.0006	0.0012	
15.83	0.0153	0.0245	0.0031	0.0055	
19.97	0.0220	0.0361	0.0031	0.0055	
24.75	0.0483	0.0698	0.0031	0.0110	
28.77	0.0795	0.1040	0.0086	0.0196	CRACKING NOISES
31.03	0.0972	0.1248	0.0141	0.0232	
32.66	0.1168	0.1468	0.0214	0.0294	
34.05	0.1327	0.1664	0.0294	0.0355	
34.92	0.1505	0.1878	0.0410	0.0446	DECK/CONC. SEPARATION
35.80	0.1712	0.2117	0.0569	0.0593	SLIGHT DECK BULGING
36.93	0.1969	0.2398	0.0789	0.0777	POPPING NOISES
37.44	0.2238	0.2698	0.1052	0.1009	
38.19	0.2501	0.3010	0.1315	0.1229	
38.32	0.2777	0.3304	0.1590	0.1480	
38.32	0.3040	0.3616	0.1896	0.1731	
38.32	0.3315	0.3928	0.2189	0.2018	
38.57	0.3590	0.4234	0.2495	0.2293	
38.82	0.3865	0.4540	0.2795	0.2550	
39.07	0.4128	0.4846	0.3082	0.2838	
39.07	0.4385	0.5146	0.3364	0.3088	
39.57	0.4648	0.5439	0.3639	0.3351	DECK BULGING, BOT. STUD, SIDE A
39.95	0.4917	0.5733	0.3932	0.3633	
40.83	0.5186	0.6033	0.4220	0.3877	
41.71	0.5431	0.6290	0.4470	0.4116	
42.46	0.5706	0.6590	0.4746	0.4379	
43.34	0.5969	0.6871	0.4996	0.4605	
43.59	0.6251	0.7183	0.5272	0.4856	
43.47	0.6526	0.7471	0.5528	0.5100	SOFT BANG

PUSH-OUT TEST SUMMARY SHEET

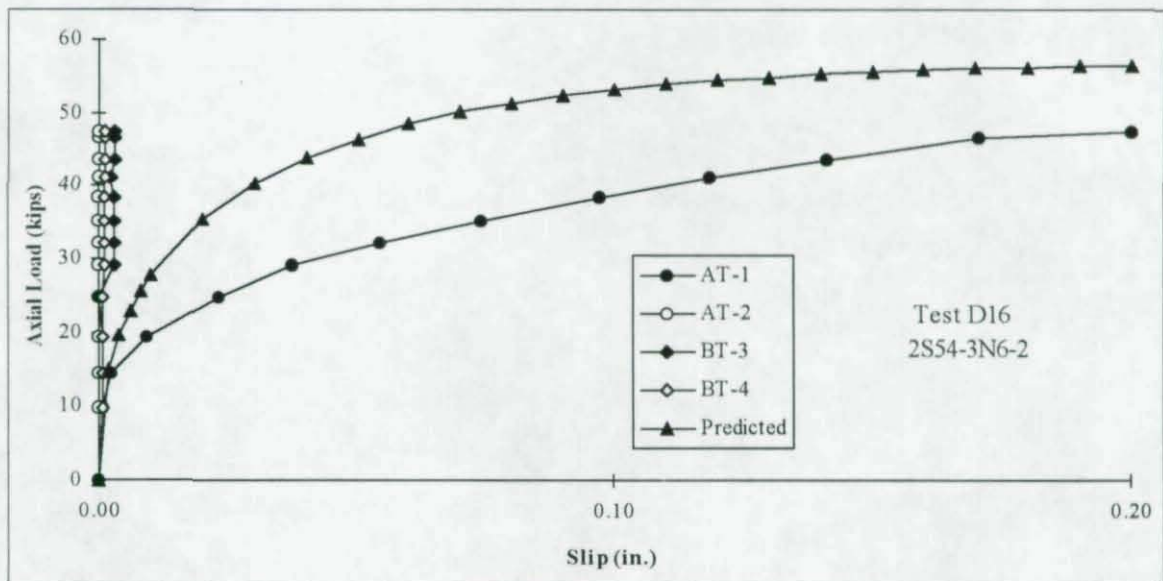
Test:	D16	Deck Type:	2" USD, 20 ga.
Designation:	2S54-3N6-2		
Date of Test:	4/17/97		
Concrete Strength:	2915 psi	Stud Position:	2S
Concrete Weight:	140.95 pcf	Stud Size:	5/8 in. x 4 in.
Concrete Thickness:	6 in.	Stud Tensile Strength:	72.635 ksi
Maximum Applied Load:	47.49 kips		
Applied Load Per Stud:	11.87 kips		

Concrete Slip at Failure:

Pot. AT-1: 0.2000 in.	Pot. BT-3: 0.0031 in.
Pot. AT-2: ---	Pot. BT-4: ---
Avg. Side A: 0.2000 in.	Avg. Side B: 0.0031 in.

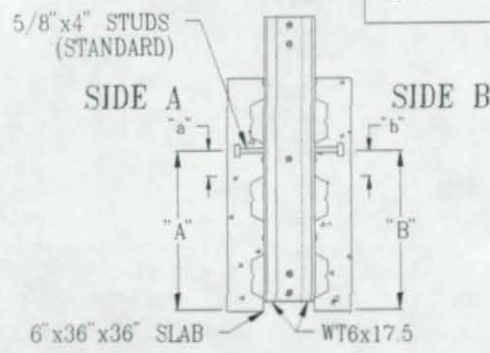
Avg.: 0.1016 in.

Comments: 10% Normal Load
Stud Shearing Failure of Both Studs on Side A

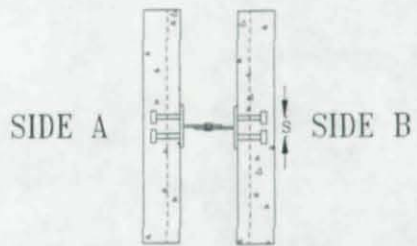


PUSH-OUT TEST LAYOUT & CRACKING SHEET

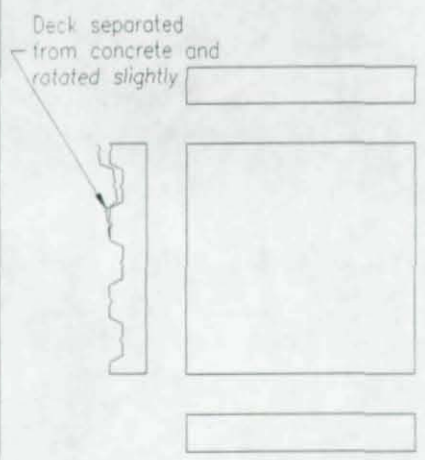
Test:	D16
Designation:	2S54-3N6-2
Date:	4/17/97



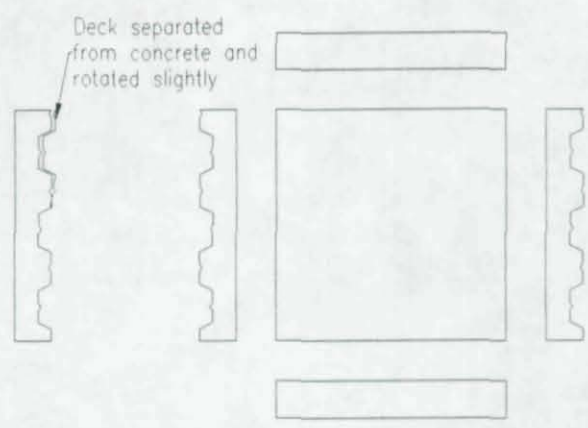
SIDE VIEW



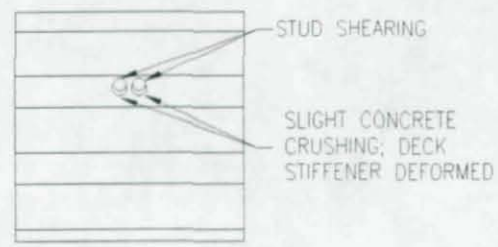
TOP VIEW



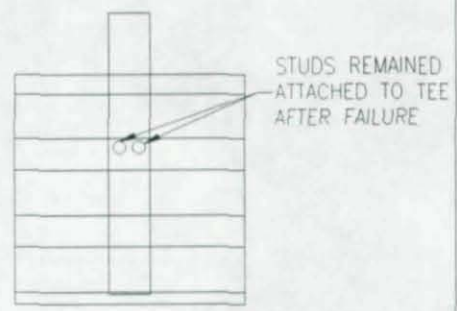
SIDE A SURFACE



SIDE B SURFACE



SIDE A BOTTOM



SIDE B BOTTOM

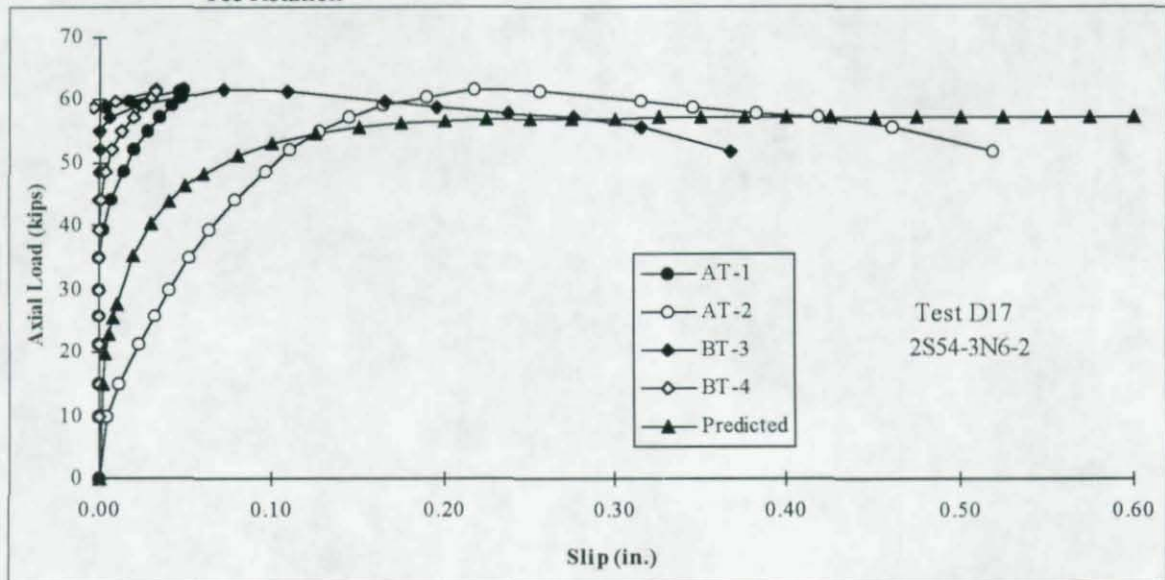
Test D16 Data

Axial Load (kips)	Slips (in.)				Test Comments
	Pot. AT-1	Pot. AT-2	Pot. BT-3	Pot. BT-4	
0.00	0.0000		0.0000		BEGIN TEST
9.80	0.0006		0.0006		
14.57	0.0024		0.0006		
19.35	0.0092		0.0006		
24.87	0.0232		0.0000		
29.15	0.0373		0.0031		
32.29	0.0544		0.0031		
35.18	0.0740		0.0031		
38.44	0.0972		0.0031		
41.08	0.1186		0.0024		DECK DEBONDING SIDE A
43.59	0.1413		0.0031		
46.61	0.1706		0.0031		
47.49	0.2000		0.0031		DECK RIB ROTATION SIDE A

PUSH-OUT TEST SUMMARY SHEET

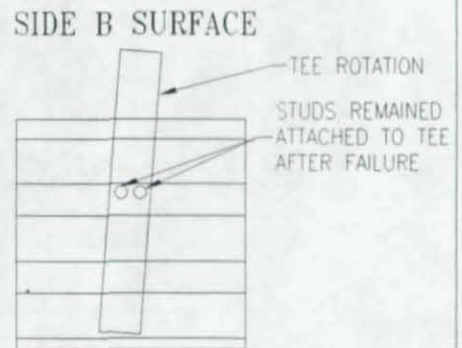
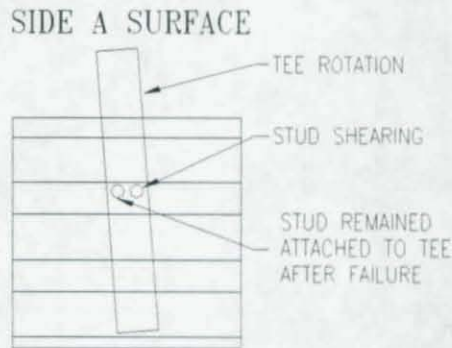
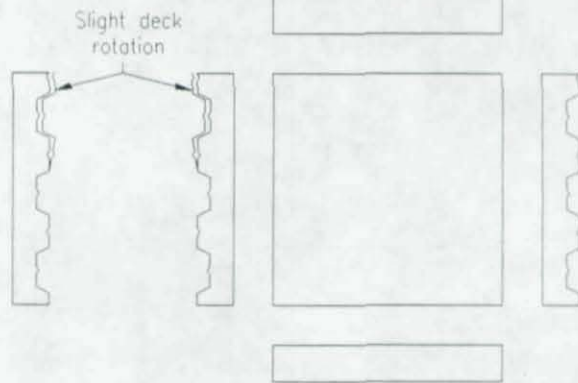
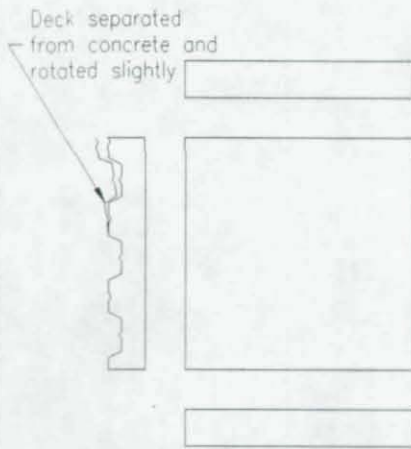
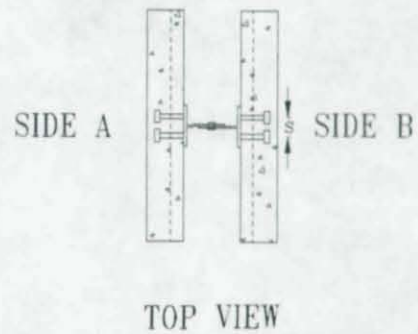
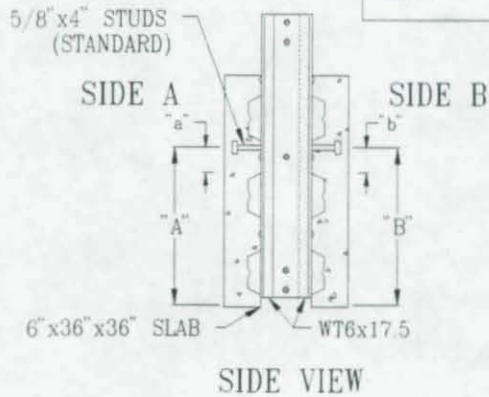
Test:	D17	Deck Type:	2" USD, 20 ga.
Designation:	2S54-3N6-2		
Date of Test:	4/17/97		
Concrete Strength:	2915 psi	Stud Position:	2S
Concrete Weight:	140.95 pcf	Stud Size:	5/8 in. x 4 in.
Concrete Thickness:	6 in.	Stud Tensile Strength:	72.635 ksi
Maximum Applied Load:	61.68 kips		
Applied Load Per Stud:	15.42 kips		
Concrete Slip at Failure:			
Pot. AT-1:	-0.0837 in.	Pot. BT-3:	0.3670 in.
Pot. AT-2:	0.5194 in.	Pot. BT-4:	-0.0825 in.
Avg. Side A:	0.2179 in.	Avg. Side B:	0.1423 in.
	Avg.: 0.1801 in.		

Comments: 10% Normal Load
 Stud Shearing Failure of Stud AT-1
 Tee Rotation



PUSH-OUT TEST LAYOUT & CRACKING SHEET

Test:	D17
Designation:	2S54-3N6-2
Date:	4/17/97



Test D17 Data

Axial Load (kips)	Slips (in.)				Test Comments
	Pot. AT-1	Pot. AT-2	Pot. BT-3	Pot. BT-4	
0.00	0.0000	0.0000	0.0000	0.0000	BEGIN TEST
9.80	0.0000	0.0049	0.0000	0.0000	
15.08	0.0000	0.0110	0.0000	0.0000	
21.23	0.0000	0.0232	0.0000	0.0000	
25.63	0.0000	0.0324	0.0000	0.0000	
29.90	0.0000	0.0404	0.0000	0.0000	
34.92	0.0000	0.0520	0.0000	0.0000	
39.32	0.0019	0.0642	0.0000	0.0000	
44.10	0.0074	0.0789	0.0000	0.0006	
48.74	0.0135	0.0960	0.0000	0.0031	
52.26	0.0202	0.1101	0.0000	0.0073	CONC./DECK DEBONDING, A & B
55.15	0.0276	0.1272	0.0000	0.0128	
57.41	0.0349	0.1444	0.0061	0.0196	
59.17	0.0416	0.1646	0.0232	0.0251	DECK RIB ROTATION, A & B
60.55	0.0471	0.1896	0.0465	0.0306	
61.68	0.0490	0.2178	0.0722	0.0324	
61.43	0.0465	0.2557	0.1089	0.0324	TEE ROTATION
59.67	0.0178	0.3150	0.1657	0.0098	
58.92	0.0037	0.3450	0.1957	-0.0031	
58.04	-0.0165	0.3817	0.2379	-0.0208	
57.16	-0.0348	0.4184	0.2758	-0.0373	
55.78	-0.0556	0.4606	0.3156	-0.0563	
52.01	-0.0837	0.5194	0.3670	-0.0825	ENDED TEST. EXCESSIVE TEE ROT.

PUSH-OUT TEST SUMMARY SHEET

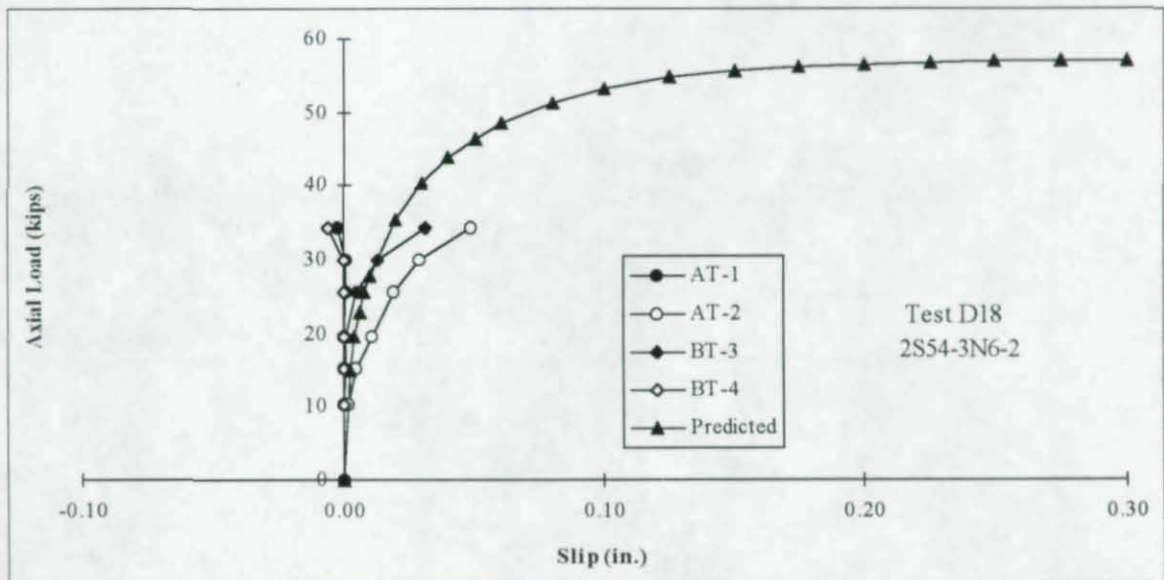
Test:	D18	Deck Type:	2" USD, 20 ga.
Designation:	2S54-3N6-2		
Date of Test:	4/17/97		
Concrete Strength:	2915 psi	Stud Position:	2S
Concrete Weight:	140.95 pcf	Stud Size:	5/8 in. x 4 in.
Concrete Thickness:	6 in.	Stud Tensile Strength:	72.635 ksi
Maximum Applied Load:	34.30 kips		
Applied Load Per Stud:	8.58 kips		

Concrete Slip at Failure:

Pot. AT-1: -0.0024 in.	Pot. BT-3: 0.0312 in.
Pot. AT-2: 0.0489 in.	Pot. BT-4: -0.0061 in.
Avg. Side A: 0.0232 in.	Avg. Side B: 0.0126 in.

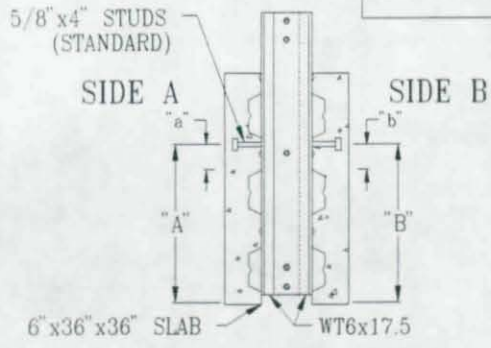
Avg.: 0.0179 in.

Comments: 10% Normal Load
 Test Aborted - Excessive Tee Rotation

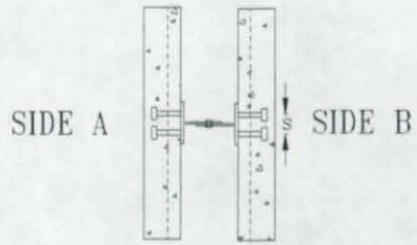


PUSH-OUT TEST LAYOUT & CRACKING SHEET

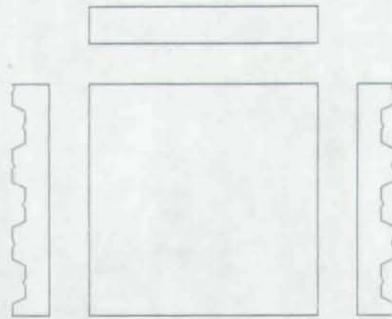
Test:	D18
Designation:	2S54-3N6-2
Date:	4/17/97



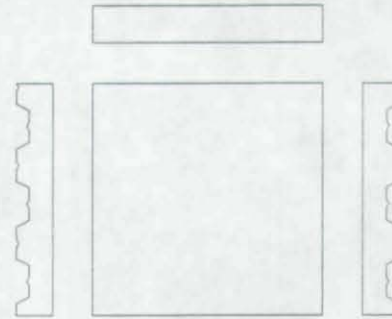
SIDE VIEW



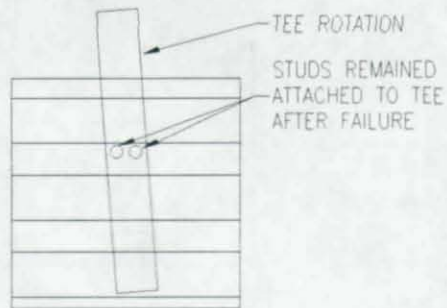
TOP VIEW



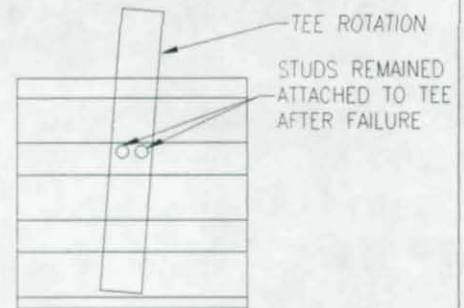
SIDE A SURFACE



SIDE B SURFACE



SIDE A BOTTOM



SIDE B BOTTOM

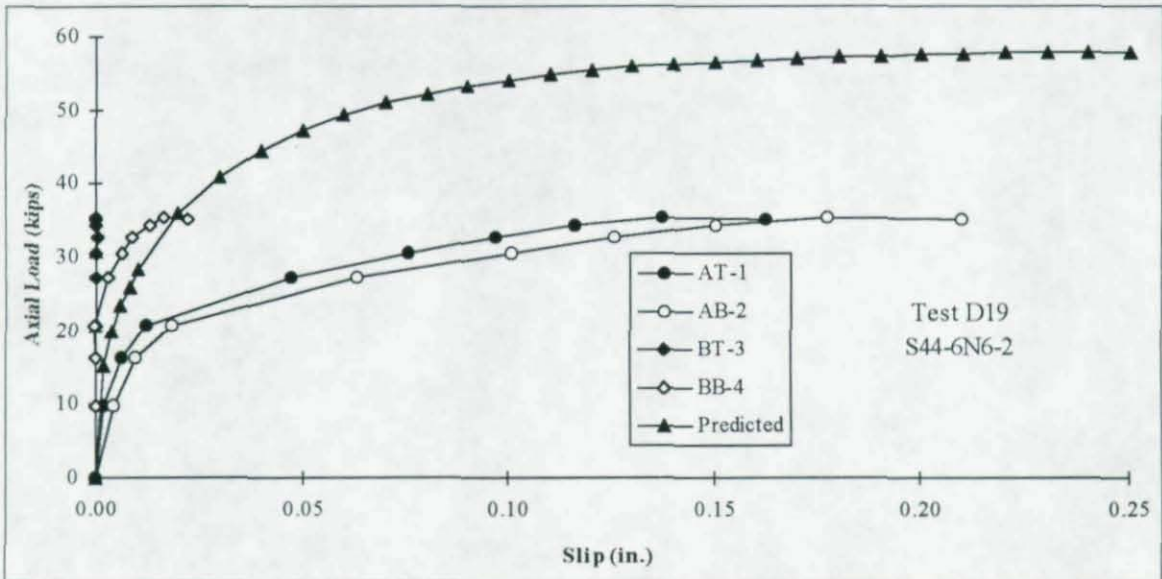
Test D18 Data

Axial Load (kips)	Slips (in.)				Test Comments
	Pot. AT-1	Pot. AT-2	Pot. BT-3	Pot. BT-4	
0.00	0.0000	0.0000	0.0000	0.0000	BEGIN TEST
10.43	0.0000	0.0018	0.0000	0.0000	
15.20	0.0000	0.0043	0.0006	0.0000	
19.60	0.0000	0.0104	0.0006	0.0000	
25.50	0.0006	0.0190	0.0043	0.0000	
30.03	0.0006	0.0294	0.0128	0.0000	
34.30	-0.0024	0.0489	0.0312	-0.0061	ENDED TEST. EXCESSIVE TEE ROT.

PUSH-OUT TEST SUMMARY SHEET

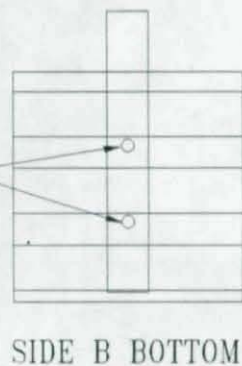
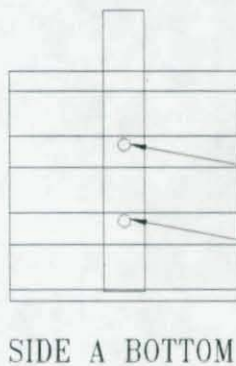
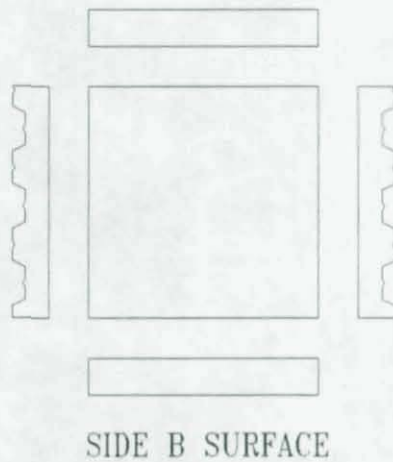
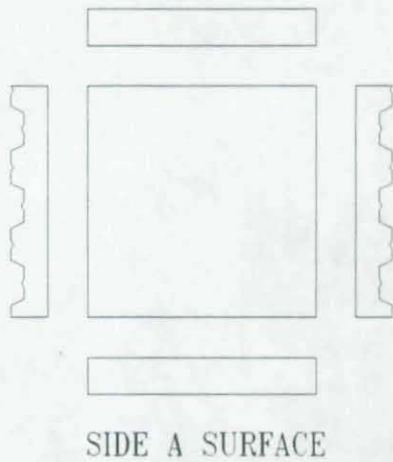
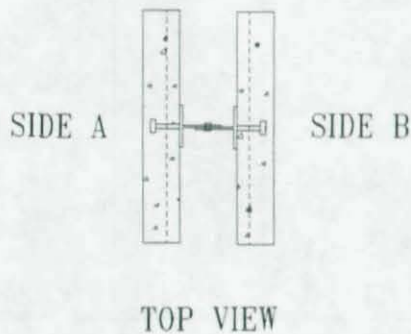
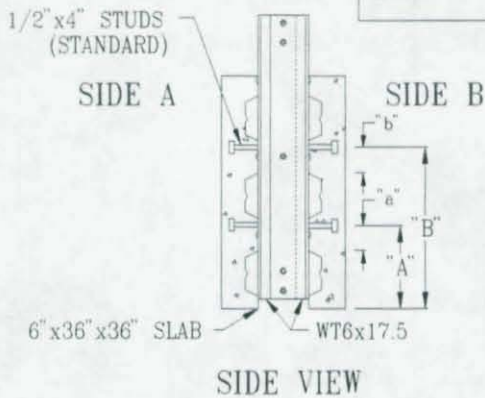
Test:	D19	Deck Type:	2" USD, 20 ga.
Designation:	S44-6N6-2		
Date of Test:	5/14/97		
Concrete Strength:	5890 psi	Stud Position:	S
Concrete Weight:	150.40 pcf	Stud Size:	1/2 in. x 4 in.
Concrete Thickness:	6 in.	Stud Tensile Strength:	74.049 ksi
Maximum Applied Load:	35.43 kips		
Applied Load Per Stud:	8.86 kips		
Concrete Slip at Failure:			
Pot. AT-1:	0.1627 in.	Pot. BT-3:	0 in.
Pot. AB-2:	0.2098 in.	Pot. BB-4:	0.0220 in.
Avg. Side A:	0.1863 in.	Avg. Side B:	0.0110 in.
	Avg.: 0.0986 in.		

Comments: 10% Normal Load
Stud Shearing Failure of Bottom Stud on Side A



PUSH-OUT TEST LAYOUT & CRACKING SHEET

Test:	D19
Designation:	S44-6N6-2
Date:	5/14/97



STUDS REMAINED ATTACHED TO TEE AFTER FAILURE

STUD SHEARING

Test D19 Data

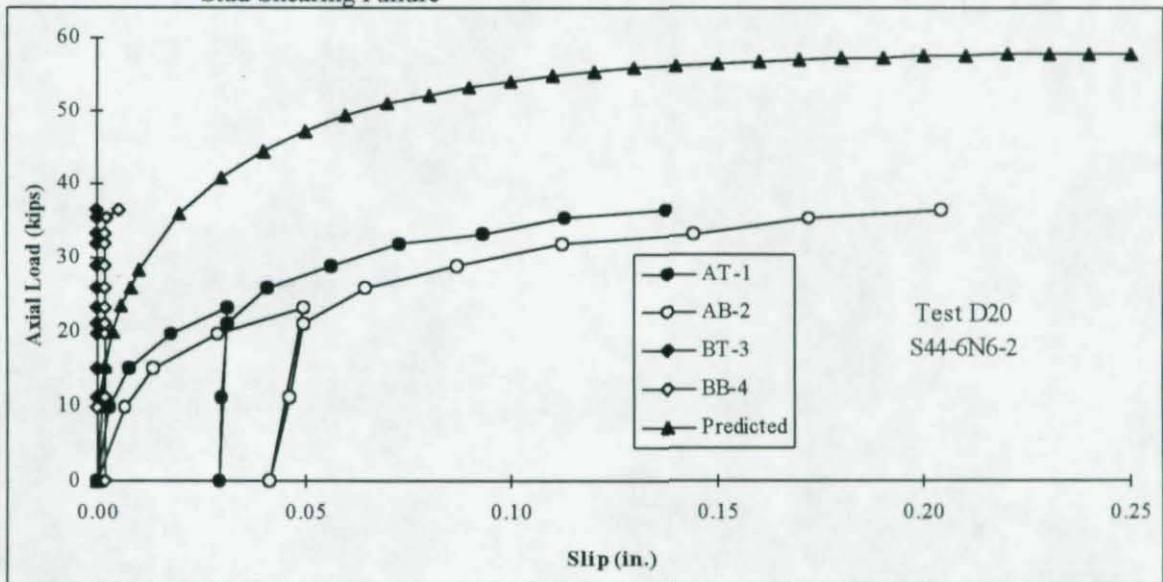
Axial Load (kips)	Slips (in.)				Test Comments	
	Pot. AT-1	Pot. AB-2	Pot. BT-3	Pot. BB-4		
0.00	0.0000	0.0000	0.0000	0.0000	BEGIN TEST	
9.92	0.0018	0.0043	0.0000	0.0000		
16.33	0.0061	0.0098	0.0000	0.0000		
20.60	0.0122	0.0184	0.0000	-0.0006		
27.39	0.0471	0.0630	0.0000	0.0031		
30.53	0.0758	0.1009	0.0000	0.0061		
32.79	0.0972	0.1260	0.0006	0.0086		
34.30	0.1162	0.1505	0.0000	0.0128		
35.43	0.1376	0.1774	0.0000	0.0165		
35.30	0.1627	0.2098	0.0000	0.0220		SOFT BANG

PUSH-OUT TEST SUMMARY SHEET

Test:	D20	Deck Type:	2" USD, 20 ga.
Designation:	S44-6N6-2		
Date of Test:	5/14/97		
Concrete Strength:	5890 psi	Stud Position:	S
Concrete Weight:	150.40 pcf	Stud Size:	1/2 in. x 4 in.
Concrete Thickness:	6 in.	Stud Tensile Strength:	74.049 ksi
Maximum Applied Load:	36.56 kips		
Applied Load Per Stud:	9.14 kips		
Concrete Slip at Failure:			

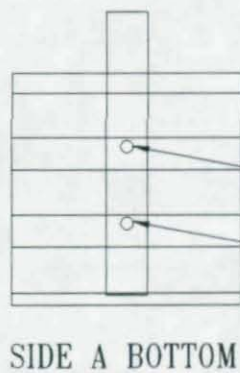
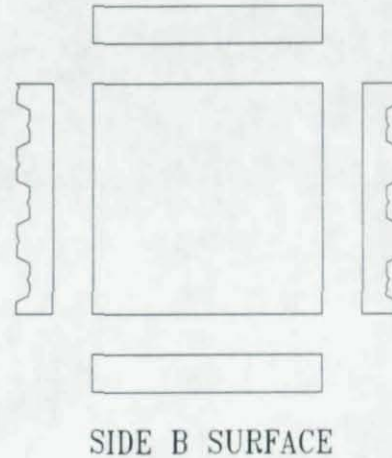
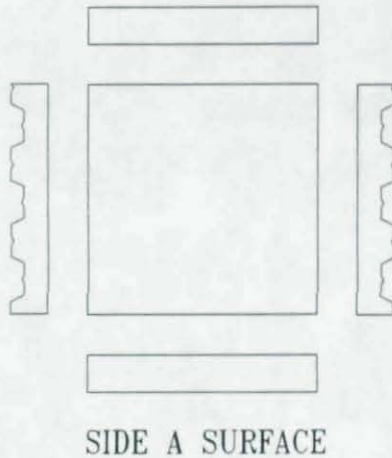
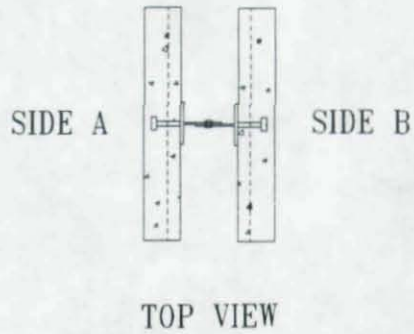
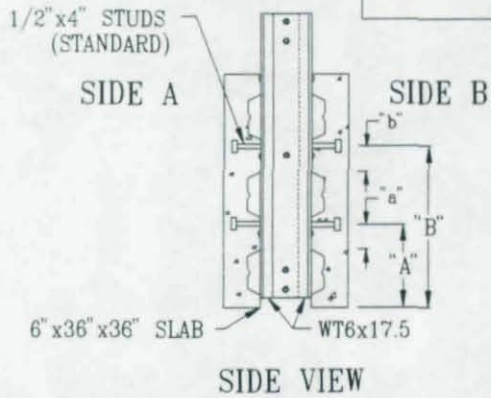
Pot. AT-1: 0.1376 in.	Pot. BT-3: 0 in.
Pot. AB-2: 0.2043 in.	Pot. BB-4: 0.0055 in.
Avg. Side A: 0.1710 in.	Avg. Side B: 0.0028 in.
Avg.: 0.0869 in.	

Comments: 10% Normal Load
Weld Failure
Stud Shearing Failure



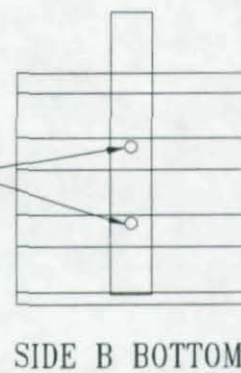
PUSH-OUT TEST LAYOUT & CRACKING SHEET

Test:	D20
Designation:	S44-6N6-2
Date:	5/14/97



STUDS REMAINED
ATTACHED TO TEE
AFTER FAILURE

WELD FAILURE
STUD SHEARING



Test D20 Data

Axial Load (kips)	Slips (in.)				Test Comments
	Pot. AT-1	Pot. AB-2	Pot. BT-3	Pot. BB-4	
0.00	0.0000	0.0000	0.0000	0.0000	BEGIN TEST
9.92	0.0031	0.0067	0.0000	0.0000	
15.08	0.0080	0.0135	0.0000	0.0018	
19.72	0.0177	0.0287	0.0000	0.0018	
23.12	0.0312	0.0495	0.0000	0.0018	
0.13	0.0294	0.0416	0.0000	0.0018	UNLOADED. SLIPS NOT EQUAL.
11.06	0.0300	0.0465	0.0000	0.0018	
20.98	0.0312	0.0495	0.0000	0.0018	
26.01	0.0410	0.0648	0.0000	0.0018	
29.02	0.0563	0.0869	0.0000	0.0018	
31.78	0.0728	0.1125	0.0000	0.0018	
33.17	0.0930	0.1443	0.0000	0.0018	
35.55	0.1131	0.1725	0.0000	0.0024	
36.56	0.1376	0.2043	0.0000	0.0055	BANG

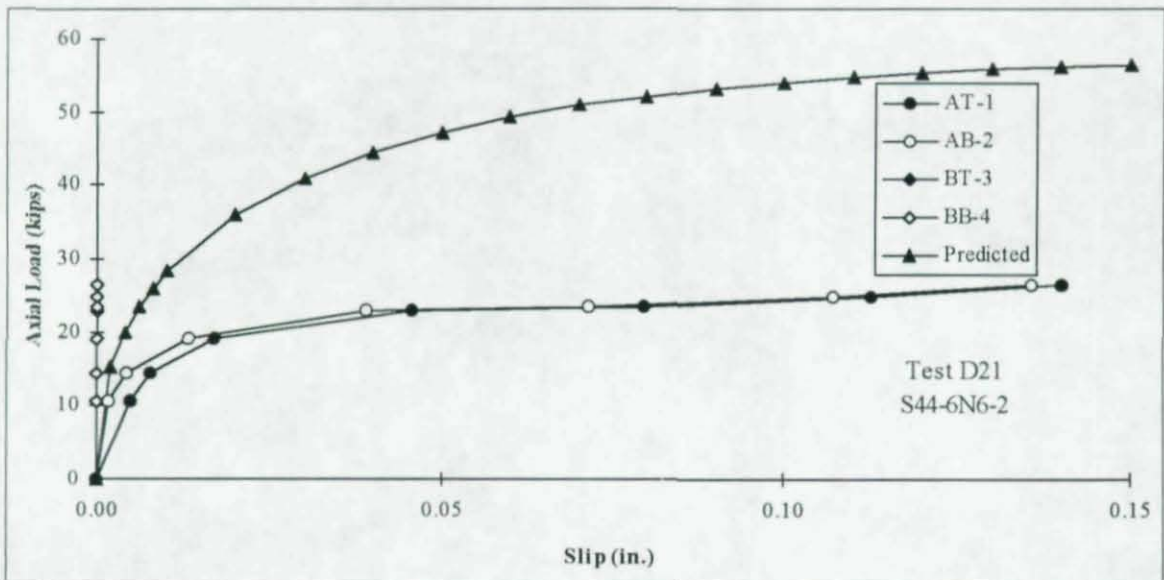
PUSH-OUT TEST SUMMARY SHEET

Test:	D21	Deck Type:	2" USD, 20 ga.
Designation:	S44-6N6-2		
Date of Test:	5/14/97		
Concrete Strength:	5890 psi	Stud Position:	S
Concrete Weight:	150.40 pcf	Stud Size:	1/2 in. x 4 in.
Concrete Thickness:	6 in.	Stud Tensile Strength:	74.049 ksi
Maximum Applied Load:	26.51 kips		
Applied Load Per Stud:	6.63 kips		
Concrete Slip at Failure:			

Pot. AT-1:	0.1401 in.	Pot. BT-3:	0 in.
Pot. AB-2:	0.1358 in.	Pot. BB-4:	0 in.
Avg. Side A:	0.1380 in.	Avg. Side B:	0 in.

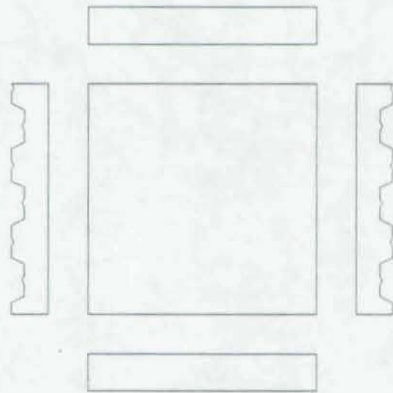
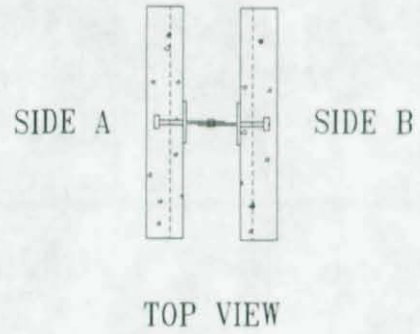
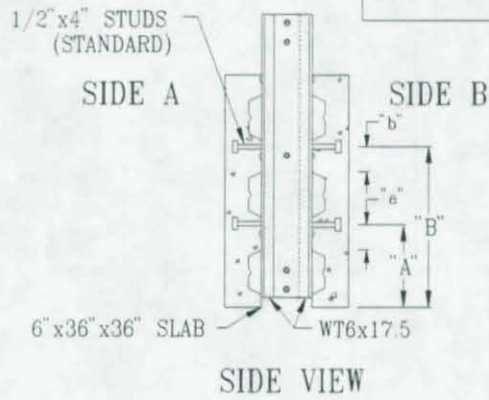
Avg.: 0.0690 in.

Comments: 10% Normal Load
Stud Shearing Failure of Both Studs on Side A

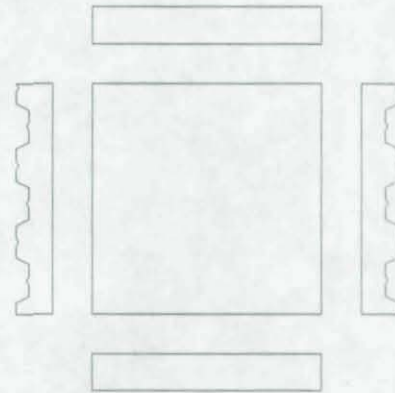


PUSH-OUT TEST LAYOUT & CRACKING SHEET

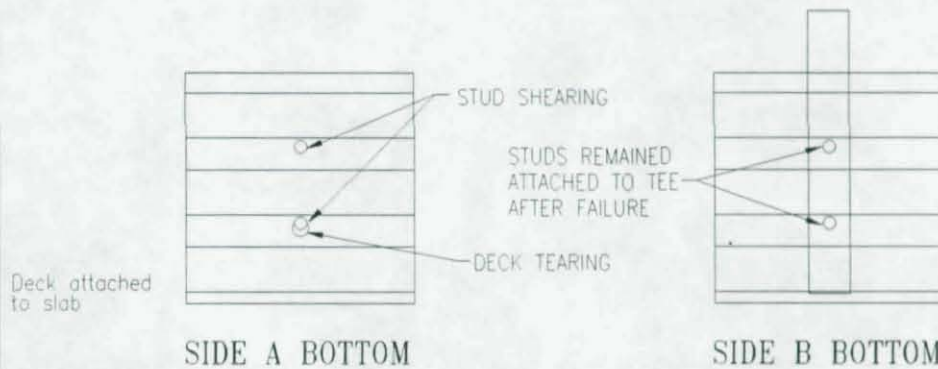
Test:	D21
Designation:	S44-6N6-2
Date:	5/14/97



SIDE A SURFACE



SIDE B SURFACE



SIDE A BOTTOM

SIDE B BOTTOM

Test D21 Data

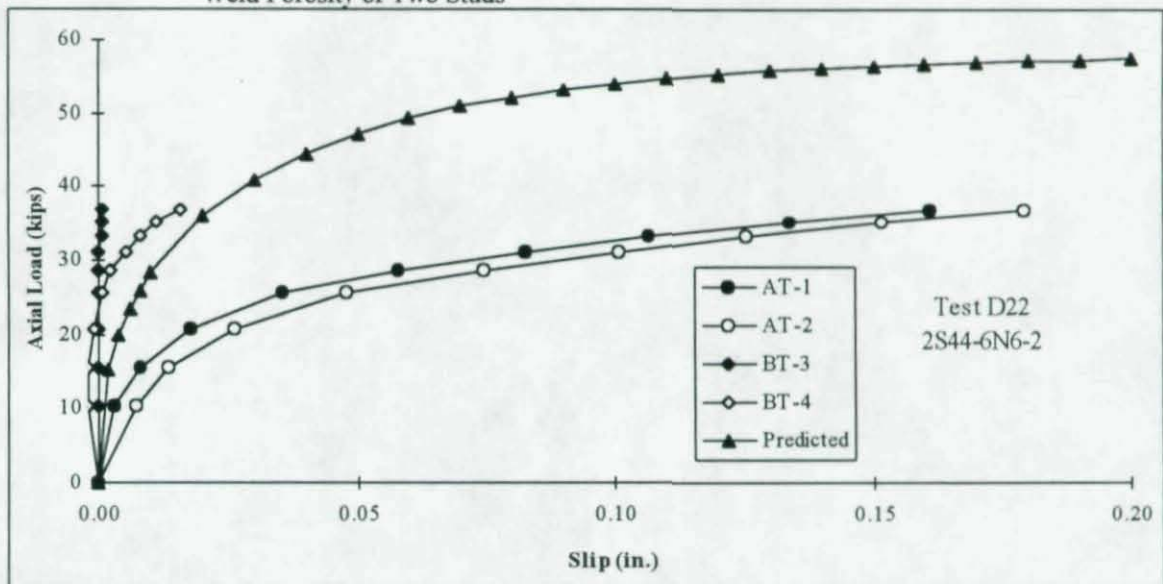
Axial Load (kips)	Slips (in.)				Test Comments
	Pot. AT-1	Pot. AB-2	Pot. BT-3	Pot. BB-4	
0.00	0.0000	0.0000	0.0000	0.0000	BEGIN TEST
10.68	0.0049	0.0018	0.0000	0.0000	
14.45	0.0080	0.0043	0.0000	0.0000	
19.22	0.0171	0.0135	0.0000	0.0000	
22.86	0.0459	0.0391	0.0000	0.0000	
23.37	0.0795	0.0716	0.0000	0.0000	
24.87	0.1125	0.1070	0.0000	0.0000	
26.51	0.1401	0.1358	0.0000	0.0000	BANG

PUSH-OUT TEST SUMMARY SHEET

Test:	D22	Deck Type:	2" USD, 20 ga.
Designation:	2S44-6N6-2		
Date of Test:	5/15/97		
Concrete Strength:	5890 psi	Stud Position:	2S
Concrete Weight:	150.40 pcf	Stud Size:	1/2 in. x 4 in.
Concrete Thickness:	6 in.	Stud Tensile Strength:	74.049 ksi
Maximum Applied Load:	36.93 kips		
Applied Load Per Stud:	9.23 kips		
Concrete Slip at Failure:			

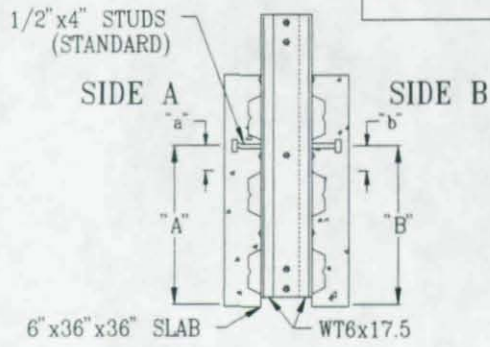
Pot. AT-1: 0.1608 in.	Pot. BT-3: 0.0006 in.
Pot. AT-2: 0.1792 in.	Pot. BT-4: 0.0159 in.
Avg. Side A: 0.1700 in.	Avg. Side B: 0.0083 in.
Avg.: 0.0892 in.	

Comments: 10% Normal Load
 Stud Shearing Failure of Stud AT-1
 Weld Porosity of Two Studs

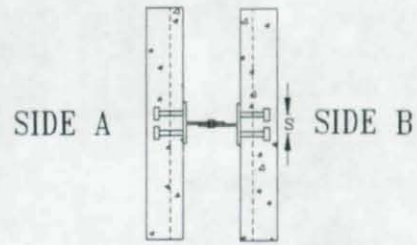


PUSH-OUT TEST LAYOUT & CRACKING SHEET

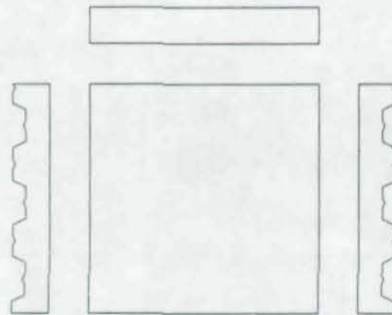
Test:	D22
Designation:	2S44-6N6-2
Date:	5/15/97



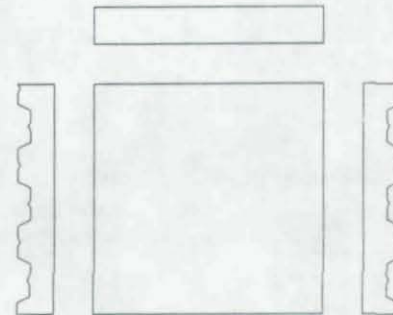
SIDE VIEW



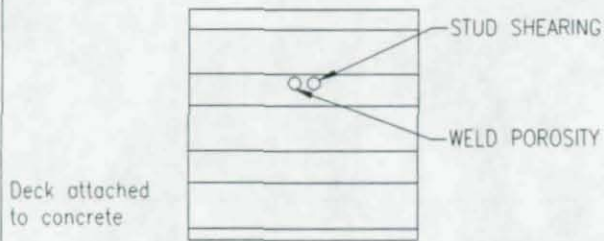
TOP VIEW



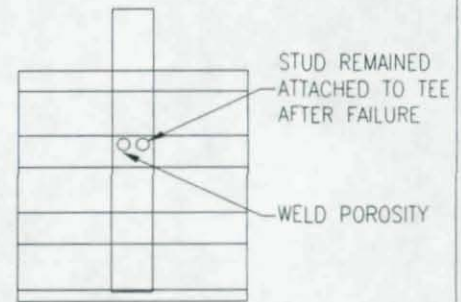
SIDE A SURFACE



SIDE B SURFACE



SIDE A BOTTOM



SIDE B BOTTOM

Test D22 Data

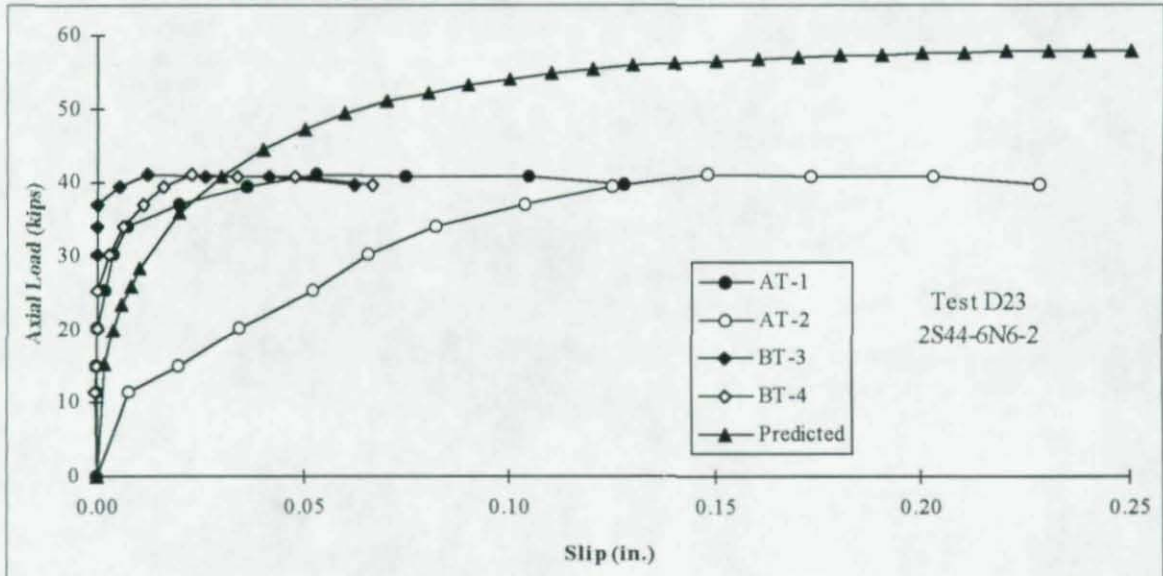
Axial Load (kips)	Slips (in.)				Test Comments
	Pot. AT-1	Pot. AT-2	Pot. BT-3	Pot. BT-4	
0.00	0.0000	0.0000	0.0000	0.0000	BEGIN TEST
10.43	0.0031	0.0073	0.0000	-0.0018	
15.58	0.0080	0.0135	0.0000	-0.0018	
20.85	0.0177	0.0263	0.0000	-0.0006	
25.63	0.0355	0.0477	0.0000	0.0006	
28.77	0.0581	0.0746	0.0000	0.0024	
31.03	0.0826	0.1009	0.0000	0.0055	
33.29	0.1064	0.1254	0.0006	0.0079	
35.30	0.1339	0.1517	0.0006	0.0110	
36.93	0.1608	0.1792	0.0006	0.0159	BANG

PUSH-OUT TEST SUMMARY SHEET

Test:	D23	Deck Type:	2" USD, 20 ga.
Designation:	2S44-6N6-2		
Date of Test:	5/15/97		
Concrete Strength:	5890 psi	Stud Position:	2S
Concrete Weight:	150.40 pcf	Stud Size:	1/2 in. x 4 in.
Concrete Thickness:	6 in.	Stud Tensile Strength:	74.049 ksi
Maximum Applied Load:	41.21 kips		
Applied Load Per Stud:	10.30 kips		
Concrete Slip at Failure:			

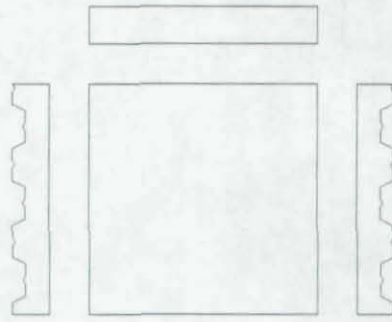
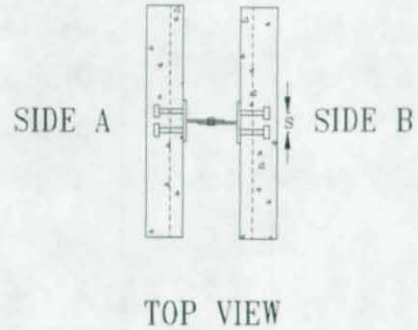
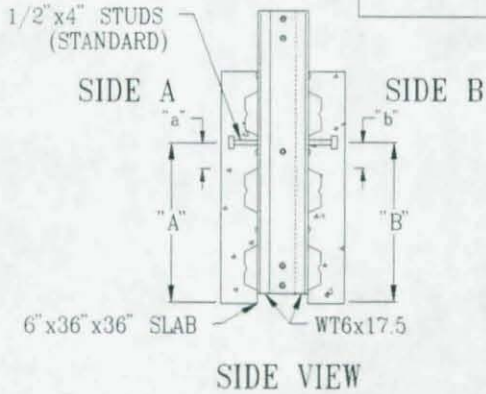
Pot. AT-1:	0.1278 in.	Pot. BT-3:	0.0624 in.
Pot. AT-2:	0.2282 in.	Pot. BT-4:	0.0666 in.
Avg. Side A:	0.1780 in.	Avg. Side B:	0.0645 in.
Avg.:		0.1213 in.	

Comments: 10% Normal Load
 Stud Shearing Failure of Stud AT-2
 Weld Failure of Three Studs

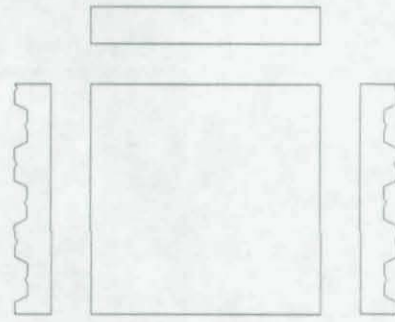


PUSH-OUT TEST LAYOUT & CRACKING SHEET

Test:	D23
Designation:	2S44-6N6-2
Date:	5/15/97

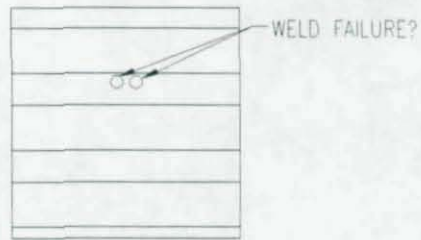


SIDE A SURFACE

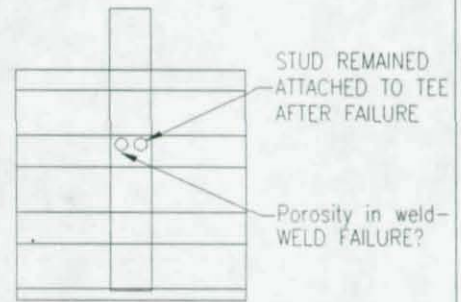


SIDE B SURFACE

Deck attached to concrete



SIDE A BOTTOM



SIDE B BOTTOM

Test D23 Data

Axial Load (kips)	Slips (in.)				Test Comments
	Pot. AT-1	Pot. AT-2	Pot. BT-3	Pot. BT-4	
0.00	0.0000	0.0000	0.0000	0.0000	BEGIN TEST
11.43	0.0000	0.0080	0.0000	-0.0006	
14.95	0.0000	0.0196	0.0000	0.0000	
20.10	0.0000	0.0343	0.0000	0.0000	
25.38	0.0018	0.0520	0.0000	0.0000	
30.15	0.0037	0.0655	0.0000	0.0031	
34.17	0.0073	0.0820	0.0000	0.0061	
37.06	0.0196	0.1040	0.0000	0.0110	
39.45	0.0361	0.1248	0.0055	0.0159	
41.21	0.0532	0.1480	0.0122	0.0226	
40.95	0.0746	0.1731	0.0263	0.0336	
40.95	0.1046	0.2025	0.0416	0.0477	
39.70	0.1278	0.2282	0.0624	0.0666	BANG

PUSH-OUT TEST SUMMARY SHEET

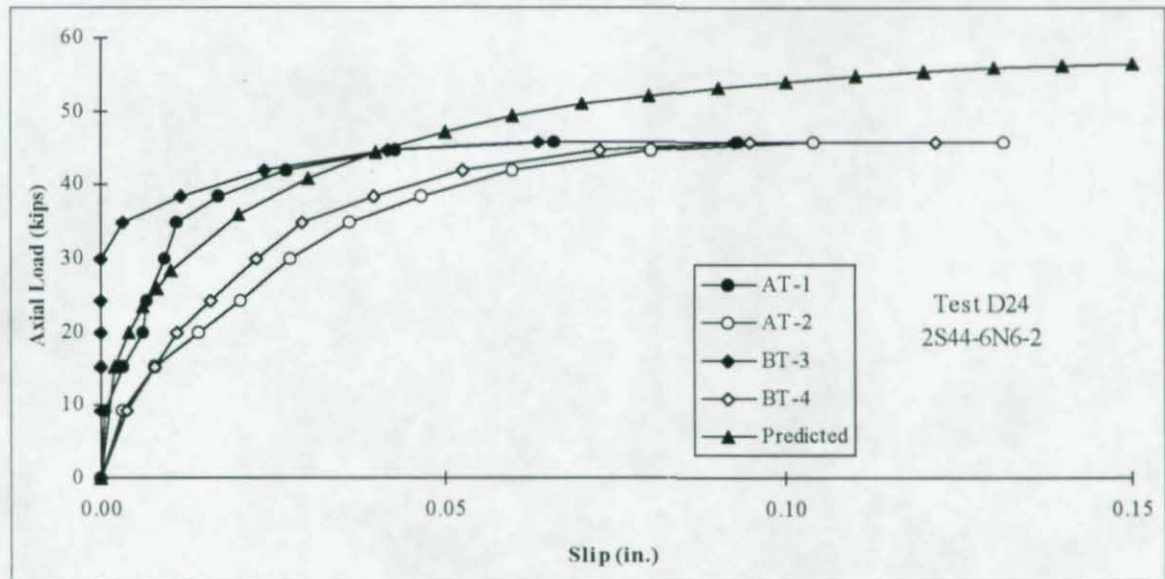
Test:	D24	Deck Type:	2" USD, 20 ga.
Designation:	2S44-6N6-2		
Date of Test:	5/15/97		
Concrete Strength:	5890 psi	Stud Position:	2S
Concrete Weight:	150.40 pcf	Stud Size:	1/2 in. x 4 in.
Concrete Thickness:	6 in.	Stud Tensile Strength:	74.049 ksi
Maximum Applied Load:	45.85 kips		
Applied Load Per Stud:	11.46 kips		

Concrete Slip at Failure:

Pot. AT-1: 0.0930 in.	Pot. BT-3: 0.0924 in.
Pot. AT-2: 0.1315 in.	Pot. BT-4: 0.1217 in.
Avg. Side A: 0.1123 in.	Avg. Side B: 0.1071 in.

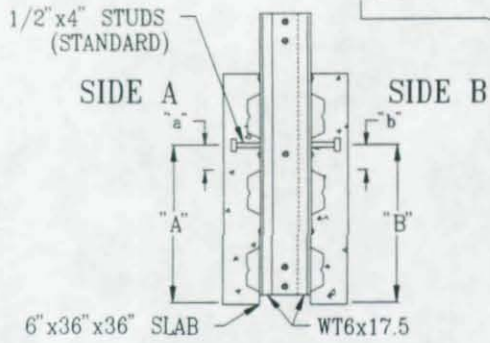
Avg.: 0.1097 in.

Comments: 10% Normal Load
Weld Failure of Top Stud on Side A

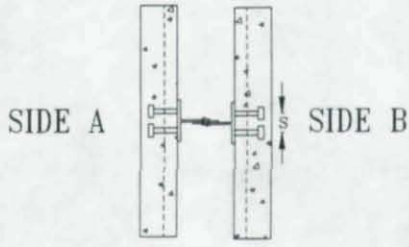


PUSH-OUT TEST LAYOUT & CRACKING SHEET

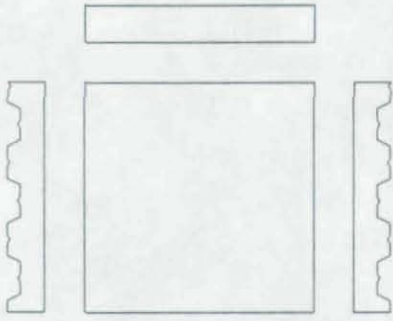
Test:	D24
Designation:	2S44-6N6-2
Date:	5/15/97



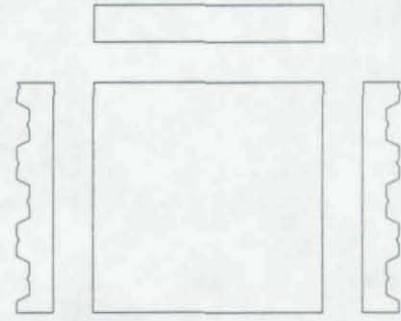
SIDE VIEW



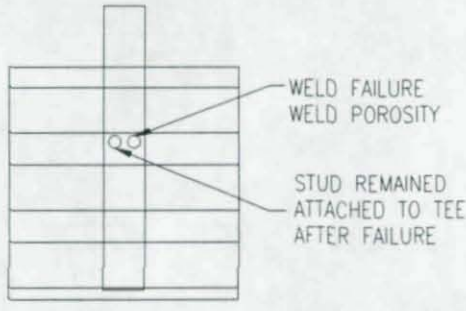
TOP VIEW



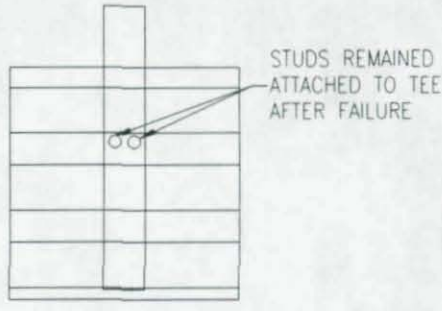
SIDE A SURFACE



SIDE B SURFACE



SIDE A BOTTOM



SIDE B BOTTOM

Test D24 Data

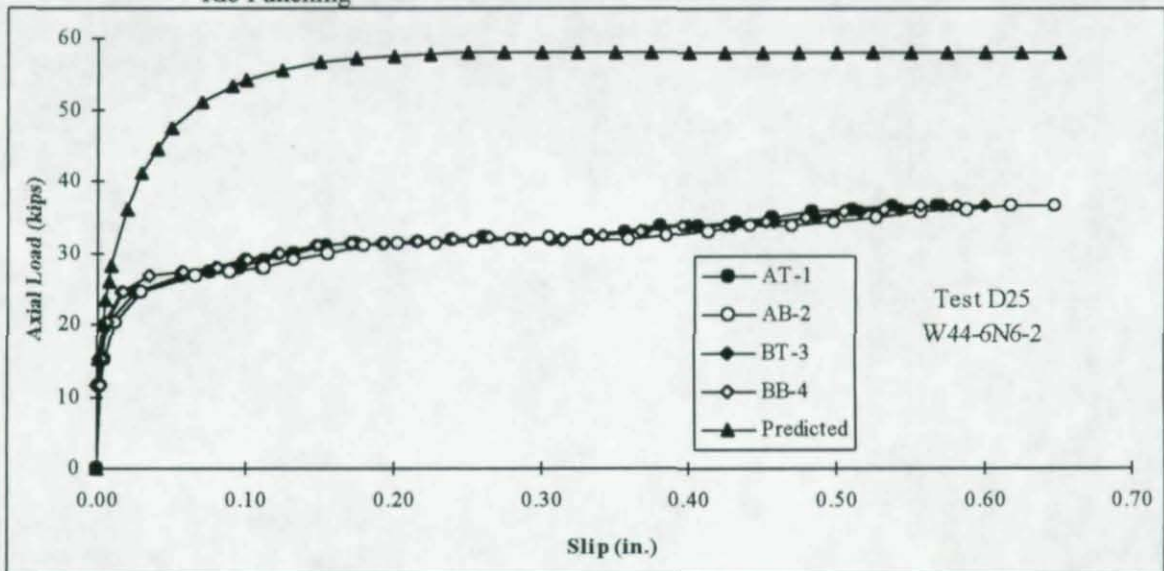
Axial Load (kips)	Slips (in.)				Test Comments
	Pot. AT-1	Pot. AT-2	Pot. BT-3	Pot. BT-4	
0.00	0.0000	0.0000	0.0000	0.0000	BEGIN TEST
9.30	0.0006	0.0031	0.0000	0.0037	
15.33	0.0031	0.0080	0.0000	0.0079	
19.85	0.0061	0.0141	0.0000	0.0110	
24.25	0.0067	0.0202	0.0000	0.0159	
29.90	0.0092	0.0275	0.0000	0.0226	
34.80	0.0110	0.0361	0.0031	0.0293	
38.44	0.0171	0.0465	0.0116	0.0397	DECK/CONC. SEPARATION SIDE A
41.96	0.0269	0.0599	0.0239	0.0526	
44.72	0.0428	0.0801	0.0416	0.0728	
45.73	0.0661	0.1040	0.0636	0.0948	
45.85	0.0930	0.1315	0.0924	0.1217	SOFT POP

PUSH-OUT TEST SUMMARY SHEET

Test:	D25	Deck Type:	2" USD, 20 ga.
Designation:	W44-6N6-2		
Date of Test:	5/15/97		
Concrete Strength:	5890 psi	Stud Position:	W
Concrete Weight:	150.40 pcf	Stud Size:	1/2 in. x 4 in.
Concrete Thickness:	6 in.	Stud Tensile Strength:	74.049 ksi
Maximum Applied Load:	36.68 kips		
Applied Load Per Stud:	9.17 kips		
Concrete Slip at Failure:			

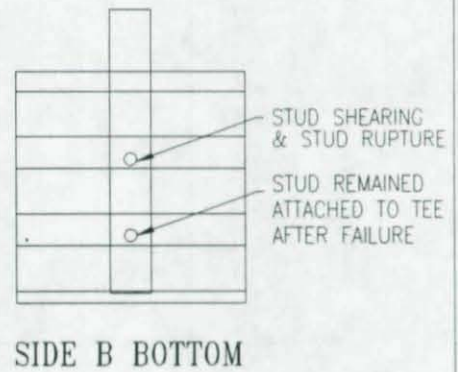
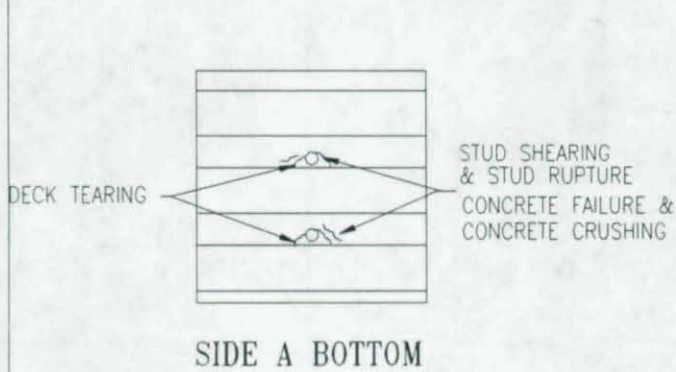
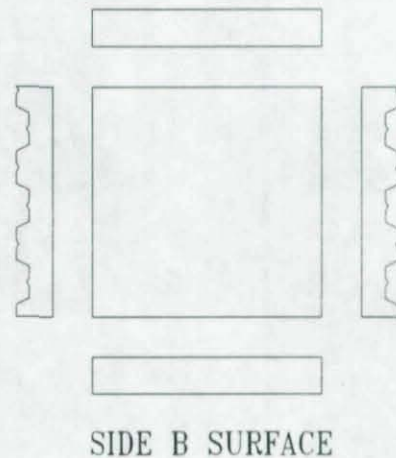
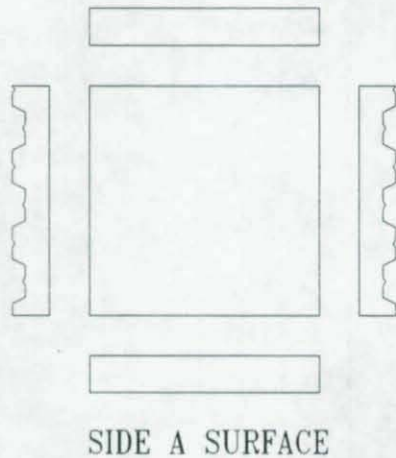
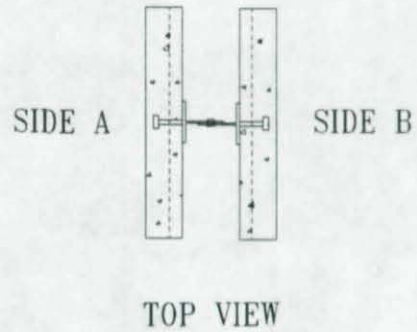
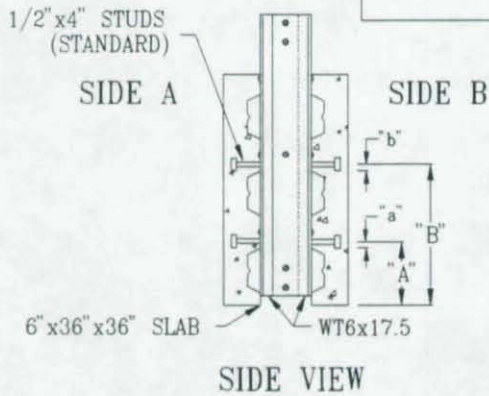
Pot. AT-1:	0.5676 in.	Pot. BT-3:	0.5994 in.
Pot. AB-2:	0.6477 in.	Pot. BB-4:	0.5814 in.
Avg. Side A:	0.6077 in.	Avg. Side B:	0.5904 in.
Avg.:		0.5990 in.	

Comments: 10% Normal Load
 Stud Shearing & Stud Rupture Failure of Both Studs on Side A and Top Stud on Side B
 Rib Punching



PUSH-OUT TEST LAYOUT & CRACKING SHEET

Test:	D25
Designation:	W44-6N6-2
Date:	5/15/97



Test D25 Data

Axial Load (kips)	Slips (in.)				Test Comments
	Pot. AT-1	Pot. AB-2	Pot. BT-3	Pot. BB-4	
0.00	0.0000	0.0000	0.0000	0.0000	BEGIN TEST
11.43	0.0012	0.0031	0.0000	0.0024	
15.33	0.0031	0.0049	0.0012	0.0043	
20.23	0.0086	0.0116	0.0055	0.0073	
24.62	0.0257	0.0300	0.0165	0.0171	
26.88	0.0563	0.0667	0.0355	0.0355	
27.26	0.0752	0.0893	0.0569	0.0581	
28.02	0.0948	0.1113	0.0795	0.0807	
29.15	0.1125	0.1327	0.0991	0.1009	
29.90	0.1321	0.1554	0.1217	0.1235	
30.90	0.1535	0.1798	0.1474	0.1492	
31.28	0.1737	0.2031	0.1706	0.1712	SLIGHT DECK BULGING
31.41	0.1933	0.2281	0.1921	0.1938	
31.53	0.2165	0.2538	0.2153	0.2164	
31.78	0.2385	0.2795	0.2404	0.2403	
32.04	0.2612	0.3058	0.2648	0.2653	
31.78	0.2844	0.3327	0.2887	0.2898	
31.91	0.3070	0.3590	0.3138	0.3142	
32.41	0.3327	0.3853	0.3419	0.3417	
33.04	0.3566	0.4135	0.3700	0.3680	
33.67	0.3816	0.4422	0.4000	0.3962	
33.92	0.4073	0.4704	0.4300	0.4255	
34.42	0.4324	0.4985	0.4587	0.4530	
35.05	0.4569	0.5272	0.4869	0.4793	
35.68	0.4838	0.5572	0.5156	0.5056	
36.18	0.5113	0.5872	0.5438	0.5319	
36.68	0.5376	0.6172	0.5713	0.5563	
36.68	0.5676	0.6477	0.5994	0.5814	NO NOISE WHEN FAILED

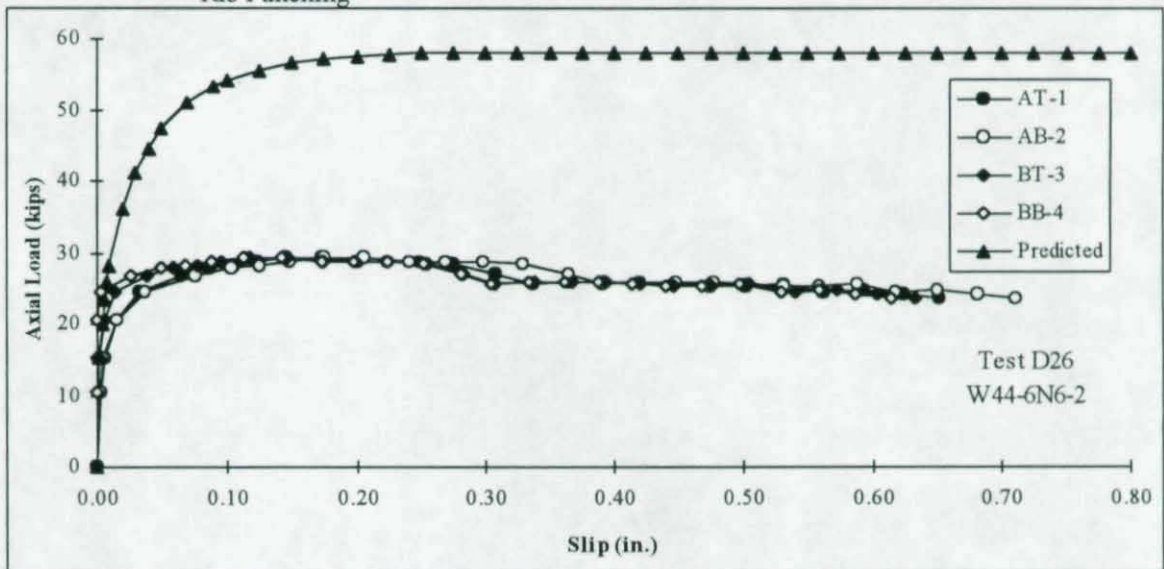
PUSH-OUT TEST SUMMARY SHEET

Test:	D26	Deck Type:	2" USD, 20 ga.
Designation:	W44-6N6-2		
Date of Test:	5/16/97		
Concrete Strength:	5890 psi	Stud Position:	W
Concrete Weight:	150.40 pcf	Stud Size:	1/2 in. x 4 in.
Concrete Thickness:	6 in.	Stud Tensile Strength:	74.049 ksi
Maximum Applied Load:	29.27 kips		
Applied Load Per Stud:	7.32 kips		
Concrete Slip at Failure:			

Pot. AT-1: 0.6520 in.	Pot. BT-3: 0.6330 in.
Pot. AB-2: 0.7098 in.	Pot. BB-4: 0.6153 in.
Avg. Side A: 0.6809 in.	Avg. Side B: 0.6242 in.

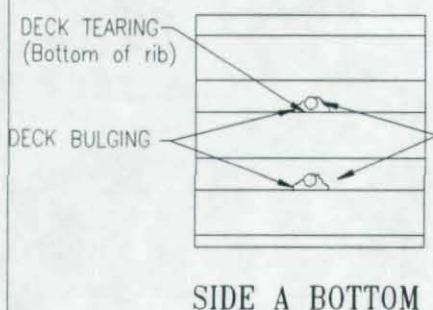
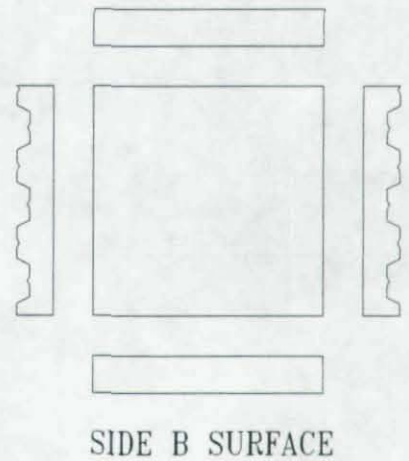
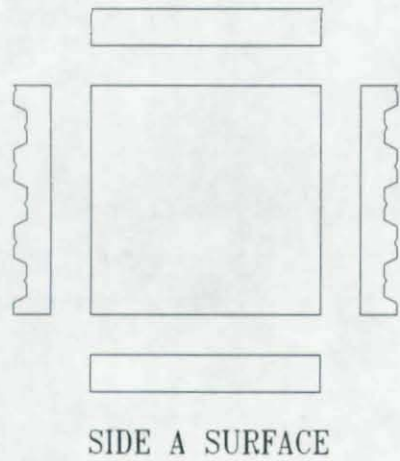
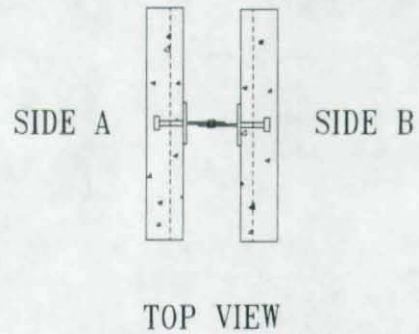
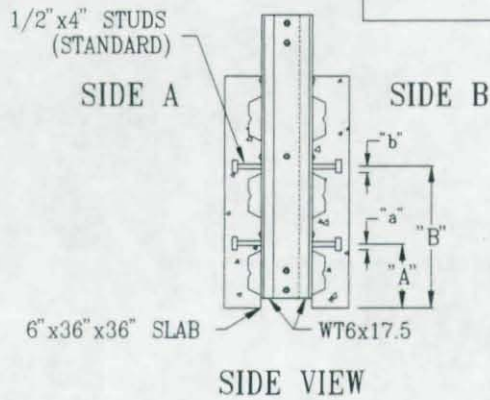
Avg.: 0.6525 in.

Comments: 10% Normal Load
 Stud Shearing & Stud Rupture Failure of Both Studs on Side A
 Rib Punching

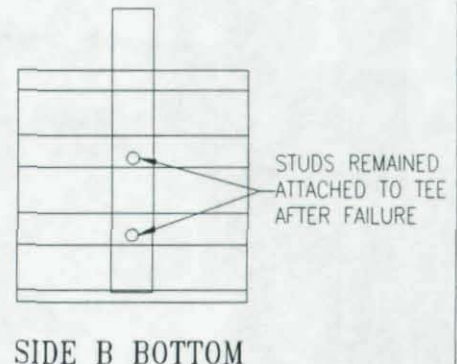


PUSH-OUT TEST LAYOUT & CRACKING SHEET

Test:	D26
Designation:	W44-6N6-2
Date:	5/16/97



STUD SHEARING & STUD RUPTURE
CONCRETE FAILURE & CONCRETE CRUSHING



Test D26 Data

Axial Load (kips)	Slips (in.)				Test Comments
	Pot. AT-1	Pot. AB-2	Pot. BT-3	Pot. BB-4	
0.00	0.0000	0.0000	0.0000	0.0000	BEGIN TEST
10.55	0.0031	0.0024	0.0000	0.0000	
15.20	0.0067	0.0049	0.0012	0.0000	
20.60	0.0153	0.0147	0.0055	0.0000	
24.50	0.0330	0.0373	0.0141	0.0031	
26.88	0.0648	0.0759	0.0385	0.0269	
27.76	0.0862	0.1028	0.0593	0.0495	
28.27	0.1046	0.1248	0.0777	0.0685	
28.77	0.1229	0.1481	0.0954	0.0875	
29.27	0.1456	0.1750	0.1180	0.1125	
29.27	0.1731	0.2056	0.1468	0.1425	
28.64	0.2012	0.2405	0.1749	0.1725	
28.77	0.2245	0.2686	0.2000	0.1982	SLIGHT DECK BULGING
28.64	0.2483	0.2980	0.2244	0.2232	
28.52	0.2752	0.3286	0.2544	0.2520	
27.14	0.3070	0.3641	0.2831	0.2807	
25.63	0.3364	0.3904	0.3070	0.3040	
25.88	0.3645	0.4198	0.3382	0.3339	
26.01	0.3926	0.4479	0.3669	0.3621	
25.88	0.4202	0.4767	0.3944	0.3884	
25.50	0.4471	0.5030	0.4195	0.4134	
25.25	0.4734	0.5305	0.4458	0.4403	
25.38	0.5021	0.5593	0.4752	0.4679	
25.50	0.5315	0.5880	0.5057	0.4972	
24.62	0.5614	0.6180	0.5412	0.5303	
24.75	0.5926	0.6498	0.5736	0.5596	
24.25	0.6232	0.6804	0.6036	0.5871	
23.74	0.6520	0.7098	0.6330	0.6153	SOFT BANG

PUSH-OUT TEST SUMMARY SHEET

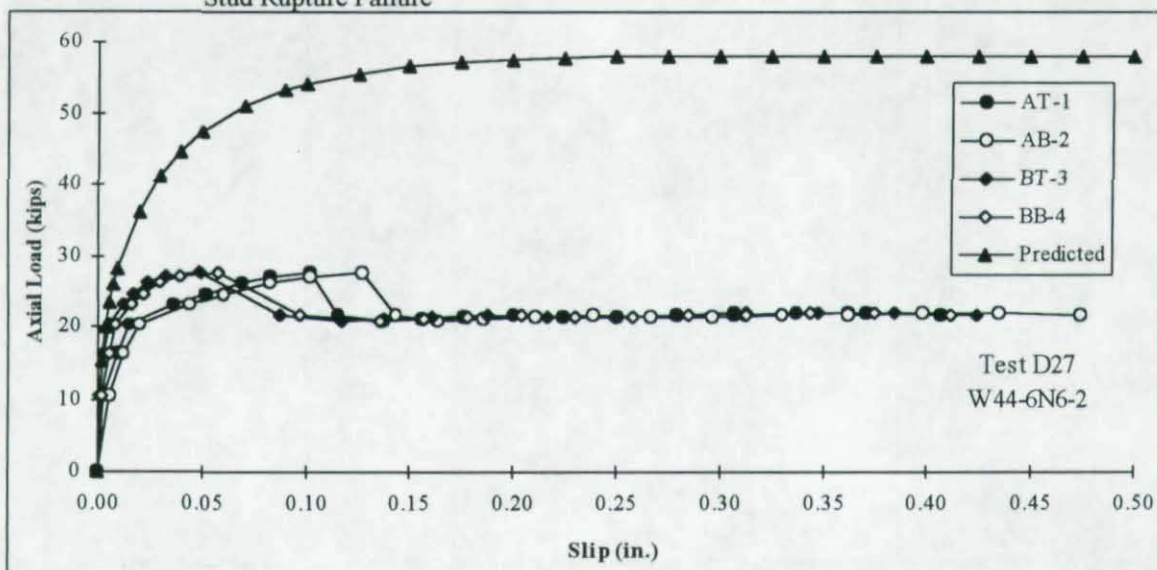
Test:	D27	Deck Type:	2" USD, 20 ga.
Designation:	W44-6N6-2		
Date of Test:	5/16/97		
Concrete Strength:	5890 psi	Stud Position:	W
Concrete Weight:	150.40 pcf	Stud Size:	1/2 in. x 4 in.
Concrete Thickness:	6 in.	Stud Tensile Strength:	74.049 ksi
Maximum Applied Load:	27.51 kips		
Applied Load Per Stud:	6.88 kips		

Concrete Slip at Failure:

Pot. AT-1: 0.4073 in.	Pot. BT-3: 0.4245 in.
Pot. AB-2: 0.4753 in.	Pot. BB-4: 0.4121 in.
Avg. Side A: 0.4413 in.	Avg. Side B: 0.4183 in.

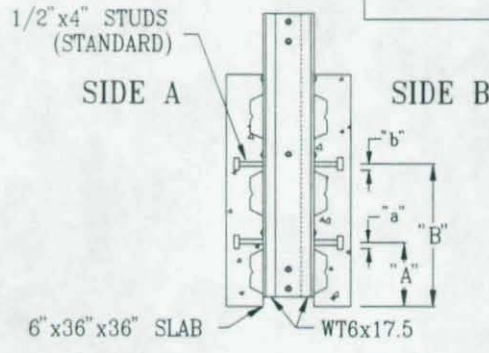
Avg.: 0.4298 in.

Comments: 10% Normal Load
Weld Failure
Stud Rupture Failure

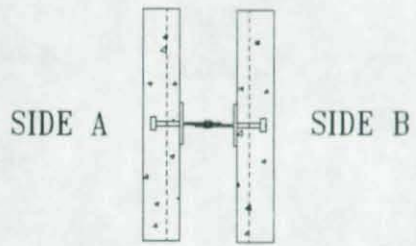


PUSH-OUT TEST LAYOUT & CRACKING SHEET

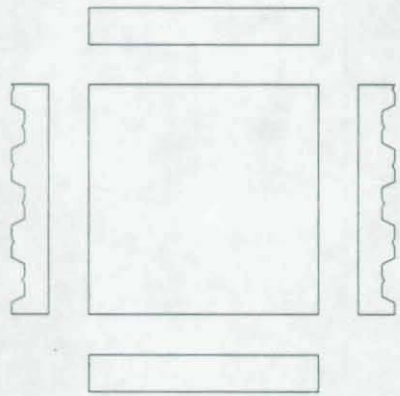
Test:	D27
Designation:	W44-6N6-2
Date:	5/16/97



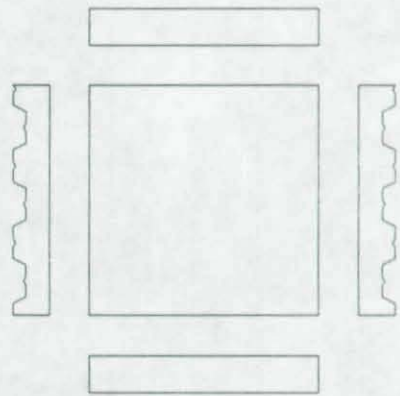
SIDE VIEW



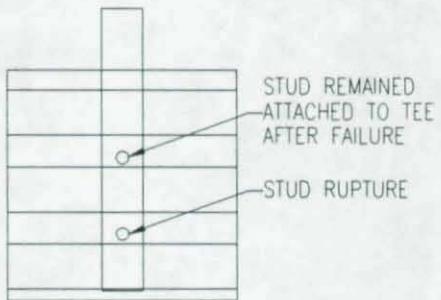
TOP VIEW



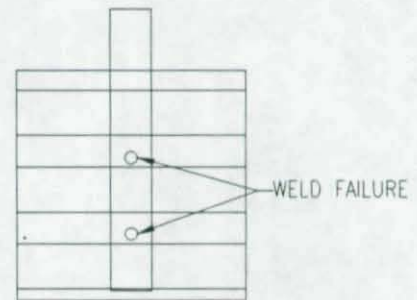
SIDE A SURFACE



SIDE B SURFACE



SIDE A BOTTOM



SIDE B BOTTOM

Test D27 Data

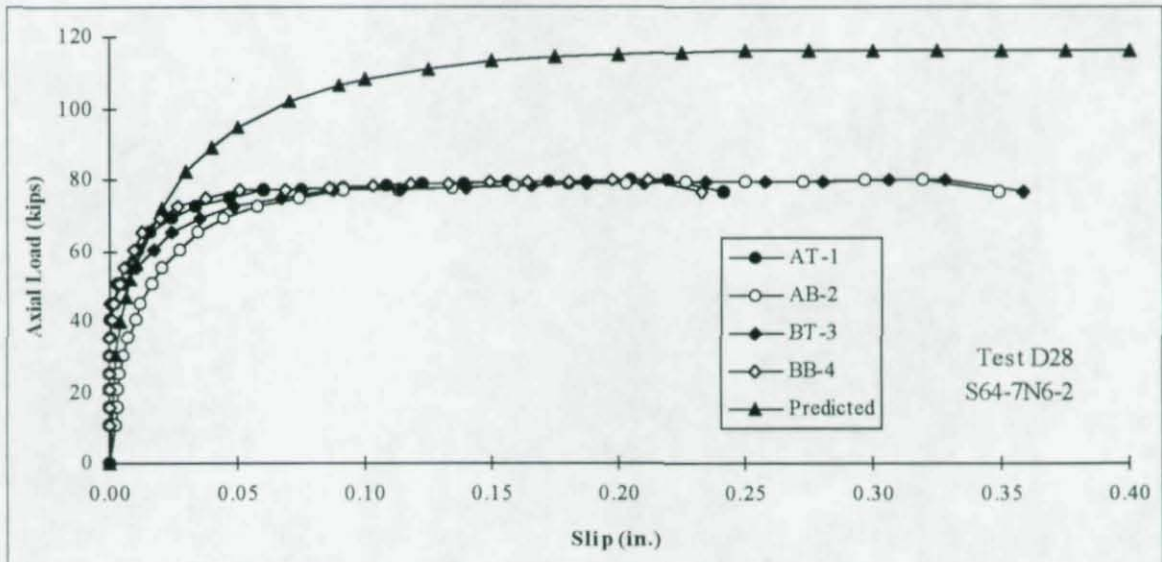
Axial Load (kips)	Slips (in.)				Test Comments
	Pot. AT-1	Pot. AB-2	Pot. BT-3	Pot. BB-4	
0.00	0.0000	0.0000	0.0000	0.0000	BEGIN TEST
10.43	0.0031	0.0055	0.0006	0.0018	
16.46	0.0098	0.0128	0.0031	0.0055	
20.23	0.0153	0.0202	0.0061	0.0086	
23.12	0.0367	0.0447	0.0122	0.0165	
24.62	0.0526	0.0612	0.0177	0.0220	
26.13	0.0691	0.0826	0.0245	0.0300	
27.01	0.0832	0.1022	0.0330	0.0397	
27.51	0.1027	0.1278	0.0495	0.0581	
21.61	0.1162	0.1437	0.0881	0.0978	BANG
20.98	0.1376	0.1639	0.1174	0.1357	
21.11	0.1560	0.1866	0.1376	0.1571	
21.36	0.1768	0.2116	0.1609	0.1785	
21.73	0.2006	0.2398	0.1878	0.2048	
21.48	0.2245	0.2673	0.2171	0.2305	
21.36	0.2514	0.2973	0.2496	0.2586	
21.61	0.2801	0.3309	0.2814	0.2861	
21.73	0.3076	0.3633	0.3132	0.3136	
21.98	0.3382	0.3982	0.3486	0.3442	
22.11	0.3719	0.4355	0.3853	0.3754	
21.61	0.4073	0.4753	0.4245	0.4121	BANG

PUSH-OUT TEST SUMMARY SHEET

Test:	D28	Deck Type:	2" USD, 20 ga.
Designation:	S64-7N6-2		
Date of Test:	7/4/97		
Concrete Strength:	7080 psi	Stud Position:	S
Concrete Weight:	151.26 pcf	Stud Size:	3/4 in. x 4 in.
Concrete Thickness:	6 in.	Stud Tensile Strength:	65.813 ksi
Maximum Applied Load:	80.03 kips		
Applied Load Per Stud:	20.01 kips		
Concrete Slip at Failure:			

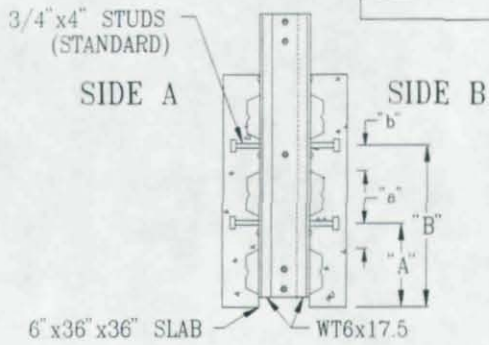
Pot. AT-1:	0.2416 in.	Pot. BT-3:	0.3585 in.
Pot. AB-2:	0.3491 in.	Pot. BB-4:	0.2328 in.
Avg. Side A:	0.2954 in.	Avg. Side B:	0.2957 in.
Avg.: 0.2955 in.			

Comments: 10% Normal Load
Stud Shearing Failure of Bottom Stud on Side B

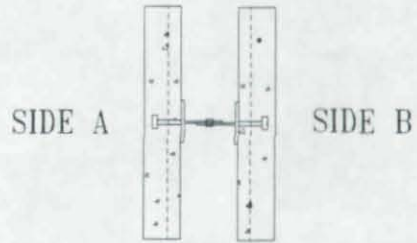


PUSH-OUT TEST LAYOUT & CRACKING SHEET

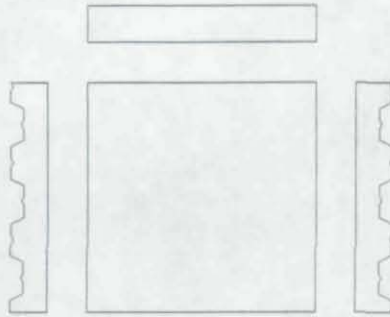
Test:	D28
Designation:	S64-7N6-2
Date:	7/4/97



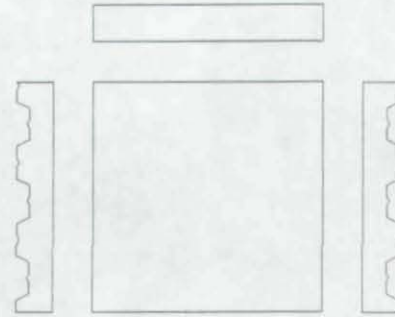
SIDE VIEW



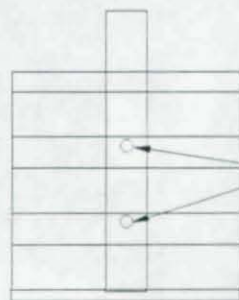
TOP VIEW



SIDE A SURFACE



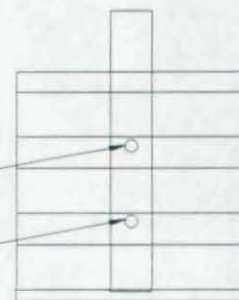
SIDE B SURFACE



SIDE A BOTTOM

STUDS REMAINED
ATTACHED TO TEE
AFTER FAILURE

STUD SHEARING



SIDE B BOTTOM

Test D28 Data

Axial Load (kips)	Slips (in.)				Test Comments
	Pot. AT-1	Pot. AB-2	Pot. BT-3	Pot. BB-4	
0.00	0.0000	0.0000	0.0000	0.0000	BEGIN TEST
10.55	0.0000	0.0024	0.0000	0.0000	
15.83	0.0000	0.0031	0.0000	0.0000	
20.60	0.0000	0.0031	0.0000	0.0000	
25.13	0.0000	0.0043	0.0000	0.0000	
30.53	0.0000	0.0055	0.0000	0.0000	
35.43	0.0000	0.0073	0.0000	0.0000	
40.45	0.0000	0.0098	0.0000	0.0006	
45.23	0.0012	0.0116	0.0000	0.0012	
50.63	0.0031	0.0165	0.0055	0.0037	
55.40	0.0061	0.0202	0.0104	0.0055	
60.55	0.0110	0.0275	0.0171	0.0092	
65.08	0.0159	0.0342	0.0245	0.0128	SLIGHT DECK SEP. TOP SIDE A
69.35	0.0245	0.0446	0.0349	0.0196	
72.61	0.0336	0.0581	0.0483	0.0263	
75.13	0.0471	0.0746	0.0673	0.0373	
77.01	0.0599	0.0911	0.0875	0.0507	
77.14	0.0752	0.1131	0.1138	0.0684	
77.64	0.0911	0.1345	0.1395	0.0862	
78.39	0.1083	0.1590	0.1658	0.1033	
78.77	0.1223	0.1804	0.1878	0.1179	
79.15	0.1388	0.2030	0.2104	0.1326	
79.65	0.1560	0.2268	0.2343	0.1491	
79.52	0.1725	0.2501	0.2575	0.1644	
79.65	0.1878	0.2727	0.2802	0.1802	
80.03	0.2049	0.2972	0.3065	0.1974	
79.77	0.2196	0.3192	0.3279	0.2120	
76.51	0.2416	0.3491	0.3585	0.2328	BANG.

PUSH-OUT TEST SUMMARY SHEET

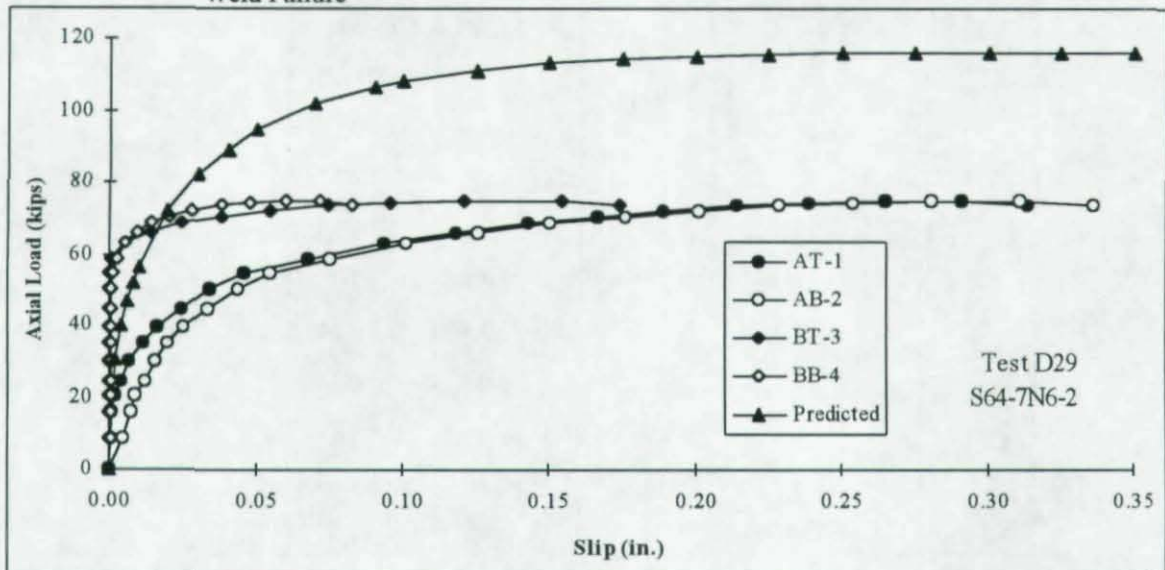
Test:	D29	Deck Type:	2" USD, 20 ga.
Designation:	S64-7N6-2		
Date of Test:	7/4/97		
Concrete Strength:	7080 psi	Stud Position:	S
Concrete Weight:	151.26 pcf	Stud Size:	3/4 in. x 4 in.
Concrete Thickness:	6 in.	Stud Tensile Strength:	65.813 ksi
Maximum Applied Load:	74.87 kips		
Applied Load Per Stud:	18.72 kips		

Concrete Slip at Failure:

Pot. AT-1: 0.3138 in.	Pot. BT-3: 0.1743 in.
Pot. AB-2: 0.3363 in.	Pot. BB-4: 0.0825 in.
Avg. Side A: 0.3251 in.	Avg. Side B: 0.1284 in.

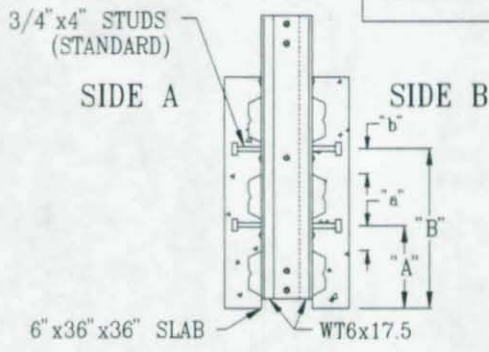
Avg.: 0.2267 in.

Comments: 10% Normal Load
 Stud Shearing Failure of Bottom Stud on Side A and Top Stud on Side B
 Weld Failure

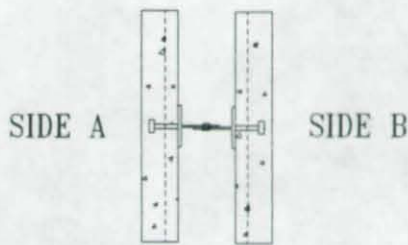


PUSH-OUT TEST LAYOUT & CRACKING SHEET

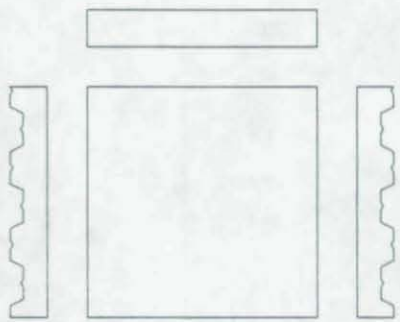
Test:	D29
Designation:	S64-7N6-2
Date:	7/4/97



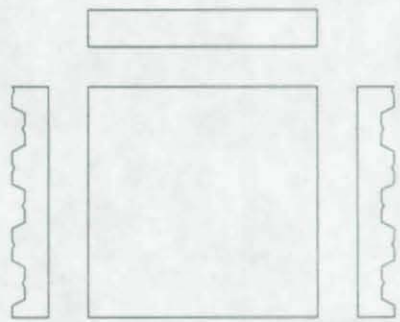
SIDE VIEW



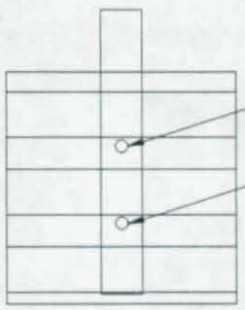
TOP VIEW



SIDE A SURFACE

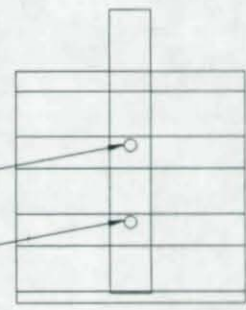


SIDE B SURFACE



SIDE A BOTTOM

WELD FAILURE
STUD SHEARING
STUD REMAINED ATTACHED TO TEE AFTER FAILURE



SIDE B BOTTOM

Test D29 Data

Axial Load (kips)	Slips (in.)				Test Comments
	Pot. AT-1	Pot. AB-2	Pot. BT-3	Pot. BB-4	
0.00	0.0000	0.0000	0.0000	0.0000	BEGIN TEST
8.67	0.0006	0.0049	0.0000	0.0006	
15.58	0.0006	0.0073	0.0000	0.0006	
20.35	0.0018	0.0092	0.0000	0.0006	
23.99	0.0043	0.0122	0.0000	0.0006	
29.77	0.0067	0.0159	0.0000	0.0006	
35.18	0.0116	0.0196	0.0000	0.0006	
39.32	0.0165	0.0251	0.0000	0.0006	
44.60	0.0245	0.0336	0.0000	0.0006	
50.00	0.0343	0.0434	0.0000	0.0006	
54.40	0.0459	0.0544	0.0000	0.0012	
58.79	0.0679	0.0752	0.0006	0.0031	
62.94	0.0936	0.1009	0.0055	0.0055	
66.08	0.1180	0.1260	0.0147	0.0098	
68.47	0.1431	0.1504	0.0245	0.0147	
70.48	0.1670	0.1761	0.0385	0.0208	
72.24	0.1896	0.2018	0.0544	0.0281	
73.74	0.2147	0.2287	0.0746	0.0385	
74.37	0.2392	0.2544	0.0960	0.0477	
74.87	0.2655	0.2813	0.1211	0.0605	
74.75	0.2911	0.3113	0.1548	0.0721	
73.87	0.3138	0.3363	0.1743	0.0825	BANG.

