Design Provisions for Cold-Formed Steel Columns and Beam Columns

RESEARCH REPORT RP92-1

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Committee on Specifications for the Design of Cold-Formed Steel Structural Members



**American Iron and Steel Institute** 

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September 30, 1992

TO:

American Iron and Steel Institute, Subcommittee 22 -Compression Members

Rack Manufacturers Institute Specification Advisory Committee

FROM: SUBJECT:

Teoman Peköz and Özgür Sümer

Final Report - DESIGN PROVISIONS FOR COLD-FORMED STEEL

COLUMNS AND BEAM COLUMNS

Results of two research projects are presented together because of their close relationship:

- Research to develop an improved design approach for cold-formed steel columns was carried out for the AMERICAN IRON AND STEEL INSTITUTE.
- Research on cold-formed steel beam-columns was carried out for the RACK MANUFACTURERS INSTITUTE as a part of the research to develop an improved design approach for frames. Further studies on frame design will be reported separately.
- Possible design provisions based on this study are given in Appendix F.

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In the first phase of the column research, the effect of local buckling and residual stresses on over-all column buckling was studied. These studies are discussed in Appendix A. It is seen in Appendix A that a desirable approach would be to adopt sufficiently accurate column design equations rather than trying to account for the effects of residual stresses on the post-local buckling behavior explicitly.

Figure 1 taken from Peköz, T. (1988) leads to the conclusion that the column design equations of the Load and Resistance Factor Design Specification of the American Institute of Steel Construction [1986] may be satisfactory. In this figure, curves designated AISI, AISC, ECCS are according to the AISI (1986), AISC (1986) and European Convention for Constructional Steelwork (1987) Recommendations, respectively. Curves designated with subscripts include resistance or safety factors. The work reported in Pekoz (1988) given as Appendix E did not include partiaally effective sections and sections loaded eccentrically.

#### 1. DATA BASE

Test results from several sources were used in the evaluation of the present design provisions and possible changes to them for columns and beam columns. A wide variety of types of sections were used in these evaluations. The cross-sectional dimensions, and other pertinent information along with the test results are given in the tables of this appendix. The notation for the sections used are illustrated in Figs. B1 through B3.

The test results evaluated were on sections having component elements with a wide range of width to thickness ratios. Some of these sections were fully effective at buckling, some were not.

The following assumptions were made regarding the information not given in the references.

- The yield stress of the material at the flat portions is assumed equal to the yield stress of the virgin material.
- If not given explicitly, ultimate stress for the material is assumed as

 $F_{ult}$ =1.25 $F_y$ 

These values were used in the equations to estimate the increase in the yield stress due to cold work.

- In the symmetric sections, dimensions are given as the outer dimensions and the corners are assumed to be sharp.
- For all cases dimensions given are the outer dimensions except for Specimens of Mulligan and Pekoz (1983) where the dimensions are the flat dimensions.
- If not given explicitly the outer radius is assumed as 4 times the thickness of the specimen.

#### 2. CORRELATION STUDIES

Section C of the current AISI Specification (1986) has the following formulas for the nominal limit stress  $F_n$ :

For 
$$F_e > F_y/2$$
  $F_n = F_y (1 - F_y/4F_e)$ 

For 
$$F_e \le F_y/2$$
  $F_n = F_e$ 

These equations can also be written as

For 
$$\lambda_c \le \sqrt{2}$$
  $F_n = (1 - \lambda_c^2 / 4) F_v$ 

For 
$$\lambda_c > \sqrt{2}$$
  $F_n = F_y / \lambda_c^2$ 

where

$$\lambda_c = \sqrt{\frac{F_y}{F_g}}$$

An observed column strength divided by the column strength predicted using these equations is designated ra in the tables of Appendices C and D.

Chapter E of the AISC-LRFD Specification (1986) has the following formulas for the nominal limit state:

For 
$$\lambda_c \le 1.5$$
  $F_n = (0.658^{\lambda_c^2}) F_v$ 

For 
$$\lambda_c > 1.5$$
 
$$F_n = \left[ \frac{0.877}{\lambda_c^2} \right] F_y$$

An observed column strength divided by the column strength predicted using these equations is designated rc in the Tables of Appendices C and D.

In case the loading was eccentric with respect to the centroid of the effective section, ultimate loads were obtained using the interaction equations of the AISI Specification in Appendix C and the AISC-LRFD Specification in Appendix D. The interaction equations of the AISC-LRFD Specification were used in the form below:

For 
$$\frac{P_u}{P_n} \ge 0.2$$

$$\frac{P_u}{P_n} + \frac{8}{9} \left( \frac{M_{mux}}{M_{nx}} + \frac{M_{muy}}{M_{ny}} \right) \le 1.0$$

For 
$$\frac{P_u}{P_n} < 0.2$$

$$\frac{P_u}{2P_n} + \left(\frac{M_{mux}}{M_{nx}} + \frac{M_{muy}}{M_{ny}}\right) \le 1.0$$

where 
$$M_{\text{mux}} = C_{\text{mx}} M_{\text{ux}} / \alpha_{\text{nx}}$$
 $M_{\text{muy}} = C_{\text{my}} M_{\text{uy}} / \alpha_{\text{ny}}$ 
 $1/\alpha_{\text{nx}}, 1/\alpha_{\text{ny}} = 1/\left[1 - \frac{P_u}{P_E}\right]$ 

All other terms are as defined in the AISI LRFD Specification.

The following are given in the tables of Appendices C and D:

- the value of the width of the widest element divided by the thickness is tabulated under wmax/t. For I sections made up of two back to back channels, wmax was taken as the flat width of the unstiffened element.
- eccentricities of the axial load in inches. Eccentricities are with respect to the centroidal axes of the full section. The symmetry axis for singly symmetric sections is the x axis.
- Ptest given is the ultimate load observed in test given in kips.
- rc and ra as defined above.
- means and coefficients of variation (c. o. v.), resistance factors  $(\phi)$  and factors of safety (FS)

Resistance factors were calculated using the following statistics:

 $M_m$  = 1.10 Mean value of the material factor

- $V_m$  = 0.10 Coefficient of variation of the material factor
- $F_m$  = 1.00 Mean value of the fabrication factor
- $V_F$  = 0.05 Coefficient of variation of the fabrication factor
- $P_m$  = Mean from the tests
- $V_p$  = c. o. v. from the tests

Factors of safety was based on the resistance factor and a live to dead load ratio of 5.

For each test series, calculations were repeated taking  $F_y$  as the yield stress of the flats and the average yield stress calculated according to the cold-forming effects formulas of the AISI Specification (1986).

The results given in Appendices C and D are summarized in Tables 1 and 2. In these tables, for each test series the following are given:

- means and coefficients of variation (c. o. v.), resistance factors and factors of safety. The results are designated calc. for those obtained with the AISC-LRFD Specification (1986) column design formulas and AISI for those obtained using the AISI Specification (1986) column design formulas.
- In Table 1 the results are obtained using the AISI Specification (1986) beam column formulas and in Table 2 results are obtained using the AISC-LRFD Specification (1986) beam column formulas.
- The numbers of tests for each series and the eccentricity characteristics are given. It is possible that for a series indicated as ex \neq 0, a few specimen might have been tested concentrically even though the majority of sections were tested with eccentricity with respect to the y axis. Details of eccentricities can be found in the tables of the Appendices of C and D.
- For each test series the results of three types of calculations are given in Tables 1 and 2. These are given as follows:
  - First line in each group are the results for taking  $F_y$  as the yield stress of the flats
  - Second line is for taking for all sections  $F_y$  as the average yield stress calculated

according to the cold-forming effects formulas of the AISI Specification (1986).

- Third line is taking  $F_y$  as in second line only for those sections that are fully effective.
- For those sections which were reported to have sharp corners only the type of analysis given in the first line was carried out.

#### 3. CONCLUSIONS

The following conclusions can be drawn from the correlation studies:

- The test results evaluated represent a wide range of behavior modes. The specimens have partially or fully effective sections. They are subject to flexural or torsional flexural elastic and inelastic buckling.
- The results plotted in Figs. 1 and 2 show that the AISC-LRFD formulas represent the test results better than those of the AISI Specification. This can also be seen in Table 1. The means are closer to unity and the coefficients of variation are in general smaller for the AISC-LRFD column formulas than those for the AISI column formulas.
- In some cases the calculated value of the resistance factor is larger than unity, indicating that the predictions for those cases are overly conservative.
- It is seen in Table 1, that in general the eccentrically loaded columns required smaller resistance factors, indicating that the interaction equation used in the AISI Specification can be made more accurate. For this reason the studies reported in Table 2 and Appendix D were carried out.
- The results reported in Table 2 and Appendix D show that the AISC-LRFD beam column interaction equations are more accurate for predicting the test results. It should be pointed out that only the interaction equations are studied here, and not the approach of the AISC-LRFD Specification to account for  $P-\Delta$  effects. These effects are being studied for the Rack Manufacturers Institute and will be reported separately.
- The ratio rc is plotted against the wmax/t ratios in Figs. 3 through 6. Figure 6 is for a wide range of wmax/t ratios and shows a trend of decreasing rc values as the wmax/t increases. This would indicate a possiblity of varying

resistance factor of factors or safety for different values of wmax/t. However the additional complication introduced by this approach was not thought to be desirable. There appears some justification for the use of larger factor of safety for thinner sections as is done in the AISI ASD Specification.

- The results obtained using the AISC LRFD Specification column formulas and beam column interaction formulas are plotted in Fig. 7 through 9. The solid line represents the AISC LRFD interaction formulas. The results shown in these figures and tabulated in Table 2 lead to the conclusion that the AISC LRFD beam column equation give more accurate results.
- The use of the increased yield stress due to cold-forming does not seem to influence the c.o.v. for the results compared to using the yield stress of the flats. Obviously, the resistance factors increase and the required factors of safety decrease when the increased yield stresses are used. Though the numerical values do not indicate strong grounds for adopting either approach, it appears more reasonable to use the yield stress of the flat in design. This is a decision to be made by the Specification writing committees and subcommittees.
- The magnitude of the resistance factor and the factor of safety should be decided by the Specification writing Committees and Subcommittees on the basis of the information given in this report. Resistance factor values between 0.85 and 0.90 and factors of safety values between 1.92 and 1,67 appear quite reasonable.
- Possible design provisions based on this study are given in Appendix F. Plots to help the evaluation of the impact of these provisions are also given in Appendix F.

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#### TABLE 1

# SUMMARY OF RESULTS AISI AND AISC-LRFD COLUMN DESIGN EQUATIONS WITH AISI BEAM-COLUMN INTERACTION EQUATIONS

Mean Calc.	Mean AISI	c.o.v. Calc.	c.o.v. AISI	φ Calc.	φ AISI	F.S. Calc.	F.S. AISI
	BOX SEC	TIONS OF		PEKOZ AI		(1973)	
1.131	1.055	0.050				1.481	1.622
BACK	TO BACK	CHANNELS		OLF, PEK = 0, ey		INTER (1	973)
1.267	1.184	0.076				1.344	1.420
BACK T	O BACK	CHANNELS I		RAMAN, P		WINTER (	(1972)
1.096	0.999	0.114	0.105	0.954	0.877	1.608	1.748
	TE	ST RESULT	S OF WEN	IG AND P	EKOZ (198	7)	
		[N =	40, ex	= 0, ey	= 0]	•	
1.025	0.918	0.078	0.086	0.922	0.820	1.663	1.869
0.984	0.880	0.082	0.081	0.882	0.789	1.738	1.943
0.985	0.864	0.081	0.094	0.884	0.767	1.734	2.000
	НА	T SECTION	S OF DA	T AND PE	KOZ (1980	))	
					= 0]		
		0.090					
1.076	0.951	0.074	0.062	0.971	0.866	1.580	1.772
1.076	0.951	0.074	0.062	0.971	0.866	1.580	1.772
	LIP	PED CHANN				80)	
		[N =	45, ex	= 0, ey	= 0]		
		0.193					
		0.178					
1.009	0.912	0.178	0.188	0.807	0.717	1.901	2.138
	TEST	RESULTS (				983)	
				LOADED C			-
1 070				0, ey =			
1.073	1.040		0.162	0.889	0.852	1.724	1.800
1.062 1.073	1.028	0.151			0.844 0.852	1.738 1.724	
1.0/3	1.040	0.155	0.102	0.009	0.652	1./24	1.800
	TEST	RESULTS C		GAN AND LOADED (		983)	
		[N =	13, ex :	= 0, ey	= 0]		
1.201	1.147	0.090				1.433	1.497
	1.135	0.090	0.087	1.059	1.014	1.447	1.512
1.201	1.147	0.090	0.087	1.070	1.024	1.433	1.497

# TABLE 1 (Cont.) SUMMARY OF RESULTS

# AISI AND AISC-LRFD COLUMN DESIGN EQUATIONS WITH AISI BEAM-COLUMN INTERACTION EQUATIONS

Mean Calc.	Mean ATST	c.o.v. Calc.	c.o.v.	$\phi$ Calc.	φ AISI	F.S. Calc.	F.S. AISI
00101							
	HAT	SECTIONS	OF PEKC	Z AND WI	NTER (19	67)	
				7), TABL			
	1 107	[N =	18, ex;	≠ 0, ey :	= 0]	1 500	1 612
1.239	1.127	0.167	0.140	1.007	0.951	1.523	1.613
1.221	1.110	0.178 0.178	0.151	0.976	0.922	1.571	1.663
1.221	1.110	0.178	0.131		0.922	1.3/1	1.003
	LIPPED	CHANNEL S				(1985)	
				7), TABL			
		[N = 0.227	: 6, ex ₹	0, ey =	= 0j	1 210	1 226
1.575	1.554	0.227	0.227	1.103	1.14/	1 3/0	1 360
1.489	1.469	0.207 0.207	0.208	1.13/ 1 137	1 121	1 349	1 368
1.489	1.469	0.207	0.200	T.T3/	1.121	1.349	1.500
	LIPPED	CHANNEL S	ECTIONS	OF LOH A	ND PEKOZ	(1985)	4
•		FROM PE	KOZ (198	7), TABL	E 3.3-3	,	*
		\N =	17, ex	= 0, ey :	≠ 0]		
1.405	1.367	0.128	0.126	1.202	1.174	1.276	1.307
1.345	1.309	0.124	0.121	1.157	1.129	1.325	1.358
1.345	1.309	[N = 0.128 0.124 0.124	0.121	1.157	1.129	1.325	1.358
		CHANNEL S					
		DDOM DD	707 /100	71 MADT	TO 2 2 4		
		FROM PE [N =	7, ex 7	é0, ey ₹	<b>∉</b> 0]	•	
1.615	1.593	0.078	0.080	1.453	1.431	1.055	1.071
1.542	1.521	0.082	0.084	1.383	1.361	1.108	1.126
1.542	1.521	0.082	0.084	1.383	1.361	1.108	1.126
	ттррю	D CHANNEI	SECTION	IS OF THO	MASSON (	1978)	
				7), TABL		•	
		N =	13, ex	= 0, ey	= 0]		
1.039	0.976	0.099	0.087	0.918	0.871	1.670	1.760
1.034	0.971	0.098	0.086	0.914	0.867	1.677	1.768
1.039	0.976	0.099	0.087	0.918	0.871	1.670	1.760
	תיים מיד.ד	CHANNEL S	RECTTONS	OF LOH 2	AND PEKO?	(1985)	•
	التلاط عميي			7), TABL		(	
		N =	19. ex	= 0, ey	= 0]		
1.101	1.083	กกัดเร	0.081	0.986	0.971	1.555	
	1.065	0.080	0.077	0.974	0.958	1.575	1.600
	1.080	0.082	0.079	0.986	0.970	1.555	1.580
						The second second	

### TABLE 1 (Cont.) SUMMARY OF RESULTS

### AISI AND AISC-LRFD COLUMN DESIGN EQUATIONS WITH AISI BEAM-COLUMN INTERACTION EQUATIONS

Mean Calc.	Mean AISI	c.o.v. Calc.	c.o.v. AISI	$\phi$ Calc.	φ AISI	F.S. Calc.	F.S. AISI
	LIPPED	FROM PE	KOZ (198 <sup>°</sup>	7), TABI		(1985)	
			13, ex;				
					0.897		
					0.899		
1.273	1.238	0.219	0.228	0.954	0.913	1.607	1.680
	LIPPE	FROM PE	KOZ (198	7), TABI		1979)	
1 007	1 040				= 0]	1 540	
					0.963		
					0.954		
1.087	1.049	0.050	0.046	0.996	0.963	1.540	1.592
	на	T SECTIO	NS OF LOI	H AND PE	KOZ (1985	5)	
			15, ex 7			•	
1.076	1.012	0.179	0.192	0.860	0.791	1.784	1.939
1.069	1.005	0.176	0.189	0.856	0.790	1.790	1.941
1.076	1.012	0.179	0.192	0.860	0.790 0.791	1.784	1.939
ALL TES	T RESULTS	FROM PE	KOZ (1987	7), TABL	ES 3.3-2	; 3.3-3	; 3.3-4
1.488	1.458	0.154	0.157	1.231	1.202	1.246	1.276
1 420	1.390	0.146	0.148	1 199	1 160	1.290	1 222
1.420	1.390	0.146	0.148	1.188	1.160 1.160	1.290	
			M PEKOZ		TABLES 7		3-4
1.177	1.151	0.187			0.904	1.653	1.696
					0.900		
1.170	1.144	0.176	0.178	0.939	0.915	1.633	1.675
**************************************	(1005)		ALL TEST				
FROM PEK	.OZ (1987)	, TABLES	3.3-2 , 7.3-4 ,		, 3.3-4 ,	7.3-2 ,	7.3-3 ,
			[N =				
1.248	1.215	0.212	0.221		0.906	1.622	1.692
1.217	1.185	0.195	0.204				1.687
1.224	1.192	0.191	0.200			1.597	1.666
		J 1 1 J 1		0.500	J. J. L.		1.000

#### TABLE 2

#### SUMMARY OF RESULTS

AISI AND AISC-LRFD COLUMN DESIGN EQUATIONS WITH LRFD BEAM-COLUMN INTERACTION EQUATIONS

> F.S. c.o.v. Mean Calc Calc. Calc. Calc.

BOX SECTIONS OF DEWOLF, PEKOZ AND WINTER (1973) [N = 18, ex = 0, ey = 0]1.131 0.050 1.036 1.481

BACK TO BACK CHANNELS OF DEWOLF, PEKOZ AND WINTER (1973) [N = 16, ex = 0, ey = 0]1.267 0.076 1.141 1.344

BACK TO BACK CHANNELS OF KALYANARAMAN, PEKOZ AND WINTER (1972) [N = 15, ex = 0, ey = 0]1.096 0.114 0.954 1.608

Mean Calc.	Mean AISI	c.o.v. Calc.	c.o.v. AISI	$\phi$ Calc.	$oldsymbol{\phi}$ AISI	r.s. Calc.	AISI
	TES	ST RESULT	S OF WEN	G AND PI	EKOZ (198	37)	
			40, ex				
1.024	0.918	0.078	0.086	0.922	0.820	1.663	1.869
0.984	0.880		0.081	0.882	0.789	1.738	1.943
0.985	0.864	0.081	0.094	0.884	0.766	1.734	2.001
6	***	T SECTIO	NO OF DAY	חואג יד	KOZ (198	.01	
	HA					,	
	**	[N =	15, ex	= 0, ey			
1.165	1.040	0.090	0.094	1.038	0.922	1.477	1.662
1.165	1.040	0.090	0.094	1.038	0.922	1.477	1.662
1.076	0.951	0.074	0.062	0.971	0.866	1.580	1.772

### LIPPED CHANNELS OF DAT AND PEKOZ (1980)

1.076 0.951 0.074

		N ==	40, EX	- U, Ey	_ 0]		
1 085	0.986	0.193	0.213	0.848	0.746	1.809	2.057
1 081	0.982	0.185	0.204	0.855	0.753	1.794	2.036
1.009	0.912	0.178	0.188	0.807	0.717	1.901	2.138
1.009	0.912	0.178	0.188	0.807	0./17	1.901	2.13

#### TEST RESULTS OF MULLIGAN AND PEKOZ (1983) ECCENTRICALLY LOADED COLUMNS

[N = 13, ex = 0, ey = 0]1.734 0.884 1.810 0.847 0.142 0.150 1.018 1.051 1.828 1.749 0.140 0.149 0.877 0.839 1.040 1.006 1.810 0.142 0.150 0.884 0.847 1.734 1.018 1.051

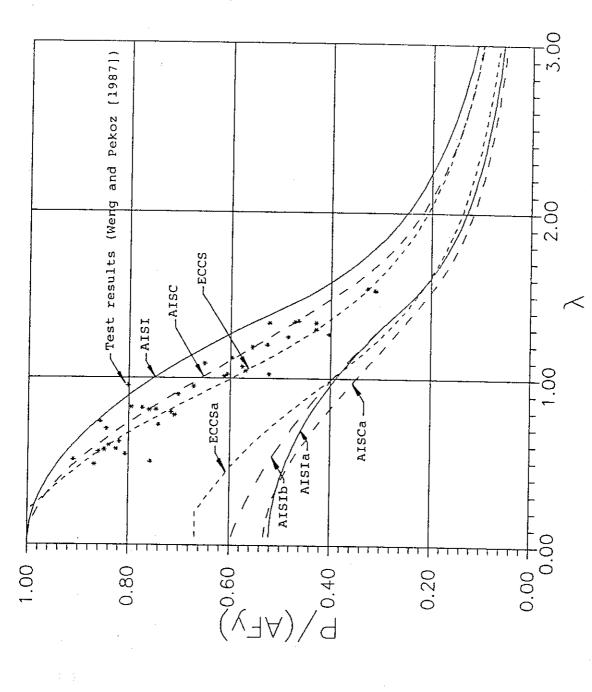
### TABLE 2 (Cont.) SUMMARY OF RESULTS

### AISI AND AISC-LRFD COLUMN DESIGN EQUATIONS WITH LRFD BEAM-COLUMN INTERACTION EQUATIONS

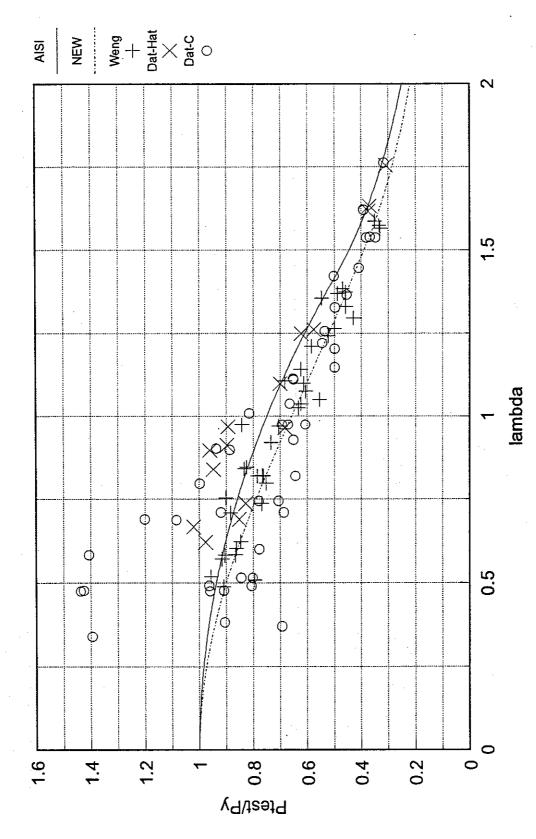
Mean	Mean	c.o.v. Calc.	c.o.v.	φ	$oldsymbol{\phi}_{-}$	F.S.	F.S.
Calc.	AISI	Calc.	AISI	Calc.	AISI	Calc.	AISI
		RESULTS			•	•	
•		CONCENT [N = 0.083 0.083 0.083	RICALLY	LOADED (	COLUMNS		-
1 176	1 123	0.083	13, EX	- U, EY	- U J 1 008	1 456	1 521
1.165	1.111	0.083	0.080	1.033	0.998	1.450	1.536
1.176	1.123	0.083	0.080	1.053	1.008	1.456	1.521
	HAT	SECTIONS	OF PEK	Z AND W	INTER (19	67)	
÷.		FROM PER	KOZ (198	7), TABL	E 3.3-1		
		[N = 0.188]	18, ex	≠ 0, ey	= 0]		
1.207	1.095	0.188	0.162	0.950	0.897	1.614	1.710
1.191	1.081	0.199	0.172	0.921	0.872	1.664	1.759
1.191	1.081	0.199	0.1/2	0.921	0.872	1.664	1.759
	TITPPED	CHANNEL S	ECTIONS	OF LOH	AND PEKOZ	(1985)	
				7), TABL		(1505)	
		[N =	6. ex =	≠ 0. ev =	= 01		
1.457	1.437	0.220	0.220	1.089	1.074	1.408	1.428
		0.200					
1.378	1.359	0.200	0.201	1.065	1.048	1.440	1.463
	LIPPED	CHANNEL S				(1985)	•
		FROM PER	4.7	^	/ 03		
1 212	1 276	[N = 0.126]	1/, ex	= U, ey	≠ V J 1 000	1 261	1 205
1 258	1 221	0.128	0.123	1.12/	1 057	1.301	1.451
1.258	1 221	0.122	0.119	1.084	1.057	1.414	1.451
	1.221	0.122	0.117	1.004	1.057	1.414	T.42T
· ·	LIPPED	CHANNEL S	ECTIONS	OF LOH A	AND PEKOZ	(1985)	
		FROM PEK	OZ (198	7). TABL	E 3.3-4	•	
		[N =	17, ex	= 0, ey	<b>≠</b> 0]		
1.479	1.457	0.077	0.079	1.332	1.310	1.151	1.171
1.412	1.390	[N = 0.077 0.080	0.083	1.268	1.246	1.209	1.231
1.412	1.390	0.080	0.083	1.268	1.246	1.209	1.231
•	TTDDE	D CHANNET	CECUTA	TC OF MIL	OMACCON (	1070)	
	DIFFE	D CHANNEL FROM PEK				19/8)	
•				/), IABL = 0, ey			
1.015	0.952	0.099	0.086	0.897	0.851	1,710	1.802
	0.947	0.097	0.085	0.894	0.847	1.716	1.811
1.015	0.952	0.099	0.086	0.897	0.851	1.710	

## TABLE 2 (Cont.) SUMMARY OF RESULTS AISI AND AISC-LRFD COLUMN DESIGN EQUATIONS WITH LRFD BEAM-COLUMN INTERACTION EQUATIONS

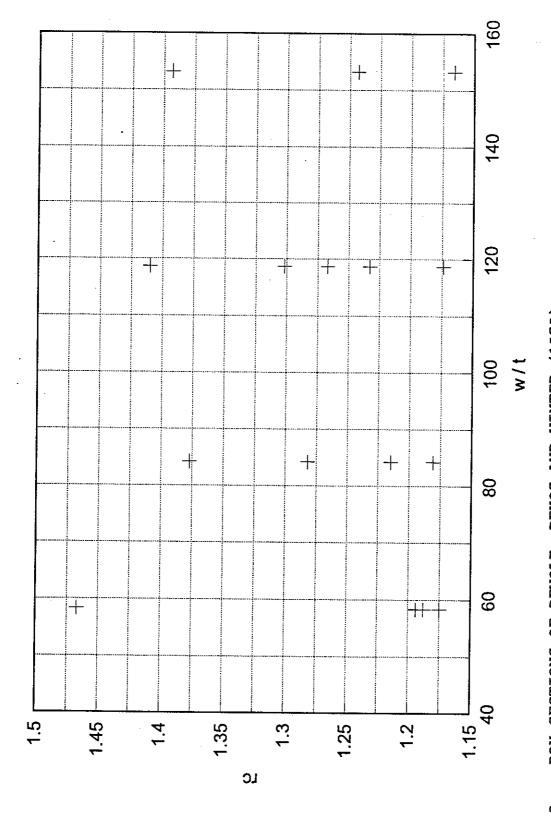
				•	25.0		
Mean	Mean	c.o.v.	c.o.v.	φ	φ	F.S.	F.S.
Calc.	AISI	Calc.	AISI	Calc.	AISI	Calc.	AISI
•	LIPPED	CHANNEL SI	ECTIONS	OF LOH A	ND PEKOZ	(1985)	and the second
		FROM PE	KOZ (198	7), TABL	E 7.3-3		
		[N =	19, ex	= 0, ey	= 0]		
		0.085					
		0.081					
1.024	1.006	0.085	0.082	0.916	0.902	1.674	1.701
							• 1
	LIPPED	CHANNEL S				(1985)	.*
J.		FROM PE	KOZ (198	7), TABL	E 7.3-4		•
		[N 1:	3= , ex	≠ 0, ey	≠ 0] ≠		
1.199	1.163	0.223	0.234	0.890	0.849	1.722	1.806
1,177	1.142	0.212 0.208	0.222	0.892	0.850	1.719	1.803
1.186	1.151	0.208	0.218	0.905	0.863	1.695	1.776
	TTDI	NED GUANNE	CHOMIC	NG OF TO	110111 AM (	1070\	
* •	PIPE	ED CHANNE	SECTIO	NS OF LO	D 7 2 5	19/9)	-
* . *		FROM PE	KOZ (198	/), TABL	E 7.3-5		•
	1 010	= N <sub>j</sub>	20, ex	= 0, ey	= 0]	1 500	1 (40
1.051	1.013	0.049	0.045	0.963	0.930	1.592	1.648
1.041	1.003	0.050	0.045	0.954	0.922	1.607	1.664
1.051	1.013	0.049	0.045	0.963	0.930	1.592	1.648
\$ 4.4		· · · · · · · · · · · · · · · · · · ·			7706 /100	<b>-</b> \	
		HAT SECTION	NS OF LO	H AND PE	KOZ (198	5)	
		[N = 0.171]	15, ex	≠ U, ey	= 0]	1 707	1 054
1.057	0.990	0.1/1	0.184	0.853	0.785	1.797	1.954
1.049	0.983	0.169	0.181	0.850	0.783	1.804	1.959
1.057	0.990	0.171	0.184	0.853	0.785	1.797	1.954
አተ.ተ. ጥፑፍጥ	י דונפת י	S FROM PE	KOZ (198	7) TART	ES 3.3-2	. 3.3-3	: 3.3-4
WID TEDI	. RECOL	D TROM TE	001) BOX	30]	5.5 &	, 3.3 3	, 3.3 4
1 381	1 351	0.148	0.150	1.152	1.124	1.330	1.364
1 318	1.288	0.139	0.142	1.112	1.084	1.379	1.415
1 318	1.288	0.139	0.142	1.112	1.084	1.379	1.415
1.510	1.200	0.133	0.142	**********	1,001		
ALL	TEST R	ESULTS FRO	M PEKOZ	(1987),	TABLES 7	7.3-3, 7.	3-4
0			[N =	321		•	
1.095		0.182	0.184	0.870	0.847	1.762	1.809
1.077	1.051	0.174	0.176	0.866	0.843	1.770	1.818
1.090	1.065	0.170	0.172	0.882	0.859	1.770 1.739	1.785
ALL TEST	RESULT	S FROM PER	OZ (1981	7), TABL	ES 3.3-2	, 3.3-3	, 3.3-4
		7.3-2 ,	7.3-3	7.3-4	, 7.3 <del>-</del> 5	•	•
	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	•	[N =		<del>.</del> .		
	1.141	0.196			0.874	1.680	1.754
		0.180					
		0.176					



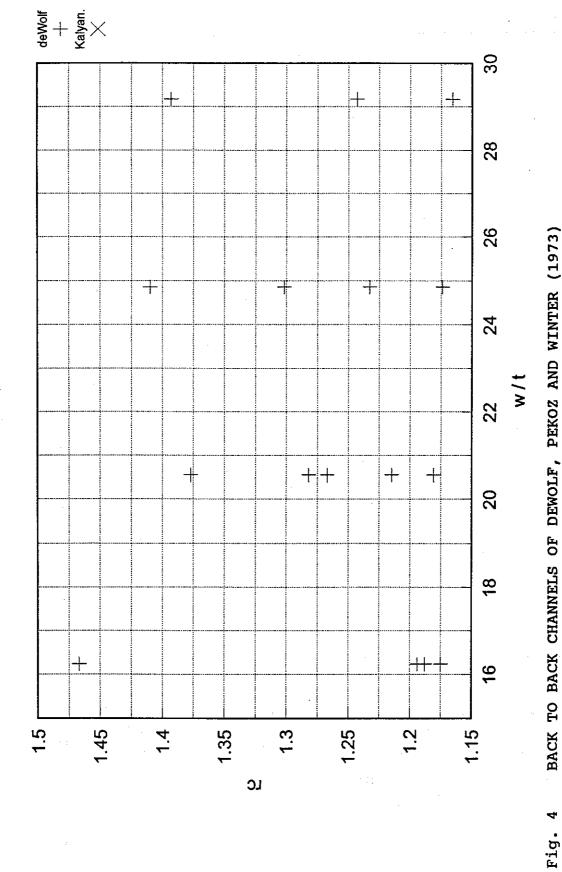
COLUMN DESIGN EQUATIONS AND LIPPED CHANNEL SECTIONS OF WENG AND PEKOZ (1987) TAKEN FROM PEKOZ (1988)



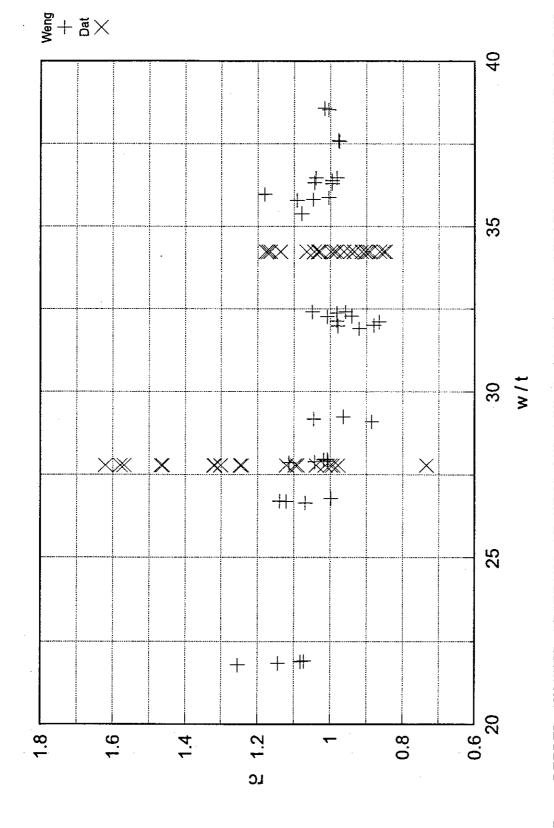
LIPPED CHANNEL SECTIONS OF WENG AND PEKOZ (1987), HAT AND LIPPED CHANNELS OF DAT AND PEKOZ (1980)



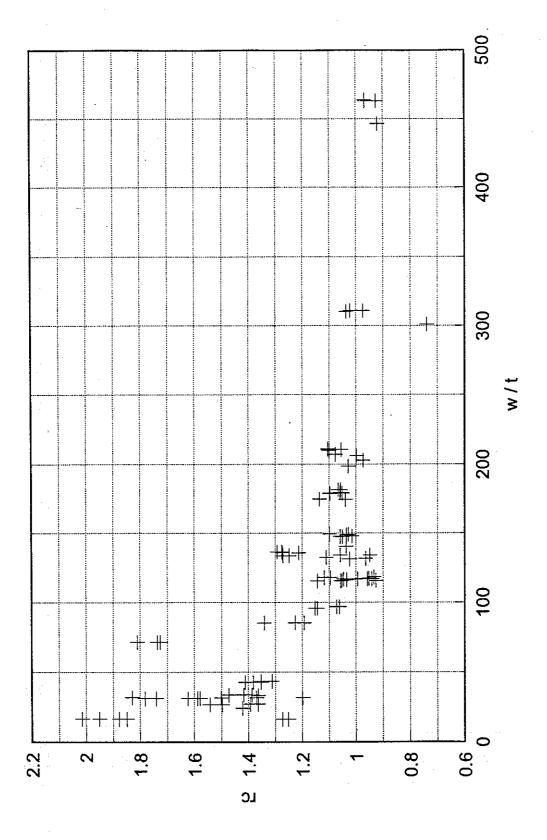
BOX SECTIONS OF DEWOLF, PEKOZ AND WINTER (1973) Fig. 3



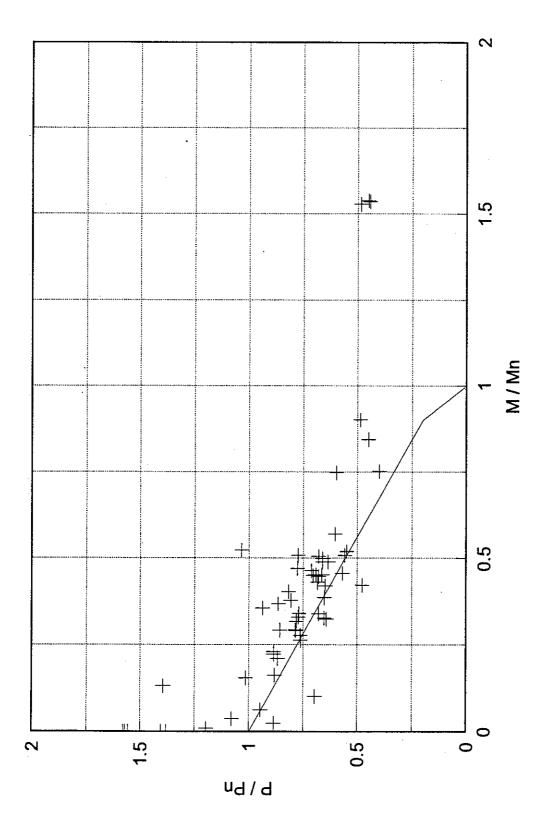
CHANNELS OF DEWOLF, PEKOZ AND WINTER (1973) CHANNELS OF KALYANARAMAN, PEKOZ AND WINTER (1972) BACK TO BACK BACK TO BACK



LIPPED CHANNEL SECTIONS OF WENG AND PEKOZ (1987) AND LIPPED CHANNELS OF DAT AND PEKOZ (1980) വ Fig.

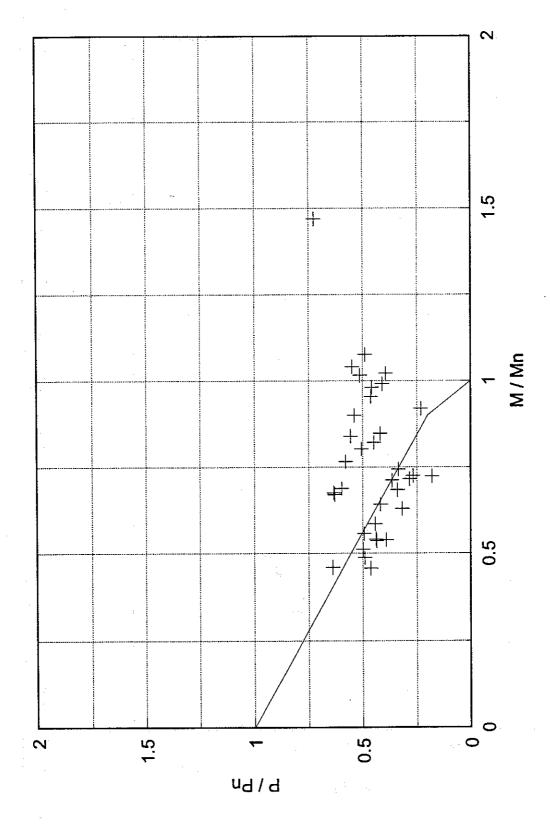


3.3-3 , 3.3-4 , 7.3-2 ALL TEST RESULTS, FROM PEKOZ (1987), TABLES 3.3-2, 7.3-3, 7.3-4, 7.3-5 Fig. 6

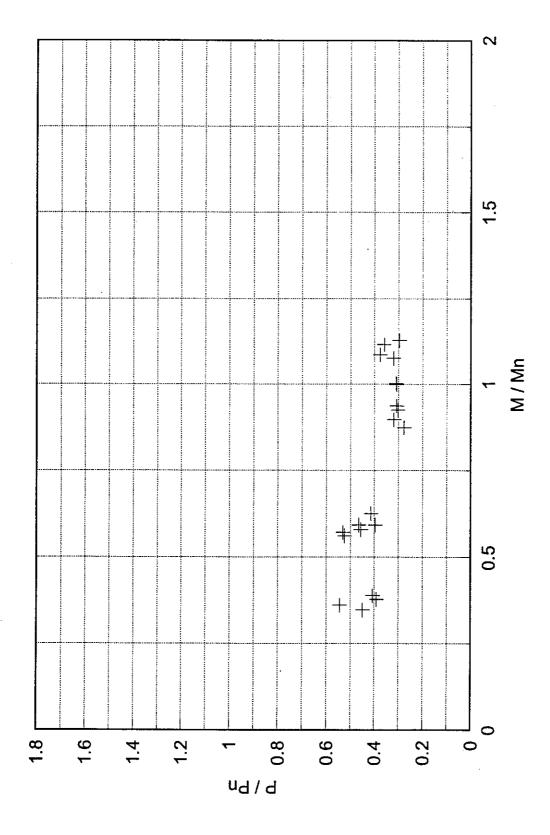


LIPPED CHANNEL SECTIONS OF MULLIGAN AND PEKOZ (1983), HAT SECTIONS OF PEKOZ AND WINTER (1967), LIPPED CHANNEL SECTIONS OF LOH AND PEKOZ (1985) [ex  $\neq$  0, ey = 0]

Fig. 7



LIPPED CHANNEL SECTIONS OF LOH AND PEKOZ (1985) [ex = 0, ey  $\neq$  0]



LIPPED CHANNEL SECTIONS OF LOH AND PEKOZ (1985) [ex  $\neq$  0, ey  $\neq$  0]

Fig. 9

. \*\*\*  APPENDIX A - EFFECT OF LOCAL BUCKLING AND RESIDUAL STRESSES

Local buckling is known to influence the overall buckling of columns. The current AISI column design approach has been shown to be unsatisfactory if the component elements of a column are close to the limiting values for local buckling. However the specification was also shown to be quite satisfactory if the elements have flat width-to-thickness ratios in excess of 1.6 times the limiting value or one-half the limiting value.

The primary reason for the unconservatism was therefore thought to be the local buckling effects when the plate slenderness is close to the limiting value.

#### A1. WENG'S APPROACH FOR LOCAL BUCKLING EFFECTS

The effect of residual stresses on the post-local buckling behavior of columns has been studied and a design procedure has been formulated in Weng (1991). The following is a critical look at this approach. The approach involves determining the effective widths as follows:

The column buckling stress  $F_u$  is determined ignoring local buckling.

The effective width, b, of a component elements is determined by

$$b = \rho w$$

where w is the flat width and

$$\rho = \frac{1 - 0.22 \lambda_r}{\lambda_r}$$

The plate slenderness  $\boldsymbol{\lambda}_r$  for the component elements is determined using the equation

$$\lambda_r = \left(\frac{1.052}{\sqrt{K}}\right) \left(\frac{W}{t_r}\right) \sqrt{\frac{F_u}{E}}$$

where

$$t_r = \phi t$$

If  $F_u \le 0.5F_y$  and  $\lambda \ge 0.673$  then

$$\Phi = 1$$

If  $F_n > 0.5F_v$  and  $\lambda < 0.673$  then

$$\Phi = 1 - \left(0.5 - \frac{0.005}{\left(\frac{F_u}{F_y}\right) - 0.49}\right) \cdot \sqrt{2\left(1 - \frac{F_u}{F_y}\right)}$$

After the effective section is determined, the axial load is assumed to be at the centroid of the gross section and the member is treated as a beam column with eccentric load with respect to the centroid of the effective section.

A better understanding of the implication of the above approach can be gotten by plotting the resulting  $\rho$  versus  $\lambda$  as is done in Fig. A1. In this figure  $\rho$  is designated RO and  $\lambda$  is designated LAMBDA. This plot is produced by a computer Program as follows:

In the AISI Specification,  $\rho$  is determined as

$$\rho = \frac{1 - 0.22\lambda}{\lambda}$$

Basically Weng's approach is to replace  $\lambda$  by  $\lambda/\phi$ . Figure A1 was produced by assuming values of  $\lambda$  and calculating  $\rho$  by Weng's approach.

It is seen clearly in Fig. A1 that at  $\lambda=0.673$  the approach leads to a severe discontinuity which cannot be justified and thus should not be considered for adoption in its present form. The reason why the approach gives good estimates of the test results of Weng and Dat is that the approach is based on these test results.

#### A2. LOCAL BUCKLING STUDIES PERFORMED

Other approaches of accounting for possible local buckling were tried. These involve the modification of the Winter effective width equation for calculating the effective widths of column sections. The results are plotted in Fig. A2. The effective width ratios,  $\rho$ , for a 0.1 inch thick element are determined and plotted for various widths. The yield stress is assumed to be 50 In this figure the solid line designated W is for the current Winter effective width approach. This approach will be referred to as Approach 1. The modified Winter approaches involve introducing a third segment which is a straight line. This segment is inserted between the  $\lambda_1$  and  $\lambda_2$  values. At these values  $\rho$  is assumed to be same as in the adjoining segments.  $\lambda_1$ ,  $\lambda_2$  values tried are (0.75, 0.6) and (1.0, 0.5). These approaches will be referred to as Approaches 2 and 3. The curves for these approaches are designated in Fig. A2 as MW1 and MW2, respectively. Such approaches could represent the effect of residual stresses which might "round out" the discontinuity

around  $\lambda = 0.673$ .

The other lines in Fig. A2 were obtained using a reduced value of The reasoning behind this is as follows. The effective width equations have been used satisfactorily for flexural members. In flexural members the longitudinal edges of the flanges are supported against rotation more rigidly by webs that have stress gradients than in the same member if the webs were subjected to uniform compression. This topic will be discussed further in connection with the finite strip analysis. A reduction of K from what is commonly used in flexural members (K = 4) would give an idea of what the consequence of having a less rigid supporting condition along the longitudinal edges of the plate elements. The values of K tried were 0.9x4 and 0.8x4. These approaches will be referred to as Approaches 4 and 5. The curves for these approaches are designated as .9K and .8K in Fig. A2. The approaches discussed above and their designations are summarized in the table below.

Approach	Line designation in Fig. A2	λ	$\lambda_2$	К
1	W	NA	NA	4
2	MW1	0.75	0.60	4
3	MW2	1.00	0.50	4
4	.9K	NA	NA	3.6
5	.8K	NA	NA	3.2

#### A3. COLUMN BUCKLING BEHAVIOR STUDIES

The local buckling and post-buckling behavior models discussed above were applied to the columns tested by Dat and Weng. The test results were compared with the values obtained using the Approaches 1 through 5. The results of computer studies are displayed in Tables 3 and 4. In these tables the notation is as follows:

SEC		Section Designation given in Weng, Peköz
AP, BP,	CP, T	Cross sectional dimensions
<b>L</b>		Effective length of specimen for flexural buckling
RLAM1		The ratio of the actual w/t of the most slender component element to the value of w/t

that will make the value of  $\lambda = .673$  at F.

for that element, namely,  $\frac{\frac{w}{t}}{\frac{219.76}{\sqrt{F_u}}}$ .

RLAM2

The ratio of the actual w/t of the most slender component element to the value of w/t that will make the value of  $\lambda$  = .673 at  $F_y$ 

for that element, namely,  $\frac{\frac{w}{t}}{\frac{219.76}{\sqrt{F_y}}}$ 

R1 through R5

The ratio the observed ultimate column load divided by the ultimate load calculated using Approaches 1 through 5.

RA1 through RA5

The ratio the effective area calculated using Approaches 1 through 5 divided by gross area.

F,

Nominal ultimate stress for the column calculated according to the AISI Specification ignoring local buckling

W Flat width

The results are plotted for each of the approaches in Figs. A3a through A4e.

The following conclusions can be drawn from the above studies:

- Basically all the approaches give similar results. Therefore the above modifications to the effective width approach are not satisfactory. Further modifications need to be studied.
- The specimens had RLAM1 and RLAM2 values that cover the range between .6 and 1.1. tests on specimens with RLAM1 and RLAM2 values above 1.1 would be desirable. Test results in this range will be studied and if necessary new tests will be carried out. The information given in Peköz (1988) on additional tests carried out will be included in this study.

#### A4. FINITE STRIP ANALYSIS

The possibility of more rigid support along the longitudinal edges of component plate elements was discussed above. In order to get a quantitative estimate of the edge support finite strip

studies were carried out for the column section shown in Fig. A5. This is the section of Specimen RFC14. The test results for this section had the worst correlation with the calculated values.

Local buckling stress versus length is plotted in Figs. 6a and b for the case of uniform stress around the cross-section. Local buckling stress is designated LOAD in the figure. Mode shapes in Fig. A6c for various lengths. Plate buckling coefficient K can be calculated for the most slender element of the cross-section as follows:

The plate buckling stress can be expressed as

$$\sigma_{CR} = \frac{E\pi^2 K}{12(1-\mu^2)(w/t)^2}$$

This equation can be solved for K as follows

$$K = \frac{12(1-\mu^2)(w/t)^2}{E\pi^2}\sigma_{CR}$$

Noting that

$$w = H - T - 2R$$

$$w=3.00-.075-2x.22$$

$$w = 2.485$$

substituting the values of E and  $\mu$ , the above equation becomes

$$K = \frac{12(.91)(2.485/.075)^2}{29500\pi^2}\sigma_{CR}$$

Thus

$$K = .0421\sigma_{CR}$$

It is seen in Fig. A6b that  $\sigma_{\rm cr}$  = 103.7526 and K = 103.7526 x .0412 = 4.272.

Local buckling stress versus length is plotted in Figs. A7a and b for the case of bending to cause compression in the most slender element of the cross-section. Local buckling stress is designated LOAD in the figure. Mode shapes in Fig. A7c for various lengths. In accordance with the above reasoning It is seen in Fig. A6b that  $\sigma_{\rm cr}$  = 106.61 and K = 106.61 x .0412 = 4.38.

It is seen that the two buckling coefficients are too close to each other to make any difference in the outcome of calculations of column strength.

#### A5. POSSIBLE FLEXURAL TESTS

A parametric study for possible bending tests using a lipped C column section 3 in. deep, 1.63 in. wide with lips that are 1.5 in. wide is shown in Table A3. Two different thicknesses, .1 and .075 in., are studied. In this table geometric parameters as well as expected moments are given. The following is the notation used in the Table.

MNO Ultimate moment computed using Approach 1 described above

MYO Yield moment computed using Approach 1 described above

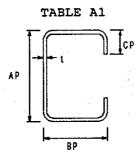
RN The ultimate moment computed using Approach N described above divided by MNO (values of N vary from 2 to 5)

RYN The yield moment computed using Approach N described above divided by MYO (values of N vary from 2 to 5)

It is seen that since R and RY values are close to 1.000, performing bending tests on columns would not give conclusive results on the behavior of the slender stiffened element of the columns.

#### A6. CONCLUSIONS

The studies conducted here show that new tests within the context of this project would not be too conclusive for getting simple enough column design procedures. It would be more fruitful to correlate available column test results with possible design formulations.

