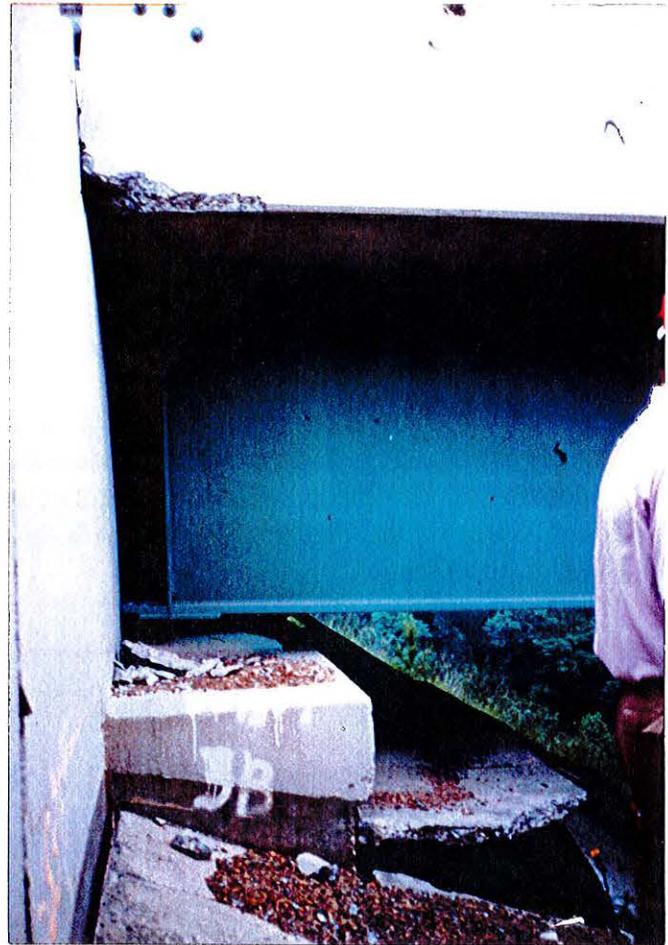




SD-90-07-F

SD Department of Transportation
Office of Research



Field Performance of Abutment Tiebacks

Study SD90-07
Final Report

Prepared by
South Dakota Department of Transportation
Office of Research
700 East Broadway Avenue
Pierre, SD 57501-2586

December, 1996

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Executive Summary

The South Dakota Department of Transportation (SDDOT) has experienced problems with rotation of sill type bridge abutments resulting in abutment backwalls jamming against the ends of bridges. A sill tieback system to prevent displacement and rotation of bridge end abutments has been designed for use in new construction and abutment retrofitting. The tieback system consists of a series of drilled shaft concrete anchors placed behind an abutment backwall. Sleeves are cast in the anchors and abutment backwall to allow threaded rod to be passed through and locked off at a predetermined tension (see figure 1 on next page).

SDDOT sponsored Dr. Sangchul Bang of the South Dakota School of Mines and Technology (SDSM&T) to develop software defining tieback systems design parameters using finite element analysis. This software, called BART (Bridge Abutment Reinforcement with Tie Rods), uses soils and foundations survey information and bridge design parameters as input. Because the design parameters produced by the software are theoretical, a field testing program was undertaken to verify its accuracy. This research project monitored actual loads and movements on two newly constructed sill type abutment bridges for comparison with predictions from the design program. These data were analyzed and tested for correlation with the BART data and a recommendation was made to continue the use of BART as a sill tieback design tool with a minor modification.

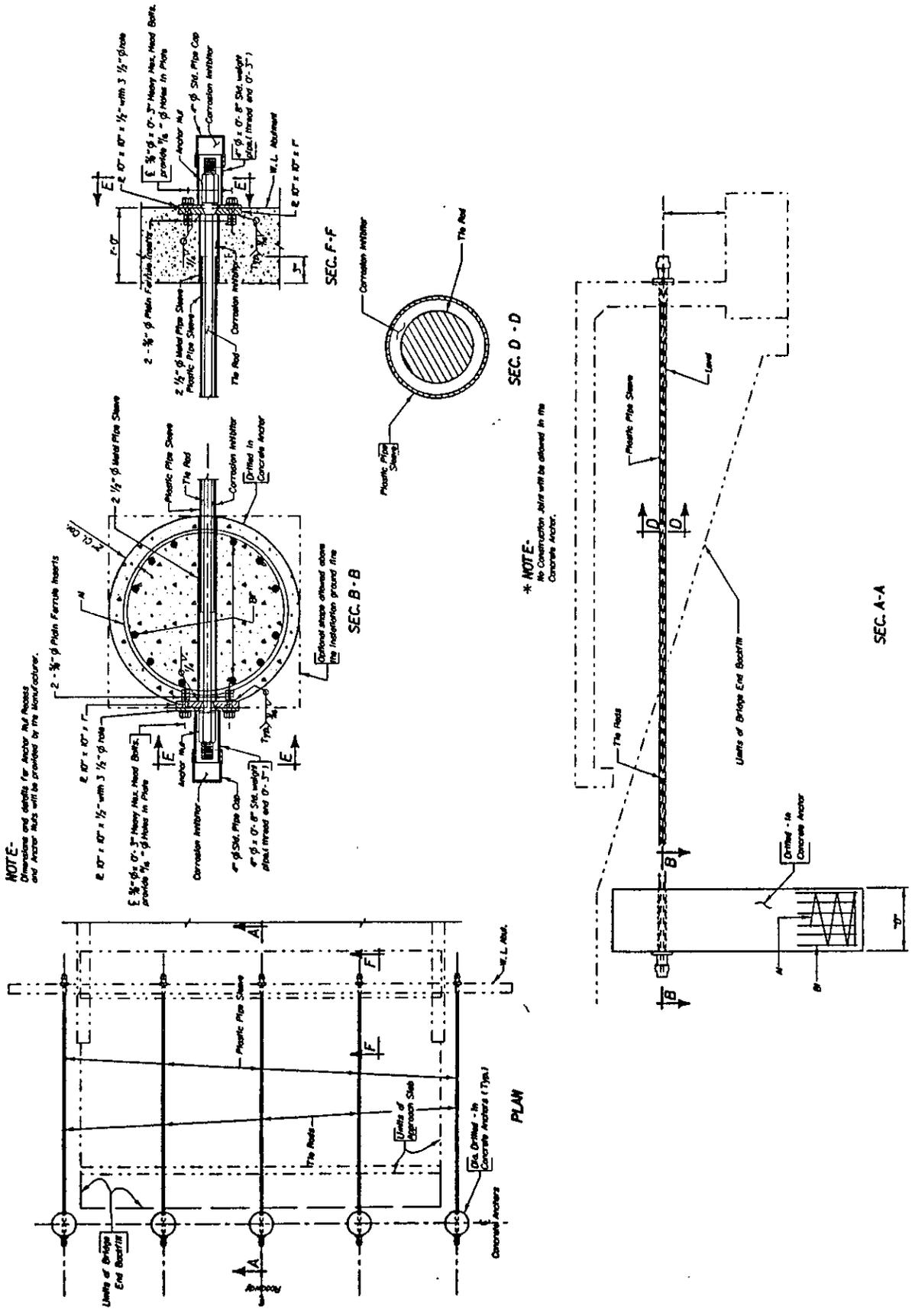
In addition, there was interest in developing a simple method for monitoring tension in each tie rod as an integrity test of sill tieback systems. A method using a measurement of torque to estimate tension was proposed.

Problem Description

The South Dakota Department of Transportation (SDDOT) has experienced problems with rotation of sill type bridge abutments resulting in abutment backwalls jamming against the ends of girders and bridge decks. A sill tieback system to prevent displacement and rotation of bridge end abutments has been designed for use in new construction and abutment retrofitting. The tieback system consists of a series of drilled shaft concrete anchors placed behind an abutment backwall. Sleeves are cast in the anchors and abutment backwall allowing threaded rod to be passed through and locked off at a predetermined tension.

SDDOT sponsored Dr. Sangchul Bang of the South Dakota School of Mines and Technology (SDSM&T) for development of software using finite element analysis to design tieback systems for sill type abutments. This software, called BART (Bridge Abutment Reinforcement with Tie Rods), uses soils engineering properties and bridge design parameters as input. Because the design parameters produced by the software are theoretical and have not been field verified, this research project was initiated to monitor actual loads and movements on newly constructed bridges for comparison with predictions from the design program.

In addition, the SDDOT's Geotechnical Activity expressed interest in developing a simple method for monitoring tension or load in each tie rod as an integrity test of sill tieback systems. One potential method may be to measure the torque on the tie rod nut and correlate it to actual load. An objective of this project was to determine if such a method is possible.



NOTE:
Dimensions and details for Anchor Nut Access and Anchor Nuts will be provided by the manufacturer.

*** NOTE -**
No construction joints will be allowed in the Concrete Anchor.

Figure 1 Typical Sill Tieback Design

Objectives

The primary objective of this research project was to determine whether the actual forces and movements in a tied back sill type abutment designed using BART correlate with the theoretical forces and movements. To do this, key points on the structure were instrumented and monitored during the initial load testing of the sill tieback system and periodically thereafter. Field data collected during the initial load testing was used primarily for verification of the installed instrumentation. These data along with periodic post construction measurements were submitted to Dr. Bang, who was contracted to compare them to the BART theoretical data and provide a report of the results.

The secondary objective of this project was to identify a simple inexpensive method of measuring the post construction load on the tie rods of a sill tieback system. The tie rods or threaded bars (DYWIDAG, for example) are used in a typical sill tieback system, nutted at each end and locked off at a predetermined load. Theoretically, a measurement of the torque on the nut at the abutment wall should correlate with the actual tie rod load. It was understood that this might not be the best method for determining tension but might be adequate for this application. This project tested that theory.

Task Description

The numbered tasks listed below were specified in the original problem statement developed by the project's technical panel. Below each task is an explanation of how the researcher addressed the task.

Task 1: Select Sites

A minimum of three sites will be selected from the construction program for study. Testing will proceed on an "as available for construction basis."

In the time period allotted for the project, only two bridges were designed using the sill tieback system. Typically, steel girder bridges of up to 90 meters (300 feet) or concrete girder bridges up to 180 meters (600 feet) can be of the integral abutment type and do not require sill type

abutments. No additional bridges of sufficient length to require sill type abutments were scheduled during this research period so tests on only two bridges could be conducted.

The first structure, number 61-164-405 (MRM 0.05), on Interstate 29 S over the Big Sioux River was scheduled for completion by the end of 1990. This was an excellent structure for evaluation with the exception of the 480 kilometer (300 mile) distance from the SDDOT Office of Research. Some of the desirable factors were no skew, soils engineering properties availability and a construction schedule convenient for instrumentation purposes. Also it was the only bridge with tied back abutments scheduled to be constructed for at least two years. The instrumentation was to be installed on the north end of the bridge as the south end is in Iowa.

The second sill tieback type bridge to be monitored as part of this project was on Interstate 229 S south of Sioux Falls, structure number 50-188-239 (MRM 1.88). The instrumentation of this bridge took place in the summer of 1994. Some of the details of this bridge were 45 degree skew and short piling, approximately 8 meters (27 feet), resting on quartzite.

It was determined that the critical forces and movements necessary to meet the objectives in this study were:

- abutment wall translation
- abutment wall tilt
- drilled-in anchor tilt
- drilled-in anchor translation
- tie rod tension
- tie rod elongation

Translation seemed the most difficult to monitor. Because the anchors would be buried and no additional post construction measurements could be taken, it was decided that anchor tilt would suffice. Measuring translation at the abutment wall was also a problem. Although it was a simple matter to monitor it during the initial load testing, it was not possible to establish a reference point from which to measure post construction movements with the sub millimeter accuracy necessary. It was decided that tilt would suffice there also.

Task 2: Instrument Tendons

Instrument all tendons of one structure per site location for force analysis.

To measure tension in the tie rods, strain gages were used. Vibrating wire strain gages were chosen because of their ability to monitor static strain levels over long periods of time. Additional information for these gages can be found in Appendix A. Two gages were attached on each of the six tie rods. By placing the gages on opposite sides of a tie rod (top and bottom), both elongation (the average of top and bottom strains) and bending (the difference between top and bottom strains) can be computed. An added benefit of this method is the ability to estimate fill settlement.

To protect against corrosion, the tie rods are encased in a plastic pipe filled with grease. To gain access to the rods, it was necessary to remove a small section of plastic pipe.

After cleaning the tie rod, a flat, smooth surface was made by grinding lightly. The gages were spot welded in place and grease was replaced to insure protection. A rigid watertight cover was installed over the exposed area to protect it during back-filling and compaction. Figures 2 through 7 illustrate the strain gage installation procedure.

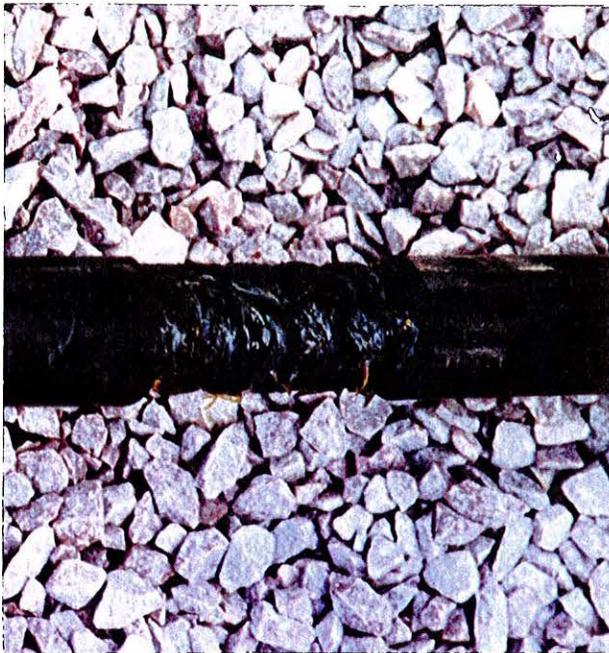


Figure 2 Plastic Sheathing Removed

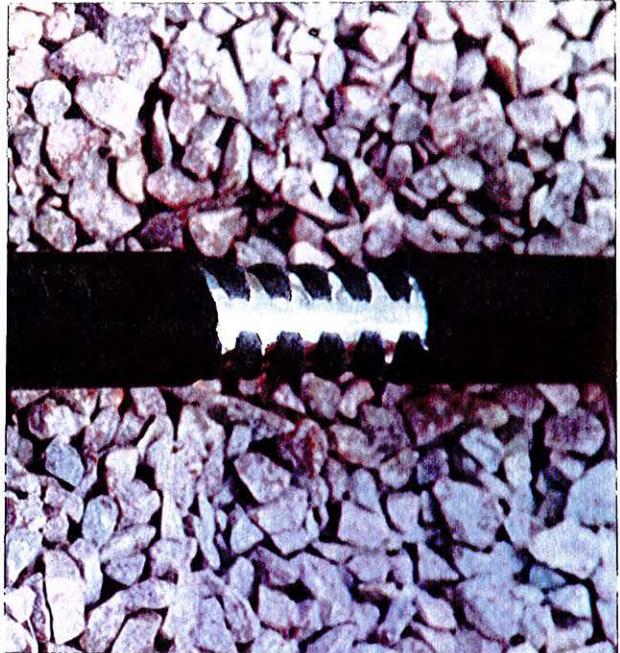


Figure 3 Surface Prepared for Gage



Figure 4 Gage Placed and Ready for Spot-Welding

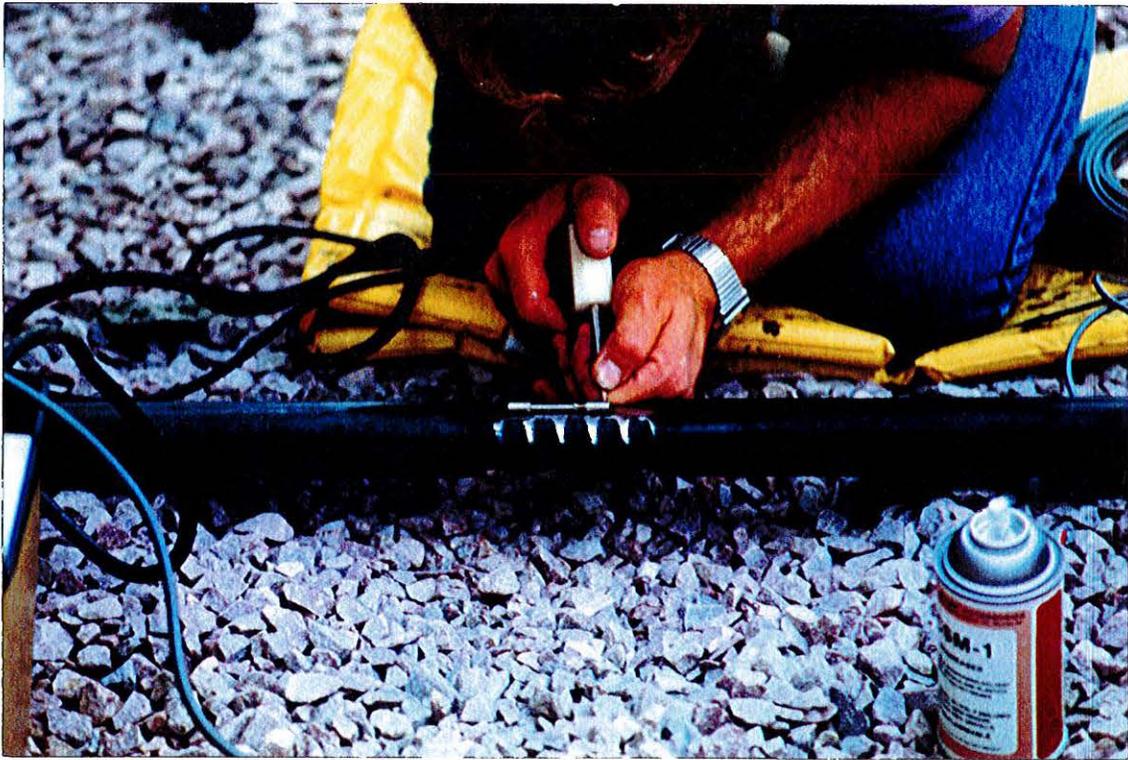


Figure 5 Spot-Welding Gage In Place

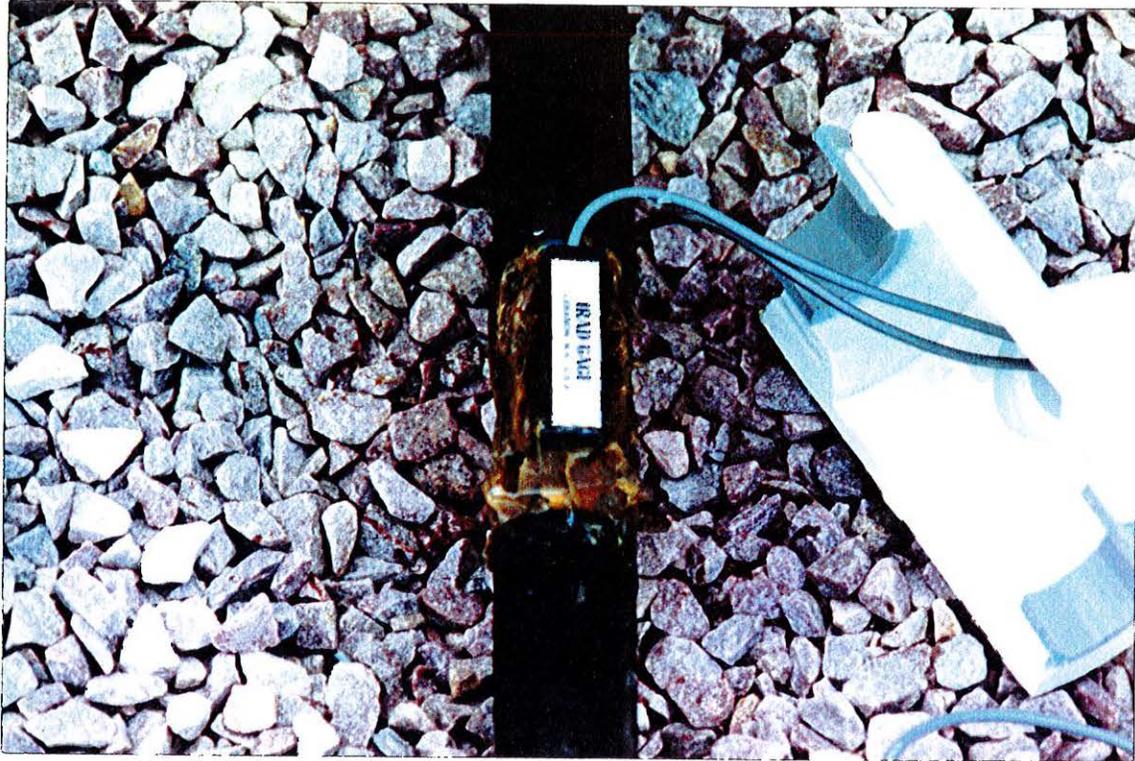


Figure 6 Gage Cover Installed and Corrosion Inhibitor Replaced



Figure 7 Protective Cover Installed

Task 3: Instrument Anchors

Instrument drilled shaft anchors to measure displacement at same location.

A practical method for measuring actual anchor displacement could not be identified. However, tilt could be measured and was determined to be adequate. The tilt measurement instrumentation is described under Task 4.

Task 4: Measure Abutment Movements

Measure abutment movements by tilt analysis or by direct displacement method.

The researcher chose inclinometers to measure rotation (tilt) of the anchors and abutment. Since the primary concern was tilt in a plane parallel to centerline, single axis inclinometers were selected. A total of eight were used on the first structure, one on each end of the north abutment and on each of the six drilled-in anchors.

Because the inclinometers would be cast in concrete and unrecoverable, cost was a factor in the selection of a device. The Lucas Schaevitz company provided the answer with the Accustar Clinometer at a cost of approximately \$115 each. The clinometer has a range of plus or minus 45 degrees and a resolution of one thousandth of a degree. Additional information can be found in Appendix A. The tilt angle can be determined by reading the clinometer output with a high accuracy voltmeter and applying a scaling factor, eliminating the need to purchase additional signal conditioning equipment.

Because the inclinometers were to be cast into the concrete, they had to be protected from moisture and physical damage during the pour. To accomplish this, they were individually mounted in plastic electrical enclosures cast full of epoxy. The enclosures were bolted to the inside of the plywood forms prior to concrete placement. When the forms were removed, the electrical leads from the clinometer were accessible.

The leads from the strain gages and inclinometers were routed through 25 mm (one inch), schedule 80 PVC pipe. The pipes were assembled to form three runs which extended through the abutment.

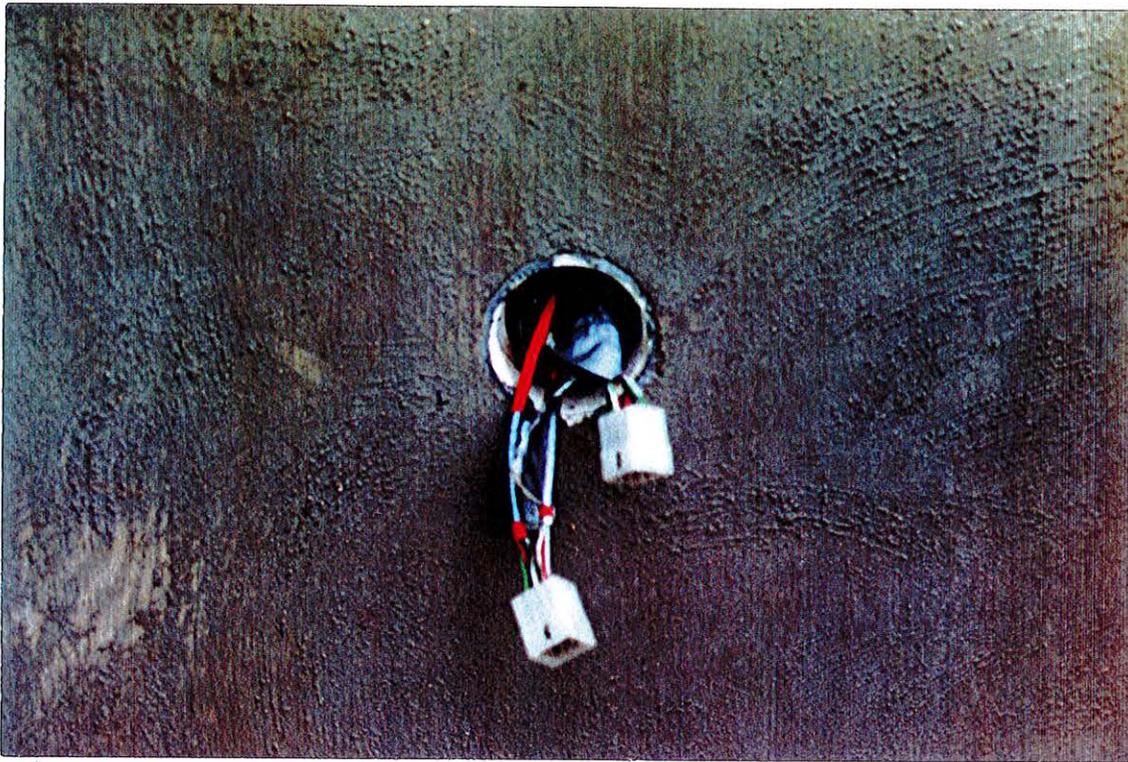


Figure 8 Plastic Fitting Cast In Backwall Allowing Instrument Cable Access



Figure 9 Completed instrumentation and cable protection prior to back fill

A fitting with a removable cap was cast in place on the abutment face to gain access to the three wire runs (Figures 8 and 9).