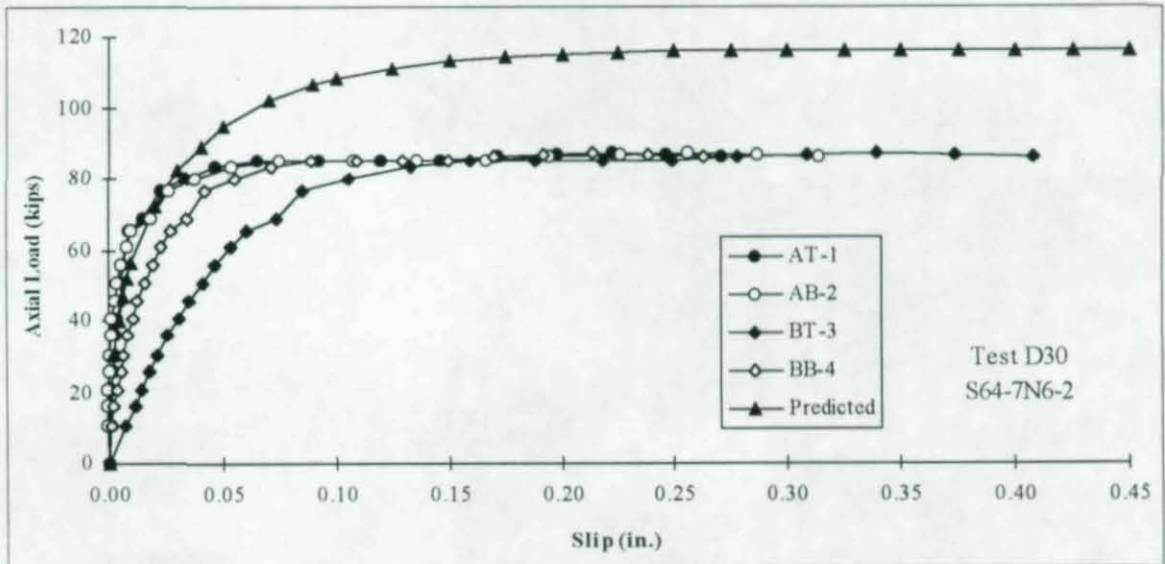
PUSH-OUT TEST SUMMARY SHEET

Test:	D30	Deck Type:	2" USD, 20 ga.
Designation:	S64-7N6-2		
Date of Test:	7/8/97		
Concrete Strength:	7080 psi	Stud Position:	S
Concrete Weight:	151.26 pcf	Stud Size:	3/4 in. x 4 in.
Concrete Thickness:	6 in.	Stud Tensile Strength:	65.813 ksi
Maximum Applied Load:	87.19 kips		
Applied Load Per Stud:	21.80 kips		
Concrete Slip at Failure:			

Pot. AT-1:	0.2703 in.	Pot. BT-3:	0.4074 in.
Pot. AB-2:	0.3137 in.	Pot. BB-4:	0.2628 in.
Avg. Side A:	0.2920 in.	Avg. Side B:	0.3351 in.

Avg.: 0.3136 in.

Comments: 10% Normal Load
Stud Shearing Failure of Bottom Stud on Side B

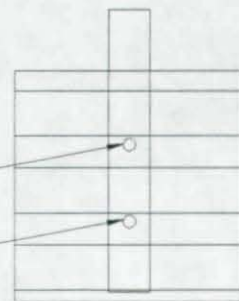
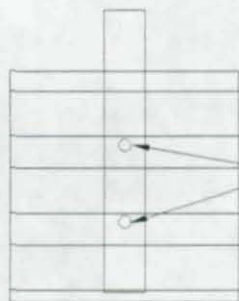
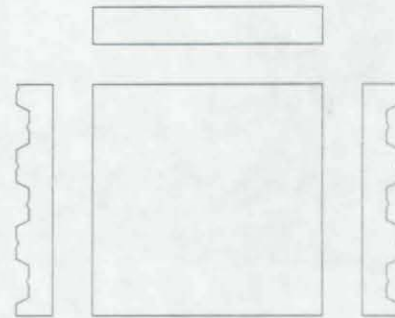
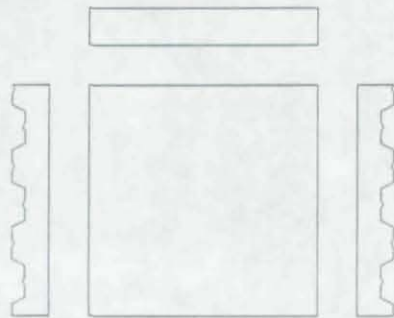
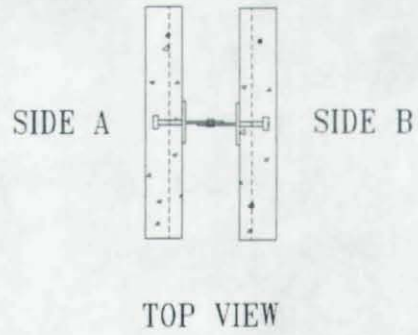
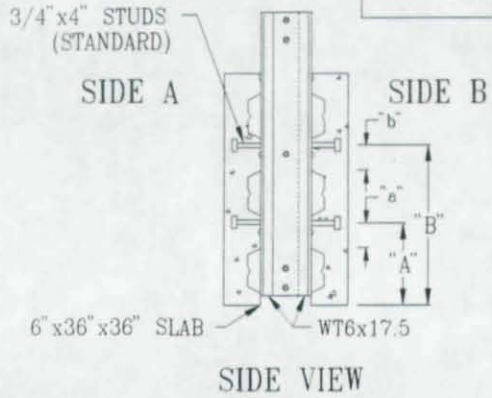


PUSH-OUT TEST LAYOUT & CRACKING SHEET

Test: D30

Designation: S64-7N6-2

Date: 7/4/97



STUDS REMAINED ATTACHED TO TEE AFTER FAILURE

STUD SHEARING

Test D30 Data

Axial Load (kips)	Slips (in.)				Test Comments
	Pot. AT-1	Pot. AB-2	Pot. BT-3	Pot. BB-4	
0.00	0.0000	0.0000	0.0000	0.0000	BEGIN TEST
10.43	0.0006	-0.0006	0.0073	0.0012	
16.08	0.0012	-0.0006	0.0110	0.0018	
20.85	0.0012	-0.0006	0.0141	0.0037	
25.75	0.0018	0.0000	0.0177	0.0049	
30.40	0.0031	0.0000	0.0214	0.0061	
36.06	0.0031	0.0006	0.0257	0.0079	
40.83	0.0037	0.0012	0.0306	0.0104	
45.60	0.0049	0.0031	0.0355	0.0122	
50.75	0.0055	0.0037	0.0410	0.0159	
55.53	0.0061	0.0049	0.0465	0.0189	
60.80	0.0080	0.0079	0.0538	0.0226	
65.20	0.0092	0.0098	0.0606	0.0269	
68.97	0.0153	0.0183	0.0740	0.0342	
76.38	0.0226	0.0263	0.0856	0.0422	
80.28	0.0330	0.0379	0.1052	0.0550	
83.29	0.0465	0.0538	0.1327	0.0709	DECK DEBONDING TOP SIDE B
84.92	0.0648	0.0746	0.1590	0.0886	
84.80	0.0924	0.1070	0.1884	0.1088	
85.18	0.1193	0.1358	0.2184	0.1289	
85.30	0.1462	0.1663	0.2483	0.1497	
86.31	0.1713	0.1945	0.2777	0.1699	
86.81	0.1976	0.2263	0.3089	0.1919	
87.19	0.2220	0.2556	0.3395	0.2139	
86.68	0.2465	0.2862	0.3731	0.2383	
86.43	0.2703	0.3137	0.4074	0.2628	BANG.

PUSH-OUT TEST SUMMARY SHEET

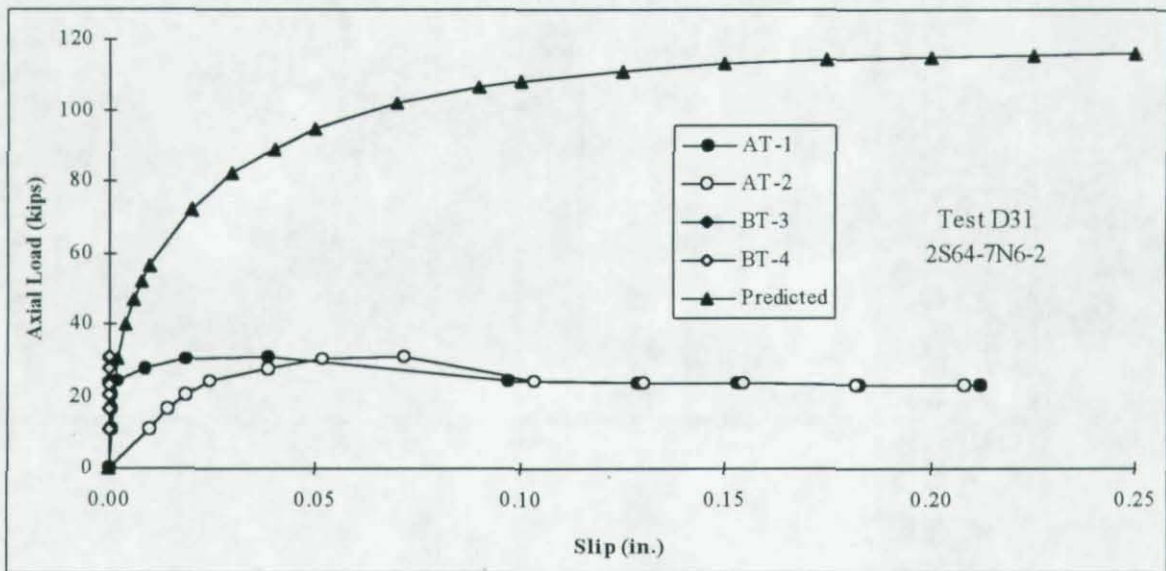
Test:	D31	Deck Type:	2" USD, 20 ga.
Designation:	2S64-7N6-2		
Date of Test:	7/7/97		
Concrete Strength:	7080 psi	Stud Position:	2S
Concrete Weight:	151.26 pcf	Stud Size:	3/4 in. x 4 in.
Concrete Thickness:	6 in.	Stud Tensile Strength:	65.813 ksi
Maximum Applied Load:	31.03 kips		
Applied Load Per Stud:	7.76 kips		

Concrete Slip at Failure:

Pot. AT-1:	0.2122 in.	Pot. BT-3:	0 in.
Pot. AT-2:	0.2086 in.	Pot. BT-4:	0 in.
Avg. Side A:	0.2104 in.	Avg. Side B:	0 in.

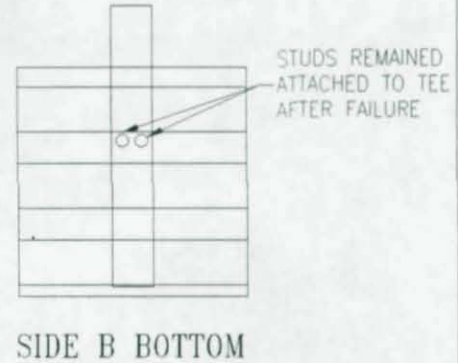
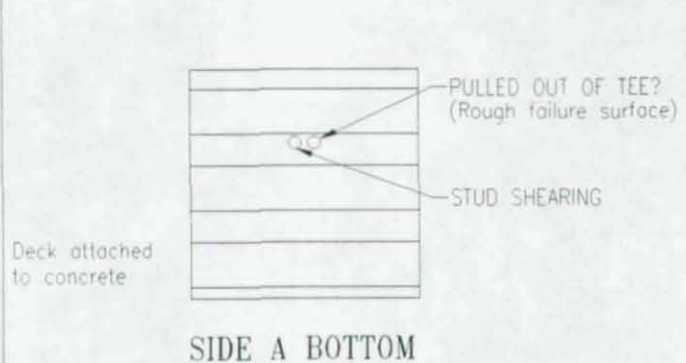
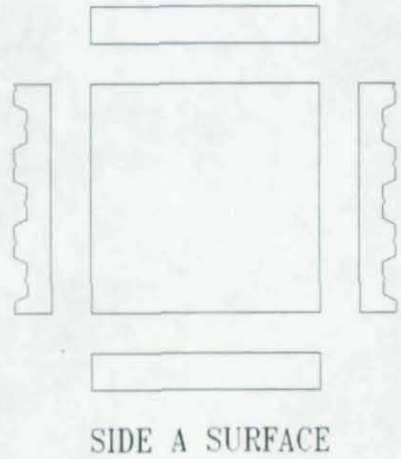
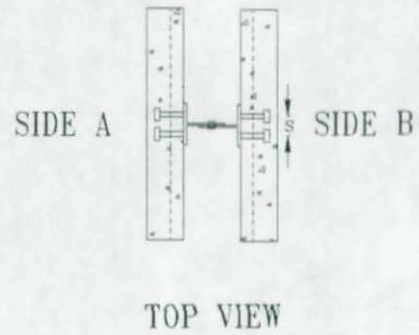
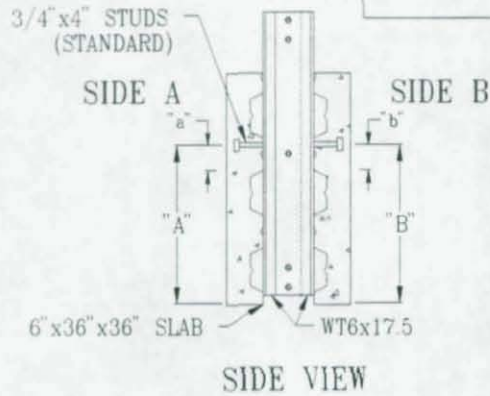
Avg.: 0.1052 in.

Comments: 10% Normal Load
Stud Shearing Failure of Stud AT-2
Weld Failure?



PUSH-OUT TEST LAYOUT & CRACKING SHEET

Test:	<u>D31</u>
Designation:	<u>2S64-7N6-2</u>
Date:	<u>7/7/97</u>



Test D31 Data

Axial Load (kips)	Slips (in.)				Test Comments
	Pot. AT-1	Pot. AT-2	Pot. BT-3	Pot. BT-4	
0.00	0.0000	0.0000	0.0000	0.0000	BEGIN TEST
10.68	0.0006	0.0098	0.0000	0.0000	
16.08	0.0006	0.0141	0.0000	0.0000	
20.35	0.0006	0.0184	0.0000	0.0000	
24.12	0.0018	0.0245	0.0000	0.0000	
27.76	0.0086	0.0385	0.0000	0.0000	
30.28	0.0183	0.0520	0.0000	0.0000	
31.03	0.0385	0.0716	0.0000	0.0000	
23.99	0.0973	0.1034	0.0000	0.0000	SOFT BANG. SLIPPAGE?
23.74	0.1291	0.1303	0.0000	0.0000	
23.62	0.1535	0.1548	0.0000	0.0000	
23.37	0.1829	0.1823	0.0000	0.0000	
23.24	0.2122	0.2086	0.0000	0.0000	ABORTED TEST.

PUSH-OUT TEST SUMMARY SHEET

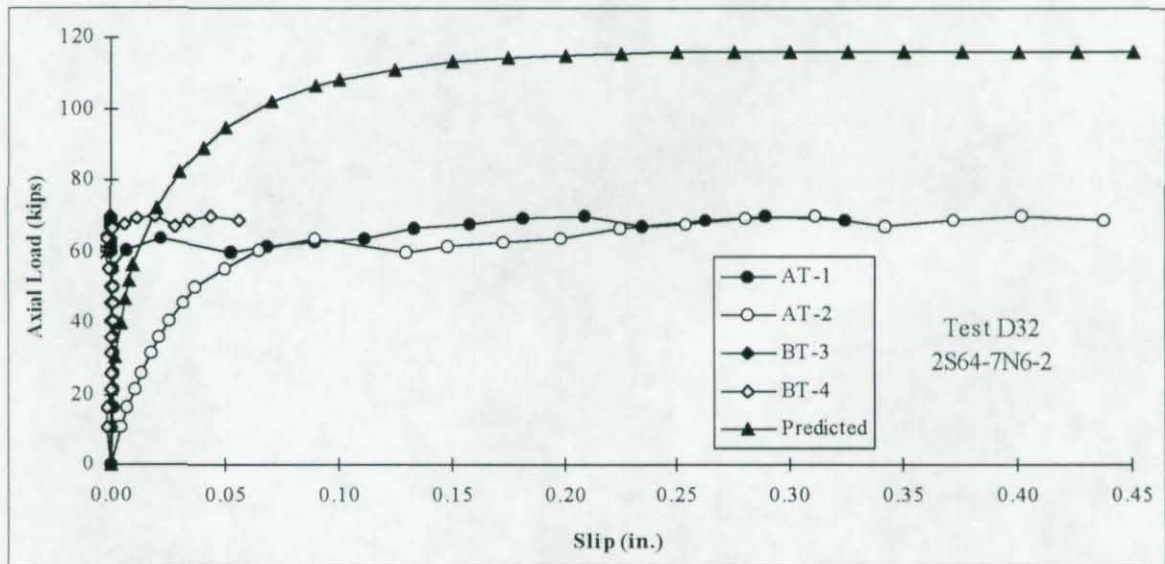
Test:	D32	Deck Type:	2" USD, 20 ga.
Designation:	2S64-7N6-2		
Date of Test:	7/8/97		
Concrete Strength:	7080 psi	Stud Position:	2S
Concrete Weight:	151.26 pcf	Stud Size:	3/4 in. x 4 in.
Concrete Thickness:	6 in.	Stud Tensile Strength:	65.813 ksi
Maximum Applied Load:	69.97 kips		
Applied Load Per Stud:	17.49 kips		

Concrete Slip at Failure:

Pot. AT-1: 0.3242 in.	Pot. BT-3: 0 in.
Pot. AT-2: 0.4380 in.	Pot. BT-4: 0.0563 in.
Avg. Side A: 0.3811 in.	Avg. Side B: 0.0282 in.

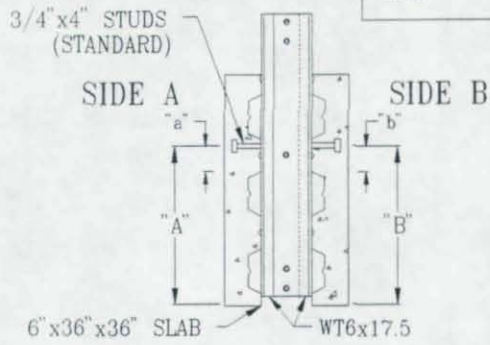
Avg.: 0.2046 in.

Comments: 10% Normal Load
Stud Shearing Failure of Both Studs on Side A

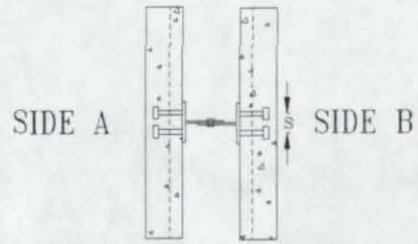


PUSH-OUT TEST LAYOUT & CRACKING SHEET

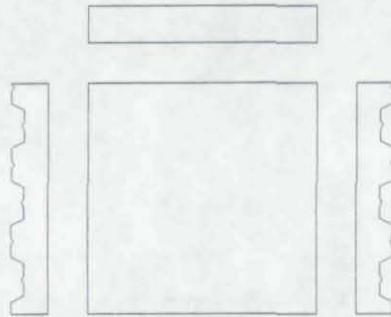
Test:	D32
Designation:	2S64-7N6-2
Date:	7/8/97



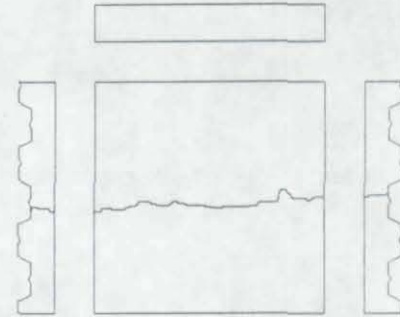
SIDE VIEW



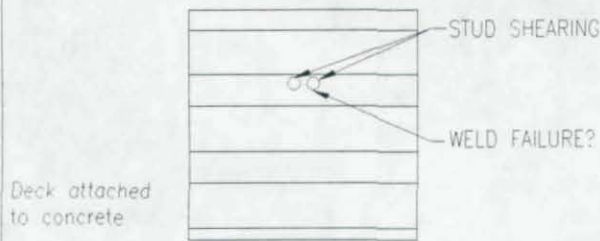
TOP VIEW



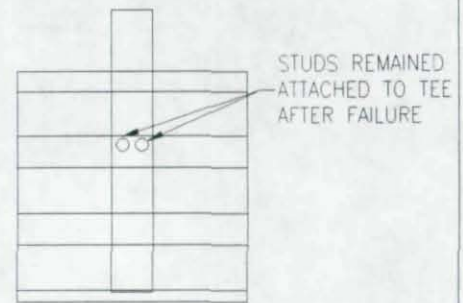
SIDE A SURFACE



SIDE B SURFACE



SIDE A BOTTOM



SIDE B BOTTOM

Test D32 Data

Axial Load (kips)	Slips (in.)				Test Comments
	Pot. AT-1	Pot. AT-2	Pot. BT-3	Pot. BT-4	
0.00	0.0000	0.0000	0.0000	0.0000	BEGIN TEST
10.68	0.0006	0.0043	0.0000	-0.0018	
16.08	0.0006	0.0067	0.0000	-0.0018	
21.23	0.0006	0.0104	0.0000	0.0000	
25.75	0.0006	0.0135	0.0000	0.0000	
31.28	0.0006	0.0177	0.0000	0.0000	
36.31	0.0006	0.0214	0.0000	0.0000	
40.83	0.0006	0.0251	0.0000	0.0006	
45.73	0.0006	0.0312	0.0000	0.0006	
50.25	0.0006	0.0367	0.0000	0.0006	
55.15	0.0012	0.0502	0.0000	-0.0006	
60.55	0.0073	0.0649	0.0000	-0.0024	
63.57	0.0220	0.0893	0.0000	-0.0024	
59.92	0.0526	0.1297	0.0000	-0.0043	POP.
61.31	0.0685	0.1487	0.0000	-0.0037	
62.56	0.0893	0.1731	0.0000	-0.0037	
63.82	0.1119	0.1982	0.0000	-0.0018	
66.21	0.1340	0.2251	0.0000	0.0012	
67.84	0.1578	0.2539	0.0000	0.0061	
69.47	0.1817	0.2802	0.0000	0.0116	TRANSVERSE CRACK SIDE B.
69.97	0.2092	0.3114	0.0000	0.0196	
66.96	0.2349	0.3420	0.0000	0.0281	POP.
68.84	0.2624	0.3720	0.0000	0.0342	
69.97	0.2893	0.4013	0.0000	0.0440	
68.84	0.3242	0.4380	0.0000	0.0563	LOUD BANG.

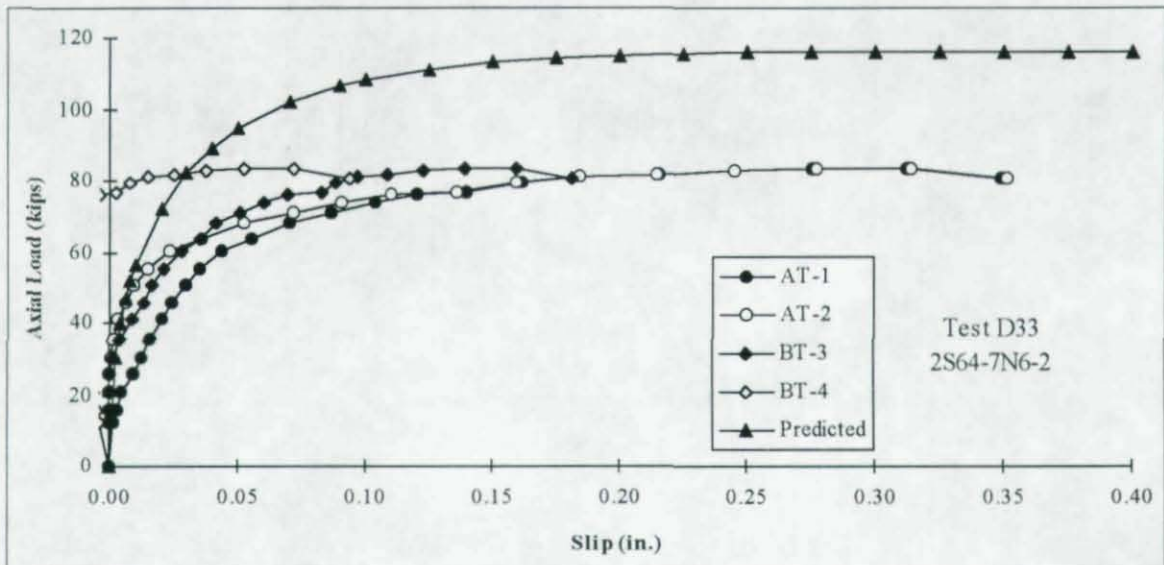
PUSH-OUT TEST SUMMARY SHEET

Test:	D33	Deck Type:	2" USD, 20 ga.
Designation:	2S64-7N6-2		
Date of Test:	7/8/97		
Concrete Strength:	7080 psi	Stud Position:	2S
Concrete Weight:	151.26 pcf	Stud Size:	3/4 in. x 4 in.
Concrete Thickness:	6 in.	Stud Tensile Strength:	65.813 ksi
Maximum Applied Load:	83.54 kips		
Applied Load Per Stud:	20.89 kips		
Concrete Slip at Failure:			

Pot. AT-1: 0.3493 in.	Pot. BT-3: 0.1811 in.
Pot. AT-2: 0.3516 in.	Pot. BT-4: 0.0941 in.
Avg. Side A: 0.3505 in.	Avg. Side B: 0.1376 in.

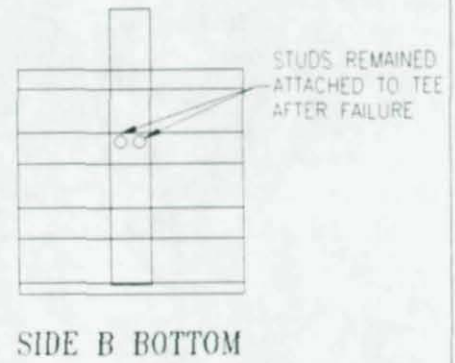
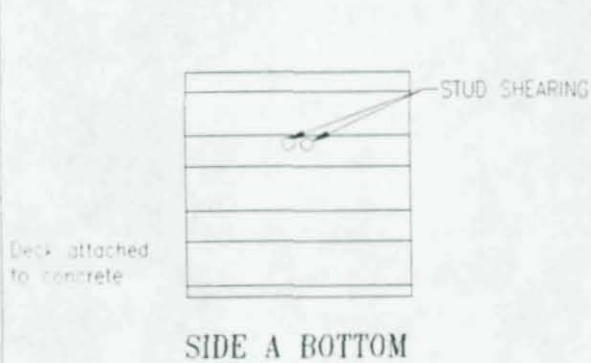
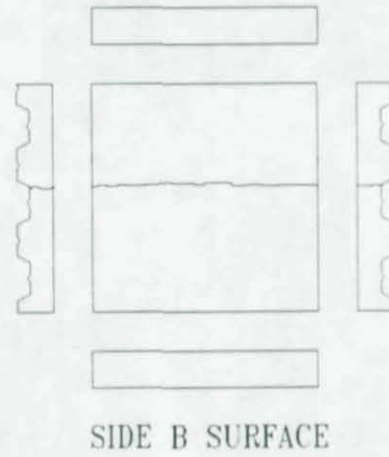
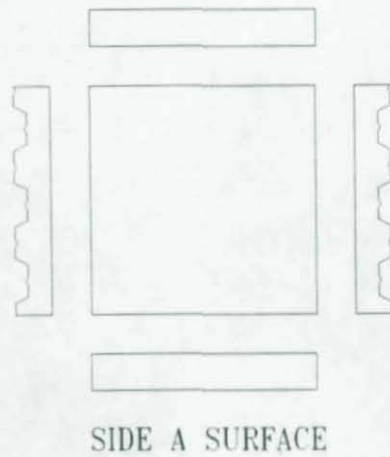
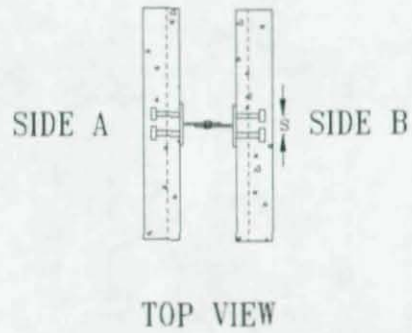
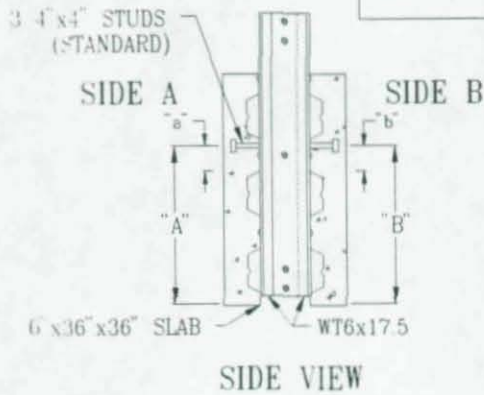
Avg.: 0.2440 in.

Comments: 10% Normal Load
Stud Shearing Failure of Both Studs on Side A



PUSH-OUT TEST LAYOUT & CRACKING SHEET

Test:	D33
Designation:	2S64-7N6-2
Date:	7/8/97



Test D33 Data

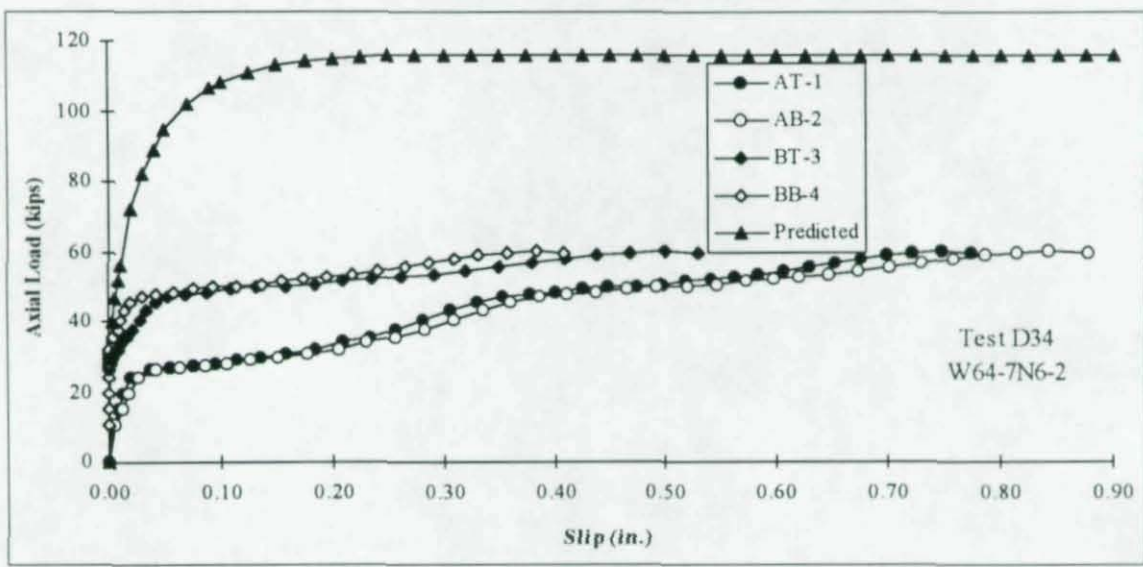
Axial Load (kips)	Slips (in.)				Test
	Pot. AT-1	Pot. AT-2	Pot. BT-3	Pot. BT-4	Comments
0.00	0.0000	0.0000	0.0000	0.0000	BEGIN TEST
12.56	0.0018	0.0000	0.0000	-0.0043	
15.70	0.0031	0.0000	0.0000	-0.0049	
20.73	0.0049	0.0000	0.0000	-0.0061	
25.75	0.0092	0.0000	0.0000	-0.0079	
30.53	0.0128	0.0006	0.0018	-0.0098	
35.55	0.0159	0.0012	0.0043	-0.0098	
41.21	0.0202	0.0031	0.0086	-0.0098	
45.73	0.0239	0.0061	0.0135	-0.0104	
50.50	0.0294	0.0092	0.0165	-0.0104	
55.15	0.0349	0.0147	0.0214	-0.0098	
60.18	0.0434	0.0232	0.0281	-0.0098	
63.44	0.0557	0.0361	0.0355	-0.0104	
68.22	0.0703	0.0526	0.0416	-0.0104	
71.23	0.0869	0.0722	0.0508	-0.0104	
73.99	0.1040	0.0905	0.0599	-0.0067	
76.01	0.1205	0.1101	0.0697	-0.0043	
76.63	0.1401	0.1358	0.0826	0.0024	
79.40	0.1621	0.1590	0.0881	0.0079	
81.16	0.1841	0.1841	0.0966	0.0147	
81.66	0.2153	0.2146	0.1083	0.0251	DECK DEBONDING TOP SIDE B
82.66	0.2453	0.2452	0.1230	0.0379	
83.54	0.2759	0.2776	0.1389	0.0526	
83.17	0.3126	0.3143	0.1597	0.0715	
80.78	0.3492	0.3516	0.1811	0.0941	BANG. TRANSVERSE CRACK & DECK DEBONDING ON SIDE B

PUSH-OUT TEST SUMMARY SHEET

Test:	D34	Deck Type:	2" USD, 20 ga.
Designation:	W64-7N6-2		
Date of Test:	7/5/97		
Concrete Strength:	7080 psi	Stud Position:	W
Concrete Weight:	151.26 pcf	Stud Size:	3/4 in. x 4 in.
Concrete Thickness:	6 in.	Stud Tensile Strength:	65.813 ksi
Maximum Applied Load:	60.18 kips		
Applied Load Per Stud:	15.05 kips		
Concrete Slip at Failure:			

Pot. AT-1: 0.7731 in.	Pot. BT-3: 0.5285 in.
Pot. AB-2: 0.8763 in.	Pot. BB-4: 0.4076 in.
Avg. Side A: 0.8247 in.	Avg. Side B: 0.4681 in.
Avg.: 0.6464 in.	

Comments: 10% Normal Load
Stud Shearing Failure of Both Studs on Side A

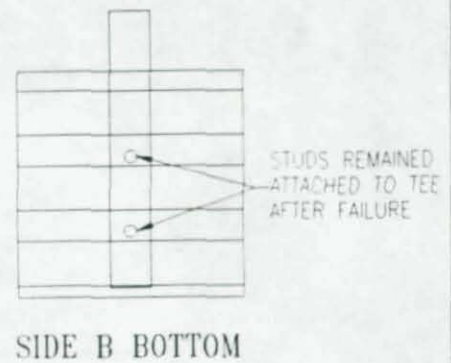
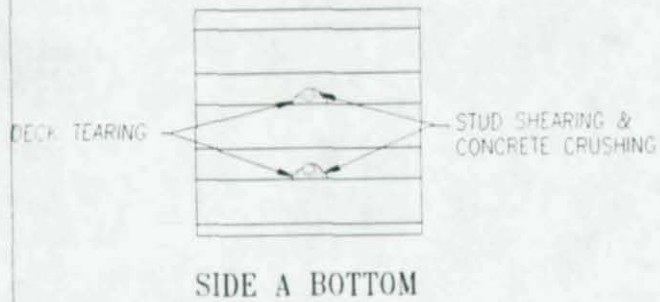
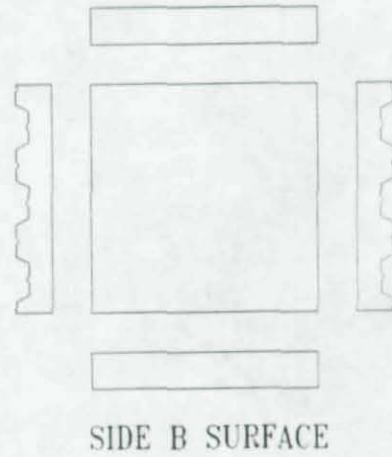
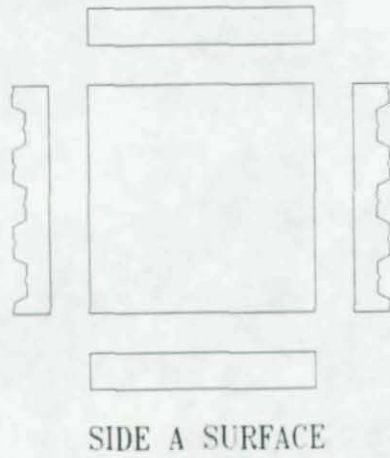
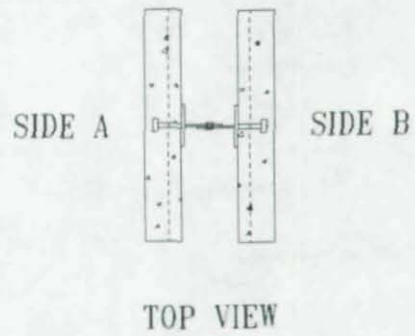
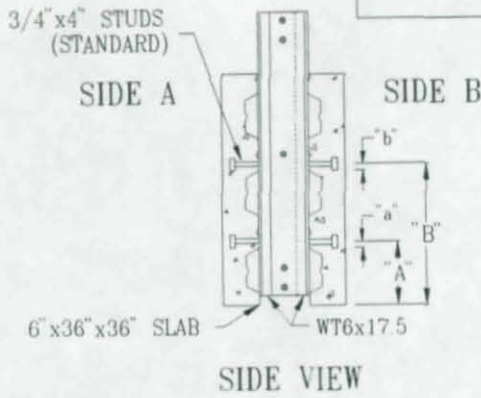


PUSH-OUT TEST LAYOUT & CRACKING SHEET

Test: D34

Designation: W64-7N6-2

Date: 7/5/97



Test D34 Data

Axial Load (kips)	Slips (in.)				Test Comments
	Pot. AT-1	Pot. AB-2	Pot. BT-3	Pot. BB-4	
0.00	0.0000	0.0000	0.0000	0.0000	BEGIN TEST
10.68	0.0037	0.0055	0.0006	0.0006	
15.20	0.0086	0.0116	0.0006	0.0006	
19.97	0.0122	0.0177	0.0000	0.0006	
24.12	0.0202	0.0263	0.0006	0.0000	
26.26	0.0367	0.0422	0.0006	0.0006	
27.01	0.0550	0.0636	0.0006	0.0000	
27.64	0.0758	0.0862	0.0006	0.0006	
28.39	0.0954	0.1058	0.0012	0.0000	
29.02	0.1138	0.1266	0.0024	0.0006	SOFT POP.
30.03	0.1352	0.1504	0.0031	0.0000	SOFT POP.
30.90	0.1590	0.1773	0.0055	0.0000	
32.16	0.1841	0.2049	0.0080	0.0006	CREAKING NOISES @ LOAD PT.
34.17	0.2092	0.2311	0.0122	0.0031	
35.55	0.2330	0.2574	0.0165	0.0043	
37.94	0.2569	0.2825	0.0214	0.0079	
40.70	0.2820	0.3094	0.0275	0.0104	DECK DEBONDING TOP SIDE B
43.22	0.3058	0.3351	0.0336	0.0147	
45.48	0.3297	0.3608	0.0416	0.0202	DECK BULGING @ STUDS SIDE A
47.24	0.3529	0.3859	0.0532	0.0293	
47.99	0.3774	0.4115	0.0679	0.0416	
48.62	0.4006	0.4378	0.0875	0.0581	
49.62	0.4251	0.4653	0.1095	0.0752	
50.25	0.4489	0.4916	0.1315	0.0929	
50.25	0.4740	0.5198	0.1578	0.1143	
50.63	0.4973	0.5467	0.1847	0.1363	
51.63	0.5193	0.5724	0.2098	0.1552	
52.26	0.5407	0.5968	0.2355	0.1748	
52.76	0.5621	0.6213	0.2618	0.1949	

Test D34 Data

Axial Load (kips)	Slips (in.)				Test Comments
	Pot. AT-1	Pot. AB-2	Pot. BT-3	Pot. BB-4	
53.39	0.5841	0.6470	0.2912	0.2182	
54.65	0.6061	0.6739	0.3199	0.2408	
55.78	0.6288	0.7020	0.3505	0.2646	
56.91	0.6514	0.7295	0.3793	0.2860	
57.91	0.6753	0.7576	0.4092	0.3092	
58.92	0.6979	0.7858	0.4374	0.3312	
59.80	0.7211	0.8133	0.4667	0.3575	
60.18	0.7468	0.8426	0.4998	0.3838	
59.67	0.7731	0.8763	0.5285	0.4076	BANG.

PUSH-OUT TEST SUMMARY SHEET

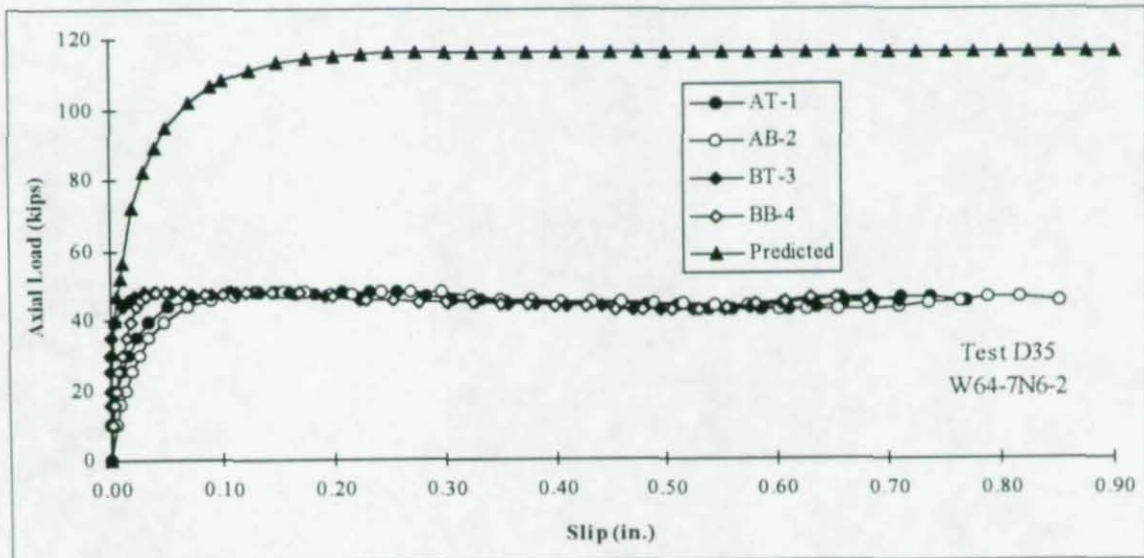
Test:	D35	Deck Type:	2" USD, 20 ga.
Designation:	W64-7N6-2		
Date of Test:	7/5/97		
Concrete Strength:	7080 psi	Stud Position:	W
Concrete Weight:	151.26 pcf	Stud Size:	3/4 in. x 4 in.
Concrete Thickness:	6 in.	Stud Tensile Strength:	65.813 ksi
Maximum Applied Load:	48.12 kips		
Applied Load Per Stud:	12.03 kips		

Concrete Slip at Failure:

Pot. AT-1: 0.7676 in.	Pot. BT-3: 0.7077 in.
Pot. AB-2: 0.8513 in.	Pot. BB-4: 0.6783 in.
Avg. Side A: 0.8095 in.	Avg. Side B: 0.6930 in.

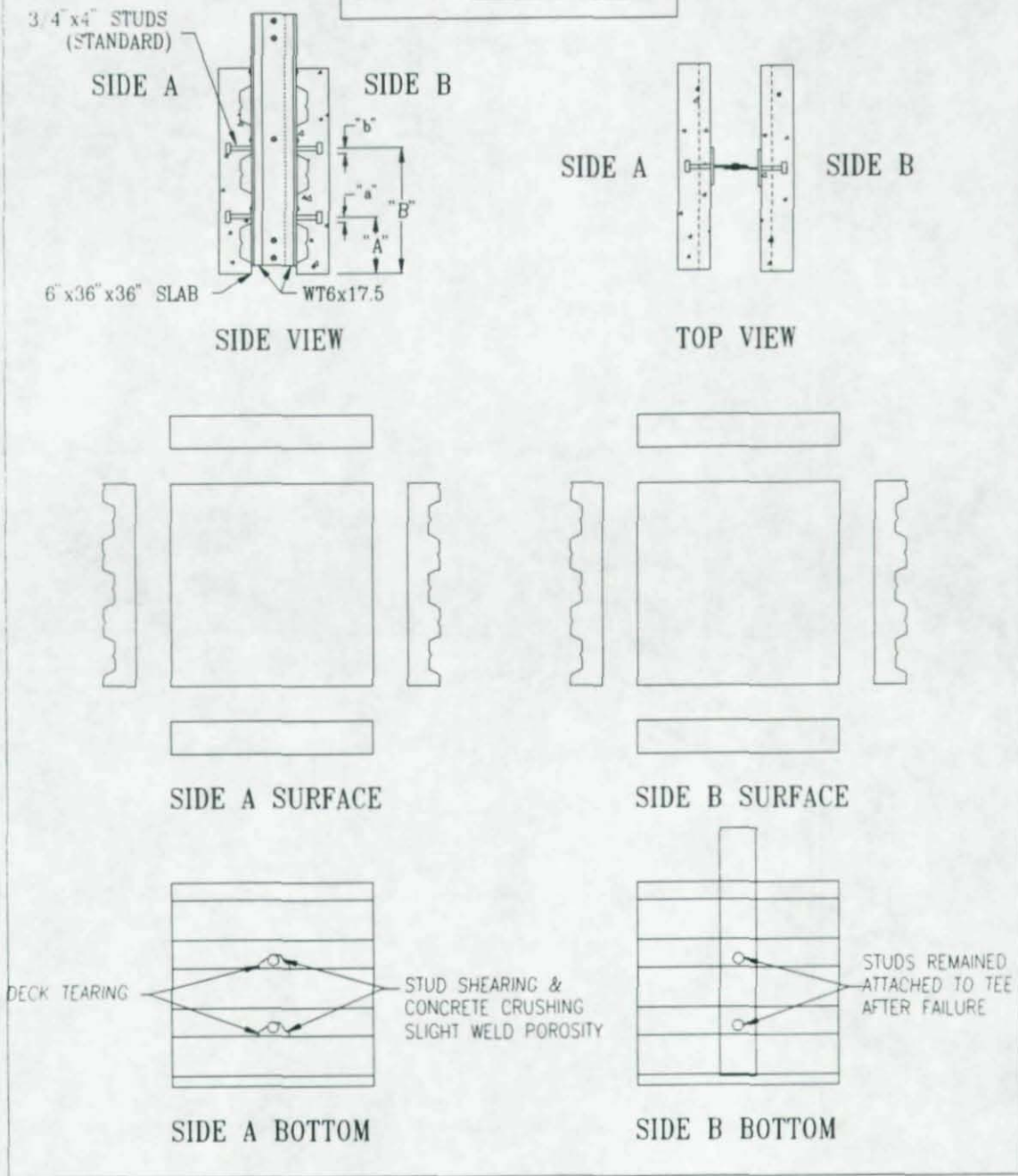
Avg.: 0.7512 in.

Comments: 10% Normal Load
Stud Shearing Failure of Both Studs on Side A



PUSH-OUT TEST LAYOUT & CRACKING SHEET

Test:	D35
Designation:	W64-7N6-2
Date:	7/5/97



Test D35 Data

Axial Load (kips)	Slips (in.)				Test Comments	
	Pot. AT-1	Pot. AB-2	Pot. BT-3	Pot. BB-4		
0.00	0.0000	0.0000	0.0000	0.0000	BEGIN TEST	
10.18	0.0000	0.0049	0.0000	0.0024		
15.95	0.0018	0.0086	0.0000	0.0037		
19.97	0.0055	0.0135	0.0000	0.0055		
25.63	0.0098	0.0196	0.0000	0.0073		
30.03	0.0153	0.0263	0.0000	0.0104		
34.92	0.0226	0.0336	0.0006	0.0134		
39.70	0.0336	0.0483	0.0043	0.0171		
43.72	0.0508	0.0685	0.0098	0.0220		
45.85	0.0703	0.0899	0.0159	0.0269		
46.73	0.0887	0.1107	0.0214	0.0324		
47.61	0.1076	0.1327	0.0294	0.0409		
47.61	0.1278	0.1541	0.0385	0.0495		
47.61	0.1468	0.1749	0.0538	0.0654		
47.49	0.1658	0.1963	0.0722	0.0837		
47.49	0.1835	0.2159	0.0893	0.1002		
47.86	0.2067	0.2428	0.1119	0.1216		
47.99	0.2312	0.2691	0.1340	0.1436		
48.12	0.2575	0.2966	0.1603	0.1687		
46.61	0.2826	0.3235	0.1921	0.1980		DECK BULGING SIDES A & B
45.48	0.3064	0.3498	0.2233	0.2279		
45.48	0.3315	0.3779	0.2526	0.2524		
45.23	0.3548	0.4048	0.2759	0.2768		
44.85	0.3804	0.4324	0.3016	0.3013		
44.85	0.4049	0.4593	0.3273	0.3245		
44.60	0.4306	0.4880	0.3566	0.3489		
44.47	0.4563	0.5155	0.3811	0.3752		
43.97	0.4820	0.5437	0.4098	0.3997		
43.72	0.5095	0.5730	0.4404	0.4278		

Test D35 Data

Axial Load (kips)	Slips (in.)				Test Comments
	Pot. AT-1	Pot. AB-2	Pot. BT-3	Pot. BB-4	
43.09	0.5370	0.6005	0.4698	0.4540	
42.71	0.5597	0.6256	0.4936	0.4785	
42.59	0.5853	0.6531	0.5242	0.5048	
42.96	0.6098	0.6813	0.5511	0.5292	
43.59	0.6349	0.7076	0.5756	0.5537	
44.60	0.6600	0.7345	0.6025	0.5793	
45.35	0.6857	0.7626	0.6276	0.6056	
45.98	0.7107	0.7877	0.6570	0.6300	
46.36	0.7364	0.8164	0.6827	0.6520	
45.23	0.7676	0.8513	0.7077	0.6783	BANG.

PUSH-OUT TEST SUMMARY SHEET

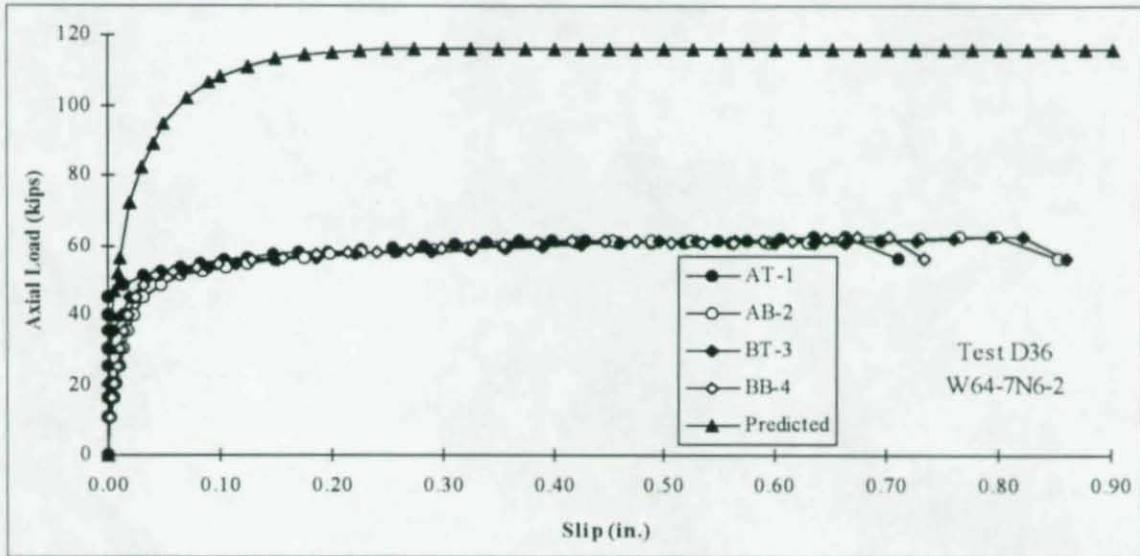
Test:	D36	Deck Type:	2" USD, 20 ga.
Designation:	W64-7N6-2		
Date of Test:	7/6/97		
Concrete Strength:	7080 psi	Stud Position:	W
Concrete Weight:	151.26 pcf	Stud Size:	3/4 in. x 4 in.
Concrete Thickness:	6 in.	Stud Tensile Strength:	65.813 ksi
Maximum Applied Load:	62.69 kips		
Applied Load Per Stud:	15.67 kips		

Concrete Slip at Failure:

Pot. AT-1: 0.7095 in.	Pot. BT-3: 0.8594 in.
Pot. AB-2: 0.8525 in.	Pot. BB-4: 0.7328 in.
Avg. Side A: 0.7810 in.	Avg. Side B: 0.7961 in.

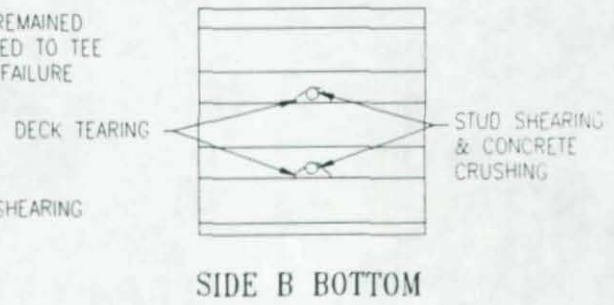
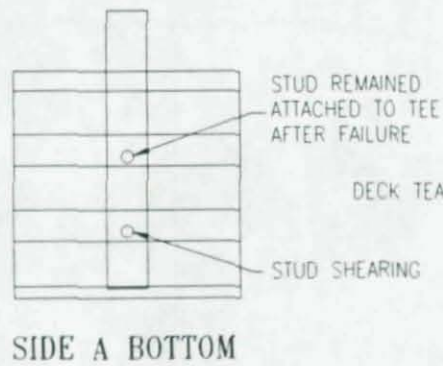
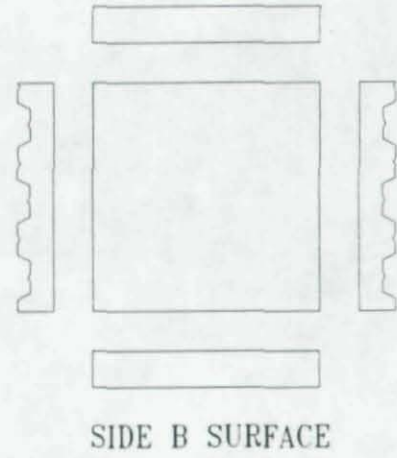
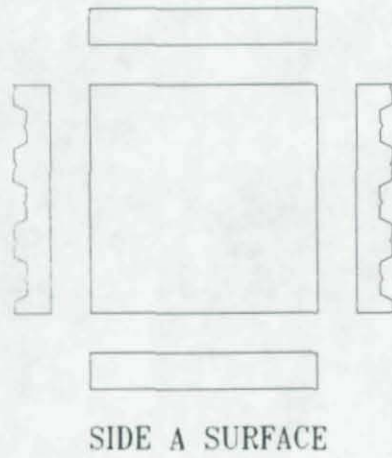
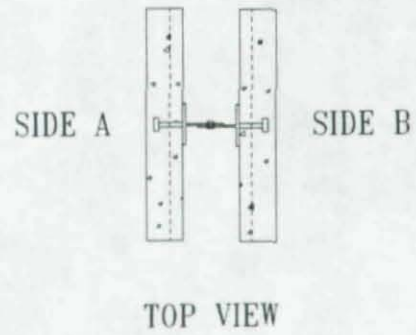
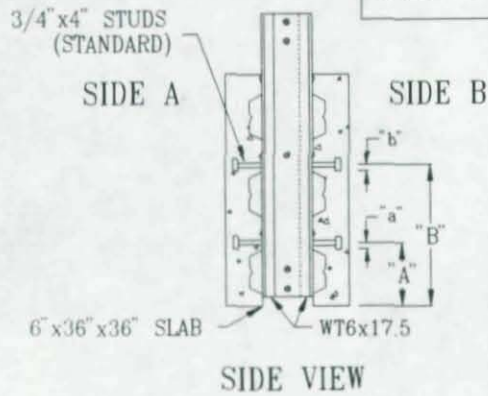
Avg.: 0.7886 in.

Comments: 10% Normal Load
 Stud Shearing Failure of Bottom Stud on Side A and Both Studs on Side B



PUSH-OUT TEST LAYOUT & CRACKING SHEET

Test:	D36
Designation:	W64-7N6-2
Date:	7/6/97



Test D36 Data

Axial Load (kips)	Slips (in.)				Test Comments
	Pot. AT-1	Pot. AB-2	Pot. BT-3	Pot. BB-4	
0.00	0.0000	0.0000	0.0000	0.0000	BEGIN TEST
10.93	-0.0006	0.0024	-0.0006	0.0018	
16.21	-0.0006	0.0049	-0.0006	0.0037	
20.35	0.0043	0.0073	-0.0006	0.0055	
25.25	-0.0006	0.0104	0.0000	0.0079	
30.65	-0.0006	0.0147	0.0018	0.0104	
35.55	-0.0006	0.0177	0.0061	0.0134	
40.08	-0.0006	0.0232	0.0122	0.0177	
44.85	-0.0006	0.0318	0.0202	0.0238	
48.37	0.0147	0.0483	0.0318	0.0312	
51.01	0.0312	0.0654	0.0465	0.0428	
52.51	0.0471	0.0838	0.0661	0.0581	
53.64	0.0648	0.1052	0.0893	0.0782	
54.52	0.0820	0.1248	0.1150	0.0990	
55.53	0.1040	0.1498	0.1517	0.1283	
56.41	0.1254	0.1755	0.1872	0.1571	
57.66	0.1468	0.1994	0.2220	0.1870	
57.91	0.1713	0.2275	0.2569	0.2151	
58.04	0.1976	0.2581	0.2893	0.2408	
58.54	0.2269	0.2917	0.3254	0.2707	DECK DEBONDING TOP SIDE A & SLIGHT DECK RIB ROTATION
58.92	0.2551	0.3235	0.3572	0.2995	
59.67	0.2826	0.3547	0.3897	0.3264	
60.55	0.3107	0.3883	0.4251	0.3551	
61.06	0.3389	0.4214	0.4600	0.3850	DECK BULGING
61.56	0.3688	0.4544	0.4955	0.4168	DECK RIB ROTATION TOP SIDE A
61.31	0.3982	0.4892	0.5291	0.4461	
61.31	0.4294	0.5241	0.5640	0.4749	
60.93	0.4593	0.5602	0.5995	0.5060	

Test D36 Data

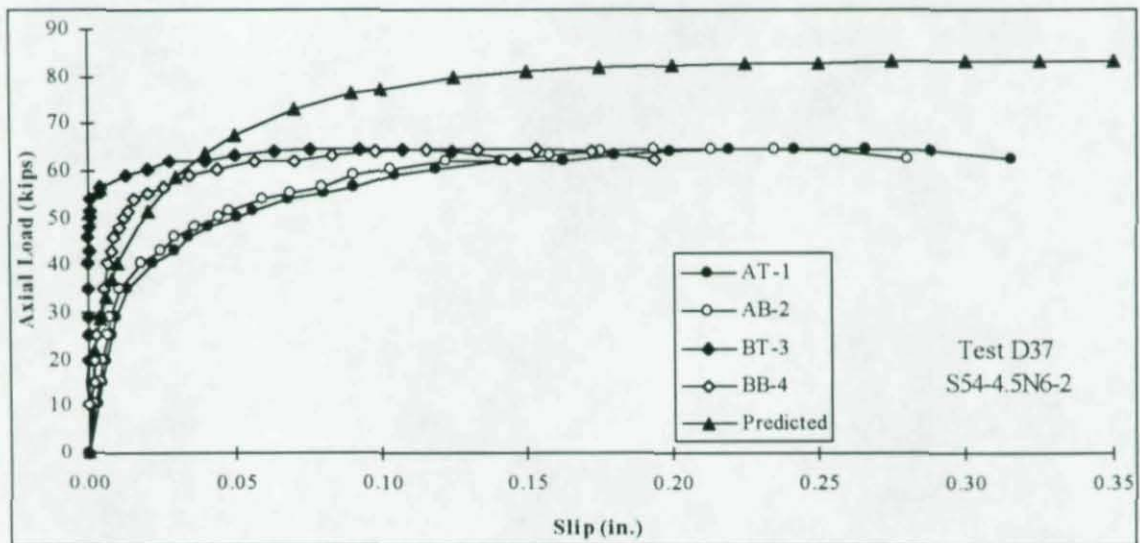
Axial Load (kips)	Slips (in.)				Test Comments
	Pot. AT-1	Pot. AB-2	Pot. BT-3	Pot. BB-4	
60.93	0.4887	0.5938	0.6343	0.5348	
60.93	0.5187	0.6293	0.6631	0.5623	
61.43	0.5480	0.6617	0.6949	0.5885	
61.68	0.5749	0.6941	0.7267	0.6160	
62.19	0.6049	0.7290	0.7597	0.6460	
62.69	0.6349	0.7638	0.7921	0.6741	
62.44	0.6624	0.7981	0.8203	0.7016	
56.16	0.7095	0.8525	0.8594	0.7328	BANG.

PUSH-OUT TEST SUMMARY SHEET

Test:	D37	Deck Type:	2" USD, 20 ga.
Designation:	S54-4.5N6-2		
Date of Test:	10/1/97		
Concrete Strength:	4710 psi	Stud Position:	S
Concrete Weight:	144.04 pcf	Stud Size:	5/8 in. x 4 in.
Concrete Thickness:	6 in.	Stud Tensile Strength:	72.635 ksi
Maximum Applied Load:	64.70 kips		
Applied Load Per Stud:	16.18 kips		
Concrete Slip at Failure:			

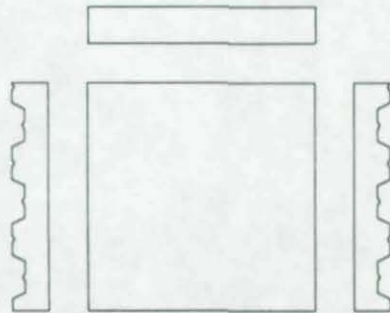
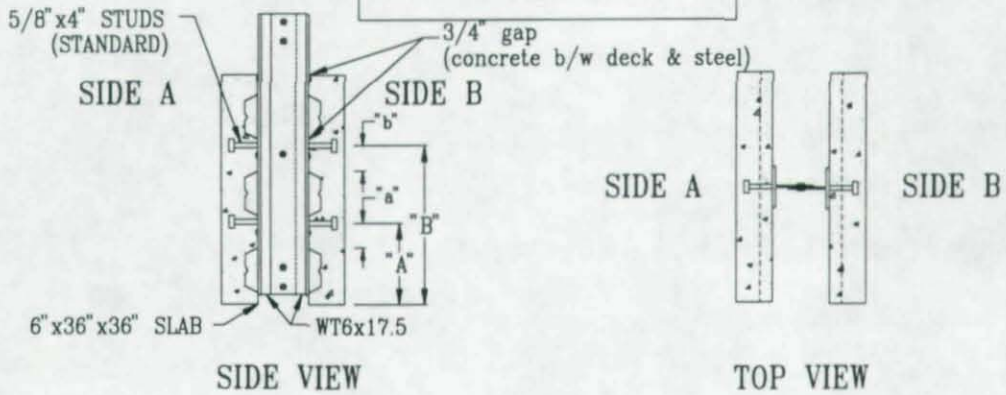
Pot. AT-1: 0.3156 in.	Pot. BT-3: 0.1464 in.
Pot. AB-2: 0.2801 in.	Pot. BB-4: 0.1940 in.
Avg. Side A: 0.2979 in.	Avg. Side B: 0.1702 in.
Avg.: 0.2340 in.	

Comments: 10% Normal Load
 Test Operator: MRR
 Stud Shearing Failure of Both Studs on Side A

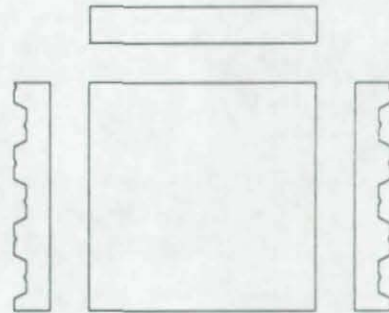


PUSH-OUT TEST LAYOUT & CRACKING SHEET

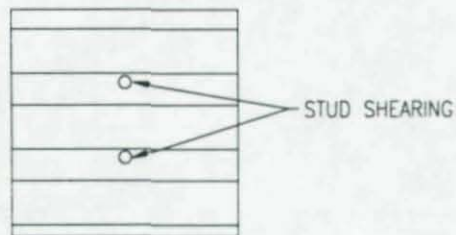
Test:	D37
Designation:	S54-4.5N6-2
Date:	10/1/97



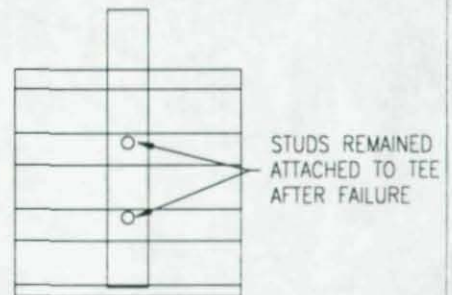
SIDE A SURFACE



SIDE B SURFACE



SIDE A BOTTOM



SIDE B BOTTOM

Test D37 Data

Axial Load (kips)	Slips (in.)				Test Comments
	Pot. AT-1	Pot. AB-2	Pot. BT-3	Pot. BB-4	
0.00	0.0000	0.0000	0.0000	0.0000	BEGIN TEST
10.43	0.0034	0.0017	-0.0001	0.0001	
15.14	0.0050	0.0038	-0.0006	0.0017	
19.97	0.0059	0.0048	0.0002	0.0022	
25.19	0.0078	0.0066	-0.0001	0.0026	
29.02	0.0098	0.0076	-0.0001	0.0042	
35.05	0.0137	0.0110	0.0002	0.0051	
40.58	0.0221	0.0184	-0.0002	0.0066	
43.09	0.0298	0.0251	0.0004	0.0079	
45.90	0.0343	0.0297	0.0000	0.0090	
48.37	0.0415	0.0364	0.0004	0.0109	
50.38	0.0509	0.0447	0.0004	0.0123	
51.57	0.0558	0.0481	0.0007	0.0134	
53.89	0.0685	0.0595	0.0009	0.0159	
55.40	0.0807	0.0691	0.0038	0.0201	
56.60	0.0908	0.0795	0.0043	0.0256	
59.17	0.1046	0.0906	0.0126	0.0348	
60.62	0.1192	0.1033	0.0204	0.0442	
61.93	0.1411	0.1225	0.0276	0.0568	
62.30	0.1626	0.1424	0.0399	0.0704	
63.40	0.1802	0.1581	0.0497	0.0831	
64.20	0.1994	0.1760	0.0634	0.0979	
64.60	0.2199	0.1936	0.0759	0.1154	
64.70	0.2420	0.2133	0.0927	0.1331	
64.70	0.2663	0.2351	0.1073	0.1535	
64.20	0.2887	0.2558	0.1243	0.1726	
62.60	0.3156	0.2801	0.1464	0.1940	BANG. STUD SHEARING.

PUSH-OUT TEST SUMMARY SHEET

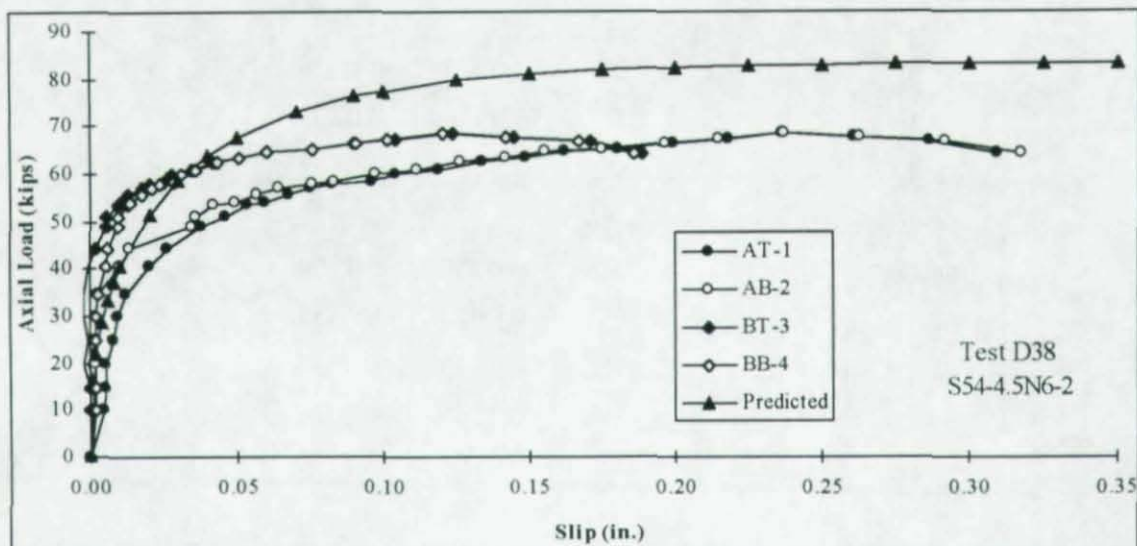
Test:	D38	Deck Type:	2" USD, 20 ga.
Designation:	S54-4.5N6-2		
Date of Test:	10/3/97		
Concrete Strength:	4710 psi	Stud Position:	S
Concrete Weight:	144.04 pcf	Stud Size:	5/8 in. x 4 in.
Concrete Thickness:	6 in.	Stud Tensile Strength:	72.635 ksi
Maximum Applied Load:	68.28 kips		
Applied Load Per Stud:	17.07 kips		

Concrete Slip at Failure:

Pot. AT-1: 0.3095 in.	Pot. BT-3: 0.1886 in.
Pot. AB-2: 0.3177 in.	Pot. BB-4: 0.1859 in.
Avg. Side A: 0.3136 in.	Avg. Side B: 0.1873 in.

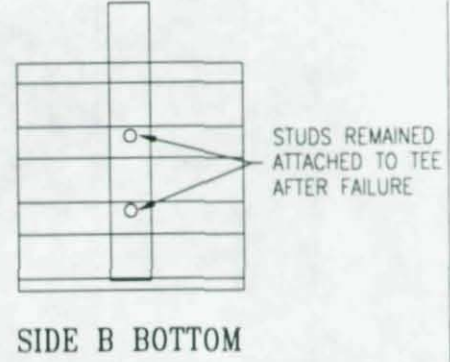
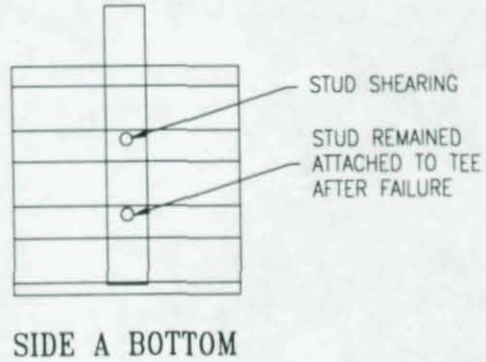
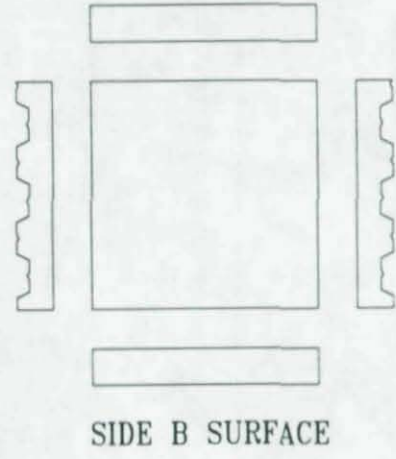
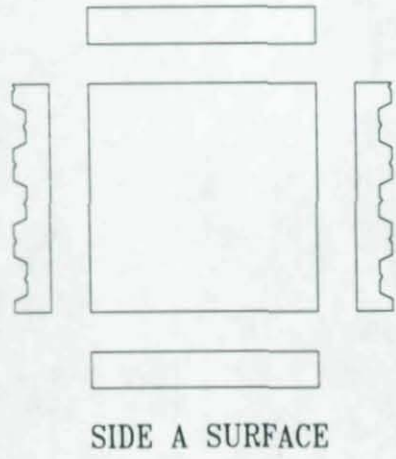
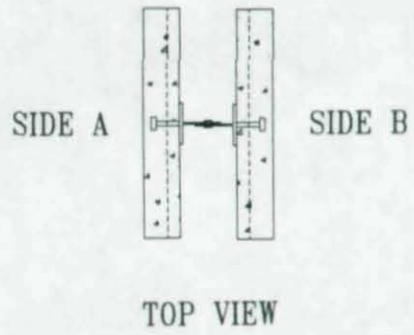
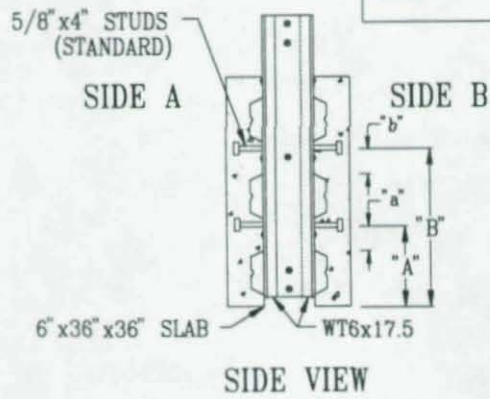
Avg.: 0.2504 in.

Comments: 10% Normal Load
 Test Operator: MRR & BCD
 Stud Shearing Failure of Top Stud on Side A



PUSH-OUT TEST LAYOUT & CRACKING SHEET

Test: D38
Designation: S54-4.5N6-2
Date: 10/3/97



Test D38 Data

Axial Load (kips)	Slips (in.)				Test
	Pot. AT-1	Pot. AB-2	Pot. BT-3	Pot. BB-4	Comments
0.00	0.0000	0.0000	0.0000	0.0000	BEGIN TEST
10.30	0.0046	0.0018	0.0000	0.0018	
15.00	0.0055	0.0018	0.0000	0.0018	
19.80	0.0055	0.0018	-0.0018	-0.0009	
25.10	0.0082	0.0018	-0.0009	0.0018	
29.84	0.0092	0.0018	-0.0018	0.0018	
34.61	0.0119	0.0027	-0.0018	0.0027	
40.45	0.0201	0.0101	-0.0009	0.0055	
44.16	0.0266	0.0137	0.0018	0.0064	
49.20	0.0375	0.0348	0.0055	0.0092	
51.30	0.0458	0.0357	0.0055	0.0092	
53.45	0.0531	0.0421	0.0092	0.0128	
54.27	0.0595	0.0494	0.0101	0.0137	
55.78	0.0678	0.0568	0.0128	0.0174	
57.04	0.0751	0.0641	0.0174	0.0211	
57.73	0.0824	0.0760	0.0201	0.0238	
58.29	0.0961	0.0833	0.0247	0.0284	
59.80	0.1044	0.0971	0.0275	0.0311	
60.80	0.1190	0.1117	0.0348	0.0357	
62.50	0.1337	0.1264	0.0421	0.0430	
63.25	0.1483	0.1419	0.0504	0.0504	
64.57	0.1621	0.1557	0.0604	0.0604	
65.26	0.1804	0.1749	0.0760	0.0760	
66.33	0.1996	0.1969	0.0897	0.0906	
67.09	0.2179	0.2152	0.1044	0.1016	
68.28	0.2362	0.2372	0.1236	0.1199	
67.78	0.2610	0.2628	0.1447	0.1419	
66.80	0.2866	0.2921	0.1712	0.1666	
64.26	0.3095	0.3177	0.1886	0.1859	BANG. STUD SHEARING.

PUSH-OUT TEST SUMMARY SHEET

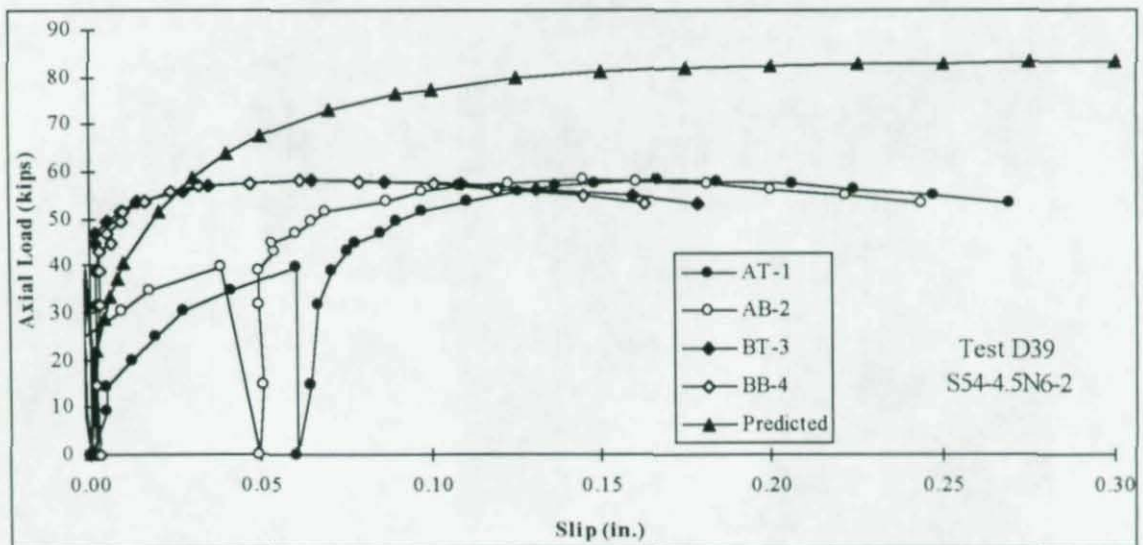
Test:	D39	Deck Type:	2" USD, 20 ga.
Designation:	S54-4.5N6-2		
Date of Test:	10/3/97		
Concrete Strength:	4710 psi	Stud Position:	S
Concrete Weight:	144.04 pcf	Stud Size:	5/8 in. x 4 in.
Concrete Thickness:	6 in.	Stud Tensile Strength:	72.635 ksi
Maximum Applied Load:	58.10 kips		
Applied Load Per Stud:	14.53 kips		

Concrete Slip at Failure:

Pot. AT-1: 0.2692 in.	Pot. BT-3: 0.1785 in.
Pot. AB-2: 0.2436 in.	Pot. BB-4: 0.1630 in.
Avg. Side A: 0.2564 in.	Avg. Side B: 0.1708 in.

Avg.: 0.2136 in.

Comments: 10% Normal Load
 Test Operator: BCD
 Stud Shearing Failure of Both Studs on Side A

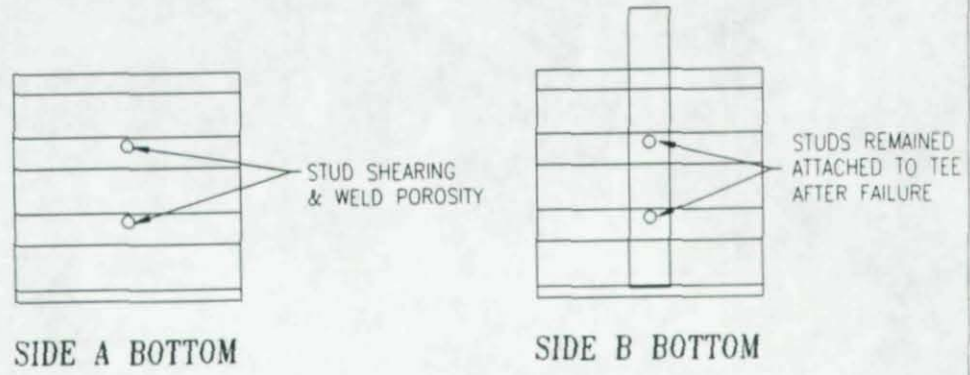
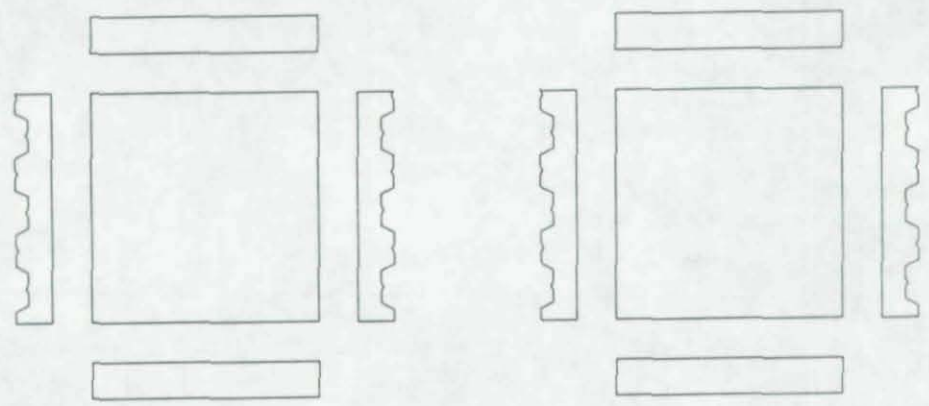
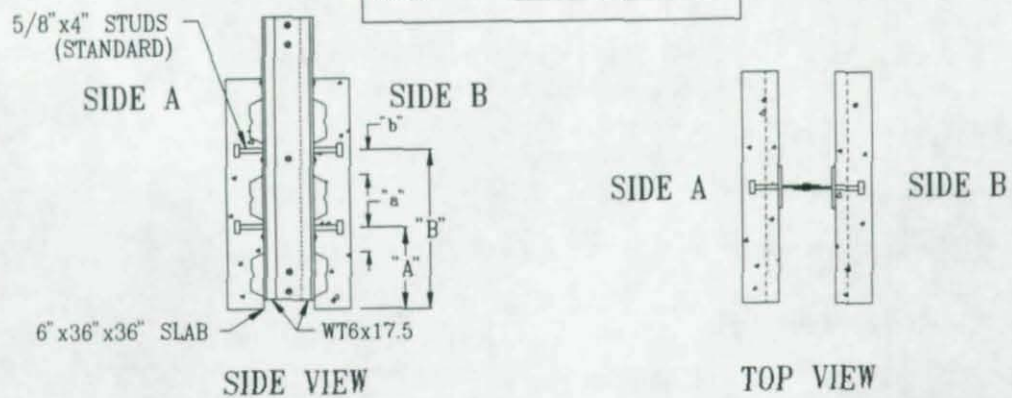


PUSH-OUT TEST LAYOUT & CRACKING SHEET

Test: D39

Designation: S54-4.5N6-2

Date: 10/3/97



Test D39 Data

Axial Load (kips)	Slips (in.)				Test Comments
	Pot. AT-1	Pot. AB-2	Pot. BT-3	Pot. BB-4	
0.00	0.0000	0.0000	0.0000	0.0000	BEGIN TEST
9.17	0.0046	-0.0009	-0.0018	-0.0009	
14.38	0.0046	-0.0009	-0.0018	-0.0018	
19.97	0.0119	-0.0018	-0.0009	-0.0018	
24.94	0.0192	-0.0018	-0.0018	-0.0018	
30.46	0.0275	0.0092	-0.0009	-0.0018	
34.74	0.0412	0.0174	-0.0009	-0.0018	
39.82	0.0604	0.0385	-0.0009	-0.0009	
0.06	0.0604	0.0494	0.0018	0.0027	NORMAL LOAD FELL. RESTARTED.
14.89	0.0641	0.0504	0.0018	0.0018	
31.53	0.0668	0.0494	0.0018	0.0027	
38.82	0.0705	0.0494	0.0018	0.0027	
43.09	0.0751	0.0540	0.0027	0.0027	
44.60	0.0778	0.0531	0.0018	0.0064	
47.05	0.0852	0.0604	0.0018	0.0055	
49.37	0.0897	0.0650	0.0055	0.0092	
51.63	0.0971	0.0687	0.0092	0.0101	
53.83	0.1108	0.0870	0.0137	0.0165	
55.90	0.1254	0.0971	0.0275	0.0238	
57.16	0.1364	0.1080	0.0348	0.0320	
57.60	0.1483	0.1227	0.0467	0.0467	
58.10	0.1666	0.1447	0.0650	0.0613	
57.85	0.1840	0.1602	0.0861	0.0787	
57.35	0.2060	0.1813	0.1090	0.1007	
56.16	0.2243	0.1996	0.1309	0.1190	
55.09	0.2472	0.2216	0.1593	0.1447	
53.08	0.2692	0.2436	0.1785	0.1630	BANG. STUD SHEARING.

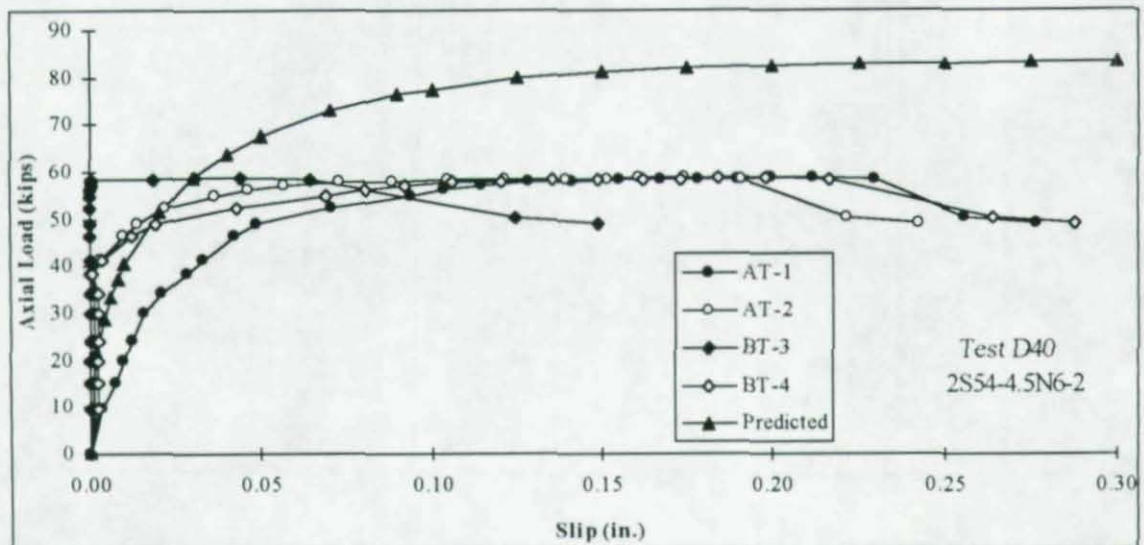
PUSH-OUT TEST SUMMARY SHEET

Test:	D40	Deck Type:	2" USD, 20 ga.
Designation:	2S54-4.5N6-2		
Date of Test:	10/20/97		
Concrete Strength:	4710 psi	Stud Position:	2S
Concrete Weight:	144.04 pcf	Stud Size:	5/8 in. x 4 in.
Concrete Thickness:	6 in.	Stud Tensile Strength:	72.635 ksi
Maximum Applied Load:	58.80 kips		
Applied Load Per Stud:	14.70 kips		
Concrete Slip at Failure:			

Pot. AT-1: 0.2771 in.	Pot. BT-3: 0.1489 in.
Pot. AT-2: 0.2429 in.	Pot. BT-4: 0.2881 in.
Avg. Side A: 0.2600 in.	Avg. Side B: 0.2185 in.

Avg.: 0.2393 in.

Comments: 10% Normal Load
 Test Operator: BCD
 Stud Shearing Failure of Both Studs on Side A?

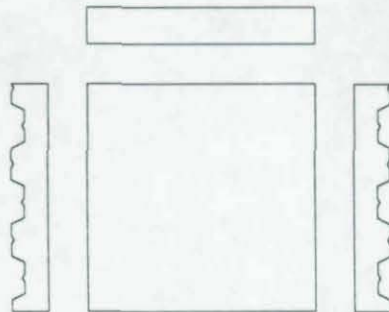
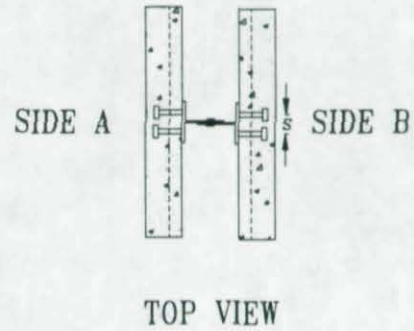
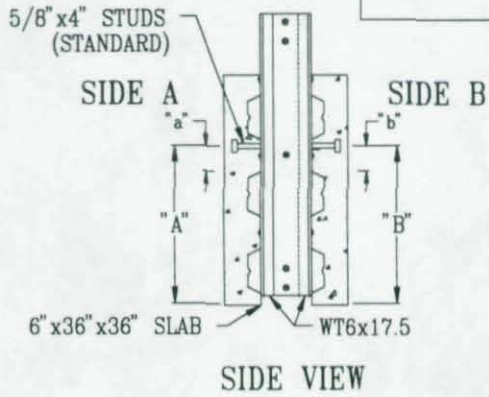


PUSH-OUT TEST LAYOUT & CRACKING SHEET

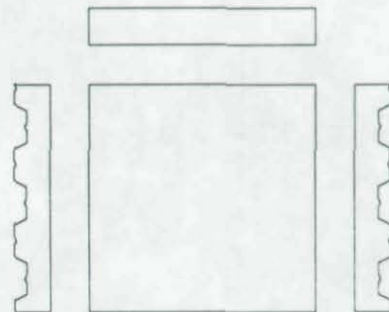
Test: D40

Designation: 2S54-4.5N6-2

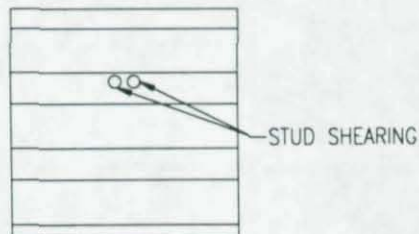
Date: 10/20/97



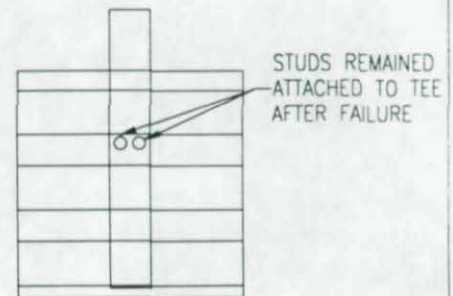
SIDE A SURFACE



SIDE B SURFACE



SIDE A BOTTOM



SIDE B BOTTOM

Test D40 Data

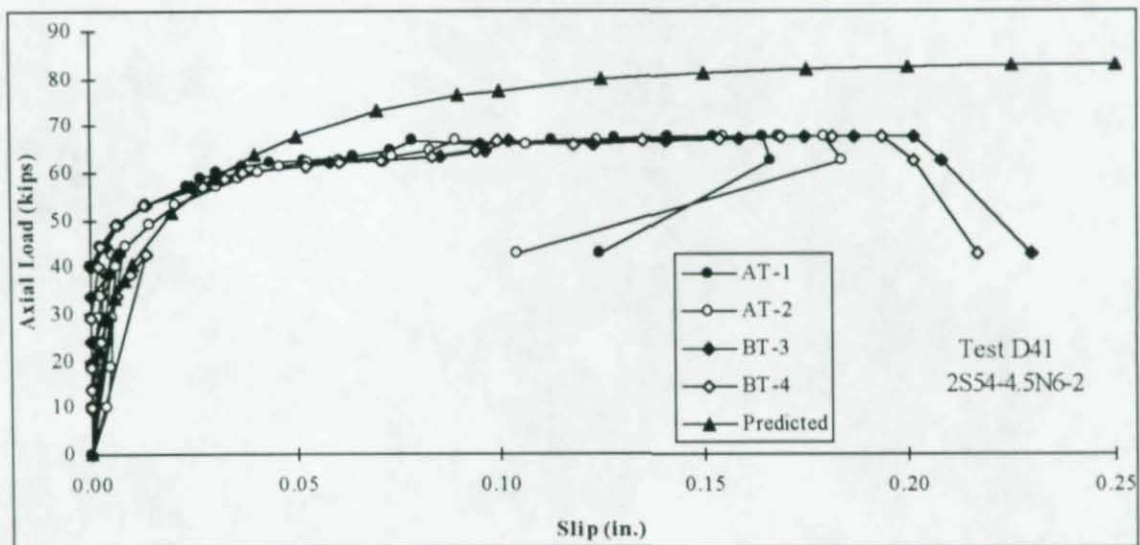
Axial Load (kips)	Slips (in.)				Test Comments
	Pot. AT-1	Pot. AT-2	Pot. BT-3	Pot. BT-4	
0.00	0.0000	0.0000	0.0000	0.0000	BEGIN TEST
9.80	0.0037	0.0012	0.0000	0.0024	
15.30	0.0073	0.0012	0.0000	0.0024	
19.70	0.0098	0.0012	0.0000	0.0024	
24.00	0.0122	0.0012	0.0000	0.0024	
29.80	0.0159	0.0012	0.0000	0.0024	
34.40	0.0208	0.0012	0.0000	0.0024	
38.40	0.0281	0.0006	0.0000	0.0006	
41.60	0.0330	0.0031	0.0000	0.0037	
46.60	0.0420	0.0098	0.0000	0.0122	
49.10	0.0488	0.0140	0.0000	0.0189	
52.50	0.0708	0.0220	0.0000	0.0427	
55.00	0.0940	0.0366	0.0000	0.0690	
56.00	0.1038	0.0464	0.0000	0.0806	
57.00	0.1147	0.0568	0.0006	0.0922	
57.70	0.1288	0.0732	0.0006	0.1062	
58.00	0.1416	0.0885	0.0006	0.1202	
58.20	0.1550	0.1050	0.0006	0.1355	
58.40	0.1672	0.1215	0.0006	0.1489	
58.40	0.1782	0.1398	0.0006	0.1624	1/4" DECK/CONC. SEPARATION - A
58.40	0.1898	0.1520	0.0183	0.1733	
58.80	0.1996	0.1611	0.0305	0.1843	
58.80	0.2118	0.1746	0.0439	0.1978	5/8" DECK/CONC. SEPARATION - A
58.40	0.2301	0.1910	0.0641	0.2167	
50.30	0.2557	0.2216	0.1245	0.2643	
49.10	0.2771	0.2429	0.1489	0.2881	THUD.

PUSH-OUT TEST SUMMARY SHEET

Test:	D41	Deck Type:	2" USD, 20 ga.
Designation:	2S54-4.5N6-2		
Date of Test:	10/24/97		
Concrete Strength:	4710 psi	Stud Position:	2S
Concrete Weight:	144.04 pcf	Stud Size:	5/8 in. x 4 in.
Concrete Thickness:	6 in.	Stud Tensile Strength:	72.635 ksi
Maximum Applied Load:	67.80 kips		
Applied Load Per Stud:	16.95 kips		
Concrete Slip at Failure:			

Pot. AT-1: 0.1666 in.	Pot. BT-3: 0.2081 in.
Pot. AT-2: 0.1837 in.	Pot. BT-4: 0.2014 in.
Avg. Side A: 0.1752 in.	Avg. Side B: 0.2048 in.
Avg.: 0.1900 in.	

Comments: 10% Normal Load
 Test Operator: BCD
 Stud Shearing Failure?

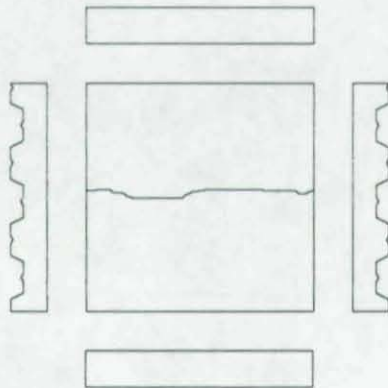
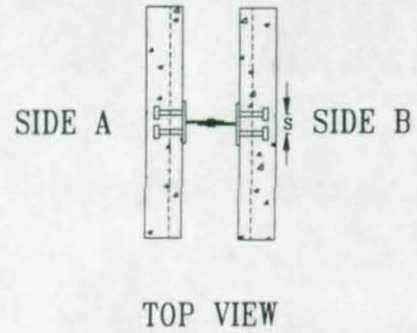
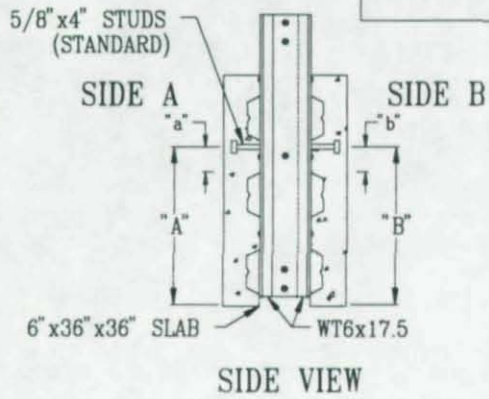


PUSH-OUT TEST LAYOUT & CRACKING SHEET

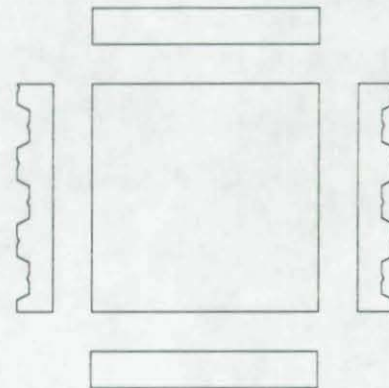
Test: D41

Designation: 2S54-4.5N6-2

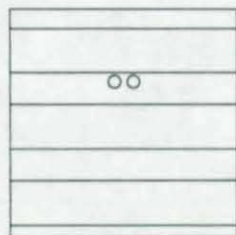
Date: 10/24/97



SIDE A SURFACE

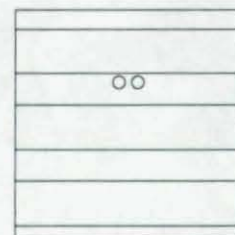


SIDE B SURFACE



SIDE A BOTTOM

NO OBSERVATIONS
MADE



SIDE B BOTTOM

Test D41 Data

Axial Load (kips)	Slips (in.)				Test Comments
	Pot. AT-1	Pot. AT-2	Pot. BT-3	Pot. BT-4	
0.00	0.0000	0.0000	0.0000	0.0000	BEGIN TEST
9.70	0.0000	0.0000	0.0000	0.0000	
14.10	0.0006	0.0006	0.0000	0.0000	
19.30	0.0012	0.0006	0.0000	0.0000	
24.10	0.0012	0.0012	0.0000	0.0024	
29.00	0.0031	0.0018	0.0000	0.0037	
33.80	0.0031	0.0024	0.0000	0.0061	
38.40	0.0055	0.0037	0.0043	0.0098	
42.80	0.0075	0.0055	0.0067	0.0134	SYSTEM CRASHED. RESTARTED TEST
0.00	0.0000	0.0000	0.0000	0.0000	
10.30	0.0000	0.0037	0.0000	0.0000	
18.80	0.0000	0.0049	0.0000	0.0000	
29.00	0.0000	0.0055	0.0000	0.0000	
40.10	0.0000	0.0061	0.0000	0.0018	
44.20	0.0024	0.0085	0.0037	0.0024	
48.90	0.0067	0.0146	0.0067	0.0061	
53.10	0.0134	0.0208	0.0134	0.0128	
57.20	0.0238	0.0311	0.0244	0.0275	
58.70	0.0269	0.0360	0.0311	0.0330	
59.90	0.0311	0.0409	0.0366	0.0372	
61.10	0.0372	0.0464	0.0525	0.0525	
62.10	0.0439	0.0531	0.0586	0.0610	
62.70	0.0519	0.0610	0.0712	0.0708	1/8" DECK/CONC. SEPARATION - A
63.40	0.0641	0.0739	0.0854	0.0836	
64.70	0.0732	0.0830	0.0964	0.0940	1/4" DECK/CONC. SEPARATION - A
66.80	0.0787	0.0891	0.1025	0.0995	
66.00	0.0958	0.1068	0.1233	0.1184	TRANSVERSE CRACK, MID SIDE A
66.80	0.1129	0.1239	0.1410	0.1349	
67.30	0.1282	0.1410	0.1587	0.1538	

Test D41 Data

Axial Load (kips)	Slips (in.)				Test Comments
	Pot. AT-1	Pot. AT-2	Pot. BT-3	Pot. BT-4	
67.80	0.1416	0.1550	0.1746	0.1691	1/2" DECK/CONC. SEPARATION
67.70	0.1526	0.1685	0.1868	0.1813	
67.70	0.1648	0.1794	0.2014	0.1935	
62.70	0.1666	0.1837	0.2081	0.2014	NORMAL LOAD RELEASED
42.80	0.1245	0.1044	0.2295	0.2167	THUD. SPECIMEN ROTATED.

PUSH-OUT TEST SUMMARY SHEET

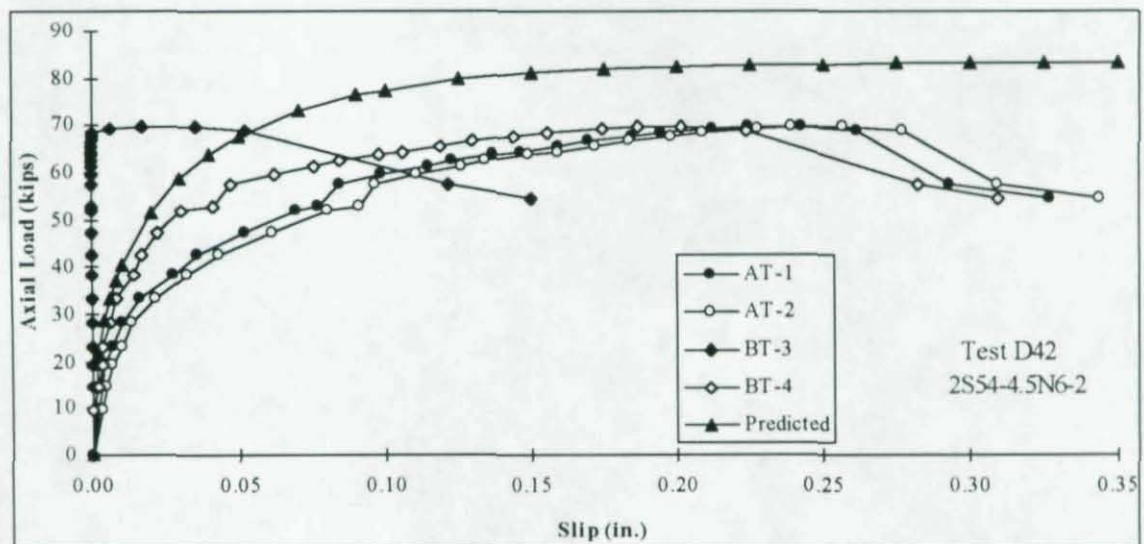
Test:	D42	Deck Type:	2" USD, 20 ga.
Designation:	2S54-4.5N6-2		
Date of Test:	10/24/97		
Concrete Strength:	4710 psi	Stud Position:	2S
Concrete Weight:	144.04 pcf	Stud Size:	5/8 in. x 4 in.
Concrete Thickness:	6 in.	Stud Tensile Strength:	72.635 ksi
Maximum Applied Load:	69.70 kips		
Applied Load Per Stud:	17.43 kips		

Concrete Slip at Failure:

Pot. AT-1:	0.3271 in.	Pot. BT-3:	0.1501 in.
Pot. AT-2:	0.3436 in.	Pot. BT-4:	0.3094 in.
Avg. Side A:	0.3354 in.	Avg. Side B:	0.2298 in.

Avg.: 0.2826 in.

Comments: 10% Normal Load
 Test Operator: BCD
 Stud Shearing Failure on Side B

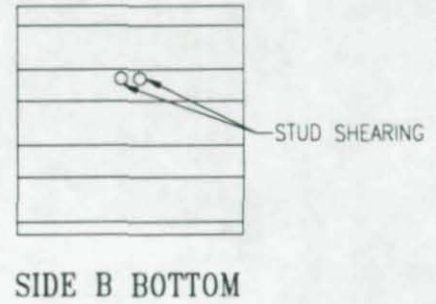
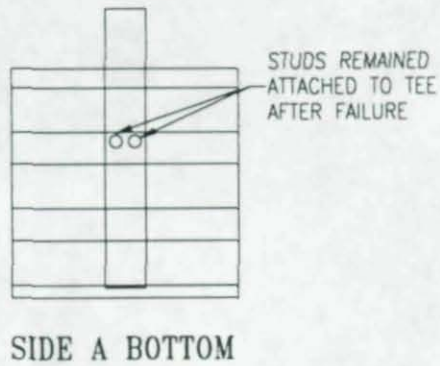
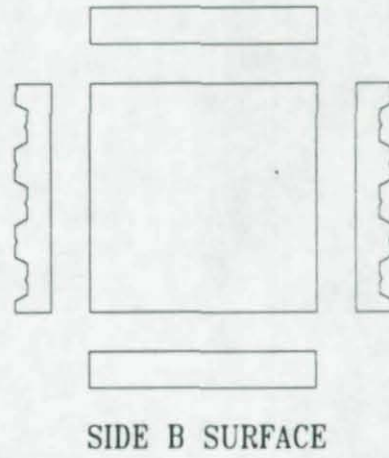
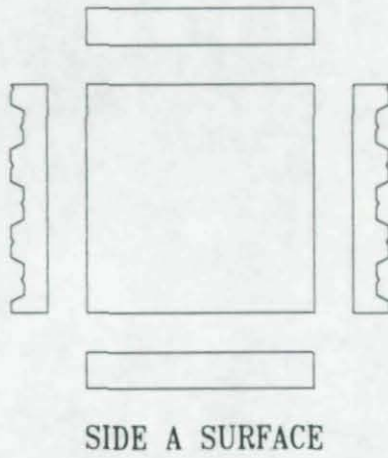
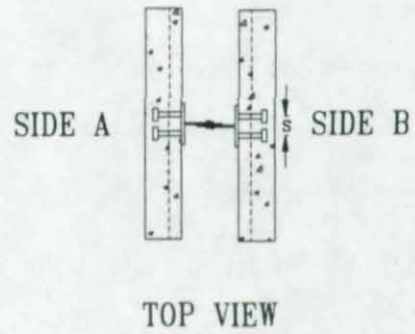
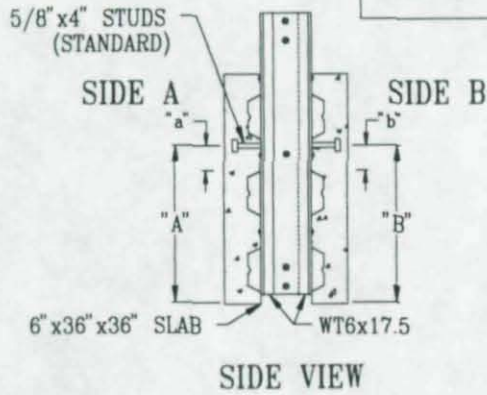


PUSH-OUT TEST LAYOUT & CRACKING SHEET

Test: D42

Designation: 2S54-4.5N6-2

Date: 10/24/97



002158

Test D42 Data

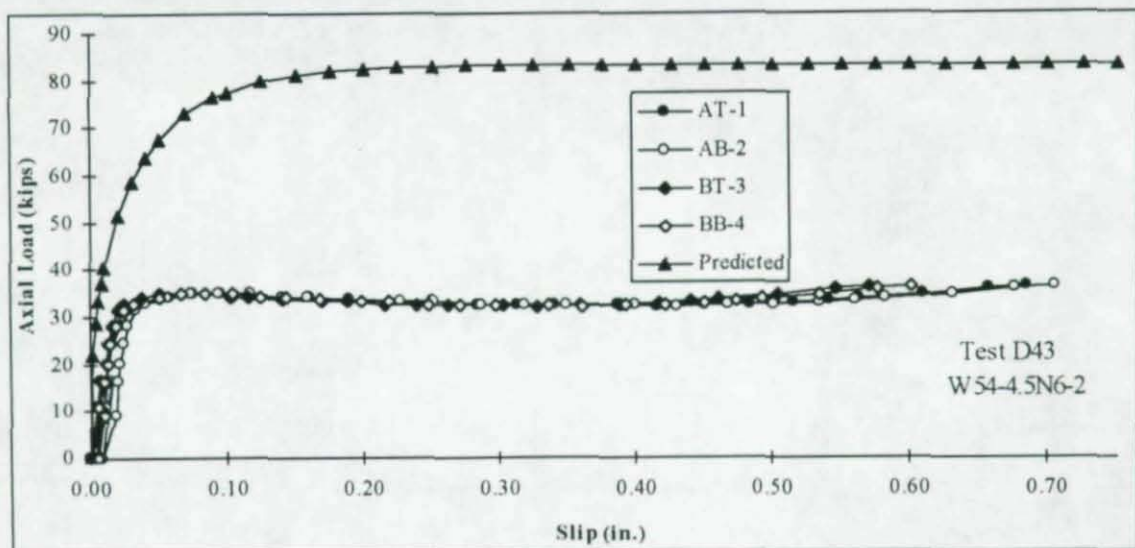
Axial Load (kips)	Slips (in.)				Test Comments
	Pot. AT-1	Pot. AT-2	Pot. BT-3	Pot. BT-4	
0.00	0.0000	0.0000	0.0000	0.0000	BEGIN TEST
9.90	0.0018	0.0037	0.0000	0.0000	
14.90	0.0031	0.0049	0.0000	0.0018	
19.60	0.0043	0.0067	0.0000	0.0031	
23.10	0.0067	0.0098	0.0000	0.0037	
28.30	0.0098	0.0134	0.0000	0.0061	
33.40	0.0165	0.0214	0.0000	0.0079	
38.30	0.0275	0.0323	0.0000	0.0140	
42.60	0.0360	0.0433	0.0000	0.0171	
47.20	0.0519	0.0616	0.0000	0.0226	
52.00	0.0696	0.0806	0.0000	0.0305	POP. TRANSVERSE CRACK SIDE A.
52.90	0.0769	0.0909	0.0000	0.0409	
57.40	0.0842	0.0964	0.0000	0.0476	
59.70	0.0989	0.1105	0.0000	0.0623	
61.30	0.1147	0.1263	0.0000	0.0757	1/4" DECK/CONC. SEPARATION - A
62.70	0.1227	0.1343	0.0000	0.0842	
63.70	0.1373	0.1495	0.0000	0.0983	3/8" DECK/CONC. SEPARATION - A
64.40	0.1465	0.1593	0.0000	0.1062	
65.70	0.1593	0.1721	0.0000	0.1190	
66.80	0.1697	0.1837	0.0000	0.1300	5/8" DECK/CONC. SEPARATION - A
67.60	0.1843	0.1978	0.0000	0.1440	
68.30	0.1947	0.2087	0.0000	0.1556	
69.10	0.2124	0.2277	0.0061	0.1746	
69.60	0.2246	0.2393	0.0171	0.1862	
69.70	0.2423	0.2570	0.0348	0.2015	
68.70	0.2612	0.2771	0.0519	0.2234	LOAD DROPPED. NO NOISES
57.50	0.2930	0.3094	0.1215	0.2826	
54.60	0.3271	0.3436	0.1501	0.3094	THUD.