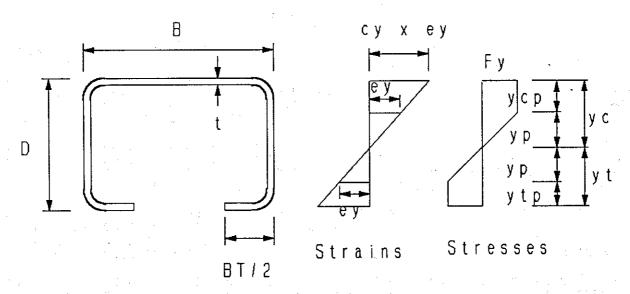


SEC RFC14-1	AP 3.00	BP 1.76	CP 0.69	0.075	INTR 0.219		27.0 38.7 51.0 63.0		0.93 0.90 0.77 0.74	0.91 0.77 0.74	0.96 0.92 0.78 0.75	0.94 0.90 0.77 0.74	0.95 0.91 0.77 0.74
RFC13-1	3.07	1.63	0.71	0.096	0.156	51.8	39.0 51.0	30.20 29.20 23.80 17.00	1.02 0.98	1.02 0.98	1.02	1.02	1.02
RFC11-1	3.15	1.65	0.71	0.119	0.156	40.4	39.0 51.0	32.30 30.30 28.50 19.70	1.05	1.05	1.05	1.05	1.05
R14 -1	3.02	1.66	0.61	0.075	0.219	49.7	39.0 51.0 63.0	23.20 19.40 15.40 11.60 8.50	0.92 0.85 0.82	0.92 0.85 0.82	0.94 0.86 0.82	0.92 0.85 0.82	0.93 0.85 0.82
R13 -1	3.01	1.63	0.61	0.086	0.219	50.2	39.0 51.0 63.0	26.20 23.80 17.80 13.20 10.10	1.00 0.89 0.86	1.00 0.89 0.86	1.01 0.90 0.86	1.00 0.89 0.86	1.00 0.89 0.86
PBC14-1	3.00	1.63	0.61	0.071	0.156	36.3	39.0 51.0 63.0	16.10 15.60 13.00 11.20 9.70	1.01 0.93 0.94	1.01 0.93 0.94	1.03 0.95 0.95	1.01 0.93 0.94	1.01 0.93 0.94
PBC13-1	3.03	1.62	0.61	0.087	0.156	38.4	39.0	18.00 17.50 16.00	0.89	0.89	0.90	0.89	0.89
P11 -1	5.04	2.49	0.88	0.120	0.125	32.1	75.0 90.0	34.20 30.40 27.80 22.30	0.87 0.88	0.87 0.88	0.89 0.89	0.87 0.88	0.87 0.88
P16 -1	2.64	1.38	0.62	0.064	0.094	32.8	41.0 52.0 62.0	11.20 10.40 8.00 6.90 6.20	0.96 0.84 0.86	0.96 0.84 0.86	0.98 0.85 0.86	0.96 0.84 0.86	0.96 0.84 0.86

## TABLE A2

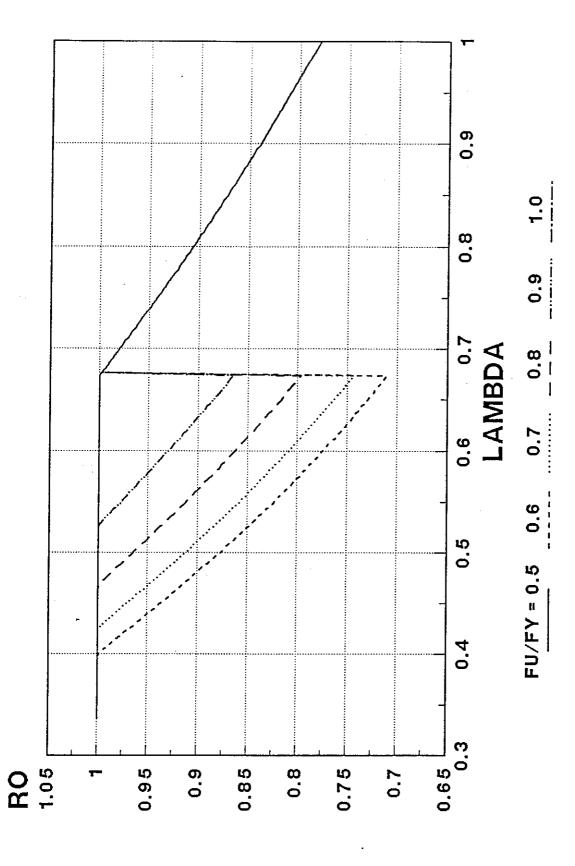
SEC RFC14-1 RFC14-2 RFC14-3 RFC14-4 RFC14-5	38.7 51.0 63.0	25.30 22.30 16.40	0.93 0.90 0.77 0.74	1.00 1.00 1.00	0.91 0.77 0.74	0.99 1.00 1.00	0.96 0.92 0.78 0.75	0.97 0.97 0.98 0.99	0.94 0.90 0.77 0.74	0.99 1.00 1.00	0.97 0.93 0.78 0.74	0.96 0.97 0.98 1.00	RLAM1 1.04 1.00 0.92 0.83 0.70	RLAM2 1.09 1.09 1.09 1.09
RFC13-1 RFC13-2 RFC13-3 RFC13-4	39.0 51.0	29.20 23.80	1.02 0.98	1.00	1.02 0.98	1.00	1.02	0.99	1.02 0.98	1.00	1.02	1.00	0.84 0.79 0.73 0.64	0.87 0.87 0.87 0.87
RFC11-1 RFC11-2 RFC11-3 RFC11-4	39.0 51.0	30.30 28.50	1.05	1.00	1.05 1.11	1.00	1.05 1.11	1.00	1.05 1.11	1.00	1.05 1.11	1.00	0.61 0.59 0.55 0.50	0.63 0.63 0.63 0.63
R14 -2 R14 -3 R14 -4	39.0 51.0	23.20 19.40 15.40 11.60 8.50	0.92 0.85 0.82	1.00 1.00 1.00	0.92 0.85 0.82	0.99 1.00 1.00	0.94 0.86 0.82	0.98 0.99 1.00	0.92 0.85 0.82	1.00 1.00 1.00	0.94 0.86 0.82	0.98 0.99 1.00	1.00 0.95 0.88 0.78 0.66	1.04 1.04 1.04 1.04
R13 -2 R13 -3 R13 -4	39.0 51.0 63.0	26.20 23.80 17.80 13.20 10.10	1.00 0.89 0.86	1.00 1.00 1.00	1.00 0.89 0.86	1.00 1.00 1.00	1.01 0.90 0.86	0.99 0.99 0.99	1.00 0.89 0.86	1.00 1.00 1.00	1.00 0.90 0.86	1.00 0.99 1.00	0.86 0.82 0.75 0.66 0.57	0.90 0.90 0.90 0.90
PBC14-1 PBC14-2 PBC14-3 PBC14-4 PBC14-5	39.0 51.0 63.0	15.60 13.00 11.20	1.01 0.93 0.94	1.00 1.00 1.00	1.01 0.93 0.94	1.00 1.00 1.00	1.03 0.95 0.95	0.98 0.99 0.99	1.01 0.93 0.94	1.00 1.00 1.00	1.03 0.94 0.94	0.98 0.99 1.00	0.95 0.92 0.87 0.81 0.72	0.98 0.98 0.98 0.98 0.98
PBC13-1 PBC13-2 PBC13-3	39.0	17.50	0.89	1.00	0.89	1.00	0.90	1.00	0.89	1.00	0.89	1.00	0.80 0.76 0.72	0.82 0.82 0.82
P11 -2 P11 -3	75.0 90.0	34.20 30.40 27.80 22.30	0.87 0.88	1.00	0.87 0.88	1.00 1.00	0.89	0.98 0.99	0.87 0.88	1.00	0.89 0.88	0.99 1.00	0.93 0.89 0.84 0.77	0.98 0.98 0.98 0.98
P16 -2 P16 -3 P16 -4		6.90		1.00 1.00 1.00	0.96 0.84 0.86	1.00 1.00 1.00	0.98 0.85 0.86	0.99 0.99 1.00	0.96 0.84 0.86	1.00 1.00 1.00	0.97 0.84 0.86	0.99 1.00 1.00	0.90 0.87 0.81 0.75 0.69	0.95 0.95 0.95 0.95 0.95

Table 3



```
D
        В
1.63 3.00 1.50 .100
                       YC
                             YT YP YCP YTP
                                                   Z
                                                       SX XBAR
            LA
3.00 1.53 0.65 1.00 0.44 1.19 0.29 0.15 0.90 0.46 0.36 0.66 23.203
                                                                         18.016
2.94 1.53 0.65 0.98 0.45 1.17 0.30 0.16 0.88 0.46 0.36 0.66 23.058
                                                                         17.979
2.80 1.53 0.65 0.93 0.49 1.14 0.32 0.17 0.82 0.45 0.36 0.67 22.661
                                                                         17.878
2.97 1.53 0.68 0.99 0.44 1.18 0.29 0.15 0.89 0.46 0.36 0.66 23.137
                                                                         17.999
2.77 1.53 0.78 0.92 0.50 1.13 0.32 0.17 0.81 0.45 0.36 0.68 22.588
                                                                         17.860
                                              RY3
                                                       R4
                                                               RY4
                     R2
                             RY2
                                      R3
   MNO
           MYO
                 0.9937
                         0.9979
                                  0.9766 0.9923
                                                   0.9971
                                                            0.9990
                                                                    0.9735
                                                                             0.9913
 23.20
         18.02
   D
        В
            BT
1.63 3.00 1.50 .075
                                                       SX XBAR
                       YC
                             YT
                                  YP YCP
                                           YTP
                                                   Z ·
                  RO
            LA
2.58 1.00 0.87 0.86 0.54 1.08 0.54 0.00 0.54 0.32 0.27 0.69 16.110
2.58 1.00 0.87 0.86 0.54 1.08 0.54 0.00 0.54 0.32 0.27 0.69 16.110
                                                                         13.291
2.50 1.00 0.87 0.83 0.56 1.06 0.56 0.00 0.50 0.32 0.26 0.70 15.875 2.49 1.00 0.91 0.83 0.56 1.06 0.56 0.00 0.50 0.32 0.26 0.70 15.862
                                                                         13.241
                                                                         13.238
2.28 1.00 1.04 0.76 0.62 1.01 0.62 0.00 0.39 0.30 0.26 0.72 15.236
                                                                         R5
                                      R3
                                              RY3
                                                       R4
                                                               RY4
            MYO
                     R2
                            RY2
   MNO
            13.29 1.0000 1.0000 0.9854 0.9962 0.9846 0.9960 0.9457
                                                                                0.9858
   16.11
```





A representation of Weng's approach to account for the effect of residual stresses of effective widths Fig. A1

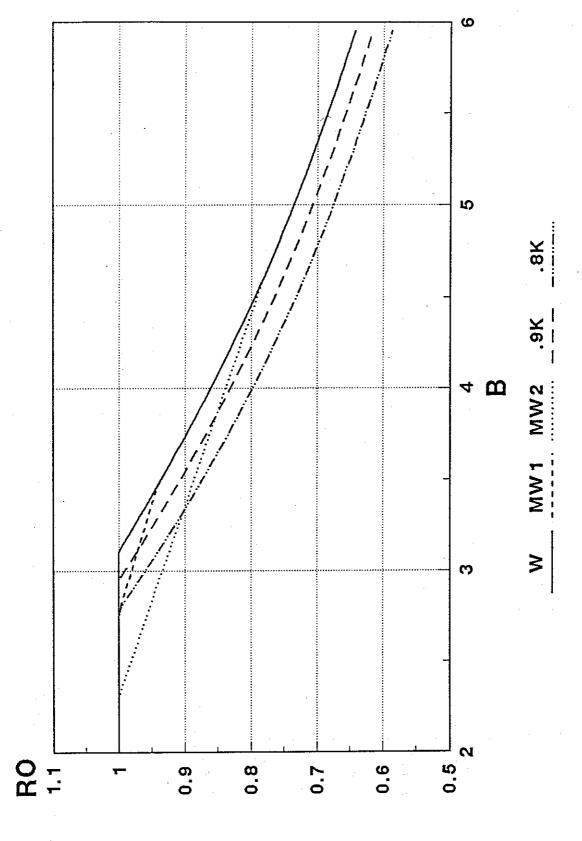
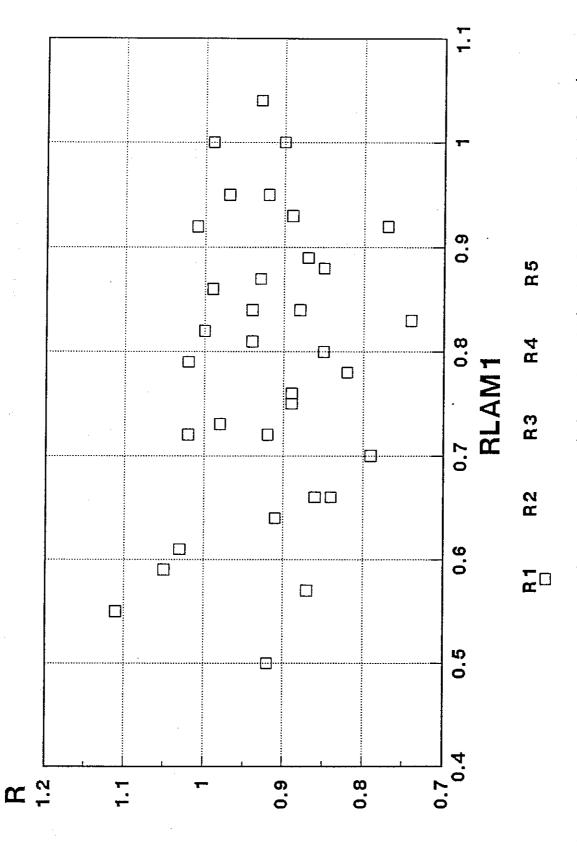
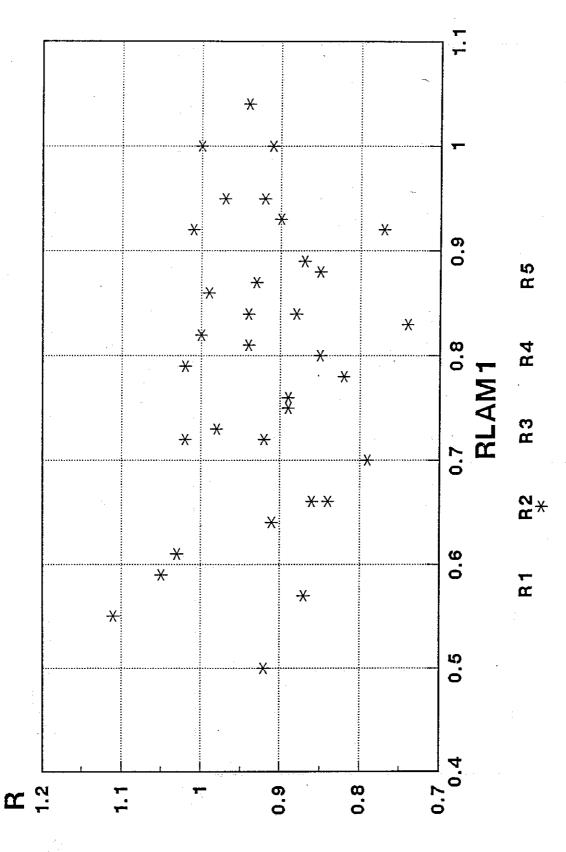


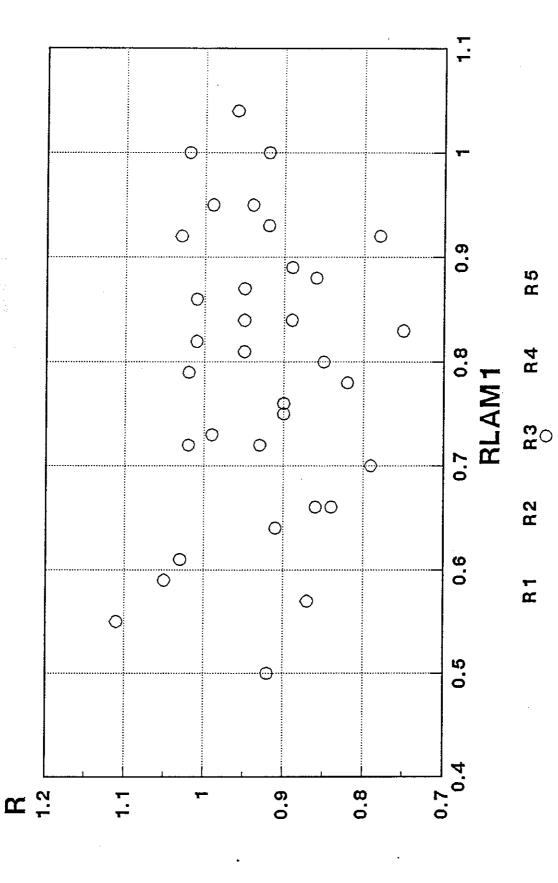
Fig. A2 Effective width approaches tried



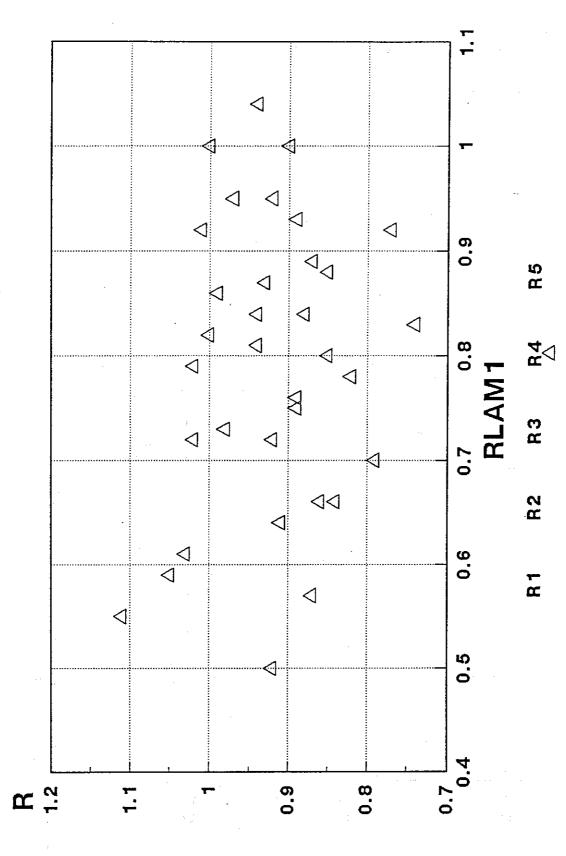
Observed column ultimate loads divided by ultimate load calculated using Approach 1 Fig. A3a



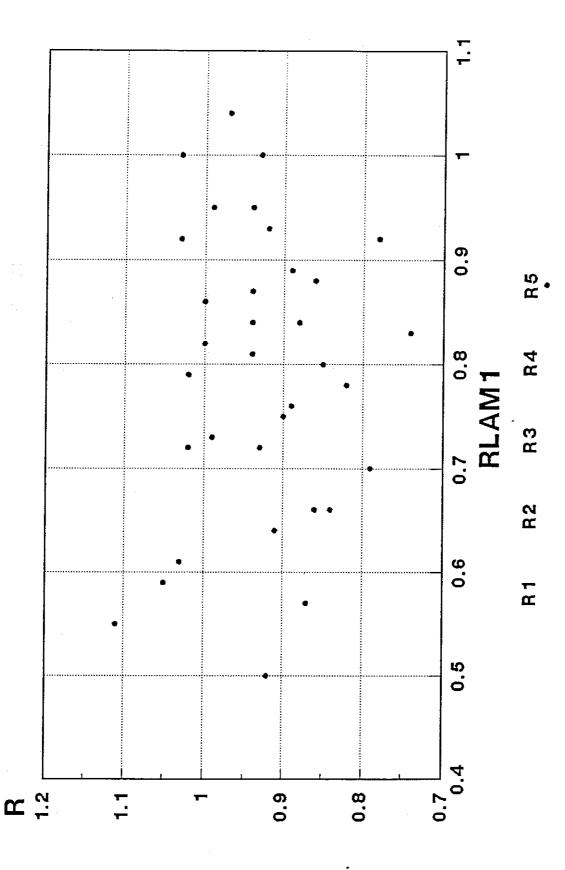
Observed column ultimate loads divided by ultimate load calculated using Approach 2 Fig. A3b



Observed column ultimate loads divided by ultimate load calculated using Approach 3 Fig. A3c



Observed column ultimate loads divided by ultimate load calculated using Approach 4 Fig. A3d



Observed column ultimate loads divided by ultimate load calculated using Approach 5 Fig. A3e

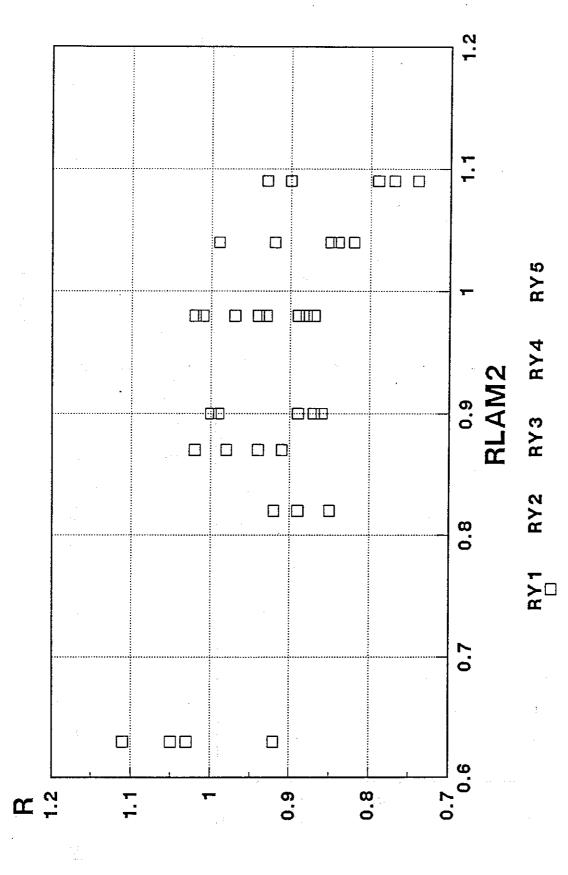
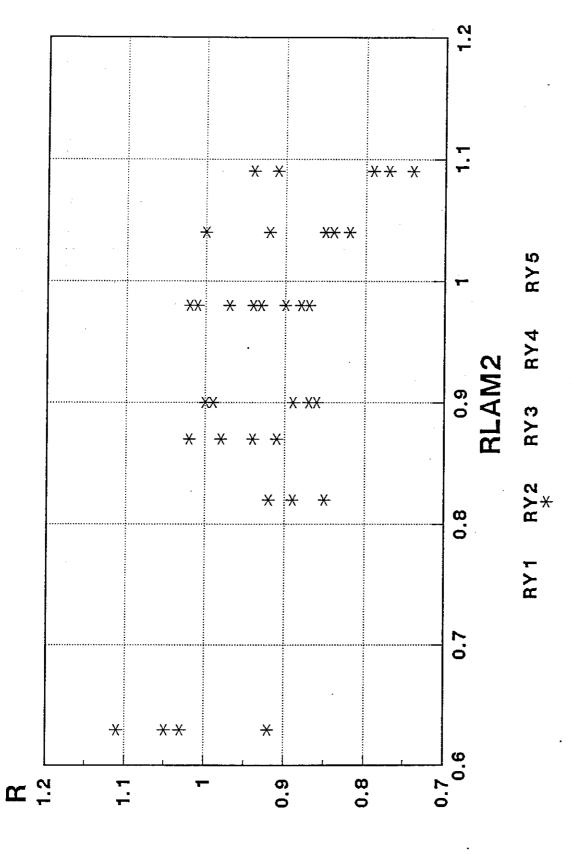
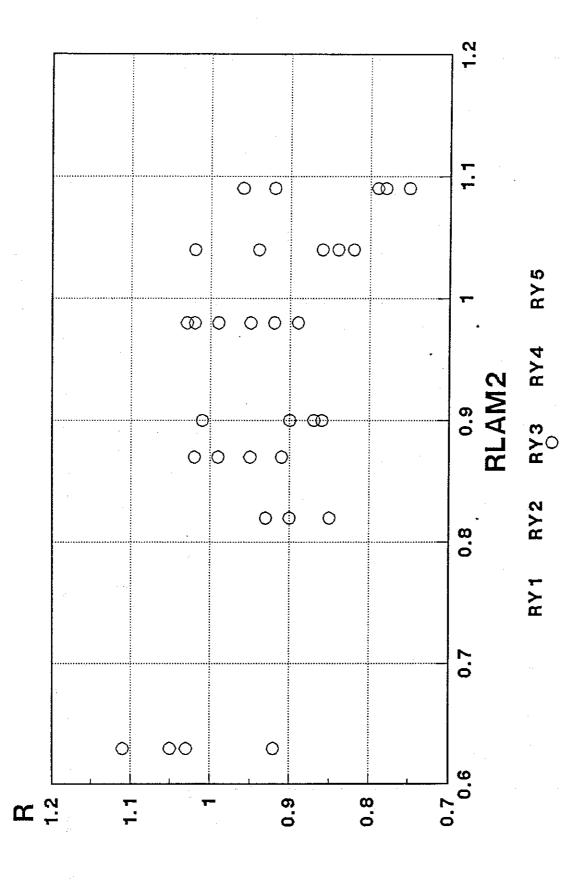


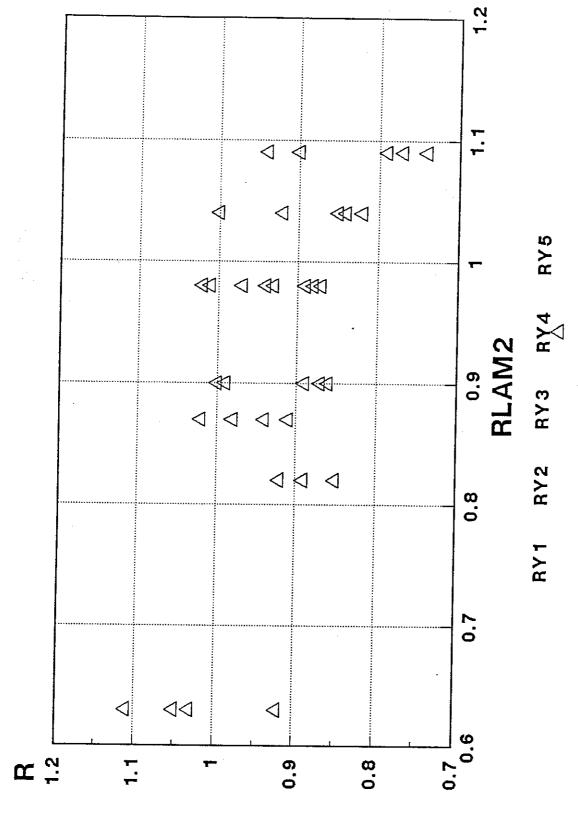
Fig. A4a Observed column ultimate loads divided by ultimate load calculated using Approach 1



Observed column ultimate loads divided by ultimate load calculated using Approach 2 Fig. A4b



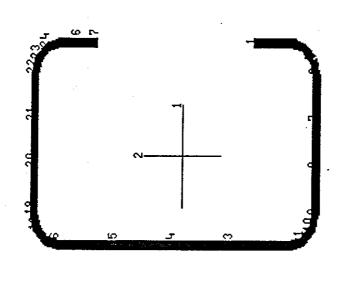
Observed column ultimate loads divided by ultimate load calculated using Approach 3 Fig. A4c



Observed column ultimate loads divided by ultimate load calculated using Approach 4 Fig. A4d

Fig. A4e Observed column ultimate loads divided by ultimate load calculated using Approach 5

## PROFILE NR.



SC 

B=.176E+01 CL=.690E+00 T=.75E-01 H=.300E+01 R=.22E+00

R => Return

Section properties of the section used for finite strip analysis Fig. A5

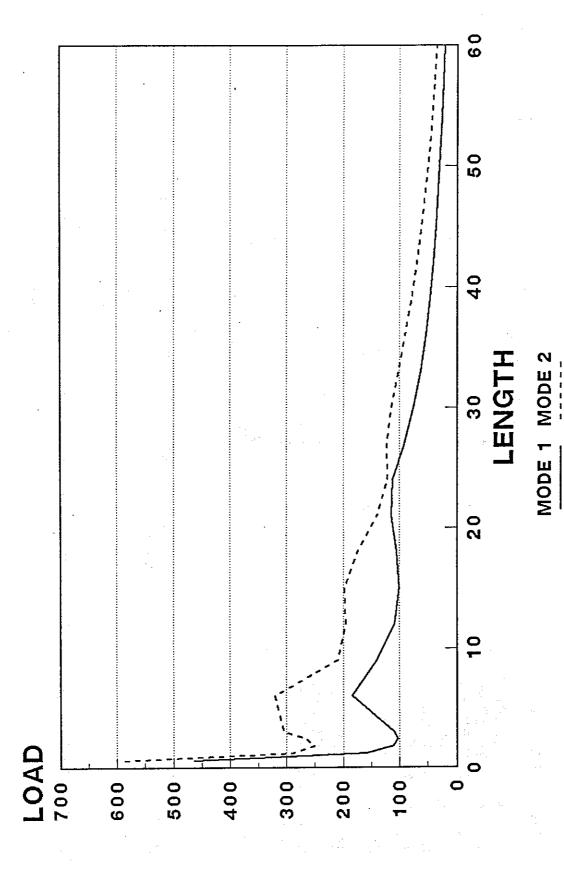


Fig. A6a Finite strip analysis results for uniform compression

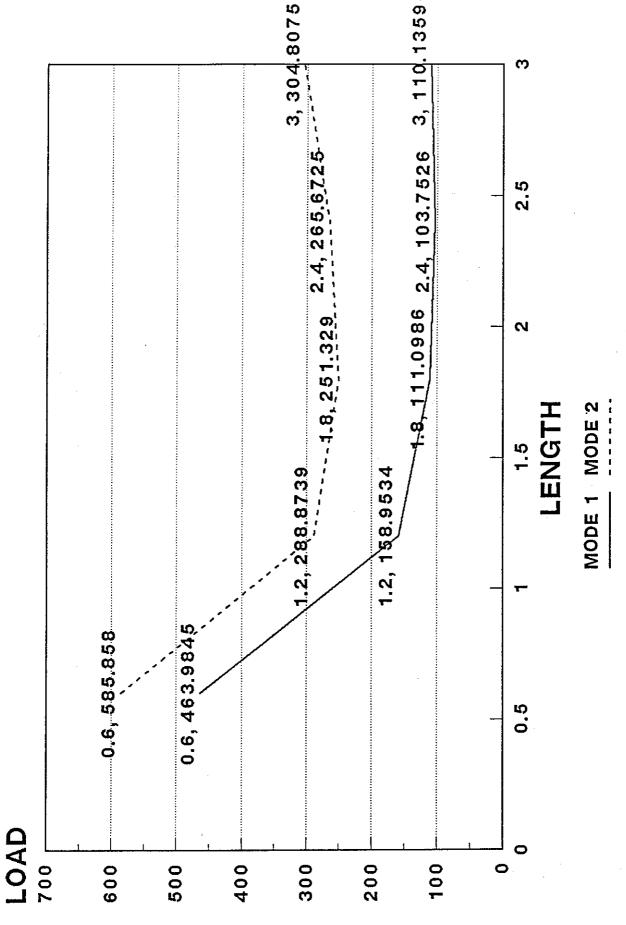
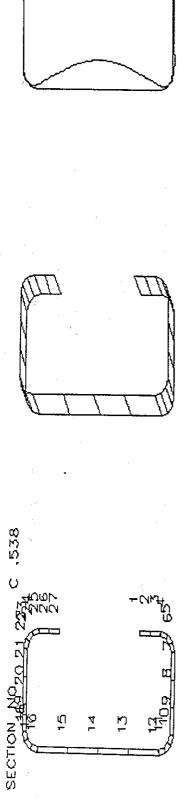
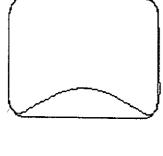


Fig. A6b Finite strip analysis results for uniform compression

APPENDIX A





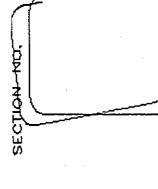
27	26	S	^
			٠
NODES=	STRIPS.	MODES=	LENGTHS=

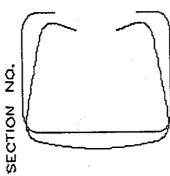
SMAX-SMIN=

-0.100E+01 -0.100E+01

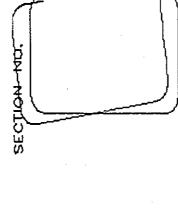
MODE NO. =

C.538





C .538



MODE NO.

Local buckling shapes for uniform compression Fig. A6c

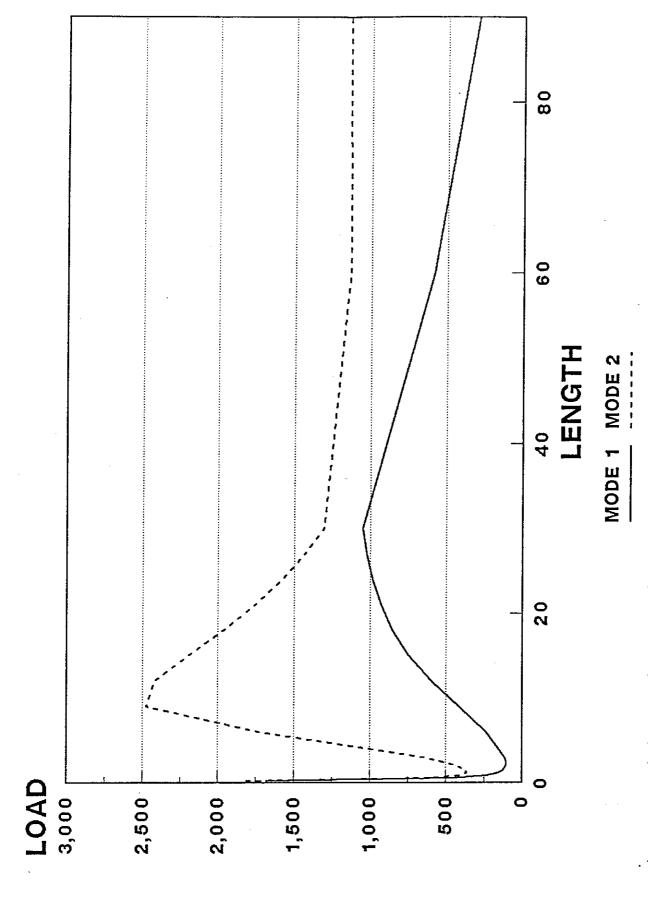


Fig. A7a Finite strip analysis results for bending

APPENDIX A

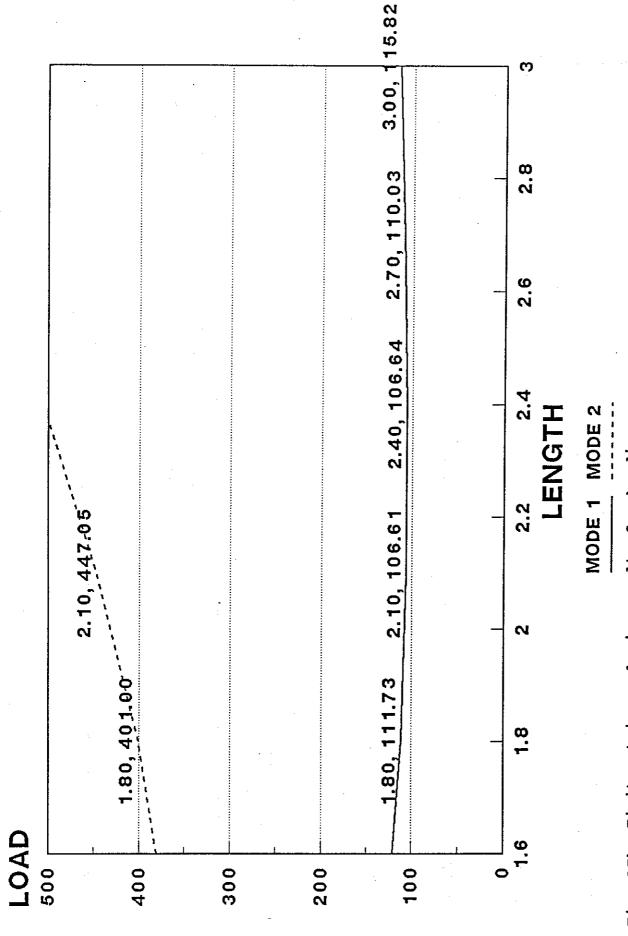
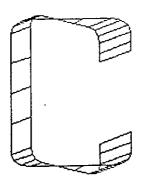


Fig. A7b Finite strip analysis results for bending

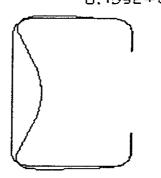
APPENDIX A

\_



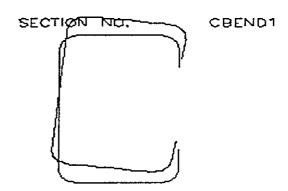
SMIN= SMAX-

-0.999E+00 0.159E+01



MODE NO. = 1

HALF-WAVELENGTH= 0.240E+01 LOAD FACTOR= 0.109E+03



MODE NO. = 1

HALF-WAVELENGTH= 0.600E+02 LOAD FACTOR= 0.594E+03

Fig. A7c Local buckling shapes for bending

on the CDA of the CDA

APPENDIX B - DATA BASE

TABLE B1
BOX SECTIONS OF DEWOLF, PEKOZ AND WINTER (1973)

Specimen	L/r	D	W	t	Ftest	Fyield
sil	8.500	3.500	2.000	0.058	40.500	41.900
S1	39.000	3.500	2.000	0.058	37.400	41.900
S1	69.100	3.500	2.000	0.058	34.600	41.900
S1	114.100	3.500	2.000	0.058	20.900	41.900
S2	11,700	5.000	2.000	0.058	33.900	41.900
S2	66,000	5.000	2.000	0.058	27.200	41.900
s2	102.000	5.000	2.000	0.058	20.800	41.900
S2	123.500	5.000	2.000	0.058	17.200	41.900
S3	13.600	7.000	2.000	0.058	29.300	41.900
<b>S</b> 3	29.000	7.000	2.000	0.058	27.800	41.900
<b>S</b> 3	109.800	7.000	2.000	0.058	15.500	41.900
<b>\$</b> 3	109.800	7.000	2.000	0.058	15.100	41.900
s3	109.800	7.000	2.000	0.058	14.400	41.900
S4	13.800	9.000	2.000	0.058	24.600	41.900
<b>S</b> 4	42.600	9.000	2.000	0.058	22.600	41.900
S4	65.500	9.000	2.000	0.058	19.600	41.900
<b>S4</b>	116.000	9.000	2.000	0.058	11.800	41.900
S4	138.200	9.000	2.000	0.058	9.200	41.900

TABLE B2
BACK TO BACK CHANNELS OF DEWOLF, PEKOZ AND WINTER (1973)

Specimen	L/r	D	¥	t	Ftest	Fyield
uii -	12.900	3.000	1.000	0.058	43.800	41.900
U1	55.700	3.000	1.000	0.058	37.900	41.900
Ū1	89.100	3.000	1.000	0.058	36.200	41.900
<b>U1</b>	116.600	3.000	1.000	0.058	21.600	41.900
U2	12.000	3.000	1.250	0.058	42.000	41.900
U2	12,000	3.000	1.250	0.058	40.800	41.900
Ü2	53.000	3.000	1.250	0.058	38.600	41.900
U2	85.600	3.000	1.250	0.058	32.800	41.900
U2	108.000	3.000	1.250	0.058	24,100	41,900
U3	9.500	3.000	1.500	0.058	39.600	41.900
U3	42.200	3.000	1.500	0.058	34,600	41.900
u3	77.900	3.000	1.500	0.058	33,400	41.900
U3	95.500	3.000	1.500	0.058	26.400	41,900
U4	7.900	3.000	1.750	0.058	37.200	41,900
U4	44.100	3.000	1.750	0.058	31.700	41,900
114	92.400	3.000	1.750	0.058	27,200	41,900

## TABLE B3 SECTIONS OF KALYANARAMAN, PEKOZ AND WINTER (1972) n L/r D W t Ftest Fyield 31.590 31.590 Specimen LC-I 1 L/r 4.024 4.031 0.049 0.049 2.866 2.869 49 450 14.960 72.070 95.840 52.710 83.130 14.070 LC-I 2.876 2.500 2.501 2.509 2.113 4.006 4.007 4.018 LC-I 0.049 11.000 30.730 16.170 13.160 9.950 LC-II 0.049 30.260 2 83.150 3 113.070 I 1 58.100 I 2 98.480 0.049 30.260 LC-II 0.049 25.680 LC-II 4.008 31.290 LC-III 1 4.039 0.049 16.490 0.048 11.660 8.830 2.120 31.110 25.680 LC-III 2 98.480 LC-III 3 138.330 4.015 0.049 3.990 2.126 1 68.660 2 97.370 3 125.000 1 73.530 2 91.700 3 122.360 12.190 11.290 31.050 LC-IV 3.018 1.743 0.047 1.726 1.742 1.488 0.048 0.049 0.049 3.004 3.015 LC-IV 30.500 8.960 14.630 31.290 33.180 FC-1A 3.029 LC-V 2.996 3.027 LC-V 1.502 0.049 12.650 30.630 LC-V 1.490 0.049 10.750 33.180

TABLE B4
SECTIONS OF WENG AND PEKOZ (1987)

Specimen	Length	а	ь	С	t	radius	ex	ey	Ptest	Fyield Fu	ultimate
RFC11	27.000	3.157	1.646	0.709	0.119	0.275	0.000	0.000	32.300	40.380	53.120
RFC11 #2	39.000	3.149	1.639	0.705	0.119	0.275	0.000	0.000	30.300	40.380	53.120
RFC11 #3	51.000	3.143	1.654	0.714	0.119	0.275	0.000	0.000	28.500	40.380	53.120
RFC11 #4	63.000	3.155	1.649	0.698	0.119	0.275	0.000	0.000	19.700	40.380	53,120
RFC13	27.000	3.074	1.631	0.702	0.096	0.252	0.000	0.000	30.200	51.850	62.210
RFC13 #2	39.000	3.066	1.629	0.721	0.096	0.252	0.000	0.000	29.200	51.850	62.210
RFC13 #3	51.000	3.067	1.620	0.715	0.096	0.252	0.000	0.000	23.800	51.850	62.210
RFC13 #4	63.000	3.061	1.617	0.719	0.096	0.252	0.000	0.000	17,000	51.850	62.210
RFC14	27.000	2.987	1.766	0.687	0.075	0.294	0.000	0.000	25.300	55.090	76.550
RFC14 #2	38.700	2.998	1.751	0.705	0.075	0.294	0.000	0.000	22.300	55.090	76.550
RFC14 #3	51.000	2.988	1.757	0.696	0.075	0.294	0.000	0.000	16.400	55.090	76.550
RFC14 #4	63.000	2.996	1.760	0.694	0.075	0.294	0.000	0.000	12.700	55.090	76.550
RFC14 #5	75.500	2.981	1.748	0.688	0.075	0.294	0.000	0.000	9.700	55.090	76.550
PBC13	26.800	3.018	1.620	0.605	0.087	0.243	0.000	0.000	18.000	38.400	50.560
PBC13 #2	39.000	3.029	1.625	0.610	0.087	0.242	0.000	0.000	17.500	38.400	50.560
PBC13 #3	51.000	3.025	1.614	0.613	0.087	0.243	0.000	0.000	16.000	38.400	50.560
PBC14	27.000	3.001	1.629	0.611	0.071	0.227	0.000	0.000	16.100	36.300	50.070
PBC14 #2	39.000	2.995	1.625	0.603	0.071	0.227	0.000	0.000	15.600	36.300	50.070
PBC14 #3	51.000	2.997	1.637	0.601	0.071	0.227	0.000	0.000	13.000	36.300	50.070
PBC14 #4	63.000	3.004	1.630	0.605	0.072	0.228	0.000	0.000	11.200	36.300	50.070
PBC14 #5	75.000	3.008	1.632	0.609	0.071	0.227	0.000	0.000	9.700	36.300	50.070
R13	27.000	3.008	1.635	0.614	0.086	0.305	0.000	0.000	26.200	50.150	70.630
R13 #2	39.000	3.006	1.633	0.605	0.086	0.305	0.000	0.000	23.800	50.150	70.630
R13 #3	51.000	3.014	1.641	0.608	0.086	0.305	0.000	0.000	17.800	50.150	70.630
R13 #4	63.000	3.015	1.628	0.597	0.086	0.305	0.000	0.000	13,200	50.150	70.630
R13 #5	73.000	3.010	1.630	0.601	0.086	0.305	0.000	0.000	10.100	50.150	70.630
R14	27.000	3.019	1.649	0.608	0.075	0.294	0.000	0.000	23.200	49.730	69.320
R14 #2	39.000	3.008	1.663	0.614	0.075	0.294	0.000	0.000	19,400	49.730	69.320
R14 #3	51.000	3.016	1.655	0.616	0.075	0.294	0.000	0.000	15.400	49.730	69.320
R14 #4	63.000	3.019	1.658	0.601	0.075	0.294	0.000	0.000	11.600	49.730	69.320
R14 #5	75.000	3.009	1.664	0.613	0.075	0.294	0.000	0.000	8.500	49.730	69.320
P11	55.000	5.031	2.488	0.878	0.118	0.243	0.000	0.000	34.200	30.590	50.950
P11 #2	75,000	5.037	2.499	0.864	0.118	0.243	0.000	0.000	30.400	30.590	50.950
P11 #3	90,000	5.042	2,486	0.879	0.121	0.246	0.000	0.000	27.800	33.600	51.910
P11 #4	110.000	5.038	2.491	0.882	0.121	0.246	0.000	0.000	22.300	33.600	51.910
P16	31.000	2.645	1.373	0.628	0.064	0.158	0.000	0.000	11.200	33.450	40.130
P16 #2	41.000	2.650	1.383	0.620	0.064	0.158	0.000	0.000	10.400	33.450	40.130
P16 #3	52.000	2.651	1.372	0.619	0.064	0.158	0.000	0.000	8.000	32.060	45.090
P16 #4	62.000	2.639	1.379	0.623	0.064	0.158	0.000	0.000	6,900	33.450	40,130
P16 #5	69.000	2.641	1.377	0.625	0.064	0.158	0.000	0.000	6.200	33,450	40.130
110 #3	37.000				0.007	J.,	20000			221.24	

TABLE B5
HAT SECTIONS OF DAT AND PEKOZ (1980)

Specimen	Length	а	ь	Ċ	t	r1	r2	ex	ey	Ptest	Fyield	Faverage
н11 -E1	19,400 0	140	0.470	0.440	0.120	0.400	0.400	0.000	0.000	18.500	42.830	51.620
H11 -E3	28.000 0	140	0.470	0.440	0.120	0.400	0.400	0.000	0.000	18.200	42.830	51.620
H11 -E4	39.000 0	1.140	0.470	0.440	0.120	0.400	0.400	0.000	0.000	11.800	42.830	51.620
#11 -E5	51.000 0	140	0.470	0.440	0.120	0.400	0.400	0.000	0.000	7.000	42.830	51.620
H11 -E2	23.000 0	140	0.470	0.440	0.120	0.400	0.400	0.000	0.000	15.700	42.830	51.620
H7 -F1	31.000 0	1.150	0.672	0.860	0.179	0.500	0.527	0.000	0.000	45.000	44.540	54.850
H7 -F2	39.000 0	150	0.672	0.860	0.179	0.500	0.527	0.000	0.000	41.800	44.540	54.850
H7 -F3	42.400 0	3.150	0.672	0.860	0.179	0.500	0.527	0.000	0.000	39.600	44.540	54.850
H7 -F4	45.000 0	150	0.672	0.860	0.179	0.500	0.527	0.000	0.000	39.400	44.540	54.850
H7 -F5	51.000 0	150	0.672	0.860	0.179	0.500	0.527	0.000	0.000	30.900	44.540	54.850
HT -G1	27.900 0	200.	0.450	1.000	0.300	0.542	0.632	0.000	0.000	97.400	58.000	60.690
HT -G1	39.000 0	200	0.450	1.000	0.300	0.542	0.632	0.000	0,000	78,000	58.000	60.690
HT -G3	51.000 0	200	0.450	1.000	0.300	0.542	0.632	0.000	0.000	65.800	58.000	60.690
HT -G4	65,400 0	200	0.450	1.000	0.300	0.542	0.632	0.000	0.000	42.750	58.000	60.690
HT -G5	71.000 0	200	0.450	1.000	0.300	0.542	0.632	0.000	0.000	35.400	58.000	60.690

TABLE B6 LIPPED CHANNELS OF DAT AND PEKOZ (1980)

Specimen	Length	а	ь	С	t	г1	г2	ex	ey	Ptest	Fyield	Faverage
PBC14 -A3	27.000	2.500	1.200	0.500	0.073	0.200	0.200	0.000	0.000	20.200	38.980	44.750
PBC14 -A5	39.000	2.500	1.200	0.500	0.073	0.200	0.200	0.000	0.000	19.300	38.980	44.750
PBC14 -A9	57.000	2.500	1.200	0.500	0.073	0.200	0.200	0.000	0.000	13.950	38,980	44.750
PBC14 -A11	69.000	2.500	1.200	0.500	0.073	0.200	0.200	0.000	0.000	11.200	38.980	44.750
PBC14 -A13	78.000	2.500	1.200	0.500	0.073	0.200	0.200	0.000	0.000	10.500	38.980	44.750
PBC14 -A14	89.000	2.500	1.200	0.500	0.073	0.200	0.200	0.000	0.000	8.200	38.980	44.750
PBC14 -A1	21.000	2.500	1.200	0.500	0.073	0.200	0.200	0.000	0.000	19.000	38.980	44.750
PBC14 -A2	27.000	2.500	1.200	0.500	0.073	0.200	0.200	0.000	0.000	16.900	38.980	44.750
PBC14 -A4	33.000	2,500	1.200	0.500	0.073	0.200	0.200	0.000	0.000	16.300	38.980	44.750
PBC14 -A6	39.000	2.500	1.200	0.500	0.073	0.200	0.200	0.000	0.000	14.400	38,980	44.750
PBC14 -A7	45.000	2.500	1.200	0.500	0.073	0.200	0.200	0.000	0.000	13.500	38.980	44.750
PBC14 -A8	51.000	2.500	1.200	0.500	0.073	0.200	0.200	0.000	0.000	13.660	38.980	44.750
PBC14 -A10	63.000	2.500	1.200	0.500	0.073	0.200	0.200	0.000	0.000	10,450	38.980	44.750
PBC14 -A12	75.000	2.500	1.200	0.500	0.073	0.200	0.200	0.000	0.000	9.500	38.980	44.750
RFC14 -B2	27.000	2.500	1.200	0.500	0.073	0.200	0.200	0.000	0.000	19.500	44.540	47,910
RFC14 -B4	39.000	2.500	1.200	0.500	0.073	0.200	0.200	0.000	0.000	18.000	44.540	47.910
RFC14 -B5	51.000	2.500	1,200	0.500	0.073	0.200	0.200	0.000	0.000	16.000	44.540	47,910
RFC14 -B6	51.000	2.500	1.200	0.500	0.073	0.200	0.200	0.000	0.000	15.500	44.540	47,910
RFC14 -B9	80.500	2.500	1.200	0.500	0.073	0.200	0.200	0.000	0.000	8.800	44.540	47.910
RFC14 -B10	80.500	2.500	1.200	0.500	0.073	0.200	0.200	0.000	0.000	8.000	44.540	47.910
RFC14 -B11	84.900	2.500	1.200	0.500	0.073	0.200	0.200	0.000	0.000	9.050	44.540	47.910
RFC14 -B1	27.000	2.500	1.200	0.500	0.073	0.200	0.200	0.000	0.000	18.500	44.540	47,910
RFC14 -B3	39.000	2.500	1.200	0.500	0.073	0.200	0.200	0.000	0.000	16,300	44.540	47.910
RFC14 -B7	51.000	2.500	1.200	0.500	0.073	0.200	0.200	0.000	0.000	14.000	44.540	47.910
RFC14 -88	63.000	2.500	1.200	0.500	0.073	0.200	0.200	0.000	0.000	11.500	44.540	47.910
PBC13 -C3	39.000	2.500	1.200	0.500	0.090	0.200	0.200	0.000	0.000	26.400	38.050	44.260
PBC13 -C4	51.000	2.500	1.200	0.500	0.090	0.200	0.200	0.000	0.000	21,600	38.050	44.260
PBC13 -C5	63.000	2.500	1.200	0.500	0.090	0.200	0.200	0.000	0.000	15.850	38.050	44.260
PBC13 -C6	82.000	2.500	1,200	0.500	0.090	0.200	0.200	0.000	0.000	9.950	38.050	44.260
PBC13 -C7	100.000	2.500	1.200	0.500	0.090	0.200	0.200	0.000	0.000	7.700	38.050	44.260
PBC13 -C1	27.000	2.500	1.200	0.500	0.090	0.200	0.200	0.000	0.000	35.000	38,050	44.260
PBC13 -C2	27.000	2.500	1.200	0.500	0.090	0.200	0.200	0.000	0.000	23.380	38,050	44.260
RFC13 -D6	39.000	2.500	1.200	0.500	0.090	0.200	0.200	0.000	0.000	29.500	38.340	44.270
RFC13 -D7	45.000	2.500	1.200	0.500	0.090	0.200	0.200	0.000	0.000	24,500	38.340	44.270
RFC13 -D8	51.000	2.500	1.200	0.500	0.090	0.200	0.200	0.000	0.000	23.000	38.340	44.270
RFC13 -D9	57.000	2.500	1.200	0.500	0.090	0.200	0.200	0.000	0.000	20.000	38.340	44.270
RFC13 -D10	63.000	2.500	1.200	0.500	0.090	0.200	0.200	0.000	0.000	16.000	38.340	44.270
RFC13 -D11	69.000	2.500	1.200	0.500	0.090	0.200	0.200	0.000	0.000	13.350	38.340	44.270
RFC13 -D12	75.000	2.500	1.200	0.500	0.090	0.200	0.200	0.000	0.000	12.200	38.340	44.270
RFC13 -D13	87.000	2.500	1.200	0.500	0.090	0.200	0.200	0.000	0.000	9.030	38.340	44.270
RFC13 -D1	19.250	2.500	1.200	0.500	0.090	0.200	0.200	0.000	0.000	34.200	38.340	44.270
RFC13 -D2	21.000	2.500	1.200	0.500	0.090	0.200	0.200	0.000	0.000	17.000	38.340	44.270
RFC13 -D3	27.000	2.500	1.200	0.500	0.090	0.200	0.200	0.000	0.000	35.000	38.340	44.270
RFC13 -D4	27.000	2.500	1.200	0.500	0.090	0.200	0.200	0.000	0.000	22.300	38.340	44.270
RFC13 -D4	33.000	2.500	1.200	0.500	0.090	0.200	0.200	0.000	0.000	34.500	38.340	44.270
ALCID D	33.000	2.300	11200	0.500	0.070	4.544	0.200	0.000	0.000	54.500	30.340	LIU

TABLE B7
SECTIONS OF MULLIGAN AND PEKOZ (1983)

Specimen	Length	a	b	с.	t	radius	ex	ey	Ptest	Fyield	Fultimate
C1	63.000	5.856	2.885	0.559	0.045	0.154	0.000	0.000	9.800	32.410	40.513
9 C2	75.020	5.837	2.888	0.519	0.045	0.152	0.000	0.000	10.400	31.950	39.938
3 C3	121.100	5.872	2.884	0.517	0.046	0.154	0.000	0.000	8.200	31.950	39.938
4 C4	121.000	5.805	2.885	0.538	0.045	0.156	0.000	0.000	8,400	31.950	39.938
≤ C5	75.000	5.836	2.841	0.556	0.048	0.164	0.000	0.000	11.800	32.470	40.588
7.01	72.010	8.813	2.895	0.528	0.045	0.152	0.000	0.000	9,600	32,590	40.737
ဗို <b>C2</b>	95.120	8.821	2.882	0.532	0.045	0.156	0.000	0.000	8.750	32.410	40.513
<b>₹ C3</b>	118.000	8.841	2.894	0.534	0.044	0.150	0.000	0,000	7.600	32.410	40.513
ကို <b>c</b> 4	95.030	8,750	2.871	0.562	0.048	0.164	0.000	0.000	10.800	33.060	41.325
α C4 ( <sub>0</sub> C1	99.160	4.184	4.148	0.612	0.048	0.166	0.000	0.000	11.000	34.340	42.925
្ស៊ី C1	75.070	8.418	4.172	0.623	0.048	0.162	0.000	0.000	12.300	31.820	39.775
,5c2	99,070	8.441	4.144	0.600	0.048	0.166	0.000	0.000	12.100	35.420	44.275
€ C3	99.160	8.434	4.156	0.587	0.048	0.166	0.000	0.000	11.800	33.850	42.313

TABLE B8
SECTIONS OF MULLIGAN AND PEKOZ (1983)

Specimen	Length	а	ь	С	t	radius	ex	ey	Ptest	Fyield	Fultimate
C1.1	19.960	5.832	1.378	0.231	0.048	0.131	-0.203	0.000	8.000	32,790	40.988
C2.1	75.000	5.836	2.835	0.542	0.047	0.168	-0.536	0.000	10.300	31.820	39.775
C2.2	75.720	5.842	2.850	0.562	0.048	0.166	-0.534	0.000	8.750	31.820	39.775
C2.3	75.660	5.816	2.851	0.546	0.048	0.166	-0.982	0.000	6.750	31.820	39.775
C2.4	75.000	5,812	2.863	0.550	0.048	0.164	-0.212	0.000	12,400	32.470	40.588
C2.1	95.050	8.852	2.865	0.551	0.048	0.156	-0.424	0.000	10.400	34.980	43.725
C2.2	95.090	8.790	2.875	0.585	0.048	0.156	-0.397	0.000	10.000	34.340	42.925
C2.1	99.030	8.415	4.180	0.614	0.048	0.152	-0.521	0.000	12.500	33.060	41.325
C2.2	99.190	8.422	4.164	0.609	0.048	0.164	-0.515	0.000	8.750	34.340	42.925

