RIGID FRAME STUDIES

Progress Report

FULL SCALE FRAME TESTS
SRL04 50 20/25 16/25

by

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Sponsored by

Star Manufacturing Company
Oklahoma City, Oklahoma

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University of Oklahoma
Norman, Oklahoma 73019

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INTRODUCTION

A series of tests was conducted in the Fears Structural Engineering Laboratory, School of Civil Engineering and Environmental Science, University of Oklahoma, using standard rigid frames produced by Star Manufacturing Company, Oklahoma City, Oklahoma. The purpose of these tests was to determine the structural strength and stiffness of rigid frames designated by Star Manufacturing Company as SRL04 50 20/25 16/25. The frames, referred to herein as SRL04 50, are normally used in pre-engineering buildings with the following design parameters:

Clear Span	50 ft.
Design Live Load	20 psf
Design Wind Load	25 psf
Eave Height	16 ft.
Frame Spacing	25 ft.
Roof Slope	1:12

The SRL04 frame series consist of clear span gable rigid frames with variable depth tapered columns and variable depth tapered rafters of shop-welded steel plate. A roof slop of 1:12 is used for frames of this series.

The test specimens were fabricated as part of standard production runs. The test set-up and testing procedures were developed using details and descriptions found in the literature. The test set-up consisted of two frames spaced

24 ft. 0 in. apart, with connecting simple span purlins and girts, standard flange brace angles and rod braces as shown in Figure 1. Simulated live load was applied using gravity load simulators similar to those described in Reference 1. Only full live load was applied to the frames.

The purpose of the testing was to verify existing design procedures used by Star Manufacturing Company to predict deflections and strength. This report provides a detailed description of the testing procedures, instrumentation and results. Comparisons are made with the standard Star Manufacturing Company design procedures.

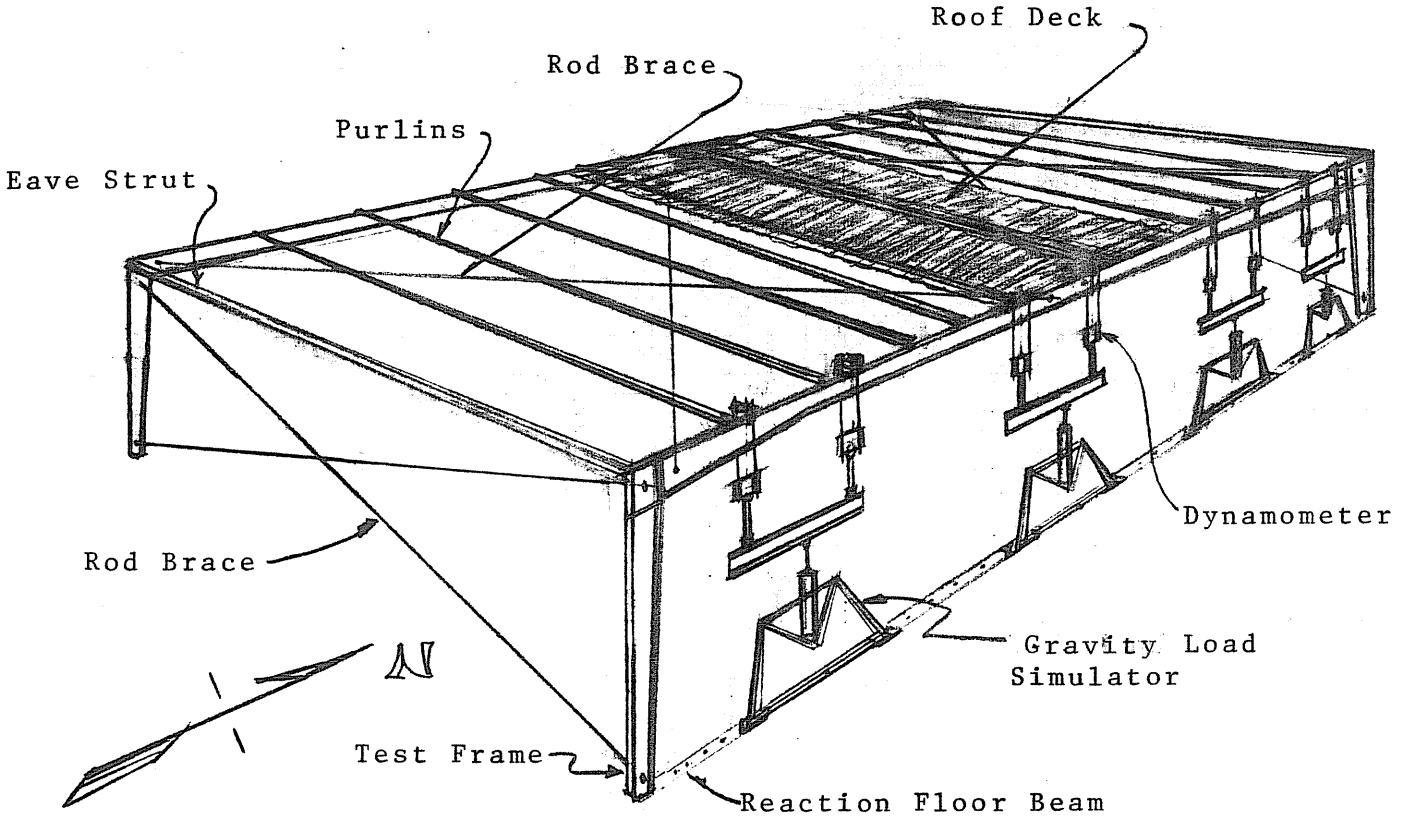


Figure 1 Overall View of Test Set-up

TEST DETAILS

Description of Specimens

Details and dimensions of the test specimens are shown in Figure 2 and points of load application are shown in Figure 3. The specimens were fabricated from A572 Gr50 steel. The only modification made to the specimens compared to standard production frames was the addition of holes in the top flanges of the rafters to permit installation of loading devices.

Test Set-up

The frames were erected inside the Fears Structural Engineering Laboratory on the laboratory reaction floor. This floor is a concrete slab 30 ft. by 60 ft. in plan, 3 ft. 6 in. deep with four W36x150 steel beams embedded in concrete. The slab weighs one million pounds and is capable of reacting 320,000 lb. in any one location. The frames were erected directly over two of the embedded W36 beams, spaced 24 ft. 0 in. apart. Purlins and girts at standard spacings were connected between the frames along with standard rod bracing in both the roof and side walls. Compression flange braces at the standard locations were connected between the purlins and the bottom flanges of the rafters. Only a portion of the roof area near the peak was sheeted, as shown in Figure 1, for tests conducted on the east frame. The entire roof was sheeted for west frame tests. No sheeting was used on the

end walls.

The column base plates were bolted to channel sections which in turn were bolted to the reaction floor beams as shown in Figure 4. Six, 7/8 in. diameter, A325 bolts were used at the rafter to column connection, six, 5/8 in. diameter, A325 bolts were used at the peak splice connections, and 1/2 in. diameter by 1 1/4 in. hex screws were used to connect all cold-formed parts to the frames. The erection procedure was as near as possible to standard practice and no special procedure was used to tighten bolts in the end plate connections.

Load Application

Simulated live load was applied using the loading apparatus shown in Figure 5. The loading apparatus consists of a gravity load simulator (Figure 6), a 35 kip tension-compression hydraulic cylinder, spreader beam, two calibrated dynamometers, and spreader beams and tension rods attached to the frame. The simulator is a device which permits horizontal movement of the point of load application while maintaining a vertical line of action of the applied load. For the simulator used in these tests, the point of application of the load can move left or right a maximum of 10 in. and the hydraulic ram will remain vertical.

The points of load application are shown in Figure 3. Equal load at the eight points was achieved by connecting all four hydraulic cylinders in series to an electric pump.

Instrumentation

Instrumentation consisted of calibrated dynamometers,

calibrated load cells, strain gages, dial gages and horizontal deflection gages. Gravity load was measured using the calibrated dynamometers positioned as shown in Figure 5.

Vertical deflection of the center line of the frames was measured using a taut wire and a dial gage, Figure 7. Sidesway of the top of the column was measured using a horizontal scale (0.1 in.) located as shown in Figure 8 and a fixed transit. Lateral movement of the column and rafter flanges was measured by means of a transit set in a fixed position with the telescope free to move only in a vertical plane. Graduated scales (0.1 in.) were attached perpendicular to the plane of the web at the flange locations shown in Figure 9. The locations shown on the rafters are midway between purlin attachment points. The locations shown on the columns were arbitrarily selected.

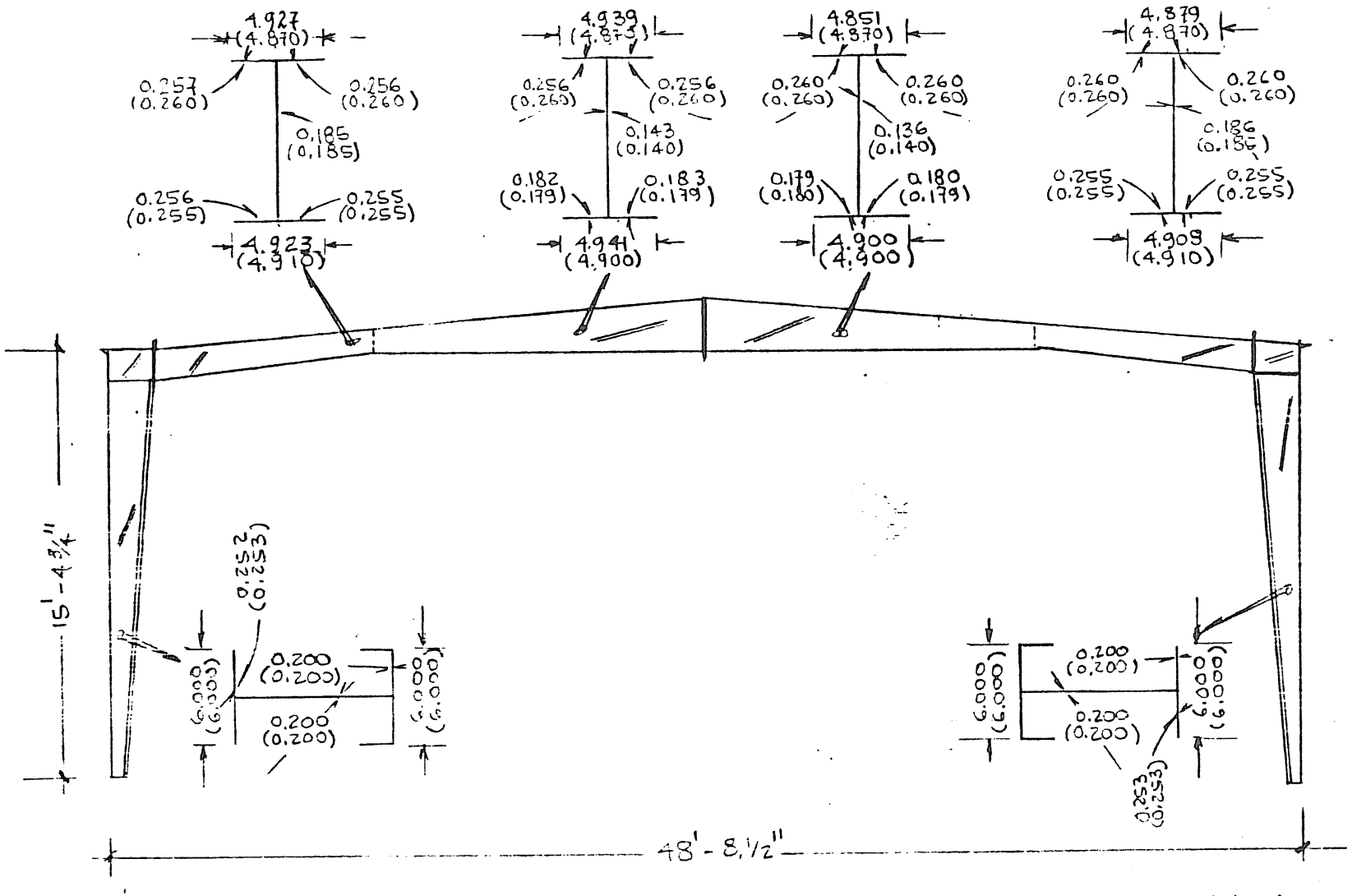
Foil strain gages were positioned on both frames at critical locations, as shown in Figure 10. Gages on opposite sides of the flange location were wired so that twice the average strain at a particular location was recorded. An electronic data acquisition system was used to record all strain gage data.

Testing Procedure

Prior to any actual testing, an overall check of the testing apparatus and instrumentation was made and zero readings were recorded. In general, load was applied in increments of 0.5 kips until near the failure load when the increment was decreased. After each load increment, deflection

and strain gage readings were recorded and the specimens were checked for signs of yielding. Yielding was detected by flaking of mill scale under the whitewash coat on the frame. When the specimens were no longer able to resist any additional loading, the maximum load was recorded and the load was then removed.

Two series of tests were conducted: initial tests to verify the performance of the frames relative to analytical predictions and final tests to determine the load-carrying capacity of the frames. For the initial tests, each frame was independently loaded to 4.0 kips at each location. This load is greater than the working load, approximately 3.0 kips. For the final tests, full live load was applied to each frame independently until failure. Failure was determined when additional load could not be applied to the frame.

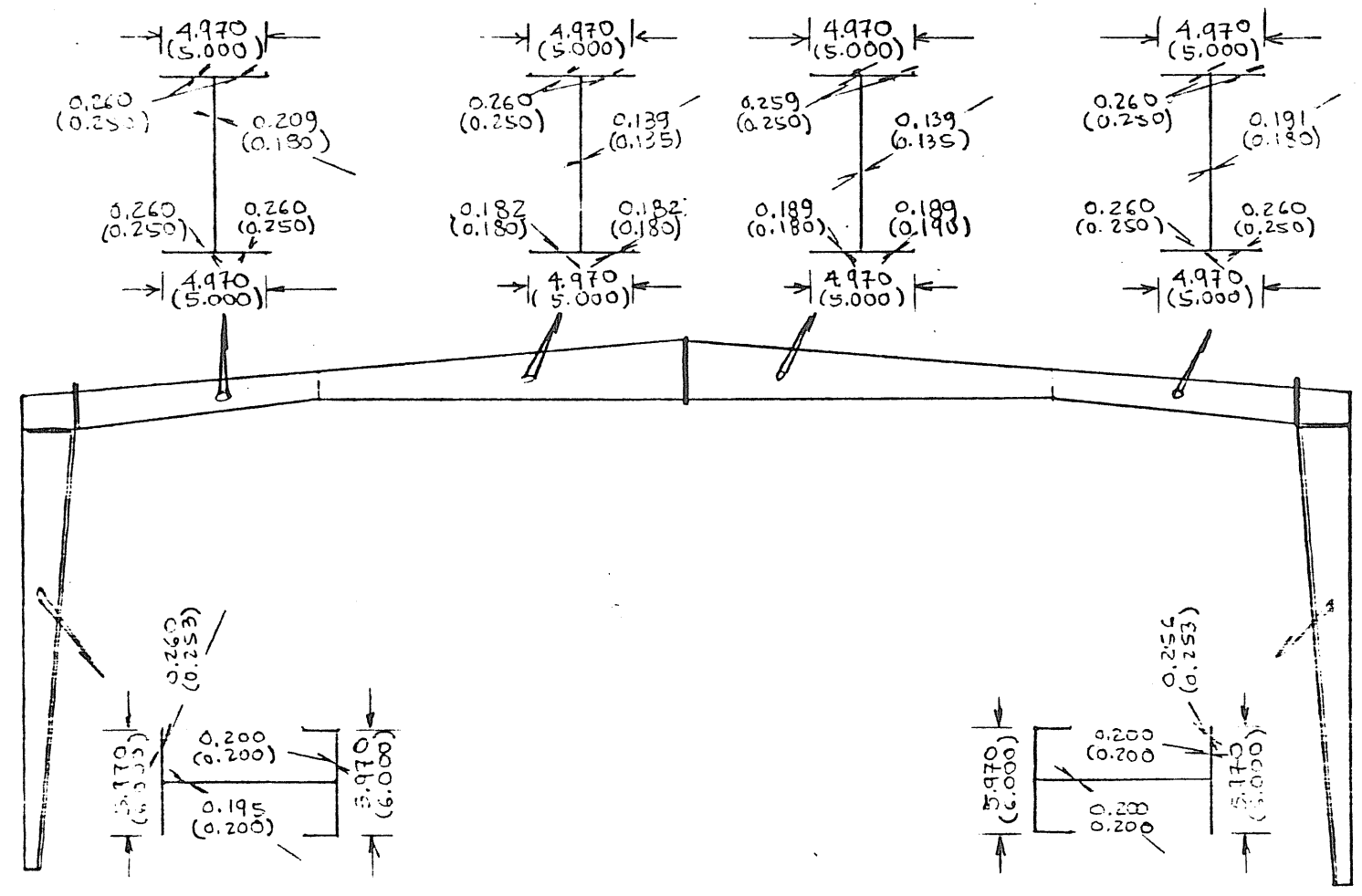


LOOKING WEST

DESING DIMENSION IN BRACKED
OTHER, AVERAGE MEASURED.

FRAME TEST 1
SR104 20/25 16/25

-8-



48-8 ½"