PUSH-OUT TEST SUMMARY SHEET

Test:	D43	Deck Type:	2" USD, 20 ga.
Designation:	W54-4.5N6-2		
Date of Test:	12/23/97		
Concrete Strength:	4710 psi	Stud Position:	W
Concrete Weight:	144.04 pcf	Stud Size:	5/8 in. x 4 in.
Concrete Thickness:	6 in.	Stud Tensile Strength:	72.635 ksi
Maximum Applied Load:	36.49 kips		
Applied Load Per Stud:	9.12 kips		
Concrete Slip at Failure:			

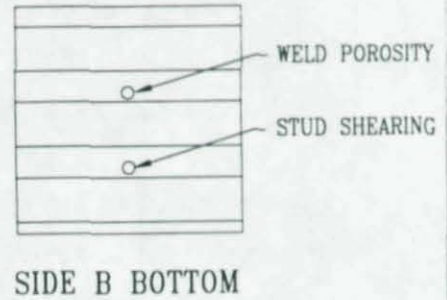
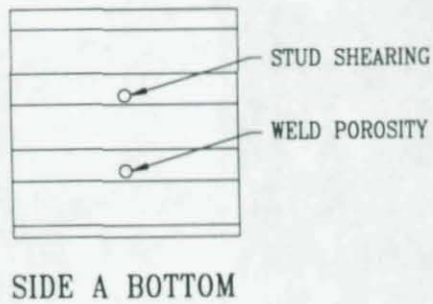
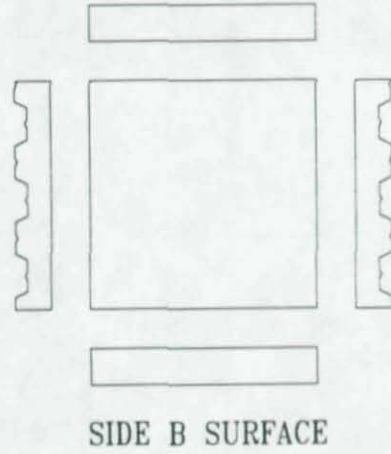
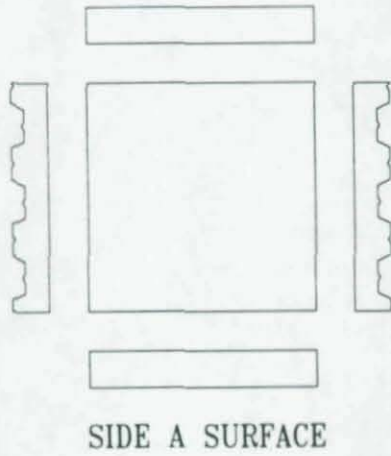
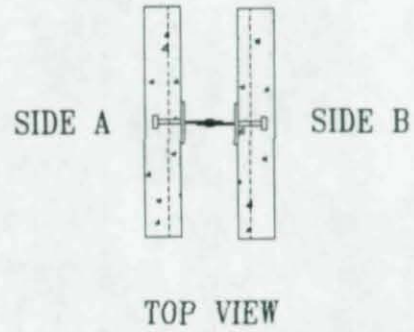
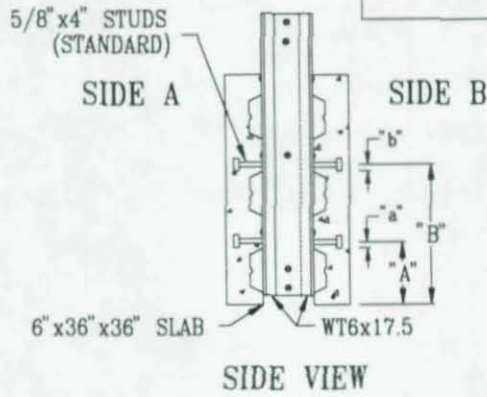
Pot. AT-1:	0.6854 in.	Pot. BT-3:	0.5708 in.
Pot. AB-2:	0.7049 in.	Pot. BB-4:	0.6014 in.
Avg. Side A:	0.6952 in.	Avg. Side B:	0.5861 in.
Avg.:		0.6406 in.	

Comments: 10% Normal Load
 Test Operator: BCD
 Stud Shearing Failure of Top Stud on Side A and Bottom Stud on Side B
 Weld Porosity on Remaining Studs



PUSH-OUT TEST LAYOUT & CRACKING SHEET

Test:	D43
Designation:	W54-4.5N6-2
Date:	12/23/97



Test D43 Data

Axial Load (kips)	Slips (in.)				Test Comments
	Pot. AT-1	Pot. AB-2	Pot. BT-3	Pot. BB-4	
0.00	0.0000	0.0000	0.0000	0.0000	BEGIN TEST
10.80	0.0048	0.0123	0.0075	0.0055	
16.39	0.0075	0.0154	0.0092	0.0075	LOAD CELL MALFUNCTION.
0.06	0.0042	0.0086	0.0044	0.0051	RESTARTED TEST
9.36	0.0099	0.0190	0.0101	0.0101	
16.46	0.0123	0.0203	0.0114	0.0108	
20.16	0.0126	0.0220	0.0119	0.0125	
24.50	0.0156	0.0240	0.0130	0.0145	
28.52	0.0214	0.0271	0.0161	0.0190	
31.78	0.0295	0.0337	0.0201	0.0251	
33.17	0.0368	0.0399	0.0245	0.0319	
34.30	0.0579	0.0568	0.0372	0.0502	
34.92	0.0751	0.0734	0.0505	0.0659	
35.11	0.0950	0.0945	0.0665	0.0835	
35.05	0.1168	0.1167	0.0841	0.1037	
34.42	0.1403	0.1410	0.1026	0.1249	
34.36	0.1604	0.1595	0.1165	0.1427	
33.79	0.1897	0.1892	0.1406	0.1676	
33.29	0.2274	0.2271	0.1692	0.1991	
33.35	0.2500	0.2513	0.1883	0.2185	
32.41	0.2831	0.2873	0.2161	0.2474	
32.35	0.3122	0.3181	0.2392	0.2712	
32.41	0.3401	0.3496	0.2628	0.2969	
32.54	0.3860	0.4000	0.3033	0.3364	
32.29	0.4155	0.4307	0.3278	0.3604	
32.41	0.4505	0.4673	0.3597	0.3921	
32.73	0.4835	0.5010	0.3884	0.4206	
32.98	0.5159	0.5347	0.4177	0.4507	
33.42	0.5410	0.5606	0.4401	0.4730	

Test D43 Data

Axial Load (kips)	Slips (in.)				Test Comments
	Pot. AT-1	Pot. AB-2	Pot. BT-3	Pot. BB-4	
33.67	0.5631	0.5825	0.4600	0.4922	
34.67	0.6094	0.6311	0.5042	0.5336	
35.74	0.6571	0.6768	0.5455	0.5758	
36.49	0.6854	0.7049	0.5708	0.6014	BANG. BANG. BANG. BANG.

PUSH-OUT TEST SUMMARY SHEET

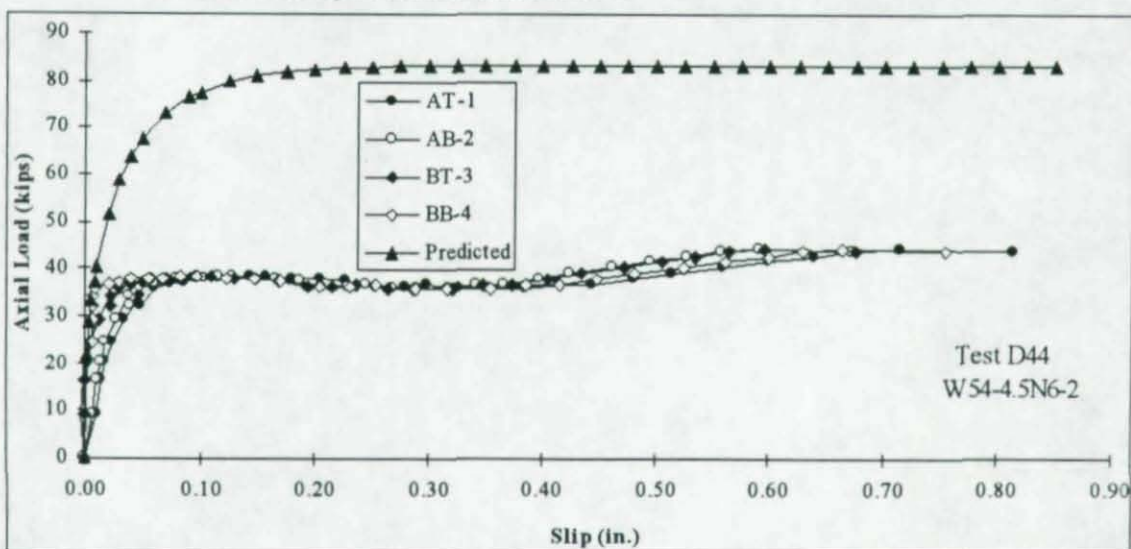
Test:	D44	Deck Type:	2" USD, 20 ga.
Designation:	W54-4.5N6-2		
Date of Test:	12/30/97		
Concrete Strength:	4710 psi	Stud Position:	W
Concrete Weight:	144.04 pcf	Stud Size:	5/8 in. x 4 in.
Concrete Thickness:	6 in.	Stud Tensile Strength:	72.635 ksi
Maximum Applied Load:	44.54 kips		
Applied Load Per Stud:	11.14 kips		

Concrete Slip at Failure:

Pot. AT-1: 0.8131 in.	Pot. BT-3: 0.6763 in.
Pot. AB-2: 0.6721 in.	Pot. BB-4: 0.7539 in.
Avg. Side A: 0.7426 in.	Avg. Side B: 0.7151 in.

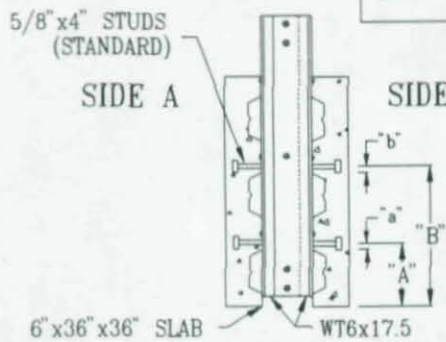
Avg.: 0.7289 in.

Comments: 10% Normal Load
 Test Operator: BCD
 Stud Shearing & Stud Rupture of Both Studs on Side A and Bottom Stud on Side B
 Weld Porosity on Bottom Stud on Side B



PUSH-OUT TEST LAYOUT & CRACKING SHEET

Test:	D44
Designation:	W54-4.5N6-2
Date:	12/30/97



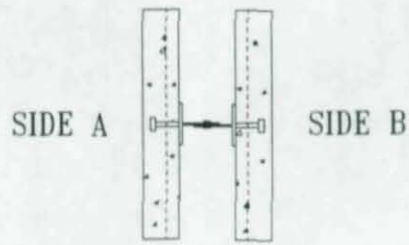
SIDE A

SIDE B

6"x36"x36" SLAB

WT6x17.5

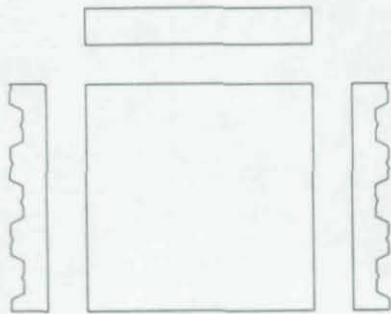
SIDE VIEW



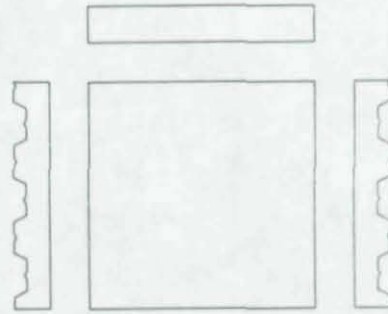
SIDE A

SIDE B

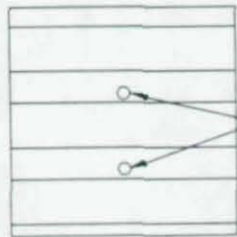
TOP VIEW



SIDE A SURFACE

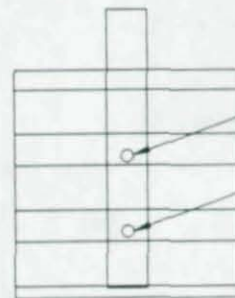


SIDE B SURFACE



SIDE A BOTTOM

STUD SHEARING & STUD RUPTURE



SIDE B BOTTOM

CONICAL FAILURE - hoe ram failure?

STUD SHEARING WELD POROSITY

Test D44 Data

Axial Load (kips)	Slips (in.)				Test Comments
	Pot. AT-1	Pot. AB-2	Pot. BT-3	Pot. BB-4	
0.00	0.0000	0.0000	0.0000	0.0000	BEGIN TEST
9.48	0.0103	0.0070	0.0004	-0.0029	
16.46	0.0147	0.0103	0.0005	-0.0026	
20.10	0.0170	0.0132	0.0009	-0.0026	
24.37	0.0236	0.0181	0.0053	0.0070	
29.15	0.0341	0.0271	0.0130	0.0071	
34.11	0.0482	0.0388	0.0225	0.0071	BANG.
32.10	0.0482	0.0392	0.0227	0.0071	
35.87	0.0601	0.0480	0.0291	0.0081	
36.56	0.0745	0.0601	0.0394	0.0201	
37.25	0.0863	0.0700	0.0498	0.0297	
38.13	0.0978	0.0797	0.0577	0.0399	
38.19	0.1159	0.0930	0.0711	0.0548	
38.19	0.1293	0.1042	0.0819	0.0672	
38.32	0.1434	0.1163	0.0956	0.0842	
38.57	0.1586	0.1293	0.1099	0.0980	
38.00	0.1811	0.1478	0.1302	0.1227	
38.13	0.2055	0.1672	0.1498	0.1469	
37.81	0.2278	0.1868	0.1687	0.1703	
36.37	0.2534	0.2073	0.1941	0.2049	
36.31	0.2789	0.2285	0.2161	0.2318	
36.75	0.2990	0.2456	0.2362	0.2538	
36.06	0.3274	0.2692	0.2637	0.2882	
35.80	0.3522	0.2895	0.2875	0.3157	
36.06	0.3862	0.3179	0.3207	0.3540	
36.68	0.4148	0.3423	0.3476	0.3849	
36.93	0.4450	0.3664	0.3728	0.4148	
38.00	0.4811	0.3972	0.4056	0.4477	
39.32	0.5142	0.4239	0.4342	0.4818	

Test D44 Data

Axial Load (kips)	Slips (in.)				Test Comments
	Pot. AT-1	Pot. AB-2	Pot. BT-3	Pot. BB-4	
40.52	0.5600	0.4624	0.4725	0.5250	
41.71	0.6001	0.4952	0.5049	0.5615	
42.78	0.6397	0.5276	0.5355	0.5996	
43.91	0.6748	0.5576	0.5651	0.6294	
44.54	0.7133	0.5908	0.5952	0.6629	
44.10	0.8131	0.6721	0.6763	0.7539	BANG.

PUSH-OUT TEST SUMMARY SHEET

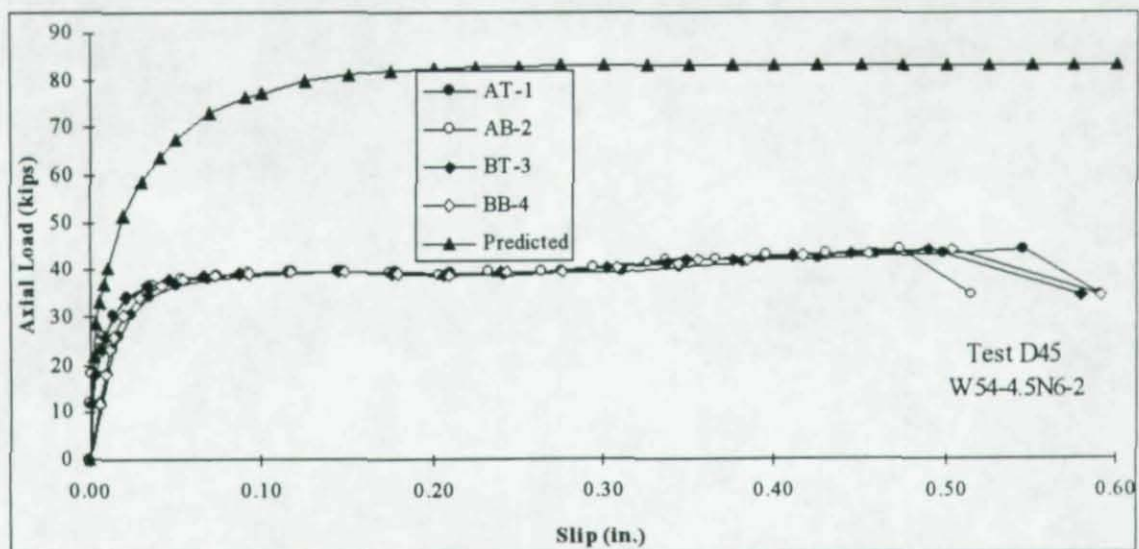
Test:	D45	Deck Type:	2" USD, 20 ga.
Designation:	W54-4.5N6-2		
Date of Test:	12/30/97		
Concrete Strength:	4710 psi	Stud Position:	W
Concrete Weight:	144.04 pcf	Stud Size:	5/8 in. x 4 in.
Concrete Thickness:	6 in.	Stud Tensile Strength:	72.635 ksi
Maximum Applied Load:	44.28 kips		
Applied Load Per Stud:	11.07 kips		

Concrete Slip at Failure:

Pot. AT-1: 0.5911 in.	Pot. BT-3: 0.5794 in.
Pot. AB-2: 0.5150 in.	Pot. BB-4: 0.5913 in.
Avg. Side A: 0.5531 in.	Avg. Side B: 0.5854 in.

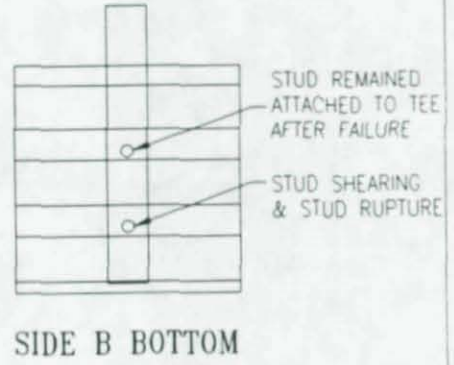
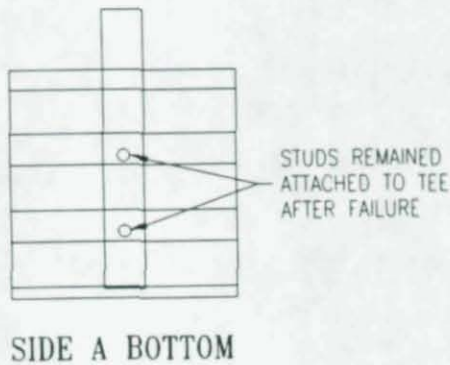
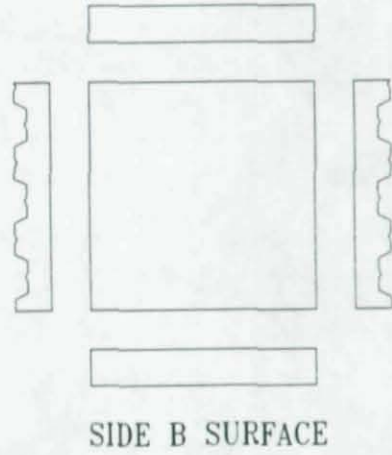
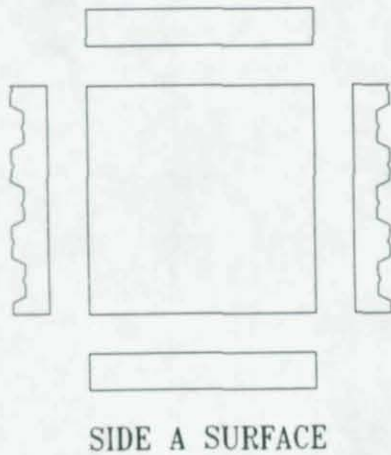
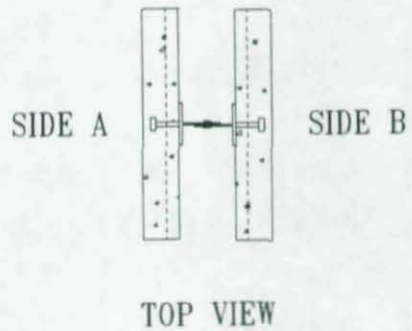
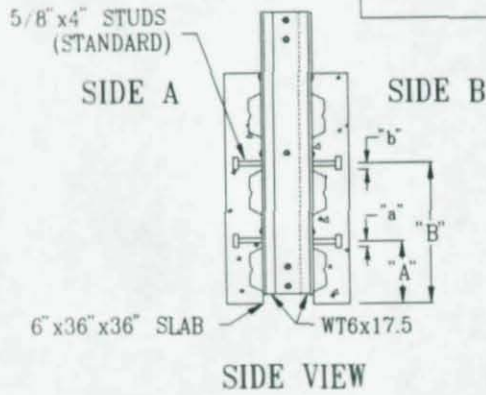
Avg.: 0.5692 in.

Comments: 10% Normal Load
 Test Operator: BCD
 Stud Shearing & Stud Rupture Failure of Bottom Stud on Side B?



PUSH-OUT TEST LAYOUT & CRACKING SHEET

Test: D45
Designation: W54-4.5N6-2
Date: 12/30/97



Test D45 Data

Axial Load (kips)	Slips (in.)				Test Comments
	Pot. AT-1	Pot. AB-2	Pot. BT-3	Pot. BB-4	
0.00	0.0000	0.0000	0.0000	0.0000	BEGIN TEST
11.68	0.0064	-0.0002	0.0007	0.0057	
17.96	0.0099	0.0013	0.0035	0.0090	
23.30	0.0145	0.0059	0.0068	0.0121	
25.69	0.0172	0.0082	0.0090	0.0137	
30.21	0.0240	0.0136	0.0139	0.0200	
34.17	0.0348	0.0222	0.0211	0.0289	
36.87	0.0509	0.0372	0.0335	0.0414	
37.94	0.0700	0.0535	0.0461	0.0546	
38.88	0.0934	0.0745	0.0665	0.0729	
39.13	0.1170	0.0928	0.0864	0.0921	
39.51	0.1452	0.1185	0.1150	0.1165	
39.70	0.1785	0.1476	0.1450	0.1478	
39.13	0.2110	0.1751	0.1758	0.1795	
39.01	0.2421	0.2044	0.2064	0.2102	
39.57	0.2756	0.2333	0.2393	0.2430	
39.82	0.3111	0.2643	0.2752	0.2760	
40.64	0.3450	0.2945	0.3029	0.3084	
41.46	0.3824	0.3271	0.3373	0.3445	
42.15	0.3935	0.3368	0.3483	0.3553	
42.15	0.4258	0.3655	0.3767	0.3842	
42.96	0.4602	0.3961	0.4111	0.4166	
43.66	0.4992	0.4311	0.4448	0.4553	NORMAL LOAD DROPPED TO 5%
44.28	0.5455	0.4734	0.4901	0.5036	
34.61	0.5911	0.5150	0.5794	0.5913	BANG.

PUSH-OUT TEST SUMMARY SHEET

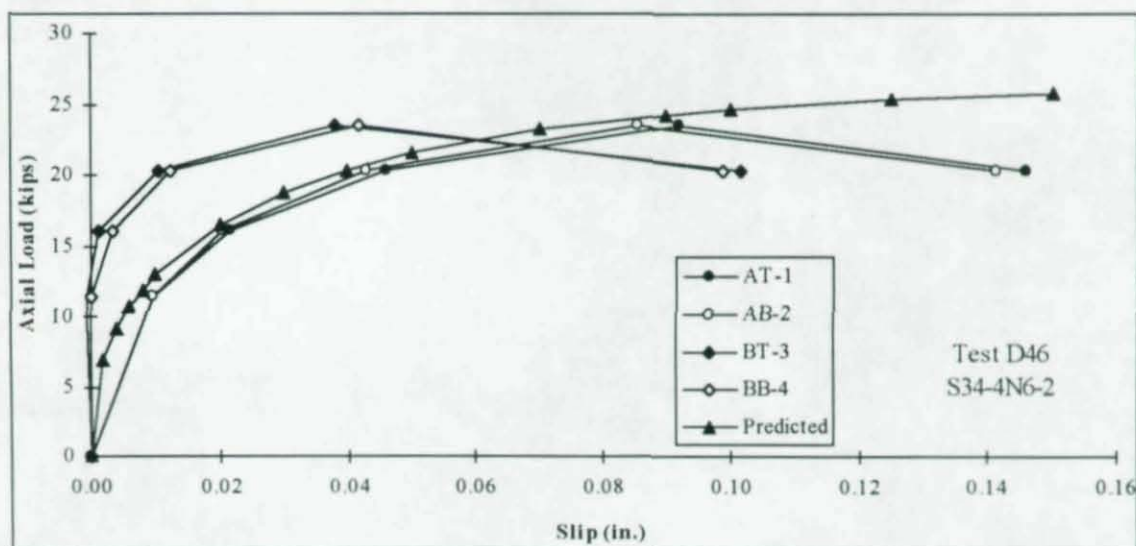
Test:	D46	Deck Type:	2" USD, 20 ga.
Designation:	S34-4N6-2		
Date of Test:	12/30/97		
Concrete Strength:	3930 psi	Stud Position:	S
Concrete Weight:	146.45 pcf	Stud Size:	3/8 in. x 4 in.
Concrete Thickness:	6 in.	Stud Tensile Strength:	79.192 ksi
Maximum Applied Load:	23.56 kips		
Applied Load Per Stud:	5.89 kips		

Concrete Slip at Failure:

Pot. AT-1:	0.1460 in.	Pot. BT-3:	0.1016 in.
Pot. AB-2:	0.1416 in.	Pot. BB-4:	0.0987 in.
Avg. Side A:	0.1438 in.	Avg. Side B:	0.1002 in.

Avg.: 0.1220 in.

Comments: 10% Normal Load
 Test Operator: BCD
 Stud Shearing Failure of Both Studs on Side A
 Weld Failure on Side B

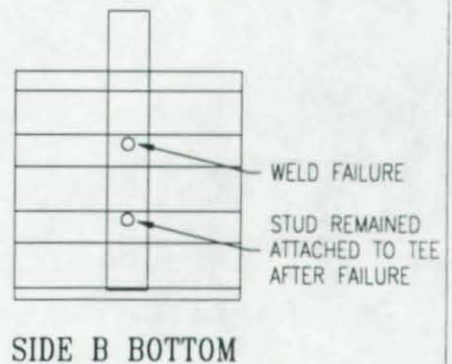
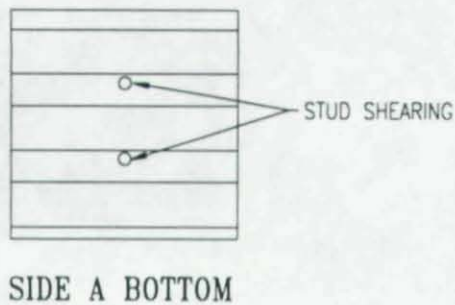
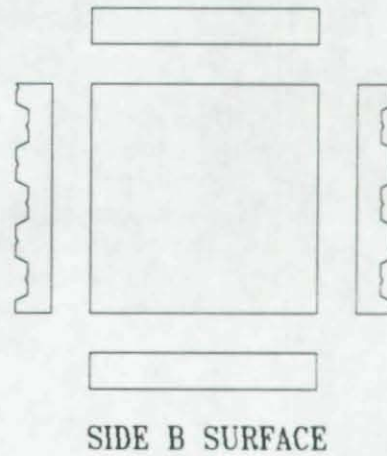
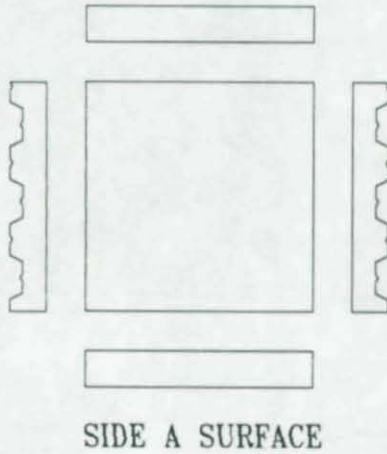
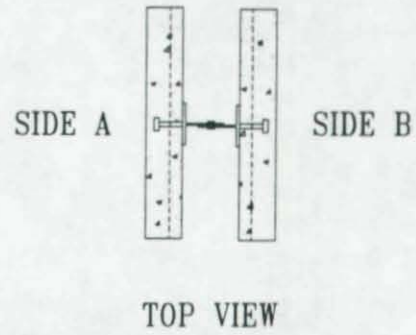
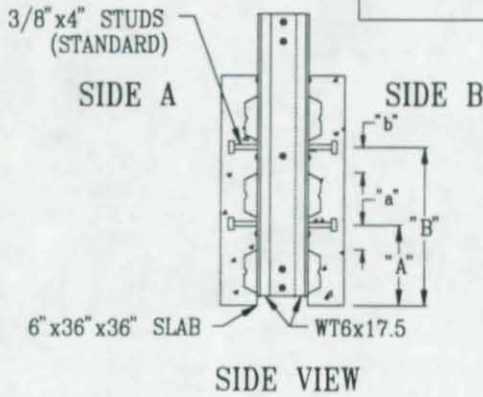


PUSH-OUT TEST LAYOUT & CRACKING SHEET

Test: D46

Designation: S34-4N6-2

Date: 12/30/97



Test D46 Data

Axial Load (kips)	Slips (in.)				Test Comments
	Pot. AT-1	Pot. AB-2	Pot. BT-3	Pot. BB-4	
0.00	0.0000	0.0000	0.0000	0.0000	BEGIN TEST
11.37	0.0095	0.0095	-0.0007	0.0000	
16.02	0.0216	0.0203	0.0013	0.0035	
20.23	0.0460	0.0430	0.0104	0.0125	
23.56	0.0919	0.0857	0.0379	0.0418	POP.
20.35	0.1460	0.1416	0.1016	0.0987	BANG.

PUSH-OUT TEST SUMMARY SHEET

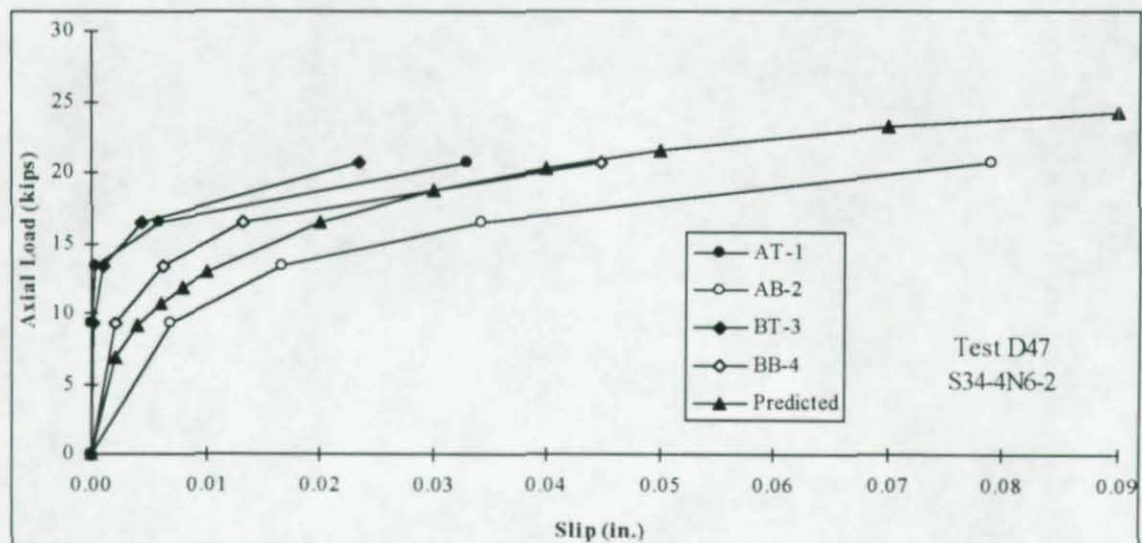
Test:	D47	Deck Type:	2" USD, 20 ga.
Designation:	S34-4N6-2		
Date of Test:	12/31/97		
Concrete Strength:	3930 psi	Stud Position:	S
Concrete Weight:	146.45 pcf	Stud Size:	3/8 in. x 4 in.
Concrete Thickness:	6 in.	Stud Tensile Strength:	79.192 ksi
Maximum Applied Load:	20.70 kips		
Applied Load Per Stud:	5.18 kips		

Concrete Slip at Failure:

Pot. AT-1: 0.0330 in.	Pot. BT-3: 0.0234 in.
Pot. AB-2: 0.0791 in.	Pot. BB-4: 0.0449 in.
Avg. Side A: 0.0561 in.	Avg. Side B: 0.0342 in.

Avg.: 0.0451 in.

Comments: 10% Normal Load
 Test Operator: BCD
 Stud Shearing Failure of Both Studs on Side A

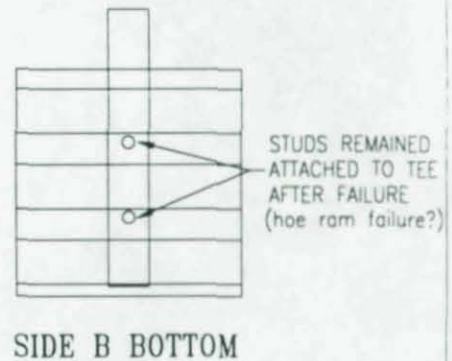
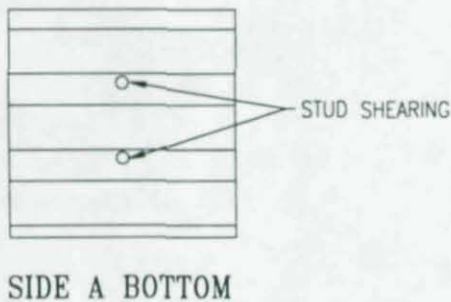
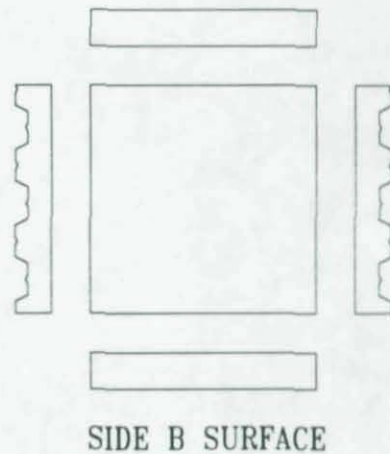
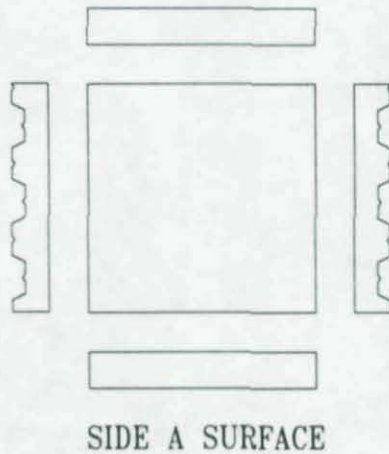
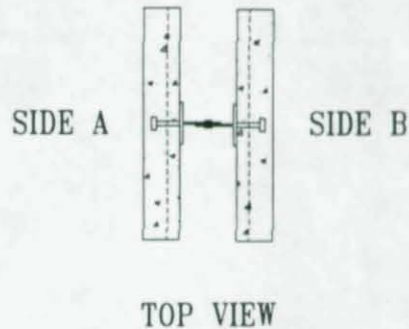
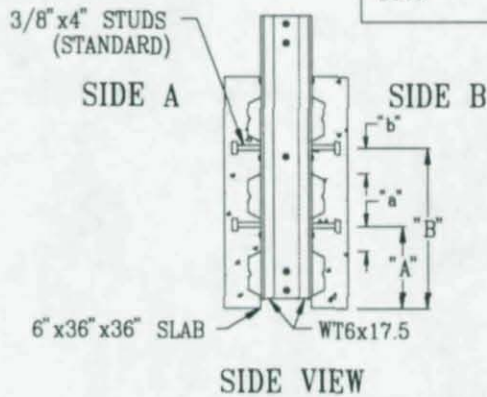


PUSH-OUT TEST LAYOUT & CRACKING SHEET

Test: D47

Designation: S34-4N6-2

Date: 12/31/97



Test D47 Data

Axial Load (kips)	Slips (in.)				Test Comments
	Pot. AT-1	Pot. AB-2	Pot. BT-3	Pot. BB-4	
0.00	0.0000	0.0000	0.0000	0.0000	BEGIN TEST
9.23	0.0000	0.0070	0.0002	0.0020	
13.32	0.0004	0.0167	0.0011	0.0062	
16.46	0.0059	0.0342	0.0044	0.0132	
20.70	0.0330	0.0791	0.0234	0.0449	BANG.

PUSH-OUT TEST SUMMARY SHEET

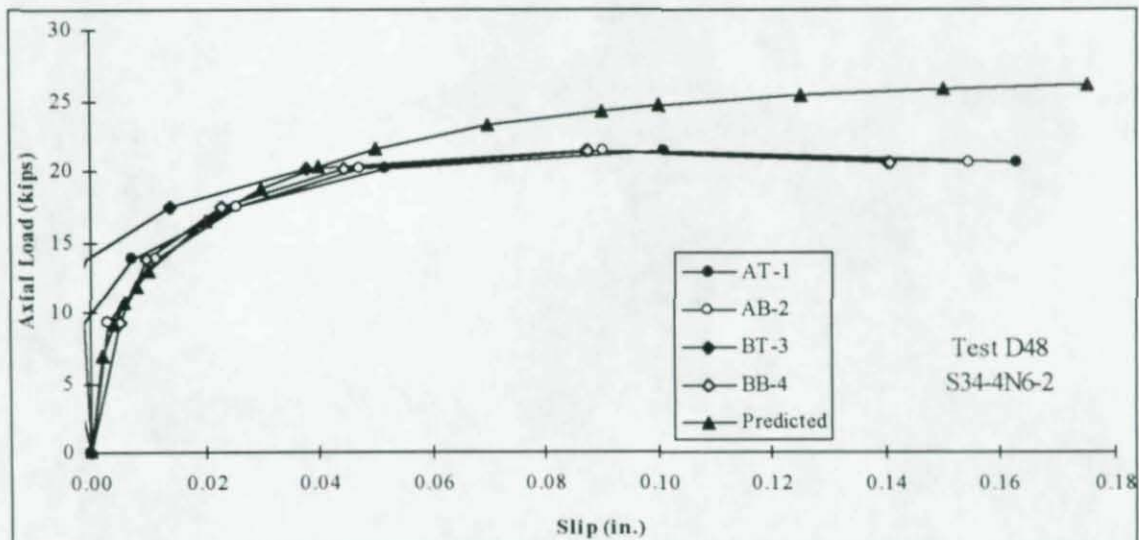
Test:	D48	Deck Type:	2" USD, 20 ga.
Designation:	S34-4N6-2		
Date of Test:	12/31/97		
Concrete Strength:	3930 psi	Stud Position:	S
Concrete Weight:	146.45 pcf	Stud Size:	3/8 in. x 4 in.
Concrete Thickness:	6 in.	Stud Tensile Strength:	79.192 ksi
Maximum Applied Load:	21.42 kips		
Applied Load Per Stud:	5.36 kips		

Concrete Slip at Failure:

Pot. AT-1:	0.1630 in.	Pot. BT-3:	0.1403 in.
Pot. AB-2:	0.1546 in.	Pot. BB-4:	0.1406 in.
Avg. Side A:	0.1588 in.	Avg. Side B:	0.1405 in.

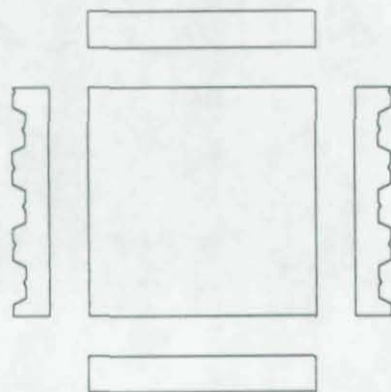
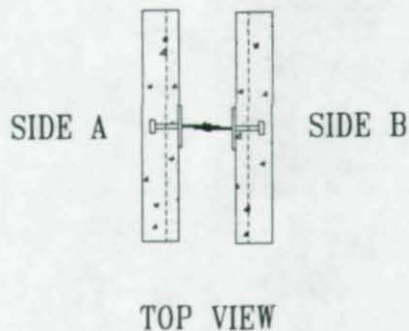
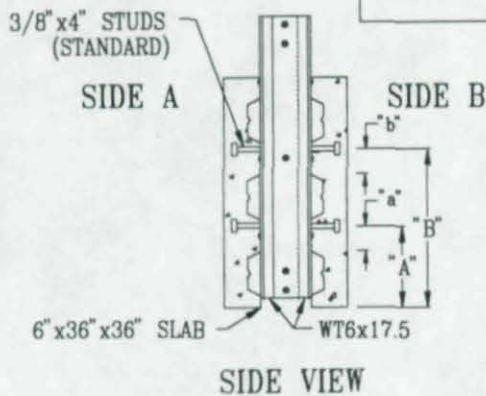
Avg.: 0.1496 in.

Comments: 10% Normal Load
 Test Operator: BCD
 Stud Shearing Failure of Both Studs on Side A and Bottom Stud on Side B
 Weld Failure of Top Stud on Side B

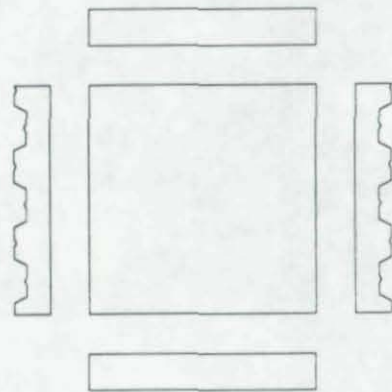


PUSH-OUT TEST LAYOUT & CRACKING SHEET

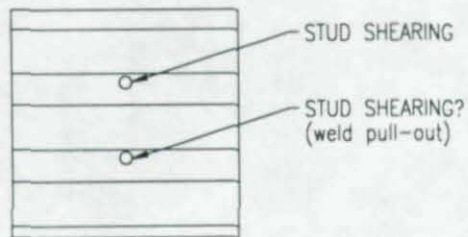
Test:	D48
Designation:	S34-4N6-2
Date:	12/31/97



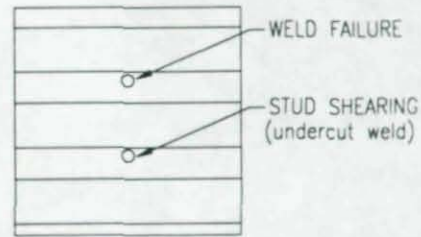
SIDE A SURFACE



SIDE B SURFACE



SIDE A BOTTOM



SIDE B BOTTOM

Test D48 Data

Axial Load (kips)	Slips (in.)				Test Comments
	Pot. AT-1	Pot. AB-2	Pot. BT-3	Pot. BB-4	
0.00	0.0000	0.0000	0.0000	0.0000	BEGIN TEST
9.30	-0.0011	0.0033	-0.0049	0.0051	
13.82	0.0073	0.0114	-0.0005	0.0099	
17.53	0.0258	0.0258	0.0137	0.0229	
20.10	0.0516	0.0474	0.0379	0.0443	
21.42	0.1011	0.0905	0.0874	0.0877	
20.54	0.1630	0.1546	0.1403	0.1406	BANG.

PUSH-OUT TEST SUMMARY SHEET

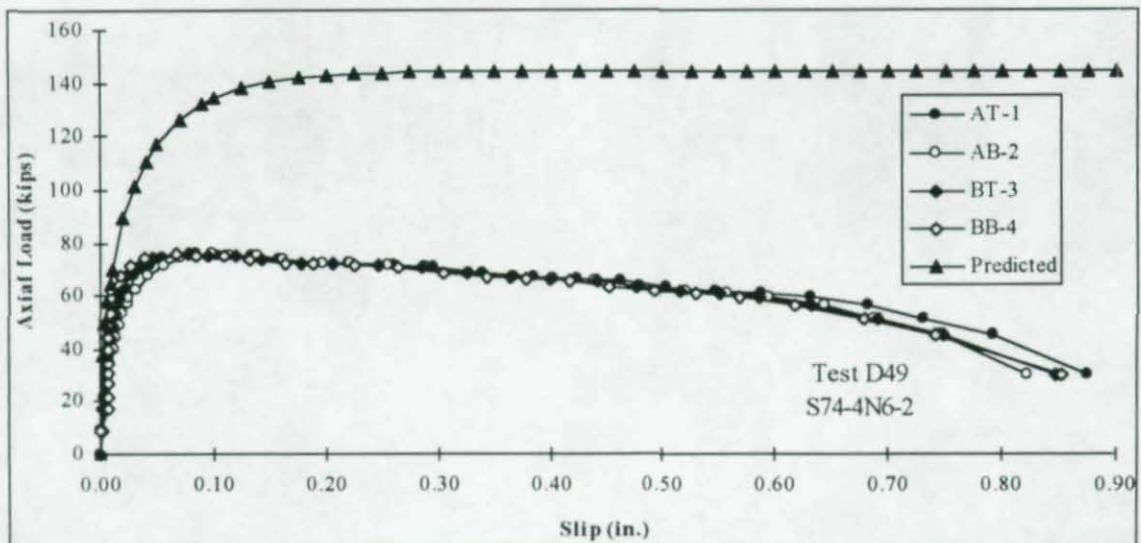
Test:	D49	Deck Type:	2" USD, 20 ga.
Designation:	S74-4N6-2		
Date of Test:	12/31/97		
Concrete Strength:	3930 psi	Stud Position:	S
Concrete Weight:	146.45 pcf	Stud Size:	7/8 in. x 4 in.
Concrete Thickness:	6 in.	Stud Tensile Strength:	64.451 ksi
Maximum Applied Load:	75.69 kips		
Applied Load Per Stud:	18.92 kips		

Concrete Slip at Failure:

Pot. AT-1: 0.8761 in.	Pot. BT-3: 0.8473 in.
Pot. AB-2: 0.8235 in.	Pot. BB-4: 0.8525 in.
Avg. Side A: 0.8498 in.	Avg. Side B: 0.8499 in.

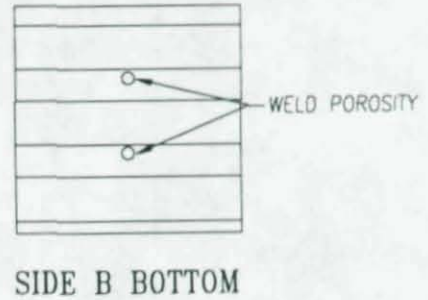
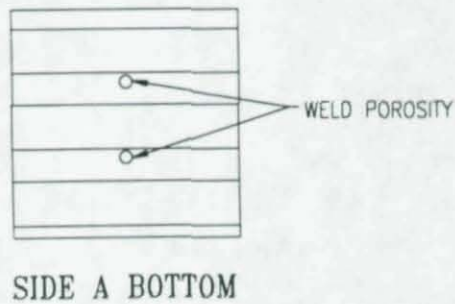
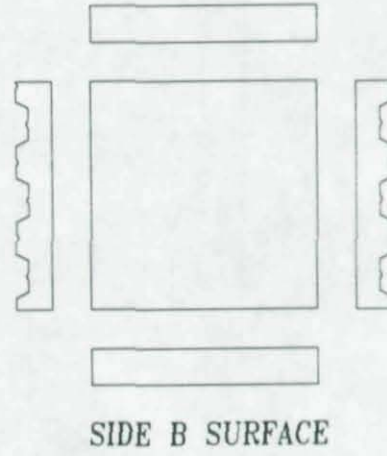
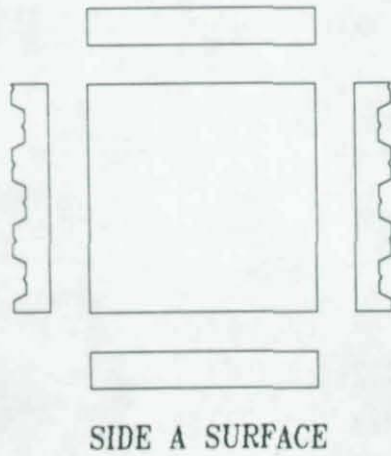
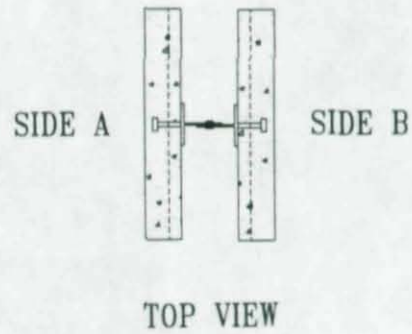
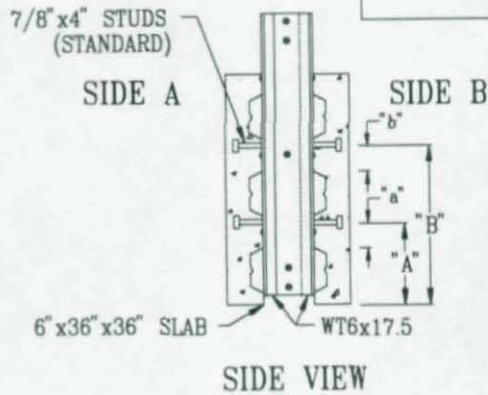
Avg.: 0.8499 in.

Comments: 10% Normal Load
 Test Operator: BCD
 Weld Porosity of All Studs



PUSH-OUT TEST LAYOUT & CRACKING SHEET

Test:	D49
Designation:	S74-4N6-2
Date:	12/31/97



Test D49 Data

Axial Load (kips)	Slips (in.)				Test Comments
	Pot. AT-1	Pot. AB-2	Pot. BT-3	Pot. BB-4	
0.00	0.0000	0.0000	0.0000	0.0000	BEGIN TEST
9.17	-0.0004	0.0018	0.0013	-0.0002	
17.40	0.0071	0.0029	0.0024	0.0079	
21.98	0.0075	0.0042	0.0031	0.0077	
27.14	0.0075	0.0057	0.0044	0.0071	
30.46	0.0073	0.0070	0.0049	0.0073	
34.30	0.0071	0.0084	0.0059	0.0075	
39.45	0.0071	0.0115	0.0062	0.0075	
44.35	0.0075	0.0141	0.0088	0.0073	
49.12	0.0071	0.0174	0.0104	0.0077	
53.39	0.0128	0.0201	0.0123	0.0084	
56.90	0.0130	0.0245	0.0147	0.0088	
59.61	0.0128	0.0253	0.0150	0.0086	
62.44	0.0249	0.0317	0.0185	0.0090	
67.34	0.0295	0.0421	0.0236	0.0170	
71.17	0.0436	0.0555	0.0344	0.0262	
74.18	0.0553	0.0698	0.0463	0.0379	
75.69	0.0846	0.0978	0.0767	0.0674	
75.25	0.1033	0.1150	0.0956	0.0848	
75.00	0.1333	0.1390	0.1188	0.1084	
73.62	0.1582	0.1623	0.1427	0.1313	
72.40	0.1967	0.1970	0.1773	0.1639	
72.20	0.2203	0.2212	0.2062	0.1886	
71.55	0.2604	0.2549	0.2456	0.2249	
70.80	0.2945	0.2881	0.2848	0.2630	
68.09	0.3397	0.3278	0.3260	0.3033	
67.09	0.3853	0.3666	0.3635	0.3428	
66.33	0.4228	0.4020	0.3996	0.3783	
65.01	0.4617	0.4402	0.4413	0.4168	

Test D49 Data

Axial Load (kips)	Slips (in.)				Test Comments
	Pot. AT-1	Pot. AB-2	Pot. BT-3	Pot. BB-4	
63.13	0.5036	0.4800	0.4772	0.4525	1/16" DECK SEPARATION SIDE A NO BANG.
61.87	0.5474	0.5204	0.5153	0.4928	
60.49	0.5873	0.5571	0.5501	0.5287	
59.42	0.6309	0.5948	0.5860	0.5677	
56.60	0.6812	0.6428	0.6318	0.6164	
51.01	0.7316	0.6878	0.6911	0.6785	
44.80	0.7926	0.7472	0.7490	0.7426	
29.90	0.8761	0.8235	0.8473	0.8525	

PUSH-OUT TEST SUMMARY SHEET

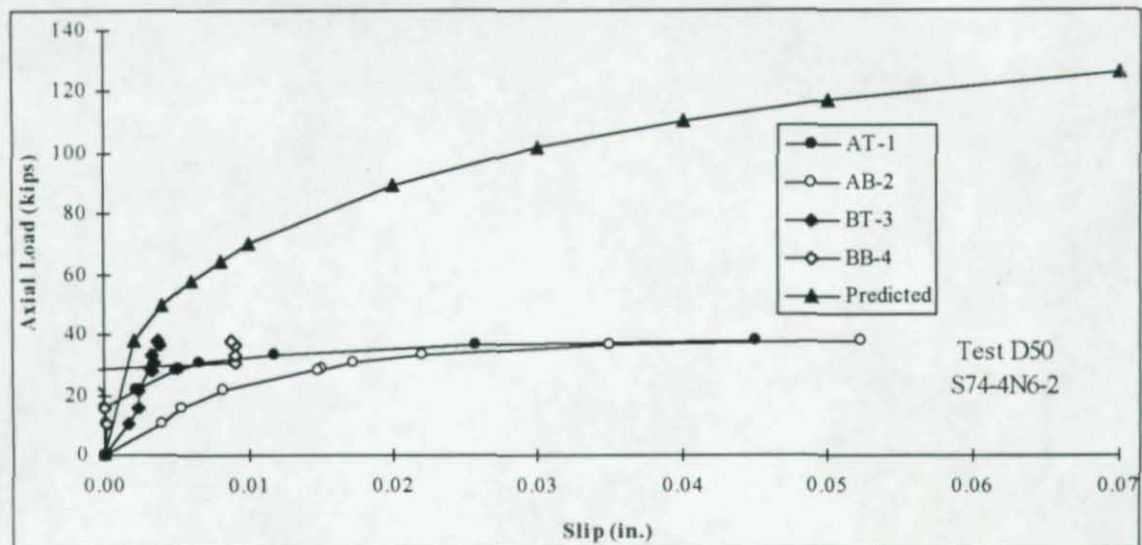
Test:	D50	Deck Type:	2" USD, 20 ga.
Designation:	S74-4N6-2		
Date of Test:	1/2/98		
Concrete Strength:	3930 psi	Stud Position:	S
Concrete Weight:	146.45 pcf	Stud Size:	7/8 in. x 4 in.
Concrete Thickness:	6 in.	Stud Tensile Strength:	64.451 ksi
Maximum Applied Load:	38.44 kips		
Applied Load Per Stud:	9.61 kips		

Concrete Slip at Failure:

Pot. AT-1: 0.0450 in.	Pot. BT-3: 0.0037 in.
Pot. AB-2: 0.0524 in.	Pot. BB-4: 0.0088 in.
Avg. Side A: 0.0487 in.	Avg. Side B: 0.0063 in.

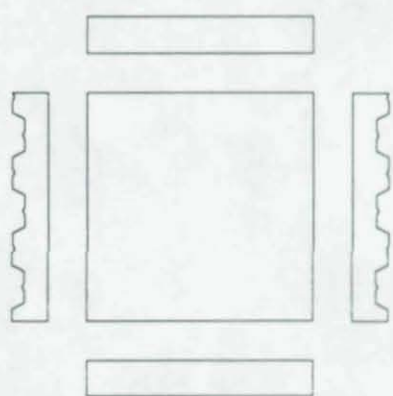
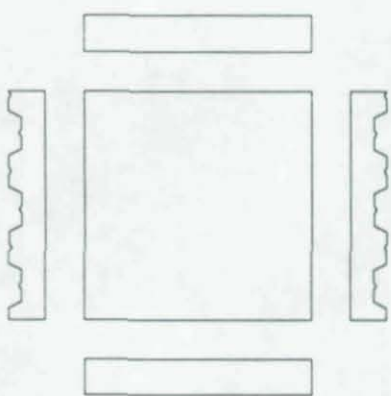
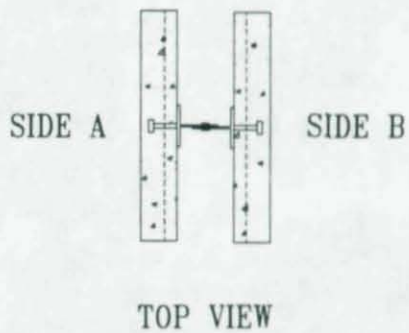
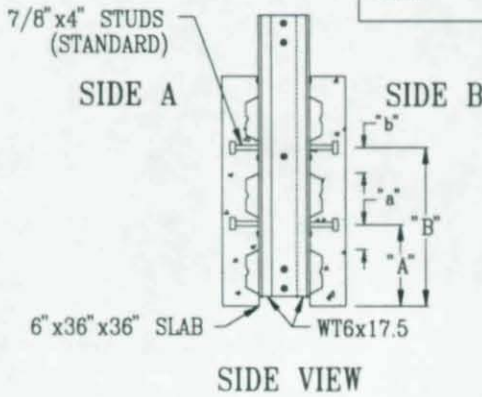
Avg.: 0.0275 in.

Comments: 10% Normal Load
 Test Operator: BCD
 Weld Failure of Top Stud on Side A



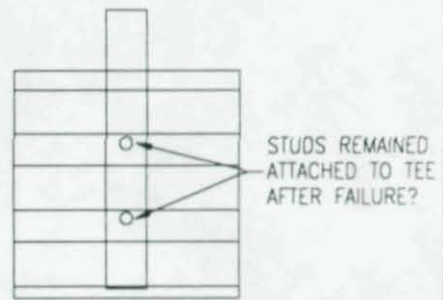
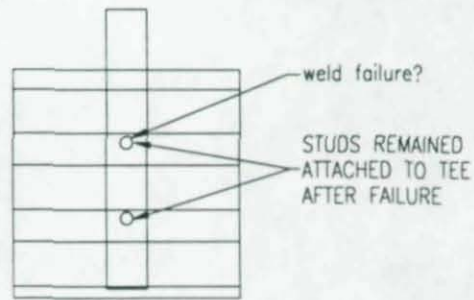
PUSH-OUT TEST LAYOUT & CRACKING SHEET

Test:	<u> D50 </u>
Designation:	<u> S74-4N6-2 </u>
Date:	<u> 1/2/98 </u>



SIDE A SURFACE

SIDE B SURFACE



SIDE A BOTTOM

SIDE B BOTTOM

Test D50 Data

Axial Load (kips)	Slips (in.)				Test Comments
	Pot. AT-1	Pot. AB-2	Pot. BT-3	Pot. BB-4	
0.00	0.0000	0.0000	0.0000	0.0000	BEGIN TEST
10.24	0.0002	0.0040	0.0016	0.0002	
15.89	0.0000	0.0053	0.0024	0.0000	
21.98	0.0022	0.0082	0.0024	-0.0002	
28.89	0.0051	0.0150	0.0031	-0.0022	
28.33	0.0049	0.0148	0.0033	-0.0024	
30.97	0.0066	0.0172	0.0035	0.0090	
33.48	0.0117	0.0220	0.0033	0.0090	
36.56	0.0256	0.0350	0.0038	0.0090	
38.44	0.0450	0.0524	0.0037	0.0088	

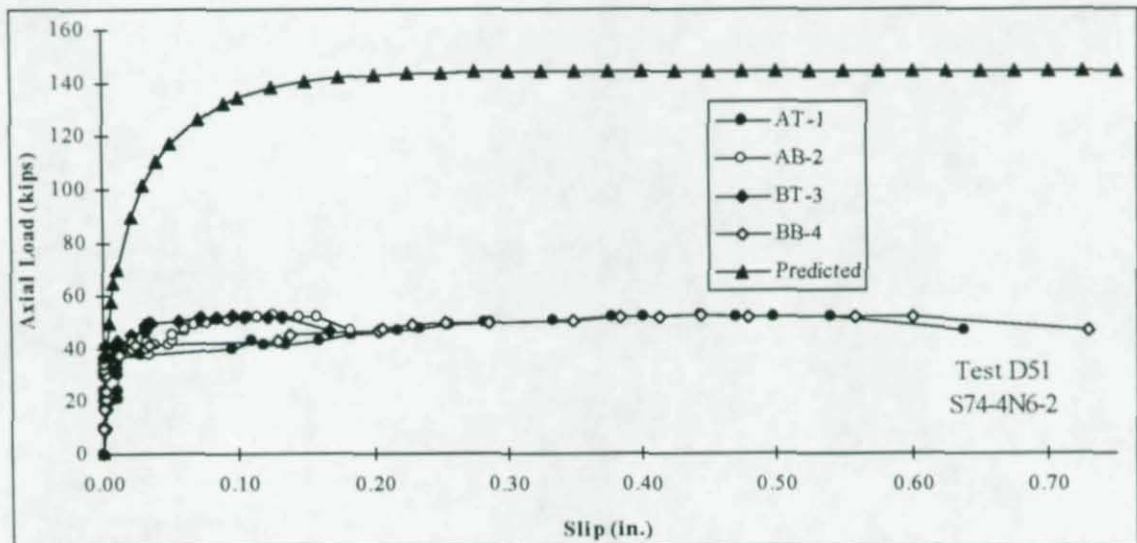
PUSH-OUT TEST SUMMARY SHEET

Test:	D51	Deck Type:	2" USD, 20 ga.
Designation:	S74-4N6-2		
Date of Test:	1/3/98		
Concrete Strength:	3930 psi	Stud Position:	S
Concrete Weight:	146.45 pcf	Stud Size:	7/8 in. x 4 in.
Concrete Thickness:	6 in.	Stud Tensile Strength:	64.451 ksi
Maximum Applied Load:	52.39 kips		
Applied Load Per Stud:	13.10 kips		

Concrete Slip at Failure:

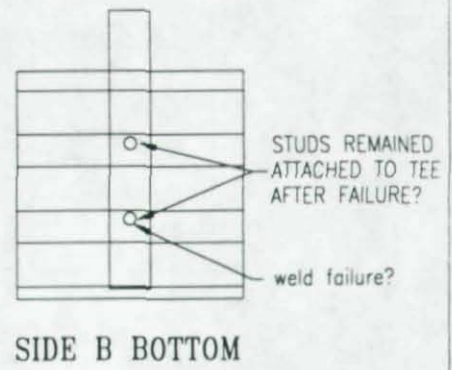
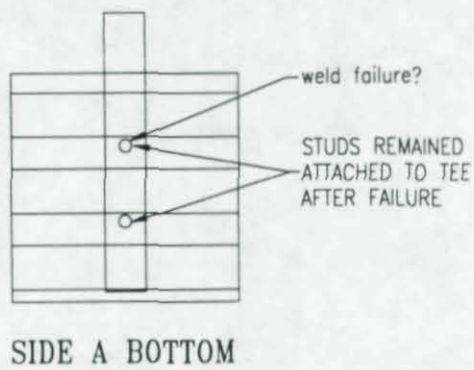
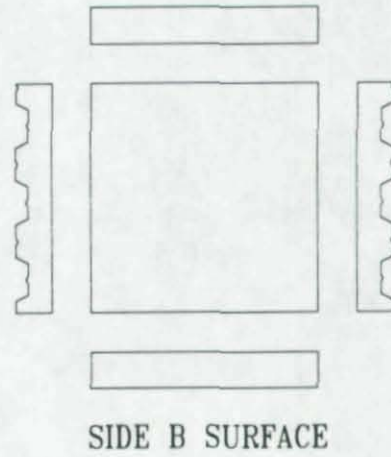
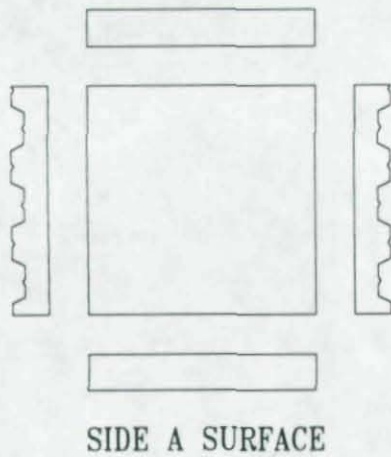
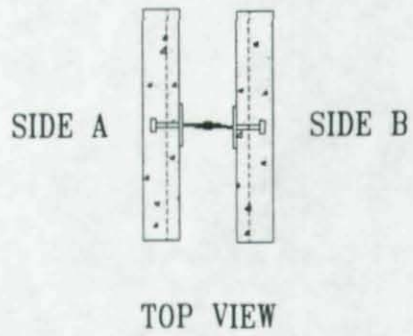
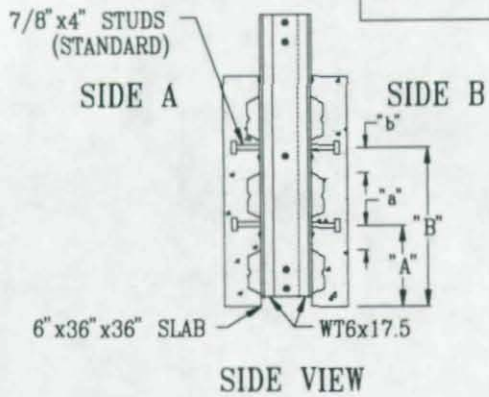
Pot. AT-1:	0.6393 in.	Pot. BT-3:	0.1670 in.
Pot. AB-2:	0.1829 in.	Pot. BB-4:	0.7294 in.
Avg. Side A:	0.4111 in.	Avg. Side B:	0.4482 in.
Avg.: 0.4297 in.			

Comments: 10% Normal Load
 Test Operator: BCD
 Weld Failure of Top Stud on Side A and Bottom Stud on Side B



PUSH-OUT TEST LAYOUT & CRACKING SHEET

Test:	D51
Designation:	S74-4N6-2
Date:	1/3/98



Test D51 Data

Axial Load (kips)	Slips (in.)				Test Comments
	Pot. AT-1	Pot. AB-2	Pot. BT-3	Pot. BB-4	
0.00	0.0000	0.0000	0.0000	0.0000	BEGIN TEST
10.11	-0.0005	-0.0004	0.0009	0.0000	
17.40	-0.0002	-0.0005	0.0018	0.0002	
20.67	0.0101	-0.0005	0.0002	0.0015	
24.06	0.0097	0.0004	-0.0002	0.0011	
29.71	0.0101	0.0004	-0.0002	0.0011	
32.66	0.0103	0.0049	0.0011	0.0000	
34.30	0.0103	0.0057	0.0011	-0.0002	
36.56	0.0103	0.0104	0.0011	0.0002	
37.88	0.0273	0.0333	0.0071	0.0115	
39.76	0.0954	0.0328	0.0108	0.0205	
42.71	0.1099	0.0328	0.0101	0.0207	
41.58	0.1188	0.0386	0.0013	0.0233	
41.39	0.1340	0.0476	0.0211	0.0337	
42.71	0.1591	0.0518	0.0198	0.1295	
44.79	0.1835	0.0515	0.0209	0.1383	
46.73	0.2176	0.0593	0.0306	0.2040	1/4" DECK SEPARATION SIDE A
47.05	0.2342	0.0604	0.0306	0.2062	
48.68	0.2564	0.0667	0.0302	0.2287	
49.87	0.2875	0.0733	0.0333	0.2533	
49.56	0.2831	0.0754	0.0352	0.2855	
50.44	0.3338	0.0919	0.0551	0.3487	3/8" DECK SEPARATION
51.76	0.3776	0.1069	0.0718	0.3842	
52.07	0.4020	0.1146	0.0830	0.4133	LOAD NOT CENTERED
52.39	0.4437	0.1258	0.0945	0.4432	
51.63	0.4708	0.1326	0.1046	0.4796	
52.01	0.4983	0.1456	0.1212	0.5587	
52.14	0.5404	0.1575	0.1315	0.6008	
46.73	0.6393	0.1829	0.1670	0.7294	

PUSH-OUT TEST SUMMARY SHEET

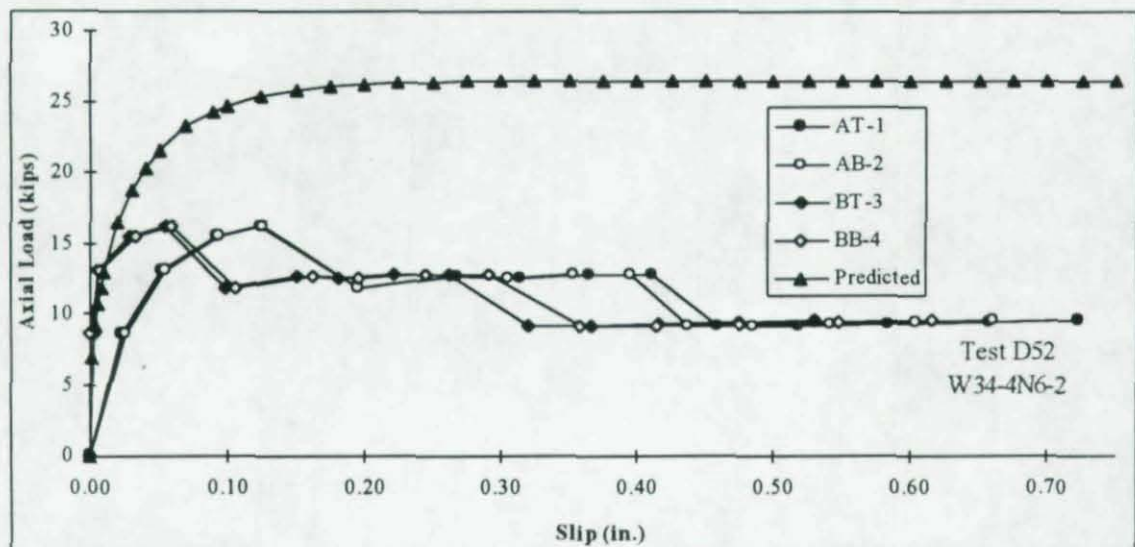
Test:	D52	Deck Type:	2" USD, 20 ga.
Designation:	W34-4N6-2		
Date of Test:	1/7/98		
Concrete Strength:	3930 psi	Stud Position:	W
Concrete Weight:	146.45 pcf	Stud Size:	3/8 in. x 4 in.
Concrete Thickness:	6 in.	Stud Tensile Strength:	79.192 ksi
Maximum Applied Load:	16.21 kips		
Applied Load Per Stud:	4.05 kips		

Concrete Slip at Failure:

Pot. AT-1: 0.7221 in.	Pot. BT-3: 0.5298 in.
Pot. AB-2: 0.6604 in.	Pot. BB-4: 0.6157 in.
Avg. Side A: 0.6913 in.	Avg. Side B: 0.5728 in.

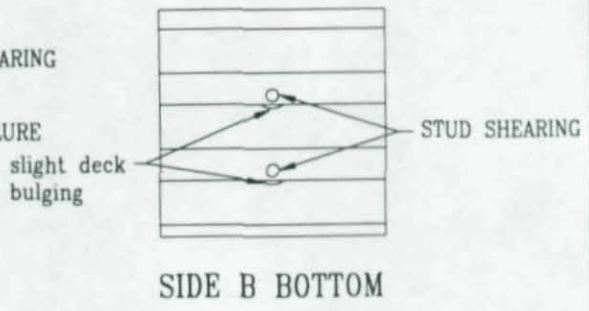
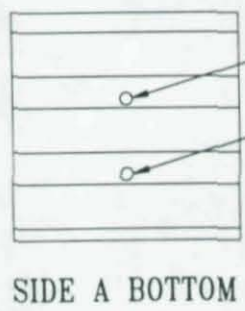
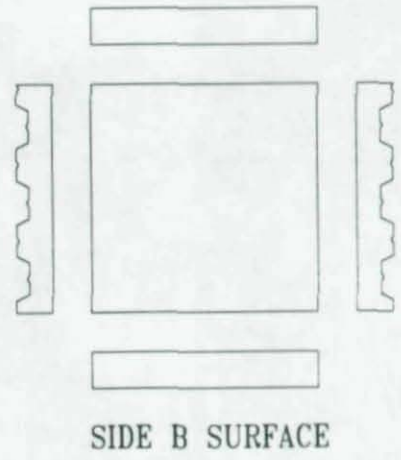
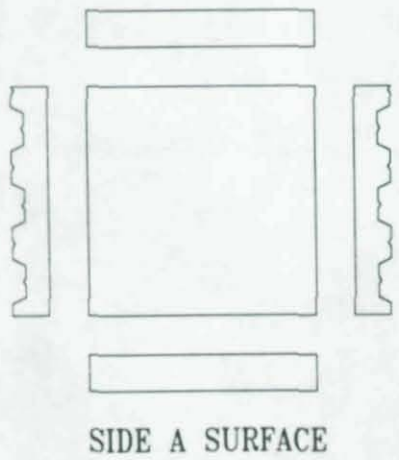
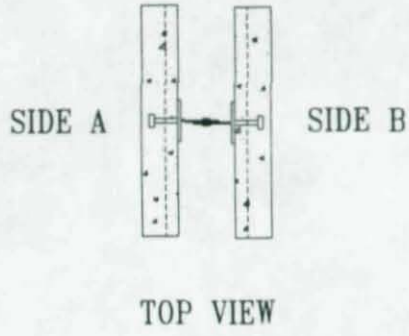
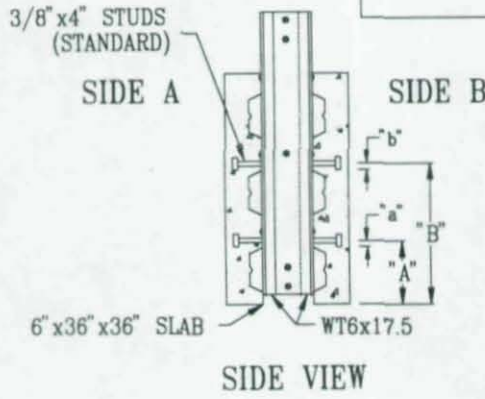
Avg.: 0.6320 in.

Comments: 10% Normal Load
 Test Operator: BCD
 Stud Shearing Failure of Top Stud on Side A and Both Studs on Side B
 Weld Failure of Bottom Stud on Side A



PUSH-OUT TEST LAYOUT & CRACKING SHEET

Test:	D52
Designation:	W34-4N6-2
Date:	1/7/98



Test D52 Data

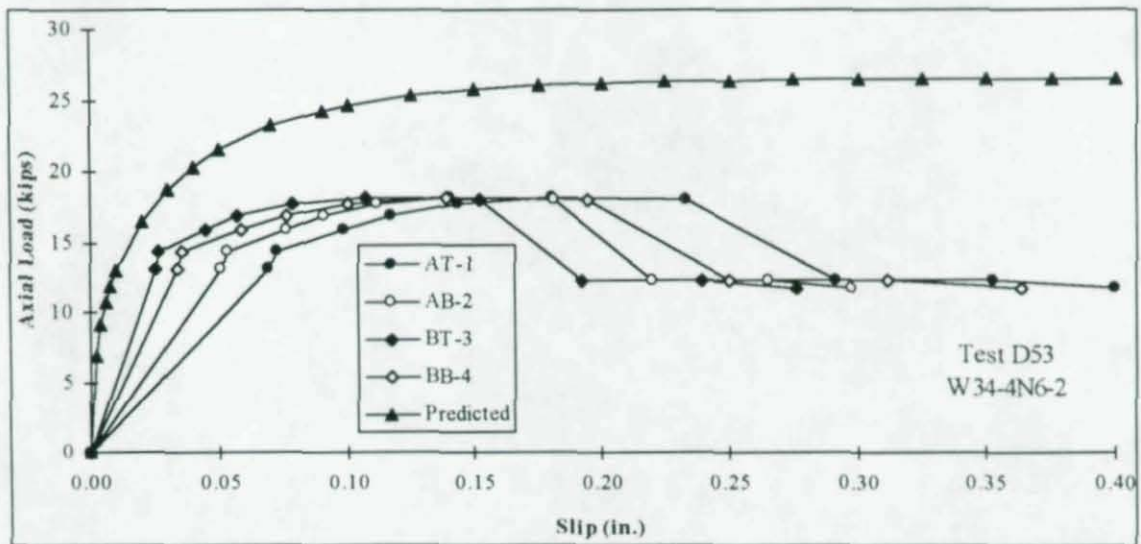
Axial Load (kips)	Slips (in.)				Test Comments
	Pot. AT-1	Pot. AB-2	Pot. BT-3	Pot. BB-4	
0.00	0.0000	0.0000	0.0000	0.0000	BEGIN TEST
8.54	0.0238	0.0260	0.0026	0.0004	
13.13	0.0527	0.0551	0.0064	0.0066	1/16" DECK SEPARATION SIDE B
15.52	0.0925	0.0945	0.0293	0.0331	
16.21	0.1245	0.1265	0.0551	0.0590	POPPING.
11.81	0.1956	0.1948	0.0980	0.1051	
12.69	0.2685	0.2639	0.1513	0.1623	
12.50	0.3141	0.3053	0.1807	0.1954	
12.88	0.3655	0.3540	0.2221	0.2448	
12.75	0.4106	0.3959	0.2624	0.2912	BANG.
9.17	0.4593	0.4368	0.3197	0.3575	
9.11	0.5188	0.4853	0.3663	0.4135	
9.23	0.5838	0.5415	0.4153	0.4752	
9.42	0.6580	0.6043	0.4745	0.5476	
9.55	0.7221	0.6604	0.5298	0.6157	BANG.

002175

PUSH-OUT TEST SUMMARY SHEET

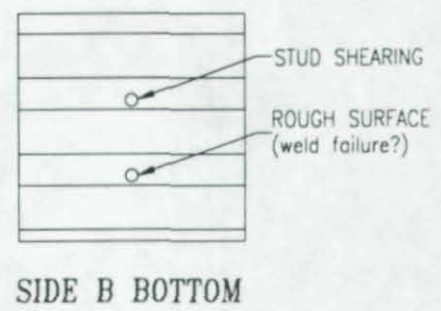
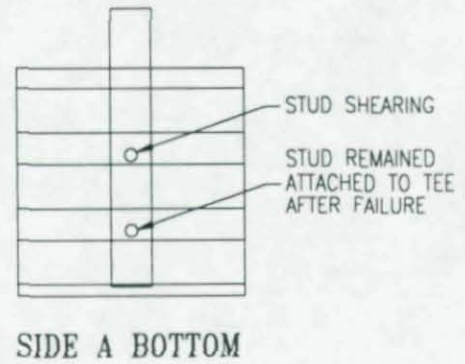
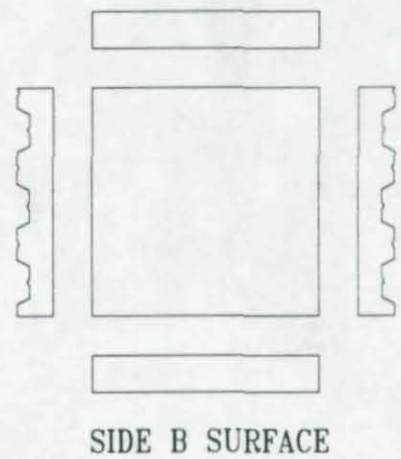
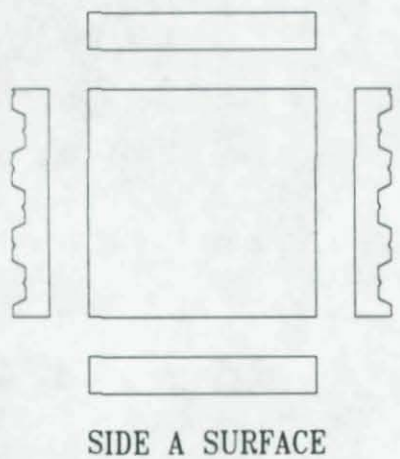
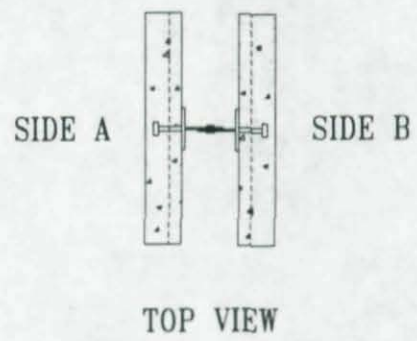
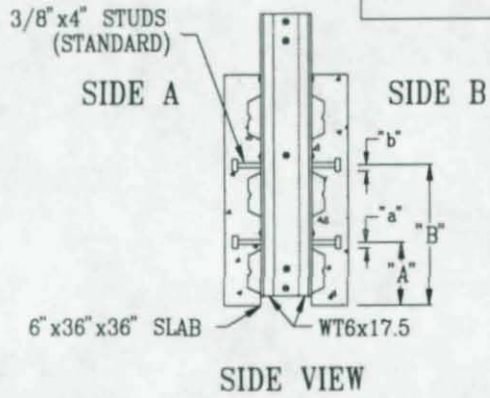
Test:	D53	Deck Type:	2" USD, 20 ga.
Designation:	W34-4N6-2		
Date of Test:	1/9/98		
Concrete Strength:	3930 psi	Stud Position:	W
Concrete Weight:	146.45 pcf	Stud Size:	3/8 in. x 4 in.
Concrete Thickness:	6 in.	Stud Tensile Strength:	79.192 ksi
Maximum Applied Load:	18.15 kips		
Applied Load Per Stud:	4.54 kips		
Concrete Slip at Failure:			
Pot. AT-1:	0.4001 in.	Pot. BT-3:	0.2767 in.
Pot. AB-2:	0.2983 in.	Pot. BB-4:	0.3635 in.
Avg. Side A:	0.3492 in.	Avg. Side B:	0.3201 in.
	Avg.: 0.3347 in.		

Comments: 10% Normal Load
 Test Operator: BCD
 Stud Shearing Failure of Top Stud on Side A and Top Stud on Side B
 Weld Failure of Bottom Stud on Side B?



PUSH-OUT TEST LAYOUT & CRACKING SHEET

Test:	_____ D53 _____
Designation:	_____ W34-4N6-2 _____
Date:	_____ 1/9/98 _____



Test D53 Data

Axial Load (kips)	Slips (in.)				Test Comments
	Pot. AT-1	Pot. AB-2	Pot. BT-3	Pot. BB-4	
0.00	0.0000	0.0000	0.0000	0.0000	BEGIN TEST
13.07	0.0698	0.0513	0.0253	0.0342	
14.32	0.0727	0.0537	0.0266	0.0359	
15.95	0.0985	0.0764	0.0447	0.0588	
16.83	0.1176	0.0908	0.0571	0.0764	
17.78	0.1438	0.1121	0.0789	0.1005	
18.15	0.1809	0.1408	0.1075	0.1386	
17.96	0.2335	0.1817	0.1524	0.1943	BANG.
12.25	0.2923	0.2201	0.1927	0.2502	
12.31	0.3527	0.2654	0.2392	0.3119	
11.68	0.4001	0.2983	0.2767	0.3635	BANG.

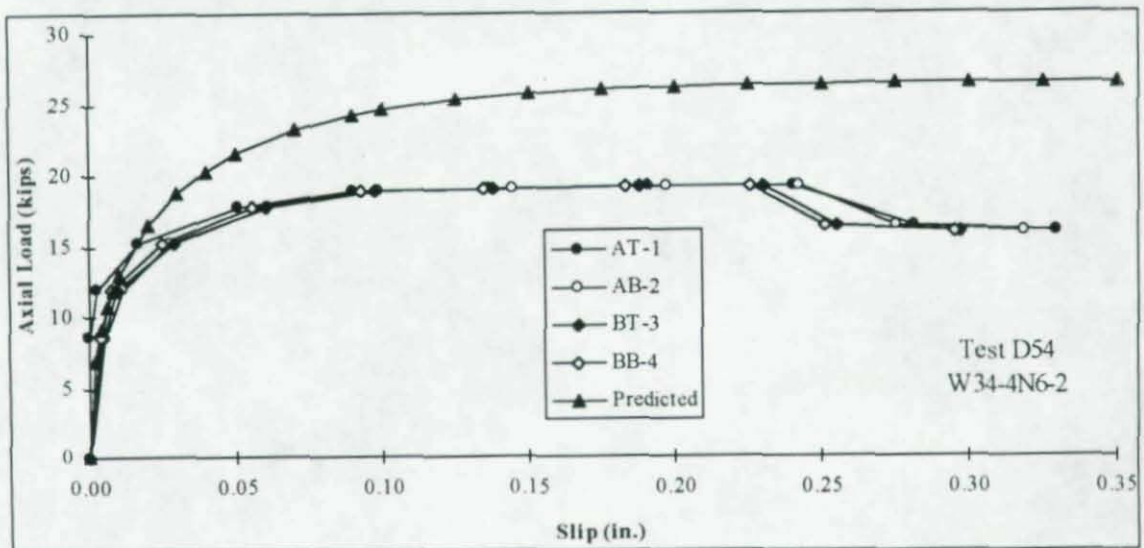
PUSH-OUT TEST SUMMARY SHEET

Test:	D54	Deck Type:	2" USD, 20 ga.
Designation:	W34-4N6-2		
Date of Test:	1/7/98		
Concrete Strength:	3930 psi	Stud Position:	W
Concrete Weight:	146.45 pcf	Stud Size:	3/8 in. x 4 in.
Concrete Thickness:	6 in.	Stud Tensile Strength:	79.192 ksi
Maximum Applied Load:	19.22 kips		
Applied Load Per Stud:	4.81 kips		
Concrete Slip at Failure:			

Pot. AT-1: 0.3294 in.	Pot. BT-3: 0.2970 in.
Pot. AB-2: 0.3190 in.	Pot. BB-4: 0.2956 in.
Avg. Side A: 0.3242 in.	Avg. Side B: 0.2963 in.

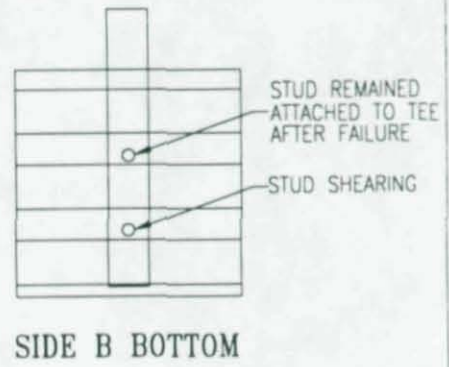
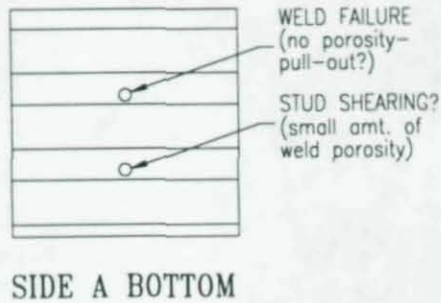
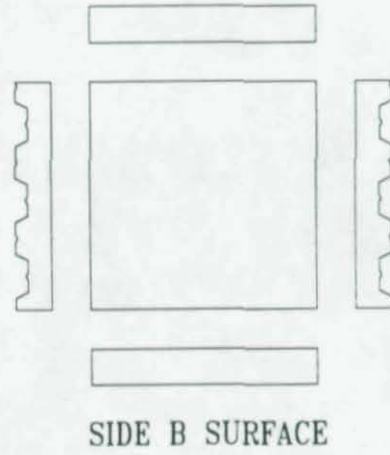
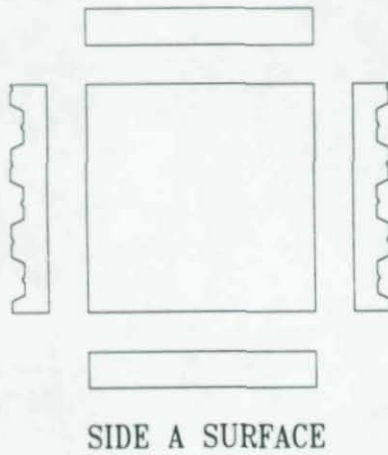
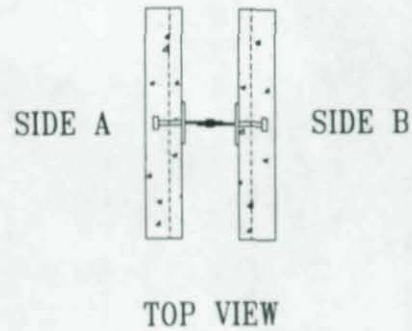
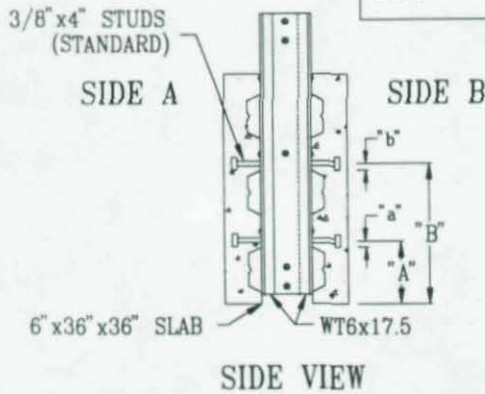
Avg.: 0.3103 in.

Comments: 10% Normal Load
 Test Operator: BCD
 Stud Shearing Failure of Bottom Stud on Side A and Bottom Stud on Side B
 Weld Failure of Top Stud on Side A?



PUSH-OUT TEST LAYOUT & CRACKING SHEET

Test:	D54
Designation:	W34-4N6-2
Date:	1/7/98



Test D54 Data

Axial Load (kips)	Slips (in.)				Test Comments
	Pot. AT-1	Pot. AB-2	Pot. BT-3	Pot. BB-4	
0.00	0.0000	0.0000	0.0000	0.0000	BEGIN TEST
8.54	0.0000	0.0053	0.0048	0.0042	
11.93	0.0027	0.0114	0.0097	0.0077	
15.26	0.0167	0.0275	0.0293	0.0249	
17.78	0.0504	0.0606	0.0604	0.0553	
18.84	0.0897	0.0985	0.0974	0.0923	
18.97	0.1366	0.1443	0.1381	0.1342	
19.22	0.1914	0.1976	0.1881	0.1831	
19.22	0.2404	0.2425	0.2304	0.2256	BANG.
16.27	0.2818	0.2760	0.2555	0.2513	
15.89	0.3294	0.3190	0.2970	0.2956	BANG.

PUSH-OUT TEST SUMMARY SHEET

Test:	D55	Deck Type:	2" USD, 20 ga.
Designation:	W74-4N6-2		
Date of Test:	1/9/98		
Concrete Strength:	3930 psi	Stud Position:	W
Concrete Weight:	146.45 pcf	Stud Size:	7/8 in. x 4 in.
Concrete Thickness:	6 in.	Stud Tensile Strength:	64.451 ksi
Maximum Applied Load:	58.60 kips		
Applied Load Per Stud:	14.65 kips		
Concrete Slip at Failure:			

Pot. AT-1: 1.0844 in.

Pot. BT-3: 0.9704 in.

Pot. AB-2: 1.0795 in.

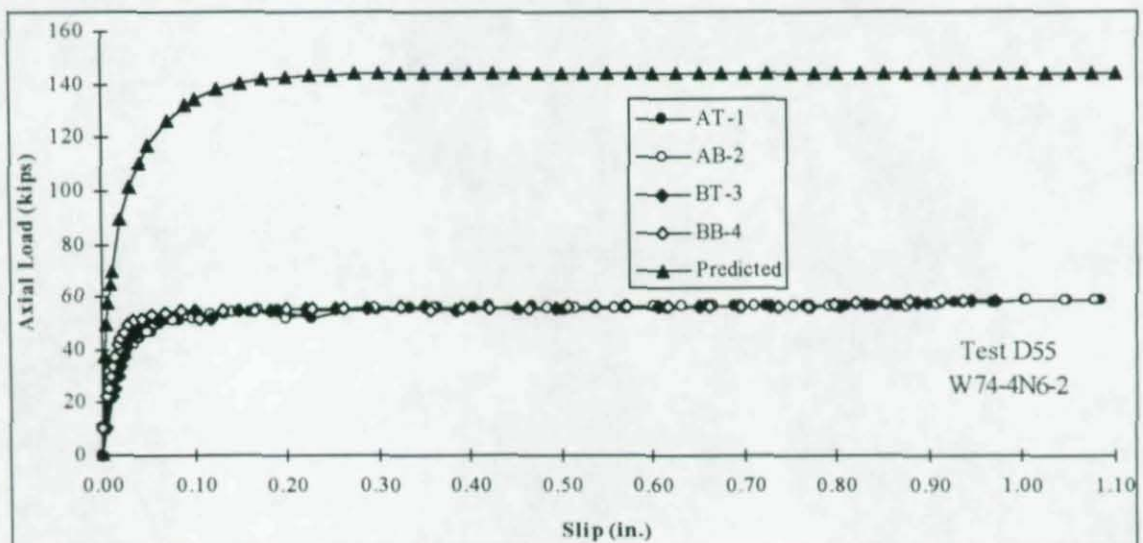
Pot. BB-4: 0.9369 in.

Avg. Side A: 1.0820 in.

Avg. Side B: 0.9537 in.

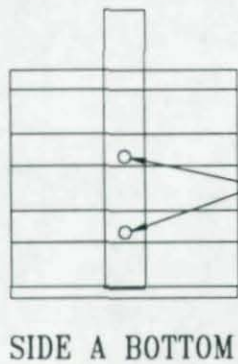
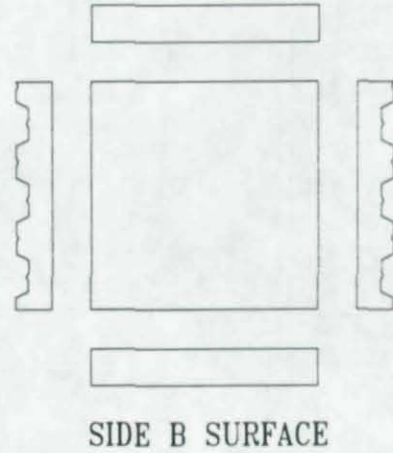
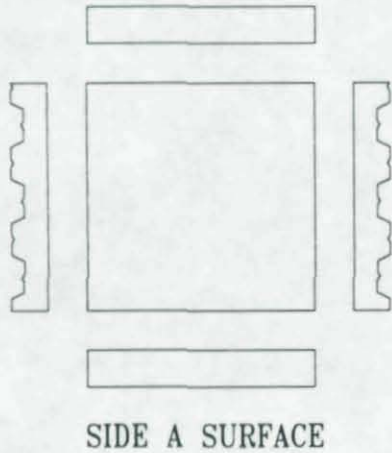
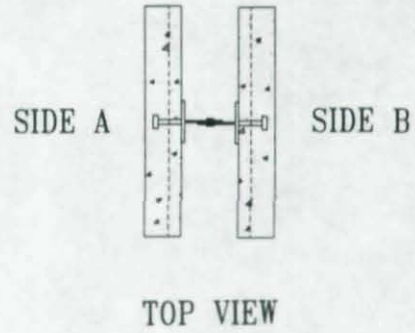
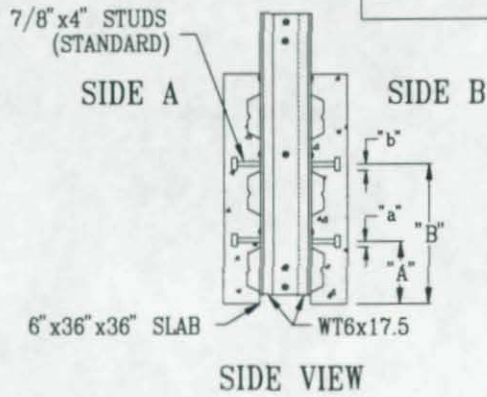
Avg.: 1.0178 in.

Comments: 10% Normal Load
 Test Operator: BCD
 Rib Punching Failure
 Ended Test Due to Excessive Slips

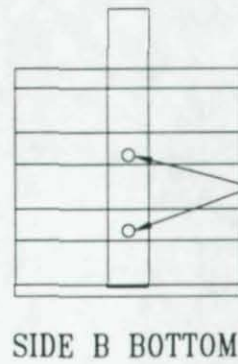


PUSH-OUT TEST LAYOUT & CRACKING SHEET

Test:	D55
Designation:	W74-4N6-2
Date:	1/9/98



STUDS REMAINED
ATTACHED TO TEE
&
RIB PUNCHING



STUDS REMAINED
ATTACHED TO TEE
&
RIB PUNCHING

Test D55 Data

Axial Load (kips)	Slips (in.)				Test Comments
	Pot. AT-1	Pot. AB-2	Pot. BT-3	Pot. BB-4	
0.00	0.0000	0.0000	0.0000	0.0000	BEGIN TEST
10.18	0.0004	0.0013	0.0035	-0.0002	
22.42	0.0090	0.0097	0.0117	0.0053	
25.75	0.0108	0.0117	0.0132	0.0060	
30.21	0.0161	0.0168	0.0174	0.0092	
33.79	0.0209	0.0209	0.0200	0.0106	
37.44	0.0260	0.0258	0.0227	0.0128	
41.71	0.0348	0.0344	0.0266	0.0168	
43.97	0.0410	0.0397	0.0298	0.0189	
46.86	0.0531	0.0494	0.0359	0.0229	
49.75	0.0624	0.0581	0.0396	0.0269	
51.07	0.0830	0.0764	0.0482	0.0346	
51.76	0.1099	0.0985	0.0575	0.0434	
53.27	0.1326	0.1181	0.0685	0.0542	
54.40	0.1602	0.1421	0.0837	0.0681	
55.20	0.1912	0.1688	0.1016	0.0866	
51.88	0.2284	0.1996	0.1190	0.1049	
54.96	0.2632	0.2306	0.1472	0.1320	
55.03	0.2983	0.2622	0.1833	0.1661	
55.34	0.3359	0.2974	0.2218	0.2000	
55.53	0.3661	0.3258	0.2529	0.2278	
55.72	0.4029	0.3602	0.2879	0.2632	
56.03	0.4681	0.4217	0.3507	0.3236	
54.96	0.5021	0.4538	0.3849	0.3569	
55.40	0.5373	0.4864	0.4206	0.3901	
55.50	0.5690	0.5166	0.4514	0.4210	
55.90	0.6146	0.5595	0.4952	0.4644	
56.30	0.6589	0.6019	0.5380	0.5073	
56.28	0.6889	0.6320	0.5690	0.5375	

Test D55 Data

Axial Load (kips)	Slips (in.)				Test Comments
	Pot. AT-1	Pot. AB-2	Pot. BT-3	Pot. BB-4	
56.34	0.7239	0.6664	0.6052	0.5723	
56.16	0.7662	0.7105	0.6503	0.6168	
55.97	0.8094	0.7550	0.6941	0.6622	
55.97	0.8402	0.7924	0.7294	0.6955	
56.41	0.8664	0.8351	0.7702	0.7369	
56.40	0.8728	0.8770	0.8032	0.7695	3/16" DECK SEPARATION
57.16	0.9008	0.9089	0.8316	0.7981	
57.98	0.9292	0.9365	0.8554	0.8215	
58.20	0.9682	0.9741	0.8871	0.8532	
58.60	1.0028	1.0057	0.9136	0.8787	1/4" DECK SEPARATION
58.40	1.0475	1.0473	0.9455	0.9122	
58.48	1.0844	1.0795	0.9704	0.9369	

PUSH-OUT TEST SUMMARY SHEET

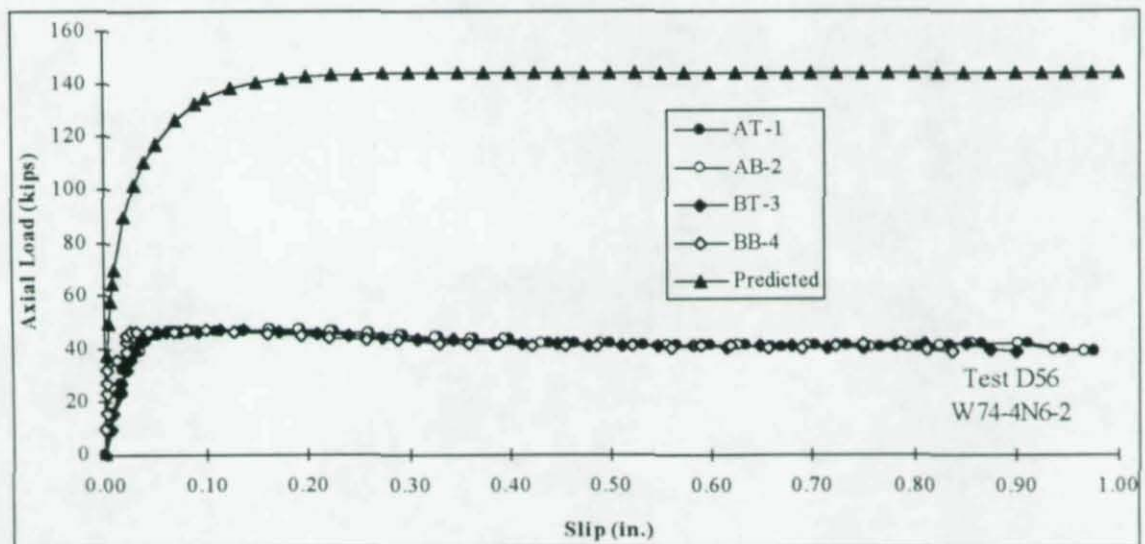
Test: D56 Deck Type: 2" USD, 20 ga.
 Designation: W74-4N6-2
 Date of Test: 1/8/98
 Concrete Strength: 3930 psi Stud Position: W
 Concrete Weight: 146.45 pcf Stud Size: 7/8 in. x 4 in.
 Concrete Thickness: 6 in. Stud Tensile Strength: 64.451 ksi
 Maximum Applied Load: 47.42 kips
 Applied Load Per Stud: 11.86 kips

Concrete Slip at Failure:

Pot. AT-1:	0.9770 in.	Pot. BT-3:	0.9008 in.
Pot. AB-2:	0.9673 in.	Pot. BB-4:	0.8371 in.
Avg. Side A:	0.9722 in.	Avg. Side B:	0.8690 in.

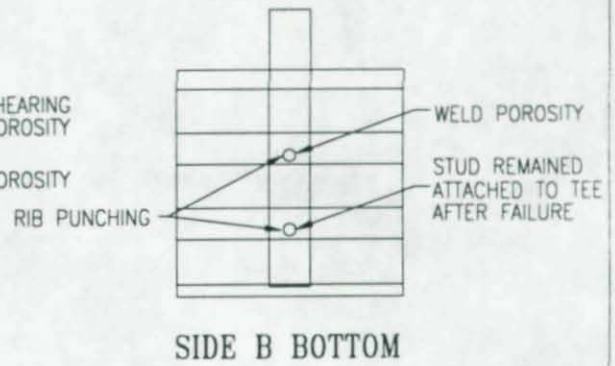
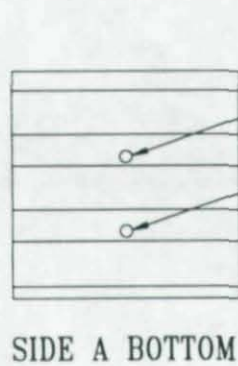
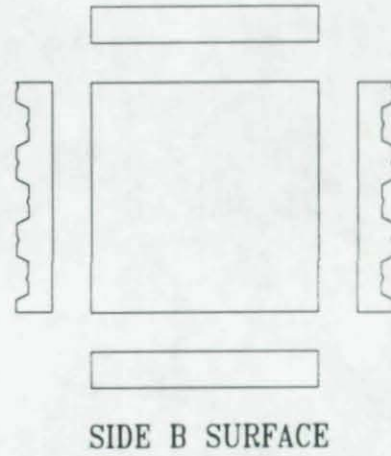
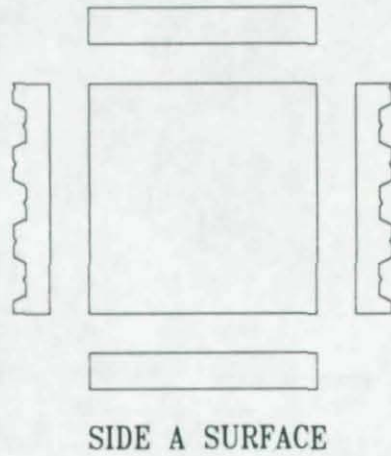
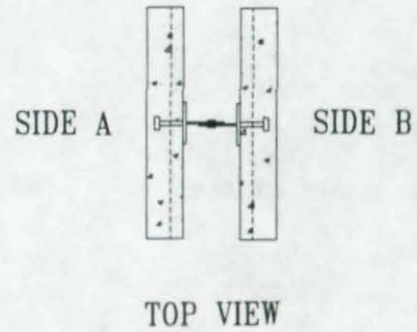
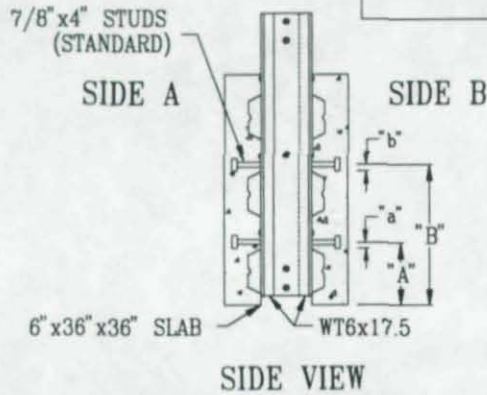
Avg.: 0.9206 in.