TABLE B9
HAT SECTIONS OF PEKOZ AND WINTER (1967)
FROM PEKOZ (1987), TABLE 3.3-1

ь	С .	t	radius	ex	ey	Ptest	Fyield	Fultimate
1.200 1.650	0.450	0.058	0.232	-0.100	0.000	3.990	45.000	56.250
1.200 1.650	0.450	0.058	0.232	-0.900	0.000	2.210	45.000	56.250
1.200 1.650	0.450	0.058	0.232	-1.400	0.000	1.570	45.000	56.250
0.950 1.925	0.506	0.058	0.232	0.000	0.000	3.730	45.000	56,250
0.950 1.925	0.506	0.058	0.232	-1.330	0.000	1.830	45.000	56.250
0.950 1.925	0.506	0.058	0.232	-1.860	0.000	1.290	45.000	56.250
0.950 1.450	0.450	0.058	0.232	0.000	0.000	3.220	45,000	56.250
0.950 1.450	0.450	0.058	0.232	-0.760	0.000	1.780	45.000	56.250
0.950 1.450	0.450	0.058	0.232	-1.260	0.000	1.280	45.000	56,250
1.296 1.719	0.445	0.048	0.192	0.000	0.000	4.000	45.000	56.250
1.296 1.719	0.445	0.048	0.192	-0.950	0.000	1.810	45.000	56.250
1.296 1.719	0.445	0.048	0.192	-1.450	0.000	1.550	45.000	56.250
0.968 1.969	0.460	0.048	0.192	0.000	0.000	3.060	45.000	56.250
0.968 1.969	0.460	0.048	0.192	-1.020	0.000	1.520	45.000	56.250
0.968 1.969	0.460	0.048	0.192	-1.520	0.000	1.270	45.000	56.250
0.968 1.484	0.460	0.048	0.192	0.000	0.000	2.840	45.000	56.250
0.968 1.484	0.460	0.048	0.192	-0.760	0.000	1.470	45.,000	56.250
0.968 1.484	0.460	0.048	0.192	-1.270	0.000	1.140	45.000	56.250
	.200 1.650 .200 1.650 .200 1.650 .950 1.925 .950 1.925 .950 1.925 .950 1.450 .950 1.450 .950 1.450 .296 1.719 .296 1.719 .296 1.719 .968 1.969 .968 1.969 .968 1.969	.200 1.650 0.450 .200 1.650 0.450 .200 1.650 0.450 .950 1.925 0.506 .950 1.925 0.506 .950 1.925 0.506 .950 1.450 0.450 .950 1.450 0.450 .950 1.450 0.450 .950 1.450 0.450 .950 1.450 0.450 .961 1.719 0.445 .296 1.719 0.445 .968 1.969 0.460 .968 1.969 0.460 .968 1.969 0.460 .968 1.969 0.460 .968 1.969 0.460 .968 1.969 0.460 .968 1.484 0.460	.200 1.650 0.450 0.058 .200 1.650 0.450 0.058 .200 1.650 0.450 0.058 .290 1.650 0.450 0.058 .950 1.925 0.506 0.058 .950 1.925 0.506 0.058 .950 1.450 0.450 0.058 .950 1.450 0.450 0.058 .950 1.450 0.450 0.058 .950 1.450 0.450 0.058 .296 1.719 0.445 0.048 .296 1.719 0.445 0.048 .296 1.719 0.445 0.048 .296 1.969 0.460 0.048 .968 1.969 0.460 0.048	.200 1.650 0.450 0.058 0.232 .200 1.650 0.450 0.058 0.232 .200 1.650 0.450 0.058 0.232 .200 1.650 0.450 0.058 0.232 .950 1.925 0.506 0.058 0.232 .950 1.925 0.506 0.058 0.232 .950 1.450 0.450 0.058 0.232 .950 1.450 0.450 0.058 0.232 .950 1.450 0.450 0.058 0.232 .950 1.450 0.450 0.058 0.232 .950 1.450 0.450 0.058 0.232 .950 1.450 0.450 0.058 0.232 .950 1.450 0.450 0.058 0.232 .966 1.719 0.445 0.048 0.192 .968 1.969 0.460 0.048 0.192 .968 1.969 0.460 0.048 0.192 .968 1.969 0.460 0.048 0.192 .968 1.969 0.460 0.048 0.192 .968 1.969 0.460 0.048 0.192 .968 1.969 0.460 0.048 0.192 .968 1.969 0.460 0.048 0.192 .968 1.969 0.460 0.048 0.192 .968 1.969 0.460 0.048 0.192	.200 1.650 0.450 0.058 0.232 -0.100 .200 1.650 0.450 0.058 0.232 -0.900 .200 1.650 0.450 0.058 0.232 -1.400 .950 1.925 0.506 0.058 0.232 0.000 .950 1.925 0.506 0.058 0.232 -1.380 .950 1.925 0.506 0.058 0.232 -1.380 .950 1.450 0.450 0.058 0.232 0.000 .950 1.450 0.450 0.058 0.232 0.000 .950 1.450 0.450 0.058 0.232 -0.760 .950 1.450 0.450 0.058 0.232 -0.760 .950 1.450 0.450 0.058 0.232 -0.760 .950 1.450 0.450 0.058 0.232 -1.260 .296 1.719 0.445 0.048 0.192 0.000 .296 1.719 0.445 0.048 0.192 -0.950 .296 1.719 0.445 0.048 0.192 -1.450 .968 1.969 0.460 0.048 0.192 -1.450 .968 1.969 0.460 0.048 0.192 -1.020 .968 1.969 0.460 0.048 0.192 -1.520 .968 1.969 0.460 0.048 0.192 -1.520 .968 1.969 0.460 0.048 0.192 -1.520 .968 1.969 0.460 0.048 0.192 -0.000	.200         1.650         0.450         0.058         0.232         -0.100         0.000           .200         1.650         0.450         0.058         0.232         -0.900         0.000           .200         1.650         0.450         0.058         0.232         -1.400         0.000           .950         1.925         0.506         0.058         0.232         0.000         0.000           .950         1.925         0.506         0.058         0.232         -1.330         0.000           .950         1.925         0.506         0.058         0.232         -1.860         0.000           .950         1.450         0.450         0.058         0.232         -0.000         0.000           .950         1.450         0.450         0.058         0.232         -0.760         0.000           .950         1.450         0.450         0.058         0.232         -0.760         0.000           .950         1.450         0.450         0.058         0.232         -1.260         0.000           .296         1.719         0.445         0.048         0.192         -0.950         0.000           .296         1.719 <td< td=""><td>.200         1.650         0.450         0.058         0.232         -0.100         0.000         3.990           .200         1.650         0.450         0.058         0.232         -0.900         0.000         2.210           .200         1.650         0.450         0.058         0.232         -1.400         0.000         1.570           .950         1.925         0.506         0.058         0.232         0.000         0.000         3.730           .950         1.925         0.506         0.058         0.232         -1.330         0.000         1.830           .950         1.925         0.506         0.058         0.232         -1.860         0.000         1.290           .950         1.925         0.506         0.058         0.232         -1.860         0.000         1.290           .950         1.450         0.450         0.058         0.232         -0.000         0.000         1.780           .950         1.450         0.450         0.058         0.232         -1.260         0.000         1.280           .296         1.719         0.445         0.048         0.192         0.000         0.000         1.810</td><td>.200         1.650         0.450         0.058         0.232         -0.100         0.000         3.990         45.000           .200         1.650         0.450         0.058         0.232         -0.900         0.000         2.210         45.000           .200         1.650         0.450         0.058         0.232         -1.400         0.000         1.570         45.000           .950         1.925         0.506         0.058         0.232         0.000         0.000         3.730         45.000           .950         1.925         0.506         0.058         0.232         -1.330         0.000         1.830         45.000           .950         1.925         0.506         0.058         0.232         -1.860         0.000         1.290         45.000           .950         1.450         0.450         0.058         0.232         0.000         0.000         3.220         45.000           .950         1.450         0.450         0.058         0.232         -0.760         0.000         1.780         45.000           .950         1.450         0.450         0.058         0.232         -1.260         0.000         1.280         45.000</td></td<>	.200         1.650         0.450         0.058         0.232         -0.100         0.000         3.990           .200         1.650         0.450         0.058         0.232         -0.900         0.000         2.210           .200         1.650         0.450         0.058         0.232         -1.400         0.000         1.570           .950         1.925         0.506         0.058         0.232         0.000         0.000         3.730           .950         1.925         0.506         0.058         0.232         -1.330         0.000         1.830           .950         1.925         0.506         0.058         0.232         -1.860         0.000         1.290           .950         1.925         0.506         0.058         0.232         -1.860         0.000         1.290           .950         1.450         0.450         0.058         0.232         -0.000         0.000         1.780           .950         1.450         0.450         0.058         0.232         -1.260         0.000         1.280           .296         1.719         0.445         0.048         0.192         0.000         0.000         1.810	.200         1.650         0.450         0.058         0.232         -0.100         0.000         3.990         45.000           .200         1.650         0.450         0.058         0.232         -0.900         0.000         2.210         45.000           .200         1.650         0.450         0.058         0.232         -1.400         0.000         1.570         45.000           .950         1.925         0.506         0.058         0.232         0.000         0.000         3.730         45.000           .950         1.925         0.506         0.058         0.232         -1.330         0.000         1.830         45.000           .950         1.925         0.506         0.058         0.232         -1.860         0.000         1.290         45.000           .950         1.450         0.450         0.058         0.232         0.000         0.000         3.220         45.000           .950         1.450         0.450         0.058         0.232         -0.760         0.000         1.780         45.000           .950         1.450         0.450         0.058         0.232         -1.260         0.000         1.280         45.000

TABLE B10
LIPPED CHANNEL SECTIONS OF LOH AND PEKOZ (1985)
FROM PEKOZ (1987), TABLE 3.3-2

Specimen	Length	8	b	C	t	radius	ex	ey	Ptest	Fyield	Fultimate
LC1 -LS - 1	39.000	2.922	2.922	0.711	0.078	0.223	-1.500	0.000	12.750	45.500	56.875
LC1 -LS - 2	51.000	2.922	2.922	0.711	0.078	0.223	-1.500	0.000	11.250	45.500	56.875
LC1 -LS - 3	63.000	2.922	2.922	0.711	0.078	0.223	-1.500	0.000	9.450	45.500	56.875
LC2 -LS - 1	36.600	2.868	2.868	0.684	0.132	0.344	2.000	0.000	22.000	41.900	52.375
LC2 -LS - 2	49.800	. 2.868	2.868	0.684	0.132	0.344	2.250	0.000	18.650	41.900	52.375
LC2 -LS - 3	60.600	2.868	2.868	0.684	0.132	0.344	2.250	0.000	17.600	41.900	52.375

TABLE B11
LIPPED CHANNEL SECTIONS OF LOH AND PEKOZ (1985)
FROM PEKOZ (1987), TABLE 3.3-3

Specimen	Length	а	þ	С	t	radius	ex	ey	Ptest	Fyield	Fultimate
LC3 -LS - 1	52.000	2.900	1.600	0.700	0.073	0.237	0.000	-1.450	8.900	40.900	51.125
LC3 -LS - 2	39.100	2.927	1.552	0.713	0.073	0.234	0.000	-2.000	7.800	39.100	48.875
LC3 -LS - 3	51.100	2.927	1.552	0.713	0.073	0.234	0.000	-2.000	7.200	39.100	48.875
LC3 -LS - 4	63.400	2.927	1.552	0.713	0.073	0.234	0.000	-2.000	7.100	39.100	48.875
LC4 -LS - 1	39,100	2.910	1,566	0.705	0.090	0.235	0.000	-2.500	11.600	59,400	74.250
LC4 -LS - 2	51.200	2.910	1.566	0.705	0.090	0.235	0.000	-2.500	10.500	59.400	74.250
LC5 -LS - 1	51.200	2.868	2.868	0.684	0.132	0.352	0.000	-2.030	19.000	47.500	59.375
LC5 -LS - 2	69.200	2.868	2.868	0.684	0.132	0.352	0.000	-2.000	17.200	47.500	59.375
LC6 -LS - 1	51.500	2.925	2.925	0.712	0.075	0.289	0.000	-2.380	10.300	39.300	49.125
, LC6 -LS - 2	63.500	2.925	2.925	0.712	0.075	0.289	0.000	-2.130	10.500	39.300	49.125
LC7 -LS - 1	50.200	3.868	2.868	0.684	0.132	0.340	0.000	-2.250	23.400	37.400	46.750
LC7 -LS - 2	69.000	2.868	2.868	0.684	0.132	0.340	0.000	-2.220	21.700	37.400	46.750
LC8 -LS - 1	40.100	3.923	2.923	0.711	0.077	0.313	0.000	-1.500	16.800	41.600	52.000
LC8 -LS - 2	51,100	3.923	2.923	0.711	0.077	0.313	0.000	-1.500	16.200	41.600	52.000
LC8 -LS - 3	63.800	3.923	2.923	0.711	0.077	0.313	0.000	-1.500	15.500	41.600	52.000
LC8 -LS - 4	75.600	3.924	2.924	0.712	0.076	0.312	0.000	-1.660	13.800	42.500	53.125
LC8 -LS - 5	87.600	3.924	2.924	0.712	0.076	0.312	0.000	-2.000	12.300	42.500	53.125

TABLE B12
LIPPED CHANNEL SECTIONS FROM LOH AND PEKOZ (1985)
FROM PEKOZ (1987), TABLE 3.3-4

Specimen	Length	а	ь	C	t	radius	ex	ey	Ptest	Fyield Fi	ultimate
LC9 -LS - 1	39.500	3.396	2.334	0.604	0.104	0.305	-1.500	-2.000	11.500	58.200	72.750
LC9 -LS - 2	52.800	3.396	2.334	0.604	0.104	0.305	-1.500	-2.000	11.150	58.200	72.750
LC9 -LS - 3	64.800	3.396	2.334	0.604	0.104	0.305	-1.500	-2.000	9.950	58.200	72.750
LC10 -LS - 3		3.899	2.899	0.949	0.101	0.336	2,000	-2.500	16.400	54.900	68.625
LC11 -LS - 1	39.000	2.924	2.924	0.712	0.076	0.281	-2.000	-2.500	7.900	48.800	61.000
LC11 -LS - 2		2.924	2.924	0.712	0.076	0.281	-2.500	-2,000	7.400	48.800	61.000
LC11 -LS - 3		2.924	2.924	0.712	0.076	0.281	-2.000	-2.500	6.800	48.800	61.000

TABLE B13 LIPPED CHANNEL SECTIONS OF THOMASSON (1978) FROM PEKOZ (1987), TABLE 7.3-2

Specimen	Length	а	ь	С	t	radius	ex	ey	Ptest	Fyield	Fultimate
A71	105.900	11.775	3.949	0.771	0.025	0.100	0.000	0.000	3.600	56.700	70.875
A74	105.900	11.795	3.965	0.811	0.025	0.100	0.000	0.000	3.640	57.300	71.625
A75	105.900	11.775	3.957	0.787	0.025	0.100	0.000	0.000	3.480	57.700	72.125
A76	105.900	11.814	3.944	0.795	0.026	0.104	0.000	0.000	3.260	41.800	52.250
A101	105.900	11.803	3.957	0.795	0.037	0.148	0.000	0.000	8.300	67.300	84.125
A102	105.900	11.803	3.957	0.787	0.037	0.148	0.000	0.000	7.870	66.700	83.375
A103	105.900	11.783	3.961	0.771	0.037	0.148	0.000	0.000	8.340	66.700	83.375
A104	105.900	11.742	9.921	0.768	0.038	0.152	0.000	0.000	7.760	68.900	86.125
A151	105.900	11.783	3.937	0.799	0.057	0.228	0.000	0.000	17.200	55.400	69.250
A152	105.900	11.814	3.937	0.795	0.056	0.224	0.000	0.000	15.700	55.000	68.750
A153	105.900	11.806	3.929	0.819	0.054	0.216	0.000	0.000	16.000	57.300	71.625
A154	105.900	11.835	3.952	0.921	0.055	0.220	0.000	0.000	16.400	57.000	71.250
A156	105.900	11.785	3.926	0.803	0.055	0.220	0.000	0.000	15.500	55.300	69.125

TABLE B14
LIPPED CHANNEL SECTIONS OF LOH AND PEKOZ (1985)
FROM PEKOZ (1987), TABLE 7.3-3

Specimen	Length	а	b	c	t	radius	ex	ey	Ptest	Fyield	Fultimate
LC1 -LU - 1	76.000	6.870	2.461	0.710	0.073	0.313	0.000	-2.100	18.740	55.900	69.875
LC1 -LU - 2	76.000	6.870	2.461	0.710	0.073	0.313	0.000	-12.000	6.800	55.900	69.875
LC1 -LU - 3	76,000	6.870	2.461	0.710	0.073	0.313	0.000	-6.000	12.320	55.900	69.875
LC2 -LU - 1	99.900	9.086	3.136	0.684	0.050	0.178	0.000	-6.000	5.760	35.100	43.875
LC2 -LU - 2	99.900	9.071	3.129	0.717	0.050	0.178	0.000	-9.000	4.290	35.800	44.750
LC3 -LU - 1	99,900	7.958	3.900	0.624	0.058	0.156	0.000	-4.000	8.000	43.400	54.250
LC3 -LU - 2	99,900	8.001	3.919	0.620	0.058	0.156	0.000	-8.000	6.350	44.400	55.500
LC3 -LU - 3	99.900	7.930	3.927	0.631	0.058	0.156	0.000	-4.000	8.500	43.200	54.000
LC4 -LU - 1	99,900	8.881	3.379	1.023	0.061	0.344	0.000	-12,000	7.720	62.100	77.625
LC4 -LU - 2	99,900	8.881	3.379	1.023	0.061	0.344	0.000	-18.000	5.180	62.100	77.625
LC4 -LU - 3	99.900	8.873	3.383	1.026	0.058	0.359	0.000	-6.000	10.660	62.900	78.625
LC5 -LU - 1	99.900	7.882	3.399	1.028	0.061	0.344	0.000	-4.000	13.690	58.500	73.125
LC5 -LU - 2	99.900	7.882	3.399	1.028	0.061	0.344	0.000	-8.000	9.320	58.500	73.125
LC5 -LU - 3	99.800	7.884	3.394	1.032	0.062	0.359	0.000	-6.000	11.780	58.600	73.250
LC5 -LU - 4	99.800	7.884	3.394	1.032	0.062	0.359	0.000	-10.000	7.990	58.600	73.250
LC6 -LU - 1	99.900	9.351	3.436	1.222	0.090	0.359	0.000	-5.000	28.750	71.700	89.625
LC6 -LU - 2	99.800	9.351	3.436	1.222	0.090	0.359	0.000	-10.000	19.490	71.700	89.625
LC10 -LU - 1	98,900	9.375	3.439	1.221	0.089	0.375	0.000	-5.500	24.800	70.600	88.250
LC10 -LU - 2		9.375	3.439	1.221	0.089	0.375	0.000	-5.500	25.000	70.600	88.250

TABLE B15
LIPPED CHANNEL SECTIONS OF LOH AND PEKOZ (1985)
FROM PEKOZ (1987), TABLE 7.3-4

Specimen	Length	8	ь	° c	t	radius	ex	ey	Ptest	Fyield	Fultimate
LC7 -LU - 1	37.400	6.090	1.642	0.571	0.077	0.285	1.500	-3.500	6.500	50.300	62.875
LC7 -LU - 2	49.400	6.090	1.642	0.571	0.077	0.285	1.500	-3.500	5.800	50.300	62.875
LC7 -LU - 3	61.400	6.090	1.642	0.571	0.077	0.285	1.500	-3.500	5.350	50.300	62.875
LC8 -LU - 1	98.900	8.887	3.379	1.031	0.060	0.344	1.000	-2.000	11.850	61.200	76.500
LC8 -LU - 2	99.200	8.887	3.379	1.031	0.060	0.344	1.000	-2.000	12.000	61.200	76.500
LC8 -LU - 3	98,900	8.886	3.374	1.029	0.061	0.359	1.000	-4.000	10.750	62.900	78.625
LC8 -LU - 4	98.900	8.886	3.374	1.029	0.061	0.359	1.000	-4.000	10.550	62.900	78.625
LC8 -LU - 5	99.100	8.879	3.375	1.021	0.060	0.359	1.000	-6.000	8.900	63.200	79.000
LC8 -LU - 6	98.700	8.879	3.375	1.021	0.060	0.359	1.000	-6.000	9.350	63.200	79.000
LC9 -LU - 1	93,400	7.874	3.400	1.031	0.062	0.344	-0.380	-3.940	14.000	69.900	87.375
LC9 -LU - 2	93.100	7.874	3.400	1.031	0.062	0.344	-0.380	-6.000	10.100	69.900	87.375
LC9 -LU - 3	93.100	7.885	3.404	1.031	0.062	0.313	-0.380	-6.000	10.600	70.300	87.875
LC9 -LU - 4	93.100	7.885	3.404	1.031	0.062	0.313	-0.630	-3.940	11.700	70.300	87.875

TABLE B16 LOCALLY STABLE BEAM-COLUMNS HAT SECTIONS OF LOH AND PEKOZ (1985)

Specimen	Length	a	ь Б	С	T	outr	ex	ey	Ptest	Fyield
LX1 -LU -	1 63	4.126	6.623	1.241	.105	.251	0.10	ĺ0	40.60	38.7
LH1 -LU -	2 63	4.162	6.568	1.281	.107	.258	0.50	0	53.60	42.1
LH2 -LU -	1 69	2.024	4.074	.770	.046	.141	0.00	Ò	8.00	31.5
LH2 -LU -	2 69	2.085	4.043	.764	.046	.156	0.75	0	6.00	33.4
LH2 -LU -	3 69	2.080	4.045	.789	.046	.149	1.50	0	4.00	33.9
LH3 -LU -	1 69	2.635	5.013	.801	.046	.172	0.00	0	7.55	32.5
LH3 -LU -	2 69	2.627	5.029	.795	.046	.172	0.00	G	7.90	33.7
LH3 -LU -	3 69	2.592	5.025	793	.046	.172	0.00	0	8.30	33.0
LH4 -LU -	1 67.	1 2.098	4.031	.613	.030	.180	0.00	0	2.60	22.3
LH4 -LU -	2 69	2.075	4.028	.610	.030	.180	0.00	0	2.30	21.5
LH4 -LU -	3 69	2.088	4.067	.590	.030	.180	0.00	Ò	2.90	22.5
LH5 -LU -	1 69	2.321	5.556	.654	.039	. 145	0.00	0	5.30	30.0
LH5 -LU - :	2 69	2.325	5.544	.664	.039	.137	0.00	Ó	5.65	30.1
LH5 -LU - 1	3 69	2.314	5.562	.666	.039	.137	0.00	0	6.00	31.3
LH5 -LU -	4 69	2.347	5.544	.655	.040	.148	0.00	0	5.90	35.2

TABLE B17
LIPPED CHANNEL SECTIONS OF LOUGHLAN (1979)
FROM PEKOZ (1987), TABLE 7.3-5

Specimen	Length 75.000	a 3.998	ь 1,991	с 0.742	t 0.032	radius 0.128	ex 0.290	ey 0.000	Ptest 3.120	Fyield 35.100	Fultimate 43.875
L1 L2	51.000	3.981	1.988	0.757	0.032	0.128	0.290	0.000	3.600	35.100	43.875
13	75.000	4.045	2.471	1.001	0.032	0.128	0.400	0.000	3.520	35.100	43.875
L4	63.000	4.014	2.472	1.000	0.032	0.128	0.400	0.000	3.780	35.100	43.875
Ĺ5	51.000	4.001	2.480	1.013	0.032	0.128	0.410	0.000	4.100	35.100	43.875
L6	75.000	5.034	1.992	0.735	0.032	0.128	0.070	0.000	3.800	35.100	43.875
L7	63.000	4.976	1.987	0.742	0.032	0.128	0.070	0.000	3.970	35.100	43.875
L8	51.000	4.980	1.991	0.753	0.032	0.128	0.070	0.000	4.310	35.100	43.875
L9	75.000	5.031	2.469	1.000	0.032	0.128	0.180	0.000	4.340	35.100	43.875
L10	63.000	5.015	2.481	1.004	0.032	0.128	0.190	0.000	4.570	35.100	43.875
L11	51.000	4.990	2.477	1.007	0.032	0.128	0.190	0.000	4.650	35.100	43.875
L12	75.000	5.981	1.998	0.746	0.032	0.128	0.180	0.000	3.350	35.100	43.875
L13	63.000	5.992	1.992	0.774	0.032	0.128	0.180	0.000	3.530	35.100	43.875
L14	51.000	5.974	1.987	0.749	0.032	0.128	0.180	0.000	3.850	35.100	43.875
L15	75.000	6.061	2.472	0.998	0.032	0.128	0.000	0.000	4.900	35.100	43.875
L16	63.000	6.061	2.476	1.008	0.032	0.128	0.000	0.000	5.180	35.100	43.875
L17	51.000	5.985	2.480	1.006	0.032	0.128	0.000	0.000	5.310	35.100	43.875
L18	75.000	7.009	1.976	0.742	0.032	0.128	0.220	0.000	3.130	35.100	43.875
£19	63.000	6.976	1.987	0.745	0.032	0.128	0.220	0.000	3.390	35.100	43.875
L20	51.000	6.995	1.988	0.771	0.032	0.128	0.220	0.000	3.670	35.100	43.875

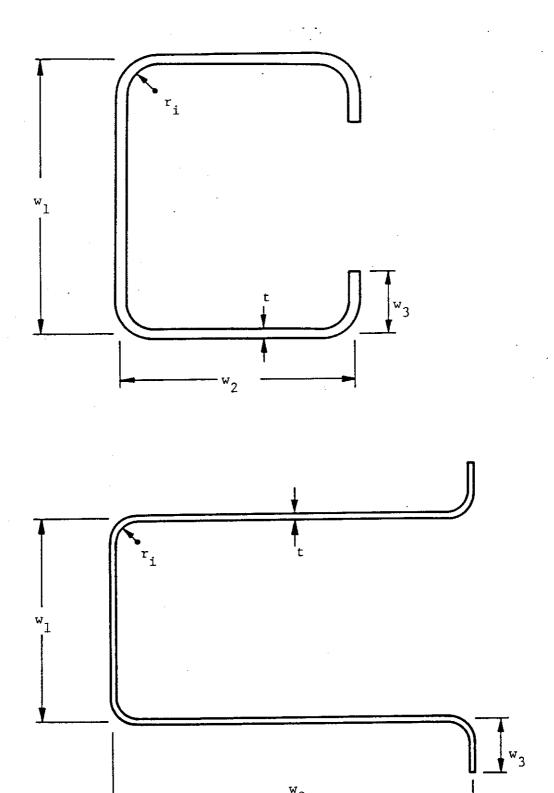


FIG. B1 NOTATION FOR SECTION DIMENSIONS ARE THE SAME FOR ALL SECTIONS EXCEPT AS NOTED ON FIGS. B2 AND B3

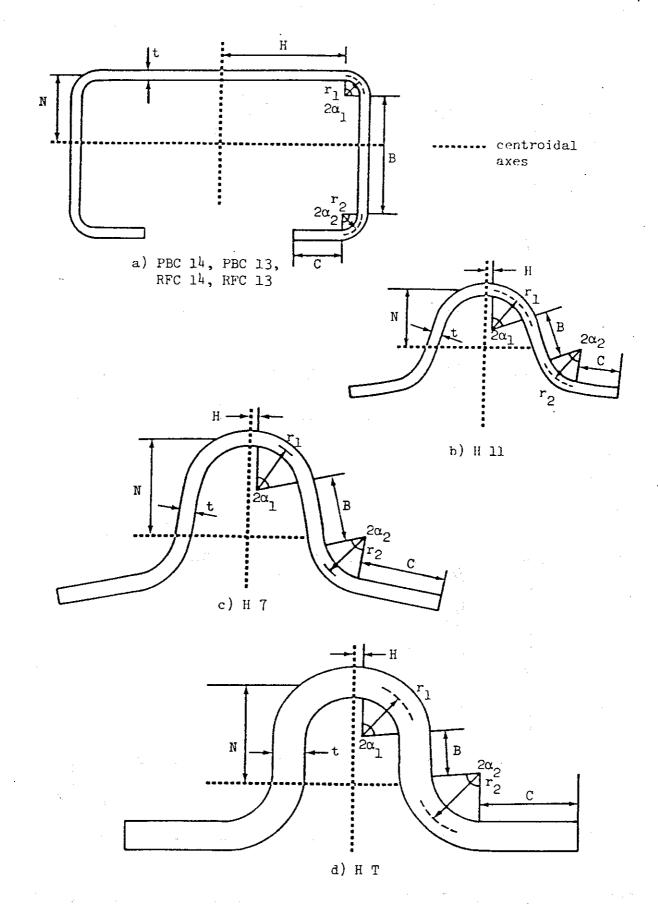
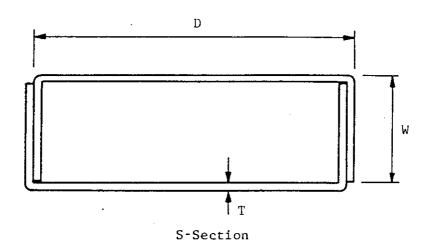


FIG. B2 NOTATION FOR SECTIONS OF DAT AND PEKOZ (1980)



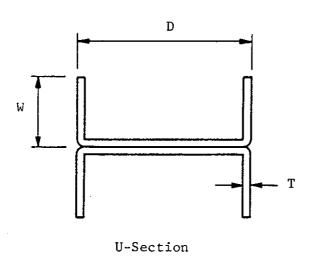


FIG. B3 NOTATION FOR BOX SECTIONS AND BACK TO BACK CHANNELS

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APPENDIX C - CORRELATION USING AISI BEAM COLUMN INTERACTION EQUATIONS

TABLE C1
BOX SECTIONS OF DEWOLF, PEKOZ AND WINTER (1973)

(ນ:	sing yield :	stress of	flats)	
Specimen	wmax/t	Ptest	rc	гa
<b>S1</b>	58.345	34.830	1.150	1.149
<b>\$1</b>	58.345	32.164	1.144	1.110
<b>S</b> 1	58.345	29.756	1.252	1.150
\$1	58.345	17,974	1.158	1.016
<b>S</b> 2	84.207	34.917	1.126	1.123
\$2	84.207	28.016	1.115	1.034
S2	84.207	21.424	1.151	1.011
<b>S2</b>	84.207	17.716	1.210	1.085
<b>s</b> 3	118.690	36.918	1.173	1.168
<b>s</b> 3	118.690	35.028	. 1.149	1.131
<b>S</b> 3	118.690	19.530	1.104	0.974
<b>\$</b> 3	118.690	19.026	1.075	0.948
<b>S</b> 3	118.690	18.144	1.025	0.904
<b>S</b> 4	153.172	36.654	1.154	1.149
S4	153.172	33.674	1.147	1,109
<b>S4</b>	153.172	29.204	1.121	1.043
S4	153.172	17.582	1.044	0.929
<b>S</b> 4	153.172	13.708	1.052	0.951
Mean			1.131	1.055
C.O.V.			0.050	0.082
I			1.036	0.945
FS		<b>1</b> ,	1.481	1.622

TABLE C2
BACK TO BACK CHANNELS OF DEWOLF, PEKOZ AND WINTER (1973)

(Usin	g yield :	stress of	flats)	
Specimen	wmax/t	Ptest	ГĊ	ra
U1	16.241	24.747	1.175	1.171
U1	16.241	21.413	1.188	1.118
U1	16.241	20.453	1.467	1.294
U1	16.241	12.204	1.194	1.040
U2	20.552	26.166	1.215	
UŽ	20.552	25,418	1.181	1.177
U2	20.552	24.048	1.282	1.215
UŽ	20.552	20.434	1.377	1.226
UŽ	20.552	15.014	1.267	1.105
U3	24.862	26.968	1.233	1.230
U3	24.862	23.563	1.174	1.134
U3	24.862	22.745	1.410	1.275
U3	24.862	17.978	1.302	1.145
U4	29.172	27.491	1.243	1.242
U4	29.172	23.426	1.166	1,123
U4	29.172	20.101	1.393	1.232
Mean			1.267	1.184
c.o.v.			0.076	0.058
I			1.141	1.080
FS			1.344	1.420

TABLE C3
TEST RESULTS OF KALYANARAMAN, PEKOZ AND WINTER (1972)

(Usi	ng yield :	stress of	flats)	
Specimen	wmax/t	Ptest	rć	ra
LC-I 1	57.609	14.960	0.942	0.908
LC-I 2	57.313	14.070	0.977	0.909
LC-I 3	57.934	11.000	0.916	0.822
LC-II 1	49.813	16.170	1.064	1.023
LC-II 2	50.355	13.160	1.021	0.936
LC-II 3	50.309	9.950	1.021	0.907
LC-III 1	41.860	16.490	1.081	1.029
LC-III 2	42.892	11.660	1.008	0.899
LC-III 3	42.566	8.830	1.121	0.981
LC-IV 1	35.772	12.190	1.092	1.024
LC-IV 2	34.735	11.290	1.194	1.071
LC-IV 3	34.407	8.960	1.146	1.005
LC-V 1	29.429	14.630	1.249	1.156
LC-V 2	29.528	12.650	1.269	1.146
LC-V 3	29.346	10.750	1.343	1.175
Mean			1.096	0.999
c.o.v.			0.114	0.105
I			0.954	0.877
FS			1.608	1.748

#### TABLE C4 TEST RESULTS OF WENG AND PEKOZ (1987) (Using yield stress of flats)

_	(using y	rieta st				
Specimen	wmax/t	ex	ey	Ptest	ГС	ra
RFC11 #1	21.908	0.000	0.000	32.300	1.072	1.026
RFC11 #2	21.840	0.000	0.000	30.300	1.144	1.051
RFC11 #3	21,790	0.000	0.000	28.500	1.255	1.106
RFC11 #4	21.891	0.000	0.000	19.700	1.082	0.924
RFC13 #1	26.771	0.000	0.000	30 200	0.999	0.947
RFC13 #2	26.688	0.000	0.000	29.200	1.122	1.014
RFC13 #3	26.698	0.000	0.000	23.800	1.140	0.984
RFC13 #4	26.635	0.000	0.000	17.000	1.069	0.918
RFC14 #1	31.987	0.000	0.000	25.300	0.980	0.945
RFC14 #2	32.133	0.000	0.000	22.300	0.983	0.895
RFC14 #3	32.000	0.000	0.000	16.400	0.880	0.766
RFC14 #4	32.107	0.000	0.000	12.700	0.866	0.739
RFC14 #5	31.907	0.000	0.000	9.700	0.921	0.808
PBC13 #1	29.103	0.000	0.000	18.000	0.886	0.850
PBC13 #2	29.253	0.000	0.000	17.500	0.965	0.890
PBC13 #3	29.184	0.000	0.000	16.000	1.046	0.922
PBC14 #1	35.873	0.000	0.000	16.100	1.005	0.967
PBC14 #2	35.789	0.000	0.000	15.600	1.092	1.012
PBC14 #3	35.817	0.000	0.000	13.000	1.048	0.933
PBC14 #4	35.389	0.000	0.000	11.200	1.079	0.927
PBC14 #5	35.972	0.000	0.000	9.700	1.181	1.013
R13 #1	27.884	0.000	0.000	26.200	1.043	0.989
R13 #2	27.860	0.000	0.000	23.800	1.113	1.005
R13 #3	27.953	0.000	0.000	17.800	1.019	0.880
R13 #4	27.965	0.000	0.000	13.200	1.009	0.867
R13 #5	27.907	0.000	0.000	10.100	1.007	0.883
R14 #1	32.413	0.000	0.000	23.200	1.050	0.997
R14 #2	32.267	0.000	0.000	19.400	1.009	0.916
R14 #3	32.373	0.000	0.000	15.400	0.982	0.852
R14 #4	32.413	0.000	0.000	11.600	0.959	0.820
	32.280	0.000	0.000	8.500	0.942	0.827
P11 #1	38.517	0.000	0.000	34.200	1.005	0.950
P11 #2	38.568	0.000	0.000	30.400	1.017	0.923
P11 #3	37.603	0.000	0.000	27.800	0.978	0.852
P11 #4	37.570	0.000	0.000	22.300	0.975	0.832
P16 #1	36.391	0.000	0.000	11.200	0.996	0.938
P16 #2	36.469	0.000	0.000	10.400	1.040	0.944
P16 #3	36.484	0.000	0.000	8.000	0.982	0.858
P16 #4	36.297	0.000	0.000	6.900	0.996	0.850
P16 #5	36.328	0.000	0.000	6.200	1.044	0.899
Mean					1.025	0.918
c.o.v.					0.078	0.086
I					0.922	0.820
F. S.					1.663	1.869

TABLE C5
TEST RESULTS OF WENG AND PEKOZ (1987)

(Using calcu		erage y	ield st		ll sect	ions)
Specimen	wmax/t	ex	ey	Ptest	ГC	ra
RFC11 #1	21.908	0.000	0.000	32.300	0.978	0.933
RFC11 #2	21.840	0.000	0.000	30.300	1.058	0.965
RFC11 #3	21.790	0.000	0.000	28.500	1.182	1.032
RFC11 #4	21.891	0.000	0.000	19.700	1.043	0.890
RFC13 #1	26,771	0.000	0.000	30.200	0.999	0.947
RFC13 #2	26.688	0.000	0.000	29.200	1.122	1.014
RFC13 #3	26.698	0.000	0.000	23.800	1.140	0.984
RFC13 #4	26.635	0.000	0.000	17.000	1.069	0.918
RFC14 #1	31.987	0.000	0.000	25.300	0.924	0.891
RFC14 #2	32.133	0.000	0.000	22.300	0.921	0.851
RFC14 #3	32.000	0.000	0.000	16.400	0.840	0.726
RFC14 #4	32.107	0.000	0.000	12.700	0.846	0.725
RFC14 #5	31.907	0.000	0.000	9.700	0.921	0.808
PBC13 #1	29.103	0.000	0.000	18.000	0.822	0.785
PBC13 #2	29.253	0.000	0.000	17.500	0.905	0.829
PBC13 #3	29.184	0.000	0.000	16,000	0.994	0.871
PBC14 #1	35.873	0.000	0.000	16.100	0.933	0.895
PBC14 #2	35.789	0.000	0.000	15.600	1.024	0.943
PBC14 #3	35.817	0.000	0.000	13.000	0.995	0.880
PBC14 #4	35.389	0.000	0.000	11.200	1.041	0.891
PBC14 #5	35.972	0.000	0.000	9.700	1.162	1.006
R13 #1	27.884	0.000	0.000	26.200	0.950	0.896
R13 #2	27.860	0.000	0.000	23.800	1.032	0.923
R13 #3	27.953	0.000	0.000	17.800	0.968	0.831
R13 #4	27.965	0.000	0.000	13.200	0.991	0.864
R13 #5	27.907	0.000	0.000	10.100	1.007	0.883
R14 #1	32.413	0.000	0.000	23.200	0.974	0.936
R14 #2	32.267	0.000	0.000	19.400	0.944	0.850
R14 #3	32.373	0.000	0.000	15,400	0.937	0.807
R14 #4	32.413	0.000	0.000	11.600	0.939	0.810
R14 #5	32.280	0.000	0.000	8.500	0.942	0.827
P11 #1	38.517	0.000	0.000	34.200	0.920	0.865
P11 #2	38,568	0.000	0.000	30.400	0.945	0.850
P11 #3	37.603	0.000	0.000	27.800	0.930	0.805
P11 #4	37.570	0.000	0.000	22.300	0.948	0.810
P16 #1	36.391	0.000	0.000	11.200	0.996	0.938
P16 #2	36.469	0.000	0.000	10.400	1.040	0.944
P16 #3	36.484	0.000	0.000	8.000	0.941	0.816
P16 #4	36.297	0.000	0.000	6.900	0.996	0.850
P16 #5	36.328	0.000	0.000	6.200	1.044	0.899
Mean					0.984	0.880
c.o.v.					0.082	0.081
I 1/2					0.882	0.789
F. S.			*	100	1.738	1.943

TABLE C6
TEST RESULTS OF WENG AND PEKOZ (1987)

	(Using calcul	lated a	verage	yield sti	ress)	
Specimen	wmax/t	ex	ey	Ptest	rc	га
RFC11 #1	21.908	0.000	0.000	32.300	0.978	0.933
RFC11 #2	21.840	0.000	0.000	30.300	1.058	0.965
RFC11 #3	21.790	0.000	0.000	28.500	1.182	1.032
RFC11 #4	21.891	0.000	0.000	19.700	1.043	0.890
RFC13 #1	26.771	0.000	0.000	30.200	0.999	0.947
RFC13 #2	26.688	0.000	0.000	29.200	1.122	1.014
RFC13 #3	26.698	0.000	0.000	23.800	1.140	0.984
RFC13 #4	26.635	0.000	0.000	17.000	1.069	0.918
RFC14 #1	31.987	0.000	0.000	25.300	0.980	0.945
RFC14 #2	32.133	0.000	0.000	22.300	0.921	0.851
RFC14 #3	32.000	0.000	0.000	16,400	0.840	0.700
RFC14 #4	32.107	0.000	0.000	12.700	0.846	0.721
RFC14 #5	31.907	0.000	0.000	9.700	0.921	0.808
PBC13 #1	29.103	0.000	0.000	18.000	0.822	0.743
PBC13 #2	29.253	0.000	0.000	17.500	0.905	0.789
PBC13 #3	29.184	0.000	0.000	16.000	0.994	0.838
PBC14 #1	35.873	0.000	0.000	16,100	0.933	0.854
PBC14 #2	35.789	0.000	0.000	15,600	1.024	0.895
PBC14 #3	35.817	0.000	0.000	13.000	0.995	0.842
PBC14 #4	35.389	0.000	0.000	11.200	1.041	0.867
PBC14 #5	35.972	0.000	0.000	9.700	1.162	1.006
R13 #1	27.884	0.000	0.000	26.200	0.950	0.836
R13 #2	27.860	0.000	0.000	23.800	1.032	0.872
R13 #3	27.953	0.000	0.000	17.800	0.968	0.802
R13 #4	27.965	0.000	0.000	13.200	0.991	0.864
R13 #5	27.907	0.000	0.000	10.100	1.007	0.883
R14 #1	32.413	0.000	0.000	23.200	0.974	0.936
R14 #2	32.267	0.000	0.000	19,400	0.944	0.810
R14 #3	32.373	0.000	0.000	15.400	0.937	0.779
R14 #4	32.413	0.000	0.000	11.600	0.939	0.809
R14 #5	32.280	0.000	0.000	8.500	0.942	0.827
P11 #1	38.517	0.000	0.000	34.200	0.920	0.803
P11 #2	38.568	0.000	0.000	30.400	0.945	0.795
P11 #3	37.603	0.000	0.000	27.800	0.930	0.771
P11 #4	37.570	0.000	0.000	22.300	0.948	0.801
P16 #1	36.391	0.000	0.000	11.200	0.996	0.938
P16 #2	36.469	0.000	0.000	10.400	1.040	0.944
P16 #3	36.484	0.000	0.000	8.000	0.941	0.787
P16 #4	36.297	0.000	0.000	6.900	0.996	0.850
P16 #5	36.328	0.000	0.000	6.200	1.044	0.899
Mean					0.985	0.864
C.O.V.					0.081	0.094
I					0.884	0.767
F. S.					1.734	2.000

TABLE C7
HAT SECTIONS OF DAT AND PEKOZ (1980)

		(Using	yield si	tress o	f flats)		
Specimen		wmax/t	ex	ey	Ptest	rc	ra
H11 -E1		3.917	0.000	0.000	18.500	1.148	1.081
H11 -E3		3.917	0.000	0.000	18.200	1.345	1.203
H11 -E4		3.917	0.000	0.000	11.800	1.197	1.022
H11 -E5		3.917	0.000	0.000	7.000	1.124	0.986
H11 -E2	**.	3.917	0.000	0.000	15.700	1.040	0.959
H7 -F1		4.804	0.000	0.000	45.000	1.229	1.148
H7 -F2		4.804	0.000	0.000	41.800	1.273	1.151
H7 -F3		4.804	0.000	0.000	39.600	1.272	1.134
H7 -F4	44	4.804	0.000	0.000	39.400	1.323	1.167
H7 -F5		4.804	0.000	0.000	30.900	1.160	1.003
HT -G1		3.333	0.000	0.000	97.400	1.040	0.967
HT -G1		3.333	0.000	0.000	78.000	1.007	0.889
HT -G3		3.333	0.000	0.000	65.800	1.120	0.956
HT -G4		3.333	0.000	0.000	42.750	1,115	0.978
HT -G5		3.333	0.000	0.000	35.400	1.089	0.954
Mean						1.165	1.040
c.o.v.						0.090	0.094
1						1,038	0.922
F. S.	1.0					1.477	1.662

TABLE C8
HAT SECTIONS OF DAT AND PEKOZ (1980)

(Using cal	culated av	erage y	ield st	ress - a	il sect	ions)
Specimen	wmax/t	ex	ey	Ptest	ГC	ra
H11 -E1	3.917	0.000	0.000	18.500	0.985	0.917
H11 -E3	3.917	0.000	0.000	18.200	1.197	1.053
H11 -E4	3.917	0.000	0.000	11.800	1.136	0.975
H11 -E5	3.917	0.000	0.000	7.000	1.124	0.986
H11 -E2	3.917	0.000	0.000	15.700	0.904	0.822
H7 -F1	4.804	0.000	0.000	45.000	1.042	0.960
H7 -F2	4.804	0.000	0.000	41.800	1.107	0.983
H7 -F3	4.804	0.000	0.000	39.600	1.120	0.980
H7 -F4	4.804	0,000	0.000	39.400	1.176	1.020
H7 -F5	4.804	0.000	0.000	30.900	1,059	0.904
HT -G1	3.333	0.000	0.000	97.400	1.003	0.930
HT -G1	3.333	0.000	0.000	78.000	0.980	0.862
HT -G3	3.333	0.000	0.000	65.800	1.104	0.942
HT -G4	3.333	0.000	0.000	42.750	1.115	0.978
HT -G5	3.333	0.000	0.000	35.400	1.089	0.954
Mean					1.076	0.951
C.O.V.					0.074	0.062
I					0.971	0.866
F. S.					1.580	1.772

TABLE C9
HAT SECTIONS OF DAT AND PEKOZ (1980)

(Using calculated average yield stress)									
Specimen	wmax/t	ex	ey	Ptest	rc	ra			
H11 -E1	3.917	0.000	0.000	18.500	0.985	0.917			
H11 -E3	3.917	0.000	0.000	18.200	1.197	1.053			
H11 -E4	3.917	0.000	0.000	11.800	1.136	0.975			
H11 -E5	3.917	0.000	0.000	7.000	1.124	0.986			
H11 -E2	3.917	0.000	0.000	15.700	0.904	0.822			
H7 -F1	4.804	0.000	0.000	45.000	1.042	0.960			
H7 -F2	4.804	0.000	0.000	41.800	1.107	0.983			
H7 -F3	4.804	0.000	0.000	39.600	1.120	0.980			
H7 -F4	4.804	0.000	0.000	39,400	1.176	1.020			
H7 -F5	4.804	0.000	0.000	30,900	1.059	0.904			
HT -G1	3.333	0.000	0.000	97.400	1,003	0.930			
HT -G1	3.333	0.000	0.000	78.000	0.980	0.862			
HT -G3	3.333	0.000	0.000	65.800	1.104	0.942			
HT -G4	3.333	0.000	0.000	42.750	1.115	0.978			
HT -G5	3.333	0.000	0.000	35.400	1.089	0.954			
Mean					1.076	0.951			
c.o.v.	٠.				0.074	0.062			
Ī.	•				0.971	0.866			
F. S.	1 <sup>1</sup>				1.580	1.772			

TABLE C10 LIPPED CHANNELS OF DAT AND PEKOZ (1980)

	(Using y	yield si	tress of	f flats)		
Specimen	wmax/t	ex	ey	Ptest	rc	ra
PBC14 -A3	34.247	0.000	0.000	20.200	1.065	1.025
PBC14 -A5	34.247	0.000	0.000	19.300	1.137	1.053
PBC14 -A9	34.247	0.000	0.000	13.950	1.044	0.911
PBC14 -A11	34.247	0.000	0.000	11.200	1.034	0.883
PBC14 -A13	34.247	0.000	0.000	10.500	1.165	1.011
PBC14 -A14	34.247	0.000	0.000	8.200	1.171	1.028
PBC14 -A1	34.247	0.000	0.000	19.000	1.963	0.940
PBC14 -A2	34.247	0.000	0.000	16.900	0.891	0.857
PBC14 -A4	34.247	0.000	0.000	16.300	0.904	0.854
PBC14 -A6	34.247	0.000	0.000	14.400	0.848	0.786
PBC14 -A7	34.247	0.000	0.000	13.500	0.853	0.774
PBC14 -A8	34.247	0.000	0.000	13.660	0.934	0.830
PBC14 -A10	34.247	0.000	0.000	10.450	0.864	0.743
PBC14 -A12	34.247	0.000	0.000	9.500	0.990	0.849
RFC14 -B2	34.247	0.000	0.000	19,500	0.945	0.906
RFC14 -B4	34.247	0.000	0.000	18.000	0.984	0.906
RFC14 -B5	34.247	0.000	0.000	16.000	1.032	0.909
RFC14 -B6	34.247	0.000	0.000	15.500	0.999	0.881
RFC14 -B9	34.247	0.000	0.000	8.800	1.028	0.903
RFC14 -B10	34.247	0.000	0.000	8.000	0.935	0.821
RFC14 -B10	34.247	0.000	0.000	9.050	1.177	1.032
RFC14 -B1	34.247	0.000	0.000	18.500	0.896	0.860
RFC14 -B3	34.247	0.000	0.000	16.300	0.891	0.820
RFC14 -B7	34.247	0.000	0.000	14.000	0.903	0.795
RFC14 -B8	34.247	0.000	0.000	11.500	0.914	0.781
PBC13 -C3	27.778	0.000	0.000	26.400	1.321	1.229
PBC13 -C4	27.778	0.000	0.000	21.600	1.244	1.112
PBC13 -C5	27.778	0.000	0.000	15.850	1.091	0.941
PBC13 -C6	27.778	0.000	0.000	9.950	0.979	0.854
PBC13 - C7	27.778	0.000	0.000	7.700	1.121	0.982
PBC13 -C1	27.778	0.000	0.000	35.000	1.580	1.523
PBC13 -C2	27.778	0.000	0.000	23.000	1.056	1.017
RFC13 -D6	27.778	0.000	0.000	29.500	1.467	1.364
	27.778	0.000	0.000	24.500	1.302	1.186
				23.000	1.318	
RFC13 -D8	27.778	0.000	0.000			1.177
RFC13 -D9	27.778	0.000	0.000	20.000	1.248	1.093
RFC13 -D10	27.778	0.000	0.000	16.000		
RFC13 -D11	27.778	0.000	0.000	13.350	1.015	0.867
RFC13 -D12	27.778	0.000	0.000	12.200	1.039	0.889
RFC13 -D13	27.778	0.000	0.000	9.030	0.994	0.872
RFC13 -D1	27.778	0.000	0.000	34.200	1.463	1.435
RFC13 -D2	27.778	0.000	0.000	17.000	0.734	0.718
RFC13 -D3	27.778	0.000	0.000	35.000	1.569	1.513
RFC13 -D4	27.778	0.000	0.000	22.300	1.000	0.964
RFC13 -D5	27.778	0.000	0.000	34.500	1.621	1.537
Mean					1.085	0.986
C.O.V.					0.193	0.213
I					0.848	0.746
F. S.					1.809	2.057

TABLE C11 LIPPED CHANNELS OF DAT AND PEKOZ (1980)

diaine nele			عمامة مه		ll cont	ionel
(Using calcu				Ptest	rc sect	ra
Specimen PBC14 -A3	wmax/t 34.247	ex 0.000	ey 0.000	20.200	0.942	0.902
	34.247		0.000	19.300	1.022	0.937
	34.247	0.000	0.000	13.950	0.973	0.839
PBC14 -A9		0.000				0.851
PBC14 -A11	34.247	0.000	0.000	11.200	0.994	
PBC14 -A13	34.247	0.000	0.000	10.500	1.153	1.011
PBC14 -A14	34.247	0.000	0.000	8.200	1.171	1.028
PBC14 -A1	34.247	0.000	0.000	19.000	0.847 0.788	0.826 0.755
PBC14 -A2	34.247 34.247	0.000	0.000	16.900 16.300	0.805	0.755
PBC14 -A4	34.247	0.000	0.000	14.400	0.762	0.699
PBC14 -A6		0.000		13.500		0.694
PBC14 -A7	34.247	0.000	0.000		0.774	0.754
PBC14 -A8	34.247	0.000	0.000	13.660	0.859	
PBC14 -A10	34.247	0.000	0.000	10.450	0.817	0.698
PBC14 -A12	34.247	0.000	0.000	9.500	0.967	0.845
RFC14 -B2	34.247	0.000	0.000	19.500	0.888	0.852
RFC14 -B4	34 247	0.000	0.000	18.000	0.931	0.852
RFC14 -B5	34.247	0.000	0.000	16.000	0.988	0.866
RFC14 -B6	34.247	0.000	0.000	15.500	0.957	0.839
RFC14 -B9	34 247	0.000	0.000	8.800	1.028	0.903
RFC14 -B10	34.247	0.000	0.000	8.000	0.935	0.821
RFC14 -B11	34.247	0.000	0.000	9.050	1.177	1.032
RFC14 -B1	34.247	0.000	0.000	18.500	0.842	0.809
RFC14 -B3	34.247	0.000	0.000	16.300	0.843	0.772
RFC14 -B7	34.247	0.000	0.000	14.000	0.865	0.758
RFC14 -B8	34.247	0.000	0.000	11.500	0.889	0.759
PBC13 -C3	27.778	0.000	0.000	26.400	1,173	1.080
PBC13 -C4	27.778	0.000	0.000	21.600	1.130	0.997
PBC13 -C5	27.778	0.000	0.000	15.850	1.020	0.872
PBC13 -C6	27.778	0.000	0.000	9.950	0.974	0.854
PBC13 -C7	27.778	0.000	0.000	7.700	1.121	0.982
PBC13 -C1	27.778	0.000	0.000	35.000	1.380	1.323
PBC13 -C2	27.778	0.000	0.000	23.380	0.922	0.884
RFC13 -D6	27.778	0.000	0.000	29.500	1.311	1.207
RFC13 -D7	27.778	0.000	0.000	24.500	1.174	1.058
RFC13 -D8	27.778	0.000	0.000	23.000	1.204	1.061
RFC13 -D9	27.778	0.000	0.000	20.000	1.154	0.999
RFC13 -D10	27.778	0.000	0.000	16.000	1.030	0.881
RFC13 -D11	27.778	0.000	0.000	13.350	0.969	0.827
RFC13 -D12	27.778	0.000	0.000	12.200	1.009	0.876
RFC13 -D13	27.778	0.000	0.000	9.030	0.994	0.872
RFC13 -D1	27.778	0.000	0.000	34.200	1.277	1.249
RFC13 -D2	27.778	0.000	0.000	17.000	0.641	0.625
RFC13 -D3	27.778	0.000	0.000	35.000	1.379	1.322
RFC13 -D4	27.778	0.000	0.000	22.300	0.879	0.842
RFC13 -D5	27.778	0.000	0.000	34.500	1.436	1.350
Mean				•	1.009	0.912
C.O.Y.					0.178	0.188
I					0.807	0.717
F. S.					1.901	2.138

TABLE C12 LIPPED CHANNELS OF DAT AND PEKOZ (1980)

	ing calcu	lated a	verage y	yield sti	ress)	
Specimen	wmax/t	ex	ey	Ptest	rc	ra
PBC14 -A3	34.247	0.000	0.000	20.200	0.942	0.902
PBC14 -A5	34.247	0.000	0.000	19.300	1.022	0.937
PBC14 -A9	34.247	0.000	0.000	13.950	0.973	0.839
PBC14 -A11	34.247	0.000	0.000	11.200	0.994	0.851
PBC14 -A13	34.247	0.000	0.000	10.500	1.153	1.011
PBC14 -A14	34.247	0.000	0.000	8.200	1.171	1.028
PBC14 -A1	34.247	0.000	0.000	19.000	0.847	0.826
PBC14 -A2	34.247	0.000	0.000	16.900	0.788	0.755
PBC14 -A4	34.247	0.000	0.000	16.300	0.805	0.755
PBC14 -A6	34.247	0.000	0.000	14,400	0.762	0.699
PBC14 -A7	34.247	0.000	0.000	13.500	0.774	0.694
PBC14 -A8	34.247	0.000	0.000	13.660	0.859	0.754
PBC14 -A10	34.247	0.000	0.000	10.450	0.817	0.698
PBC14 -A12	34.247	0.000	0.000	9.500	0.967	0.845
RFC14 -B2	34.247	0.000	0.000	19.500	0.888	0.852
RFC14 -B4	34.247	0.000	0.000	18.000	0.931	0.852
RFC14 -85	34.247	0.000	0.000	16.000	0.988	0.866
RFC14 -B6					0.957	0.839
	34.247	0.000	0.000	15.500		
RFC14 -B9	34.247	0.000	0.000	8.800	1.028	0.903
RFC14 -B10	34.247	0.000	0.000	8.000	0.935	0.821
RFC14 -B11	34.247	0.000	0.000	9.050	1,177	1.032
RFC14 -B1	34.247	0.000	0.000	18.500	0.842	0.809
RFC14 -B3	34.247	0.000	0.000	16.300	0.843	0.772
RFC14 -B7	34.247	0.000	0.000	14.000	0.865	0.758
RFC14 -B8	34.247	0.000	0.000	11.500	0.889	0.759
PBC13 -C3	27.778	0.000	0.000	26.400	1.173	1.080
PBC13 -C4	27.778	0.000	0.000	21.600	1.130	0.997
PBC13 -C5	27.778	0.000	0.000	15.850	1.020	0.872
PBC13 -C6	27.778	0.000	0.000	9.950	0.974	0.854
PBC13 -C7	27.778	0.000	0.000	7.700	1.121	0.982
PBC13 -C1		0.000		35.000	1.380	1.323
	27.778		0.000			
PBC13 -C2	27.778	0.000	0.000	23.380	0.922	0.884
RFC13 -D6	27.778	0.000	0.000	29.500	1.311	1.207
RFC13 -D7	27.778	0.000	0.000	24.500	1.174	1.058
RFC13 -D8	27.778	0.000	0.000	23.000	1.204	1.061
RFC13 -D9	27.778	0.000	0.000	20.000	1.154	0.999
RFC13 -D10	27.778	0.000	0.000	16.000	1.030	0.881
RFC13 -D11	27.778	0.000	0.000	13.350	0.969	0.827
RFC13 -D12	27.778	0.000	0.000	12.200	1.009	0.876
RFC13 -D13	27.778	0.000	0.000	9.030	0.994	0.872
RFC13 -D1	27.778	0.000	0.000	34.200	1.277	1.249
RFC13 -D2	27.778	0.000	0.000	17.000	0.641	0.625
RFC13 -D3	27.778	0.000	0.000	35.000	1.379	1.322
	27 770					
RFC13 -04	27.778	0.000	0.000	22.300	0.879	0.842
RFC13 -D5	27.778	0.000	0.000	34.500	1.436	1.350
Mean					1.009	0.912
c.o.v.					0.178	0.188
I					0.807	0.717
F. S.	•				1.901	2.138