The instrumentation of the first bridge (Sioux City) was completed and tested on August 2, 1990. The load testing and tensioning of the tie rods took place on August 9, 1990. The intention was to monitor all sensors during each step of the tensioning procedure. Because of the lack of quality voltmeters, it was impossible to continuously measure north end abutment tilt during the load testing. Lateral translation was measured at each end of the abutment with dial indicators mounted on tripods. However, movement was so slight that it was difficult to determine whether actual movement or thermal expansion was measured. During construction, the sill tieback system undergoes a load testing procedure. Creep of the anchors and elongation of the tie rods were measured to verify compliance as defined in the plans. This was accomplished using a jack and load cell (Figure 10) to place and maintain predetermined loads on each tie rod. These loads were maintained for an established time period while measuring the extension of the tie rod end (creep) at the abutment wall.

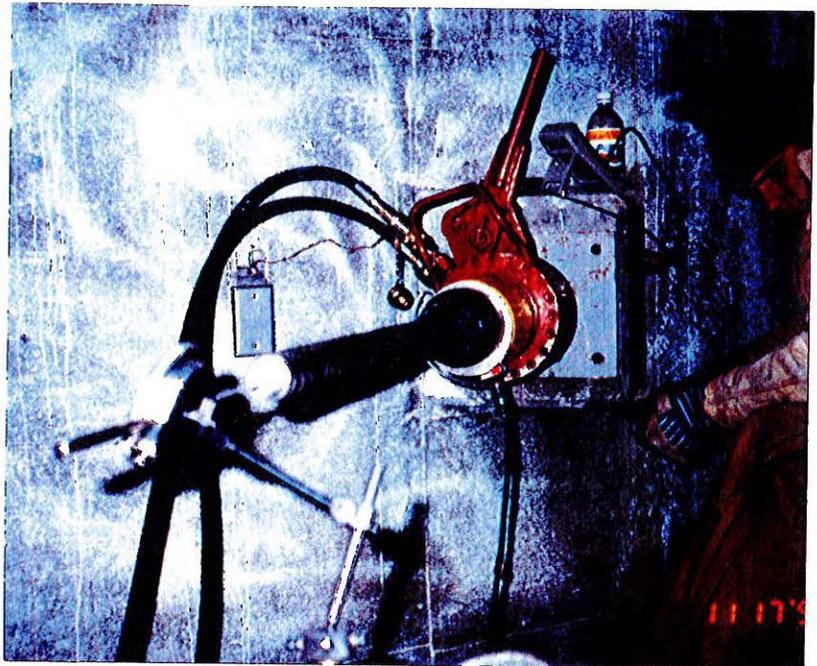


Figure 10 Load Testing Tieback With Jack and Load Cell

The measurements taken during this process confirmed that the instrumentation was working well as can be seen in the chart in Figure 11. The chart was created from the data table for tie rod number one (Table 1). Actual tie rod load in pounds was computed as the average change in strain multiplied by the modulus of elasticity of steel and the cross sectional area of the tie rod:

$$Load = \frac{(\Delta\epsilon_1 + \Delta\epsilon_2)}{2} \times 29 \times 10^6 \text{ psi} \times 1.56 \text{ inches}^2$$

The loads computed from the strain measurements on the tie rods correlated closely with the load cell output. All initial measurements as well as post load test measurements and charts are included in Appendix B.

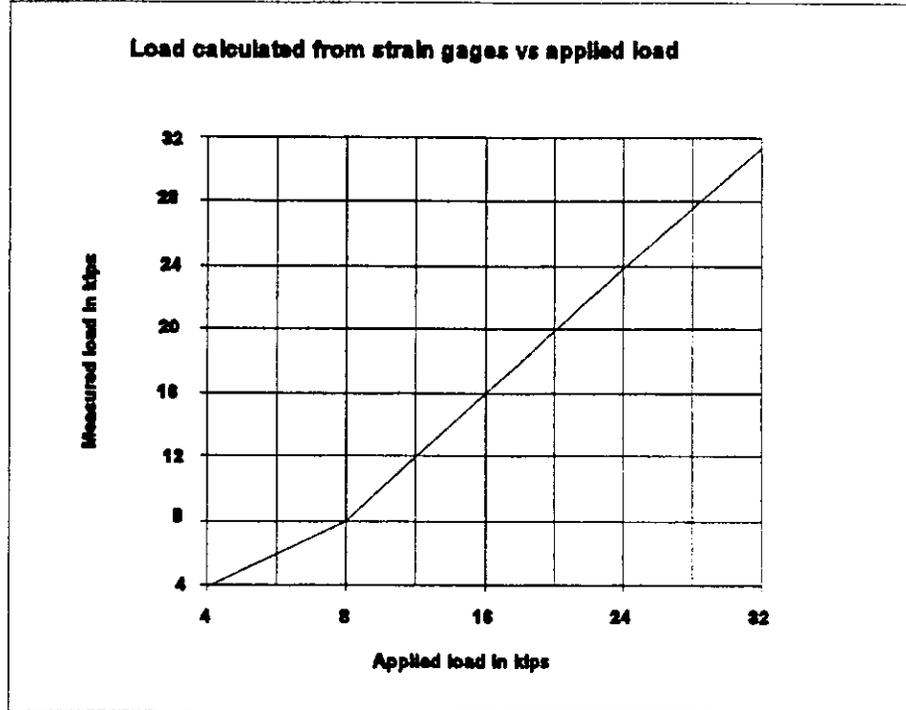


Figure 11 Applied vs Measured Tie Rod Load

Tie Rod Number = 1		Date	Aug. 8, 1990	Processed Data				
Load In Kips	Abutment Tilt in Degrees		Anchor Tilt in Degrees	Measured Tie Rod Load In Pounds	Tie Rod Tension in Microstrain	Tie Rod Movement in Inches	South End Abutment Translation In Inches	
	South Inc. #1	North Inc #2	Inc. #3					
0	0	0	0	0	0	NA	0	
4	0.0000	Data	0.0079	3393	75	0	0.003	
8	-0.0016	Not	0.0134	7940	176	0.065	0.005	
4	-0.0010	Available	0.0066	4072	90	0.018	0.003	
8	-0.0016		0.0115	8053	178	0.070	0.005	
16	-0.0033		0.0508	15857	351	0.222	0.009	
4	-0.0008		0.0279	4004	89	0.062	0.004	
8	-0.0008		0.0328	7985	177	0.113	0.006	
16	-0.0025		0.0529	15947	353	0.232	0.009	
24	-0.0049		0.1245	23887	528	0.432	0.015	
4	-0.0011		0.0700	3891	86	0.135	0.005	
8	-0.0016		0.0775	7917	175	0.188	0.007	
16	-0.0033		0.1005	15992	354	0.313	0.011	
24	-0.0049		0.1324	23819	527	0.448	0.015	
32	-0.0066		0.2130	31397	694	0.659	0.020	
1 Min	-0.0074		0.2285	32166	711	0.689	0.021	
2	-0.0066		0.2376	32120	710	0.703	0.021	
3	-0.0066		0.2437	32098	710	0.712	0.022	
4	-0.0066		0.2476	32166	711	0.719	0.022	
5	-0.0066		0.2496	32007	708	0.721	0.022	
6	-0.0069		0.2522	32143	711	0.727	0.022	
10	-0.0064		0.2579	32030	708	0.739	0.022	
4 Kips	-0.0008		0.1580	4049	80	NA	0.007	
11/10/90	-0.0382	-0.0251	0.2022	16513	365	Gage Temp.		
02/01/91	-0.0637	0.0281	0.2252	19453	430	Deg F.		
06/26/91	-0.0115	-0.0213	0.2189	14726	326	NA	NA	
06/27/91	-0.0188	-0.0423	0.2180	13482	298	72		
6/06/92	-0.0554	-0.0537	0.2216	17214	381	43		
7/24/95	-0.0274	-0.1604	0.2324	11333	251	73		

Table 1 Sioux City Load Test Data

Some design changes from the previous instrumentation methods were made for the second bridge (Sioux Falls). Since the data from all the tendons on the Sioux City bridge correlated it was determined that it was not necessary to instrument all tie rods and anchors. Instead, the two central tie rods and their anchors were instrumented along with one location on the abutment. Dr. Bang requested that instrumentation be placed to measure pile translation. Therefore, a slope inclinometer casing was placed next to piling and later cast through the concrete pile cap.

Strain gages used were vibrating wire type identical to those on the first bridge. Alternative clinometers with lower long term drift were selected. These units, 900 series Applied Geomechanics clinometers were biaxial with a plus or minus 20 degree range. Additional information can be found in Appendix B. The clinometers were read with a high accuracy volt meter by applying the output voltage value to a polynomial calibration curve. They were mounted in a plastic enclosure and cast full of epoxy for protection. A sample of the data from tieback 3 can be seen in Table 2.

Northern tierod #3 November 17, 1994						
Applied Load in KIPs	#22 Bot. Gage Out. in uStrain	#23 Top Gage Out. in uStrain	Calculated load in pounds	Tie Rod Movement in inches (Ref. Zero)	Tie Rod Movement in inches (Raw)	
0	1104	2113	0			
4	973	2421	4004	0.000	0.179	
8	1067	2508	8098	0.037	0.216	
4	?	?	?	0.015	0.194	
8	1070	2507	8143	0.042	0.221	
16	1259	2686	16467	0.149	0.328	
4	1001	2439	5044	0.022	0.201	
8	1077	2507	8302	0.051	0.230	
16	1259	2686	16467	0.152	0.331	
24	1449	2863	24769	0.267	0.446	
4	1001	2439	5044	0.031	0.210	
8	1084	2513	8596	0.057	0.236	
16	1263	2686	16558	0.161	0.340	
24	1450	2861	24746	0.270	0.449	
32	1644	3031	32980	0.385	0.564	
minute 1	1651	3033	33184	0.391	0.570	
2	1651	3033	33184	0.392	0.571	
3	1651	3033	33184	0.394	0.573	
4	1652	3031	33161	0.395	0.574	
5	1653	3031	33184	0.395	0.574	
6	1655	3029	33184	0.395	0.574	
10	1656	3029	33206	0.397	0.576	
Kips 4	1001	2446	5203	0.038	0.217	
03/20/95	1077	2478	7646	0.038	0.217	
07/10/95	1111	2496	8822	0.038	0.217	

Table 2 Sioux Falls Load Test Data

Although all clinometers tested fine before installation, they would not provide valid measurements after concrete was placed. The failure mode could not be determined.

Task 5: Determine Torque / Tension Correlation

Determine if measurement of torque on tendon head nut with a torque wrench can be a method of monitoring post construction tendon tension.

The threaded steel rods used in this sill tieback construction are DYWIDAG rods provided by DYWIDAG Systems International (DSI). DSI conducted torque/tension correlation testing in conjunction with Carleton Laboratory, Columbia University and the results were provided. A chart in Appendix C shows the torque/tension relationship for the type of tie rods used by SDDOT. The values in the chart for the lubricated condition should be applicable to our standard practice, enabling an estimate of the tie rod load by measuring torque of the lock-off nut with a torque wrench rated to 138 kilogram meters (1,000 foot pounds).

Task 6: Report Progress

Following a measurement period of one year a report will be written that summarizes the progress.

A preliminary comparison of field data vs BART generated data for the Sioux City bridge was provided by Dr. Bang in May of 1991. This information was forwarded to the technical panel and is included in this report under Task 7.

Task 7: Collect and Report Data

The above procedure will be used on three structures as they are available for construction. A final report will be written summarizing the entire project. Anchor parameter data collection will continue throughout the entire project and the data will be summarized for future analysis if desired.

As previously explained, only two bridges were designed with sill tiebacks during this project. These two bridges were instrumented to measure load, tilt and displacement. During initial load testing, these parameters were monitored and logged. Periodic measurements of load and tilt were made after construction and all data were forwarded to Dr Sangchul Bang of the South Dakota School of Mines and Technology. Dr. Bang was contracted to analyze the collected data

and compare it with the theoretical output of BART. Dr. Bang's report is presented here.

INTRODUCTION

This report presents the results of a study that compares the field instrumentation on bridge abutments reinforced with tiebacks with those calculated from the analytical finite element solution method. The study was performed at the South Dakota School of Mines and Technology, Rapid City, South Dakota, from July 1, 1993 to Dec. 31, 1995.

The comparisons include two bridge abutments: a prestressed, skew girder bridge in Sioux Falls and a non-skew girder bridge in Sioux City. The former bridge abutments comparison includes a brief description of the input and a complete output of the analytical solution as well as the comparison with the field measurements. The latter includes comparison of analytical predictions with five field measurements taken over a period of approximately five years.

The analytical predictions were made with the finite element computer program, BART, which was developed by Sangchul Bang of the South Dakota School of Mines and Technology for the analysis and design of a tieback system for reinforcing distressed bridge abutments (*Design and Analysis of Reinforcing Distressed Bridge Abutment and Analytical Parametric Study of a Tieback System for reinforcing Distressed Bridge Abutments*, reports to the South Dakota Department of Transportation, by S. Bang, 1988 and 1990). This program utilizes the concept of "generalized plane strain," with which certain three dimensional structures can be analyzed for three dimensional stresses, strains, forces, moments, and displacements without resorting to full three dimensional analysis.

SIOUX FALLS BRIDGE ABUTMENTS

The prestressed girder bridge over the Big Sioux River, Sioux Falls, South Dakota (structure number 50-188-239 on I-229), was analyzed to compare stresses within the skew tieback and

lateral displacements of the abutment determined analytically against those observed in the field.

Information on the instrumented tiebacks, i.e., the northern tieback #3 and the southern tieback #4, were provided and stresses and displacements were measured and calculated by the South Dakota Department of Transportation. In addition to the tiebacks, data on lateral deformation from a slope inclinometer located near these tiebacks were also available.

The computer program BART analyzed the abutments based on the generalized plane strain finite element approach in three dimensions. Details of input parameters for the program were determined from the bridge plans and supporting documentation provided by the South Dakota Department of Transportation. Pile lengths beneath the abutments at the locations in question were determined to be 9.1 and 11.3 meters (30 and 37 ft). for the southern and northern abutments, respectively. Cross-sections of the northern tieback #3 and the southern tieback #4 differed very slightly only in the thickness of the abutment base. Therefore, the cross section of the northern tieback #3 was used in the analysis.

Attached in this report as Appendix D are the input and output of the program BART for the analysis of the northern tieback #3. The output shows the details of the geometric and material properties used in the analysis. The back fill material behind the abutment, Sioux Quartzite, has internal friction angle of 47 degrees. The foundation soil beneath the abutment, silty to clayey sand (SM to SC based on the Unified Soil Classification System), was classified to have a relative density of 95 % of the Standard AASHTO compaction method. This soil has cohesion of 400 psf and internal friction angle of 33 degrees.

Measurements were taken by Paul Orth, research engineer of the South Dakota Department of Transportation. Since the locations where the measurements were made did not exactly coincide with the nodal point coordinates where the analytical solutions were obtained, calculated results were linearly interpolated between the nearest nodes.

Results of the comparisons are included in Tables 3 and 4, and Figure 13. As can be seen from Table 3, measured movements of the tiebacks range from 0.965 mm (0.038 in) for the northern tieback #3 to 3.53 mm (0.139 in) for the southern tieback #4. The calculated displacements of the tieback are 5.79 mm (0.228 in) and 1.35 mm (0.053 in) along the directions of x and z coordinates, respectively. The cross-section of the abutment lies on a plane defined by the x and z coordinates, with the x coordinate being perpendicular to the abutment. The axial directional displacement of the tieback can therefore be obtained from the vector analysis of the x and z directional displacements with the known bridge skew angle of 45 degrees. It shows the tieback axial displacement of 5.05 mm (0.199 in). Please refer to Figure 12 for the details of this conversion of displacements. This calculated axial displacement of the tiebacks compares reasonably well with the field measurement of the southern tieback #4, which recorded a

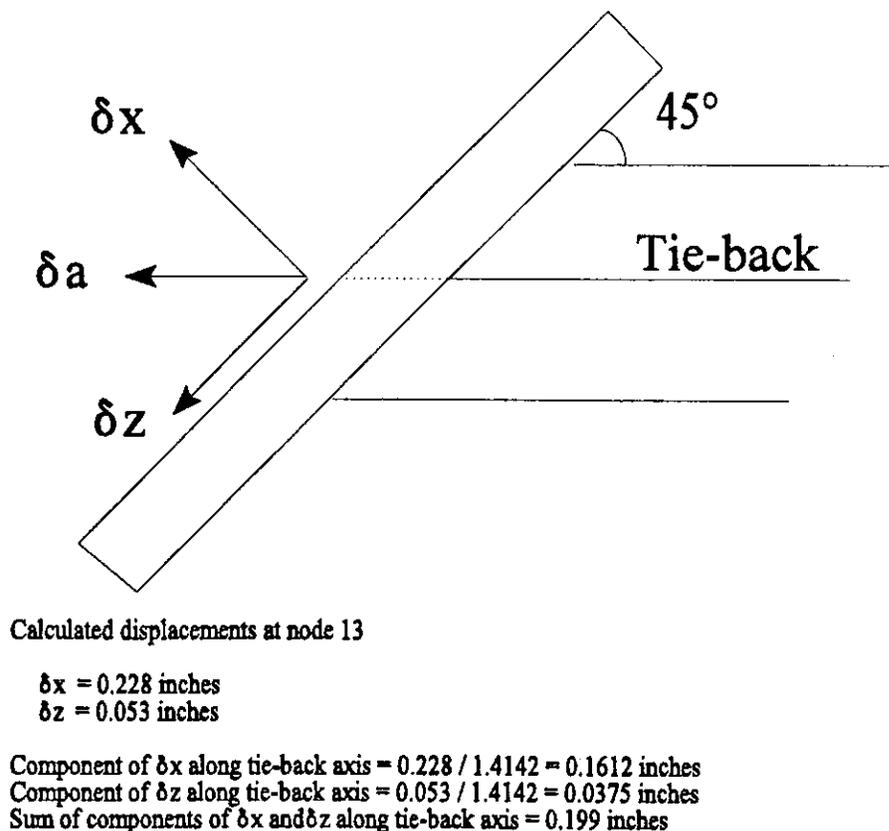


Figure 12 Displacement Conversion Diagram

movement of 3.53 mm (0.139 in). However, this comparison is inconclusive in view of the fact that the field measurements did not include the movement of the tiebacks for the initial 1814 kg (4 kips) of axial load application during the proof test. The true field tieback axial displacement therefore must be greater than 3.53 mm (0.139 in), but the exact magnitude is impossible to determine. If a direct extrapolation is used among 0, 1814, 3628 kg (0, 4 and 8 kips) of axial load, the corrected axial displacement of the tiebacks would be 4.32 and 1.91 mm (0.170 and 0.075 in) for the southern tieback #4 and the northern tieback #3, respectively.

Sioux Falls Bridge Tiebacks Displacements and Stresses Comparison

DISPLACEMENTS

Measured: 0.038 inches for northern tieback #3
 0.139 inches for southern tieback #4

Calculated: 0.199 inches (node 13)

STRESSES

Measured:

 Northern tieback #3, at 11 ft. from the abutment.

 5,203 psi on 11/17/94

 7,646 psi on 3/20/95

 8,822 psi on 7/10/95

 Southern tieback #4, at 3 ft. from the abutment.

 4,795 psi on 11/17/94

 7,012 psi on 3/20/95

 3,099 psi on 7/10/95

Calculated:

 0.85 ft. from abutment (middle of element 80) = 0 psi

 6.54 ft. from abutment (middle of element 81) = 15,015 psi

 17.06 ft. from abutment (middle of element 82) = 11,949 psi

 28.43 ft. from abutment (middle of element 83) = 1,269 psi

 Average = 8,660 psi

Table 3 Sioux Falls Bridge Tieback Displacements and Stress Comparison

Table 3 also shows the values of measured and calculated axial stresses within the tiebacks. It is noted that the program BART calculates the axial forces (axial stresses can be obtained by dividing the axial force by the cross-sectional area of the tie rod) assuming that a full contact is maintained between the tiebacks and the surrounding soil all the time. The actual tiebacks used (#11 DYWIDAG bars) were encapsulated with corrosion inhibitor between the rod and the plastic sleeve, which allowed a uniform distribution of the axial stress. The Sioux Falls Bridge Tiebacks Displacements and Stresses Comparison calculated axial stresses were therefore converted into a uniform axial stress by the weighted average method, i.e., the sum of the product of calculated axial stress and the element length was divided by the total length of the tieback. This shows the average axial stress of 59,711 kPa (8,660 psi) developing over the entire length of the tieback.

Figure 13 shows the comparison of the calculated average tieback axial stress with the measured axial stresses at three different occasions. As can be seen, the measurements of both tiebacks made on March 20, 1995, agree very well with the prediction. The measurement of the northern tieback #3 on July 10, 1995 agrees extremely well with the calculated value. However, the measurement of the southern tieback #4 on the same day indicates a drop of nearly 27,580 kPa (4,000 psi) over a period of four months. This sudden drop in the tieback axial stress is totally unexpected. Typical long-term soil behaviors such as settlement and creep usually increase the tieback axial stress with time. Possible explanations for such a sudden drop in tieback axial stress include; (1) excessive tilt of the deadman anchor due to insufficient back fill compaction, (2) structural degradation or loosening of the tieback connection with the abutment, and (3) instrumentation error, failure, or malfunction.

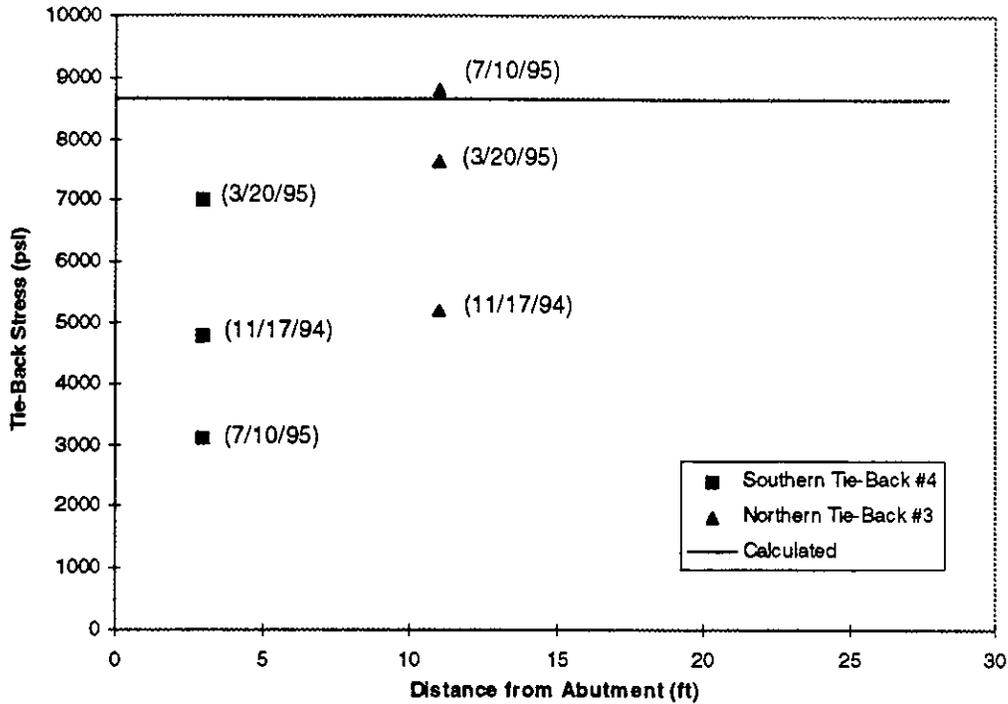


Figure 13 Tieback Axial Stress Comparison

Table 4 shows a comparison between the calculated and measured lateral deformations along the slope inclinometer located beneath the northern abutment. The first three columns of the table show the node numbers and their coordinates used in the finite element analysis. The fourth column indicates the corresponding inclinometer vertical coordinates of the nodes. The fifth column shows the calculated lateral deformations at the nodes directly from the finite element analysis. Since the inclinometer location does not coincide with any specific node, linear interpolations have been made with the lateral deformations of two adjacent finite element nodes between which the inclinometer is located. The interpolated lateral deformations are listed in column six. These were adjusted once again to indicate only the relative lateral deformations to the inclinometer tip in column seven. Finally, the measured lateral deformations from the inclinometer are shown in column eight.

The comparison shows that the magnitudes of the measured and calculated lateral deformations are within the same order of magnitude. However, the calculated values indicate that the mode

of lateral deformation is outward bulging near the middle of the slope inclinometer, whereas the measured values indicate an increasing mode of lateral deformation toward the abutment.