Comments: 10% Normal Load
 Test Operator: BCD
 Rib Punching Failure
 Weld Porosity



PUSH-OUT TEST LAYOUT & CRACKING SHEET

Test:	D56
Designation:	W74-4N6-2
Date:	1/8/98



Test D56 Data

Axial Load (kips)	Slips (in.)				Test Comments
	Pot. AT-1	Pot. AB-2	Pot. BT-3	Pot. BB-4	
0.00	0.0000	0.0000	0.0000	0.0000	BEGIN TEST
9.48	0.0026	0.0044	0.0064	-0.0004	
15.89	0.0070	0.0051	0.0084	0.0013	
22.93	0.0172	0.0141	0.0141	0.0016	
27.14	0.0170	0.0150	0.0165	0.0020	
32.16	0.0181	0.0209	0.0211	0.0024	
36.10	0.0218	0.0256	0.0245	0.0117	
39.32	0.0295	0.0361	0.0300	0.0207	
42.90	0.0370	0.0410	0.0352	0.0209	
45.04	0.0476	0.0520	0.0408	0.0216	
46.80	0.0663	0.0700	0.0507	0.0247	
46.73	0.0861	0.0897	0.0610	0.0317	
46.55	0.1095	0.1121	0.0747	0.0430	
46.42	0.1339	0.1366	0.0912	0.0689	POP.
47.20	0.1632	0.1626	0.1135	0.0802	
47.42	0.1925	0.1910	0.1375	0.0987	
46.29	0.2267	0.2236	0.1714	0.1271	
45.60	0.2622	0.2600	0.2089	0.1608	
44.79	0.2954	0.2919	0.2412	0.1930	
44.30	0.3300	0.3260	0.2736	0.2210	
43.66	0.3653	0.3608	0.3078	0.2573	
43.28	0.4000	0.3937	0.3441	0.2888	
42.34	0.4397	0.4320	0.3851	0.3294	
42.20	0.4655	0.4580	0.4126	0.3589	
41.83	0.4992	0.4908	0.4465	0.3890	
41.52	0.5324	0.5237	0.4794	0.4227	
41.60	0.5659	0.5574	0.5117	0.4543	
41.21	0.6003	0.5915	0.5461	0.4873	
41.08	0.6347	0.6261	0.5812	0.5210	

Test D56 Data

Axial Load (kips)	Slips (in.)				Test Comments
	Pot. AT-1	Pot. AB-2	Pot. BT-3	Pot. BB-4	
40.89	0.6706	0.6611	0.6153	0.5600	
41.02	0.7036	0.6946	0.6492	0.5906	
41.02	0.7347	0.7241	0.6800	0.6193	
40.64	0.7684	0.7587	0.7144	0.6560	
40.83	0.8048	0.7946	0.7505	0.6902	
41.27	0.8369	0.8268	0.7821	0.7221	
41.90	0.8664	0.8570	0.8109	0.7503	
42.27	0.9114	0.9017	0.8519	0.7876	
39.57	0.9466	0.9378	0.8759	0.8120	
39.38	0.9770	0.9673	0.9008	0.8371	BANG.

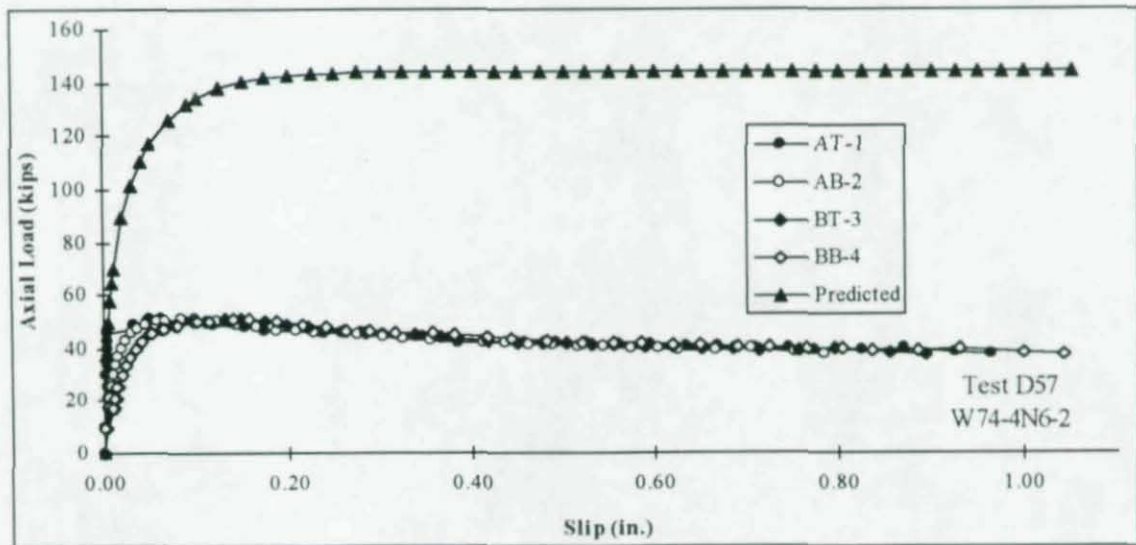
PUSH-OUT TEST SUMMARY SHEET

Test:	D57	Deck Type:	2" USD, 20 ga.
Designation:	W74-4N6-2		
Date of Test:	1/8/98		
Concrete Strength:	3930 psi	Stud Position:	W
Concrete Weight:	146.45 pcf	Stud Size:	7/8 in. x 4 in.
Concrete Thickness:	6 in.	Stud Tensile Strength:	64.451 ksi
Maximum Applied Load:	51.13 kips		
Applied Load Per Stud:	12.78 kips		

Concrete Slip at Failure:

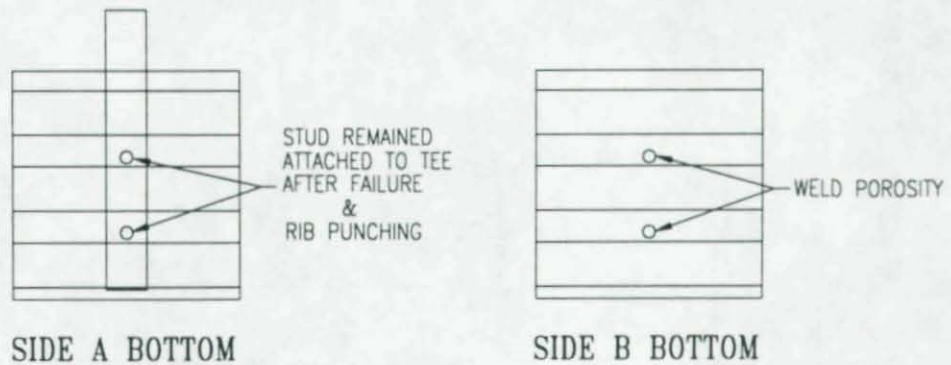
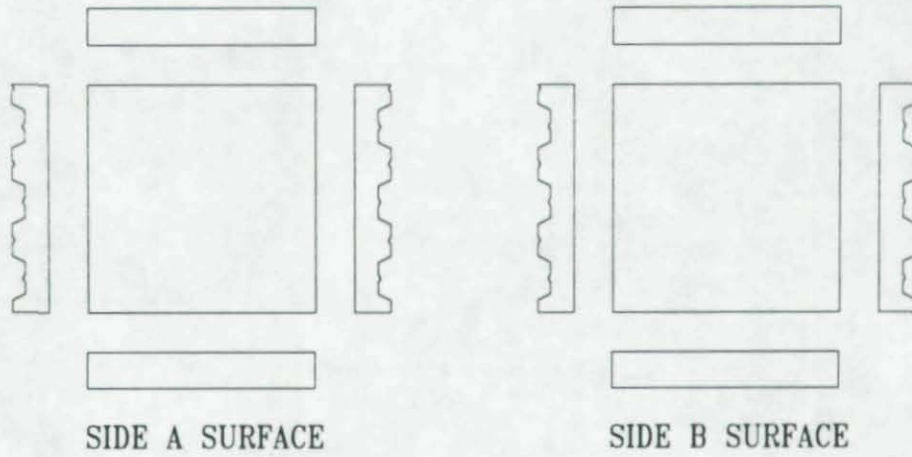
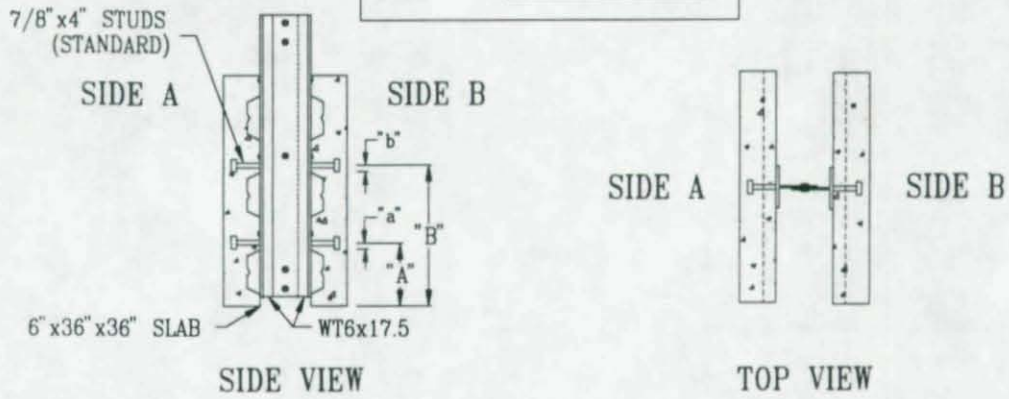
Pot. AT-1:	0.9651 in.	Pot. BT-3:	0.8927 in.
Pot. AB-2:	0.7851 in.	Pot. BB-4:	1.0424 in.
Avg. Side A:	0.8751 in.	Avg. Side B:	0.9676 in.
Avg.: 0.9213 in.			

Comments: 10% Normal Load
 Test Operator: BCD
 Rib Punching Failure
 Weld Porosity



PUSH-OUT TEST LAYOUT & CRACKING SHEET

Test:	D57
Designation:	W74-4N6-2
Date:	1/8/98



Test D57 Data

Axial Load (kips)	Slips (in.)				Test Comments
	Pot. AT-1	Pot. AB-2	Pot. BT-3	Pot. BB-4	
0.00	0.0000	0.0000	0.0000	0.0000	BEGIN TEST
9.48	0.0000	-0.0002	0.0016	0.0009	
17.27	0.0035	0.0073	0.0104	0.0082	
21.20	0.0037	0.0075	0.0125	0.0112	
25.25	0.0037	0.0084	0.0152	0.0139	
29.71	0.0031	0.0103	0.0203	0.0190	
33.73	0.0038	0.0132	0.0238	0.0244	
37.00	0.0035	0.0152	0.0282	0.0275	
40.00	0.0037	0.0189	0.0337	0.0349	
43.15	0.0037	0.0227	0.0399	0.0418	
45.79	0.0038	0.0297	0.0502	0.0520	
47.17	0.0330	0.0355	0.0617	0.0646	
48.99	0.0331	0.0447	0.0765	0.0798	
50.06	0.0476	0.0573	0.0967	0.1016	
50.44	0.0489	0.0663	0.1090	0.1139	
50.94	0.0489	0.0839	0.1317	0.1406	
51.13	0.0613	0.0980	0.1472	0.1577	
50.25	0.0879	0.1229	0.1731	0.1866	
49.12	0.1174	0.1447	0.1970	0.2143	
47.80	0.1516	0.1661	0.2203	0.2415	POP.
46.67	0.1742	0.1868	0.2388	0.2630	
46.36	0.2079	0.2077	0.2606	0.2882	
45.85	0.2372	0.2285	0.2833	0.3166	
45.54	0.2795	0.2580	0.3166	0.3562	
44.97	0.3033	0.2760	0.3364	0.3813	
44.10	0.3456	0.3034	0.3648	0.4166	
43.72	0.3756	0.3247	0.3855	0.4430	
42.71	0.4157	0.3547	0.4177	0.4814	
42.09	0.4573	0.3848	0.4499	0.5210	

Test D57 Data

Axial Load (kips)	Slips (in.)				Test Comments
	Pot. AT-1	Pot. AB-2	Pot. BT-3	Pot. BB-4	
41.90	0.4926	0.4117	0.4780	0.5547	
41.77	0.5247	0.4360	0.5025	0.5840	
41.58	0.5604	0.4622	0.5296	0.6181	
41.58	0.5941	0.4875	0.5547	0.6496	POP.
40.50	0.6340	0.5161	0.5889	0.6900	
40.60	0.6691	0.5430	0.6182	0.7250	
40.08	0.7093	0.5728	0.6518	0.7638	
40.01	0.7462	0.6029	0.6845	0.8030	
39.20	0.7735	0.6250	0.7129	0.8347	
39.20	0.8254	0.6668	0.7563	0.8852	
39.70	0.8702	0.7039	0.7946	0.9296	
38.30	0.9264	0.7510	0.8547	0.9990	
37.60	0.9651	0.7851	0.8927	1.0424	BANG.

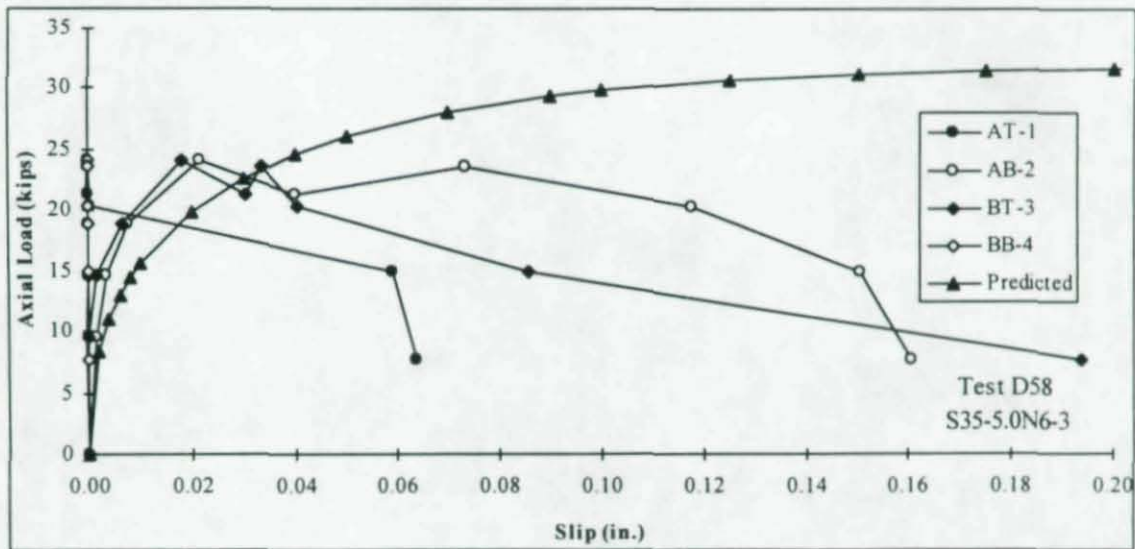
PUSH-OUT TEST SUMMARY SHEET

Test:	D58	Deck Type:	3" USD, 20 ga.
Designation:	S35-5.0N6-3		
Date of Test:	3/30/98		
Concrete Strength:	5240 psi	Stud Position:	S
Concrete Weight:	141.81 pcf	Stud Size:	3/8 in. x 5 in.
Concrete Thickness:	6 in.	Stud Tensile Strength:	77.238 ksi
Maximum Applied Load:	24.12 kips		
Applied Load Per Stud:	6.03 kips		

Concrete Slip at Failure:

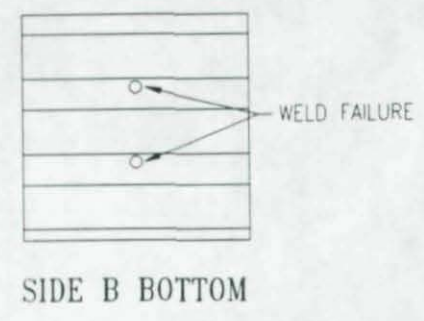
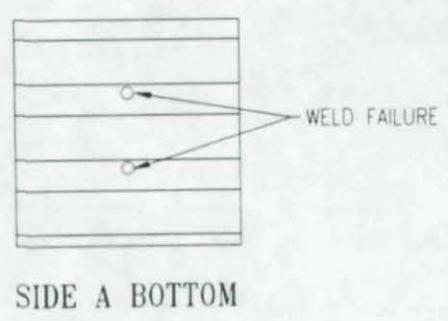
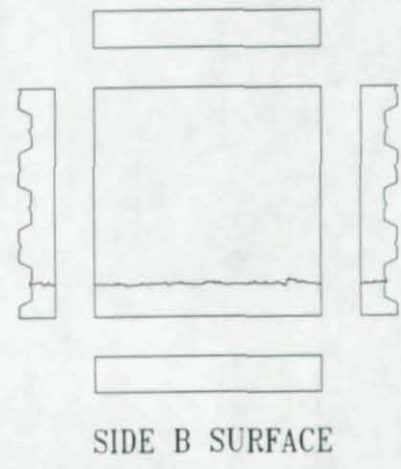
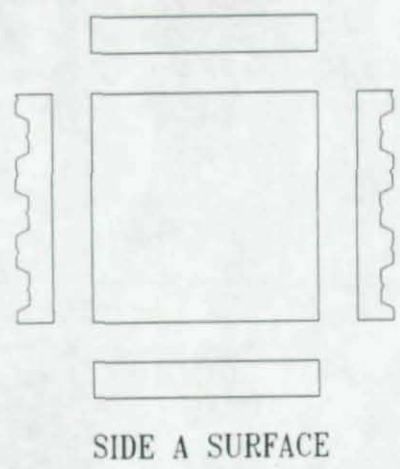
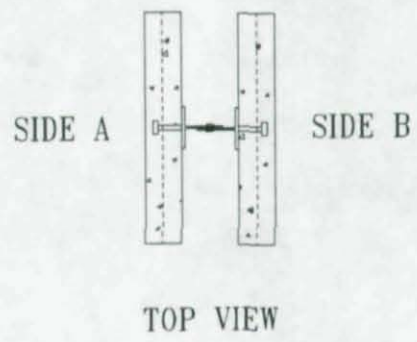
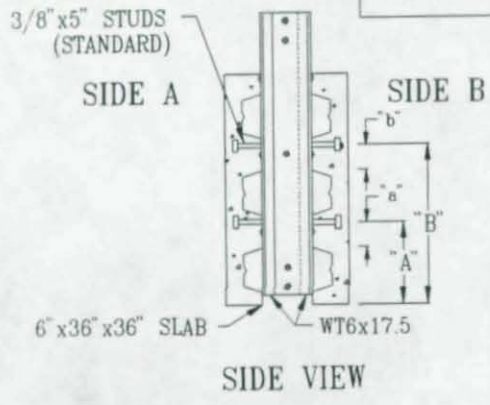
Pot. AT-1: 0.0635 in.	Pot. BT-3: 0.1937 in.
Pot. AB-2: 0.1606 in.	Pot. BB-4: -.0002 in.
Avg. Side A: 0.1121 in.	Avg. Side B: 0.0968 in.
Avg.: 0.1044 in.	

Comments: 10% Normal Load
 Test Operator: SCC
 Weld Failure



PUSH-OUT TEST LAYOUT & CRACKING SHEET

Test:	D58
Designation:	S35-5.0N6-3
Date:	3/30/98



Test D58 Data

Axial Load (kips)	Slips (in.)				Test Comments
	Pot. AT-1	Pot. AB-2	Pot. BT-3	Pot. BB-4	
0.00	0.0000	0.0000	0.0000	0.0000	BEGIN TEST POP.
9.48	0.0002	0.0015	-0.0002	-0.0005	
14.70	-0.0002	0.0035	0.0016	0.0000	
18.97	-0.0002	0.0079	0.0066	0.0000	
24.12	0.0002	0.0216	0.0183	-0.0002	
21.29	0.0002	0.0401	0.0304	-0.0004	
23.68	-0.0002	0.0734	0.0335	0.0000	
20.35	0.0004	0.1179	0.0407	0.0000	
14.89	0.0592	0.1505	0.0859	0.0000	
7.79	0.0635	0.1606	0.1937	-0.0002	

PUSH-OUT TEST SUMMARY SHEET

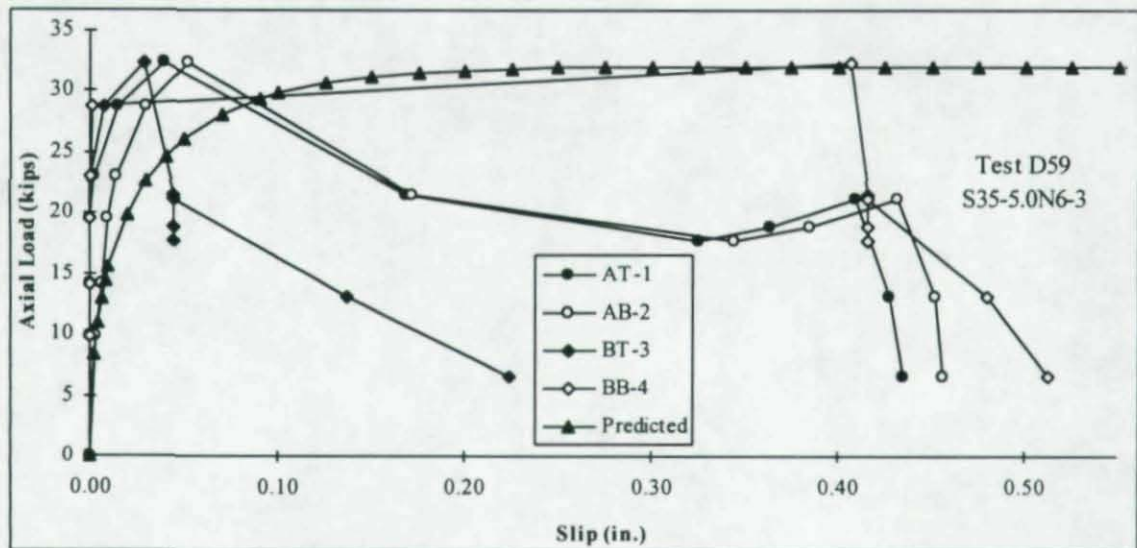
Test:	D59	Deck Type:	3" USD, 20 ga.
Designation:	S35-5.0N6-3		
Date of Test:	3/29/98		
Concrete Strength:	5240 psi	Stud Position:	S
Concrete Weight:	141.81 pcf	Stud Size:	3/8 in. x 5 in.
Concrete Thickness:	6 in.	Stud Tensile Strength:	77.238 ksi
Maximum Applied Load:	32.41 kips		
Applied Load Per Stud:	8.10 kips		

Concrete Slip at Failure:

Pot. AT-1: 0.4358 in.	Pot. BT-3: 0.2238 in.
Pot. AB-2: 0.4569 in.	Pot. BB-4: 0.5126 in.
Avg. Side A: 0.4464 in.	Avg. Side B: 0.3682 in.

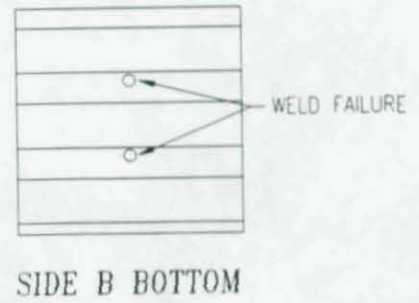
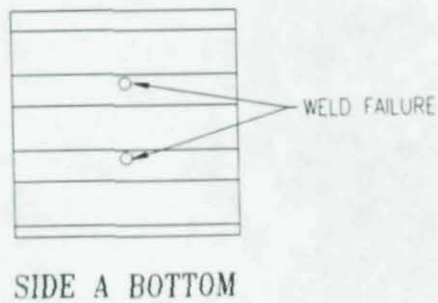
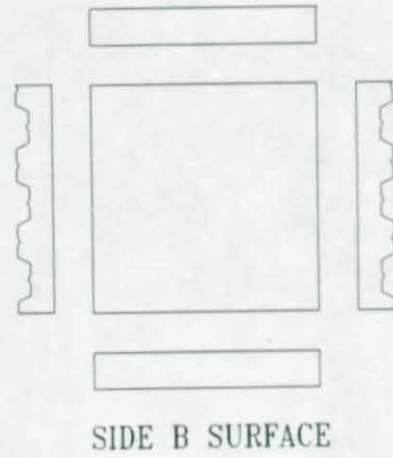
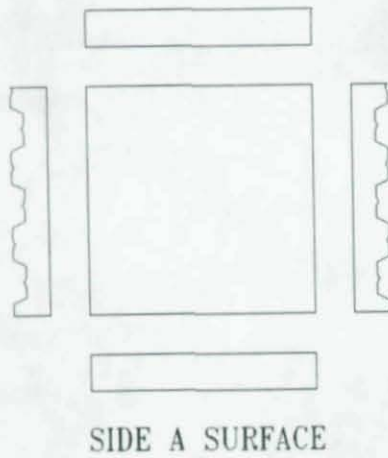
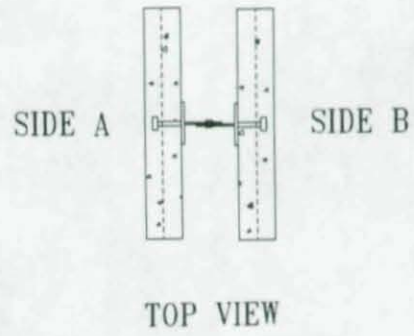
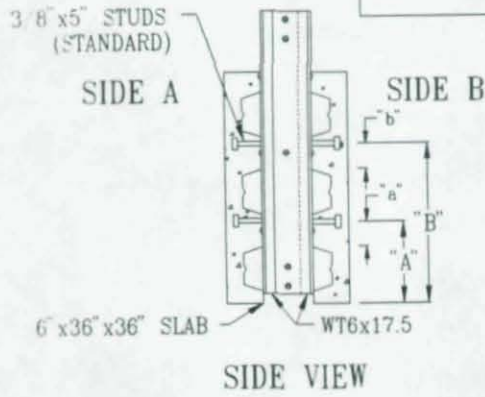
Avg.: 0.4073 in.

Comments: 10% Normal Load
 Test Operator: SCC
 Weld Failure



PUSH-OUT TEST LAYOUT & CRACKING SHEET

Test:	D59
Designation:	S35-5.0N6-3
Date:	3/29/98



Test D59 Data

Axial Load (kips)	Slips (in.)				Test Comments
	Pot. AT-1	Pot. AB-2	Pot. BT-3	Pot. BB-4	
0.00	0.0000	0.0000	0.0000	0.0000	BEGIN TEST
9.80	0.0002	0.0033	-0.0002	0.0002	
14.20	0.0004	0.0060	0.0002	0.0004	
19.54	0.0005	0.0099	0.0005	0.0000	NOISE.
22.99	0.0020	0.0140	0.0005	0.0002	
28.71	0.0145	0.0300	0.0079	0.0007	
32.41	0.0388	0.0520	0.0288	0.4071	FAST LOAD DROP. NO NOISE.
21.55	0.1693	0.1723	0.0450	0.4161	
17.78	0.3263	0.3448	0.0450	0.4159	RAM IS LEANING.
18.97	0.3637	0.3853	0.0450	0.4161	
21.23	0.4100	0.4322	0.0450	0.4161	
13.13	0.4276	0.4523	0.1373	0.4802	
6.60	0.4358	0.4569	0.2238	0.5126	

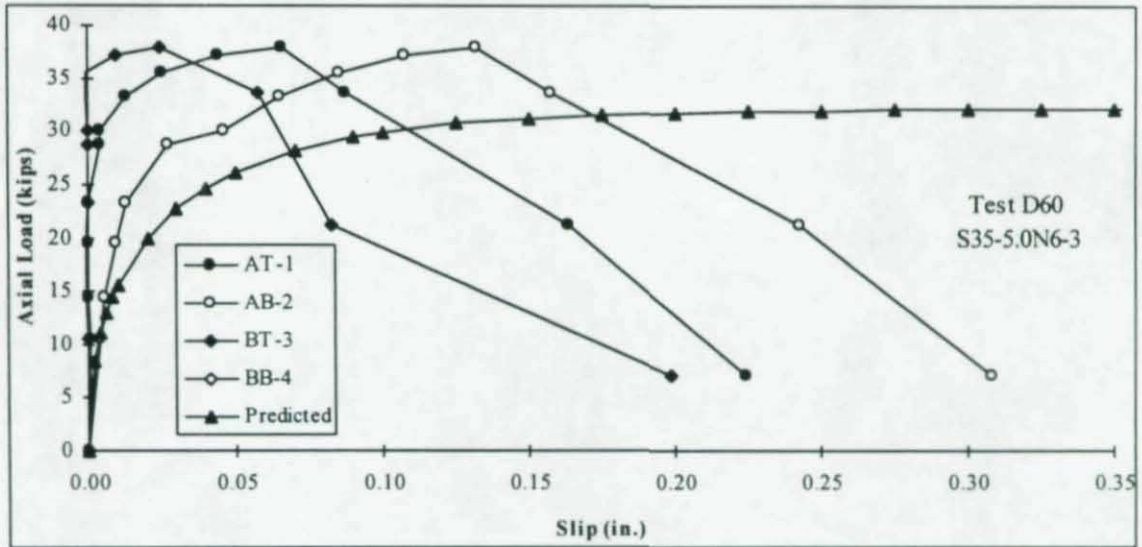
PUSH-OUT TEST SUMMARY SHEET

Test:	D60	Deck Type:	3" USD, 20 ga.
Designation:	S35-5.0N6-3		
Date of Test:	4/6/98		
Concrete Strength:	5240 psi	Stud Position:	S
Concrete Weight:	141.81 pcf	Stud Size:	3/8 in. x 5 in.
Concrete Thickness:	6 in.	Stud Tensile Strength:	77.238 ksi
Maximum Applied Load:	38.00 kips		
Applied Load Per Stud:	9.50 kips		

Concrete Slip at Failure:

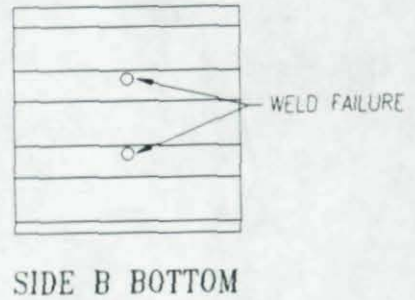
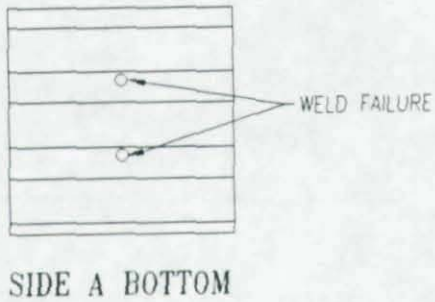
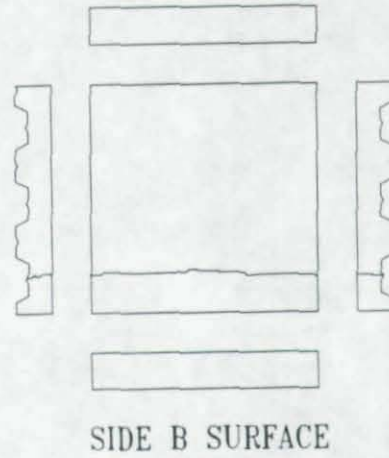
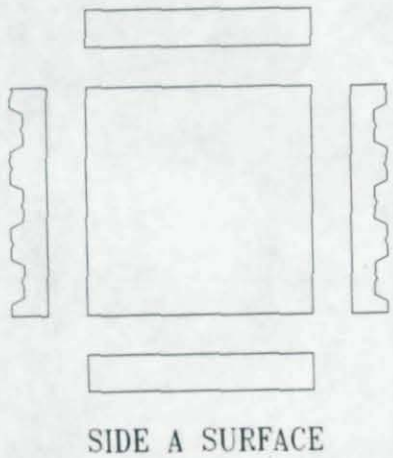
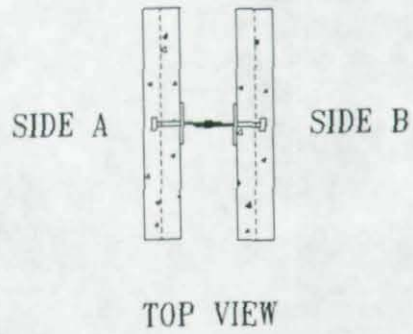
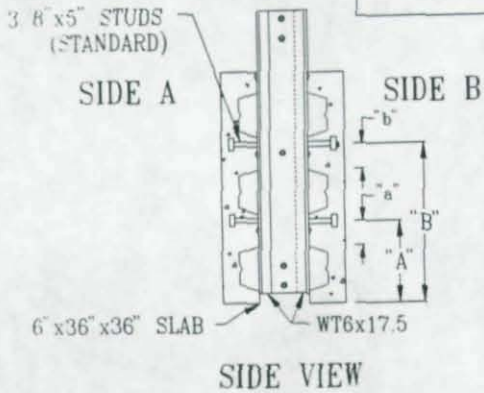
Pot. AT-1: 0.2245 in.	Pot. BT-3: 0.1985 in.
Pot. AB-2: 0.3082 in.	Pot. BB-4: No Reading
Avg. Side A: 0.2664 in.	Avg. Side B: 0.1985 in.
Avg.: 0.2324 in.	

Comments: 10% Normal Load
 Test Operator: SCC
 Weld Failure



PUSH-OUT TEST LAYOUT & CRACKING SHEET

Test:	D60
Designation:	S35-5.0N6-3
Date:	3/29/98



Test D60 Data

Axial Load (kips)	Slips (in.)				Test Comments
	Pot. AT-1	Pot. AB-2	Pot. BT-3	Pot. BB-4	
0.00	0.0000	0.0000	0.0000	0.0000	BEGIN TEST
10.43	0.0004	0.0038	0.0000	-0.0002	
14.38	0.0000	0.0057	-0.0004	-0.0002	
19.60	0.0002	0.0095	-0.0005	-0.0002	
23.30	0.0002	0.0126	-0.0002	-0.0002	
28.71	0.0040	0.0271	-0.0002	--	
29.96	0.0042	0.0458	0.0000	--	
33.29	0.0128	0.0648	-0.0004	--	
35.43	0.0253	0.0852	-0.0004	--	
37.19	0.0436	0.1075	0.0093	--	
38.00	0.0657	0.1320	0.0245	--	DECK DEBONDING.
33.67	0.0874	0.1573	0.0577	--	
21.23	0.1635	0.2425	0.0824	--	POP. POP.
7.16	0.2245	0.3082	0.1985	--	BANG.

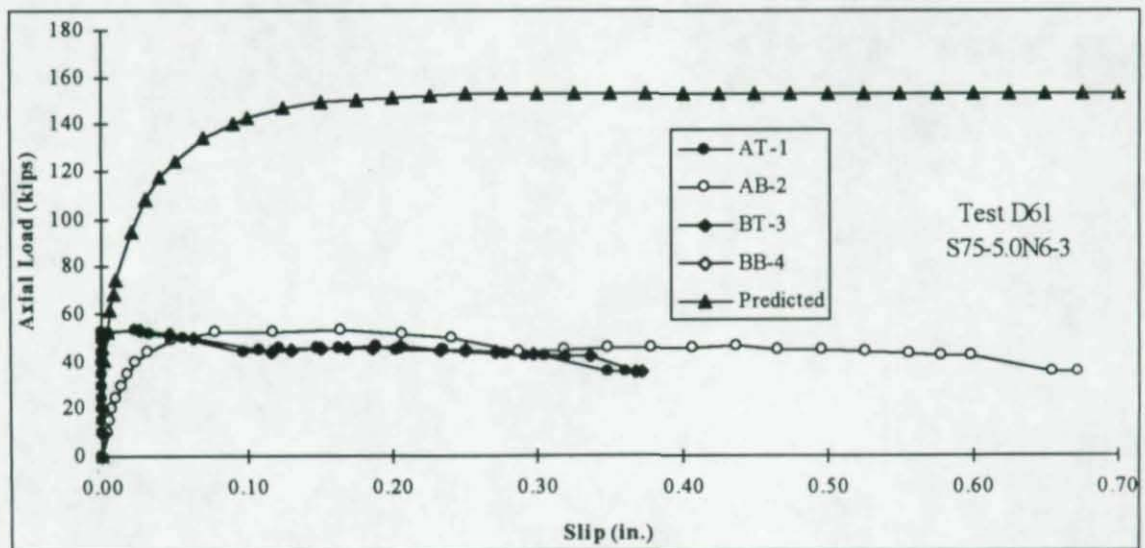
PUSH-OUT TEST SUMMARY SHEET

Test:	D61	Deck Type:	3" USD, 20 ga.
Designation:	S75-5.0N6-3		
Date of Test:	4/3/98		
Concrete Strength:	5240 psi	Stud Position:	S
Concrete Weight:	141.81 pcf	Stud Size:	7/8 in. x 5 in.
Concrete Thickness:	6 in.	Stud Tensile Strength:	63.767 ksi
Maximum Applied Load:	52.89 kips		
Applied Load Per Stud:	13.22 kips		

Concrete Slip at Failure:

Pot. AT-1: 0.3608 in.	Pot. BT-3: 0.3712 in.
Pot. AB-2: 0.6730 in.	Pot. BB-4: No Reading
Avg. Side A: 0.5169 in.	Avg. Side B: 0.3712 in.
Avg.: 0.4441 in.	

Comments: 10% Normal Load
 Test Operator: SCC
 Weld Failure

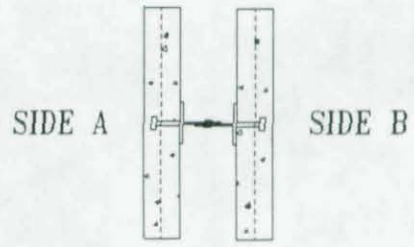
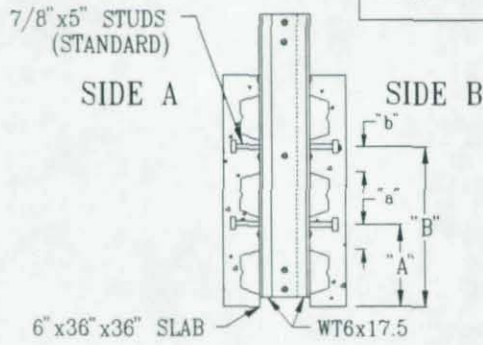


PUSH-OUT TEST LAYOUT & CRACKING SHEET

Test: D61

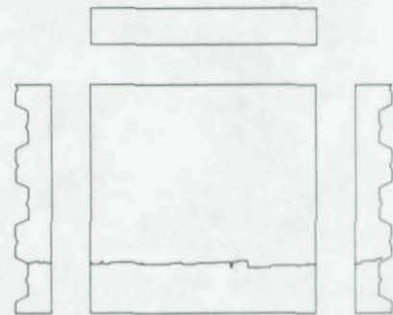
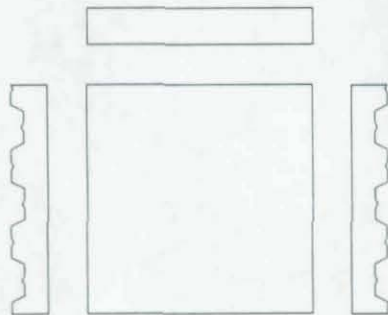
Designation: S75-5.0N6-3

Date: 4/3/98



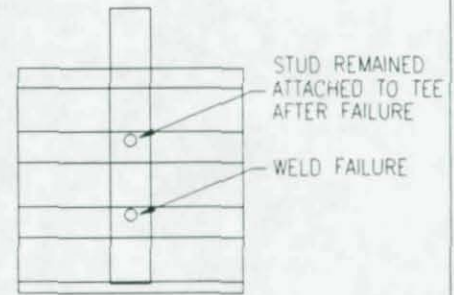
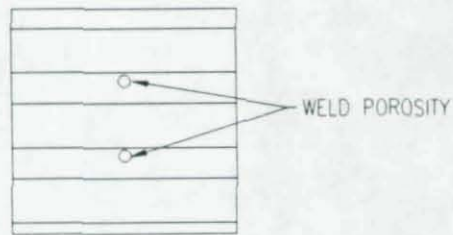
SIDE VIEW

TOP VIEW



SIDE A SURFACE

SIDE B SURFACE



SIDE A BOTTOM

SIDE B BOTTOM

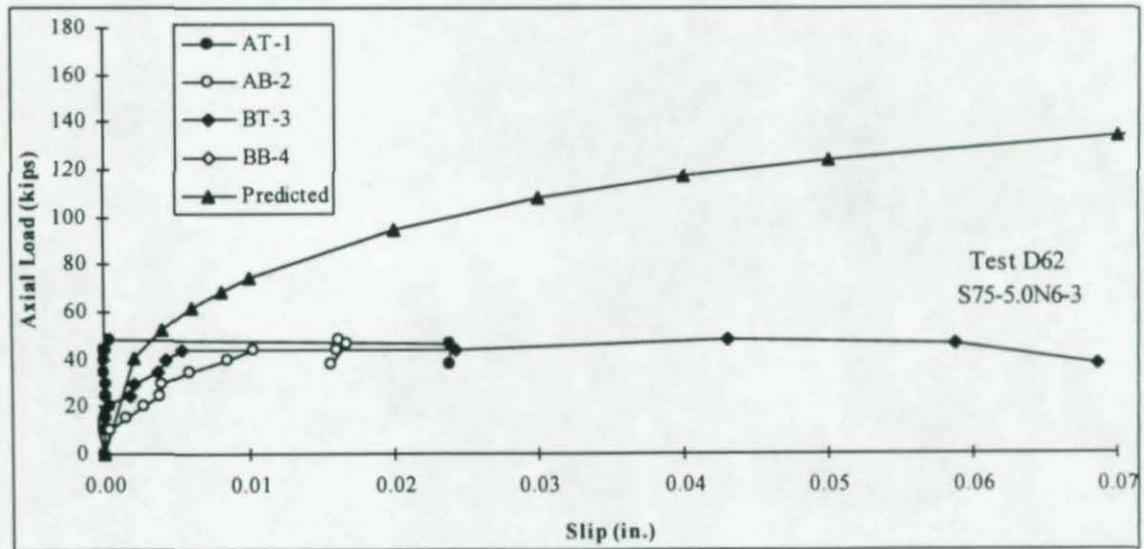
Test D61 Data

Axial Load (kips)	Slips (in.)				Test Comments
	Pot. AT-1	Pot. AB-2	Pot. BT-3	Pot. BB-4	
0.00	0.0000	0.0000	0.0000	0.0000	BEGIN TEST
10.43	0.0000	0.0037	-0.0005	-0.0004	
14.95	-0.0002	0.0053	-0.0009	0.0000	
20.04	0.0002	0.0075	-0.0004	-0.0002	
24.75	0.0000	0.0095	-0.0007	0.0000	
29.77	-0.0004	0.0130	-0.0007	-0.0004	POPS WHEN ADD NORMAL LOAD.
34.92	-0.0002	0.0181	-0.0007	0.0000	
39.82	0.0000	0.0236	-0.0005	0.0000	
44.10	0.0000	0.0313	-0.0004	-0.0002	
49.37	-0.0002	0.0476	-0.0005	-0.0002	
52.51	0.0000	0.0782	-0.0007	0.0000	
52.70	0.0005	0.1172	0.0038	-0.0004	
52.89	0.0227	0.1644	0.0260	--	
51.63	0.0333	0.2069	0.0467	--	
49.62	0.0564	0.2406	0.0624	--	BIG POP.
43.78	0.0972	0.2871	0.1159	--	
44.85	0.1077	0.3190	0.1300	--	
45.35	0.1212	0.3485	0.1498	--	
45.41	0.1482	0.3787	0.1677	--	
45.67	0.1626	0.4075	0.1862	--	
46.11	0.1892	0.4377	0.2051	--	
45.10	0.2024	0.4666	0.2329	--	CRACKING ALONG BOTTOM OF B.
44.60	0.2346	0.4963	0.2503	--	
44.03	0.2500	0.5267	0.2710	--	
43.09	0.2776	0.5565	0.2972	--	
42.59	0.2915	0.5787	0.3188	--	
42.27	0.3055	0.5994	0.3370	--	POP.
35.80	0.3481	0.6547	0.3679	--	
35.11	0.3608	0.6730	0.3712	--	SNAP, CRACKLE, POP.

PUSH-OUT TEST SUMMARY SHEET

Test:	D62	Deck Type:	3" USD, 20 ga.
Designation:	S75-5.0N6-3		
Date of Test:	4/10/98		
Concrete Strength:	5240 psi	Stud Position:	S
Concrete Weight:	141.81 pcf	Stud Size:	7/8 in. x 5 in.
Concrete Thickness:	6 in.	Stud Tensile Strength:	63.767 ksi
Maximum Applied Load:	47.86 kips		
Applied Load Per Stud:	11.97 kips		
Concrete Slip at Failure:			
Pot. AT-1:	0.0238 in.	Pot. BT-3:	0.0687 in.
Pot. AB-2:	0.0156 in.	Pot. BB-4:	No Reading
Avg. Side A:	0.5169 in.	Avg. Side B:	0.0687 in.
	Avg.: 0.0442 in.		

Comments: 10% Normal Load
 Test Operator: SCC
 Weld Failure

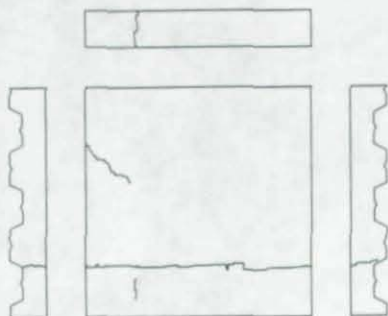
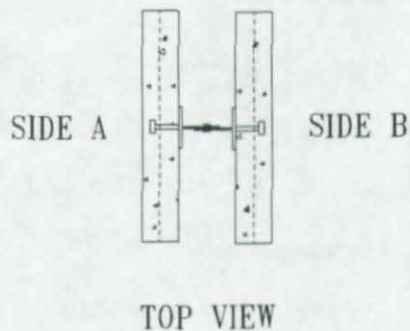
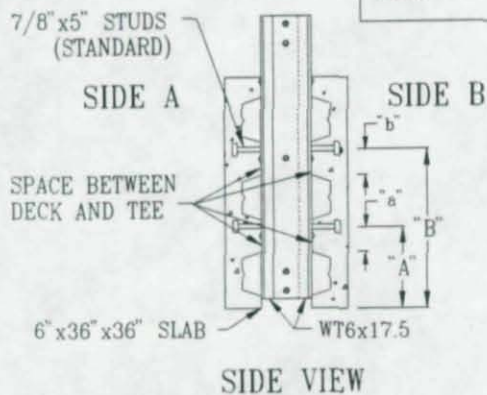


PUSH-OUT TEST LAYOUT & CRACKING SHEET

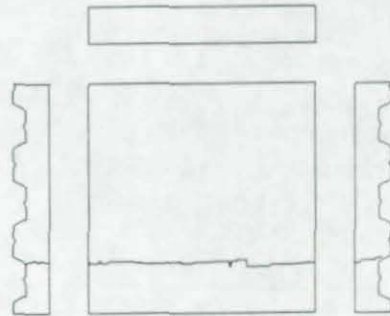
Test: D62

Designation: S75-5.0N6-3

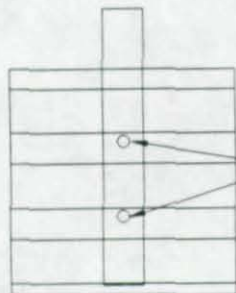
Date: 4/10/98



SIDE A SURFACE

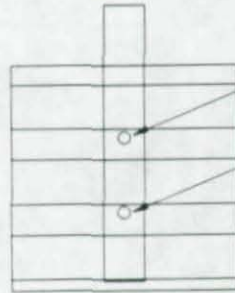


SIDE B SURFACE



SIDE A BOTTOM

STUDS REMAINED ATTACHED TO TEE AFTER FAILURE



SIDE B BOTTOM

STUD REMAINED ATTACHED TO TEE AFTER FAILURE

WELD POROSITY

Test D62 Data

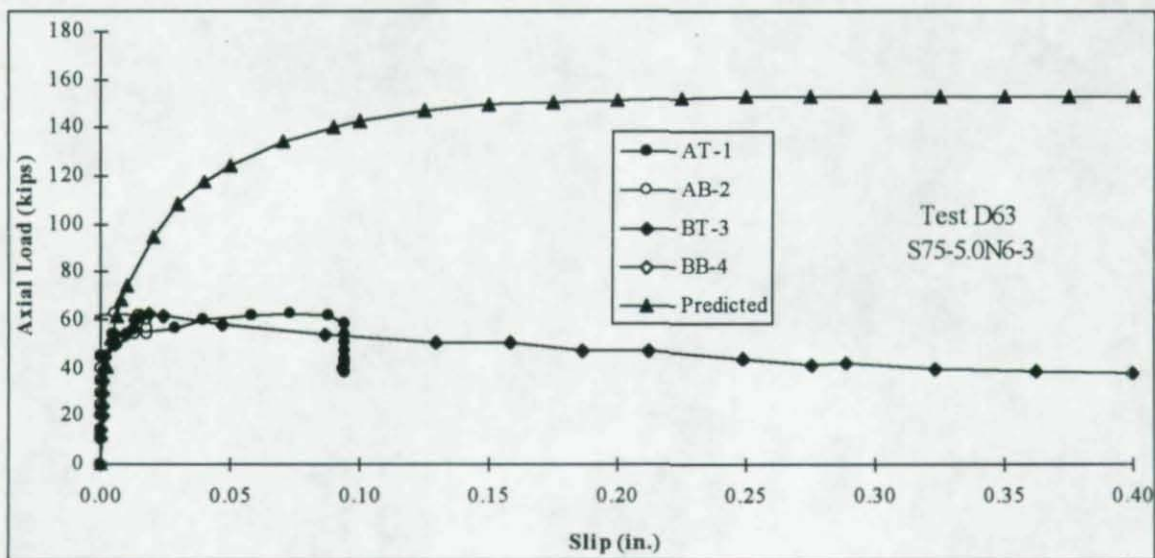
Axial Load (kips)	Slips (in.)				Test Comments
	Pot. AT-1	Pot. AB-2	Pot. BT-3	Pot. BB-4	
0.00	0.0000	0.0000	0.0000	--	BEGIN TEST
10.36	0.0000	0.0004	-0.0004	--	
14.89	0.0002	0.0015	-0.0004	--	
20.35	0.0004	0.0027	-0.0002	--	
24.62	0.0002	0.0038	0.0018	--	POP.
29.27	0.0002	0.0040	0.0020	--	
34.86	0.0000	0.0059	0.0037	--	
39.45	0.0000	0.0084	0.0042	--	
44.22	0.0002	0.0103	0.0053	--	BIG POP.
44.16	0.0000	0.0159	0.0242	--	
47.86	0.0004	0.0161	0.0430	--	POP.
46.67	0.0238	0.0167	0.0588	--	AXIAL LOAD COMING OUT IN NL.
37.75	0.0238	0.0156	0.0687	--	CRACKS ON BOTTOM OF SLAB.

PUSH-OUT TEST SUMMARY SHEET

Test:	D63	Deck Type:	3" USD, 20 ga.
Designation:	S75-5.0N6-3		
Date of Test:	4/13/98		
Concrete Strength:	5240 psi	Stud Position:	S
Concrete Weight:	141.81 pcf	Stud Size:	7/8 in. x 5 in.
Concrete Thickness:	6 in.	Stud Tensile Strength:	63.767 ksi
Maximum Applied Load:	62.44 kips		
Applied Load Per Stud:	15.61 kips		
Concrete Slip at Failure:			

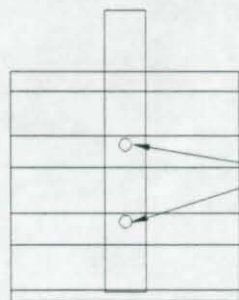
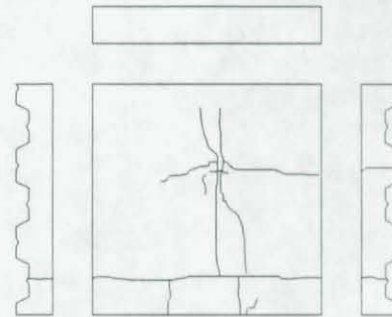
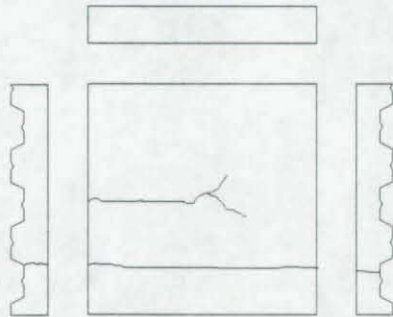
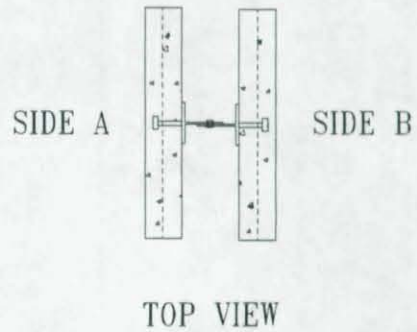
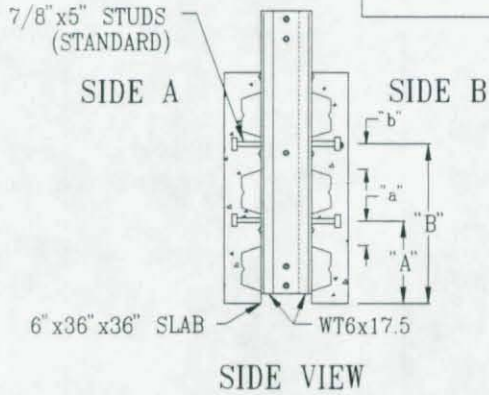
Pot. AT-1: 0.0945 in.	Pot. BT-3: 0.4000 in.
Pot. AB-2: -0.0663 in.	Pot. BB-4: No Reading
Avg. Side A: 0.0141 in.	Avg. Side B: 0.4000 in.
Avg.: 0.2071 in.	

Comments: 10% Normal Load
 Test Operator: SCC
 Weld Failure

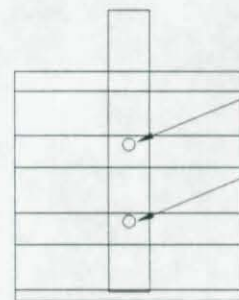


PUSH-OUT TEST LAYOUT & CRACKING SHEET

Test:	<u> D63 </u>
Designation:	<u> S75-5.0N6-3 </u>
Date:	<u> 4/13/98 </u>



STUDS REMAINED ATTACHED TO TEE AFTER FAILURE



STUD REMAINED ATTACHED TO TEE AFTER FAILURE

WELD FAILURE

Test D63 Data

Axial Load (kips)	Slips (in.)				Test Comments
	Pot. AT-1	Pot. AB-2	Pot. BT-3	Pot. BB-4	
0.00	0.0000	0.0000	0.0000	0.0000	BEGIN TEST
11.37	-0.0004	0.0000	-0.0004	--	
14.51	-0.0005	0.0000	-0.0002	--	BIG POP.
20.16	-0.0004	0.0000	0.0007	--	CRACKING OF BOTTOM RIB SIDE A.
24.56	-0.0002	0.0004	0.0011	--	
29.40	-0.0002	0.0002	0.0007	--	
34.42	-0.0002	0.0002	0.0011	--	CRACKING NOISES.
39.38	0.0000	0.0004	0.0013	--	
44.47	0.0000	0.0018	0.0018	--	
49.69	0.0046	0.0064	0.0053	--	
54.08	0.0049	0.0136	0.0055	--	
54.21	0.0103	0.0183	0.0093	--	
56.97	0.0291	0.0183	0.0126	--	
59.99	0.0396	0.0179	0.0130	--	DECK DEBONDING SIDE A.
61.56	0.0590	0.0147	0.0157	--	
62.44	0.0734	0.0055	0.0187	--	
61.68	0.0883	-0.0007	0.0244	--	
58.10	0.0945	-0.0326	0.0465	--	CRACK IN BOTTOM OF SIDE B.
53.71	0.0947	-0.0419	0.0868	--	
50.31	0.0945	-0.0471	0.1300	--	
51.01	0.0945	-0.0494	0.1584	--	
47.68	0.0945	-0.0518	0.1864	--	
47.30	0.0943	-0.0535	0.2126	--	
44.10	0.0945	-0.0557	0.2491	--	
41.08	0.0943	-0.0602	0.2756	--	
42.34	0.0945	-0.0602	0.2893	--	
40.14	0.0941	-0.0637	0.3234	--	POPPING SOUNDS.
38.88	0.0943	-0.0657	0.3622	--	DECK DEBONDING SIDE B.
37.81	0.0945	-0.0663	0.4000	--	

PUSH-OUT TEST SUMMARY SHEET

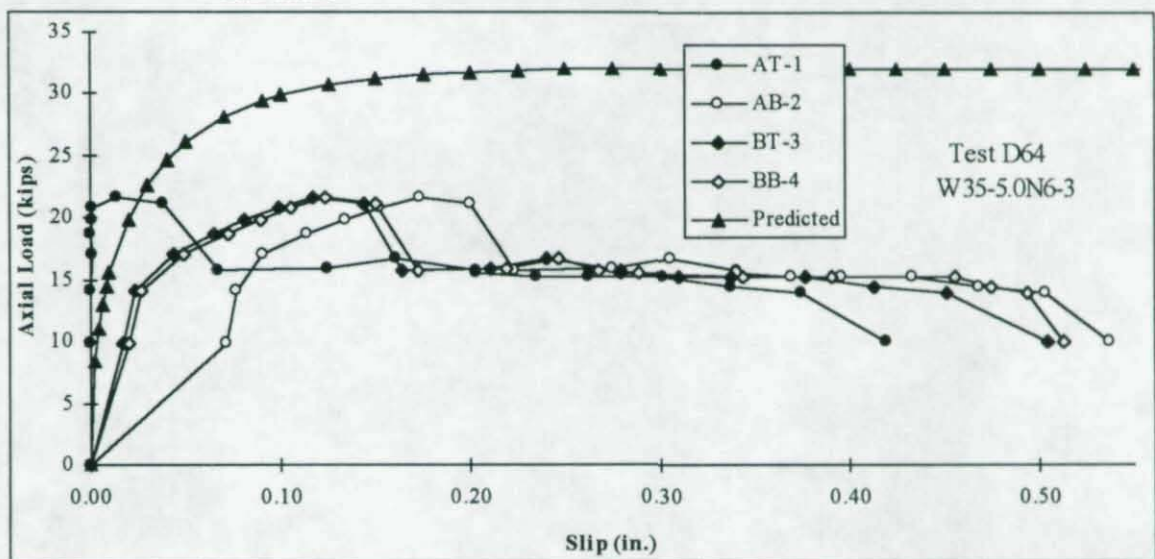
Test:	D64	Deck Type:	3" USD, 20 ga.
Designation:	W35-5.0N6-3		
Date of Test:	3/28/98		
Concrete Strength:	5240 psi	Stud Position:	W
Concrete Weight:	141.81 pcf	Stud Size:	3/8 in. x 5 in.
Concrete Thickness:	6 in.	Stud Tensile Strength:	77.238 ksi
Maximum Applied Load:	21.61 kips		
Applied Load Per Stud:	5.40 kips		

Concrete Slip at Failure:

Pot. AT-1: 0.4192 in.	Pot. BT-3: 0.5043 in.
Pot. AB-2: 0.5375 in.	Pot. BB-4: 0.5124 in.
Avg. Side A: 0.4784 in.	Avg. Side B: 0.5084 in.

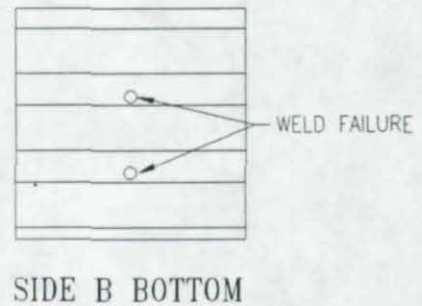
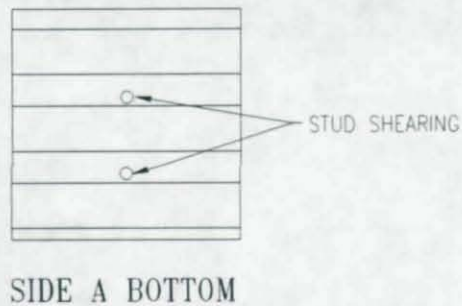
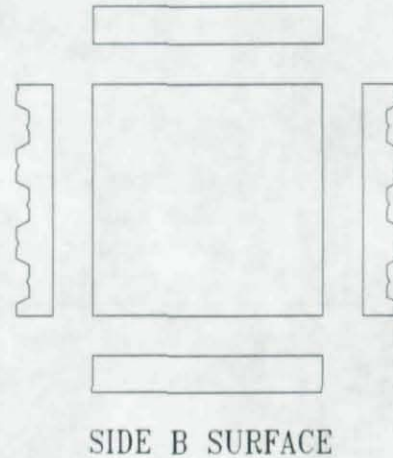
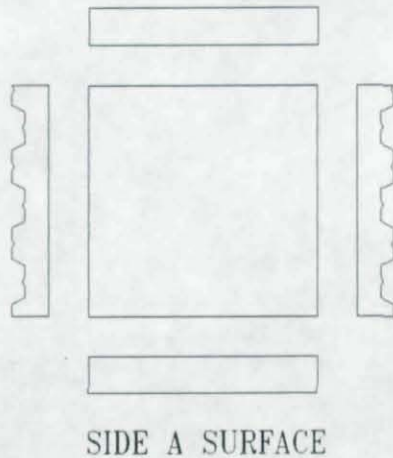
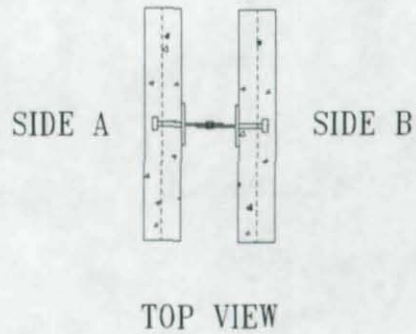
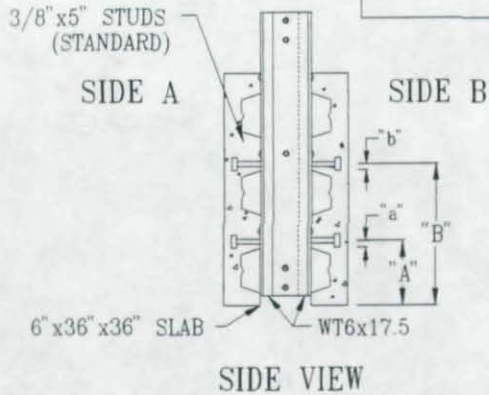
Avg.: 0.4934 in.

Comments: 10% Normal Load
 Test Operator: SCC & MRR
 Stud Shearing
 Weld Failure



PUSH-OUT TEST LAYOUT & CRACKING SHEET

Test:	D64
Designation:	W35-5.0N6-3
Date:	3/28/98



Test D64 Data

Axial Load (kips)	Slips (in.)				Test Comments
	Pot. AT-1	Pot. AB-2	Pot. BT-3	Pot. BB-4	
0.00	0.0000	0.0000	0.0000	0.0000	BEGIN TEST
9.80	0.0000	0.0714	0.0168	0.0201	
14.07	0.0004	0.0762	0.0229	0.0266	
17.02	0.0005	0.0901	0.0430	0.0489	
18.72	0.0004	0.1132	0.0648	0.0723	
19.91	0.0009	0.1337	0.0808	0.0894	POPPING NOISE.
20.79	0.0013	0.1520	0.0985	0.1051	
21.61	0.0136	0.1729	0.1170	0.1236	
21.23	0.0383	0.1996	0.1434	0.1492	
15.70	0.0670	0.2232	0.1639	0.1718	
16.02	0.1240	0.2751	0.2100	0.2192	
16.77	0.1602	0.3060	0.2397	0.2459	
15.77	0.2024	0.3406	0.2787	0.2672	
15.58	0.2024	0.3410	0.2787	0.2884	
15.26	0.2342	0.3690	0.3100	0.3439	
15.33	0.2624	0.3956	0.3375	0.3910	
15.20	0.3018	0.4333	0.3774	0.4556	
14.51	0.3375	0.4684	0.4131	0.4745	
13.94	0.3750	0.5029	0.4510	0.4935	
9.99	0.4192	0.5375	0.5043	0.5124	BANG.

PUSH-OUT TEST SUMMARY SHEET

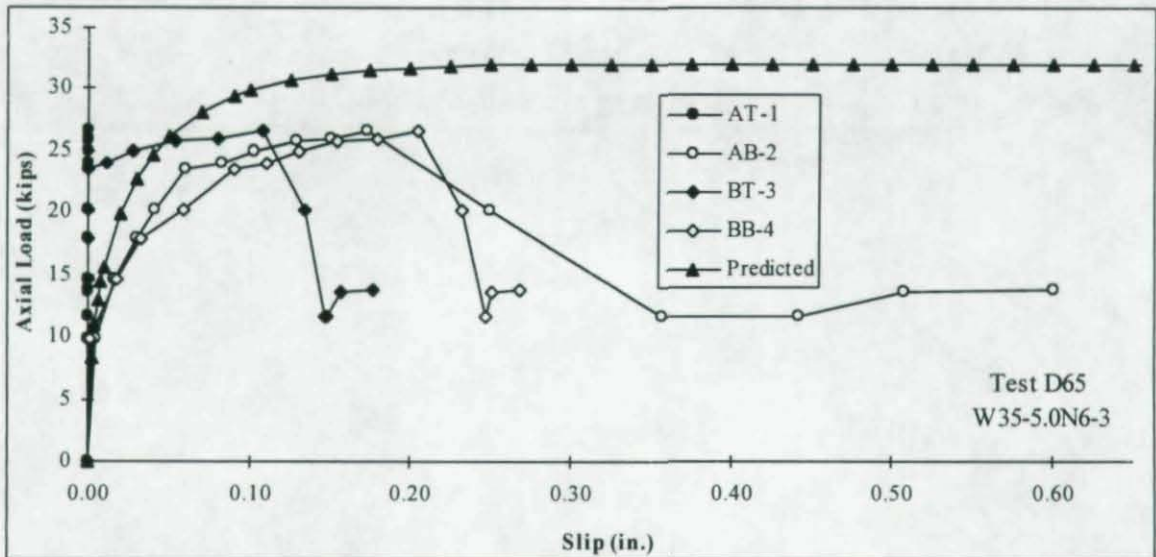
Test:	D65	Deck Type:	3" USD, 20 ga.
Designation:	W35-5.0N6-3		
Date of Test:	4/14/98		
Concrete Strength:	5240 psi	Stud Position:	W
Concrete Weight:	141.81 pcf	Stud Size:	3/8 in. x 5 in.
Concrete Thickness:	6 in.	Stud Tensile Strength:	77.238 ksi
Maximum Applied Load:	26.70 kips		
Applied Load Per Stud:	6.68 kips		

Concrete Slip at Failure:

Pot. AT-1: -0.0002 in.	Pot. BT-3: 0.1773 in.
Pot. AB-2: 0.6012 in.	Pot. BB-4: 0.2685 in.
Avg. Side A: 0.3005 in.	Avg. Side B: 0.2229 in.

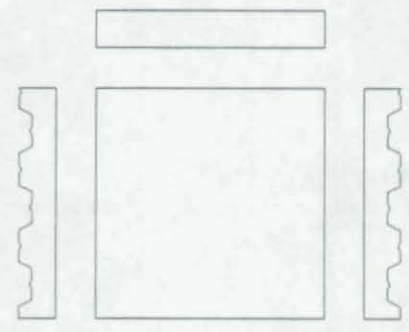
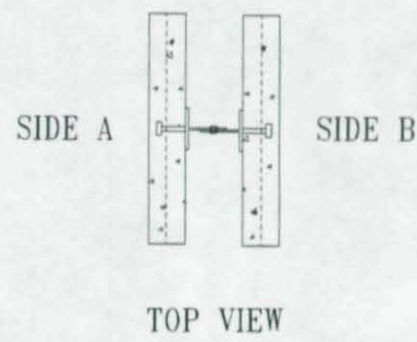
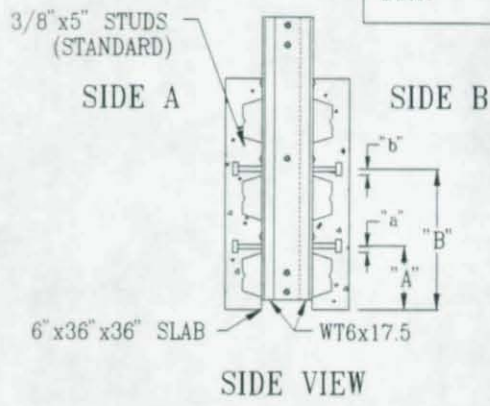
Avg.: 0.2617 in.

Comments: 10% Normal Load
 Test Operator: SCC
 Rib Punching
 Weld Failure

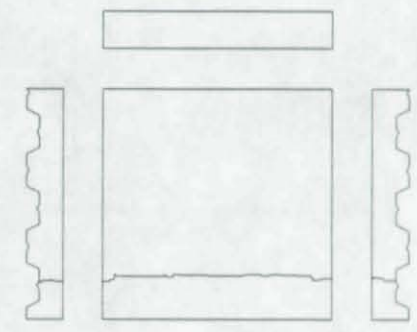


PUSH-OUT TEST LAYOUT & CRACKING SHEET

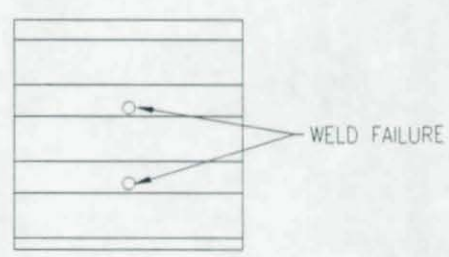
Test:	D65
Designation:	W35-5.0N6-3
Date:	4/14/98



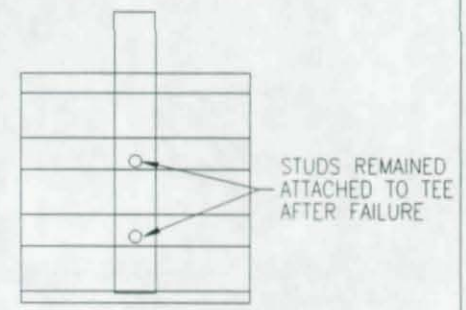
SIDE A SURFACE



SIDE B SURFACE



SIDE A BOTTOM



SIDE B BOTTOM

Test D65 Data

Axial Load (kips)	Slips (in.)				Test Comments
	Pot. AT-1	Pot. AB-2	Pot. BT-3	Pot. BB-4	
0.00	0.0000	0.0000	0.0000	0.0000	BEGIN TEST
9.86	0.0002	0.0051	-0.0004	0.0009	
14.57	-0.0004	0.0157	-0.0004	0.0174	
17.96	0.0000	0.0306	-0.0004	0.0328	
20.16	-0.0004	0.0418	-0.0004	0.0584	
23.43	0.0000	0.0604	-0.0004	0.0908	
23.93	0.0000	0.0833	0.0110	0.1110	
24.94	-0.0004	0.1031	0.0282	0.1308	
25.88	0.0000	0.1293	0.0535	0.1547	SLIGHT DECK BULGING.
26.01	-0.0002	0.1502	0.0804	0.1791	
26.70	-0.0002	0.1727	0.1073	0.2047	BIG POP.
20.29	-0.0004	0.2502	0.1348	0.2320	BIG POP.
11.68	0.0002	0.3573	0.1463	0.2469	CRACK ON BOTTOM OF SIDE B.
11.62	-0.0002	0.4430	0.1478	0.2472	
13.63	0.0000	0.5085	0.1569	0.2513	
13.82	-0.0002	0.6012	0.1773	0.2685	

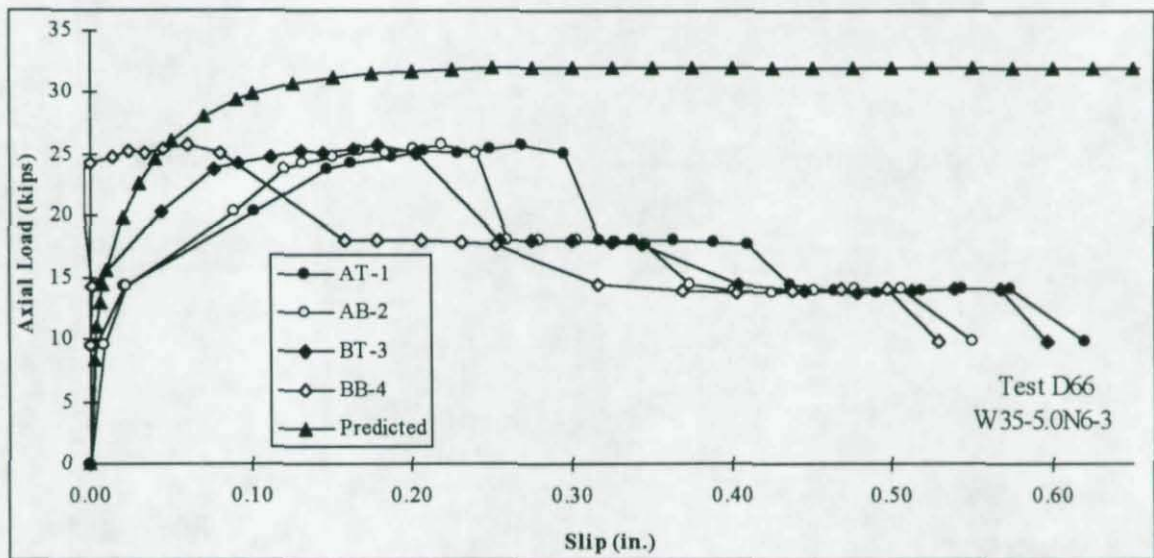
PUSH-OUT TEST SUMMARY SHEET

Test:	D66	Deck Type:	3" USD, 20 ga.
Designation:	W35-5.0N6-3		
Date of Test:	3/27/98		
Concrete Strength:	5240 psi	Stud Position:	W
Concrete Weight:	141.81 pcf	Stud Size:	3/8 in. x 5 in.
Concrete Thickness:	6 in.	Stud Tensile Strength:	77.238 ksi
Maximum Applied Load:	25.82 kips		
Applied Load Per Stud:	6.46 kips		

Concrete Slip at Failure:

Pot. AT-1: 0.6204 in.	Pot. BT-3: 0.5955 in.
Pot. AB-2: 0.5499 in.	Pot. BB-4: 0.5281 in.
Avg. Side A: 0.5852 in.	Avg. Side B: 0.5618 in.
Avg.: 0.5735 in.	

Comments: 10% Normal Load
 Test Operator: SCC & MRR
 Rib Punching
 Weld Failure

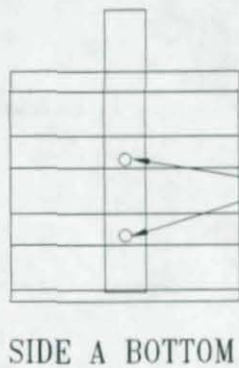
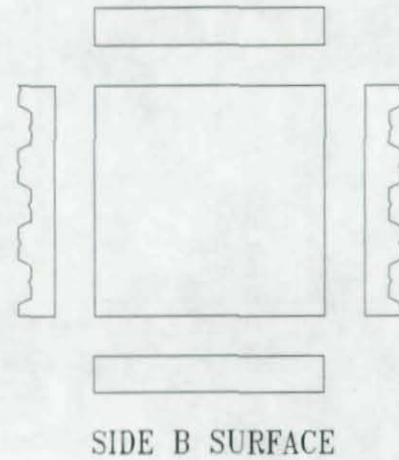
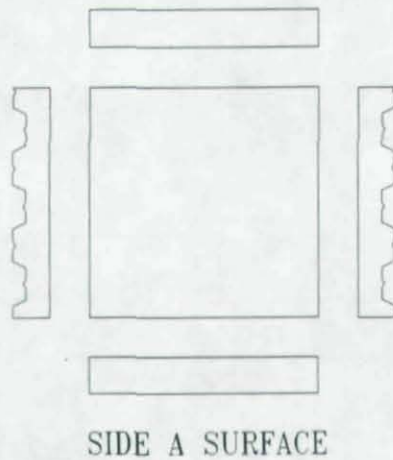
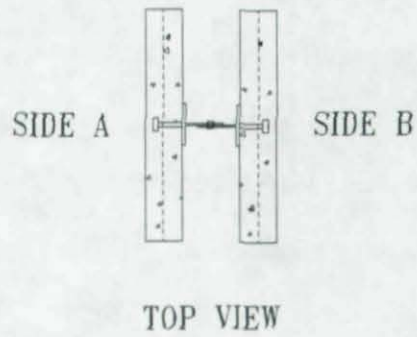
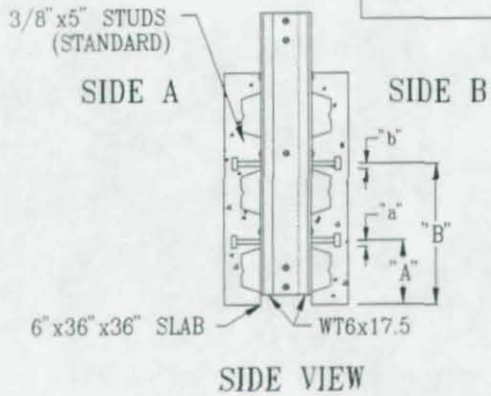


PUSH-OUT TEST LAYOUT & CRACKING SHEET

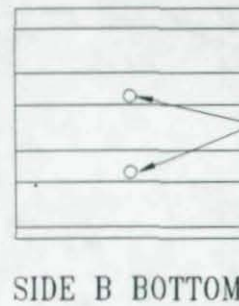
Test: D66

Designation: W35-5.0N6-3

Date: 3/27/98



STUDS REMAINED
ATTACHED TO TEE
AFTER FAILURE



WELD FAILURE

Test D66 Data

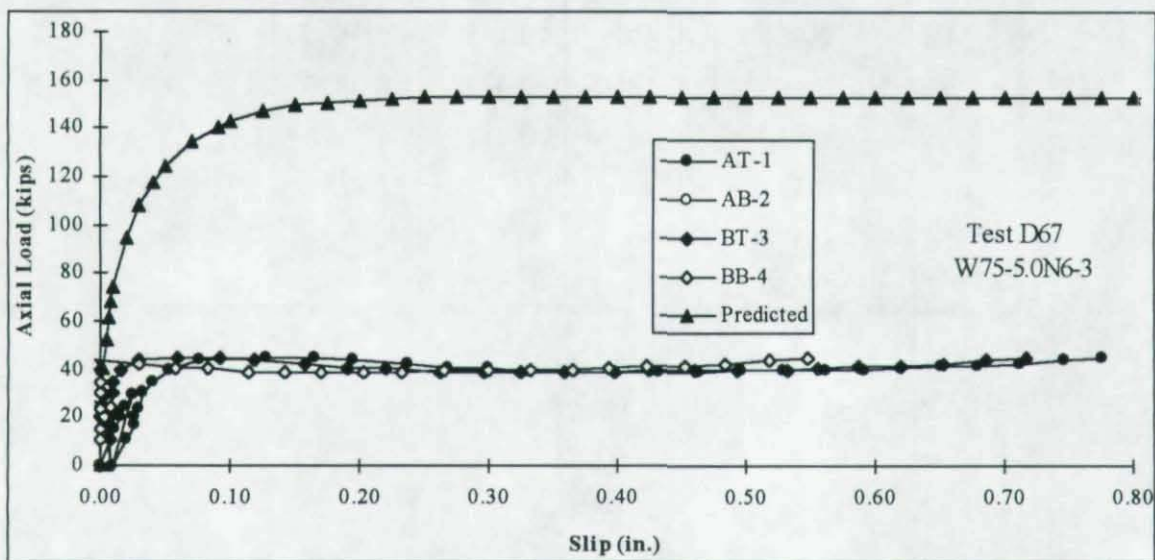
Axial Load (kips)	Slips (in.)				Test Comments
	Pot. AT-1	Pot. AB-2	Pot. BT-3	Pot. BB-4	
0.00	0.0000	0.0000	0.0000	0.0000	BEGIN TEST
9.48	0.0035	0.0082	0.0002	0.0000	
14.26	0.0214	0.0227	0.0009	0.0018	
20.41	0.1018	0.0886	0.0434	-0.0038	
23.87	0.1474	0.1205	0.0767	-0.0038	
24.31	0.1615	0.1317	0.0919	0.0005	
24.87	0.1864	0.1503	0.1121	0.0137	
25.38	0.2075	0.1665	0.1306	0.0234	
25.06	0.2284	0.1835	0.1443	0.0335	SLIGHT DECK BULGING.
25.50	0.2487	0.2007	0.1630	0.0458	
25.82	0.2688	0.2183	0.1782	0.0606	
25.13	0.2947	0.2393	0.2018	0.0808	POP.
18.09	0.3175	0.2600	0.2544	0.1577	
18.09	0.3386	0.2793	0.2743	0.1785	
18.09	0.3642	0.3040	0.3005	0.2055	
17.84	0.3890	0.3276	0.3256	0.2306	
17.78	0.4104	0.3459	0.3437	0.2518	
14.51	0.4362	0.3743	0.4045	0.3163	
14.01	0.4648	0.4018	0.4454	0.3686	
13.88	0.4908	0.4250	0.4778	0.4027	
13.94	0.5184	0.4516	0.5126	0.4375	
14.20	0.5433	0.4765	0.5378	0.4679	
14.13	0.5730	0.5054	0.5671	0.4966	
9.92	0.6204	0.5499	0.5955	0.5281	

PUSH-OUT TEST SUMMARY SHEET

Test:	D67	Deck Type:	3" USD, 20 ga.
Designation:	W75-5.0N6-3		
Date of Test:	5/22/98		
Concrete Strength:	5240 psi	Stud Position:	W
Concrete Weight:	141.81 pcf	Stud Size:	7/8 in. x 5 in.
Concrete Thickness:	6 in.	Stud Tensile Strength:	63.767 ksi
Maximum Applied Load:	45.16 kips		
Applied Load Per Stud:	11.29 kips		
Concrete Slip at Failure:			

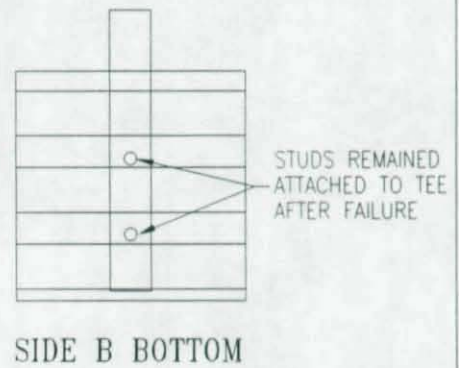
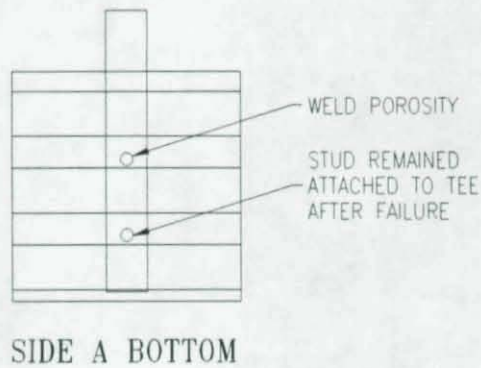
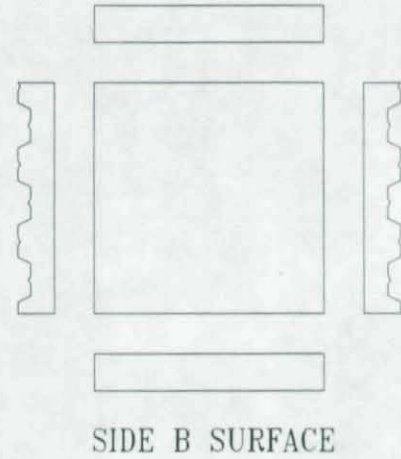
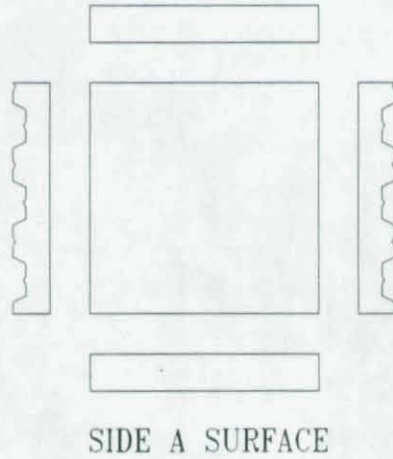
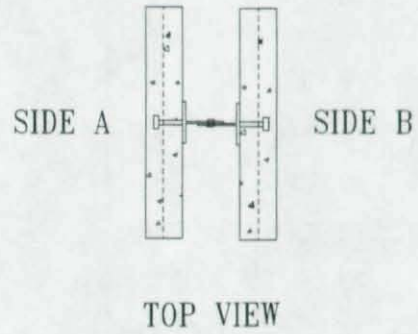
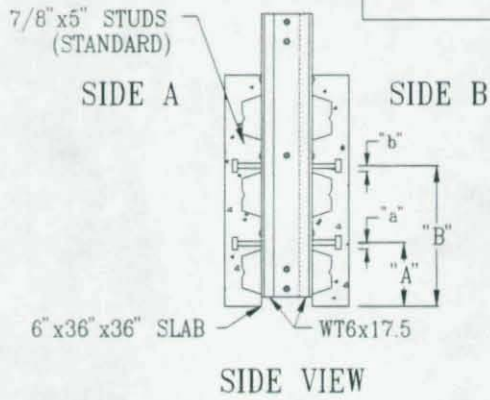
Pot. AT-1:	0.7772 in.	Pot. BT-3:	0.7166 in.
Pot. AB-2:	No Reading	Pot. BB-4:	0.5479 in.
Avg. Side A:	0.7772 in.	Avg. Side B:	0.6323 in.
Avg.: 0.7047 in.			

Comments: 10% Normal Load
 Test Operator: MRR
 Rib Punching
 Weld Failure



PUSH-OUT TEST LAYOUT & CRACKING SHEET

Test:	D67
Designation:	W75-5.0N6-3
Date:	5/22/98



Test D67 Data

Axial Load (kips)	Slips (in.)				Test Comments
	Pot. AT-1	Pot. AB-2	Pot. BT-3	Pot. BB-4	
0.00	0.0000	--	0.0000	0.0000	BEGIN TEST
10.68	0.0073	--	-0.0004	-0.0002	
14.95	0.0104	--	-0.0002	0.0005	
20.23	0.0152	--	-0.0002	0.0026	
24.25	0.0190	--	0.0000	0.0075	
29.33	0.0244	--	0.0024	-0.0196	
0.00	0.0088	--	0.0081	-0.0214	UNLOADED. RESET RAM & LOAD PL.
10.93	0.0203	--	0.0084	-0.0244	
16.90	0.0260	--	0.0084	-0.0284	
20.35	0.0271	--	0.0082	-0.0297	
23.99	0.0295	--	0.0086	-0.0004	RESET & ZEROED POT. BB-4.
30.28	0.0328	--	0.0088	0.0000	
34.92	0.0405	--	0.0090	-0.0005	
39.51	0.0537	--	0.0150	-0.0007	
44.03	0.0769	--	0.0295	-0.0031	
45.16	0.1276	--	0.0593	-0.0209	
44.66	0.1659	--	0.0921	-0.0218	
43.66	0.1956	--	0.1190	-0.0090	
41.96	0.2375	--	0.1573	0.0297	
40.89	0.2692	--	0.1912	0.0581	
40.52	0.2994	--	0.2205	0.0835	
39.07	0.3329	--	0.2632	0.1139	
39.01	0.3675	--	0.2965	0.1427	
39.07	0.3992	--	0.3243	0.1699	
38.94	0.4322	--	0.3589	0.2024	
39.20	0.4648	--	0.3987	0.2329	DECK BULGING. (RIB PUNCHING).
39.45	0.4968	--	0.4258	0.2652	
39.51	0.5300	--	0.4609	0.2992	
39.82	0.5620	--	0.4944	0.3335	

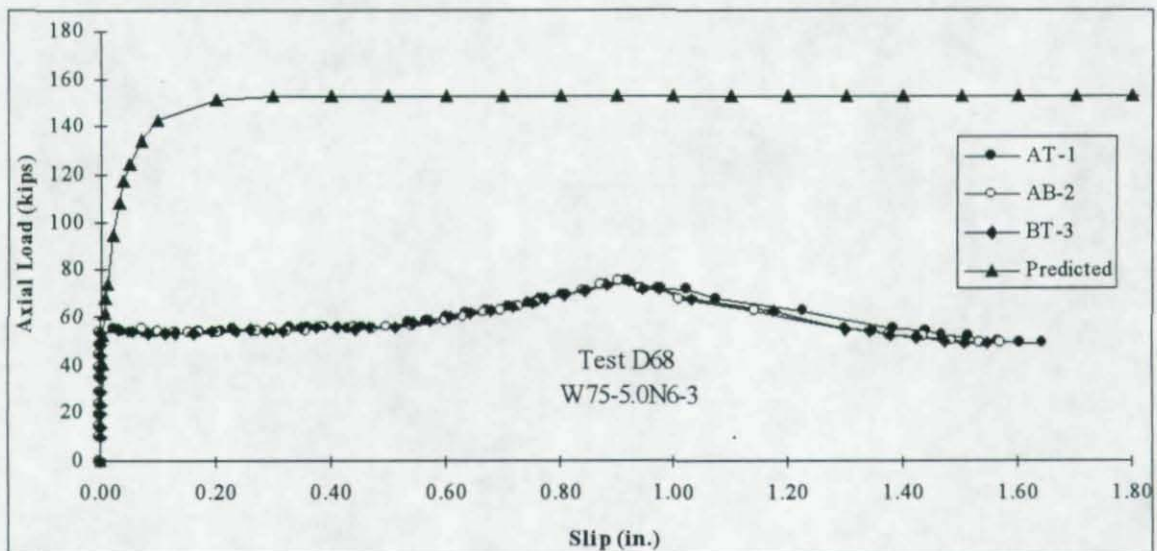
Test D67 Data

Axial Load (kips)	Slips (in.)				Test Comments
	Pot. AT-1	Pot. AB-2	Pot. BT-3	Pot. BB-4	
39.95	0.5921	--	0.5325	0.3650	TERMINATED TEST. TOO MUCH SLIP.
40.64	0.6210	--	0.5563	0.3945	
41.08	0.6512	--	0.5882	0.4241	
41.58	0.6796	--	0.6204	0.4531	
42.46	0.7127	--	0.6538	0.4847	
43.84	0.7464	--	0.6864	0.5181	
44.54	0.7772	--	0.7166	0.5479	

PUSH-OUT TEST SUMMARY SHEET

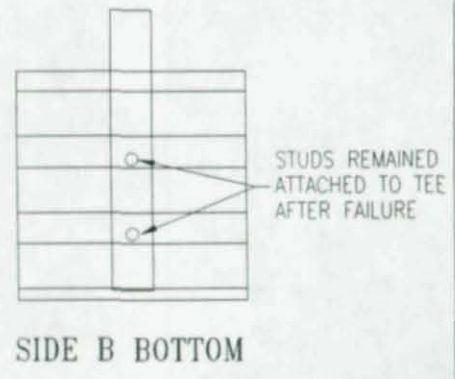
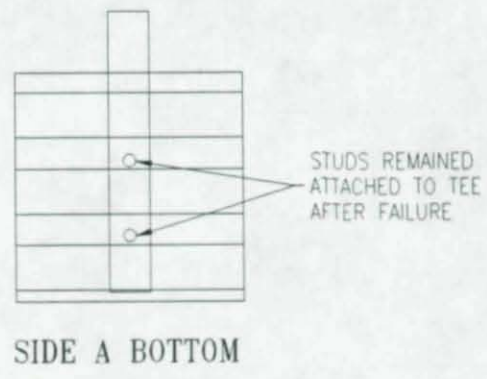
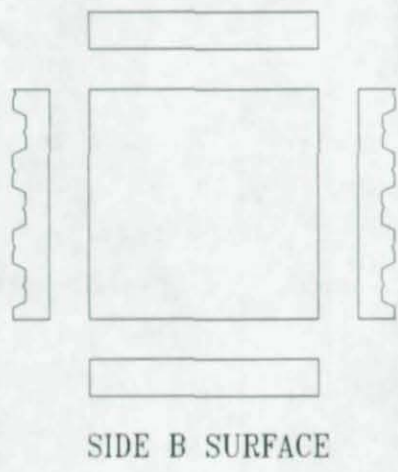
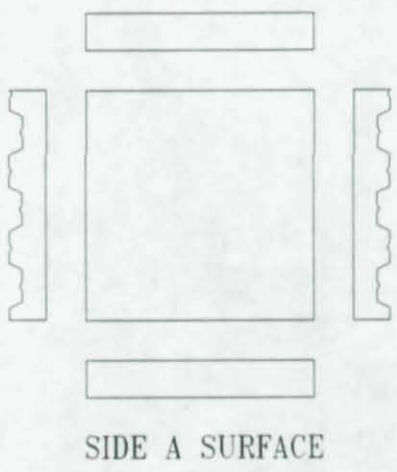
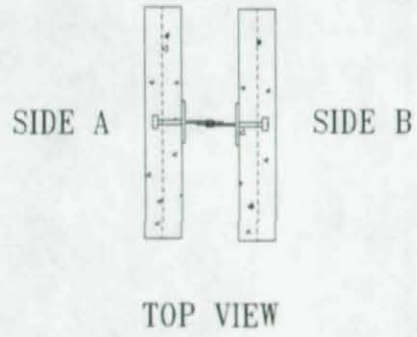
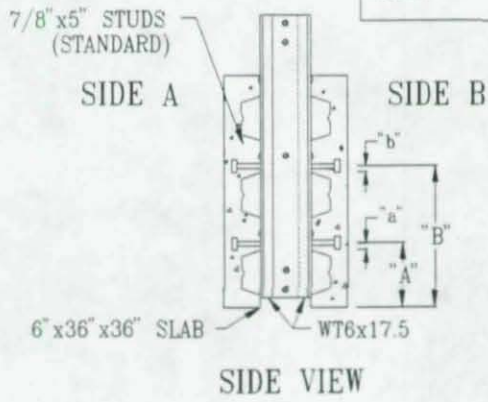
Test:	D68	Deck Type:	3" USD, 20 ga.
Designation:	W75-5.0N6-3		
Date of Test:	4/1/98		
Concrete Strength:	5240 psi	Stud Position:	W
Concrete Weight:	141.81 pcf	Stud Size:	7/8 in. x 5 in.
Concrete Thickness:	6 in.	Stud Tensile Strength:	63.767 ksi
Maximum Applied Load:	75.50 kips		
Applied Load Per Stud:	18.88 kips		
Concrete Slip at Failure:			
Pot. AT-1:	1.6455 in.	Pot. BT-3:	1.5459 in.
Pot. AB-2:	1.5725 in.	Pot. BB-4:	No Reading
Avg. Side A:	1.6090 in.	Avg. Side B:	1.5459 in.
	Avg.:		1.5775 in.

Comments: 10% Normal Load
 Test Operator: SCC
 Rib Punching



PUSH-OUT TEST LAYOUT & CRACKING SHEET

Test: D68
Designation: W75-5.0N6-3
Date: 4/1/98



Test D68 Data

Axial Load (kips)	Slips (in.)				Test Comments
	Pot. AT-1	Pot. AB-2	Pot. BT-3	Pot. BB-4	
0.00	0.0000	0.0000	0.0000	0.0000	BEGIN TEST
10.43	0.0000	-0.0004	-0.0002	--	
14.57	0.0000	-0.0005	-0.0004	--	
19.47	-0.0002	-0.0004	0.0000	--	
23.87	0.0000	-0.0004	0.0000	--	
28.96	-0.0002	-0.0002	0.0000	--	
34.36	0.0002	-0.0002	-0.0002	--	POP.
39.26	0.0000	0.0000	-0.0004	--	
43.72	0.0002	0.0002	-0.0002	--	SNAP, CRACKLE, POP.
48.43	-0.0002	-0.0002	-0.0004	--	
53.45	0.0000	-0.0002	-0.0004	--	
55.03	0.0253	0.0725	0.0322	--	
54.27	0.0392	0.1013	0.0579	--	
53.64	0.0544	0.1295	0.0844	--	
53.39	0.0769	0.1557	0.1123	--	
53.14	0.0993	0.1734	0.1304	--	
53.58	0.1346	0.2036	0.1601	--	
54.21	0.1712	0.2359	0.1930	--	
54.27	0.2106	0.2736	0.2353	--	DECK BULGING AT ALL STUDS.
54.52	0.2309	0.2987	0.2604	--	
54.40	0.2692	0.3278	0.2881	--	
54.46	0.3007	0.3578	0.3174	--	
55.40	0.3313	0.3855	0.3472	--	
55.72	0.3613	0.4141	0.3776	--	
55.53	0.3902	0.4423	0.4124	--	
55.34	0.4325	0.4754	0.4426	--	
55.46	0.4560	0.5009	0.4673	--	
55.90	0.4990	0.5454	0.5150	--	
57.22	0.5393	0.5748	0.5455	--	

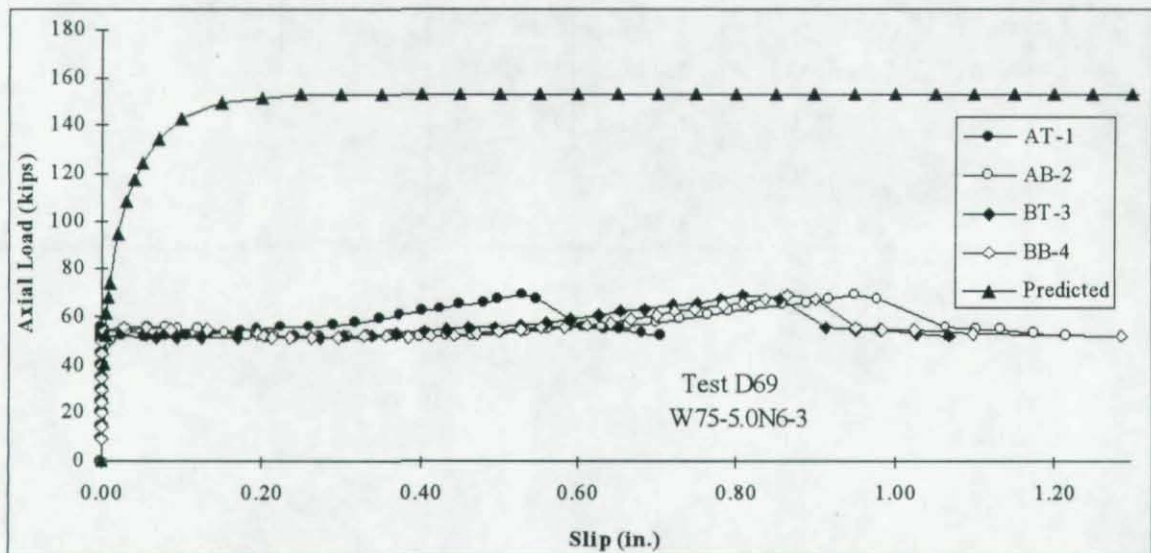
Test D68 Data

Axial Load (kips)	Slips (in.)				Test Comments
	Pot. AT-1	Pot. AB-2	Pot. BT-3	Pot. BB-4	
58.54	0.5701	0.6027	0.5732	--	
59.61	0.6008	0.6345	0.6084	--	
61.31	0.6360	0.6673	0.6417	--	
62.63	0.6723	0.6959	0.6789	--	
64.13	0.7113	0.7279	0.7162	--	
65.95	0.7468	0.7591	0.7539	--	
67.21	0.7658	0.7757	0.7724	--	DECK DEBONDING ON SIDE B.
69.22	0.8063	0.8105	0.8100	--	
71.17	0.8481	0.8407	0.8437	--	
73.43	0.8832	0.8732	0.8829	--	
75.50	0.9182	0.9021	0.9204	--	
71.92	0.9737	0.9418	0.9442	--	
71.67	1.0236	0.9768	0.9750	--	DECK TEARING.
67.96	1.0753	1.0081	1.0304	--	
62.25	1.2253	1.1416	1.1747	--	
55.15	1.3835	1.3022	1.2998	--	DECK DEBONDING ON SIDE A.
53.83	1.4408	1.3492	1.3441	--	
52.01	1.4701	1.3795	1.3789	--	
51.13	1.5153	1.4382	1.4245	--	
49.62	1.5684	1.4862	1.4739	--	
49.43	1.6060	1.5355	1.5073	--	
49.06	1.6455	1.5725	1.5459	--	

PUSH-OUT TEST SUMMARY SHEET

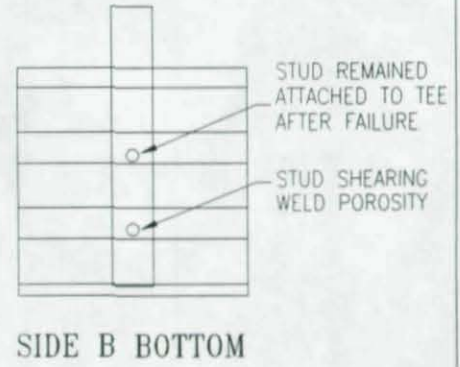
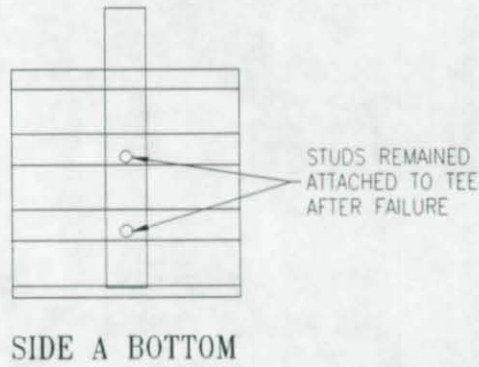
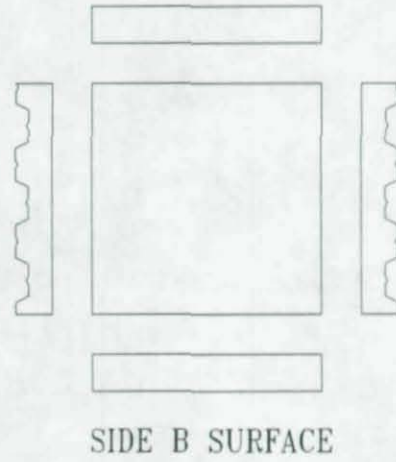
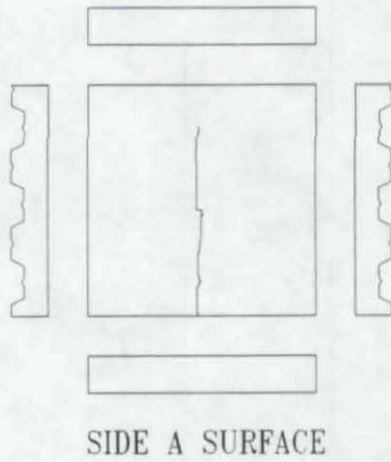
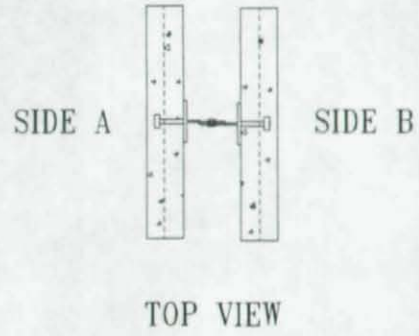
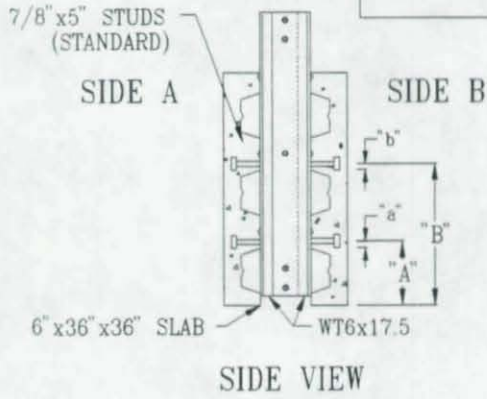
Test:	D69	Deck Type:	3" USD, 20 ga.
Designation:	W75-5.0N6-3		
Date of Test:	4/15/98		
Concrete Strength:	5240 psi	Stud Position:	W
Concrete Weight:	141.81 pcf	Stud Size:	7/8 in. x 5 in.
Concrete Thickness:	6 in.	Stud Tensile Strength:	63.767 ksi
Maximum Applied Load:	69.10 kips		
Applied Load Per Stud:	17.28 kips		
Concrete Slip at Failure:			
Pot. AT-1:	0.7061 in.	Pot. BT-3:	1.0689 in.
Pot. AB-2:	1.2185 in.	Pot. BB-4:	1.2884
Avg. Side A:	0.9623 in.	Avg. Side B:	1.1787 in.
	Avg.: 1.0705 in.		