#### TABLE C13 TEST RESULTS OF MULLIGAN AND PEKOZ (1983) ECCENTRICALLY LOADED COLUMNS

	(Using	yield st	tress of	f flats)		
Specimen	wmax/t	ex	ey	Ptest	rc	ra
C1.1	121.500	-0.203	0.000	8.000	1.044	1.028
C2.1	124.170	-0.536	0.000	10.300	1.272	1.242
C2.2	121.708	-0.534	0.000	8.750	1.023	0.999
C2.3	121.167	0.982	0.000	6.750	1.313	1.288
C2.4	121.083	-0.212	0.000	12.400	1.115	1.080
C2.1	184.417	-0.424	0.000	10.400	1.011	0.959
C2.2	183.125	-0.397	0.000	10.000	0.911	0.845
C2.1	175.313	-0.521	0.000	12.500	1,166	1.138
C2.2	175.458	-0.515	0.000	8.750	0.801	0.782
Mean		25.0		•	1.073	1.040
c.o.v.		4			0.153	0.162
I		and the	16		0.889	0.852
F. S.	100				1.724	1.800

#### TABLE C14 TEST RESULTS OF MULLIGAN AND PEKOZ (1983) ECCENTRICALLY LOADED COLUMNS

(Using cal	culated ave	erage y	rield st	ress - a	ll sect	ions)
Specimen	₩πax/t	ex	ey	Ptest	rc	ra
C1.1	121.500 -	0.203	0.000	8.000	1.023	1.006
C2.1	124.170 -	0.536	0.000	10.300	1.258	1.228
C2.2	121.708 -	0.534	0.000	8.750	1.012	0.988
C2.3	121.167	0.982	0.000	6.750	1.296	1.266
C2.4	121.083 -	0.212	0.000	12.400	1.105	1.070
C2.1	184.417 -	0.424	0.000	10.400	1.005	0.952
C2.2	183,125 -	0.397	0.000	10.000	0.904	0.838
C2.1	175.313 -	0.521	0.000	12.500	1.158	1.131
C2.2	175.458 -	0.515	0.000	8.750	0.797	0.777
Mean					1.062	1.028
c.o.v.					0.151	0.160
I					0.882	0.844
F. S.					1.738	1.816

#### TABLE C15 TEST RESULTS OF MULLIGAN AND PEKOZ (1983) ECCENTRICALLY LOADED COLUMNS

(Using calculated average yield stress)									
Specimen		wmax/t	ex	ey	Ptest	rc	ra		
C1.1		121.500	-0.203	0.000	8.000	1.044	1.028		
C2.1		124.170	-0.536	0.000	10.300	1.272	1.242		
C2.2		121.708	-0.534	0.000	8.750	1.023	0.999		
C2.3		121.167	0.982	0.000	6.750	1.313	1.288		
C2.4	200	121.003	-0.212	0.000	12.400	1.115	1.080		
C2.1	\$ "	184.417	-0.424	0.000	10.400	1.011	0.959		
C2.2		183.125	-0.397	0.000	10,000	0.911	0.845		
C2.1		175.313		0.000	12,500	1.166	1.138		
C2.2		175.458		0.000	8.750	0.801	0.782		
Mean	1.					1.073	1.040		
c.o.v.						0.153	0.162		
Ī		i.				0.889	0.852		
F. S.	: 15 m					1.724	1.800		

TABLE C16
TEST RESULTS OF MULLIGAN AND PEKOZ (1983)
CONCENTRICALLY LOADED COLUMNS

	diaine .	مماسلمتن		£		
		,		f flats)		
Specimen	wmax/t	ex	ey	Ptest	rc	гa
C1	130.133	0.000	0.000	9.800	1.137	1.106
C2	129.711	0.000	0.000	10.400	1.231	1.182
C3	127.652	0.000	0.000	8.200	1.176	1.090
C4	129.000	0.000	0.000	8.400	1.261	1.180
C5	121.583	0.000.	0.000	11.800	1.257	1.208
C1 ·	195.844	0.000	0.000	9.600	1.265	1.221
C2	196.022	0.000	0.000	8.750	1.279	1.217
C3	200.932	0.000	0.000	7.600	1.304	1.228
C4	182.292	0.000	0.000	10.800	1.395	1.330
C1	87.167	0.000	0.000	11.000	1.001	0.958
C1	175.375	0.000	0.000	12.300	1.142	1.117
C2 .	175.854	0.000	0.000	12.100	1.091	1.045
C3	175.708	0.000	0.000	11.800	1.080	1.035
Mean					1.201	1.147
c.o.v.					0.090	0.087
I					1.070	1,024
F. S.					1.433	1.497

#### TABLE C17 TEST RESULTS OF MULLIGAN AND PEKOZ (1983) CONCENTRICALLY LOADED COLUMNS

(Using ca	iculated av	erage y	ield st	ress - a	ll sect	ions)
Specimen	wmax/t	ex	ey ·	Ptest	rc	ra
C1	130.133	0.000	0.000	9.800	1.121	1.091
C2	129.711	0.000	0.000	10.400	1.216	1.166
C3 :	127.652	0.000	0.000	8.200	1.166	1.080
C4	129.000	0.000	0.000	8.400	1.250	1.168
C5	121.583	0.000	0.000	11.800	1.241	1.192
C1 '	195.844	0.000	0.000	9.600	1.252	1.209
C2	196.022	0.000	0.000	8.750	1.268	1.205
<b>C3</b> /	200.932	0.000	0.000	7.600	1.295	1.218
C4	182.292	0.000	0.000	10.800	1.383	1.315
C1	87.167	0.000	0.000	11.000	0.995	0,952
C1 -	175.375	0.000	0.000	12.300	1.130	1.105
C2	175.854	0.000	0.000	12.100	1.081	1.035
C3 .	175.708	0.000	0.000	11.800	1.070	1.024
Mean					1.190	1.135
c.o.v.	•				0.090	0.087
I .	4				1.059	1.014
F. S.					1.447	1.512

## TABLE C18 TEST RESULTS OF MULLIGAN AND PEKOZ (1983) CONCENTRICALLY LOADED COLUMNS

(Using calculated average yield stress)									
Specimen	wmax/t	ex	ey	Ptest	rc	га			
C1	130.133	0.000	0.000	9.800	1.137	1.106			
C2	129.711	0.000	0.000	10.400	1.231	1.182			
C3	127.652	0.000	0.000	8.200	1.176	1.090			
C4	129.000	0.000	0.000	8.400	1.261	1.180			
C5	121.583	0.000	0.000	11.800	1.257	1.208			
C1	195.844	0.000	0.000	9.600	1.265	1.221			
C2	196.022	0.000	0.000	8.750	1.279	1.217			
C3	200.932	0.000	0.000	7.600	1.304	1.228			
C4	182,292	0.000	0.000	10.800	1.395	1.330			
C1	87.167	0.000	0.000	11.000	1.001	0.958			
C1	175.375	0.000	0.000	12.300	1.142	1,117			
C2	175.854	0.000	0.000	12.100	1.091	1.045			
C3	175.708	0.000	0.000	11.800	1.080	1.035			
Mean		4.			1.201	1.147			
C.O.V.		455			0.090	0.087			
I					1.070	1.024			
F. S.	100				1.433	1.497			

#### TABLE C19 HAT SECTIONS OF PEKOZ AND WINTER (1967) FROM PEKOZ (1987), TABLE 3.3-1

	(Using )	∕ield si	tress of	flats)		
Specimen	wmax/t	ex	ey	Ptest	rc	ra
LH1 -LS - 1	20.448	0.100	0.000	3.990	1.500	1.334
LH1 -LS - 2	20,448	0.900	0.000	2.210	1.249	1,163
LH1 -LS - 3	20.448	1.400	0.000	1.570	1.061	1.000
LH2 -LS - 1	25.190	0.000	0.000	3.730	1.381	1.211
LH2 -LS - 2	25.190	1.330	0.000	1.830	1.116	1.034
LH2 -LS - 3	25.190	1.860	0.000	1.290	0.902	0.849
LH3 -LS - 1	17.000	0.000	0.000	3.220	1.400	1.229
LH3 -LS - 2	17.000	0.760	0.000	1.780	1.211	1.127
LH3 -LS - 3	17.000	1.260	0.000	1.280	1.058	0.992
LH4 -LS - 1	27.813	0.000	0.000	4.000	1.550	1.361
LH4 -LS - 2	27.813	0.950	0.000	1.810	1.138	1.058
LH4 -LS - 3	27.813	1.450	0.000	1.550	1.157	1.084
LH5 -LS - 1	33.021	0.000	0.000	3.060	1.569	1.378
LH5 -LS - 2	33.021	1.020	0.000	1.520	1.094	1.000
LH5 -LS - 3	33.021	1.520	0.000	1.270	1.033	0.955
LH6 -LS - 1	22.917	0.000	0.000	2.840	1.578	1.379
LH6 -LS - 2	22.917	0.760	0.000	1,470	1.195	1.105
LH6 -LS - 3	22.917	1.270	0.000	1.140	1.107	1.036
Hean	CC. / / / /	1,4,70	0.000		1.239	1.127
C.O.V.					0.167	0.140
I					1.007	0.951
f. S.					1.523	1.613
1. 3.						,.012

#### TABLE C20 HAT SECTIONS OF PEKOZ AND WINTER (1967) FROM PEKOZ (1987), TABLE 3.3-1

(Using calcu	ulated av	erage y	ield st	ress - a	ll sect	ions)
Specimen	wmax/t	ex	ey	Ptest	rc	ra
LH1 -LS - 1	20.448	0.100	0.000	3.990	1.494	1.326
LH1 -LS - 2	20.448	0.900	0.000	2.210	1.221	1.133
LH1 -LS - 3	20.448	1.400	0.000	1.570	1.026	0.963
LH2 -LS - 1	25.190	0.000	0.000	3.730	1.381	1.211
LH2 -LS - 2	25.190	1.330	0.000	1.830	1.089	1.011
LH2 -LS - 3	25.190	1.860	0.000	1.290	0.878	0.822
LH3 -LS - 1	17.000	0.000	0.000	3.220	1.400	1.229
LH3 -LS - 2	17.000	0.760	0.000	1.780	1.179	.1.099
LH3 -LS - 3	17.000	1.260	0.000	1.280	1.024	0.962
LH4 -LS - 1	27.813	0.000	0.000	4.000	1.550	1.361
LH4 -LS - 2	27.813	0.950	0.000	1.810	1.117	1.034
LH4 -LS - 3	27,813	1.450	0.000	1.550	1.131	1.062
LH5 -LS - 1	33.021	0.000	0.000	3.060	1.569	1.378
LH5 LS - 2	33.021	1.020	0.000	1.520	1.078	0.981
LH5 -LS - 3	33.021	1.520	0.000	1.270	1.016	0.941
LH6 -LS - 1	22.917	0.000	0.000	2.840	1.578	1.379
LH6 -LS - 2	22.917	0.760	0.000	1.470	1,176	1.081
LH6 -LS - 3	22.917	1.270	0.000	1.140	1.075	1.009
Mean					1.221	1.110
c.o.v.					0.178	0.151
I					0.976	0.922
F. S.					1.571	1.663

### TABLE C21 HAT SECTIONS OF PEKOZ AND WINTER (1967) FROM PEKOZ (1987), TABLE 3.3-1

(Using calculated average yield stress)						
Specimen	wmax/t	ex	ey :	Ptest	rc	ra .
LH1 -LS - 1	20,448	0.100		3.990	1.494	1.326
LH1 -LS - 2	20.448	0.900	0.000	2.210	1.221	1.133
LH1 -LS - 3	20.448	1.400	0.000	1.570	1.026	0.963
LH2 -LS - 1	25:190	0.000	0.000	3.730	1.381	1.211
LH2 -LS - 2	25.190	1.330	0.000	1.830	1.089	1.011
LH2 -LS - 3	25.190	1.860	0.000	1.290	0.878	0.822
LH3 -LS - 1	17.000	0.000	0.000	3.220	1.400	1.229
LH3 -LS - 2	17.000	0.760	0.000	1.780	1.179	1.099
LH3 -LS - 3	17.000	1.260	0.000	1.280	1.024	0.962
LH4 -LS - 1	27.813	0.000	0.000	4.000	1.550	1.361
LH4 -LS - 2	27.813	0.950	0.000	1.810	1.117	1.034
LH4 -LS - 3	27.813	1.450	0.000	1.550	1.131	1.062
LH5 -LS - 1	33.021	0.000	0.000	3.060	1.569	1.378
LH5 -LS - 2	33.021	1.020	0.000	1.520	1.078	0.981
LH5 -LS - 3	33.021	1.520	0.000	1.270	1.016	0.941
LH6<-LS - 1	22.917	0.000	0.000	2.840	1.578	1.379
LH6 -LS - 2	22.917	0.760	0.000	1.470	1.176	1.081
LH6 -LS - 3	22.917	1.270	0.000	1.140	1.075	1.009
Mean					1.221	1.110
C.O.V.					0.178	0.151
I					0.976	0.922
F. S.	:				1.571	1.663

## TABLE C22 LIPPED CHANNEL SECTIONS OF LOH AND PEKOZ (1985) FROM PEKOZ (1987), TABLE3.3-2

(Using yield stress of flats)							
Specimen	wmax/t	ex	ey	Ptest	rç	ra	
LC1 -LS - 1	31.744	-1.500	0.000	12.750	1.369	1.358	
LC1 -LS - 2	31.744	-1.500	0.000	11.250	1.270	1.254	
LC1 -LS - 3	31.744	-1.500	0.000	9.450	1.134	1.114	
LC2 -LS - 1	16.515	2.000	0.000	22.000	1.950	1.933	
LC2 -LS - 2	16.515	2.250	0.000	18.650	1.878	1.854	
LC2 -LS - 3	16.515	2.250	0.000	17.600	1.849	1.814	
Mean					1.575	1.554	
c.o.v.					0.227	0.227	
I					1.163	1.147	
F. S.					1.318	1.336	

#### TABLE C23 LIPPED CHANNEL SECTIONS OF LOH AND PEKOZ (1985) FROM PEKOZ (1987), TABLE3.3-2

(Using cal	culated av	/erage	yield st	ress - a	ll sect	ions)
Specimen	wmax/t	ex	ey	Ptest	rc	ra
LC1 -LS - 1	31.744	-1.500	0.000	12.750	1.321	1.309
LC1 -LS - 2	31.744	-1.500	0.000	11.250	1.228	1.212
LC1 -LS - 3	31.744	-1.500	0.000	9.450	1.099	1.080
LC2 -LS - 1	16.515	2.000	0.000	22.000	1.809	1.797
LC2 -LS - 2	16.515	2.250	0.000	18.650	1.750	1.724
LC2 -LS - 3	16.515	2.250	0.000	17.600	1.725	1.692
Mean			***		1.489	1.469
c.o.v.					0.207	0.208
I					1.137	1.121
F. S.					1.349	1.368

#### TABLE C24 LIPPED CHANNEL SECTIONS OF LOH AND PEKOZ (1985) FROM PEKOZ (1987), TABLE3.3-2

#### 

## TABLE C25 LIPPED CHANNEL SECTIONS OF LOH AND PEKOZ (1985) FROM PEKOZ (1987), TABLE3.3-3

	(Using )	∕ield s	tress of	f flats)		
Specimen	wmax/t	ex	ey	Ptest	ГC	ra
LC3 -LS - 1	33.233	0.000	-1.450	8.900	1.365	1.320
LC3 -LS - 2	33.685	0.000	-2.000	7.800	1.418	1.395
LC3 -LS - 3	33.685	0.000	-2.000	7.200	1.387	1.353
LC3 -LS - 4	33.685	0.000	-2.000	7.100	1.473	1.423
LC4 -LS - 1	27.111	0.000	-2.500	11.600	1.393	1.365
LC4 -LS - 2	27.111	0.000	-2.500	10.500	1.365	1.324
LC5 -LS - 1	16.394	9.000	-2.030	19.000	1.252	1.212
LC5 -LS - 2	16.394	0.000	-2.000	17.200	1.274	1.212
LC6 -LS - 1	31.293	0.000	-2.380	10.300	1.530	1.508
LC6 -LS - 2	31.293	0.000	-2.130	10.500	1.535	1.489
LC7 -LS - 1	24.152	0.000	-2.250	23.400	1.422	1.397
LC7 -LS - 2	16.576	0.000	-2.220	21.700	2.015	1.936
LC8 -LS - 1	42.818	0.000	-1.500	16.800	1.303	1.291
LC8 -LS - 2	42.818	0.000	-1.500	16.200	1.291	1.273
LC8 -LS - 3	42.818	0.000	-1.500	15.500	1.283	1.257
LC8 -LS - 4	43.421	0.000	-1.660	13.800	1.264	1.230
LC8 -LS - 5	43.421	0.000	-2.000	12.300	1.313	1,262
Mean					1.405	1.367
C.O.V.					0.128	0.126
1					1.202	1,174
F. S.					1.276	1.307

## TABLE C26 LIPPED CHANNEL SECTIONS OF LOR AND PEKOZ (1985). FROM PEKOZ (1987), TABLE3.3-3

(Using calcu	ılated av	erage yi	eld st	ress - a	ll sect	ions)
Specimen	wmax/t	ex	ey	Ptest	rc	ra
LC3 -LS - 1	33.233	0.000 -	1.450	8.900	1.297	1.254
LC3 -LS - 2	33.685	0.000 -	2.000	7.800	1.340	1.320
LC3 -LS - 3	33.685	0.000 -	2.000	7.200	1.319	1.283
LC3 -LS - 4	33.685	0.000 -	2.000	7.100	1.406	1.355
LC4 -LS - 1	27.111	0.000 -	2.500	11.600	1.306	1.280
LC4 -LS - 2	27.111	0.000 -	2.500	10.500	1.290	1.248
LC5 -LS - 1	16.394	0.000 -	2.030	19.000	1.176	1.140
LC5 -LS - 2	16.394	0.000 -	2.000	17.200	1.210	1.148
LC6 -LS - 1	31.293	0.000 -	2.380	10.300	1.493	1.471
LC6 -LS - 2	31.293	0.000 -	2.130	10.500	1.496	1.454
LC7 -LS - 1	24.152	0.000 -	2.250	23.400	1.333	1.308
LC7 -LS - 2	16.576	0.000 -	2.220	21.700	1.895	1.816
LC8 -LS - 1	42.818	0.000 -	1.500	16.800	1.271	1.259
LC8 -LS - 2	42.818	0.000 -	1.500	16.200	1.260	1.242
LC8 -LS - 3	42.818	0.000 -	1.500	15.500	1.255	1,228
LC8 -LS - 4	43.421	0.000 -	1.660	13.800	1.237	1.204
LC8 -LS - 5	43.421	0.000 -2	2.000	12.300	1.284	1.235
Mean					1.345	1.309
c.o.v.					0.124	0.121
I					1.157	1.129
F. S.					1.325	1.358

# TABLE C27 LIPPED CHANNEL SECTIONS OF LOH AND PEKOZ (1985) FROM PEKOZ (1987), TABLE3.3-3 (Using calculated average yield stress)

(USING CALCULATED average yield stress)							
Specimen wmax/t ex ey Ptest rc	ra						
LC3 -LS - 1 33.233 0.000 -1.450 8.900 1.297 1.	254						
LC3 -LS - 2 33.685 0.000 -2.000 7.800 1.340 1.	320						
LC3 -LS - 3 33.685 0.000 -2.000 7.200 1.319 1.	283						
LC3 -LS - 4 33.685 0.000 -2.000 7.100 1.406 1.	355						
LC4 -LS - 1 27.111 0.000 -2.500 11.600 1.306 1.	280						
LC4 -LS - 2 27.111 0.000 -2.500 10.500 1.290 1.	248						
LC5 -LS - 1 16.394 0.000 -2.030 19.000 1.176 1.	140						
LC5 -LS - 2 16.394 0.000 -2.000 17.200 1.210 1.	148						
LC6 -LS - 1 31.293 0.000 -2.380 10.300 1.493 1.	471						
LC6 -LS - 2 31.293 0.000 -2.130 10.500 1.496 1.	454						
LC7 -LS - 1 24.152 0.000 -2.250 23.400 1.333 1.	308						
LC7 -LS - 2 16.576 0.000 -2.220 21.700 1.895 1.	816						
LC8 -LS - 1 42.818 0.000 -1.500 16.800 1.271 1.	259						
LC8 -LS - 2 42.818 0.000 -1.500 16.200 1.260 1.	242						
LC8 -LS - 3 42.818 0.000 -1.500 15.500 1.255 1.	228						
LC8 -LS - 4 43.421 0.000 -1.660 13.800 1.237 1.	204						
LC8 -LS - 5 43.421 0.000 -2.000 12.300 1.284 1.	235						
Mean 1.345 1.	309						
c.o.v. 0.124 0.	121						
	129						
F. S. 1.325 1.	358						

## TABLE C28 LIPPED CHANNEL SECTIONS OF LOH AND PEKOZ (1985) FROM PEKOZ (1987), TABLE 3.3-4

	(Using )	yfeld s	tress of	f flats)		
Specimen	wmax/t	ex	ey	Ptest	LC	ra
LC9 -LS - 1	26.788	-1.500	-2.000	11.500	1.480	1.467
LC9 -LS - 2	26.788	-1.500	-2.000	11.150	1.542	1.517
LC9 -LS - 3	26.788	-1.500	-2.000	9.950	1.498	1.459
LC10 -LS - 3	31.950	2.000	-2.500	16.400	1.830	1.800
LC11 -LS - 1	31.079	-2.000	-2.500	7.900	1.699	1.688
LC11 -LS - 2	31.079	-2.500	-2.000	7.400	1.678	1.663
LC11 -LS - 3	31.079	-2.000	-2.500	6.800	1.581	1.560
Mean					1.615	1.593
C.O.V.					0.078	0.080
Ī					1.453	1.431
F. S.					1.055	1.071

# TABLE C29 LIPPED CHANNEL SECTIONS OF LOH AND PEKOZ (1985) FROM PEKOZ (1987), TABLE 3.3-4

(Using calcu	lated av	/erage y	yield st	ress - a	li sect	ions)
Specimen	wmax/t	ex	ey	Ptest	rc -	ra
LC9 -LS - 1	26.788	-1.500	-2.000	11.500	1.397	1.381
LC9 -LS - 2	26.788	-1.500	-2.000	11.150	1.459	1.437
LC9 -LS - 3	26.788	-1.500	-2.000	9.950	1.425	1.388
LC10 -LS - 3	31.950	2.000	-2.500	16.400	1.748	1.721
LC11 -LS - 1	31.079	-2.000	-2.500	7.900	1.609	1.599
LC11 -LS - 2	31.079	-2.500	-2.000	7.400	1.623	1.605
LC11 -LS - 3	31.079	-2.000	-2.500	6.800	1.535	1.514
Mean :					1.542	1.521
C.O.V.					0.082	0.084
I					1.383	1.361
F. S.					1.108	1.126

## TABLE C30 LIPPED CHANNEL SECTIONS OF LOH AND PEKOZ (1985) FROM PEKOZ (1987), TABLE 3.3-4

#### (Using calculated average yield stress)

,	(40)3									
Specimen	wmax/t	ex	ey	Ptest	rc	ra				
LC9 -LS - 1	26.788	-1.500	-2.000	11,500	1.397	1.381				
LC9 -LS - 2	26.788	-1.500	-2.000	11,150	1.459	1.437				
LC9 -LS - 3	26.788	-1.500	-2.000	9.950	1.425	1.388				
LC10 -LS - 3	31.950	2.000	-2.500	16.400	1.748	1.721				
LC11 -LS - 1	31.079	-2.000	-2,500	7.900	1.609	1.599				
LC11 -LS - 2	31.079	-2.500	-2.000	7.400	1.623	1.605				
				6.800	1.535	1.514				
					1.542	1.521				
					0.082	0.084				
ī					1.383	1.361				
F. S.					1.108	1.126				
	LC9 -LS - 1 LC9 -LS - 2 LC9 -LS - 3 LC10 -LS - 3 LC11 -LS - 1 LC11 -LS - 2 Mean C.O.V.	LC9 -LS - 1 26.788 LC9 -LS - 2 26.788 LC9 -LS - 3 26.788 LC10 -LS - 3 31.950 LC11 -LS - 1 31.079 LC11 -LS - 2 31.079 LC11 -LS - 3 31.079 Mean C.O.V.	LC9 -LS - 1 26.788 -1.500 LC9 -LS - 2 26.788 -1.500 LC9 -LS - 3 26.788 -1.500 LC10 -LS - 3 31.950 2.000 LC11 -LS - 1 31.079 -2.000 LC11 -LS - 2 31.079 -2.500 LC11 -LS - 3 31.079 -2.000 Mean C.O.V.	LC9 -LS - 1 26.788 -1.500 -2.000 LC9 -LS - 2 26.788 -1.500 -2.000 LC9 -LS - 3 26.788 -1.500 -2.000 LC11 -LS - 3 31.079 -2.000 -2.500 LC11 -LS - 2 31.079 -2.500 -2.500 Mean c.o.v. I	LC9 -LS - 1	LC9 -LS - 1				

# TABLE C31 LIPPED CHANNEL SECTIONS OF THOMASSON (1978) FROM PEKOZ (1987), TABLE 7.3-2

(Using yield stress of flats)									
Specimen	wmax/t	ex	ey	Ptest	rc	ra			
A71	463.000	0.000	0.000	3.600	1.026	0.968			
A74	463.800	0.000	0.000	3.640	1.025	0.968			
A75	463.000	0.000	0.000	3.480	0.983	0.926			
A76	446.385	0.000	0.000	3.260	0.967	0.921			
A101	311.000	0.000	0.000	8.300	1.086	1.022			
A102	311.000	0.000	0.000	7,870	1.037	0.975			
A103	310.459	0.000	0.000	8.340	1.103	1.037			
A104	301.000	0.000	0.000	7.760	0.753	0.740			
A151	198.719	0.000	0.000	17.200	1.114	1.029			
A152	202.964	0.000	0.000	15.700	1.054	0.974			
A153	210.630	0.000	0.000	16.000	1.137	1.055			
A154	207.182	0.000	0.000	16.400	1,150	1.077			
A156	206.273	0.000	0.000	15.500	1.078	0.998			
Mean					1.039	0.976			
c.o.v.					0.099	0.087			
I					0.918	0.871			
F. S.					1.670	1.760			

TABLE C32 LIPPED CHANNEL SECTIONS OF THOMASSON (1978) FROM PEKOZ (1987), TABLE 7.3-2

(Using cal	culated av	erage y	ield st	ress - a	ll sect	ions)
Specimen	wmax/t	ex	ey	Ptest	rc	ra
A71	463.000	0.000	0.000	3.600	1.023	0.965
A74	463.800	0.000	0.000	3.640	1.022	0.966
A75	463,000	0.000	0.000	3.480	0.980	0.923
A76	446.385	0.000	0.000	3.260	0.962	0.918
A101	311.000	0.000	0.000	8.300	1.082	1.017
A102	311.000	0.000	0.000	7.870	1.033	0.970
A103	310.459	0.000	0.000	8.340	1.099	1.032
A104	301.000	0.000	0.000	7.760	0.750	0.737
A151	198.719	0.000	0.000	17.200	1.106	1.020
A152	202.964	0.000	0.000	15.700	1.046	0.966
A153	210.630	0.000	0.000	16.000	1.130	1.046
A154	207.182	0.000	0.000	16.400	1.141	1.068
A156	206.273	0.000	0.000	15.500	1.070	0.990
Mean					1.034	0.971
c.o.v.					0.098	0.086
I					0.914	0.867
F. S.					1.677	1.768

# TABLE C33 LIPPED CHANNEL SECTIONS OF THOMASSON (1978) FROM PEKOZ (1987), TABLE 7.3-2

(Us	ing calcu	lated a	verage y	yield st	ress)	
Specimen	wmax/t	ex	ey	Ptest	rc	ra
A71	463.000	0.000	0.000	3.600	1.026	0.968
A74	463.800	0.000	0.000	3.640	1.025	0.968
A75	463.000	0.000	0.000	3.480	0.983	0.926
A76	446.385	0.000	0.000	3.260	0,967	0.921
A101	311.000	0.000	0.000	8.300	1.086	1.022
A102	311.000	0.000	0.000	7.870	1.037	0.975
A103	310.459	0.000	0.000	8.340	1.103	1.037
A104	301.000	0.000	0.000	7.760	0.753	0.740
A151	198.719	0.000	0.000	17.200	1.114	1.029
A152	202.964	0.000	0.000	15.700	1.054	0.974
A153	210.630	0.000	0.000	16.000	1.137	1.055
A154	207.182	0.000	0.000	16.400	1.150	1.077
A156	206.273	0.000	0.000	15.500	1.078	0.998
Mean					1.039	0.976
C.O.V.					0.099	0.087
1					0.918	0.871
F. S.					1.670	1.760

## TABLE C34 LIPPED CHANNEL SECTIONS OF LOH AND PEKOZ (1985) FROM PEKOZ (1987), TABLE 7.3-3

	(Using	yield s	stress of	flats)		
Specimen	wmex/t		ey	Ptest	LC	rа
LC1 -LU - 1	85.534	0.000	-2.100	18.740	1.227	1.189
LC1 -LU - 2	85.534	0.000	-12.000	6.800	1.193	1.179
LC1 -LU - 3	85.534	0.000	-6.000	12.320	1.342	1.318
LC2 -LU - 1	174.600	0.000	-6.000	5.760	1.136	1.121
LC2 -LU - 2	174.300	0,000	-9.000	4.290	1.039	1.029
LC3 -LU - 1	131.828	0.000	-4.000	8.000	0.965	0.952
LC3 -LU - 2	132.569	0.000	-8.000	6.350	1.110	1.099
LC3 -LU - 3	131.345	0.000	-4.000	8.500	1.024	1.011
LC4 -LU - 1	134.311	0.000	-12.000	7.720	1.059	1.045
LC4 -LU - 2	134.311	0.000	-18.000	5,180	0.949	0.940
LC4 -LU - 3	140,603	0.000	-6.000	10.660	1.037	1.017
LC5 -LU - 1	117.934	0.000	-4.000	13.690	1.118	1.090
LC5 -LU - 2	117.934	0.000	-8.000	9.320	1.095	1.076
LC5 -LU - 3	115.581	0.000	-6.000	11.780	1.144	1.121
LC5 -LU - 4	115.581	0.000	-10.000	7.990	1.057	1.040
LC6 -LU - 1	95.922	0.000	-5.000	28.750	1.152	1.126
LC6 -LU - 2	95.922	0.000	-10.000	19.490	1.144	1.127
LC10 -LU - 1	96.910	0.000	-5.500	24.800	1.062	1.040
LC10 -LU - 2	96.910	0.000	-5.500	25.000	1.071	1.048
Mean	•				1.101	1.083
C.O.V.					0.083	0.081
I					0.986	0.971
F. S.					1.555	1.579

## TABLE C35 LIPPED CHANNEL SECTIONS OF LOH AND PEKOZ (1985) FROM PEKOZ (1987), TABLE 7.3-3

```
(Using calculated average yield stress - all sections)
                wmax/t ex ey Ptest
85.534 0.000 -2.100 18.740
85.534 0.000 -12.000 6.800
85.534 0.000 -6.000 12.320
 Specimen
LC1 -LU - 1
                                                    1.197
                                                             1.158
LC1 -LU - 2
                                                     1.164
1.311
                                                             1.151
LC1 -LU - 3
                                                             1.285
               174.600
174.300
LC2 -LU - 1
                          0.000
                                  -6.000
                                             5.760
                                                     1.125
                                                             1.108
LC2 -LU - 2
LC3 -LU - 1
                                                     1.029
                          0.000
                                  -9.000
                                             4.290
                                                             1.017
                          0.000
               131.828
                                  -4.000
                                             8.000
                                                     0.956
                                                             0.943
LC3 -LU - 2 132.569
                                                             1.089
                                  -8.000
                                             6.350
                                                     1.099
                                            8.500
7.720
5.180
LC3 -LU - 3
                                                             1.001
               131.345
                          0.000
                                  -4.000
                                                     1.016
               134.311
134.311
LC4 -LU - 1
                          0.000 -12.000
                                                     1,046
                                                             1.032
LC4 -LU - 2
                                                     0.937
                          0.000 -18.000
                                                             0.928
LC4 -LU - 3
               140.603
                          0.000
                                 -6.000
                                            10.660
                                                     1.025
                                                             1,005
LC5 -LU - 1
LC5 -LU - 2
LC5 -LU - 3
                                           13.690
9.320
11.780
               117.934
                          0.000
                                 -4.000
                                                     1.103
                                                             1.075
               117.934
115.581
                          0.000
                                 -8.000
                                                     1.081
                                                             1.063
                          0.000
                                  -6.000
                                                     1.126
                                                             1.103
LC5 -LU - 4
               115.581
                          0.000 -10.000
                                            7.990
                                                     1.039
                                                             1.023
              95.922
95.922
LC6 -LU - 1
                          0.000 -5.000
                                                             1.102
                                                     1.129
                                           28.750
LC6 -LU - 2
                         0.000 -10.000
                                           19.490
                                                     1.120
                                                             1,102
LC10 -LU - 1 96.910
                         0.000 -5.500
                                           24.800
                                                     1.040
                                                             1.018
                                                             1.026
LC10 -LU - 2 96.910 0.000 -5.500
                                           25.000
                                                     1.049
                                                     1.084
Mean
                                                             1.065
c.o.v.
                                                     0.080
                                                             0.077
                                                             0.958
                                                     0.974
F. S.
                                                     1.575
                                                             1,600
```

# TABLE C36 LIPPED CHANNEL SECTIONS OF LOH AND PEKOZ (1985) FROM PEKOZ (1987), TABLE 7.3-3

### (Using calculated average yield stress)

Specimen	wmax/t	ex	ey	Ptest	LC	ra
LČ1 -LU - 1	85.534	0.000	-2.100	18.740	1.227	1.189
LC1 -LU - 2	85.534	0.000	-12.000	6.800	1.164	1.128
LC1 -LU - 3	85.534	0.000	-6.000	12.320	1.342	1.318
LC2 -LU - 1	174.600	0.000	-6.000	5.760	1.136	1.121
LC2 -LU - 2	174.300	0.000	-9.000	4.290	1.039	1.029
LC3 -LU - 1	131.828	0.000	-4.000	8.000	0.965	0.952
LC3 -LU - 2	132.569	0.000	-8.000	6.350	1.110	1.099
LC3 -LU - 3	131.345	0.000	-4.000	8.500	1.024	1.011
LC4 -LU - 1	134.311	0.000	-12.000	7.720	1.059	1.045
LC4 -LU - 2	134.311	0.000	-18.000	5.180	0.949	0.940
LC4 -LU - 3	140.603	0.000	-6.000	10.660	1.037	1.017
LC5 -LU - 1	117.934	0.000	-4.000	13.690	1.118	1.090
LC5 -LU - 2	117.934	0.000	-8.000	9.320	1.095	1.076
LC5 -LU - 3	115.581	0.000	-6.000	11.780	1.144	1,121
LC5 -LU - 4	115.581	0.000	-10.000	7.990	1.057	1.040
LC6 -LU - 1	95.922	0.000	-5.000	28.750	1.152	1.126
LC6 -LU - 2	95.922	0.000	-10.000	19.490	1.144	1.127
LC10 -LU - 1	96.910	0.000	-5.500	24.800	1.062	1.040
LC10 -LU - 2	96.910	0.000	-5.500	25.000	1.071	1.048
Mean					1.100	1.080
c.o.v.					0.082	0.079
'I					0.986	0.970
F. S.					1.555	1.580

# TABLE C37 LIPPED CHANNEL SECTIONS OF LOH AND PEKOZ (1985) FROM PEKOZ (1987), TABLE 7.3-4

	(Using	yield s	tress of	f flats)		Fred St
Specimen	wmax/t	ex	ey	Ptest	rc	ra
LC7 -LU - 1	71.688	1.500	-3.500	6.500	1.811	1.796
LC7 -LU - 2	71.688	1.500	-3.500	5.800	1.726	1.701
LC7 -LU - 3	71.688	1,500	-3.500	5.350	1.737	1.704
LC8 -LU - 1	136.650	1.000	-2.000	11.850	1.276	1.228
LC8 -LU - 2	136.650	1.000	-2.000	12.000	1.293	1.246
LC8 -LU - 3	133.902	1.000	-4,000	10.750	1.272	1.229
LC8 -LU - 4	133.902	1.000	-4.000	10.550	1.249	1.206
LC8 -LU - 5	136.017	1.000	-6.000	8.900	1,214	1.177
LC8 -LU - 6	136.017	1.000	-6.000	9.350	1.274	1,233
LC9 -LU - 1	115.903	-0.380	-3.940	14.000	1.052	1.011
LC9 -LU - 2	115.903	-0.380	-6.000	10.100	0.927	0.898
LC9 -LU - 3	117.081	-0.380	-6.000	10.600	0.958	0.928
LC9 -LU - 4	117.081	-0.630	-3.940	11.700	0.942	0.911
Mean	2.47			100	1.287	1.251
C.O.V.				1	0.234	0.244
I			,	April 2 April 2	0.938	0.897
F. S.				200	1.634	1.709

#### TABLE C38 LIPPED CHANNEL SECTIONS OF LOH AND PEKOZ (1985) FROM PEKOZ (1987), TABLE 7.3-4

(Us	ing	Ca	lc	ulated av	verage y	rield st	ress - a	ll sect	ions)
Spec	:imen		•	Hmax/t	ex	ey	Ptest	rc	гa
LC7	-LU	-	1	71.688	1.500	-3.500	6.500	1.747	1.729
LC7	-LU	-	2	71.688	1.500	-3.500	5.800	1.667	1.643
LC7	-LU	-	3	71.688	1.500	-3.500	5.350	1.682	1.656
LC8	-LU	-	1	136.650	1.000	-2.000	11.850	1.261	1.214
LC8	-LU	-	2	136,650	1.000	-2.000	12.000	1.279	1.231
LC8	-LU	•	3	133.902	1.000	-4.000	10.750	1.257	1.213
LCB	-LU	-	4	133.902	1.000	-4.000	10,550	1.234	1.191
LC8	-LU	-	5	136.017	1.000	-6.000	8.900	1.201	1.163
FC8	-LU	~	6	136.017	1.000	-6.000	9.350	1.260	1.221
LC9	-LU	-	1	115,903	-0.380	-3.940	14,000	1.042	1.002
LC9	-LU	-	2	115.903	-0.380	-6.000	10.100	0.919	0.890
LC9	-LU	-	3	117.081	-0.380	-6.000	10.600	0.949	0.920
LC9	-LU	-	4	117,081	-0.630	-3.940	11.700	0.934	0.903
Mear	1							1.264	1.229
c.o.	٧.							0.223	0.232
I	٠			-			•	0.940	0.899
F. S	) <b>.</b>							1.631	1.706

## TABLE C39 LIPPED CHANNEL SECTIONS OF LOH AND PEKOZ (1985) FROM PEKOZ (1987), TABLE 7.3-4

(Using calculated average yield stress)								
Specimen	wmax/t	ex	ey	Ptest	rc	га		
LC7 -LU - 1	71.688	1.500	-3.500	6.500	1.747	1.729		
LC7 -LU - 2	71.688	1.500	-3.500	5.800	1.667	1.643		
LC7 -LU - 3	71.688	1.500	-3.500	5.350	1.682	1.656		
LC8 -LU - 1	136.650	1.000	~2,000	11.850	1.276	1.228		
LC8 -LU - 2	136.650	1.000	-2.000	12.000	1.293	1.246		
LC8 -LU - 3	133.902	1,000	-4.000	10.750	1.272	1,229		
LC8 -LU - 4	133.902	1.000	-4.000	10.550	1.249	1.206		
LC8 -LU - 5	136.017	1.000	-6.000	8.900	1.214	1.177		
LC8 -LU - 6	136.017	1,000	-6.000	9.350	1.274	1.233		
LC9 -LU - 1	115,903	-0.380	-3.940	14.000	1.052	1.011		
LC9 -LU - 2	115.903	-0.380	-6,000	10.100	0.927	0.898		
LC9 -LU - 3	117.081	-0.380	-6.000	10.600	0.958	0.928		
LC9 -LU - 4	117.081	-0.630	-3.940	11.700	0.942	0.911		
Mean	•		.,		1.273	1.238		
E.O.Y.					0.219	0.228		
I					0.954	0.913		
F. S.			•		1.607	1.680		

TABLE C40 LIPPED CHANNEL SECTIONS OF LOUGHLAN (1979) FROM PEKOZ (1987), TABLE 7.3-5

(Using yield stress of flats)									
Specimen	wmax/t	ex	ey	Ptest	rc	ιa			
LÍ	116.937	0.290	0.000	3.120	1.095	1.047			
L2	116.406	0.290	0.000	3.600	1.062	1.034			
L3	118.406	0.400	0.000	3.520	0.967	0.934			
L4	117.437	0.400	0.000	3.780	0.979	0.952			
L5	117.031	0.410	0.000	4.100	1.015	0,995			
L6	149.312	0.070	0.000	3.800	1.155	1.098			
L7	147.500	0.070	0.000	3.970	1.097	1.050			
L8	147.625	0.070	0.000	4.310	1.094	1.059			
L9 .	149.219	0.180	0.000	4.340	1.072	1.028			
L10	148.719	0.190	0.000	4.570	1.070	1.036			
L11	147,937	0.190	0.000	4.650	1.038	1.015			
L12	178.906	0.180	0.000	3.350	1.147	1.098			
L13	179.250	0.180	0.000	3.530	1.100	1.060			
L14	178.687	0.180	0.000	3.850	1.129	1.097			
L15	181.406	0.000	0.000	4.900	1.109	1.058			
L16	181,406	0.000	0.000	5.180	1,104	1.066			
L17	179.031	0.000	0.000	5.310	1.077	1.051			
L18	211.031	0.220	0.000	3.130	1.155	1.106			
L19 .	210.000	0.220	0.000	3.390	1.141	1.101			
L20	210.594	0.220	0.000	3.670	1.136	1.105			
Mean			••••		1.087	1.049			
C.O.Y.					0.050	0.046			
i					0.996	0.963			
F. S.					1.540	1.592			

TABLE C41 LIPPED CHANNEL SECTIONS OF LOUGHLAN (1979) FROM PEKOZ (1987), TABLE 7.3-5

(Using o	alculated av	erage y	ield st	ress - a	ll sect	ions)
Specimen	wmax/t	ex	ey	Ptest	rc	ra
£1	116.937	0.290	0.000	3.120	1.083	1.037
L2	116,406	0.290	0.000	3.600	1.047	1.020
L3	118.406	0.400	0.000	3,520	0.959	0.924
L4	117, 437	0.400	0.000	3.780	0.972	0.943
Ľ5	117.031	0.410	0.000	4 100	1.005	0.983
L6	149.312	0.070	0.000	3.800	1.145	1.089
Ĺ7	147.500	0.070	0.000	3.970	1.085	1.039
LB	147.625	0.070	0.000	4.310	1.083	1.049
Ĺ9	149.219	0.180	0.000	4.340	1.064	1.021
L10	148.719	0.190	0.000	4.570	1.060	1.027
111	147.937	0.190	0.000	4.650	1.029	1.006
Ĺ12	178,906	0.180	0.000	3.350	1.139	1.088
L13	179,250	0.180	0.000	3.530	1.090	1.047
L14	178 687	0.180	0.000	3.850	1.116	1.088
L 15	181.406	0.000	0.000	4.900	1.101	1.051
L16	181.406	0.000	0.000	5.180	1.095	1.057
L17	179.031	0.000	0.000	5.310	1.068	1.041
L18	211.031	0.220	0.000	3.130	1.147	1.094
		0.220	0.000	3.390	1.130	1.090
L19	210.000				1.126	1.096
L20	210.594	0.220	0.000	3.670		1.040
Mean					1.077	
c.o.v.					0.050	0.046
I					0.987	0.954
f. S.	5.74				1.554	1.607

#### TABLE C42 LIPPED CHANNEL SECTIONS OF LOUGHLAN (1979) FROM PEKOZ (1987), TABLE 7.3-5

(Using calculated average yield stress)						
Specimen	www./t	ex	ey	Ptest	rc	ra
L1	116.937	0.290	0.000	3.120	1.095	1.047
L2	116.406	0.290	0.000	3.600	1.062	1.034
L3 '	118.406	0.400	0.000	3.520	0.967	0.934
L4 '`	117.437	0.400	0.000	3.780	0.979	0.952
<b>L</b> 5	117.031	0.410	0.000	4,100	1.015	0.995
L6	149.312	0.070	0.000	3.800	1.155	1.098
L7	147.500	0.070	0.000	3.970	1.697	1.050
L8 '	147.625	0.070	0.000		1.094	1.059
L9 .	149.219	0.180	0.000	4.340	1.072	1.028
L10	148.719	0.190	0.000	4.570	1.070	1.036
L11	147.937	0.190	0.000	4.650	1.038	1.015
L12	178.906	0.180	0.000	3.350	1,147	1.098
L13 ·	179.250	0.180	0.000	3.530	1.100	1.060
L14	178.687	0.180	0.000	3.850	1.129	1.097
L15	181.406	0.000	0.000	4.900	1.109	1.058
L16	181.406	0.000	0.000	5.180	1.104	1.066
L17	179.031	0.000	0.000	5.310	1.077	1.051
L18	211.031	0.220	0.000	3,130	1.155	1.106
L19	210.000	0.220	0.000	3,390	1.141	1.101
L20	210.594	0.220	0.000	3.670	1.136	1.105
Mean			- • · · · ·		1.087	1.049
C.O.V.					0.050	0.046
I					0.996	0.963
F. S.					1.540	1,592

#### TABLE C43 HAT SECTIONS OF LOH AND PEKOZ (1985)

	(Using	yield st	ress of	flats)		
Specimen	. wmax/t	ex	ey	Ptest	rc	га
LH1 -LU - 1	58.295	-0.100	0.000	40.600	1.147	1.122
LH1 -LU - 2	56.561	-0.500	0.000	53.600	1.545	1.512
LH2 -LU - 1	82.435	0,000	0.000	8.000	1.207	1,072
LH2 -LU - 2	81.109	-0.750	0.000	6.000	1.224	1.130
LH2 -LU - 3	81.457	-1.500	0.000	4.000	1.023	0.962
LH3 -LU - 1	101.500	0.000	0.000	7.550	0.896	0.845
LH3 -LU - 2	101.848	0.000	0.000	7.900	0.945	0.892
LH3 -LU - 3	101.761	0.000	0.000	8.300	1.012	0.955
LH4 -LU - 1	122.367	0.000	0.000	2.600	0.818	0.747
LH4 -LU - 2	122,267	0.000	0.000	2.300	0.757	0.689
LH4 -LU - 3	123,567	0.000	0.000	2,900	0.993	0.929
LH5 -LU - 1	135.026	0.000	0.000	5.300	1.106	1.045
LH5 -LU - 2	135.128	0.000	0.000	5.650	1.135	1.072
LH5 -LU - 3	135.590	0.000	0.000	6.000	1.190	1.124
LH5 -LU - 4	131.200	0.000	0.000	5.900	1.143	1.077
Mean		••			1.076	1.012
C.O.V.	-				0.179	0.192
I	4				0.860	0.791
F. S.			٠.		1.784	1.939

TABLE C44
HAT SECTIONS OF LOH AND PEKOZ (1985)

(Using calc	ılated av	erage y	ield st	ress - a	ll sect	ions)
Specimen	wmax/t	ex	ey	Ptest	rc	ra
LH1 -LU - 1	58.295	-0.100	0.000	40.600	1.131	1.105
LH1 -LU - 2	56.561	-0,500	0,000	53.600	1.521	1.487
LH2 -LU - 1	82.435	0.000	0.000	8.000	1.201	1.070
LH2 -LU - 2	81.109	-0.750	0.000	6.000	1.215	1.121
LH2 -LU - 3	81.457	-1.500	0.000	4.000	1.015	0.955
LH3 -LU - 1	101.500	0,000	0.000	7.550	0.890	0.841
LH3 -LU - 2	101.848	0.000	0.000	7.900	0.940	0.887
LH3 -LU - 3	101.761	0.000	0.000	8.300	1.006	0.949
LH4 -LU - 1	122.367	0.000	0.000	2.600	0.813	0.745
LH4 -LU - 2	122.267	0.000	0.000	2.300	0.752	0.687
LH4 -LU - 3	123.567	0.000	0.000	2.900	0.990	0.927
LH5 -LU - 1	135.026	0.000	0.000	5.300	1.102	1.039
LR5 -LU - 2	135.128	0.000	0.000	5.650	1.128	1.066
LH5 -LU - 3	135.590	0.000	0.000	6.000	1.186	1.117
LH5 -LU - 4	131.200	0.000	0.000	5.900	1.139	1.073
Mean					1.069	1.005
c.o.v.					0.176	0.189
I					0.856	0.790
F. S.					1.790	1.941

#### TABLE C45 HAT SECTIONS OF LOH AND PEKOZ (1985)

(Using calculated average yield stress)							
Specimen	wmax/t	ex	ey	Ptest	rc	ra	
LH1 -LU - 1	58.295	-0.100	0.000	40.600	.1.147	1.122	
LH1 -LU - 2	56.561	-0.500	0.000	53.600	1.545	1.512	
LH2 -LU - 1	82.435	0.000	0.000	8.000	1.207	1.072	
LH2 -LU - 2	81.109	-0.750	0.000	6,000	1.224	1.130	
LH2 -LU - 3	81.457	-1.500	0.000	4.000	1.023	0.962	
LH3 -LU - 1	101.500	0.000	0.000	7.550	0.896	0.845	
LH3 -LU - 2	101.848	0.000	0.000	7.900	0.945	0.892	
LH3 -LU - 3	101.761	0.000	0.000	8.300	1.012	0.955	
LH4 -LU - 1	122.367		0.000	2.600	0.818	0.747	
LH4 -LU - 2	122.267	0.000	0.000	2.300	0.757	0.689	
LH4 -LU - 3	123.567	0.000	0.000	2.900	0.993	0.929	
LH5 -LU - 1	135.026	0.000	0.000	5.300	1.106	1.045	
LH5 -LU - 2	135.128	0.000	0.000	5.650	1.135	1.072	
LH5 -LU - 3	135.590	0.000	0.000	6.000	1.190	1.124	
	131.200	0.000	0.000	5.900	1.143	1,077	
	131.200	0.000	0.000	3.700	1.076	1.012	
Mean					0.179	0.192	
C.O.Y.						0.791	
I					0.860		
F. S.					1.784	1.939	

### TABLE C46 ALL TEST RESULTS FROM PEKOZ (1987), TABLES 3.3-2; 3.3-3; 3.3-4

```
(Using yield stress of flats)

WHAZ/T ex ey Ptest

31.744 -1.500 0.000 12.750

31.744 -1.500 0.000 11.250
Specimen
                                                              1.358
1.254
1.114
                                                     1.369
LC1 -LS - 1
                                                      1.270
LC1 -LS - 2
LC1 -LS - 3
LC2 -LS - 1
                 31.744 -1.500
                                   0.000
                                             9.450
                                                      1.134
                 16.515
                          2.000
                                   0.000
                                            22.000
                                                      1.950
                                                               1.933
LC2 -LS - 2
LC2 -LS - 3
                 16.515
                          2.250
                                   0.000
                                            18.650
                                                      1.878
                                                               1.854
                 16.515
                          2.250
                                            17.600
                                                      1.849
                                                               1.814
                                   0.000
                          0.000
                                  -1.450
                                             8.900
LC3 -LS -
                 33.233
                                                      1.365
                                                               1.320
                                                      1.418
LC3 -LS - 2
                 33.685
                          0.000 -2.000
                                             7,800
                                                               1.395
                                             7.200
LC3 -LS - 3
                 33.685
                                                               1.353
                           0.000
                                  -2.000
LC3 -LS - 4
                 33.685
27.111
                                             7.100
                                                               1.423
                           0.000 -2.000
                                                      1.473
LC4 -LS -
                                                      1.393
                                                               1.365
                           0.000
                                  -2.500
                                            11.600
LC4 -LS - 2
                                            10.500
                                                               1.324
                 27,111
                           0.000 -2.500
                                                      1.365
LC5 -LS
                 16.394
                           0.000
                                  -2.030
                                            19.000
                                                      1.252
                                                               1.212
                 16,394
31,293
31,293
LC5 -LS - 2
                           0.000 -2.000
                                            17.200
                                                      1.274
                                                               1.212
LC6 -LS - 1
                           0.000 -2.380
                                            10.300
                                                      1.530
                                                               1.508
                           0.000 -2.130
                                            10.500
                                                      1.535
                                                               1.489
LC6 -LS - 2
                          0.000 -2.250
0.000 -2.220
LC7 -LS - 1
LC7 -LS - 2
                 24.152
                                            23.400
21.700
                                                      1.422
                                                               1.397
                                                      2.015
                                                               1.936
                 16.576
                                                               1.291
LC8' -LS - 1-
                 42.818
                           0.000 -1.500
                                            16.800
                                                      1.303
                                                      1.291
LC8 -LS - 2
                 42.818
                           0.000 -1.500
                                            16.200
                                                               1.273
                                                               1.257
LC8 -LS - 3
                 42.818
                          0.000 -1.500
                                            15.500
                                                      1.283
LC8 -LS - 4
                 43.421
                           0.000 -1.660
                                            13.800
                                                      1.264
                                                               1.230
                 43.421 0.000 -2.000
26.788 -1.500 -2.000
26.788 -1.500 -2.000
LC8 -LS - 5
                                            12.300
                                                      1.313
                                                               1.262
                                            11.500
                                                               1.467
LC9 -LS - 1
                                                      1.480
LC9 -LS - 2
                                            11.150
                                                      1.542
                                                               1.517
                 26.788 -1.500 -2.000
                                                      1.498
                                                               1.459
LC9 -LS - 3
                                             9.950
                 31.950 2.000 -2.500
31.079 -2.000 -2.500
LC10 -LS - 3
                                            16.400
                                                      1.830
                                                               1.800
LC11 -LS - 1
                                                      1.699
                                                               1.688
                                             7.900
LC11 -LS - 2 31.079 -2.500 -2.000
LC11 -LS - 3 31.079 -2.000 -2.500
                                             7.400
                                                      1.678
                                                               1.663
                                             6.800
                                                      1.581
                                                               1.560
                                                      1.488
                                                               1.458
Mean
                                                      0.154
                                                               0.157
C.O.V.
                                                               1.202
                                                      1.231
                                                      1.246
                                                               1.276
F. S.
```