Node	Finite Element Coordinate System		Inclin.	Calculated Lateral Deformation from FEM (ft)	Interpolated lateral Deformation @ x=-3' (in)	Corrected for zero bottom deformation (in)	Measured lateral deformation (in)
	X Coord (ft)	Y Coord (ft)	Y Coord (ft)				
29	-4.000	0.000	-4.000	0.0570	0.684	0.121	0.20
30	-1.500	0.000	-4.000	0.0570			
41	-3.833	-9.124	-13.124	0.0742	0.904	0.341	0.13
42	0.021	-9.124	-13.124	0.0794			
53	-3.667	-18.248	-22.248	0.0633	0.772	0.209	0.08
54	1.541	-18.248	-22.248	0.0713			
Interpolated		-24.000	-28.000		0.563	0.000	0.00
65	-3.500	-27.372	-31.372	0.0362	0.440		
66	3.062	-27.372	-31.372	0.0425			

Note: Top of the inclinometer is at Y = - 4 ft.

Bottom of the inclinometer is at Y = - 28 ft.

Table 4 Sioux Falls Bridge Abutment Lateral Deformation Comparison

SIoux CITY BRIDGE ABUTMENT

The non-skew bridge over the Big Sioux River located in Sioux City (structure number 46-164-405 on I-29) was analyzed and compared with the field measurements taken over a period of approximately five years. An initial comparison was made with the field measurements and reported to the South Dakota Department of Transportation in a letter on May 15, 1991. Subsequent field measurements were later added in the comparison and reported to the South Dakota Department of Transportation in a letter dated Dec. 19, 1995.

Table 5 summarizes the comparisons between the analytical calculation and five field measurements made by the South Dakota Department of Transportation to date. The table indicates that the calculated and measured tieback axial forces agree very well. On the other hand, rotations of the abutment and the deadman do not agree as well. However, the magnitudes of rotations are so small that both the measured and calculated rotations fall practically within the range of allowable error limits. The accuracy of the clinometer used in field measurement was 0.001 degrees (0.0000175 radians), but the error could be as high as 0.05 degrees (0.00087 radians) for measurements taken after a long period of time.

	Tieback Axial Force at 2 ft. from Abutment (lbs)	Rotation of Abutment at 3 ft. 9 in. from Top (rad)	Rotation of Deadman at 3 ft. 9 in. from Top (rad)
Field Measurement (Nov. 1, 1990)	13,572	0.000666	0.00273
Field Measurement (Feb. 1, 1991)	14,503	0.001112	0.00292
Field Measurement (June 27, 1991)	13,546	0.00027	0.0034
Field Measurement (March, 1992)	14,273	0.000918	0.0030
Field Measurement (July 1995)	10,281	0.000272	0.0038
Analysis #1 KCODE=2, back fill KCODE=11, soil	12,662	0.006659	0.001533
Analysis #2 KCODE=2, back fill KCODE=12, soil	10,522	0.004628	0.000661

Note: Field measurements of the tieback axial force and the abutment rotation are average readings from the six instrumented tiebacks.

The error of the strain gages used for this tieback axial force measurement generally does not exceed ± 2 microstrain which equates to an error of up to ± 90 lbs.

Table 5 Sioux City Bridge Abutment Comparison

Conclusions and Recommendations

The results of comparisons presented in this report indicate that in general there exist reasonable agreements between the BART calculated and field measured performance of the sill tieback bridge abutment reinforcement system, considering the uncertainties involved in field measurements and instrumentation accuracy. Therefore, it is recommended that the Office of Bridge Design continue the use of BART as design tool. However, due to the limited number of measurements, it is difficult to draw any overall quantitative conclusion with regard to the effectiveness of the program BART.

It is recommended that if any future performance studies are conducted on the sill tieback bridge abutment reinforcement system, they should include additional instrumentation to measure the following: lateral earth pressures acting on the abutment and deadman anchors, surface settlements, out-of-plane deformations of the abutment (if skewed), bending moments within the abutment and base, and abutment tilts. The program BART is fully capable of analyzing three dimensional responses of the tieback bridge abutment reinforcement system. In addition, if slope inclinometers are to be used as part of the instrumentation, the inclinometer casings need to be embedded completely within the abutment backwall so that continuous lateral deformations from the tip of the inclinometer to the top of the abutment can be measured.

During the course of this project, it was determined that the BART program assumes that friction will occur between the tie rod and the surrounding soil. This may introduce small errors in the design output because the department uses tie rods encased in sleeves filled with grease for corrosion resistance thus eliminating any soil friction. It is recommended that the BART program be modified to accommodate this free slip between the tie rods and soil. Additional effort involved in this program modification may be significant.

Although it does not provide a high degree of accuracy ($\pm 8\%$), it is recommended that the method of estimating tie rod load by correlating measured tie rod nut torque with the torque/load

chart in Appendix C is adequate for the purpose of testing sill tieback tie rod tension and should be used as such..

APPENDIX

A-Instrumentation Information and Specifications

schaevitz

AccuStar Electronic Clinometer

The AccuStar electronic clinometer is an extremely accurate and economical angle measurement system. This compact and rugged unit is ideal where space and environment are serious considerations.

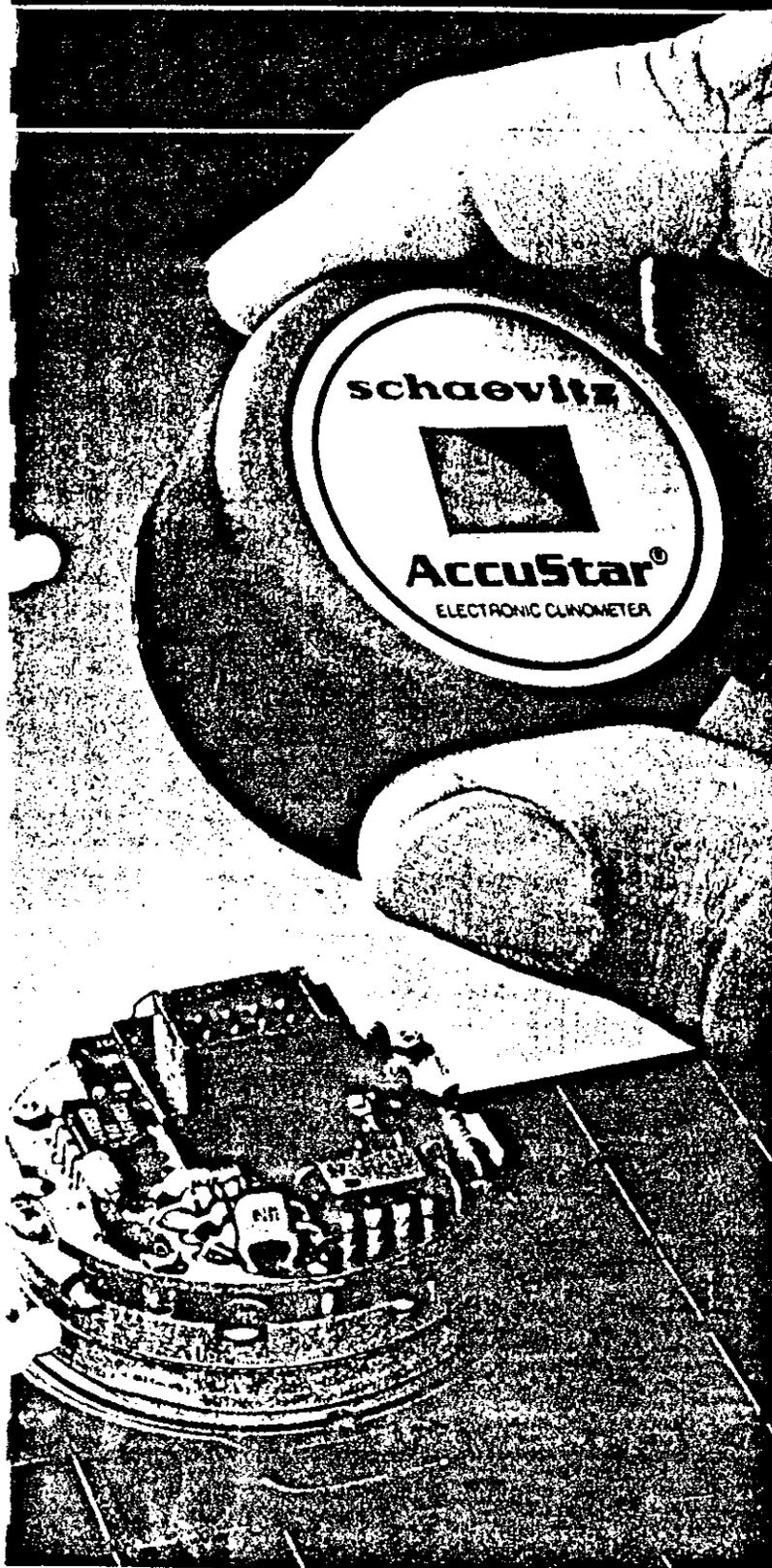
The heart of the system is an innovative, all-metal gravity sensor with no moving parts. When rotated about its sensitive axis, this unique sensor provides an exceedingly linear variation in capacitance, which is electronically converted into angular data. The sensor and low-power CMOS electronics are encased in a rugged housing ready to install as a system component or as a stand-alone device.

Designed for easy integration, with a choice of analog, ratiometric or digital models, the clinometer will output either an analog DC voltage or PWM output corresponding to direction and magnitude of angular displacement. In addition to its adaptability, this precision device has outstanding resolution and a wide angular range, making it ideal for an array of applications.

AccuStar Electronic Clinometer Applications

Integrate as a component or install as a stand-alone device:

- Robotics
- Cranes
- Antennas
- Construction
- Aircraft
- Manufacturing
- Automotive
- Military
- Security
- Marine
- Medical
- Petroleum



Clinometer Specifications

Performance

Total range	±60 deg.
Linear range	±45 deg.
Threshold & resolution	.001 deg.
Linearity	— null to 10 deg. ±.1 deg.
	— 10 to 45 deg. ±1 percent angle
	— 45 to 60 deg. Monotonic
Null Repeatability	.05 deg.
Cross axis error	< 1 % up to 45 deg. cross axis angle
Time constant	.3 second
Frequency response	.5 Hz

Electrical

Voltage supply — nominal	+12 VDC
Voltage supply range	+8 to +20 VDC
Current — each nominal supply	5 milliamps
Scale factor — to linear range	60 millivolts/deg. nom
Load resistance — minimum	

Specifications continued

Environmental

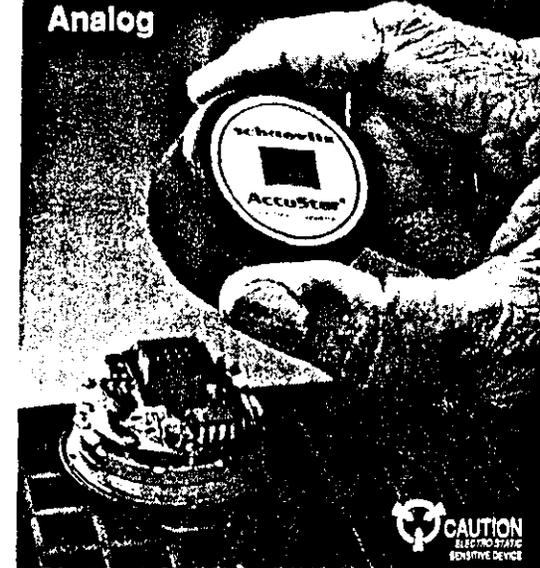
Temperature range — Operating	-40 to +65°C
— Storage	-55 to +65°C
Temperature coefficient of null	.008 deg. per °C
Temperature coefficient of scale factor	.1 percent per °C

Specifications are subject to change without notice.

SCHAEVITZ SENSING SYSTEMS, INC.

21640 N. 14TH AVENUE • PHOENIX, AZ 85027-2839
(602) 256-7674 • TLX: 150232 • FAX: (602) 582-3520

AccuStar® Clinometer Installation Analog



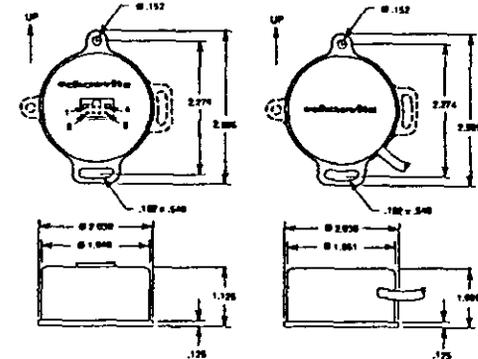
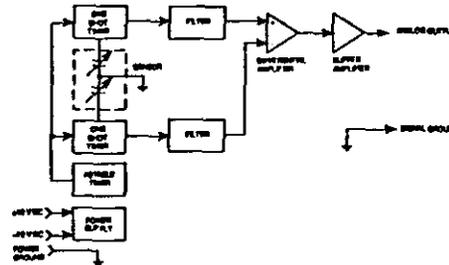
Installation Procedure

1. Prepare vertically oriented mounting plane with two holes for No. 6 (.138 inch dia.) screws spaced at 2.274 inches. Align the holes vertically or horizontally as required in specifications table herein.
2. Remove grease and particulate matter from mounting plane and mounting face of clinometer.
3. Retain clinometer to mounting plane snugly with two No. 6 screws with flat washers (not supplied).
4. Make electrical connections in accordance with diagram.

Note: The clinometer connector mates with a Molex IDT connector, No. 22-51-1108 (not supplied), requiring two covers, No. 15-05-6083. The 22-51-1108 has a smaller polarizing ramp than the more common 22-51-1208.

5. Apply power and rotate clinometer to null position. Signal is plus volts dc for clockwise rotation and minus volts dc for counter clockwise rotation from null.
6. Secure mounting hardware and recheck null signal output.

Analog I/O Block Diagram



WEIGHT: 6.0 OUNCES

WEIGHT: 4.5 OUNCES

DIMENSIONS ARE IN INCHES

Electrical Connections

PIN	WIRE		
8	Black	Power Ground	} dc Power Supply
6	Red	+ 12 Volts dc	
5	Gray	- 12 Volts dc	
1	Brown	Signal Ground	} dc Voltmeter
2	Blue	Signal Output	

SPECIFICATION: Model 900 Biaxial Clinometer

Model 900 is a low-cost biaxial clinometer for a wide variety of industrial and scientific applications. A precision electrolytic transducer comprises the sensing element. The clinometer consists of a printed circuit assembly with four mounting holes. It is designed for easy mounting or repackaging in customer products or systems. Linear and polynomial calibrations for both tilt axes are provided with each clinometer. A temperature sensor, mounted in the circuit, is available as an option.

OUTPUT CHANNELS	Two orthogonal tilt angles, ± 2 VDC per channel (single-ended); one temperature channel (optional), -0.4 to $+1.0$ VDC
ANGULAR RANGE	Standard: ± 20 degrees (40 deg. span). Optional: ± 45 degrees (90 deg. span)
RESOLUTION	0.01 degree of arc
REPEATABILITY	< 0.02 degree of arc at constant temperature
HYSTERESIS	< 0.02 degree of arc
LINEARITY	± 20 degree unit: 1% over half span; 2.5% over full span. Use of factory-supplied polynomials can improve linearity by factor of 10
TEMPERATURE COEF.	Span: -0.05% of voltage reading per $^{\circ}\text{C}$ typical
SCALE FACTORS	Tilt (± 20 degree unit): 10 degrees/volt $\pm 20\%$. Temperature: $0.1^{\circ}\text{C}/\text{mV}$, $\pm 0.75^{\circ}\text{C}$ accuracy
TIME CONSTANT, T	0.25 second; output is proportional to $1 - e^{-t/T} - 0.001e^{-t/5000T}$ where t is time in seconds
NATURAL FREQUENCY	10 Hz
OUTPUT IMPEDANCE	270 ohms, short circuit protected
POWER REQUIREMENTS	$+8$ to $+24$ VDC @ 7 mA, 250 mV peak-to-peak ripple max., reverse polarity protected
ENVIRONMENTAL	-10° to $+50^{\circ}\text{C}$ operating and storage, 0-80% humidity
SIZE & WEIGHT	2 x 2 x 0.64 inches (51 x 51 x 17 mm), 0.5 oz (15 grams); 18 inch (450 mm) cable with connector
MOUNTING	Four 0.125 inch (3.2 mm) no. 4 mounting holes, one in each corner
MATERIALS	Liquid-filled glass sensor, fiberglass PC board, unpotted assembly

	radians	degrees	arc minutes	arc seconds	μ radians
radians	1	57.30	3438	206265	10^6
degrees	0.01745	1	60	3600	17453
arc minutes	2.909×10^{-4}	0.01667	1	60	290.9
arc seconds	4.848×10^{-6}	2.778×10^{-4}	0.01667	1	4.848
μ radians	10^{-6}	5.730×10^{-5}	3.438×10^{-3}	0.2063	1

Model 900	± 20 degree range
Model 900-T	Adds temperature sensor
Model 900-45	± 45 degree range
Model 900-45T	Adds temperature sensor

APPLIED
GEOMECHANICS

- Automated Deformation-Sensing Systems
- System Installation and Training
- Tiltmeters and Inclinoimeters
- Monitoring of Structural and Ground Behavior
- Hydraulic-Fracture Evaluation
- Well Testing

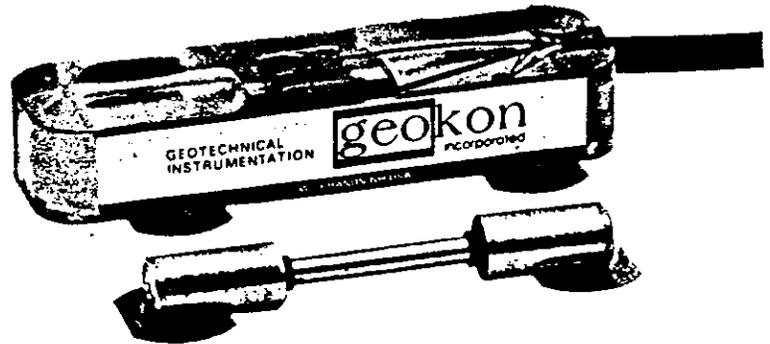
geokon

GEOTECHNICAL
INSTRUMENTATION

Model VK-4100

Vibrating Wire Strain Gage

- Spot weldable.
- Low profile.
- Small size.
- Waterproof.
- Stainless steel.
- Detachable plucking coil.
- Adjustable range.
- High compliance.
- Epoxy bondable.



The Model VK-4100 Vibrating Wire Strain Gage is designed to measure strains in steel structures, such as bridges, piles, tunnel linings, buildings etc. It can be installed quickly and easily in the field by means of a spot welder. (Alternatively, the gage may be epoxy-bonded to the surface of either steel or concrete). The VK-4100 has a fully-sealed, all stainless steel construction, making it waterproof and highly resistant to corrosion.

The GK-4100 utilizes the vibrating wire principle: a 2-inch length of steel wire is tensioned between two end blocks which are spot welded (or epoxy bonded) to the surface of the steel member. The wire is plucked so that it vibrates at its natural resonant frequency. This frequency depends on the wire tension which will vary as strains in the steel member vary. An electromagnetic coil is used to pluck the wire and to measure the frequency of the vibration so produced. The change in frequency is then related to the strain change either directly in the readout box or by means of tables supplied with the gage.

Advantages of the VK-4100 Vibrating Wire Strain Gage:

- The vibrating wire principle gives maximum accuracy, sensitivity and long-term stability.
- Installation is quick and simple, requiring the use of a portable spot welder only. Surface preparation is minimal. Installation can also be made by epoxy bonding the gage to either steel or concrete.
- The gage is of small size and the wire is in close proximity to the surface to which it is attached.
- The wire is positively gripped in the end blocks by a patented swaging technique.
- True 'O'ring seals provide complete waterproofing and allow the protective tube to 'float' around the wire.

This makes the gage very compliant, or 'soft', in that strains in the steel or concrete member do not have to stretch the protective tube, as well as the wire, in order to alter wire tension. This places a minimum strain on the weld points and makes epoxy bonding possible.

- An internal spring holds the wire at an initial tension which is normally in the mid-range position of the gage. This initial tension can be set to any desired level by a simple adjustment technique during installation. Thus gages can be set to place the available range mostly in tension or mostly in compression, as required.

- The gage is constructed from carefully selected stainless steel elements so that the corrosion resistance of the gage is maximized.

- Temperature compensation is achieved by matching the coefficient of expansion of the wire to that of the underlying steel. Temperatures can be measured by specifying an optional thermistor encapsulated in the plucking coil housing.

- The plucking coil housing is separate from the gage element and can be carried around with the readout box so that only the gage element is left behind on the structure. If the gage is inaccessible the coil housing is attached permanently in place around the gage. Also, should the plucking coil or signal cable become damaged in any way they can easily be replaced without disturbing the gage element.

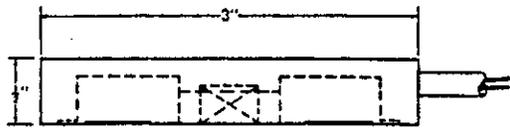
- Lightning protection may be specified for gages in exposed locations.

- Frequency signals can be transmitted over electrical cables many thousands of meters long without loss of accuracy. Cable resistance changes caused by temperature or moisture effects are not a problem with vibrating wire strain gages.

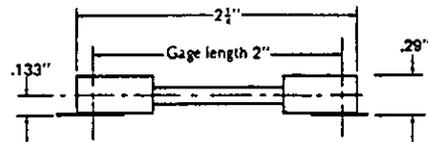
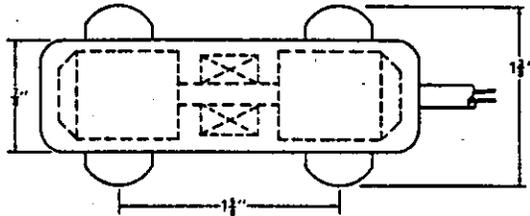
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WEST LEBANON, NH 03784

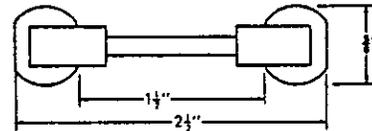
203/228-5064



Coil housing



Gage



SPECIFICATIONS — Model VK-4100 Vibrating Wire Strain Gage

Gage Element

Range*	microstrain	±1500
Sensitivity	microstrain	1
Active gage length	in (mm)	2 (50.8)
Wire height above surface	in (mm)	.133 (3.4)
Thermal coefficient of expansion	ppm/°F (1/°C)	6.5 (10.8)
Overall dimensions LxWxH	in (mm)	2.5x.63x.29 (63x10x7)
Temperature range	°F (°C)	-40 to +250 (-40 to +120)
Materials		Stainless steel, buna N

*Range can be increased to ±2500 by extending range in tension and resetting mid-point.

Coil Housing

Overall dimensions LxWxH	in (mm)	3x.88x.5 (76x22x13)
Temperature range	°F (°C)	-40 to +175 (-40 to +80)
Materials		Waterproof copolymer epoxy

Cable

Material	4 conductor-shielded 22 gage vinyl jacket
Size	.165 (4.2)

Accessories

Setting tools (test strips and special coil housing).
Spot welding equipment.
Epoxy kits.
Vibrating Wire Readout Box.
Thermistor Readout Box.
Terminal Boxes.

Options

Thermistors.
Lightning protection.

Ordering Information

Specify: 1. Cable length.
2. Options required.
3. Accessories required.