LOOKING WEST

DESIGN DIMENSION IN BRACKETS
OTHER, AVERAGE MEASURED

FRAME TEST 2
SR104 20/25 16/25

Figure 2. [illegible] of Test Specimens--West Span

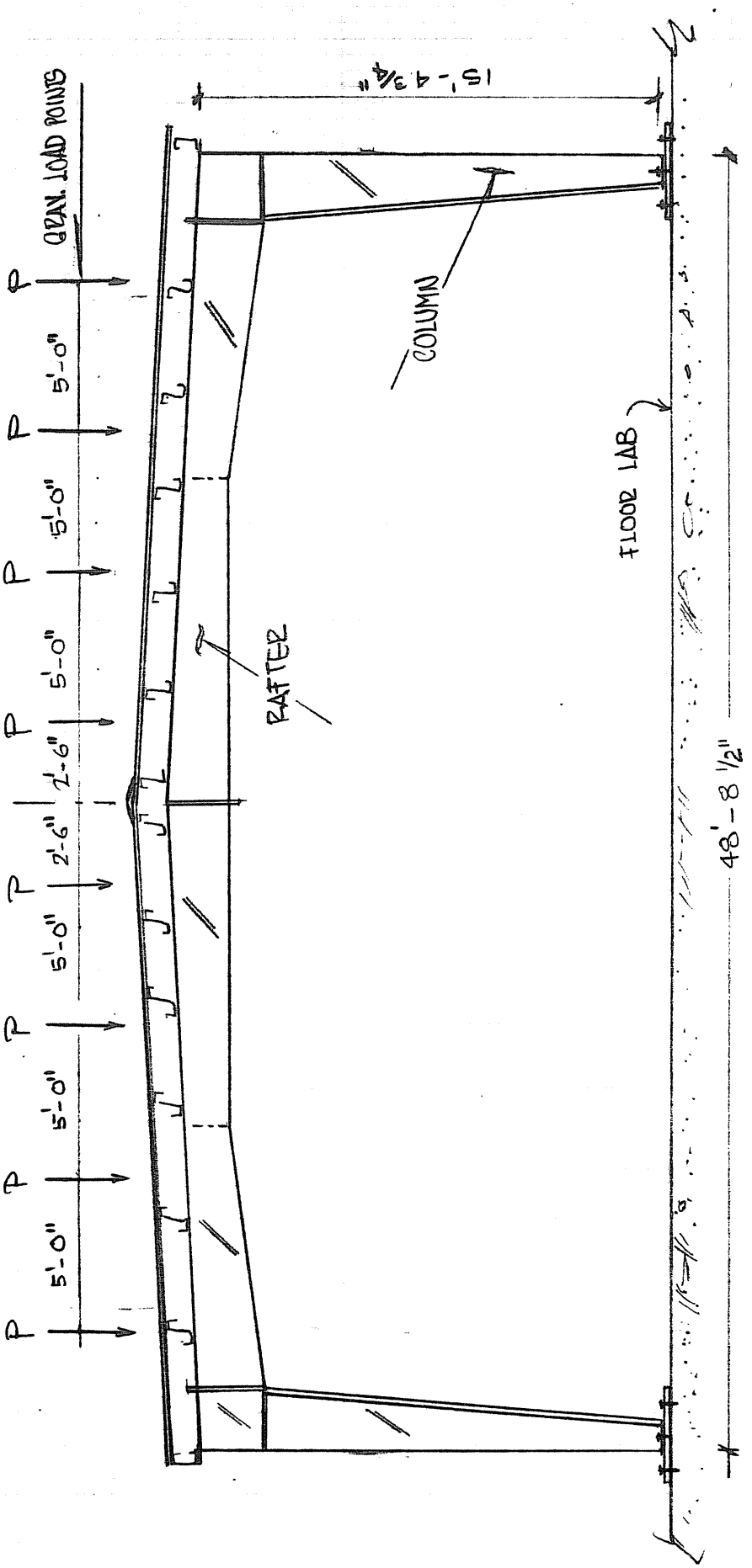


Figure 3. Points of Load Application

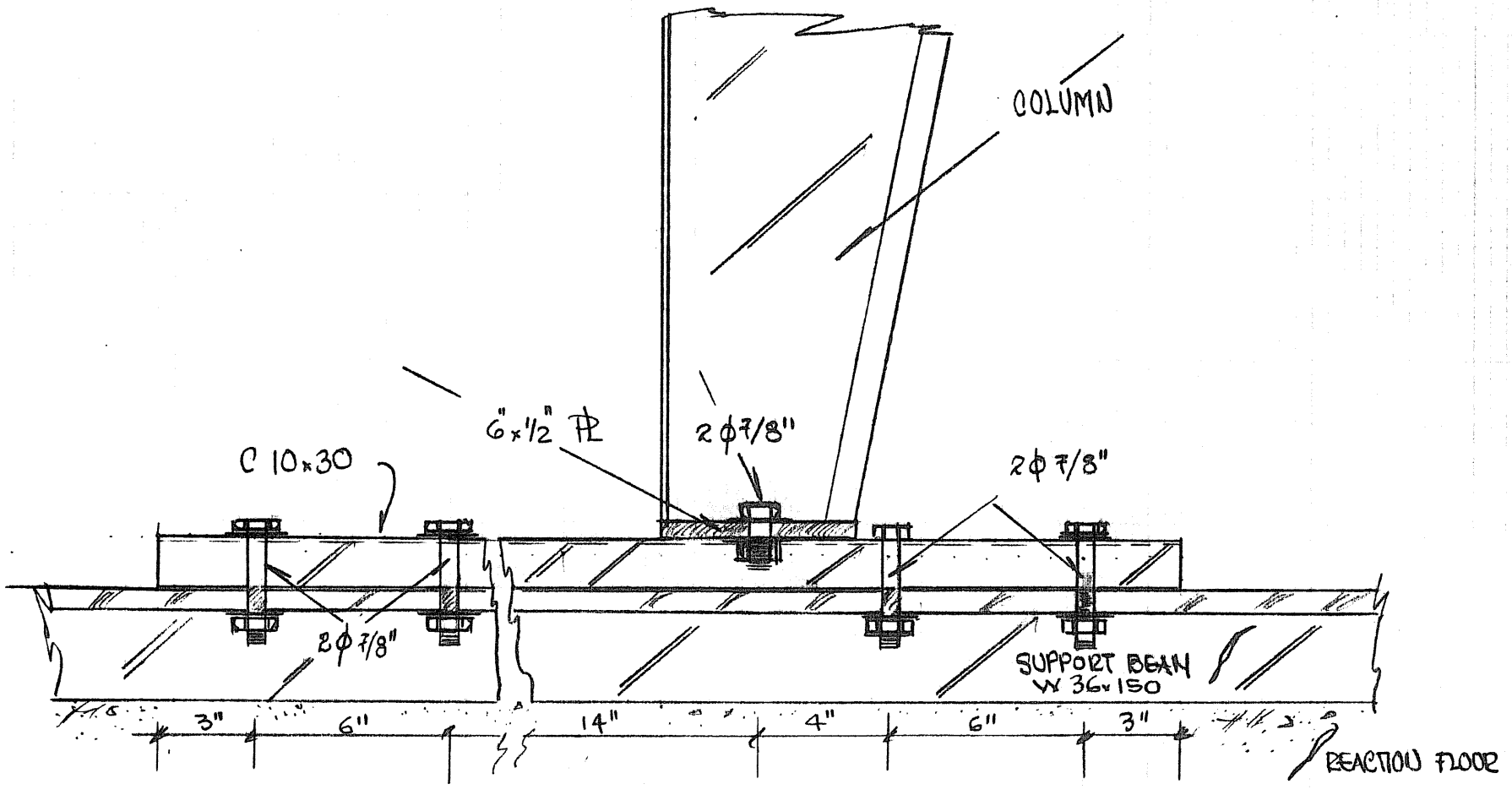


Figure 4. Details of Column to Reaction Floor Connection

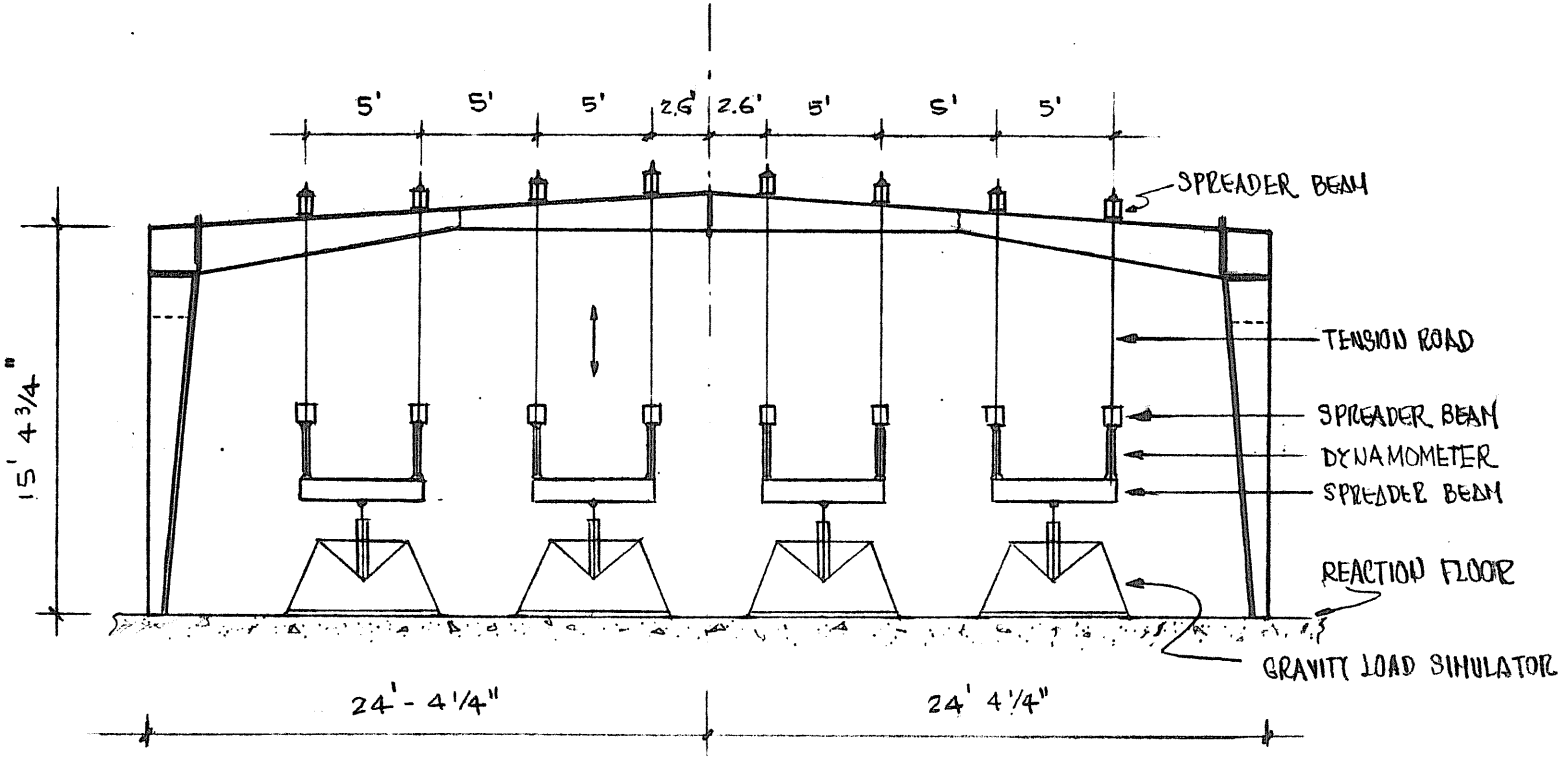


Figure 5. Simulated Live Load Loading

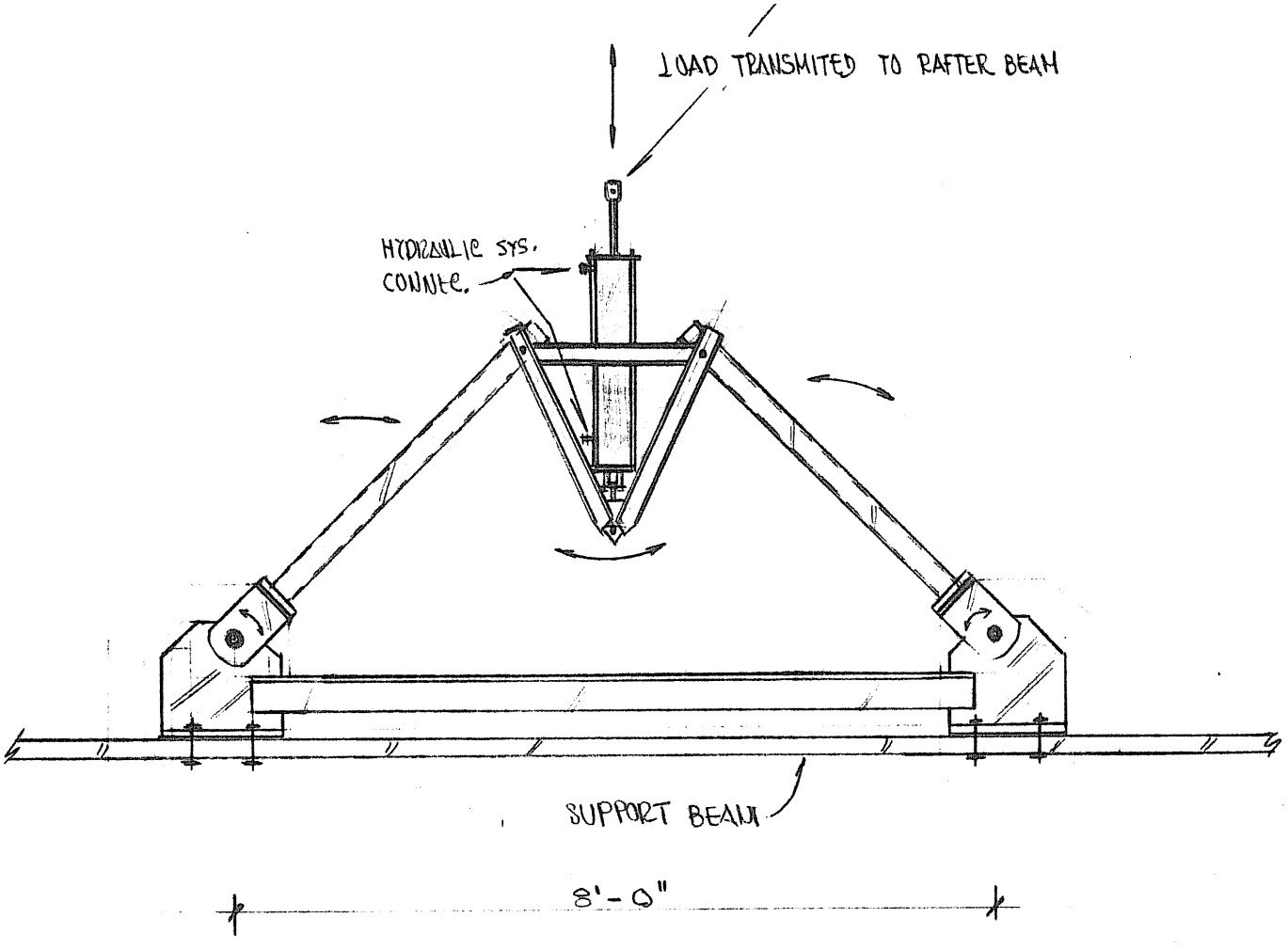


Figure 6. Gravity Load Simulator

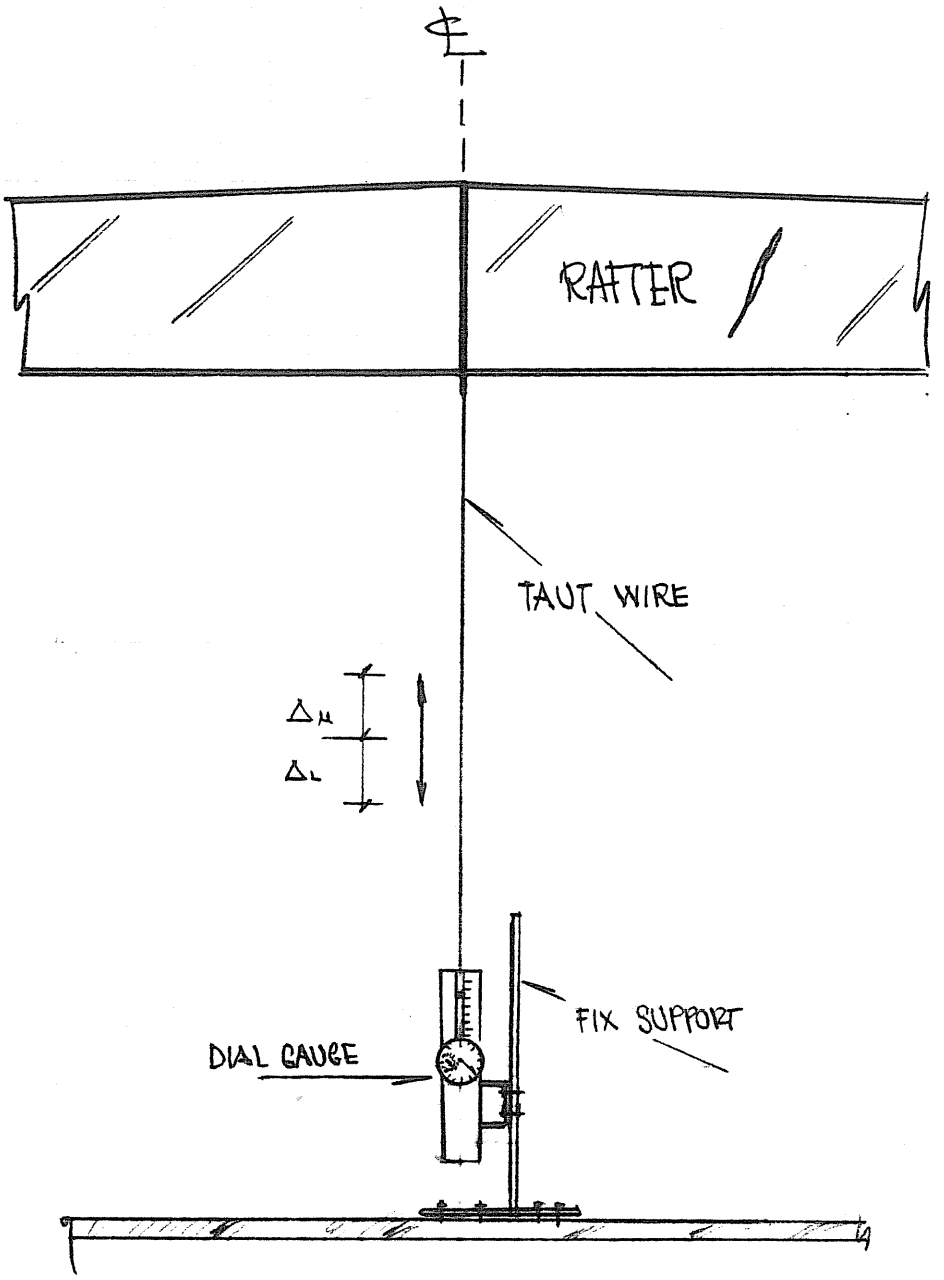


Figure 7. Measurement of Vertical Deflection

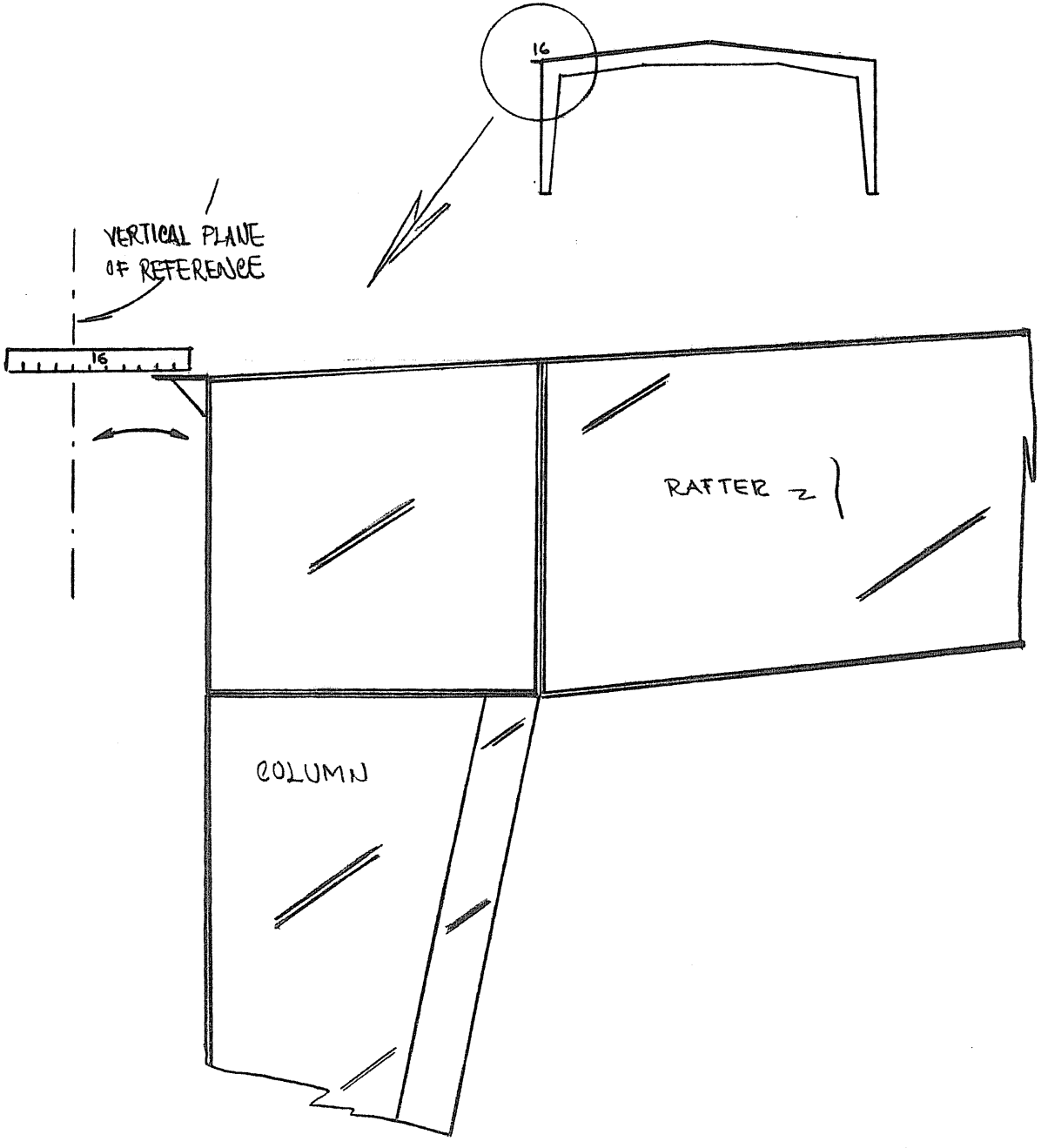


Figure 8. Measurement of Sidesway Deflections

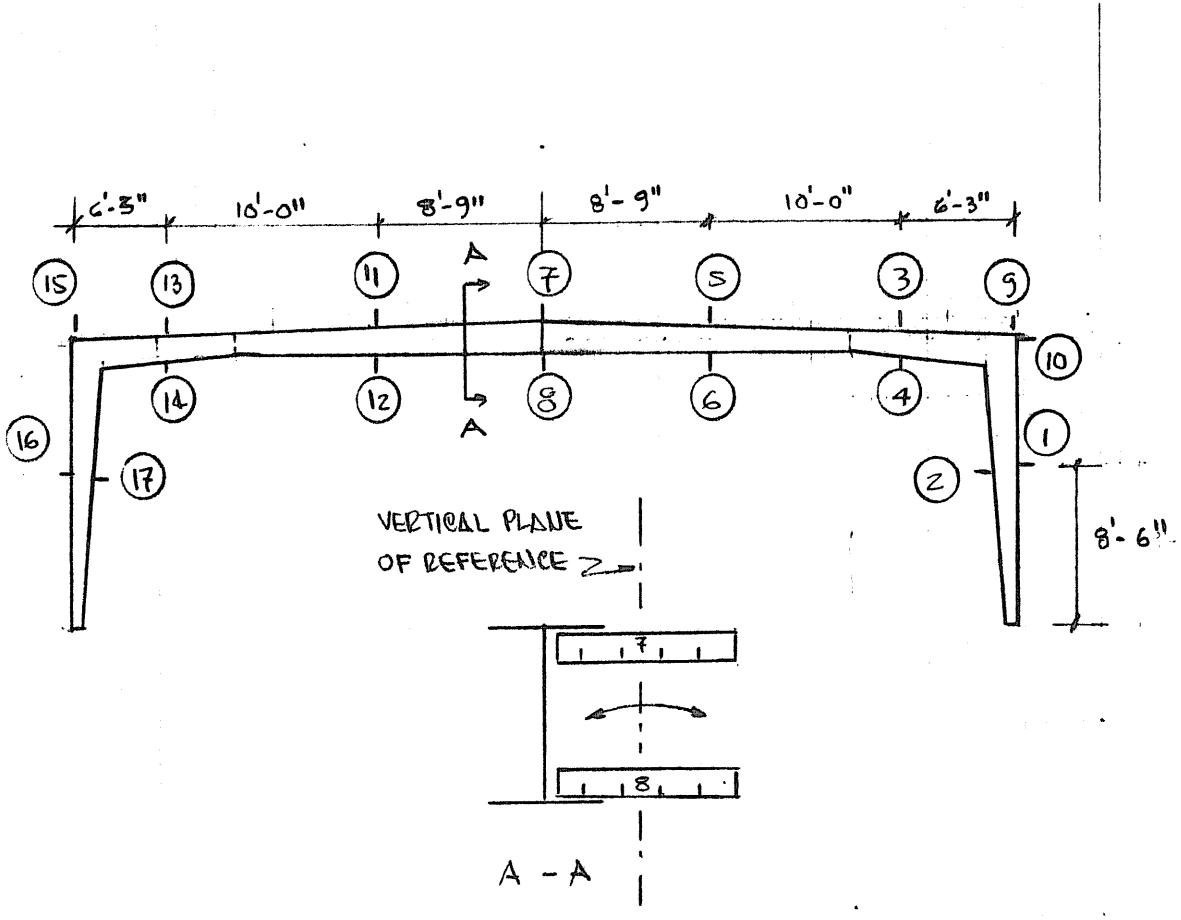


Figure 9. Measurement of Lateral Deflections

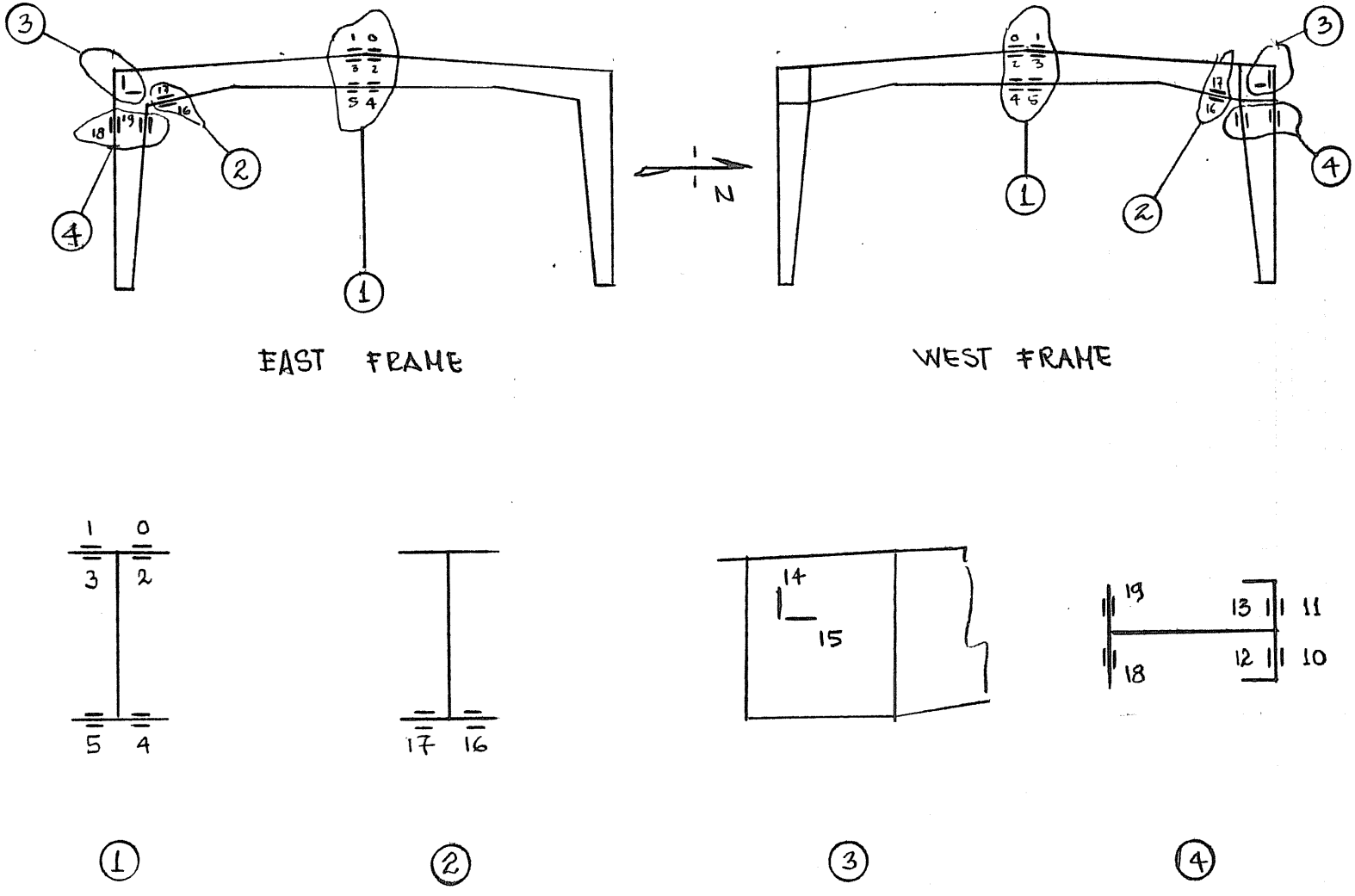


Figure 10. Strain Gage Locations

TEST RESULTS AND ANALYTICAL COMPARISONS

Analysis Procedure

In the section following, test results are compared to Star Manufacturing Company's standard computer design program. This program was used to obtain theoretical frame stiffness and failure predictions. The program uses a standard stiffness analysis to determine internal axial forces, shears and moments and external deflections. For analysis purposes, non-prismatic members are divided into a number of segments each with uniform properties. The stiffness matrix is then developed and solutions obtained. Stresses at the end of all segments are calculated and standard AISC interaction equation (Formulas 1.6-1a, 1.6-1b or 1.6-2) are used to determine allowable or service load. The interaction equations are checked at each analysis point and the location with a maximum value less than 1.0 (unity check) is used as a criterion for determining maximum service load. In addition, local buckling and shear failure is checked using AISC provisions.