## TABLE C47 ALL TEST RESULTS FROM PEKOZ (1987), TABLES 3.3-2; 3.3-3; 3.3-4

```
(Using calculated average yield stress - all sections)
                  wmax/t ex
31.744 -1.500
                                      ey
0.000
Specimen
                                               Ptest
                                                            rc
                                                                     ra
LC1 -LS - 1
LC1 -LS - 2
                                               12.750
                                                         1.321
                                                                   1,309
                  31.744 -1.500
                                      0.000
                                               11.250
                                                         1,228
                                                                  1.212
LC1 -LS - 3
LC2 -LS - 1
                  31.744
16.515
                                               9.450
22.000
                            -1.500
                                      0.000
                                                         1.099
                                                                   1.080
                            2.000
                                      0.000
                                                         1.809
                                                                   1.797
LC2 -LS - 2
LC2 -LS - 3
LC3 -LS - 1
LC3 -LS - 2
                  16.515
16.515
                            2.250
2.250
                                      0.000
                                               18.650
                                                         1,750
                                                                   1.724
                                               17.600
                                      0.000
                                                         1.725
                                                                   1.692
                                                8.900
7.800
                  33.233
33.685
                             0.000 -1.450
                                                         1.297
                                                                   1.254
                             0.000 -2.000
                                                                   1.320
                                                7.200
                                                         1.319
LC3 -LS - 3
                             0.000 -2.000
                                                                   1.283
                  33.685
LC3 -LS - 4
                  33.685
                             0.000 -2.000
                                                7.100
                                                         1.406
                                                                   1.355
LC3 -Ls - -

1C4 -Ls - 1

LC4 -Ls - 2

LC5 -Ls - 1
                  27.111
27.111
                             0.000 -2.500
                                               11.600
                                                         1.306
                                                                   1.280
                             0.000 -2.500
                                               10.500
                                                         1.290
                                                                   1.248
                  16.394
16.394
31.293
31.293
                             0.000 -2.030
0.000 -2.000
                                               19.000
                                                         1.176
                                                                   1.140
LC5 -LS - 2
LC6 -LS - 1
LC6 -LS - 2
LC7 -LS - 1
                                               17.200
                                                         1.210
                                                                   1.148
                             0.000 -2.380
0.000 -2.130
                                               10.300
                                                         1.493
                                                                   1.471
                                               10.500
                                                         1.496
                                                                   1.454
                                               23.400
21.700
                                                                   1.308
                  24.152
                             0.000 -2.250
LC7 -LS - 2
                  16.576
                             0.000 -2.220
                                                         1.895
                                                                   1.816
LC8 -LS
                  42.818
                             0.000 -1.500
                                               16.800
                                                          1.271
                                                                   1.259
                                               16.200
15.500
                             0.000 -1.500
LC8 -LS
                  42.818
                                                         1.260
                                                                   1.242
                  42.818
LC8 -LS - 3
                             0.000 -1.500
                                                          1.255
                                                                   1.228
                  43.421
43.421
26.788
LC8 -LS -
                             0.000 -1.660
                                               13.800
                                                          1.237
                                                                   1.204
LC8 -LS - 5
LC9 -LS - 1
                            0.000 -2.000
-1.500 -2.000
                                               12.300
                                                          1.284
                                                                   1,235
                                               11.500
                                                                   1.381
                                                          1.397
LC9 -LS - 2
LC9 -LS - 3
                           -1.500 -2.000
-1.500 -2.000
                                               11.150
9.950
                                                                   1.437
1.388
                                                          1.459
                   26.788
                                                          1.425
                  26.788
                                                          1.748
                                                                   1.721
LC10 -LS - 3
                  31.950
                            2.000 -2.500
                                               16.400
LC11 -LS - 1
                  31.079
                            -2.000 -2.500
                                                 7.900
                                                          1.609
                                                                   1.599
LC11 -LS - 2
                  31.079
                            -2.500 -2.000
                                                7.400
                                                          1.623
                                                                   1.605
LC11 -LS - 3 31.079 -2.000 -2.500
                                                 6.800
                                                          1.535
                                                                   1.514
                                                         1.420
0.146
                                                                   1.390
Mean
                                                                   0.148
c.o.v.
                                                          1.188
                                                          1.290
                                                                   1.322
F. S.
```

### TABLE C48 ALL TEST RESULTS FROM PEKOZ (1987), TABLES 3.3-2; 3.3-3; 3.3-4

```
(Using calculated average yield stress)
               wmax/t ex
31.744 -1.500
31.744 -1.500
                                         Ptest
Specimen -
                                  ęγ
                                0.000
                                         12.750
                                                  1.321 1.309
LC1 -LS - 1
                                                  1.228
LC1 -LS - 2
LC1 -LS - 3
                                 0.000
                                         11.250
                                                          1.212
                                 0.000
                                          9.450
                                                          1.080
                31.744 -1.500
                                                   1.099
                                 0.000
                                                  1.809
                                         22.000
                                                          1.797
LC2 -LS - 1
                16.515
                        2.000
LC2 -LS - 2
LC2 -LS - 3
                                                   1.750
                                                          1,724
                16.515
                         2.250
                                 0.000
                                         18.650
                16.515
                         2.250
                                 0.000
                                         17.600
                                                   1.725
                                                          1,692
LC3 -LS - 1
                33.233
                         0.000
                                 -1,450
                                          8.900
                                                   1.297
                                                           1.254
LC3 -LS - 2
LC3 -LS - 3
LC3 -LS - 4
               33.685
                         0.000
                                -2.000
                                          7.800
                                                   1.340
               33.685
33.685
                                         7.200
                                                   1.319
                                                           1.283
                         0.000
                                -2.000
                                                   1.406
                         0.000
                                -2.000
                                                          1.355
                                         11.600
                                                   1.306
LC4'-LS - 1
                27.111
                         0.000 -2.500
                                                          1.280
                                         10.500
                                                          1.248
                         0.000
                                -2.500
                                                   1,290
LC4 -LS - 2
                27.111
                                         19.000
17.200
                         0.000 -2.030
                                                   1.176
                                                           1.140
LC5 -LS - 1
                16.394
LC5 -LS - 2
                16.394
                         0.000
                                -2.000
                                                   1.210
                                                           1.148
                         0.000 -2.380
0.000 -2.130
LC6 -LS -
                31.293
                                         10.300
                                                   1.493
                                                           1.471
LC6 -LS - 2
LC7 -LS - 1
                31.293
                                         10.500
                                                   1.496
                                                           1.454
                24.152
                         0.000 -2.250
                                         23.400
                                                   1.333
                                                          1.308
                         0.000 -2.220
0.000 -1.500
                16.576
42.818
                                         21.700
                                                   1.895
LC7:-LS - 2
                                                           1.816
                                         16,800
                                                   1.271
LC8 -LS - 1
                                         16.200
15.500
                         0.000 -1.500
                                                   1.260
                                                           1.242
LC8 -LS - 2
                42.818
                                                           1.228
                                                   1.255
LC8 -LS - 3
                42.818
                         0.000 -1.500
                                                           1.204
                43.421
43.421
                         0.000 -1.660
                                         13,800
LC8 -LS - 4
                                                   1.284
                                                           1.235
LC8 -LS - 5
                         0.000 -2.000
                                         12.300
LC9 -LS - 1
                26.788 -1.500 -2.000
                                         11.500
                                                   1.397
                                                           1.381
                26.788 -1.500 -2.000
26.788 -1.500 -2.000
LC9 -LS - 2
                                         11,150
                                                   1.459
                                                           1.437
                                                   1.425
                                          9.950
                                                           1.388
LC9 -LS - 3
                                                   1.748
                31.950 2.000 -2.500
                                          16.400
                                                           1.721
LC10 -LS - 3
LC11 -LS - 1
                31.079 -2.000 -2.500
                                          7.900
                                                   1.609
                                                           1.599
LC11 -LS - 2
                                                   1.623
                31.079 -2.500 -2.000
                                           7.400
                                                           1.605
LC11 -LS - 3
                31.079 -2.000
                                -2.500
                                          6.800
                                                   1.535
                                                           1.514
                                                   1.420
                                                           1.390
Mean
                                                   0.146
                                                           0.148
c.o.v.
                                                   1.188
                                                           1.160
                                                   1,290
                                                           1.322
F. S.
```

### TABLE C49 ALL TEST RESULTS FROM PEKOZ (1987), TABLES 7.3-3, 7.3-4

```
(Using yield stress of flats)
                        ex ey
0.000 -2.100
0.000 -12.000
                                        Ptest
Specimen
                wmax/t
                                                          1.189
1.179
                                         18.740
                                                  1.227
LC1 -LU - 1
               85.534
                                                  1.193
1.342
                                          6.800
LC1 -LU -
               85.534
LC1 -LU - 3
                                         12.320
                                                          1.318
               85,534
                        0.000
                                -6.000
                                                  1.136
                                                          1.121
LC2 -LU -
               174.600
                        0.000
                                -6.000
                                          5.760
LC2 -LU -
              174.300
                        0.000
                                -9.000
                                          4.290
                                                  1.039
                                                          1.029
           2
LC3 -LU -
               131.828
                        0.000
                                -4.000
                                          8.000
                                                  0.965
                                                          0.952
              132.569
                        0.000
                                -8.000
                                          6.350
                                                  1.110
                                                          1.099
                                          8.500
7.720
                        0,000
                                -4.000
                                                          1.011
LC3 -LU - 3
                                                  1.024
               131.345
                                                  1.059
                                                          1.045
                        0.000 -12.000
LC4 -LU
               134.311
                                          5.180
                                                  0.949
                                                          0.940
              134.311
                        0.000 -18.000
LC4 -LU
                                         10.660
13.690
9.320
11.780
                                                  1.037
                                                          1.017
LC4 -LU
               140.603
                        0.000
                                -6.000
                                                          1.090
                                                  1.118
LC5 -LU -
               117.934
                         0.000
                                -4.000
LC5 -LU - 2
               117.934
                         0.000
                                -8.000
                                                   1.095
                                                           1.076
1C5 -LU - 3
1C5 -LU - 4
               115.581
                        0.000
                                -6.000
                                                   1.144
                                                           1.121
              115.581
95.922
                        0.000 -10.000
                                          7.990
                                                   1.057
                                                           1.040
                         0.000
                                -5.000
                                         28.750
                                                   1.152
                                                           1.126
LC6 -LU -
           1
               95.922
                         0.000 -10.000
LC6 -LU - 2
                                          19,490
                                                   1.144
                                                           1.127
               96.910
                                -5.500
-5.500
                                         24.800
                                                           1,040
                         0.000
                                                   1.062
LC10 -LU - 1
                        0.000
                                                   1.071
                                                           1.048
LC10 -LU - 2
               96.910
                                         25.000
                                          6.500
5.800
                                                   1.811
                                                           1.796
                         1.500
                                -3,500
LC7 -LU -
                71.688
                                                          1.701
                         1.500
                                -3.500
LC7 -LU -
                                                   1.726
                71.688
                                                   1.737
                                                           1.704
LC7 -LU -
                71,688
                         1.500
                                -3.500
                                           5.350
                                                   1.276
1.293
                                                          1.228
LCB -LU -
               136,650
                         1.000
                                -2,000
                                          11.850
LC8 -LU -
               136.650
                         1.000
                                 -2,000
                                          12.000
                                                           1.246
           2
               133,902
                         1.000
                                 -4.000
                                          10.750
                                                   1.272
                                                           1.229
LC8 -LU -
               133.902
                        1.000
                                -4.000
                                          10.550
                                                   1.249
                                                           1.206
LC8 -LU - 4
                                          8.900
                                                   1.214
                                                           1.177
LC8 -LU -
               136.017
                         1.000
                                 -6.000
           5
                                                   1.274
                                                           1.233
LC8 -LU -
               136.017
                         1.000
                                 -6.000
                                          9.350
                                                           1.011
LC9 -LU -
               115.903
                        -0.380
                                 -3.940
                                          14.000
                                                   1.052
                                                   0.927
                                                          0.898
LC9 -LU -
               115.903 -0.380
                                 -6.000
                                          10.100
           2
LC9 -LU - 3
               117.081 -0.380
                                 -6.000
                                          10.600
                                                   0.958
                                                           0.928
                                                   0.942
                                                           0.911
LC9 -LU
               117.081 -0.630
                                 -3.940
                                          11.700
                                                   1.177
                                                           1,151
Mean
                                                   0.187
                                                           0.189
c.o.v.
                                                   0.927
                                                           0.904
                                                           1.696
F. S.
                                                   1.653
```

### TABLE C50 ALL TEST RESULTS FROM PEKOZ (1987), TABLES 7.3-3, 7.3-4

```
(Using calculated average yield stress - all sections)
                                        Ptest
18.740
                                ey
-2.100
                                                  гс
1.197
Specimen
                wmax/t ex
                                                           ra
               85.534
85.534
                       0.000
                                                          1.158
LC1 -LU - 1
LC1 -LU - 2
LC1 -LU - 3
                                          6.800
                        0.000 -12.000
                                                  1.164
                                                          1.151
               85.534
                        0.000
                               -6.000
                                         12.320
                                                  1.311
                                                          1.285
              174.600
174.300
131.828
LC2 -LU -
                        0.000
                                -6.000
                                          5.760
                                                  1.125
                                                          1.108
           1
LC2 -LU - 2
LC3 -LU - 1
                        0.000
                                -9.000
                                          4.290
                                                  1.029
                                                          1.017
                        0.000
                                          8.000
6.350
8.500
                                                  0.956
                                                          0.943
                                -4.000
                        0.000
                                                  1.099
                                                          1.089
LC3 -LU - 2
                                -8.000
              132.569
LC3 -LU -
           3
              131.345
                        0.000
                                -4.000
                                                  1.016
                                                          1,001
                        0.000 -12.000
                                                          1.032
LC4 -LU - 1.
              134.311
                                          7.720
                                                  1.046
LC4 -LU -
               134.311
                        0.000 -18.000
                                          5.180
                                                  0.937
                                                          0.928
LC4 -LU -
              140,603
                        0.000
                                -6.000
                                         10.660
                                                  1.025
                                                          1,005
LC5 -LU - 1
               117.934
                        0.000
                                -4.000
                                         13.690
                                                  1.103
                                                          1.075
               117.934
                                -8.000
                                          9.320
                                                  1.081
                                                          1.063
LC5 -LU -
                        0.000
              115.581
115.581
95.922
                                         11.780
LC5 -LU - 3
                        0.000
                                -6.000
                                                  1.126
                                                          1.103
LC5 -LU -
                        0.000 -10.000
                                          7.990
                                                  1.039
                                                          1.023
                                                          1.102
                        0.000
                                -5.000
LC6 -LU - 1
                                         28.750
                                                  1.129
LC6 -LU - 2
               95.922
                                                          1.102
                        0.000 -10.000
                                         19,490
                                                  1,120
                                         24.800
                                                  1.040
LC10 -LU - 1
                96.910
                        0.000
                                -5.500
                                                          1.018
LC10 -LU
                96.910
                        0.000
                                -5.500
                                         25.000
                                                  1.049
                                                          1.026
LC7 -LU - 1
LC7 -LU - 2
                71.688
                         1.500
                                -3.500
                                          6.500
                                                  1.747
                                                          1.729
               71.688
                        1.500
                                -3.500
                                          5.800
                                                  1.667
                                                          1.643
LC7 -LU - 3
               71.688
                         1.500
                                -3.500
                                          5.350
                                                  1.682
                                                          1.656
                        1.000
                                                  1.261
LC8 -LU - 1
               136.650
                                -2.000
                                         11.850
                                                          1.214
LC8 -LU - 2
                                         12.000
10.750
               136,650
                         1.000
                                -2.000
                                                  1.279
                                                          1.231
                                -4.000
                                                          1.213
                        1.000
                                                  1.257
LC8 -LU - 3
               133.902
                                         10.550
8.900
                                                          1,191
               133.902
                                -4.000
                                                  1.234
LC8 -LU - 4
                         1.000
                                                  1.201
                        1.000
                                -6.000
LC8 -LU - 5
               136.017
                                                          1.163
              136.017 1.000
115.903 -0.380
LC8 -LU - 6
                                -6.000
                                          9.350
                                                  1.260
                                                          1.221
LC9 -LU - 1
                                -3.940
                                         14.000
                                                  1.042
                                                          1.002
               115.903 -0.380
LC9 -LU - 2
                                -6.000
                                         10.100
                                                  0.919
                                                          0.890
LC9 -LU - 3
              117.081 -0.380
                                -6.000
                                         10.600
                                                  0.949
                                                          0.920
                                                  0.934
                                                          0.903
LC9 -LU - 4 117.081 -0.630
                                -3.940
                                         11.700
                                                  1.157
                                                          1.131
Mean
                                                  0.179
                                                          0.182
C.D.V.
                                                  0.923
                                                          0.900
                                                  1.661
F. S.
```

### TABLE C51 ALL TEST RESULTS FROM PEKOZ (1987), TABLES 7.3-3, 7.3-4

(Using calculated average yield stress) WMAX/t ex ey 85.534 0.000 -2.100 85.534 0.000 -12.000 85.534 0.000 -6.000 Specimen Ptest 18.740 1.227 1.189 LC1 -LU - 1 LC1 -LU - 2 6.800 1.128 1.318 1.164 LC2 -LU - 3 LC2 -LU - 1 12.320 1.342 174.600 174.300 0.000 -6.000 5.760 1.136 1.121 LC2 -LU - 2 0.000 -9.000 4.290 1.039 1.029 LC3 -LU - 1 131.828 0.000 -4,000 8.000 0.965 0.952 131.026 132.569 131.345 134.311 134.311 140.603 117.934 LC3 -LU - Z 0.000 -8,000 6.350 1.110 1.099 LC3 -LU -0.000 -4.000 8.500 1.011 1.024 LC4 -LU - 1 LC4 -LU - 2 LC4 -LU - 3 LC5 -LU - 1 7.720 5.180 1.059 1.045 0.000 -12.000 0.000 -18.000 0.940 0.949 -6.000 0.000 10.660 1.037 1.017 13.690 9.320 1.118 0.000 -4.000 1.090 LC5 -LU - 2 0.000 -8.000 1.095 1.076 11.780 LC5 -LU - 3 115.581 0.000 -6.000 1.144 1.121 LC5 -LU - 4 115.581 0.000 -10.000 7.990 1.057 1.040 95.922 95.922 LC6 -LU - 1 0.000 -5.000 28.750 1.152 1.126 0.000 -10.000 0.000 -5.500 0.000 -5.500 LC6 -LU - 2 19.490 1.127 1.144 LC10 -LU - 1 LC10 -LU - 2 24.800 25.000 96.910 1.062 1.040 96.910 1.071 1.048 LC7 -LU - 1 LC7 -LU - 2 1.747 1.729 6.500 71.688 1.500 -3.500 71.688 -3.500 5.800 1.500 1.567 1.643 LC7 -LU - 3 71.688 1.500 -3.500 5.350 1,682 1.656 LC8 -LU - 1 136.650 1.000 -2.000 11.850 1.276 1.228 136.650 133.902 133.902 LC8 -LU -1,000 -2.000 12,000 1.293 1.246 LC8 -LU - 3 1.272 1.229 1.000 -4.000 10.750 LC8 -LU - 4 10.550 1.249 -4.000 1.206 1.000 8.900 9.350 136.017 1.000 1.214 -6.000 1.177 LC8 -LU - 5 1.274 136.017 LC8 -LU - 6 -6,000 -3,940 1.233 1.000 LC9 -LU - 1 115.903 -0.380 14.000 1.011 LC9 -LU - 2 115.903 -0.380 -6.000 10.100 0.927 0.898 LC9 -LU - 3 117.081 -0.380 -6.000 10.600 0.958 0.928 LC9 -LU - 4 117.081 -0.630 -3.940 11.700 0.942 0.911 1.170 1.144 Mean 0.176 0.178 C.O.V. 0.939 0.915 F. S. 1.633 1.675

TABLE C52
ALL TEST RESULTS
FROM PEKOZ (1987), TABLES 3.3-2 , 3.3-3 , 3.3-4 , 7.3-2 , 7.3-3 , 7.3-4 , 7.3-5

```
(Using yield stress of flats)
               wmax/t ex
31.744 -1.500
                                       Ptest
Specimen
                                ev
                               0.000
                                                1.502
                                       12.750
                                                      1.502
LC1 -LS - 1
               31.744 -1.500
                               0.000
                                       11.250
                                                1.370
                                                       1,372
LC1 -LS - 2
                                        9.450
                                                       1.202
LC1 -LS - 3
               31.744
                      -1.500
                               0.000
                                                1.199
                                                       1.933
LC2 -LS - 1
               16.515
                       2.000
                               0.000
                                       22.000
                                                1.950
               16.515
                                0.000
                                       18.650
                                                1.878
                                                       1.854
LC2 -LS - 2
                        2.250
LC2 -LS - 3
               16.515
                        2.250
                                0.000
                                       17.600
                                                1.849
                                                        1,814
               33.233
                       0.000
                               -1.450
                                        8,900
                                                1.365
                                                        1.320
LC3 -LS - 1
                                        7.800
                                                       1.395
                       0.000
                                                1.418
               33.685
                               -2,000
LC3 -LS - 2
                                        7.200
                        0.000
                              -2.000
                                                1.387
                                                        1.353
               33.685
LC3 -LS - 3
                                                1-473
                                                       1.423
LC3 -LS - 4
               33.685
                        0.000
                               -2.000
                                        7.100
                                                1.393
               27.111
                        0.000
                               -2.500
                                       11.600
                                                       1.365
LC4 -LS
                               -2.500
LC4 -LS - 2
                        0.000
                                       10.500
                                                1.365
                                                        1.324
               27.111
                                       19.000
                                                1.252
                                                        1,212
           1
               16.394
                        0.000
                               -2,030
LC5 -LS -
               16.394
                                                1.274
                                                        1.212
LC5 -LS - 2
                        0.000
                              -2.000
                                       17.200
                                                1.589
                                       10.300
                                                        1.589
LC6 -LS -
               31.293
                        0.000
                               -2.380
           1
                                       10.500
LC6 -LS - 2
                        0.000
                                                1,579
                                                        1.551
                               -2.130
               31.293
                                       23.400
                                                1.422
                                                        1.397
LC7 -LS -
               24.152
                        0.000
                               -2.250
                                       21.700
                                                        1.936
                                                2.015
LC7 -LS - 2
               16.576
                        0.000
                               -2.220
                                                        1.412
LC8 -LS - 1
               42:818
                        0.000
                               -1.500
                                        16.800
                                                1.413
LC8 -LS - 2
               42.818
                        0.000
                               -1.500
                                        16.200
                                                1,383
                                                        1.380
               42.818
43.421
LC8 -LS - 3
                        0.000
                               -1.500
                                        15,500
                                                1.353
                                                        1.348
                        0.000
                                        13.800
                                                1.313
                                                        1,303
                               -1.660
LC8 -LS - 4
                        0.000
                                                        1.310
               43.421
26.788
                               -2.000
                                        12.300
                                                1.353
LC8 - LS - 5
                                        11.500
                                                1.497
                                                        1.492
                               -2.000
LC9 .- LS - 1
                       -1.500
                                                1.542
                                        11.150
                                                        1.529
LC9 -LS - 2
               26.788 -1.500
                               -2.000
                                        9.950
                                                        1.459
LC9 -LS - 3
                                                1,498
               26.788
                       -1.500
                               -2.000
                                                        1.800
LC10 -LS - 3
LC11 -LS - 1
                                                1.830
               31.950
                        2.000
                               -2.500
                                        16.400
               31.079
                       -2,000
                               -2.500
                                        7.900
                                                1.783
                                                        1.779
               31.079
                       -2:500
                               -2.000
                                         7.400
                                                1.741
                                                        1.737
LC11 -LS
               31.079
85.534
LC11 -LS - 3
                       -2,000
                               -2.500
                                         6.800
                                                1.623
                                                        1.619
                                                        1.189
LC1 -LU - 1
LC1 -LU - 2
                                        18.740
                                                1.227
                        0.000 -2.100
               85.534
85.534
                        0.000 -12.000
                                         6.800
                                                1.193
                                                        1.179
                        0.000 -6.000
                                        12.320
                                                1,342
                                                        1.318
LC1 -LU -
                                         5.760
                        0.000 -6.000
                                                1.136
                                                        1.121
              174.600
LC2 -LU -
                                                        1.029
                        0.000 -9.000
                                                1.039
                                         4.290
LC2 -LU -
           2
              174.300
                                         8.000
                                                        0.952
LC3 -LU - 1
              131.828
                        0.000 -4.000
                                                0.965
               132.569
                        0.000 -8.000
                                         6.350
                                                1.110
                                                        1.099
LC3 -LU -
           2
              131.345
                        0.000 -4.000
                                         8.500
                                                1.024
                                                        1.011
LC3 -LU
           3
                                                1.059
                                                        1.045
              134.311
134.311
                        0.000 -12.000
                                         7.720
          1
LC4 -LU -
                                                        0.940
                        0.000 -18.000
                                         5.180
                                                0.949
LC4 -LU
                                                1.037
                                                        1.017
                        0.000 -6.000
                                        10,660
LC4 -LU
               140.603
                                        13.690
                                                1.118
                                                        1.090
LC5 -LU
               117.934
                        0.000 -4.000
                                                        1.076
LC5 -LU -
              117.934
                        0.000 -8.000
                                         9.320
                                                 1.095
              115.581
115.581
                        0.000 -6.000
                                        11.780
                                                 1.144
                                                        1,121.
LC5 -LU - 3
                        0.000 -10.000
                                        7.990
                                                 1.057
                                                        1.040
LC5 -LU
               95.922
95.922
LC6 -LU - 1
                        0.000 -5.000
                                        28.750
                                                 1.152
                                                        1.126
                        0.000 -10.000
                                        19.490
                                                 1,144
                                                        1.127
LC6 -LU - 2
                        0.000 -5.500
                                        24.800
                                                 1,062
                                                        1.040
LC10. -LU - 1
                96.910
                                                 1.071
                                                        1.048
                        0.000 -5.500
                                        25.000
LC10 -LU - 2
                96.910
                                                        1.796
                         1,500
                                         6.500
                                                 1.811
LC7 -LU - 1
                71.688
                               -3.500
LC7 -LU -
                71.688
                         1.500
                               -3.500
                                         5.800
                                                 1.726
                                                        1,701
LC7 -LU -
                71.688
                         1.500 -3.500
                                         5,350
                                                 1.737
                                                        1.704
               136.650
                         1.000 -2.000
                                        11.850
                                                 1.276
                                                        1.228
LC8 -LU - 1
                         1.000 -2.000
                                                 1,293
                                                        1.246
                                        12,000
LC8 -LU - 2
               136,650
                                                 1.272
                                                        1,229
                         1.000 -4.000
                                        10.750
LC8 -LU - 3
               133,902
                                                        1.206
                         1.000 -4.000
                                        10.550
                                                 1,249
 LC8 -LU
               133.902
                                                        1.177
                                         8.900
                                                 1.214
. LCB -LU
               136,017
                         1.000 -6.000
                                         9.350
                                                        1,233
               136.017
                         1.000 -6.000
                                                 1.274
 LC8 -LU - 6
                                                         1.011
               115.903 -0.380
                               -3.940
                                        14,000
                                                 1.052
 LC9 -LU -
 LC9 -LU - 2
               115.903 -0.380 -6.000
                                        10.100
                                                 0.927
                                                        0.898
               117.081 -0.380
                               -6.000
                                        10,600
                                                 0.958
                                                        0.928
LC9 -LU
               117.081 -0.630
                               -3.940
                                        11.700
                                                 0.942
                                                        0.911
 LC9 -LU
                                                 1.026
                                                        0.968
 A71
               463.000
                        0.000
                                0.000
                                         3.600
                                                 1,025
                                                         0.968
               463.800
                         0.000
                                0.000
                                         3.640
```

## TABLE C52 (CONT.) ALL TEST RESULTS FROM PEKOZ (1987), TABLES 3.3-2 , 3.3-3 , 3.3-4 , 7.3-2 , 7.3-3 , 7.3-4 , 7.3-5

```
ra
0.926
                                            Ptest
                           0.000 0.000
                                                     0.983
Α75
                463.000
                                             3.480
                                             3.260
                                                      0.967
                                                              0.921
A76
                446.385
                           0.000
                                   0.000
A101
                311.000
                           0.000
                                   0.000
                                             8.300
                                                      1.086
                                                              1.022
               311.000
310.459
A102
                           0.000
                                   0.000
                                             7.870
                                                      1.037
                                                              0.975
                           0.000
                                   0.000
                                             8.340
                                                      1.103
                                                              1.037
A103
                                            7.760
17.200
15.700
                301.000
198.719
                          0.000
                                                     0.753
                                   0.000
                                                              0.740
A104
                                                              1.029
A151
                           0.000
                                   0.000
                                                              0.974
A152
                202.964
                           0.000
                                   0.000
                                                      1.054
A153
                210.630
                           0.000
                                   0.000
                                            16.000
                                                      1.137
                                                               1.055
                                            16.400
15.500
A154
                207.182
                           0.000
                                   0.000
                                                      1.150
                                                               1.077
                207.182
206.273
116.937
116.406
118.406
117.437
117.031
149.312
A156
                           0.000
                                   0.000
                                                      1.078
                                                              0.998
L1
L2
L3
L4
L5
                           0.290
                                   0.000
                                             3.120
                                                      1.095
                                                               1.047
                          0.298
                                             3.600
3.520
                                   0.000
                                                      1.062
                                                              1.034
                                                      0.967
                                                              0.934
                                   0.000
                          0.400
0.410
0.070
                                   0.000
                                             3.780
                                                      0.979
                                                              0.952
                                             4.100
                                   0,000
                                                      1.015
                                                              0.995
                                             3.800
                                                      1.155
                                                               1.098
L6
L7
                                   0.000
                                             3.970
4.310
                                                      1.097
                                                              1.050
                           0.070
                                   0.000
                147.625
149.219
148.719
                                                      1.094
                                                              1.059
                           0.070
                                   0.000
L8
L9
                           0.180
                                   0.000
                                             4.340
                                                      1.072
                                                               1.028
L10
                           0.190
                                   0.000
                                             4.570
                                                      1.070
                                                              1.036
                147.937
178.906
179.250
                           0.190
                                   0.000
                                             4.650
                                                      1.038
                                                               1.015
L11
                           0,180
                                   0.000
                                             3.350
                                                      1.147
                                                               1,098
L12
                                             3.530
                           0.180
                                   0.000
                                                      1.100
                                                               1.060
L13
                                                      1.129
                178.687
                           0.180
                                   0.000
                                             3.850
                                                               1.097
L14
                                                              1.058
                           0.000
                                                      1.109
                181.406
                                   0.000
                                             4.900
L15
                                             5.180
                                                               1.066
L16
                181,406
                           0.000
                                   0.000
                                                      1.104
                179.031
                           0.000
                                   0.000
                                             5.310
                                                      1.077
                                                               1.051
L17
                211.031
210.000
                           0.220
                                   0.000
                                             3.130
                                                      1.155
                                                               1.106
L18
L19
                           0.220
                                   0.000
                                             3.390
                                                      1.141
                                                               1.101
                210.594
                           0.220
                                   0.000
                                             3.670
                                                      1.136
                                                               1.105
L20
                                                      1.248
                                                              1,215
Mean
                                                              0.221
c.o.v.
                                                              0.906
                                                      0.946
F. S.
                                                      1.622
                                                              1,692
```

### TABLE C53 ALL TEST RESULTS FROM PEKOZ (1987), TABLES 3.3-2 , 3.3-3 , 3.3-4 , 7.3-2 , 7.3-3 , 7.3-4 , 7.3-5

```
(Using calculated average yield stress - all sections)
               Wmax/t ex
31.744 -1.500
                                       Ptest
Specimen
                                 ev
                                0.000
                                                1,459
LC1 -LS - 1
                                        12.750
                                                        1,460
LC1 -LS - 2
LC1 -LS - 3
               31.744 -1.500
31.744 -1.500
                                       11.250
                                0.000
                                                1.333
                                                        1.335
                                        9.450
                                                1.168
                                0.000
                                                        1.171
LC2 -LS - 1
               16.515
                        2.000
                                0.000
                                       22.000
                                                1.809
                                                        1.787
LC2 -LS - 2
               16.515
                        2.250
                                0.000
                                        18,650
                                                1.750
                                                        1.724
LC2 -LS - 3
               16.515
                        2.250
                                0.000
                                        17.600
                                                1.725
                                                        1.692
                                                        1.254
LC3 -LS - 1
               33.233
                        0.000
                               -1.450
                                        8.900
                                                1.297
                                                1.340
1.319
LC3 -LS - 2
               33.685
                        0.000 -2.000
                                        7.800
                                                        1.320
               33.685
                        0.000 -2.000
                                        7.200
LC3 -LS - 3
                                                        1,283
                        0.000 -2.000
LC3 - LS - 4
               33.685
27.111
                                        7.100
                                                        1.355
                                                1.406
                        0.000 -2.500
                                                1.306
                                                        1.280
LC4 -LS - 1
                                        11.600
LC4 -LS - 2
LC5 -LS - 1
                                                1.290
                        0.000 -2.500
0.000 -2.030
                                                        1.248
               27,111
                                        10.500
                16.394
                                        19,000
                                                1.176
                                                        1.144
LC5 -LS - 2
                        0.000 -2.000
0.000 -2.380
               16.394
                                        17.200
                                                1.210
                                                        1.148
LC6 -LS
               31.293
                                        10.300
                                                1.558
                                                        1.556
LC6 -LS - 2
               31.293
                        0.000 -2.130
                                        10.500
                                                1.542
                                                        1.522
               24.152
16.576
LC7 -LS -
                        0.000 -2.250
                                                1.333
          1
                                       23.400
                                                        1.308
LC7 -LS -
                                       21,700
                        0.000 -2.220
                                                1.895
                                                        1.816
               42.818
                        0.000 -1.500
LC8 -LS - 1
                                        16.800
                                                1.387
                                                        1.385
LC8 -LS -
                        0.000 -1.500
                                                        1.356
           2
               42.818
                                        16,200
                                                1.359
LC8 -LS - 3
               42.818
                        0.000 -1.500
                                        15.500
                                                1.330
                                                        1.325
LC8 -LS. - 4
               43.421
                        0.000 -1.660
                                        13.800
                                                1.290
                                                        1,281
LC8 -LS -
               43.421
                       0.000 -2.000
                                        12.300
                                                1.324
                                                        1.288
LC9 -LS - 1
               26.788 -1.500 -2.000
                                        11.500
                                                1.418
                                                        1.409
               26.788 -1.500 -2.000
LC9 -LS - 2
                                        11.150
                                                1.459
                                                        1.456
               26.788 -1.500 -2.000
31.950 2.000 -2.500
LC9 -LS - 3
                                        9.950
                                                1.425
                                                        1.388
LC10 -LS - 3
                                                1.748
                                                        1,717
                                        16.400
LC11 -LS - 1
                                                1.692
                                        7.900
               31.079 -2.000 -2.500
                                                        1.692
LC11 -LS -
               31.079
                       -2.500 -2.000
                                        7.400
                                                1.686
                                                        1.686
LC11 -LS - 3
               31.079
                       -2.000 -2.500
                                         6.800
                                                1,578
                                                        1.574
LC1 -LU - 1
               85.534
                        0.000 -2.100
                                        18.740
                                                1.197
                                                        1,158
LC1 -LU -
               85.534
                        0.000 -12.000
                                                        1.151
                                        6.800
                                                1.164
LC1 -LU -
               85.534
                        0.000 -6.000
                                        12.320
                                                1.311
                                                        1.285
LC2 -LU -
              174.600
174.300
                        0.000 -6.000
                                        5.760
                                                1,125
                                                        1.108
LC2 -LU - 2
                        0.000 -9.000
                                         4.290
                                                1.029
                                                        1.017
LC3 -LU - 1
              131.828
                        0.000 -4.000
                                        8.000
                                                        0.943
                                                0.956
LC3 -LU - 2
                        0.000 -8.000
                                                1.099
                                                        1.089
              132.569
                                        6.350
LC3 -LU
              131.345
                                        8.500
                        0.000 -4.000
                                                1.016
                                                        1.001
LC4 -LU - 1
              134.311
                        0.000 -12.000
                                        7.720
                                                1.046
                                                        1.032
LC4 -LU
              134.311
                        0.000 -18.000
                                        5.180
                                                0.937
                                                        0.928
LC4 -LU
                        0.000 -6.000
              140,603
                                        10.660
                                                1.025
                                                        1.005
              117.934
117.934
                        0.000 -4.000
                                        13.690
LC5 -LU -
                                                1.103
                                                        1.075
LC5 -LU -
                        0.000 -8.000
                                                        1.063
                                                1.081
              115.581
115.581
LC5 -LU - 3
                        0.000 -6.000
                                        11.780
                                                1.126
                                                        1.103
LC5 -LU - 4
                        0.000 -10.000
                                        7.990
                                                1.039
                                                        1.023
LC6 -LU - 1
               95.922
                        0.000 -5.000
                                       28.750
                                                1.129
                                                        1.102
                                                        1.102
LC6 -LU - 2
               95.922
                        0.000 -10.000
                                       19.490
                                                1.120
LC10 -LU - 1
               96.910
                        0.000 -5.500
                                                1.040
                                       24.800
                                                        1.018
               96.910
71.688
LC10 -LU - 2
                        0.000 -5.500
                                        25,000
                                                1.049
                                                        1.026
                                         6.500
LC7 -LU - 1
                        1.500 -3.500
                                                1.747
                                                        1.729
LC7 -LU - 2
                        1,500 -3,500
                                        5.800
               71.688
                                                1.667
                                                        1.643
LC7 -LU -
                        1.500 -3.500
               71.688
                                         5,350
                                                1.682
                                                        1.656
LC8 -LU - 1
                        1.000 -2.000
              136.650
                                        11.850
                                                1.261
                                                        1.214
LC8 -LU -
              136.650
                        1.000 -2.000
                                        12.000
                                                1.279
                                                        1.231
LC8 -LU - 3
              133.902
                        1.000 -4.000
                                        10.750
                                                1.257
                                                        1.213
                        1.000 -4.000
                                                1.234
                                                        1.191
LC8 -LU -
              133.902
                                        10.550
              136.017
LC8 -LU -
                        1.000 -6.000
                                         8.900
                                                1.201
                                                        1.163
                                                1.260
LC8 -LU - 6
              136.017
                        1,000 -6.000
                                        9.350
                                                        1.221
LC9 -LU
              115.903
                       -0.380 -3.940
                                        14,000
                                                1.042
                                                        1.002
LC9 -LU -
              115.903 -0.380 -6.000
                                        10.100
                                                0.919
                                                        0.890
LC9 -LU -
           3
               117.081 -0.380 -6.000
                                                0.949
                                                        0.920
                                        10.600
    -LU
              117.081 -0.630 -3.940
                                                0.934
LC9
                                        11.700
                                                        0.903
              463,000 0,000
                               0.000
                                        3.600
                                                1.023
                                                        0.965
```

TABLE 53(CONT.)
ALL TEST RESULTS
FROM PEKOZ (1987), TABLES 3.3-2 , 3.3-3 , 3.3-4 , 7.3-2 , 7.3-3 , 7.3-4 , 7.3-5

Specimen A74 A75 A76 A101 A102 A103 A104 A151 A152 A153 A156 L1 L2 L3 L4 L5 L6 L7 L8	Mmax/t 463,800 463,000 446,385 311,000 311,000 310,459 301,000 198,719 202,964 210,630 207,182 206,273 116,406 117,437 117,031 149,312 147,500 147,625	ex 0.800 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.290 0.290 0.400 0.410 0.070 0.070	0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000	7.760 17.200 15.700 16.400 15.500 3.120 3.600 3.780 4.100 3.970 4.310	rc 1.022 0.980 0.962 1.082 1.099 0.750 1.106 1.046 1.130 1.047 0.959 0.972 1.005 1.145 1.083	ra 0.966 0.923 0.918 1.017 0.970 1.032 0.737 1.020 0.966 1.046 1.037 1.020 0.924 0.924 0.983 1.039 1.039
L8 L9	147.625	0.180	0.000	4.310	1.064	1.021
L10	148.719	0.190	0.000	4.570	1.060	1.027
L11	147.937	0.190	0.000	4.650	1.029	1.006
L12	178.906	0.180	0.000	3.350	1.139	1.088
L13	179,250	0.180	0.000	3.530	1.090	1.047
L14	178.687	0.180	0.000	3.850	1.116	1.088
L15	181.406	0.000	0.000	4.900 5.180	1.101 1.095	1.051
L16 L17	181.406 179.031	0.000	0.000	5.310	1.068	1.041
L18	211.031	0.220	0.000	3.130	1.147	1.094
L19	210.000	0.220	0.000	3.390	1.130	1.090
L20	210.594	0.220	0.000	3.670	1.126	1.096
Mean					1.217	1.185
c.o.v.					0.195	0.204
I F. S.					0.948 1.617	0.909 1.687

### TABLE C54 ALL TEST RESULTS FROM PEKOZ (1987), TABLES 3.3-2 , 3.3-3 , 3.3-4 , 7.3-2 , 7.3-3 , 7.3-4 , 7.3-5

(Using calculated average yield stress) wmax/t ex ey 31.744 -1.500 0.000 Specimen Ptest 12.750 1.459 1.460 LC1 -LS - 1 LC1 -LS - 2 LC1 -LS - 3 31.744 -1.500 0.000 11.250 1.333 1.335 31.744 -1.500 0.000 9.450 1.168 1.171 16.515 16.515 LC2 -LS - 1 LC2 -LS - 2 2.000 2.250 22.000 1.809 0.000 1.787 0.000 18.650 1.750 1.724 LC2 -LS - 3 LC3 -LS - 1 16.515 33.233 2.250 0.000 17.600 1.692 1.725 8.900 1.297 0.000 -1.450 1.254 LC3 -LS - 2 33.685 0.000 -2.000 7.800 1.340 1.320 LC3 -LS - 3 33.685 0.000 -2.000 7,200 1,319 1.283 LC3 -LS - 4 LC4 -LS - 1 LC4 -LS - 2 LC5 -LS - 1 LC5 -LS - 2 33.685 0.000 -2.000 7.100 1.406 1,355 27.111 27.111 16.394 0.000 -2.500 1.306 11,600 1.280 0.000 -2.500 10.500 1,290 1,248 0.000 -2.030 0.000 -2.000 19.000 1.176 1.145 17.200 1.210 1,148 16.394 LC6 -LS - 1 0.000 -2.380 10.300 31.293 1.558 1.556 LC6 -LS - 2 31.293 0.000 -2.130 10.500 . 1.542 1.522 23.400 21.700 24.152 0.000 -2.250 1.333 1.308 LC7 -LS - 2 0.000 -2.220 1.895 1.816 16.576 LC8 -LS - 1 42,818 0.000 -1.500 16.800 1.387 1.385 LC8 -LS - 2 LC8 -LS - 3 LC8 -LS - 4 0.000 -1.500 42.818 16,200 1.359 1.356 0.000 -1.500 15.500 1.330 1.325 42.818 13.800 12.300 1.281 0.000 -1.660 1.290 43,421 LC8 -LS - 5 0.000 -2.000 43.421 1.324 1.288 1.409 26'.788 -1.500 -2.000 11.500 1.418 LC9 -LS - 2 26.788 -1.500 -2.000 11.150 1.459 1.456 LC9 -LS - 3 1.388 26.788 -1.500 -2.000 9.950 1.425 LC10 -LS - 3 LC11 -LS - 1 31.950 2.000 -2.500 16.400 1.748 1.717 -2.000 -2.500 -2.500 -2.000 -2.000 -2.500 31.079 7.900 1.692 1.692 LC11 -LS - 2 31.079 7.400 1.686 1.686 LC11 -LS - 3 1.578 6.800 1.574 31.079 LC1 -LU - 1 85.534 LC1 -LU - 2 85.534 1.227 0.000 -2.100 18,740 1.189 0.000 -12.000 6.800 1.164 1.128 LC1 -LU - 3 0.000 -6.000 85.534 12.320 1.342 1.318 5.760 LC2 -LU - 1 174\_600 0.000 -6.000 1.136 1.121 LC2 -LU - 2 174.300 0.000 -9,000 4.290 1.039 1.029 LC3 -LU - 1 131.828 0.000 -4.000 8.000 0.965 0.952 132.569 LC3 -LU - 2 0.000 -8.000 6.350 1.099 1.110 0.000 -4.000 0.000 -12.000 131.345 134.311 LC3 -LU - 3 8.500 1.024 1.011 LC4 -LU - 1 7.720 1.059 1.045 0.000 -18.000 LC4 -LU - 2 134.311 5.180 0.940 ~0.949 LC4 -LU -0.000 -6.000 140.603 10.660 1.037 1.017 LC5 -LU - 1 117.934 0.000 -4.000 13.690 1.118 1.090 LC5 -LU - 2 117.934 0.000 -8.000 9.320 1.095 1.076 LC5 -LU - 3 115.581 0.000 -6.000 11.780 1,121 1.144 LC5 -LU - 4 115.581 0.000 -10.000 7,990 1.057 1.040 LC6 -LU - 1 95.922 0.000 -5.000 28.750 1.126 1.152 0.000 -10.000 19.490 95.922 LC6 -LU - 2 1.127 1.144 LC10 -LU - 1 LC10 -LU - 2 0.000 -5.500 96.910 24.800 1.062 1.040 96.910 0.000 -5.500 25.000 1.071 1.048 LC7 -LU - 1 LC7 -LU - 2 1.500 -3.500 6.500 1.747 1.729 71.688 1.500 -3.500 1.500 -3.500 71.688 5.800 1.667 1.643 LC7 -LU - 3 LC8 -LU - 1 71.688 1.682 5.350 1.656 1.000 -2.000 11.850 1.276 1.228 136.650 136.650 1.000 -2.000 1.293 LC8 -LU - 2 12.000 1\_246 LC8 -LU - 3 133.902 1.000 -4.000 10.750 1.272 1,229 LC8 -LU - 4 133.902 1.000 -4.000 10,550 1.249 1.206 LC8 -LU - 5 136.017 1.000 -6.000 8.900 1.214 1.177 LC8 -LU -136.017 1,000 -6,000 9,350 1.274 1.233 LC9 -LU - 1 115.903 -0.380 -3.940 14.000 1.052 1.011 10.100 0.898 LC9 -LU - 2 115.903 -0.380 -6.000 0.927 LC9 -LU - 3 0.958 0.928 117.081 -0.380 -6.000 10,600 LC9 117.081 -0.630 -3.940 11.700 0.942 0.911 463.000 0.000 0.000 3.600 1.026 0.968

## TABLE C54(CONT) ALL TEST RESULTS FROM PEKOZ (1987), TABLES 3.3-2 , 3.3-3 , 3.3-4 , 7.3-2 , 7.3-3 , 7.3-4 , 7.3-5

Ci		A.V		Ptest	rc	га
Specimen	¥max/t 463.800	ex 0.000	ey 0.000	3.640		0.968
A74 A75	463.600	0.000	0.000	3.480	0.983	0.926
	446.385	0.000	0.000	3.260		0.921
A76	311.000	0.000	0.000	8.300	1.086	1.022
A101		0.000	0.000	7.870	1.037	0.975
A102	311,000 310,459	0.000	0.000	8.340	1.103	1.037
A103		0.000	0.000	7.760	0.753	0.740
A104	301.000 198.719		0.000	17.200	1.114	1.029
A151	202.964	0.000	0.000	15.700	1.054	0.974
A152			0.000	16.000	1.137	1.055
A153	210.630	0.000	0.000	16.400	1.150	1.077
A154	207.182	0.000	0.000	15.500	1.078	0.998
A156	206.273	0.290	0.000	3.120	1.075	1.047
L1	116.937	0.290	0.000	3.600	1.062	1.034
L2	116.406			3.520	0.967	0.934
L3	118.406	0.400	0.000	3,780	0.979	0.952
L4	117.437	0.400		4.100	1.015	0.995
L5	117.031	0.410	0.000		1.155	1.098
L6	149.312	0.070	0.000	3.800		1.050
L7	147.500	0.070	0.000	3.970	1.097	1.059
L8	147.625	0.070	0.000	4.310		
L9	149.219	0.180	0.000	4.340	1.072	1.028
L10	148.719	0.190	0.000	4.570	1.070	1.036
L11	147.937	0.190	0.000	4.650	1.038	1.015
L12	178.906	0.180	0.000	3.350	1.147	1.098
L13	179.250	0.180	0.000	3.530	1.100	1.060
L14	178.687	0.180	0.000	3.850	1.129	1.097
L15	181.406	0.000	0.000	4.900	1.109	1.058
L16	181.406	0.000	0.000	5.180	1.104	1.066
L17	179.031	0.000	0.000	5.310	1.077	1.051
L18	211.031	0.220	0.000	3.130	1.155	1.106
L19	210.000	0.220	0.000	3.390	1.141	1.101
L20	210,594	0.220	0.000	3.670	1.136	1.105
Mean	. *				1.224	1.192
C.O.V.					0.191	0.200
I					0.960	0.921
F. S.					1.597	1.666

APPENDIX D - CORRELATION USING AISC-LRFD BEAM COLUMN INTERACTION EQUATIONS

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TABLE D1

BOX SECTIONS OF DEWOLF, PEKOZ AND WINTE)

USING LRFD BEAM COLUMN EQUATION

(Using yield stress of flats))

USING AISC-LRFD BEAM-COLUMN EQUATIONS

Specimen wmax/t Ptest rc

S1 58.345 32.164 1.144

S1 58.345 32.164 1.145

S1 58.345 32.164 1.145

S1 58.345 17.974 1.158

S2 84.207 34.917 1.126

S2 84.207 34.917 1.126

S2 84.207 21.424 1.151

S2 84.207 17.716 1.210

S3 118.690 36.918 1.173

S3 118.690 35.028 1.149

S3 118.690 19.530 1.104

S3 118.690 19.530 1.104

S3 118.690 19.530 1.104

S4 153.172 36.654 1.154

S4 153.172 33.674 1.147

S4 153.172 33.674 1.147

S4 153.172 13.708 1.052

Mean 1.331

C.O.V. 1.036
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TABLE D2

BACK TO BACK CHANNELS OF DEWOLF, PEKOZ AND WINTER (1973)

USING LRFD INTERACTION EQUATIONS

(Using yield stress of flats)

USING AISC-LRFD BEAM-COLUMN EQUATIONS ыпах/t Ptest 16.241 24.747 16.241 21.413 16.241 20.453 16.241 12.204 1.175 1.188 1.467 Specimen 24.747 21.413 20.453 12.204 ינו טו U1 U2 U2 U2 U2 U3 U3 U3 U3 U4 U4 U4 U4 1.194 16.241 12.204 20.552 26.166 20.552 25.418 20.552 20.434 20.552 15.014 24.862 26.968 24.862 23.563 24.862 27.45 24.862 17.978 29.172 27.491 29.172 23.426 29.172 20.101 1.215 1.181 1.282 1.377 20.434 15.014 26.968 23.563 22.745 17.978 27.491 23.426 1.267 1.233 1.174 1.410 1.302 1.243 1.166 1.393 Mean 1,267

c.o.v. I FS 0.076

1.344

TABLE D3
TEST RESULTS OF WENG AND PEKOZ (1987)

	(Using y	ield st	ress of	flats)	<b>.</b>	
	USING AISC-L			N EQUAL:	UNS	
Specimen	wmax/t	ex	ey	Ptest	rc	ra
RFC11 #1	21.908	0.000	0.000	32.300	1.072	1.026
RFC11 #2	21.840	0.000	0.000	30.300	1,144	1.051
RFC11 #3	21.790	0.000	0.000	28.500	1.255	1.106
RFC11 #4	21.891	0.000	0.000	19.700	1.082	0.924
RFC13 #1	26.771	0.000	0.000	30.200	0.999	0.947
RFC13 #2	26.688	0.000	0.000	29.200	1.122	1.014
RFC13 #3	26.698	0.000	0.000	23.800	1.140	0.984
RFC13 #4	26.635	0.000	0.000	17.000	1.069	0.918
RFC14 #1	31,987	0.000	0.000	25.300	0.979	0.944
RFC14 #2	32.133	0.000	0.000	22.300	0.983	0.895
RFC14 #3	32.000	0.000	0.000	16.400	0.880	0.766
RFC14 #4	32.107	0.000	0.006	12,700	0.866	0.739
RFC14 #5	31,907	0.000	0.000	9.700	0.921	0.808
PBC13 #1	29.103	0.000	0.000	18.000	0.886	0.850
PBC13 #2	29.253	0.000	0.000	17.500	0.965	0.890
	29.184	0.000	0.000	16.000	1.046	0.922
PBC13 #3		0.000	0.000	16.100	1.005	0.967
PBC14 #1	35.873		0.000	15.600	1.092	1.012
PBC14 #2	35.789	0.000		13.000	1.048	0.933
PBC14 #3	35.817	0.000	0.000	11.200	1.079	0.927
PBC14 #4	35.389	0.000	0.000	9.700	1.181	1.013
PBC14 #5	35.972	0.000	0.000		1.043	0.989
R13 #1	27.884	0.000	0.000	26.200		1.005
R13 #2	27.860	0.000	0.000	23.800	1.113	
R13 #3	27.953	0.000	0.000	17.800	1.019	0.880
R13 #4	27.965	0.000	0.000	13.200	1.009	0.867
R13 #5	27 <b>.</b> 90 <b>7</b>	0.000	0.000	10.100	1.007	0.883
R14 #1	32,413	0.000	0.000	23.200	1.050	0.997
R14 #2	32.267	0.000	0.000	19.400	1.009	0.916
R14 #3	32.373	0.000	0.000	15.400	0.982	0.852
R14 #4	32.413	0.000	0.000	11.600	0.959	0.820
R14 #5	32.280	0.000	0.000	8.500	0.942	0.827
P11 #1	38.517	0.000	0.000	34.200	1.005	0.950
P11 #2	38,568	0.000	0.000	30.400	1.017	0.923
P11 #3	37.603	0.000	0.000	27,800	0.978	0.852
P11 #4	37.570	0.000	0.000	22.300	0.975	0.832
P36 #1	36.391	0.000	0.000	11.200	0.996	0.938
P16 #2	36,469	0.000	0.000	10.400	1.040	0.944
P16 #3	36.484	0.000	0.000	8.000	0.982	0.858
P16 #4	36.297	0.000	0.000	6.900	0,996	0.850
P16 #5	36.328	0.000	0.000	6.200	1.044	0.899
Mean					1.024	0.918
C.O.V.					0.078	0.086
l	;				0.922	0.820
FS					1,663	1.869

TABLE D4
TEST RESULTS OF WENG AND PEKOZ (1987)

(Using calculated average yield stress - all sections)
USING AISC-LRFD BEAM-COLUMN EQUATIONS