For further information contact us . . .

geokon
incorporated

7 CENTRAL AVENUE
WEST LEBANON, N.H. 03784

603/298-5064

B-Bridge Test Data

Sioux City Data

Tierod number =		1										
Load		Abutment Tilt		Anchor Tilt		Measured		Tie Rod		Tie Rod		South End
In		In Degrees		In Degrees		Tie Rod		Tension		Movement		Abutment
Kips		South	North			Load In		In		In Inches		Translation
Inc. #1		Inc #2		Inc. #3		Pounds		Microstrain				In Inches
0	0.0000		0		0.0000		0		0		NA	0
4	0.0000		Data		0.0079		3393		75		0	0.003
8	-0.0016		Not		0.0134		7940		176		0.065	0.005
4	-0.0010		Available		0.0066		4072		90		0.018	0.003
8	-0.0016				0.0115		8053		178		0.070	0.005
16	-0.0033				0.0508		15857		351		0.222	0.009
4	-0.0008				0.0279		4004		89		0.062	0.004
8	-0.0008				0.0328		7985		177		0.113	0.006
16	-0.0025				0.0529		15947		353		0.232	0.009
24	-0.0049				0.1245		23887		528		0.432	0.015
4	-0.0011				0.0700		3891		86		0.135	0.005
8	-0.0016				0.0775		7917		175		0.188	0.007
16	-0.0033				0.1005		15992		354		0.313	0.011
24	-0.0049				0.1324		23819		527		0.448	0.015
32	-0.0066				0.2130		31397		694		0.659	0.020
1 Min	-0.0074				0.2285		32166		711		0.689	0.021
2	-0.0066				0.2376		32120		710		0.703	0.021
3	-0.0066				0.2437		32098		710		0.712	0.022
4	-0.0066				0.2476		32166		711		0.719	0.022
5	-0.0066				0.2496		32007		708		0.721	0.022
6	-0.0069				0.2522		32143		711		0.727	0.022
10	-0.0064				0.2579		32030		708		0.739	0.022
4 Kips	-0.0008				0.1590		4049		90		NA	0.007
11/10/90	-0.0382		-0.0251		0.2022		16513		365		Gage Temp.	
02/01/91	-0.0637		0.0281		0.2252		19453		430		Deg F.	
06/26/91	-0.0115		-0.0213		0.2189		14726		326		NA	NA
06/27/91	-0.0188		-0.0423		0.2180		13482		298		72	
03/06/92	-0.0554		-0.0537		0.2216		17214		381		43	
07/24/95	-0.0274		-0.1604		0.2324		11333		251		73	

Sioux City Data

Tie Rod Number =		2		Date	Aug. 8, 1990							
Load		Abutment Tilt		Anchor Tilt		Measured	Tie Rod		Tie Rod		South End	
in	South	in Degrees		in Degrees		Tie Rod	Tension		Movement		Abutment	
Kips	Inc. #1	North		Inc. #4		Load In	in		In Inches		Translator	
						Pounds	Microstrain				In Inches	
0	0.0000		Data		0.0000	0		0		NA		0
4	0.0000		Not		0.0097	3099		69		0		0
8	0.0008		Available		0.0263	7238		160		0.063		0
4	0.0000				0.0214	3551		79		0.015		0
8	0.0013				0.0265	7306		162		0.068		0
16	0.0025				0.0713	14318		317		0.221		0.001
4	0.0000				0.0464	3687		82		0.064		0
8	0.0010				0.0533	7171		159		0.112		0
16	0.0020				0.0772	14341		317		0.23		0.001
24	0.0044				0.1567	21579		477		0.439		0.003
4	0.0003				0.1003	3574		79		0.146		-0.001
8	0.0008				0.1077	7216		160		0.198		0
16	0.0025				0.1352	14341		317		0.32		0.001
24	0.0049				0.1735	21851		483		0.465		0.003
32	0.0074				0.2705	29021		642		0.691		0.005
1 Min	0.0074				0.3080	29021		642		0.751		0.005
2	0.0074				0.3161	29089		643		0.769		0.005
3	0.0079				0.3238	29067		643		0.779		0.005
4	0.0079				0.3280	29067		643		0.786		0.005
5	0.0074				0.3329	29067		643		0.791		0.005
6	0.0074				0.3350	29067		643		0.798		0.005
10	0.0074				0.3438	29112		644		0.812		0.005
4KIPS	0.0003				0.2223	3574		79		NA		0
11/10/90	0.0373				0.2338	11220		248		Temp in		
02/01/91	0.0629				0.2420	12893		285		Deg. f.		
06/26/91	0.0106				0.2529	9274		205				NA
06/27/91	0.0180				0.2502	9048		200		68		
03/06/92	0.0545				0.2609	11762		260		42		
07/24/95	0.0265				0.2967	7487		166		71		

Sioux City Data

Tie Rod Number =		3		Date	Aug. 8, 1990							
		Abutment Tilt		Anchor Tilt		Measured	Tie Rod		Tie Rod		South End	
Load	in Degrees		in Degrees		Tie Rod	Tension		Movement		Abutment		
in	South	North				Load In	in		In Inches		Translation	
Kips	Inc. #1	Inc #2		Inc. #5		Pounds	Microstrain				In Inches	
0	0.0000	Data		0.0000		0	0		NA		0	
4	0.0002	Not		0.0126		3529	78		0		0	
8	0.0011	Available		0.0210		7487	166		0.074		0	
4	0.0005			0.0169		3913	87		0.025		0	
8	0.0011			0.0216		7510	166		0.075		0	
16	0.0026			0.0539		15110	334		0.22		0	
4	0.0002			0.0320		3845	85		0.061		0	
8	0.0013			0.0379		7465	165		0.113		0	
16	0.0021			0.0559		15155	335		0.226		0.001	
24	0.0039			0.1093		22416	496		0.395		0.001	
4	0.0010			0.0621		3868	86		0.113		0	
8	0.0021			0.0700		7306	162		0.164		0	
16	0.0029			0.0913		15042	333		0.284		0.001	
24	0.0043			0.1182		22349	494		0.407		0.001	
32	0.0061			0.1822		29836	660		0.589		0.002	
1 Min	0.0054			0.2052		29881	661		0.625		0.002	
2	0.0062			0.2099		29881	661		0.636		0.002	
3	0.0062			0.2134		29881	661		0.64		0.002	
4	0.0066			0.2157		29881	661		0.645		0.002	
5	0.0072			0.2181		29881	661		0.651		0.002	
6	0.0072			0.2191		29881	661		0.652		0.002	
10	0.0072			0.2240		30017	664		0.665		0.002	
4 kips	0.0025			0.1275		3778	84		NA		-0.001	
11/10/90	0.0370	-0.02513		0.1596		11649	258		Soil			
02/01/91	0.0626	0.028108		0.2044		14002	310		Temp.			
06/26/91	0.0103	-0.02133		0.1885		11672	258		Deg F			
06/27/91	0.0177	-0.04233		0.1832		11785	261					
03/06/92	0.0572	-0.05374		0.2101		13708	303		43			
07/24/95	0.0262	-0.16038		0.1955		9048	200		72			

Sioux City Data

Tie Rod Number =		4		Date	Aug. 8	1990						
Load	Abutment Tilt			Anchor Tilt	Measured	Tie Rod	Tie Rod					
in	in Degrees			in Degrees	Tie Rod	Tension	Movement	Abutment				
Kips	South	North			Load In	in	In Inches	Translation				
	Inc. #1	Inc. #2		Inc. #6	Pounds	Microstrain		In Inches				In Inches
0	0.0000		Data	0.0000	0	0	NA	NOT				
4	0.0031		Not	0.0131	3619	80	0	MEASURA				
8	0.0029		Available	0.0199	7352	163	0.067					
4	0.0026			0.0125	4139	92	0.02					
8	0.0026			0.0166	7261	161	0.067					
16	0.0038			0.0394	14386	318	0.194					
4	0.0026			0.0233	4139	92	0.045					
8	0.0029			0.0279	7352	163	0.092					
16	0.0036			0.0458	14816	328	0.208					
24	0.0044			0.0830	21783	482	0.352					
4	0.0023			0.0429	4026	89	0.08					
8	0.0025			0.0485	7306	162	0.13					
16	0.0033			0.0660	14703	325	0.243					
24	0.0043			0.0892	21783	482	0.361					
32	0.0057			0.1401	29361	649	0.519					
1 Min	0.0054			0.1485	29338	649	0.542					
2	0.0059			0.1524	29338	649	0.55					
3	0.0057			0.1544	29338	649	0.553					
4	0.0057			0.1562	29383	650	0.556					
5	0.0057			0.1569	29383	650	0.559					
6	0.0054			0.1579	29383	650	0.56					
10	0.0059			0.1626	29564	654	0.572					
4kips	0.0028			0.0810	3755	83	NA					
11/10/90	0.0346			0.1079	10541	233	Gage Temp					
02/01/91	0.0601			0.1283	11808	261	in Deg F.					
06/26/91	0.0079			0.1521	11785	261	68					
06/27/91	0.0152			0.1457	12079	267	68					
03/06/92	0.0518			0.1519	12645	280	42					
07/24/95	0.0238			0.1935	8369	185	71					

Sioux City Data

Tie Rod Number =		5		Date	Aug. 8	1990						
Load	Abutment Tilt in Degrees			Anchor Tilt in Degrees	Measured Tie Rod Load	Tie Rod Tension in Pounds	Tie Rod Movement In Inches	Tie Rod Movement In Inches	Abutment Translation In Inches			
In Kips	South Inc. #1		North Inc #2		Inc. #7		Microstrain					
0	0.0000		Data		0.0000	0	0	NA	NOT			
4	0.0002		Not		0.0041	4886	108	0	MEASURA			
8	0.0011		Available		0.0148	8754	194	0.059				
4	0.0008				0.0321	5067	112	0.012				
8	0.0010				0.0165	8844	196	0.062				
16	0.0013				0.0434	16467	364	0.187				
4	0.0010				0.0270	5090	113	0.038				
8	0.0010				0.0319	8890	197	0.086				
16	0.0013				0.0518	16694	369	0.196				
24	0.0026				0.0943	24384	539	0.347				
4	0.0008				0.0528	5180	115	0.073				
8	0.0013				0.0612	8980	199	0.124				
16	0.0018				0.0806	17033	377	0.242				
24	0.0026				0.1081	24724	547	0.365				
32	0.0033				0.1606	32663	722	0.524				
1 Min	0.0028				0.1741	32641	722	0.544				
2	0.0029				0.1784	32641	722	0.55				
3	0.0031				0.1811	32641	722	0.556				
4	0.0031				0.1838	32641	722	0.56				
5	0.0034				0.1856	32641	722	0.652				
6	0.0038				0.1864	32641	722	0.564				
10	0.0043				0.1884	32912	728	0.572				
4kips	0.0013				0.0979	5157	114	NA				
11/10/90	0.0318				0.0796	14092	312	Gage Temp				
02/01/91	0.0573				0.0884	15155	335	Deg. F				
06/26/91	0.0051				0.0244	16965	375	52				
06/27/91	0.0124				0.0197	16467	364	54				
03/06/92	0.0490				0.0661	16038	355	28				
07/24/95	0.0210				NA	12079	267	56				

Sioux City Data

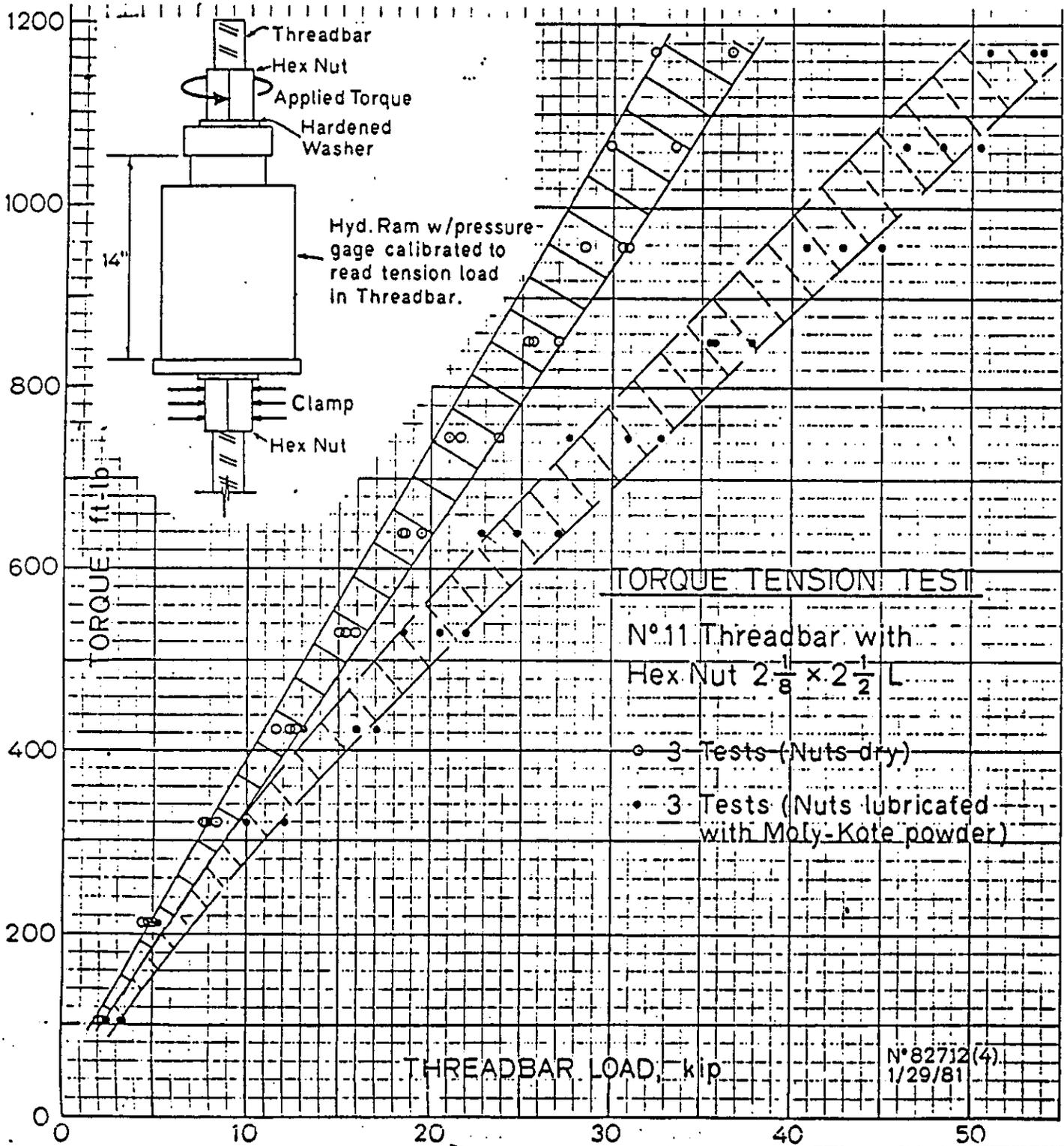
Tie Rod Number -		6	Date	Aug. 8	1990						
Load	Abutment Tilt		Anchor Tilt		Measured	Tie Rod		Tie Rod	North End		
In	in Degrees		in Degrees		Tie Rod	Tension		Movement	Abutment		
Kips	South	North			Load	in		In Inches	Translation		
	Inc. #1	Inc #2	Inc. #8		In Pounds	Microstrain			In Inches		
0	0.0000	Data	0.0000		0	0		NA	0		
4	0.0000	Not	0.0149		3823	85		0	0		
8	-0.0003	Available	0.0356		7306	162		0.065	0		
4	0.0000		0.0313		3710	82		0.018	0		
8	-0.0003		0.0346		7578	168		0.07	0.001		
16	-0.0007		0.0567		15563	344		0.222	0.003		
4	-0.0002		0.0416		3755	83		0.062	0.001		
8	-0.0002		0.0457		7578	168		0.113	0.001		
16	-0.0007		0.0627		15744	348		0.232	0.003		
24	-0.0013		0.0990		23525	520		0.432	0.005		
4	-0.0002		0.0595		3551	79		0.135	0.001		
8	-0.0003		0.0646		7284	161		0.188	0.001		
16	-0.0007		0.0829		15314	339		0.313	0.003		
24	-0.0011		0.1061		23706	524		0.448	0.005		
32	-0.0021		0.1522		32120	710		0.659	0.007		
1 Min	-0.0021		0.1656		31781	703		0.689	0.007		
2	-0.0021		0.1697		31781	703		0.703	0.007		
3	-0.0021		0.1716		31781	703		0.712	0.007		
4	-0.0021		0.1739		31781	703		0.719	0.007		
5	-0.0021		0.1750		31781	703		0.721	0.007		
6	-0.0023		0.1754		31781	703		0.727	0.007		
10	-0.0025		0.1784		31917	706		0.739	0.006		
4kips	-0.0002		0.0960		3597	80		NA	-0.001		
11/10/90	-0.0305	0.0251	0.1547		17417	385		Gage Temp			
02/01/91	-0.0560	-0.0281	0.1159		13708	303		Deg. F			
06/26/91	-0.0038	0.0213	0.1581		19589	433		55	NA		
06/27/91	-0.0111	0.0423	0.1556		18413	407		57			
03/06/92	-0.0477	0.0537	0.1159		NA	NA					
07/24/95	-0.0197	0.1604	0.1523		13368	296		57			

Sioux Falls Data

Northern tierod #3						
November 17,1994						
	#22 Bot.	#23 Top	Calculated	Tie Rod	Tie Rod	
Applied	Gage Out.	Gage Out.	Load	Movement	Movement	
Load in	in uStrain	in uStrain	in pounds	in inches	in inches	
KIPs				(Ref. Zero)	(Raw)	
0	1104	2113	0			
4	973	2421	4004	0.000	0.179	
8	1067	2508	8098	0.037	0.216	
4	?	?	?	0.015	0.194	
8	1070	2507	8143	0.042	0.221	
16	1259	2686	16467	0.149	0.328	
4	1001	2439	5044	0.022	0.201	
8	1077	2507	8302	0.051	0.230	
16	1259	2686	16467	0.152	0.331	
24	1449	2863	24769	0.267	0.446	
4	1001	2439	5044	0.031	0.210	
8	1084	2513	8596	0.057	0.236	
16	1263	2686	16558	0.161	0.340	
24	1450	2861	24746	0.270	0.449	
32	1644	3031	32980	0.385	0.564	
min. 1	1651	3033	33184	0.391	0.570	
2	1651	3033	33184	0.392	0.571	
3	1651	3033	33184	0.394	0.573	
4	1652	3031	33161	0.395	0.574	
5	1653	3031	33184	0.395	0.574	
6	1655	3029	33184	0.395	0.574	
10	1656	3029	33206	0.397	0.576	
Kips 4	1001	2446	5203	0.038	0.217	
03/20/95	1077	2478	7646	0.038	0.217	
07/10/95	1111	2496	8822	0.038	0.217	

C-Load Versus Torque Chart

REPORT OF TESTS



NOTE: No responsibility is assumed by Columbia University for the results or conclusions of any tests made in these laboratories. The use of reports herein for regulations governing the publication of reports of tests and special investigations.

CIVIL ENGINEERING
CARLETON LABORATORY
John W. ...
COLUMBIA UNIVERSITY
NEW YORK

D-BART Input/Output Data for Analysis of the Sioux Falls Bridge

INPUT

11.480000
5.730000
2.500000E-01
6.500000E+02
30.000000
45.000000
11.310000
90000.000000
1.500000
2.5000000000

2
30

12.0000000000
1.1670000000
48.2500000000
650.0000000000

.8000000000
.1200000000

6.000000
2.000000
1.000000E+01
2.800000
5.500000E+01
1.7300000000
6.0000000000
6.0000000000
37.0000000000
37.0000000000

1.500000
1.500000

6.800000E+03

2
0
0

12.400000
210.000000
71.700000
2.900000E+07
11.310000

5.000000E-01
1.500000
2.900000E+07
3.630000

2
2

OUTPUT

INPUT DATA FILE NAME =N3IN3
OUTPUT DATA FILE NAME =N3OUT3

****INPUT DATA AS FOLLOWS****

HEIGHT OF ABUTMENT WALL = 11.480 FT
DEPTH TO TIE ROD = 5.730 FT
BACKFILL SLOPE (V/H) = .250
SURCHARGE LOADING = 650.000 PSF
WALL FRICTION ANGLE = 30.000 DEG
BRIDGE SKEW ANGLE = 45.000 DEG
TIE ROD SPACING = 11.310 FT
ALLOWABLE STRESS OF TIE ROD = .900E+05 PSI

BACKFILL SOIL PROPERTIES

UNIT WEIGHT = 103.500 PCF
FRICTION ANGLE = 47.000 DEG

FOUNDATION SOIL PROPERTIES

UNIT WEIGHT = 130.000 PCF
COHESION = 400.000 PSF
FRICTION ANGLE = 33.000 DEG
UNDRAINED SHEAR STRENGTH = 743.402 PSF AT .0 FT

CONCRETE ANCHOR DIAMETER = 2.500 FT
FACTOR OF SAFETY = 1.500

****OUTPUT DATA AS FOLLOWS****

MINIMUM DIAMETER OF TIE ROD = 1.062 IN

MINIMUM REQUIRED DIMENSIONS ARE

LENGTH OF TIE ROD = 43.891 FT
LENGTH OF CONCRETE ANCHOR = 12.000 FT

******* FINAL DESIGN SELECTION *******

TIE ROD TENSION = 79721.180 LBS PER TIE
TIE ROD DIAMETER = 1.167 IN
TIE ROD LENGTH = 48.250 FT
CONCRETE ANCHOR LENGTH = 12.000 FT
CONCRETE ANCHOR DIAMETER = 2.500 FT

****GENERALIZED PLANE STRAIN FINITE ELEMENT ANALYSIS****

RELAXATION = .80
MAXIMUM ERROR FOR ITERATION = .12
MAXIMUM NO. OF ITERATION = 9

****SOLUTION HAS TWO INCREMENTS**

IN INCR 1 ONLY FOUNDATION SOIL STRESSES ARE CALCULATED

GEOMETRIC PARAMETERS

WIDTH OF ABUTMENT BASE = 6.000 FT
 DISTANCE FROM ABUTMENT TO GIRDER SUPPORT= 2.000 FT
 HORIZ EXTENSION OF BERM IN FRONT OF ABUT= 10.000 FT
 SLOPE OF SOIL BEYOND BERM (H/V) = 2.800
 HORIZ EXTENSION OF SLOPE BEYOND BERM = 55.000 FT
 DEPTH TO TOP OF DRILLED-IN ANCHOR = 1.730 FT

FRONT ROW PILE BATTER (V/H) = 6.000
 REAR ROW PILE BATTER (V/H) = 6.000
 LENGTH OF FRONT ROW PILES = 37.000 FT
 LENGTH OF REAR ROW PILES = 37.000 FT

POINT BEARING PILES

DIST FROM FRONT OF BASE TO FRONT PILES = 1.500 FT
 DIST FROM REAR OF BASE TO REAR PILES = 1.500 FT

NODAL POINT DATA

NODAL POINT COORDINATES BOUNDARY CONDITION CODES GLOBAL EQUATION NUMBER

IN INCREMENT 2

NODE	X(N)	Y(N)	D-X	D-Y	D-Z	TH-X	TH-Y	TH-Z	D-X	D-Y	D-Z	TH-X	TH-Y	TH-Z
1	.000	11.480	0	0	0	0	0	0	1	2	3	4	5	6
2	1.706	11.480	0	0	0	1	1	1	7	8	9	0	0	0
3	11.373	11.480	0	0	0	1	1	1	10	11	12	0	0	0
4	22.745	11.480	0	0	0	1	1	1	13	14	15	0	0	0
5	34.118	11.480	0	0	0	0	0	0	16	17	18	19	20	21
6	51.177	11.480	1	1	1	1	1	1	0	0	0	0	0	0
7	.000	8.615	0	0	0	0	0	0	22	23	24	25	26	27
8	1.706	8.615	0	0	0	1	1	1	28	29	30	0	0	0
9	11.373	8.615	0	0	0	1	1	1	31	32	33	0	0	0
10	22.745	8.615	0	0	0	1	1	1	34	35	36	0	0	0
11	34.118	9.750	0	0	0	0	0	0	37	38	39	40	41	42
12	51.177	8.615	1	1	1	1	1	1	0	0	0	0	0	0
13	.000	5.750	0	0	0	0	0	0	43	44	45	46	47	48
14	1.706	5.750	0	0	0	0	0	0	49	50	51	52	53	54
15	11.373	5.750	0	0	0	0	0	0	55	56	57	58	59	60
16	22.745	5.750	0	0	0	0	0	0	61	62	63	64	65	66
17	34.118	5.750	0	0	0	0	0	0	67	68	69	70	71	72
18	51.177	5.750	1	1	1	1	1	1	0	0	0	0	0	0
19	.000	2.875	0	0	0	0	0	0	73	74	75	76	77	78
20	1.706	2.875	0	0	0	1	1	1	79	80	81	0	0	0
21	11.373	2.875	0	0	0	1	1	1	82	83	84	0	0	0
22	22.745	2.875	0	0	0	1	1	1	85	86	87	0	0	0
23	34.118	2.875	0	0	0	0	0	0	88	89	90	91	92	93
24	51.177	2.875	1	1	1	1	1	1	0	0	0	0	0	0
25	-16.000	.000	0	0	0	1	1	1	94	95	96	0	0	0
26	-11.000	.000	0	0	0	1	1	1	97	98	99	0	0	0
27	-6.000	.000	0	0	0	0	0	0	100	101	102	103	104	105
28	-4.500	.000	0	0	0	0	0	0	106	107	108	109	110	111
29	-4.000	.000	0	0	0	0	0	0	112	113	114	115	116	117
30	-1.500	.000	0	0	0	0	0	0	118	119	120	121	122	123
31	.000	.000	0	0	0	0	0	0	124	125	126	127	128	129
32	1.706	.000	0	0	0	1	1	1	130	131	132	0	0	0
33	11.373	.000	0	0	0	1	1	1	133	134	135	0	0	0
34	22.745	.000	0	0	0	1	1	1	136	137	138	0	0	0
35	34.118	.000	0	0	0	0	0	0	139	140	141	142	143	144
36	51.177	.000	1	1	1	1	1	1	0	0	0	0	0	0