Comments: 10% Normal Load
 Test Operator: SCC
 Stud Shearing
 Weld Failure of Bottom Stud Side B



PUSH-OUT TEST LAYOUT & CRACKING SHEET

Test:	D69
Designation:	W75-5.0N6-3
Date:	4/15/98



Test D69 Data

Axial Load (kips)	Slips (in.)				Test Comments
	Pot. AT-1	Pot. AB-2	Pot. BT-3	Pot. BB-4	
0.00	0.0000	0.0000	0.0000	0.0000	BEGIN TEST
9.48	0.0002	0.0002	-0.0004	0.0000	
14.64	0.0002	0.0033	-0.0004	-0.0002	
20.16	0.0004	0.0033	-0.0002	0.0002	
24.81	0.0004	0.0035	-0.0002	0.0004	
29.71	0.0004	0.0033	0.0000	0.0002	
34.30	0.0009	0.0035	-0.0002	0.0000	
39.45	0.0009	0.0033	-0.0002	0.0002	
44.72	0.0007	0.0035	0.0000	0.0002	
50.13	0.0007	0.0126	-0.0004	0.0005	
54.08	0.0007	0.0335	-0.0002	0.0027	
55.59	0.0005	0.0588	-0.0005	0.0284	
56.16	0.0011	0.0800	-0.0002	0.0549	SLIGHT DECK BULGING.
54.96	0.0007	0.0961	0.0000	0.0872	
55.21	0.0007	0.1220	0.0000	0.1317	
53.08	0.0011	0.1549	0.0533	0.1967	
52.26	0.0009	0.1824	0.0560	0.2040	
51.44	0.0009	0.2174	0.0679	0.2128	
51.19	0.0007	0.2448	0.0939	0.2373	
51.51	0.0011	0.2751	0.1247	0.2648	
51.76	0.0009	0.3088	0.1692	0.2979	
52.32	0.0057	0.3364	0.2068	0.3289	
52.51	0.0247	0.3668	0.2401	0.3578	DECK BULGING AT ALL STUDS.
51.95	0.0527	0.4020	0.2747	0.3866	
52.14	0.0809	0.4338	0.3044	0.4137	
52.20	0.1075	0.4672	0.3399	0.4437	
52.95	0.1383	0.5025	0.3717	0.4728	
53.96	0.1751	0.5346	0.4065	0.5007	
55.03	0.1958	0.5637	0.4344	0.5276	

Test D69 Data

Axial Load (kips)	Slips (in.)				Test Comments
	Pot. AT-1	Pot. AB-2	Pot. BT-3	Pot. BB-4	
55.59	0.2256	0.5926	0.4613	0.5532	DECK IS TEARING.
56.03	0.2624	0.6314	0.4957	0.5847	
56.22	0.2928	0.6662	0.5274	0.6124	
57.73	0.3199	0.7010	0.5613	0.6413	
59.36	0.3501	0.7316	0.5906	0.6686	
60.99	0.3752	0.7675	0.6276	0.7019	
62.25	0.4038	0.7924	0.6563	0.7246	
63.32	0.4278	0.8219	0.6845	0.7503	
65.01	0.4527	0.8602	0.7201	0.7854	
66.27	0.4814	0.8906	0.7512	0.8105	
67.90	0.5010	0.9199	0.7818	0.8384	
69.10	0.5305	0.9513	0.8111	0.8653	
67.21	0.5490	0.9801	0.8563	0.9012	
55.59	0.6062	1.0659	0.9149	0.9513	
55.03	0.6340	1.1046	0.9519	0.9843	
55.03	0.6560	1.1357	0.9838	1.0260	
53.45	0.6822	1.1787	1.0277	1.0984	
52.20	0.7061	1.2185	1.0689	1.2884	

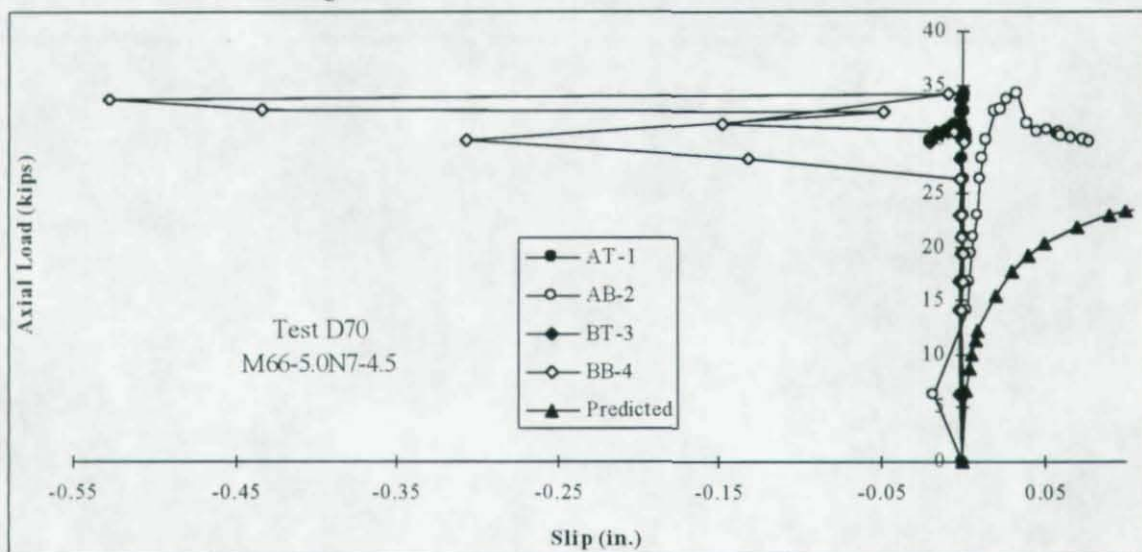
PUSH-OUT TEST SUMMARY SHEET

Test:	D70	Deck Type:	4 1/2" USD, 16 ga.
Designation:	M66-5.0N7-4.5		
Date of Test:	5/26/98		
Concrete Strength:	5000 psi	Stud Position:	M
Concrete Weight:	142.32 pcf	Stud Size:	3/4 in. x 6 in.
Concrete Thickness:	6 3/4 in.	Stud Tensile Strength:	62,500 ksi
Maximum Applied Load:	34.23 kips		
Applied Load Per Stud:	8.56 kips		
Concrete Slip at Failure:			

Pot. AT-1: 0.0002 in.	Pot. BT-3: -0.0209 in.
Pot. AB-2: 0.0782 in.	Pot. BB-4: 0.0002 in.
Avg. Side A: 0.0392 in.	Avg. Side B: -0.0104 in.

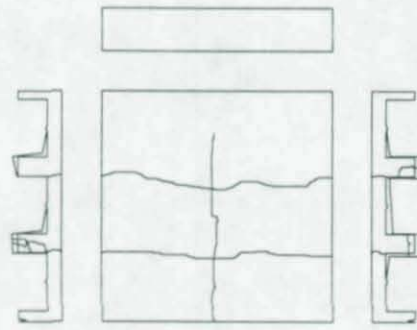
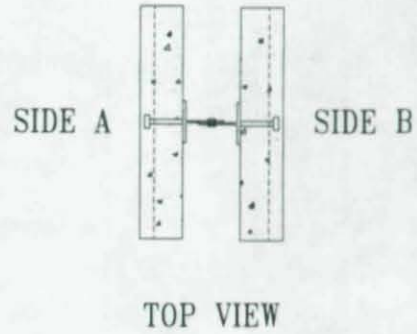
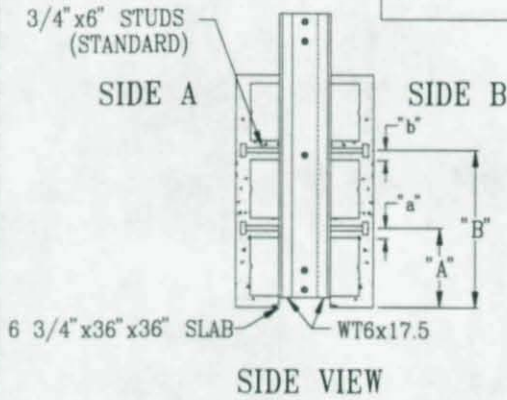
Avg.: 0.0144 in.

Comments: 10% Normal Load
 Test Operator: MRR
 Holes pre-drilled in deck for studs; deck was welded to tee flange
 Rib Cracking

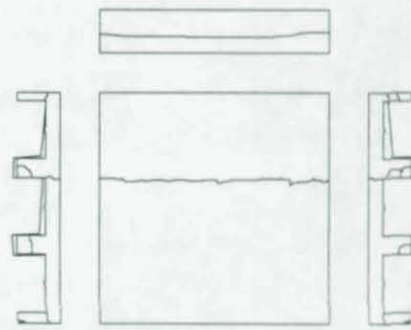


PUSH-OUT TEST LAYOUT & CRACKING SHEET

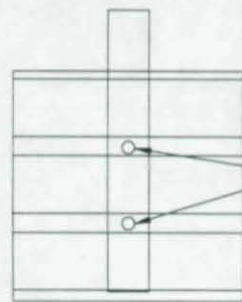
Test:	D70
Designation:	M66-5.0N7-4.5
Date:	5/26/98



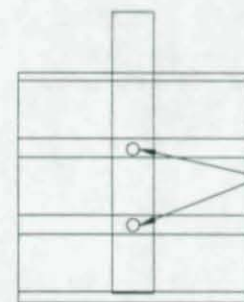
SIDE A SURFACE



SIDE B SURFACE



SIDE A BOTTOM



SIDE B BOTTOM

STUDS REMAINED ATTACHED TO TEE AFTER FAILURE

STUDS REMAINED ATTACHED TO TEE AFTER FAILURE

Test D70 Data

Axial Load (kips)	Slips (in.)				Test Comments
	Pot. AT-1	Pot. AB-2	Pot. BT-3	Pot. BB-4	
0.00	0.0000	0.0000	0.0000	0.0000	BEGIN TEST
6.28	0.0000	-0.0181	-0.0011	0.0002	
14.01	0.0000	0.0037	-0.0011	-0.0002	
16.71	-0.0002	0.0048	-0.0013	0.0004	
19.35	0.0002	0.0059	-0.0009	0.0002	
20.92	0.0002	0.0071	-0.0009	-0.0002	
22.99	0.0002	0.0097	-0.0011	-0.0004	RIB CRACKING, SIDE A TOP.
26.32	0.0004	0.0106	-0.0009	-0.0011	AXIAL LOAD COMING OUT IN N.L.
28.20	-0.0002	0.0125	-0.0013	-0.1317	
29.84	0.0002	0.0145	-0.0009	-0.3075	SLAB CRACKING PERP. TO BEAM.
32.41	0.0002	0.0189	-0.0011	-0.0489	DECK DEBONDING.
32.73	0.0000	0.0233	-0.0011	-0.4336	
33.54	0.0004	0.0266	-0.0011	-0.5274	
34.23	0.0002	0.0331	-0.0009	-0.0090	
31.41	0.0000	0.0397	-0.0062	-0.1480	
30.65	0.0000	0.0452	-0.0090	-0.0051	
30.84	-0.0002	0.0513	-0.0117	0.0002	
30.34	0.0002	0.0573	-0.0141	0.0002	
30.53	0.0000	0.0593	-0.0167	0.0002	
30.28	-0.0002	0.0599	-0.0181	0.0004	
29.96	0.0000	0.0659	-0.0200	-0.0002	
29.84	0.0002	0.0742	-0.0203	0.0002	
29.71	0.0002	0.0782	-0.0209	0.0002	LOTS OF CRACKS IN TOP OF SLAB. TERMINATED TEST

PUSH-OUT TEST SUMMARY SHEET

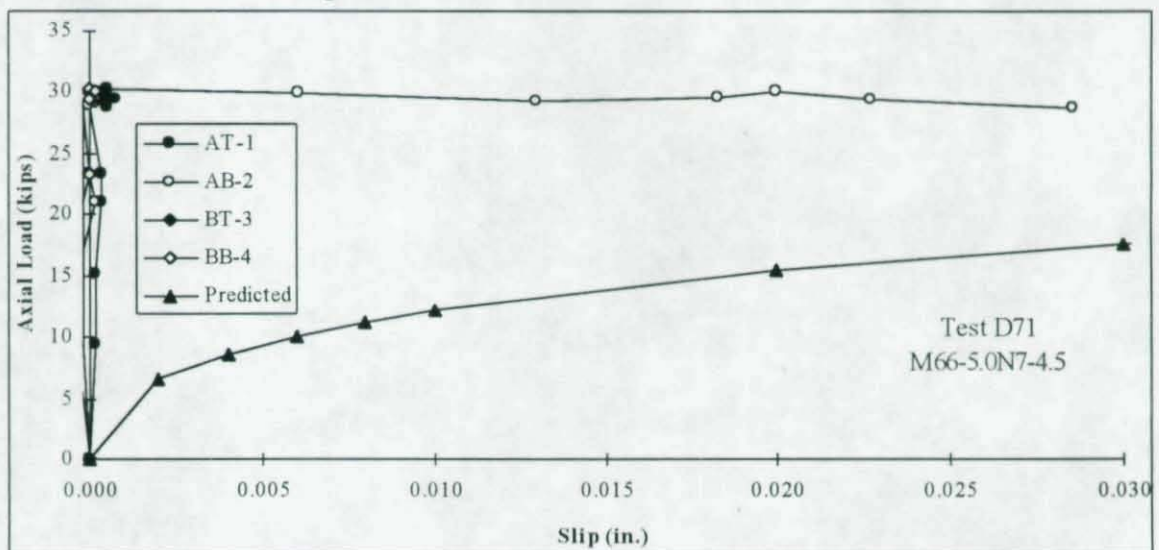
Test:	D71	Deck Type:	4 1/2" USD, 16 ga.
Designation:	M66-5.0N7-4.5		
Date of Test:	4/23/98		
Concrete Strength:	5000 psi	Stud Position:	M
Concrete Weight:	142.32 pcf	Stud Size:	3/4 in. x 6 in.
Concrete Thickness:	6 3/4 in.	Stud Tensile Strength:	62.500 ksi
Maximum Applied Load:	30.21 kips		
Applied Load Per Stud:	7.55 kips		

Concrete Slip at Failure:

Pot. AT-1:	0.0005 in.	Pot. BT-3:	-0.0020 in.
Pot. AB-2:	0.0286 in.	Pot. BB-4:	-0.0002 in.
Avg. Side A:	0.0146 in.	Avg. Side B:	-0.0011 in.

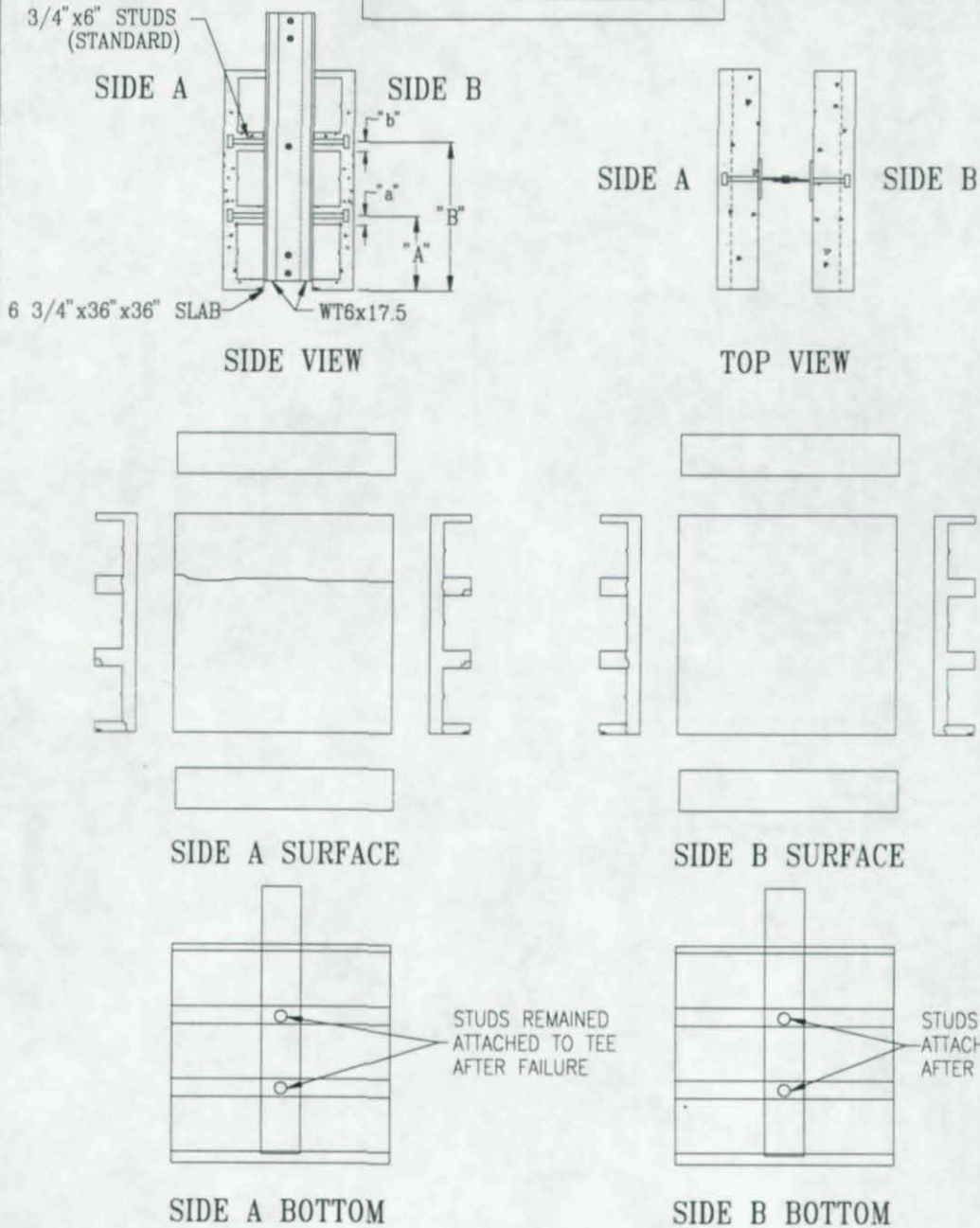
Avg.: 0.0067 in.

Comments: 10% Normal Load
 Test Operator: SCC
 Holes pre-drilled in deck for studs; deck was welded to tee flange
 Rib Cracking



PUSH-OUT TEST LAYOUT & CRACKING SHEET

Test:	D71
Designation:	M66-5.0N7-4.5
Date:	4/23/98



Test D71 Data

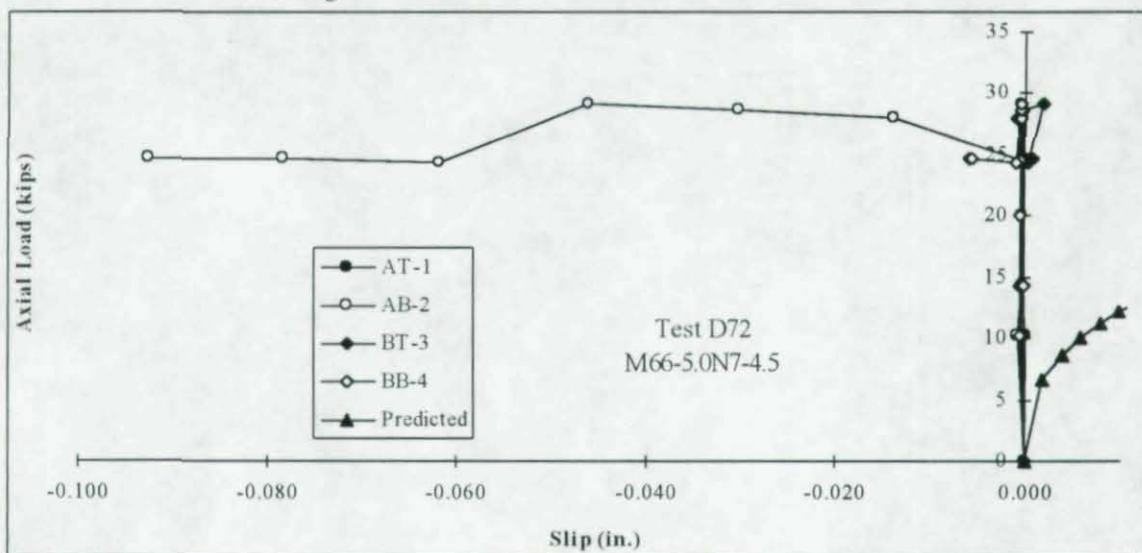
Axial Load (kips)	Slips (in.)				Test Comments
	Pot. AT-1	Pot. AB-2	Pot. BT-3	Pot. BB-4	
0.00	0.0000	0.0000	0.0000	0.0000	BEGIN TEST
9.30	0.0002	-0.0002	-0.0004	-0.0002	CRACKING OF BOTTOM RIB SIDE A.
15.14	0.0002	-0.0004	-0.0002	-0.0002	
21.11	0.0004	0.0002	-0.0002	-0.0002	CRACKING OF BOTTOM RIB SIDE B.
23.30	0.0004	0.0000	-0.0002	0.0000	
28.89	0.0000	0.0000	-0.0002	-0.0002	CRACKING OF SECOND RIB SIDE A.
30.21	0.0005	-0.0002	0.0000	0.0000	
29.90	0.0004	0.0060	-0.0009	-0.0002	AXIAL LOAD COMING OUT IN NL.
29.21	0.0005	0.0130	-0.0009	0.0002	
29.52	0.0005	0.0183	-0.0016	0.0002	CRACKING OF TIPS OF RIBS.
30.09	0.0005	0.0200	-0.0016	0.0002	
29.33	0.0007	0.0227	-0.0018	0.0000	
28.71	0.0005	0.0286	-0.0020	-0.0002	TERMINATED TEST DUE TO CRACKS.

PUSH-OUT TEST SUMMARY SHEET

Test:	D72	Deck Type:	4 1/2" USD, 16 ga.
Designation:	M66-5.0N7-4.5		
Date of Test:	4/22/98		
Concrete Strength:	5000 psi	Stud Position:	M
Concrete Weight:	142.32 pcf	Stud Size:	3/4 in. x 6 in.
Concrete Thickness:	6 3/4 in.	Stud Tensile Strength:	62.500 ksi
Maximum Applied Load:	29.08 kips		
Applied Load Per Stud:	7.27 kips		
Concrete Slip at Failure:			

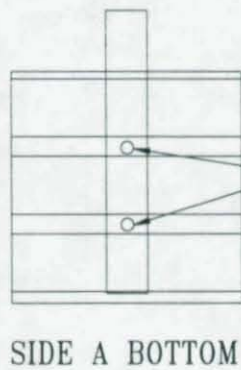
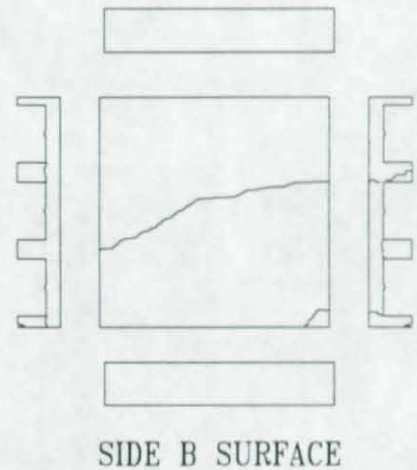
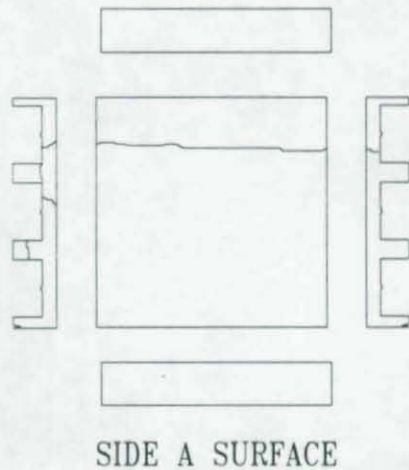
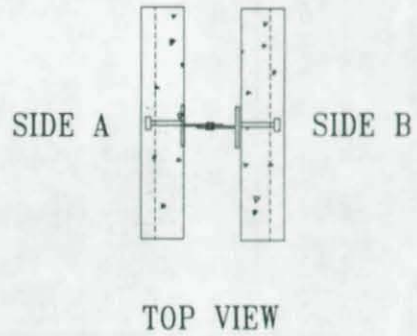
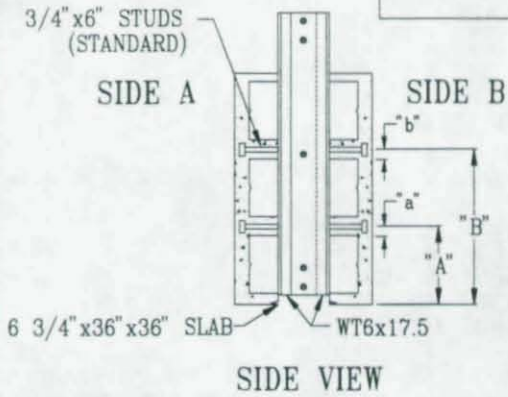
Pot. AT-1: -0.0002 in.	Pot. BT-3: 0.0009 in.
Pot. AB-2: -0.0925 in.	Pot. BB-4: -0.0055 in.
Avg. Side A: -0.0464 in.	Avg. Side B: -0.0023 in.
Avg.: -0.0243 in.	

Comments: 10% Normal Load
 Test Operator: SCC
 Holes pre-drilled in deck for studs; deck was welded to tee flange
 Rib Cracking

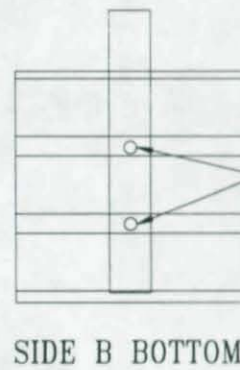


PUSH-OUT TEST LAYOUT & CRACKING SHEET

Test: D72
Designation: M66-5.0N7-4.5
Date: 4/22/98



STUDS REMAINED ATTACHED TO TEE AFTER FAILURE



STUDS REMAINED ATTACHED TO TEE AFTER FAILURE

Test D72 Data

Axial Load (kips)	Slips (in.)				Test Comments
	Pot. AT-1	Pot. AB-2	Pot. BT-3	Pot. BB-4	
0.00	0.0000	0.0000	0.0000	0.0000	BEGIN TEST
10.24	0.0002	-0.0005	-0.0002	-0.0004	
14.32	-0.0002	-0.0002	-0.0004	0.0000	
19.97	-0.0002	-0.0002	-0.0004	-0.0004	
24.56	0.0000	-0.0002	-0.0004	-0.0004	
28.02	-0.0002	-0.0137	-0.0007	-0.0004	
28.58	-0.0002	-0.0300	-0.0002	-0.0004	AXIAL LOAD COMING OUT IN NL.
29.08	-0.0004	-0.0460	0.0020	-0.0004	
24.31	-0.0002	-0.0617	0.0005	-0.0009	POP.
24.62	0.0000	-0.0784	0.0007	-0.0057	
24.62	-0.0002	-0.0925	0.0009	-0.0055	TERMINATED TEST DUE TO CRACKS.

PUSH-OUT TEST SUMMARY SHEET

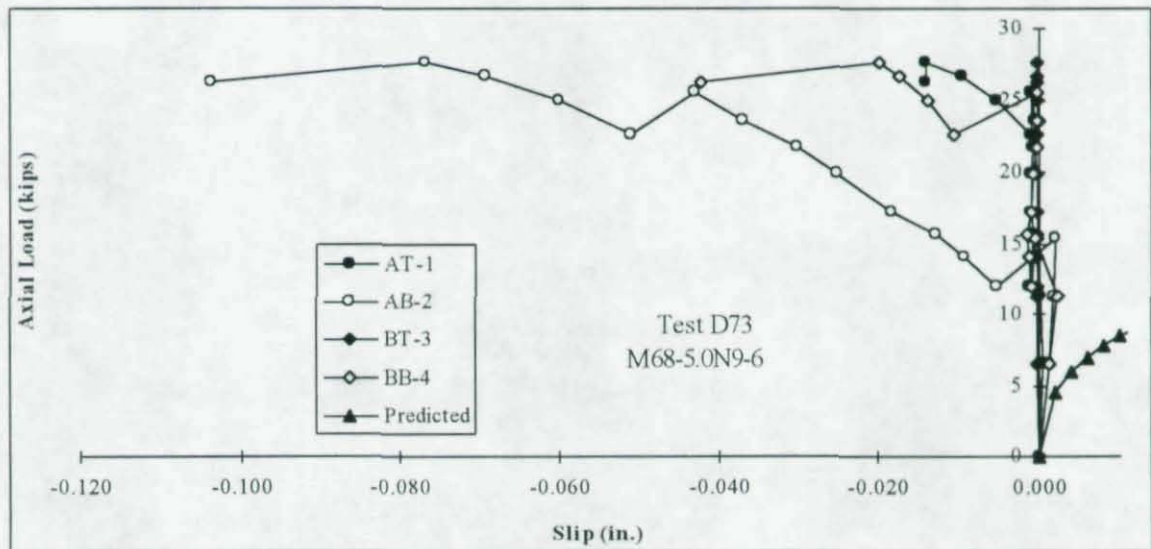
Test:	D73	Deck Type:	6" USD, 16 ga.
Designation:	M68-5.0N9-6		
Date of Test:	4/22/98		
Concrete Strength:	5000 psi	Stud Position:	M
Concrete Weight:	142.32 pcf	Stud Size:	¾ in. x 7 ¼ in.
Concrete Thickness:	8 ¾ in.	Stud Tensile Strength:	65.634 ksi
Maximum Applied Load:	27.64 kips		
Applied Load Per Stud:	6.91 kips		

Concrete Slip at Failure:

Pot. AT-1: -0.0141 in.	Pot. BT-3: -0.0004 in.
Pot. AB-2: -0.1037 in.	Pot. BB-4: -0.0423 in.
Avg. Side A: -0.0589 in.	Avg. Side B: -0.0214 in.

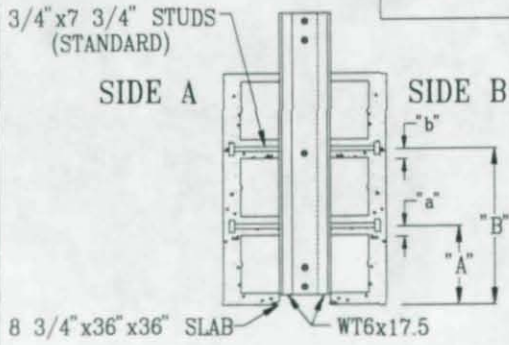
Avg.: -0.0401 in.

Comments: 10% Normal Load
 Test Operator: SCC
 Holes pre-drilled in deck for studs; deck was welded to tee flange
 Rib Cracking

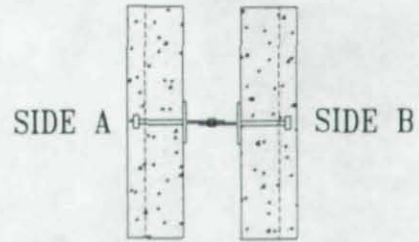


PUSH-OUT TEST LAYOUT & CRACKING SHEET

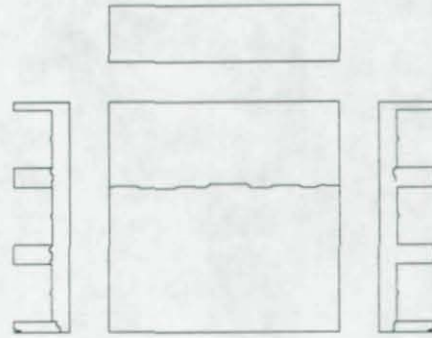
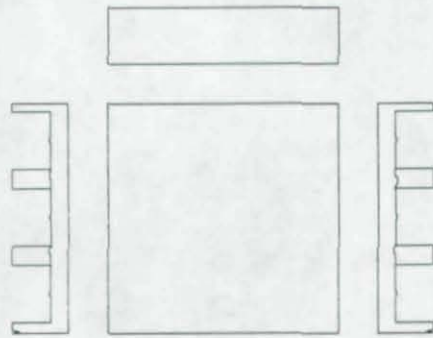
Test:	D73
Designation:	M68-5.0N9-6
Date:	4/22/98



SIDE VIEW

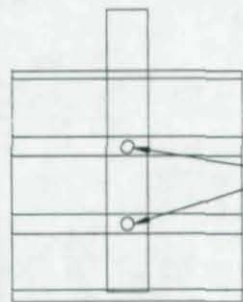


TOP VIEW

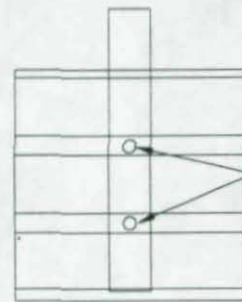


SIDE A SURFACE

SIDE B SURFACE



STUDS REMAINED ATTACHED TO TEE AFTER FAILURE



STUDS REMAINED ATTACHED TO TEE AFTER FAILURE

Test D73 Data

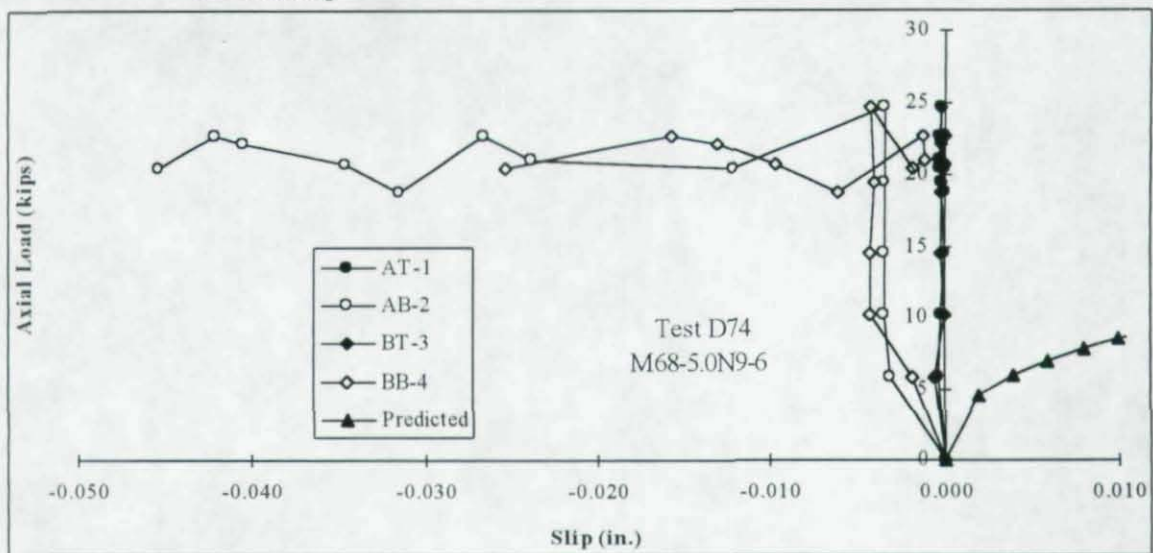
Axial Load (kips)	Slips (in.)				Test Comments
	Pot. AT-1	Pot. AB-2	Pot. BT-3	Pot. BB-4	
0.00	0.0000	0.0000	0.0000	0.0000	BEGIN TEST
6.53	0.0004	0.0011	-0.0004	0.0013	
11.31	0.0002	0.0018	-0.0002	0.0022	UNLOADED TO TIGHTEN A BOLT.
15.33	-0.0009	0.0020	-0.0002	-0.0005	SLIPS WENT NEGATIVE.
12.00	-0.0013	-0.0053	-0.0002	-0.0011	
14.13	-0.0009	-0.0093	-0.0004	-0.0013	CRACK IN BOTTOM OF SIDE B.
15.64	-0.0009	-0.0128	-0.0002	-0.0015	SIDE A CRACKED IN MIDDLE RIBS.
17.21	-0.0011	-0.0183	-0.0002	-0.0011	
19.85	-0.0011	-0.0251	-0.0004	-0.0009	
21.67	-0.0009	-0.0300	-0.0005	-0.0004	BOTTOM RIB OF SIDE A HASN'T CRACKED.
23.56	-0.0005	-0.0368	0.0000	-0.0002	
25.50	-0.0011	-0.0430	-0.0004	-0.0002	
22.49	-0.0011	-0.0509	-0.0002	-0.0106	
24.87	-0.0053	-0.0601	-0.0004	-0.0139	
26.63	-0.0095	-0.0694	-0.0004	-0.0174	
27.64	-0.0141	-0.0767	-0.0004	-0.0200	
26.26	-0.0141	-0.1037	-0.0004	-0.0423	TERMINATED TEST DUE TO CRACKS.

PUSH-OUT TEST SUMMARY SHEET

Test:	D74	Deck Type:	6" USD, 16 ga.
Designation:	M68-5.0N9-6		
Date of Test:	4/20/98		
Concrete Strength:	5000 psi	Stud Position:	M
Concrete Weight:	142.32 pcf	Stud Size:	¾ in. x 7 ¾ in.
Concrete Thickness:	8 ¾ in.	Stud Tensile Strength:	65.634 ksi
Maximum Applied Load:	24.69 kips		
Applied Load Per Stud:	6.17 kips		
Concrete Slip at Failure:			

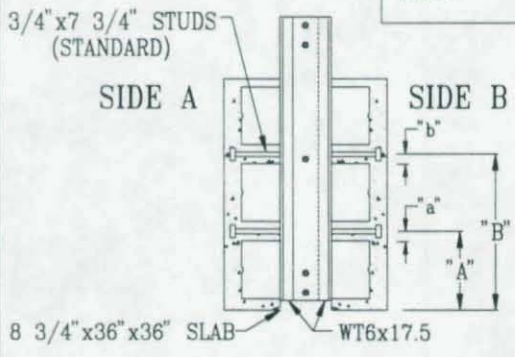
Pot. AT-1: 0.0000 in.	Pot. BT-3: -0.0002 in.
Pot. AB-2: -0.0454 in.	Pot. BB-4: -0.0253 in.
Avg. Side A: -0.0227 in.	Avg. Side B: -0.0128 in.
Avg.: -0.0177 in.	

Comments: 10% Normal Load
 Test Operator: SCC & MRR
 Holes pre-drilled in deck for studs; deck was welded to tee flange
 Rib Cracking

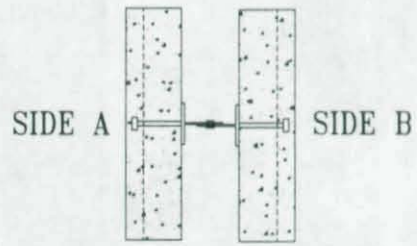


PUSH-OUT TEST LAYOUT & CRACKING SHEET

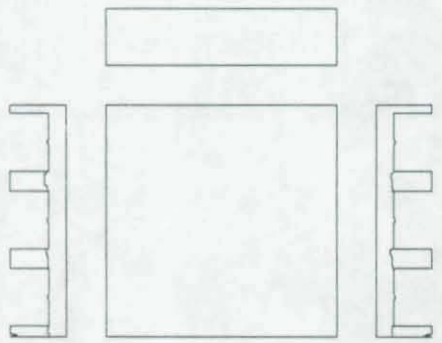
Test:	<u> D74 </u>
Designation:	<u> M68-5.0N9-6 </u>
Date:	<u> 4/20/98 </u>



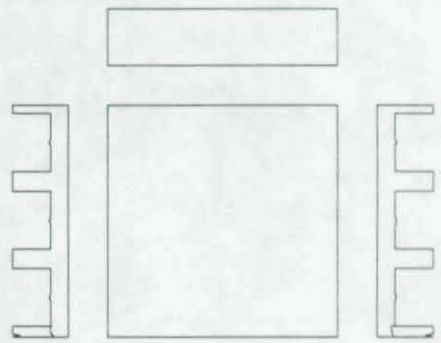
SIDE VIEW



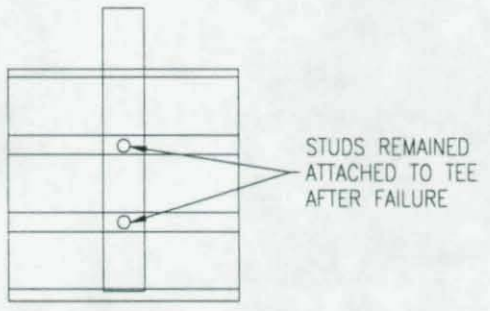
TOP VIEW



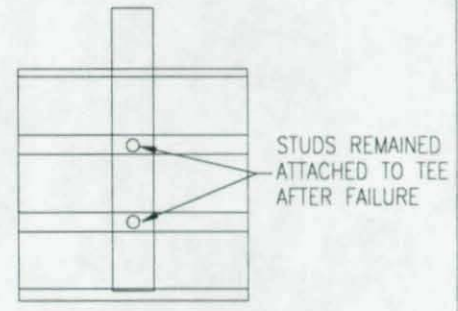
SIDE A SURFACE



SIDE B SURFACE



SIDE A BOTTOM



SIDE B BOTTOM

Test D74 Data

Axial Load (kips)	Slips (in.)				Test Comments
	Pot. AT-1	Pot. AB-2	Pot. BT-3	Pot. BB-4	
0.00	0.0000	0.0000	0.0000	0.0000	BEGIN TEST
5.72	-0.0004	-0.0031	-0.0005	-0.0018	BOTTOM RIB CRACKED. POP.
10.18	-0.0002	-0.0035	0.0000	-0.0042	
14.45	0.0000	-0.0035	-0.0002	-0.0042	POP.
19.47	-0.0002	-0.0035	-0.0002	-0.0040	
24.69	-0.0002	-0.0035	-0.0002	-0.0042	RIB CRACKING SIDE A.
20.41	-0.0004	-0.0121	-0.0002	-0.0018	
21.04	-0.0004	-0.0238	-0.0002	-0.0011	
22.61	-0.0004	-0.0266	0.0000	-0.0013	AXIAL LOAD COMING OUT IN NL.
18.78	0.0000	-0.0315	-0.0002	-0.0060	POP.
20.73	-0.0002	-0.0346	0.0000	-0.0097	
22.11	-0.0002	-0.0405	-0.0002	-0.0130	
22.61	0.0000	-0.0421	-0.0002	-0.0157	DECK DEBONDING. RIB ROTATION.
20.48	0.0000	-0.0454	-0.0002	-0.0253	

PUSH-OUT TEST SUMMARY SHEET

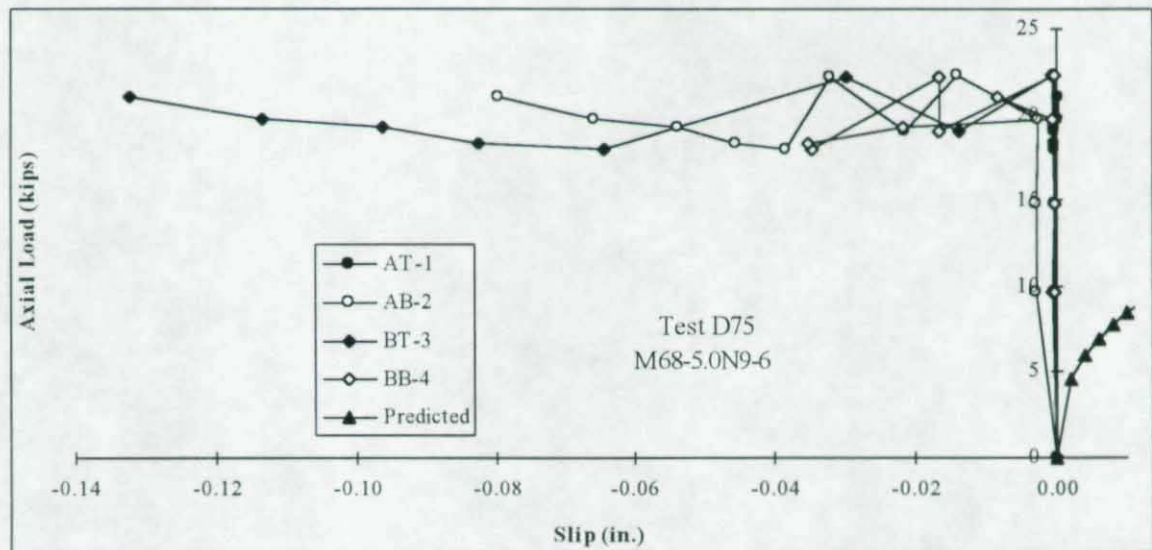
Test:	D75	Deck Type:	6" USD, 16 ga.
Designation:	M68-5.0N9-6		
Date of Test:	4/19/98		
Concrete Strength:	5000 psi	Stud Position:	M
Concrete Weight:	142.32 pcf	Stud Size:	¾ in. x 7 ¼ in.
Concrete Thickness:	8 ¾ in.	Stud Tensile Strength:	65.634 ksi
Maximum Applied Load:	22.30 kips		
Applied Load Per Stud:	5.58 kips		

Concrete Slip at Failure:

Pot. AT-1: 0.0002 in.	Pot. BT-3: -0.1322 in.
Pot. AB-2: -0.0797 in.	Pot. BB-4: -0.0084 in.
Avg. Side A: -0.0398 in.	Avg. Side B: -0.0703 in.

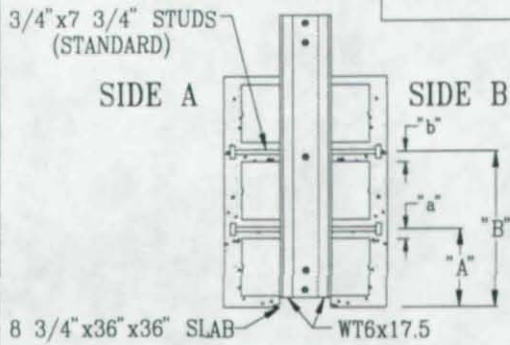
Avg.: -0.0550 in.

Comments: 10% Normal Load
 Test Operator: SCC
 Holes pre-drilled in deck for studs; deck was welded to tee flange
 Rib Cracking

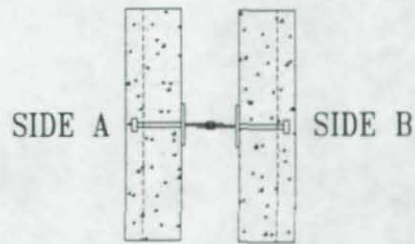


PUSH-OUT TEST LAYOUT & CRACKING SHEET

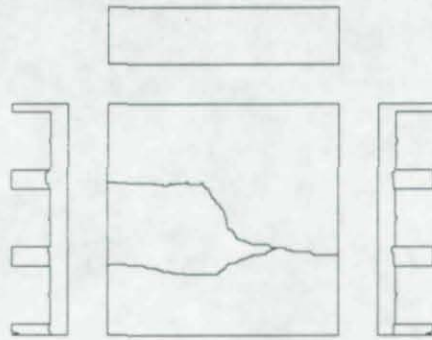
Test:	D75
Designation:	M68-5.0N9-6
Date:	4/19/98



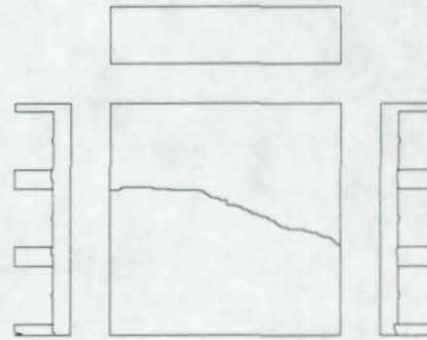
SIDE VIEW



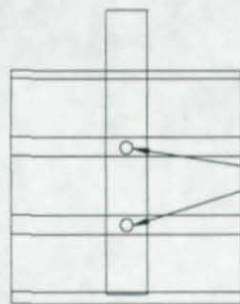
TOP VIEW



SIDE A SURFACE

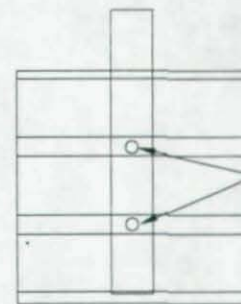


SIDE B SURFACE



SIDE A BOTTOM

STUDS REMAINED
ATTACHED TO TEE
AFTER FAILURE



SIDE B BOTTOM

STUDS REMAINED
ATTACHED TO TEE
AFTER FAILURE

Test D75 Data

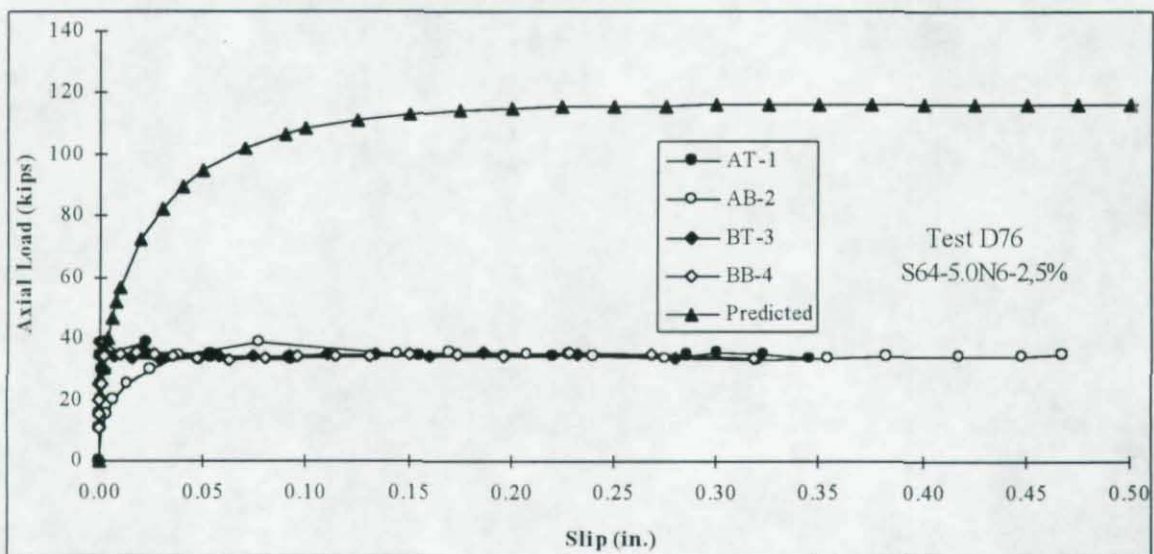
Axial Load (kips)	Slips (in.)				Test
	Pot. AT-1	Pot. AB-2	Pot. BT-3	Pot. BB-4	Comments
0.00	0.0000	0.0000	0.0000	0.0000	BEGIN TEST
9.61	-0.0002	-0.0027	-0.0005	-0.0002	POP. POP.
14.82	-0.0002	-0.0027	-0.0002	-0.0002	CRACKING IN BOTTOM RIB.
19.66	0.0000	-0.0026	-0.0007	-0.0002	POPPING. CONCRETE RIBS CRACKING.
22.30	-0.0004	-0.0139	-0.0007	-0.0002	
18.97	-0.0002	-0.0214	-0.0137	-0.0165	
22.24	-0.0004	-0.0320	-0.0297	-0.0165	SLAB A IS CRACKING.
17.96	-0.0002	-0.0385	-0.0645	-0.0346	DECK RIBS ROTATING.
18.34	-0.0002	-0.0454	-0.0826	-0.0353	AXIAL LOAD COMING OUT IN NL.
19.22	-0.0002	-0.0538	-0.0961	-0.0218	
19.72	0.0002	-0.0657	-0.1134	-0.0007	DECK DEBONDING BOTH SIDES.
21.04	0.0002	-0.0797	-0.1322	-0.0084	N.L. WILL NOT RELEASE.
					TERM. TEST BECAUSE OF N.L. LOAD CELL.

PUSH-OUT TEST SUMMARY SHEET

Test:	D76	Deck Type:	2" USD, 20 ga.
Designation:	S64-5.0N6-2,5%		
Date of Test:	5/2/98		
Concrete Strength:	5000 psi	Stud Position:	S
Concrete Weight:	142.32 pcf	Stud Size:	¾ in. x 4 in.
Concrete Thickness:	5 ¾ in.	Stud Tensile Strength:	65.813 ksi
Maximum Applied Load:	39.07 kips		
Applied Load Per Stud:	9.77 kips		
Concrete Slip at Failure:			

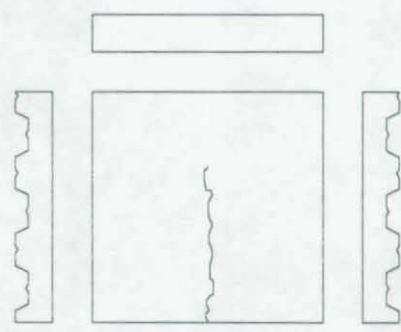
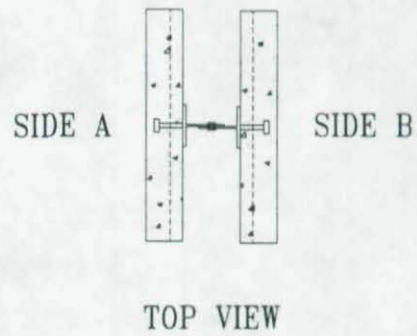
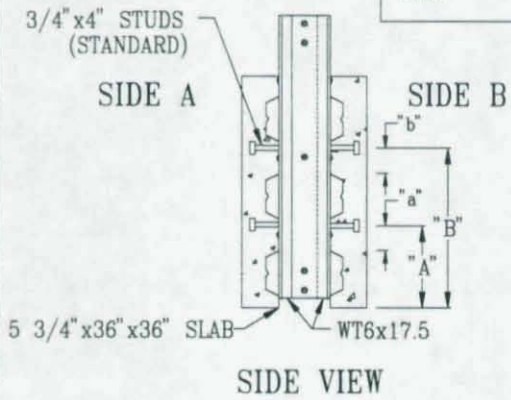
Pot. AT-1:	0.3454 in.	Pot. BT-3:	0.2807 in.
Pot. AB-2:	No Reading	Pot. BB-4:	0.3186 in.
Avg. Side A:	0.3454 in.	Avg. Side B:	0.2997 in.
Avg.:		0.3225 in.	

Comments: 5% Normal Load
 Test Operator: SCC
 Stud Shearing of Both Studs on Side B

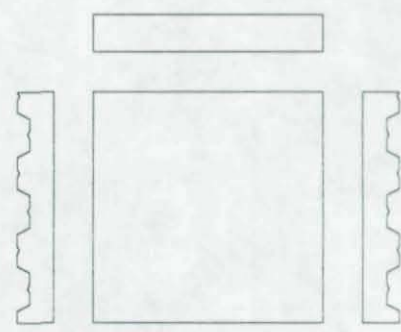


PUSH-OUT TEST LAYOUT & CRACKING SHEET

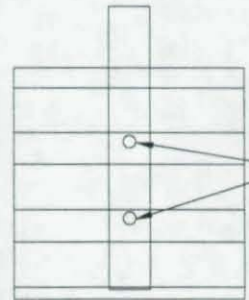
Test:	D76
Designation:	S64-5.0N6-2.5%
Date:	5/2/98



SIDE A SURFACE

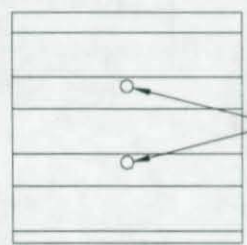


SIDE B SURFACE



SIDE A BOTTOM

STUDS REMAINED ATTACHED TO TEE AFTER FAILURE



SIDE B BOTTOM

STUD SHEARING

Test D76 Data

Axial Load (kips)	Slips (in.)				Test Comments
	Pot. AT-1	Pot. AB-2	Pot. BT-3	Pot. BB-4	
0.00	0.0000	0.0000	0.0000	0.0000	BEGIN TEST
10.68	0.0000	0.0009	0.0002	-0.0004	SLAB IS SHIFTING TO SIDE B.
15.26	0.0004	0.0042	-0.0009	-0.0002	
19.72	0.0007	0.0071	-0.0011	0.0004	
25.00	0.0005	0.0134	-0.0004	0.0011	
29.71	0.0011	0.0240	-0.0009	0.0015	
33.86	0.0002	0.0381	-0.0002	0.0020	POPPING.
39.07	0.0222	0.0767	-0.0002	0.0022	POP.
34.61	0.0222	0.1445	0.0005	0.0101	DECK DEBONDING SIDE A.
35.62	0.0216	0.1698	0.0011	0.0174	
34.92	0.0538	0.2082	0.0029	0.0262	
33.92	0.0529	0.2404	0.0068	0.0355	
33.67	0.0537	0.2754	0.0154	0.0467	
33.17	0.0928	0.3203	0.0289	0.0626	
33.35	0.0917	0.3545	0.0476	0.0798	
34.17	0.1553	0.3829	0.0575	0.0956	
33.92	0.1972	0.4184	0.0743	0.1139	
34.48	0.2203	0.4483	0.0921	0.1309	
35.05	0.2287	0.4683	0.1099	0.1505	DECK IS RIDING OVER POT. 2
35.05	0.2860	--	0.1340	0.1738	
34.30	0.2860	--	0.1597	0.1959	
35.55	0.3005	--	0.1866	0.2285	
34.74	0.3236	--	0.2328	0.2683	
33.61	0.3454	--	0.2807	0.3186	BIG BANG.

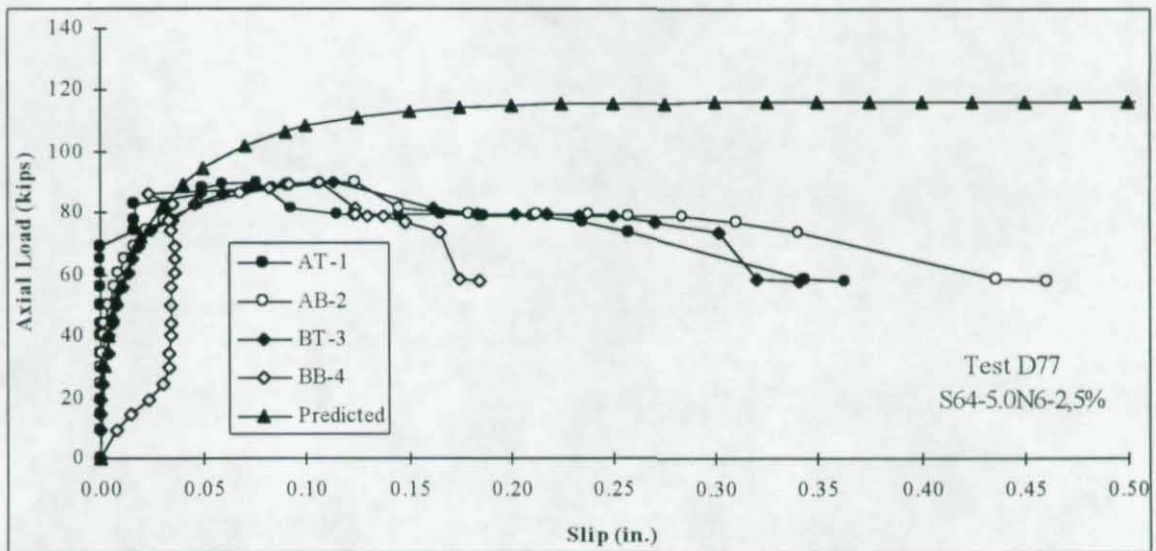
PUSH-OUT TEST SUMMARY SHEET

Test:	D77	Deck Type:	2" USD, 20 ga.
Designation:	S64-5.0N6-2,5%		
Date of Test:	4/29/98		
Concrete Strength:	5000 psi	Stud Position:	S
Concrete Weight:	142.32 pcf	Stud Size:	¾ in. x 4 in.
Concrete Thickness:	5 ¾ in.	Stud Tensile Strength:	65.813 ksi
Maximum Applied Load:	90.14 kips		
Applied Load Per Stud:	22.54 kips		

Concrete Slip at Failure:

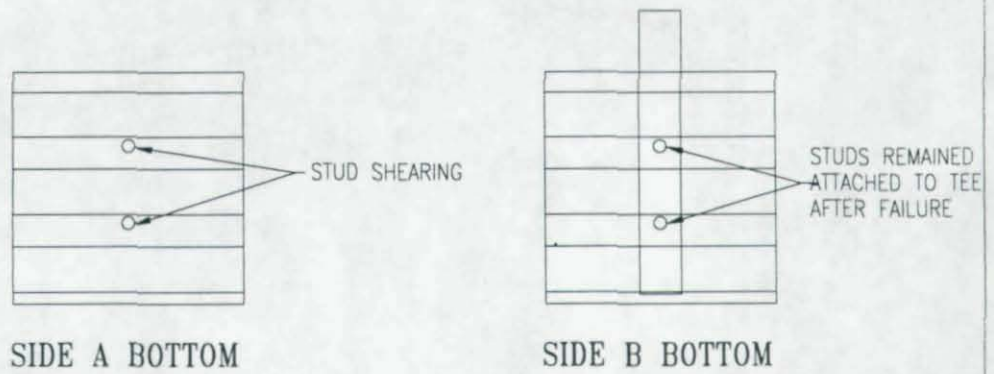
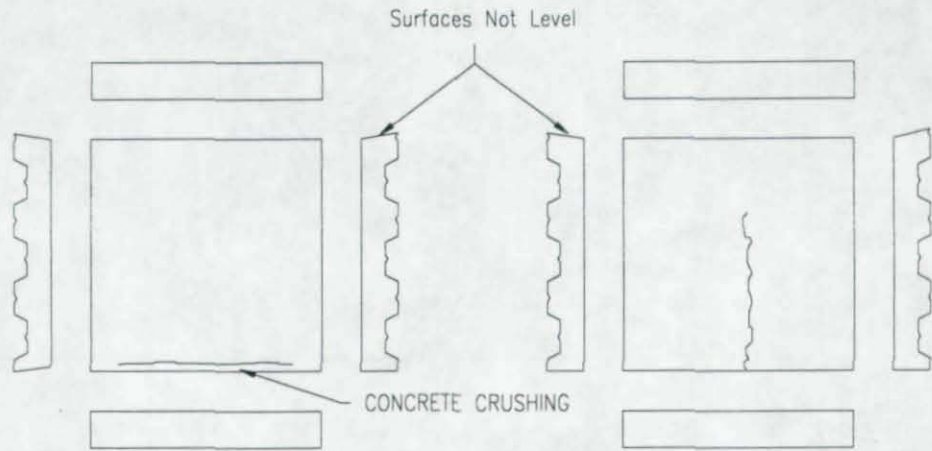
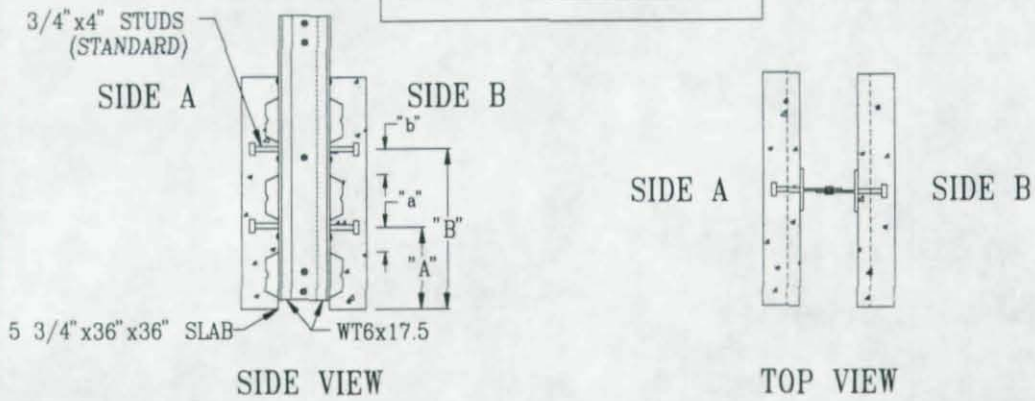
Pot. AT-1: 0.3637 in.	Pot. BT-3: 0.3404 in.
Pot. AB-2: 0.4611 in.	Pot. BB-4: 0.1846 in.
Avg. Side A: 0.4121 in.	Avg. Side B: 0.2625 in.
Avg.: 0.3375 in.	

Comments: 5% Normal Load
 Test Operator: SCC
 Stud Shearing of Both Studs on Side A



PUSH-OUT TEST LAYOUT & CRACKING SHEET

Test:	D77
Designation:	S64-5.0N6-2.5%
Date:	4/29/98



Test D77 Data

Axial Load (kips)	Slips (in.)				Test Comments
	Pot. AT-1	Pot. AB-2	Pot. BT-3	Pot. BB-4	
0.00	0.0000	0.0000	0.0000	0.0000	BEGIN TEST
9.42	0.0000	0.0000	-0.0004	0.0081	
14.57	-0.0004	0.0000	0.0000	0.0145	
19.35	-0.0002	-0.0002	0.0002	0.0231	BANG WHEN ADDED NORMAL LOAD.
24.50	0.0004	-0.0002	0.0005	0.0298	
29.71	0.0002	0.0002	0.0009	0.0331	
34.05	0.0000	0.0007	0.0038	0.0335	
39.82	0.0000	0.0015	0.0037	0.0341	
44.03	0.0000	0.0022	0.0057	0.0344	
50.06	0.0002	0.0035	0.0081	0.0346	
56.09	-0.0002	0.0064	0.0106	0.0344	POP.
60.55	0.0000	0.0088	0.0132	0.0363	
64.89	-0.0002	0.0121	0.0157	0.0364	
68.72	0.0000	0.0161	0.0189	0.0363	
74.06	0.0161	0.0229	0.0245	0.0339	BIG POP.
77.83	0.0161	0.0315	0.0355	0.0328	NO DECK BULGING.
82.98	0.0161	0.0480	0.0461	0.0348	
86.37	0.0500	0.0685	0.0595	0.0234	
87.75	0.0502	0.0844	0.0716	0.0822	DECK DEBONDING SIDE A.
89.07	0.0599	0.1055	0.0901	0.0919	
90.14	0.0764	0.1238	0.1135	0.1064	POP.
81.22	0.0925	0.1454	0.1623	0.1236	
79.33	0.1154	0.1796	0.1835	0.1234	
79.71	0.1456	0.2132	0.2025	0.1234	
79.33	0.1655	0.2382	0.2176	0.1238	
79.02	0.1866	0.2578	0.2331	0.1295	
78.58	0.2110	0.2844	0.2498	0.1379	
76.88	0.2350	0.3110	0.2701	0.1485	POP.
73.49	0.2582	0.3412	0.3020	0.1650	

Test D77 Data

Axial Load (kips)	Slips (in.)				Test Comments
	Pot. AT-1	Pot. AB-2	Pot. BT-3	Pot. BB-4	
58.79	0.3437	0.4366	0.3201	0.1745	
57.60	0.3637	0.4611	0.3404	0.1846	BIG BANG.

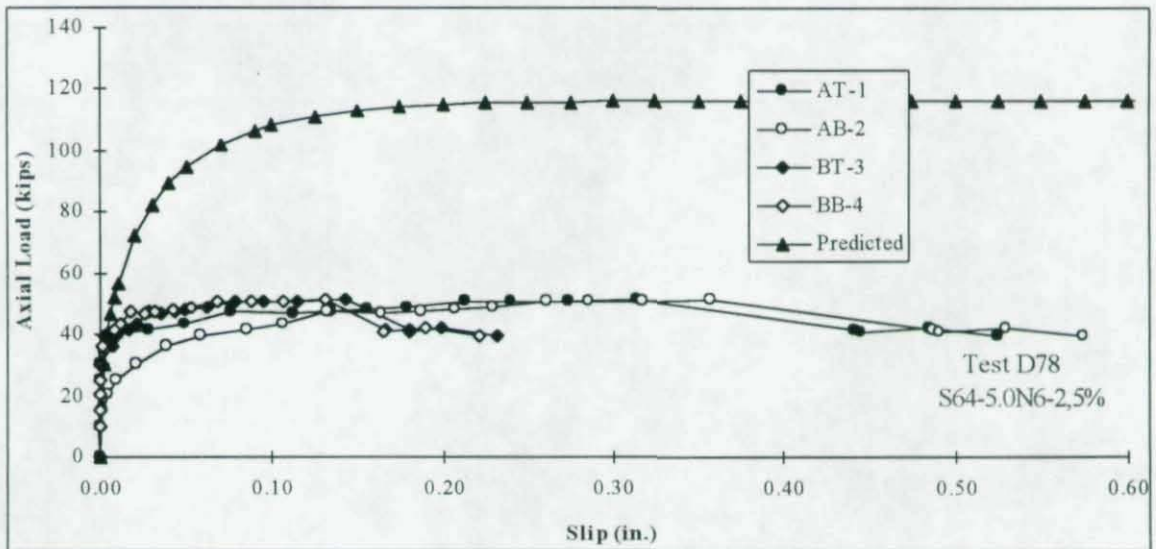
PUSH-OUT TEST SUMMARY SHEET

Test:	D78	Deck Type:	2" USD, 20 ga.
Designation:	S64-5.0N6-2,5%		
Date of Test:	5/2/98		
Concrete Strength:	5000 psi	Stud Position:	S
Concrete Weight:	142.32 pcf	Stud Size:	¾ in. x 4 in.
Concrete Thickness:	5 ¾ in.	Stud Tensile Strength:	65.813 ksi
Maximum Applied Load:	50.94 kips		
Applied Load Per Stud:	12.74 kips		

Concrete Slip at Failure:

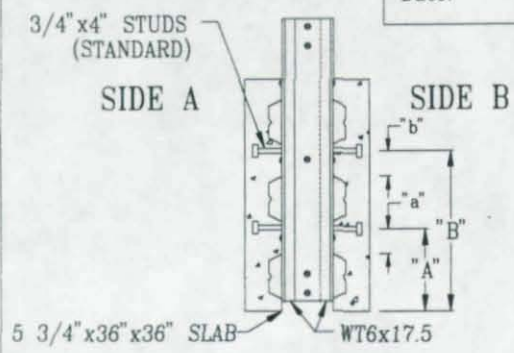
Pot. AT-1: 0.5250 in.	Pot. BT-3: 0.2317 in.
Pot. AB-2: 0.5737 in.	Pot. BB-4: 0.2210 in.
Avg. Side A: 0.5494 in.	Avg. Side B: 0.2264 in.
Avg.: 0.3879 in.	

Comments: 5% Normal Load
 Test Operator: SCC
 Stud Shearing of Top Stud on Side A and Both Studs on Side B

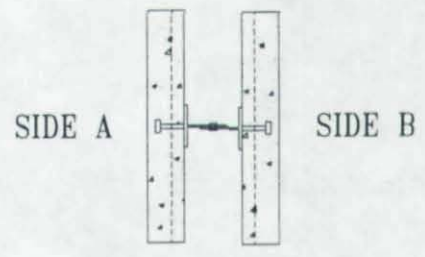


PUSH-OUT TEST LAYOUT & CRACKING SHEET

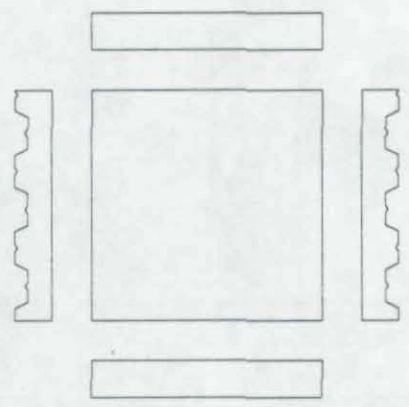
Test:	D78
Designation:	S64-5.0N6-2.5%
Date:	5/2/98



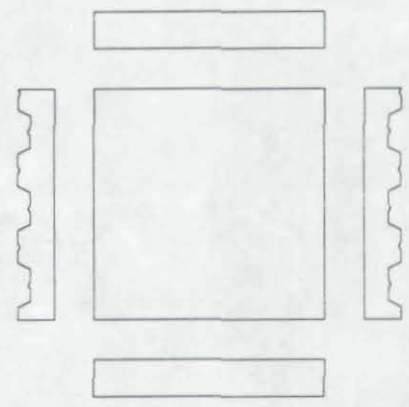
SIDE VIEW



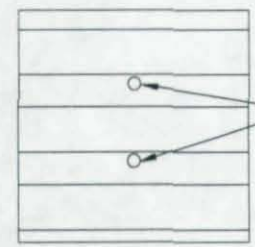
TOP VIEW



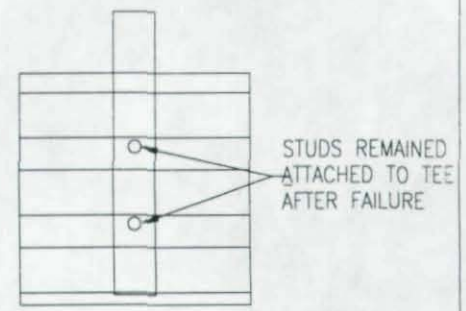
SIDE A SURFACE



SIDE B SURFACE



SIDE A BOTTOM



SIDE B BOTTOM

Test D78 Data

Axial Load (kips)	Slips (in.)				Test Comments
	Pot. AT-1	Pot. AB-2	Pot. BT-3	Pot. BB-4	
0.00	0.0000	0.0000	0.0000	0.0000	BEGIN TEST
9.74	0.0000	0.0005	-0.0007	0.0002	
15.08	-0.0007	0.0013	-0.0002	0.0004	
20.10	-0.0009	0.0049	0.0000	-0.0002	CRACKING NOISES.
25.19	0.0000	0.0099	-0.0004	0.0004	
30.40	-0.0002	0.0214	0.0000	0.0009	CRACKING NOISES.
36.06	-0.0013	0.0390	0.0075	0.0009	
39.51	0.0046	0.0588	0.0097	0.0018	
41.52	0.0284	0.0861	0.0163	0.0077	
43.53	0.0487	0.1069	0.0207	0.0123	
47.30	0.0760	0.1319	0.0284	0.0181	
46.42	0.1130	0.1643	0.0348	0.0258	
47.24	0.1351	0.1872	0.0429	0.0313	
47.86	0.1562	0.2071	0.0493	0.0419	
48.37	0.1787	0.2295	0.0615	0.0533	
50.31	0.2128	0.2611	0.0786	0.0676	
50.31	0.2397	0.2862	0.0954	0.0874	
50.88	0.2745	0.3181	0.1150	0.1066	
50.94	0.3137	0.3571	0.1430	0.1317	
41.52	0.4423	0.4877	0.1802	0.1665	POP.
40.95	0.4455	0.4908	0.1806	0.1655	
41.77	0.4851	0.5298	0.1994	0.1901	DECK DEBONDING SIDE A & B.
39.64	0.5250	0.5737	0.2317	0.2210	BIG BANG.

PUSH-OUT TEST SUMMARY SHEET

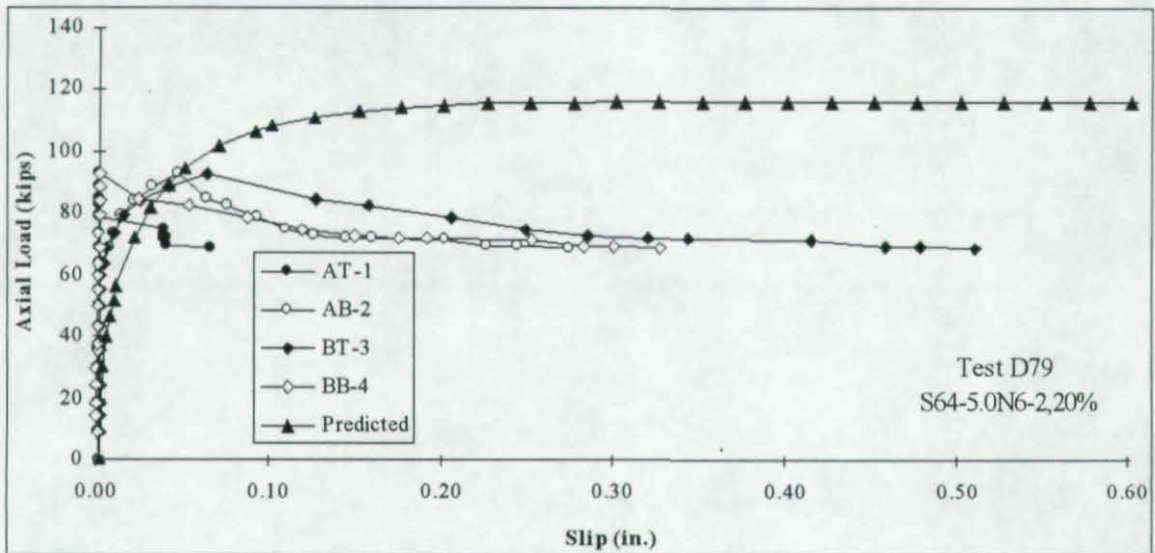
Test:	D79	Deck Type:	2" USD, 20 ga.
Designation:	S64-5.0N6-2,20%		
Date of Test:	4/29/98		
Concrete Strength:	5000 psi	Stud Position:	S
Concrete Weight:	142.32 pcf	Stud Size:	¾ in. x 4 in.
Concrete Thickness:	5 ¾ in.	Stud Tensile Strength:	65.813 ksi
Maximum Applied Load:	92.46 kips		
Applied Load Per Stud:	23.12 kips		

Concrete Slip at Failure:

Pot. AT-1: 0.0643 in.	Pot. BT-3: 0.5085 in.
Pot. AB-2: 0.2738 in.	Pot. BB-4: 0.3258 in.
Avg. Side A: 0.1691 in.	Avg. Side B: 0.4172 in.

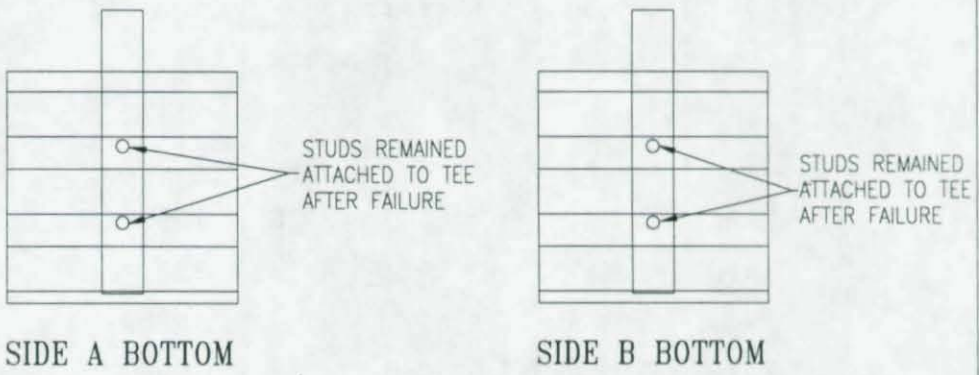
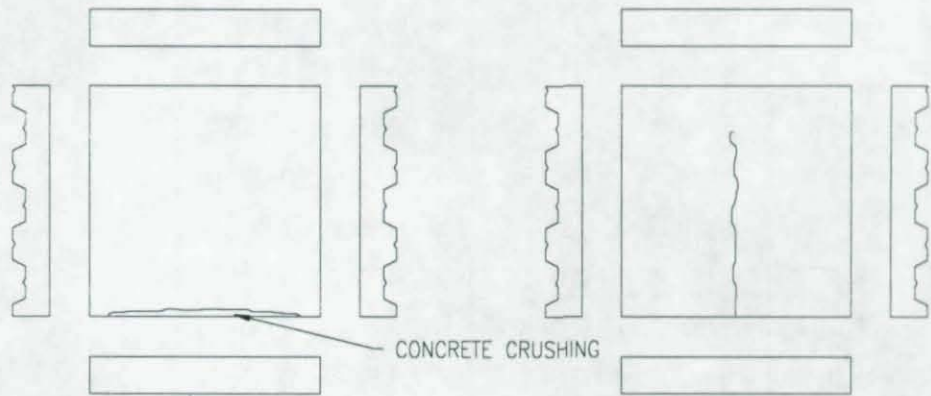
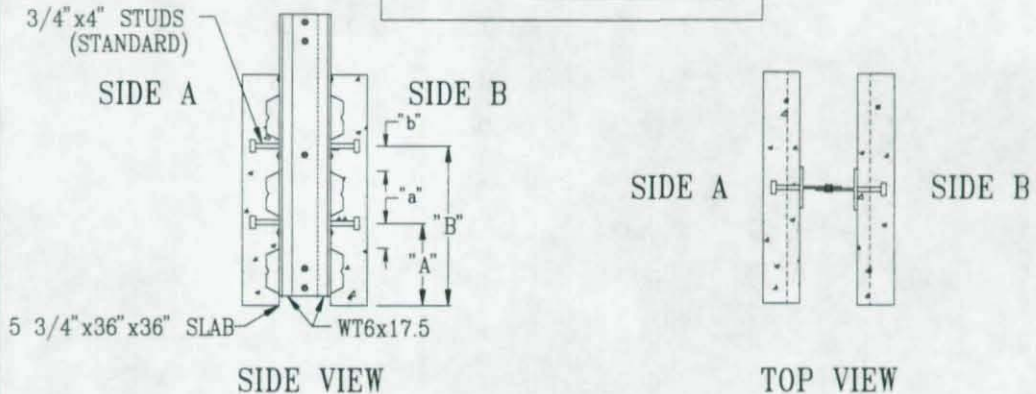
Avg.: 0.2931 in.

Comments: 20% Normal Load
Test Operator: SCC



PUSH-OUT TEST LAYOUT & CRACKING SHEET

Test: D79
Designation: S64-5.0N6-2.20%
Date: 4/29/98



Test D79 Data

Axial Load (kips)	Slips (in.)				Test Comments
	Pot. AT-1	Pot. AB-2	Pot. BT-3	Pot. BB-4	
0.00	0.0000	0.0000	0.0000	0.0000	BEGIN TEST
9.48	0.0000	-0.0004	-0.0002	-0.0013	
14.26	-0.0002	0.0002	-0.0002	-0.0015	
18.72	-0.0004	0.0000	0.0000	-0.0016	
23.99	0.0000	0.0000	-0.0002	-0.0015	
29.33	-0.0004	0.0000	-0.0004	-0.0016	
35.49	-0.0004	0.0000	0.0002	-0.0013	
37.75	0.0002	0.0000	0.0002	-0.0011	
43.47	-0.0002	0.0002	0.0004	-0.0009	
50.00	0.0000	0.0004	0.0002	-0.0007	POP.
54.90	0.0000	0.0002	0.0002	-0.0005	
59.99	0.0000	0.0005	0.0002	-0.0007	
63.88	0.0000	0.0015	0.0024	-0.0005	
69.28	0.0000	0.0062	0.0033	-0.0002	CRACKING NOISES.
73.87	0.0000	0.0084	0.0081	-0.0004	
79.59	0.0000	0.0136	0.0139	0.0000	
84.30	-0.0002	0.0205	0.0236	0.0004	
88.57	0.0004	0.0311	0.0405	0.0009	
92.46	0.0000	0.0456	0.0626	0.0009	
85.05	-0.0002	0.0623	0.1253	0.0231	
82.73	0.0000	0.0745	0.1557	0.0524	
78.96	0.0000	0.0914	0.2046	0.0863	
74.94	0.0383	0.1079	0.2478	0.1174	
73.05	0.0383	0.1249	0.2840	0.1482	
72.36	0.0383	0.1428	0.3194	0.1742	
72.42	0.0385	0.1580	0.3426	0.1906	
71.61	0.0381	0.2005	0.4133	0.2514	
69.79	0.0385	0.2258	0.4569	0.2809	
69.47	0.0386	0.2430	0.4767	0.2990	

Test D79 Data

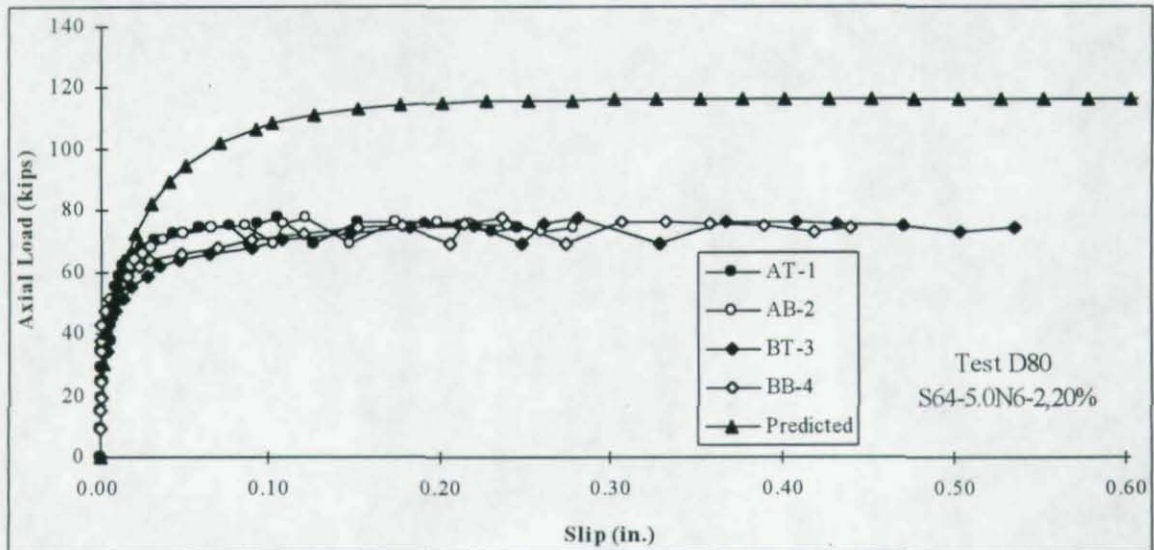
Axial Load (kips)	Slips (in.)				Test Comments
	Pot. AT-1	Pot. AB-2	Pot. BT-3	Pot. BB-4	
68.97	0.0643	0.2738	0.5085	0.3258	

PUSH-OUT TEST SUMMARY SHEET

Test:	D80	Deck Type:	2" USD, 20 ga.
Designation:	S64-5.0N6-2,20%		
Date of Test:	5/22/98		
Concrete Strength:	5000 psi	Stud Position:	S
Concrete Weight:	142.32 pcf	Stud Size:	¾ in. x 4 in.
Concrete Thickness:	5 ¼ in.	Stud Tensile Strength:	65.813 ksi
Maximum Applied Load:	77.39 kips		
Applied Load Per Stud:	19.35 kips		
Concrete Slip at Failure:			

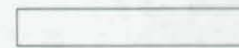
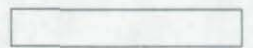
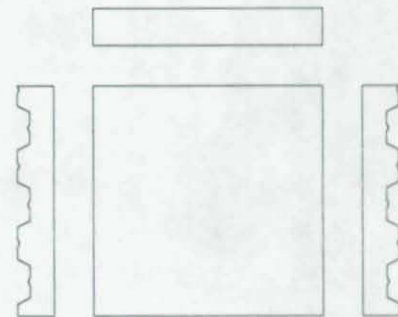
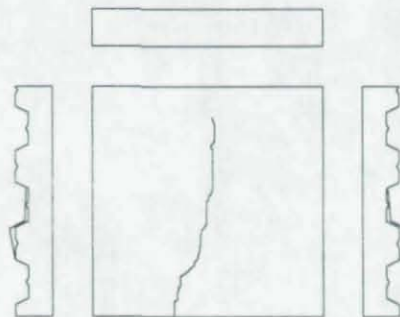
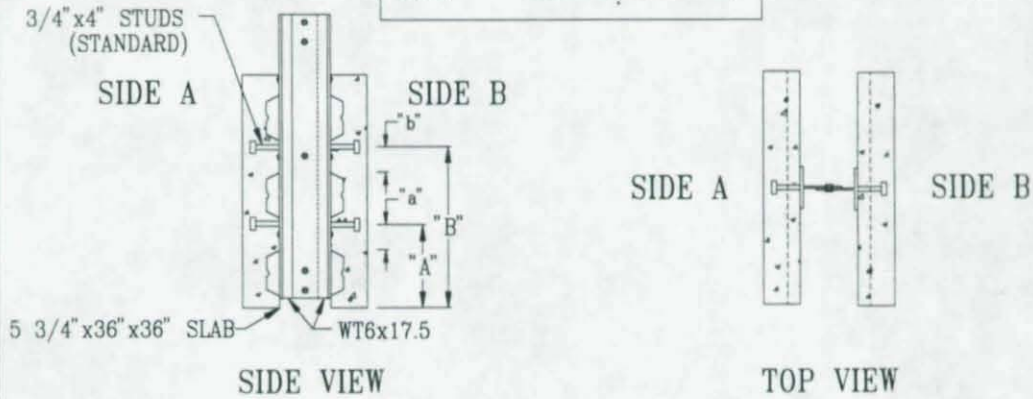
Pot. AT-1:	0.2439 in.	Pot. BT-3:	0.5336 in.
Pot. AB-2:	0.2765 in.	Pot. BB-4:	0.4386 in.
Avg. Side A:	0.2602 in.	Avg. Side B:	0.4861 in.
Avg.:		0.3732 in.	

Comments: 20% Normal Load
Test Operator: MRR



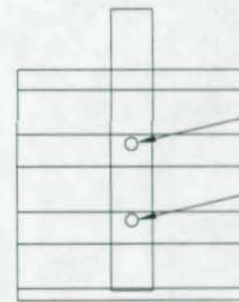
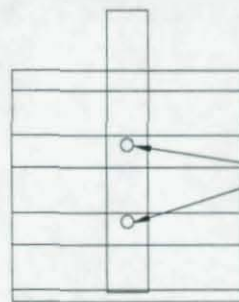
PUSH-OUT TEST LAYOUT & CRACKING SHEET

Test:	D80
Designation:	S64-5.0N6-2.20%
Date:	5/22/98



SIDE A SURFACE

SIDE B SURFACE



STUDS REMAINED ATTACHED TO TEE AFTER FAILURE

STUD REMAINED ATTACHED TO TEE AFTER FAILURE

STUD FAILURE

Test D80 Data

Axial Load (kips)	Slips (in.)				Test Comments
	Pot. AT-1	Pot. AB-2	Pot. BT-3	Pot. BB-4	
0.00	0.0000	0.0000	0.0000	0.0000	BEGIN TEST
9.17	-0.0002	-0.0002	0.0002	0.0002	
14.95	-0.0002	0.0002	0.0000	0.0000	
19.22	0.0000	0.0002	0.0002	0.0000	
24.37	-0.0002	0.0011	0.0004	-0.0002	
29.02	0.0002	0.0020	0.0002	0.0000	
33.92	0.0002	0.0042	0.0044	0.0004	
37.69	0.0020	0.0057	0.0044	0.0004	
42.71	0.0038	0.0068	0.0044	0.0009	
47.42	0.0048	0.0090	0.0081	0.0029	
51.19	0.0090	0.0112	0.0130	0.0055	
54.90	0.0090	0.0130	0.0176	0.0086	
58.67	0.0108	0.0154	0.0271	0.0150	
61.62	0.0132	0.0178	0.0346	0.0225	
63.69	0.0156	0.0207	0.0460	0.0284	
65.58	0.0196	0.0245	0.0634	0.0472	POP.
67.96	0.0240	0.0297	0.0881	0.0679	
70.10	0.0315	0.0363	0.1058	0.0883	
72.42	0.0429	0.0483	0.1452	0.1187	
74.37	0.0579	0.0650	0.1809	0.1502	
75.19	0.0758	0.0844	0.2187	0.1760	
69.10	0.0866	0.1009	0.2467	0.2042	UNLOADED N.L. & RELOADED.
75.50	0.0912	0.1075	0.2589	0.2126	(YOKE WAS NOT LEVEL).
77.39	0.1038	0.1196	0.2787	0.2342	
69.22	0.1251	0.1450	0.3272	0.2719	UNLOADED N.L. DID REST OF
76.51	0.1498	0.1725	0.3657	0.3044	TEST W/ CONSTANT N.L. = 12 k
76.19	0.1727	0.1976	0.4062	0.3305	
75.75	0.1895	0.2163	0.4307	0.3560	
74.87	0.2102	0.2381	0.4684	0.3877	

Test D80 Data

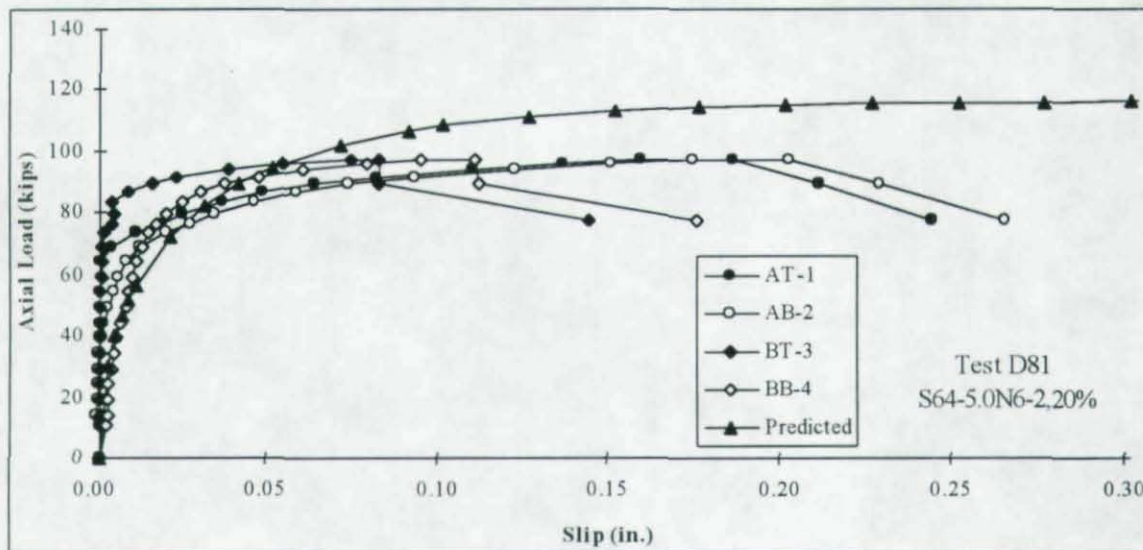
Axial Load (kips)	Slips (in.)				Test Comments
	Pot. AT-1	Pot. AB-2	Pot. BT-3	Pot. BB-4	
73.12	0.2282	0.2580	0.5021	0.4173	RAM LEANING SLIGHTLY.
74.43	0.2439	0.2765	0.5336	0.4386	POP.

PUSH-OUT TEST SUMMARY SHEET

Test:	D81	Deck Type:	2" USD, 20 ga.
Designation:	S64-5.0N6-2,20%		
Date of Test:	5/23/98		
Concrete Strength:	5000 psi	Stud Position:	S
Concrete Weight:	142.32 pcf	Stud Size:	¾ in. x 4 in.
Concrete Thickness:	5 ¾ in.	Stud Tensile Strength:	65.813 ksi
Maximum Applied Load:	97.55 kips		
Applied Load Per Stud:	24.39 kips		
Concrete Slip at Failure:			

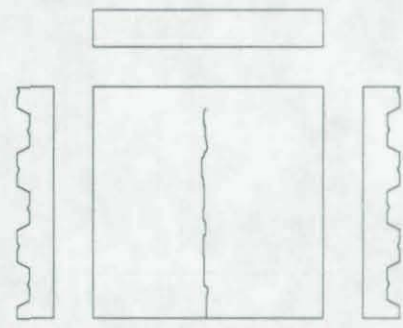
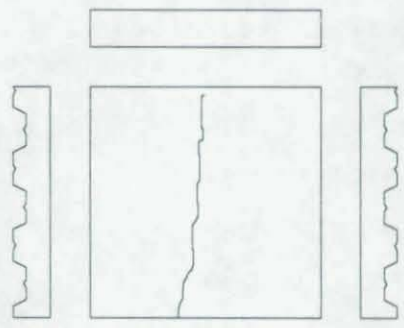
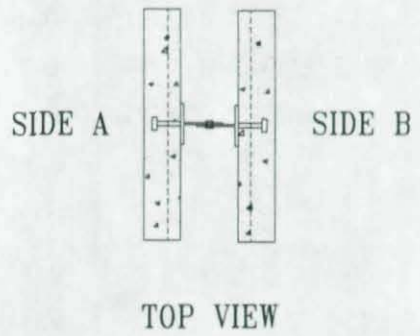
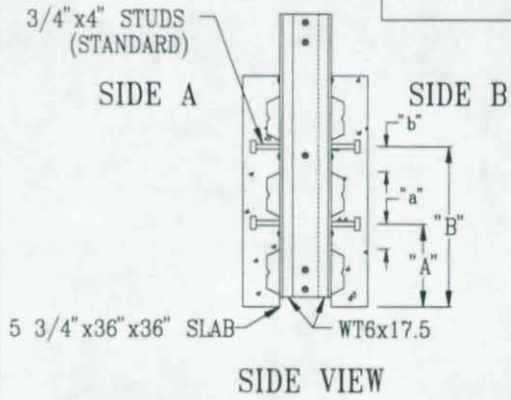
Pot. AT-1:	0.2426 in.	Pot. BT-3:	0.1428 in.
Pot. AB-2:	0.2637 in.	Pot. BB-4:	0.1742 in.
Avg. Side A:	0.2532 in.	Avg. Side B:	0.1585 in.
Avg.:		0.2058 in.	

Comments: 20% Normal Load
Test Operator: MRR



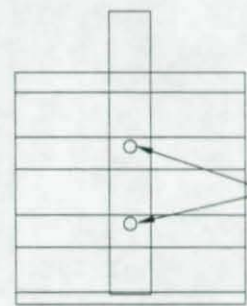
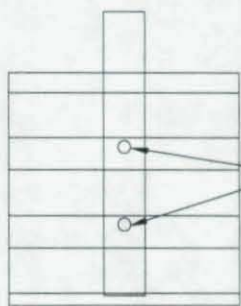
PUSH-OUT TEST LAYOUT & CRACKING SHEET

Test:	D81
Designation:	S64-5.0N6-2.20%
Date:	5/23/98



SIDE A SURFACE

SIDE B SURFACE



SIDE A BOTTOM

SIDE B BOTTOM

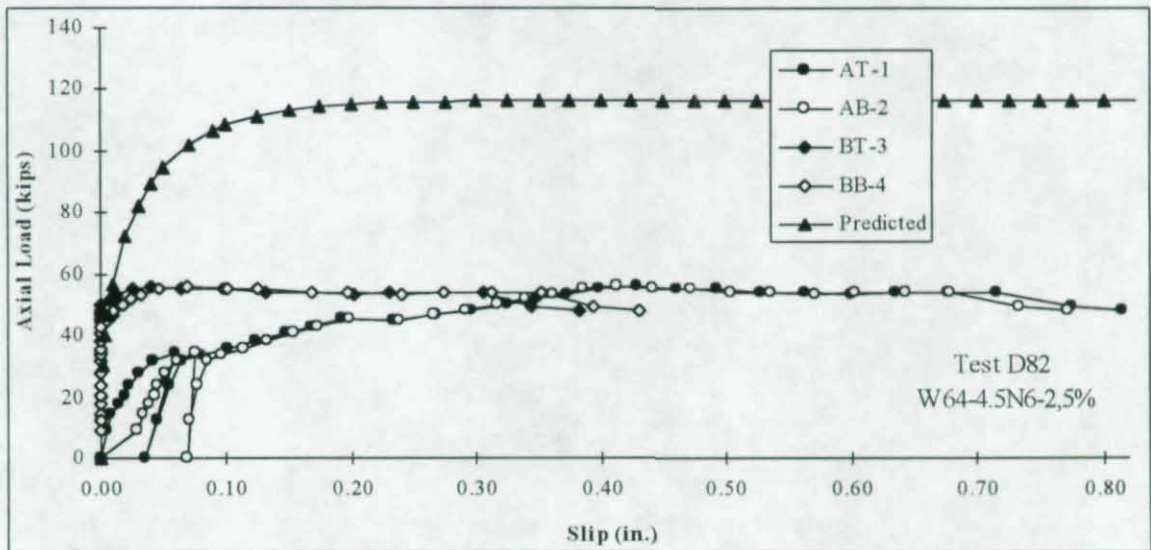
Test D81 Data

Axial Load (kips)	Slips (in.)				Test Comments
	Pot. AT-1	Pot. AB-2	Pot. BT-3	Pot. BB-4	
0.00	0.0000	0.0000	0.0000	0.0000	BEGIN TEST
10.36	0.0000	-0.0002	0.0000	0.0013	
14.01	0.0000	-0.0013	0.0000	0.0020	
19.35	0.0000	-0.0009	-0.0002	0.0022	
24.31	0.0000	-0.0011	-0.0002	0.0024	
29.21	0.0000	-0.0011	-0.0002	0.0035	
34.30	0.0000	-0.0011	-0.0002	0.0038	
39.51	-0.0002	0.0004	-0.0004	0.0042	
44.28	-0.0002	0.0007	-0.0002	0.0057	
49.50	-0.0002	0.0024	0.0000	0.0071	
54.52	0.0000	0.0040	0.0000	0.0079	
59.30	0.0002	0.0053	0.0004	0.0093	
64.51	0.0000	0.0073	0.0004	0.0101	
68.84	0.0035	0.0115	0.0005	0.0119	
73.30	0.0103	0.0189	0.0011	0.0139	CRACKING NOISES.
76.19	0.0179	0.0260	0.0035	0.0163	
79.46	0.0238	0.0330	0.0038	0.0189	
83.61	0.0357	0.0447	0.0035	0.0236	
86.56	0.0469	0.0571	0.0077	0.0289	
89.38	0.0624	0.0725	0.0148	0.0359	
91.39	0.0806	0.0917	0.0222	0.0461	
93.91	0.1084	0.1210	0.0370	0.0592	
95.79	0.1350	0.1491	0.0531	0.0776	
97.55	0.1580	0.1731	0.0731	0.0934	
97.05	0.1848	0.2013	0.0811	0.1093	
89.32	0.2100	0.2276	0.0813	0.1106	
77.45	0.2426	0.2637	0.1428	0.1742	SOFT CRACKING NOISE.

PUSH-OUT TEST SUMMARY SHEET

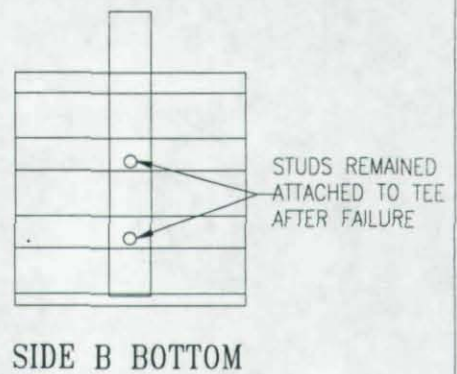
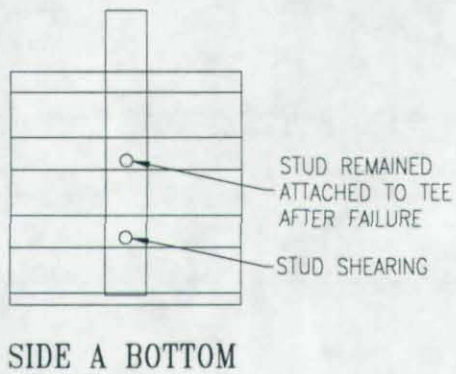
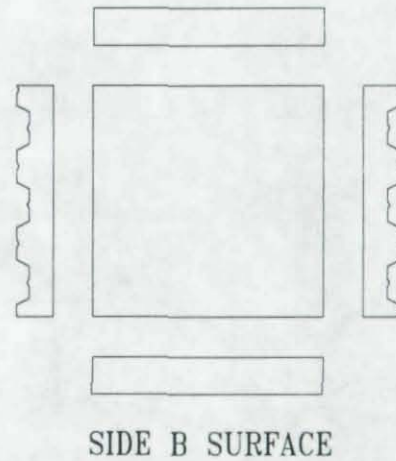
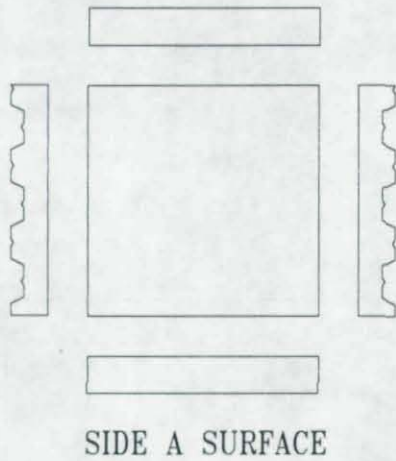
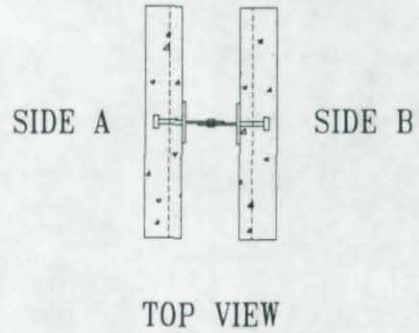
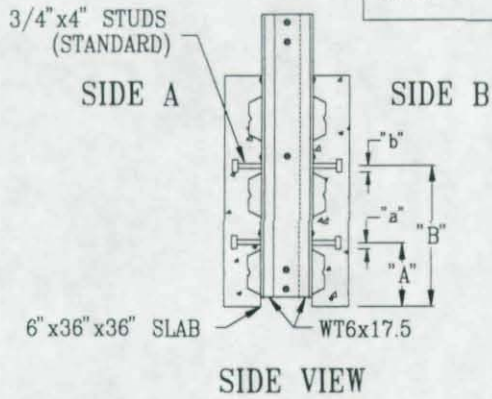
Test:	D82	Deck Type:	2" USD, 20 ga.
Designation:	W64-4.5N6-2,5%		
Date of Test:	5/25/98		
Concrete Strength:	4690 psi	Stud Position:	W
Concrete Weight:	144.73 pcf	Stud Size:	3/4 in. x 4 in.
Concrete Thickness:	6 in.	Stud Tensile Strength:	65.813 ksi
Maximum Applied Load:	55.59 kips		
Applied Load Per Stud:	13.90 kips		
Concrete Slip at Failure:			
Pot. AT-1:	0.8151 in.	Pot. BT-3:	0.3820 in.
Pot. AB-2:	0.7721 in.	Pot. BB-4:	0.4307 in.
Avg. Side A:	0.7936 in.	Avg. Side B:	0.4064 in.
	Avg.: 0.6000 in.		