The basic factor of safety in the AISC specification is 1.67. To determine the ultimate load of the frames from the Star Manufacturing Company design procedure, the service loading was increased until a unity check value of approximately 1.67 was attained for at least one analysis point in the frame. Computer output showing geometry and section

property data and the analyses for ultimate full live load loading for the two frames is found in Appendix A.

Initial Tests

Full Live Load - East Frame. Test results and theoretical predictions from Star Manufacturing Company's design program are shown in Appendix B for the east frame subjected to the full live load. For this test 4.0 kips was applied at each load point on the frame. This is greater than the loading for a unity check value of 1.0, 3.07 kips. Figures B.1 and B.2 show experimental and theoretical load versus deflection data for vertical centerline deflection and sidesway deflection, respectively. Excellent agreement was found between predicted and measured vertical centerline deflection. The measured sidesway deflection was not in agreement with the predicted values, especially after 3 kips load. However, the difference is small and can be considered insignificant.

Lateral deflections of the inside and outside flanges of the east frame are shown in Figures B.3 and B.4, respectively. Maximum lateral deflection was approximately 1.06 in. near the centerline of the rafter, indicating potential lateral buckling.

Figures B.5, B.6 and B.7 show load versus predicted stress and stress computed from measured strains at locations in the south column near the knee, south rafter near the knee and the south rafter near the peak, respectively. (Measured strains were multiplied by E = 29,000,000 psi to obtain stresses below the yield stress of the material. If the computed stress

exceeded the yield stress the yield stress is used.) In all instances excellent agreement was found between predicted and experimentally determined stresses.

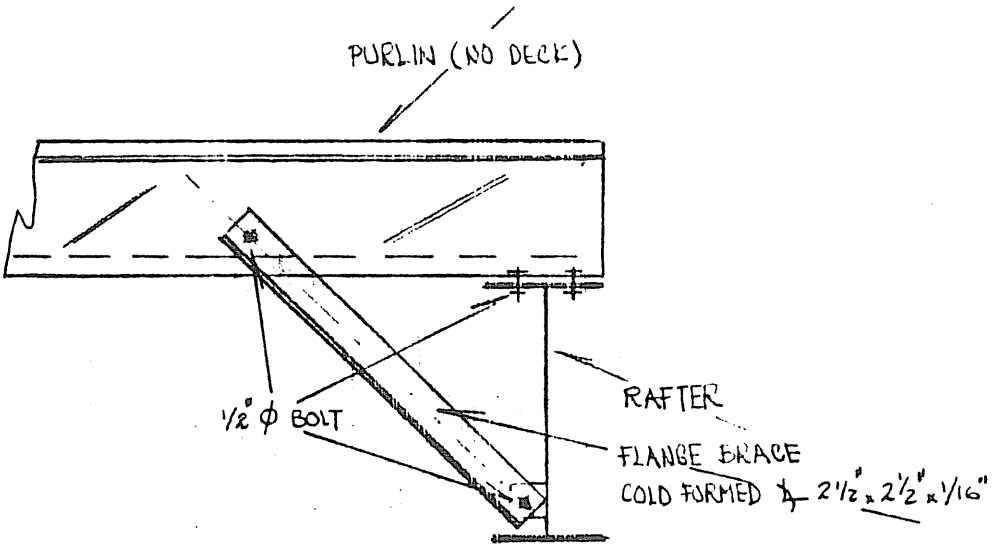
Results of this test indicate that frame stiffness and stress distributions are accurately predicted by Star Manufacturing Company's design program.

Final Tests

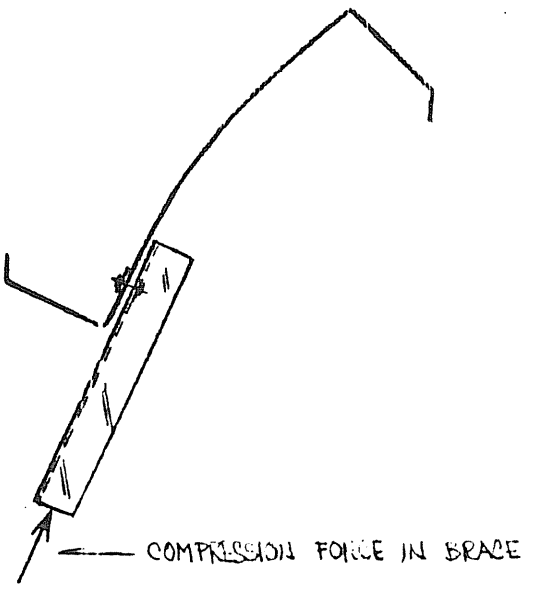
Full Live Load - East Frame. Test results for the west frame loaded with full live load are shown in Appendix C. Failure occurred by lateral buckling of the north rafter near the knee at a load of 4.75 kips. A unity check value of 1.67, as determined using Star Manufacturing Company's design program, corresponds to a load of 5.13 kips. Output is shown in Figure A.2 and the critical location is in the rafters near the knee. Lateral buckling occurred because of failure of the rafter compression (lower) flange brace near the north knee. The roof sheeting did not extend to the purlin supporting the flange brace and the purlin rolled as shown in Figure 11, effectively eliminating the brace and permitting lateral buckling.

As shown in Figure C.1, good agreement was attained between measured and predicted vertical centerline deflection. It is evident from Figure C.1 that the capacity of the frame was reached before the predicted failure load of 5.13 kips.

Lateral deflection of the inside and outside flanges are shown in Figures C.2 and C.3, respectively. The maximum lateral deflection was 0.6 in. near the peak. This deflection is not considered to be of significance.



a) Flange Brace



b) Failure Mode

Figure 11 Failure of Compression Flange Brace

Load versus predicted stress and stress calculated from measured strain data is shown in Figure C.4 for the south column near the knee, Figure C.5 for the south rafter near the peak, and Figure C.6 for the south rafter near the peak. Reasonable agreement was obtained between the predicted stresses and experimentally obtained stresses for the column knee and rafter peak locations. No explanation was found for the discrepancies at the rafter knee location.

Results of this test indicate that the design procedure accurately predicts the stiffness of the frame and stress distributions within the frame. Failure of the frame was caused by an inadequate compression flange brace near the north knee.

Full Live Load - West Frame. Before conducting the final test on the west frame, roof sheeting was attached to the entire roof area. End wall sheeting was not used. The west frame was then subjected to full live load until failure by lateral buckling in the south rafter at a load of 4.8 kips at each location. Results are shown in Appendix D. Lateral movement was visually more evident along the inside (peak) rafter segment, however, it was apparent that the outside (knee) rafter segment also moved laterally. Output from the Star Manufacturing Company's program for the test condition is shown in Figure A.3. The predicted failure load for this analysis was 5.29 kips.

Load versus vertical deflection at the centerline is shown in Figure D.1. Good agreement was obtained between the measured and predicted deflections. Lateral deflections are shown in Figure D.2 and D.3 for the outside and inside flanges,

respectively. The maximum deflection before failure was 0.49 in. and the buckled configuration is clearly shown in Figure D.3.

Load versus experimentally determined and predicted stresses are shown in Figures D.4 to D.6. Fair agreement was obtained between the experimentally determined and predicted values except for two locations in the north column near the knee (Figure D.4).

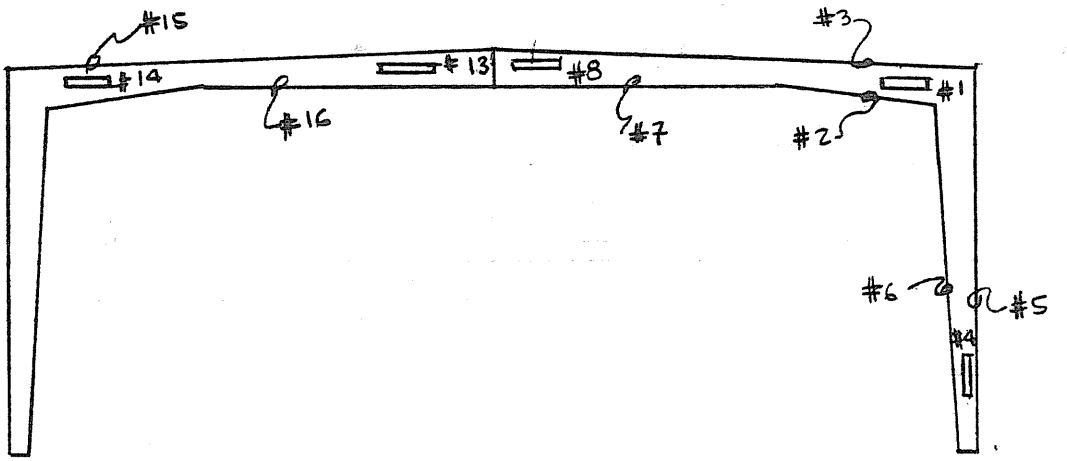
Results of this test indicate that Star Manufacturing Company's design program adequately predicts frame stiffness and internal stress distributions. The roof sheeting was found to have sufficiently stiffened the purlin so that the type of failure shown in Figure 11 was prevented. It is believed that the frame failed below the predicted ultimate load because of damage caused by the east frame failure. When the lateral brace failed during the east frame test, the rafter segments of the west frame were pushed laterally at the flange brace locations. The west rafter segments remained in a laterally deflected position when the load on the east frame was removed.

Coupon Tests

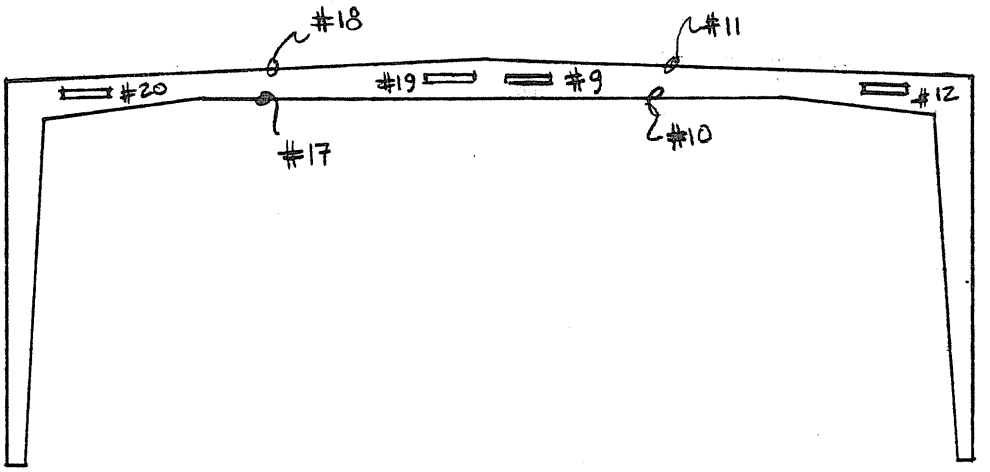
Upon completion of all testing, samples of the plate material used to fabricate the frames were removed at the locations shown in Figure 12. The locations were chosen to minimize the effects of possible yielding due to test loading. Standard ASTM E-8-57 T tensile coupons were then machined and tested. Results are shown in Table 1. Measured yield stresses varied from 47.9 to 66.3 ksi. The higher values were found in the web material and the lower values in the flange material. The

results for the flanges were sufficiently close to the specified minimum yield stress, 50 ksi, to be acceptable.

For the Star Manufacturing Company computer analyses, a yield stress of 50 ksi was used.



a) East Frame



b) West Frame

Figure 12. Location of Coupon Samples

TABLE 1

Results of Coupon Tests

#	Location	Yield Stress	Ultimate Stress	Elongation % in 2 in
		ksi	ksi	
1	Middle Web at Knee Northeast Rafter	66.3	86.3	17.0
2	Lower Flange Northeast Rafter	48.5	72.7	25.0
3	Upper Flange Northeast Rafter	47.9	42.7	27.0
4	Middle Web Northeast Column	60.0	76.1	23.0
5	Outside Flange Northeast Column	61.8	76.2	23.0
6	Inside Flange Northeast Column	N.A.	N.A.	N.A.
7	Lower Flange Northeast Rafter	50.3	73.2	23.0
8	Middle Web at Peak Northeast Rafter	58.2	69.8	25.0
9	Middle Web at Peak Northwest Rafter	57.5	67.1	25.0
10	Lower Flange Northwest Rafter	N.A.	72.5	30.0
11	Upper Flange Northwest Rafter	48.2	72.2	25.0
12	Middle Web at Knee Northwest Rafter	59.1	78.8	20.0
13	Middle Web at Peak Southeast Rafter	57.2	67.7	25.0
14	Middle Web at Knee Southeast Rafter	61.3	77.8	22.0
15	Upper Flange at Knee Southeast Rafter	50.1	73.8	23.0
16	Lower Flange Southeast Rafter	49.7	72.9	22.0
17	Lower Flange Southwest Rafter	50.5	74.7	25.0
18	Upper Flange Southwest Rafter	49.2	72.5	25.0
19	Middle Web at Peak Southwest Rafter	58.6	66.6	23.0
20	Middle Web at Knee Southwest Rafter	63.6	80.7	18.0

SUMMARY AND CONCLUSIONS

A series of tests was conducted on standard pre-engineered metal building frames fabricated by Star Manufacturing Company, Oklahoma City. The frames used in the testing are designated by the manufacturer as SRLO 50 20/25 16/25. The test set-up consisted of two frames forming a single bay, 24 ft. by 50 ft. Standard roof deck, purlins, eave struts, girts, flange braces, and rod braces were used to construct the test set-up. The frames were subjected to full live load loading with load applied to each frame independently.

Experimentally determined results were compared to predicted values using Star Manufacturing Company's design computer program. Vertical and sidesway deflections predicted by the design program were in excellent agreement with measured displacements. Failure loads predicted by the design program were higher than those determined experimentally.

Failure of the first frame tested was caused by an inadequate compression flange brace. The test was conducted without roof sheeting at the brace location and the purlin used to resist the flange brace force was not restrained from rolling. This lack of restraint permitted the rafter compression flange to move laterally causing failure. In addition, the compression flange of the opposite (untested) frame was also moved laterally and damaged.

It is apparent from the test results that the Star Manufacturing Company design program adequately predicts frame stiffness and stress distributions in the members. It is also apparent that purlin roll restraint is required to provide an adequate rafter compression flange brace.

REFERENCES

1. Fisher, J. W., Lee, G.C., Yura, J. A., and Driscoll, G. C., "Plastic Design and Tests of Haunched Corner Connections", Welding Research Council Bulletin, No. 91, October 1963.

2. "Specification for the Design, Fabrication, and Erection of Structural Steel for Buildings", American Institute of Steel Construction, New York, 1978.

APPENDIX A

STAR MANUFACTURING COMPANY

COMPUTER ANALYSES

STAR MANUFACTURING CO. 8600 S. I-35 OKLAHOMA CITY, OK. JOB SRLOFRA
SRL04 50 20/25 16/25 FILE OU. FRA. 1
DESIGN DIMENSIONS AND PROPERTIES REPORT PAGE 3

MEMBER NO. 1- 2 LENGTH= 14.65 FT ANGLE= 87.36 DEG FYF=50. KSI FYW=50. KSI
SECTION 1 LENGTH= 13.87 FT DF= 6.00 X 0.2500 WEB=0.1875 IF=C 6 X 8.2

POINT NO.	X (FT)	Y (FT)	DEPTH (IN)	AREA (IN2)	IX (IN4)	RX (IN)	RY (IN)	SOX (IN3)	SIX (IN3)	RTO (IN)	RTI (IN)
1*	0.00	0.00	6.00	4.94	30.0	2.47	1.89	9.0	11.3	1.630	2.265
101	0.06	1.15	7.22	5.17	45.9	2.98	1.85	11.3	14.4	1.610	2.251
102	0.17	3.46	9.67	5.63	89.1	3.98	1.77	16.4	21.0	1.571	2.222
103	0.28	5.77	12.12	6.09	149.0	4.95	1.70	21.9	28.0	1.536	2.194
104	0.39	8.08	14.57	6.55	226.9	5.89	1.64	27.9	35.3	1.503	2.167
105	0.51	10.39	17.02	7.01	324.3	6.80	1.59	34.3	42.9	1.473	2.140
106	0.62	12.70	19.47	7.47	442.5	7.70	1.54	41.1	50.9	1.444	2.114
107*	0.67	13.86	20.69	7.70	509.9	8.14	1.51	44.6	55.1	1.431	2.102

STAR MANUFACTURING CO. 8600 S. I-35 OKLAHOMA CITY, OK. JOB SRLOFRA
SRL04 50 20/25 16/25 FILE OU. FRA. 1
DESIGN DIMENSIONS AND PROPERTIES REPORT PAGE 4

MEMBER NO. 2- 3 LENGTH= 23.47 FT ANGLE= 4.89 DEG FYF=50. KSI FYW=50. KSI
SECTION 1 LENGTH= 7.25 FT DF= 5.00 X 0.2500 WEB=0.1875 IF= 5.00 X 0.2500
SECTION 2 LENGTH= 15.51 FT DF= 5.00 X 0.2500 WEB=0.1345 IF= 5.00 X 0.1799

POINT NO.	X (FT)	Y (FT)	DEPTH (IN)	AREA (IN2)	IX (IN4)	RX (IN)	RY (IN)	SOX (IN3)	SIX (IN3)	RTO (IN)	RTI (IN)
110*	1.38	14.69	20.00	6.16	359.7	7.64	0.92	36.0	36.0	1.184	1.184
111	2.58	14.83	19.00	5.97	318.7	7.31	0.94	33.5	33.5	1.194	1.194
112	4.98	15.13	17.00	5.59	245.6	6.63	0.97	28.9	28.9	1.215	1.215
113	7.38	15.42	15.00	5.22	183.6	5.93	1.00	24.5	24.5	1.237	1.237
114*	8.58	15.56	14.00	5.03	156.6	5.58	1.02	22.4	22.4	1.248	1.248
114*	8.58	15.56	14.00	3.97	128.7	5.69	1.06	20.1	17.0	1.306	1.234
115	10.13	15.67	14.61	4.06	141.9	5.91	1.05	21.1	18.0	1.301	1.227
116	13.22	15.88	15.84	4.22	170.5	6.35	1.03	23.4	20.0	1.290	1.213
117	16.32	16.10	17.07	4.39	202.2	6.79	1.01	25.6	22.0	1.279	1.199
118	19.41	16.31	18.29	4.55	237.3	7.22	0.99	28.0	24.2	1.268	1.187
119	22.51	16.52	19.52	4.72	275.8	7.65	0.97	30.4	26.4	1.258	1.174
3*	24.05	16.63	20.13	4.80	296.4	7.86	0.97	31.6	27.5	1.253	1.168

a) East Frame

Figure A.1 Geometry and Section Properties

STAR MANUFACTURING CO. 8600 S. I-35 OKLAHOMA CITY, OK. JOB SRLOFRA
SRL04 50 20/25 16/25 FILE OU. FRA. 1
DESIGN DIMENSIONS AND PROPERTIES REPORT PAGE 5

MEMBER NO. 3- 5 LENGTH= 23.46 FT ANGLE= -4.89 DEG FYF=50. KSI FYW=50. KSI
SECTION 1 LENGTH= 15.51 FT OF= 5.00 X 0.2500 WEB=0.1345 IF= 5.00 X 0.1799
SECTION 2 LENGTH= 7.25 FT OF= 5.00 X 0.2500 WEB=0.1875 IF= 5.00 X 0.2500

POINT NO.	X (FT)	Y (FT)	DEPTH (IN)	AREA (IN2)	IX (IN4)	RX (IN)	RY (IN)	SOX (IN3)	SIX (IN3)	RTO (IN)	RTI (IN)
3*	24.05	16.63	20.19	4.81	298.4	7.88	0.97	31.8	27.6	1.253	1.167
120	25.60	16.52	19.57	4.72	277.6	7.67	0.97	30.5	26.5	1.258	1.174
121	28.70	16.31	18.33	4.56	238.6	7.24	0.99	28.1	24.3	1.268	1.186
122	31.79	16.10	17.10	4.39	203.1	6.80	1.01	25.7	22.1	1.279	1.199
123	34.88	15.88	15.86	4.22	170.9	6.36	1.03	23.4	20.0	1.290	1.213
124	37.98	15.67	14.62	4.06	142.0	5.92	1.05	21.2	18.0	1.301	1.227
125*	39.53	15.56	14.00	3.97	128.7	5.69	1.06	20.1	17.0	1.306	1.234
125*	39.53	15.56	14.00	5.03	156.6	5.58	1.02	22.4	22.4	1.248	1.248
126	40.73	15.42	15.00	5.22	183.6	5.93	1.00	24.5	24.5	1.237	1.237
127	43.13	15.13	17.00	5.59	245.6	6.63	0.97	28.9	28.9	1.215	1.215
128	45.53	14.83	19.00	5.97	318.7	7.31	0.94	33.5	33.5	1.194	1.194
129*	46.73	14.69	20.00	6.16	359.7	7.64	0.92	36.0	36.0	1.184	1.184