37	-32.000	-5.714	0	0	0	1	1	1	145	146	147	0	0	0
38	-23.340	-6.851	0	0	0	1	1	1	148	149	150	0	0	0
39	-14.680	-7.988	0	0	0	1	1	1	151	152	153	0	0	0
40	-6.021	-9.124	0	0	0	0	0	0	154	155	156	157	158	159
41	-3.833	-9.124	0	0	0	1	1	1	160	161	162	0	0	0
42	.021	-9.124	0	0	0	0	0	0	163	164	165	166	167	168
43	2.480	-9.124	0	0	0	1	1	1	169	170	171	0	0	0
44	5.112	-9.124	0	0	0	1	1	1	172	173	174	0	0	0
45	14.377	-9.124	0	0	0	1	1	1	175	176	177	0	0	0
46	25.064	-9.124	0	0	0	1	1	1	178	179	180	0	0	0
47	34.118	-.520	0	0	0	0	0	0	181	182	183	184	185	186
48	51.177	-9.124	1	1	1	1	1	1	0	0	0	0	0	0
49	-48.000	-11.429	0	0	0	1	1	1	187	188	189	0	0	0
50	-34.514	-13.702	0	0	0	1	1	1	190	191	192	0	0	0
51	-21.028	-15.975	0	0	0	1	1	1	193	194	195	0	0	0
52	-7.541	-18.248	0	0	0	0	0	0	196	197	198	199	200	201
53	-3.667	-18.248	0	0	0	1	1	1	202	203	204	0	0	0
54	1.541	-18.248	0	0	0	0	0	0	205	206	207	208	209	210
55	4.961	-18.248	0	0	0	1	1	1	211	212	213	0	0	0
56	8.518	-18.248	0	0	0	1	1	1	214	215	216	0	0	0
57	17.382	-18.248	0	0	0	1	1	1	217	218	219	0	0	0
58	27.383	-18.248	0	0	0	1	1	1	220	221	222	0	0	0
59	37.385	-13.946	0	0	0	1	1	1	223	224	225	0	0	0
60	51.177	-18.248	1	1	1	1	1	1	0	0	0	0	0	0
61	-64.000	-17.143	1	1	1	1	1	1	0	0	0	0	0	0
62	-45.687	-20.553	0	0	0	1	1	1	226	227	228	0	0	0
63	-27.375	-23.963	0	0	0	1	1	1	229	230	231	0	0	0
64	-9.062	-27.372	0	0	0	0	0	0	232	233	234	235	236	237
65	-3.500	-27.372	0	0	0	1	1	1	238	239	240	0	0	0
66	3.062	-27.372	0	0	0	0	0	0	241	242	243	244	245	246
67	7.441	-27.372	0	0	0	1	1	1	247	248	249	0	0	0
68	11.924	-27.372	0	0	0	1	1	1	250	251	252	0	0	0
69	20.387	-27.372	0	0	0	1	1	1	253	254	255	0	0	0
70	29.702	-27.372	0	0	0	1	1	1	256	257	258	0	0	0
71	39.018	-27.372	0	0	0	1	1	1	259	260	261	0	0	0
72	51.177	-27.372	1	1	1	1	1	1	0	0	0	0	0	0
73	-64.000	-35.944	1	1	1	1	1	1	0	0	0	0	0	0
74	-46.194	-36.128	0	0	0	1	1	1	262	263	264	0	0	0
75	-28.389	-36.312	0	0	0	1	1	1	265	266	267	0	0	0
76	-10.583	-36.497	1	1	1	1	1	1	0	0	0	0	0	0
77	-3.000	-36.497	0	0	0	1	1	1	268	269	270	0	0	0
78	4.583	-36.497	1	1	1	1	1	1	0	0	0	0	0	0
79	11.162	-36.497	0	0	0	1	1	1	271	272	273	0	0	0
80	17.033	-36.497	0	0	0	1	1	1	274	275	276	0	0	0
81	24.894	-36.497	0	0	0	1	1	1	277	278	279	0	0	0
82	33.181	-36.497	0	0	0	1	1	1	280	281	282	0	0	0
83	41.468	-36.497	0	0	0	1	1	1	283	284	285	0	0	0
84	51.177	-36.497	1	1	1	1	1	1	0	0	0	0	0	0
85	-64.000	-54.745	1	1	1	1	1	1	0	0	0	0	0	0
86	-47.208	-54.745	1	1	1	1	1	1	0	0	0	0	0	0
87	-30.416	-54.745	1	1	1	1	1	1	0	0	0	0	0	0
88	-13.624	-54.745	1	1	1	1	1	1	0	0	0	0	0	0
89	-3.000	-54.745	1	1	1	1	1	1	0	0	0	0	0	0
90	7.624	-54.745	1	1	1	1	1	1	0	0	0	0	0	0
91	14.883	-54.745	1	1	1	1	1	1	0	0	0	0	0	0
92	22.142	-54.745	1	1	1	1	1	1	0	0	0	0	0	0
93	29.400	-54.745	1	1	1	1	1	1	0	0	0	0	0	0
94	36.659	-54.745	1	1	1	1	1	1	0	0	0	0	0	0
95	43.918	-54.745	1	1	1	1	1	1	0	0	0	0	0	0
96	51.177	-54.745	1	1	1	1	1	1	0	0	0	0	0	0

**TOTAL NUMBER OF EQUATIONS = 285 IN INCR= 2

NODAL POINT LOAD TO BE INCLUDED IN INCREMENT 2

NODE	PN(X)	PN(Y)	PN(Z)	M(X)	M(Y)	M(Z)
29	.00000E+00	-.68000E+04	.00000E+00	.00000E+00	.00000E+00	.00000E+00

MATERIAL NUMBERS AS FOLLOWS

- 1 = BACKFILL SOIL
- 2,3= FOUNDATION SOIL
- 4 = FRONT ROW PILES
- 5 = REAR ROW PILES
- 6 = ABUTMENT STEM
- 7 = TIE ROD
- 8 = DRILLED IN CONCRETE ANCHOR
- 9 = ABUTMENT BASE

MATERIAL PROPERTIES

MAT.	K	KUR	N	RF	C	PHI	DPHI	KB	M	PA	FX	FY
1	525.00	1050.00	.95	.76	.00	47.00	12.00	150.00	.20	2116.80	.0000	-103.5000
2	200.00	400.00	.60	.70	400.00	33.00	.00	100.00	.50	2116.80	.0000	-130.0000
3	200.00	400.00	.60	.70	400.00	33.00	.00	100.00	.50	2116.80	.0000	-130.0000

FRONT ROW PILE PROPERTIES

GENERAL SHAPE PILE

- NO OF PILES PER GROUP = 2
- CROSS SECTIONAL AREA = 12.400 IN**2
- MAJOR AXIS MOMENT OF INERTIA = 210.000 IN**4
- MINOR AXIS MOMENT OF INERTIA = 71.700 IN**4
- PILE MATERIAL MODULUS = .290E+08 PSI
- PILE GROUP SPACING = 11.310 FT

MAT.	AE	GJ1	EI2	EI3	E	POIS	FX	FY
4	.64E+08	.40E+07	.75E+07	.26E+07	.42E+10	.25	.0000	.0000
5	.32E+08	.20E+07	.37E+07	.13E+07	.42E+10	.25	.0000	.0000

ABUTMENT STEM THICKNESS = 1.500 FT

6	.86E+09	.94E+08	.16E+09	.72E+08	.58E+09	.25	.0000	.0000
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TIE-ROD MATERIAL MODULUS = .290E+08 PSI

7	.27E+07	.13E-04	.16E-04	.16E-04	.42E+10	.25	.0000	.0000
8	.25E+09	.78E+08	.98E+08	.98E+08	.58E+09	.25	.0000	.0000

ABUTMENT BASE THICKNESS = 3.630 FT

9	.21E+10	.99E+09	.23E+10	.17E+09	.58E+09	.25	.0000	.0000
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ELEMENT DATA

IN INCR=1 ONLY ELEMENT 1 THRU 55 ARE CONSIDERED

ELEM	NODE1	NODE2	NODE3	NODE4	REINF	MAT	ANGLE	TX	TY
1	85	86	74	73	0	3	.00	.00	.00
2	86	87	75	74	0	3	.00	.00	.00
3	87	88	76	75	0	3	.00	.00	.00
4	88	89	77	76	0	3	.00	.00	.00
5	89	90	78	77	0	3	.00	.00	.00
6	90	91	79	78	0	3	.00	.00	.00
7	91	92	80	79	0	3	.00	.00	.00
8	92	93	81	80	0	3	.00	.00	.00
9	93	94	82	81	0	3	.00	.00	.00

10	94	95	83	82	0	3	.00	.00	.00
11	95	96	84	83	0	3	.00	.00	.00
12	73	74	62	61	0	3	.00	.00	.00
13	74	75	63	62	0	3	.00	.00	.00
14	75	76	64	63	0	3	.00	.00	.00
15	76	77	65	64	0	3	.00	.00	.00
16	77	78	66	65	0	3	.00	.00	.00
17	78	79	67	66	0	3	.00	.00	.00
18	79	80	68	67	0	3	.00	.00	.00
19	80	81	69	68	0	3	.00	.00	.00
20	81	82	70	69	0	3	.00	.00	.00
21	82	83	71	70	0	3	.00	.00	.00
22	83	84	72	71	0	3	.00	.00	.00
23	61	62	50	49	0	2	.00	.00	.00
24	62	63	51	50	0	2	.00	.00	.00
25	63	64	52	51	0	2	.00	.00	.00
26	64	65	53	52	0	2	.00	.00	.00
27	65	66	54	53	0	2	.00	.00	.00
28	66	67	55	54	0	2	.00	.00	.00
29	67	68	56	55	0	2	.00	.00	.00
30	68	69	57	56	0	2	.00	.00	.00
31	69	70	58	57	0	2	.00	.00	.00
32	70	71	59	58	0	2	.00	.00	.00
33	71	72	60	59	0	2	.00	.00	.00
34	49	50	38	37	0	2	.00	.00	.00
35	50	51	39	38	0	2	.00	.00	.00
36	51	52	40	39	0	2	.00	.00	.00
37	52	53	41	40	0	2	.00	.00	.00
38	53	54	42	41	0	2	.00	.00	.00
39	54	55	43	42	0	2	.00	.00	.00
40	55	56	44	43	0	2	.00	.00	.00
41	56	57	45	44	0	2	.00	.00	.00
42	57	58	46	45	0	2	.00	.00	.00
43	58	59	47	46	0	2	.00	.00	.00
44	59	60	48	47	0	2	.00	.00	.00
45	37	38	26	25	0	2	.00	.00	.00
46	38	39	27	26	0	2	.00	.00	.00
47	39	40	28	27	0	2	.00	.00	.00
48	40	41	29	28	0	2	.00	.00	.00
49	41	42	30	29	0	2	.00	.00	.00
50	42	43	31	30	0	2	.00	.00	.00
51	43	44	32	31	0	2	.00	.00	.00
52	44	45	33	32	0	2	.00	.00	.00
53	45	46	34	33	0	2	.00	.00	.00
54	46	47	35	34	0	2	.00	.00	.00
55	47	48	36	35	0	2	.00	.00	.00
56	31	32	20	19	0	1	.00	.00	.00
57	32	33	21	20	0	2	.00	.00	.00
58	33	34	22	21	0	2	.00	.00	.00
59	34	35	23	22	0	2	.00	.00	.00
60	35	36	24	23	0	2	.00	.00	.00
61	19	20	14	13	0	1	.00	.00	.00
62	20	21	15	14	0	1	.00	.00	.00
63	21	22	16	15	0	2	.00	.00	.00
64	22	23	17	16	0	2	.00	.00	.00
65	23	24	18	17	0	2	.00	.00	.00
66	13	14	8	7	0	1	.00	.00	.00
67	14	15	9	8	0	1	.00	.00	.00
68	15	16	10	9	0	1	.00	.00	.00
69	16	17	11	10	0	2	.00	.00	.00
70	17	18	12	11	0	2	.00	.00	.00
71	7	8	2	1	0	1	.00	.00	-650.00
72	8	9	3	2	0	1	.00	.00	-650.00
73	9	10	4	3	0	1	.00	.00	-650.00
74	10	11	5	4	0	1	.00	.00	-650.00
75	11	12	6	5	0	2	.00	.00	-650.00
76	1	7	0	0	0	6	.00	.00	.00

77	7	13	0	0	0	6	.00	.00	.00
78	13	19	0	0	0	6	.00	.00	.00
79	19	31	0	0	0	6	.00	.00	.00
80	13	14	0	0	0	7	45.00	.00	.00
81	14	15	0	0	0	7	45.00	.00	.00
82	15	16	0	0	0	7	45.00	.00	.00
83	16	17	0	0	0	7	45.00	.00	.00
84	5	11	0	0	0	8	.00	.00	.00
85	11	17	0	0	0	8	.00	.00	.00
86	17	23	0	0	0	8	.00	.00	.00
87	23	35	0	0	0	8	.00	.00	.00
88	35	47	0	0	0	8	.00	.00	.00
89	27	28	0	0	0	9	.00	.00	.00
90	28	29	0	0	0	9	.00	.00	.00
91	29	30	0	0	0	9	.00	.00	.00
92	30	31	0	0	0	9	.00	.00	.00
93	28	40	0	0	0	4	.00	.00	.00
94	30	42	0	0	0	5	.00	.00	.00
95	40	52	0	0	0	4	.00	.00	.00
96	42	54	0	0	0	5	.00	.00	.00
97	52	64	0	0	0	4	.00	.00	.00
98	54	66	0	0	0	5	.00	.00	.00
99	64	76	0	0	0	4	.00	.00	.00
100	66	78	0	0	0	5	.00	.00	.00

NODAL POINT DATA

NODAL POINT COORDINATES BOUNDARY CONDITION CODES GLOBAL EQUATION NUMBER

IN INCREMENT 1

NODE	X(N)	Y(N)	D-X	D-Y	D-Z	TH-X	TH-Y	TH-Z	D-X	D-Y	D-Z	TH-X	TH-Y	TH-Z
1	.000	11.480	1	1	1	1	1	1	0	0	0	0	0	0
2	1.706	11.480	1	1	1	1	1	1	0	0	0	0	0	0
3	11.373	11.480	1	1	1	1	1	1	0	0	0	0	0	0
4	22.745	11.480	1	1	1	1	1	1	0	0	0	0	0	0
5	34.118	11.480	1	1	1	1	1	1	0	0	0	0	0	0
6	51.177	11.480	1	1	1	1	1	1	0	0	0	0	0	0
7	.000	8.615	1	1	1	1	1	1	0	0	0	0	0	0
8	1.706	8.615	1	1	1	1	1	1	0	0	0	0	0	0
9	11.373	8.615	1	1	1	1	1	1	0	0	0	0	0	0
10	22.745	8.615	1	1	1	1	1	1	0	0	0	0	0	0
11	34.118	9.750	1	1	1	1	1	1	0	0	0	0	0	0
12	51.177	8.615	1	1	1	1	1	1	0	0	0	0	0	0
13	.000	5.750	1	1	1	1	1	1	0	0	0	0	0	0
14	1.706	5.750	1	1	1	1	1	1	0	0	0	0	0	0
15	11.373	5.750	1	1	1	1	1	1	0	0	0	0	0	0
16	22.745	5.750	1	1	1	1	1	1	0	0	0	0	0	0
17	34.118	5.750	1	1	1	1	1	1	0	0	0	0	0	0
18	51.177	5.750	1	1	1	1	1	1	0	0	0	0	0	0
19	.000	2.875	1	1	1	1	1	1	0	0	0	0	0	0
20	1.706	2.875	1	1	1	1	1	1	0	0	0	0	0	0
21	11.373	2.875	1	1	1	1	1	1	0	0	0	0	0	0
22	22.745	2.875	1	1	1	1	1	1	0	0	0	0	0	0
23	34.118	2.875	1	1	1	1	1	1	0	0	0	0	0	0
24	51.177	2.875	1	1	1	1	1	1	0	0	0	0	0	0
25	-16.000	.000	0	0	0	1	1	1	1	2	3	0	0	0
26	-11.000	.000	0	0	0	1	1	1	4	5	6	0	0	0
27	-6.000	.000	0	0	0	1	1	1	7	8	9	0	0	0
28	-4.500	.000	0	0	0	1	1	1	10	11	12	0	0	0
29	-4.000	.000	0	0	0	1	1	1	13	14	15	0	0	0
30	-1.500	.000	0	0	0	1	1	1	16	17	18	0	0	0
31	.000	.000	0	0	0	1	1	1	19	20	21	0	0	0
32	1.706	.000	0	0	0	1	1	1	22	23	24	0	0	0
33	11.373	.000	0	0	0	1	1	1	25	26	27	0	0	0

34	22.745	.000	0	0	0	1	1	1	28	29	30	0	0	0
35	34.118	.000	0	0	0	1	1	1	31	32	33	0	0	0
36	51.177	.000	1	0	1	1	1	1	0	34	0	0	0	0
37	-32.000	-5.714	0	0	0	1	1	1	35	36	37	0	0	0
38	-23.340	-6.851	0	0	0	1	1	1	38	39	40	0	0	0
39	-14.680	-7.988	0	0	0	1	1	1	41	42	43	0	0	0
40	-6.021	-9.124	0	0	0	1	1	1	44	45	46	0	0	0
41	-3.833	-9.124	0	0	0	1	1	1	47	48	49	0	0	0
42	.021	-9.124	0	0	0	1	1	1	50	51	52	0	0	0
43	2.480	-9.124	0	0	0	1	1	1	53	54	55	0	0	0
44	5.112	-9.124	0	0	0	1	1	1	56	57	58	0	0	0
45	14.377	-9.124	0	0	0	1	1	1	59	60	61	0	0	0
46	25.064	-9.124	0	0	0	1	1	1	62	63	64	0	0	0
47	34.118	-.520	0	0	0	1	1	1	65	66	67	0	0	0
48	51.177	-9.124	1	0	1	1	1	1	0	68	0	0	0	0
49	-48.000	-11.429	0	0	0	1	1	1	69	70	71	0	0	0
50	-34.514	-13.702	0	0	0	1	1	1	72	73	74	0	0	0
51	-21.028	-15.975	0	0	0	1	1	1	75	76	77	0	0	0
52	-7.541	-18.248	0	0	0	1	1	1	78	79	80	0	0	0
53	-3.667	-18.248	0	0	0	1	1	1	81	82	83	0	0	0
54	1.541	-18.248	0	0	0	1	1	1	84	85	86	0	0	0
55	4.961	-18.248	0	0	0	1	1	1	87	88	89	0	0	0
56	8.518	-18.248	0	0	0	1	1	1	90	91	92	0	0	0
57	17.382	-18.248	0	0	0	1	1	1	93	94	95	0	0	0
58	27.383	-18.248	0	0	0	1	1	1	96	97	98	0	0	0
59	37.385	-13.946	0	0	0	1	1	1	99	100	101	0	0	0
60	51.177	-18.248	1	0	1	1	1	1	0	102	0	0	0	0
61	-64.000	-17.143	1	0	1	1	1	1	0	103	0	0	0	0
62	-45.687	-20.553	0	0	0	1	1	1	104	105	106	0	0	0
63	-27.375	-23.963	0	0	0	1	1	1	107	108	109	0	0	0
64	-9.062	-27.372	0	0	0	1	1	1	110	111	112	0	0	0
65	-3.500	-27.372	0	0	0	1	1	1	113	114	115	0	0	0
66	3.062	-27.372	0	0	0	1	1	1	116	117	118	0	0	0
67	7.441	-27.372	0	0	0	1	1	1	119	120	121	0	0	0
68	11.924	-27.372	0	0	0	1	1	1	122	123	124	0	0	0
69	20.387	-27.372	0	0	0	1	1	1	125	126	127	0	0	0
70	29.702	-27.372	0	0	0	1	1	1	128	129	130	0	0	0
71	39.018	-27.372	0	0	0	1	1	1	131	132	133	0	0	0
72	51.177	-27.372	1	0	1	1	1	1	0	134	0	0	0	0
73	-64.000	-35.944	1	0	1	1	1	1	0	135	0	0	0	0
74	-46.194	-36.128	0	0	0	1	1	1	136	137	138	0	0	0
75	-28.389	-36.312	0	0	0	1	1	1	139	140	141	0	0	0
76	-10.583	-36.497	0	0	0	1	1	1	142	143	144	0	0	0
77	-3.000	-36.497	0	0	0	1	1	1	145	146	147	0	0	0
78	4.583	-36.497	0	0	0	1	1	1	148	149	150	0	0	0
79	11.162	-36.497	0	0	0	1	1	1	151	152	153	0	0	0
80	17.033	-36.497	0	0	0	1	1	1	154	155	156	0	0	0
81	24.894	-36.497	0	0	0	1	1	1	157	158	159	0	0	0
82	33.181	-36.497	0	0	0	1	1	1	160	161	162	0	0	0
83	41.468	-36.497	0	0	0	1	1	1	163	164	165	0	0	0
84	51.177	-36.497	1	0	1	1	1	1	0	166	0	0	0	0
85	-64.000	-54.745	1	1	1	1	1	1	0	0	0	0	0	0
86	-47.208	-54.745	0	1	1	1	1	1	167	0	0	0	0	0
87	-30.416	-54.745	0	1	1	1	1	1	168	0	0	0	0	0
88	-13.624	-54.745	0	1	1	1	1	1	169	0	0	0	0	0
89	-3.000	-54.745	0	1	1	1	1	1	170	0	0	0	0	0
90	7.624	-54.745	0	1	1	1	1	1	171	0	0	0	0	0
91	14.883	-54.745	0	1	1	1	1	1	172	0	0	0	0	0
92	22.142	-54.745	0	1	1	1	1	1	173	0	0	0	0	0
93	29.400	-54.745	0	1	1	1	1	1	174	0	0	0	0	0
94	36.659	-54.745	0	1	1	1	1	1	175	0	0	0	0	0
95	43.918	-54.745	0	1	1	1	1	1	176	0	0	0	0	0
96	51.177	-54.745	1	1	1	1	1	1	0	0	0	0	0	0

**TOTAL NUMBER OF EQUATIONS = 176 IN INCR= 1

**BANDWIDTH OF MATRIX = 40 IN INCR= 1

SOLUTION CONVERGED AFTER 2 ITERATIONS
RESULTING ERROR IS .79154E-01

DISPLACEMENTS AT NODES

NODE	X-TRAN	Y-TRAN	Z-TRAN	X-ROT	Y-ROT	Z-ROT
1	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00
2	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00
3	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00
4	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00
5	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00
6	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00
7	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00
8	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00
9	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00
10	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00
11	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00
12	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00
13	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00
14	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00
15	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00
16	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00
17	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00
18	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00
19	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00
20	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00
21	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00
22	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00
23	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00
24	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00
25	-.16342E-01	-.61926E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00
26	-.24393E-01	-.66135E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00
27	-.35168E-01	-.70067E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00
28	-.40600E-01	-.71292E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00
29	-.41439E-01	-.71181E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00
30	-.44679E-01	-.70932E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00
31	-.46100E-01	-.70785E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00
32	-.48154E-01	-.70508E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00
33	-.52956E-01	-.70117E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00
34	-.66940E-01	-.68450E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00
35	-.31514E-01	-.70465E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00
36	.00000E+00	-.67290E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00
37	-.33129E-01	-.48630E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00
38	-.51262E-01	-.55336E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00
39	-.61421E-01	-.60809E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00
40	-.58874E-01	-.64465E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00
41	-.56892E-01	-.65102E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00
42	-.55115E-01	-.65709E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00
43	-.53465E-01	-.65862E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00
44	-.52510E-01	-.65918E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00
45	-.51500E-01	-.65456E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00
46	-.45063E-01	-.65477E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00
47	-.31301E-01	-.70478E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00
48	.00000E+00	-.65135E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00
49	-.33930E-01	-.36838E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00
50	-.65145E-01	-.44439E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00
51	-.81400E-01	-.50787E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00
52	-.75410E-01	-.54383E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00
53	-.71540E-01	-.55594E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00

**NOTE THAT THE CALCULATED DISPLACEMENTS WILL NOT BE SUMMED IN INCR=2

54	-.66757E-01	-.56637E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00
55	-.61638E-01	-.56999E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00
56	-.57510E-01	-.57079E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00
57	-.48233E-01	-.56766E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00
58	-.36083E-01	-.55561E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00
59	-.24043E-01	-.60000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00
60	.00000E+00	-.54574E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00
61	.00000E+00	-.29610E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00
62	-.53592E-01	-.34634E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00
63	-.87898E-01	-.40211E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00
64	-.89277E-01	-.42723E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00
65	-.83809E-01	-.44104E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00
66	-.74510E-01	-.45145E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00
67	-.66065E-01	-.45508E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00
68	-.58030E-01	-.45479E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00
69	-.43715E-01	-.44960E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00
70	-.29685E-01	-.44130E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00
71	-.16905E-01	-.43745E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00
72	.00000E+00	-.43127E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00
73	.00000E+00	-.19469E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00
74	-.66948E-01	-.21400E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00
75	-.10063E+00	-.25588E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00
76	-.10190E+00	-.29465E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00
77	-.93226E-01	-.31087E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00
78	-.77690E-01	-.31772E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00
79	-.63799E-01	-.31822E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00
80	-.51879E-01	-.31670E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00
81	-.37877E-01	-.31221E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00
82	-.24843E-01	-.30829E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00
83	-.12822E-01	-.30495E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00
84	.00000E+00	-.30232E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00
85	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00
86	-.63226E-01	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00
87	-.10364E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00
88	-.11004E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00
89	-.98344E-01	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00
90	-.75171E-01	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00
91	-.59151E-01	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00
92	-.44179E-01	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00
93	-.30867E-01	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00
94	-.19324E-01	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00
95	-.90991E-02	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00
96	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00