Comments: 5% Normal Load
 Test Operator: MRR
 Rib Punching
 Stud Shearing of Bottom Stud on Side A



PUSH-OUT TEST LAYOUT & CRACKING SHEET

Test:	D82
Designation:	W64-4.5N6-2.5%
Date:	5/25/98



Test D82 Data

Axial Load (kips)	Slips (in.)				Test Comments
	Pot. AT-1	Pot. AB-2	Pot. BT-3	Pot. BB-4	
0.00	0.0000	0.0000	0.0000	0.0000	BEGIN TEST
9.36	0.0042	0.0295	0.0000	-0.0002	
14.13	0.0086	0.0335	-0.0002	-0.0004	
17.84	0.0143	0.0383	-0.0002	-0.0002	
20.60	0.0192	0.0427	-0.0002	0.0000	
23.74	0.0222	0.0456	-0.0002	-0.0002	
27.83	0.0311	0.0518	-0.0002	0.0000	
31.53	0.0421	0.0612	0.0000	0.0000	
34.48	0.0588	0.0760	-0.0004	-0.0002	UNLOADED TO RESET RAM.
0.00	0.0346	0.0694	0.0000	-0.0002	
12.44	0.0447	0.0698	0.0000	-0.0004	
23.56	0.0544	0.0762	-0.0002	-0.0002	
31.60	0.0635	0.0842	-0.0002	0.0002	
33.73	0.0793	0.0956	-0.0002	0.0000	
35.80	0.1009	0.1139	-0.0002	0.0002	
38.13	0.1231	0.1333	-0.0002	0.0002	
40.70	0.1474	0.1533	0.0002	0.0002	
42.40	0.1679	0.1732	-0.0002	0.0002	
45.35	0.1916	0.1989	-0.0002	0.0044	
44.91	0.2340	0.2382	0.0000	0.0042	RIB PUNCHING SIDE A.
46.36	0.2668	0.2659	-0.0002	0.0101	
48.05	0.2961	0.2915	-0.0002	0.0101	
50.19	0.3249	0.3175	0.0000	0.0178	
51.82	0.3498	0.3403	0.0081	0.0245	
53.52	0.3738	0.3626	0.0134	0.0320	
54.90	0.3994	0.3855	0.0251	0.0460	RIB PUNCHING SIDE B.
55.59	0.4296	0.4133	0.0405	0.0685	
55.40	0.4606	0.4419	0.0643	0.1013	
55.09	0.4928	0.4717	0.0972	0.1256	

Test D82 Data

Axial Load (kips)	Slips (in.)				Test Comments
	Pot. AT-1	Pot. AB-2	Pot. BT-3	Pot. BB-4	
54.02	0.5283	0.5052	0.1317	0.1681	
53.58	0.5631	0.5362	0.1677	0.1970	
53.33	0.6012	0.5715	0.2020	0.2395	
53.71	0.6353	0.6041	0.2307	0.2740	
53.83	0.6774	0.6433	0.2738	0.3124	
53.96	0.7157	0.6798	0.3056	0.3516	
49.31	0.7744	0.7342	0.3437	0.3941	
48.24	0.8151	0.7721	0.3820	0.4307	SOFT POP. ENDED TEST DUE TO LOAD LOSS & RP

PUSH-OUT TEST SUMMARY SHEET

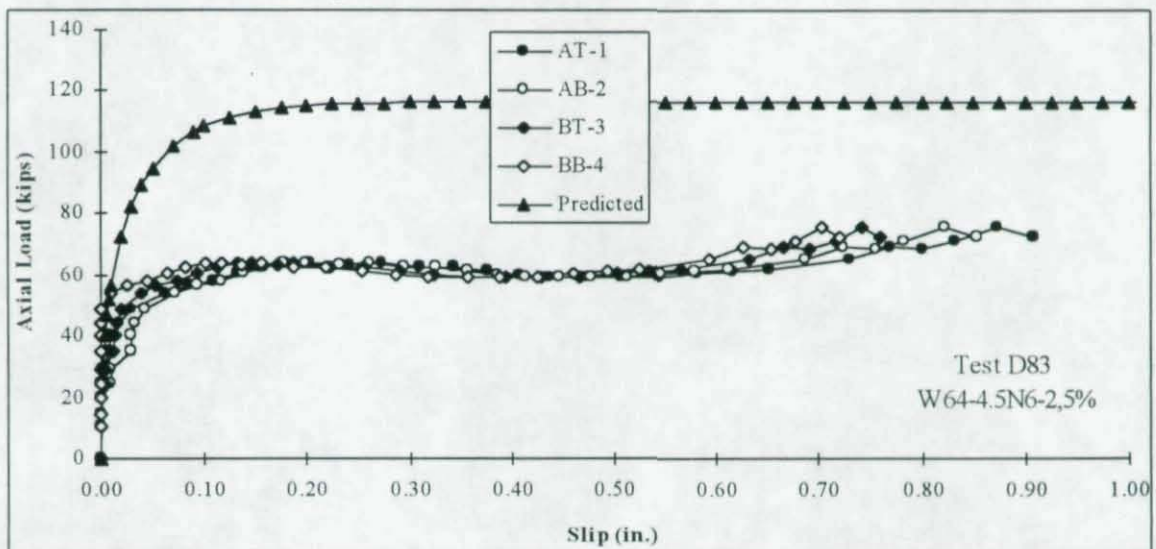
Test:	D83	Deck Type:	2" USD, 20 ga.
Designation:	W64-4.5N6-2,5%		
Date of Test:	5/7/98		
Concrete Strength:	4690 psi	Stud Position:	W
Concrete Weight:	144.73 pcf	Stud Size:	¾ in. x 4 in.
Concrete Thickness:	6 in.	Stud Tensile Strength:	65.813 ksi
Maximum Applied Load:	75.38 kips		
Applied Load Per Stud:	18.85 kips		

Concrete Slip at Failure:

Pot. AT-1: 0.9079 in.	Pot. BT-3: 0.7592 in.
Pot. AB-2: 0.8537 in.	Pot. BB-4: 0.7213 in.
Avg. Side A: 0.8808 in.	Avg. Side B: 0.7403 in.

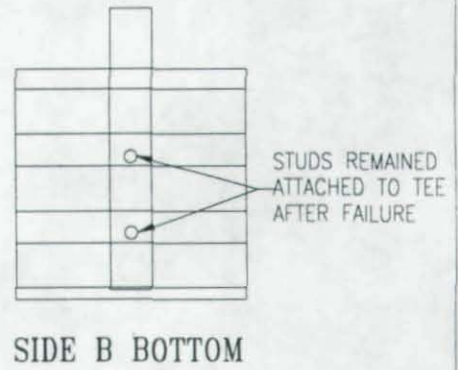
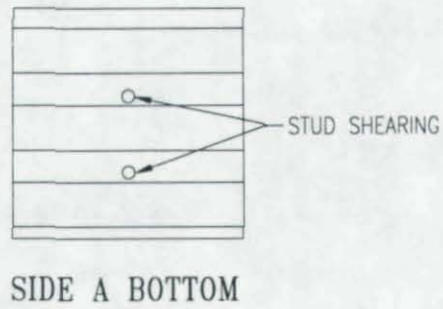
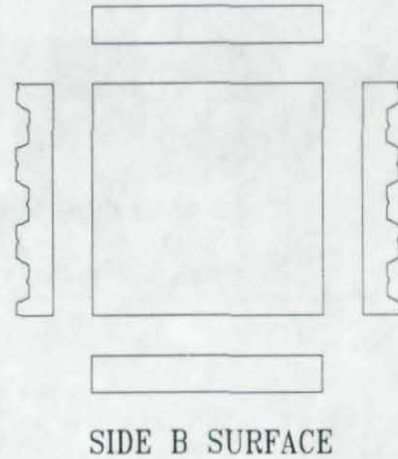
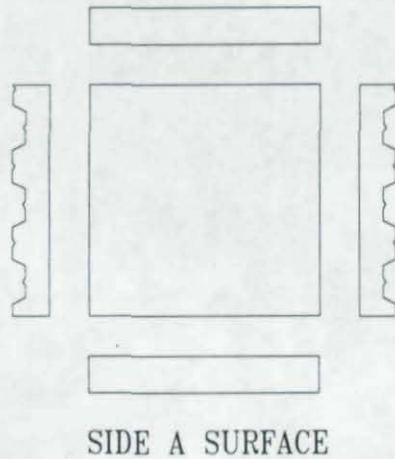
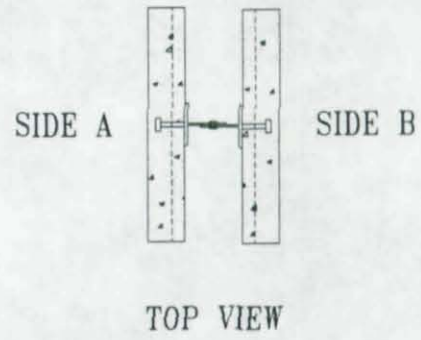
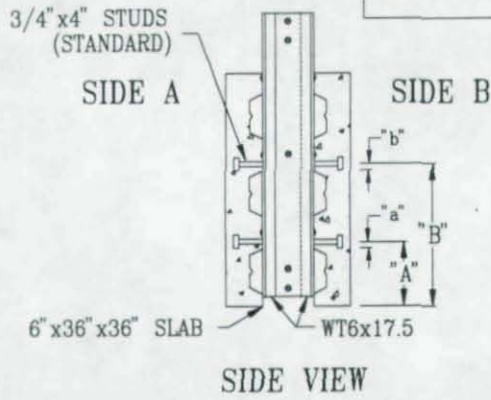
Avg.: 0.8105 in.

Comments: 5% Normal Load
 Test Operator: SCC
 Rib Punching
 Stud Shearing of Both Studs on Side A



PUSH-OUT TEST LAYOUT & CRACKING SHEET

Test:	D83
Designation:	W64-4.5N6-2.5%
Date:	5/7/98



Test D83 Data

Axial Load (kips)	Slips (in.)				Test Comments
	Pot. AT-1	Pot. AB-2	Pot. BT-3	Pot. BB-4	
0.00	0.0000	0.0000	0.0000	0.0000	BEGIN TEST
10.36	-0.0002	-0.0002	-0.0002	-0.0005	
14.13	0.0000	-0.0002	0.0000	-0.0004	
19.72	0.0000	0.0002	-0.0002	-0.0002	
24.43	0.0009	0.0090	0.0046	-0.0004	
28.83	0.0016	0.0093	0.0046	-0.0004	
34.86	0.0086	0.0288	0.0126	0.0002	
39.82	0.0099	0.0289	0.0134	0.0002	
44.28	0.0178	0.0322	0.0152	0.0002	
48.43	0.0297	0.0436	0.0200	0.0007	POPPING.
54.15	0.0630	0.0720	0.0390	0.0088	
56.34	0.0866	0.0939	0.0526	0.0258	
57.91	0.1099	0.1167	0.0747	0.0456	
60.49	0.1328	0.1377	0.0943	0.0641	
62.69	0.1544	0.1573	0.1135	0.0811	
63.63	0.1791	0.1782	0.1322	0.1013	
63.63	0.2038	0.2000	0.1472	0.1168	DECK DEBONDING SIDE A.
63.32	0.2415	0.2324	0.1716	0.1370	
63.76	0.2740	0.2619	0.1883	0.1560	DECK BULGING.
62.63	0.3110	0.2952	0.2229	0.1881	
62.25	0.3443	0.3260	0.2551	0.2185	
61.06	0.3774	0.3573	0.2906	0.2533	
59.99	0.4084	0.3869	0.3249	0.2873	
59.42	0.4373	0.4141	0.3565	0.3181	
58.92	0.4728	0.4474	0.3945	0.3567	
58.98	0.5073	0.4789	0.4294	0.3895	
59.23	0.5443	0.5144	0.4675	0.4260	
60.49	0.5812	0.5477	0.5032	0.4615	
61.31	0.6166	0.5798	0.5360	0.4941	

Test D83 Data

Axial Load (kips)	Slips (in.)				Test Comments
	Pot. AT-1	Pot. AB-2	Pot. BT-3	Pot. BB-4	
61.93	0.6530	0.6137	0.5673	0.5261	BIG POP. 50% LOAD LOSS.
64.76	0.7310	0.6884	0.6327	0.5933	
69.22	0.7701	0.7250	0.6659	0.6270	
68.66	0.8012	0.7552	0.6919	0.6538	
70.79	0.8321	0.7838	0.7168	0.6779	
75.38	0.8732	0.8213	0.7420	0.7036	
72.61	0.9079	0.8537	0.7592	0.7213	

PUSH-OUT TEST SUMMARY SHEET

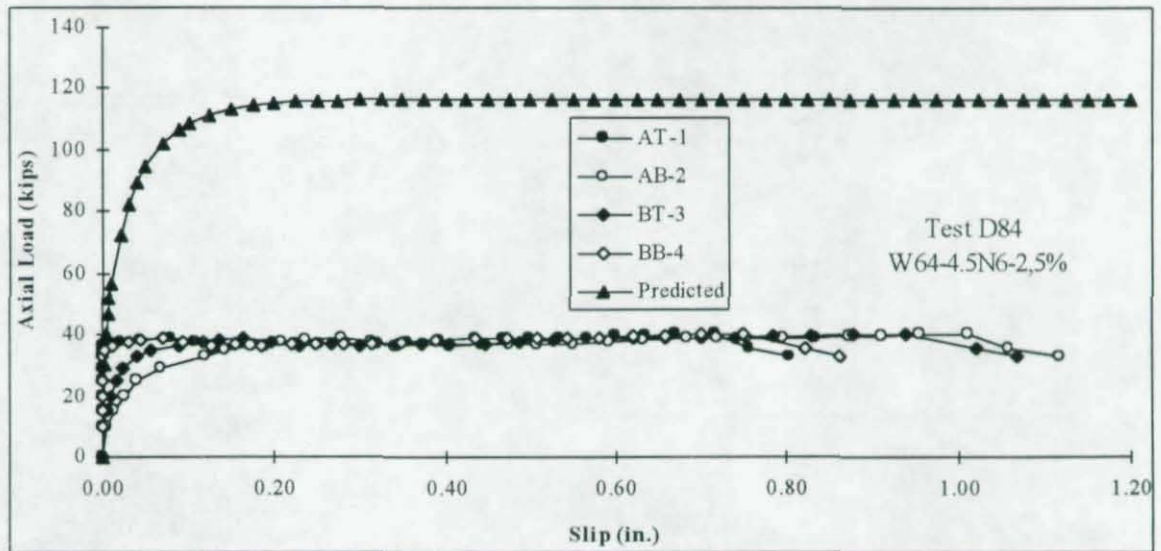
Test:	D84	Deck Type:	2" USD, 20 ga.
Designation:	W64-4.5N6-2,5%		
Date of Test:	5/5/98		
Concrete Strength:	4690 psi	Stud Position:	W
Concrete Weight:	144.73 pcf	Stud Size:	3/4 in. x 4 in.
Concrete Thickness:	6 in.	Stud Tensile Strength:	65.813 ksi
Maximum Applied Load:	40.39 kips		
Applied Load Per Stud:	10.10 kips		

Concrete Slip at Failure:

Pot. AT-1: 0.8039 in.	Pot. BT-3: 1.0678 in.
Pot. AB-2: 1.1190 in.	Pot. BB-4: 0.8616 in.
Avg. Side A: 0.9615 in.	Avg. Side B: 0.9647 in.

Avg.: 0.9631 in.

Comments: 5% Normal Load
 Test Operator: SCC
 Rib Punching
 Stud Shearing of Both Studs on Side A and Bottom Stud on Side B

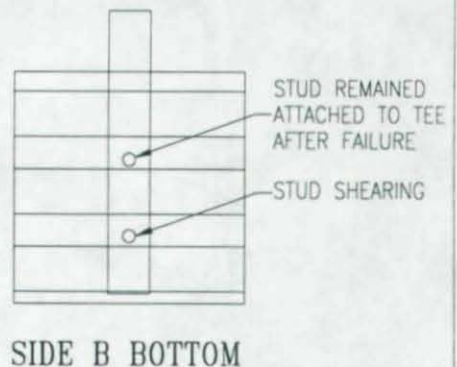
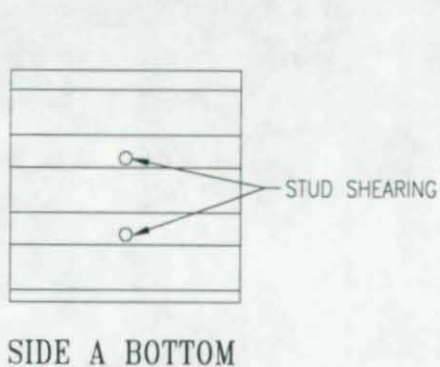
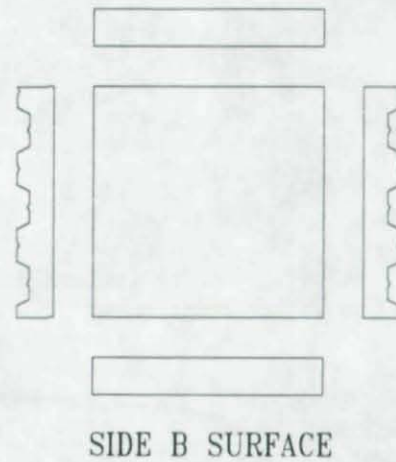
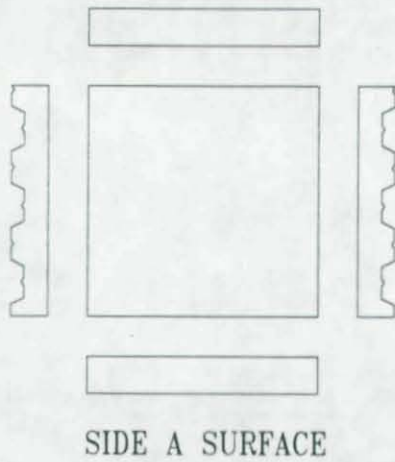
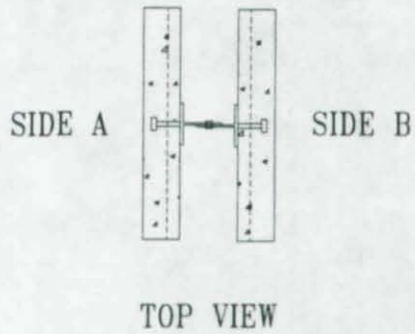
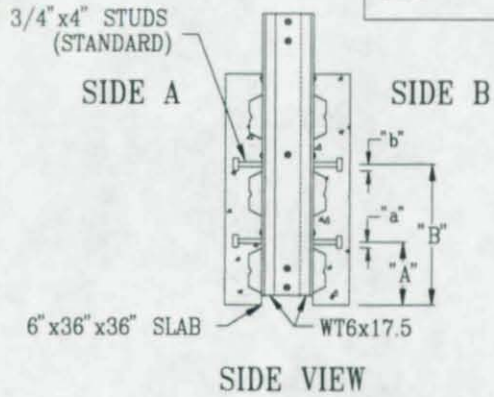


PUSH-OUT TEST LAYOUT & CRACKING SHEET

Test: D84

Designation: W64-4.5N6-2.5%

Date: 5/5/98



Test D84 Data

Axial Load (kips)	Slips (in.)				Test Comments
	Pot. AT-1	Pot. AB-2	Pot. BT-3	Pot. BB-4	
0.00	0.0000	0.0000	0.0000	0.0000	BEGIN TEST
10.11	-0.0002	0.0051	0.0007	-0.0005	CRACKING NOISES.
15.14	0.0000	0.0152	0.0042	-0.0002	
19.60	-0.0005	0.0264	0.0097	0.0000	
25.06	0.0004	0.0407	0.0157	0.0002	
28.96	-0.0007	0.0674	0.0234	0.0004	OOPS. NL WAS 10%. CHANGED TO 5%.
32.73	0.0000	0.1188	0.0392	0.0005	POPPING.
34.86	-0.0004	0.1428	0.0570	0.0033	
36.43	-0.0005	0.1743	0.0895	0.0117	
37.19	0.0211	0.2086	0.1183	0.0315	
38.19	0.0440	0.2362	0.1348	0.0438	
38.57	0.0793	0.2785	0.1635	0.0692	
37.63	0.1086	0.3135	0.1965	0.0947	RIB PUNCHING.
36.12	0.1348	0.3421	0.2307	0.1264	
36.62	0.1626	0.3743	0.2665	0.1558	
36.43	0.1901	0.4047	0.3000	0.1853	
36.62	0.2245	0.4441	0.3434	0.2209	
37.06	0.2536	0.4758	0.3732	0.2496	
36.87	0.2833	0.5095	0.4056	0.2813	
36.87	0.3208	0.5519	0.4468	0.3137	
37.69	0.3565	0.5935	0.4864	0.3498	
38.13	0.3926	0.6340	0.5283	0.3893	
38.51	0.4362	0.6832	0.5807	0.4355	
38.51	0.4692	0.7199	0.6223	0.4739	
39.07	0.4996	0.7554	0.6587	0.5074	
39.07	0.5349	0.7966	0.7014	0.5443	
39.07	0.5673	0.8340	0.7408	0.5816	
39.20	0.6001	0.8746	0.7860	0.6212	
39.20	0.6353	0.9120	0.8288	0.6583	

Test D84 Data

Axial Load (kips)	Slips (in.)				Test Comments
	Pot. AT-1	Pot. AB-2	Pot. BT-3	Pot. BB-4	
40.08	0.6704	0.9557	0.8797	0.6999	
40.39	0.7168	1.0125	0.9405	0.7501	
35.62	0.7560	1.0597	1.0229	0.8224	
32.66	0.8039	1.1190	1.0678	0.8616	

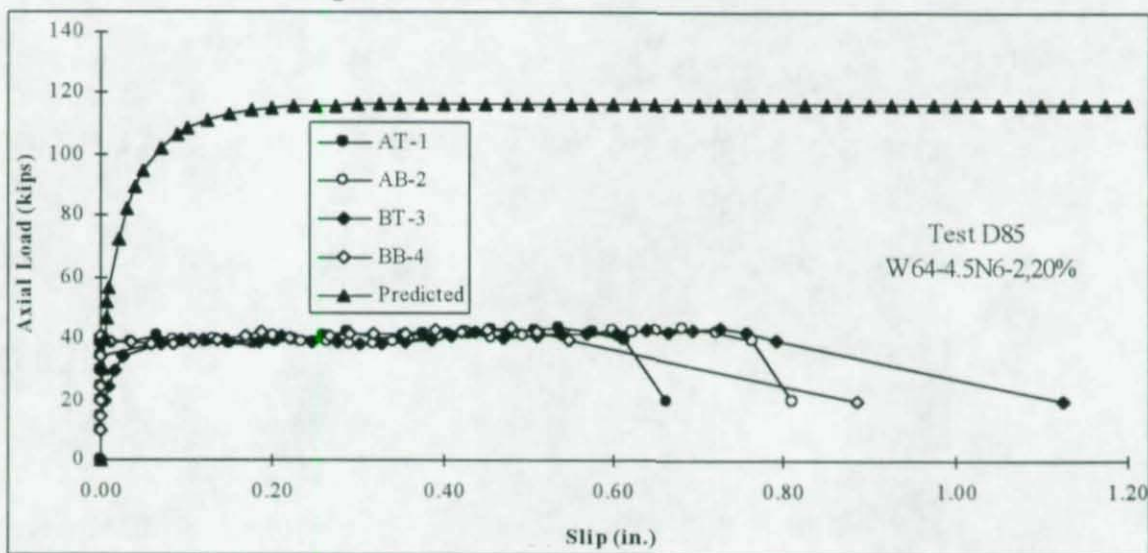
PUSH-OUT TEST SUMMARY SHEET

Test:	D85	Deck Type:	2" USD, 20 ga.
Designation:	W64-4.5N6-2,20%		
Date of Test:	5/5/98		
Concrete Strength:	4690 psi	Stud Position:	W
Concrete Weight:	144.73 pcf	Stud Size:	3/4 in. x 4 in.
Concrete Thickness:	6 in.	Stud Tensile Strength:	65.813 ksi
Maximum Applied Load:	43.15 kips		
Applied Load Per Stud:	10.79 kips		

Concrete Slip at Failure:

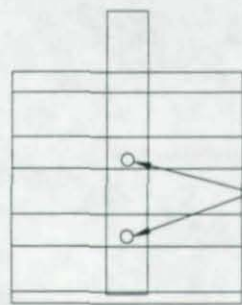
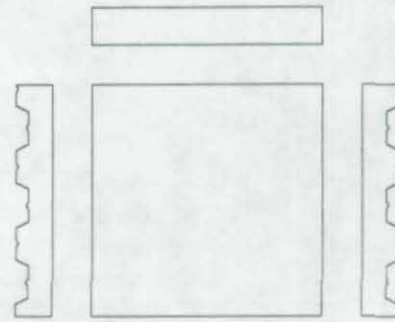
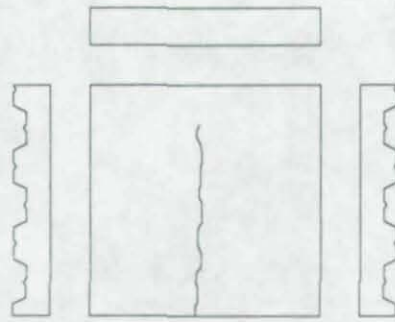
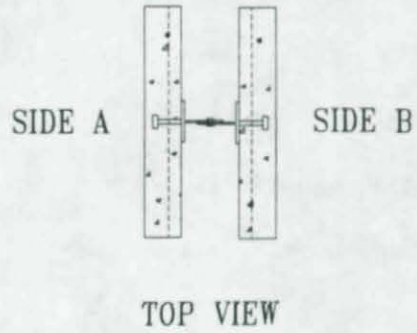
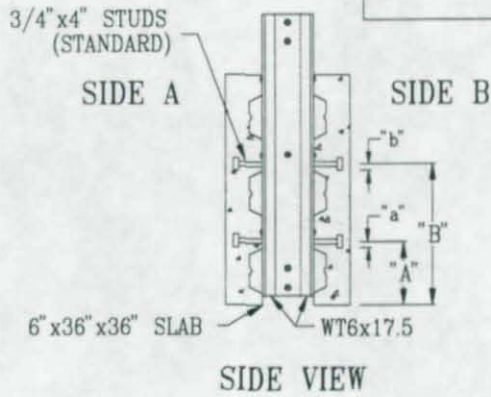
Pot. AT-1:	0.6622 in.	Pot. BT-3:	1.1244 in.
Pot. AB-2:	0.8113 in.	Pot. BB-4:	0.8849 in.
Avg. Side A:	0.7368 in.	Avg. Side B:	1.0047 in.
Avg.: 0.8707 in.			

Comments: 20% Normal Load
 Test Operator: SCC
 Rib Punching
 Stud Shearing of Both Studs on Side B

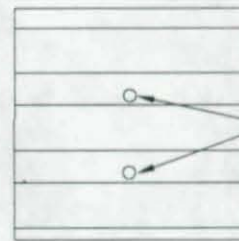


PUSH-OUT TEST LAYOUT & CRACKING SHEET

Test:	_____ D85 _____
Designation:	_____ W64-4.5N6-2.20% _____
Date:	_____ 5/5/98 _____



STUDS REMAINED ATTACHED TO TEE AFTER FAILURE



STUD SHEARING

Test D85 Data

Axial Load (kips)	Slips (in.)				Test Comments
	Pot. AT-1	Pot. AB-2	Pot. BT-3	Pot. BB-4	
0.00	0.0000	0.0000	0.0000	0.0000	BEGIN TEST
9.67	0.0000	0.0002	-0.0004	-0.0004	
14.57	0.0005	0.0004	0.0004	-0.0004	
19.79	0.0005	-0.0005	0.0037	0.0002	
24.62	0.0004	-0.0007	0.0088	0.0000	
29.71	0.0004	0.0011	0.0168	-0.0004	
34.05	-0.0005	0.0009	0.0258	-0.0002	
38.13	0.0004	0.0626	0.0703	0.0002	
39.32	0.0005	0.0848	0.0947	-0.0002	
39.51	0.0005	0.1084	0.1199	0.0000	
39.70	0.0049	0.1324	0.1456	0.0002	
39.01	0.0361	0.1707	0.1846	0.0004	
40.83	0.0645	0.2009	0.2113	0.0004	
38.57	0.0950	0.2346	0.2450	0.0114	
38.63	0.1245	0.2644	0.2776	0.0341	
38.25	0.1509	0.2901	0.3020	0.0581	
38.13	0.1784	0.3177	0.3282	0.0848	
38.82	0.2040	0.3421	0.3555	0.1086	
39.20	0.2252	0.3620	0.3860	0.1350	
40.64	0.2602	0.3968	0.4111	0.1681	
42.02	0.2881	0.4254	0.4391	0.1873	
40.26	0.3205	0.4578	0.4716	0.2203	
40.58	0.3549	0.4943	0.5118	0.2679	
41.08	0.3771	0.5151	0.5391	0.2899	
41.27	0.4043	0.5441	0.5699	0.3183	POPPING.
41.58	0.4309	0.5714	0.6051	0.3573	RIB PUNCHING.
42.96	0.4571	0.5997	0.6402	0.3904	
42.15	0.4809	0.6230	0.6653	0.4219	
42.59	0.5078	0.6519	0.6946	0.4516	

Test D85 Data

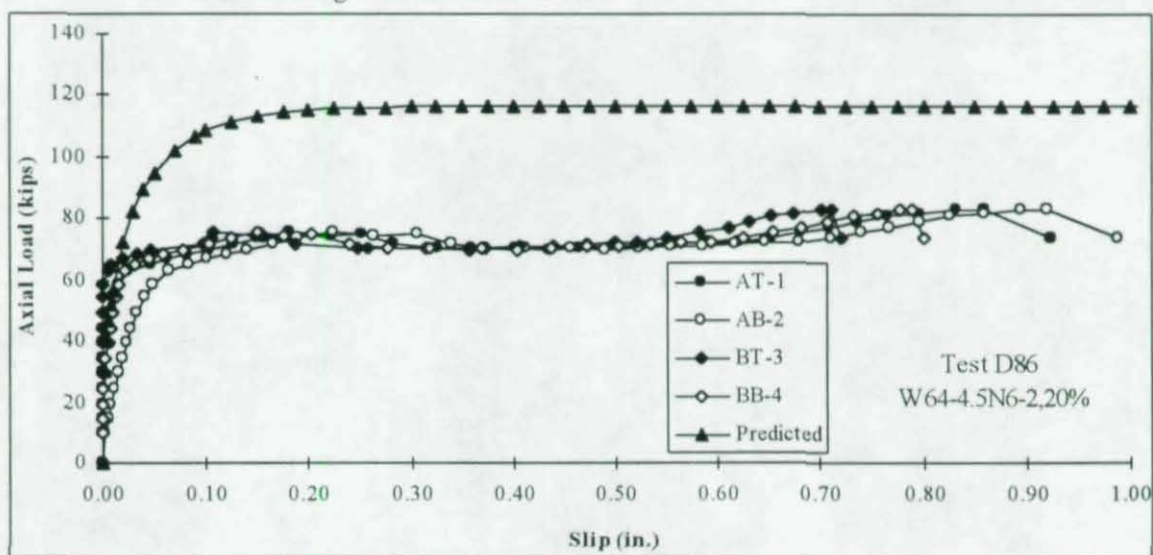
Axial Load (kips)	Slips (in.)				Test Comments
	Pot. AT-1	Pot. AB-2	Pot. BT-3	Pot. BB-4	
43.15	0.5356	0.6816	0.7274	0.4802	
41.77	0.5758	0.7226	0.7569	0.5098	
39.57	0.6144	0.7638	0.7928	0.5496	POP.
19.79	0.6622	0.8113	1.1244	0.8849	POP.

PUSH-OUT TEST SUMMARY SHEET

Test:	D86	Deck Type:	2" USD, 20 ga.
Designation:	W64-4.5N6-2,20%		
Date of Test:	5/23/98		
Concrete Strength:	4690 psi	Stud Position:	W
Concrete Weight:	144.73 pcf	Stud Size:	¼ in. x 4 in.
Concrete Thickness:	6 in.	Stud Tensile Strength:	65.813 ksi
Maximum Applied Load:	82.85 kips		
Applied Load Per Stud:	20.71 kips		
Concrete Slip at Failure:			

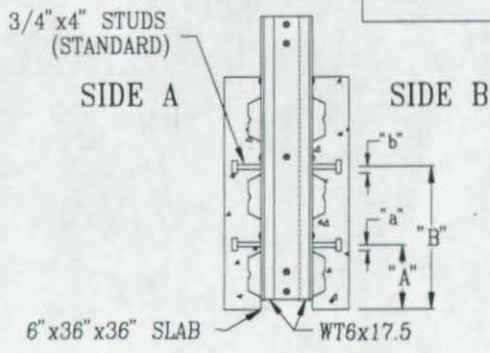
Pot. AT-1:	0.9241 in.	Pot. BT-3:	0.7206 in.
Pot. AB-2:	0.9887 in.	Pot. BB-4:	0.8005 in.
Avg. Side A:	0.9564 in.	Avg. Side B:	0.7606 in.
Avg.: 0.8585 in.			

Comments: 20% Normal Load
 Test Operator: MRR
 Rib Punching
 Stud Shearing of Bottom Stud on Side A

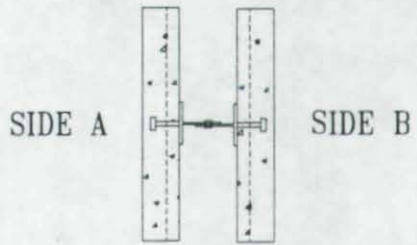


PUSH-OUT TEST LAYOUT & CRACKING SHEET

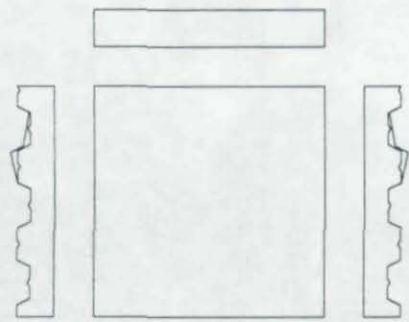
Test:	D86
Designation:	W64-4.5N6-2.20%
Date:	5/23/98



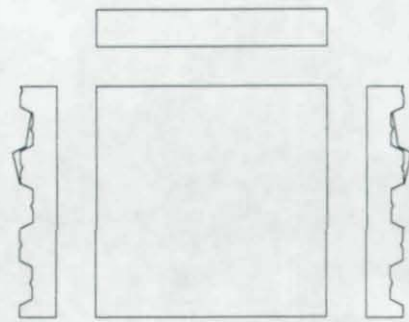
SIDE VIEW



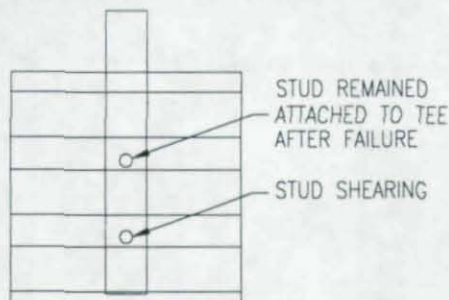
TOP VIEW



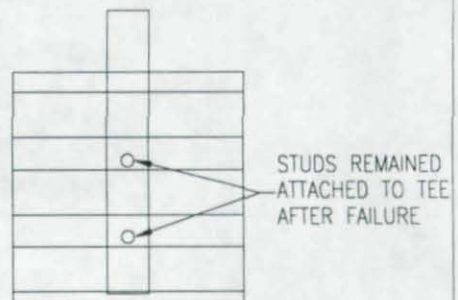
SIDE A SURFACE



SIDE B SURFACE



SIDE A BOTTOM



SIDE B BOTTOM

Test D86 Data

Axial Load (kips)	Slips (in.)				Test Comments
	Pot. AT-1	Pot. AB-2	Pot. BT-3	Pot. BB-4	
0.00	0.0000	0.0000	0.0000	0.0000	BEGIN TEST
9.61	0.0000	0.0027	-0.0004	0.0002	
14.26	-0.0002	0.0055	-0.0004	0.0002	
19.10	-0.0004	0.0081	-0.0004	-0.0004	
24.12	-0.0002	0.0119	-0.0002	0.0007	
29.27	0.0000	0.0161	0.0000	0.0015	
34.48	0.0000	0.0201	-0.0002	0.0027	
39.32	0.0000	0.0236	0.0000	0.0051	
44.22	0.0004	0.0282	-0.0004	0.0079	
49.56	0.0051	0.0337	0.0000	0.0099	
54.40	0.0095	0.0405	-0.0004	0.0128	
58.67	0.0147	0.0485	0.0000	0.0163	
63.13	0.0262	0.0635	0.0066	0.0212	POPPING NOISES.
64.82	0.0467	0.0833	0.0082	0.0309	
67.02	0.0634	0.1022	0.0201	0.0443	
68.59	0.0824	0.1210	0.0328	0.0581	
69.54	0.1037	0.1406	0.0471	0.0773	POP.
71.73	0.1260	0.1663	0.0967	0.1040	
73.87	0.1553	0.1892	0.1051	0.1253	
75.57	0.1817	0.2249	0.1082	0.1494	RIB PUNCHING.
74.37	0.2229	0.2643	0.1492	0.1764	
74.62	0.2516	0.3062	0.1544	0.2022	
71.86	0.2840	0.3395	0.1868	0.2410	
70.60	0.3252	0.3734	0.2481	0.2780	
70.16	0.3591	0.4130	0.2573	0.3186	
70.10	0.4029	0.4567	0.3137	0.3685	
69.97	0.4355	0.4893	0.3576	0.4036	
70.35	0.4651	0.5236	0.3738	0.4382	
70.85	0.4976	0.5552	0.4067	0.4728	

Test D86 Data

Axial Load (kips)	Slips (in.)				Test Comments
	Pot. AT-1	Pot. AB-2	Pot. BT-3	Pot. BB-4	
71.11	0.5270	0.5858	0.4399	0.5042	
71.48	0.5580	0.6164	0.4721	0.5342	
71.98	0.5895	0.6474	0.5003	0.5648	
72.61	0.6210	0.6794	0.5208	0.5939	
73.68	0.6529	0.7116	0.5503	0.6248	
75.63	0.6822	0.7397	0.5811	0.6541	
77.07	0.7085	0.7679	0.6111	0.6811	
79.15	0.7364	0.7975	0.6316	0.7076	
80.72	0.7651	0.8265	0.6523	0.7323	
81.60	0.7973	0.8598	0.6735	0.7554	
82.54	0.8312	0.8937	0.7012	0.7774	
82.85	0.8591	0.9204	0.7111	0.7898	
73.74	0.9241	0.9887	0.7206	0.8005	LOAD DROPPED. NO NOISE.

002232

PUSH-OUT TEST SUMMARY SHEET

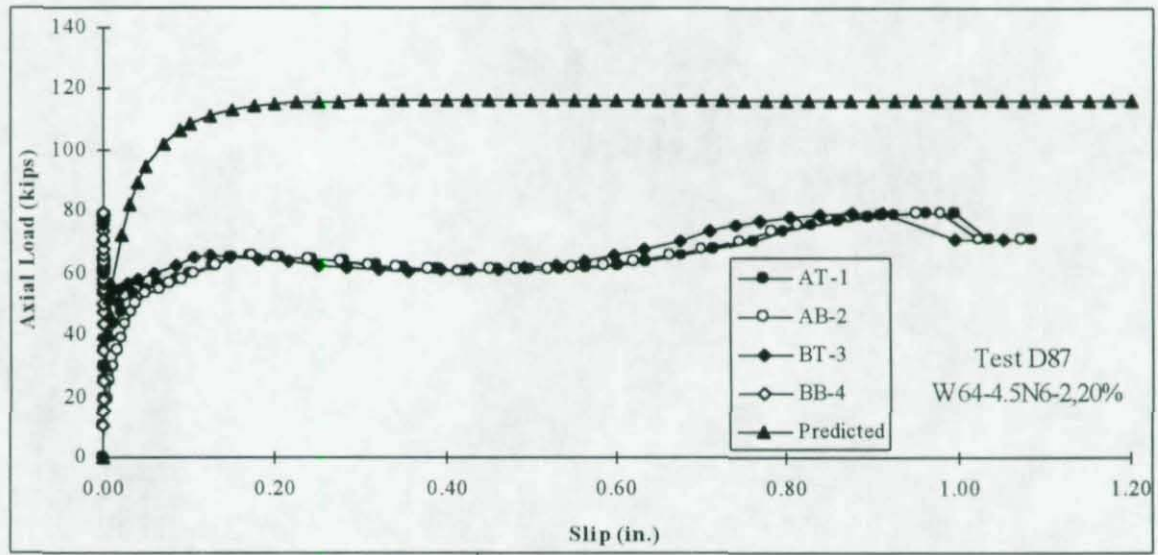
Test:	D87	Deck Type:	2" USD, 20 ga.
Designation:	W64-4.5N6-2,20%		
Date of Test:	5/26/98		
Concrete Strength:	4690 psi	Stud Position:	W
Concrete Weight:	144.73 pcf	Stud Size:	3/4 in. x 4 in.
Concrete Thickness:	6 in.	Stud Tensile Strength:	65.813 ksi
Maximum Applied Load:	79.65 kips		
Applied Load Per Stud:	19.91 kips		

Concrete Slip at Failure:

Pot. AT-1:	1.0841 in.	Pot. BT-3:	1.0520 in.
Pot. AB-2:	1.0729 in.	Pot. BB-4:	0.0000 in.
Avg. Side A:	1.0785 in.	Avg. Side B:	0.5260 in.

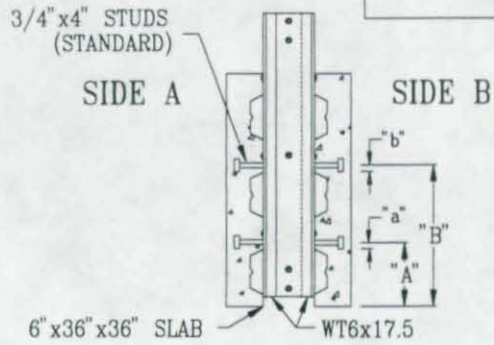
Avg.: 0.8023 in.

Comments: 20% Normal Load
 Test Operator: MRR
 Rib Punching
 Stud Shearing of Both Studs on Side A

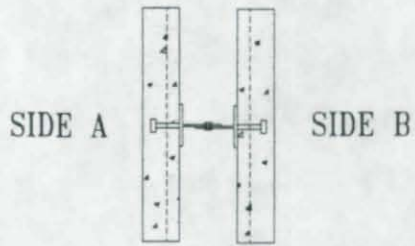


PUSH-OUT TEST LAYOUT & CRACKING SHEET

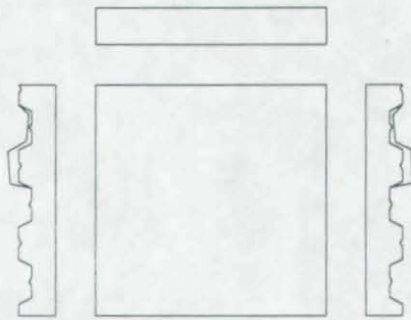
Test:	D87
Designation:	W64-4.5N6-2.20%
Date:	5/26/98



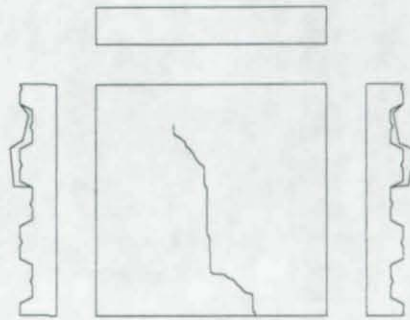
SIDE VIEW



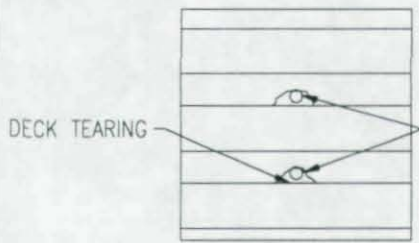
TOP VIEW



SIDE A SURFACE

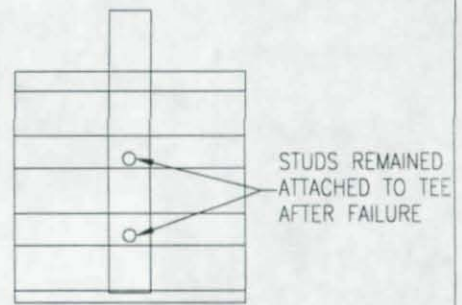


SIDE B SURFACE



SIDE A BOTTOM

STUD SHEARING
& CONCRETE CRUSHING



SIDE B BOTTOM

STUDS REMAINED
ATTACHED TO TEE
AFTER FAILURE

Test D87 Data

Axial Load (kips)	Slips (in.)				Test Comments
	Pot. AT-1	Pot. AB-2	Pot. BT-3	Pot. BB-4	
0.00	0.0000	0.0000	0.0000	0.0000	BEGIN TEST
10.55	0.0005	0.0004	-0.0002	0.0002	
15.01	0.0004	0.0009	-0.0002	0.0002	
19.35	0.0004	0.0040	0.0000	0.0002	
24.69	0.0004	0.0070	-0.0002	0.0002	
29.33	0.0004	0.0110	-0.0004	0.0002	
34.55	0.0005	0.0161	-0.0005	0.0002	
39.01	0.0070	0.0214	-0.0004	0.0000	
43.34	0.0128	0.0266	-0.0002	0.0004	
47.24	0.0201	0.0324	0.0002	-0.0002	
50.00	0.0196	0.0386	0.0031	0.0000	
53.14	0.0353	0.0489	0.0073	0.0000	
54.77	0.0482	0.0648	0.0185	0.0002	
56.85	0.0643	0.0782	0.0271	0.0000	
58.17	0.0842	0.0917	0.0396	0.0000	POPPING NOISES.
59.99	0.1002	0.1062	0.0584	0.0002	
62.75	0.1260	0.1304	0.0852	0.0002	
64.76	0.1474	0.1507	0.1066	0.0000	
65.70	0.1716	0.1738	0.1247	0.0002	
65.14	0.2064	0.2024	0.1478	0.0000	RIB PUNCHING BOTH SIDES.
64.13	0.2445	0.2381	0.1802	0.0002	
63.44	0.2815	0.2762	0.2166	0.0002	
62.75	0.3179	0.3088	0.2514	0.0000	DECK DEBONDING.
61.87	0.3514	0.3423	0.2840	0.0002	
60.80	0.3901	0.3793	0.3203	0.0000	
60.55	0.4228	0.4141	0.3556	0.0000	
60.80	0.4617	0.4525	0.3945	0.0002	
60.87	0.4994	0.4838	0.4300	0.0002	
61.12	0.5355	0.5197	0.4626	0.0000	

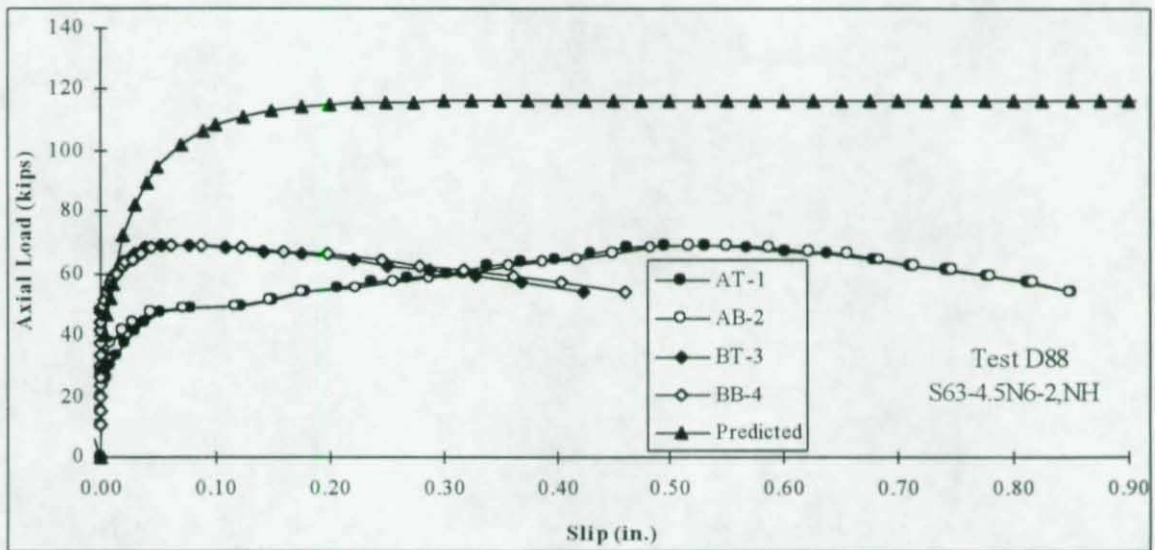
Test D87 Data

Axial Load (kips)	Slips (in.)				Test Comments
	Pot. AT-1	Pot. AB-2	Pot. BT-3	Pot. BB-4	
61.62	0.5639	0.5479	0.4917	0.0000	CRACKING NOISES.
62.69	0.6016	0.5860	0.5296	0.0000	
63.94	0.6360	0.6217	0.5618	0.0004	
65.95	0.6770	0.6631	0.5988	0.0002	
67.84	0.7149	0.7006	0.6333	0.0000	
70.54	0.7607	0.7451	0.6750	0.0002	
73.62	0.7972	0.7821	0.7109	0.0004	
75.50	0.8296	0.8129	0.7415	0.0000	
77.14	0.8598	0.8398	0.7688	0.0000	
78.20	0.8948	0.8735	0.8037	0.0000	
79.02	0.9261	0.9092	0.8380	0.0000	
79.65	0.9627	0.9504	0.8759	0.0000	
79.40	0.9964	0.9806	0.9129	0.0000	
71.29	1.0355	1.0253	0.9958	0.0000	
70.67	1.0841	1.0729	1.0520	0.0000	

PUSH-OUT TEST SUMMARY SHEET

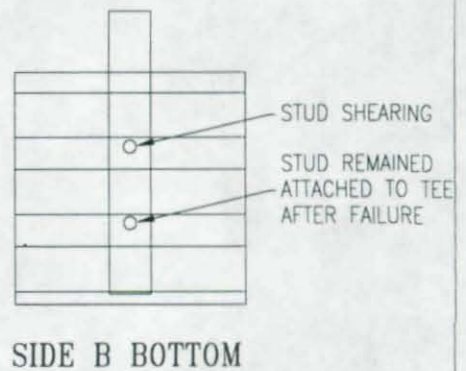
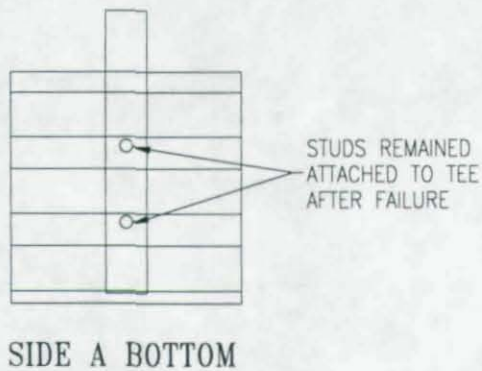
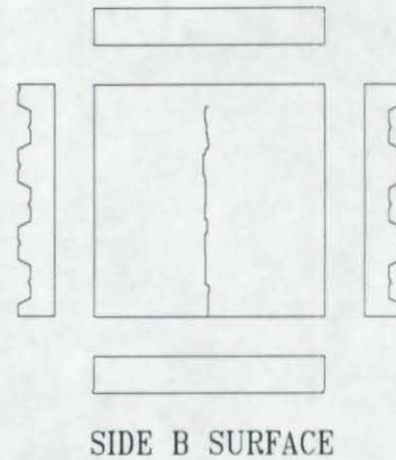
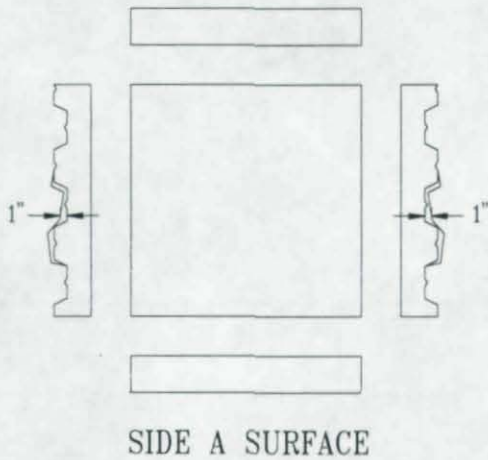
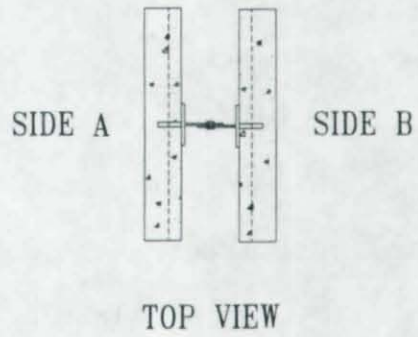
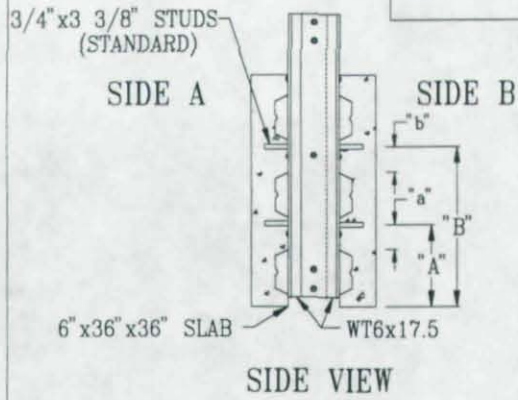
Test:	D88	Deck Type:	2" USD, 20 ga.
Designation:	S63-4.5N6-2,NH		
Date of Test:	5/24/98		
Concrete Strength:	4690 psi	Stud Position:	S
Concrete Weight:	144.73 pcf	Stud Size:	¾ in. x 3 3/8 in. (no head)
Concrete Thickness:	6 in.	Stud Tensile Strength:	65.813 ksi
Maximum Applied Load:	69.22 kips		
Applied Load Per Stud:	17.31 kips		
Concrete Slip at Failure:			
Pot. AT-1:	0.8506 in.	Pot. BT-3:	0.4239 in.
Pot. AB-2:	0.8484 in.	Pot. BB-4:	0.4606 in.
Avg. Side A:	0.8495 in.	Avg. Side B:	0.4423 in.
	Avg.: 0.6459 in.		

Comments: 10% Normal Load
 Test Operator: MRR
 Head Cut off of Stud & Stud Shank Greased
 Stud Shearing of Top Stud on Side B



PUSH-OUT TEST LAYOUT & CRACKING SHEET

Test:	_____ D88 _____
Designation:	_____ S63-4.5N6-2,NH _____
Date:	_____ 5/24/98 _____



002235

Test D88 Data

Axial Load (kips)	Slips (in.)				Test
	Pot. AT-1	Pot. AB-2	Pot. BT-3	Pot. BB-4	Comments
0.00	0.0000	0.0000	0.0000	0.0000	BEGIN TEST
10.30	0.0000	-0.0104	0.0000	-0.0002	
15.08	0.0000	-0.0231	0.0000	0.0004	
19.47	0.0000	-0.0150	0.0000	-0.0005	
23.74	0.0024	-0.0101	0.0000	0.0000	
26.38	0.0059	-0.0057	0.0002	0.0002	
30.53	0.0081	-0.0057	0.0000	0.0002	
33.79	0.0139	0.0031	0.0005	0.0004	
37.31	0.0203	0.0092	0.0004	0.0004	
41.08	0.0291	0.0185	0.0004	0.0002	
44.22	0.0383	0.0288	0.0002	0.0002	
47.17	0.0529	0.0443	0.0007	0.0005	
48.56	0.0789	0.0720	0.0015	0.0004	AXIAL LOAD COMING OUT IN NL
49.06	0.1225	0.1179	0.0024	0.0015	
51.44	0.1514	0.1476	0.0037	0.0035	
53.64	0.1787	0.1764	0.0053	0.0049	
55.15	0.2066	0.2232	0.0071	0.0070	
57.16	0.2375	0.2560	0.0093	0.0095	DECK DEBONDING SIDE A.
58.61	0.2692	0.2881	0.0112	0.0114	
59.99	0.3049	0.3190	0.0128	0.0134	
62.19	0.3392	0.3582	0.0168	0.0187	
63.51	0.3694	0.3882	0.0192	0.0214	SPECIMEN VERTICAL!
64.70	0.3996	0.4192	0.0245	0.0282	POPPING NOISES.
66.58	0.4298	0.4498	0.0300	0.0350	
68.22	0.4629	0.4829	0.0383	0.0445	
69.22	0.4963	0.5164	0.0529	0.0610	
69.22	0.5307	0.5505	0.0767	0.0875	
68.47	0.5681	0.5877	0.1093	0.1236	DECK DEBONDING SIDE B.
67.27	0.6018	0.6215	0.1425	0.1595	

Test D88 Data

Axial Load (kips)	Slips (in.)				Test Comments
	Pot. AT-1	Pot. AB-2	Pot. BT-3	Pot. BB-4	
66.21	0.6375	0.6563	0.1764	0.1985	ENDED TEST DUE TO LOAD LOSS.
64.20	0.6792	0.6843	0.2218	0.2469	
62.63	0.7094	0.7140	0.2520	0.2804	
60.87	0.7424	0.7475	0.2882	0.3185	
59.23	0.7776	0.7810	0.3285	0.3613	
57.29	0.8116	0.8180	0.3696	0.4040	
53.89	0.8506	0.8484	0.4239	0.4606	

PUSH-OUT TEST SUMMARY SHEET

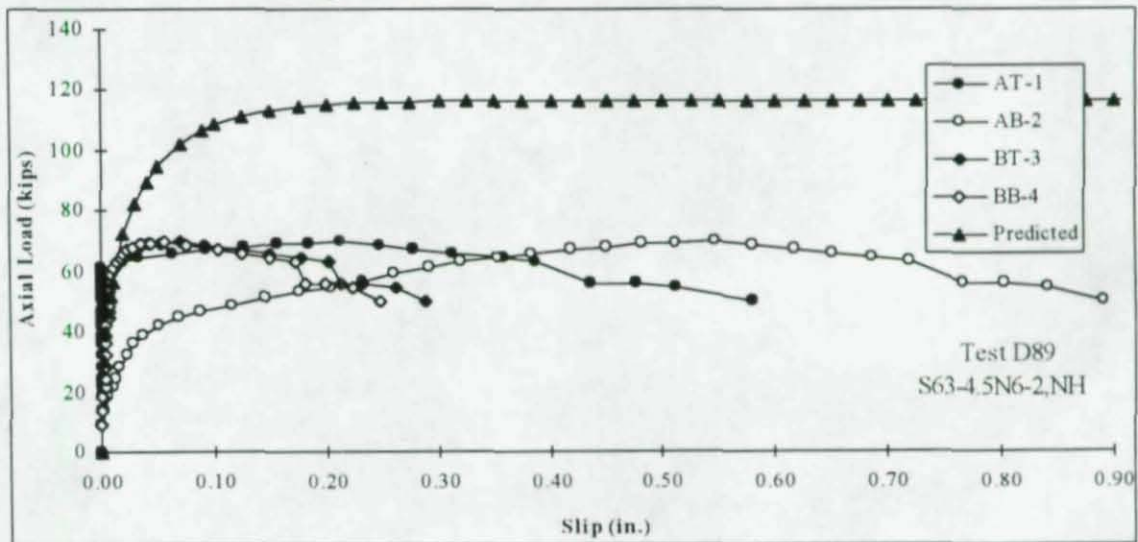
Test:	D89	Deck Type:	2" USD, 20 ga.
Designation:	S63-4.5N6-2,NH		
Date of Test:	5/24/98		
Concrete Strength:	4690 psi	Stud Position:	S
Concrete Weight:	144.73 pcf	Stud Size:	3/4 in. x 3 3/8 in. (no head)
Concrete Thickness:	6 in.	Stud Tensile Strength:	65.813 ksi
Maximum Applied Load:	69.41 kips		
Applied Load Per Stud:	17.35 kips		

Concrete Slip at Failure:

Pot. AT-1: 0.5792 in.	Pot. BT-3: 0.2881 in.
Pot. AB-2: 0.8907 in.	Pot. BB-4: 0.2476 in.
Avg. Side A: 0.7350 in.	Avg. Side B: 0.2679 in.

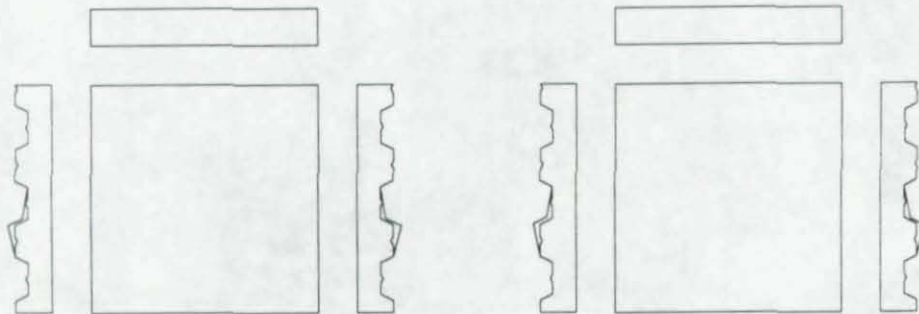
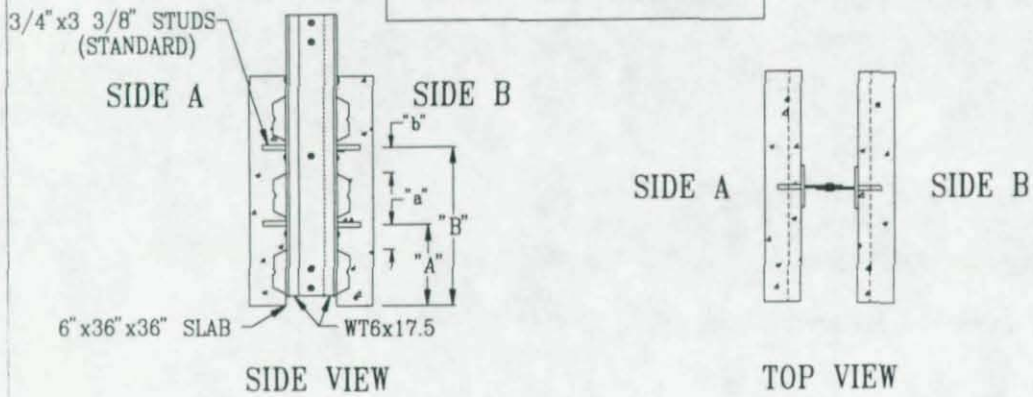
Avg.: 0.5014 in.

Comments: 10% Normal Load
 Test Operator: MRR
 Head Cut off of Stud & Stud Shank Greased
 Stud Shearing of Both Studs on Side A



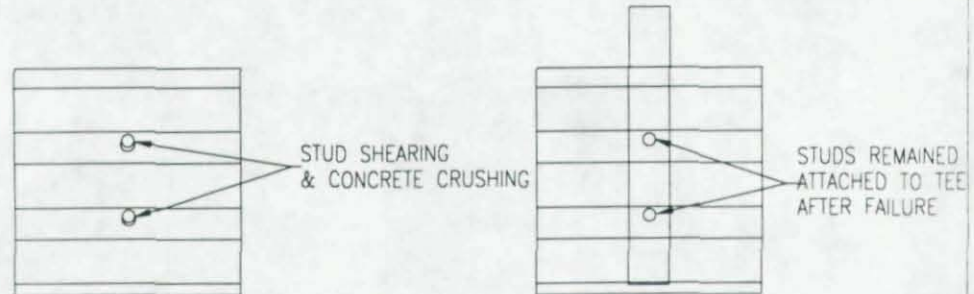
PUSH-OUT TEST LAYOUT & CRACKING SHEET

Test:	D89
Designation:	S63-4.5N6-2.NH
Date:	5/24/98



SIDE A SURFACE

SIDE B SURFACE



SIDE A BOTTOM

SIDE B BOTTOM

Test D89 Data

Axial Load (kips)	Slips (in.)				Test Comments
	Pot. AT-1	Pot. AB-2	Pot. BT-3	Pot. BB-4	
0.00	0.0000	0.0000	0.0000	0.0000	BEGIN TEST
9.42	0.0004	0.0000	-0.0002	-0.0004	
13.82	0.0002	0.0020	-0.0004	-0.0002	
18.09	0.0004	0.0051	-0.0005	-0.0004	
21.73	0.0002	0.0110	0.0027	0.0031	
24.62	0.0005	0.0117	0.0027	0.0033	
28.14	0.0002	0.0161	0.0029	0.0037	
32.41	0.0004	0.0222	0.0022	0.0038	
35.87	0.0004	0.0282	0.0022	0.0037	
39.07	0.0002	0.0377	0.0022	0.0042	
42.09	0.0004	0.0509	0.0022	0.0040	POP.
44.79	0.0007	0.0690	0.0053	0.0071	
46.92	0.0004	0.0877	0.0049	0.0070	
48.74	0.0009	0.1168	0.0049	0.0073	
51.07	0.0005	0.1454	0.0051	0.0075	AXIAL LOAD COMING OUT IN NL.
52.95	0.0007	0.1754	0.0055	0.0075	LEANING SLIGHTLY TO SIDE B.
54.46	0.0007	0.2033	0.0068	0.0073	
56.60	0.0005	0.2328	0.0071	0.0086	
58.98	0.0005	0.2600	0.0084	0.0090	
60.99	0.0007	0.2912	0.0125	0.0112	DECK DEBONDING SIDE A.
63.00	0.0200	0.3207	0.0161	0.0137	
64.20	0.0341	0.3525	0.0196	0.0168	
65.64	0.0639	0.3833	0.0240	0.0198	
67.09	0.0923	0.4177	0.0291	0.0234	
67.90	0.1271	0.4505	0.0341	0.0280	SPECIMEN IS VERTICAL.
69.16	0.1560	0.4814	0.0418	0.0344	
69.16	0.1839	0.5117	0.0529	0.0434	
69.41	0.2132	0.5472	0.0701	0.0566	
68.66	0.2474	0.5807	0.0917	0.0758	POPPING NOISES.

Test D89 Data

Axial Load (kips)	Slips (in.)				Test Comments
	Pot. AT-1	Pot. AB-2	Pot. BT-3	Pot. BB-4	
66.83	0.2782	0.6164	0.1247	0.1033	DECK DEBONDING SIDE B.
65.64	0.3122	0.6501	0.1496	0.1253	
64.57	0.3584	0.6860	0.1778	0.1498	
62.88	0.3859	0.7186	0.2022	0.1727	
56.16	0.4360	0.7671	0.2130	0.1815	LOAD DROPPED WHEN LOADED.
55.59	0.4758	0.8025	0.2322	0.1987	
54.65	0.5113	0.8417	0.2617	0.2238	LOAD DROPPED. ENDED TEST.
49.75	0.5792	0.8907	0.2881	0.2476	

002237

PUSH-OUT TEST SUMMARY SHEET

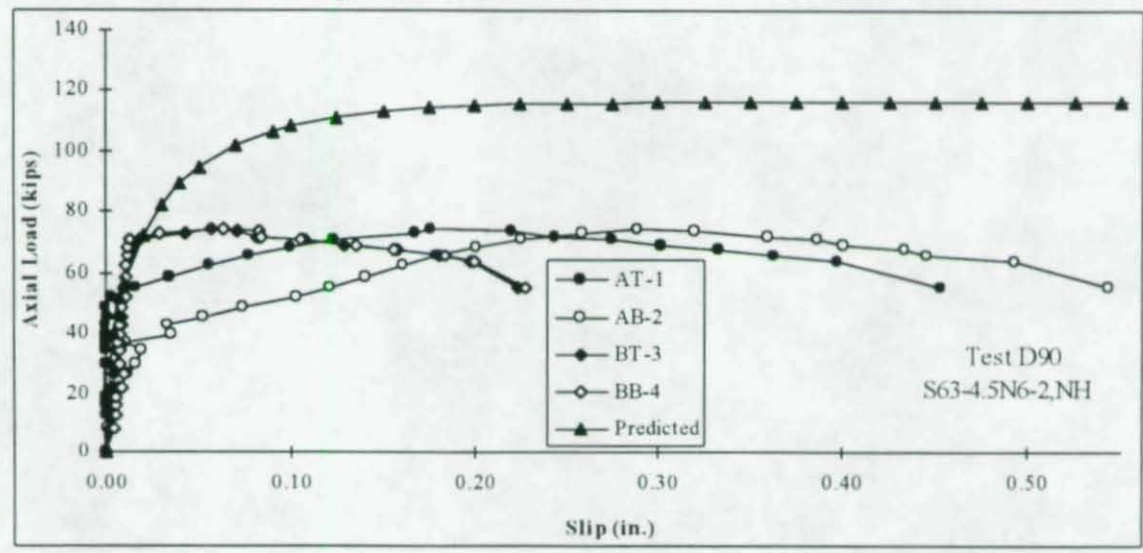
Test:	D90	Deck Type:	2" USD, 20 ga.
Designation:	S63-4.5N6-2,NH		
Date of Test:	5/23/98		
Concrete Strength:	4690 psi	Stud Position:	S
Concrete Weight:	144.73 pcf	Stud Size:	¾ in. x 3 3/8 in. (no head)
Concrete Thickness:	6 in.	Stud Tensile Strength:	65.813 ksi
Maximum Applied Load:	74.06 kips		
Applied Load Per Stud:	18.52 kips		

Concrete Slip at Failure:

Pot. AT-1: 0.4532 in.	Pot. BT-3: 0.2240 in.
Pot. AB-2: 0.5439 in.	Pot. BB-4: 0.2276 in.
Avg. Side A: 0.4986 in.	Avg. Side B: 0.2258 in.

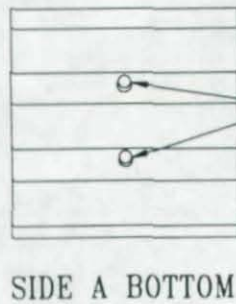
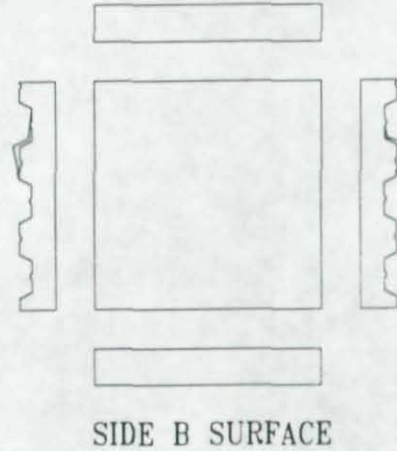
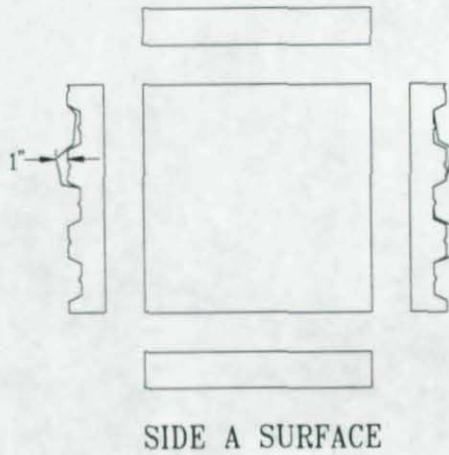
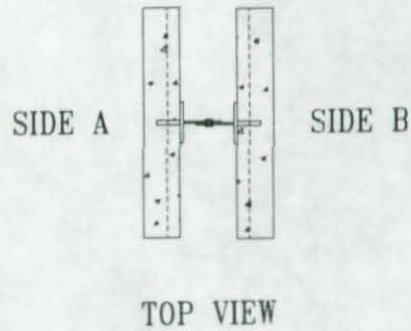
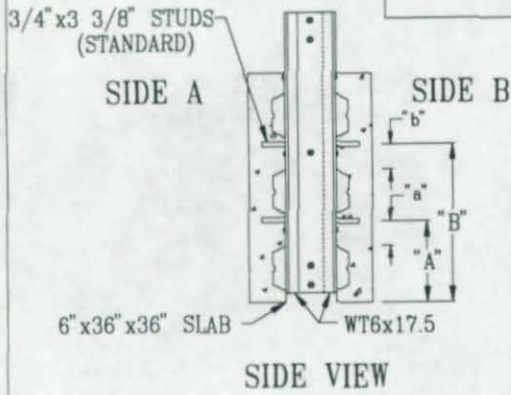
Avg.: 0.3622 in.

Comments: 10% Normal Load
 Test Operator: MRR
 Head Cut off of Stud & Stud Shank Greased
 Stud Shearing of Both Studs on Side A

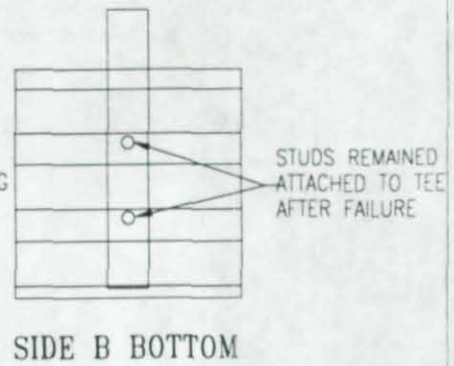


PUSH-OUT TEST LAYOUT & CRACKING SHEET

Test:	_____ D90 _____
Designation:	_____ S63-4.5N6-2.NH _____
Date:	_____ 5/23/98 _____



STUD SHEARING
& CONCRETE CRUSHING



STUDS REMAINED
ATTACHED TO TEE
AFTER FAILURE

Test D90 Data

Axial Load (kips)	Slips (in.)				Test Comments
	Pot. AT-1	Pot. AB-2	Pot. BT-3	Pot. BB-4	
0.00	0.0000	0.0000	0.0000	0.0000	BEGIN TEST
7.79	-0.0005	0.0007	0.0020	0.0040	
12.63	0.0002	0.0016	0.0035	0.0051	
15.52	-0.0002	0.0057	0.0031	0.0057	
18.28	0.0000	0.0057	0.0037	0.0055	
21.86	-0.0005	0.0077	0.0033	0.0084	
26.01	-0.0005	0.0119	0.0038	0.0093	
29.71	0.0000	0.0159	0.0062	0.0071	
33.86	0.0000	0.0198	0.0059	0.0071	
36.68	0.0000	0.0104	0.0071	0.0060	
39.64	0.0004	0.0352	0.0070	0.0073	
42.78	0.0004	0.0328	0.0084	0.0077	
45.16	0.0005	0.0522	0.0082	0.0081	POPPING NOISES.
48.62	0.0002	0.0740	0.0084	0.0081	
51.70	0.0035	0.1033	0.0104	0.0110	
55.09	0.0163	0.1218	0.0104	0.0110	
58.73	0.0346	0.1408	0.0104	0.0110	
62.50	0.0562	0.1608	0.0108	0.0112	
65.77	0.0776	0.1796	0.0130	0.0114	POPPING NOISES. DECK DEBONDING.
68.40	0.1000	0.2011	0.0145	0.0117	
70.98	0.1236	0.2256	0.0187	0.0132	
72.99	0.1681	0.2589	0.0429	0.0293	
74.06	0.1758	0.2886	0.0571	0.0637	
73.37	0.2199	0.3205	0.0709	0.0830	
71.73	0.2443	0.3595	0.0817	0.0841	
70.73	0.2745	0.3864	0.1077	0.1057	AXIAL LOAD COMING OUT IN NL
69.22	0.3023	0.4005	0.1293	0.1351	
67.90	0.3326	0.4342	0.1577	0.1557	DECK ROTATION.
65.45	0.3635	0.4463	0.1807	0.1837	

Test D90 Data

Axial Load (kips)	Slips (in.)				Test Comments
	Pot. AT-1	Pot. AB-2	Pot. BT-3	Pot. BB-4	
63.44	0.3976	0.4935	0.1974	0.2002	SOFT POPS. LOAD DROPPED. ENDED TEST
55.34	0.4532	0.5439	0.2240	0.2276	

PUSH-OUT TEST SUMMARY SHEET

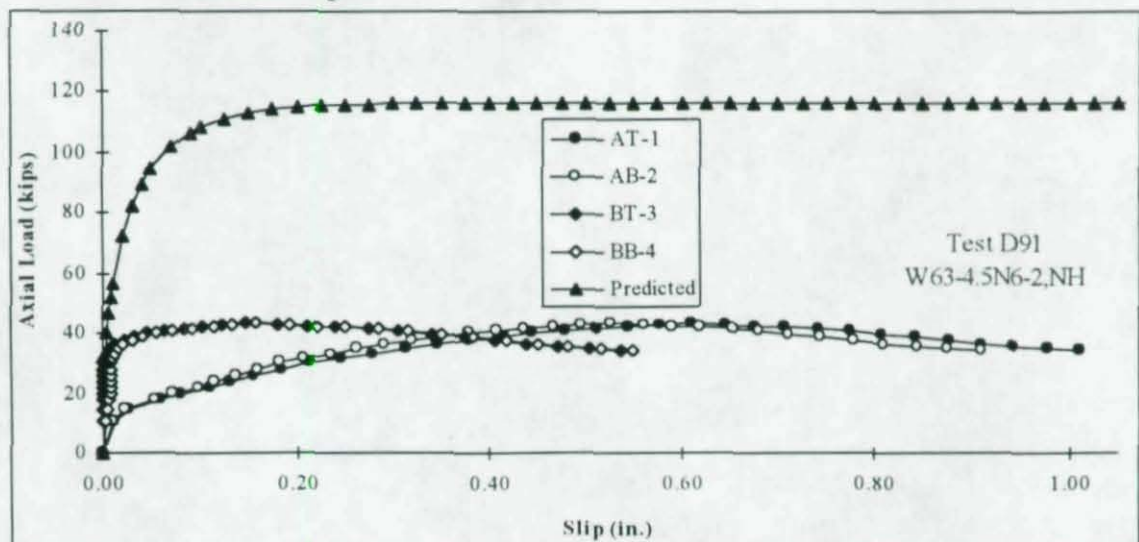
Test:	D91	Deck Type:	2" USD, 20 ga.
Designation:	W63-4.5N6-2,NH		
Date of Test:	5/24/98		
Concrete Strength:	4690 psi	Stud Position:	W
Concrete Weight:	144.73 pcf	Stud Size:	3/4 in. x 3 3/8 in. (no head)
Concrete Thickness:	6 in.	Stud Tensile Strength:	65.813 ksi
Maximum Applied Load:	43.28 kips		
Applied Load Per Stud:	10.82 kips		

Concrete Slip at Failure:

Pot. AT-1:	1.0104 in.	Pot. BT-3:	0.5371 in.
Pot. AB-2:	0.9107 in.	Pot. BB-4:	0.5492 in.
Avg. Side A:	0.9606 in.	Avg. Side B:	0.5432 in.

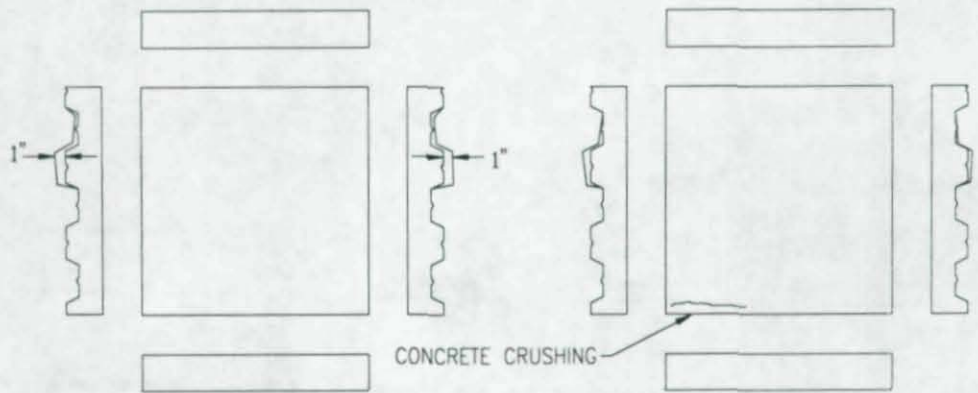
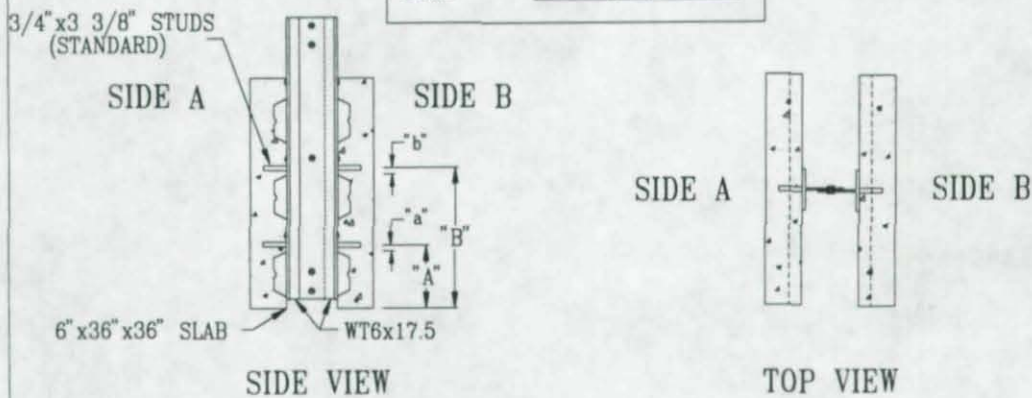
Avg.: 0.7519 in.

Comments: 10% Normal Load
 Test Operator: MRR
 Head Cut off of Stud & Stud Shank Greased
 Rib Punching



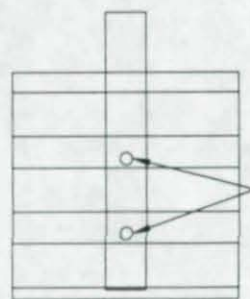
PUSH-OUT TEST LAYOUT & CRACKING SHEET

Test:	D91
Designation:	W63-4.5N6-2.NH
Date:	5/24/98

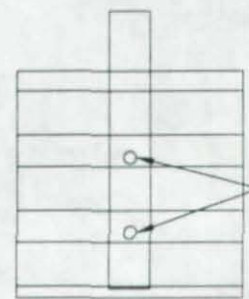


SIDE A SURFACE

SIDE B SURFACE



SIDE A BOTTOM



SIDE B BOTTOM

STUDS REMAINED ATTACHED TO TEE AFTER FAILURE

STUDS REMAINED ATTACHED TO TEE AFTER FAILURE

Test D91 Data

Axial Load (kips)	Slips (in.)				Test Comments
	Pot. AT-1	Pot. AB-2	Pot. BT-3	Pot. BB-4	
0.00	0.0000	0.0000	0.0000	0.0000	BEGIN TEST
10.36	0.0125	0.0095	-0.0005	0.0027	
14.38	0.0266	0.0220	-0.0005	0.0037	
18.03	0.0593	0.0526	-0.0002	0.0070	
19.91	0.0809	0.0723	-0.0004	0.0077	
21.92	0.1101	0.0987	-0.0002	0.0081	
23.56	0.1308	0.1148	-0.0004	0.0079	
25.69	0.1557	0.1370	-0.0004	0.0084	
27.89	0.1848	0.1595	-0.0002	0.0081	POPPING NOISES.
30.03	0.2141	0.1818	-0.0002	0.0086	
31.85	0.2463	0.2079	0.0016	0.0112	DECK DEBONDING SIDE A.
33.17	0.2793	0.2357	0.0046	0.0128	
34.55	0.3128	0.2633	0.0082	0.0163	RIB PUNCHING SIDE A.
36.12	0.3472	0.2914	0.0126	0.0207	
37.37	0.3798	0.3194	0.0218	0.0306	
38.57	0.4157	0.3514	0.0330	0.0414	
39.95	0.4457	0.3787	0.0454	0.0546	AXIAL LOAD COMING OUT IN NL
40.77	0.4798	0.4089	0.0641	0.0711	POPPING NOISES.
41.33	0.5128	0.4371	0.0833	0.0921	
42.02	0.5452	0.4673	0.1031	0.1154	
42.96	0.5774	0.4972	0.1227	0.1340	
43.28	0.6105	0.5272	0.1474	0.1582	RIB PUNCHING SIDE B.
42.59	0.6455	0.5618	0.1813	0.1927	DECK DEBONDING SIDE B.
42.27	0.6763	0.5913	0.2106	0.2210	
41.96	0.7072	0.6193	0.2401	0.2502	
41.21	0.7428	0.6538	0.2752	0.2844	
40.52	0.7748	0.6801	0.3056	0.3166	
39.76	0.8081	0.7118	0.3399	0.3507	
38.94	0.8429	0.7450	0.3745	0.3844	

Test D91 Data

Axial Load (kips)	Slips (in.)				Test Comments
	Pot. AT-1	Pot. AB-2	Pot. BT-3	Pot. BB-4	
37.50	0.8785	0.7787	0.4069	0.4192	ENDED TEST DUE TO DEC. IN LOAD
36.43	0.9107	0.8102	0.4395	0.4516	
35.74	0.9435	0.8440	0.4714	0.4818	
34.67	0.9777	0.8766	0.5042	0.5161	
33.86	1.0104	0.9107	0.5371	0.5492	

PUSH-OUT TEST SUMMARY SHEET

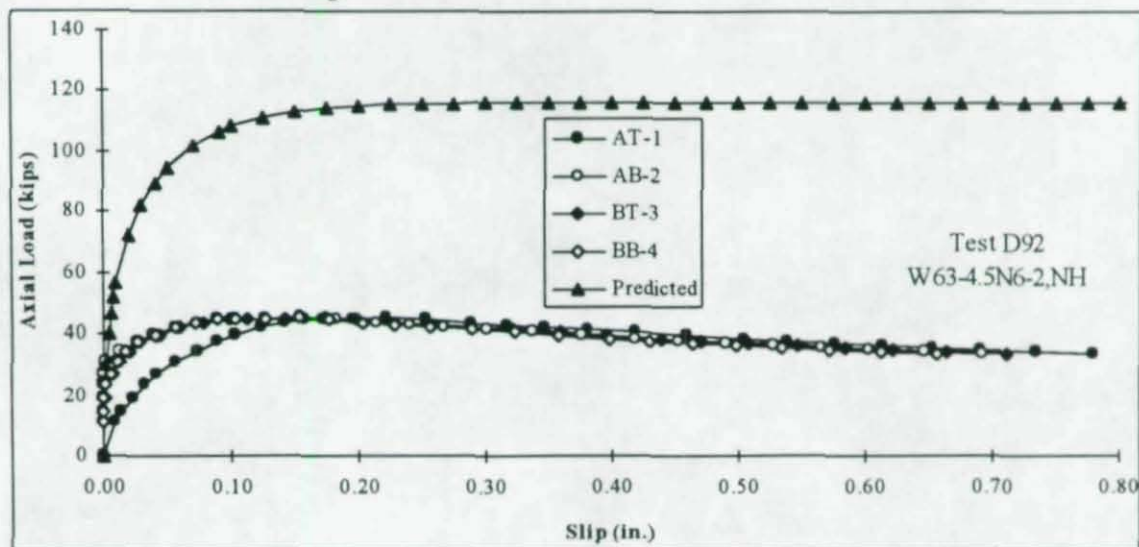
Test:	D92	Deck Type:	2" USD, 20 ga.
Designation:	W63-4.5N6-2,NH		
Date of Test:	5/25/98		
Concrete Strength:	4690 psi	Stud Position:	W
Concrete Weight:	144.73 pcf	Stud Size:	3/4 in. x 3 3/8 in. (no head)
Concrete Thickness:	6 in.	Stud Tensile Strength:	65.813 ksi
Maximum Applied Load:	45.41 kips		
Applied Load Per Stud:	11.35 kips		

Concrete Slip at Failure:

Pot. AT-1: 0.7792 in.	Pot. BT-3: 0.7102 in.
Pot. AB-2: 0.6915 in.	Pot. BB-4: 0.6560 in.
Avg. Side A: 0.7354 in.	Avg. Side B: 0.6831 in.

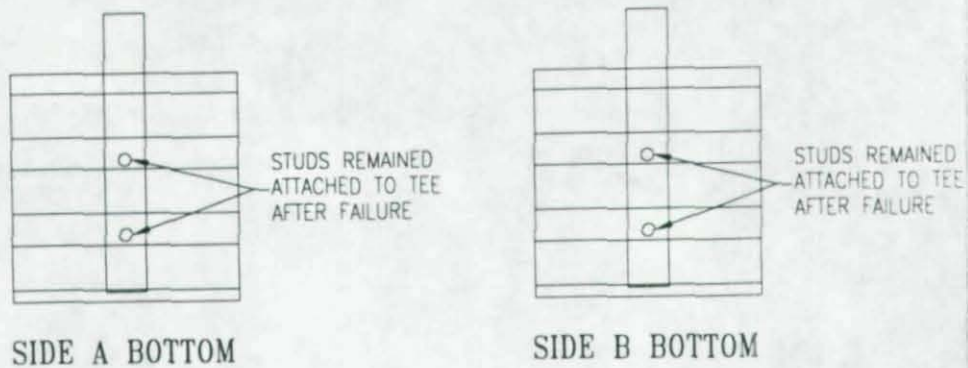
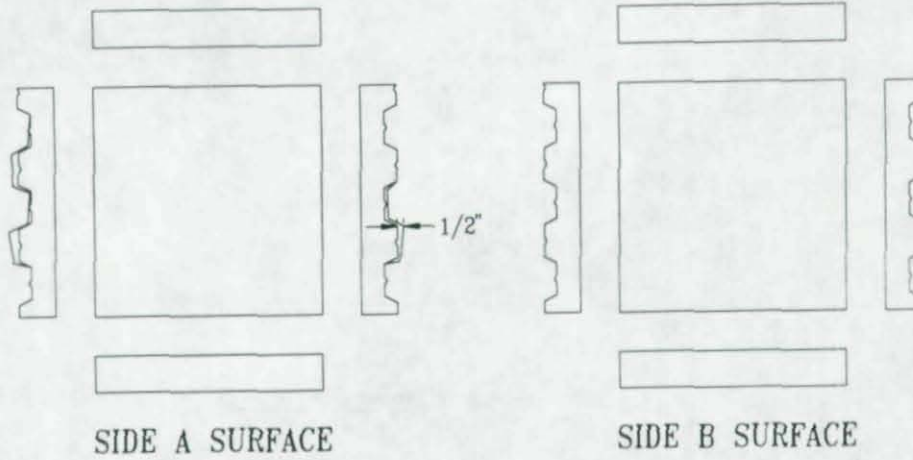
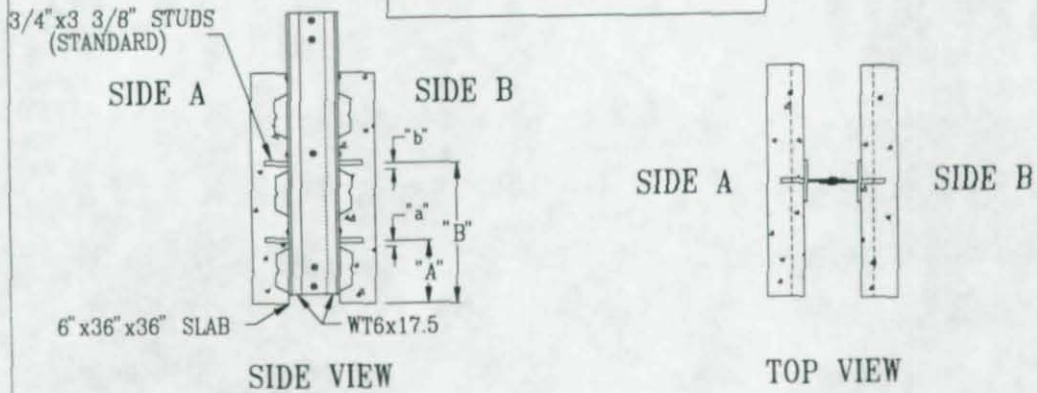
Avg.: 0.7092 in.

Comments: 10% Normal Load
 Test Operator: MRR
 Head Cut off of Stud & Stud Shank Greased
 Rib Punching



PUSH-OUT TEST LAYOUT & CRACKING SHEET

Test:	D92
Designation:	W63-4.5N6-2.NH
Date:	5/25/98



Test D92 Data

Axial Load (kips)	Slips (in.)				Test Comments
	Pot. AT-1	Pot. AB-2	Pot. BT-3	Pot. BB-4	
0.00	0.0000	0.0000	0.0000	0.0000	BEGIN TEST
11.24	0.0088	-0.0007	-0.0005	0.0002	
14.20	0.0137	-0.0004	-0.0004	0.0002	
19.10	0.0233	0.0000	0.0011	-0.0002	
23.68	0.0324	-0.0002	0.0020	0.0016	
27.26	0.0423	0.0004	0.0071	0.0059	
31.09	0.0557	0.0009	0.0125	0.0110	
34.48	0.0734	0.0123	0.0200	0.0178	
37.19	0.0890	0.0260	0.0288	0.0260	
39.70	0.1038	0.0392	0.0438	0.0410	
41.83	0.1227	0.0570	0.0592	0.0555	
43.28	0.1416	0.0734	0.0780	0.0714	POP.
44.85	0.1580	0.0894	0.0985	0.0894	
44.54	0.1712	0.1026	0.1132	0.1029	SLIGHT RIB PUNCHING.
44.97	0.1948	0.1260	0.1425	0.1273	
45.41	0.2225	0.1540	0.1731	0.1535	
44.60	0.2538	0.1822	0.1978	0.1767	
43.34	0.2884	0.2137	0.2274	0.2035	
42.84	0.3175	0.2403	0.2584	0.2287	
42.15	0.3474	0.2677	0.2879	0.2560	
41.65	0.3815	0.3022	0.3223	0.2897	
41.02	0.4194	0.3370	0.3600	0.3230	
39.76	0.4595	0.3760	0.3956	0.3580	
38.13	0.5052	0.4183	0.4393	0.3989	DECK DEBONDING SIDE A.
37.19	0.5391	0.4531	0.4708	0.4302	
36.62	0.5759	0.4906	0.5074	0.4644	
35.99	0.6148	0.5283	0.5463	0.4990	
35.43	0.6525	0.5657	0.5838	0.5336	
34.80	0.6913	0.6030	0.6215	0.5714	

Test D92 Data

Axial Load (kips)	Slips (in.)				Test Comments
	Pot. AT-1	Pot. AB-2	Pot. BT-3	Pot. BB-4	
34.36	0.7342	0.6463	0.6640	0.6127	ENDED TEST DUE TO LOSS OF LOAD.
33.79	0.7792	0.6915	0.7102	0.6560	

PUSH-OUT TEST SUMMARY SHEET

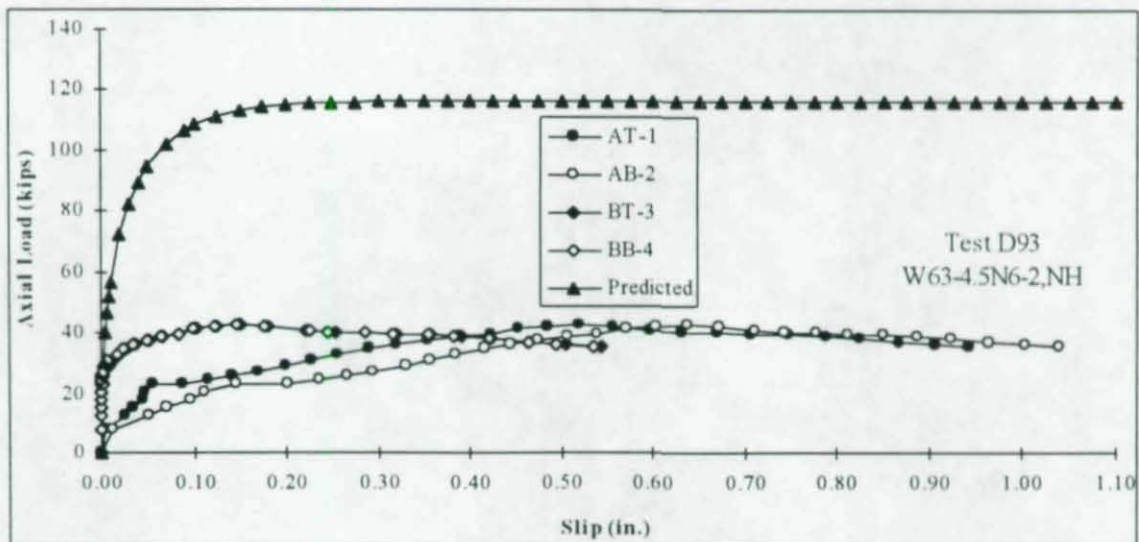
Test:	D93	Deck Type:	2" USD, 20 ga.
Designation:	W63-4.5N6-2,NH		
Date of Test:	5/25/98		
Concrete Strength:	4690 psi	Stud Position:	W
Concrete Weight:	144.73 pcf	Stud Size:	3/4 in. x 3 3/8 in. (no head)
Concrete Thickness:	6 in.	Stud Tensile Strength:	65.813 ksi
Maximum Applied Load:	42.90 kips		
Applied Load Per Stud:	10.73 kips		

Concrete Slip at Failure:

Pot. AT-1:	0.9438 in.	Pot. BT-3:	0.5446 in.
Pot. AB-2:	1.0401 in.	Pot. BB-4:	0.5340 in.
Avg. Side A:	0.9920 in.	Avg. Side B:	0.5393 in.

Avg.: 0.7656 in.

Comments: 10% Normal Load
 Test Operator: MRR
 Head Cut off of Stud & Stud Shank Greased
 Rib Punching

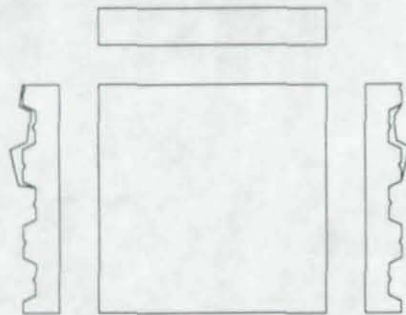
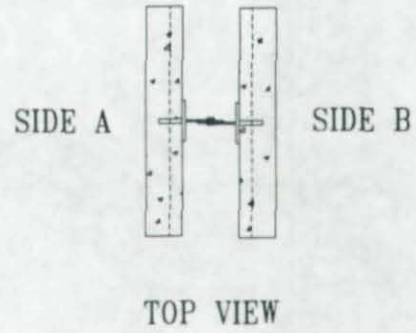
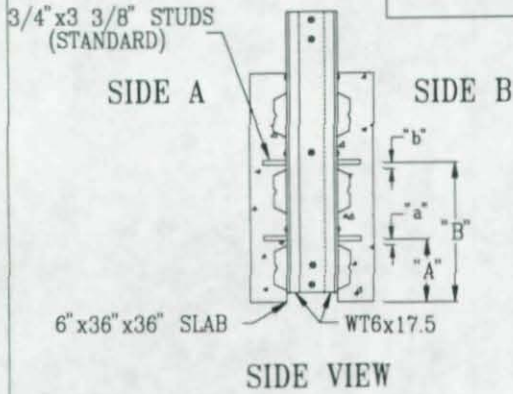


PUSH-OUT TEST LAYOUT & CRACKING SHEET

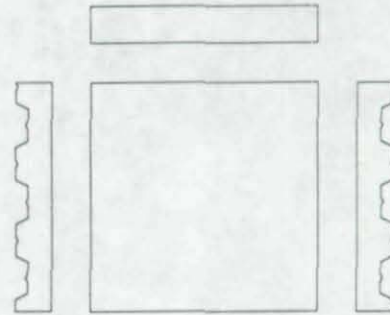
Test: D93

Designation: W63-4.5N6-2,NH

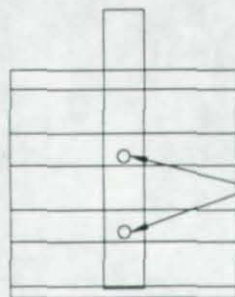
Date: 5/25/98



SIDE A SURFACE

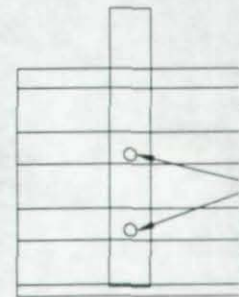


SIDE B SURFACE



SIDE A BOTTOM

STUDS REMAINED ATTACHED TO TEE AFTER FAILURE



SIDE B BOTTOM

STUDS REMAINED ATTACHED TO TEE AFTER FAILURE

Test D93 Data

Axial Load (kips)	Slips (in.)				Test Comments
	Pot. AT-1	Pot. AB-2	Pot. BT-3	Pot. BB-4	
0.00	0.0000	0.0000	0.0000	0.0000	BEGIN TEST
7.79	0.0035	0.0136	-0.0002	0.0005	
12.31	0.0267	0.0516	-0.0002	0.0004	
15.26	0.0348	0.0711	-0.0004	0.0005	
17.84	0.0452	0.0961	-0.0002	0.0004	
20.48	0.0482	0.1123	0.0000	0.0004	
22.80	0.0551	0.1458	-0.0002	0.0009	
22.99	0.0875	0.2020	-0.0004	0.0011	POPPING NOISES.
24.12	0.1159	0.2362	-0.0002	0.0009	
25.50	0.1419	0.2654	-0.0002	0.0013	
26.88	0.1687	0.2947	0.0027	0.0013	
28.96	0.1996	0.3309	0.0079	0.0071	RIB PUNCHING SIDE A.
31.09	0.2267	0.3560	0.0123	0.0075	
33.10	0.2556	0.3855	0.0187	0.0168	DECK DEBONDING SIDE A.
35.05	0.2897	0.4166	0.0280	0.0236	
36.43	0.3203	0.4457	0.0364	0.0337	
37.69	0.3542	0.4756	0.0511	0.0491	
38.94	0.3886	0.5069	0.0657	0.0643	
39.38	0.4241	0.5397	0.0846	0.0842	CRACKING NOISES.
41.33	0.4532	0.5714	0.1029	0.0994	
42.09	0.4864	0.6036	0.1249	0.1232	POPPING NOISES.
42.90	0.5210	0.6375	0.1500	0.1461	
42.21	0.5554	0.6726	0.1815	0.1762	RIB PUNCHING SIDE B.
40.52	0.5963	0.7120	0.2223	0.2258	
40.39	0.6312	0.7426	0.2533	0.2454	
40.08	0.6697	0.7783	0.2866	0.2855	
39.64	0.7067	0.8129	0.3199	0.3157	
39.13	0.7486	0.8506	0.3573	0.3545	
38.63	0.7876	0.8884	0.3901	0.3815	

Test D93 Data

Axial Load (kips)	Slips (in.)				Test Comments
	Pot. AT-1	Pot. AB-2	Pot. BT-3	Pot. BB-4	
37.81	0.8255	0.9244	0.4234	0.4208	ENDED TEST DUE TO LARGE SLIP & DROP IN LOAD.
36.93	0.8682	0.9644	0.4640	0.4639	
36.12	0.9063	1.0031	0.5058	0.4939	
35.24	0.9438	1.0401	0.5446	0.5340	

APPENDIX E

COMPOSITE BEAM TEST RESULTS

E.1 General

The test parameters and results for the three composite beam tests are reported herein. The summary sheets given in Tables E.1, E.16, and E.30 contain the test parameters, material properties, predicted moment of inertia, AISC predicted moment capacity, the predicted moment capacity using the new method, and the test results. The remaining tables contain the information that supports these predictions and test results. Tables E.9 through E.15, E.24 through E.30, and E.39 through E.45 contain the measured loads and deformations during testing. Figs. E.1 through E.36 contain load-deformation plots.