STAR MANUFACTURING CO. 8600 S. I-35 OKLAHOMA CITY, OK. JOB SRLOFRA
SRL04 50 20/25 16/25 FILE OU. FRA. 1
DESIGN DIMENSIONS AND PROPERTIES REPORT PAGE 6

MEMBER NO. 4- 5 LENGTH= 14.65 FT ANGLE=-87.35 DEG FYF=50. KSI FYW=50. KSI
SECTION 1 LENGTH= 13.87 FT OF= 6.00 X 0.2500 WEB=0.1875 IF=C 6 X 8.2

POINT NO.	X (FT)	Y (FT)	DEPTH (IN)	AREA (IN2)	IX (IN4)	RX (IN)	RY (IN)	SOX (IN3)	SIX (IN3)	RTO (IN)	RTI (IN)
4*	48.11	0.00	6.00	4.94	30.0	2.47	1.89	9.0	11.3	1.630	2.265
131	48.05	1.15	7.23	5.17	46.0	2.98	1.85	11.4	14.5	1.609	2.251
132	47.94	3.46	9.69	5.63	89.4	3.99	1.77	16.4	21.1	1.571	2.222
133	47.83	5.77	12.15	6.09	149.7	4.96	1.70	22.0	28.0	1.535	2.194
134	47.71	8.08	14.60	6.55	228.1	5.90	1.64	28.0	35.4	1.502	2.167
135	47.60	10.39	17.06	7.01	326.2	6.82	1.58	34.4	43.1	1.472	2.140
136	47.49	12.70	19.52	7.48	445.4	7.72	1.53	41.2	51.1	1.444	2.114
137*	47.43	13.86	20.75	7.71	513.3	8.16	1.51	44.8	55.3	1.430	2.101

a) East Frame Continued

Figure A.1 Geometry and Section Properties Continued

STAR MANUFACTURING CO. 8600 S. I-35 OKLAHOMA CITY, OK. JOB SRLOFRA
SRL04 50 20/25 16/25 FILE TEST.TMP.3
DESIGN DIMENSIONS AND PROPERTIES REPORT PAGE 3

MEMBER NO. 1- 2 LENGTH= 14.65 FT ANGLE= 87.33 DEG FYF=50.KSI FYW=50.KSI
SECTION 1 LENGTH= 13.80 FT DF= 5.97 X 0.2600 WEB=0.1950 IF=C 6 X 8.2

POINT NO.	X (FT)	Y (FT)	DEPTH (IN)	AREA (IN2)	IX (IN4)	RX (IN)	RY (IN)	SOX (IN3)	SIX (IN3)	RTO (IN)	RTI (IN)
1*	0.00	0.00	6.00	5.03	30.6	2.47	1.88	9.3	11.4	1.623	2.261
101	0.06	1.15	7.25	5.28	47.2	2.99	1.83	11.7	14.6	1.602	2.246
102	0.17	3.46	9.75	5.76	92.6	4.01	1.75	17.1	21.4	1.563	2.216
103	0.28	5.77	12.25	6.25	155.9	4.99	1.68	22.9	28.6	1.527	2.186
104	0.40	8.08	14.75	6.74	238.5	5.95	1.62	29.2	36.2	1.494	2.157
105	0.51	10.39	17.25	7.23	342.0	6.88	1.57	36.0	44.2	1.463	2.129
106	0.63	12.70	19.75	7.71	467.9	7.79	1.52	43.2	52.5	1.435	2.102
107*	0.68	13.86	21.00	7.96	539.8	8.24	1.49	46.9	56.9	1.421	2.088

STAR MANUFACTURING CO. 8600 S. I-35 OKLAHOMA CITY, OK. JOB SRLOFRA
SRL04 50 20/25 16/25 FILE TEST.TMP.3
DESIGN DIMENSIONS AND PROPERTIES REPORT PAGE 4

MEMBER NO. 2- 3 LENGTH= 23.46 FT ANGLE= 4.88 DEG FYF=50.KSI FYW=50.KSI
SECTION 1 LENGTH= 7.25 FT DF= 4.97 X 0.2600 WEB=0.2090 IF= 4.97 X 0.2600
SECTION 2 LENGTH= 15.46 FT DF= 4.97 X 0.2540 WEB=0.1930 IF= 4.97 X 0.1840

POINT NO.	X (FT)	Y (FT)	DEPTH (IN)	AREA (IN2)	IX (IN4)	RX (IN)	RY (IN)	SOX (IN3)	SIX (IN3)	RTO (IN)	RTI (IN)
110*	1.41	14.69	20.00	6.66	380.5	7.56	0.90	38.1	30.1	1.162	1.162
111	2.61	14.84	19.00	6.45	336.8	7.23	0.91	35.5	35.5	1.173	1.173
112	5.01	15.13	17.00	6.03	259.0	6.55	0.94	30.5	30.5	1.194	1.194
113	7.41	15.42	15.00	5.61	193.3	5.87	0.97	25.8	25.8	1.217	1.217
114*	8.61	15.56	14.00	5.40	164.7	5.52	0.99	23.5	23.5	1.229	1.229
114*	8.61	15.56	14.00	4.79	142.3	5.45	0.97	21.8	19.0	1.249	1.167
115	10.15	15.67	14.60	4.91	157.0	5.65	0.96	23.0	20.2	1.242	1.159
116	13.24	15.93	15.80	5.14	189.1	6.06	0.93	25.5	22.5	1.229	1.143
117	16.32	16.09	17.00	5.37	224.8	6.47	0.91	28.2	24.9	1.216	1.127
118	19.42	16.31	18.20	5.60	264.4	6.87	0.90	30.9	27.5	1.203	1.113
119	22.51	16.52	19.40	5.84	303.1	7.27	0.88	33.6	30.1	1.190	1.098
3*	24.06	16.62	20.00	5.95	331.4	7.46	0.87	35.1	31.4	1.184	1.092

b) West Frame

Figure A.1 Geometry and Section Properties Continued

STAR MANUFACTURING CO 8600 S. I-35 OKLAHOMA CITY, OK. JOB SRLOFRA
SRL04 50 30/25 16/25 FILE TEST.TMP.3
DESIGN DIMENSIONS AND PROPERTIES REPORT PAGE 5

MEMBER NO 3- 5 LENGTH= 23.46 FT ANGLE= -4.87 DEG FYF=50.KSI FYW=50.KSI
SECTION 1 LENGTH= 15.48 FT OF= 4.97 X 0.2540 WEB=0.1870 IF= 4.97 X 0.1840
SECTION 2 LENGTH= 7.25 FT OF= 4.97 X 0.2570 WEB=0.1910 IF= 4.97 X 0.2550

POINT NO	X (FT)	Y (FT)	DEPTH (IN)	AREA (IN2)	IX (IN4)	RX (IN)	RY (IN)	SOX (IN3)	SIX (IN3)	RTO (IN)	RTI (IN)
3*	24.06	16.62	20.00	5.83	327.7	7.49	0.88	34.7	31.0	1.190	1.099
120	25.80	16.52	19.40	5.72	304.6	7.30	0.89	33.3	29.7	1.196	1.105
121	28.69	16.31	18.20	5.50	261.6	6.90	0.90	30.6	27.1	1.209	1.119
122	31.78	16.09	17.00	5.27	222.5	6.50	0.92	27.9	24.7	1.221	1.134
123	34.87	15.88	15.80	5.05	187.2	6.09	0.94	25.3	22.3	1.234	1.149
124	37.96	15.67	14.60	4.83	155.6	5.68	0.96	22.8	20.0	1.247	1.165
125*	39.51	15.56	14.00	4.71	141.1	5.47	0.98	21.6	18.9	1.254	1.173
125*	39.51	15.56	14.00	5.12	159.2	5.58	1.01	22.8	22.7	1.242	1.240
126	40.71	15.42	15.00	5.31	186.7	5.93	0.99	24.9	24.9	1.230	1.229
127	43.11	15.13	17.00	5.69	249.7	6.62	0.96	29.4	29.3	1.209	1.207
128	45.51	14.84	19.00	6.08	324.1	7.30	0.93	34.2	34.1	1.188	1.186
129*	46.71	14.69	20.00	6.27	365.8	7.64	0.92	36.6	36.5	1.178	1.176

STAR MANUFACTURING CO. 8600 S. I-35 OKLAHOMA CITY, OK. JOB SRLOFRA
SRL04 50 30/25 16/25 FILE TEST.TMP.3
DESIGN DIMENSIONS AND PROPERTIES REPORT PAGE 6

MEMBER NO. 4- 5 LENGTH= 14.65 FT ANGLE=-87.32 DEG FYF=50.KSI FYW=50.KSI
SECTION 1 LENGTH= 13.88 FT OF= 3.97 X 0.2560 WEB=0.1970 IF=C 6 X 8.2

POINT NO.	X (FT)	Y (FT)	DEPTH (IN)	AREA (IN2)	IX (IN4)	RX (IN)	RY (IN)	SOX (IN3)	SIX (IN3)	RTO (IN)	RTI (IN)
4*	48.11	0.00	6.00	5.02	30.4	2.46	1.87	9.2	11.4	1.620	2.261
131	48.06	1.15	7.25	5.27	46.9	2.98	1.83	11.6	14.6	1.599	2.246
132	47.94	3.46	9.75	5.76	92.2	4.00	1.75	16.9	21.4	1.559	2.215
133	47.83	5.77	12.25	6.25	155.2	4.98	1.68	22.7	28.6	1.522	2.185
134	47.72	8.08	14.75	6.74	237.5	5.93	1.62	29.0	36.2	1.489	2.156
135	47.60	10.39	17.25	7.24	340.8	6.86	1.56	35.7	44.2	1.458	2.128
136	47.49	12.70	19.75	7.73	466.6	7.77	1.51	42.9	52.5	1.429	2.100
137*	47.43	13.86	21.00	7.98	538.4	8.22	1.49	46.7	56.9	1.415	2.087

b) West Frame Continued

Figure A.1 Geometry and Section Properties Continued

△ OCT 27 1975 MJC △2 JUL 27 1979 JDF

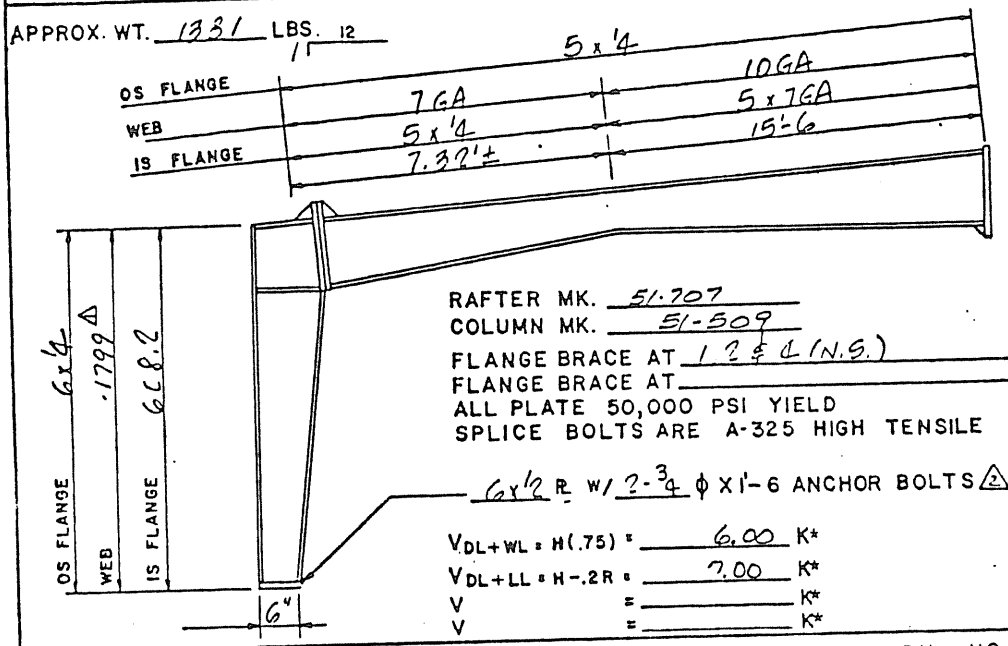
STAR BUILDINGS ®

SRLO CLEAR SPAN DESIGN

SHEET NO. ___ OF ___
JOB NO. ___
QUOTE NO. ___
BY S.Y. 2/1/7C
CHK'D BY ___

SRLO 50 6/3 16/25 E-506 3-8-73

APPROX. WT. 1331 LBS. 12

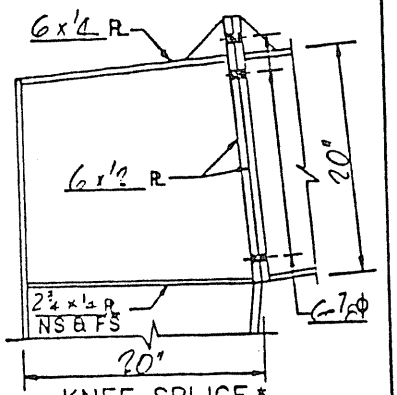


RAFTER MK. 51.707
COLUMN MK. 51-509
FLANGE BRACE AT 1 2 & 4 (N.S.) PURLINS
FLANGE BRACE AT ___ GIRTS
ALL PLATE 50,000 PSI YIELD
SPLICE BOLTS ARE A-325 HIGH TENSILE

6x1/2 R w/ 2-3/4 ϕ X 1'-6 ANCHOR BOLTS △2

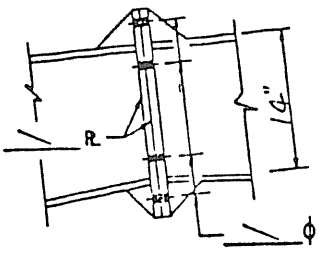
$V_{DL+WL} = H(.75) =$ 6.00 K*
$V_{DL+LL} = H-.2R =$ 7.00 K*
V = ___ K*
V = ___ K*

*IF VALUES ARE NOT SHOWN REFER TO COMPUTER RUN NO. ___



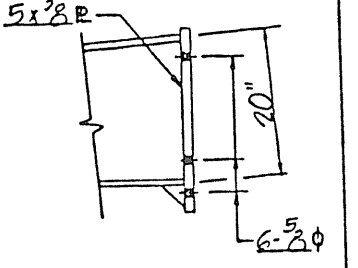
KNEE SPLICE*

M_{DL+LL}	= -84.10 K'
M_{DL+WL}	= 63.90 K'
M_{D+L+W}	= -78.02 K'
M_{D+UL}	= -67.69 K'
$T_{MAX.}$ (POS. MOM)	= 31.95 K
$T_{MAX.}$ (NEG MOM)	= 50.46 K



NO INTERMEDIATE SPLICE*

M_{DL+LL}	= ___ K'
M_{DL+WL}	= ___ K'
M	= ___ K'
M	= ___ K'
$T_{MAX.}$	= ___ K



PEAK SPLICE*

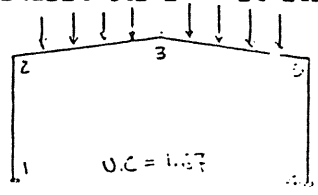
M_{DL+LL}	= 37.47 K'
M_{DL+WL}	= -21.43 K'
M_{D+L+W}	= 29.72 K'
M_{D+UL}	= 44.84 K'
$T_{MAX.}$ (POS. MOM.)	= 34.4± K
$T_{MAX.}$ (NEG. MOM.)	= 10.72 K

c) Nominal Dimensions

Figure A.1 Geometry and Section Properties Continued

STAR MANUFACTURING CO. 8600 S. I-35 OKLAHOMA CITY, OK. JOB SRLOFRA
SRL04 50 20/25 16/25 FILE OU.FRA.1
FORCE, MOMENT, AND STRESS REPORT PAGE 15
MEMBER 1 - 2 LOAD CONDITION 3 - P=5.13 KIPS U.C.=1.67

POINT NO.	AXIAL FORCE (KIP)	MOMENT (KIP-FT)	SHEAR FORCE (KIP)	-ALLOWABLE STRESS- FA (KSI)	FBO (KSI)	FBI (KSI)	ALLOW SHEAR (KIP)	A/H RATIO	-UNITY CHECK- UCA	BEND (CF)	BEND (IF)	MAX. COMB UC	DEFLECTIONS DELTA-X (IN)	DELTA-Y (IN)
1*	21.06	0.0	-10.61	13.07	14.61	30.00	20.81	NONE	0.33	0.00	0.00	0.33	0.0000	0.0000
101	21.06	-12.3	-10.61	15.77	30.00	23.36	25.40	NONE	0.26	0.43	0.47	0.73	-0.1938	0.0070
102	21.06	-36.8	-10.61	14.83	30.00	23.10	34.58	NONE	0.25	0.90	0.87	1.12	-0.5118	0.0179
103	21.06	-61.3	-10.61	13.91	30.00	22.84	37.77	NONE	0.25	1.12	1.05	1.30	-0.7041	0.0233
104	21.06	-85.9	-10.61	12.98	30.00	22.57	37.77	NONE	0.25	1.23	1.15	1.40	-0.7657	0.0230
105	21.06	-110.4	-10.61	12.14	30.00	22.30	33.08	NONE	0.25	1.29	1.21	1.46	-0.7090	0.0174
106	21.06	-135.0	-10.61	11.39	30.00	22.03	28.82	NONE	0.25	1.31	1.25	1.50	-0.5429	0.0069
107*	21.06	-147.2	-10.61	11.05	30.00	21.89	27.08	NONE	0.25	1.32	1.27	1.52	------	------



STAR MANUFACTURING CO. 8600 S. I-35 OKLAHOMA CITY, OK. JOB SRLOFRA
SRL04 50 20/25 16/25 FILE OU.FRA.1
FORCE, MOMENT, AND STRESS REPORT PAGE 16
MEMBER 2 - 3 LOAD CONDITION 3 - P=5.13 KIPS U.C.=1.67

POINT NO.	AXIAL FORCE (KIP)	MOMENT (KIP-FT)	SHEAR FORCE (KIP)	-ALLOWABLE STRESS- FA (KSI)	FBO (KSI)	FBI (KSI)	ALLOW SHEAR (KIP)	A/H RATIO	-UNITY CHECK- UCA	BEND (CF)	BEND (IF)	MAX. COMB UC	DEFLECTIONS DELTA-X (IN)	DELTA-Y (IN)
110*	14.01	-142.5	18.97	26.27	30.00	30.00	28.11	NONE	0.09	1.58	1.58	1.67	------	------
111	14.01	-119.5	18.97	26.04	30.00	30.00	29.63	NONE	0.09	1.43	1.43	1.52	-0.3071	-0.2819
112	14.01	-73.7	18.97	22.31	30.00	29.32	33.22	NONE	0.11	1.02	1.04	1.16	-0.2676	-0.7456
113	13.39	-32.0	13.88	22.68	30.00	29.46	37.77	NONE	0.11	0.52	0.53	0.65	-0.2235	-1.3112
114*	13.39	-15.2	13.88	10.67	30.00	18.12	37.77	NONE	0.25	0.27	0.40	0.65	------	------
114*	12.65	-15.2	14.55	11.61	30.00	17.76	14.91	NONE	0.27	0.30	0.54	0.82	------	------
115	12.65	7.3	14.55	11.37	29.83	30.00	14.26	NONE	0.27	0.12	0.16	0.40	-0.1660	-2.0209
116	12.30	43.9	9.44	10.93	29.77	30.00	13.13	NONE	0.27	0.67	0.88	0.94	-0.1044	-2.7873
117	12.30	73.2	9.44	10.52	29.71	30.00	12.16	NONE	0.27	1.01	1.33	1.28	-0.0546	-3.4136
118	11.95	87.8	4.32	19.20	29.65	30.00	11.33	NONE	0.14	1.27	1.45	1.41	-0.0217	-3.8398
119	11.60	96.4	-0.80	18.79	29.52	30.00	10.60	NONE	0.13	1.29	1.46	1.42	-0.0067	-4.0567
3*	11.60	95.1	-0.80	18.53	29.75	30.00	10.27	NONE	0.13	1.21	1.38	1.34	-0.0056	-4.0695

Figure 7.2 Stress and Deflection Data, Full Live Load, East Frame

STAR MANUFACTURING CO. 8600 S. I-35 OKLAHOMA CITY, OK. JOB SRLOFRA
SRL04 50 20/25 16/25 FILE OU. FRA. 1
FORCE, MOMENT, AND STRESS REPORT PAGE 17
MEMBER 3 - 5 LOAD CONDITION 3 - P=5.13 KIPS U.C.=1.67

POINT NO.	AXIAL FORCE (KIP)	MOMENT (KIP-FT)	SHEAR FORCE (KIP)	-ALLOWABLE STRESS- FA (KSI)	FBO (KSI)	FBI (KSI)	ALLOW SHEAR (KIP)	A/H RATIO	-UNITY CHECK- UCA	BEND (OF)	BEND (IF)	MAX. COMB UC	DEFLECTIONS DELTA-X (IN)	DELTA-Y (IN)
3*	11.60	95.1	0.80	18.53	29.74	30.00	10.24	NONE	0.13	1.21	1.38	1.34	-0.0056	-4.0895
120	11.60	96.4	0.80	18.77	29.51	30.00	10.57	NONE	0.13	1.28	1.45	1.41	-0.0014	-4.0555
121	11.95	87.9	-4.32	19.19	29.65	30.00	11.30	NONE	0.14	1.27	1.45	1.40	0.0108	-3.8373
122	12.30	73.2	-9.44	10.51	29.71	30.00	12.14	NONE	0.27	1.01	1.33	1.28	0.0436	-3.4109
123	12.30	44.0	-9.44	10.92	29.77	30.00	13.11	NONE	0.27	0.67	0.88	0.94	0.0934	-2.7853
124	12.65	7.4	-14.55	11.37	29.83	30.00	14.26	NONE	0.27	0.13	0.16	0.40	0.1550	-2.0201
125*	12.65	-15.2	-14.55	11.61	30.00	17.76	14.91	NONE	0.27	0.30	0.54	0.82	----	------
125*	13.39	-15.2	-13.88	10.67	30.00	18.12	37.77	NONE	0.25	0.27	0.40	0.65	---	-----
126	13.39	-31.9	-13.88	22.68	30.00	29.46	37.77	NONE	0.11	0.52	0.53	0.64	0.2124	-1.3111
127	14.01	-73.6	-18.97	22.31	30.00	29.32	33.22	NONE	0.11	1.02	1.04	1.15	0.2594	-0.7459
128	14.01	-119.4	-18.97	26.04	30.00	30.00	29.63	NONE	0.09	1.42	1.42	1.51	0.2959	-0.2825
129*	14.01	-142.4	-18.97	26.27	30.00	30.00	28.11	NONE	0.09	1.58	1.58	1.67	----	------