ELEMENT STRAINS AND STRESSES

EL.NO.	LOC	DEXX	DEYY	DGXY	DGXZ	DGYZ	SXX	SYX	SZZ	TXY	TXZ	TYZ
1	CEN	-.376E-02	-.109E-01	-.614E-03	.000E+00	.000E+00	-.284E+04	-.446E+04	-.199E+04	-.694E+02	.000E+00	.000E+00
I-J		-.377E-02	-.109E-01	.254E-05	.000E+00	.000E+00	-.284E+04	-.446E+04	-.199E+04	.287E+00	.000E+00	.000E+00
J-K		-.376E-02	-.115E-01	-.614E-03	.000E+00	.000E+00	-.292E+04	-.466E+04	-.207E+04	-.694E+02	.000E+00	.000E+00
K-L		-.376E-02	-.109E-01	-.119E-02	.000E+00	.000E+00	-.284E+04	-.445E+04	-.199E+04	-.135E+03	.000E+00	.000E+00
L-I		-.376E-02	-.104E-01	-.613E-03	.000E+00	.000E+00	-.277E+04	-.426E+04	-.192E+04	-.693E+02	.000E+00	.000E+00
2	CEN	-.214E-02	-.126E-01	-.112E-02	.000E+00	.000E+00	-.262E+04	-.492E+04	-.215E+04	-.123E+03	.000E+00	.000E+00
I-J		-.241E-02	-.127E-01	.179E-03	.000E+00	.000E+00	-.274E+04	-.499E+04	-.221E+04	.196E+02	.000E+00	.000E+00
J-K		-.214E-02	-.137E-01	-.885E-03	.000E+00	.000E+00	-.279E+04	-.534E+04	-.232E+04	-.972E+02	.000E+00	.000E+00
K-L		-.189E-02	-.125E-01	-.234E-02	.000E+00	.000E+00	-.252E+04	-.484E+04	-.210E+04	-.258E+03	.000E+00	.000E+00
L-I		-.214E-02	-.114E-01	-.135E-02	.000E+00	.000E+00	-.246E+04	-.449E+04	-.198E+04	-.149E+03	.000E+00	.000E+00
3	CEN	-.220E-03	-.148E-01	-.865E-03	.000E+00	.000E+00	-.244E+04	-.548E+04	-.239E+04	-.902E+02	.000E+00	.000E+00
I-J		-.381E-03	-.150E-01	.357E-03	.000E+00	.000E+00	-.252E+04	-.557E+04	-.244E+04	.372E+02	.000E+00	.000E+00
J-K		-.219E-03	-.159E-01	-.723E-03	.000E+00	.000E+00	-.261E+04	-.589E+04	-.257E+04	-.754E+02	.000E+00	.000E+00
K-L		-.684E-04	-.147E-01	-.202E-02	.000E+00	.000E+00	-.236E+04	-.540E+04	-.234E+04	-.210E+03	.000E+00	.000E+00
L-I		-.221E-03	-.138E-01	-.101E-02	.000E+00	.000E+00	-.226E+04	-.508E+04	-.222E+04	-.105E+03	.000E+00	.000E+00
4	CEN	.112E-02	-.165E-01	-.621E-03	.000E+00	.000E+00	-.234E+04	-.574E+04	-.256E+04	-.598E+02	.000E+00	.000E+00
I-J		.110E-02	-.166E-01	.271E-03	.000E+00	.000E+00	-.236E+04	-.577E+04	-.257E+04	.261E+02	.000E+00	.000E+00
J-K		.112E-02	-.170E-01	-.611E-03	.000E+00	.000E+00	-.243E+04	-.592E+04	-.265E+04	-.587E+02	.000E+00	.000E+00
K-L		.114E-02	-.164E-01	-.187E-02	.000E+00	.000E+00	-.232E+04	-.570E+04	-.254E+04	-.180E+03	.000E+00	.000E+00

L-I .112E-02 -.160E-01 -.632E-03 .000E+00 .000E+00 -.226E+04 -.555E+04 -.247E+04 -.608E+02 .000E+00 .000E+00
5 CEN .213E-02 -.173E-01 -.128E-03 .000E+00 .000E+00 -.232E+04 -.579E+04 -.270E+04 -.114E+02 .000E+00 .000E+00
I-J .218E-02 -.172E-01 .253E-03 .000E+00 .000E+00 -.230E+04 -.577E+04 -.269E+04 .226E+02 .000E+00 .000E+00
J-K .213E-02 -.175E-01 -.160E-03 .000E+00 .000E+00 -.236E+04 -.587E+04 -.274E+04 -.143E+02 .000E+00 .000E+00
K-L .205E-02 -.173E-01 -.661E-03 .000E+00 .000E+00 -.236E+04 -.582E+04 -.272E+04 -.591E+02 .000E+00 .000E+00
L-I .213E-02 -.170E-01 -.954E-04 .000E+00 .000E+00 -.228E+04 -.571E+04 -.266E+04 -.854E+01 .000E+00 .000E+00
6 CEN .216E-02 -.174E-01 .168E-03 .000E+00 .000E+00 -.232E+04 -.588E+04 -.271E+04 .152E+02 .000E+00 .000E+00
I-J .221E-02 -.174E-01 .213E-03 .000E+00 .000E+00 -.230E+04 -.587E+04 -.271E+04 .193E+02 .000E+00 .000E+00
J-K .216E-02 -.174E-01 .149E-03 .000E+00 .000E+00 -.232E+04 -.589E+04 -.272E+04 .136E+02 .000E+00 .000E+00
K-L .211E-02 -.174E-01 .118E-03 .000E+00 .000E+00 -.234E+04 -.590E+04 -.272E+04 .107E+02 .000E+00 .000E+00
L-I .216E-02 -.174E-01 .186E-03 .000E+00 .000E+00 -.232E+04 -.588E+04 -.271E+04 .169E+02 .000E+00 .000E+00
7 CEN .205E-02 -.174E-01 .273E-03 .000E+00 .000E+00 -.233E+04 -.592E+04 -.271E+04 .252E+02 .000E+00 .000E+00
I-J .206E-02 -.174E-01 .161E-03 .000E+00 .000E+00 -.233E+04 -.592E+04 -.271E+04 .148E+02 .000E+00 .000E+00
J-K .205E-02 -.173E-01 .268E-03 .000E+00 .000E+00 -.232E+04 -.590E+04 -.270E+04 .247E+02 .000E+00 .000E+00
K-L .203E-02 -.173E-01 .413E-03 .000E+00 .000E+00 -.233E+04 -.591E+04 -.271E+04 .381E+02 .000E+00 .000E+00
L-I .205E-02 -.174E-01 .279E-03 .000E+00 .000E+00 -.234E+04 -.593E+04 -.272E+04 .258E+02 .000E+00 .000E+00
8 CEN .181E-02 -.172E-01 .370E-03 .000E+00 .000E+00 -.236E+04 -.593E+04 -.270E+04 .348E+02 .000E+00 .000E+00
I-J .183E-02 -.172E-01 .802E-04 .000E+00 .000E+00 -.236E+04 -.595E+04 -.271E+04 .756E+01 .000E+00 .000E+00
J-K .181E-02 -.170E-01 .359E-03 .000E+00 .000E+00 -.234E+04 -.589E+04 -.268E+04 .338E+02 .000E+00 .000E+00
K-L .178E-02 -.171E-01 .637E-03 .000E+00 .000E+00 -.235E+04 -.591E+04 -.269E+04 .600E+02 .000E+00 .000E+00
L-I .181E-02 -.173E-01 .381E-03 .000E+00 .000E+00 -.238E+04 -.597E+04 -.272E+04 .359E+02 .000E+00 .000E+00
9 CEN .158E-02 -.169E-01 .255E-03 .000E+00 .000E+00 -.238E+04 -.593E+04 -.268E+04 .245E+02 .000E+00 .000E+00
I-J .159E-02 -.170E-01 .462E-05 .000E+00 .000E+00 -.238E+04 -.595E+04 -.269E+04 .443E+00 .000E+00 .000E+00
J-K .158E-02 -.168E-01 .251E-03 .000E+00 .000E+00 -.236E+04 -.590E+04 -.266E+04 .241E+02 .000E+00 .000E+00
K-L .157E-02 -.169E-01 .474E-03 .000E+00 .000E+00 -.237E+04 -.592E+04 -.267E+04 .455E+02 .000E+00 .000E+00
L-I .158E-02 -.170E-01 .258E-03 .000E+00 .000E+00 -.239E+04 -.597E+04 -.270E+04 .248E+02 .000E+00 .000E+00
10 CEN .143E-02 -.168E-01 .194E-03 .000E+00 .000E+00 -.239E+04 -.592E+04 -.267E+04 .188E+02 .000E+00 .000E+00
I-J .141E-02 -.168E-01 .244E-04 .000E+00 .000E+00 -.241E+04 -.593E+04 -.268E+04 -.237E+01 .000E+00 .000E+00
J-K .143E-02 -.167E-01 .203E-03 .000E+00 .000E+00 -.239E+04 -.589E+04 -.265E+04 .197E+02 .000E+00 .000E+00
K-L .145E-02 -.167E-01 .386E-03 .000E+00 .000E+00 -.238E+04 -.590E+04 -.266E+04 .374E+02 .000E+00 .000E+00
L-I .143E-02 -.169E-01 .185E-03 .000E+00 .000E+00 -.241E+04 -.595E+04 -.268E+04 .179E+02 .000E+00 .000E+00
11 CEN .129E-02 -.166E-01 .140E-03 .000E+00 .000E+00 -.240E+04 -.591E+04 -.266E+04 .137E+02 .000E+00 .000E+00
I-J .125E-02 -.166E-01 .179E-04 .000E+00 .000E+00 -.242E+04 -.592E+04 -.267E+04 -.175E+01 .000E+00 .000E+00
J-K .129E-02 -.166E-01 .155E-03 .000E+00 .000E+00 -.239E+04 -.589E+04 -.265E+04 .152E+02 .000E+00 .000E+00
K-L .132E-02 -.166E-01 .257E-03 .000E+00 .000E+00 -.239E+04 -.590E+04 -.265E+04 .252E+02 .000E+00 .000E+00
L-I .129E-02 -.167E-01 .124E-03 .000E+00 .000E+00 -.241E+04 -.593E+04 -.267E+04 .122E+02 .000E+00 .000E+00
12 CEN .329E-02 -.676E-02 -.216E-02 .000E+00 .000E+00 -.140E+04 -.191E+04 -.921E+03 .158E+03 .000E+00 .000E+00
I-J .376E-02 -.678E-02 -.711E-03 .000E+00 .000E+00 -.151E+04 -.196E+04 -.965E+03 .520E+02 .000E+00 .000E+00
J-K .324E-02 -.841E-02 -.180E-02 .000E+00 .000E+00 -.154E+04 -.230E+04 -.107E+04 -.132E+03 .000E+00 .000E+00
K-L .285E-02 -.674E-02 -.357E-02 .000E+00 .000E+00 -.129E+04 -.186E+04 -.878E+03 .261E+03 .000E+00 .000E+00
L-I .334E-02 -.539E-02 -.246E-02 .000E+00 .000E+00 -.129E+04 -.159E+04 -.800E+03 .180E+03 .000E+00 .000E+00
13 CEN .178E-02 -.978E-02 -.265E-02 .000E+00 .000E+00 -.159E+04 -.288E+04 -.131E+04 .212E+03 .000E+00 .000E+00
I-J .188E-02 -.984E-02 -.142E-02 .000E+00 .000E+00 -.163E+04 -.291E+04 -.133E+04 .114E+03 .000E+00 .000E+00
J-K .177E-02 -.115E-01 -.267E-02 .000E+00 .000E+00 -.179E+04 -.335E+04 -.151E+04 .214E+03 .000E+00 .000E+00
K-L .168E-02 -.971E-02 -.383E-02 .000E+00 .000E+00 -.156E+04 -.285E+04 -.129E+04 .307E+03 .000E+00 .000E+00
L-I .179E-02 -.838E-02 -.262E-02 .000E+00 .000E+00 -.144E+04 -.250E+04 .115E+04 .210E+03 .000E+00 .000E+00
14 CEN .435E-04 -.126E-01 -.185E-02 .000E+00 .000E+00 -.166E+04 -.366E+04 -.167E+04 .146E+03 .000E+00 .000E+00
I-J .594E-04 -.127E-01 .112E-02 .000E+00 .000E+00 -.170E+04 -.370E+04 -.169E+04 .884E+02 .000E+00 .000E+00
J-K .631E-04 -.140E-01 .179E-02 .000E+00 .000E+00 -.184E+04 -.406E+04 -.185E+04 .141E+03 .000E+00 .000E+00
K-L .141E-03 -.125E-01 .254E-02 .000E+00 .000E+00 -.162E+04 -.363E+04 -.165E+04 .201E+03 .000E+00 .000E+00
L-I .288E-04 -.116E-01 .190E-02 .000E+00 .000E+00 -.153E+04 -.337E+04 .154E+04 .149E+03 .000E+00 .000E+00
15 CEN .108E-02 -.143E-01 .114E-02 .000E+00 .000E+00 -.168E+04 .400E+04 .185E+04 .857E+02 .000E+00 .000E+00
I-J .114E-02 -.143E-01 .996E-03 .000E+00 .000E+00 -.166E+04 .399E+04 .184E+04 .750E+02 .000E+00 .000E+00
J-K .108E-02 -.144E-01 .119E-02 .000E+00 .000E+00 -.170E+04 .403E+04 .186E+04 .900E+02 .000E+00 .000E+00
K-L .983E-03 .143E-01 .133E-02 .000E+00 .000E+00 .171E+04 .401E+04 .186E+04 .100E+03 .000E+00 .000E+00
L-I .108E-02 .142E-01 .108E-02 .000E+00 .000E+00 .167E+04 .396E+04 .183E+04 .814E+02 .000E+00 .000E+00
16 CEN .176E-02 -.146E-01 .335E-03 .000E+00 .000E+00 .168E+04 .405E+04 .193E+04 .243E+02 .000E+00 .000E+00
I-J .205E-02 .146E-01 .146E-04 .000E+00 .000E+00 .159E+04 .400E+04 .188E+04 .106E+01 .000E+00 .000E+00
J-K .176E-02 .149E-01 .579E-03 .000E+00 .000E+00 .172E+04 .413E+04 .197E+04 .420E+02 .000E+00 .000E+00
K-L .142E-02 .146E-01 .739E-03 .000E+00 .000E+00 .178E+04 .411E+04 .199E+04 .536E+02 .000E+00 .000E+00
L-I .176E-02 .143E-01 .912E-04 .000E+00 .000E+00 .164E+04 .397E+04 .189E+04 .662E+01 .000E+00 .000E+00
17 CEN .204E-02 .149E-01 .258E-03 .000E+00 .000E+00 .168E+04 .408E+04 .196E+04 .183E+02 .000E+00 .000E+00
I-J .211E-02 .149E-01 .580E-03 .000E+00 .000E+00 .164E+04 .404E+04 .194E+04 .410E+02 .000E+00 .000E+00
J-K .204E-02 .152E-01 .205E-03 .000E+00 .000E+00 .171E+04 .414E+04 .200E+04 .145E+02 .000E+00 .000E+00
K-L .193E-02 .151E-01 .225E-03 .000E+00 .000E+00 .173E+04 .413E+04 .200E+04 .160E+02 .000E+00 .000E+00
L-I .204E-02 .147E-01 .311E-03 .000E+00 .000E+00 .164E+04 .402E+04 .193E+04 .220E+02 .000E+00 .000E+00
18 CEN .193E-02 .150E-01 .647E-03 .000E+00 .000E+00 .170E+04 .416E+04 .198E+04 .471E+02 .000E+00 .000E+00

I-J .203E-02 -.149E-01 .781E-03 .000E+00 .000E+00 -.167E+04 -.414E+04 -.196E+04 .568E+02 .000E+00 .000E+00
 J-K .193E-02 -.150E-01 .580E-03 .000E+00 .000E+00 -.171E+04 -.418E+04 -.199E+04 .422E+02 .000E+00 .000E+00
 K-L .179E-02 -.150E-01 .471E-03 .000E+00 .000E+00 -.175E+04 -.420E+04 -.201E+04 .343E+02 .000E+00 .000E+00
 L-I .193E-02 -.149E-01 .713E-03 .000E+00 .000E+00 -.169E+04 -.415E+04 -.197E+04 .519E+02 .000E+00 .000E+00
 19 CEN .173E-02 -.148E-01 .850E-03 .000E+00 .000E+00 -.170E+04 -.416E+04 -.196E+04 .631E+02 .000E+00 .000E+00
 I-J .178E-02 -.148E-01 .852E-03 .000E+00 .000E+00 -.169E+04 -.415E+04 -.196E+04 .633E+02 .000E+00 .000E+00
 J-K .173E-02 -.148E-01 .810E-03 .000E+00 .000E+00 -.170E+04 -.415E+04 -.196E+04 .602E+02 .000E+00 .000E+00
 K-L .169E-02 -.148E-01 .848E-03 .000E+00 .000E+00 -.171E+04 -.416E+04 -.197E+04 .630E+02 .000E+00 .000E+00
 L-I .173E-02 -.148E-01 .890E-03 .000E+00 .000E+00 -.171E+04 -.416E+04 -.196E+04 .661E+02 .000E+00 .000E+00
 20 CEN .154E-02 -.145E-01 .782E-03 .000E+00 .000E+00 -.170E+04 -.413E+04 -.194E+04 .592E+02 .000E+00 .000E+00
 I-J .157E-02 -.146E-01 .576E-03 .000E+00 .000E+00 -.171E+04 -.416E+04 -.194E+04 .436E+02 .000E+00 .000E+00
 J-K .154E-02 -.143E-01 .750E-03 .000E+00 .000E+00 -.167E+04 -.407E+04 -.191E+04 .568E+02 .000E+00 .000E+00
 K-L .151E-02 -.144E-01 .965E-03 .000E+00 .000E+00 -.170E+04 -.411E+04 -.193E+04 .731E+02 .000E+00 .000E+00
 L-I .154E-02 -.147E-01 .814E-03 .000E+00 .000E+00 -.173E+04 -.420E+04 -.197E+04 .617E+02 .000E+00 .000E+00
 21 CEN .141E-02 -.144E-01 .377E-03 .000E+00 .000E+00 -.171E+04 -.418E+04 -.193E+04 .294E+02 .000E+00 .000E+00
 I-J .145E-02 -.144E-01 .385E-03 .000E+00 .000E+00 -.170E+04 -.417E+04 -.193E+04 .300E+02 .000E+00 .000E+00
 J-K .141E-02 -.144E-01 .340E-03 .000E+00 .000E+00 -.171E+04 -.418E+04 -.193E+04 .264E+02 .000E+00 .000E+00
 K-L .137E-02 -.144E-01 .370E-03 .000E+00 .000E+00 -.173E+04 -.418E+04 -.194E+04 .288E+02 .000E+00 .000E+00
 L-I .141E-02 -.144E-01 .415E-03 .000E+00 .000E+00 -.171E+04 -.418E+04 -.193E+04 .323E+02 .000E+00 .000E+00
 22 CEN .136E-02 -.143E-01 .362E-03 .000E+00 .000E+00 -.170E+04 -.414E+04 -.191E+04 .282E+02 .000E+00 .000E+00
 I-J .132E-02 -.143E-01 .224E-03 .000E+00 .000E+00 -.171E+04 -.415E+04 -.192E+04 .175E+02 .000E+00 .000E+00
 J-K .136E-02 -.141E-01 .403E-03 .000E+00 .000E+00 -.168E+04 -.410E+04 -.189E+04 .314E+02 .000E+00 .000E+00
 K-L .139E-02 -.143E-01 .471E-03 .000E+00 .000E+00 -.169E+04 -.413E+04 -.190E+04 .368E+02 .000E+00 .000E+00
 L-I .136E-02 -.144E-01 .320E-03 .000E+00 .000E+00 -.172E+04 -.418E+04 -.193E+04 .250E+02 .000E+00 .000E+00
 23 CEN .239E-02 .358E-02 .306E-02 .000E+00 .000E+00 .505E+03 .601E+03 .313E+03 .123E+03 .000E+00 .000E+00
 I-J .257E-02 .543E-02 .182E-02 .000E+00 .000E+00 .625E+03 .856E+03 .419E+03 .733E+02 .000E+00 .000E+00
 J-K .230E-02 .607E-02 .299E-02 .000E+00 .000E+00 .623E+03 .826E+03 .438E+03 .120E+03 .000E+00 .000E+00
 K-L .214E-02 .100E-02 .479E-02 .000E+00 .000E+00 .337E+03 .245E+03 .165E+03 .192E+03 .000E+00 .000E+00
 L-I .248E-02 .102E-02 .313E-02 .000E+00 .000E+00 .383E+03 .266E+03 .184E+03 .126E+03 .000E+00 .000E+00
 24 CEN .136E-02 .769E-02 .385E-02 .000E+00 .000E+00 .956E+03 .170E+04 .795E+03 .227E+03 .000E+00 .000E+00
 I-J .159E-02 .831E-02 .306E-02 .000E+00 .000E+00 .106E+04 .185E+04 .870E+03 .180E+03 .000E+00 .000E+00
 J-K .126E-02 .899E-02 .354E-02 .000E+00 .000E+00 .105E+04 .196E+04 .900E+03 .209E+03 .000E+00 .000E+00
 K-L .105E-02 .682E-02 .495E-02 .000E+00 .000E+00 .816E+03 .150E+04 .692E+03 .292E+03 .000E+00 .000E+00
 L-I .146E-02 .635E-02 .418E-02 .000E+00 .000E+00 .859E+03 .143E+04 .686E+03 .247E+03 .000E+00 .000E+00
 25 CEN .331E-03 .112E-01 .288E-02 .000E+00 .000E+00 .119E+04 .261E+04 .123E+04 .178E+03 .000E+00 .000E+00
 I-J .135E-03 .114E-01 .236E-02 .000E+00 .000E+00 .126E+04 .268E+04 .127E+04 .146E+03 .000E+00 .000E+00
 J-K .405E-03 .121E-01 .263E-02 .000E+00 .000E+00 .127E+04 .281E+04 .132E+04 .162E+03 .000E+00 .000E+00
 K-L .598E-03 .109E-01 .359E-02 .000E+00 .000E+00 .109E+04 .251E+04 .117E+04 .221E+03 .000E+00 .000E+00
 L-I .254E-03 .103E-01 .314E-02 .000E+00 .000E+00 .110E+04 .240E+04 .113E+04 .194E+03 .000E+00 .000E+00
 26 CEN .990E-03 .125E-01 .139E-02 .000E+00 .000E+00 .126E+04 .291E+04 .138E+04 .851E+02 .000E+00 .000E+00
 I-J .983E-03 .125E-01 .112E-02 .000E+00 .000E+00 .126E+04 .292E+04 .138E+04 .689E+02 .000E+00 .000E+00
 J-K .990E-03 .126E-01 .138E-02 .000E+00 .000E+00 .128E+04 .295E+04 .140E+04 .848E+02 .000E+00 .000E+00
 K-L .999E-03 .125E-01 .177E-02 .000E+00 .000E+00 .125E+04 .290E+04 .138E+04 .108E+03 .000E+00 .000E+00
 L-I .990E-03 .123E-01 .139E-02 .000E+00 .000E+00 .124E+04 .287E+04 .136E+04 .853E+02 .000E+00 .000E+00
 27 CEN .120E-02 .128E-01 .563E-03 .000E+00 .000E+00 .125E+04 .291E+04 .139E+04 .334E+02 .000E+00 .000E+00
 I-J .142E-02 .127E-01 .358E-03 .000E+00 .000E+00 .120E+04 .287E+04 .136E+04 .212E+02 .000E+00 .000E+00
 J-K .120E-02 .129E-01 .722E-03 .000E+00 .000E+00 .127E+04 .294E+04 .141E+04 .428E+02 .000E+00 .000E+00
 K-L .918E-03 .128E-01 .821E-03 .000E+00 .000E+00 .132E+04 .294E+04 .143E+04 .487E+02 .000E+00 .000E+00
 L-I .120E-02 .126E-01 .404E-03 .000E+00 .000E+00 .124E+04 .287E+04 .138E+04 .240E+02 .000E+00 .000E+00
 28 CEN .174E-02 .128E-01 .119E-03 .000E+00 .000E+00 .127E+04 .294E+04 .147E+04 .681E+01 .000E+00 .000E+00
 I-J .193E-02 .128E-01 .261E-03 .000E+00 .000E+00 .122E+04 .291E+04 .144E+04 .149E+02 .000E+00 .000E+00
 J-K .174E-02 .128E-01 .282E-04 .000E+00 .000E+00 .128E+04 .295E+04 .148E+04 .161E+01 .000E+00 .000E+00
 K-L .150E-02 .128E-01 .628E-04 .000E+00 .000E+00 .134E+04 .298E+04 .151E+04 .360E+01 .000E+00 .000E+00
 L-I .174E-02 .128E-01 .210E-03 .000E+00 .000E+00 .127E+04 .292E+04 .147E+04 .120E+02 .000E+00 .000E+00
 29 CEN .151E-02 .127E-01 .696E-03 .000E+00 .000E+00 .127E+04 .296E+04 .145E+04 .414E+02 .000E+00 .000E+00
 I-J .179E-02 .126E-01 .914E-03 .000E+00 .000E+00 .120E+04 .291E+04 .141E+04 .543E+02 .000E+00 .000E+00
 J-K .151E-02 .127E-01 .559E-03 .000E+00 .000E+00 .128E+04 .297E+04 .146E+04 .332E+02 .000E+00 .000E+00
 K-L .116E-02 .127E-01 .422E-03 .000E+00 .000E+00 .137E+04 .302E+04 .150E+04 .250E+02 .000E+00 .000E+00
 L-I .151E-02 .126E-01 .834E-03 .000E+00 .000E+00 .126E+04 .294E+04 .144E+04 .495E+02 .000E+00 .000E+00
 30 CEN .136E-02 .127E-01 .739E-03 .000E+00 .000E+00 .129E+04 .301E+04 .145E+04 .454E+02 .000E+00 .000E+00
 I-J .169E-02 .126E-01 .989E-03 .000E+00 .000E+00 .120E+04 .295E+04 .141E+04 .607E+02 .000E+00 .000E+00
 J-K .136E-02 .128E-01 .433E-03 .000E+00 .000E+00 .130E+04 .304E+04 .147E+04 .266E+02 .000E+00 .000E+00
 K-L .105E-02 .127E-01 .501E-03 .000E+00 .000E+00 .137E+04 .306E+04 .150E+04 .307E+02 .000E+00 .000E+00
 L-I .136E-02 .125E-01 .105E-02 .000E+00 .000E+00 .127E+04 .298E+04 .144E+04 .641E+02 .000E+00 .000E+00
 31 CEN .136E-02 .124E-01 .851E-03 .000E+00 .000E+00 .125E+04 .295E+04 .141E+04 .525E+02 .000E+00 .000E+00
 I-J .151E-02 .125E-01 .732E-03 .000E+00 .000E+00 .122E+04 .294E+04 .140E+04 .451E+02 .000E+00 .000E+00
 J-K .136E-02 .123E-01 .697E-03 .000E+00 .000E+00 .123E+04 .290E+04 .139E+04 .430E+02 .000E+00 .000E+00