E.2 Beam Test 1 Results

Table E.1 Beam Test 1 Summary

Test Program: Rambo-Roddenberry (1999)	
Beam Test 1	
TEST SUMMARY	
<i>Test Parameters</i>	
Span: 30 ft	
Slab: 81 in. x 32 ft	
Steel Beam: W16 x 31 A572Gr50	
Shear Stud Size: 3/4 in. x 3 1/2 in. (after welding)	
No. Studs Per Beam: 28 (12 Per Shear Span)	
Shear Stud Position: S	
Deck: 2 in. 20 gage	
<i>Material Properties</i>	
Concrete: $f_c = 4.995$ ksi	Steel Beam
$w = 141.3$ pcf	Flanges: $F_{yf} = 54.25$ ksi
Deck: $F_y =$ ksi	$F_{uf} = 72.6$ ksi
$F_u =$ ksi	Web: $F_{yw} = 58.2$ ksi
Studs: $F_u = 66.81$ ksi	$F_{uw} = 72.4$ ksi
<i>Predicted Moment of Inertia</i>	
$I_t = 1349$ in ⁴	$I_c = 1061$ in ⁴
<i>AISC Predicted Results</i>	<i>New Predicted Results</i>
$M_{AISC} = 469.2$ k-ft	$M_c = 424.3$ k-ft
$Q_{AISC} = 29.5$ k/stud	$Q_c = 20.07$ k/stud
% composite = 69.2%	% composite = 47.1%
<i>Test Results</i>	
$I_c = 1139$ in ⁴	
$M_c = 412.1$ k-ft	
$Q_{bc} = 17.65$ k	
% composite = 41.4%	

Table E.2 Beam Test 1 Predicted Moment of Inertia

Test Program: Rambo-Roddenberry (1999)	
Beam Test 1	
Predicted Moment of Inertia Calculations:	
$I_c = I_s + 0.85p^{0.25}(I_t - I_s)$	
<p>where $p = 0.471$ (47.1% composite) $I_s = 375 \text{ in}^4$ (Mom. of Inertia of W16x31)</p>	
Calculate $I_{\text{conc tr}}$ (Transformed Mom. of Inertia of Slab):	
$I_{\text{conc tr}} = (81/7)(4)^3/12 = 61.7 \text{ in}^4$ $A_{\text{conc tr}} = (81)(4)/7 = 46.3 \text{ in}^2$	
Calculate I_t (Transformed Mom. of Inertia):	
$Y = \frac{\sum Ay}{\sum A} = \frac{(9.12)(15.88/2) + (46.3)(15.88 + 1 + 2)}{9.12 + 46.3}$ $Y = 17.08 \text{ in.}$ $I_t = 61.7 + 375 + (9.12)(17.08 - 15.88/2)^2$ $+ (46.3)(15.88 + 1 + 2 - 17.08)^2$ $I_t = 1349 \text{ in}^4$	
Calculate I_c (Predicted Mom. of Inertia):	
$I_c = 375 + 0.85(0.471)^{0.25}(1349 - 375)$ $I_c = 1061 \text{ in}^4$	

Table E.3 Beam Test 1 Experimental Moment of Inertia

Test Program: Rambo-Roddenberry (1999) Beam Test 1	
Experimental Moment of Inertia Calculations:	
The experimental moment of inertia in the elastic region can be found by calculating the slope of the load vs. deflection plot. The slope between data points 7 and 11 is calculated below.	
Data Pt. 7: $P = 22.57 \text{ k}$ $\Delta = 0.721 \text{ in.}$	Data Pt. 11: $P = 59.92 \text{ k}$ $\Delta = 1.469 \text{ in.}$
$\delta P = 59.92 - 22.57 = 37.35 \text{ k}$ $\delta \Delta = 1.469 - 0.721 = 0.748 \text{ in.}$	
The equation for the deflection of a beam with four concentrated loads, two of which are positioned 4.5 ft from each support, and the other two positioned 11.5 ft from each support, is below:	
$\Delta = \frac{382.8 P \text{ ft}^3}{EI}$	
thus, $I = \frac{382.8 P \text{ ft}^3}{E\Delta}$	
Calculate I_e (Experimental Mom. of Inertia):	
Substituting $P = 37.35 \text{ k}$, $E = 29000 \text{ ksi}$, and $\Delta = 0.748 \text{ in.}$,	
$I_e = 1139 \text{ in}^4$	

Table E.4 Beam Test 1 AISC Predicted Moment Capacity

Test Program: Rambo-Roddenberry (1999) Beam Test 1			Test Program: Rambo-Roddenberry (1999) Beam Test 1			
<i>Slab</i>		<i>Studs</i>		AISC Predicted Moment Capacity Calculations:		
Span = 30.0	ft	No. Studs in Pairs* =		$C1 = A_s F_y = 511.6$	k	
Depth = 5.0	in.	No. Single Studs** = 12	S	$C2 = 0.85 f_c A_c = 1031.7$	k	
Width = 81.0	in.	No. Single Studs*** =		$C3 = \Sigma Q_{AISC} = 354.2$	k	
<i>Concrete</i>		Stud Dia. = 0.75	in.	$C = \min(C1, C2, C3) = 354.2$	k	
$f_c = 4.995$	ksi	Stud Length = 3.5	in.	% Composite: 69.2%		
w = 141.3	pcf	$A_{sc} = 0.4418$	in ²	a = 1.030	in.	Depth of Conc. Comp. Block
<i>Steel Beam</i>		$F_u = 66.81$	ksi	$C_f = 131.9$	k	Comp. Force in Flange
Section: W16x31		Position = S		$C_1 - C_f = 379.7$	k	
$A_s = 9.12$	in ²	Transverse Spacing =	in.	$C_f + C = 486.1$	k	> 379.7 k P.N.A. in flange
d = 15.88	in.	e = 4.5	in.	$P_y = C1 = 511.6$	k	
$b_f = 5.525$	in.	Q_{AISC} (Studs in Pairs)* =	k	$T_y = (P_y + C)/2 = 432.9$	k	Tension Force in Steel
$t_f = 0.44$	in.	Q_{AISC} (Single Studs)** = 29.5	k	$T_{yw} = 247.8$	k	Tension Force in Web
$t_w = 0.275$	in.	Q_{AISC} (Single Studs)*** =	k	$T_{yf2} = 131.9$	k	Tension Force in Bot. Flange
$A_{sf} = 2.431$	in ²	<i>Deck</i>		$T_{yf1} = 53.2$	k	Tension Force in Top Flange
$F_{yf} = 54.25$	ksi	Type =		s = 0.18	in.	Portion of Flange in Tension
$F_{uf} = 72.6$	ksi	Height = 2	in.	p = 0.26	in.	Portion of Flange in Comp.
$A_{sw} = 4.258$	in ²	Ave. Rib Width = 6	in.	$C_f = 78.7$	k	Comp. Force in Top Flange
$F_{yw} = 58.2$	ksi	Gage = 20		$M_{AISC} = 469.2$ k-ft Predicted Moment Capacity		
$F_{uw} = 72.4$	ksi	$F_y =$	ksi			
		$F_u =$	ksi			

Table E.5 Beam Test 1 New Predicted Moment Capacity with $Q_c=0.68A_sF_u$

Test Program: Rambo-Roddenberry (1999) Beam Test 1			Test Program: Rambo-Roddenberry (1999) Beam Test 1				
Slab		Studs		New Predicted Moment Capacity Calculations:			
Span = 30.0	ft	No. Studs in Pairs* =		$C1 = A_s F_y =$	511.6	k	
Depth = 5.0	in.	No. Single Studs** = 12	S	$C2 = 0.85 f_c A_c =$	1031.7	k	
Width = 81.0	in.	No. Single Studs*** =		$C3 = \Sigma Q_c =$	240.8	k	
Concrete		Stud Dia. = 0.75	in.	$C = \min(C1, C2, C3) =$	240.8	k	
$f_c = 4.995$	ksi	Stud Length = 3.5	in.	% Composite: 47.1%			
w = 141.3	pcf	$A_{sc} = 0.4418$	in ²	a = 0.700	in.	Depth of Conc. Comp. Block	
Steel Beam		$F_u = 66.81$	ksi	$C_f =$	131.9	k	Comp. Force in Flange
Section: W16x31		Position = S		$C_1 - C_f =$	379.7	k	
$A_s = 9.12$	in ²	Transverse Spacing =	in.	$C_f + C =$	372.7	k	< 379.7 k P.N.A. in web
d = 15.88	in.	e = 4.5	in.	$P_y = C1 =$	511.6	k	
$b_f = 5.525$	in.	Q_c (Studs in Pairs)* =	k	$T_y = (P_y + C)/2 =$	376.2	k	Tension Force in Steel
$t_f = 0.44$	in.	Q_c (Single Studs)** = 20.07	k	x = 7.52	in.	Dist. From PNA to c.g.	
$t_w = 0.275$	in.	Q_c (Single Studs)*** =	k	p = 0.42	in.	Dist. from Top Flange to PNA	
$A_{sf} = 2.431$	in ²	Deck		q = -0.02	in.	Portion of Web in Comp.	
$F_{yf} = 54.25$	ksi	Type =		$C_w = T_y - C - C_f =$	3.5	k	Comp. Force in Web
$F_{uf} = 72.6$	ksi	Height = 2	in.	$T_{yf} =$	131.9	k	Tension Force in Flange
$A_{sw} = 4.258$	in ²	Ave. Rib Width = 6	in.	$T_{yw} = T_y - T_{yf} =$	244.3	k	Tension Force in Web
$F_{yw} = 58.2$	ksi	Gage = 20		$M_c = 424.3$ k-ft			Predicted Moment Capacity
$F_{uw} = 72.4$	ksi	$F_y =$	ksi				
		$F_u =$	ksi				

Table E.6 Beam Test 1 Experimental Moment Capacity

Test Program: Rambo-Roddenberry (1999) Beam Test 1
Experimental Moment Calculations:
The Total Load given in the data sheets consists of both distributed loads and concentrated loads. These must be separated in order to calculate the moment. Ultimate Total Load = 102.31 k
Theoretical Self Wt. of Beam, Deck, and Concrete: $w = 11.59 \text{ k}/32 \text{ ft} = 0.362 \text{ k/ft}$
Applied Load from Rams + Wt. of Load Beams and Plates: $P = 104.46 - 11.59 = 92.87 \text{ k}$
Reactions = $0.5(0.362)(32) + 0.5(92.87) = 52.23 \text{ k}$ $M_c = 412.1 \text{ k-ft}$ (Experimental Ultimate Moment Capacity)

Table E.7 Beam Test 1 Back-Calculated Stud Strength

Test Program: Rambo-Roddenberry (1999) Beam Test 1			Test Program: Rambo-Roddenberry (1999) Beam Test 1			
<i>Slab</i>		<i>Studs</i>		Back-Calculated (Q_{bc}) Moment Capacity Calculations:		
Span = 30.0	ft	No. Studs in Pairs* =		$M_e = 412.1$	k-ft	
Depth = 5.0	in.	No. Single Studs** = 12	S	$C1 = A_s F_y = 511.6$	k	
Width = 81.0	in.	No. Single Studs*** =		$C2 = 0.85 f_c A_c = 1031.7$	k	
<i>Concrete</i>		Stud Dia. = 0.75	in.	$C3 = \Sigma Q_{bc} = 211.8$	k	
$f_c = 4.995$	ksi	Stud Length = 3.5	in.	$C = \min(C1, C2, C3) = 211.8$	k	
$w = 141.3$	pcf	$A_{bc} = 0.4418$	in ²	% Composite: 41.4%		
<i>Steel Beam</i>		$F_u = 66.81$	ksi	$a = 0.616$	in.	Depth of Conc. Comp. Block
Section: W16x31		Position = S		$C_f = 131.9$	k	Comp. Force in Flange
$A_s = 9.12$	in ²	Transverse Spacing =	in.	$C_1 - C_f = 379.7$	k	
$d = 15.88$	in.	$e = 4.5$	in.	$C_f + C = 343.7$	k	< 379.7 k P.N.A. in web
$b_f = 5.525$	in.	Q_{bc} (Single Studs)** = 17.65	k	$P_y = C1 = 511.6$	k	
$t_f = 0.44$	in.			$T_y = (P_y + C)/2 = 361.7$	k	Tension Force in Steel
$t_w = 0.275$	in.			$x = 6.62$	in.	Dist. From PNA to c.g.
$A_{sf} = 2.431$	in ²	<i>Deck</i>		$p = 1.32$	in.	Dist. from Top Flange to PNA
$F_{yf} = 54.25$	ksi	Type =		$q = 0.88$	in.	Portion of Web in Comp.
$F_{uf} = 72.6$	ksi	Height = 2	in.	$C_w = T_y - C - C_f = 18.0$	k	Comp. Force in Web
$A_{sw} = 4.258$	in ²	Ave. Rib Width = 6	in.	$T_{yf} = 131.9$	k	Tension Force in Flange
$F_{yw} = 58.2$	ksi	Gage = 20		$T_{yw} = T_y - T_{yf} = 229.8$	k	Tension Force in Web
$F_{uw} = 72.4$	ksi	$F_y =$	ksi	$M_c = 411.7$	k-ft	Predicted Moment Capacity
		$F_u =$	ksi	$M_e/M_c = 1.00$		

Table E.8 Beam Test 1 Load Effects Not Measured

Test Program: Rambo-Roddenberry (1999) Beam Test 1
Interpolations for Load Effects Not Measured:
Non-Composite Loads (Not Measured):
Self Wt. of W16x31 = (31)(32) = 992 lb
Wt. of Deck = (1.97)(32)(81/12) = 426 lb
Total = 992 + 426 = 1418 lb
Total Load of Concrete = 8020 lb (Measured)
$\frac{1418}{8020} = 0.177$
~ Multiply the load effects from concrete placement by 0.177 to obtain the load effects due to the self wt. of beam and deck (Load effects = strains and deflections)
Composite Loads (Not Measured):
Self Wt. of Load Beams [W12x65] = 2(65)(9) = 1170 lb
Wt. of Load Plates = 180 lb (estimated)
Total = 1170 + 180 = 1350 lb
Load from Composite Test = 9620 lb (Data Pt. #7)
*Data Pt. #7 was chosen because the beam was still elastic
$\frac{1350}{9620} = 0.140$
~ Multiply the load effects from Data Pt. #7 by 0.140 to obtain the load effects due to the self wt. of load beams and plates (Load effects = strains and deflections)

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Table E.9 Beam Test 1 Data (Loads and Deflections)

Data Point	Total Load (k)	LOADS			DEFLECTIONS			NOTES
		Total (k)	East (k)	West (k)	EQ	CL (in.)	WQ	
N1	0.00	0.00	0.00	0.00	0.000	0.000	0.000	BEGIN
N2	1.42	1.42	0.71	0.71	0.062	0.077	0.054	BEAM & DECK WT.
N3	11.59	11.59	5.80	5.80	0.415	0.510	0.361	BEAM, DECK & CONC. WT.
1A	11.59	11.59	5.80	5.80	0.415	0.510	0.361	BEG. OF COMPOSITE TEST
1B	12.94	12.94	6.46	6.48	0.435	0.536	0.379	WT. OF LOAD BEAMS & PLATES
2	22.81	22.81	11.27	11.54	0.576	0.723	0.509	FIRST INCR. OF APPL. LOAD
3	12.94	12.94	6.46	6.48	0.442	0.548	0.388	
4	12.94	12.94	6.46	6.48	0.435	0.536	0.379	Zeroed
5	23.14	23.14	11.51	11.62	0.576	0.718	0.504	
6	12.94	12.94	6.46	6.48	0.435	0.536	0.379	Zeroed
7	22.57	22.57	11.19	11.38	0.579	0.721	0.513	
8	32.52	32.52	15.92	16.60	0.727	0.900	0.643	
9	41.82	41.82	20.48	21.34	0.868	1.075	0.769	
10	51.60	51.60	25.70	25.91	1.031	1.276	0.902	
11	59.92	59.92	29.77	30.15	1.175	1.469	1.036	
12	67.18	67.18	33.28	33.90	1.316	1.659	1.158	
13	72.81	72.81	36.05	36.76	1.449	1.833	1.274	Bottom Flange Yielding
14	51.36	51.36	25.62	25.74	1.147	1.451	1.009	
15	34.07	34.07	17.14	16.93	0.888	1.119	0.789	
16	12.94	12.94	6.46	6.48	0.543	0.686	0.480	
17	32.52	32.52	15.83	16.68	0.853	1.069	0.748	
18	12.94	12.94	6.46	6.48	0.543	0.686	0.476	
19	32.68	32.68	16.16	16.52	0.864	1.084	0.762	
20	52.58	52.58	26.02	26.56	1.158	1.466	1.024	
21	69.55	69.55	34.50	35.05	1.418	1.804	1.254	
22	75.83	75.83	37.60	38.23	1.561	1.993	1.375	Noises
23	79.34	79.34	39.31	40.02	1.701	2.192	1.506	
24	81.86	81.86	40.62	41.25	1.833	2.392	1.625	Yielding on Top of Bot. Flange
25	85.05	85.05	42.08	42.96	1.969	2.587	1.757	
26	87.82	87.82	43.39	44.43	2.115	2.806	1.895	
27	90.18	90.18	44.53	45.66	2.273	3.021	2.033	
28	67.35	67.35	33.20	34.15	1.982	2.655	1.764	Reset Load Beams
29	54.13	54.13	26.76	27.37	1.798	2.393	1.582	
30	32.84	32.84	16.32	16.52	1.462	1.964	1.277	
31	12.94	12.94	6.46	6.48	1.088	1.495	0.952	
32	32.76	32.76	16.16	16.60	1.420	1.898	1.226	
33	52.58	52.58	25.94	26.64	1.730	2.286	1.498	

Table E.9 Beam Test 1 Data (Loads and Deflections)

Data Point	Total Load (k)	LOADS			DEFLECTIONS			NOTES	
		Total (k)	East (k)	West (k)	EQ	CL (in.)	WQ		
34	72.32	72.32	35.72	36.60	2.025	2.674	1.775	Yield Lines on Web	
35	82.52	82.52	40.70	41.82	2.180	2.883	1.921		
36	90.18	90.18	44.53	45.66	2.381	3.146	2.104		
37	93.28	93.28	46.00	47.29	2.563	3.410	2.260		
38	95.32	95.32	46.97	48.35	2.726	3.653	2.407		
39	97.36	97.36	47.95	49.41	2.909	3.909	2.559		
40	99.56	99.56	48.93	50.63	3.257	4.405	2.856		
41	101.36	101.36	49.75	51.61	3.605	4.897	3.162		
42	102.66	102.66	50.32	52.35	3.959	5.393	3.462		Noises
43	102.91	102.91	50.32	52.59	4.277	5.866	3.755		Significant Web Yielding, Pop
44	103.15	103.15	50.40	52.76	4.624	6.388	4.067		Reset Ram
45	74.61	74.61	36.38	38.23	4.283	5.945	3.763		
46	54.87	54.87	26.92	27.95	3.991	5.555	3.489		
47	31.21	31.21	15.51	15.70	3.581	5.037	3.127		
48	12.94	12.94	6.46	6.48	3.221	4.599	2.816		
49	53.07	53.07	26.35	26.72	3.876	5.412	3.398	Cracking Long. Crack Down CL of Beam	
50	93.04	93.04	46.08	46.96	4.504	6.252	3.985		
51	97.53	97.53	48.36	49.16	4.589	6.374	4.072		
52	102.26	102.26	50.56	51.69	4.941	6.879	4.392		
53	103.97	103.97	51.29	52.67	5.278	7.379	4.697		
54	104.46	104.46	51.46	53.00	5.592	7.877	4.988		
55	104.13	104.13	51.21	52.92	5.909	8.363	5.280		
56	93.69	93.69	46.08	47.61	5.944	8.440	5.306		
57	98.18	98.18	48.28	49.90	6.176	8.746	5.514		
58	64.00	64.00	31.57	32.43	5.641	8.072	5.034		
59	33.66	33.66	16.73	16.93	5.109	7.363	4.547		
60	12.94	12.94	6.46	6.48	4.622	6.757	4.146		

Table E.10 Beam Test 1 Data (Strains at Midspan)

Data Point	Total Load (k)	STRAINS AT MIDSPAN							
		SG1	SG2	SG3	SG4	SG5	SG6	SG7	SG8
N1	0.00	0	0	0	0	0	0	0	0
N2	1.42	-42	2	43	45	45	42	1	-41
N3	11.59	-279	11	287	300	298	280	3	-271
1A	11.59	-279	11	287	300	298	280	3	-271
1B	12.94	-276	27	315	329	326	309	18	-269
2	22.81	-259	149	527	545	538	522	123	-252
3	12.94	-277	31	319	331	329	311	18	-271
4	12.94	-276	27	315	329	326	309	18	-269
5	23.14	-259	148	530	549	543	527	125	-251
6	12.94	-276	27	315	329	326	309	18	-269
7	22.57	-259	142	517	536	530	514	120	-251
8	32.52	-245	257	718	744	734	720	221	-237
9	41.82	-233	365	910	944	931	918	317	-226
10	51.60	-224	480	1115	1156	1141	1130	420	-217
11	59.92	-218	587	1308	1353	1339	1335	516	-212
12	67.18	-215	699	1511	1574	1552	1686	617	-208
13	72.81	-207	812	1741	1671	1648	2812	721	-201
14	51.36	-246	576	1323	1242	1223	2421	502	-241
15	34.07	-271	378	963	875	861	2051	320	-265
16	12.94	-288	139	516	417	412	1583	102	-282
17	32.52	-266	352	915	825	813	1990	299	-259
18	12.94	-288	133	516	415	410	1582	102	-281
19	32.68	-263	357	932	840	827	2003	306	-257
20	52.58	-238	588	1350	1267	1246	2429	515	-232
21	69.55	-216	787	1713	1635	1607	2809	696	-210
22	75.83	-199	923	1664	2236	2870	4027	822	-193
23	79.34	-182	1093	1584	2200	8224	7779	977	-178
24	81.86	-163	1232	1581	2199	9300	8868	1107	-160
25	85.05	-144	1373	1599	2215	10161	10073	1237	-143
26	87.82	-124	1523	1592	2212	10805	11294	1379	-122
27	90.18	-110	1693	1599	2211	11118	12024	1537	-108
28	67.35	-157	1446	1132	1736	10650	11573	1298	-155
29	54.13	-180	1294	852	1449	10342	11265	1151	-175
30	32.84	-211	1048	401	988	9822	10746	914	-205
31	12.94	-229	820	-28	543	9296	10221	692	-222
32	32.76	-200	1026	385	960	9713	10638	904	-192
33	52.58	-175	1250	794	1381	10169	11094	1115	-169

Table E.10 Beam Test 1 Data (Strains at Midspan)

Data Point	Total Load (k)	STRAINS AT MIDSPAN							
		SG1	SG2	SG3	SG4	SG5	SG6	SG7	SG8
34	72.32	-149	1479	1204	1804	10648	11574	1333	-144
35	82.52	-136	1601	1418	2027	10919	11845	1447	-131
36	90.18	-132	1760	1587	2210	11277	12273	1598	-129
37	93.28	-107	1963	1593	2205	11292	12283	1792	-105
38	95.32	-90	2124	1602	2209	11348	12357	1950	-90
39	97.36	-71	2303	1609	2213	11464	12733	2137	-72
40	99.56	-49	2473	1594	2221	12155	13933	2341	-52
41	101.36	-45	2478	1576	2242	12984	14929	2328	-50
42	102.66	-42	2477	1557	2247	13958	--	2332	-50
43	102.91	-58	2470	1529	2252	14654	--	2332	-67
44	103.15	-72	2475	1498	2264	15142	--	2330	-82
45	74.61	-126	2147	923	1680	14564	--	2021	-128
46	54.87	-159	1909	525	1268	14095	--	1798	-153
47	31.21	-196	1618	49	772	13498	--	1529	-186
48	12.94	-210	1393	-314	387	13005	14972	1321	-200
49	53.07	-153	1858	511	1229	13891	--	1751	-142
50	93.04	-98	2349	1335	2083	14890	--	2210	-95
51	97.53	-98	2412	1431	2183	15034	--	2269	-96
52	102.26	-105	2483	1500	2288	15484	--	2346	-105
53	103.97	-78	2512	1505	2307	15701	--	2377	-81
54	104.46	-71	2519	1498	2300	15911	--	2396	-76
55	104.13	-80	2514	1509	2307	16062	--	2405	-86
56	93.69	-386	2298	1410	2213	15997	--	2209	-405
57	98.18	-492	2410	1538	2328	16145	--	2312	-508
58	64.00	-542	2006	825	1603	15374	--	1940	-542
59	33.66	-556	1637	183	936	14615	--	1603	-541
60	12.94	-513	1393	-256	471	14052	--	1381	-495

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Table E.11 Beam Test 1 Data (Strains at East Quarter Point)

Data Point	Total Load (k)	STRAINS AT EAST QUARTER PT.							
		SG9	SG10	SG11	SG12	SG13	SG14	SG15	SG16
N1	0.00	0	0	0	0	0	0	0	0
N2	1.42	-27	1	31	32	33	31	0	-33
N3	11.59	-183	8	204	216	216	205	1	-221
1A	11.59	-183	8	204	216	216	205	1	-221
1B	12.94	-181	19	225	238	237	226	13	-220
2	22.81	-172	103	381	397	392	377	96	-209
3	12.94	-182	19	226	239	238	227	13	-220
4	12.94	-181	19	225	238	237	226	13	-220
5	23.14	-172	105	385	401	396	381	99	-209
6	12.94	-181	19	225	238	237	226	13	-220
7	22.57	-173	101	377	393	387	372	94	-211
8	32.52	-170	178	529	547	536	515	172	-207
9	41.82	-173	252	681	700	681	657	247	-209
10	51.60	-180	329	845	865	838	809	324	-217
11	59.92	-192	393	984	1008	974	941	389	-229
12	67.18	-204	452	1111	1138	1095	1059	447	-241
13	72.81	-211	498	1210	1239	1187	1147	493	-250
14	51.36	-236	325	885	908	871	839	318	-275
15	34.07	-245	184	616	630	611	583	177	-284
16	12.94	-214	25	269	270	268	249	16	-252
17	32.52	-238	170	575	585	575	548	162	-276
18	12.94	-213	25	267	269	267	249	16	-251
19	32.68	-237	175	585	596	586	559	168	-275
20	52.58	-228	336	900	918	895	858	330	-267
21	69.55	-221	473	1173	1196	1155	1111	469	-262
22	75.83	-225	526	1286	1310	1257	1209	521	-267
23	79.34	-224	560	1361	1392	1313	1264	557	-267
24	81.86	-229	588	1418	1450	1368	1316	585	-273
25	85.05	-231	622	1483	1523	1433	1376	620	-276
26	87.82	-230	653	1548	1585	1490	1434	653	-277
27	90.18	-236	684	1607	1645	1541	1481	683	-283
28	67.35	-262	500	1263	1293	1208	1155	497	-309
29	54.13	-272	389	1050	1074	1005	958	386	-317
30	32.84	-274	217	703	718	671	634	212	-318
31	12.94	-227	73	361	364	338	312	66	-269
32	32.76	-255	221	665	680	668	633	215	-295
33	52.58	-256	375	973	995	982	938	373	-297

Table E.11 Beam Test 1 Data (Strains at East Quarter Point)

Data Point	Total Load (k)	STRAINS AT EAST QUARTER PT.							
		SG9	SG10	SG11	SG12	SG13	SG14	SG15	SG16
34	72.32	-251	534	1279	1310	1296	1241	532	-292
35	82.52	-252	617	1440	1475	1460	1400	614	-293
36	90.18	-264	687	1587	1631	1599	1538	683	-309
37	93.28	-262	726	1633	1731	1655	1592	721	-308
38	95.32	-261	760	1640	1886	1699	1641	755	-308
39	97.36	-267	793	1647	1977	1745	1688	787	-310
40	99.56	-277	861	1604	2070	1764	1680	856	-320
41	101.36	-310	925	1575	2156	1776	1688	925	-350
42	102.66	-344	962	1605	2252	1782	1686	958	-379
43	102.91	-372	990	1636	2470	1733	1638	982	-402
44	103.15	-389	1018	1858	2715	1712	1617	1008	-414
45	74.61	-421	786	1449	2299	1271	1188	773	-449
46	54.87	-423	626	1144	1982	954	881	610	-454
47	31.21	-406	439	769	1585	564	503	421	-437
48	12.94	-333	316	465	1261	247	197	296	-365
49	53.07	-377	622	1106	1928	901	829	608	-406
50	93.04	-391	945	1758	2607	1537	1446	933	-423
51	97.53	-397	982	1840	2697	1612	1519	971	-429
52	102.26	-411	1044	2200	2972	1699	1602	1031	-443
53	103.97	-400	1076	2314	3103	1722	1624	1062	-432
54	104.46	-402	1092	2410	3189	1724	1626	1079	-431
55	104.13	-410	1101	2516	3285	1713	1617	1088	-436
56	93.69	-460	1004	2389	3154	1578	1484	988	-495
57	98.18	-538	1016	2488	3261	1685	1586	1000	-579
58	64.00	-551	738	1952	2706	1140	1056	720	-592
59	33.66	-512	501	1439	2167	630	563	478	-547
60	12.94	-387	371	1058	1763	255	202	348	-418

Table E.12 Beam Test 1 Data (Strains at Support)

Data Point	Total Load (k)	STRAINS AT 1 FT. FROM SUPPORT							
		SG17	SG18	SG19	SG20	SG21	SG22	SG23	SG24
N1	0.00	0	0	0	0	0	0	0	0
N2	1.42	-8	2	5	5	6	5	1	-2
N3	11.59	-50	12	33	33	37	33	3	-15
1A	11.59	-50	12	33	33	37	33	3	-15
1B	12.94	-51	14	35	35	42	38	4	-14
2	22.81	-54	29	50	54	80	76	11	-11
3	12.94	-52	15	36	36	41	38	4	-14
4	12.94	-51	14	35	35	42	38	4	-14
5	23.14	-53	29	50	55	81	77	12	-10
6	12.94	-51	14	35	35	42	38	4	-14
7	22.57	-53	28	49	54	80	76	11	-12
8	32.52	-48	43	76	85	98	95	17	-4
9	41.82	-36	59	101	112	118	117	24	14
10	51.60	-15	75	124	137	140	143	33	44
11	59.92	4	91	143	159	158	165	43	61
12	67.18	10	103	162	182	176	186	47	67
13	72.81	16	113	175	199	189	204	49	71
14	51.36	-6	75	139	154	138	143	33	33
15	34.07	-24	47	94	103	102	103	21	8
16	12.94	-25	16	33	34	45	41	8	3
17	32.52	-26	41	77	82	103	97	22	10
18	12.94	-24	16	33	33	45	40	8	3
19	32.68	-25	41	80	85	101	94	22	12
20	52.58	-4	74	128	138	149	147	37	39
21	69.55	14	104	163	181	191	197	51	68
22	75.83	22	117	175	199	206	218	54	80
23	79.34	24	134	180	221	204	237	43	84
24	81.86	28	140	186	228	211	244	45	88
25	85.05	33	147	193	237	220	255	47	95
26	87.82	36	155	195	245	225	267	45	98
27	90.18	37	163	199	254	231	278	42	98
28	67.35	10	118	176	219	165	203	27	51
29	54.13	-4	91	143	177	139	168	19	24
30	32.84	-22	49	95	114	87	100	8	-7
31	12.94	-22	19	35	38	40	39	3	-7
32	32.76	-21	36	85	84	100	86	21	3
33	52.58	-4	64	139	140	149	134	40	29

Table E.12 Beam Test 1 Data (Strains at Support)

Data Point	Total Load (k)	STRAINS AT 1 FT. FROM SUPPORT							
		SG17	SG18	SG19	SG20	SG21	SG22	SG23	SG24
34	72.32	20	94	193	194	199	182	62	65
35	82.52	32	110	221	221	225	207	75	86
36	90.18	26	120	251	252	248	227	79	87
37	93.28	26	124	259	260	258	238	82	87
38	95.32	31	127	266	268	266	244	85	87
39	97.36	35	131	271	273	272	249	88	93
40	99.56	40	137	276	278	278	256	92	105
41	101.36	50	141	283	280	282	254	100	116
42	102.66	59	141	287	281	284	256	105	127
43	102.91	63	139	290	282	286	255	109	133
44	103.15	65	135	293	285	289	254	112	139
45	74.61	21	91	210	205	230	204	78	75
46	54.87	-8	60	152	148	179	156	52	33
47	31.21	-36	26	83	81	111	93	23	-3
48	12.94	-37	9	21	22	61	51	7	-3
49	53.07	-10	65	140	144	169	155	44	32
50	93.04	45	138	242	254	283	277	89	111
51	97.53	49	147	252	267	299	295	93	116
52	102.26	54	158	258	275	320	318	98	125
53	103.97	62	157	255	269	335	327	108	137
54	104.46	64	158	258	272	333	325	110	139
55	104.13	65	159	259	273	328	320	110	140
56	93.69	46	140	245	258	288	282	92	112
57	98.18	17	134	263	274	312	300	87	86
58	64.00	-24	76	165	173	230	220	50	33
59	33.66	-46	26	88	89	126	112	18	-4
60	12.94	-38	8	29	29	63	56	10	-2

Table E.13 Beam Test 1 Data (Concrete Strains)

Data Point	Total Load (k)	CONCRETE STRAINS		
		ES	EQ ($\mu\epsilon$)	CL
N1	0.00	--	--	--
N2	1.42	--	--	--
N3	11.59	--	--	--
1A	11.59	0	0	0
1B	12.94	1	-4	-6
2	22.81	6	-37	-48
3	12.94	1	-5	-6
4	12.94	1	-4	-6
5	23.14	5	-37	-50
6	12.94	1	-4	-6
7	22.57	5	-35	-47
8	32.52	9	-66	-89
9	41.82	5	-97	-129
10	51.60	-5	-129	-172
11	59.92	-10	-151	-212
12	67.18	-10	-170	-250
13	72.81	-9	-184	-285
14	51.36	-8	-120	-196
15	34.07	0	-68	-121
16	12.94	-1	-3	-27
17	32.52	1	-64	-109
18	12.94	-1	-3	-26
19	32.68	0	-66	-111
20	52.58	-8	-124	-199
21	69.55	-13	-174	-273
22	75.83	-14	-187	-313
23	79.34	-14	-195	-352
24	81.86	-13	-201	-383
25	85.05	-14	-209	-416
26	87.82	-15	-219	-449
27	90.18	-15	-228	-482
28	67.35	-13	-164	-391
29	54.13	-8	-124	-333
30	32.84	2	-63	-236
31	12.94	3	-4	-141
32	32.76	-2	-65	-222
33	52.58	-7	-121	-309

Table E.13 Beam Test 1 Data (Concrete Strains)

Data Point	Total Load (k)	CONCRETE STRAINS		
		ES	EQ ($\mu\epsilon$)	CL
34	72.32	-14	-176	-397
35	82.52	-17	-211	-441
36	90.18	-16	-240	-489
37	93.28	-15	-251	-527
38	95.32	-11	-261	-567
39	97.36	-10	-272	-602
40	99.56	-8	-293	-664
41	101.36	-6	-316	-731
42	102.66	-10	-333	-790
43	102.91	-10	-345	-839
44	103.15	-19	-354	-888
45	74.61	-11	-276	-780
46	54.87	1	-217	-691
47	31.21	9	-142	-561
48	12.94	5	-80	-445
49	53.07	-11	-204	-650
50	93.04	-28	-326	-845
51	97.53	-28	-341	-870
52	102.26	-23	-361	-924
53	103.97	-24	-367	-965
54	104.46	-23	-369	-1007
55	104.13	-22	-372	-1049
56	93.69	-277	-329	-1161
57	98.18	-303	-332	-1223
58	64.00	-239	-215	-996
59	33.66	-155	-110	-771
60	12.94	-99	-37	-590

Table E.14 Beam Test 1 Data (East End Slips)

Data Point	Total Load (k)	EAST END SLIPS					
		E1	E2	E3	E4	E5	E6
N1	0.00	--	--	--	--	--	--
N2	1.42	--	--	--	--	--	--
N3	11.59	--	--	--	--	--	--
1A	11.59	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1B	12.94	0.0000	0.0000	0.0001	0.0001	0.0000	0.0000
2	22.81	0.0000	0.0000	0.0007	0.0001	0.0000	0.0000
3	12.94	0.0000	0.0000	0.0001	0.0001	0.0000	0.0000
4	12.94	0.0000	0.0000	0.0001	0.0001	0.0000	0.0000
5	23.14	0.0000	0.0000	0.0001	0.0007	0.0000	0.0000
6	12.94	0.0000	0.0000	0.0001	0.0001	0.0000	0.0000
7	22.57	0.0000	0.0000	0.0007	0.0007	0.0000	0.0000
8	32.52	0.0000	0.0000	0.0019	0.0007	0.0000	0.0000
9	41.82	0.0006	0.0024	0.0044	0.0019	0.0000	0.0000
10	51.60	0.0024	0.0055	0.0086	0.0062	0.0000	0.0000
11	59.92	0.0055	0.0098	0.0129	0.0105	0.0000	0.0000
12	67.18	0.0092	0.0146	0.0178	0.0153	0.0000	0.0000
13	72.81	0.0140	0.0189	0.0227	0.0196	0.0000	0.0006
14	51.36	0.0140	0.0195	0.0221	0.0196	0.0000	0.0006
15	34.07	0.0140	0.0195	0.0184	0.0190	0.0000	0.0006
16	12.94	0.0092	0.0153	0.0062	0.0080	0.0000	0.0006
17	32.52	0.0092	0.0153	0.0129	0.0111	0.0000	0.0006
18	12.94	0.0092	0.0153	0.0050	0.0074	0.0000	0.0006
19	32.68	0.0092	0.0153	0.0129	0.0117	0.0000	0.0006
20	52.58	0.0128	0.0195	0.0184	0.0160	0.0000	0.0000
21	69.55	0.0159	0.0226	0.0227	0.0202	0.0000	0.0006
22	75.83	0.0195	0.0262	0.0269	0.0239	0.0000	0.0024
23	79.34	0.0220	0.0299	0.0294	0.0276	0.0122	0.0043
24	81.86	0.0256	0.0336	0.0337	0.0312	0.0140	0.0073
25	85.05	0.0293	0.0378	0.0373	0.0355	--	0.0098
26	87.82	0.0336	0.0427	0.0416	0.0404	--	0.0134
27	90.18	0.0385	0.0476	0.0459	0.0453	--	0.0177
28	67.35	0.0403	0.0482	0.0453	0.0459	--	0.0183
29	54.13	0.0403	0.0482	0.0440	0.0459	--	0.0183
30	32.84	0.0385	0.0482	0.0379	0.0404	--	0.0183
31	12.94	0.0262	0.0342	0.0239	0.0257	--	0.0183
32	32.76	0.0281	0.0354	0.0318	0.0306	--	0.0177
33	52.58	0.0336	0.0409	0.0385	0.0367	--	0.0177

Table E.14 Beam Test 1 Data (East End Slips)

Data Point	Total Load (k)	EAST END SLIPS					
		E1	E2	E3	E4	E5	E6
34	72.32	0.0372	0.0458	0.0440	0.0416	--	0.0183
35	82.52	0.0397	0.0482	0.0465	0.0446	--	0.0189
36	90.18	0.0476	0.0568	0.0544	0.0526	--	0.0244
37	93.28	0.0525	0.0623	0.0605	0.0581	--	0.0299
38	95.32	0.0592	0.0684	0.0666	0.0642	--	0.0348
39	97.36	0.0653	0.0751	0.0739	0.0709	--	0.0409
40	99.56	0.0781	0.0879	0.0868	0.0849	--	0.0537
41	101.36	0.0940	0.1031	0.1026	0.1002	--	0.0677
42	102.66	0.1111	0.1196	0.1203	0.1179	--	0.0842
43	102.91	0.1270	0.1337	0.1368	0.1337	--	0.1013
44	103.15	0.1410	0.1483	0.1533	0.1508	--	0.1178
45	74.61	0.1440	0.1526	0.1545	0.1539	--	0.1208
46	54.87	0.1440	0.1526	0.1496	0.1527	--	0.1208
47	31.21	0.1422	0.1508	0.1405	0.1429	--	0.1208
48	12.94	0.1270	0.1355	0.1234	0.1264	--	0.1202
49	53.07	0.1349	0.1416	0.1405	0.1386	--	0.1202
50	93.04	0.1453	0.1538	0.1539	0.1533	--	0.1202
51	97.53	0.1489	0.1562	0.1576	0.1557	--	0.1221
52	102.26	0.1660	0.1727	0.1710	0.1704	--	0.1361
53	103.97	0.1752	0.1831	0.1807	0.1801	--	0.1459
54	104.46	0.1855	0.1947	0.1917	0.1917	--	0.1569
55	104.13	0.1978	0.2069	0.2033	0.2045	--	0.1685
56	93.69	0.2142	0.2240	0.2180	0.2216	--	0.1855
57	98.18	0.2319	0.2460	0.2314	0.2430	--	0.2020
58	64.00	0.2319	0.2460	0.2259	0.2430	--	0.2032
59	33.66	0.2228	0.2362	0.2125	0.2290	--	0.2032
60	12.94	0.1996	0.2124	0.1899	0.2039	--	0.1935

Table E.15 Beam Test 1 Data (West End Slips)

Data Point	Total Load (k)	WEST END SLIPS					
		W1	W2	W3	W4	W5	W6
N1	0.00	--	--	--	--	--	--
N2	1.42	--	--	--	--	--	--
N3	11.59	--	--	--	--	--	--
1A	11.59	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1B	12.94	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	22.81	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
3	12.94	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
4	12.94	-0.0006	0.0000	0.0000	0.0000	0.0000	0.0000
5	23.14	-0.0006	0.0000	0.0000	0.0000	0.0000	0.0000
6	12.94	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
7	22.57	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	32.52	0.0000	0.0012	0.0000	0.0006	0.0006	0.0018
9	41.82	0.0000	0.0037	0.0000	0.0037	0.0031	0.0037
10	51.60	0.0006	0.0079	0.0006	0.0073	0.0067	0.0067
11	59.92	0.0024	0.0110	0.0012	0.0122	0.0104	0.0098
12	67.18	0.0043	0.0153	0.0024	0.0171	0.0153	0.0134
13	72.81	0.0061	0.0177	0.0055	0.0214	0.0189	0.0153
14	51.36	0.0067	0.0177	0.0049	0.0214	0.0195	0.0153
15	34.07	0.0067	0.0153	0.0049	0.0177	0.0165	0.0153
16	12.94	0.0031	0.0043	0.0024	0.0061	0.0061	0.0092
17	32.52	0.0031	0.0110	0.0037	0.0128	0.0116	0.0110
18	12.94	0.0031	0.0043	0.0024	0.0055	0.0061	0.0092
19	32.68	0.0031	0.0116	0.0043	0.0128	0.0116	0.0110
20	52.58	0.0049	0.0153	0.0049	0.0177	0.0159	0.0146
21	69.55	0.0073	0.0189	0.0061	0.0220	0.0195	0.0165
22	75.83	0.0098	0.0220	0.0085	0.0250	0.0226	0.0189
23	79.34	0.0116	0.0244	0.0110	0.0281	0.0250	0.0214
24	81.86	0.0140	0.0275	0.0140	0.0311	0.0281	0.0250
25	85.05	0.0165	0.0317	0.0171	0.0342	0.0311	0.0281
26	87.82	0.0195	0.0354	0.0201	0.0378	0.0348	0.0323
27	90.18	0.0220	0.0397	0.0238	0.0415	0.0378	0.0360
28	67.35	0.0232	0.0397	0.0238	0.0421	0.0391	0.0366
29	54.13	0.0232	0.0391	0.0238	0.0403	0.0378	0.0366
30	32.84	0.0232	0.0330	0.0238	0.0342	0.0330	0.0348
31	12.94	0.0171	0.0189	0.0183	0.0208	0.0208	0.0250
32	32.76	0.0159	0.0262	0.0183	0.0287	0.0262	0.0275
33	52.58	0.0177	0.0330	0.0189	0.0342	0.0317	0.0317

Table E.15 Beam Test 1 Data (West End Slips)

Data Point	Total Load (k)	WEST END SLIPS					
		W1	W2	W3	W4	W5	W6
34	72.32	0.0201	0.0372	0.0232	0.0397	0.0354	0.0348
35	82.52	0.0250	0.0403	0.0250	0.0421	0.0372	0.0366
36	90.18	0.0317	0.0458	0.0305	0.0470	0.0415	0.0409
37	93.28	0.0354	0.0500	0.0336	0.0507	0.0439	0.0452
38	95.32	0.0391	0.0537	0.0372	0.0549	0.0476	0.0488
39	97.36	0.0433	0.0580	0.0421	0.0598	0.0513	0.0543
40	99.56	0.0537	0.0696	0.0525	0.0720	0.0598	0.0653
41	101.36	0.0684	0.0861	0.0708	0.0885	0.0665	0.0818
42	102.66	0.0830	0.1007	0.0842	0.1031	0.0671	0.0952
43	102.91	0.1001	0.1160	0.1007	0.1184	0.0726	0.1105
44	103.15	0.1166	0.1331	0.1166	0.1355	0.0824	0.1263
45	74.61	0.1202	0.1349	0.1208	0.1379	0.0879	0.1294
46	54.87	0.1202	0.1300	0.1202	0.1343	0.0916	0.1282
47	31.21	0.1178	0.1215	0.1178	0.1251	0.0940	0.1221
48	12.94	0.1050	0.1074	0.1068	0.1111	0.0903	0.1129
49	53.07	0.1123	0.1208	0.1074	0.1251	0.0897	0.1196
50	93.04	0.1251	0.1343	0.1184	0.1385	0.0897	0.1288
51	97.53	0.1282	0.1373	0.1215	0.1410	0.0897	0.1312
52	102.26	0.1459	0.1544	0.1392	0.1587	0.0964	0.1471
53	103.97	0.1593	0.1672	0.1532	0.1721	0.1117	0.1605
54	104.46	0.1752	0.1825	0.1672	0.1874	0.1306	0.1752
55	104.13	0.1917	0.1996	0.1855	0.2045	0.1593	0.1917
56	93.69	0.2075	0.2161	0.2039	0.2203	0.1855	0.2112
57	98.18	0.2258	0.2368	0.2252	0.2399	0.2057	0.2295
58	64.00	0.2264	0.2332	0.2264	0.2374	0.2075	0.2289
59	33.66	0.2209	0.2209	0.2209	0.2258	0.1978	0.2197
60	12.94	0.1984	0.1990	0.1984	0.2026	0.1770	0.2032

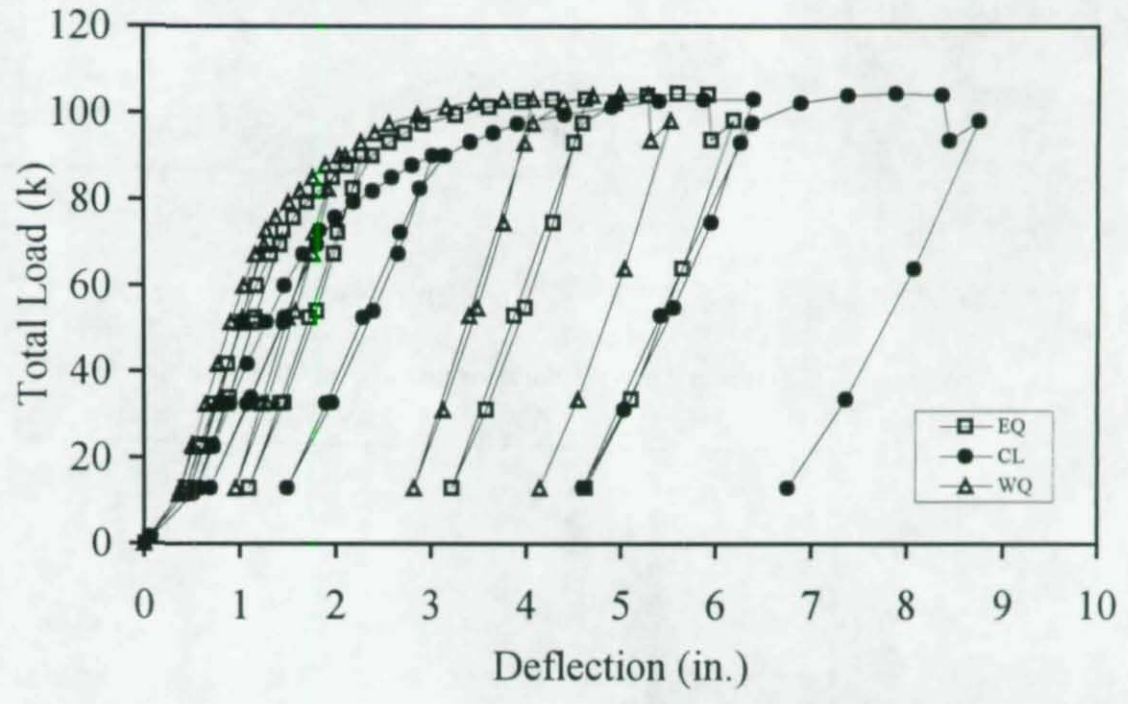


Fig. E.1 Beam Test 1 - Total Load vs. Deflection

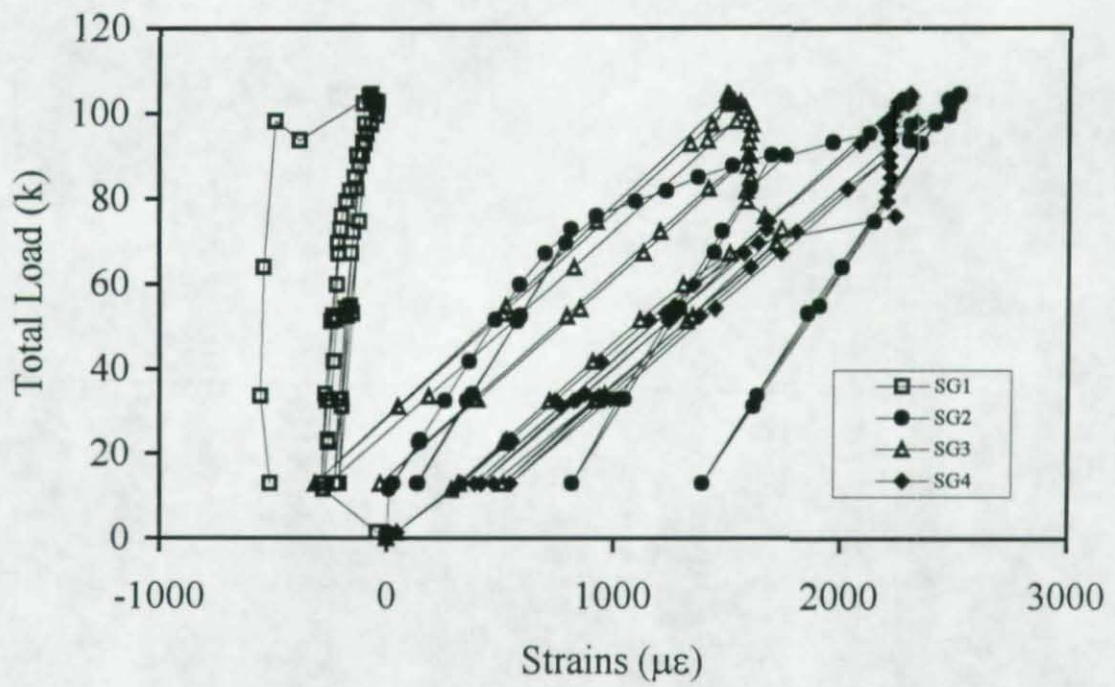


Fig. E.2 Beam Test 1 - Total Load vs. Strains (SG1 - SG4)

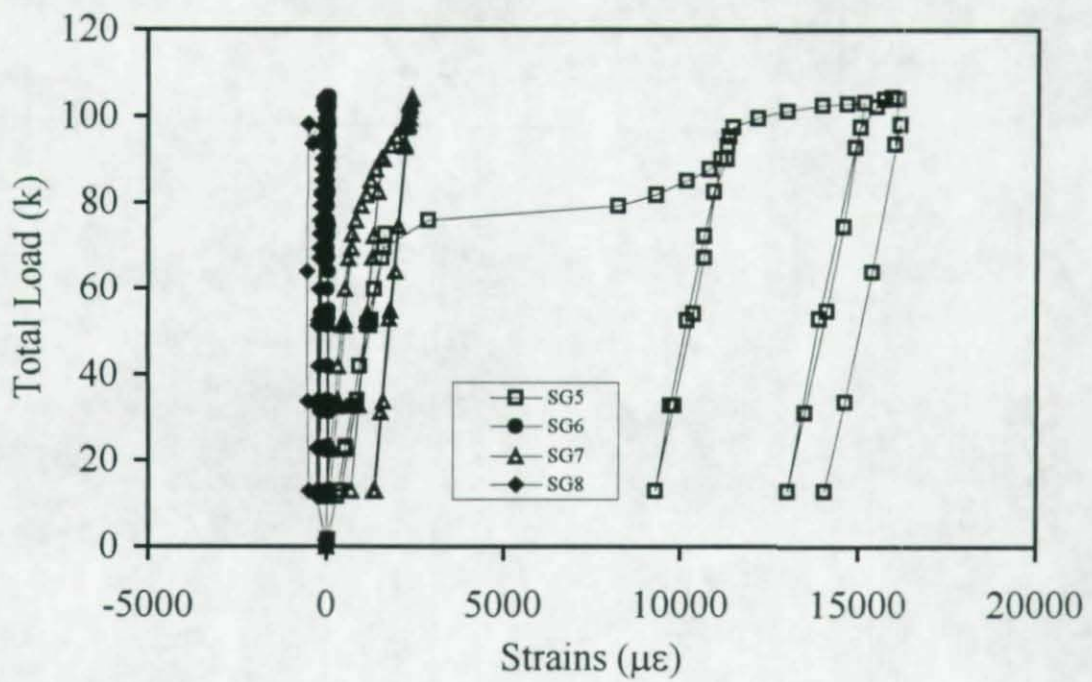


Fig. E.3 Beam Test 1 - Total Load vs. Strains (SG5 - SG8)

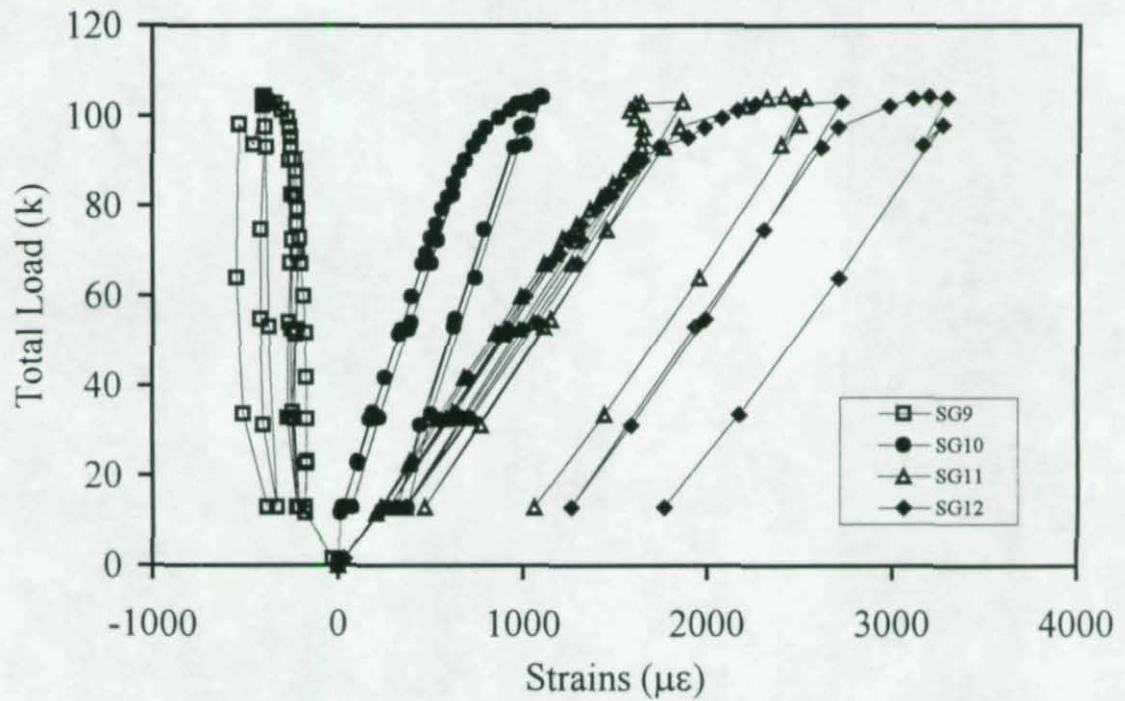


Fig. E.4 Beam Test 1 - Total Load vs. Strains (SG9 - SG12)

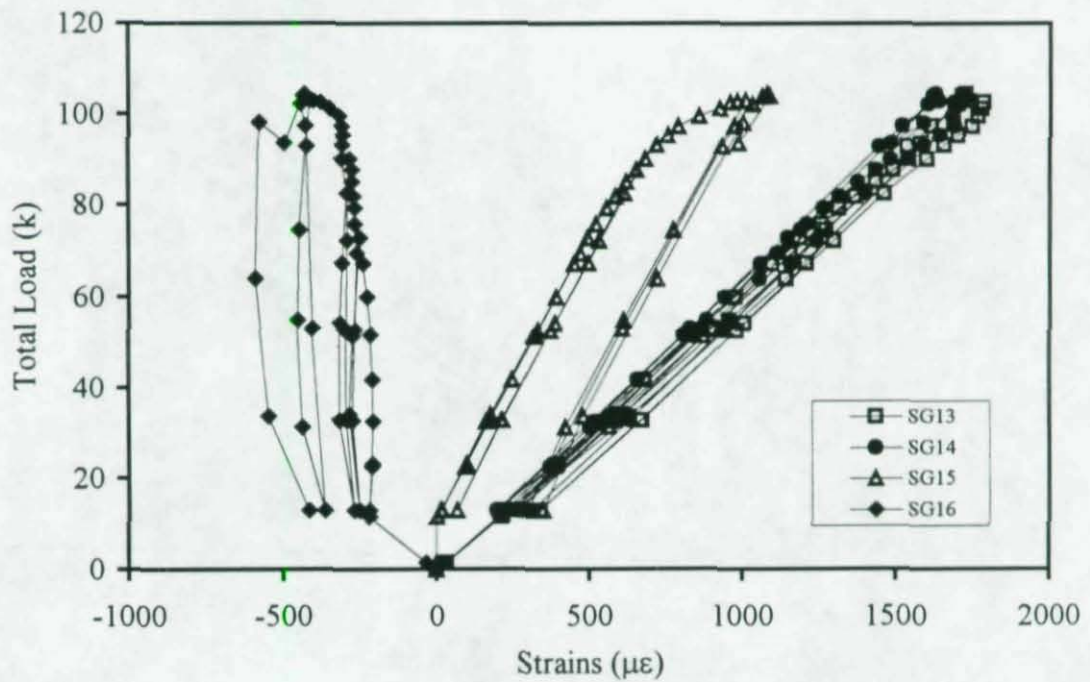


Fig. E.5 Beam Test 1 - Total Load vs. Strains (SG13 - SG16)

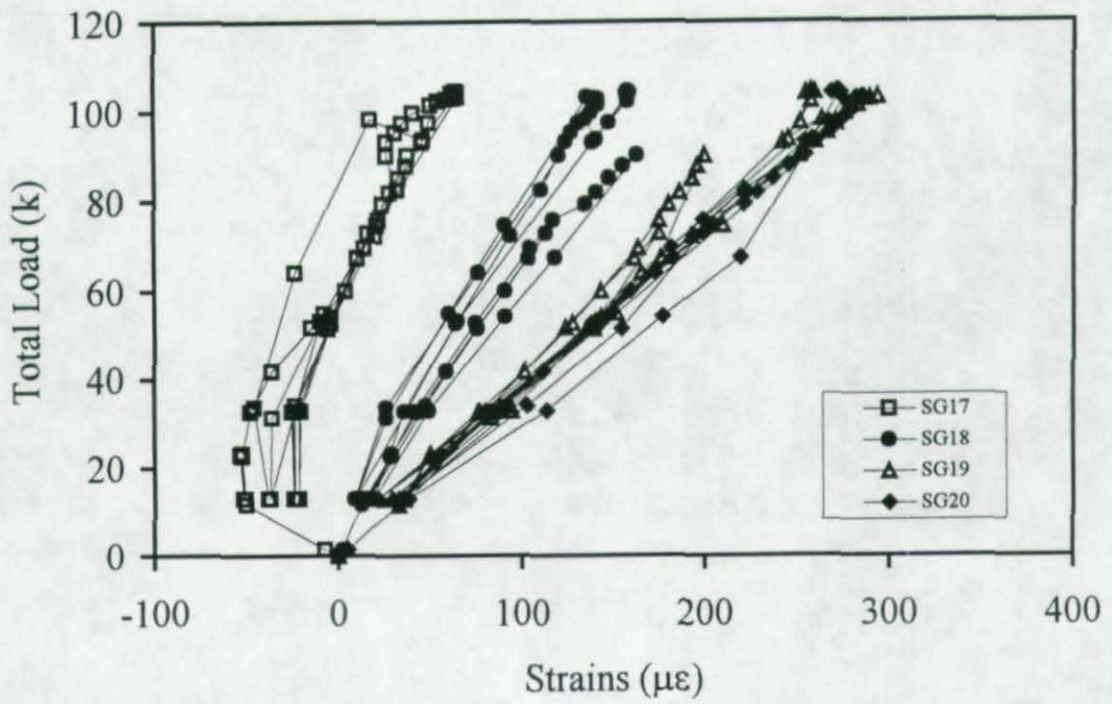


Fig. E.6 Beam Test 1 - Total Load vs. Strains (SG17-SG20)

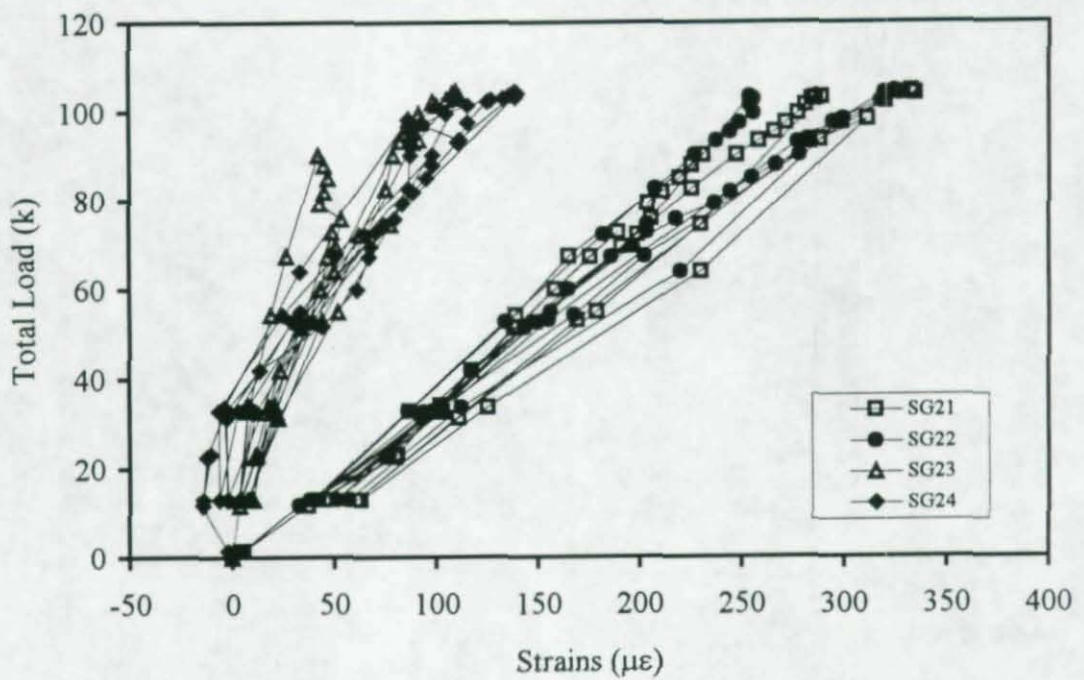


Fig. E.7 Beam Test 1 - Total Load vs. Strains (SG21 - SG24)

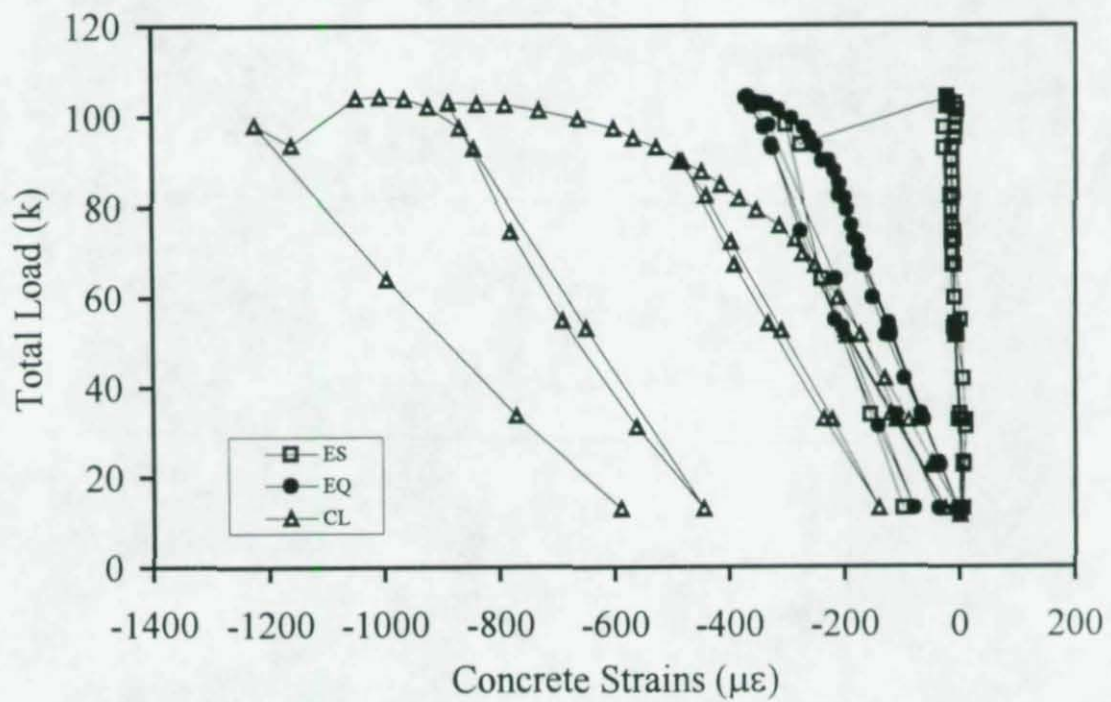


Fig. E.8 Beam Test 1 - Total Load vs. Concrete Strains

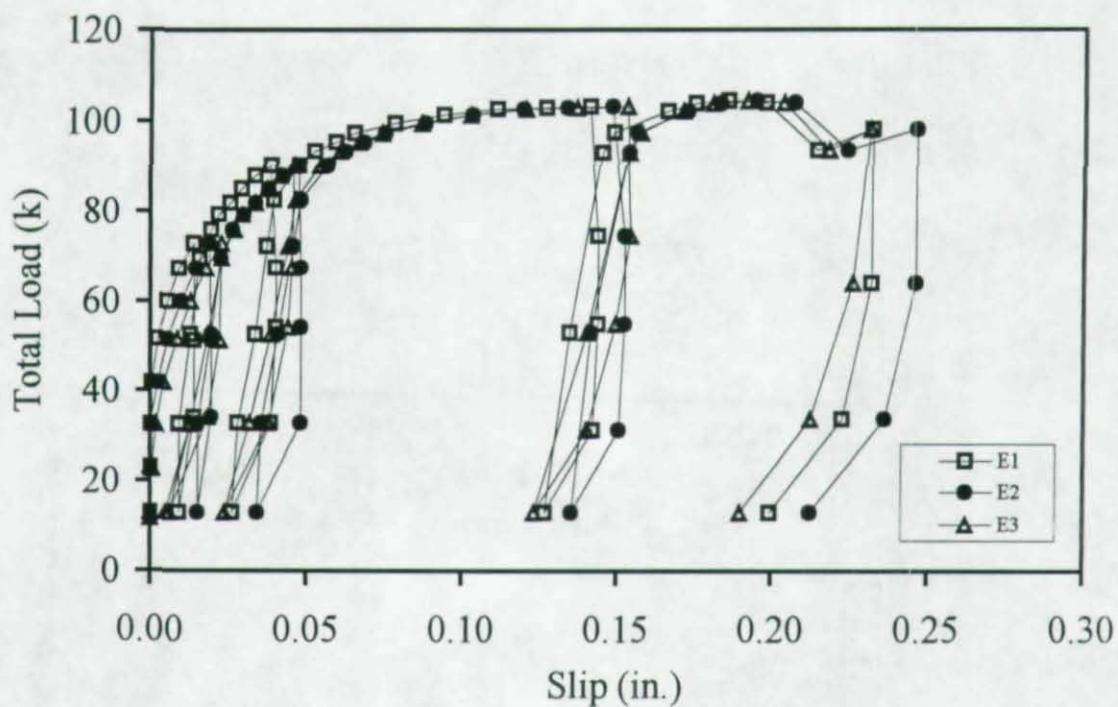


Fig. E.9 Beam Test 1 - Total Load vs. Slip (E1 - E3)

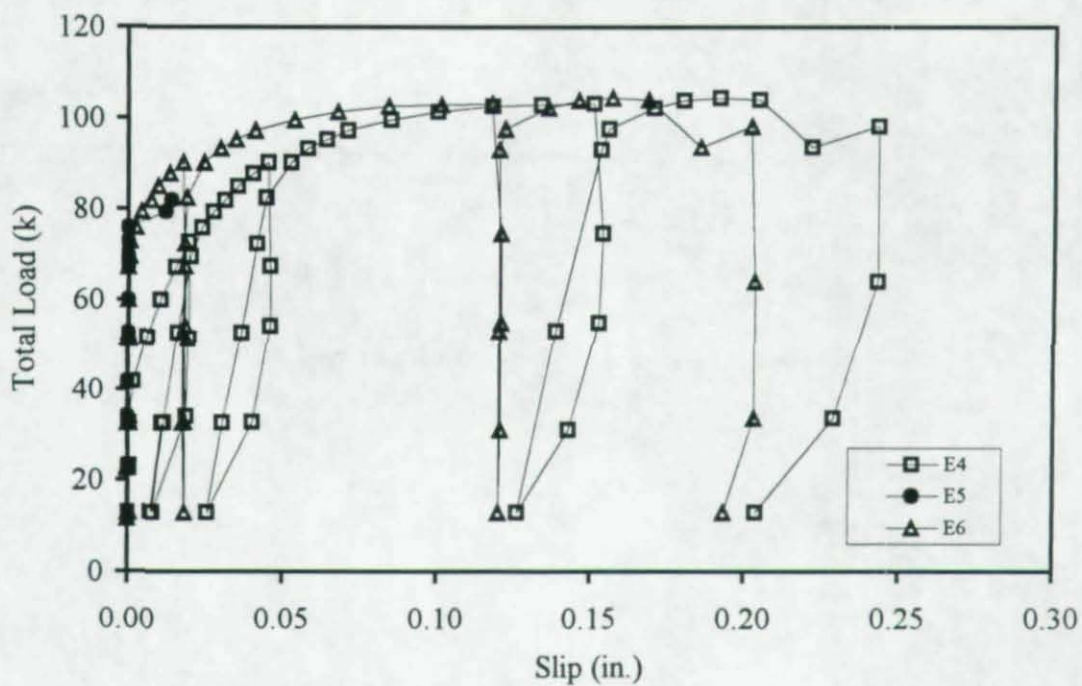


Fig. E.10 Beam Test 1 - Total Load vs. Slip (E4 - E6)

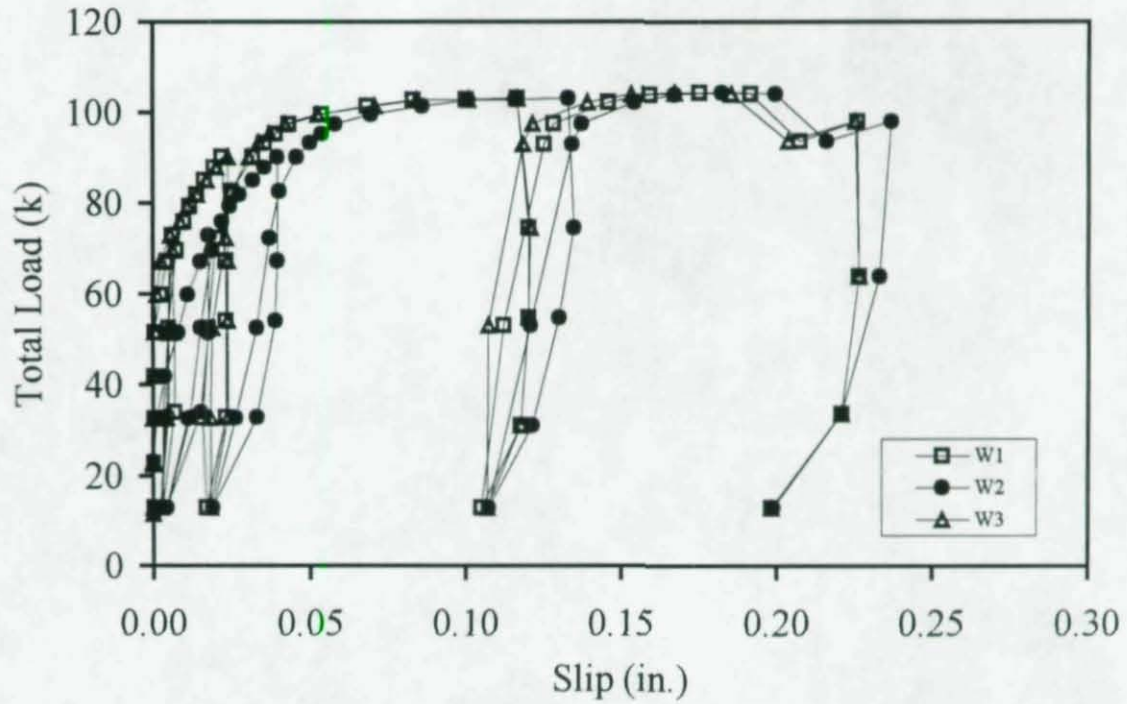


Fig. E.11 Beam Test 1 - Total Load vs. Slip (W1 - W3)

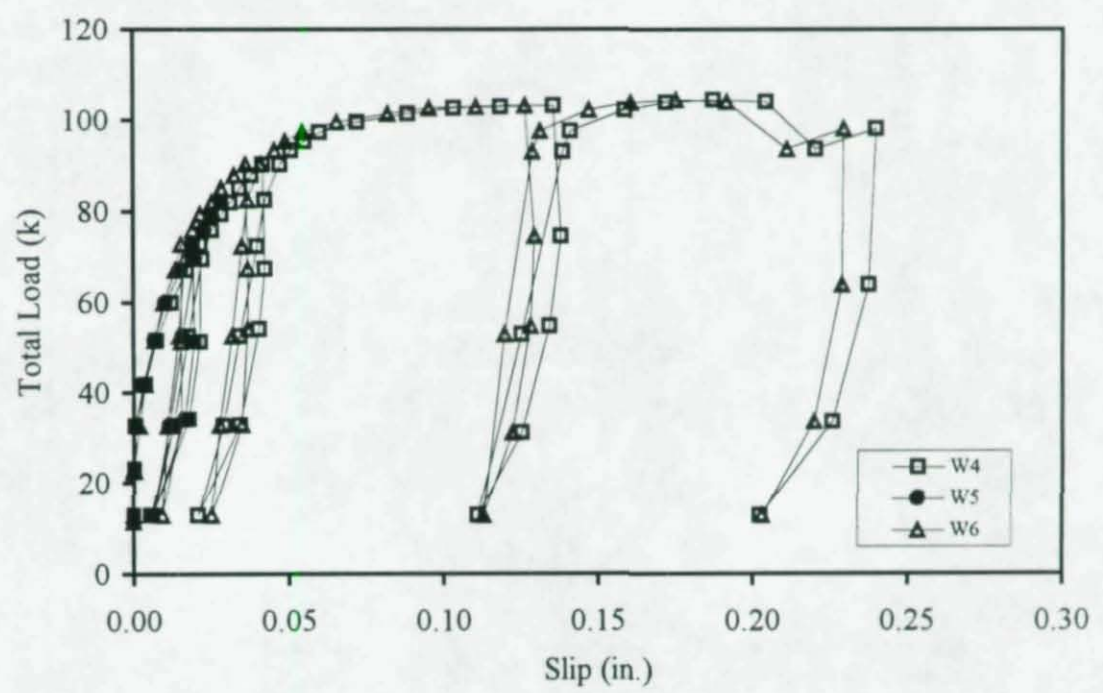


Fig. E.12 Beam Test 1 - Total Load vs. Slip (W4 - W6)

E.3 Beam Test 2 Results

002261

Table E.16 Beam Test 2 Summary

Test Program: Rambo-Roddenberry (1999)	
Beam Test 2	
TEST SUMMARY	
<i>Test Parameters</i>	
Span: 30 ft	
Slab: 81 in. x 32 ft	
Steel Beam: W16 x 31 A572Gr50	
Shear Stud Size: 3/4 in. x 3 1/2 in. (after welding)	
No. Studs Per Beam: 28	
Shear Stud Position: W	
Deck: 2 in. 20 gage	
<i>Material Properties</i>	
Concrete: $f_c = 4.840$ ksi	Steel Beam
$w = 141.1$ pcf	Flanges: $F_{yf} = 54.25$ ksi
Deck: $F_y =$ ksi	$F_{uf} = 72.6$ ksi
$F_u =$ ksi	Web: $F_{yw} = 58.2$ ksi
Studs: $F_u = 66.81$ ksi	$F_{uw} = 72.4$ ksi
<i>Predicted Moment of Inertia</i>	
$I_t = 1349$ in ⁴	$I_c = 1003$ in ⁴
<i>AISC Predicted Results</i>	<i>New Predicted Results</i>
$M_{AISC} = 468.7$ k-ft	$M_c = 389.2$ k-ft
$Q_{AISC} = 29.5$ k/stud	$Q_c = 14.17$ k/stud
% composite = 69.2%	% composite = 33.2%
<i>Test Results</i>	
$I_c = 1013$ in ⁴	
$M_c = 379.0$ k-ft	
$Q_{bc} = 12.78$ k	
% composite = 30.0%	

Table E.17 Beam Test 2 Predicted Moment of Inertia

Test Program: Rambo-Roddenberry (1999) Beam Test 2	
Predicted Moment of Inertia Calculations:	
$I_c = I_s + 0.85p^{0.25}(I_t - I_s)$	
where	$p = 0.332$ (33.2 % composite) $I_s = 375 \text{ in}^4$ (Mom. of Inertia of W16x31)
Calculate $I_{\text{conc tr}}$ (Transformed Mom. of Inertia of Slab):	
$I_{\text{conc tr}} = (81/7)(4)^3/12 = 61.7 \text{ in}^4$ $A_{\text{conc tr}} = (81)(4)/7 = 46.3 \text{ in}^2$	
Calculate I_t (Transformed Mom. of Inertia):	
$Y = \frac{\sum Ay}{\sum A} = \frac{(9.12)(15.88/2) + (46.3)(15.88 + 1 + 2)}{9.12 + 46.3}$ $Y = 17.08 \text{ in.}$ $I_t = 61.7 + 375 + (9.12)(17.08 - 15.88/2)^2$ $+ (46.3)(15.88 + 1 + 2 - 17.08)^2$ $I_t = 1349 \text{ in}^4$	
Calculate I_c (Predicted Mom. of Inertia):	
$I_c = 375 + 0.85(0.332)^{0.25}(1349 - 375)$ $I_c = 1003 \text{ in}^4$	

Table E.18 Beam Test 2 Experimental Moment of Inertia

Test Program: Rambo-Roddenberry (1999) Beam Test 2	
Experimental Moment of Inertia Calculations:	
The experimental moment of inertia in the elastic region can be found by calculating the slope of the load vs. deflection plot. The slope between data points 4 and 7 is calculated below.	
Data Pt. 4: $P = 23.12 \text{ k}$ $\Delta = 0.786 \text{ in.}$	Data Pt. 7: $P = 52.40 \text{ k}$ $\Delta = 1.445 \text{ in.}$
$\delta P = 52.40 - 23.12 = 29.28 \text{ k}$ $\delta \Delta = 1.445 - 0.786 = 0.659 \text{ in.}$	
The equation for the deflection of a beam with four concentrated loads, two of which are positioned 4.5 ft from each support, and the other two positioned 11.5 ft from each support, is below:	
$\Delta = \frac{382.8 P \text{ ft}^3}{EI}$	
thus, $I = \frac{382.8 P \text{ ft}^3}{E\Delta}$	
Calculate I_e (Experimental Mom. of Inertia):	
Substituting $P = 29.28 \text{ k}$, $E = 29000 \text{ ksi}$, and $\Delta = 0.659 \text{ in.}$,	
$I_e = 1013 \text{ in}^4$	

Table E.19 Beam Test 2 AISC Predicted Moment Capacity

Test Program: Rambo-Roddenberry (1999) Beam Test 2			Test Program: Rambo-Roddenberry (1999) Beam Test 2			
<i>Slab</i>		<i>Studs</i>		AISC Predicted Moment Capacity Calculations:		
Span = 30.0	ft	No. Studs in Pairs* =		$C1 = A_s F_y =$	511.6	k
Depth = 5.0	in.	No. Single Studs** = 12		$C2 = 0.85 f_c A_c =$	999.7	k
Width = 81.0	in.	No. Single Studs*** =		$C3 = \Sigma Q_{AISC} =$	354.2	k
<i>Concrete</i>		Stud Dia. = 0.75		$C = \min(C1, C2, C3) =$		
$f_c =$	4.840 ksi	Stud Length = 3.5		354.2 k		
$w =$	141.1 pcf	$A_{sc} =$		% Composite: 69.2%		
<i>Steel Beam</i>		$F_u =$		a = 1.063 in. Depth of Conc. Comp. Block		
Section: W16x31		Position = W		$C_f =$		
$A_s =$	9.12 in ²	Transverse Spacing =		131.9 k Comp. Force in Flange		
d	15.88 in.	e = 1.5		$C_1 - C_f =$		
$b_f =$	5.525 in.	Q_{AISC} (Studs in Pairs)* =		379.7 k		
$t_f =$	0.44 in.	Q_{AISC} (Single Studs)** = 29.5		$C_f + C =$		
$t_w =$	0.275 in.	Q_{AISC} (Single Studs)*** =		486.1 k > 379.7 k P.N.A. in flange		
$A_{st} =$	2.431 in ²	<i>Deck</i>		$P_y = C1 =$		
$F_{yf} =$	54.25 ksi	Type =		511.6 k		
$F_{uf} =$	72.6 ksi	Height = 2		$T_y = (P_y + C)/2 =$		
$A_{sw} =$	4.258 in ²	Ave. Rib Width = 6		432.9 k Tension Force in Steel		
$F_{yw} =$	58.2 ksi	Gage = 20		$T_{yw} =$		
$F_{uw} =$	72.4 ksi	$F_y =$		247.8 k Tension Force in Web		
		$F_u =$		$T_{y\Omega} =$		
				131.9 k Tension Force in Bot. Flange		
				$T_{y\Omega} =$		
				53.2 k Tension Force in Top Flange		
				s = 0.18 in. Portion of Flange in Tension		
				p = 0.26 in. Portion of Flange in Comp.		
				$C_f =$		
				78.7 k Comp. Force in Top Flange		
				$M_{AISC} =$		
				468.7 k-ft Predicted Moment Capacity		

Table E.20 Beam Test 2 New Predicted Moment Capacity with $Q_c=0.48A_sF_u$

Test Program: Rambo-Roddenberry (1999) Beam Test 2		Test Program: Rambo-Roddenberry (1999) Beam Test 2	
<i>Slab</i>	<i>Studs</i>	New Predicted Moment Capacity Calculations:	
Span = 30.0 ft	No. Studs in Pairs* =	$C1 = A_s F_y = 511.6$ k	
Depth = 5.0 in.	No. Single Studs** = 12 W	$C2 = 0.85 f'_c A_c = 999.7$ k	
Width = 81.0 in.	No. Single Studs*** =	$C3 = \Sigma Q_c = 170.0$ k	
<i>Concrete</i>	Stud Dia. = 0.75 in.	$C = \min(C1, C2, C3) = 170.0$ k	
$f'_c = 4.840$ ksi	Stud Length = 3.5 in.	% Composite: 33.2%	
$w = 141.1$ pcf	$A_{sc} = 0.4418$ in ²	$a = 0.510$ in. Depth of Conc. Comp. Block	
<i>Steel Beam</i>	$F_u = 66.81$ ksi	$C_f = 131.9$ k Comp. Force in Flange	
Section: W16x31	Position = W	$C_1 - C_f = 379.7$ k	
$A_s = 9.12$ in ²	Transverse Spacing =	$C_f + C = 301.9$ k < 379.7 k P.N.A. in web	
$d = 15.88$ in.	$e = 1.5$ in.	$P_y = C1 = 511.6$ k	
$b_f = 5.525$ in.	Q_c (Studs in Pairs)* =	$T_y = (P_y + C)/2 = 340.8$ k Tension Force in Steel	
$t_f = 0.44$ in.	Q_c (Single Studs)** = 14.17 k	$x = 5.31$ in. Dist. From PNA to c.g.	
$t_w = 0.275$ in.	Q_c (Single Studs)*** =	$p = 2.63$ in. Dist. from Top Flange to PNA	
$A_{sf} = 2.431$ in ²	<i>Deck</i>	$q = 2.19$ in. Portion of Web in Comp.	
$F_{yf} = 54.25$ ksi	Type =	$C_w = T_y - C - C_f = 38.9$ k Comp. Force in Web	
$F_{uf} = 72.6$ ksi	Height = 2 in.	$T_{yf} = 131.9$ k Tension Force in Flange	
$A_{sw} = 4.258$ in ²	Ave. Rib Width = 6 in.	$T_{yw} = T_y - T_{yf} = 208.9$ k Tension Force in Web	
$F_{yw} = 58.2$ ksi	Gage = 20	$M_c = 389.2$ k-ft Predicted Moment Capacity	
$F_{uw} = 72.4$ ksi	$F_y =$ ksi		
	$F_u =$ ksi		

Table E.21 Beam Test 2 Experimental Moment Capacity

Test Program: Rambo-Roddenberry (1999) Beam Test 2
Experimental Moment Calculations:
The Total Load given in the data sheets consists of both distributed loads and concentrated loads. These must be separated in order to calculate the moment. Ultimate Total Load = 96.20 k Theoretical Self Wt. of Beam, Deck, and Concrete: $w = 11.58 \text{ k}/32 \text{ ft} = 0.362 \text{ k}/\text{ft}$ Applied Load from Rams + Wt. of Load Beams and Plates: $P = 96.20 - 11.58 = 84.62 \text{ k}$
Reactions = $0.5(0.362)(32) + 0.5(84.62) = 48.10 \text{ k}$ $M_e = 379.0 \text{ k-ft}$ (Experimental Ultimate Moment Capacity)

Table E.22 Beam Test 2 Back-Calculated Stud Strength

Test Program: Rambo-Roddenberry (1999) Beam Test 2			Test Program: Rambo-Roddenberry (1999) Beam Test 2			
<i>Slab</i>		<i>Studs</i>		Back-Calculated (Q_{bc}) Moment Capacity Calculations:		
Span = 30.0	ft	No. Studs in Pairs* =		$M_e = 379.0$	k-ft	
Depth = 5.0	in.	No. Single Studs** = 12	W	$C1 = A_s F_y = 511.6$	k	
Width = 81.0	in.	No. Single Studs*** =		$C2 = 0.85 f'_c A_c = 999.7$	k	
<i>Concrete</i>		Stud Dia. = 0.75	in.	$C3 = \Sigma Q_{bc} = 153.4$	k	
$f'_c = 4.840$	ksi	Stud Length = 3.5	in.	$C = \min(C1, C2, C3) = 153.4$	k	
$w = 141.1$	pcf	$A_{sc} = 0.4418$	in ²	% Composite: 30.0%		
<i>Steel Beam</i>		$F_u = 66.81$	ksi	$a = 0.460$	in.	Depth of Conc. Comp. Block
Section: W16x31		Position = W		$C_f = 131.9$	k	Comp. Force in Flange
$A_s = 9.12$	in ²	Transverse Spacing =	in.	$C_1 - C_f = 379.7$	k	
$d = 15.88$	in.	$e = 1.5$	in.	$C_f + C = 285.3$	k	< 379.7 k P.N.A. in web
$b_f = 5.525$	in.	Q_{bc} (Studs in Pairs)* =	k	$P_y = C1 = 511.6$	k	
$t_f = 0.44$	in.	Q_{bc} (Single Studs)** = 12.78	k	$T_y = (P_y + C)/2 = 332.5$	k	Tension Force in Steel
$t_w = 0.275$	in.	Q_{bc} (Single Studs)*** =	k	$x = 4.79$	in.	Dist. From PNA to c.g.
$A_{sf} = 2.431$	in ²	<i>Deck</i>		$p = 3.15$	in.	Dist. from Top Flange to PNA
$F_{yf} = 54.25$	ksi	Type =		$q = 2.71$	in.	Portion of Web in Comp.
$F_{uf} = 72.6$	ksi	Height = 2	in.	$C_w = T_y - C - C_f = 47.2$	k	Comp. Force in Web
$A_{sw} = 4.258$	in ²	Ave. Rib Width = 6	in.	$T_{yf} = 131.9$	k	Tension Force in Flange
$F_{yw} = 58.2$	ksi	Gage = 20		$T_{yw} = T_y - T_{yf} = 200.6$	k	Tension Force in Web
$F_{uw} = 72.4$	ksi	$F_y =$	ksi	$M_e = 379.0$ k-ft Predicted Moment Capacity		
		$F_u =$	ksi	$M_e/M_c = 1.00$		

Table E.23 Beam Test 2 Load Effects Not Measured

Test Program: Rambo-Roddenberry (1999) Beam Test 2
Interpolations for Load Effects Not Measured:
Non-Composite Loads (Not Measured): Self Wt. of W16x31 = (31)(32) = 992 lb Wt. of Deck = (1.97)(32)(81/12) = 426 lb Total = 992 + 426 = 1418 lb
Total Load of Concrete = 7610 lb (Measured)
$\frac{1418}{7610} = 0.186$
~ Multiply the load effects from concrete placement by 0.186 to obtain the load effects due to the self wt. of beam and deck (Load effects = strains and deflections)
Composite Loads (Not Measured): Self Wt. of Load Beams [W12x65] = 2(65)(9) = 1170 lb Wt. of Load Plates = 180 lb (estimated) Total = 1170 + 180 = 1350 lb
Load from Composite Test = 10200 lb (Data Pt. #4)
*Data Pt. #4 was chosen because the beam was still elastic
$\frac{1350}{10200} = 0.132$
~ Multiply the load effects from Data Pt. #4 by 0.132 to obtain the load effects due to the self wt. of load beams and plates (Load effects = strains and deflections)

Table E.24 Beam Test 2 Data (Loads and Deflections)

Data Point	Total Load (k)	LOADS			DEFLECTIONS			NOTES
		Total (k)	East (k)	West (k)	EQ	CL (in.)	WQ	
N1	0.00	0.00	0.00	0.00	0.000	0.000	0.000	BEGIN
N2	1.42	1.42	0.70	0.71	0.073	0.089	0.062	BEAM & DECK WT.
N3	11.58	11.58	5.78	5.79	0.463	0.567	0.397	BEAM, DECK & CONC. WT.
1A	11.58	11.58	5.78	5.79	0.463	0.572	0.397	BEG. OF COMPOSITE TEST
1B	12.93	12.93	6.45	6.47	0.482	0.597	0.414	WT. OF LOAD BEAMS & PLATES
2	22.80	22.80	11.34	11.45	0.603	0.731	0.474	FIRST INCR. OF APPL. LOAD
3	12.93	12.93	6.45	6.47	0.482	0.597	0.414	Unloaded and Zeroed
4	23.12	23.12	11.50	11.61	0.621	0.786	0.546	
5	32.75	32.75	16.31	16.43	0.761	0.964	0.681	
6	42.61	42.61	21.28	21.32	0.958	1.202	0.850	
7	52.40	52.40	26.18	26.22	1.160	1.445	1.023	
8	61.70	61.70	30.82	30.87	1.352	1.686	1.197	
9	68.63	68.63	34.33	34.30	1.571	1.971	1.393	
10	73.69	73.69	36.69	36.99	1.732	2.202	1.548	Slight Bottom Flange Yielding
11	55.67	55.67	27.64	28.01	1.473	1.880	1.318	
12	32.50	32.50	16.15	16.34	1.089	1.401	0.984	
13	12.93	12.93	6.45	6.47	0.689	0.902	0.617	
14	32.83	32.83	16.31	16.51	1.060	1.367	0.954	
15	54.93	54.93	27.32	27.61	1.436	1.829	1.285	
16	71.90	71.90	35.79	36.09	1.732	2.203	1.549	
17	78.18	78.18	38.89	39.28	1.997	2.577	1.777	
18	80.95	80.95	40.20	40.74	2.171	2.824	1.936	
19	84.30	84.30	41.83	42.46	2.479	3.250	2.202	Web and Bottom Flange Yielding
20	87.23	87.23	43.21	44.01	2.752	3.645	2.464	Noises
21	89.52	89.52	44.27	45.23	3.027	4.028	2.705	
22	91.07	91.07	45.01	46.05	3.307	4.438	2.951	
23	73.61	73.61	36.45	37.15	3.044	4.094	2.721	
24	54.03	54.03	26.75	27.28	2.729	3.691	2.432	
25	33.72	33.72	16.64	17.08	2.344	3.197	2.076	
26	13.01	13.01	6.45	6.55	1.850	2.592	1.654	
27	42.21	42.21	20.96	21.24	2.438	3.318	2.165	
28	72.79	72.79	36.20	36.58	2.985	4.015	2.657	
29	89.19	89.19	44.35	44.82	3.318	4.444	2.953	Cracking noises
30	92.45	92.45	45.82	46.62	3.616	4.861	3.227	
31	93.19	93.19	46.23	46.95	3.890	5.275	3.490	
32	94.00	94.00	46.56	47.44	4.150	5.666	3.743	
33	94.57	94.57	46.80	47.76	4.415	6.067	4.001	

Table E.24 Beam Test 2 Data (Loads and Deflections)

Data Point	Total Load (k)	LOADS			DEFLECTIONS			NOTES	
		Total (k)	East (k)	West (k)	EQ	CL (in.)	WQ		
34	94.65	94.65	46.80	47.84	4.646	6.438	4.245	Yielding Across 1/3 of Beam	
35	95.31	95.31	47.04	48.25	4.880	6.798	4.472		
36	95.47	95.47	47.04	48.42	5.124	7.198	4.724	Slight Deck Bulging	
37	95.80	95.80	47.13	48.66	5.309	7.477	4.907		
38	96.20	96.20	47.21	48.99	5.568	7.882	5.169		
39	95.80	95.80	46.88	48.91	5.809	8.267	5.402		
40	95.63	95.63	46.72	48.91	6.053	8.657	5.640		
41	96.20	96.20	46.88	49.31	6.292	9.020	5.873		
42	96.04	96.04	46.72	49.31	6.466	9.276	6.028		
43	96.04	96.04	46.64	49.40	6.666	9.568	6.204		
44	95.47	95.47	46.39	49.07	6.666	9.572	6.209		
45	68.31	68.31	33.43	34.87	6.205	9.004	5.808		
46	40.82	40.82	20.06	20.75	5.641	8.285	5.311		
47	12.68	12.68	6.28	6.39	4.894	7.338	4.677		Terminated Test Due to Deflection

Table E.25 Beam Test 2 Data (Strains at Midspan)

Data Point	Total Load (k)	STRAINS AT MIDSPAN							
		SG1	SG2	SG3	SG4	SG5	SG6	SG7	SG8
N1	0.00	0	0	0	0	0	0	0	0
N2	1.42	-47	0	49	51	51	53	3	-46
N3	11.58	-300	1	311	328	322	340	20	-295
1A	11.58	-300	1	311	328	322	339	20	-295
1B	12.93	-297	15	338	355	350	367	35	-292
2	22.80	-281	114	540	561	561	570	149	-272
3	12.93	-297	15	338	356	350	367	35	-292
4	23.12	-280	117	544	566	565	575	152	-271
5	32.75	-268	213	738	764	769	771	261	-256
6	42.61	-289	302	951	979	989	979	359	-275
7	52.40	-319	393	1197	1212	1220	1199	458	-301
8	61.70	-348	487	1551	1493	1465	1430	561	-327
9	68.63	-398	598	4601	2891	1720	1553	682	-380
10	73.69	-421	734	6952	4735	1699	1415	832	-407
11	55.67	-447	553	6616	4393	1327	1051	637	-438
12	32.50	-451	324	6104	3881	830	577	387	-445
13	12.93	-391	149	5622	3403	381	155	193	-388
14	32.83	-422	332	6046	3837	818	572	395	-418
15	54.93	-433	545	6536	4327	1296	1032	627	-424
16	71.90	-442	715	6996	4772	1668	1389	811	-426
17	78.18	-470	880	8108	6076	1740	1430	982	-428
18	80.95	-499	1030	8509	6603	1759	1412	1137	-470
19	84.30	-550	1232	8950	7230	1793	1388	1346	-518
20	87.23	-596	1458	9295	7792	1816	1376	1584	-571
21	89.52	-633	1641	9645	8402	1842	1358	1775	-607
22	91.07	-675	1875	9767	8805	1837	1337	2024	-653
23	73.61	-696	1689	9395	8428	1468	977	1831	-683
24	54.03	-702	1485	8957	7984	1053	577	1619	-698
25	33.72	-681	1277	8465	7484	608	149	1401	-682
26	13.01	-593	1086	7922	6931	134	-297	1199	-595
27	42.21	-650	1358	8559	7580	777	320	1486	-651
28	72.79	-675	1668	9272	8306	1441	963	1811	-669
29	89.19	-702	1855	9750	8807	1807	1312	2004	-690
30	92.45	-738	2084	9978	9234	1805	1351	2240	-730
31	93.19	-801	2248	10093	9546	1790	1345	2407	-789
32	94.00	-852	2327	10266	9880	1789	1360	2481	-835
33	94.57	-935	2370	10496	10214	1795	1407	2514	-909

Table E.25 Beam Test 2 Data (Strains at Midspan)

Data Point	Total Load (k)	STRAINS AT MIDSPAN							
		SG1	SG2	SG3	SG4	SG5	SG6	SG7	SG8
34	94.65	-990	2392	10770	10527	1835	1458	2524	-962
35	95.31	-1031	2398	11140	10884	2121	1547	2500	-1007
36	95.47	-1066	2386	11889	11600	3317	1598	2451	-1041
37	95.80	-1088	2389	12507	12258	4523	1815	2435	-1061
38	96.20	-1115	2396	13308	13099	5982	2666	2413	-1089
39	95.80	-1146	2388	13866	13692	7346	4653	2385	-1125
40	95.63	-1171	2397	14175	14089	8793	6439	2377	-1153
41	96.20	-1198	2390	14300	14254	10018	7852	2365	-1182
42	96.04	-1220	2390	14334	14306	10813	--	2362	-1208
43	96.04	-1241	2400	14359	14337	11480	--	2370	-1236
44	95.47	-1245	2391	14351	14330	11493	--	2362	-1240
45	68.31	-1251	2089	13731	13697	10868	--	2065	-1273
46	40.82	-1211	1784	13048	12995	10177	--	1766	-1241
47	12.68	-1007	1525	12289	12212	9397	--	1514	-1039

Table E.26 Beam Test 2 Data (Strains at East Quarter Point)

Data Point	Total Load (k)	STRAINS AT EAST QUARTER PT.							
		SG9	SG10	SG11	SG12	SG13	SG14	SG15	SG16
N1	0.00	0	0	0	0	0	0	0	0
N2	1.42	-34	0	34	39	32	30	-2	-35
N3	11.58	-219	0	216	252	207	193	-13	-224
1A	11.58	-220	0	216	252	207	193	-13	-224
1B	12.93	-218	11	236	272	228	214	-2	-222
2	22.80	-201	91	384	422	384	369	75	-204
3	12.93	-218	11	236	272	229	214	-2	-223
4	23.12	-200	93	386	425	388	372	77	-204
5	32.75	-200	167	534	576	540	524	146	-205
6	42.61	-236	229	694	742	708	690	205	-240
7	52.40	-267	291	857	910	878	857	265	-271
8	61.70	-302	351	1012	1072	1041	1018	321	-309
9	68.63	-354	393	1144	1214	1186	1161	360	-364
10	73.69	-377	425	1232	1308	1280	1252	391	-390
11	55.67	-391	287	964	1034	1003	978	258	-402
12	32.50	-377	118	604	665	629	607	99	-385
13	12.93	-290	0	274	325	279	262	-12	-294
14	32.83	-354	127	594	654	619	599	107	-362
15	54.93	-376	285	941	1011	979	954	256	-386
16	71.90	-393	407	1212	1288	1259	1232	375	-407
17	78.18	-419	453	1332	1417	1383	1352	417	-440
18	80.95	-437	478	1397	1490	1448	1412	441	-461
19	84.30	-478	512	1508	1613	1545	1505	472	-505
20	87.23	-519	548	1640	1755	1626	1644	506	-544
21	89.52	-559	587	1777	1900	1632	1919	539	-585
22	91.07	-595	624	1980	2190	1622	2112	574	-619
23	73.61	-610	489	1715	1917	1344	1837	443	-629
24	54.03	-605	344	1408	1603	1025	1519	303	-619
25	33.72	-556	206	1070	1256	673	1168	171	-567
26	13.01	-406	99	701	873	281	778	72	-420
27	42.21	-529	274	1182	1369	795	1286	238	-544
28	72.79	-581	489	1681	1880	1313	1801	444	-600
29	89.19	-615	607	1981	2183	1603	2099	557	-643
30	92.45	-640	662	2061	2282	1673	2412	617	-676
31	93.19	-659	690	2057	2277	1715	3186	645	-699
32	94.00	-682	723	2063	2280	1782	3454	675	-722
33	94.57	-702	738	2073	2288	1832	3613	689	-742

Table E.26 Beam Test 2 Data (Strains at East Quarter Point)

Data Point	Total Load (k)	STRAINS AT EAST QUARTER PT.							
		SG9	SG10	SG11	SG12	SG13	SG14	SG15	SG16
34	94.65	-723	747	2077	2290	1920	3778	698	-760
35	95.31	-741	759	2091	2305	2337	3964	709	-781
36	95.47	-753	771	2092	2304	2533	4183	721	-793
37	95.80	-765	781	2100	2311	2640	4371	731	-804
38	96.20	-780	793	2108	2317	2806	4668	742	-820
39	95.80	-793	801	2103	2310	3014	5058	749	-830
40	95.63	-818	809	2103	2308	3149	5412	758	-854
41	96.20	-847	822	2113	2314	3401	5949	770	-883
42	96.04	-868	839	2108	2307	3650	6343	787	-903
43	96.04	-879	851	2103	2300	3870	6627	798	-913
44	95.47	-879	848	2092	2289	3875	6639	795	-912
45	68.31	-880	638	1653	1840	3414	6179	591	-905
46	40.82	-805	445	1175	1348	2901	5656	408	-822
47	12.68	-561	318	654	808	2331	5065	290	-573

Table E.27 Beam Test 2 Data (Strains at Support)

Data Point	Total Load (k)	STRAINS AT 1 FT. FROM SUPPORT							
		SG17	SG18	SG19	SG20	SG21	SG22	SG23	SG24
N1	0.00	0	0	0	0	0	0	0	0
N2	1.42	-4	0	7	7	5	5	-1	-7
N3	11.58	-24	-1	47	45	33	30	-9	-47
1A	11.58	-25	-1	47	45	33	30	-9	-47
1B	12.93	-28	0	50	48	38	34	-8	-50
2	22.80	-51	9	76	72	72	64	2	-69
3	12.93	-28	1	50	48	38	34	-8	-50
4	23.12	-51	9	76	74	73	65	3	-68
5	32.75	-64	19	105	104	98	86	12	-83
6	42.61	-78	28	139	137	120	106	22	-96
7	52.40	-88	39	176	174	141	123	30	-112
8	61.70	-91	44	204	202	162	142	33	-120
9	68.63	-105	44	229	227	181	160	33	-136
10	73.69	-112	47	244	242	194	171	35	-141
11	55.67	-105	28	193	191	161	140	18	-126
12	32.50	-83	9	119	117	107	92	2	-99
13	12.93	-40	-2	47	45	43	39	-12	-62
14	32.83	-79	7	110	108	105	91	1	-97
15	54.93	-100	26	183	181	154	135	17	-124
16	71.90	-114	44	235	232	196	172	33	-139
17	78.18	-126	47	256	253	212	185	37	-142
18	80.95	-130	50	265	260	219	190	39	-144
19	84.30	-140	51	275	270	229	198	40	-142
20	87.23	-144	54	283	278	237	204	43	-145
21	89.52	-144	55	289	284	243	210	44	-153
22	91.07	-140	59	290	288	247	218	43	-156
23	73.61	-139	38	241	239	212	188	23	-146
24	54.03	-128	16	181	181	171	151	4	-131
25	33.72	-94	-1	113	111	113	98	-11	-107
26	13.01	-38	-10	40	39	41	35	-20	-74
27	42.21	-97	6	135	134	124	108	-5	-123
28	72.79	-131	38	237	237	206	182	22	-151
29	89.19	-144	56	292	292	251	224	40	-166
30	92.45	-145	59	304	303	261	231	43	-168
31	93.19	-144	62	297	302	268	248	38	-171
32	94.00	-144	61	305	309	268	245	37	-172
33	94.57	-150	59	308	311	270	246	37	-176

Table E.27 Beam Test 2 Data (Strains at Support)

Data Point	Total Load (k)	STRAINS AT 1 FT. FROM SUPPORT							
		SG17	SG18	SG19	SG20	SG21	SG22	SG23	SG24
34	94.65	-151	57	307	311	271	246	38	-180
35	95.31	-159	54	312	314	275	248	38	-188
36	95.47	-162	52	312	314	277	248	37	-192
37	95.80	-166	51	313	314	280	250	37	-194
38	96.20	-168	50	313	314	282	252	38	-195
39	95.80	-172	49	308	311	284	257	36	-192
40	95.63	-173	50	306	309	285	259	35	-191
41	96.20	-176	51	307	312	286	261	35	-192
42	96.04	-177	50	309	313	286	261	35	-194
43	96.04	-176	50	310	314	287	262	35	-195
44	95.47	-176	50	307	311	286	261	35	-194
45	68.31	-160	17	216	220	223	204	4	-165
46	40.82	-118	-8	126	130	136	124	-19	-127
47	12.68	-52	-16	42	40	49	44	-22	-73

Table E.28 Beam Test 2 Data (Concrete Strains)

Data Point	Total Load (k)	CONCRETE STRAINS		
		ES	EQ ($\mu\epsilon$)	CL
N1	0.00	--	--	--
N2	1.42	--	--	--
N3	11.58	--	--	--
1A	11.58	0	0	0
1B	12.93	-1	-3	-6
2	22.80	-11	-27	-53
3	12.93	-2	-3	-6
4	23.12	-11	-27	-53
5	32.75	-9	-51	-98
6	42.61	-9	-81	-149
7	52.40	-23	-108	-199
8	61.70	-43	-130	-249
9	68.63	-60	-149	-304
10	73.69	-69	-158	-352
11	55.67	-53	-119	-272
12	32.50	-30	-62	-159
13	12.93	-29	0	-58
14	32.83	-30	-64	-153
15	54.93	-49	-116	-262
16	71.90	-71	-154	-346
17	78.18	-87	-163	-410
18	80.95	-95	-171	-455
19	84.30	-107	-185	-524
20	87.23	-120	-191	-592
21	89.52	-136	-197	-660
22	91.07	-143	-205	-729
23	73.61	-124	-167	-642
24	54.03	-93	-126	-542
25	33.72	-61	-76	-424
26	13.01	-54	-29	-281
27	42.21	-62	-102	-436
28	72.79	-102	-170	-611
29	89.19	-126	-208	-708
30	92.45	-131	-220	-775
31	93.19	-132	-225	-837
32	94.00	-134	-230	-888
33	94.57	-135	-232	-937

Table E.28 Beam Test 2 Data (Concrete Strains)

Data Point	Total Load (k)	CONCRETE STRAINS		
		ES	EQ ($\mu\epsilon$)	CL
34	94.65	-137	-232	-992
35	95.31	-140	-235	-1044
36	95.47	-142	-237	-1103
37	95.80	-145	-239	-1142
38	96.20	-150	-241	-1195
39	95.80	-155	-242	-1245
40	95.63	-159	-245	-1297
41	96.20	-167	-249	-1351
42	96.04	-172	-254	-1383
43	96.04	-179	-253	-1424
44	95.47	-178	-252	-1423
45	68.31	-139	-190	-1222
46	40.82	-85	-125	-966
47	12.68	-74	-62	-569

Table E.29 Beam Test 2 Data (East End Slips)

Data Point	Total Load (k)	EAST END SLIPS					
		E1	E2	E3	E4	E5	E6
N1	0.00	--	--	--	--	--	--
N2	1.42	--	--	--	--	--	--
N3	11.58	--	--	--	--	--	--
1A	11.58	-0.0006	0.0000	0.0000	0.0000	0.0000	0.0000
1B	12.93	-0.0006	0.0001	0.0000	0.0000	0.0000	0.0000
2	22.80	-0.0006	0.0013	0.0000	0.0000	0.0000	0.0000
3	12.93	-0.0006	0.0001	0.0000	0.0000	0.0000	0.0000
4	23.12	-0.0006	0.0007	0.0000	0.0000	0.0000	0.0000
5	32.75	0.0024	0.0050	0.0000	0.0024	0.0000	0.0006
6	42.61	0.0104	0.0129	0.0073	0.0116	0.0049	0.0055
7	52.40	0.0201	0.0227	0.0159	0.0226	0.0116	0.0122
8	61.70	0.0305	0.0336	0.0171	0.0317	0.0122	0.0177
9	68.63	0.0439	0.0477	0.0220	0.0452	0.0177	0.0232
10	73.69	0.0513	0.0556	0.0256	0.0519	0.0226	0.0275
11	55.67	0.0519	0.0507	0.0256	0.0525	0.0238	0.0275
12	32.50	0.0513	0.0398	0.0232	0.0482	0.0232	0.0275
13	12.93	0.0305	0.0153	0.0098	0.0256	0.0140	0.0189
14	32.83	0.0366	0.0336	0.0140	0.0330	0.0140	0.0195
15	54.93	0.0488	0.0477	0.0189	0.0470	0.0189	0.0244
16	71.90	0.0586	0.0587	0.0238	0.0574	0.0244	0.0287
17	78.18	0.0708	0.0697	0.0311	0.0684	0.0342	0.0360
18	80.95	0.0800	0.0788	0.0366	0.0769	0.0397	0.0415
19	84.30	0.0964	0.0953	0.0507	0.0928	0.0519	0.0531
20	87.23	0.1129	0.1106	0.0671	0.1086	0.0659	0.0659
21	89.52	0.1282	0.1258	0.0824	0.1251	0.0800	0.0806
22	91.07	0.1440	0.1411	0.0977	0.1404	0.0946	0.0958
23	73.61	0.1440	0.1368	0.0970	0.1398	0.0964	0.0958
24	54.03	0.1422	0.1270	0.0934	0.1349	0.0964	0.0952
25	33.72	0.1257	0.1099	0.0867	0.1178	0.0958	0.0928
26	13.01	0.0897	0.0758	0.0696	0.0854	0.0702	0.0726
27	42.21	0.1123	0.1081	0.0824	0.1068	0.0769	0.0812
28	72.79	0.1337	0.1307	0.0909	0.1294	0.0885	0.0909
29	89.19	0.1489	0.1466	0.1025	0.1453	0.0977	0.1007
30	92.45	0.1617	0.1600	0.1147	0.1587	0.1093	0.1123
31	93.19	0.1739	0.1710	0.1251	0.1691	0.1190	0.1227
32	94.00	0.1849	0.1832	0.1367	0.1813	0.1306	0.1324
33	94.57	0.1935	0.1905	0.1440	0.1892	0.1373	0.1404

Table E.29 Beam Test 2 Data (East End Slips)

Data Point	Total Load (k)	EAST END SLIPS					
		E1	E2	E3	E4	E5	E6
34	94.65	0.2002	0.1972	0.1508	0.1959	0.1447	0.1465
35	95.31	0.2087	0.2058	0.1593	0.2045	0.1526	0.1538
36	95.47	0.2154	0.2137	0.1660	0.2106	0.1599	0.1605
37	95.80	0.2222	0.2186	0.1721	0.2167	0.1666	0.1666
38	96.20	0.2307	0.2277	0.1801	0.2258	0.1764	0.1746
39	95.80	0.2392	0.2363	0.1886	0.2332	0.1849	0.1825
40	95.63	0.2496	0.2454	0.1984	0.2435	0.1953	0.1923
41	96.20	0.2618	0.2576	0.2106	0.2557	0.2081	0.2039
42	96.04	0.2710	0.2668	0.2197	0.2649	0.2173	0.2124
43	96.04	0.2820	0.2778	0.2301	0.2753	0.2283	0.2228
44	95.47	0.2826	0.2778	0.2301	0.2753	0.2289	0.2234
45	68.31	0.2814	0.2668	0.2264	0.2734	0.2295	0.2234
46	40.82	0.2576	0.2412	0.2179	0.2496	0.2222	0.2185
47	12.68	0.2057	0.1899	0.1831	0.1996	0.1794	0.1855