Specimen	Wmax/t	AY	. ey	Ptest	rc	ra
		ex		32.300	0.978	0.933
RFC11 #1	21.908	0.000	0.000			0.965
RFC11 #2	21.840	0.000	0.000	30.300	1.058	
RFC11 #3	21.790	0.000	0.000	28.500	1.182	1.032
RFC11 #4	21.891	0.000	0.000	19.700	1.043	0.890
RFC13 #1	26.771	0.000	0.000		0.999	0.947
RFC13 #2	26,688	0.000	0.000	29.200	1.122	1.014
RFC13 #3	26.698	0.000	0.000	23.800	1.140	0.984
RFC13 #4	26.635	0.000	0.000	17.000	1.069	0.918
RFC14 #1	31.987	0.000	0.000	25.300	0.923	0.888
RFC14 #2	32.133	0.000	0.000	22.300	0.921	0.850
RFC14 #3	32,000	0.000	0.000	16.400	0.840	0,726
RFC14 #4	32,107	0.000	0.000	12.700	0.846	0.725
RFC14 #5	31.907	0.000	0.000	9,700	0.921	0.808
PBC13 #1	29, 103	0.000	0.000	18.000	0.822	0.785
PBC13 #2	29.253	0.000	0.000	17.500	0.905	0.829
PBC13 #3	29.184	0.000	0.000	16,000		0.871
PBC14 #1	35.873	0.000	0.000	16.100	0.933	0.895
PBC14 #2	35.789	0.000	0.000	15,600	1.024	0.943
P8C14 #3	35.817	0.000	0.000	13.000	0.995	0.880
	35.389	0.000	0.000	11,200	1.041	0.891
PBC14 #4 PBC14 #5	35.972	0.000	0.000	9.700	1,162	1.006
	27,884	0.000	0.000	26.200	0.950	0.896
R13 #1			0.000	23.800	1.032	0.923
R13 #2	27.860	0.000		17.800	0.968	0.831
R13 #3	27,953	0.000			0.991	0.864
R13 #4	27.965	0.000	0.000	13.200		
R13 #5	27.907	0.000	0.000	10.100	1.007	0.883
R14 #1	32.413	0.000	0.000	23.200	0.973	0.934
R14 #2	32.267	0.000	0.000	19.400	0.944	0.850
R14 #3	32.373	0.000	0.000	15,400	0.937	0.807
R14 #4	32.413	0.000	0.000	11.600	0.939	0.810
R14 #5	32.280	0.000	0.000	8.500	0.942	0.827
P11 #1	38.517	0.000	0.000	34.200	0.920	0.865
P11 #2	38.568	0.000	0.000	30,400	0.945	0.850
P11 #3	37.603	0.000	0.000	27.800	0.930	0.805
P11 #4	37.570	0.000	0.000	22.300	0.948	0.810
P16 #1	36.391	0.000	0.000	11.200	0.996	0.938
P16 #2	36.469	0.000	0.000	10.400	1.040	0.944
P16 #3	36.484	0.000	0.000	8.000	0.941	0.816
P16 #4	36.297	0.000	0.000	6.900	0.996	0.850
P16 #5	36.328	0.000	0.000	6.200	1.044	0.899
Mean					0.984	0.880
C.O.V.					0.082	0.081
					0.882	0.789
I FS	*				1.738	1.943
ГÐ					14120	

### TABLE D5 TEST RESULTS OF WENG AND PEKOZ (1987)

### (Using calculated average yield stress) USING AISC-LRFD BEAM-COLUMN EQUATIONS

	DOING WIRE	אבט פבא.	4-5000	IN EACV: I		
Specimen	wmax/t	ex	ey	Ptest	rc	ra
RFC11 #1	21.908	0.000	0.000	32.300	0.978	0.933
RFC11 #2	21.840	0.000	0.000	30.300	1.058	0.965
RFC11 #3	21.790	0.000	0.000	28.500	1.182	1.032
RFC11 #4	21.891	0.000	0.000	19.700	1.043	0.890
RFC13 #1	26.771	0.000		30.200	0.999	0.947
RFC13 #2	26.688	0.000	0.000	29.200	1.122	1.014
			0.000	23.800	1.140	0.984
RFC13 #3	26.698		0.000	17.000	1.069	0.918
RFC13 #4	26.635	0.000			0.979	0.944
RFC14 #1	31.987	0.000	0.000	25.300		
RFC14 #2	32.133	0.000	0.000	22.300	0.921	0.850
RFC14 #3	32.000	0.000	0.000	16.400	0.840	0.700
RFC14 #4	32.107	0.000	0.000	12.700	0.846	0.721
RFC14 #5	31.907	0.000	0.000	9.700	0.921	0.808
PBC13 #1	29.103	0.000	0.000	18.000	0.822	0.743
PBC13 #2	29.253	0.000	0.000	17.500	0.905	0.789
PBC13 #3	29.184	0.000	0.000	16.000	0.994	0.838
PBC14 #1	35,873	0.000	0.000	16.100	0.933	0.853
PBC14 #2	35.789	0.000	0.000	15,600	1.024	0.895
PBC14 #3	35,817	0.000	0.000	13.000	0.995	0.842
PBC14 #4	35.389	0.000	0.000	11,200	1.041	0.867
PBC14 #5	35,972	0.000	0.000	9.700	1.162	1,006
R13 #1	27.884	0.000	0.000	26.200	0.950	0.836
R13 #2	27.860	0.000	0.000	23,800	1.032	0.872
R13 #3	27.953	0.000	0.000	17.800	0.968	0.802
R13 #4	27.965	0.000	0.000	13.200	0.991	0.864
R13 #5	27.907	0.000	0.000	10.100	1.007	0.883
R14 #1	32.413	0.000	0.000	23.200	0.973	0.934
		0.000	0.000	19.400	0.944	0.810
R14 #2	32.267	0.000	0.000	15.400	0.937	0.779
R14 #3	32.373			11.600	0.939	0,809
R14 #4	32.413	0.000	0.000	8.500	0.942	0.827
R14 #5	32.280	0.000	0.000		0.920	0.803
P11 #1	38.517	0.000	0.000	34.200		
P11 #2	38.568	0.000	0.000	30.400	0.945	0.795
P11 #3	37.603	0.000	0.000	27.800	0.930	0.771
P11 #4	37.570	0.000	0.000	22.300	0.948	0.801
P16 #1	36.391	0.000	0.000	11.200	0.996	0.938
P16 #2	36.469	0.000	0.000	10.400	1.040	0.944
P16 #3	36.484	0.000	0.000	8.000	0.941	0.787
P16 #4	36.297	0.000	0.000	6.900	0.996	0.850
P16 #5	36.328	0.000	0.000	6.200	1.044	0.899
Mean	<del></del> ,		•		0.985	0.864
C.O.V.					0.081	0.094
Ĭ					0.884	0.766
FS					1.734	2.001
, 3						-

TABLE D6
HAT SECTIONS OF DAT AND PEKOZ (1980)

	(Using	yield si	tress of	f flats)		
	USING AISC-	RFD BEA	M-COLUM	AN EQUATI	ONS	
Specimen	wmax/t	- ex	ey	Ptest	rc	га
H11 -E1	3.917	0.000	0.000	18.500	1.148	1.081
H11 -E3	3.917	0.000	0.000	18.200	1.345	1.203
H11 -E4	3.917	0.000	0.000	11.800	1.197	1.022
H11 -E5	3.917	0.000	0.000	7.000	1.124	0.986,
H11 -E2	3.917	0.000	0.000	15.700	1.040	0.959
H7 -F1	4.804	0.000	0.000	45.000	1.229	1.148
H7 -F2	4.804	0.000	0.000	41.800	1.273	1.151
H7 -F3	4.804	0.000	0.000	39.600	1.272	1.134
H7 -F4	4.804	0.000	0.000	39.400	1.323	1.167
H7 -F5	4.804	0.000	0.000	30.900	1.160	1.003
HT -G1	3.333	0.000	0.000	97.400	1.040	0.967
HT -G1	3.333	0.000	0.000	78.000	1.007	0.889
HT -G3	3.333	0.000	0.000	65.800	1.120	0.956
HT -G4	3.333	0.000	0.000	42.750	1.115	0.978
HT -GS	3.333	0.000	0.000	35.400	1.089	0.954
Mean					1.165	1.040
c.o.v.				-	0.090	0.094
I					1.038	0.922
FS					1,477	1.662

## TABLE D7 HAT SECTIONS OF DAT AND PEKOZ (1980)

	USING AISC-I	.RFD BE <i>l</i>	AM-COLUM	IN EQUAL.	UNS	
Specimen	wmax/t	ex	ey	Ptest	rc	ra
H11 -E1	3.917	0.000	0.000	18.500	1.148	1.081
H11 -E3	3.917	0.000	0.000	18.200	1.345	1.203
H11 -E4	3.917	0.000	0.000	11.800	1.197	1.022
H11 -E5	3.917	0.000	0.000	7.000	1.124	0.986.
H11 -E2	3.917	0.000	0.000	15.700	1.040	0.959
H7 -F1	4.804	0.000	0.000	45.000	1.229	1.148
H7 -F2	4.804	0.000	0.000	41,800	1.273	1.151
H7 -F3	4_804	0.000	0.000	39.600	1.272	1.134
H7 -F4	4.804	0.000	0,000	39.400	1.323	1.167
H7 -F5	4.804	0.000	0.000	30.900	1.160	1,003
HT -G1	3.333	0.000	0.000	97.400	1.040	0.967
HT -G1	3.333	0.000	0.000	78,000	1.007	0.889
HT -G3	3.333	0.000	0.000	65.800	1.120	0.956
HT -G4	3.333	0.000	0.000	42.750	1.115	0.978
HT -G5	3.333	0.000	0.000	35.400	1.089	0.954
Mean					1.165	1.040
C.O.V.					0.090	0.094
I					1.038	0.922
EC					1.477	1.662

TABLE D8
HAT SECTIONS OF DAT AND PEKOZ (1980)

	. OGING MISC.	TUID DEV	AL COLOR	SH FANAL	10110		
Specimen	MIRAX/T	ex.	ey	Ptest	rc	гa	
H11 -E1	3.917	0.000	0.000	18.500	0.985	0.917	
H11: -E3	3.917	0.000	.0.000	18.200	1.197	1.053	
H11 -E4	3.917	0.000	0.000	11,800	1.136	0.975	
H11 -E5	3.917	0.000	0.000	7.000	1.124	0.986	
H11 -E2	3.917	0.000	0.000	15.700	0.904	0.822	
H7:-F1	4.804	0.000	0.000	45.000	1 042	0.960	
H7 -F2	4.804	0.000	0.000	41.800	1.107	0.983	
H7 -F3	4.804	0.000	0.000	39.600	1.120	0.980	
H7 -F4	4,804	0.000	0.000	39.400	1.176	1.020	
H7: -F5	4.804	0.000	0.000	30.900	1.059	0.904	
HT -G1	3.333	0.000	0.000	97.400	1.003	0.930	
HT -G1	3.333	0.000	0.000	78.000	0.980	0.862	
HT -G3	3.333	0.000	0.000	65.800	1.104	0.942	
HT -G4	3,333	0.000	0.000	42.750	1.115	0.978	
HT -G5	3.333	0.000	0.800	35.400	1.089	0.954	
Mean					1.076	0.951	
C.O.V.				:	0.074	0.062.	
I	*. *				0.971	0.866	
FS					1.580	1.772	

## TABLE D9 LIPPED CHANNELS OF DAT AND PEKOZ (1980)

US	ING AISC-L	.RFD BEA	M-COLDH		ONS	
Specimen	wmax/t	ex	ey	Ptest	rc	ra
PBC14 -A3	34.247	0.000	0.000	20.200	1.065	1.025
PBC14 -A5	34.247	0.000	0.000	19.300	1.137	1.053
PBC14 -A9	34.247	0.000	0.000	13.950	1.044	0.911
	34,541	0.000	0.000	11.200	1.034	0.883
PBC14 -A11	34.247			11.200		
PBC14 -A13	34.247	0.000	0.000	10.500	1.165	1.011
PBC14 -A14	34.247	0.000	0.000	8.200	1.171	1.028
PBC14 -A1	34.247	0.000	0.000	19.000	0.963	0.940
PBC14 -A2	34.247	0.000	0.000	16.900	0.891	0.857
PBC14 -A4	34.247	0.000	0.000	16.300	0.904	0.854
PBC14 -A6	34.247	0.000	0.000	14.400	0.848	0.786
PBC14 -A7	34.247	0.000	0.000	13.500	0.853	0.774
PBC14 -A8	34.247	0.000	0.000	13.660	0.934	0.830
PBC14 -A10	34.247	0.000	0.000	10.450	0.864	0.743
PBC14 -A12	34.247	0.000	0,000	9.500	0.990	0.849
			0.000	19.500	0.945	0.906
RFC14 -B2	34.247	0.000		18.000	0.984	0.906
RFC14 -B4	34.247	0.000	0.000			
RFC14 -B5	34.247	0.000	0.000		1.032	0.909
RFC14 -B6	34.247	0.000	0.000	15.500	0.999	0.881
RFC14 -B9	34.247	0.000	0.000	8.800	1.028	0.903
RFC14 -B10	34.247	0.000	0.000	8.000	0.935	0.821
RFC14 -B11	34.247	0.000	0,000	9:050	1.177	1.032
RFC14 -B1	34.247	0.000	0.000	18.500	0.896	0.860
RFC14 -B3	34.247	0.000	0.000	16.300	0.891	0.820
RFC14 -B7	34.247	0.000	0.000	14.000	0.903	0.795
RFC14 -B8	34.247	0.000	0.000	11.500	0.914	0.781
PBC13 -C3	27.778	0.000	0.000	26.400	1.321	1.229
PBC13 -C4	27.778	0.000	0.000	21.600	1.244	1.112
PBC13 -C5	27.778	0.000	0.000	15.850	1.091	0.941
PBC13 -C6	27.778	0.000	0.000	9.950	0.979	0.854
	27.778	0.000	0.000	7.700	1.121	0.982
	27.110		0.000	35.000	1.580	1.523
PBC13 -C1	27.778	0.000		23,380	1.056	1.017
PBC13 -C2	27.778	0.000	0.000			
RFC13 -D6	27.778	0.000	0.000	29.500	1.467	1.364
RFC13 -D7	27.778	0.000	0.000	24.500	1.302	1.186
RFC13 -D8	27.778	0.000	0.000	23.000	1.318	1.177
RFC13 -D9	27.778	0.000	0.000	20.000	1,248	1.093
RFC13 -D10	27.778	0.000	0.000	16.000	1.097	0.946
RFC13 -D11	27.778	0.000	0.000	13.350	1.015	0.867
RFC13 -D12	27.778	0.000	0.000	12.200	1.039	0.889
RFC13 -D13	27.778	0.000	0.000	9.030	0.994	0.872
RFC13 -D1	27.778	0.000	0.000	34.200	1.463	1.435
RFC13 -D2	27.778	0.000	0.000	17,000	0.734	0.718
RFC13 -D3	27,778	0.000	0.000	35.000	1.569	1.513
RFC13 -D3	27.778	0.000	0.000	22.300	1.000	0.964
	27.778	0.000	0.000	34,500	1.621	1.537
RFC13 -D5	21.110	0.000	3.000	344300	1.085	0.986
Mean					0.193	0.213
c.o.v.						
I					0.848	0.746
FS					1.809	2.057

TABLE D10 LIPPED CHANNELS OF DAT AND PEKOZ (1980)

(Using cal	culated a	verage : RFD BEA	yield s M-COLUM	tress - : IN EQUATI	all sec	tio)
Specimen	wmax/t	ex	ey	Ptest '	rc .	ra
PBC14 -A3	34.247	0.000	0.000	20.200	1.065	1.025
PBC14 -A5	34.247	0.000	0.000	19.300	1.137	1.053
PBC14 -A9	34.247	0.000	0.000	13.950	1.044	0.911
	34.247	0.000	0.000	11,200	1.034	0.883
PBC14 -A11		0.000	0.000	10.500	1.165	1.011
PBC14 -A13	34.247			8.200	1,171	1.028
PBC14 -A14	34.247	0.000	0.000		0.963	0.940
PBC14 -A1	34.247	0.000	0.000	19.000	0.891	0.857
PBC14 -A2	34.247	0.000	0.000	16.900	0.904	0.854
PBC14 -A4	34.247	0.000	0.000	16.300		0.786
PBC14 -A6	34.247	0.000	0.000	14,400	0.848	
PBC14 -A7	34.247	0.000	0.000	13.500	0.853	0.774
PBC14 -A8	34.247		0.000	13.660	0.934	0.830
PBC14 -A10	34.247	0.000	0.000	10.450	0.864	0.743
PBC14 -A12	34.247	0.000	0.000	9.500	0.990	0.849
RFC14 -B2	34.247	0.000	0.000	19.500	0.945	0.906
RFC14 -B4	34.247	0.000	0.000	18.000	0.984	0.906
RFC14 ~B5	34.247	0.000	0.000	16.000	1.032	0.909
RFC14 -86	34.247	0.000	9.000	15.500	0.999	0.881
RFC14 -89	34,247	0.000	0.000	8.800	1.028	0.903
RFC14 -B10	34.247	0.000	0.000	8.000	0.935	0.821
RFC14 -B11	34.247	0.000	0.000	9.050	1.177	1.032
RFC14 -B1	34.247	0.000	0.000	18.500	0.896	0.860
RFC14 -B3	34.247	0.000	0.000	16.300	0.891	0.820
RFC14 -B7	34.247	0.000	0.000	14.000	0.903	0.795
RFC14 -B8	34.247	0.000	0.000	11.500	0.914	0.781
PBC13 -C3	27,778	0.000	0.000	26.400	1.321	1.229
PBC13 -C4	27.778	0.000	0.000	21.600	1.244	1.112
PBC13 -C5	27.778	0.000	0.000	15.850	1.091	0.941
PBC13 -C6	27.778	0.000	0.000	9.950	0.979	0.854
PBC13 -C7	27.778	0.000	0.000	7.700	1,121	0.982
PBC13 -C1	27.778	0.000	0.000	35.000	1.580	1.523
PBC13 -C2	27.778	0.000	0.000	23.380	1.056	1.017
RFC13 -D6	27.778	0.000	0.000	29.500	1.467	1.364
RFC13 -D7	27.778	0.000	0.000	24.500	1.302	1.186
RFC13 -08	27.778	0.000	0.000	23.000	1.318	1.177
RFC13 -D9 .	27,778	0.000	0.000	20.000	1.248	1.093
RFC13 -D10	27,778	0.000	0.000	16.000	1.097	0.946
RFC13 -D11	27,778	0.000	0.000	13.350	1.015	0.867
RFC13 -D12	27.778	0.000	0.000	12.200	1.039	0.889
RFC13 -D13	27.778	0.000	0.000	9.030	0.994	0.872
RFC13 -D1	27,778	0.000	0.000	34.200	1.463	1.435
RFC13 -D2	27,778	0.000	0.000	17,000	0,734	0.718
RFC13 -D3	27,778	0.000	0.000	35.000	1.569	1.513
RFC13 -D4	27,778	0.000	0.000	22.300	1.000	0.964
RFC13 -D5	27.778	0.000	0.000	34.500	1.436	1.350
Mean					1.081	0.982
C.O.V.					0.185	0.204
I					0.855	0.753
FS					1.794	2.036

#### TABLE D11 LIPPED CHANNELS OF DAT AND PEKOZ (1980)

#### (Using calculated average yield stress)

USI	NG AISC-L	RFD BEA	M-COLUM	N EQUATI	ONS	
Specimen	wmax/t	ex	ey	Ptest	rc	ra
PBC14 -A3	34.247	0.000	0.000	20.200	0.942	0.902
PBC14 -A5	34.247	0.000	0.000	19.300	1.022	0.937
PBC14 -A9	34.247	0.000	0.000	13.950	0.973	0.839
PBC14 -A11	34.247	0.000	0.000	11.200	0.994	0.851
PBC14 -A13	34.247	0.000	0.000	10.500	1.153	1.011
PBC14 -A14	34.247	0.000	0.000	8,200	1.171	1.028
PBC14 -A1	34.247	0.000	0.000	19.000	0.847	0.826
PBC14 -A2	34.247		0.000	16.900	0.788	0.755
PBC14 -A4	34.247	0.000	0.000	16.300	0.805	0.755
PBC14 -A6	34.247	0.000	0.000	14.400	0.762	0.699
PBC14 -A7	34.247	0.000	0.000	13.500	0.774	0.694
PBC14 -A8	34.247	0.000	0.000	13.660	0.859	0.754
PBC14 -A10	34.247	0.000	0.000	10.450	0.817	0.698
PBC14 -A12	34,247	0.000	0.000	9.500	0.967	0.845
RFC14 -B2	34.247		0.000	19.500	0.888	0.852
RFC14 -B4	34.247	0.000	0.000	18.000	0.931	0.852
RFC14 -85	34.247	0.000	0.000	16.000	0.988	0.866
RFC14 -B6	34.247	0.000	0.000	15.500	0.957	0.839
RFC14 -B9	34.247	0.000	0.000	8.800	1.028	0.903
RFC14 -B10	34.247	0.000	0.000	8.000	0.935	0.821
RFC14 -B10	34.247	0.000	0.000	9.050	1.177	1.032
RFC14 -B1	34.247	0.000	0.000	18.500	0.842	0.809
RFC14 -B3	34.247	0.000	0.000	16.300	0.843	0.772
RFC14 -B7	34.247	0.000	0.000	14.000	0.865	0.758
RFC14 -B7	34.247	0.000	0.000	11.500	0.889	0.759
PBC13 -C3	27.778	0.000	0.000	26.400	1.173	1.080
PBC13 -C4		0.000	0.000	21.600	1.130	0.997
PBC13 -C5	27.778 27.778	0.000	0.000	15.850	1.020	0.872
PBC13 -C6	27.778	0.000	0.000	9.950	0.974	0.854
PBC13 -C7	27.778	0.000	0.000	7.700	1.121	0.982
PBC13 -C1	27.778	0.000	0.000	35.000	1.380	1.323
	27.778	0.000	0.000	23.380	0.922	0.884
		0.000	0.000	29.500	1.311	1.207
RFC13 -D6	27.778 27.778	0.000	0.000	24.500	1.174	1.058
RFC13 -D7		0.000	0.000	23.000	1.204	1.061
RFC13 -D8	27.778 27.778	0.000	0.000	20.000	1.154	0.999
RFC13 -D9	27.778	0.000	0.000	16.000	1.030	0.881
RFC13 -D10	27.778	0.000	0.000	13.350	0.969	0.827
RFC13 -D11		0.000	0.000	12.200	1.009	0.876
RFC13 -D12	27.778 27.778	0.000	0.000	9.030	0.994	0.872
RFC13 -D13				34.200	1.277	1.249
RFC13 -D1	27.778	0.000	0.000	17.000	0.641	0.625
RFC13 -D2	27.778		0.000	35,000	1.379	1.322
RFC13 -D3	27.778	0.000	0.000	22.300	0.879	0.842
RFC13 -D4	27.778			34.500	1,436	1.350
RFC13 -D5	27.778	0.000	0.000	J4.,100	1.009	0.912
Mean					0.178	0.188
c.o.v.					0.807	0.717
1					1.901	2.138
FS					1.701	£. 130

# TABLE D12 TEST RESULTS OF MULLIGAN AND PEKOZ (1983) ECCENTRICALLY LOADED COLUMNS

#### (Using yield stress of flats)

	USING AISC"L	KLR BEY	いれっしひじわし	JU EKOVII	UNO	
Specimen	₩max/t	ex	ey	Ptest	LC	ra
C1.1		0.203	0.000	8.000	1.027	1.010
C2.1	124.170	0.536	0.000	10.300	1.236	1.206
C2.2	121.708		0.000	8.750	0.995	0.970
	121.167		0.000	6.750	1.239	1.212
c2.4	121.083		0.000	12,400	1.111	1.075
C2.1	184.417		0.000	10.400	1.004	0.951
CZ.2	183.125		0.000	10,000	0.908	0.843
1277	175.313		0.000	12.500	1.149	1.121
C2.2	175.458		0.000	8.750	0.790	0.770
Mean					1.051	1.018
C.O.Y.					0.142	0.150
I	: *				0.884	0.847
FS					1.734	1.810

# TABLE D13 TEST RESULTS OF MULLIGAN AND PEKOZ (1983) ECCENTRICALLY LOADED COLUMNS

#### (Using calculated average yield stress - all sectio)

	USING AISC-LAFD BEA	M-COLUI	MN EGUAL:	LONS	4
Specimen	wmax/t ex	ey	Ptest	FC	ra
C1.1	121.500 -0.203	0.000	8.000	1.006	0,989
C2.1	124.170 -0.536	0.000	10.300	1.223	1.192
c2.2	121.708 -0.534	0.000	8,750	0.984	0.959
C2.3	121.167 0.982	0.000	6.750	1.221	1.195
C2.4	121.083 -0.212	0.000	12,400	1.101	1.065
	184.417 -0.424	0.000	18.400	0.998	0.944
C2.1		0.000	10.000	0.902	0.835
C2.2	183.125 -0.397		12,500	1.143	1.114
C2.1	175.313 -0.521	0.000			
CZ.2	175,4580,515	0.000	8.750	0.785	0.765
Mean				1.040	1.006
c.p.v.				0.140	0.149
ī				0.877	0.839
FS	-			1.749	1.828

# TABLE D14 TEST RESULTS OF MULLIGAN AND PEKOZ (1983) ECCENTRICALLY LOADED COLUMNS

Specimen		wmax/t	ex	ey	Ptest	· rc	ra
C1.1		121.500	-0.203	0.000	8.000	1.027	1.010
C2.1		124.170	-0.536	0.000	10.300	1.236	1.206
C2.2		121.708	-0.534	0.000	8.750	0.995	0.970
C2.3		121.167	0.982	0.000	6.750	1,239	1.212
C2.4			-0.212	0.000	12,400	1.111	1.075
c2.1		184,417		0.000	10.400	1.004	0.951
C2.2		183.125		0.000	10.000	0.908	0.843
C2.1		175.313		0.000	12.500	1.149	1.121
C2.2		175 458		0.000	8.750	0.790	0.770
Mean						1.051	1.018
c.o.v.	4.8					0.142	0.150
ī	- " "					0.884	0.847
FS						1.734	1.810

#### TEST RESULTS OF MULLIGAN AND PEKOZ (1983) CONCENTRICALLY LOADED COLUMNS

#### (Using yield stress of flats) USING AISC-LRFD BEAM-COLUMN EQUATIONS WHREX/t ex ey Ptest ro 130.133 0.000 0.000 9.800 1.11 129.711 0.000 0.000 10.400 1.20 127.652 0.000 0.000 8.200 1.12 129.000 0.000 0.000 8.400 1.22 121.583 0.000 0.000 11.800 1.23 195.844 0.000 0.000 9.600 1.22 196.022 0.000 0.000 8.750 1.24 200.932 0.000 0.000 7.600 1.26 182.292 0.000 0.000 10.800 1.35 87.167 0.000 0.000 12.300 1.12 175.375 0.000 0.000 12.300 1.12 175.854 0.000 0.000 12.100 1.07 175.708 0.000 0.000 12.100 1.07 Specimen C1 C2 C3 C4 C5 C1 C2 C3 C4 C1 C1 C1 C2 C3 C4 C1 C1 C2 C3 C4 C1 C1 C2 C3 Mean 1.111 1.209 1.153 1.233 1.232 1.228 1.241 1.265 1.353 1.080 1.161 1.069 1.152 1.184 1.187 1.189 1.289 0.997 1.122 1.076 1.067 0.953 1.097 1.032 1.023 1.123 0.080 1.008 1.521 1.176 0.083 Mean c.o.v.

FS

1.053 1.456

# TABLE D16 TEST RESULTS OF MULLIGAN AND PEKOZ (1983) CONCENTRICALLY LOADED COLUMNS

Specimen	wmax/t	ex	ey	Ptest	rc	ra
C1	130.133	0.000	0.000	9.800	1.096	1.066
C2	129.711	0.000	0.000	10.400	1.195	1.147
C3	127.652	0.000	0.000	8.200	1.144	1.059
C4	129.000	0.000	0.000	8.400	1.224	1.141
C5	121.583	0.000	0.000	11.800	1.216	1.168
C1	195.844	0.000	0.000	9.600	1.217	1.174
C2	196.022	0.000	0.000	8.750	1.231	1.168
C3	200.932	0.000	0,000	7.600	1.256	1.180
C4	182.292	0.000	0.000	10.800	1.342	1.275
C1	87.167	0.000	0.000	11.000	0.991	0.946
C1	175.375	0.000	0.000	12.300	1.111	1.087
C2	175.854	0.000	0.000	12.100	1.067	1.021
C3	175.708	0.000	0.000	11.800	1.057	1.013
Mean					1.165	1.111
C.O.V.	•				0.083	0.080
I .	•			•	1.044	0.998
FS					1.469	1.536

# TABLE D17 TEST RESULTS OF MULLIGAN AND PEKOZ (1983) CONCENTRICALLY LOADED COLUMNS

	OSTUR VISC.	. KIY DE	AL COLO	W. Francis		
Specimen	wmax/t	ex	ey	Ptest	· rc	га
C1	130.133	0.000	0.000	9.800	1.111	1.080
C2	129.711	0.000	0.000	10.400	1.209	1.161
C3	127,652	0.000	0.000	8.200	1.153	1.069
C4	129.000	0.000	0.000	8.400	1,233	1.152
C5	121,583	0.000	0.000	11.800	1.232	1.184
C1	195.844	0.000	0.000	9.600	1.228	1.187
ČŽ	196.022	0.000	0.000	8.750	1.241	1.179
£3	200.932	0.000	0.000	7.600	1.265	1.189
C4	182.292	0.000	0.000	10.800	1.353	1.289
Č1	87.167	0.000	0.000	11.000	0.997	0.953
C1	175.375	0.000	0.000	12.300	1.122	1.097
C2	175.854	0.000	0.000	12.100	1.076	1.032
C3	175.708	0.000	0.000	11.800	1.067	1.023
	173.700	0.000	0.000	11.000	1.176	1.123
Mean					0.083	0.080
c.o.v.	•					
Ī					1.053	1.008
FS					1.456	1.521

# TABLE D18 HAT SECTIONS OF PEKOZ AND WINTER (1967) FROM PEKOZ (1987), TABLE 3.3-1

#### (Using yield stress of flats)

USING AISC-LRFD BEAM-COLUMN EQUATIONS	
	ra
	321
LH1 -LS - 2 20.448 0.900 0.000 2.210 1.201 1.	116
LH1-LS-3 20.448 1.400 0.000 1.570 1.006 0.	946. 1
LH2 -LS - 1 25.190 0.000 0.000 3.730 1.381 1.	211
LH2 -LS - 2 25.190 1.330 0.000 1.830 1.070 0.	989
	801
	229 -
	085
	941
	361
	011
	026
	378
	962
	914
LH6 -LS - 1 22.917 0.000 0.000 2.840 1.578 1.	379
	065
	983
	095
	162
	897
	710

# TABLE D19 HAT SECTIONS OF PEKOZ AND WINTER (1967) FROM PEKOZ (1987), TABLE 3.3-1

```
Wmax/t ex ey
20.448 0.100 0.000
                                                            Ptest
3.990
Specimen
LH1 -LS - 1
LH1 -LS - 2
LH1 -LS - 3
                                                                          1.483 1.317
                       20.448 0.700
20.448 1.400
25.190 0.000
25.190 1.330
25.190 1.860
17.000 0.760
17.000 0.760
17.000 1.260
27.813 0.000
                                                0.000
                                                              2.210
                                                                          1.176
                                                                                      1.089
                                                 0.000
                                                              1.570
                                                                          0.975
                                                                                      0.918
LH1 -LS - 3

LH2 -LS - 1

LH2 -LS - 2

LH2 -LS - 3

LH3 -LS - 1

LH3 -LS - 2

LH3 -LS - 3
                                                              3.730
1.830
                                                 0.000
                                                                          1,381
                                                                                      1.211
                                                 0.000
                                                                          1.046
                                                                                     0.968
                                                 0.000
                                                              1.290
3.220
1.780
1.280
                                                                          0.832
1.400
1.141
0.970
                                                                                      0.777
                                                 0.000
                                                                                      1.229
                                                 0.000
                                                                                      1.053
                                                 0.000
                                                                                      0.914
                        27.813
27.813
ŁH4 -LS - 1
                                                               4.000
                                                                           1.550
                                                                                      1,361
                                     0.000
                                     0.950
1.450
                                                                           1.071
                                                                                      0.995
 LH4 -LS - 2
                                                 0.000
                                                               1.810
LH4 -LS - 3
                        27.813
                                                 0.000
                                                               1.550
                                                                           1.076
                                                                                      1.006
                                                                                     1.378
0.950
LH5 -LS - 1
                        33.021
                                     0.000
                                                 0.000
                                                              3,060
                                                                           1.569
                       33.021
33.021
22.917
22.917
                                                                          1.041
0.977
1.578
1.140
LH5 -LS - 2
LH5 -LS - 3
LH6 -LS - 1
                                     1.020
1.520
                                                 0.000
                                                               1.520
                                                                                     0.901
1.379
1.043
0.966
                                                              1.270
2.840
1.470
                                                0.000
                                     0.000
0.760
LH6 -LS - 2
                                                                          1.036
LH6 -LS - 3
                        22.917
                                     1,270
                                                 0.000
                                                               1.140
                                                                                      1,081
Mean
                                                                           0.199
                                                                                      0.172
c.o.v.
                                                                           0.921
                                                                                      0.872
FS
                                                                          1.664
                                                                                      1,759
```

#### TABLE D20 HAT SECTIONS OF PEKOZ AND WINTER (1967) FROM PEKOZ (1987), TABLE 3.3-1

991	MA WITC I	THIS DE	41 4040			
Specimen	wmax/t	ex .	ey	Ptest	Г¢	ra
LH1 -LS - 1	20.448	0.100	0.000	3.990	1.483	1.317
LH1 -LS - 2	20.448	0.900	0.000	2,210	1.176	1.089
LH1 -LS - 3	20,448	1.400	0.000	1.570	0.975	0.918
LH2 -LS - 1	25.190	0.000	0.000	3.730	1.381	1.211
LH2 -LS - 2	25.190	1.330	0.000	1.830	1.046	0.968
LH2 -LS - 3	25,190	1.860	0.000	1.290	0.832	0.777
LH3 -LS - 1	17,000	0.000	0.000	3.220	1.400	1.229
LH3 -LS - 2	17.000	0.760	0.000	1.780	1.141	1.053
LH3 -LS - 3	17.000	1.260	0.000	1.280	0.970	0.914
LH4 -LS - 1	27.813	0.000	0.000	4.000	1.550	1.361
LH4 -LS - 2	27.813	0.950	0.000	1.810	1.071	0.995
LH4 -LS - 3	27.813	1.450	0.000	1.550	1.076	1.006
LH5 -LS - 1	33.021	0.000	0.000	3.060	1.569	1.378
LH5 -LS - 2	33.021	1.020	0.000	1.520	1.041	0.950
LH5 -LS - 3	33.021	1.520	0.000	1.270	0.977	0.901
LH6 -LS - 1	22.917	0.000	0.000	2.840	1.578	1.379
LH6 -LS - 2	22.917	0.760	0.000	1.470	1.140	1.043
LH6 -LS - 3	22.917	1.270	0.000	1.140	1.036	0.966
Mean	E	,			1.191	1.081
					0.199	0.172
C.O.V.					- •	
I					0.921	0.872
ř\$					1.664	1.759

# TABLE D21 LIPPED CHANNEL SECTIONS OF LOH AND PEKOZ (1985) FROM PEKOZ (1987), TABLE3.3-2

Specimen	wmax/t	ex	ey	Ptest	ΓC	ra :
LC1 -LS - 1				12.750	1.275	1.264
LC1 -LS - 2	31.744	-1.500	0.000	11.250	1.184	1.168
LC1 -LS - 3	31.744	-1.500	0.000	9,450	1.059	1.041
LC2 -LS - 1	16.515	2.000	0.000	22.000	1.793	1.776
LC2 -LS - 2			0.000	18.650	1.728	1.703
LC2 -LS - 3	16.515	2,250	0.000	17,600	1.704	1.670
Mean	,		.,		1.457	1.437
c.o.v.					0.220	0.220
Ī	2.3				1.089	1.074
FS					1.408	1.428

#### TABLE D22 LIPPED CHANNEL SECTIONS OF LOH AND PEKOZ (1985) FROM PEKOZ (1987), TABLE3.3-2

Specimen	wnax/t ex	ey	Ptest	rc	ra
LC1 -LS - 1	31.744 -1.5	0.000	12.750	1.231	1.219
LC1 -LS - 2	31,744 -1.5	000.0	11.250	1.146	1.130
LC1 -LS - 3	31.744 -1.5	0.000	9.450	1.027	1.007
LC2 -LS - 1	16.515 2.0	000.0	22.000	1.664	1.653
LC2 -LS - 2	16.515 2.2	250 0.000	18.650	1,609	1.585
LC2 -LS - 3	16.515 2.2	250 0.000	17.600	1.593	1.559
Mean				1.378	1.359
c.o.v.				0.200	0.201
I				1.065	1,048
EQ.				1.440	1.463

#### TABLE D23 LIPPED CHANNEL SECTIONS OF LOH AND PEKOZ (1985) FROM PEKOZ (1987), TABLE3.3-2

Specimen	wmax/t ex	ey	Ptest	rc	Гa
LC1 -LS - 1	31.744 -1.500	0.000	12.750	1.231	1.219
LC1 -LS - 2	31.744 -1.500	0.000	11.250	1.146	1.130
LC1 -LS - 3	31.744 -1.500	0.000	9.450	1.027	1.007
LC2 -LS - 1	16.515 2.000	0.000	22.000	1.664	1.653
LC2 -LS - 2	16.515 2.250	0.000	18.650	1.609	1.585
LC2 -LS - 3	16.515 2.250	0.000	17,600	1.593	1.559
Mean				1.378	1.359
C.O.V.	-			0.200	0.201
I	ì			1.065	1.048
FS				1.440	1,463

# TABLE D24 LIPPED CHANNEL SECTIONS OF LOH AND PEKOZ (1985) FROM PEKOZ (1987), TABLE3.3-3

031	40 WIDC-1	TLD OF	WILL POPOL	M PACULT	- VIII -	
Specimen	wmax/t	ex	ey	Ptest	rc	ra
LC3 -LS - 1	33.233	.0.000	-1.450	8.900	1.279	1.236
LC3 -LS - 2	33.685	0.000	-2.000	7.800	1.315	1.294
LC3 -LS - 3	33.685	0.000	-2.000	7.200	1,290	1.257
LC3 -LS - 4	33.685	0.000	-2.000	7.100	1.373	1.322
LC4 -LS - 1	27.111	0.000	-2.500	11.600	1.286	1.258
	27.111	0.000	-2.500	10,500	1.267	1.225
LC5 -LS - 1	16.394	0.000	-2.030	19,000	1.167	1.128
LC5 -LS - 2	16.394	0.000	-2,000	17.200	1.196	1.134
LC6 -LS - 1	31.293	0.000	-2.380	10,300	1,421	1.398
LC6 -LS - 2	31.293	0.000	-2.130	10.500	1,432	1.387
LC7 -LS - 1	24.152	0.000	-2.250	23.400	1.327	1.301
LC7 -LS - 2	16.576	0.000	-2.220	21.700	1.880	1.802
LC8 -LS - 1	42.818	0.000	-1.500	16.800	1.230	1.218
LC8 -LS - 2	42.818	0.000	-1.500	16.200	1.219	1.202
LC8 -LS - 3	42.818	0.000	-1.500	15.500	1.214	1.188
LC8 -LS - 4	43.421	0.000	-1.660	13,800	1.194	1.161
LC8 -LS - 5	43.421	0,000	-2.000	12.300	1.236	1.185
Mean					1,313	1.276
c.o.v.					0.126	0.123
1					1.127	1.099
FS					1.361	1.395

## TABLE D25 LIPPED CHANNEL SECTIONS OF LOH AND PEKOZ (1985) FROM PEKOZ (1987), TABLE3.3-3

```
Mmax/t ex ey Ptest 33.233 0.000 -1.450 8.900 33.685 0.000 -2.000 7.800 33.685 0.000 -2.000 7.200 33.685 0.000 -2.000 7.100 27.111 0.000 -2.500 10.500 10.500 16.394 0.000 -2.300 19.000
Specimen
LC3 -LS - 1
LC3 -LS - 2
LC3 -LS - 3
LC3 -LS - 4
                                                                      8.900
7.800
7.200
                                                                                     1.217 1.174
                                                                                                  1.223
1.192
                                                                                     1.244
                                                                                     1.224
                                                                                                   1.259
                                                                        7.100
                                                                                      1.310
 LC4 -LS - 1
                                                                      11.600
                                                                                      1.207
                                                                                                   1.180
LC4 -LS - 1

LC5 -LS - 1

LC5 -LS - 2

LC6 -LS - 1

LC6 -LS - 1

LC6 -LS - 2
                                          0.000 -2.500

0.000 -2.500

0.000 -2.000

0.000 -2.380

0.000 -2.130

0.000 -2.250

0.000 -1.500

0.000 -1.500
                                                                      10.500
                                                                                      1.197
                                                                                                   1.155
                           16.394
                                                                      19,000
                                                                                                   1.061
                                                                                      1.098
                           16.394
31.293
31.293
                                                                      17.200
10.300
                                                                                                   1.075
                                                                                      1.137
                                                                                                   1.362
1.353
                                                                                      1.386
                                                                      10.500
                                                                                      1.394
                                                                                      1.243
                                                                                                   1.219
                           24.152
                                                                      23.400
 LC7 -LS
                                                                      21.700
                            16.576
                                                                                      1.771
                                                                                                   1.693
                                                                                                   1.188
 LC8 -LS
                                                                                      1.200
                           42.818
                                                                      16.800
                           42.818
42.818
                                          0.000 -1.500
0.000 -1.500
                                                                      16.200
15.500
 LC8 -LS
                                                                                      1.190
 LC8 -LS -
                                                                                      1.187
                                                                                                   1.160
LC8 -LS - 4
LC8 -LS - 5
                           43.421 0.000 -1.660 13.800
43.421 0.000 -2.000 12.300
                                                                                                   1.136
                                                                                      1.168
                                                                                      1.209
                                                                                                   1.161
                                                                                      1.258
                                                                                                   1.221
Mean.
                                                                                      0.122
                                                                                                  0.119
c.o.Ÿ.
                                                                                      1.084
                                                                                                   1,057
 FS
                                                                                      1.414
                                                                                                   1.451
```

## TABLE D26 LIPPED CHANNEL SECTIONS OF LOH AND PEKOZ (1985) FROM PEKOZ (1987), TABLE3.3-3

```
MARSC-LRFD BEAM-COLUMN
33.233 0.000 -1.450
33.685 0.000 -2.000
33.685 0.000 -2.000
33.685 0.000 -2.000
27.111 0.000 -2.500
27.111 0.000 -2.500
16.394 0.000 -2.030
16.394 0.000 -2.030
31.293 0.000 -2.380
31.293 0.000 -2.130
 US
Specimen
LC3 -Ls - 1
LC3 -Ls - 2
LC3 -Ls - 3
LC3 -Ls - 4
LC4 -Ls - 1
LC4 -Ls - 1
LC5 -Ls - 1
LC5 -Ls - 2
LC6 -Ls - 2
LC6 -Ls - 2
                                                                                                                Ptest
8.900
7.800
7.200
7.100
11.600
                                                                                                                                                              1.174
1.223
1.192
1.259
                                                                                                                                          1.217
                                                                                                                                         1.244
1.224
1.310
1.207
                                                                                                                                                                1.180
                                                                     0.000 -2.500
0.000 -2.030
0.000 -2.000
0.000 -2.380
0.000 -2.130
                                                                                                                 10.500
                                                                                                                                          1,197
                                                                                                                                                                1.155
                                                                                                                 19.000
                                                                                                                                          1.098
                                                                                                                                                                1.061
                                                                                                                 17.200
10.300
10.500
23.400
21.700
                                                                                                                                          1,137
                                                                                                                                                                1.075
                                                                                                                                                               1.362
1.353
1.219
1.693
                                                                                                                                          1.386
                                            31.293
24.152
16.576
42.818
                                                                                                                                          1.394
1.243
  LC6 -LS -
LC7 -LS -
                                                                     0.000 -2.250
0.000 -2.220
0.000 -1.500
                                                                                                                                          1.771
1.200
  LC7 -LS -
 LC8 -LS - 1

LC8 -LS - 2

LC8 -LS - 3

LC8 -LS - 4

LC8 -LS - 5
                                                                                                                 16.800
16.200
                                                                                                                                                                1.188
                                            42.818
42.818
43.421
43.421
                                                                      0.000 -1.500
                                                                                                                                           1.190
                                                                                                                                                                1,172
                                                                     0.000 -1.500 15.500
0.000 -1.660 13.800
0.000 -2.000 12.300
                                                                                                                                           1.187
                                                                                                                                                                1.160
                                                                                                                                           1.168
                                                                                                                                                                1.136
                                                                                                                                          1.209
1.258
0.122
1.084
                                                                                                                                                                1.161
                                                                                                                                                               1.221
0.119
1.057
Mean
  c.c.v.
                                                                                                                                           1.414
                                                                                                                                                               1.451
  FS
```

#### TABLE D27 LIPPED CHANNEL SECTIONS OF LOH AND PEKOZ (1985) FROM PEKOZ (1987), TABLE 3.3-4

	001112 X100 61110 00111 2000:11 E-011110110								
Specimen	wmax/t	ex	ey	Ptest	rc	ra			
LC9 -LS - 1	26.788	-1.500	-2.000	11.500	1.353	1.339			
LC9 -LS - 2	26.788	-1.500	-2.000	11.150	1.415	1.390			
LC9 -LS - 3	26.788	-1.500	-2.000	9.950	1.380	1.341			
LC10 -LS - 3	31.950	2.000	-2.500	16.400	1.675	1.647			
LC11 -LS - 1	31.079	-2.000	-2.500	7.900	1.549	1.540			
LC11 -LS - 2	31.079	-2.500	-2.000	7.400	1.532	1.516			
LC11 -LS - 3	31.079	-2,000	-2.500	6.800	1.447	1.426			
Mean	•				1.479	1.457			
C.O.V.					0.077	0.079			
I					1.332	1.310			
FS				· · · · · ·	1.151	1_171			

# TABLE D28 LIPPED CHANNEL SECTIONS OF LOH AND PEKOZ (1985) FROM PEKOZ (1987), TABLE 3.3-4

```
rc re
1.276 1.261
1.340 1.316
1.314 1.277
1.602 1.575
1.468 1.455
                                                                           1.468 1.455
1.480 1.465
1.405 1.382
1.412 1.390
0.080 0.083
1.268 1.246
1.209 1.231
Mean
c.o.v.
FS
```

# TABLE D29 LIPPED CHANNEL SECTIONS OF LOH AND PEKOZ (1985) FROM PEKOZ (1987), TABLE 3.3-4

Specimen	wmax/t	ex .	ey	Ptest	rc	Гa
LC9 -LS - 1	26.788	-1.500	-2.000	11.500	1.276	1.261
LC9 -LS - 2	26.788	-1.500	-2.000	11.150	1,340	1.316
LC9 -LS - 3	26.788	-1.500	-2.000	9.950	1.314	1.277
LC10 -LS - 3	31.950	2,000	-2.500	16.400	1.602	1.575
LC11 -LS - 1	31,079	-2.000	-2.500	7.900	1.468	1.455
LC11 -LS - 2	31.079	-2.500	-2.000	7.400	1.480	1.465
LC11 -LS - 3	31.079	-2.000	-2.500	6.800	1.405	1.382
Mean				•	1.412	1.390
C.O.V.					0,080	0.083
I					1.268	1.246
FS					1,209	1.231

# TABLE D30 LIPPED CHANNEL SECTIONS OF THOMASSON (1978) FROM PEKOZ (1987), TABLE 7.3-2

DOLLE MIDE EVIC DEVIL COCOLIN CADVILLANCE								
Specimen	wmax/t	ex	ey	Ptest	ГC	ra		
A71	463.000	0.000	0.000	3.600	1.000	0.942		
A74	463.800	0.000	0.000	3.640	1.000	0.941		
A75	463.000	0.000	0.000	3.480	0.956	0.902		
A76	446.385	0.000	0.000	3.260	0.939	0.896		
A101	311.000	0.000	0.000	8.300	1.059	0.993		
A102	311.000	0.000	0.000	7.870	1.009	0.947		
A103	310,459	0.000	0.000	8.340	1.073	1.007		
A104	301.000	0.000	0.000	7.760	0.739	0.726		
A151	198.719	0.000	0.000	17.200	1.095	1.011		
A152	202,964	0.000	0.000	15.700	1.036	0.957		
A153	210.630	0.000	0.000	16.000	1.114	1.032		
A154	207.182	0.000	0.000	16.400	1.118	1.046		
A156	206.273	0.000	0.000	15.500	1.057	0.979		
Mean					1.015	0.952		
C.O.V.					0.099	0.086		
I					0.897	0.851		
FS					1.710	1.802		

#### TABLE D31 LIPPED CHANNEL SECTIONS OF THOMASSON (1978) FROM PEKOZ (1987), TABLE 7.3-2

	AA1116 1111A					
Specimen	wmax/t	ex	ey	Ptest	LC	ra .
A71	463.000	0.000	0.000	3.600	0.997	0.940
A74	463.800	0.000	0.000	3.640	0.997	0.938
A75	463.000	0.000	0.000	3.480	0.956	0.899
A76	446.385	0.000	0.000	3.260	0.937	0.893
A101	311.000	0.000	0.000	8.300	1.053	0.988
A102	311.000	0.000	0.000	7.870	1.005	0.943
A103	310.459	0.000	0.000	8.340	1.069	1,002
A104	301.000	0.000	0.000	7.760	0.737	0.723
A151	198.719	0.000	0.000	17.200	1,087	1.003
A152	202.964	0.000	0.000	15.700	1.028	0.949
A153	210,630	0.000	0.000	16.000	1.106	1.024
A154	207.182	0.000	0.000	16.400	1.110	1.037
A156	206.273	0.000	0.000	15.500	1.050	0.971
Mean					1.010	0.947
c.o.v.	:				0.097	0.085
1					0.894	0.847
FS					1.716	1.811

#### TABLE D32 LIPPED CHANNEL SECTIONS OF THOMASSON (1978) FROM PEKOZ (1987), TABLE 7.3-2

USING ALSC-ERFD BEAR-COLUMN EGOALIONS								
Specimen	wmax/t	ex	ey	Ptest	rc	ra		
A71	463.000	0.000	0.000	3.600	1.000	0.942		
A74	463.800	0.000	0.000	3,640	1.000	0.941		
A75	463.000	0.000	0.000	3.480	0.956	0.902		
A76	446.385	0.000	0,000	3.260	0.939	0.896		
A101	311.000	0.000	0.000	8.300	1.059	0.993		
A102	311.000	0.000	0.000	7.870	1.009	0.947		
A103	310.459	0.000	0.000	8.340	1.073	1.007		
A104	301.000	0.000	0.000	7.760	0.739	0.726		
A151	198.719	0.000	0.000	17,200	1.095	1.011		
A152	202.964	0.000	0.000	15.700	1.036	0.957		
A153	210.630	0.000	0.000	16.000	1.114	1.032		
A154	207.182	0.000	0.000	16.400	1.118	1.046		
A156	206,273	0.000	0.000	15.500	1.057	0.979		
Mean -	2001210		*****		1.015	0.952		
C.O.V.					0.099	0.086		
I		*			0.897	0.851		
_	•				1.710	1.802		
FS					1.710	1.002		

#### TABLE D33 LIPPED CHANNEL SECTIONS OF LOH AND PEKOZ (1985) FROM PEKOZ (1987), TABLE 7.3-3

ŲS:	ING AISC-	LRFD BE	AM-COLUN	KN EQUATI	ONS	
Specimen	wmax/t	ex	ey	Ptest	FC .	ra
LC1 -LU - 1	85.534	0.000	-2.100	18.740	1.164	1.127
LC1 -LU - 2	85.534	0.000	-12,000	6.800	1.088	1.074
LC1 -LU - 3	85.534	0.000	-6.000	12.320	1.242	1.219
LC2 -LU - 1	174.600	0.000	-6,000	5.760	1.061	1.045
LC2 -LU - 2	174.300	0,000	-9.000	4.290	0.960	0.949
LC3 -LU - 1	131.828	0.000	-4.000	8.000	0.910	0.897
LC3 -LU - 2	132,569	0.000	-8.000	6.350	1.028	1.018
LC3 -LU - 3	131.345	0.000	-4.000	8.500	0.966	0.952
LC4 -LU - 1	134.311	0.000	-12.000	7.720	0.972	0.959
LC4 -LU - 2			-18.000	5.180	0.865	0.855
LC4 -LU - 3		0.000	-6.000	10.660	0.967	0.947
LC5 -LU - 1	117.934	0.000	-4.000	13.690	1.051	1.023
LC5 -LU - 2	117.934	0.000	-8.000	9.320	1.013	0.995
LC5 -LU - 3	115.581	0.000	-6.000	11.780	1.065	1.042
LC5 -LU - 4			-10.000	7.990	0.972	0.957
LC6 -LU - 1	95.922	0.000	-5.000	28.750	1.081	1.055
LC6 -LU - 2			-10.000	19,490	1.056	1.039
LC10 -LU - 1	96,910	0.000	-5.500	24.800	0.994	0.972
LC10 -LU - 2		0.000	-5.500	25.000	1.002	0.980
Mean		0.000	21200	451002	1.024	1.006
C.O.V.					0.085	0.082
I					0.916	0.902
FS					1.674	1.701
1.0					1.0/4	10101

# TABLE D34 LIPPED CHANNEL SECTIONS OF LOH AND PEKOZ (1985) FROM PEKOZ (1987), TABLE 7.3-3

LC2 -LU - 2 LC3 -LU - 1 LC3 -LU - 2 LC3 -LU - 3 LC4 -LU - 3 LC4 -LU - 2 LC4 -LU - 3 LC5 -LU - 1 LC5 -LU - 2 LC5 -LU - 2 LC5 -LU - 4 LC6 -LU - 1	wmax/t 85.534 85.534 174.600 174.300 131.828 132.569 131.345 134.311 140.603 117.934 117.934 115.581 115.581 115.581 95.922	0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000	-2.100 12.000 -6.000 -6.000 -9.000 -4.000 -8.000 -4.000 12.000 -6.000 -6.000 -6.000 -5.000	Ptest 18.740 6.800 12.320 5.760 4.290 8.000 6.350 8.500 7.720 5.180 10.660 9.320 11.780 7.990 28.750 19.490	1.136 1.062 1.213 1.049 0.951 0.902 1.019 0.957 0.960 0.855 0.956 1.037 1.049 0.957	ra 1.098 1.098 1.189 1.189 1.034 0.939 0.889 0.947 0.845 0.947 0.982 1.026 0.941 1.036
LC5 -LU - 4	115.581	0.000 - 0.000	10.000	7.990	0.957 1.060	0.941 1.033

#### TABLE D35 LIPPED CHANNEL SECTIONS OF LOH AND PEKOZ (1985) FROM PEKOZ (1987), TABLE 7.3-3

```
(Using calculated average yield stress)
USING AISC-LRFD BEAM-COLUMN EQUATIONS
HMMax/t ex ey Ptest rc
-1 85.534 0.000 -2.100 18.740 1.16
-2 85.534 0.000 -12.000 6.800 1.08
-3 85.534 0.000 -6.000 12.320 1.24
Specimen
LC1 -LU -
                                                               1.164
                                                                          1.127
LC1 -LU - 2
                                                                1.088
                                                                          1.074
LC1 -LU - 3
LC2 -LU - 1
LC2 -LU - 2
                                                                1.242
                                                                          1.219
                   174,600
                               0.000
                                         -6.000
                                                      5.760
                                                                1.061
                                                                          1.045
                   174.300
                               0.000
                                         -9.000
                                                      4.290
                                                                0.960
                                                                          0.949
LC3 -LU -
                   131.828
                               0.000
                                         -4.000
                                                      8.000
                                                                0.910
                                                                          0.897
                                                      6.350
8.500
7.720
5.180
LC3 -LU -
              2
3
                                0.000
                                         -8.000
                   132.569
                                                                1.028
                                                                          1,018
LC3 -LU -
                   131.345
                                0.000
                                         -4.000
                                                                0.966
                                                                          0.952
                   134.311
134.311
LC4 -LU - 1
LC4 -LU - 2
                                0.000 -12.000
                                                                0.972
                                                                          0.959
                                0.000 -18.000
                                                                0.865
                                                                          0.855
LC4 -LU - 3
                   140.603
                               0.000
                                         -6.000
                                                     10.660
                                                                0.967
                                                                          0.947
LC5 -LU -
                   117.934
                                0.000
                                         -4.000
                                                     13.690
                                                                1.051
                                                                          1.023
LC5 -LU - 2
LC5 -LU - 3
                   117.934
                               0.000
                                         -8.000
                                                      9.320
                                                                1.013
                                                                          0.995
                   115.581
                               0.000
                                         -6.000
                                                     11.780
                                                                1.065
                                                                          1.042
LC5 -LU - 4
                   115.581
                               0.000 -10.000
                                                      7.990
                                                                0.972
                                                                          0.957
LC6 -LU - 1 95.922

LC6 -LU - 2 95.922

LC10 -LU - 1 96.910

LC10 -LU - 2 96.910
                               0.000
                                                                1.081
                                         -5.000
                                                     28.750
                                                                          1.055
                                                    19.490
24.800
                               0.000 -10.000
                                                                1.056
                                                                          1.039
                               0.000
                                         -5.500
                                                                0.994
                                                                          0.972
                               0.000
                                        -5.500
                                                    25.000
                                                                1.002
                                                                          0.980
Mean
                                                                1.024
                                                                          1.006
c.o.v.
                                                                0.085
                                                                          0.082
                                                                0.916
                                                                          0.902
                                                                1.674
FS
                                                                         1.701
```