STAR MANUFACTURING CO. 8600 S. I-35 OKLAHOMA CITY, OK. JOB SRLOFRA
SRL04 50 20/25 16/25 FILE OU. FRA. 1
FORCE, MOMENT, AND STRESS REPORT PAGE 18
MEMBER 4 - 5 LOAD CONDITION 3 - P=5.13 KIPS U.C.=1.67

POINT NO.	AXIAL FORCE (KIP)	MOMENT (KIP-FT)	SHEAR FORCE (KIP)	-ALLOWABLE STRESS- FA (KSI)	FBO (KSI)	FBI (KSI)	ALLOW SHEAR (KIP)	A/H RATIO	-UNITY CHECK- UCA	BEND (OF)	BEND (IF)	MAX. COMB UC	DEFLECTIONS DELTA-X (IN)	DELTA-Y (IN)
4*	21.06	0.0	10.61	13.07	14.61	30.00	20.81	NONE	0.33	0.00	0.00	0.33	0.0000	0.0000
131	21.06	-12.3	10.61	15.77	30.00	23.36	25.42	NONE	0.26	0.43	0.47	0.73	0.1922	0.0069
132	21.06	-36.8	10.61	14.83	30.00	23.10	34.64	NONE	0.25	0.90	0.87	1.12	0.5070	0.0178
133	21.06	-61.3	10.61	13.90	30.00	22.84	37.77	NONE	0.25	1.12	1.05	1.29	0.6968	0.0231
134	21.06	-85.9	10.61	12.97	30.00	22.57	37.77	NONE	0.25	1.23	1.15	1.39	0.7574	0.0227
135	21.06	-110.4	10.61	12.12	30.00	22.30	32.99	NONE	0.25	1.28	1.21	1.46	0.6984	0.0170
136	21.06	-134.9	10.61	11.37	30.00	22.02	28.74	NONE	0.25	1.31	1.25	1.50	0.5317	0.0065
137*	21.06	-147.2	10.61	11.03	30.00	21.89	27.00	NONE	0.25	1.31	1.27	1.51	----	------

Figure A.2 Stress and Deflection Data, Full Live Load, East Frame Continued

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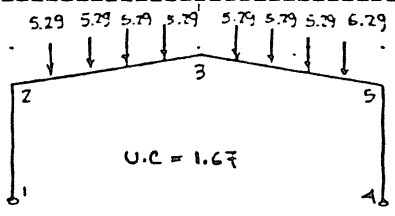
FORCE, MOMENT, AND STRESS REPORT PAGE 19
MEMBER 1 - 2 LOAD CONDITION 4 - P=5.29 KIPS U.C.=1.67

POINT NO	AXIAL FORCE (KIP)	MOMENT (KIP-FT)	SHEAR FORCE (KIP)	-ALLOWABLE STRESS- FA (KSI)	FBO (KSI)	FBI (KSI)	ALLOW SHEAR (KIP)	A/H RATIO	-UNITY CHECK- UC A	BEND (OF)	BEND (IF)	MAX. COMB UC	DEFLECTIONS DELTA-X (IN)	DELTA-Y (IN)
1*	21.70	0.0	-10.79	13.08	14.48	30.00	21.61	NONE	0.33	0.00	0.00	0.33	0.0000	0.0000
101	21.70	-12.5	-10.79	15.62	30.00	23.31	26.48	NONE	0.26	0.43	0.48	0.74	-0.1861	0.0067
102	21.70	-37.6	-10.79	14.63	30.00	23.04	36.03	NONE	0.26	0.88	0.87	1.13	-0.4895	0.0171
103	21.70	-6.4	-10.79	13.65	30.00	22.76	40.09	NONE	0.25	1.09	1.04	1.30	-0.6700	0.0221
104	21.70	-87.3	-10.79	12.69	30.00	22.47	40.65	NONE	0.25	1.20	1.14	1.40	-0.7242	0.0214
105	21.70	-112.0	-10.79	11.84	30.00	22.18	36.72	NONE	0.25	1.25	1.20	1.46	-0.6620	0.0155
106	21.70	-137.2	-10.79	11.09	30.00	21.89	31.96	NONE	0.25	1.27	1.24	1.50	-0.4952	0.0050
107*	21.70	-149.7	-10.79	10.75	30.00	21.74	30.02	NONE	0.25	1.28	1.26	1.51	------	------



STAR MANUFACTURING CO. 8500 S. I-35 OKLAHOMA CITY, OK. JOB SRLOFRA
SPACE 80 02/20 16:26 FILE TEST.TMP.3
FORCE, MOMENT, AND STRESS REPORT PAGE 20
MEMBER 2 - 3 LOAD CONDITION 4 - P=5.29 KIPS U.C.=1.67

POINT NO	AXIAL FORCE (KIP)	MOMENT (KIP-FT)	SHEAR FORCE (KIP)	-ALLOWABLE STRESS- FA (KSI)	FBO (KSI)	FBI (KSI)	ALLOW SHEAR (KIP)	A/H RATIO	-UNITY CHECK- UC A	BEND (OF)	BEND (IF)	MAX. COMB UC	DEFLECTIONS DELTA-X (IN)	DELTA-Y (IN)
110*	14.30	-144.3	19.56	26.21	30.00	30.00	38.97	NONE	0.08	1.32	1.52	1.60	------	------
111	14.30	-129.6	19.56	25.98	30.00	30.00	41.08	NONE	0.09	1.26	1.36	1.45	-0.2619	-0.2827
112	14.30	-75.3	19.56	22.02	30.00	29.18	46.06	NONE	0.11	0.96	0.99	1.10	-0.2253	-0.7365
113	13.96	-51.1	14.92	22.47	30.00	29.33	46.92	NONE	0.11	0.47	0.48	0.59	-0.1806	-1.2564
114*	13.66	-13.2	14.92	10.16	30.00	17.65	46.92	NONE	0.25	0.22	0.34	0.59	------	------
114*	12.90	-13.2	15.00	9.64	30.00	15.96	40.02	NONE	0.28	0.24	0.46	0.74	------	------
115	12.90	10.1	15.00	9.41	29.49	30.00	40.02	NONE	0.26	0.16	0.20	0.44	-0.1250	-1.9708
116	12.54	47.6	9.73	8.99	29.41	30.00	38.91	NONE	0.27	0.67	0.85	0.94	-0.0658	-2.7027
117	12.54	77.8	9.73	8.60	29.32	30.00	36.09	NONE	0.27	0.99	1.25	1.26	-0.0182	-3.2978
118	12.18	92.9	4.46	18.16	29.24	30.00	33.65	NONE	0.12	1.23	1.35	1.35	0.0133	-3.7023
119	11.82	101.5	-0.81	17.81	29.15	30.00	31.52	NONE	0.11	1.24	1.35	1.36	0.0280	-3.9089
3*	11.82	103.3	-0.81	17.60	30.00	30.00	30.56	NONE	0.11	1.14	1.28	1.26	0.0294	-3.9410

Figure A.3 Stress and Deflection Data, Full Live Load, West Frame

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FILE TEST.TMP.3
PAGE 21

POINT	AXIAL FORCE (KIP)	SHEAR FORCE (KIP-FT)	SHEAR FORCE (KIP)	-ALLOWABLE STRESS- FA (KSI)	FBO (KSI)	FBI (KSI)	ALLOW SHEAR (KIP)	A/H RATIO	-UNITY CHECK- UCA	BEND (OF)	BEND (IF)	COMB UC	DEFLECTIONS DELTA-X (IN)	DELTA-Y (IN)
3e	11.92	109.8	0.81	17.81	30.00	30.00	27.80	NONE	0.11	1.16	1.29	1.27	0.0294	-3.9410
101	11.99	101.9	0.81	17.53	29.19	30.00	28.67	NONE	0.11	1.25	1.37	1.37	0.0306	-3.9103
151	12.13	92.4	-4.46	18.32	29.29	30.00	30.61	NONE	0.12	1.24	1.37	1.36	0.0451	-3.7349
152	12.34	77.7	-9.72	9.76	29.36	30.00	32.03	NONE	0.27	1.00	1.26	1.27	0.0766	-3.3995
153	12.54	47.6	-9.73	9.15	29.44	30.79	35.39	NONE	0.27	0.67	0.86	0.95	0.1244	-2.7015
154	12.70	10.0	-15.01	9.59	29.52	30.00	37.57	NONE	0.28	0.16	0.20	0.44	0.1838	-1.9654
161e	12.70	-11.3	-15.01	9.80	30.00	16.12	37.57	NONE	0.28	0.24	0.47	0.75	------	------
1019	13.15	-19.2	-14.32	10.55	30.00	17.98	39.19	NONE	0.25	0.23	0.35	0.60	------	------
102	13.66	-31.7	-14.32	22.42	30.00	29.41	39.19	NONE	0.11	0.49	0.50	0.61	0.2396	-1.2772
103	14.00	-7.4	-19.57	22.25	30.00	29.26	35.14	NONE	0.11	1.00	1.03	1.14	0.2843	-0.7260
125	14.30	-131.7	-19.57	26.04	30.00	30.00	31.34	NONE	0.09	1.41	1.42	1.51	0.3206	-0.2744
155e	14.70	-144.3	-19.57	26.27	30.00	30.00	29.73	NONE	0.09	1.58	1.58	1.67	------	------

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FILE TEST.TMP.3
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POINT	AXIAL FORCE (KIP)	SHEAR FORCE (KIP-FT)	SHEAR FORCE (KIP)	-ALLOWABLE STRESS- FA (KSI)	FBO (KSI)	FBI (KSI)	ALLOW SHEAR (KIP)	A/H RATIO	-UNITY CHECK- UCA	BEND (OF)	BEND (IF)	COMB UC	DEFLECTIONS DELTA-X (IN)	DELTA-Y (IN)
4e	21.70	0.0	10.79	13.03	14.42	30.00	21.84	NONE	0.33	0.00	0.00	0.33	0.0000	0.0000
201	21.79	-12.3	10.79	15.60	30.00	23.31	26.77	NONE	0.26	0.43	0.48	0.74	0.1914	0.0070
202	21.92	-37.4	10.79	14.59	30.00	23.03	36.62	NONE	0.26	0.85	0.87	1.13	0.5051	0.0179
203	21.70	-44.8	10.79	13.60	30.00	22.75	41.69	NONE	0.25	1.10	1.05	1.30	0.6953	0.0233
204	21.71	-47.2	10.79	12.63	30.00	22.46	41.69	NONE	0.25	1.20	1.14	1.40	0.7567	0.0231
205	21.70	-11.5	10.79	11.77	30.00	22.17	37.85	NONE	0.25	1.26	1.21	1.46	0.7052	0.0176
206	21.70	-130.2	10.79	11.02	30.00	21.87	32.95	NONE	0.25	1.28	1.24	1.50	0.5467	0.0074
207e	21.70	-149.9	10.79	10.68	30.00	21.73	30.94	NONE	0.25	1.28	1.26	1.51	------	------