Table E.30 Beam Test 2 Data (West End Slips)

Data Point	Total Load (k)	WEST END SLIPS					
		W1	W2	W3	W4	W5	W6
N1	0.00	--	--	--	--	--	--
N2	1.42	--	--	--	--	--	--
N3	11.58	--	--	--	--	--	--
1A	11.58	0.0000	0.0000	0.0000	0.0000	-0.0006	0.0000
1B	12.93	0.0001	0.0002	0.0000	0.0000	-0.0007	0.0000
2	22.80	0.0013	0.0020	0.0000	0.0000	-0.0013	0.0000
3	12.93	-0.0005	0.0002	0.0000	0.0000	-0.0007	0.0000
4	23.12	0.0007	0.0014	0.0000	0.0000	-0.0013	0.0000
5	32.75	0.0062	0.0050	0.0006	0.0018	-0.0001	0.0006
6	42.61	0.0178	0.0154	0.0116	0.0079	0.0097	0.0098
7	52.40	0.0282	0.0258	0.0220	0.0134	0.0182	0.0171
8	61.70	0.0416	0.0380	0.0348	0.0183	0.0176	0.0269
9	68.63	0.0581	0.0545	0.0519	0.0214	0.0011	0.0403
10	73.69	0.0690	0.0649	0.0629	0.0214	-0.0105	0.0500
11	55.67	0.0654	0.0636	0.0635	0.0256	-0.0105	0.0500
12	32.50	0.0513	0.0490	0.0507	0.0269	-0.0050	0.0464
13	12.93	0.0208	0.0203	0.0208	0.0098	-0.0001	0.0244
14	32.83	0.0446	0.0417	0.0385	0.0256	-0.0019	0.0323
15	54.93	0.0599	0.0575	0.0537	0.0262	-0.0025	0.0433
16	71.90	0.0727	0.0691	0.0659	0.0232	-0.0117	0.0531
17	78.18	0.0880	0.0844	0.0824	0.0208	-0.0196	0.0677
18	80.95	0.1002	0.0954	0.0946	0.0153	-0.0233	0.0781
19	84.30	0.1197	0.1155	0.1141	0.0104	-0.0306	0.0964
20	87.23	0.1380	0.1326	0.1318	0.0098	-0.0355	0.1123
21	89.52	0.1533	0.1479	0.1471	0.0128	-0.0391	0.1270
22	91.07	0.1691	0.1650	0.1642	0.0195	-0.0416	0.1422
23	73.61	0.1655	0.1643	0.1642	0.0220	-0.0416	0.1422
24	54.03	0.1569	0.1552	0.1569	0.0250	-0.0416	0.1416
25	33.72	0.1374	0.1357	0.1367	0.0262	-0.0355	0.1294
26	13.01	0.0977	0.0978	0.0989	0.0067	-0.0208	0.1013
27	42.21	0.1356	0.1326	0.1294	0.0287	-0.0214	0.1178
28	72.79	0.1588	0.1552	0.1526	0.0208	-0.0355	0.1355
29	89.19	0.1746	0.1711	0.1691	0.0195	-0.0404	0.1471
30	92.45	0.1984	0.1936	0.1910	0.0330	-0.0398	0.1660
31	93.19	0.2265	0.2211	0.2179	0.0610	-0.0355	0.1917
32	94.00	0.2497	0.2437	0.2417	0.0854	-0.0251	0.2130
33	94.57	0.2802	0.2742	0.2722	0.1160	0.0036	0.2423

Table E.30 Beam Test 2 Data (West End Slips)

Data Point	Total Load (k)	WEST END SLIPS					
		W1	W2	W3	W4	W5	W6
34	94.65	0.3059	0.2986	0.2960	0.1398	0.0268	0.2655
35	95.31	0.3278	0.3200	0.3186	0.1624	0.0481	0.2863
36	95.47	0.3516	0.3438	0.3400	0.1855	0.0707	0.3088
37	95.80	0.3693	0.3603	0.3571	0.2026	0.0872	0.3247
38	96.20	0.3956	0.3847	0.3809	0.2252	0.1098	0.3467
39	95.80	0.4194	0.4091	0.4047	0.2484	0.1324	0.3687
40	95.63	0.4383	0.4317	0.4279	0.2704	0.1543	0.3900
41	96.20	0.4530	0.4530	0.4474	0.2887	0.1720	0.4083
42	96.04	0.4603	0.4683	0.4626	0.3040	0.1861	0.4224
43	96.04	0.4670	0.4811	0.4755	0.3168	0.1989	0.4346
44	95.47	0.4676	0.4811	0.4761	0.3174	0.1995	0.4352
45	68.31	0.4633	0.4750	0.4706	0.3217	0.2019	0.4352
46	40.82	0.4438	0.4445	0.4413	0.3162	0.2123	0.4205
47	12.68	0.3846	0.3847	0.3839	0.2740	0.2386	0.3766

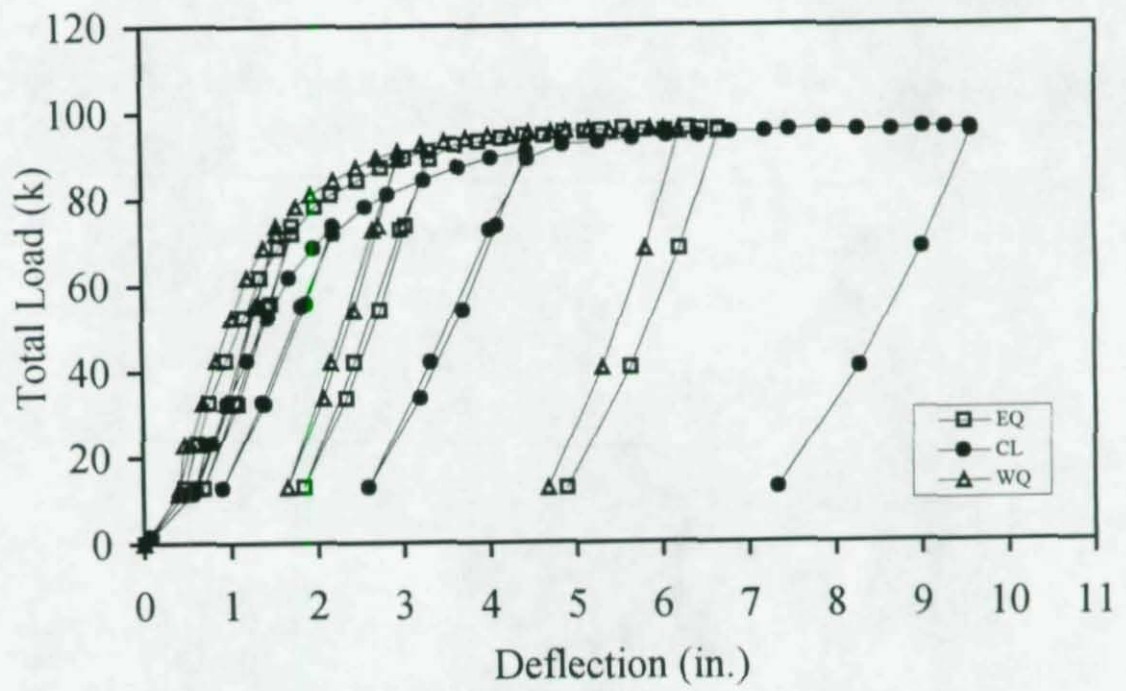


Fig. E.13 Beam Test 2 - Total Load vs. Deflection

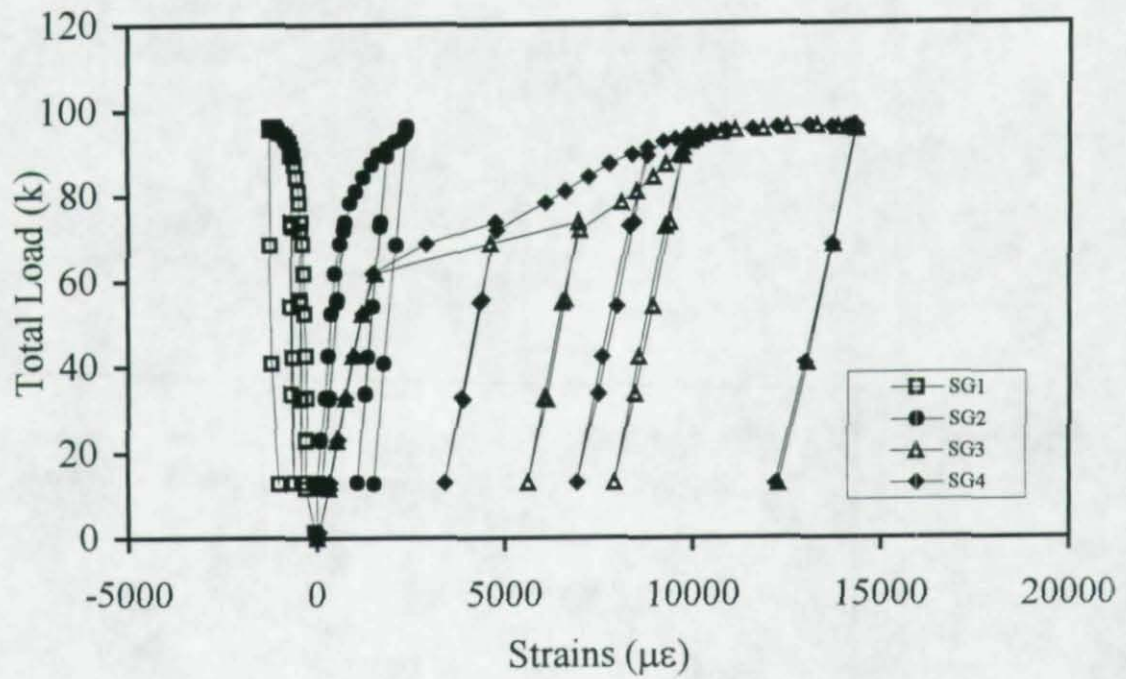


Fig. E.14 Beam Test 2 - Total Load vs. Strains (SG1 - SG4)

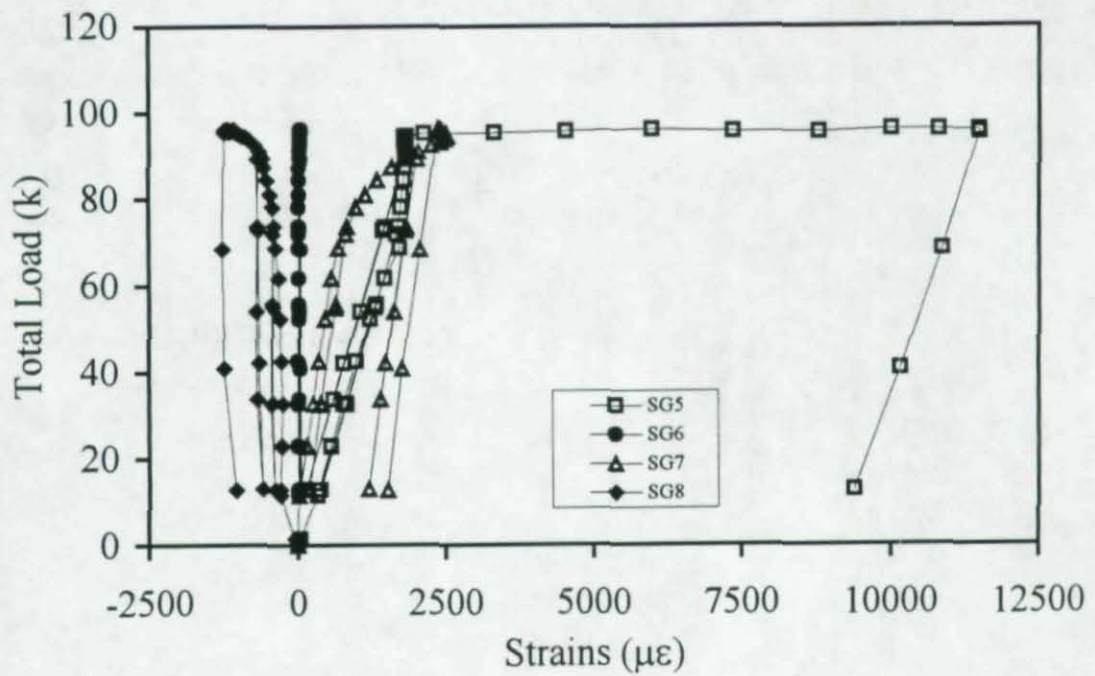


Fig. E.15 Beam Test 2 - Total Load vs. Strains (SG5 - SG8)

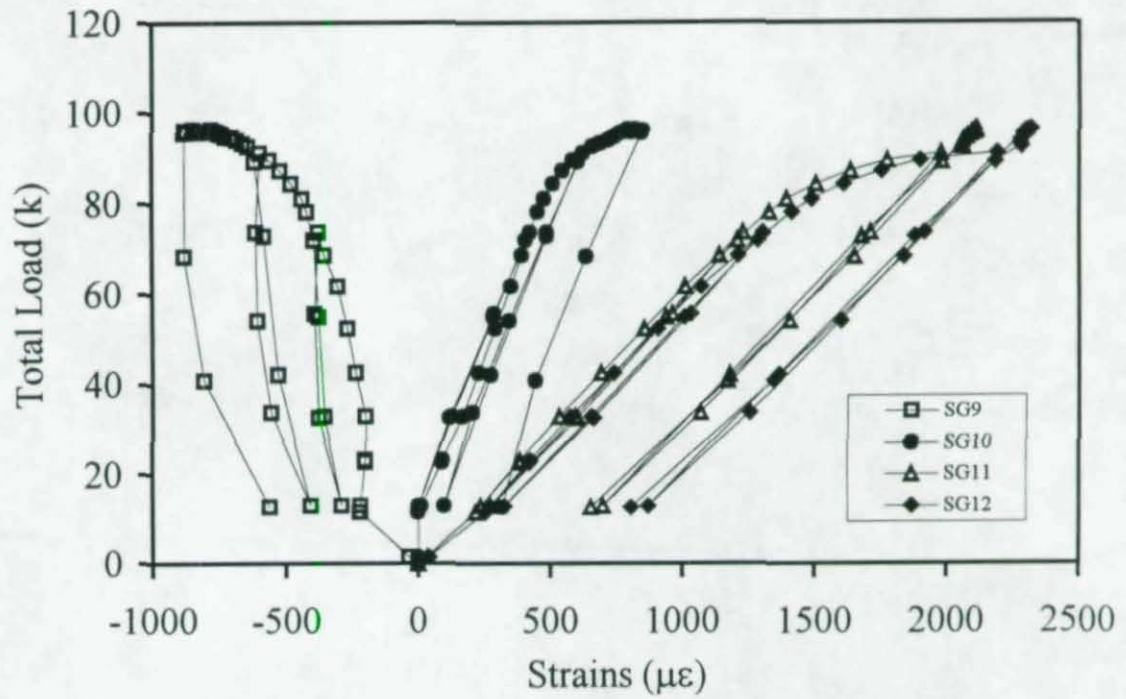


Fig. E.16 Beam Test 2 - Total Load vs. Strains (SG9 - SG12)

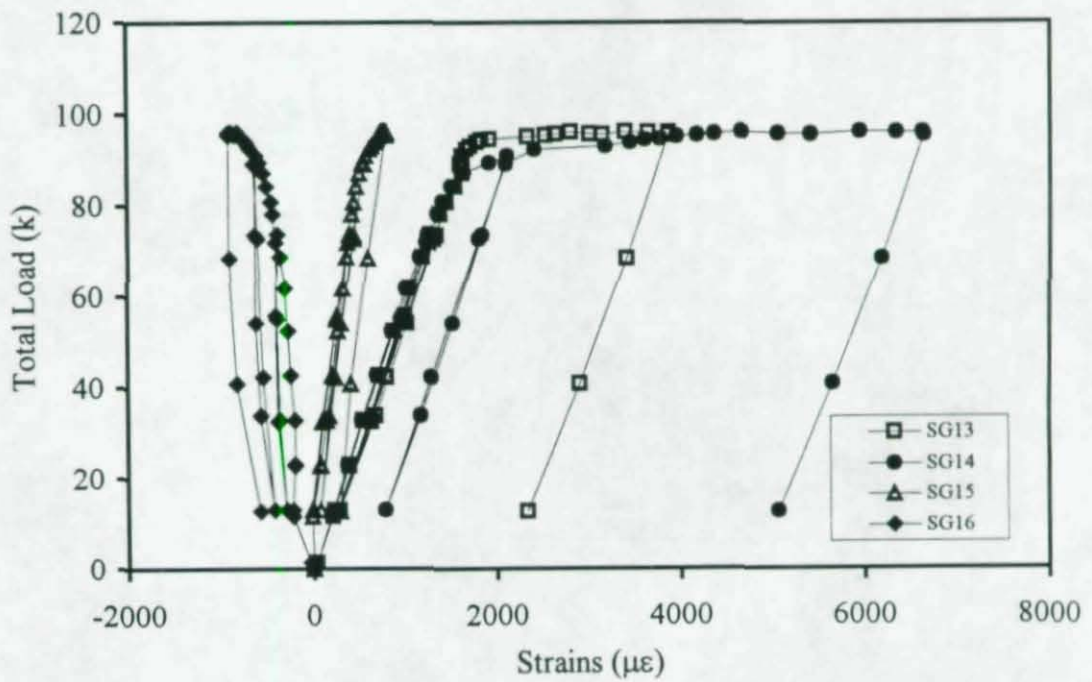


Fig. E.17 Beam Test 2 - Total Load vs. Strains (SG13 - SG16)

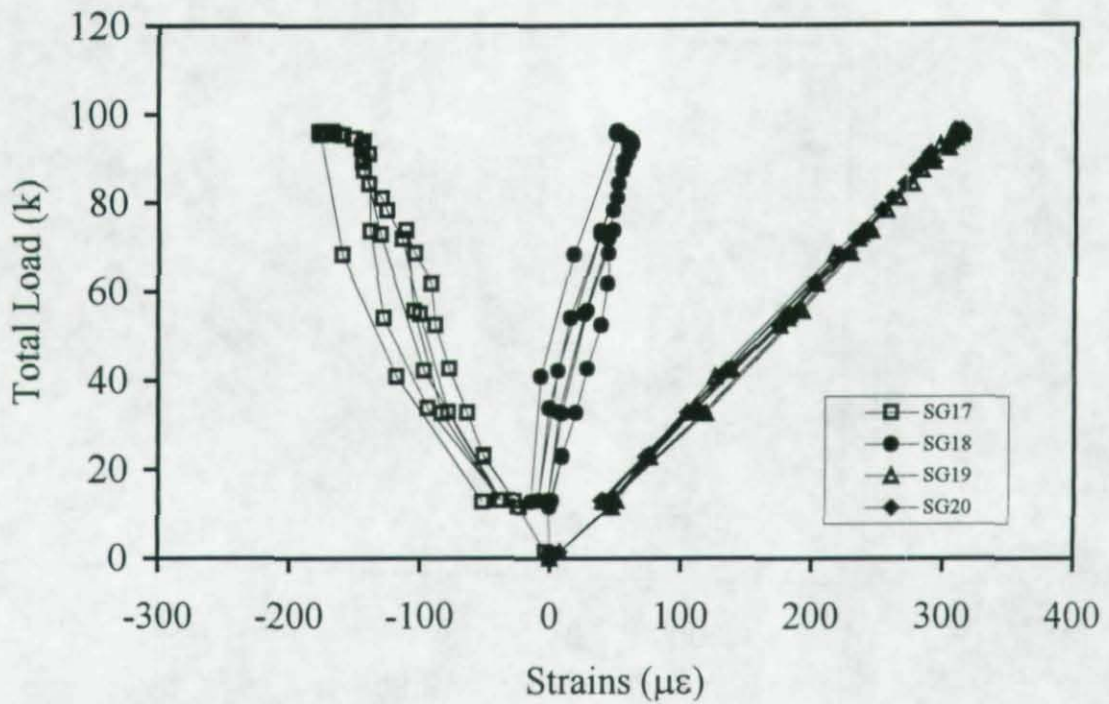


Fig. E.18 Beam Test 2 - Total Load vs. Strains (SG17-SG20)

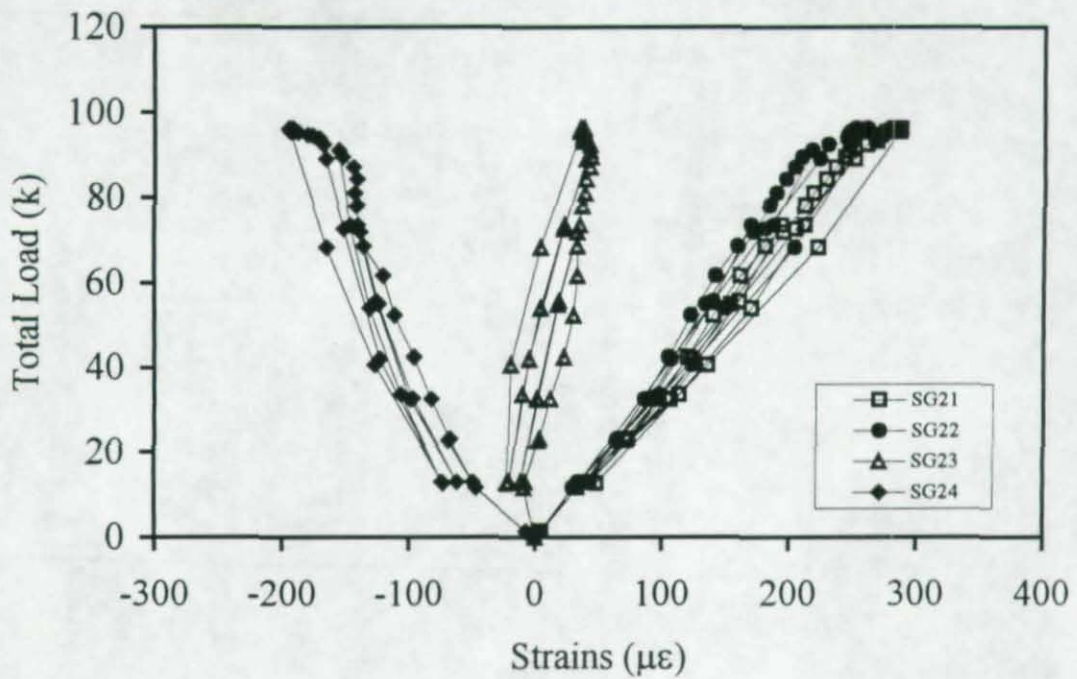


Fig. E.19 Beam Test 2 - Total Load vs. Strains (SG21 - SG24)

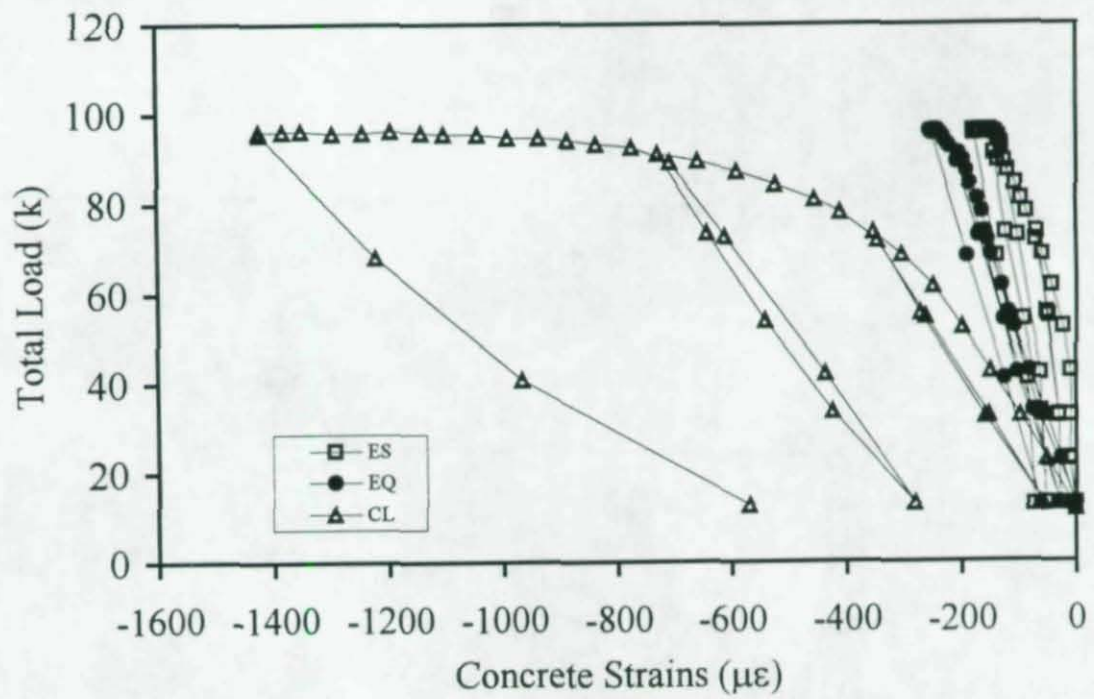


Fig. E.20 Beam Test 2 - Total Load vs. Concrete Strains

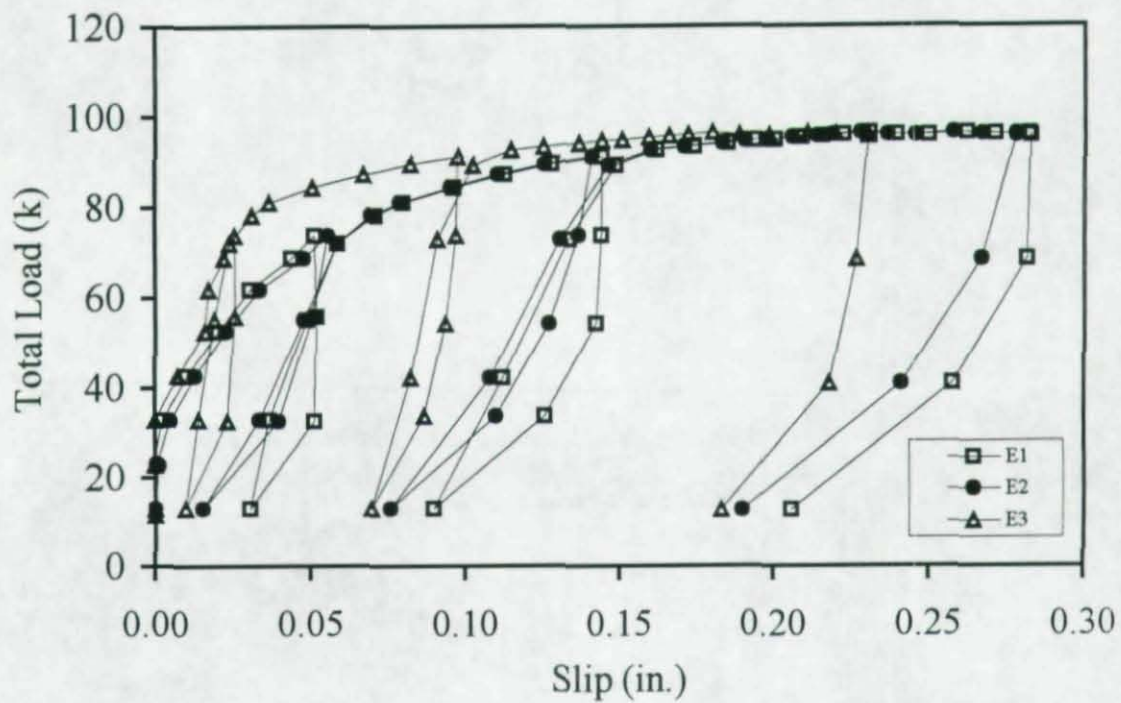


Fig. E.21 Beam Test 2 - Total Load vs. Slip (E1 - E3)

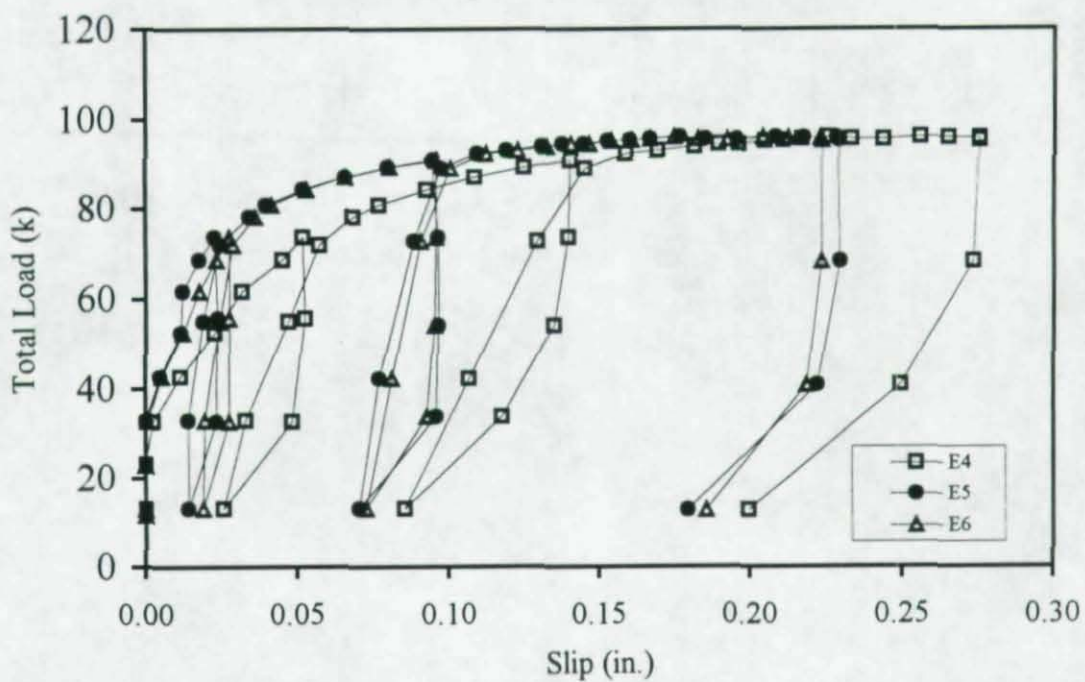


Fig. E.22 Beam Test 2 - Total Load vs. Slip (E4 - E6)

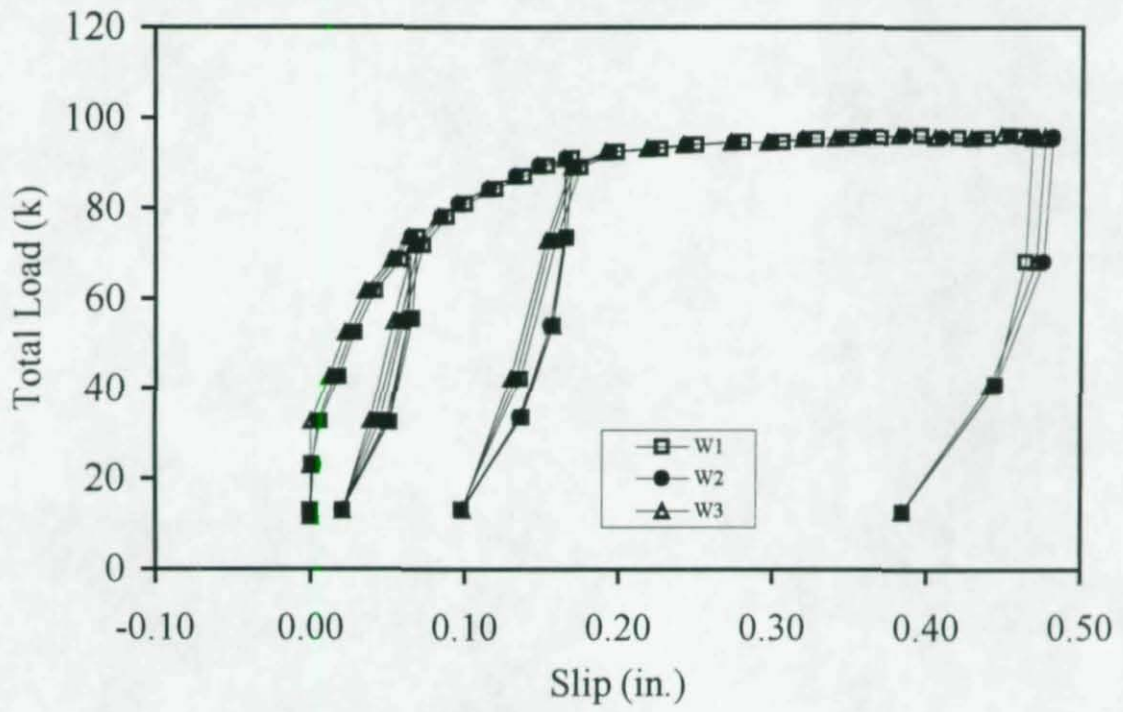


Fig. E.23 Beam Test 2 - Total Load vs. Slip (W1 - W3)

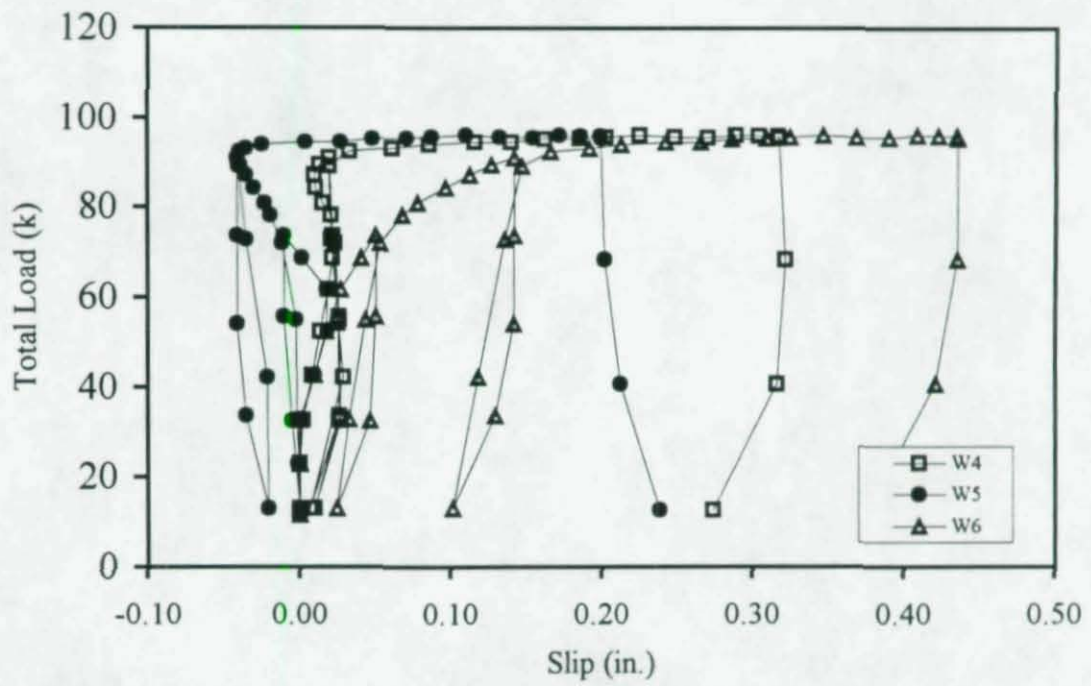


Fig. E.24 Beam Test 2 - Total Load vs. Slip (W4 - W6)

E.4 Beam Test 3 Results

Table E.31 Beam Test 3 Summary

Test Program: Rambo-Roddenberry (1999)	
Beam Test 3	
TEST SUMMARY	
<i>Test Parameters</i>	
Span: 30 ft	
Slab: 81 in. x 32 ft	
Steel Beam: W16 x 31 A572Gr50	
Shear Stud Size: 3/4 in. x 3 1/2 in. (after welding)	
No. Studs Per Beam: 28 (12 per shear span)	
Shear Stud Position: 2S	
Deck: 2 in. 20 gage	
<i>Material Properties</i>	
Concrete:	$f_c = 5.605$ $w = 143.4$
Deck:	$F_y =$ ksi $F_u =$ ksi
Studs:	$F_u = 66.81$ ksi
Steel Beam	Flanges: $F_{yf} = 54.25$ ksi $F_{uf} = 72.6$ ksi Web: $F_{yw} = 58.2$ ksi $F_{uw} = 72.4$ ksi
<i>Predicted Moment of Inertia</i>	
$I_t = 1349$ in ⁴	$I_c = 1033$ in ⁴
<i>AISC Predicted Results</i>	<i>New Predicted Results</i>
$M_{AISC} = 470.8$ k-ft	$M_c = 408.8$ k-ft
$Q_{AISC} = 29.5$ k/stud	$Q_c = 17.06$ k/stud
% composite = 69.2%	% composite = 40.0%
<i>Test Results</i>	
$I_e = 1132$ in ⁴	
$M_e = 376.1$ k-ft	
$Q_{bc} = 12.36$ k	
% composite = 29.0%	

Table E.32 Beam Test 3 Predicted Moment of Inertia

Test Program: Rambo-Roddenberry (1999)	
Beam Test 3	
Predicted Moment of Inertia Calculations:	
$I_c = I_s + 0.85p^{0.25}(I_t - I_s)$	
where $p = 0.400$ (40.0 % composite) $I_s = 375 \text{ in}^4$ (Mom. of Inertia of W16x31)	
Calculate $I_{\text{conc tr}}$ (Transformed Mom. of Inertia of Slab):	
$I_{\text{conc tr}} = (81/7)(4)^3/12 = 61.7 \text{ in}^4$	
$A_{\text{conc tr}} = (81)(4)/7 = 46.3 \text{ in}^2$	
Calculate I_t (Transformed Mom. of Inertia):	
$Y = \frac{\sum Ay}{\sum A} = \frac{(9.12)(15.88/2) + (46.3)(15.88 + 1 + 2)}{9.12 + 46.3}$	
$Y = 17.08 \text{ in.}$	
$I_t = 61.7 + 375 + (9.12)(17.08 - 15.88/2)^2$	
$+ (46.3)(15.88 + 1 + 2 - 17.08)^2$	
$I_t = 1349 \text{ in}^4$	
Calculate I_c (Predicted Mom. of Inertia):	
$I_c = 375 + 0.85(0.400)^{0.25}(1349 - 375)$	
$I_c = 1033 \text{ in}^4$	

Table E.33 Beam Test 3 Experimental Moment of Inertia

Test Program: Rambo-Roddenberry (1999) Beam Test 3	
Experimental Moment of Inertia Calculations:	
The experimental moment of inertia in the elastic region can be found by calculating the slope of the load vs. deflection plot. The slope between data points 4 and 7 is calculated below.	
Data Pt. 4: $P = 22.97 \text{ k}$ $\Delta = 0.763 \text{ in.}$	Data Pt. 7: $P = 52.74 \text{ k}$ $\Delta = 1.363 \text{ in.}$
$\delta P = 52.74 - 22.97 = 29.77 \text{ k}$ $\delta \Delta = 1.363 - 0.763 = 0.600 \text{ in.}$	
The equation for the deflection of a beam with four concentrated loads, two of which are positioned 4.5 ft from each support, and the other two positioned 11.5 ft from each support, is below:	
$\Delta = \frac{382.8 P \text{ ft}^3}{EI}$	
thus, $I = \frac{382.8 P \text{ ft}^3}{E\Delta}$	
Calculate I_e (Experimental Mom. of Inertia):	
Substituting $P = 29.77 \text{ k}$, $E = 29000 \text{ ksi}$, and $\Delta = 0.600 \text{ in.}$,	
$I_e = 1132 \text{ in}^4$	

Table E.34 Beam Test 3 AISC Predicted Moment Capacity

Test Program: Rambo-Roddenberry (1999) Beam Test 3		Test Program: Rambo-Roddenberry (1999) Beam Test 3	
<i>Slab</i>	<i>Studs</i>	AISC Predicted Moment Capacity Calculations:	
Span = 30.0 ft	No. Studs in Pairs* = 12 2S	C1 = A _s F _y = 511.6 k	
Depth = 5.0 in.	No. Single Studs** =	C2 = 0.85f _c A _c = 1157.7 k	
Width = 81.0 in.	No. Single Studs*** =	C3 = ΣQ _{AISC} = 354.2 k	
<i>Concrete</i>	Stud Dia. = 0.75 in.	C = min(C1,C2,C3) = 354.2 k	
f _c = 5.605 ksi	Stud Length = 3.5 in.	% Composite: 69.2%	
w = 143.4 pcf	A _{sc} = 0.4418 in ²	a = 0.918 in.	Depth of Conc. Comp. Block
<i>Steel Beam</i>	F _u = 66.81 ksi	C _f = 131.9 k	Comp. Force in Flange
Section: W16x31	Position = 2S	C ₁ - C _f = 379.7 k	
A _s = 9.12 in ²	Transverse Spacing =	C _f + C = 486.1 k	> 379.7 k P.N.A. in flange
d = 15.88 in.	e = 4.5 in.	P _y = C1 = 511.6 k	
b _f = 5.525 in.	Q _{AISC} (Studs in Pairs)* = 29.5 k	T _y = (P _y + C)/2 = 432.9 k	Tension Force in Steel
t _f = 0.44 in.	Q _{AISC} (Single Studs)** =	T _{yw} = 247.8 k	Tension Force in Web
t _w = 0.275 in.	Q _{AISC} (Single Studs)*** =	T _{yf2} = 131.9 k	Tension Force in Bot. Flange
A _{sf} = 2.431 in ²	<i>Deck</i>	T _{yf1} = 53.2 k	Tension Force in Top Flange
F _{yt} = 54.25 ksi	Type =	s = 0.18 in.	Portion of Flange in Tension
F _{uf} = 72.6 ksi	Height = 2 in.	p = 0.26 in.	Portion of Flange in Comp.
A _{sw} = 4.258 in ²	Ave. Rib Width = 6 in.	C _f = 78.7 k	Comp. Force in Top Flange
F _{yw} = 58.2 ksi	Gage = 20	M_{AISC} = 470.8 k-ft Predicted Moment Capacity	
F _{uw} = 72.4 ksi	F _y =		
	F _u =		

Table E.35 Beam Test 2 New Predicted Moment Capacity with $Q_c=0.85(0.68A_sF_u)$

Test Program: Rambo-Roddenberry (1999) Beam Test 3		Test Program: Rambo-Roddenberry (1999) Beam Test 3	
<i>Slab</i>	<i>Studs</i>	New Predicted Moment Capacity Calculations:	
Span = 30.0 ft	No. Studs in Pairs* = 12 2S	$C1 = A_sF_y = 511.6$ k	
Depth = 5.0 in.	No. Single Studs** =	$C2 = 0.85f_cA_c = 1157.7$ k	
Width = 81.0 in.	No. Single Studs*** =	$C3 = \Sigma Q_c = 204.7$ k	
<i>Concrete</i>	Stud Dia. = 0.75 in.	$C = \min(C1, C2, C3) = 204.7$ k	
$f_c = 5.605$ ksi	Stud Length = 3.5 in.	% Composite: 40.0%	
$w = 143.4$ pcf	$A_{sc} = 0.4418$ in ²	$a = 0.530$ in. Depth of Conc. Comp. Block	
<i>Steel Beam</i>	$F_u = 66.81$ ksi	$C_f = 131.9$ k Comp. Force in Flange	
Section: W16x31	Position = 2S	$C_1 - C_f = 379.7$ k	
$A_s = 9.12$ in ²	Transverse Spacing =	$C_f + C = 336.6$ k < 379.7 k P.N.A. in web	
$d = 15.88$ in.	$e = 4.5$ in.	$P_y = C1 = 511.6$ k	
$b_f = 5.525$ in.	Q_c (Studs in Pairs)* = 17.06 k	$T_y = (P_y + C)/2 = 358.1$ k Tension Force in Steel	
$t_f = 0.44$ in.	Q_c (Single Studs)** =	$x = 6.40$ in. Dist. From PNA to c.g.	
$t_w = 0.275$ in.	Q_c (Single Studs)*** =	$p = 1.54$ in. Dist. from Top Flange to PNA	
$A_{sf} = 2.431$ in ²	<i>Deck</i>	$q = 1.10$ in. Portion of Web in Comp.	
$F_{yf} = 54.25$ ksi	Type =	$C_w = T_y - C - C_f = 21.5$ k Comp. Force in Web	
$F_{uf} = 72.6$ ksi	Height = 2 in.	$T_{yf} = 131.9$ k Tension Force in Flange	
$A_{sw} = 4.258$ in ²	Ave. Rib Width = 6 in.	$T_{yw} = T_y - T_{yf} = 226.3$ k Tension Force in Web	
$F_{yw} = 58.2$ ksi	Gage = 20	$M_c = 408.8$ k-ft Predicted Moment Capacity	
$F_{uw} = 72.4$ ksi	$F_y =$ ksi		
	$F_u =$ ksi		

Table E.36 Beam Test 3 Experimental Moment Capacity

Test Program: Rambo-Roddenberry (1999) Beam Test 3
Experimental Moment Calculations:
The Total Load given in the data sheets consists of both distributed loads and concentrated loads. These must be separated in order to calculate the moment. Ultimate Total Load = 95.48 k
Theoretical Self Wt. of Beam, Deck, and Concrete: $w = 11.58 \text{ k}/32 \text{ ft} = 0.362 \text{ k/ft}$
Applied Load from Rams + Wt. of Load Beams and Plates: $P = 95.48 - 11.58 = 83.9 \text{ k}$
Reactions = $0.5(0.362)(32) + 0.5(83.9) = 47.74 \text{ k}$ $M_c = 376.1 \text{ k-ft}$ (Experimental Ultimate Moment Capacity)

Table E.37 Beam Test 3 Back-Calculated Stud Strength

Test Program: Rambo-Roddenberry (1999) Beam Test 3		Test Program: Rambo-Roddenberry (1999) Beam Test 3	
<i>Slab</i>	<i>Studs</i>	Back-Calculated (Q_{bc}) Moment Capacity Calculations:	
Span = 30.0 ft	No. Studs in Pairs* = 12 2S	$M_e = 376.1$ k-ft	
Depth = 5.0 in.	No. Single Studs** =	$C1 = A_s F_y = 511.6$ k	
Width = 81.0 in.	No. Single Studs*** =	$C2 = 0.85 f'_c A_c = 1157.7$ k	
<i>Concrete</i>	Stud Dia. = 0.75 in.	$C3 = \Sigma Q_{bc} = 148.3$ k	
$f'_c = 5.605$ ksi	Stud Length = 3.5 in.	$C = \min(C1, C2, C3) = 148.3$ k	
$w = 143.4$ pcf	$A_{sc} = 0.4418$ in ²	% Composite: 29.0%	
<i>Steel Beam</i>	$F_u = 66.81$ ksi	$a = 0.384$ in.	Depth of Conc. Comp. Block
Section: W16x31	Position = 2S	$C_f = 131.9$ k	Comp. Force in Flange
$A_s = 9.12$ in ²	Transverse Spacing =	$C_1 - C_f = 379.7$ k	
$d = 15.88$ in.	$e = 4.5$ in.	$C_f + C = 280.2$ k	< 379.7 k P.N.A. in web
$b_f = 5.525$ in.	Q_{bc} (Studs in Pairs)* = 12.36 k	$P_y = C1 = 511.6$ k	
$t_f = 0.44$ in.	Q_{bc} (Single Studs)** = k	$T_y = (P_y + C)/2 = 329.9$ k	Tension Force in Steel
$t_w = 0.275$ in.	Q_{bc} (Single Studs)*** = k	$x = 4.63$ in.	Dist. From PNA to c.g.
$A_{sf} = 2.431$ in ²	<i>Deck</i>	$p = 3.31$ in.	Dist. from Top Flange to PNA
$F_{yf} = 54.25$ ksi	Type =	$q = 2.87$ in.	Portion of Web in Comp.
$F_{uf} = 72.6$ ksi	Height = 2 in.	$C_w = T_y - C - C_f = 49.8$ k	Comp. Force in Web
$A_{sw} = 4.258$ in ²	Ave. Rib Width = 6 in.	$T_{yf} = 131.9$ k	Tension Force in Flange
$F_{yw} = 58.2$ ksi	Gage = 20	$T_{yw} = T_y - T_{yf} = 198.1$ k	Tension Force in Web
$F_{uw} = 72.4$ ksi	$F_y =$ ksi	$M_c = 376.1$ k-ft	Predicted Moment Capacity
	$F_u =$ ksi	$M_e/M_c = 1.00$	

Table E.38 Beam Test 3 Load Effects Not Measured

Test Program: Rambo-Roddenberry (1999) Beam Test 3
Interpolations for Load Effects Not Measured:
Non-Composite Loads (Not Measured): Self Wt. of W16x31 = $(31)(32) = 992$ lb Wt. of Deck = $(1.97)(32)(81/12) = 426$ lb Total = $992 + 426 = 1418$ lb Total Load of Concrete = 8463 lb (Measured)
$\frac{1418}{8463} = 0.168$
~ Multiply the load effects from concrete placement by 0.168 to obtain the load effects due to the self wt. of beam and deck (Load effects = strains and deflections)
Composite Loads (Not Measured): Self Wt. of Load Beams [W12x65] = $2(65)(9) = 1170$ lb Wt. of Load Plates = 180 lb (estimated) Total = $1170 + 180 = 1350$ lb Load from Composite Test = 10030 lb (Data Pt. #4) *Data Pt. #4 was chosen because the beam was still elastic
$\frac{1350}{10030} = 0.135$
~ Multiply the load effects from Data Pt. #4 by 0.135 to obtain the load effects due to the self wt. of load beams and plates (Load effects = strains and deflections)

Table E.39 Beam Test 3 Data (Loads and Deflections)

Data Point	Total Load (k)	LOADS			DEFLECTIONS			NOTES
		Total (k)	East (k)	West (k)	EQ	CL (in.)	WQ	
N1	0.00	0.00	0.00	0.00	0.000	0.000	0.000	BEGIN
N2	1.42	1.42	0.70	0.71	0.063	0.080	0.058	BEAM & DECK WT.
N3	11.58	11.58	5.78	5.79	0.435	0.554	0.403	BEAM, DECK & CONC. WT.
1A	11.58	11.58	5.78	5.79	0.435	0.554	0.403	BEG. OF COMPOSITE TEST
1B	12.93	12.93	6.44	6.48	0.455	0.579	0.420	WT. OF LOAD BEAMS & PLATES
2	23.29	23.29	11.49	11.79	0.605	0.759	0.551	FIRST INCR. OF APPL. LOAD
3	12.93	12.93	6.44	6.48	0.460	0.584	0.425	Unloaded
4	22.97	22.97	11.33	11.63	0.605	0.763	0.551	
5	33.08	33.08	16.39	16.69	0.762	0.957	0.689	
6	42.79	42.79	21.20	21.58	0.906	1.146	0.830	
7	52.74	52.74	26.17	26.56	1.071	1.363	0.980	
8	62.61	62.61	31.06	31.54	1.248	1.591	1.135	
9	71.58	71.58	35.46	36.11	1.445	1.850	1.314	Bottom Flange Yielding
10	79.74	79.74	39.29	40.43	1.744	2.288	1.525	
11	50.86	50.86	24.86	25.99	1.330	1.759	1.203	
12	34.06	34.06	16.63	17.42	1.068	1.424	0.970	
13	12.93	12.93	6.44	6.48	0.723	0.964	0.646	
14	23.05	23.05	11.41	11.63	0.891	1.179	0.802	
15	42.70	42.70	21.11	21.58	1.188	1.577	1.078	
16	62.69	62.69	30.98	31.70	1.500	1.971	1.355	
17	78.68	78.68	38.89	39.78	1.750	2.293	1.590	Popping Noises
18	82.10	82.10	40.60	41.49	1.922	2.535	1.746	
19	86.10	86.10	42.55	43.54	2.100	2.792	1.912	
20	88.79	88.79	43.86	44.92	2.309	3.089	2.097	Popping Noises
21	91.65	91.65	45.24	46.39	2.562	3.459	2.331	
22	89.28	89.28	44.43	44.84	2.834	3.864	2.627	Transverse Crack at West End
23	65.87	65.87	32.53	33.33	2.481	3.435	2.313	
24	33.32	33.32	16.55	16.77	1.939	2.733	1.799	
25	12.93	12.93	6.44	6.48	1.559	2.233	1.414	
26	42.79	42.79	21.11	21.66	2.054	2.886	1.911	
27	72.07	72.07	35.62	36.44	2.535	3.497	2.362	
28	88.79	88.79	43.94	44.84	2.836	3.875	2.642	
29	94.42	94.42	46.55	47.86	3.121	4.305	2.915	
30	95.48	95.48	47.12	48.35	3.375	4.698	3.214	
31	93.28	93.28	46.30	46.96	3.606	5.094	3.487	Diagonal Cracks on Vert. Face of Slab
32	94.50	94.50	46.79	47.70	3.814	5.446	3.822	
33	92.38	92.38	45.73	46.64	4.056	5.887	4.200	Cracks Around End Pair of Studs

Table E.39 Beam Test 3 Data (Loads and Deflections)

Data Point	Total Load (k)	LOADS			DEFLECTIONS			NOTES
		Total (k)	East (k)	West (k)	EQ	CL (in.)	WQ	
34	90.91	90.91	44.84	46.07	4.221	6.181	4.454	Deck Debonding at West End
35	90.01	90.01	44.51	45.49	4.458	6.605	4.804	
36	88.38	88.38	43.45	44.92	4.675	6.991	5.101	
37	74.44	74.44	36.60	37.82	4.461	6.712	4.906	
38	33.08	33.08	16.39	16.69	3.612	5.540	3.949	
39	12.93	12.93	6.44	6.48	3.092	4.813	3.373	
40	43.60	43.60	21.60	21.99	3.754	5.731	4.110	
41	72.89	72.89	36.03	36.84	4.375	6.589	4.805	
42	82.67	82.67	40.84	41.82	4.650	6.984	5.107	
43	83.65	83.65	41.41	42.23	4.888	7.367	5.409	
44	80.39	80.39	39.86	40.52	5.163	7.856	5.825	
45	52.90	52.90	26.17	26.72	4.629	7.137	5.245	
46	34.14	34.14	16.96	17.17	4.147	6.464	4.701	
47	12.93	12.93	6.44	6.48	3.428	5.482	3.929	

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Table E.40 Beam Test 3 Data (Strains at Midspan)

Data Point	Total Load (k)	STRAINS AT MIDSPAN							
		SG1	SG2	SG3	SG4	SG5	SG6	SG7	SG8
N1	0.00	0	0	0	0	0	0	0	0
N2	1.42	-43	1	46	49	47	44	1	-44
N3	11.58	-299	5	323	340	327	306	5	-304
1A	11.58	-298	7	323	341	328	307	7	-303
1B	12.93	-295	23	350	369	356	335	22	-301
2	23.29	-278	139	561	587	572	544	137	-285
3	12.93	-295	26	351	372	358	337	26	-302
4	22.97	-278	135	554	581	567	539	133	-286
5	33.08	-267	241	758	789	775	741	236	-274
6	42.79	-260	344	959	996	983	941	337	-268
7	52.74	-259	447	1170	1214	1202	1151	440	-267
8	62.61	-263	562	1412	1465	1451	1385	552	-272
9	71.58	-263	717	1574	1622	1658	1603	706	-273
10	79.74	-254	1003	1459	1586	1546	1411	985	-264
11	50.86	-295	696	879	996	957	837	682	-304
12	34.06	-307	516	532	643	604	494	507	-315
13	12.93	-297	305	96	202	164	60	300	-305
14	23.05	-295	411	311	421	379	270	404	-302
15	42.70	-286	613	712	828	786	668	602	-293
16	62.69	-271	823	1119	1242	1202	1071	808	-281
17	78.68	-262	1000	1453	1584	1544	1401	982	-273
18	82.10	-258	1162	1477	1598	1541	1383	1142	-269
19	86.10	-246	1352	1508	1636	1590	1390	1334	-257
20	88.79	-244	1554	1550	1679	1594	1358	1532	-256
21	91.65	-245	1803	1943	2139	1586	1330	1776	-256
22	89.28	-340	2002	4066	5260	1514	1244	1978	-351
23	65.87	-372	1750	3582	4769	1033	777	1729	-381
24	33.32	-388	1396	2865	4038	354	113	1382	-397
25	12.93	-369	1182	2386	3548	-75	-312	1172	-375
26	42.79	-369	1489	3015	4189	548	298	1472	-376
27	72.07	-355	1803	3650	4837	1163	894	1781	-364
28	88.79	-357	1993	4082	5279	1519	1240	1967	-370
29	94.42	-361	2231	6750	7649	1582	1309	2205	-374
30	95.48	-370	2412	10118	10397	1546	1307	2385	-383
31	93.28	-523	2396	11137	11380	1510	1293	2374	-539
32	94.50	-603	2439	11600	11830	1542	1332	2418	-619
33	92.38	-771	2417	11972	12208	1532	1331	2401	-784

Table E.40 Beam Test 3 Data (Strains at Midspan)

Data Point	Total Load (k)	STRAINS AT MIDSPAN							
		SG1	SG2	SG3	SG4	SG5	SG6	SG7	SG8
34	90.91	-873	2416	12208	12412	1529	1331	2403	-889
35	90.01	-997	2423	12433	12637	1539	1338	2413	-1019
36	88.38	-1129	2406	12674	12886	1545	1346	2399	-1158
37	74.44	-1136	2260	12380	12585	1253	1063	2256	-1161
38	33.08	-979	1863	11316	11496	319	154	1866	-998
39	12.93	-765	1709	10701	10865	-171	-322	1713	-780
40	43.60	-950	1968	11443	11628	550	374	1968	-968
41	72.89	-1089	2241	12216	12418	1221	1022	2236	-1113
42	82.67	-1208	2315	12569	12778	1472	--	2311	-1228
43	83.65	-1343	2298	12788	12998	1531	--	2296	-1335
44	80.39	-1488	2214	12841	13049	1520	--	2215	-1460
45	52.90	-1411	1957	12208	12400	914	--	1962	-1380
46	34.14	-1238	1809	11689	11867	447	--	1816	-1209
47	12.93	-832	1699	10962	11116	-151	--	1707	-801

Table E.41 Beam Test 3 Data (Strains at East Quarter Point)

Data Point	Total Load (k)	STRAINS AT EAST QUARTER PT.							
		SG9	SG10	SG11	SG12	SG13	SG14	SG15	SG16
N1	0.00	0	0	0	0	0	0	0	0
N2	1.42	-34	1	35	36	35	33	1	-35
N3	11.58	-239	5	240	254	242	230	6	-240
1A	11.58	-238	7	240	253	242	230	10	-238
1B	12.93	-237	19	260	273	263	250	21	-237
2	23.29	-235	106	417	431	420	402	114	-230
3	12.93	-238	22	262	273	264	251	25	-235
4	22.97	-236	103	411	425	417	400	110	-230
5	33.08	-242	181	563	580	570	546	192	-228
6	42.79	-254	257	713	734	720	693	271	-234
7	52.74	-267	332	868	893	875	845	349	-245
8	62.61	-278	408	1024	1053	1032	997	430	-256
9	71.58	-291	479	1169	1203	1175	1135	504	-269
10	79.74	-298	546	1284	1328	1302	1263	578	-273
11	50.86	-297	315	855	890	874	842	340	-281
12	34.06	-290	180	601	630	617	591	201	-280
13	12.93	-242	33	285	303	284	270	38	-241
14	23.05	-272	107	446	467	462	428	116	-263
15	42.70	-291	257	738	769	763	720	274	-275
16	62.69	-297	414	1037	1074	1069	1018	438	-277
17	78.68	-304	543	1287	1328	1320	1261	571	-282
18	82.10	-310	575	1359	1400	1382	1317	605	-287
19	86.10	-302	616	1424	1478	1453	1383	649	-280
20	88.79	-313	648	1524	1541	1514	1441	682	-290
21	91.65	-319	685	1534	1624	1581	1494	720	-297
22	89.28	-315	684	1472	1571	1534	1440	720	-295
23	65.87	-314	491	1116	1208	1181	1093	525	-301
24	33.32	-289	233	616	692	675	605	255	-286
25	12.93	-229	91	296	359	342	285	98	-230
26	42.79	-280	314	751	828	807	736	334	-272
27	72.07	-304	545	1202	1293	1262	1179	573	-290
28	88.79	-320	679	1470	1567	1527	1436	711	-302
29	94.42	-340	725	1554	1661	1610	1528	762	-321
30	95.48	-334	753	1541	1665	1598	1514	791	-315
31	93.28	-341	743	1509	1626	1559	1455	780	-322
32	94.50	-349	750	1529	1649	1580	1476	789	-330
33	92.38	-360	728	1504	1624	1553	1450	765	-344

Table E.41 Beam Test 3 Data (Strains at East Quarter Point)

Data Point	Total Load (k)	STRAINS AT EAST QUARTER PT.							
		SG9	SG10	SG11	SG12	SG13	SG14	SG15	SG16
34	90.91	-368	712	1491	1611	1533	1430	751	-353
35	90.01	-380	699	1483	1603	1526	1422	736	-366
36	88.38	-393	677	1462	1582	1508	1405	715	-381
37	74.44	-401	558	1251	1366	1299	1200	595	-391
38	33.08	-369	229	601	697	650	571	248	-365
39	12.93	-280	103	277	358	318	252	108	-279
40	43.60	-351	328	764	863	810	727	347	-346
41	72.89	-389	555	1233	1344	1272	1176	583	-380
42	82.67	-408	630	1394	1509	1430	1330	659	-397
43	83.65	-428	628	1419	1534	1456	1355	657	-417
44	80.39	-459	586	1382	1499	1423	1322	614	-450
45	52.90	-473	358	961	1070	1009	919	378	-466
46	34.14	-442	214	655	757	706	626	229	-438
47	12.93	-299	94	283	369	328	262	98	-298

Table E.42 Beam Test 3 Data (Strains at Support)

Data Point	Total Load (k)	STRAINS AT 1 FT. FROM SUPPORT							
		SG17	SG18	SG19	SG20	SG21	SG22	SG23	SG24
N1	0.00	0	0	0	0	0	0	0	0
N2	1.42	-7	0	5	6	6	6	0	-4
N3	11.58	-51	2	33	41	44	40	-3	-31
1A	11.58	-50	4	33	40	44	39	-2	-29
1B	12.93	-49	6	36	43	48	42	-1	-28
2	23.29	-43	22	54	61	77	70	8	-22
3	12.93	-46	7	37	42	46	40	1	-24
4	22.97	-42	23	56	63	73	67	7	-21
5	33.08	-28	37	77	87	93	89	15	-8
6	42.79	-11	53	101	114	112	108	21	2
7	52.74	12	69	122	138	132	128	30	25
8	62.61	33	86	143	161	152	151	38	43
9	71.58	56	99	162	182	173	171	45	57
10	79.74	67	110	187	203	186	177	54	74
11	50.86	26	66	130	141	122	115	32	32
12	34.06	-5	36	87	98	86	80	16	4
13	12.93	-28	6	26	35	35	33	2	-7
14	23.05	-29	-27	48	58	70	65	5	-12
15	42.70	5	4	96	108	107	101	20	15
16	62.69	39	36	141	157	153	146	38	46
17	78.68	64	64	178	197	192	185	52	68
18	82.10	77	69	177	199	204	200	57	75
19	86.10	88	77	188	209	210	204	62	84
20	88.79	101	84	193	216	214	209	67	90
21	91.65	113	90	196	219	221	216	71	98
22	89.28	117	88	191	214	215	211	70	95
23	65.87	79	51	147	168	158	155	51	60
24	33.32	19	-4	74	87	79	75	19	13
25	12.93	-9	-36	20	28	29	26	5	-2
26	42.79	31	7	84	98	99	93	26	30
27	72.07	83	57	149	169	173	167	54	71
28	88.79	113	85	188	211	215	211	70	92
29	94.42	123	95	198	225	230	225	75	101
30	95.48	134	98	198	226	232	228	78	106
31	93.28	134	95	192	220	227	224	77	104
32	94.50	135	96	192	221	231	228	77	104
33	92.38	133	92	184	213	226	226	74	100

Table E.42 Beam Test 3 Data (Strains at Support)

Data Point	Total Load (k)	STRAINS AT 1 FT. FROM SUPPORT							
		SG17	SG18	SG19	SG20	SG21	SG22	SG23	SG24
34	90.91	131	88	179	210	224	225	73	96
35	90.01	129	86	178	209	220	222	71	93
36	88.38	125	83	174	204	216	217	69	90
37	74.44	102	60	151	177	180	181	58	68
38	33.08	15	-13	65	80	74	70	14	2
39	12.93	-11	-41	10	21	25	21	2	-7
40	43.60	33	5	79	98	106	102	26	23
41	72.89	86	55	146	174	184	184	55	62
42	82.67	102	71	169	201	211	213	66	75
43	83.65	101	73	175	205	214	214	67	76
44	80.39	94	66	167	195	210	207	64	69
45	52.90	42	19	122	142	137	133	37	20
46	34.14	5	-13	76	94	87	84	14	-8
47	12.93	-14	-42	14	25	27	24	2	-9

Table E.43 Beam Test 3 Data (Concrete Strains)

Data Point	Total Load (k)	CONCRETE STRAINS		
		ES	EQ ($\mu\epsilon$)	CL
N1	0.00	--	--	--
N2	1.42	--	--	--
N3	11.58	--	--	--
1A	11.58	2	2	3
1B	12.93	2	-3	-3
2	23.29	1	-41	-46
3	12.93	3	-3	-2
4	22.97	0	-41	-46
5	33.08	-2	-80	-92
6	42.79	-6	-118	-137
7	52.74	-14	-150	-184
8	62.61	-22	-183	-234
9	71.58	-32	-211	-289
10	79.74	-44	-232	-372
11	50.86	-35	-135	-249
12	34.06	-28	-80	-172
13	12.93	-23	-10	-75
14	23.05	-25	-48	-120
15	42.70	-32	-112	-209
16	62.69	-39	-177	-298
17	78.68	-48	-229	-371
18	82.10	-54	-240	-415
19	86.10	-63	-249	-461
20	88.79	-81	-258	-505
21	91.65	-89	-264	-561
22	89.28	-93	-257	-594
23	65.87	-78	-181	-488
24	33.32	-51	-80	-331
25	12.93	-36	-15	-220
26	42.79	-53	-112	-357
27	72.07	-77	-201	-498
28	88.79	-94	-254	-581
29	94.42	-103	-273	-647
30	95.48	-104	-275	-695
31	93.28	-104	-270	-723
32	94.50	-105	-275	-752
33	92.38	-104	-270	-745

Table E.43 Beam Test 3 Data (Concrete Strains)

Data Point	Total Load (k)	CONCRETE STRAINS		
		ES	EQ ($\mu\epsilon$)	CL
34	90.91	-104	-267	-734
35	90.01	-104	-267	-713
36	88.38	-103	-264	-501
37	74.44	-94	-222	-418
38	33.08	-52	-98	-247
39	12.93	-38	-34	-178
40	43.60	-59	-133	-283
41	72.89	-87	-221	-361
42	82.67	-97	-254	-393
43	83.65	-99	-259	-402
44	80.39	-97	-256	-395
45	52.90	-75	-176	-272
46	34.14	-55	-117	-195
47	12.93	-38	-38	-145

Table E.44 Beam Test 3 Data (East End Slips)

Data Point	Total Load (k)	EAST END SLIPS					
		E1	E2	E3	E4	E5	E6
N1	0.00	--	--	--	--	--	--
N2	1.42	--	--	--	--	--	--
N3	11.58	--	--	--	--	--	--
1A	11.58	0.0000	0.0006	0.0000	0.0006	0.0000	0.0000
1B	12.93	0.0000	0.0008	0.0000	0.0007	0.0000	0.0001
2	23.29	0.0000	0.0020	0.0000	0.0013	0.0000	0.0007
3	12.93	0.0000	0.0014	0.0000	0.0013	0.0000	0.0007
4	22.97	0.0000	0.0020	0.0000	0.0013	0.0000	0.0007
5	33.08	0.0006	0.0044	0.0000	0.0019	0.0000	0.0025
6	42.79	0.0031	0.0069	0.0024	0.0050	0.0000	0.0056
7	52.74	0.0067	0.0124	0.0067	0.0105	0.0031	0.0098
8	62.61	0.0116	0.0173	0.0098	0.0166	0.0055	0.0147
9	71.58	0.0171	0.0240	0.0128	0.0233	0.0067	0.0208
10	79.74	0.0250	0.0331	0.0165	0.0324	0.0073	0.0294
11	50.86	0.0232	0.0301	0.0165	0.0300	0.0079	0.0275
12	34.06	0.0195	0.0252	0.0165	0.0245	0.0073	0.0233
13	12.93	0.0085	0.0124	0.0104	0.0111	0.0073	0.0123
14	23.05	0.0134	0.0166	0.0116	0.0135	0.0073	0.0153
15	42.70	0.0189	0.0234	0.0153	0.0214	0.0073	0.0214
16	62.69	0.0232	0.0295	0.0165	0.0282	0.0079	0.0263
17	78.68	0.0269	0.0350	0.0171	0.0343	0.0085	0.0306
18	82.10	0.0317	0.0411	0.0201	0.0398	0.0092	0.0367
19	86.10	0.0366	0.0459	0.0269	0.0459	0.0098	0.0416
20	88.79	0.0433	0.0551	0.0348	0.0538	0.0104	0.0495
21	91.65	0.0531	0.0649	0.0464	0.0654	0.0104	0.0605
22	89.28	0.0616	0.0746	0.0555	0.0752	0.0122	0.0697
23	65.87	0.0604	0.0710	0.0555	0.0715	0.0122	0.0684
24	33.32	0.0519	0.0600	0.0549	0.0593	0.0122	0.0587
25	12.93	0.0391	0.0447	0.0446	0.0434	0.0122	0.0471
26	42.79	0.0500	0.0569	0.0500	0.0562	0.0122	0.0556
27	72.07	0.0580	0.0679	0.0562	0.0684	0.0128	0.0648
28	88.79	0.0635	0.0752	0.0610	0.0764	0.0140	0.0715
29	94.42	0.0702	0.0838	0.0677	0.0843	0.0177	0.0782
30	95.48	0.0763	0.0905	0.0745	0.0910	0.0226	0.0849
31	93.28	0.0800	0.0948	0.0787	0.0959	0.0262	0.0892
32	94.50	0.0818	0.0954	0.0806	0.0971	0.0269	0.0904
33	92.38	0.0818	0.0966	0.0806	0.0971	0.0275	0.0910

Table E.44 Beam Test 3 Data (East End Slips)

Data Point	Total Load (k)	EAST END SLIPS					
		E1	E2	E3	E4	E5	E6
34	90.91	0.0824	0.0966	0.0812	0.0977	0.0281	0.0910
35	90.01	0.0824	0.0966	0.0812	0.0977	0.0281	0.0910
36	88.38	0.0824	0.0966	0.0812	0.0977	0.0281	0.0910
37	74.44	0.0818	0.0954	0.0812	0.0959	0.0281	0.0904
38	33.08	0.0696	0.0771	0.0757	0.0764	0.0287	0.0752
39	12.93	0.0537	0.0624	0.0604	0.0593	0.0287	0.0611
40	43.60	0.0677	0.0752	0.0708	0.0752	0.0293	0.0727
41	72.89	0.0775	0.0893	0.0787	0.0886	0.0293	0.0831
42	82.67	0.0800	0.0923	0.0812	0.0929	0.0293	0.0861
43	83.65	0.0818	0.0942	0.0824	0.0947	0.0293	0.0880
44	80.39	0.0818	0.0942	0.0824	0.0947	0.0299	0.0874
45	52.90	0.0769	0.0881	0.0824	0.0861	0.0299	0.0819
46	34.14	0.0696	0.0783	0.0769	0.0764	0.0299	0.0739
47	12.93	0.0525	0.0588	0.0598	0.0575	0.0299	0.0587

Table E.45 Beam Test 3 Data (West End Slips)

Data Point	Total Load (k)	WEST END SLIPS					
		W1	W2	W3	W4	W5	W6
N1	0.00	--	--	--	--	--	--
N2	1.42	--	--	--	--	--	--
N3	11.58	--	--	--	--	--	--
1A	11.58	0.0000	0.0006	0.0000	0.0006	0.0000	0.0000
1B	12.93	0.0000	0.0007	0.0000	0.0009	0.0000	0.0001
2	23.29	0.0000	0.0013	0.0000	0.0027	0.0000	0.0007
3	12.93	0.0000	0.0013	0.0000	0.0027	0.0000	0.0007
4	22.97	0.0000	0.0013	0.0000	0.0027	0.0000	0.0007
5	33.08	0.0000	0.0013	0.0000	0.0045	0.0018	0.0007
6	42.79	0.0000	0.0013	0.0000	0.0082	0.0043	0.0007
7	52.74	0.0000	0.0050	0.0000	0.0131	0.0085	0.0025
8	62.61	0.0024	0.0092	0.0012	0.0186	0.0128	0.0062
9	71.58	0.0073	0.0141	0.0061	0.0241	0.0177	0.0117
10	79.74	0.0128	0.0221	0.0140	0.0332	0.0189	0.0184
11	50.86	0.0128	0.0221	0.0140	0.0314	0.0189	0.0184
12	34.06	0.0128	0.0214	0.0140	0.0253	0.0189	0.0184
13	12.93	0.0055	0.0105	0.0037	0.0131	0.0153	0.0092
14	23.05	0.0061	0.0105	0.0037	0.0143	0.0153	0.0098
15	42.70	0.0073	0.0129	0.0067	0.0216	0.0165	0.0105
16	62.69	0.0110	0.0190	0.0116	0.0283	0.0183	0.0147
17	78.68	0.0140	0.0239	0.0159	0.0350	0.0201	0.0196
18	82.10	0.0183	0.0282	0.0201	0.0393	0.0220	0.0245
19	86.10	0.0220	0.0318	0.0238	0.0442	0.0250	0.0282
20	88.79	0.0275	0.0385	0.0293	0.0509	0.0305	0.0349
21	91.65	0.0336	0.0459	0.0360	0.0582	0.0385	0.0422
22	89.28	0.0159	0.1051	0.0494	0.1186	0.0824	0.0813
23	65.87	0.0140	0.1051	0.0494	0.1168	0.0824	0.0813
24	33.32	0.0085	0.0916	0.0452	0.0936	0.0818	0.0733
25	12.93	-0.0043	0.0660	0.0287	0.0668	0.0677	0.0550
26	42.79	-0.0018	0.0819	0.0305	0.0894	0.0726	0.0623
27	72.07	0.0012	0.0977	0.0342	0.1095	0.0836	0.0745
28	88.79	0.0043	0.1093	0.0360	0.1248	0.0916	0.0855
29	94.42	0.0043	0.1276	0.0385	0.1479	0.1080	0.1038
30	95.48	0.0043	0.1502	0.0421	0.1724	0.1251	0.1222
31	93.28	-0.0024	0.2119	0.0519	0.2371	0.1721	0.1710
32	94.50	-0.0073	0.2686	0.0562	0.2932	0.2081	0.2094
33	92.38	-0.0220	0.3626	0.0641	0.3872	0.2655	0.2815

Table E.45 Beam Test 3 Data (West End Slips)

Data Point	Total Load (k)	WEST END SLIPS					
		W1	W2	W3	W4	W5	W6
34	90.91	-0.0342	0.4255	0.0671	0.4464	0.3027	0.3303
35	90.01	-0.0409	0.5030	0.0720	0.5264	0.3516	0.3950
36	88.38	-0.0464	0.5836	0.0751	0.6075	0.4089	0.4639
37	74.44	-0.0464	0.5836	0.0757	0.6094	0.4132	0.4658
38	33.08	-0.0360	0.4951	0.0757	0.5013	0.3943	0.3846
39	12.93	-0.0305	0.3840	0.0757	0.4019	0.3253	0.3150
40	43.60	-0.0299	0.4670	0.0781	0.4867	0.3778	0.3748
41	72.89	-0.0452	0.5616	0.0787	0.5850	0.4169	0.4401
42	82.67	-0.0525	0.6208	0.0800	0.6448	0.4651	0.4835
43	83.65	-0.0616	0.7148	0.0812	0.7339	0.5652	0.5457
44	80.39	-0.0787	0.8662	0.0818	0.8798	0.7806	0.6263
45	52.90	-0.0787	0.8656	0.0818	0.8737	0.7666	0.6190
46	34.14	-0.0671	0.7954	0.0818	0.7784	0.6812	0.5531
47	12.93	-0.0476	0.5988	0.0818	0.6094	0.5249	0.4401

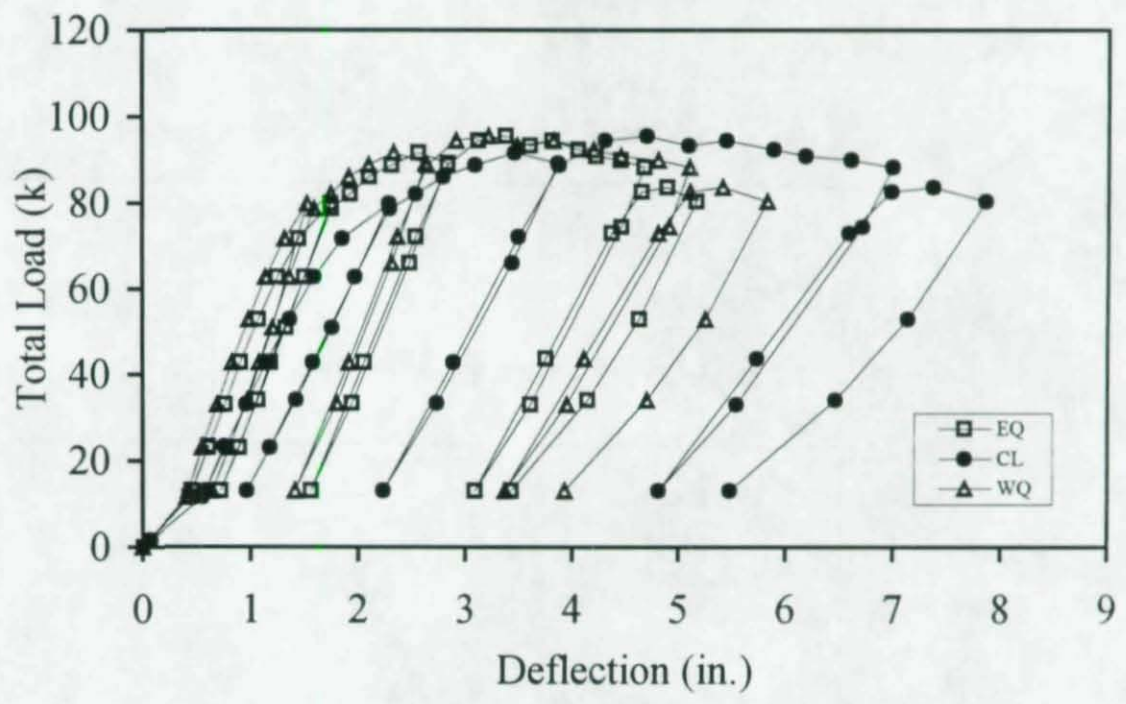


Fig. E.25 Beam Test 3 - Total Load vs. Deflection

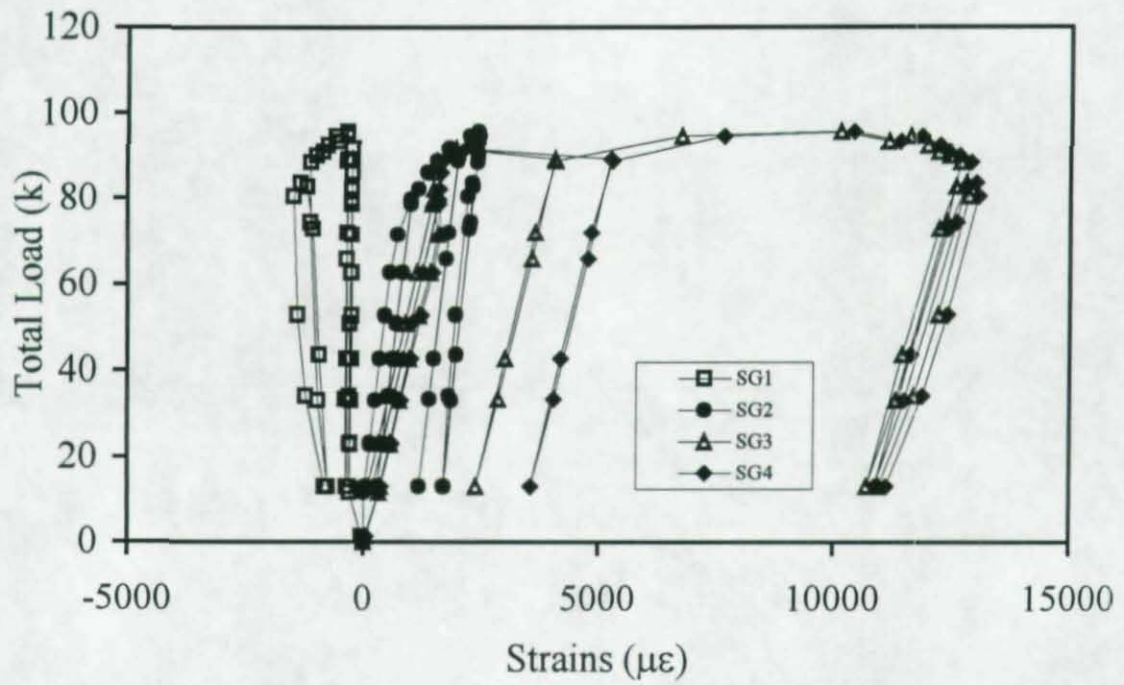


Fig. E.26 Beam Test 3 - Total Load vs. Strains (SG1 - SG4)

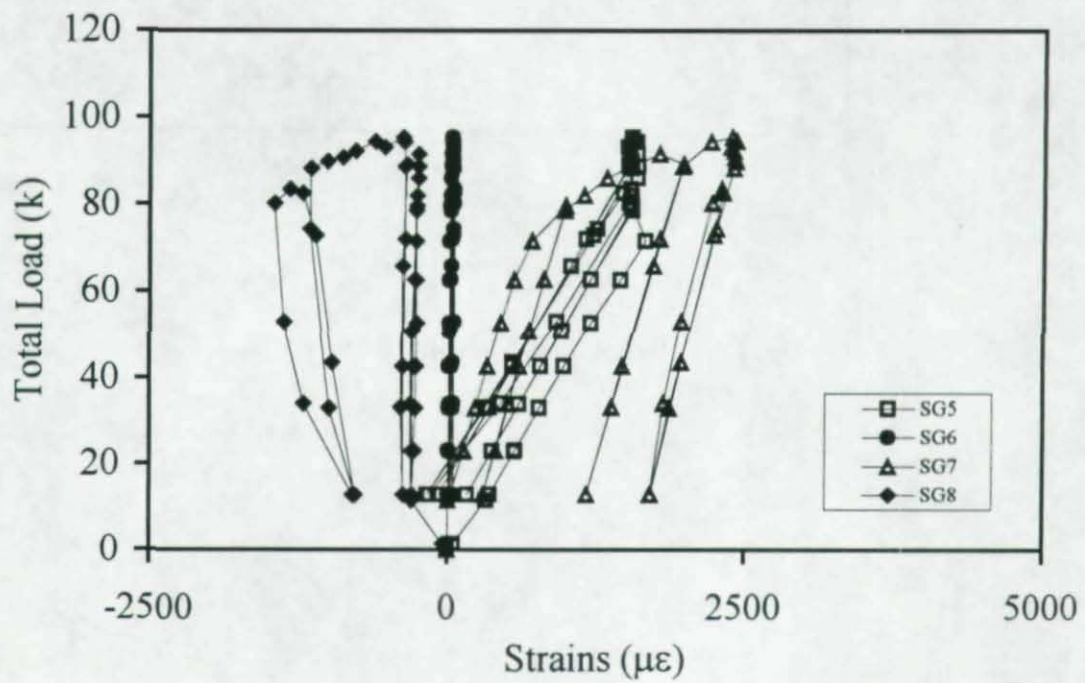


Fig. E.27 Beam Test 3 - Total Load vs. Strains (SG5 - SG8)

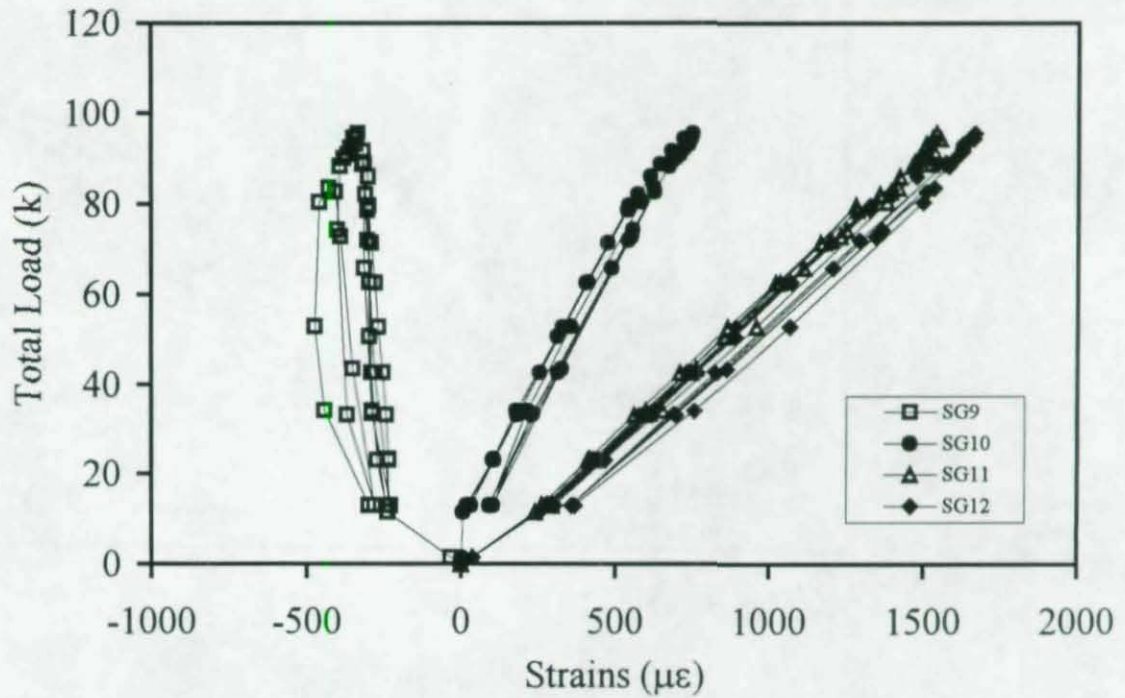


Fig. E.28 Beam Test 3 - Total Load vs. Strains (SG9 - SG12)

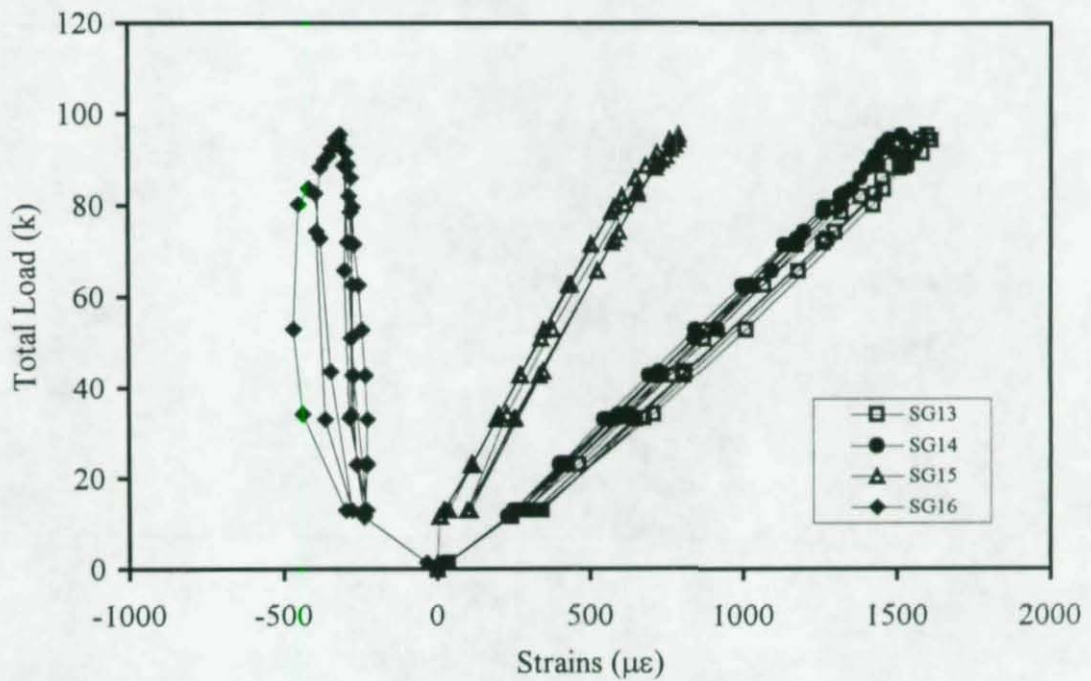


Fig. E.29 Beam Test 3 - Total Load vs. Strains (SG13 - SG16)

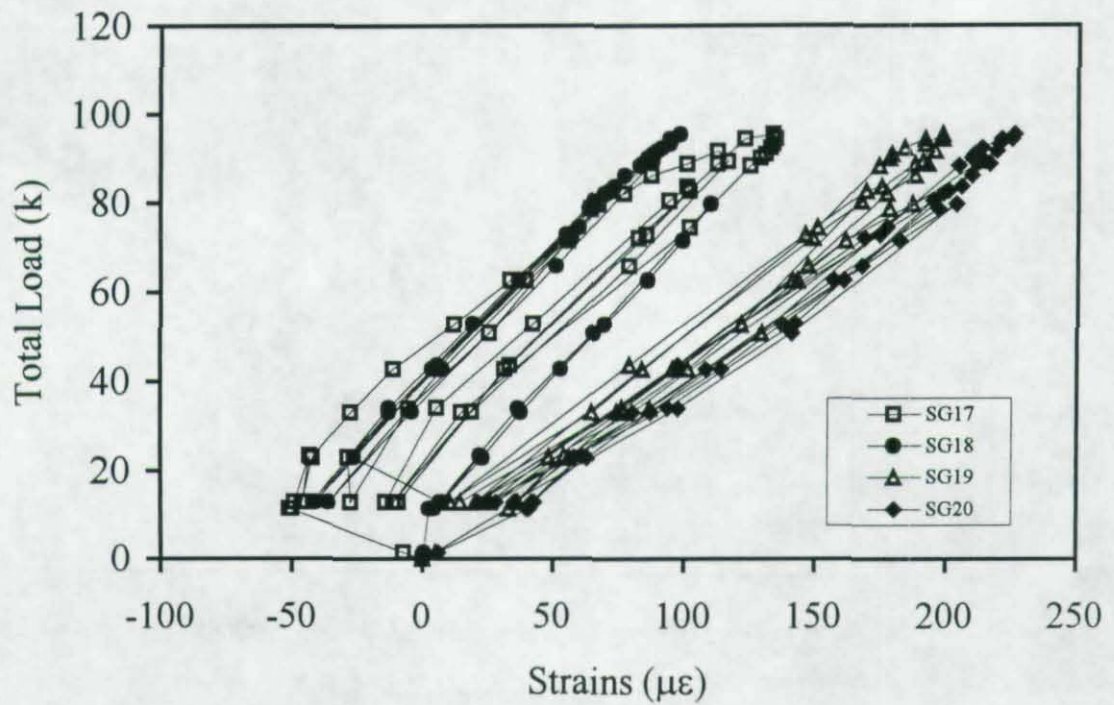


Fig. E.30 Beam Test 3 - Total Load vs. Strains (SG17-SG20)

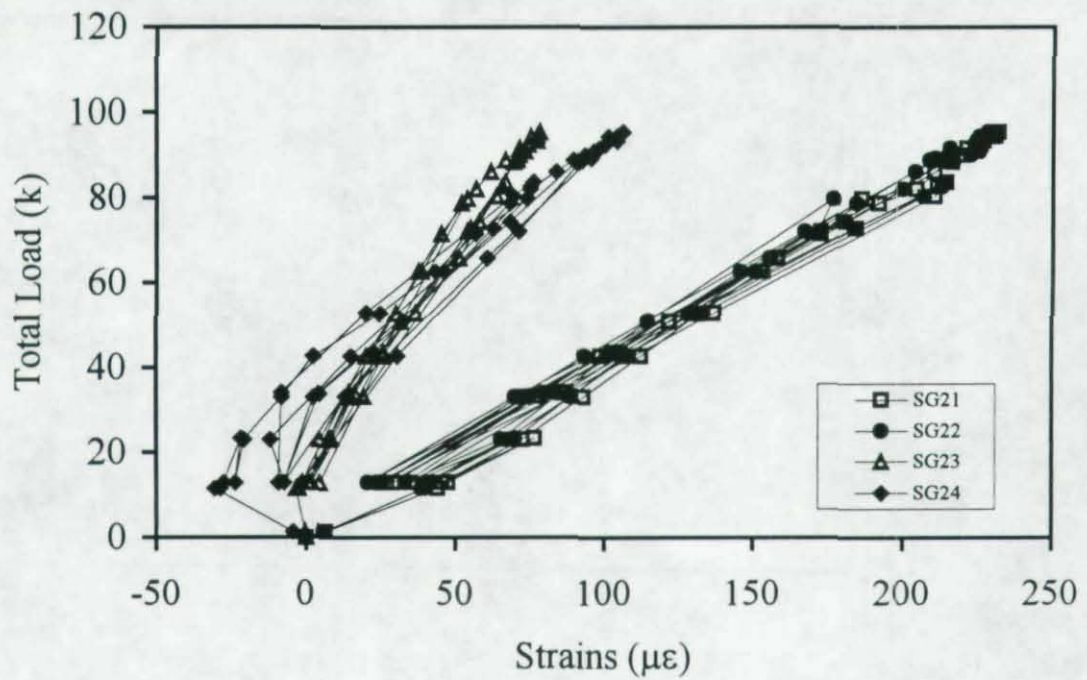


Fig. E.31 Beam Test 3 - Total Load vs. Strains (SG21 - SG24)

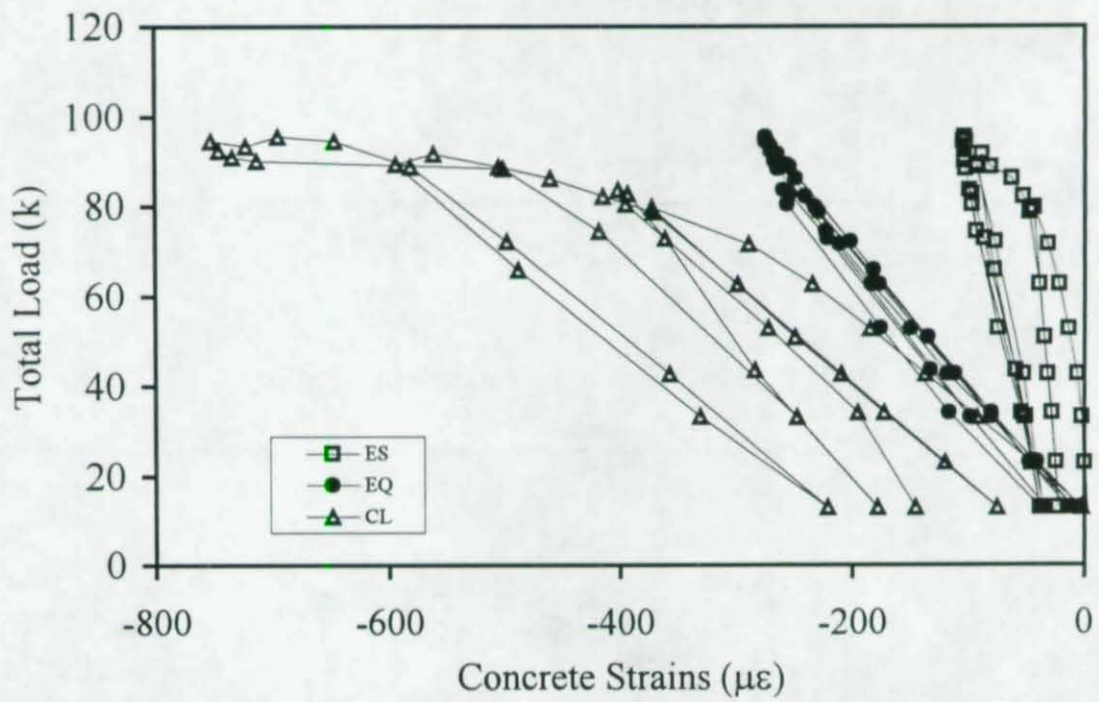


Fig. E.32 Beam Test 3 - Total Load vs. Concrete Strains

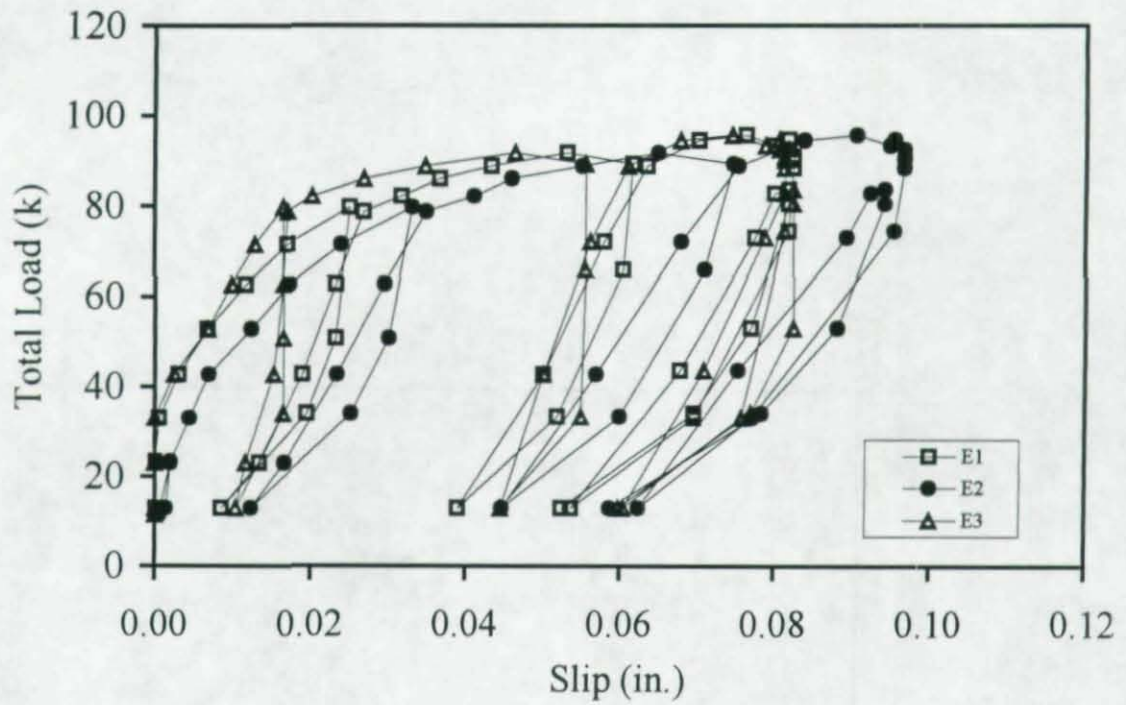


Fig. E.33 Beam Test 3 - Total Load vs. Slip (E1 - E3)

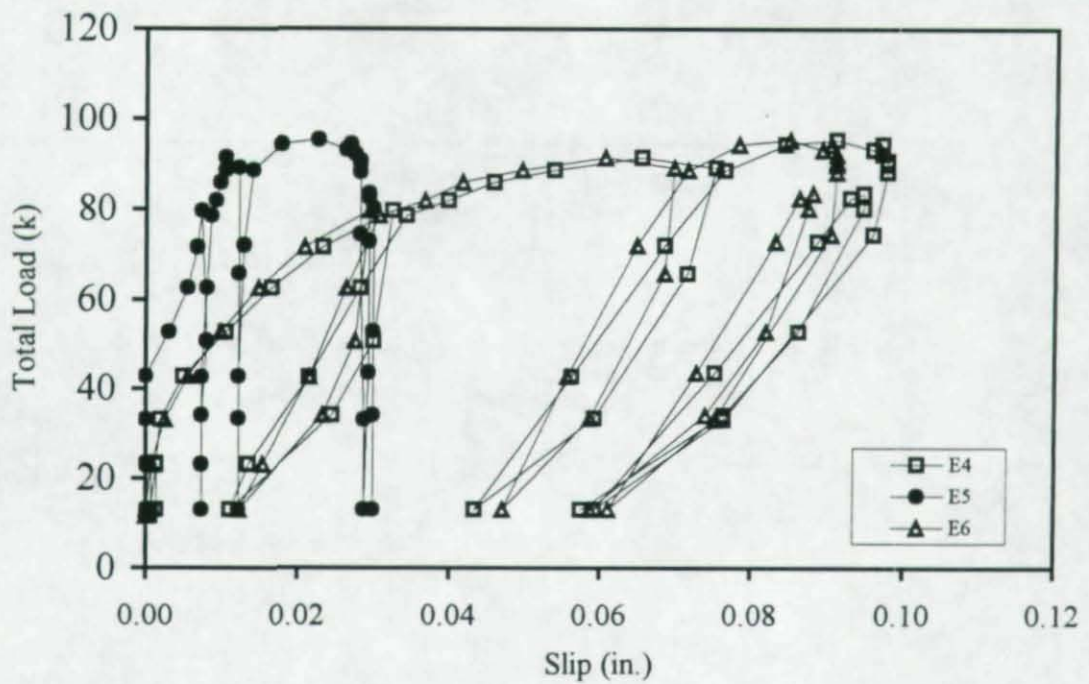


Fig. E.34 Beam Test 3 - Total Load vs. Slip (E4 - E6)

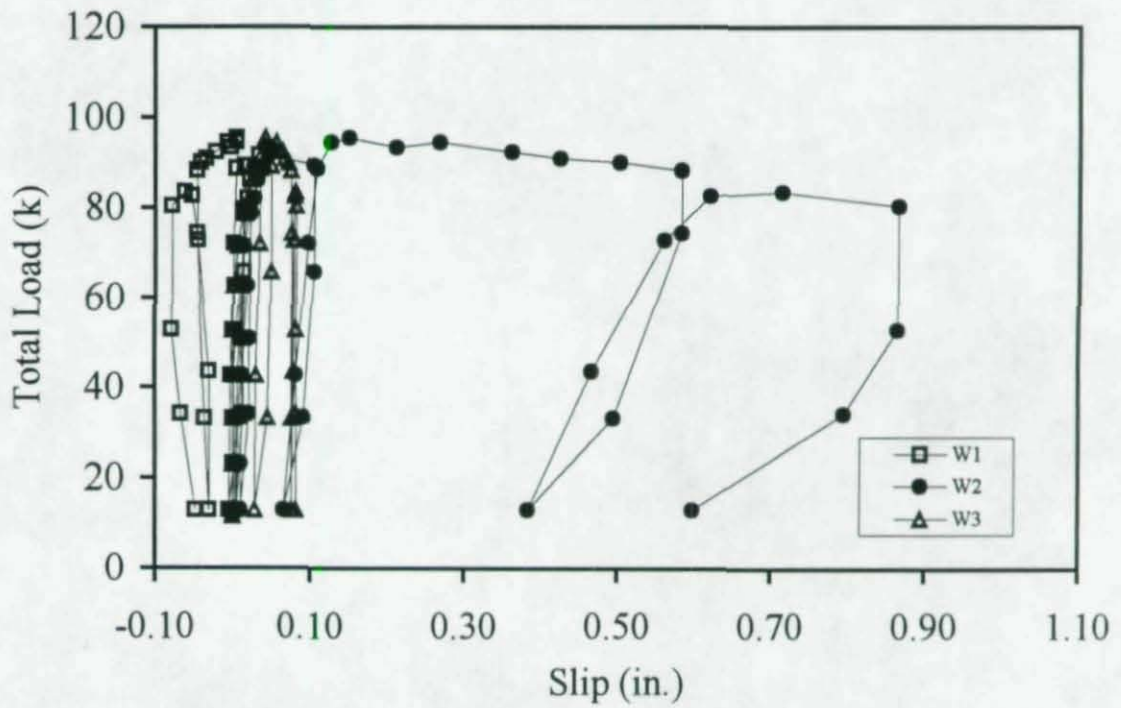


Fig. E.35 Beam Test 3 - Total Load vs. Slip (W1 - W3)

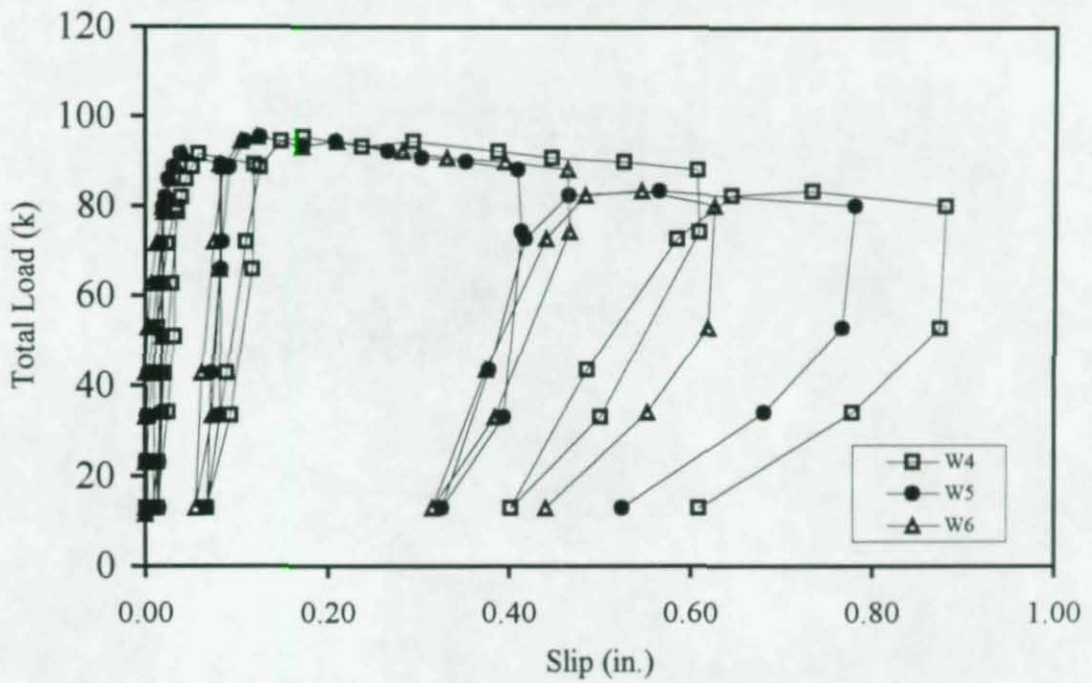


Fig. E.36 Beam Test 3 - Total Load vs. Slip (W4 - W6)

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