# TABLE 036 LIPPED CHANNEL SECTIONS OF LOH AND PEKOZ (1985) FROM PEKOZ (1987), TABLE 7.3-4

A21	MR WIDE.	FKLD SC	MW_20000	IN PARTY !	LONG	
Specimen	wmax/t	ex	ey	Ptest	LC	ra
LC7 -LU - 1	71.688	1.500	-3.500	6.500	1.654	1.646
LC7 -LU - 2	71.688	1.500	-3.500	5.800	1.585	1.555
LC7 -LU - 3	71.688	1.500	-3.500	5.350	1.602	1.569
LC8 -LU - 1	136,650	1.000	-2.000	11.850	1,199	1.153
LC8 -LU - 2	136.650	1.000	-2.000	12.000	1.217	1.170
LC8 -LU - 3	133.902	1.000	-4.000	10.750	1.189	1.146
LC8 -LU - 4	133.902	1.000	-4.000	10.550	1.167	1.125
LC8 -LU - 5	136-017	1.000	-6.000	8.900	1.129	1.092
LC8 -LU - 6	136.017	1.000	-6.000	9.350	1.184	1.144
LC9 -LU - 1	115.903	-0.380	-3.940	14.000	0.997	0.956
LC9 -LU - 2	115.903	-0.380	-6.000	10.100	0.870	0.840
LC9 -LU - 3	117-081	-0.380	-6.000	10.600	0.898	0.868
LC9 -LU - 4	117.081	-0.630	-3.940	11.700	0.890	0.858
Mean					1.199	1.163
C.O.V.					Õ.223	0.234
1					0.890	0.849
FS					1.722	1,806

# TABLE D37 LIPPED CHANNEL SECTIONS OF LOR AND PEKOZ (1985) FROM PEKOZ (1987), TABLE 7.3-4

USING AISC-LRFD BEAM-COLUMN EQUATIONS						
Specimen	ýmax∕t	ex	ey	Ptest	ГС	ra
LC7 -LU - 1	71.688	1,500	-3.500	6.500	1.589	1.582
LC7 -LU - 2	71.688	1.500	-3.500	5.800	1.530	1.503
LC7 -LU - 3	71.688	1.500	-31500	5.350	1.555	1.524
LC8 -LU - 1	1 136.650	1.000	-2.000	11.850	1.186	1,139
LC8 -LU - 2	136.650	1.000	-2.000	12.000	1.204	1.156
LC8 -LU - 3	133.902	1.000	-4,000	10.750	1,176	1.133
LC8 -LU - 4	133.902	1.000	-4.000	10.550	1.154	1.112
LC8 -LU - 5	136.017	1.000	-6.000	8.900	1.117	1.079
LC8 -LU - 6	136.017	1.000	-6.000	9.350	1.172	1.132
LC9 -LU - 1	115.903	-0.380	-3.940	14.000	0.989	0.947
LC9 -LU - 2	115.903	-0.380	-6.000	10.100	0.862	0.832
LC9 -LU - 3		-0.380		10.600	0.890	0.860
LC9 -LU - 4			-3.940	11.700	0.882	0.851
Mean					1.177	1.142
C.O.V.					0.212	0.222
I					0.892	0.850
FS	i				1.719	1.803

#### TABLE D38 LIPPED CHANNEL SECTIONS OF LOH AND PEKOZ (1985) FROM PEKOZ (1987), TABLE 7.3-4

```
MRAYTE EX EY 71.688 1.500 -3.500 71.688 1.500 -3.500 71.688 1.500 -3.500 136.650 1.000 -2.000 133.902 1.000 -4.000 133.902 1.000 -4.000 133.902 1.000 -4.000 133.902 1.000 -4.000 133.902 1.000 -4.000 133.902 1.000 -4.000
Specimen

LC7 -LU - 1

LC7 -LU - 2

LC7 -LU - 3

LC8 -LU - 1

LC8 -LU - 2

LC8 -LU - 3

LC8 -LU - 4
                                                                                           Ptest
                                                                                                6.500
5.800
5.350
11.850
                                                                                                                     1.589
1.530
1.555
                                                                                                                                        1.582
1.503
                                                                                                                                         1.524
                                   136.650
136.650
133.902
                                                                                                                      1.199
                                                                                                                                         1.153
                                                                                                12.000
10.750
10.550
                                                                                                                      1.217
1.189
                                                                                                                                         1.170
                                                                                                                                         1.146
                                                                                                                       1.167
                                                                                                                                         1.125
                                    133.902
                                  135.902 1.000 -4.000
136.017 1.000 -6.000
115.903 -0.380 -3.940
115.903 -0.380 -6.000
117.081 -0.380 -6.000
117.081 -0.630 -3.940
                                                                                                                      1.129
1.184
                                                                                                   8.900
9.350
                                                                                                                                         1.092
 LC8 -LU - 5
                                                                                                                                         1.144
 LC8 -LU - 6
LC9 -LU - 1
LC9 -LU - 2
LC9 -LU - 3
LC9 -LU - 4
                                                                                                                       0.997
                                                                                                  14.000
                                                                                                                                         0.956
                                                                                                                       0.870
                                                                                                                                         0.840
                                                                                                 10.100
                                                                                                10.600
11.700
                                                                                                                      0.898
                                                                                                                                         0.868
                                                                                                                      0.890
                                                                                                                                         0.858
                                                                                                                                        1.151
0.218
0.863
                                                                                                                      1.186
0.208
 Mean
 c.o.v.
                                                                                                                       0.905
                                                                                                                       1.695
                                                                                                                                         1.776
 FS
```

#### TABLE D39 LIPPED CHANNEL SECTIONS OF LOUGHLAN (1979) FROM PEKOZ (1987), TABLE 7.3-5

	USING AISC-I	LRFD BEI	AM-COLUI	MN EQUAT.	LONZ	:
Specimen	wmax/t.	ex	ey	Ptest	rc	ra
L1	116.937	0.290	0.000	3.120	1.054	1.006
L2	116.406	0.290	0.000	3.600	1.020	0.989
L3	118,406	0.400	0.000	3.520	0.934	0.900
L4	117.437	0.400	0.000	3.780	0.945	0.917
L5	117.031	0.410	0.000	4.100	0.979	0.958
L6	149.312	0.070	0.000	3.800	1,121	1.061
L7	147,500	0.070	0.000	3.970	1.061	1.015
L8 ·	147,625	0.070	0.000	4.310	1.059	1.026
L9	149.219	0.180	0.000	4.340	1.043	1.000
L10	148,719	0.190	0.000	4.570	1.039	1.007
L11	147.937	0.190	0.000	4.650	1.009	0.985
L12	178.906	0.180	0.000	3.350	1.106	
L13	179.250	0.180	0.000	3.530	1.057	1.017
L14	178.687	0.180	0.000	3.850	1,085	1.052
L15	181,406	0.000	0.000	4.900	1.084	1.034
L16	181.406	0.000	0.000	5.180	1.081	1.042
L17	179.031	0.000	0.000		1.054	1.027
L18	211.031	0.220	0.000	3,130	1.110	1,057
L19	210.000	0.220	0.000	3.390	1.094	1.050
L20	210,594	0.220	0.000	3.670	1.086	1.058
Mean	100007			,	1.051	1.013
c.o.v.					0.049	0.045
Ī					0.963	0.930
FS					1.592	1.648
• -						

# TABLE D40 LIPPED CHANNEL SECTIONS OF LOH AND PEKOZ (1985) FROM PEKOZ (1987), TABLE 7.3-5 (Using calculated average yield stress - all sectio) USING AISC-LRFD BEAM-COLUMN EQUATIONS pecimen wmax/t ex ey Ptest rc re

Specimen	wmax/t	ex	ey	Ptest	rc	ra
LÌ.	116.937	0.290	0.000	3.120	1.043	0.997
L2	116.406	0.290	0.000	3.600	1.006	0.978
13	118.406	0.400	0.000	3.520	0.926	0.891
L4	117.437	0.400	0.000	3.780	0.936	0.909
L5	117.031	0.410	0.000	4.100	0.969	0.949
L6	149.312	0.070	0.000	3.800	1.111	1.053
L7	147.500	0.070	0.000	3.970	1.053	1.005
L8	147.625	0.070	0.000	4.310	1.049	1.014
L9	149.219	0.180	0.000	4.340	1.036	0.991
L10	148.719	0.190	0.000	4.570	1.029	0.998
L11	147.937	0.190	0.000	4.650	0.998	0.977
L12	178.906	0,180	0.000	3.350	1.095	1.044
L13	179.250	0.180	0.000	3.530	1.047	1.006
L14	178.687	0.180	0.000	3.850	1.072	1.041
L15	181,406	0.000	0.000	4.900	1.077	1.027
L16	181.406	0.000	0.000	5.180	1.072	1.034
L17	179.031	0.000	0.000	5.310	1.045	1.019
L18	211.031	0.220	0.000	3.130	1.102	1.050
L19	210.000	0.220	0.000	3.390	1.083	1.040
L20	210.594	0.220	0.000	3.670	1.076	1.046
Mean					1.041	1.003
C.O.V.					0.050	0.045
Ĭ					0.954	0.922
FS					1.607	1.664

# TABLE D41 LIPPED CHANNEL SECTIONS OF LOH AND PEKOZ (1985) FROM PEKOZ (1987), TABLE 7.3-5

(Using calculated average yield stress) USING AISC-LRFD BEAM-COLUMN EQUATIONS							
Specimen		ex	ey	Ptest	rc	ra	
L1	116.937	0.290	0.000	3.120	1.054	1.006	
L2	116.406	0.290	0.000	3.600	1.020	0.989	
<b>L3</b>	118.406	0.400.	0.000	3.520	0.934	0.900	
L4	117.437	0.400	0.000	3.780	0.945	0.917	
1.5	117.031	0.410	0.000	4.100	0.979	0.958	
L6	149.312	0.070	0.000	3.800	1.121	1.061	
1.7	147.500	0.070	0.000	3,970	1.061	1.015	
L8 :	147.625	0.070	0.000	4.310	1.059	1.026	
19	149.219	0.180	0.000	4.340	1.043	1.000	
L10	148.719	0.190	0.000	4.570	1,039	1.007	
Ī1ī	147.937	0.190	0.000	4.650	.1.009	0.985	
L12	178.906	0.180	0.000	3.350	1.106	1.053	
L13 .	179.250	0.180	0.000	3.530	1.057	1.017	
L14	178.687	0.180	0.000	3.850	1.085	1.052	
L15	181.406	0.000	0.000	4.900	1.084	1.034	
L16	181.406	0.000	0.000	5,180	1.081	1.042	
L17	179.031	0.000	0.000	5,310	1.054	1.027	
L18	211.031	0.220	0.000	3.130	1.110	1.057	
L19	210.000	0.220	0.000	3.390	1.094	1.050	
L20	210.594	0.220	0.000	3.670	1.086	1.058	
Mean					1.051	1.013	
C.O.V.					0.049	0.045	
Ī					0.963	0.930	
FS					1.592	1.648	

### TABLE D42 HAT SECTIONS OF LOH AND PEKOZ (1985)

# (Using yield stress of flats) USING AISC-LRFD BEAM-COLUMN EQUATIONS

03	ING VIOC I	FKID DE	11 0000	=		
Specimen	wmax/t	ex	ey.	Ptest	rc	ra
LH1 -LU - 1	58.295	-0.100	0.000	40.600	1.115	1.088
LH1 -LU - 2	56.561	-0.500	0.000	53.600	1.489	1.453
LH2 -LU - 1	82.435	0.000	0.000	8.000	1.205	1.071
LH2 -LU - 2		-0.750	0.000	6.000	1.186	1.091
LH2 -LU - 3		-1.500	0.000	4.000	0.973	0.913
LH3 -LU - 1	101.500	0.000	0.000	7,550	0.888	0.836
	101.848	0.000	0.000	7.900	0.936	0.881
LH3 -LU - 2				8.300	1.002	0.943
LH3 -LU - 3	101.761	0.000	0.000			0.743
LH4 -LU - 1	122.367	0,000	0.000	2.600	0.815	
LH4 -LU - 2	122.267	0.000	0.000	2.300	0.754	0.685
LH4 -LU - 3	123.567	0.000	0.000	2.900	0.986	0.921
LH5 -LU - 1	135.026	0.000	0.000	5.300	1.088	1.023
LH5 -LU - 2	135.128	0.000	0.000	5.650	1.117	1.052
1H5 -LU - 3	135.590	0.000	0.000	6.000	1.172	1.103
LH5 -LU - 4	131.200	0.000	0.000	5.900	1.124	1.054
Mean	1211244				1-057	0.990
	. :				0.171	0.184
c.o.v.					0.853	0.785
I					1.797	1.954
FS					1+171	1.774

### TABLE D43 HAT SECTIONS OF LOH AND PEKOZ (1985)

# (Using calculated average yield stress - all sectio) USING AISC-LRFD BEAM-COLUMN EQUATIONS

	CVID DEV	WI DOLO	M PRONI	10110	
wmax/t	ex	ey	Ptest	rc	га
58.295	-0.100	0.000	40.600	1.099	1.072
56.561	-0.500	0.000	53.600	1.465	1.429
82.435	0.000	0.000	8.000	1.199	1.068
81.109	-0.750	0.000	6.000	1.176	1.083
81.457	-1.500	0.000	4.000	0.966	0.905
101.500	0.000	0.000	7.550	0.883	0.831
101.848	0.000	0.000	7.900	0.932	0.876
101.761	0.000	0.000	8.300	0.998	0.937
122.367	0.000	0.000	2.600	0.810	0.741
122.267	0.000	0.000	2.300	0.749	0.682
123.567	0.000	0.000	2.900	0.980	0.915
135.026	0.000	0.000	5.300	1.084	1.019
135.128	0.000	0.000	5.650	1.112	1.046
135.590	0.000	0.000	6.000	1.167	1.097
131.200	0.000	0.000	5.900	1.117	1.050
				1.049	0.983
				0.169	0.181
					0.783
				1.804	1.959
	wmax/t 58.295 56.561 82.435 81.109 81.457 101.500 101.848 101.761 122.367 123.567 135.026	wmax/t ex 58.295 -0.100 56.561 -0.500 82.435 0.000 81.109 -0.750 81.457 -1.500 101.500 0.000 101.761 0.000 122.367 0.000 122.367 0.000 123.567 0.000 135.026 0.000 135.590 0.000	Wmax/t ex ey 58.295 -0.100 0.000 56.561 -0.500 0.000 82.435 0.000 0.000 81.109 -0.750 0.000 101.500 0.000 0.000 101.761 0.000 0.000 122.367 0.000 0.000 122.267 0.000 0.000 123.567 0.000 0.000 135.026 0.000 0.000 135.590 0.000 0.000 1.000	Wmax/t ex ey Ptest 58.295 -0.100 0.000 40.600 56.561 -0.500 0.000 8.000 82.435 0.000 0.000 8.000 81.109 -0.750 0.000 6.000 81.457 -1.500 0.000 7.550 101.848 0.000 0.000 7.550 101.848 0.000 0.000 7.550 101.761 0.000 0.000 8.300 122.367 0.000 0.000 2.600 122.267 0.000 0.000 2.300 123.567 0.000 0.000 2.900 135.026 0.000 0.000 2.900 135.128 0.000 0.000 5.300 135.590 0.000 0.000 5.650	\text{wmax/t} ex ey Ptest rc   58.295 -0.100 0.000 40.600 1.099   56.561 -0.500 0.000 53.600 1.465   82.435 0.000 0.000 8.000 1.199   81.109 -0.750 0.000 6.000 1.176   81.457 -1.500 0.000 4.000 0.966   101.500 0.000 0.000 7.550 0.883   101.848 0.000 0.000 7.550 0.883   101.848 0.000 0.000 7.900 0.932   101.761 0.000 0.000 2.900 0.932   122.267 0.000 0.000 2.600 0.810   122.267 0.000 0.000 2.500 0.749   123.567 0.000 0.000 2.300 0.749   123.567 0.000 0.000 5.300 1.084   135.128 0.000 0.000 5.300 1.084   135.128 0.000 0.000 5.650 1.112   135.590 0.000 0.000 5.900 1.167   131.200 0.000 0.000 5.900 1.117   1049   0.169 0.850

# TABLE D44 HAT SECTIONS OF LOH AND PEKOZ (1985)

# (Using calculated average yield stress) USING AISC-LRFD BEAM-COLUMN EQUATIONS

051	MR WISC.	WLD BEY	M-COFOL		4114	
Specimen	wmax/t	ex	ey	Ptest	LC	ra
LH1 -LU - 1	58.2 <del>9</del> 5	-0.180	0.000	40.600	1.115	1.088
LH1 -LU - 2	56.561	-0.500	0.000	53.600	1.489	1.453
1H2 -LU - 1	82.435	0.000	0.000	8.000	1.205	1.071
LH2 -LU - 2	81.109	-0.750	0.000	6.000	1.186	1.091
LH2 -LU - 3	81,457	-1.500	0.000	4.000	0.973	0.913
LH3 -LU - 1	101,500	0.000	0.000	7.550	0.888	0.836
LH3 -LU - 2	101.848	0.000	0.000	7.900	0.936	0.881
LH3 -LU - 3	101.761	0.000	0.000	8.300	1.002	0.943
LH4 -LU - 1	122.367	0.000	0.000	2.600	0.815	0.743
LH4 -LU - 2	122.267	0.000	0.000	2.300	0.754	01685
LH4 -LU - 3	123.567	0.000	0.000	2,900	0.986	0.921
LH5 -LU - 1	135.026	0.000	0.000	5.300	1.088	1,023
LH5 -LU - 2	135.128	0.000	0.000	5.650	1.117	1.052
LHS -LU - 3	135.590	0.000	0.000	6.000	1.172	1.103
LH5 -LU - 4	131.200	0.000	0.000	5.900	1.124	1.054
Mean	10.000		,		1.057	0.990
C.O.V.			-		0.171	0.184
1			,		0.853	0.785
FS	, ,				1.797	1.954
ra					,.,,,	/34

# TABLE D45 ALL TEST RESULTS FROM PEKOZ (1987), TABLES 3.3-2; 3.3-3; 3.3-4

## (Using yield stress of flats)

USIN	G AISC-	LRFD BE	AM-COLUR	N EQUATI	ONS	
Specimen	wmax/t	ex	ey	Ptest	rc	ra
LC1 -LS - 1	31.744	-1.500			1.275	1.264
LC1 -LS - 2	31.744	-1.500	0.000	11.250	1.184	1.168
LC1 -LS - 3	31.744	-1.500	0.000	9.450	1.059	1.041
LC2 -LS - 1	16.515	2.000	0.000	22.000	1.793	1.776
LC2 -LS - 2	16.515	2.250	0.000	18.650	1.728	1,703
LC2 -LS - 3	16.515	2.250	0.000	17.600	1.704	1,670
LC3 -LS - 1	33.233	0.000	-1,450	8.900	1.279	1.236
LC3 -LS - 2	33.685	0.000	-2,000	7.800	1.315	1,294
LC3 -LS - 3	33.685	0.000	-2.000	7.200	1.290	1.257
LC3 -LS - 4	33.685	0.000	-2.000	7.100	1.373	1.322
LC4 -LS - 1	27,111	0,000	-2.500	11.600	1.286	1.258
LC4 -LS - 2	27.111	0.000	-2.500	10.500	1.267	1.225
LC5 -LS - 1	16.394	0.000	-2.030	19.000	1.167	1.128
LC5 -LS - 2		กกกก	~2.000	17,200	1.196	1.134
LC6 -LS - 1	31.293	0.000	-2.380	10.300	1.421	1.398
LC6 -L5 - 2	31.293	0.000	-2.130	10.500	1,432	1.387
LC7 -LS - 1	24.152		-2.250		1.327	1.301
LC7 -LS - 2	16.576	0.000	-2.220		1.880	1.802
LC8 -LS - 1	42.818	0.000		16.800	1.230	1.218
LC8 -LS - 2	42.818	0.000	-1.500	16.200	1.219	1.202
LC8 -LS - 3	42.818	0.000	-1.500	15.500	1.214	1.188
LC8 -LS - 4	43.421	0.000	-1.660	13.800	1.194	1.161
LC8 -LS - 5	43.421	0,000	-2.000	12.300	1.236	1.185
LC9 -LS - 1	26.788	-1.500		11.500	1.353	1.339
LC9 -LS - 2 -	26,788	-1.500	-2.000	11.150	1.415	1.390
LC9 -LS - 3	26.788	-1.500	-2.000	9.950	1.380	1.341
LC10 -LS - 3	31,950	2.000	-2.500	16,400	1.675	1.647
LC11 -LS - 1	31.079	-2.000	-2.500	7.900	1.549	1.540
LC11 -LS - 2	31.079	-2.500	-2,000	7.400	1.532	1.516
LC11 -LS - 3			-2.500	6.800	1,447	1.426
Mean					1.381	1.351
C.O.V.					0.148	0.150
I					1.152	1.124
FS					1.330	1.364

# TABLE D46 ALL TEST RESULTS FROM PEKOZ (1987), TABLES 3.3-2; 3.3-3; 3.3-4

(Using calculated average yield stress - all sectio) USING AISC-LRFD BEAM-COLUMN EQUATIONS Specimen wmax/t ex ey Ptest 0.000 1.219 1.130 31.744 -1.500 LC1 -LS -12.750 1.231 LC1 -LS -31.744 -1.500 0.000 11.250 1.146 9.450 22.000 LC1 -LS -31.744 -1.500 0.000 1.027 1.007 2.000 2.250 2.250 0.000 0.000 LC2 -LS - 3 LC2 -LS - 2 LC2 -LS - 3 LC3 -LS - 1 LC3 -LS - 2 16.515 16.515 0.000 1.664 1.653 18.650 1.609 1,585 0.000 1.593 1,559 0.000 17.600 16.515 8.900 1.217 1.174 33.233 -1.450 7.800 1.223 1.244 33.685 -2,000 1.192 7,200 LC3 -LS 3 33.685 0.000 -2.000 1.224 33.685 27.111 27.111 1.310 1.259 LC3 -LS 0.000 -2,000 7.100 LC4 -LS -0.000 -2.500 11.600 1.207 1.180 LC4 -LS -LC5 -LS -LC5 -LS -0.000 -2.500 10.500 1.197 1.155 16.394 16.394 31.293 31.293 24.152 16.576 0.000 -2.030 19,000 1,098 1.061 0.000 -2.000 17.200 1.137 1.075 2 10.300 LC6 -LS -LC6 -LS -LC7 -LS -1.386 1.362 0.000 -2,380 0.000 1.394 1.353 -2.130 23.400 21.700 1.243 -2.250 1,219 0.000 1,693 LC7 -LS 0.000 -2.220 LC8 -LS 42.818 42.818 0.000 -1.500 16.800 1.200 1.188 1.190 LC8 -LS 0.000 -1.500 16.200 1.172 15.500 13.800 LCB -LS 42.818 0.000 -1.500 1.187 1.160 43.421 43.421 26.788 LC8 -LS -0.000 -1.660 1.168 1.136 LC8 -LS -0.000 -2.000 12,300 1.209 1.161 LC9 -LS --1.500 -2.000 11.500 1.276 1.261 26.788 -1.500 -2.000 LC9 -LS -11.150 1.340 1.316 2 1.314 LC9 -LS - 3 26.788 -1.500 -2.000 9.950 1.277 16.400 7.900 1.602 1.575 LC10 -LS - 3 31.950 2.000 -2.500 1.468 LC11 -LS - 1 31.079 -2.000 -2.500 1.455 LC11 -LS - 2 31.079 -2.500 -2.000 7.400 1.480 1.465 LC11 -LS 31.079 -2.000 -2.500 6,800 1.405 1.382 1.318 1.288 Mean

C.O.V.

FS

0.139

1.112 1.379 0.142

1.084 1.415

# TABLE D47 ALL TEST RESULTS FROM PEKOZ (1987), TABLES 3.3-2; 3.3-3; 3.3-4

# (Using calculated average yield stress) USING AISC-LRFD BEAM-COLUMN EQUATIONS

```
ыммах/t ex ey
31.744 -1.500 0.000
31.744 -1.500 0.000
                                             Ptest
Specimen
                                                                1.219
                                                       1.231
LC1 -LS - 1
                                            12.750
LC1 -LS - 2
                                             11.250
                                                       1.146
                                                                1.130
LC1 -LS - 3
                  31.744 -1.500
                                    0.000
                                              9.450
                                                       1.027
                                                                1.007
LC2 -LS - 1
                  16.515. 2.000
                                    0.000
                                             22.000
                                                       1.664
                                                                1.653
LC2 -LS - 1

LC2 -LS - 2

LC2 -LS - 3

LC3 -LS - 1

LC3 -LS - 2

LC3 -LS - 3

LC3 -LS - 4
                 16.515
16.515
33.233
33.685
                           2.250
2.250
                                    0.000
                                             18,650
                                                       1.609.
                                                                1.585
                                                       1.593
                                                                1.559
                                   0.000
                                             17.600
                           0.000 -1.450
0.000 -2.000
                                              8.900
7.800
                                                       1.217
                                                                1.174
                                                       1.244
1.224
1.310
                                                                1.223
                           0.000 -2.000
0.000 -2.000
                 33.685
                                              7.200
                                                                1.192
                  33.685
                                              7,100
                                                                1.259
LC4 -LS - 1
                           0.000 -2.500
                                                                1.180
                  27.111
                                             11.600
                                                       1.207
LC4 -LS - 2
                  27.111
                           0.000 -2.500
                                              10.500
                                                       1.197
                                                                 1.155
LC5 -LS
                  16.394
                           0.000 -2.030
                                              19.000
                                                       1.098
                                                                1.061
LC5 -LS - 2
                  16.394
                           0.000 -2.000
                                             17.200
                                                        1.137
                                                                1.075
                                                       1.386
                  31.293
                           0.000 -2.380
LC6 -LS - 1
                                             10.300
                                                                1.362
LC6 -LS - 2
LC7 -LS - 1
LC7 -LS - 2
                           0.000 -2.130
0.000 -2.250
0.000 -2.220
                  31.293
                                             10.500
                                                       1.394
                                                                1.353
                                                       1.243
                  24.152
                                             23.400
                                                                1,219
                                             21.700
                                                       1.771
1.200
                                                                1.693
                  16.576
LC8 -LS - 1
                  42.818
                           0.000 -1.500
                                              16,800
                                                                1,188
LC8 -LS - 2
                  42.818
                           0.000 -1.500
                                              16.200
                                                       1.190
                                                                1.172
                  42.818
43.421
LC8 -LS - 3
                           0.000 -1.500
                                             15.500
                                                       1.187
                                                                 1.160
LC8 -LS - 4
                           0.000 -1.660
                                             13.800
                                                       1.168
                                                                1.136
                  43.421
26.788
                                             12.300
11.500
                                                       1.209
                           0.000 -2.000
LC8 -LS - 5
                                                                1.161
                  26.788 -1.500 -2.000
26.788 -1.500 -2.000
LC9 -LS - 1
                                                       1.276
                                                                1.261
LC9 -LS - 2
                                             11.150
9.950
                                                       1.340
1.314
                                                                1.316
LC9 -LS - 3
                  26.788 -1.500 -2.000
                                                                1.277
LC10 -LS - 3
                  31.950 2.000 -2.500
                                             16.400
                                                       1.602
                                                                1.575
LC11 -LS -- 1
                  31.079 -2.000 -2.500
                                              7.900
                                                       1.468
                                                                 1.455
LC11 -LS - 2
                 31.079 -2.500 -2.000
                                              7.400
                                                       1.480
                                                                1.465
LC11 -Ls - 3 31.079 -2.000 -2.500
                                              6.800
                                                       1.405
                                                                 1.382
                                                       1.318
                                                                1.288
Mean
                                                                0.142
                                                       0.139
C.O.V.
                                                        1.112
                                                                1.084
FS
                                                        1.379
                                                                1.415
```

# TABLE D48 ALL TEST RESULTS FROM PEKOZ (1987), TABLES 7.3-3, 7.3-4

## (Using yield stress of flats) USING AISC-LRFD BEAM-COLUMN EQUATIONS

```
wmax/t ex
                                             Ptest
Spectment
LC1 -LU - 1
LC1 -LU - 2
LC1 -LU - 3
LC2 -LU - 1
 Specimen
                            ex ey Ptest
0.000 -2.100 18.740
                 85.534
85.534
85.534
174.600
                                                        1.164
                                                                1.127
                                                       1.088
1.242
                            0.000 -12.000 6.800
                                                                1.074
                            0.000 -6.000 12.320
                                                                 1.219
                            0.000 -6.000
0.000 -9.000
                                                        1.061
                                               5.760
                                                                 1.045
LC2 -LU - 2
LC3 -LU - 1
LC3 -LU - 2
                                                                 0.949
                                               4.290
                                                       0.960
                 174.300
                                                                 0.897
                            0.000 -4.000
                                                       0.910
                 131.828
                                               8.000
                 132.569
131.345
134.311
                                               6.350
                            0.000 -8.000
                                                        1.028
                                                                 1.018
1C3 -LU -
                            0.000 -4.000
                                               8.500
                                                        0.966
                                                                 0.952
                            0.000 -12.000
                                                      0.972
                                               7.720
                                                                 0.959
                 134.311
140.603
 LC4 -LU -
                            0.000 -18.000
                                               5.180
                                                        0.865
                                                                 0.855
LC4 -LU -
LC5 -LU -
                            0.000 -6.000
                                              10,660
                                                        0.967
                                                                 0.947
                 117.934
117.934
                            0.000 -4.000
             1
                                              13.690
                                                        1.051
                                                                 1.023
                            0.000 -8.000
                                               9.320
                                                        1.013
                                                                0.995
 LC5.-LU - 2
LC5 -LU - 3
LC5 -LU - 4
                                                        1.065
                 115.581
115.581
                            0.000 -6.000
0.000 -10.000
                                              11.780
7.990
                                                                 1.042
                                                        0.972
                                                                 0.957
                                                        1.081
 LC6 -LU -
                  95.922
95.922
                                                                 1.055
                            0.000 -5.000
                                              28.750
                            0.000 -10.000 19.490
                                                        1.056
                                                                 1.039
 LC10 -LU - 1
LC10 -LU - 2
                            0.000 -5.500
0.000 -5.500
                                                        0.994
                  96.910
                                              24.800
                                                                 0.972
                  96.910
                                              25,000
                                                        1.002
                                                                 0.980
 LC7 -LU -
                   71.688
                             1.500 -3.500
                                               6.500
                                                        1.654
             1
 LC7 -LU -
LC7 -LU -
                  71.688
             ż
                             1.500 -3.500
                                               5.800
                                                        1.585
                                                                 1.555
                            1.500 -3.500
1.000 -2.000
                  71.688
                                               5,350
                                                        1,602
                                                                 1.569
                 136.650
                                              11.850
                                                        1.199
                                                                 1.153
 LC8 -LU - 1
 LC8 -LU -
                             1.000 -2.000
                                              12.000
                                                        1.217
                                                                 1,170
                 136.650
                                                                 1.146
                             1.000 -4.000
                                              10.750
                                                        1.189
 LC8 -LU
          - 3
                 133.902
                                                                 1.125
 LC8 -LU
                 133.902
                             1.000 -4.000
                                              10.550
                                                        1.167
 LC8 -LU -
                 136.017
                             1.000 -6.000
                                               8.900
                                                        1.129
                                                                 1.092
                 136.017
115.903
                             1.000 -6.000
                                               9.350
                                                        1.184
                                                                 1.144
 LC8 -LU - 6
 LC9 -LU -
                           -0.380 -3.940
                                              14.000
                                                        0.997
                                                                 0.956
                 115.903 -0.380 -6.000
117.081 -0.380 -6.000
 LC9 -LU - 2
                                              10.100
                                                        0.870
                                                                 0.840
                                                        0.898
 LC9 -LU - 3
                                                                 0.868
                                              10.600
                                                                 0.858
                                                        0.890
 LC9 -LU - 4
                 117.081 -0.630 -3.940
                                             11.700
 Mean
                                                        1,095
                                                                 1.070
                                                        0.182
                                                                 0.184
 C.O.V.
                                                        0.870
                                                                 0.847
                                                        1.762
                                                                 1.809
 FS
```

# TABLE D49 ALL TEST RESULTS FROM PEKOZ (1987), TABLES 7.3-3, 7.3-4

(Using calculated average yield stress - all sectio)
USING AISC-LRFD BEAM-COLUMN EQUATIONS

ยรา	NG ALSC-	LRFD 85.	am-culum	N EQUAL.	IUNS .	
Specimen	₩max/t	ex		Ptest	rc	ra .
LC1 -LU - 1	85.534	0.000	-2.100	18.740	1.136	1.098
LC1 -LU - 2	85.534	0.000		6.800	1.062	1.049
LC1 -LU - 3	85.534	0.000	-6.000	12.320	1.213	1,189
LC2 -LU - 1	174.600	0.000	-6.000	5.760	1.049	1.034
LC2 -LU - 2	174.300	0.000	-9.000	4.290	0.951	0.939
LC3 -LU - 1	131.828	0.000	-4.000	8.000	0.902	0.889
LC3 -LU - 2	132.569	0.000	-8.000	6.350	1.019	1.008
LC3 -LU - 3	131.345	0.000	-4.000	8.500	0.957	0.943
LC4 -LU - 1	134.311	0.000	-12.000	7.720	0.960	0.947
LC4 -LU - 2	134.311	0.000	-18.000	5,180	0.855	0.845
LC4 -LU - 3	140.603	0.000	-6.000	10.660	0.956	0.936
LC5 -LU - 1	117.934	0.000	-4.000	13.690	1.037	1.010
LC5 -LU - 2	117.934	0.000	-8.000	9.320	1,001	0.982
LC5 -LU - 3	115.581	0.000	-6.000	11.780	1.049	1.026
LC5 -LU - 4	115.581	0.000	-10.000	7.990	0.957	0.941
LC6 -LU - 1	95.922	0.000	-5.000	28.750	1.060	1.033
LC6 -LU - 2	95.922	0.000	-10.000	19.490	1.034	1.017
LC10 -LU - 1	96.910	0.000	-5.500	24.800	0.974	0.952
LC10 -LU - 2	96.910	0.000	-5.500	25.000	0.982	0.959
LC7 -LU - 1	71.688	1.500		6.500	1.589	1.582
LC7 -LU - 2	71.688	1.500		5.800	1.530	1.503
LC7 -LU - 3	71.688	1.500	-3.500	5.350	1.555	1.524
LC8 -LU - 1	136.650	1.000	-2.000	11.850	1.186	1.139
LC8 -LU - 2	136.650	1.000	-2.000	12.000	1.204	1.156
LC8 -LU - 3	133.902	1.000	-4.000	10.750	1.176	1.133
LC8 -LU - 4	133.902	1.000	-4.000	10.550	1.154	1.112
LC8 -LU - 5	136.017	1,000	-6.000	8.900	1.117	1.079
LC8 -LU - 6	136.017	1.000	-6.000	9.350	1.172	1.132
LC9 -LU - 1	115.903	-0.380	-3.940	14.000	0.989	0.947
LC9 -LU - 2	115.903	-0.380		10.100	0.862	0.832
LC9 -LU - 3	117.081	-0.380	-6.000	10.600	0.890	0.860
LC9 -LU - 4	117.081	-0.630	-3.940	11.700	0.882	0.851
Mean					1.077	1.051
c.o.v.					0.174	0.176
I					0.866	0.843
FS					1.770	1.818
	•					

# TABLE D50 ALL TEST RESULTS FROM PEKOZ (1987), TABLES 7.3-3, 7.3-4

# (Using calculated average yield stress) USING AISC-LRFD BEAM-COLUMN EQUATIONS

```
IG AISC-L
wmax/t
85.534
85.534
85.534
174.600
174.300
                          ex ey Ptest
0.000 -2.100 18.740
Specimen
                                                             1.127
                                                   1.164
LC1 -LU -
LC1 -LU - 2
LC1 -LU - 3
LC1 -LU -
                          0.000 -12.000
                                           6.800
                                                   1.088
                                                             1.074
                          0.000 -6.000
                                           12.320
                                                    1.242
                                                             1.219
                          0.000 -6.000
                                            5.760
                                                     1.061
                                                             1.045
LC2 -LU -
            1
                          0.000 -9.000
                                            4.290
                                                    0.960
                                                             0.949
LC2 -LU - 2
                          0.000 -4.000
0.000 -8.000
                                                    0.910
                                                             0.897
                                            8.000
LC3 -LU -
               131.828
                                                     1.028
                                            6.350
                                                             1.018
LC3 -LU -
               132.569
LC3 -LU
               131.345
                          0.000 -4.000
                                            8.500
                                                    0.966
                                                             0.952
                                                    0.972
                                                             0.959
LC4 -LU -
               134.311
                          0.000 -12.000
                                            7.720
               134.311
                          0.000 -18.000
                                            5.180
                                                     0.865
                                                             0.855
LC4 -LU -
LC4 -LU -
LC5 -LU -
               140.603
                          0.000 -6.000
                                           10.660
                                                     0.967
                                                             0.947
               117.934
117.934
115.581
115.581
                          0.000 -4.000
                                                             1.023
                                           13.690
                                                     1.051
LC5 -LU - 2
                          0.000 -8.000
                                            9.320
                                                     1.013
                                                             0.995
LC5 -LU - 3
LC5 -LU - 4
                          0.000 -6.000
0.000 -10.000
                                           11.780
                                                     1.065
                                                             1.042
                                           7.990
                                                     0.972
                                                             0.957
                          0.000 -5.000
                95.922
95.922
                                           28.750
                                                     1.081
                                                             1.055
LC6 -LU -
                          0.000 -10.000
                                           19,490
                                                             1.039
                                                     1.056
LC6 -LU -
                                           24.800
                                                     0.994
                                                             0.972
                          0.000 -5.500
LC10 -LU
                96.910
                                                             0.980
                                                     1.002
                          0.000 -5.500
LC10 -LU
                 96.910
                                           25.000
LC7 -LU -
                 71.688
                          1.500 -3.500
                                             6.500
                                                     1.589
                                                             1.582
LC7 -LU -
                 71,688
                          1.500
                                  -3.500
                                            5.800
                                                     1.530
                                                             1.503
            2
LC7 -LU -
LC7 -LU - 3
LC8 -LU - 1
                 71.688
                          1.500
                                  -3.500
                                            5.350
                                                     1.555
                                                             1.524
                          1.000 -2.000
                                           11.850
                                                     1.199
                                                             1.153
                136.650
                                           12.000
10.750
10.550
                          1.000 -2.000
                                                             1.170
LC8 -LU -
                136.650
                                                     1,217
                                                     1.189
                          1.000 -4.000
                                                             1.146
                133.902
LC8 -LU -
                                                             1.125
LC8 -LU -
                133.902
                           1.000
                                  -4.000
                                                     1.167
                                            8.900
                                                             1.092
LC8 -LU - 5
                136.017
                          1.000 -6.000
                                                     1.129
               136.017
115.903
                          1.000 -6.000
                                             9.350
                                                     1.184
                                                             1,144
LC8 -LU - 6
LC9 -LU - 1
LC9 -LU - 2
                         -0.380 -3.940
                                            14.000
                                                     0.997
                                                             0.956
               115.903 -0.380 -6.000
117.081 -0.380 -6.000
                                            10.100
                                                     0.870
                                                             0.840
                                                     0.898
LC9 -LU - 3
                                            10.600
                117.081 -0.630 -3.940
                                           11,700
                                                     0.890
                                                             0.858
LC9 -LU - 4
                                                     1.090
                                                             1.065
Mean
                                                             0.172
                                                     0.170
C.O.V.
                                                     0.882
                                                             0.859
FS
                                                     1.739
                                                             1.785
```

# TABLE D51 ALL TEST RESULTS FROM PEKOZ (1987), TABLES 3.3-2 , 3.3-3 , 3.3-4 , 7.3-2 , 7.3-3 , 7.3-4 , 7.3-5

## (Using yield stress of flats) USING AISC-LRFD BEAM-COLUMN EQUATIONS

```
Specimen
               wmax/t ex
                                      Ptest
LC1 -LS -
              31.744 -1.500
                              0.000
                                     12,750
                                               1.392
                                                     1.392
              31.744 -1.500
LC1 -LS - 2
                              0.000
                                      11,250
                                               1.273
                                                      1.274
LC1 -LS - 3
                                               1.117
                                                      1.118
              31.744 -1.500
                              0.000
                                       9,450
LC2 -LS - 1
               16.515
                       2.000
                              0.000
                                      22.000
                                                      1.776
                                               1.793
                                                      1.703
LC2 -LS -
               16.515
                       2.250
                              0.000
                                      18.650
                                               1.728
LC2 -LS
               16.515
                       2.250
                              0.000
                                      17.600
                                               1.704
                                                      1.670
              33.233
                       0.000
                             -1.450
                                       8.900
                                               1.279
                                                      1.236
LC3 -LS -
          1
              33.685
                                       7.800
                                               1.315
                                                      1.294
LC3 -LS -
                       0.000 -2.000
              33.685
LC3 -LS - 3
                       0.000 -2.000
                                       7.200
                                               1.290
                                                      1.257
              33.685
                       0.000 -2.000
                                               1.373
                                       7.100
                                                      1.322
LC3 -LS -
LC4 -LS - 1
              27.111
27.111
                       0.000 -2.500
                                      11.600
                                               1.286
                                                      1.258
LC4 -LS
                       0.000
                             -2.500
                                      10.500
                                               1.267
                                                      1.128
LC5 -LS
               16.394
                       0.000 -2.030
                                      19.000
                                               1.167
LC5 -LS
          2
               16.394
                       0.000
                             -2,000
                                      17.200
                                               1.196
                                                      1.134
LC6 -LS
               31.293
                       0.000
                             -2.380
                                      10.300
                                               1.474
                                                      1.469
LC6 -LS -
               31.293
                       0.000 -2.130
                                      10.500
                                               1.471
                                                      1.440
LC7 -LS
                                                      1.301
               24.152
                       0.000 -2.250
                                      23.400
                                               1.327
                       0.000 -2.220
                                      21.700
LC7 -LS - 2
                                               1.880
                                                      1.802
               16.576
                                      16,800
LC8 -LS -
                                               1.328
                                                      1.325
                       0.000 -1.500
               42.818
                                                      1.297
                                      16.200
                                               1.302
LC8 -LS -
               42.818
                       0.000
                             -1.500
                                      15.500
LC8
    -LS
          3
               42.818
                       0.000
                              -1.500
                                               1.276
                                                      1.268
LC8 -LS
               43.421
                       0.000 -1.660
                                      13.800
                                               1.238
                                                      1.226
               43,421
                       0.000
                              -2.000
                                      12.300
                                               1.272
                                                      1.229
LC8 -LS -
LC9 -LS
               26,788
                                      11.500
                                               1.367
                                                      1.359
                      -1.500
                              -2.000
              26.788
26.788
LC9 -LS -
                      -1.500
                              -2.000
                                      11.150
                                               1.415
                                                      1,399
          2
                                               1.380
LC9 -LS - 3
                      -1,500
                              -2.000
                                       9.950
                                                      1.341
                                      16.400
7.900
LC10 -LS - 3
              31.950
                      2.000
-2.000
                              -2.500
                                               1.675
                                                      1.647
LC11 -LS
                                               1.622
                                                      1.619
                              -2.500
               31.079
                              -2.000
                                       7.400
                                               1.588
                                                      1.585
LC11 -LS - 2
                      -2.500
               31.079
                                                      1.478
LC11 -LS
         - 3
               31.079
                      -2,000
                              -2.500
                                       6.800
                                               1.481
LC1 -LU -
               85.534
                       0.000 -2.100
                                      18.740
                                               1.164
                                                      1.127
LC1 -LU -
               85.534
                       0.000
                              -12.000
                                       6.800
                                               1.088
                                                      1.074
               85,534
                       0.000 -6.000
                                      12.320
                                               1.242
                                                      1.219
LC1 -LU -
                       0.000 -6.000
                                               1.061
                                                      1.045
LC2 -LU -
              174.600
                                       5.760
LC2 -LU - 2
              174.300
                       0.000 -9.000
                                       4.290
                                               0.960
                                                      0.949
LC3 -LU - 1
                       0.000 -4.000
                                       8.000
                                               0.910
                                                      0.897
              131.828
LC3 -LU - 2
              132.569
                       0.000 -8.000
                                       6.350
                                               1,028
                                                      1.018
                       0.000 -4.000
                                       8.500
                                                      0.952
LC3 -LU - 3
                                               0.966
              131,345
                                               0.972
LC4 -LU -
              134.311
                       0.000 -12.000
                                       7.720
                                                      0.959
LC4 -LU - 2
              134.311
                       0.000 -18.000
                                       5.180
                                               0.865
                                                      0.855
                       0.000 -6.000
                                               0.967
                                                      0.947
LC4 -LU - 3
              140.603
                                      10.660
              117.934
                       0.000 -4.000
                                      13.690
                                               1.051
                                                      1.023
LC5 -LU -
                                                      0.995
                       0.000 -8.000
                                       9.320
                                               1.013
LC5 -LU - 2
              117.934
LC5 -LU - 3
                                                      1.042
              115.581
                       0.000 -6,000
                                      11.780
                                               1.065
                                                      0.957
                                               0.972
LC5 - LU - 4
              115.581
                       0.000 -10.000
                                       7.990
LC6 -LU - 1
               95.922
                       0.000 -5.000
                                      28.750
                                               1.081
                                                       1.055
LC6 -LU - 2
                       0.000 -10.000
                                      19.490
                                               1.056
                                                      1.039
               95.922
               96.910
                                                      0.972
LC10 -LU - 1
                       0.000 -5.500
                                      24.800
                                               0.994
                                                      0.980
               96.910
                       0.000 -5.500
                                      25.000
                                               1.002
LC10 -LU - 2
                                               1.654
                                       6.500
LC7 -LU - 1
               71.688
                       1,500 -3,500
                                                      1.646
                                               1.585
                                                       1.555
LC7 -LU - 2
               71.688
                        1.500
                              -3.500
                                       5.800
LC7 -LU - 3
               71.688
                        1.500
                              -3.500
                                       5.350
                                               1.602
                                                      1.569
LC8 -LU - 1
              136.650
                        1.000
                              -2.000
                                       11.850
                                               1.199
                                                      1.153
LC8 -LU - 2
              136.650
                        1.000
                              -2.000
                                       12.000
                                               1.217
                                                      1.170
                                       10.750
                                               1.189
LC8 -LU - 3
              133,902
                        1.000
                              -4.000
                                                       1.146
LC8 -LU - 4
              133.902
                        1,000
                              -4.000
                                       10,550
                                               1.167
                                                      1,125
                        1.000 -6.000
                                       8,900
                                               1.129
                                                       1.092
LC8 -LU - 5
              136.017
LC8 -LU -
                       1.000
                                        9.350
                              -6.000
                                               1_184
                                                       1.144
              136.017
                                               0.997
                      -0.380
                              -3.940
                                                      0.956
LC9 -LU -
              115.903
                                       14.000
LC9 -LU -
              115.903
                      -0.380
                              -6.000
                                       10.100
                                               0.870
                                                      0.840
LC9 -LU -
              117.081 -0.380
                              -6.000
                                       10.600
                                               0.898
                                                      0.868
                                       11.700
                                               0.890
                                                      0.858
LC9
              117.081 -0.630
                              -3.940
    -LU
              463.000
                               0.000
                                        3.600
                                               1.000
                       0.000
```

TABLE D 51(CONT.)
ALL TEST RESULTS
FROM PEKOZ (1987), TABLES 3.3-2 , 3.3-3 , 3.3-4 , 7.3-2 , 7.3-3 , 7.3-4 , 7.3-5

Specimen A74 A75 A76 A101 A102 A103 A104 A151 A1552 A153 A154 A156 L1 L2 L3 L4 L5 L6 L7 L8 L9 L10 L11 L12 L13 L14 L15	Mmax/t 463.800 463.000 446.385 311.000 310.459 301.000 198.719 202.630 207.182 206.273 116.937 116.406 117.437 117.031 149.312 147.500 147.625 149.219 148.719 147.937 178.906 179.250 178.687 181.406	0.000 0.000 0.000 0.000 0.290 0.290 0.400 0.400 0.070 0.070 0.180 0.180 0.180 0.180	ey 0.000	Ptest 3.640 3.480 3.260 8.300 7.870 8.340 7.760 15.500 3.120 3.620 3.620 3.780 4.100 3.520 3.780 4.310 4.570 4.570 4.570 4.570 4.570 4.570 4.570 5.580 5.580 5.580 5.580 5.580 5.580 5.580 5.780 6.590 6.500 6.500 6.500 6.500 6.500 6.500 6.500 6.500 6.500 6.500 6.500 6.500 6.500	1.000 0.956 0.939 1.059 1.073 0.739 1.095 1.035 1.114 1.118 1.057 1.054 0.945 0.945 0.979 1.121 1.061 1.059 1.063 1.057 1.084 1.084	ra 0.941 0.902 0.896 0.997 1.007 0.726 1.011 0.957 1.032 1.046 0.979 0.900 0.917 0.958 1.015 1.026 1.000 1.007 1.005 1.0
L11	147.937	0.190	0.000	4.650	1.009	0.985
L12	178.906	0.180	0.000	3.350	1.106	1.053
L13	179.250	0.180	0.000	3.530	1.057	1.017
L14	178.687	0.180	0.000	3.850	1.085	1.052

# TABLE D52 ALL TEST RESULTS FROM PEKOZ (1987), TABLES 3.3-2 , 3.3-3 , 3.3-4 , 7.3-2 , 7.3-3 , 7.3-4 , 7.3-5

(Using calculated average yield stress - all sectio) USING AISC-LRFD BEAM-COLUMN EQUATIONS Specimen wmax/t ex Ptest ey LC1 -LS - 1 LC1 -LS - 2 0.000 1.353 1,353 31.744 -1.500 12.750 31.744 -1.500 31.744 -1.500 16.515 2.000 0.000 11,250 1.240 1,240 1,090 LC1 -LS - 3 0.000 9.450 1.090 22.000 LC2 -LS - 1 0\_000 1.664 1.642 1.585 1.609 0.000 LC2 -LS - 2 16.515 2.250 18.650 1.559 LC2 -LS - 3 16.515 2.250 0.000 17,600 1.593 8.900 LC3 -LS -33.233 0.000 -1.450 1.217 1.174 LC3 -LS - 2 33.685 0.000 -2.0007.800 1.244 1.223 7.200 1.224 1.192 LC3 -LS - 3 33.685 0.000 -2,000 0.000 -2.000 LC3 -LS - 4 7.100 1.310 1.259 33.685 -2.500 1.207 1.180 0.000 11,600 LC4 -LS - 1 27.111 10.500 1,197 1.155 0.000 -2.500LC4 -LS - 2 27.111 1.098 1:065 LC5 -LS 16.394 0.000 -2.030 19.000 1.075 LC5 -LS - 2 16.394 0.000 -2,000 17.200 1.137 LC6 -LS 31.293 0,000 -2.380 10.300 1.443 1.439 1,413 LC6 -LS 31.293 0.000 -2.13010.500 1.436 24.152 16.576 0.000 23.400 1.243 1.219 LC7 -LS --2.250 LC7 -LS - 2 0.000 -2.220 21.700 1.771 1.693 42.818 0.000 -1.500 16.800 1,303 1.300 LC8 -LS - 1 16.200 15.500 0.000 -1.500 LC8 -LS - 2 1.279 1.274 42.818 1.254 1.246 LC8 -LS - 3 0.000 -1.500 42,818 1.216 1.205 LC8 -LS - 4 43.421 0.000 -1.660 13.800 LC8 -LS - 5 43.421 0.000 -2.000 12.300 1.245 1.208 LC9 -LS - 1 26.788 -1.500 -2.000 11.500 1.295 1.286 LC9 -LS - 2 26.788 -1.500 -2.000 11.150 1.340 1,332 LC9 -LS - 3 26.788 -1.500 -2.000 9.950 1.314 1,277 LC10 -LS - 3 -2.500 1.572 31.950 2.000 16,400 1.602 LC11 -LS - 1 31.079 -2.000 7.900 -2.500 1.543 1.540 1.538 1.535 7,400 LC11 -LS - 2 31.079 -2.500 -2.000 1.441 LC11 -LS - 3 31.079 -2.000 -2.500 6.800 1.435 1.136 1.098 LC1 -LU -85.534 0.000 -2.100 18.740 LC1 -LU -85.534 0.000 -12.000 6.800 1.062 1\_049 LC1 -LU -85.534 0.000 -6.000 12.320 1.213 1.189 LC2 -LU -174,600 0.000 -6.000 5.760 1.049 1.034 174.300 0.000 -9.000 4.290 0.951 0.939 LC2 -LU - 2 LC3 -LU 131.828 0.000 -4.000 8.000 0.902 0.889 0.000 -8.000 6.350 1,019 1,008 132.569 LC3 -LU -8.500 0.000 -4.000 0.957 0.943 LC3 -LU 131.345 0.947 0.000 -12.000 0.960 7.720 LC4 -LU 134.311 0.855 0.845 LC4 -LU 134.311 0.000 -18.000 5.180 0.956 0.936 LC4 -LU 140.603 0.000 -6.000 10.660 LC5 -LU 117.934 0.000 -4.000 13.690 1.037 1.010 0.000 -8.000 9.320 1.001 0.982 LC5 -LU -117.934 LC5 -LU - 3 115.581 0.000 -6.000 11.780 1.049 1.026 LC5 -LU -B.000 -10.000 7.990 0.957 0.941 115.581 0.000 -5.000 95.922 28.750 1.060 1.033 LC6 -LU - 1 0.000 -10.000 1.017 19,490 1.034 LC6 -LU - 2 95.922 0.974 24.800 0.952 LC10 -LU - 1 96.910 0.000 -5.500 LC10 -LU - 2 96.910 0.000 -5.500 25.000 0.982 0.959 6.500 1.582 LC7 -LU - 1 71.688 1,500 -3,500 1.589 LC7 -LU - 2 71.688 1.500 -3.500 5.800 1.530 1.503 LC7 -LU -1.500 -3.500 5.350 1.555 1.524 71.688 1.000 -2.000 1.186 1.139 136,650 LC8 -LU - 1 11.850 1,204 1.156 1.000 -2.000 12.000 LC8 -LU - 2 136.650 1.176 1.133 LC8 -LU - 3 133.902 1,008 -4,000 10.750 133,902 1.000 -4.000 10.550 1.154 1.112 LC8 -LU -1.000 -6.000 8,900 1,117 1.079 108 -IU - 5 136.017 136.017 1.000 -6.000 115.903 -0.380 -3.940 9.350 1,132 LC8 -LU - 6 1,172 14.000 0.989 0.947 LC9 -LU - 1 10.100 0.862 0.832 LC9 -LU - 2 115.903 -0.380 -6.000 0.890 LC9 -LU - 3 117.081 -0.380 -6.000 10,600 0.860 0.882 LC9 117.081 -0.630 -3.940 11.700 0.851 -LU