Figure A.3 Stress and Deflection Data, Full Live Load, West Frame Continued

APPENDIX B

INITIAL TEST, FULL LIVE LOAD, EAST FRAME

Test Date June 6, 1979

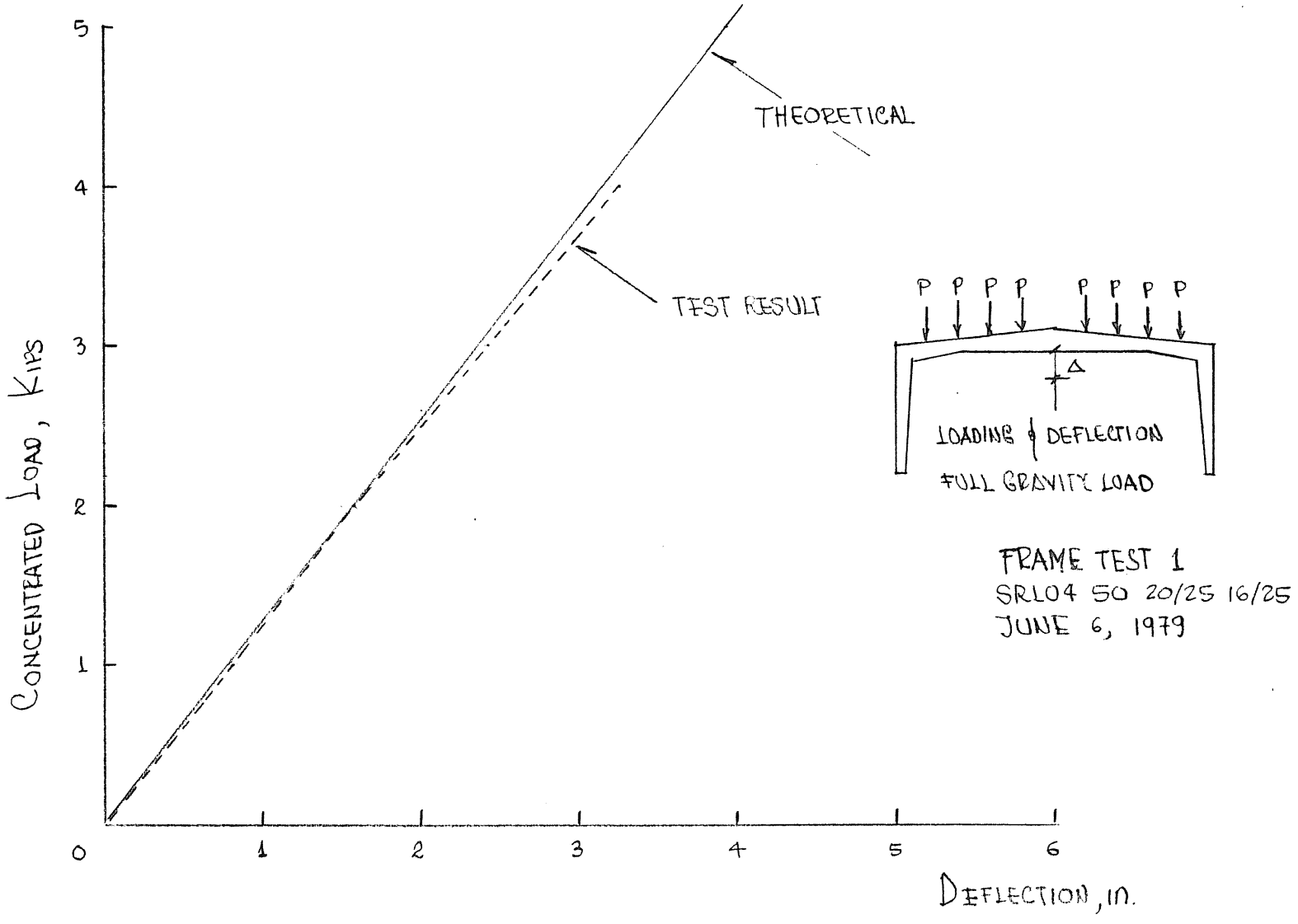

Figure B.1 Load vs. Centerline Vertical Deflection

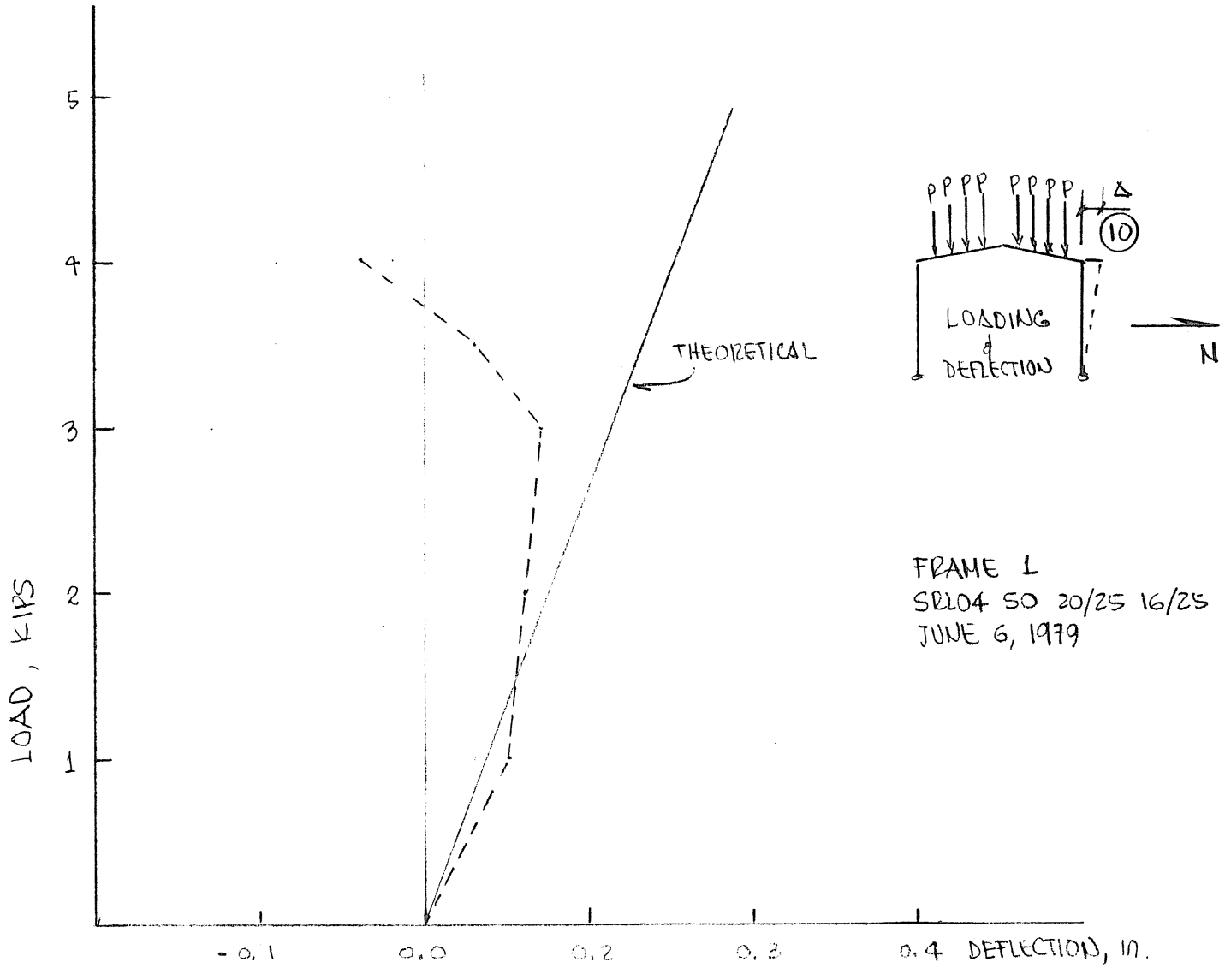

Figure B.2 Load vs. Sidesway Deflection

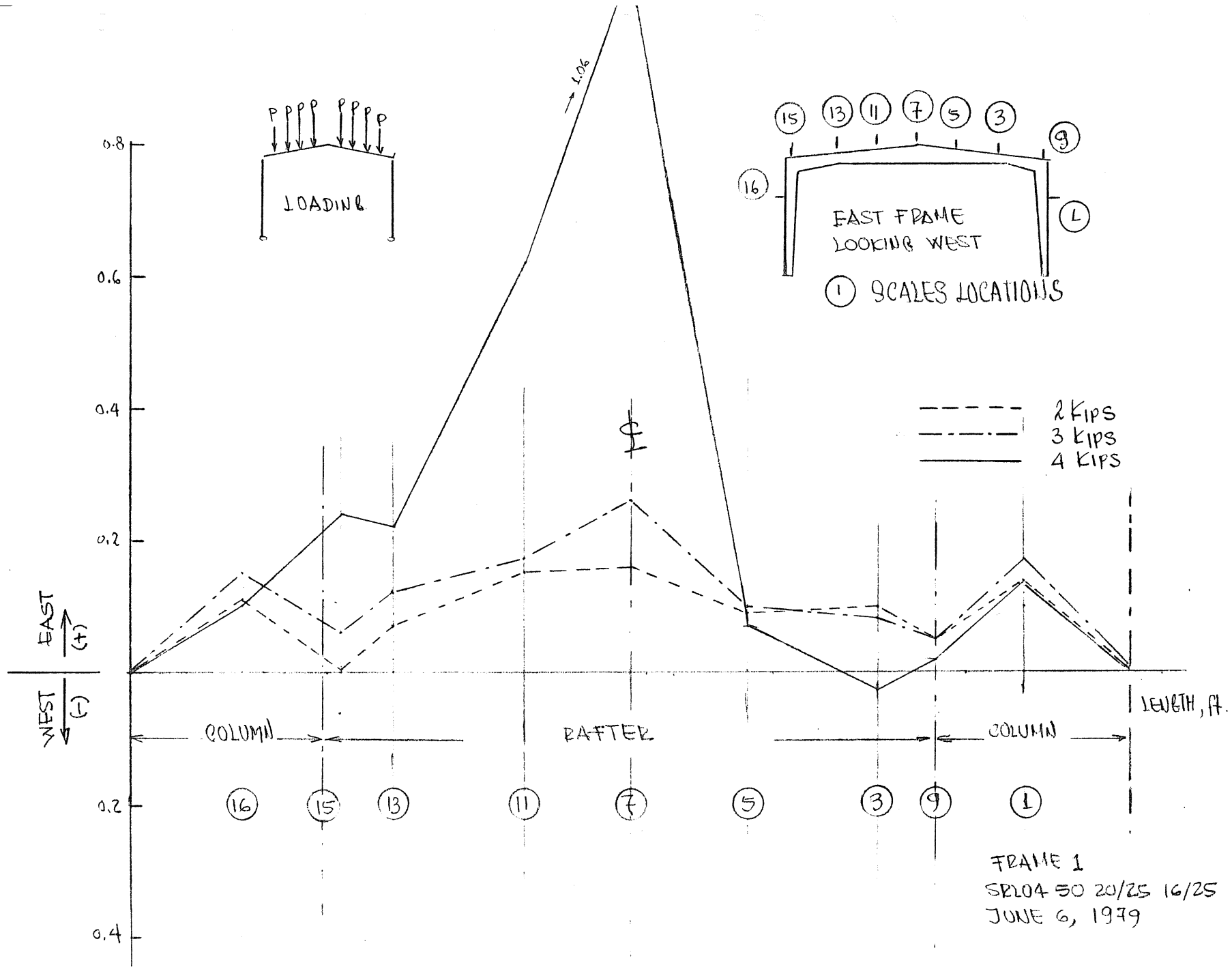

Figure B.3 Lateral Deflection, Outside Flange

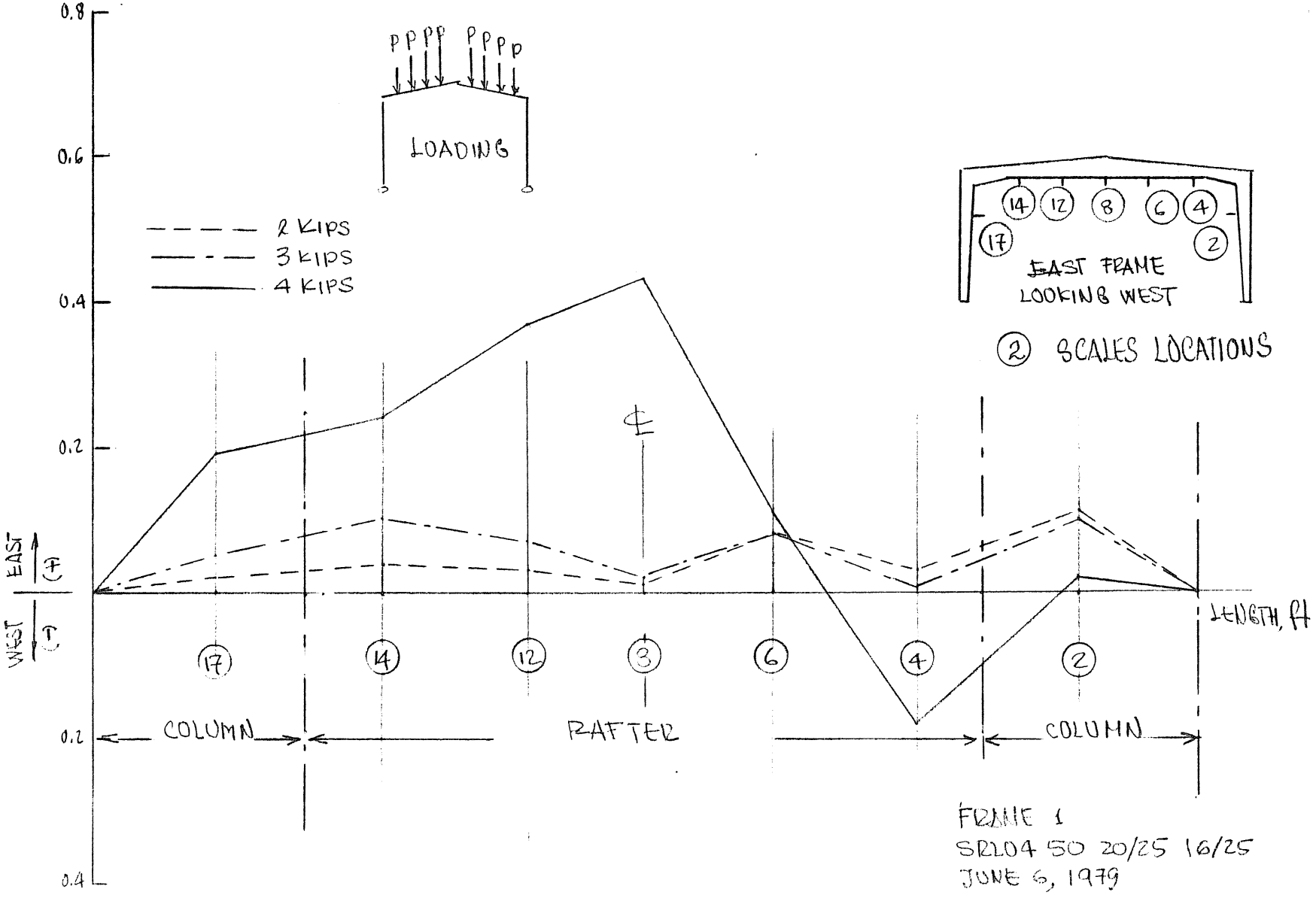

Figure B.4 Lateral Deflection, Inside Flange

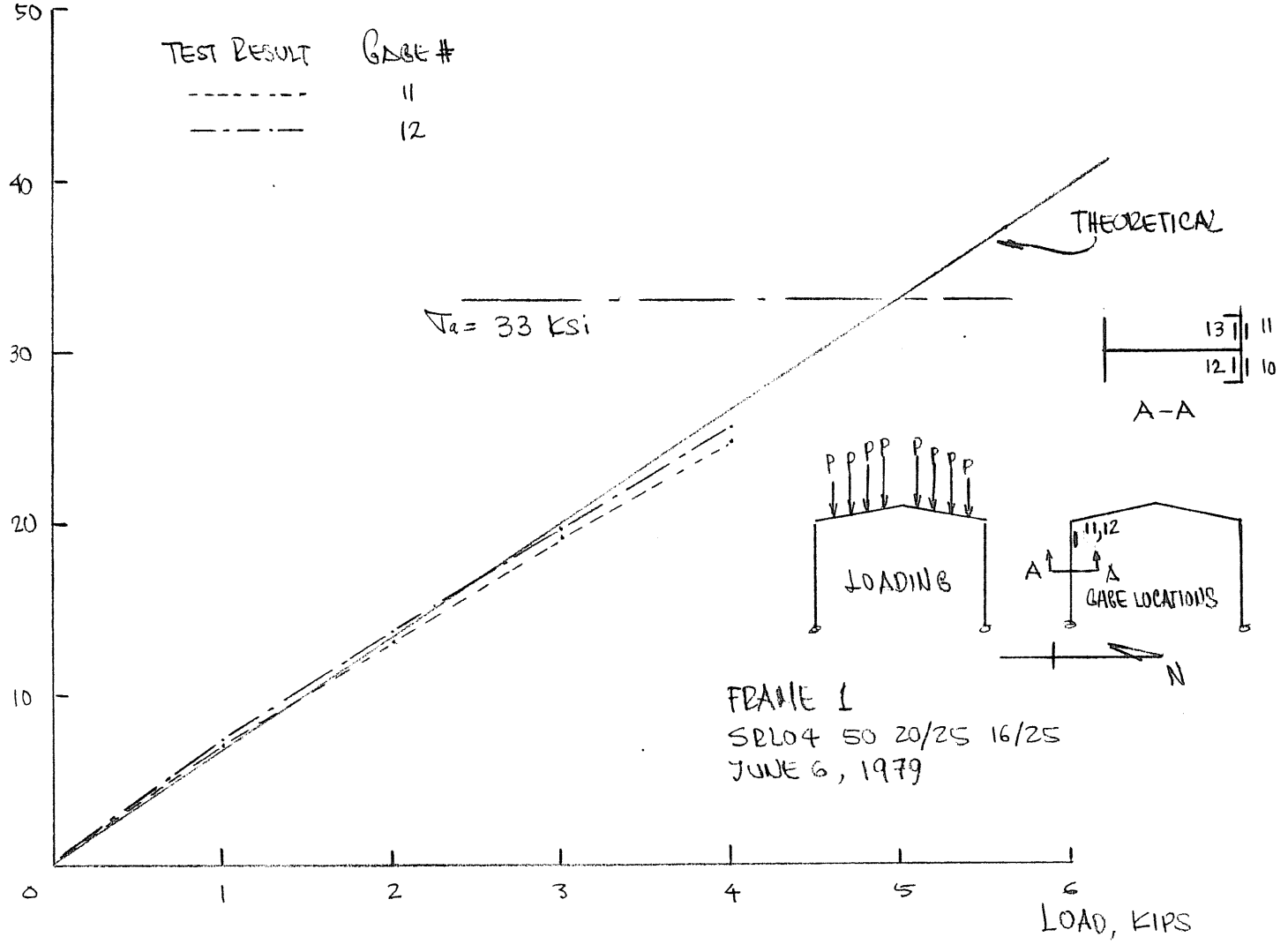

Figure B.5 Load vs. Stress, South Column at Knee

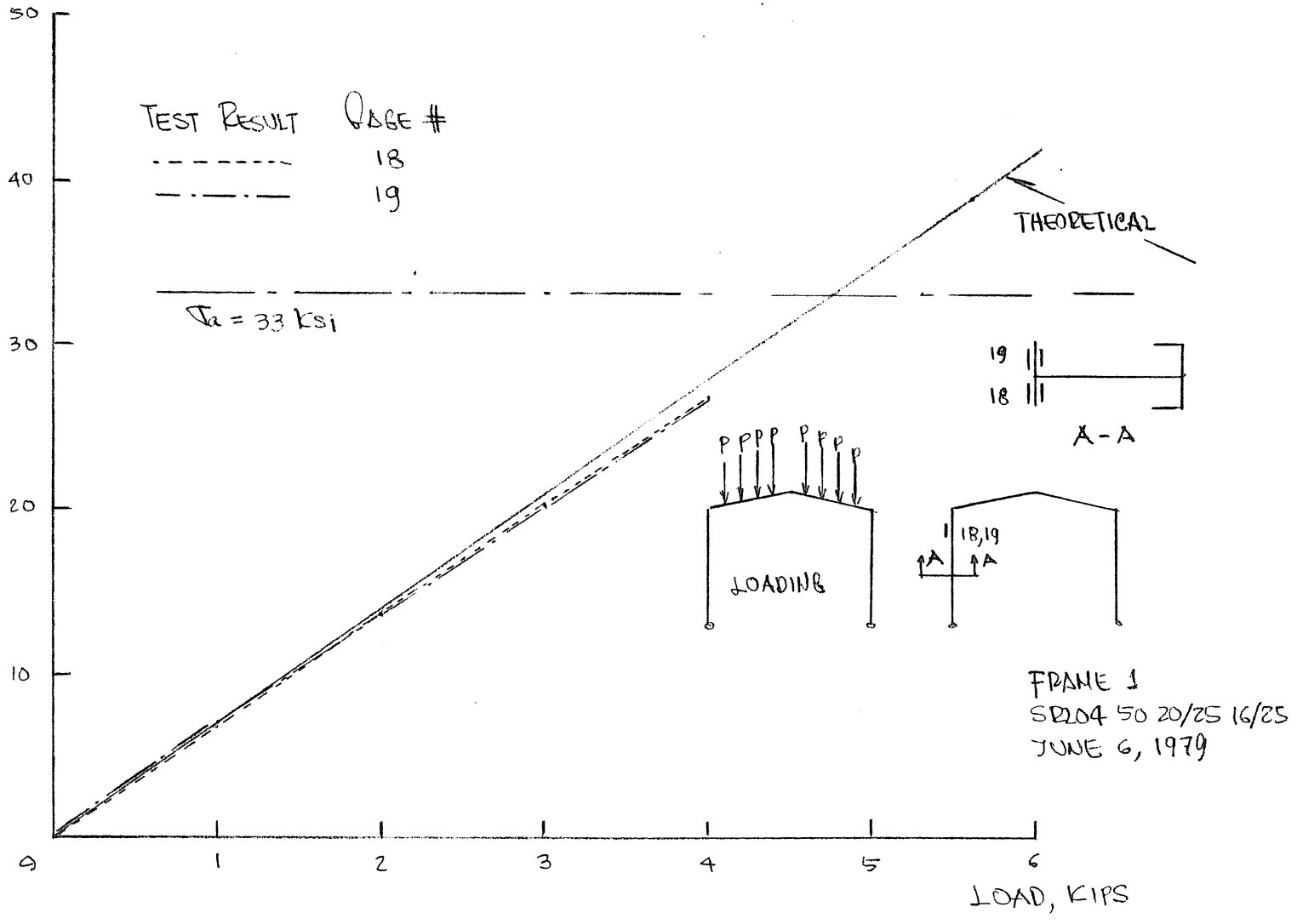

Figure B.5 Load vs. Stress, South Column at Knee, Continued

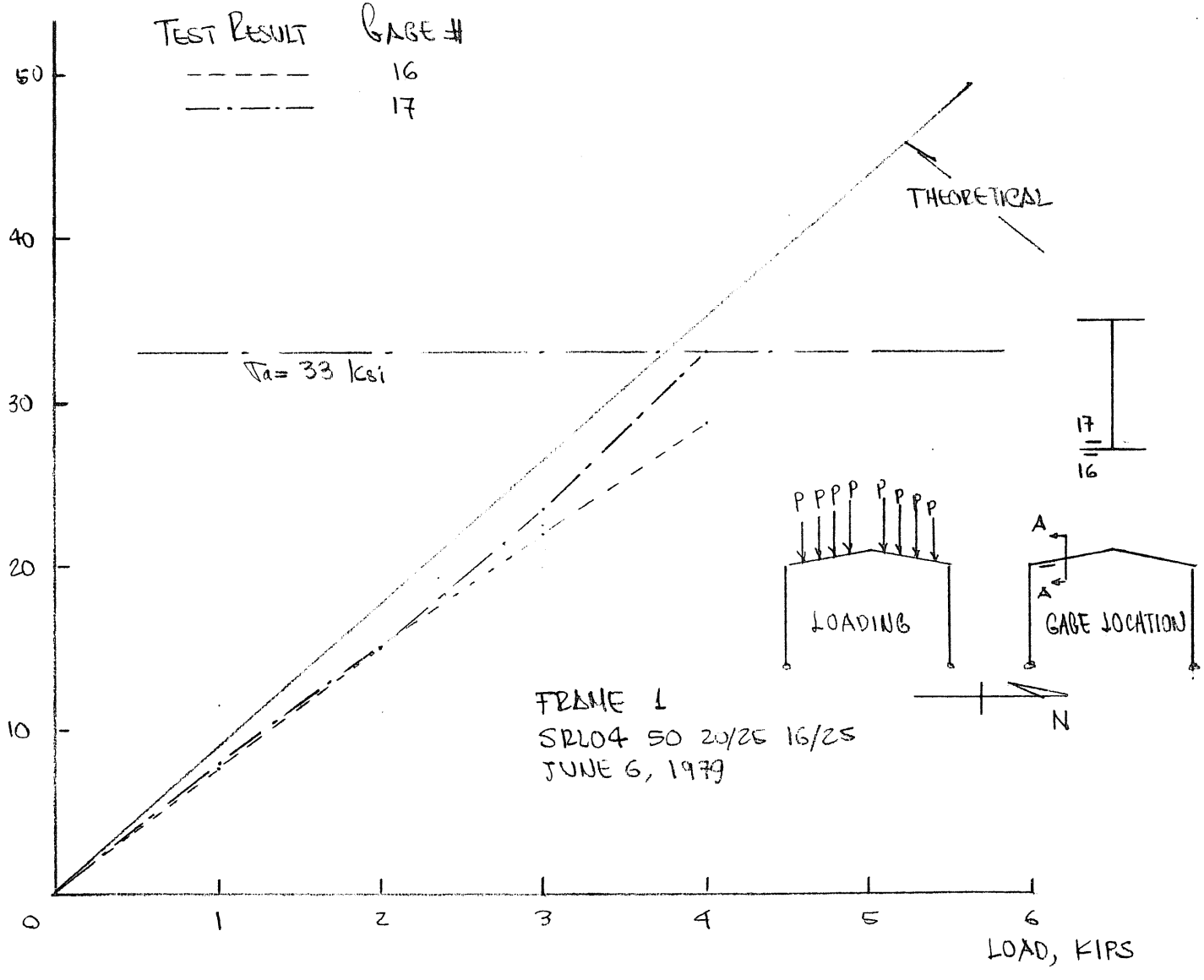