K-L .121E-02 -.124E-01 .962E-03 .000E+00 .000E+00 -.128E+04 -.295E+04 -.143E+04 .593E+02 .000E+00 .000E+00
 L-I .136E-02 -.126E-01 .100E-02 .000E+00 .000E+00 -.127E+04 -.299E+04 -.144E+04 .620E+02 .000E+00 .000E+00
 32 CEN .137E-02 -.122E-01 .251E-03 .000E+00 .000E+00 -.117E+04 -.281E+04 -.134E+04 .152E+02 .000E+00 .000E+00
 I-J .137E-02 -.122E-01 .536E-04 .000E+00 .000E+00 -.118E+04 -.282E+04 -.134E+04 .324E+01 .000E+00 .000E+00
 J-K .137E-02 -.120E-01 .216E-03 .000E+00 .000E+00 -.116E+04 -.278E+04 -.132E+04 .131E+02 .000E+00 .000E+00
 K-L .136E-02 -.121E-01 .421E-03 .000E+00 .000E+00 -.117E+04 -.281E+04 -.134E+04 .255E+02 .000E+00 .000E+00
 L-I .136E-02 -.124E-01 .300E-03 .000E+00 .000E+00 -.120E+04 -.286E+04 -.136E+04 .181E+02 .000E+00 .000E+00
 33 CEN .154E-02 -.123E-01 .912E-04 .000E+00 .000E+00 -.115E+04 -.281E+04 -.133E+04 .547E+01 .000E+00 .000E+00
 I-J .139E-02 -.122E-01 .292E-03 .000E+00 .000E+00 -.118E+04 -.282E+04 -.135E+04 .176E+02 .000E+00 .000E+00
 J-K .158E-02 -.125E-01 .249E-03 .000E+00 .000E+00 -.118E+04 -.287E+04 -.137E+04 .150E+02 .000E+00 .000E+00
 K-L .168E-02 -.123E-01 .903E-04 .000E+00 .000E+00 -.112E+04 -.279E+04 -.132E+04 .542E+01 .000E+00 .000E+00
 L-I .152E-02 -.121E-01 .183E-04 .000E+00 .000E+00 -.113E+04 -.276E+04 -.131E+04 .110E+01 .000E+00 .000E+00
 34 CEN .154E-02 -.306E-02 .244E-02 .000E+00 .000E+00 -.310E+03 -.416E+03 -.204E+03 .845E+02 .000E+00 .000E+00
 I-J .155E-02 -.430E-02 .184E-02 .000E+00 .000E+00 -.367E+03 -.557E+03 -.259E+03 .636E+02 .000E+00 .000E+00
 J-K .153E-02 -.429E-02 .260E-02 .000E+00 .000E+00 -.364E+03 -.555E+03 -.258E+03 .899E+02 .000E+00 .000E+00
 K-L .151E-02 -.102E-02 .344E-02 .000E+00 .000E+00 -.217E+03 -.183E+03 -.112E+03 .119E+03 .000E+00 .000E+00
 L-I .154E-02 -.178E-02 .228E-02 .000E+00 .000E+00 -.254E+03 -.270E+03 -.147E+03 .788E+02 .000E+00 .000E+00
 35 CEN .712E-03 .660E-02 .323E-02 .000E+00 .000E+00 -.571E+03 -.111E+04 .506E+03 .148E+03 .000E+00 .000E+00
 I-J .684E-03 .712E-02 .282E-02 .000E+00 .000E+00 .603E+03 .119E+04 .540E+03 .129E+03 .000E+00 .000E+00
 J-K .720E-03 .740E-02 .340E-02 .000E+00 .000E+00 .628E+03 .124E+04 .562E+03 .156E+03 .000E+00 .000E+00
 K-L .756E-03 .574E-02 .390E-02 .000E+00 .000E+00 .519E+03 .978E+03 .450E+03 .179E+03 .000E+00 .000E+00
 L-I .704E-03 .575E-02 .305E-02 .000E+00 .000E+00 .512E+03 .976E+03 .447E+03 .140E+03 .000E+00 .000E+00
 36 CEN .667E-03 .957E-02 .292E-02 .000E+00 .000E+00 .729E+03 .162E+04 .786E+03 .127E+03 .000E+00 .000E+00
 I-J .746E-03 .977E-02 .252E-02 .000E+00 .000E+00 .732E+03 .164E+04 .797E+03 .109E+03 .000E+00 .000E+00
 J-K .648E-03 .102E-01 .315E-02 .000E+00 .000E+00 .791E+03 .174E+04 .848E+03 .137E+03 .000E+00 .000E+00
 K-L .541E-03 .925E-02 .355E-02 .000E+00 .000E+00 .723E+03 .157E+04 .770E+03 .154E+03 .000E+00 .000E+00
 L-I .687E-03 .886E-02 .268E-02 .000E+00 .000E+00 .663E+03 .149E+04 .722E+03 .116E+03 .000E+00 .000E+00
 37 CEN .965E-03 .105E-01 .141E-02 .000E+00 .000E+00 .799E+03 .181E+04 .884E+03 .620E+02 .000E+00 .000E+00
 I-J .999E-03 .105E-01 .149E-02 .000E+00 .000E+00 .792E+03 .180E+04 .880E+03 .655E+02 .000E+00 .000E+00
 J-K .965E-03 .105E-01 .142E-02 .000E+00 .000E+00 .796E+03 .180E+04 .881E+03 .626E+02 .000E+00 .000E+00
 K-L .906E-03 .105E-01 .127E-02 .000E+00 .000E+00 .811E+03 .182E+04 .890E+03 .559E+02 .000E+00 .000E+00
 L-I .965E-03 .105E-01 .140E-02 .000E+00 .000E+00 .802E+03 .181E+04 .887E+03 .614E+02 .000E+00 .000E+00
 38 CEN .724E-03 .104E-01 .314E-03 .000E+00 .000E+00 .810E+03 .183E+04 .877E+03 .144E+02 .000E+00 .000E+00
 I-J .918E-03 .104E-01 .478E-03 .000E+00 .000E+00 .776E+03 .181E+04 .860E+03 .220E+02 .000E+00 .000E+00
 J-K .724E-03 .102E-01 .425E-03 .000E+00 .000E+00 .801E+03 .181E+04 .867E+03 .195E+02 .000E+00 .000E+00
 K-L .461E-03 .103E-01 .929E-04 .000E+00 .000E+00 .856E+03 .185E+04 .899E+03 .427E+01 .000E+00 .000E+00
 L-I .724E-03 .105E-01 .203E-03 .000E+00 .000E+00 .820E+03 .185E+04 .886E+03 .934E+01 .000E+00 .000E+00
 39 CEN .115E-02 .100E-01 .463E-03 .000E+00 .000E+00 .828E+03 .181E+04 .929E+03 .203E+02 .000E+00 .000E+00
 I-J .150E-02 .101E-01 .356E-03 .000E+00 .000E+00 .766E+03 .178E+04 .897E+03 .156E+02 .000E+00 .000E+00
 J-K .115E-02 .995E-02 .333E-03 .000E+00 .000E+00 .821E+03 .179E+04 .922E+03 .146E+02 .000E+00 .000E+00
 K-L .671E-03 .996E-02 .612E-03 .000E+00 .000E+00 .915E+03 .185E+04 .974E+03 .268E+02 .000E+00 .000E+00
 L-I .115E-02 .101E-01 .592E-03 .000E+00 .000E+00 .836E+03 .182E+04 .936E+03 .259E+02 .000E+00 .000E+00
 40 CEN .821E-03 .977E-02 .768E-03 .000E+00 .000E+00 .837E+03 .182E+04 .913E+03 .357E+02 .000E+00 .000E+00
 I-J .116E-02 .977E-02 .873E-03 .000E+00 .000E+00 .771E+03 .179E+04 .879E+03 .405E+02 .000E+00 .000E+00
 J-K .821E-03 .977E-02 .636E-03 .000E+00 .000E+00 .837E+03 .182E+04 .913E+03 .295E+02 .000E+00 .000E+00
 K-L .363E-03 .977E-02 .627E-03 .000E+00 .000E+00 .926E+03 .187E+04 .960E+03 .291E+02 .000E+00 .000E+00
 L-I .821E-03 .977E-02 .900E-03 .000E+00 .000E+00 .837E+03 .182E+04 .913E+03 .418E+02 .000E+00 .000E+00
 41 CEN .567E-03 .946E-02 .721E-03 .000E+00 .000E+00 .824E+03 .179E+04 .878E+03 .346E+02 .000E+00 .000E+00
 I-J .105E-02 .948E-02 .815E-03 .000E+00 .000E+00 .733E+03 .174E+04 .834E+03 .392E+02 .000E+00 .000E+00
 J-K .567E-03 .938E-02 .255E-03 .000E+00 .000E+00 .817E+03 .177E+04 .871E+03 .123E+02 .000E+00 .000E+00
 K-L .109E-03 .943E-02 .631E-03 .000E+00 .000E+00 .911E+03 .183E+04 .921E+03 .303E+02 .000E+00 .000E+00
 L-I .567E-03 .953E-02 .119E-02 .000E+00 .000E+00 .831E+03 .180E+04 .886E+03 .570E+02 .000E+00 .000E+00
 42 CEN .898E-03 .100E-01 .163E-03 .000E+00 .000E+00 .820E+03 .186E+04 .905E+03 .781E+01 .000E+00 .000E+00
 I-J .121E-02 .984E-02 .889E-03 .000E+00 .000E+00 .740E+03 .180E+04 .856E+03 .425E+02 .000E+00 .000E+00
 J-K .898E-03 .107E-01 .183E-03 .000E+00 .000E+00 .888E+03 .200E+04 .974E+03 .876E+01 .000E+00 .000E+00
 K-L .602E-03 .102E-01 .515E-03 .000E+00 .000E+00 .894E+03 .193E+04 .952E+03 .246E+02 .000E+00 .000E+00
 L-I .898E-03 .934E-02 .510E-03 .000E+00 .000E+00 .751E+03 .173E+04 .837E+03 .244E+02 .000E+00 .000E+00
 43 CEN .158E-02 .880E-02 .674E-03 .000E+00 .000E+00 .505E+03 .122E+04 .614E+03 .233E+02 .000E+00 .000E+00
 I-J .137E-02 .917E-02 .877E-03 .000E+00 .000E+00 .569E+03 .130E+04 .664E+03 .304E+02 .000E+00 .000E+00
 J-K .148E-02 .773E-02 .103E-03 .000E+00 .000E+00 .430E+03 .107E+04 .533E+03 .358E+01 .000E+00 .000E+00
 K-L .178E-02 .843E-02 .221E-02 .000E+00 .000E+00 .442E+03 .115E+04 .566E+03 .764E+02 .000E+00 .000E+00
 L-I .172E-02 .103E-01 .151E-02 .000E+00 .000E+00 .615E+03 .145E+04 .734E+03 .522E+02 .000E+00 .000E+00
 44 CEN .177E-02 .939E-02 .505E-03 .000E+00 .000E+00 .532E+03 .131E+04 .655E+03 .176E+02 .000E+00 .000E+00
 I-J .172E-02 .917E-02 .100E-02 .000E+00 .000E+00 .521E+03 .128E+04 .641E+03 .349E+02 .000E+00 .000E+00
 J-K .179E-02 .116E-01 .135E-02 .000E+00 .000E+00 .715E+03 .165E+04 .840E+03 .471E+02 .000E+00 .000E+00
 K-L .180E-02 .958E-02 .176E-02 .000E+00 .000E+00 .542E+03 .134E+04 .668E+03 .613E+02 .000E+00 .000E+00
 L-I .175E-02 .774E-02 .136E-03 .000E+00 .000E+00 .394E+03 .106E+04 .515E+03 .473E+01 .000E+00 .000E+00

45 CEN -.137E-02 -.970E-03 -.151E-02 .000E+00 .000E+00 -.202E+03 -.172E+03 -.978E+02 -.576E+02 .000E+00 .000E+00
I-J -.126E-02 -.132E-02 -.159E-02 .000E+00 .000E+00 -.204E+03 -.209E+03 -.108E+03 -.609E+02 .000E+00 .000E+00
J-K -.138E-02 -.119E-02 -.168E-02 .000E+00 .000E+00 -.213E+03 -.198E+03 -.107E+03 -.641E+02 .000E+00 .000E+00
K-L -.161E-02 -.188E-03 -.131E-02 .000E+00 .000E+00 -.198E+03 -.895E+02 -.751E+02 -.501E+02 .000E+00 .000E+00
L-I -.136E-02 -.724E-03 -.132E-02 .000E+00 .000E+00 -.191E+03 -.142E+03 -.869E+02 -.503E+02 .000E+00 .000E+00
46 CEN -.110E-02 -.337E-02 -.202E-02 .000E+00 .000E+00 -.272E+03 -.427E+03 -.196E+03 -.692E+02 .000E+00 .000E+00
I-J -.593E-03 -.385E-02 -.241E-02 .000E+00 .000E+00 -.236E+03 -.458E+03 -.195E+03 -.823E+02 .000E+00 .000E+00
J-K -.115E-02 -.377E-02 -.266E-02 .000E+00 .000E+00 -.295E+03 -.474E+03 -.216E+03 -.910E+02 .000E+00 .000E+00
K-L -.215E-02 -.238E-02 -.123E-02 .000E+00 .000E+00 -.346E+03 -.362E+03 -.199E+03 -.422E+02 .000E+00 .000E+00
L-I -.105E-02 -.292E-02 -.132E-02 .000E+00 .000E+00 -.246E+03 -.374E+03 -.174E+03 -.451E+02 .000E+00 .000E+00
47 CEN .657E-05 -.613E-02 -.289E-02 .000E+00 .000E+00 -.320E+03 -.714E+03 -.320E+03 -.930E+02 .000E+00 .000E+00
I-J .589E-03 -.638E-02 -.281E-02 .000E+00 .000E+00 -.265E+03 -.714E+03 -.303E+03 -.903E+02 .000E+00 .000E+00
J-K .589E-04 -.656E-02 -.353E-02 .000E+00 .000E+00 -.350E+03 -.768E+03 -.346E+03 -.113E+03 .000E+00 .000E+00
K-L -.362E-02 -.453E-02 -.341E-02 .000E+00 .000E+00 -.659E+03 -.718E+03 -.426E+03 -.110E+03 .000E+00 .000E+00
L-I .745E-04 .568E-02 -.223E-02 .000E+00 .000E+00 -.288E+03 -.659E+03 -.293E+03 -.719E+02 .000E+00 .000E+00
48 CEN .426E-03 -.693E-02 -.139E-03 .000E+00 .000E+00 -.325E+03 -.784E+03 -.352E+03 -.434E+01 .000E+00 .000E+00
I-J .906E-03 -.686E-02 -.113E-02 .000E+00 .000E+00 -.265E+03 -.750E+03 -.322E+03 -.353E+02 .000E+00 .000E+00
J-K .426E-03 -.670E-02 -.254E-03 .000E+00 .000E+00 -.313E+03 -.757E+03 -.339E+03 -.793E+01 .000E+00 .000E+00
K-L -.168E-02 -.724E-02 .420E-02 .000E+00 .000E+00 -.587E+03 -.934E+03 -.482E+03 .131E+03 .000E+00 .000E+00
L-I .426E-03 -.716E-02 -.238E-04 .000E+00 .000E+00 -.337E+03 -.811E+03 -.364E+03 -.743E+00 .000E+00 .000E+00
49 CEN -.230E-03 -.625E-02 .834E-03 .000E+00 .000E+00 -.345E+03 -.734E+03 -.330E+03 .270E+02 .000E+00 .000E+00
I-J .461E-03 -.634E-02 -.115E-03 .000E+00 .000E+00 -.269E+03 -.709E+03 -.299E+03 -.372E+01 .000E+00 .000E+00
J-K -.230E-03 -.582E-02 .542E-03 .000E+00 .000E+00 -.323E+03 -.684E+03 -.308E+03 .175E+02 .000E+00 .000E+00
K-L -.130E-02 -.610E-02 .230E-02 .000E+00 .000E+00 -.460E+03 -.771E+03 -.377E+03 .743E+02 .000E+00 .000E+00
L-I -.230E-03 -.667E-02 .113E-02 .000E+00 .000E+00 -.366E+03 -.783E+03 -.351E+03 .364E+02 .000E+00 .000E+00
50 CEN .578E-04 -.556E-02 .973E-03 .000E+00 .000E+00 -.336E+03 -.679E+03 -.340E+03 .296E+02 .000E+00 .000E+00
I-J .671E-03 -.570E-02 .502E-03 .000E+00 .000E+00 -.269E+03 -.657E+03 -.310E+03 .153E+02 .000E+00 .000E+00
J-K .578E-04 -.540E-02 .808E-03 .000E+00 .000E+00 -.326E+03 -.659E+03 -.330E+03 .246E+02 .000E+00 .000E+00
K-L -.947E-03 -.535E-02 .175E-02 .000E+00 .000E+00 -.446E+03 -.714E+03 -.388E+03 .532E+02 .000E+00 .000E+00
L-I .578E-04 -.573E-02 .114E-02 .000E+00 .000E+00 -.346E+03 -.699E+03 -.350E+03 .347E+02 .000E+00 .000E+00
51 CEN -.254E-03 -.505E-02 .107E-02 .000E+00 .000E+00 -.331E+03 -.639E+03 -.315E+03 .343E+02 .000E+00 .000E+00
I-J .363E-03 -.528E-02 .547E-03 .000E+00 .000E+00 -.269E+03 -.631E+03 -.292E+03 .176E+02 .000E+00 .000E+00
J-K -.254E-03 -.484E-02 .892E-03 .000E+00 .000E+00 -.319E+03 -.613E+03 -.303E+03 .286E+02 .000E+00 .000E+00
K-L -.120E-02 -.469E-02 .188E-02 .000E+00 .000E+00 -.427E+03 -.651E+03 -.350E+03 .602E+02 .000E+00 .000E+00
L-I -.254E-03 -.526E-02 .125E-02 .000E+00 .000E+00 -.344E+03 -.665E+03 -.327E+03 .400E+02 .000E+00 .000E+00
52 CEN -.200E-03 -.491E-02 .539E-03 .000E+00 .000E+00 -.312E+03 -.619E+03 -.299E+03 .176E+02 .000E+00 .000E+00
I-J .109E-03 -.489E-02 .695E-03 .000E+00 .000E+00 -.273E+03 -.599E+03 -.280E+03 .226E+02 .000E+00 .000E+00
J-K -.200E-03 -.496E-02 .225E-03 .000E+00 .000E+00 -.315E+03 -.625E+03 -.302E+03 .733E+01 .000E+00 .000E+00
K-L -.497E-03 -.493E-02 .389E-03 .000E+00 .000E+00 -.350E+03 -.639E+03 -.318E+03 .127E+02 .000E+00 .000E+00
L-I -.200E-03 -.486E-02 .853E-03 .000E+00 .000E+00 -.309E+03 -.613E+03 -.296E+03 .278E+02 .000E+00 .000E+00
53 CEN -.342E-03 -.397E-02 .632E-03 .000E+00 .000E+00 -.278E+03 -.513E+03 -.256E+03 -.205E+02 .000E+00 .000E+00
I-J .602E-03 -.419E-02 .112E-02 .000E+00 .000E+00 -.174E+03 -.484E+03 -.213E+03 -.363E+02 .000E+00 .000E+00
J-K -.342E-03 -.307E-02 .174E-02 .000E+00 .000E+00 -.225E+03 -.401E+03 -.203E+03 -.563E+02 .000E+00 .000E+00
K-L -.123E-02 -.376E-02 .172E-03 .000E+00 .000E+00 -.376E+03 -.539E+03 -.296E+03 -.557E+01 .000E+00 .000E+00
L-I -.342E-03 -.486E-02 .474E-03 .000E+00 .000E+00 -.331E+03 -.624E+03 -.309E+03 .153E+02 .000E+00 .000E+00
54 CEN .306E-02 -.354E-02 -.350E-02 .000E+00 .000E+00 -.383E+03 -.507E+03 -.440E+03 -.329E+02 .000E+00 .000E+00
I-J .301E-02 -.358E-02 -.369E-02 .000E+00 .000E+00 -.473E+03 -.597E+03 -.530E+03 -.347E+02 .000E+00 .000E+00
J-K .258E-02 .265E-03 -.395E-02 .000E+00 .000E+00 .270E+04 .265E+04 .265E+04 -.372E+02 .000E+00 .000E+00
K-L .312E-02 -.349E-02 -.331E-02 .000E+00 .000E+00 -.294E+03 -.418E+03 -.353E+03 -.312E+02 .000E+00 .000E+00
L-I .309E-02 -.373E-02 -.348E-02 .000E+00 .000E+00 .541E+03 .670E+03 .599E+03 .327E+02 .000E+00 .000E+00
55 CEN .184E-02 -.222E-02 .191E-02 .000E+00 .000E+00 -.327E+03 -.404E+03 -.362E+03 .182E+02 .000E+00 .000E+00
I-J .182E-02 -.222E-02 .199E-02 .000E+00 .000E+00 -.338E+03 -.415E+03 -.373E+03 .189E+02 .000E+00 .000E+00
J-K .184E-02 -.236E-02 .190E-02 .000E+00 .000E+00 -.455E+03 -.535E+03 -.490E+03 .181E+02 .000E+00 .000E+00
K-L .185E-02 -.222E-02 .184E-02 .000E+00 .000E+00 -.316E+03 -.393E+03 -.351E+03 .175E+02 .000E+00 .000E+00
L-I .174E-02 .265E-03 .215E-02 .000E+00 .000E+00 .192E+04 .189E+04 .189E+04 .205E+02 .000E+00 .000E+00