0.000

3.600

0.997

0.940

463,000 0.000

```
TABLE D52(CONT.)
FROM PEKOZ (1987), TABLES 3.3-2 , 3.3-3 , 3.3-4 ,
Specimen whaz/t ex ey Pr
                                                             7.3-2 , 7.3-3 , 7.3-4 , 7.3-5
test rc ra
                                                           Ptest
3.640
                                                  ey
0.000
0.000
                                                                     0.997
                                                                             0.938
                              463.800
463.000
                                         0.000
                                                                             0.899
                                                            3.480
                                                                     0.956
              A75
                                                                             0.893
                              446.385
                                         0.000
                                                  0.000
                                                            3.260
                                                                     0.937
              A76
                                                                     1.053
                                                                              0.988
              A101
                              311.000
                                         0.000
                                                  0.000
                                                            8.300
                              311.000
311.000
310.459
301.000
198.719
202.964
                                                                              0.943
                                         0.000
                                                  0.000
                                                            7,870
                                                                     1.005
              A102
                                         0.000
                                                  0.000
                                                            8.340
                                                                     1.069
                                                                              1.002
              A103
                                         0.000
                                                  0.000
                                                            7.760
                                                                     0.737
                                                                              0.723
              A104
                                                  0.000
                                         0.000
                                                           17.200
                                                                     1.087
                                                                              1,003
              A151
                                                           15.700
16.000
                                                  0.000
                                         0.000
                                                                     1,028
                                                                              0.949
              A152
                                                                     1.106
                                                                              1,024
              A153
                              210.630
                                         0.000
                                                  0.000
                                                           16.400
15.500
3.120
                                                                     1.110
                                                                              1.037
                                                  0.000
                                         0.000
              A154
                              207.182
                                                                     1.050
                                                                              0.971
              A156
                              206.273
                                         0.000
                                                  0.000
                                                                     1.043
1.006
0.926
                                                                             0.997
                                         0.290
                                                  0.000
              L1
                              116.937
                                                            3.600
3.520
3.780
              ĽŻ
L3
                              116.406
                                                  0.000
                                                                              0.891
                              118.406
                                          0.400
                                                  0.000
                              117.437
117.031
149.312
147.500
                                                                     0.936
                                                                              0.909
              L4
                                          0.400
                                                  0.000
                                                                     0.969
                                                                              0.949
              L5
                                          0.410
                                                  0.000
                                                             4.100
                                         0.070
                                                  0.000
                                                             3.800
                                                                     1.111
                                                                              1.053
              L6
                                                             3.970
                                                                     1.053
                                                                              1.005
                                                  0.000
              L7
                                                            4.310
4.340
4.570
                              147.625
                                                                     1.049
                                                                              1.014
                                          0.070
                                                  0.000
              L8
                                                  0.000
                                                                              0.991
                                                                     1.036
                               149.219
              L9
                                          0.180
                                                                     1.029
                                                                              0.998
                               148.719
              L10
                                          0.190
                                                                              0.977
                                                                     0.998
                                                             4.650
                               147.937
                                          0.190
                                                  0.000
              L11
                                                            3.350
3.530
                                                                              1.044
                                                                     1.095
              L12
                               178.906
                                          0,180
                                                  0.000
                              179.250
178.687
                                         0.180
0.180
              L13
                                                  0.000
                                                                     1.047
                                                                              1.006
                                                   0.000
                                                             3.850
                                                                     1.072
                                                                              1.041
                                                            4.900
5.180
                                          0.000
                                                   0.000
                                                                     1.077
                                                                              1.027
                               181.406
              L15
                                                   0.000
                                                                     1.072
                                                                              1.034
                               181.406
              L16
                                                            5.310
3.130
                                                                     1.045
                                                   0.000
                                                                              1.019
              L17
                               179.031
                                          0.000
                                                                     1.102
                                                                              1.050
              L18
                               211.031
                                          0.220
                                                   0.000
                                                                     1.083
                                                   0.000
                                                             3.390
                                                                              1.040
              L19
                               210.000
                                          0.220
              L20
                               210.594
                                          0.220
                                                   0.000
                                                             3.670
                                                                     1.076
                                                                              1.046
                                                                      1.146
                                                                              1.114
              Mean
                                                                     0.180
                                                                              0.189
              c.o.v.
                                                                     0.914
                                                                              0.876
                                                                      1.678
                                                                              1.750
              FS
```

# TABLE D53 ALL TEST RESULTS FROM PEKOZ (1987), TABLES 3.3-2 , 3.3-3 , 3.3-4 , 7.3-2 , 7.3-3 , 7.3-4 , 7.3-5

## (Using calculated average yield stress) USING AISC-LRFD BEAM-COLUMN EQUATIONS

```
Specimen
               wmax/t ex
                                      Ptest
              31.744 -1.500
31.744 -1.500
31.744 -1.500
                               0.000
                                       12.750
                                                 .353
                                                       1.353
LC1 -LS -
                               0.000
                                      11,250
                                               1.240
                                                       1.240
LC1 -LS - 2
LC1 -LS - 3
                                               1.090
                                                       1.090
                               0.000
                                       9.450
               16.515
16.515
LC2 -LS - 1
                      2.000
                               0.000
                                      22.000
                                               1.664
                                                       1.642
                       2.250
2.250
LC2 -LS - 2
                               0.000
                                               1,609
                                                       1.585
                                       18.650
LC2 -LS - 3
                               0.000
                                               1.593
                                                       1.559
               16.515
                                      17.600
                                               1,217
                                                       1.174
LC3 -LS -
               33.233
                       0.000
                              -1.450
                                        8.900
LC3 -LS - 2
               33.685
                       0.000
                              -2,000
                                        7.800
                                               1.244
                                                       1.223
LC3 -LS - 3
               33,685
                       0.000
                              -2.000
                                        7.200
                                               1.224
                                                       1.192
LC3 -LS - 4
               33.685
                       0.000
                              -2.000
                                        7,100
                                               1.310
                                                       1.259
LC4 -LS -
                       0.000 -2.500
                                       11.600
                                               1.207
                                                       1.180
          1
               27.111
                       0.000
                              -2.500
                                               1.197
                                                       1.155
LC4 -LS
               27.111
                                       10.500
LC5 -LS - 1
                       0.000 -2.030
                                       19.000
                                               1.098
                                                       1.065
               16.394
                                       17.200
                                                       1.075
LC5 -LS - 2
               16.394
                                               1.137
                       0.000
                              -2.000
                                                       1.439
LC6 -LS - 1
                       0.000
                                       10,300
                                               1.443
               31,293
                              -2.380
                                               1.436
LC6 -LS
               31.293
                       0.000
                              -2.130
                                       10.500
                                                       1.413
LC7 -LS
               24.152
                       0.000 -2.250
                                       23.400
                                                1,243
                                                       1.219
          1
LC7 -LS - 2
                       0.000 -2.220
                                       21,700
                                                1.771
                                                       1.693
               16.576
               42.818
                       0.000 -1.500
                                               1.303
                                                       1.300
LC8 -LS -
                                       16.800
                                       16.200
                                                1.279
LC8 -LS - 2
               42.818
                       0.000 -1.500
                                                       1.274
                       0.000 -1.500
               42.818
                                       15.500
                                               1.254
                                                       1.246
LC8 -LS - 3
LC8 -LS - 4
                       0.000 -1.660
                                       13.800
                                               1.216
                                                       1.205
               43.421
                                               1.245
1.295
                                                       1.208
LC8 -LS
          5
               43.421
                       0.000
                              -2.000
                                       12.300
                                                       1.286
LC9 -LS - 1
               26.788 -1.500
                              -2.000
                                       11.500
LC9 -LS
               26.788 -1.500
                              -2.000
                                       11.150
                                                1.340
                                                       1.332
LC9 -LS - 3
               26.788 -1.500
                              -2,000
                                        9.950
                                                1.314
                                                       1.277
LC10 -LS - 3
               31.950
                       2,000
                              -2.500
                                       16.400
                                                1.602
                                                       1.572
LC11 -LS
               31.079 -2.000
                              -2.500
                                        7.900
                                                1.543
                                                       1.540
                                                1.538
                                                       1.535
LC11 -LS - 2
               31.079 -2.500 -2.000
                                        7,400
               31.079 -2.000 -2.500
LC11 -LS
                                        6.800
                                                1.441
                                                       1.435
LC1 -LU - 1
LC1 -LU - 2
               85.534
85.534
                       0.000 -2.100
                                       18,740
                                                1.164
                                                       1.127
                                       6.800
                                                1.088
                                                       1.074
                       0.000 -12.000
                       0.000 -6.000
                                                       1.219
LC1 -LU - 3
                                       12.320
                                               1.242
               85.534
LC2 -LU - 1
              174.600
                       0.000 -6.000
                                        5.760
                                                1.061
                                                       1.045
                                                       0.949
LC2 -LU -
              174.300
                       0.000 -9.000
                                        4.290
                                               0.960
                                               0.910
LC3 -LU
              131.828
                       0.000 -4.000
                                        8.000
                                                       0.897
LC3 -LU
              132.569
                       0.000 -8.000
                                        6.350
                                                1.028
                                                       1.018
              131.345
                                        8.500
LC3 -LU - 3
                       0.000 -4.000
                                               0.966
                                                       0.952
                                               0.972
                       0.000 -12.000
                                       7.720
                                                       0.959
LC4 -LU
              134.311
                       0.000 -18.000
                                       5.180
                                               0.865
                                                       0.855
LC4 -LU - 2
              134.311
LC4 -LU
              140.603
                       0.000 -6.000
                                       10.660
                                                0.967
                                                       0.947
LC5 -LU
              117.934
                        0.000 -4,000
                                       13.690
                                                1.051
                                                       1.023
LC5 -LU
              117.934
                       0.000 -8.000
                                        9.320
                                                1.013
                                                       0.995
              115.581
                       0.000 -6.000
                                       11.780
                                                       1.042
LC5 -LU -
                                                1.065
LC5 -LU - 4
                        0.000 -10.000
              115.581
                                       7.990
                                                0.972
                                                       0.957
                       0.000 -5.000
               95.922
                                       28.750
                                                1.081
                                                       1.055
LC6 -LU
                        0.000 -10.000
                                                1.056
                                                       1.039
LC6 -LU - 2
               95.922
                                       19.490
LC10 -LU - 1
               96.910
                        0.000 -5.500
                                       24.800
                                                0.994
                                                       0.972
         - 2
                                                1.002
LC10 -LU
               96,910
                        0.000 -5.500
                                       25,000
                                                       0.980
LC7 -LU - 1
LC7 -LU - 2
               71.688
                        1.500 -3.500
                                        6,500
                                                1.589
                                                       1.582
               71.688
                        1.500 -3.500
                                        5.800
                                                1.530
                                                        1.503
                        1.500 -3.500
                                        5.350
                                                1.555
LC7 -LU - 3
               71.688
                                                        1.524
                        1.000 -2.000
                                       11.850
                                                1.199
                                                       1.153
              136.650
LC8 -LU -
                                       12.000
                        1,000 -2,000
                                                1.217
                                                       1.170
LC8 -LU - 2
              136.650
LC8 -LU - 3
              133,902
                        1.000 -4.000
                                       10.750
                                                1.189
                                                       1.146
LC8 -LU - 4
              133,902
                        1.000 -4.000
                                       10.550
                                                1.167
                                                       1.125
              136.017
                        1.000 -6.000
                                        8.900
                                                1.129
                                                        1.092
LC8 -LU - 5
              136.017
                                        9.350
                        1.000 -6.000
                                                1.184
                                                        1.144
LCS -LU
                                       14.000
              115.903
                       -0.380 -3.940
                                                0.997
                                                       0.956
LC9
    -011 -
LC9
                                       10.100
                                                0.870
                                                       0.840
    -LU -
              115.903 -0.380 -6.000
                                       10.600
                                                0.898
                                                       0.868
LC9 -LU - 3
              117.081 -0.380 -6.000
    -1.0
              117.081 -0.630 -3.940
                                       11.700
                                                0.890
                                                       0.858
```

# TABLE D53 (CONT.) ALL TEST RESULTS FROM PEKOZ (1987), TABLES 3.3-2 , 3.3-3 , 3.3-4 , 7.3-2 , 7.3-3 , 7.3-4 , 7.3-5

Specimen	wmax/t	ex	ey	Ptest	rc	ra
A71	463,000	0.000	0.000	3.600	1.000	0.942
A74	463.800	0.000	0.000	3.640	1.000	0.941
A75	463.000	0.000	0.000	3.480	0.956	0.902
A76	446.385	0.000	0.000	3.260	0.939	0.896
A101	311.000	0.000	0.000	8,300	1.059	0.993
A102	311.000	0.000	0.000	7.870	1.009	0.947
A103	310.459	0.000	0.000	8.340	1.073	1.007
A104	301.000	0.000	0.000	7.760	0.739	0.726
A151	198.719	0.000	0.000	17.200	1.095	1.011
A152	202.964	0.000	0.000	15.700	1.036	0.957
A153	210.630	0.000	0.000	16,000	1.114	1.032
A154	207.182	0.000	0.000	16.400	1.118	1.046
A156	206.273	0.000	0.000	15.500	1.057	0.979
Li	116.937	0.290	0.000	3.120	1,054	1.006
ī.2	116.406	0.290	0.000	3.600	1.020	0.989
Ĭ3	118.406	0.400	0.000	3.520	0.934	0.900
ĩ4	117,437	0.400	0.000	3.780	0.945	0.917
L5	117.031	0.410	0.000	4,100	0.979	0.958
<u>16</u>	149.312	0.070	0.000	3.800	1.121	1.061
L7	147.500	0.070	0.000	3.970	1.061	1.015
Ľ8	147.625	0.070	0.000	4.310	1.059	1.026
L9	149.219	0.180	0.000	4.340	1.043	1.000
L10	148.719	0.190	0.000	4.570	1.039	1.007
L11	147.937	0.190	0.000	4.650	1.009	0.985
L12	178.906	0.180	0.000	3.350	1,106	1.053
L13	179.250	0.180	0.000	3.530	1.057	1.017
L14	178.687	0.180	0.000	3.850	1.085	1.052
L15 -	181.406	0.000	0.000	4.900	1.084	1.034
L16	181.406	0.000	0.000	5.180	1.081	1.042
L17	179.031	0.000	0.000	5.310	1.054	1.027
L18	211.031	0.220	0.000	3.130	1.110	1.057
L19	210.000	0.220	0.000	3.390	1.094	1.050
L20	210.594	0.220	0.000	3.670	1.086	1.058
Mean					1.153	1,121
C.O.V.					0.176	0.184
Ī					0.925	0.887
FS					1.658	1.728

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117 11 113

# 2. REVIEW OF DESIGN APPROACHES

# 2.1 THE ECCS APPROACH FOR UNPERFORATED COLUMNS

The ECCS Approach is intended for unperforated columns that may or may not be locally stable. The effect of local buckling on the overall buckling is accounted for through the use of the Q factor defined below. The approach involves the determination of the design strength Nd as follows (the notation has been changed slightly from that given in the ECCS Recommendations [1987]):

Where

$$F_{\rm h} = F_{\rm y} \left( F - \left[ F^2 - (Q/\lambda^2) \right]^{1/2} \right)$$
 Eq. 2

where

$$F = [Q + (1 + \eta(\lambda + 0.2))/\lambda^2] / 2$$
 Eq. 3

$$= (F_{\rm Y} / F_{\rm e})^{1/2}$$

Eq.

yield stresses, and elastic buckling the are Fe and Fy respectively

For flexural buckling this parameter becomes

$$\lambda = (L/r) (1/\pi) (F_{\rm y}/E)^{1/2}$$

Ęď

Other terms of the above equations are

Eq. 6 stress equal to area at uniform compression vield stress Aeu / Ag Effective A Aeu

section Full cross-sectional area Radius of gyration of the full Effective length

 $\alpha(4-3Q) < 0.76$ 0.34 for the sections tested

<u>5</u>d

the axial force The load factor The design strength Nd is to be not less than caused by the design loads times load factors. for live load is 1.5.

# 2.2 THE AISI APPROACH FOR UNPERFORATED COLUMNS

for unperforated columns that An exception is discussed in AISI Approach is also intended or may not be locally stable. The may

column nominal the next section. In this approach first buckling stress F<sub>n</sub> is determined as follows:

For Fe 
$$<$$
 Fy/2 Fn = Fe Fy / 4Fe)

800

59. 59.

flexural in case of  $F_{\mathbf{e}}$  is the elastic column buckling stress, and buckling

$$F_{e} = \pi^{2}E / (KL/r)^{2}$$

0,0

Eq.

olastic the <u>;</u>e ξ L flexural buckling torsional-flexural buckling stress. torsional ç

The column strength P<sub>n</sub> is determined as

$$P_n = A_e F_n$$
 Eq.

Ae is the effective area of annually, the value of  $\lambda_{\rm e}$  for a yarmined analytically, the value of  $\lambda_{\rm e}$  for a start results. The can be determined on the basis of stub column test results. The value of  $\lambda_{\rm e}$  can be determined either from the measured axial value of  $\lambda_{\rm e}$  and the value of the effective area  $\lambda_{\rm e}$  at is the effective area of the column at stress  $F_n$ . When  $\lambda_e$ shortening or from the value of the effective area A<sub>eu</sub> at ultimate load. These approaches were derived by Pekoz [1986]. The latter approach leads to the following expression:

$$\lambda_e = \lambda - (\lambda - \lambda_{eu}) (F_n / F_y)^{\lambda_{eu}/\lambda}$$
 Eq. 12

ם load column is the effective area at ultimate stub A<sub>eu</sub> is the determined as

$$A_{eu} = (P_{t}) / F_{y}$$
 Eq. 13

The column strength P<sub>D</sub> is divided by a factor of safety to find the allowable load. For sections thinner that .09 inches a constant factor of safety of 1.92 is used. For thicker sections the factor of safety varies from 1.67 for very short columns to 1.92 for long columns.

# 2.3 THE AISC APPROACH FOR UNPERFORATED COLUMNS

(1986), "Load and Structural Steel The AISC design stable The American Institute of Steel Construction (1986), "Loa Resistance Factor Design Specification for Structural Buildings" is for hot-rolled steel sections. The AISC of formulation that is also primarily for locally supperforated columns is given here for Information purposes.

The column strength Pn is determined as

$$P_n = A F_{CT}$$
 2

ĭ Eq. 15

Εq.,

for 
$$\lambda \le 1.5$$
 For  $\approx (.658 \,^{\lambda})$  Fy

# APPENDIX E - REFERENCE PEKOZ (1988)

Ninth International Specialty Conference on Cold-Formed Steel Structures St. Leuis, Missouri, U.S.A., November 8-9, 1988

# DESIGN OF COLD-FORMED STEEL COLUMNS

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Professor of Structural Engineering
Cornell University
Ithaca, New York, USA

# 1. INTRODUCTION

It is well known that imperfections, residual stresses and basic inaterial properties influence the behavior of columns. The imperfections and the residual stresses and the degree to which they influence the performance of columns depends on the methods and details of manufacture as well as the cross-sectional spapes and the details of manufacture vary widely. Two general shapes and the details of manufacture vary widely. Two general studies on the flexural buckling of locally stable columns have been carried out recently at Cornell and reported in Dat and Pekoz [1980] and Weng and Pekoz [1987]. Several papers on the latter reference will be published in the near future. These general studies show that a simple formulation covering all types of columns is not possible.

This paper presents some of the results of a study to develop a design approach for a specific class of columns, namely, typical lipped channel columns with and without perforations used in industrial rack structures. Since very little test evidence existed, 30 stub columns and 31 columns were tested within this project. This study was sponsored by the Rack Kanniacturers. Institute. The results of these tests were evaluated along with the results of 42 unperforated column tests carried out in an American Iron and Steel Institute sponsored project reported in Meng and Pekoz [1987]. All the columns considered have either fully effective cross-sections or would have fully effective cross-sections if unperforated.

In the evaluation of the test results, 23 different approaches were used. The approach of the European Convention for Constructional Steelwork [1987], "European Recommendations for the Design of Light Gauge Steel Members" and its possible extensions to perforated columns were among those tried. These approaches will be referred to as the ECCS Approaches, only five out of the 23 approaches will be focused upon in this paper. Four of these approaches are related to the ECCS Approach. An approach based on the basic AISI Column design equation will also be discussed.

More detailed information on the specimens tested and the other design approaches evaluated can be found in Pekoz [1987].

Based on test results using the Eq. 12 where  $\lambda_e$  is the affective area of the column at NOMINAL STRESS,  $\Gamma_{\rm H}$ . The area  $\lambda$  was taken consistent with the cross section used in determining NOMINAL STRESS, namely it was the net area when the net section radius of gyration was used in calculating the NOMINAL STRESS and gross area was used when the gross section radius of gyration was used.

# NOMINAL STRESS

In determining the NOMINAL STRESS,  $F_{\rm n}$ , both the AISI and the ECCS column design equations were used. The radius of gyration I was taken either for the net section or for the gyross section as indicated in Table 2. When net section was used

$$\mathbf{r} = (\mathbf{I}_{\mathbf{m}}/\mathbf{A}_{\mathbf{G}})^{1/2}$$

where  $I_m$  is the minimum net moment of inertia and  $A_{\rm C}$  is the area of the section giving the minimum moment of inertia.

In case of torsional flexural buckling F<sub>e</sub> is the elastic torsional-flexural buckling stress based on sharp corner gross section properties.

# EVALUATION OF TEST RESULTS

The results of the evaluations are summarized in Tables 3a, 3b and 3c. Since the hinge-ended and the fixed-ended columns failed by flexural and torsional-flexural buckling, respectively, some conclusions can be drawn about the accuracy of the approaches for both types of buckling. Tables 1a and 3c are for columns where flexural buckling was the governing failure mode. All the columns shown in Table 3b failed by torsional-flexural buckling.

In Tables 3a, 3b and 3c, the ratios of the observed maximum test load Pt divided by the calculated load and their means, standard deviations and coefficient of variations are given. The subscript of the calculated load P refers to the procedures listed in Table 3c which is for locally stable unperforated columns, the procedures PEI, PEI, PEI and PE4 give the same results and are referred to as PE. For perforated sections \( \) is calculated for the net section.

It is seen in Tables 3a and 3b that the approach PE2 which is the ECCS Approach modified by the AISI Approach for treating the interaction of local and overall buckling gives smallest standard coefficient of variation for flexural buckling of both the unperforated and perforated columns. This approach also gives the lowest coefficient of variation for torsional-flexural buckling of perforated columns as well. For torsional-flexural buckling of

of analyses, the coefficients of variation for all types of analyses, the coefficient of variations are nearly equal. It should be noted that for the modified AISI approach (PA) the mean quite a bit below 1.0. However, the ultimate load calculated by the column curve is not the only factor to be considered by assessing the design approach. As discussed below the load and resistance factors and the factors of safety involved also need to considered.

# 5. SOME OBSERVATIONS ON THE DESIGN APPROACHES

The test results of Weng and Pekoz [1987] on unperforated columns as well as the AISI, AISC and the ECCS column curves are plotted in Fig. 3. It is seen that the ECCS curve provides a lower limit and the AISI curve provides an upper limit to the observed results. It is of interest how the allowable loads would compare If one includes the effect of the load and resistance factors and the factor of safety in the calculations. The following parametric study was carried out for such a comparison.

The results of a parametric study are summarized in Tables 4a and 4b. In these tables the modified ECCS approach design load and the modified AISI approach allowable load are compared for perforated and unperforated type A and B columns for various perforated and unperforated type A and B columns for various constant factor of safety as it is prescribed in the AISI Specification for thicknesses less than .09 inches and the variable factor of safety for the case of thicknesses larger than variable factor of safety for the case of thicknesses larger than 50 inches. It is seen that for the case of constant factor of safety the modified AISI approach gives close but consistently lower loads than the modified ECCS approach design strength divided by a load factor equal to 1.5.

For unperforated locally stable columns subject to flexural buckling, a comparison of the ECCS Recommendations, the AISI and the AISC Specifications is shown graphically in Fig. 3. In this figure the curves marked ECCS, AISI and AISC are for nominal strengths according to the respective documents. The curve marked ECCS is the ECCS design strength divided by a live load factor of 1.5. The curves marked AISI<sub>A</sub> and AISI<sub>B</sub> are for the nominal strength divided by a factor of safety of 1.92 and by the varying factor of safety stipulated in the AISI Specification for thicknesses greater than .09 inches. The curve marked AISCA is for the nominal strength multiplied by a resistance factor of .85 and divided by a live load factor of 1.6. Since the columns considered have very high live to dead load ratios only live load factors are considered.

Since only locally stable unperforated columns can be shown in Fig. 3, the conclusions from this figure are strictly correct for such columns. However, the results for perforated columns should follow similar relative trends. It is seen that for the most part

×

determined using load resistance 큯 The design strength is \$ Pn where \$ equal to .85. The required strength factors. 2.4 EXTENSIONS OF THE ECCS AND THE AISI APPROACHES TO PERFORATED COLUMNS several ways. The first that comes to mind is to use the value of Q determined by test on stub column specimens. The configuration of perforations in general does not allow the calculation of Q analytically, Another possible extension would involve combining the ECCS column design curve with the AISI Specification [1986] approach for handling the interaction of local and overall buckling. Information on the development of this approach can be found in Pekoz [1986].

satisfactory results will be discussed below. The AISI Specification contains design provisions for columns with circular perforations within certain limits. Typical rack columns do not fall within these limits of applicability.

# 3. TEST RESULTS

Two groups of test results were used in this study. The average dimensions of the sections are given in Table 1. The geometry of the sections and the cross-sectional notation are illustrated in Figs. 1 and 2. In Table 1 T is the wall thickness, r' is the average inside corner radius and  $Q_n$  is  $A_{gu}$  divided by the net minimum area.

# 3.1 SPECIMENS OF PEKOZ [1987]

The perforated and unperforated columns of Pekoz [1987] have the designations AU1, AU2, AP1, AP2, BU1, BU2, BP1, BP2). Two types of sections were taken from regular manufacturing lines of two different companies designated A and B. The perforated and unperforated sections are designated as P and U. The letters U and P are followed by 1 or 2 which designate the thinner and the thicker walled-sections, respectively. The number following the thickness designation is the number of the test in the series. The last letter in the designation indicates the end conditions as follows:

and the columns were tested flat-ended. Hydrostone was placed at each end to assure uniform distribution of the end loads and the end fixity. Fixed-ended column. In these tests base plates were welded

Hinga-ended. Specially designed end fixtures were used to assure hinged condition about the centroidal axis perpendicular to the axis of symmetry. The difference in the location of the net and the full section centroidal axes were insignificant compared with the accuracy of the cross sectional dimensions and the accuracy with which the column

In this group of specimens, all the fixed ended columns were subject to torsional-flexural and all the hings ended specimens were subject to flexural buckling. The modes of buckling predicted were confirmed by the appearances of buckling modes. fixed ended columns were

# .2 SPECIMENS OF WENG AND PEXOZ (1987)

The unperforated columns of Weng and Pekoz [1987] have the designations RFC11, RFC14, PBC13, PBC13, PBC14, P11, F16, R13, R14. RFC and PBC as Well as R and P indicate roll-formed and press-braked C-sections, respectively, The numbers that follow indicate the gage of the material.

All columns of this group were tested with hinges about the minor axis and all the specimens were subject to flexural buckling. The loads were aligned with the aid of strain gages to be concentric at about one fourth of the expected ultimate load.

# 4. EVALUATION OF TEST RESULTS

The approaches summarized in Table 2 involve the calculation of the nominal column strength  $P_{\rm h}$  as follows:

# Pn = (AREA) (NOMINAL STRESS)

on the approach different definitions of AREA and the NOMINAL STRESS were used. Depending

The following possibilities for the calculation of the AREA

NET is the net minimum area of the section.

the nominal stress determined by one of the two approaches; determined at is the area

Using the effective width equations of the AISI Specification. For the sections considered these equations are basically the same as those of the ECCS Recommendations.

APPENDIX E

the AISI approaches with constant and variable factors of safet give more conservative results than the ECCS Approach. it should be noted that stub column results are not plotted in this figure. If they were plotted they would all fall above the strength curves. The behavior of very short columns can be predicted quite conservatively. For this reason a variable factor of safety which is lower for shorter columns appears justified.

Dat and Pekoz [1980] and Weng and Pekoz [1987] show that the limit of becoming partially effective, the predictions of the AISI column curve give upper bounds to test results. Dat and Pekoz [1980] also show that members with component elements that do not have slendernesses in this range, the AISI curve gives satisfactory results. Most of the columns in the present study had component elements that were at the limit of being partially effective. It is expected that the procedures discussed above would give more conservative results for other cold-formed steel limiting slenderness between the fully effective and partially effective.

# . SUMMARY AND CONCLUSIONS

Several design provisions for perforated and unperforated lipped channel columns were studied. The formulation that gave the best results for flexural buckling involved obtaining a nominal failure stress using the ECCS Column curve with Q = 1 and with net section properties. The nominal strength or the design strength is found by multiplying the nominal failure stress by the effective area determined by stub column tests. For torsional-flexural buckling the nominal failure stress is found on the basis of the full section assuming sharp corners.

It was seen that when the entire design approaches including the column curves, factors of safety, resistance and load factors are considered, the ECCS, AISI and AISC documents lead to closer agreement than just a comparison of the column curves would indicate.

It is hoped that the observations of this paper will aid the specification writing committees in their deliberations.

# 7. FUTURE WORK

All the columns considered in this study have either fully effective cross-sections or would have had fully effective cross-sections if unperforated. Using the approach developed in this study, namely combining the ECS column curve with AISI approaches for the interaction of local and overall buckling for the case when the sections are not fully effective, appears

Columns are usually subjected to axial loads in combination with moments. This case is usually treated in design specifications by interaction equations. The load carrying capacity for concentric loading which is the case studied in the present project is one of the parameters that are used in these interaction equations. Therefore the case of combined axial loading and bending will also be studied in the near future.

promising. This topic will be studied in the near future.

# 8. ACKNOWLEDGEMENTS

The author would like to thank Dr. S. J. Errera and the AISI Specification Advisory Committee as well as Mr. Herb Klein and the RMI Specification Advisory Committee for their help, and support. He would also like to acknowledge the sponsorship of AISI and the RMI for the work that served as the basis of this paper.

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<b>~</b> {	DIMENSIONS
TABLE	CROSS-SECTIONAL

ď	98 77 80	1.00	1,000	1.00
Fy (kši)	54.68 57.71 64.00 62.75	51,55 49,17 44,64.	40,38 51.85 55.09 38.40	30.59 33,45 50.15
r. (£7)	44444 644	2424 2454	116 116 116	222
(H)	80 74 74	6 6 2 6 2 6 1	71 70 69 61	88 63 61
B (11)	44.663 663 663 663 663	1.63 1.63 1.63	1.64 1.76 1.62 1.62	2.48 1.37 1.63
A' (In)	3.03	3.03	3.02	5.65 3.03
T (4n)	.073 .106 .069	980 980 980 980	.119 .096 .075 .087	.118 .064 .086
SECTION	AU1 AU2 AP1 AP2	BU1 BU2 BP1 BP2	RFC11 RFC13 RFC14 PBC13 PBC14	P11 P16 R13 R14

# TABLE 2 EVALUATION OF LONG COLUMN TEST RESULTS

DESIGN EQUATION	ECCS(3) ECCS(3) ECCS ECCS AISI
RADIUS OF GYRATION (1)	GROSS NET (4) NET (4) GROSS NET (4)
AREA (1)	GROSS EFFECTIVE (2) EFFECTIVE EFFECTIVE (2) EFFECTIVE (2)
PROCEDURE	PE1 PE2 PE3 PA

5335

please refer to the text for description determined from stub column test determined taking Q=1 net section radius of gyration is used for flexural buckling and gross properties are used for torsional flexural buckling. In both cases the net minimum area is used in calculating the effective area from stub column test results.

TABLE 3a
EVALUATION OF TEST RESULTS
(Pekoz [1987])

Pt/PA		0.4			6,	ő	0.660			0.190		. 6	647		3 6	7.5	68	99	.91	Z.		9.	ć	000	::	~ [
Pt/PE4	-	29	9	90	8	03	962.0	Ö	٠,	. 18		č	207.0		8	90	.0.	.08	.10	. 92	99	.93	5	2000	•	. 12
// Pt/PE3		.35	96	.06	. 81	.03	0.796	00	0.203	۲.		33	0.992	4.8	60	47	.33	32	.34	. 12	. 22	.14	,	0.181	•	7
Pt/PE2		.23	.93	.06	.83	1.031	•	76	0.168	.17		00	0.705	90	2	.92	.90	.08	60	90	.97	.91	9	0.107	-	-i -i
Pt/PE1	Columns	2.9	9.	90.	.81	1.031	.79	99	0.185	8	รนเ	9	0.679	.05	.18	.08	.01	.08	10	92	8	6.	00	0.132	-	3
~		0.885	95	9	.90	.70	90				ed Columns	9.	0.677	.70	90.	Į,	. 33	. 61	86	. 62	.87	. 87				
Test	Unperforated	AU1-1H				BU2-1H	*1	MEAN	STDEV	204	Perforated	P.1-	AP1-2H	P2-	P2-	P2-	2	P1-	<u>.</u>	125 1	- 2 -	P2-	MEAN	STDEV	COV	;

TABLE 3b
EVALUATION OF GROUP 1 TEST RESULTS
(Pekoz [1987])

TABLE 3C
EVALUATION OF GROUP 2 TEST RESULTS
(Weng and Pekoz [1987])

Pt/PA		ωωσ	0.888	ν α	0.870 0.048 0.056		0.961 0.965 0.959 0.749 0.863 0.948 0.9884 0.073
Pt/PE4		96.15	1.011	60	1.056 0.060 0.057		1.110 1.090 1.287 1.019 1.019 1.059 1.055 1.055 1.050 0.080
Pt/PE3		1.006	1.029	1.094	1.070 0.065 0.061		1.544 1.489 1.245 1.335 1.330 1.438 0.184
Pt/PE2			000.1		1.040 0.062 0.060		1.086 1.087 1.087 0.931 1.001 1.068 1.064 1.047 0.054
Pt/PE1	1umns	0.958 1.151 1.091	1.011	1.094	1.055 0.062 0.059	mns	1.076 1.089 1.287 1.019 1.019 1.095 1.055 1.059 0.080
~	Unperforated Columns	72	1,021	0		Perforated Columns	0.802 1.105 0.803 1.058 0.720 0.964 0.717
TEST	Unperfo	AU1-1F AU1-2F AU2-1F	AU2-2F BU1-1F BU1-2F	BU2-2F	MEAN STDEV COV	Perfora	AP1-1F AP1-2F AP2-1F BP1-1F BP1-1F BP2-1F BP2-1F BP2-1F BP2-1F BP2-1F BP2-1F BP2-1F BP2-1F

Pt/PA	001990904 5001490904 500044181-5054	
Pt/PE	9 0 1 1 2 1 2 1 2 1 2 1 2 1 2 1 2 1 2 1 2	2020280244460446 440
~	0000 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	
TEST	i Aaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaa	P11-4 P16-1 P16-2 P16-2 P16-3 P16-5 R13-1 R13-2 R13-2 R13-4 R13-4 R14-2 R14-3 R14-3 R14-3 R14-3 R14-3 R14-3 R14-3 R14-3

																,												
fire	R3		•	•	•	•	•	•	•	•	1.13	•	٠			•	1.07	-	Œ	0	~	~	1.07	~	g,	0	~	
rai buchini	R2		1.09	1,04	1.12	1.07	1.04	1.13	1.07	1.04	1.13	1.08	1.03	1.12		1.08	1.07	1.14	1.10	1.02	1,11	1.07	1.07	1.14	1.09	1.02	1.12	
a - Frexulai	R1		1.63	'n.	ø	Ġ,	'n	9	ø	r,	1.69	٠.	ທຸ	9		1,62	1,60						1.60					
ended Corollina	~	Columns	æ		ď	8		٠.	æ	Ľ	2,68	æ	۲.	ĸ.	Columns	4	8	₩.	a	9	4	č	1.88	₩.	ω.	٩.	4.	
na aguin	J NC	Unperforated C		80			80	120	4	80	120	40	80	120	Perforated Col	40	80	120	40	80	120	40	000	120	40	80	120	
	SECTION	Unper	AU1	AUL	AU1	BUl	BUI	BUI	AUZ	AUZ	AU2	BU2	BU2	BU2	Perfo	AP1	AP1	AP1	BP1	BP1	BP1	AP2	AP2	AP2	BP2	BP2	BP2	

Notes: I is the effective length in inches. The end conditions are taken to be hinged about the minor axis and for twisting and fixed about major axis.

Rl = (modified AISI allowable with FS = 1.92)

R2 = "" (BCCS design strength) / (load factor = 1.5)
R2 = "" (modif. Alsi allow. with FS = 1.92)

(ECCS design strength) / (load factor = 1.5)

(modif. AISI allow. with varying FS)

1,04 0.88 0.81 1.04 0.88 1.04 1.04 0.89 1.04 1.00 0.99 1.03 0.87 0.98 Table 3c
PARAMETRIC STUDIES
Fixed Ended Columns - Torsional-Flexural Buckling Я 1.20 1.01 1.04 1.20 1.02 1.20 1.20 1.20 1.20 1.00 1.19 0.99 0.99 1.19 72 1.51 1.48 8 1.65 0.53 1.00 1.40 0.70 1.12 1.54 0.53 0.54 1.05 1.51 0.57 1.08 1.07 1.47 0.55 1.04 1.42 Unperforated Columns Perforated Columns 40 80 120 40 80 120 80 120 40 80 40 80 120 40 80 SECTION AU1 AU1 AU1 BU1 BU1 BU1 AU2 AU2 AU2 BU2 BU2 AP1 AP1 AP1 BP1

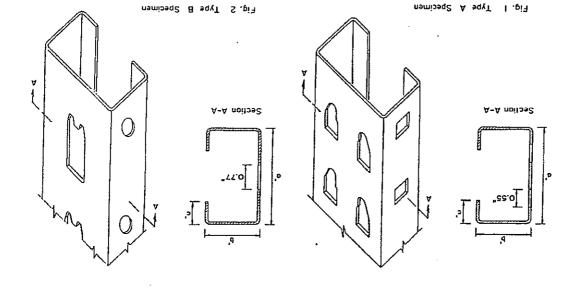
Notes: L is the effective length in inches. The and conditions are taken to be hinged about the minor axis and for twisting and fixed about major axis.

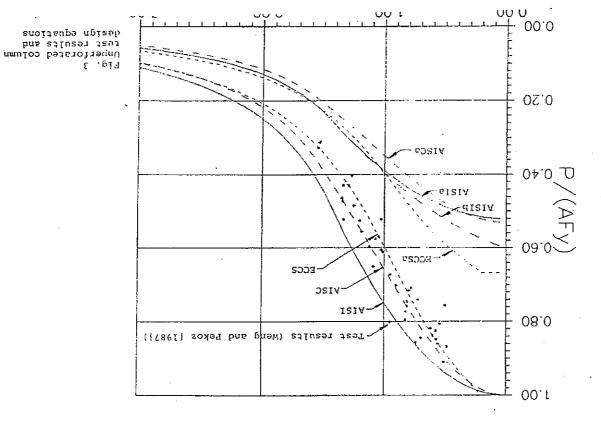
R2 # (ECCS design strength) / (load factor = 1.5) (modif. AISI allow. with FS = 1.92)

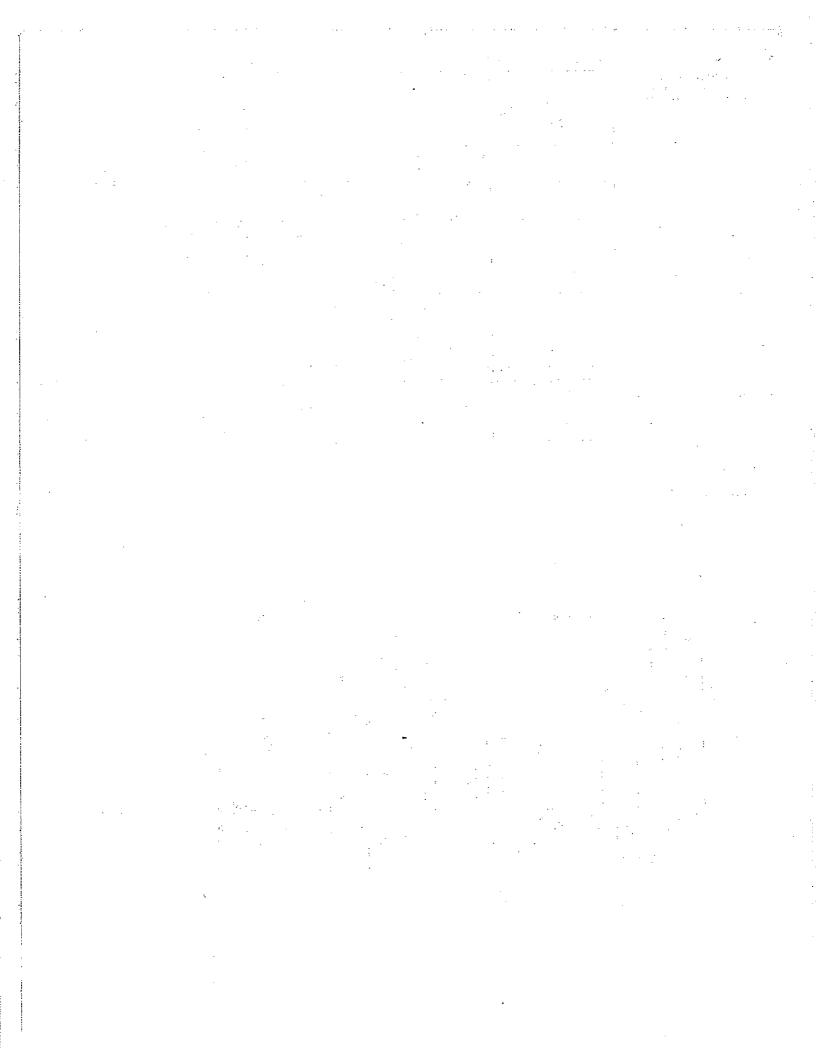
(Eccs design strength) / (load factor = 1.5)

(modif. AISI allow. with varying FS)

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# APPENDIX F POSSIBLE SPECIFICATION CHANGES

On the basis of the study presented in this report, possible specification changes are given on the following pages. The proposed changes maintain the present resistance factors and factors of safety that is in the present Specifications.

The implications of the proposed column design provisions can be studied with the help of Figs. F1 through F4. The following are the notations for the curves plotted in Figs. F1 through F4:

- A AISI without FS or φ
- B AISC without FS or φ
- C AISI divided by 1.92
- D AISI divided by varying FS
- E AISI divided by (LF/0.85)
- F AISC divided by 1.92
- G AISC divided by varying FS
- H AISC divided by (LF/0.85)
- I AISC divided by (LF/0.90)

Comparing C and D shows the differences in the present ASD AISI Specification for constant and varying factors of safety.

Comparing C and D with G shows the difference between the present provisions with the proposed ASD provisions.

Comparing E with H shows the difference between the present and the proposed LRFD provisions.comparing H and I shows the effect of using a resistance factor of 0.85 and 0.90.

where

varying FS the factor of safety  $\Omega_c = \frac{5}{3} + \frac{3}{8}R - \frac{1}{8}R^2$  in the AISI ASD Specification (1986)

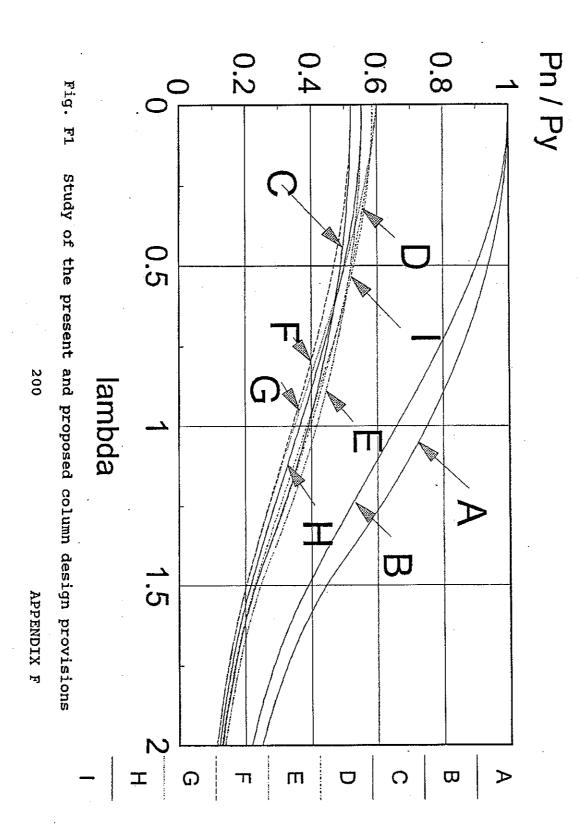
LF  $\frac{1.2(\frac{1}{5})+1.6}{(\frac{1}{5})+1}$  load factor for a dead to live load ratio of 1/5.

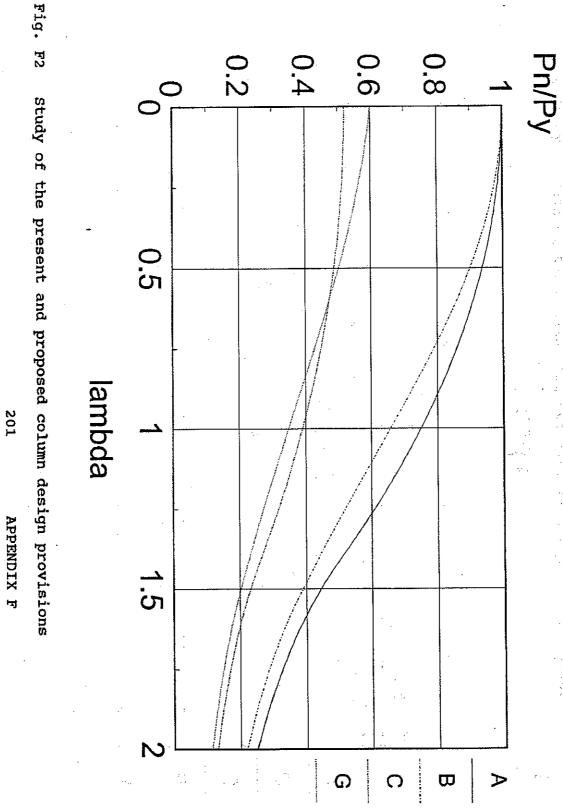
Comparison of the curves A and B show the difference between the current AISI and proposed AISC LRFD curves for the AISI

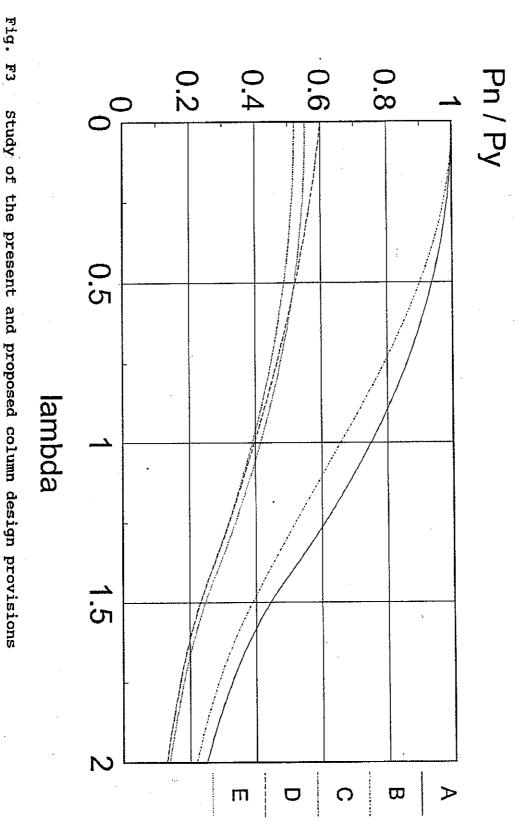
Specification. There is some loss in the calculated strength, however the proposed provisions represent the test data better.

The implications of the proposed beam column provisions can be seen in Fig. F5. It is seen that the calculated strength is increased. The resulting provisions are also simpler. They also allow future improvements for the treatment of frames similar to the treatment in the AISC LRFD Specification.

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Study of the present and proposed column design provisions 202

APPENDIX F

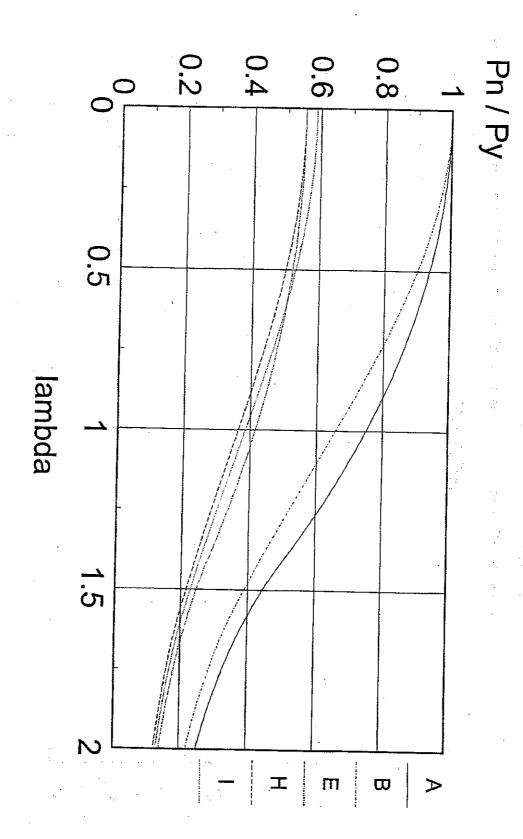
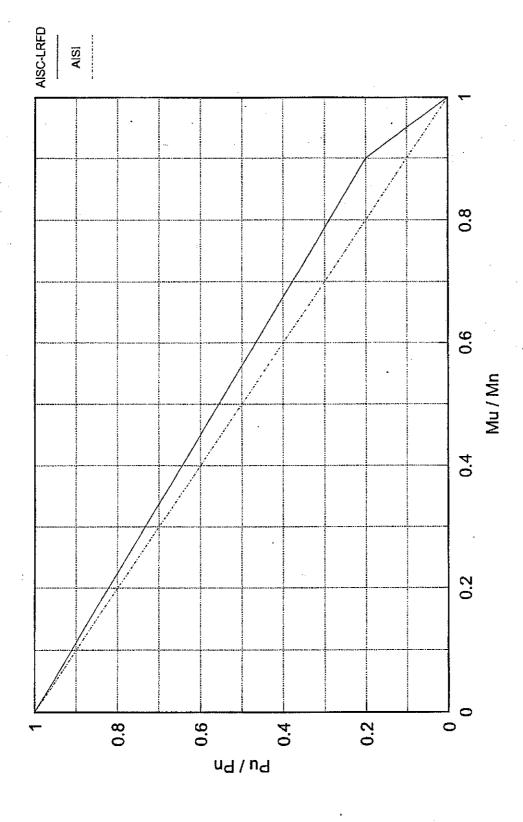


Fig. F4 Study of the present and proposed column design provisions



Study of the present and proposed beam column design provisions

APPENDIX F

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## **CHANGE TO THE SPECIFICATIONS**

It is proposed to change the following formulas in Section C4 in both the ASD and the LRFD Specifications for the Design of Cold-Formed Steel Structural Members from their present form:

For 
$$F_{\theta} > F_{\nu}/2$$

For 
$$F_{\theta} > F_y/2$$
  $F_n = F_y (1 - F_y/4F_{\theta})$ 

(Eq. C4-3 ASD and C4-3 LRFD)

For 
$$F_e \leq F_v/2$$

$$F_{B}=F_{e}$$

(Eq. C4-4 ASD and C4-4 LRFD)

To the following form:

For 
$$\lambda_c \le 1.5$$
  $F_n = (0.658^{\lambda_c^2}) F_y$ 

For 
$$\lambda_c > 1.5$$
  $F_n = \left[ \frac{0.877}{\lambda_c^2} \right] F_y$ 

where

$$\lambda_c = \sqrt{\frac{F_y}{F_e}}$$

### Reasons for the change:

The above proposed provisions are shown to be more accurate in "Final Report -DESIGN PROVISIONS FOR COLD-FORMED STEEL COLUMNS AND BEAM COLUMNS" by Pekoz, T. and Sumer, O.

### **CHANGE TO THE SPECIFICATIONS**

It is proposed to change the following formulas in Section C4 in both the ASD and the LRFD Specifications for the Design of Cold-Formed Steel Structural Members from their present forms:

ASD:

$$\frac{P}{P_a} + \frac{C_{mx}M_x}{M_{ax}\alpha_x} + \frac{C_{my}M_y}{M_{ay}\alpha_y} \le 1.0$$

$$\frac{P}{P_{ao}} + \frac{M_x}{M_{ax}} + \frac{M_y}{M_{ay}} \le 1.0$$

When  $P/P_a \le 0.15$ , the following formula may be used in lieu of the above two formulas.

$$\frac{P}{P_a} + \frac{M_x}{M_{ax}} + \frac{M_y}{M_{ay}} \le 1.0$$

To the following form:

For 
$$\frac{P_u}{\Phi P_n} \ge 0.2$$

$$\frac{P}{P_a} + \frac{8}{9} \left( \frac{M_{mx}}{M_{ax}} + \frac{M_{my}}{M_{ay}} \right) \le 1.0$$

For 
$$\frac{P_u}{\Phi P_n} < 0.2$$

$$\frac{P}{2P_a} + \left(\frac{M_{mx}}{M_{ax}} + \frac{M_{my}}{M_{ay}}\right) \le 1.0$$

where

$$M_{\text{mx}} = \frac{C_{\text{mx}} M_{x}}{\alpha_{x}} \le 1$$
 and  $M_{\text{my}} = \frac{C_{\text{my}} M_{y}}{\alpha_{y}} \le 1$ 

: LRFD:

$$\frac{P_u}{\Phi_c P_n} + \frac{C_{mx} M_{ux}}{\Phi_b M_{nx} \alpha_x} + \frac{C_{my} M_{uy}}{\Phi_b M_{ny} \alpha_y} \le 1.0$$

$$\frac{P_u}{\Phi_c P_{no}} + \frac{M_{ux}}{\Phi_b M_{nx}} + \frac{M_{uy}}{\Phi_b M_{ny}} \le 1.0$$

When  $P_u/\phi_c P_n \le 0.15$ , the following formula may be used in lieu of the above two formulas.

$$\frac{P_u}{\Phi_c P_n} + \frac{M_{ux}}{\Phi_b M_{nx}} + \frac{M_{uy}}{\Phi_b M_{ny}} \le 1.0$$

## To the following form:

For 
$$\frac{P_u}{\Phi P_n} \ge 0.2$$

$$\frac{P_u}{\Phi P_n} + \frac{8}{9} \left( \frac{M_{mux}}{\Phi_b M_{nx}} + \frac{M_{muy}}{\Phi_b M_{ny}} \right) \le 1.0$$

For 
$$\frac{P_u}{\Phi P_n} < 0.2$$

$$\frac{P_u}{2\Phi P_n} + \left(\frac{M_{mux}}{\Phi_b M_{nx}} + \frac{M_{muy}}{\Phi_b M_{ny}}\right) \le 1.0$$

where

$$\begin{split} &M_{mux} = C_{mx} M_{ux} / \alpha_{nx} \\ &M_{muy} = C_{my} M_{uy} / \alpha_{ny} \\ &1 / \alpha_{nx}, 1 / \alpha_{ny} = 1 / \left[1 - \frac{P_u}{\Phi_c P_E}\right] \end{split}$$

All other terms are as defined in the AISI LRFD Specification.

### Reasons for the change:

The above proposed provisions are shown to be more accurate in "Final Report - DESIGN PROVISIONS FOR COLD-FORMED STEEL COLUMNS AND BEAM COLUMNS" by Pekoz, T. and Sumer, O.



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