Figure B.6 Load vs. Stress, South Rafter at Knee

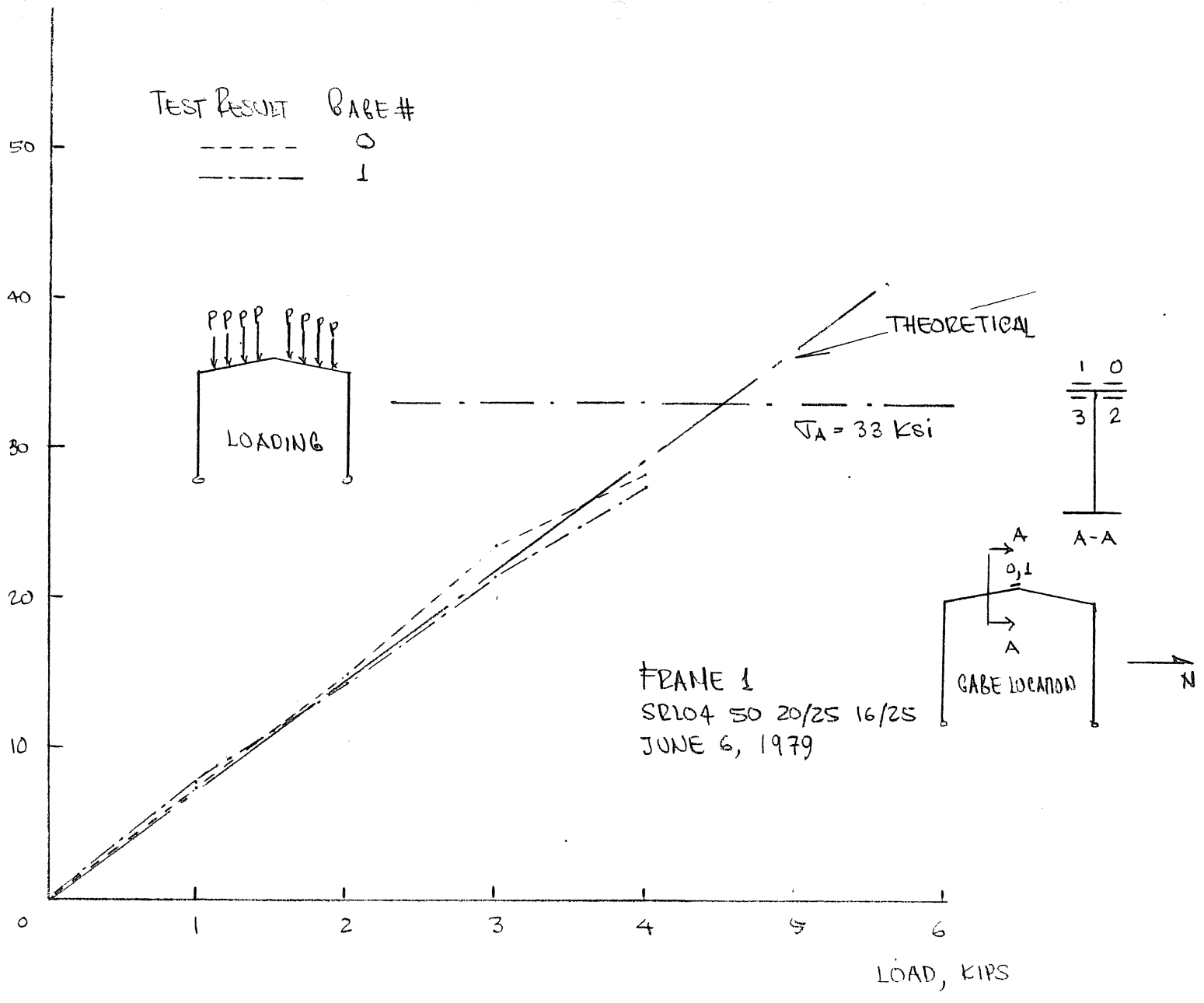

Figure B.7 Load vs. Stress, South Rafter at Peak

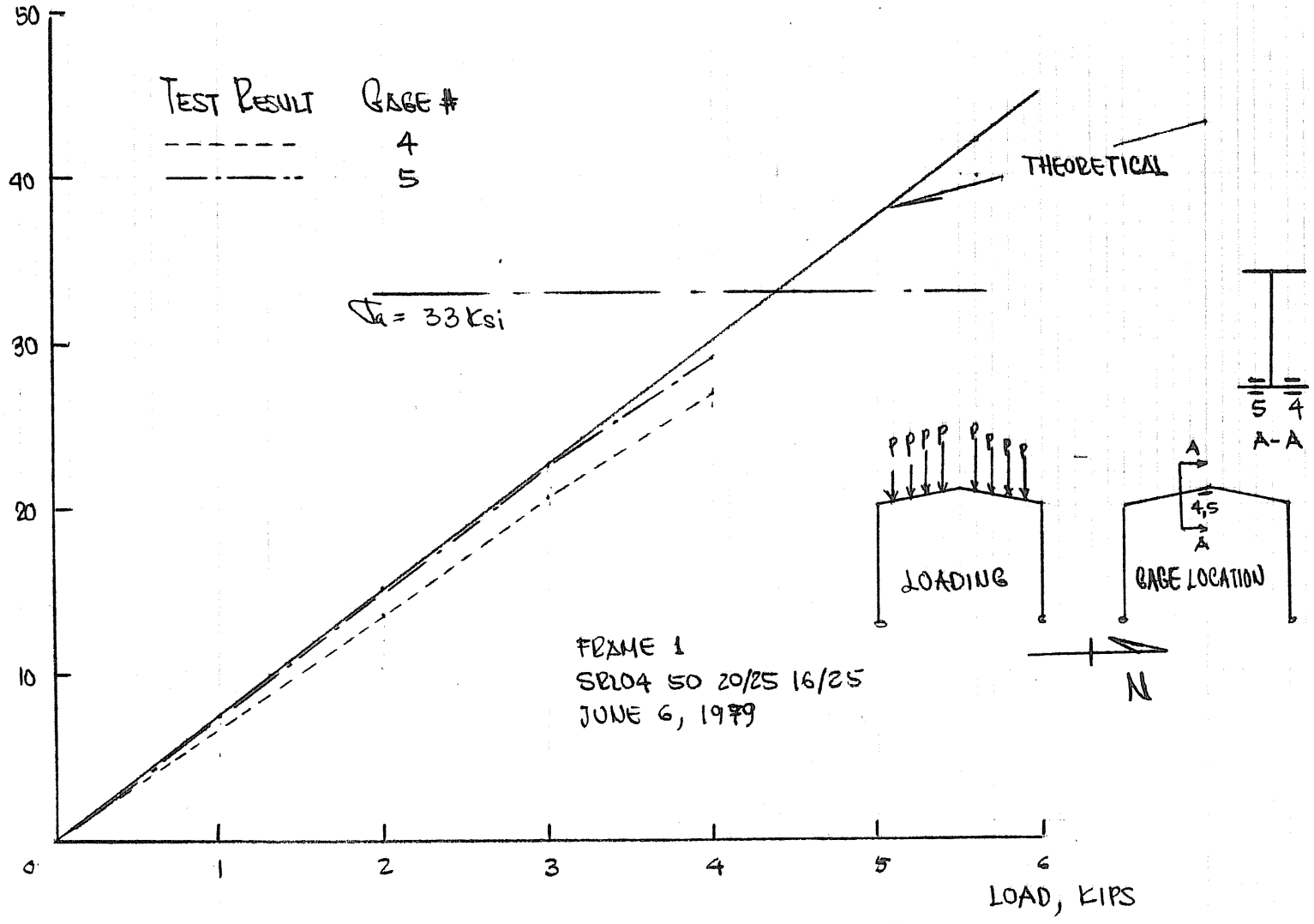

Figure B.7 Load vs. Stress, South Rafter at Peak, Continued

APPENDIX C

FINAL TEST, FULL LIVE LOAD, EAST FRAME

Test Date June 23, 1979

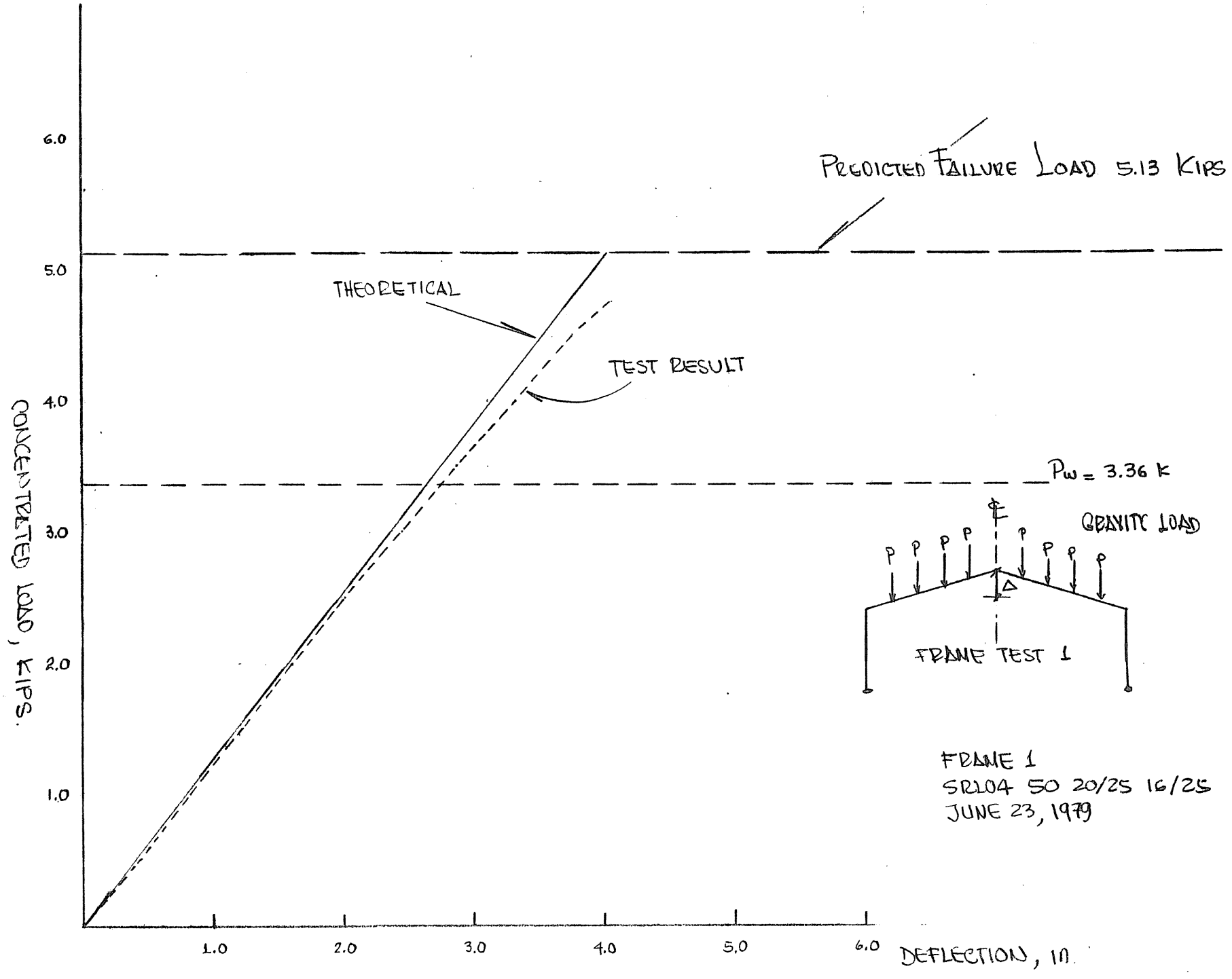

Figure C.1 Load vs. Centerline Vertical Deflection

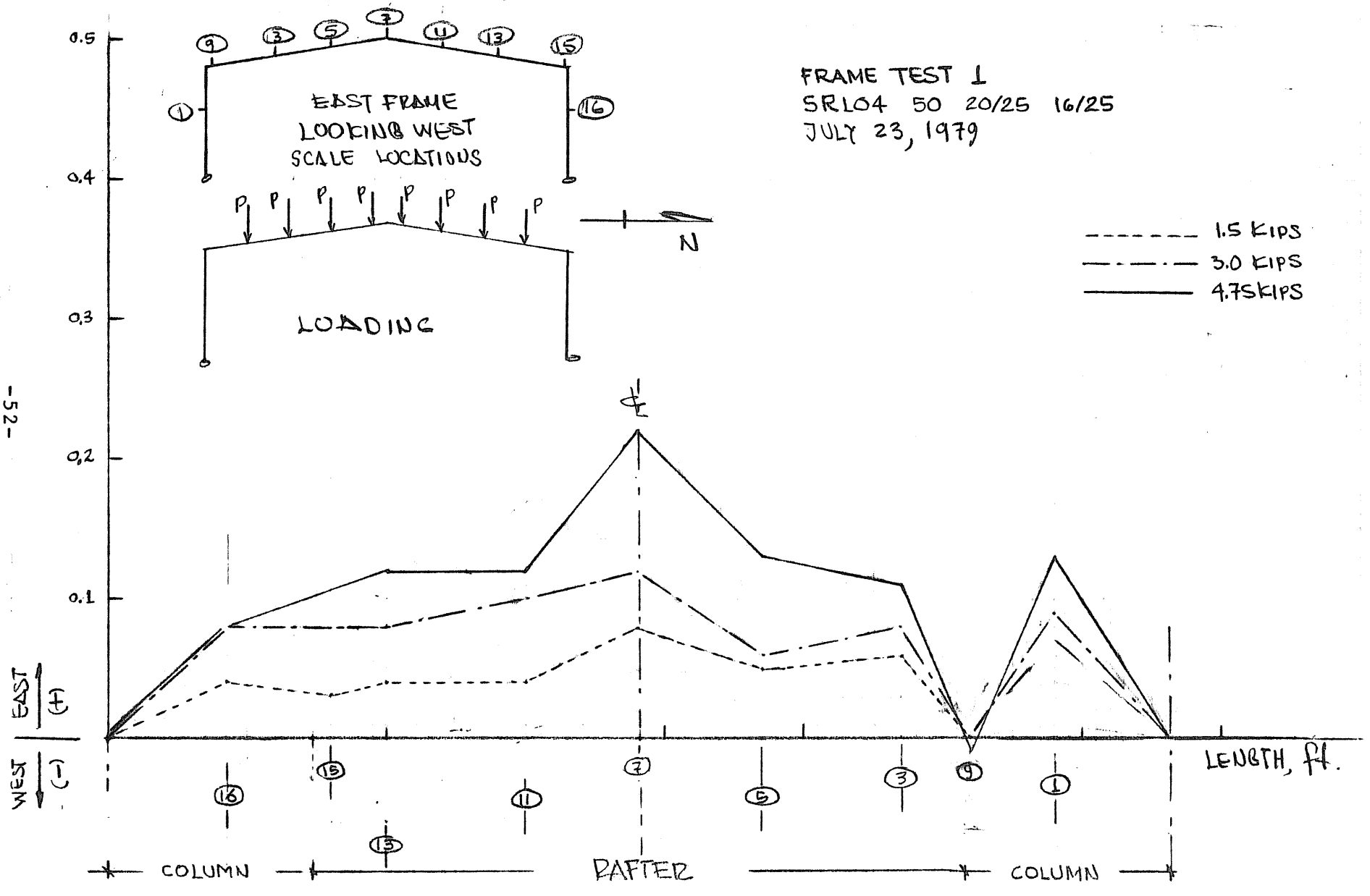

Figure C.2 Lateral Deflection, Outside Flange

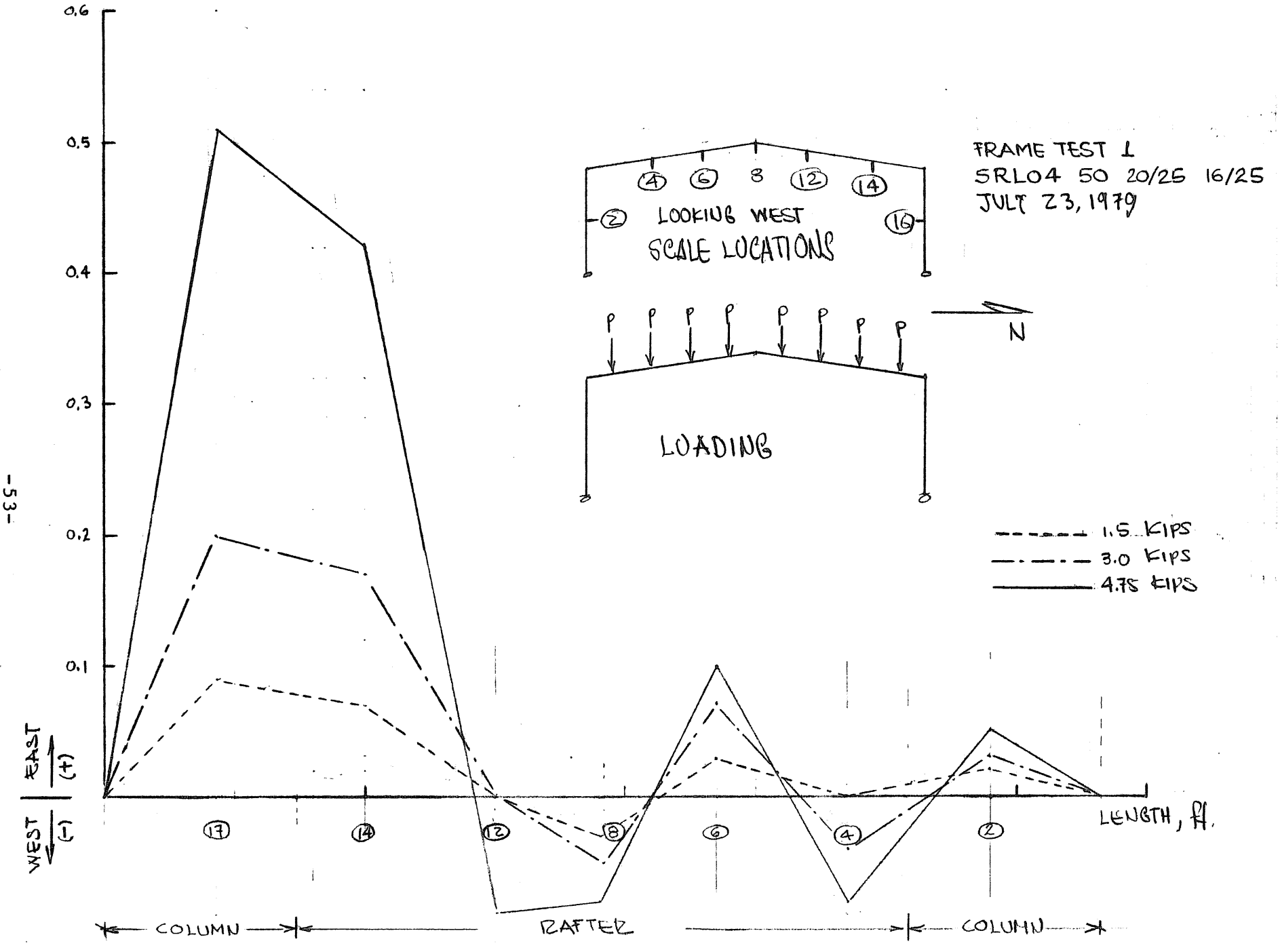

Figure C.3 Lateral Deflection, Inside Flange

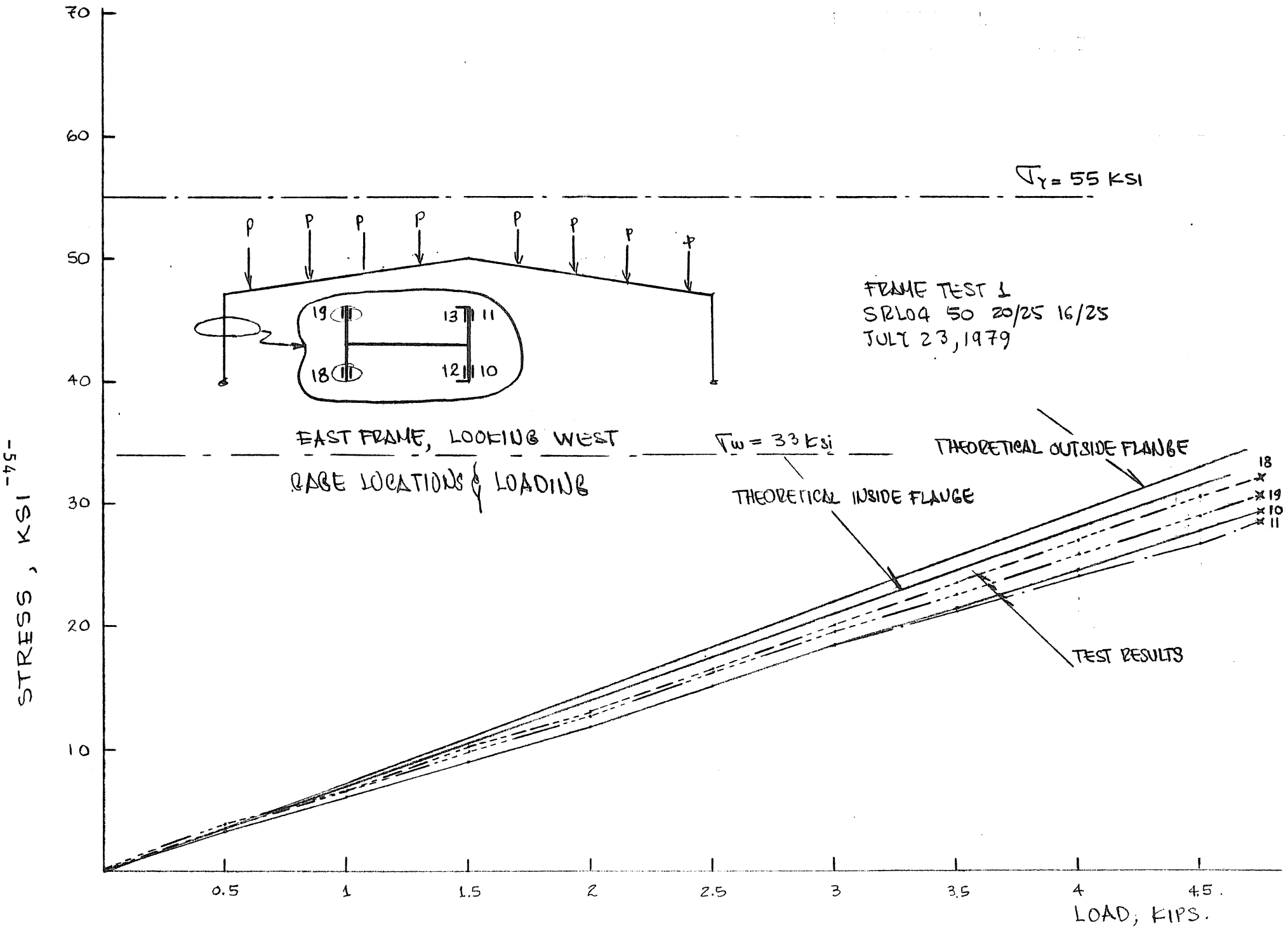

Figure C.4 Load vs. Stress, South Column at Knee

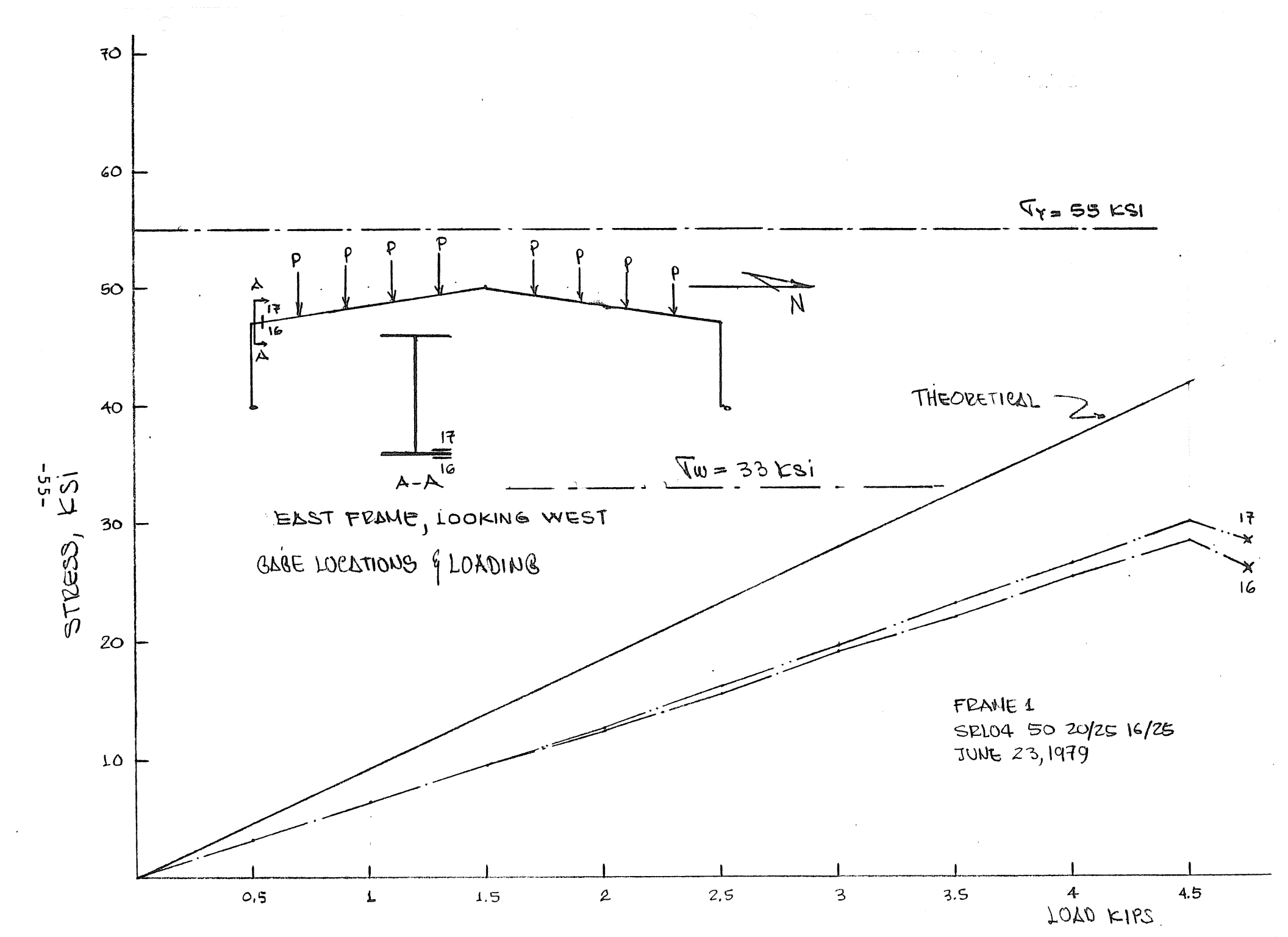

Figure C.5 Load vs. Stress, South Rafter at Knee

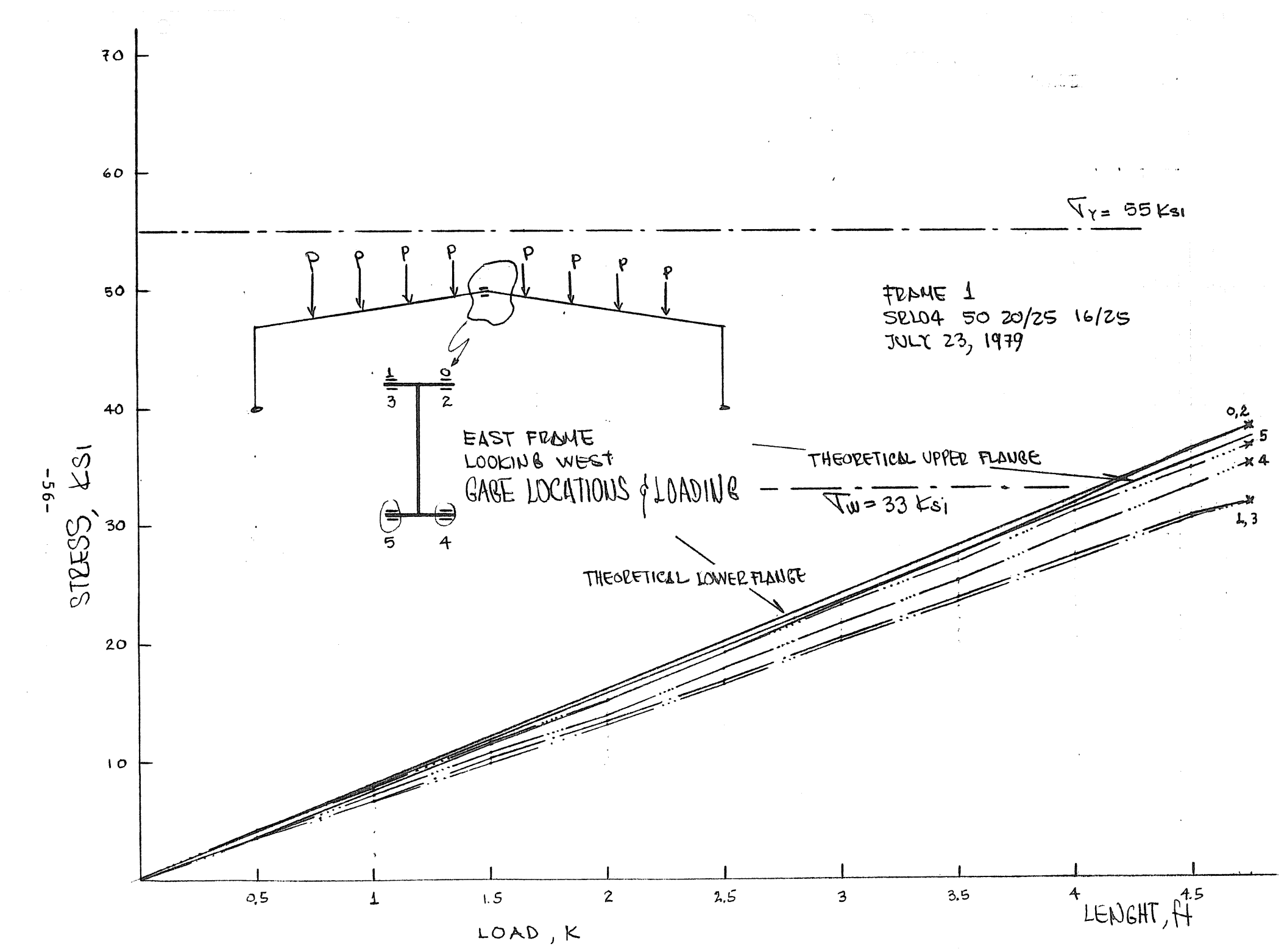

Figure C.6 Load vs. Stress, South Rafter at Peak

APPENDIX D

FINAL TEST, FULL LIVE LOAD, WEST FRAME

Test Date August 30, 1979

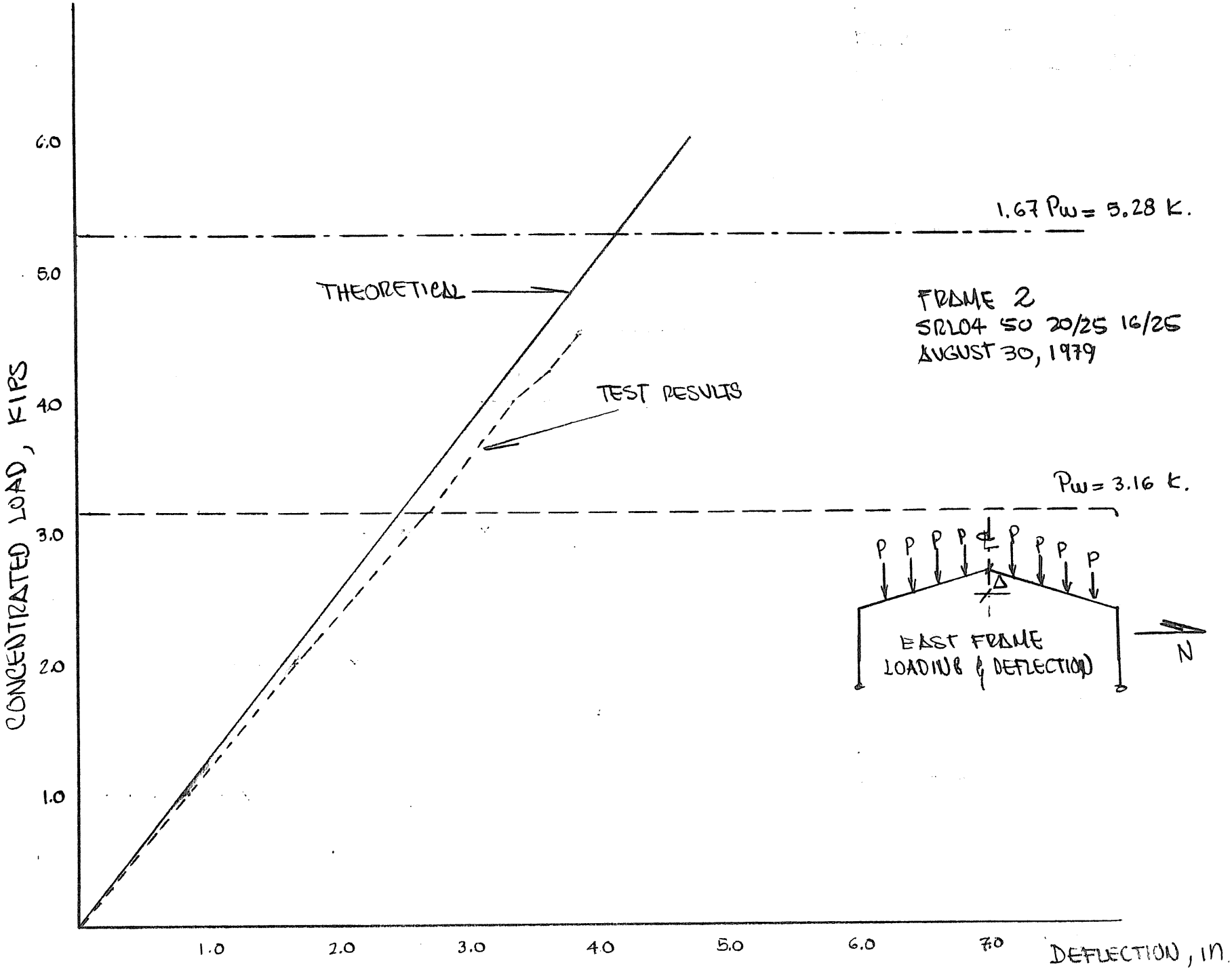

Figure D.1 Load vs. Centerline Vertical Deflection

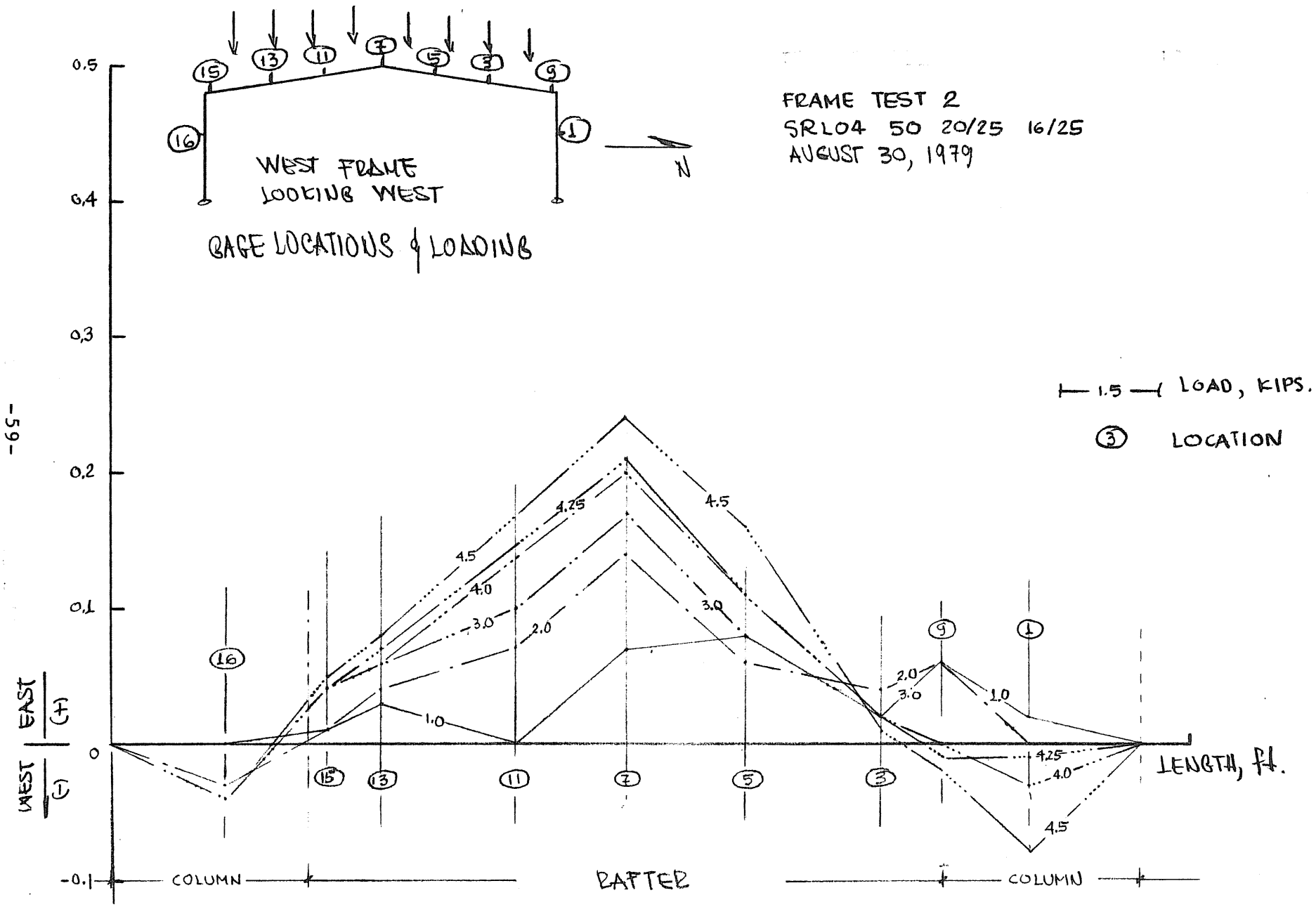

Figure D.2 Load vs. Lateral Deflection, Outside Flange

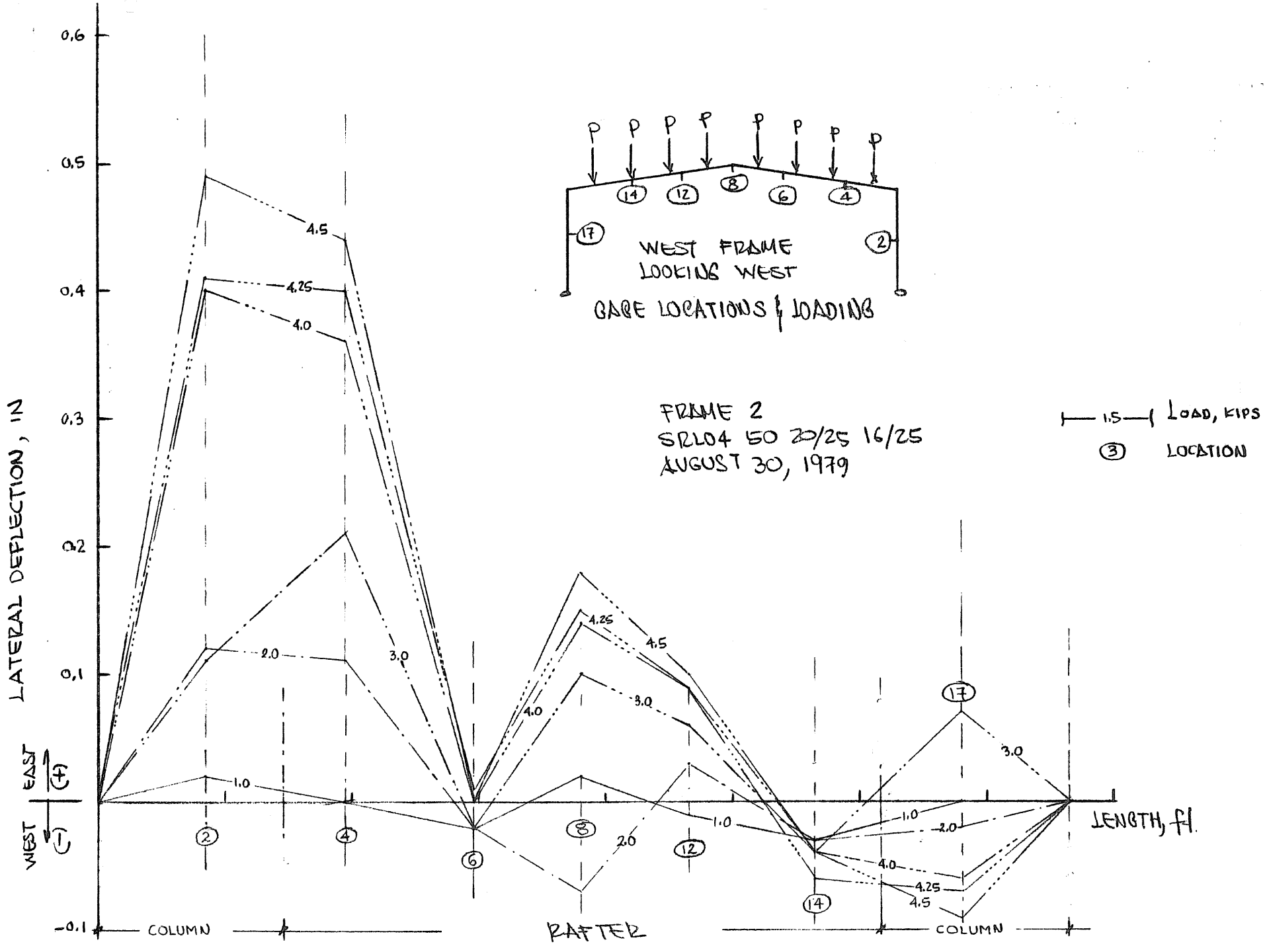

Figure D.3 Load vs. Lateral Deflection, Inside Flange

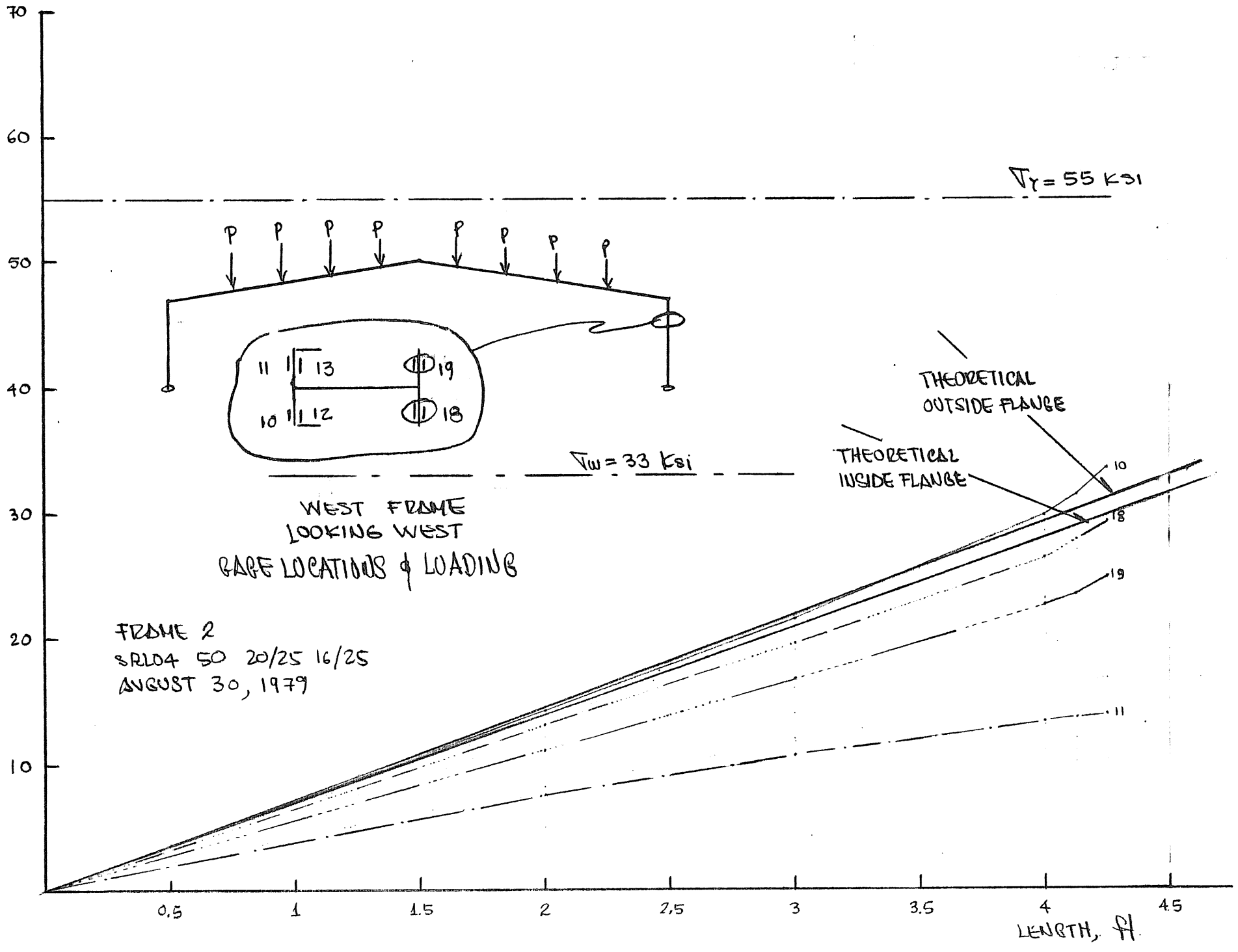

Figure D.4 Load vs. Stress, North Column at Knee

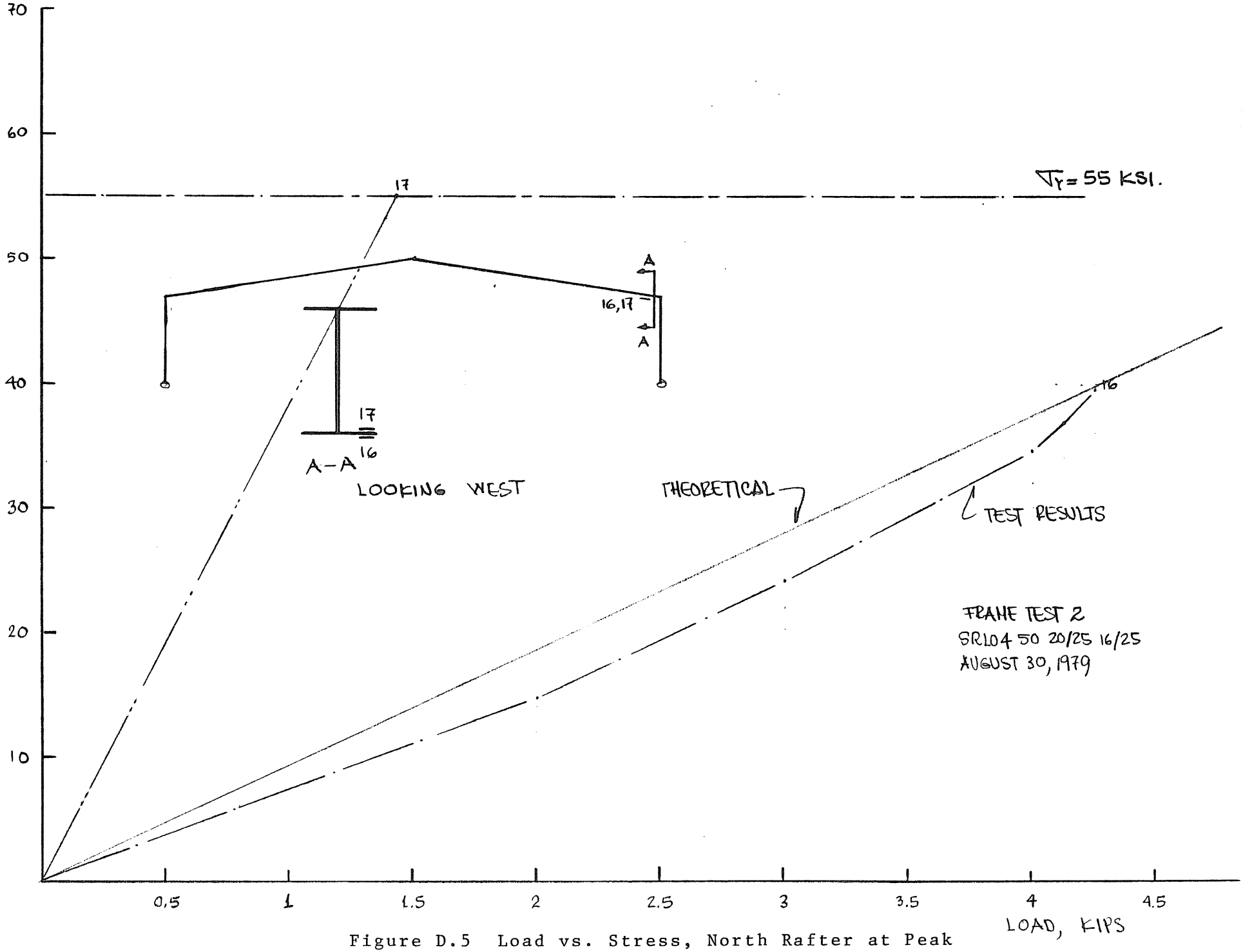

Figure D.5 Load vs. Stress, North Rafter at Peak

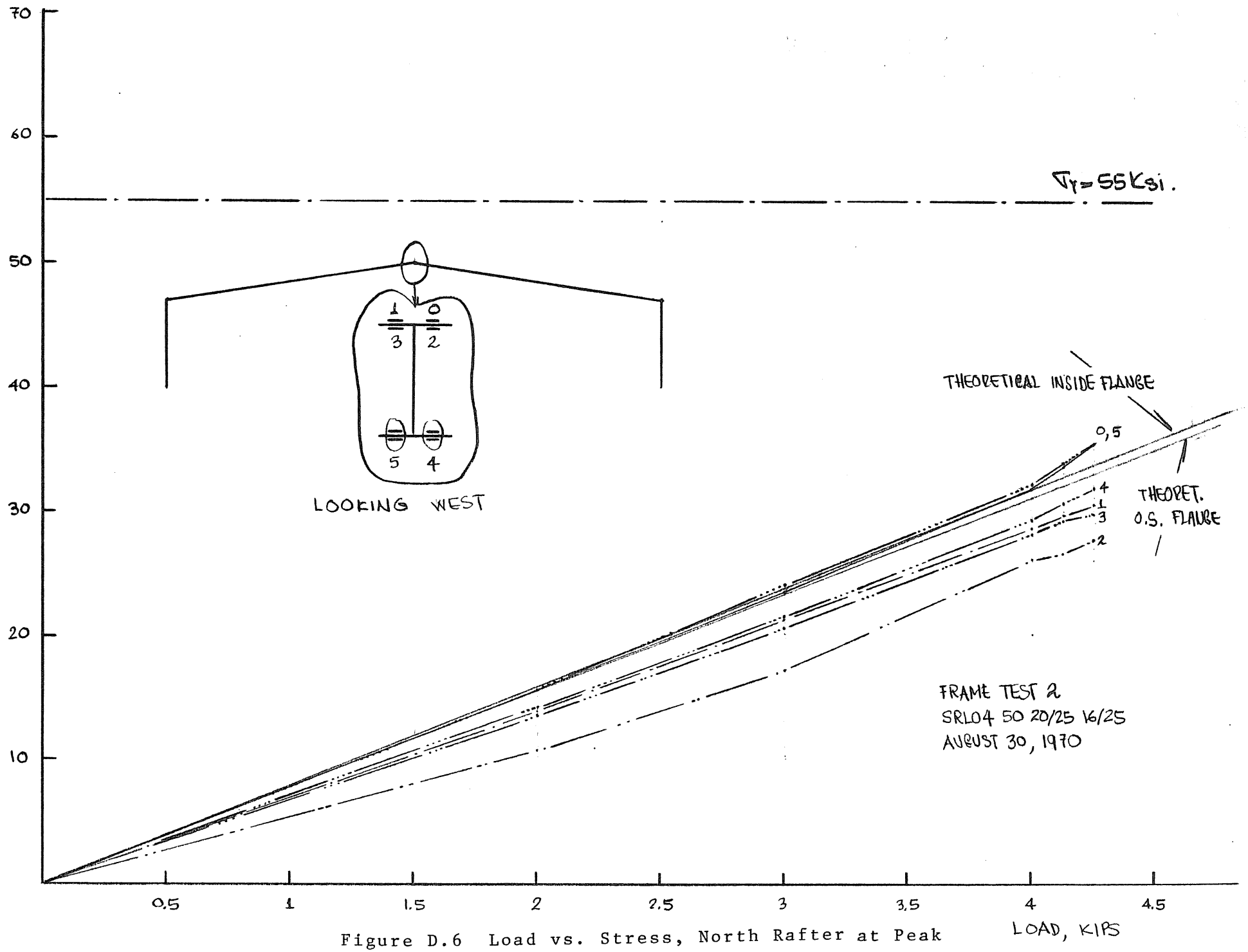

Figure D.6 Load vs. Stress, North Rafter at Peak