**BANDWIDTH OF MATRIX = 60 IN INCR= 2

SOLUTION CONVERGED AFTER 6 ITERATIONS
RESULTING ERROR IS .10363E+00

DISPLACEMENTS AT NODES

NODE	X-TRAN	Y-TRAN	Z-TRAN	X-ROT	Y-ROT	Z-ROT
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1	.18456E-01	-.29074E-01	.46855E-02	.48055E-04	-.32204E-03	-.65316E-02
2	-.16651E-01	-.36111E+00	.19014E-01	.00000E+00	.00000E+00	.00000E+00
3	.16029E-01	-.41198E+00	.41978E-02	.00000E+00	.00000E+00	.00000E+00
4	.44299E-02	-.45556E+00	-.68087E-02	.00000E+00	.00000E+00	.00000E+00
5	-.24908E-01	-.36028E+00	-.60193E-02	.92226E-04	-.68210E-02	.30232E-01
6	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00
7	-.26124E-03	-.29072E-01	.45478E-02	.48056E-04	-.32204E-03	-.65356E-02
8	-.32647E-01	-.34043E+00	.21387E-01	.00000E+00	.00000E+00	.00000E+00
9	.24858E-02	-.39949E+00	.36158E-02	.00000E+00	.00000E+00	.00000E+00
10	.11820E-01	-.45233E+00	-.71465E-02	.00000E+00	.00000E+00	.00000E+00
11	.10027E-01	-.35014E+00	-.59503E-02	-.30435E-03	-.68215E-02	.11672E-03
12	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00
13	-.19008E-01	-.29069E-01	.44101E-02	.48058E-04	-.32204E-03	-.65549E-02
14	-.43964E-01	-.31236E+00	.29334E-01	.10415E+00	-.18399E-01	-.11034E+00
15	-.69938E-02	-.38614E+00	.23734E-02	-.27870E-01	.85306E-02	.23468E-01
16	.13615E-01	-.43350E+00	-.88556E-02	.41273E-02	.38349E-03	-.64238E-02
17	.10490E-01	-.34993E+00	-.47312E-02	-.30565E-03	-.68215E-02	.11419E-03
18	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00
19	-.37915E-01	-.29065E-01	.42710E-02	.49114E-04	-.32204E-03	-.66039E-02
20	-.68188E-01	-.28478E+00	.19876E-01	.00000E+00	.00000E+00	.00000E+00
21	-.70436E-02	-.35700E+00	.42172E-02	.00000E+00	.00000E+00	.00000E+00
22	.17311E-01	-.38892E+00	-.57076E-02	.00000E+00	.00000E+00	.00000E+00
23	.10810E-01	-.34975E+00	-.38495E-02	-.30781E-03	-.68215E-02	.10854E-03
24	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00
25	-.56881E-01	.85291E-02	.13159E-02	.00000E+00	.00000E+00	.00000E+00
26	-.58525E-01	.10071E-01	.16251E-02	.00000E+00	.00000E+00	.00000E+00
27	-.57014E-01	.11106E-01	.21964E-02	.52500E-04	-.32122E-03	-.66910E-02
28	-.57013E-01	.10695E-02	.26782E-02	.52500E-04	-.32124E-03	-.66913E-02
29	-.57014E-01	-.22768E-02	.28389E-02	.52490E-04	-.32133E-03	-.66936E-02
30	-.57018E-01	-.19016E-01	.36428E-02	.52436E-04	-.32178E-03	-.66962E-02
31	-.57021E-01	-.29060E-01	.41257E-02	.52276E-04	-.32204E-03	-.66948E-02
32	-.32135E-01	-.20256E+00	.84044E-02	.00000E+00	.00000E+00	.00000E+00
33	-.68898E-02	-.31624E+00	.36014E-02	.00000E+00	.00000E+00	.00000E+00
34	.87465E-02	-.33956E+00	-.31680E-02	.00000E+00	.00000E+00	.00000E+00
35	.11133E-01	-.34951E+00	-.29618E-02	-.30937E-03	-.68215E-02	.12355E-03
36	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00
37	-.42017E-01	.31518E-02	.55557E-03	.00000E+00	.00000E+00	.00000E+00
38	-.48674E-01	.51933E-02	.82551E-03	.00000E+00	.00000E+00	.00000E+00
39	-.57986E-01	.76932E-02	.11445E-02	.00000E+00	.00000E+00	.00000E+00
40	-.71665E-01	.52692E-02	.16259E-02	.64025E-04	-.24493E-03	.11575E-02
41	-.74166E-01	-.36445E-02	.17874E-02	.00000E+00	.00000E+00	.00000E+00
42	-.79409E-01	-.22114E-01	.20338E-02	.24233E-03	-.20741E-03	.10866E-03
43	-.77272E-01	-.76510E-01	.21705E-02	.00000E+00	.00000E+00	.00000E+00
44	-.64147E-01	-.12946E+00	.18118E-02	.00000E+00	.00000E+00	.00000E+00
45	-.30974E-01	-.21712E+00	.65979E-03	.00000E+00	.00000E+00	.00000E+00
46	-.13789E-01	-.24643E+00	-.98858E-03	.00000E+00	.00000E+00	.00000E+00
47	.11198E-01	-.34947E+00	-.28009E-02	-.30943E-03	-.68215E-02	.12695E-03
48	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00
49	-.18768E-01	.75400E-04	.21180E-03	.00000E+00	.00000E+00	.00000E+00
50	-.29700E-01	-.45536E-03	.41622E-03	.00000E+00	.00000E+00	.00000E+00
51	-.42069E-01	.75874E-03	.67029E-03	.00000E+00	.00000E+00	.00000E+00
52	-.55950E-01	.45605E-02	.89897E-03	.32643E-04	-.16159E-03	.22156E-02
53	-.63284E-01	-.52863E-02	.94684E-03	.00000E+00	.00000E+00	.00000E+00
54	-.71332E-01	-.18999E-01	.89954E-03	.96944E-04	-.14901E-03	.16833E-02
55	-.67043E-01	-.58216E-01	.76687E-03	.00000E+00	.00000E+00	.00000E+00
56	-.59675E-01	-.89911E-01	.63820E-03	.00000E+00	.00000E+00	.00000E+00
57	-.35802E-01	-.14968E+00	.97376E-04	.00000E+00	.00000E+00	.00000E+00
58	-.11400E-01	-.17071E+00	-.37699E-03	.00000E+00	.00000E+00	.00000E+00
59	.96402E-02	-.16365E+00	-.65779E-03	.00000E+00	.00000E+00	.00000E+00
60	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00
61	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00
62	-.13238E-01	-.23862E-02	.19454E-03	.00000E+00	.00000E+00	.00000E+00
63	-.23488E-01	-.47788E-02	.37970E-03	.00000E+00	.00000E+00	.00000E+00
64	-.28415E-01	.21668E-02	.40282E-03	.44748E-04	-.85480E-04	.39816E-02
65	-.36236E-01	-.64783E-02	.41376E-03	.00000E+00	.00000E+00	.00000E+00
66	-.42543E-01	-.11134E-01	.35459E-03	.67772E-04	-.71207E-04	.55374E-02

67	-.39211E-01	-.36129E-01	.27421E-03	.00000E+00	.00000E+00	.00000E+00
68	-.33964E-01	-.63204E-01	.17967E-03	.00000E+00	.00000E+00	.00000E+00
69	-.20101E-01	-.97123E-01	.20428E-05	.00000E+00	.00000E+00	.00000E+00
70	-.19441E-02	-.10409E+00	-.14323E-03	.00000E+00	.00000E+00	.00000E+00
71	.88963E-02	-.76367E-01	-.12988E-03	.00000E+00	.00000E+00	.00000E+00
72	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00
73	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00
74	-.51650E-02	-.32711E-02	.98478E-04	.00000E+00	.00000E+00	.00000E+00
75	-.65038E-02	-.43635E-02	.17999E-03	.00000E+00	.00000E+00	.00000E+00
76	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00
77	-.35493E-02	-.48614E-02	.98965E-04	.00000E+00	.00000E+00	.00000E+00
78	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00
79	-.98288E-02	-.28622E-01	.43361E-04	.00000E+00	.00000E+00	.00000E+00
80	-.10052E-01	-.45460E-01	.21353E-04	.00000E+00	.00000E+00	.00000E+00
81	-.27750E-02	-.57699E-01	-.23383E-04	.00000E+00	.00000E+00	.00000E+00
82	.64310E-02	-.55346E-01	-.47043E-04	.00000E+00	.00000E+00	.00000E+00
83	.10256E-01	-.36964E-01	-.36965E-04	.00000E+00	.00000E+00	.00000E+00
84	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00
85	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00
86	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00
87	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00
88	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00
89	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00
90	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00
91	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00
92	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00
93	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00
94	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00
95	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00
96	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00	.00000E+00

****HORIZONTAL WALL MOVEMENT****

AT THE TOP = .01846 FT.
 AT THE TIE-ROD = -.01901 FT.
 AT THE BASE = -.05702 FT.

ELEMENT STRAINS AND STRESSES

EL.NO.	LOC	DEXX	DEYY	DGXY	DGXZ	DGYZ	SXX	SYY	SZZ	TXY	TXZ	TYZ
1	CEN	-.150E-03	-.848E-04	-.229E-03	.286E-05	.255E-05	-.290E+04	-.451E+04	-.203E+04	-.879E+02	.232E+00	.207E+00
I-J		.000E+00	-.874E-04	-.138E-03	.000E+00	.263E-05	-.286E+04	-.449E+04	-.201E+04	-.109E+02	.000E+00	.213E+00
J-K		-.151E-03	-.171E-03	-.365E-03	.287E-05	.513E-05	-.299E+04	-.473E+04	-.212E+04	-.990E+02	.233E+00	.416E+00
K-L		-.291E-03	-.824E-04	-.315E-03	.556E-05	.248E-05	-.294E+04	-.452E+04	-.205E+04	-.161E+03	.450E+00	.201E+00
L-I		-.149E-03	.000E+00	-.945E-04	.285E-05	.000E+00	-.281E+04	-.428E+04	-.194E+04	-.770E+02	.231E+00	.000E+00
2	CEN	-.404E-04	-.203E-03	-.344E-03	.239E-05	.732E-05	-.267E+04	-.499E+04	-.219E+04	-.151E+03	.193E+00	.591E+00
I-J		.000E+00	-.206E-03	-.315E-03	.000E+00	.752E-05	-.277E+04	-.506E+04	-.224E+04	-.580E+01	.000E+00	.607E+00
J-K		-.406E-04	-.233E-03	-.381E-03	.241E-05	.950E-05	-.284E+04	-.542E+04	-.237E+04	-.128E+03	.194E+00	.767E+00
K-L		-.784E-04	-.201E-03	-.372E-03	.465E-05	.713E-05	-.257E+04	-.492E+04	-.215E+04	-.288E+03	.375E+00	.576E+00
L-I		-.402E-04	-.174E-03	-.308E-03	.238E-05	.516E-05	-.250E+04	-.456E+04	-.202E+04	-.174E+03	.192E+00	.416E+00
3	CEN	.187E-03	-.136E-03	-.777E-04	-.517E-05	.562E-05	-.240E+04	-.550E+04	-.238E+04	-.966E+02	-.428E+00	.465E+00
I-J		.000E+00	-.119E-03	-.177E-03	.000E+00	.491E-05	-.254E+04	-.561E+04	-.246E+04	.225E+02	.000E+00	.406E+00
J-K		.188E-03	-.210E-04	.947E-04	-.520E-05	.866E-06	-.255E+04	-.586E+04	-.254E+04	-.675E+02	-.430E+00	.717E-01
K-L		.363E-03	-.153E-03	.160E-04	-.100E-04	.629E-05	-.226E+04	-.539E+04	-.231E+04	-.209E+03	-.831E+00	.521E+00
L-I		.186E-03	-.250E-03	-.249E-03	-.515E-05	.103E-04	-.224E+04	-.514E+04	-.223E+04	-.125E+03	-.426E+00	.855E+00
4	CEN	-.195E-03	-.111E-03	-.348E-03	.544E-05	.226E-05	-.243E+04	-.581E+04	-.261E+04	-.860E+02	.410E+00	.170E+00
I-J		.000E+00	-.133E-03	-.972E-04	.000E+00	.271E-05	-.239E+04	-.581E+04	-.260E+04	.188E+02	.000E+00	.205E+00
J-K		-.195E-03	-.266E-03	-.462E-03	.544E-05	.542E-05	-.254E+04	-.604E+04	-.273E+04	-.936E+02	.410E+00	.409E+00
K-L		-.468E-03	-.798E-04	-.699E-03	.131E-04	.162E-05	-.248E+04	-.580E+04	-.263E+04	-.233E+03	.984E+00	.122E+00
L-I		-.195E-03	.445E-04	-.235E-03	.544E-05	-.906E-06	-.231E+04	-.557E+04	-.250E+04	-.785E+02	.410E+00	-.683E-01
5	CEN	.195E-03	-.111E-03	.186E-03	-.544E-05	.226E-05	-.228E+04	-.579E+04	-.269E+04	.149E+01	-.377E+00	.157E+00
I-J		.000E+00	-.133E-03	-.972E-04	.000E+00	.271E-05	-.232E+04	-.581E+04	-.271E+04	.159E+02	.000E+00	.188E+00
J-K		.195E-03	.445E-04	.299E-03	-.544E-05	-.906E-06	-.229E+04	-.582E+04	-.270E+04	.649E+01	-.377E+00	-.628E-01
K-L		.468E-03	-.798E-04	.583E-03	-.131E-04	.162E-05	-.222E+04	-.576E+04	-.266E+04	-.187E+02	-.905E+00	.113E+00
L-I		.195E-03	-.266E-03	.725E-04	-.544E-05	.542E-05	-.227E+04	-.576E+04	-.267E+04	-.351E+01	-.377E+00	.376E+00
6	CEN	-.710E-03	-.117E-02	-.247E-02	.313E-05	.177E-05	-.277E+04	-.640E+04	-.305E+04	-.176E+03	.242E+00	.137E+00

I-J .000E+00 -.784E-03 -.269E-03 .000E+00 .119E-05 -.245E+04 -.614E+04 -.285E+04 -.149E+01 .000E+00 .918E-01
 J-K -.710E-03 -.199E-02 -.275E-02 .313E-05 .302E-05 -.292E+04 -.668E+04 -.320E+04 -.199E+03 .242E+00 .233E+00
 K-L -.149E-02 -.159E-02 -.490E-02 .659E-05 .241E-05 -.313E+04 -.670E+04 -.328E+04 -.368E+03 .509E+00 .186E+00
 L-I -.710E-03 -.345E-03 -.219E-02 .313E-05 .522E-06 -.262E+04 -.612E+04 -.290E+04 -.152E+03 .242E+00 .404E-01
 7 CEN -.170E-04 -.234E-02 -.183E-02 -.168E-05 .137E-05 -.277E+04 -.669E+04 -.314E+04 -.110E+03 -.124E+00 .101E+00
 I-J .000E+00 -.203E-02 -.545E-03 .000E+00 .177E-05 -.270E+04 -.660E+04 -.308E+04 -.255E+02 .000E+00 .131E+00
 J-K -.170E-04 -.285E-02 -.184E-02 -.168E-05 .701E-06 -.285E+04 -.685E+04 -.323E+04 -.111E+03 -.124E+00 .519E-01
 K-L -.380E-04 -.272E-02 -.342E-02 -.375E-05 .866E-06 -.284E+04 -.681E+04 -.321E+04 -.215E+03 -.278E+00 .641E-01
 L-I -.170E-04 -.183E-02 -.182E-02 -.168E-05 .203E-05 -.268E+04 -.654E+04 -.306E+04 -.109E+03 -.124E+00 .151E+00
 8 CEN .481E-03 -.304E-02 -.103E-02 -.296E-05 .835E-06 -.276E+04 -.684E+04 -.317E+04 -.405E+02 -.216E+00 .609E-01
 I-J .000E+00 -.283E-02 -.351E-03 .000E+00 .556E-07 -.288E+04 -.689E+04 -.323E+04 -.181E+02 .000E+00 .405E-02
 J-K .481E-03 -.336E-02 -.843E-03 -.296E-05 .201E-05 -.279E+04 -.691E+04 -.321E+04 -.276E+02 -.216E+00 .147E+00
 K-L .926E-03 -.324E-02 -.166E-02 -.569E-05 .156E-05 -.264E+04 -.681E+04 -.311E+04 -.613E+02 -.415E+00 .113E+00
 L-I .481E-03 -.272E-02 -.123E-02 -.296E-05 .342E-06 -.272E+04 -.678E+04 -.313E+04 .535E+02 .216E+00 .249E-01
 9 CEN .592E-03 -.306E-02 .381E-03 .152E-05 .226E-05 .274E+04 .684E+04 .313E+04 .523E+02 .111E+00 .166E+00
 I-J .000E+00 -.310E-02 .100E-03 .000E+00 .193E-05 .295E+04 .698E+04 .326E+04 .777E+01 .000E+00 .141E+00
 J-K .592E-03 .300E-02 .617E-03 .152E-05 .287E-05 .272E+04 .678E+04 .311E+04 .692E+02 .111E+00 .210E+00
 K-L .111E-02 .304E-02 .627E-03 .285E-05 .255E-05 .256E+04 .672E+04 .303E+04 .914E+02 .209E+00 .187E+00
 L-I .592E-03 .312E-02 .146E-03 .152E-05 .166E-05 .277E+04 .689E+04 .316E+04 .355E+02 .111E+00 .121E+00
 10 CEN .246E-03 .234E-02 .168E-02 .648E-06 .220E-05 .273E+04 .665E+04 .305E+04 .146E+03 .490E-01 .166E+00
 I-J .000E+00 .253E-02 .457E-03 .000E+00 .230E-05 .287E+04 .678E+04 .314E+04 .322E+02 .000E+00 .174E+00
 J-K .246E-03 .187E-02 .178E-02 .648E-06 .194E-05 .263E+04 .646E+04 .295E+04 .154E+03 .490E-01 .146E+00
 K-L .462E-03 .217E-02 .275E-02 .122E-05 .210E-05 .262E+04 .654E+04 .297E+04 .245E+03 .919E-01 .159E+00
 L-I .246E-03 .281E-02 .158E-02 .648E-06 .245E-05 .284E+04 .684E+04 .315E+04 .137E+03 .490E-01 .185E+00
 11 CEN .604E-03 .867E-03 .242E-02 .218E-05 .867E-06 .277E+04 .632E+04 .292E+04 .209E+03 .176E+00 .700E-01
 I-J .000E+00 .101E-02 .281E-03 .000E+00 .101E-05 .260E+04 .627E+04 .285E+04 .209E+02 .000E+00 .818E-01
 J-K .604E-03 .000E+00 .218E-02 .218E-05 .000E+00 .260E+04 .600E+04 .275E+04 .191E+03 .176E+00 .000E+00
 K-L .106E-02 .757E-03 .402E-02 .381E-05 .757E-06 .289E+04 .635E+04 .298E+04 .350E+03 .307E+00 .612E-01
 L-I .604E-03 .173E-02 .266E-02 .218E-05 .173E-05 .293E+04 .663E+04 .309E+04 .227E+03 .176E+00 .140E+00
 12 CEN .532E-03 .280E-04 .381E-03 .838E-05 .267E-05 .152E+04 .196E+04 .970E+03 .183E+03 .544E+00 .173E+00
 I-J .292E-03 .284E-04 .414E-03 .556E-05 .271E-05 .158E+04 .198E+04 .991E+03 .789E+02 .361E+00 .176E+00
 J-K .559E-03 .617E-04 .651E-03 .870E-05 .588E-05 .166E+04 .234E+04 .112E+04 .174E+03 .564E+00 .382E+00
 K-L .765E-03 .276E-04 .349E-03 .111E-04 .263E-05 .147E+04 .193E+04 .950E+03 .284E+03 .721E+00 .171E+00
 L-I .510E-03 .000E+00 .157E-03 .811E-05 .000E+00 .140E+04 .164E+04 .850E+03 .190E+03 .526E+00 .000E+00
 13 CEN .408E-03 .220E-04 .969E-03 .839E-05 .101E-04 .170E+04 .292E+04 .136E+04 .280E+03 .586E+00 .708E+00
 I-J .844E-04 .201E-04 .954E-03 .468E-05 .103E-04 .165E+04 .291E+04 .134E+04 .180E+03 .327E+00 .722E+00
 J-K .454E-03 .255E-04 .144E-02 .892E-05 .154E-04 .191E+04 .342E+04 .156E+04 .315E+03 .623E+00 .108E+01
 K-L .720E-03 .237E-04 .984E-03 .120E-04 .994E-05 .175E+04 .293E+04 .138E+04 .376E+03 .836E+00 .695E+00
 L-I .371E-03 .598E-04 .597E-03 .797E-05 .591E-05 .153E+04 .253E+04 .119E+04 .252E+03 .557E+00 .413E+00
 14 CEN .165E-03 .441E-04 .178E-02 .153E-05 .282E-04 .170E+04 .367E+04 .169E+04 .280E+03 .116E+00 .214E+01
 I-J .343E-03 .526E-04 .191E-02 .981E-05 .292E-04 .160E+04 .364E+04 .164E+04 .233E+03 .742E+00 .221E+01
 J-K .262E-03 .182E-03 .274E-02 .492E-07 .441E-04 .189E+04 .404E+04 .186E+04 .348E+03 .372E-02 .334E+01
 K-L .648E-03 .360E-04 .165E-02 .635E-05 .273E-04 .181E+04 .370E+04 .173E+04 .326E+03 .480E+00 .207E+01
 L-I .924E-04 .589E-04 .106E-02 .271E-05 .164E-04 .157E+04 .340E+04 .156E+04 .230E+03 .205E+00 .124E+01
 15 CEN .865E-03 .876E-04 .433E-02 .836E-05 .389E-04 .192E+04 .410E+04 .196E+04 .405E+03 .617E+00 .287E+01
 I-J .468E-03 .660E-04 .396E-02 .131E-04 .386E-04 .179E+04 .404E+04 .190E+04 .367E+03 .963E+00 .285E+01
 J-K .865E-03 .234E-03 .466E-02 .836E-05 .350E-04 .199E+04 .422E+04 .202E+04 .433E+03 .617E+00 .258E+01
 K-L .141E-02 .117E-03 .482E-02 .197E-05 .392E-04 .210E+04 .417E+04 .204E+04 .456E+03 .145E+00 .289E+01
 L-I .865E-03 .409E-03 .400E-02 .836E-05 .428E-04 .186E+04 .397E+04 .189E+04 .376E+03 .617E+00 .315E+01
 16 CEN .195E-03 .697E-03 .413E-02 .112E-04 .354E-04 .184E+04 .428E+04 .206E+04 .307E+03 .765E+00 .243E+01
 I-J .468E-03 .628E-03 .343E-02 .131E-04 .352E-04 .155E+04 .411E+04 .191E+04 .234E+03 .893E+00 .241E+01
 J-K .195E-03 .122E-02 .468E-02 .112E-04 .370E-04 .195E+04 .450E+04 .218E+04 .362E+03 .765E+00 .253E+01
 K-L .961E-03 .777E-03 .494E-02 .902E-05 .357E-04 .217E+04 .447E+04 .224E+04 .392E+03 .617E+00 .244E+01
 L-I .195E-03 .176E-03 .358E-02 .112E-04 .339E-04 .172E+04 .405E+04 .195E+04 .252E+03 .765E+00 .232E+01
 17 CEN .593E-03 .243E-02 .900E-02 .338E-05 .311E-04 .222E+04 .489E+04 .243E+04 .635E+03 .245E+00 .226E+01
 I-J .149E-02 .227E-02 .872E-02 .659E-05 .340E-04 .243E+04 .495E+04 .251E+04 .592E+03 .478E+00 .246E+01
 J-K .593E-03 .282E-02 .835E-02 .338E-05 .239E-04 .232E+04 .507E+04 .252E+04 .592E+03 .245E+00 .174E+01
 K-L .761E-03 .266E-02 .943E-02 .184E-04 .268E-04 .191E+04 .481E+04 .229E+04 .700E+03 .133E+01 .194E+01
 L-I .593E-03 .204E-02 .965E-02 .338E-05 .383E-04 .213E+04 .471E+04 .233E+04 .678E+03 .245E+00 .278E+01
 18 CEN .485E-03 .344E-02 .693E-02 .113E-04 .159E-04 .209E+04 .508E+04 .244E+04 .421E+03 .760E+00 .107E+01
 I-J .380E-04 .277E-02 .581E-02 .375E-05 .195E-04 .210E+04 .494E+04 .239E+04 .335E+03 .253E+00 .132E+01
 J-K .485E-03 .432E-02 .659E-02 .113E-04 .110E-04 .224E+04 .535E+04 .258E+04 .403E+03 .760E+00 .746E+00
 K-L .117E-02 .431E-02 .839E-02 .211E-04 .111E-04 .208E+04 .527E+04 .249E+04 .533E+03 .142E+01 .751E+00
 L-I .485E-03 .255E-02 .726E-02 .113E-04 .207E-04 .195E+04 .481E+04 .229E+04 .439E+03 .760E+00 .140E+01
 19 CEN .130E-02 .462E-02 .441E-02 .136E-04 .289E-05 .205E+04 .527E+04 .248E+04 .221E+03 .878E+00 .186E+00
 I-J .926E-03 .395E-02 .333E-02 .569E-05 .707E-05 .204E+04 .513E+04 .243E+04 .151E+03 .367E+00 .456E+00
 J-K .130E-02 .572E-02 .409E-02 .136E-04 .394E-05 .222E+04 .558E+04 .265E+04 .203E+03 .878E+00 .254E+00

K-L .164E-02 -.524E-02 -.540E-02 -.210E-04 -.991E-06 -.206E+04 -.540E+04 -.253E+04 -.285E+03 -.135E+01 -.639E-01
L-I .130E-02 -.353E-02 -.472E-02 -.136E-04 .972E-05 -.189E+04 -.496E+04 -.231E+04 -.238E+03 -.878E+00 .627E+00
20 CEN .155E-02 -.495E-02 -.990E-03 -.960E-05 -.808E-05 -.203E+04 -.530E+04 -.246E+04 -.432E+01 -.616E+00 -.518E+00
I-J .111E-02 -.471E-02 -.638E-03 -.285E-05 -.513E-05 -.212E+04 -.532E+04 -.250E+04 .268E+01 -.183E+00 -.329E+00
J-K .155E-02 -.544E-02 -.587E-03 -.960E-05 -.142E-04 -.208E+04 -.538E+04 -.251E+04 .191E+02 -.616E+00 -.911E+00
K-L .195E-02 -.516E-02 -.130E-02 -.156E-04 -.107E-04 -.195E+04 -.527E+04 -.243E+04 -.106E+02 -.100E+01 -.687E+00
L-I .155E-02 -.445E-02 -.139E-02 -.960E-05 -.195E-05 -.198E+04 -.522E+04 -.242E+04 .277E+02 -.616E+00 -.125E+00
21 CEN .833E-03 -.398E-02 .236E-02 .133E-05 -.993E-05 -.209E+04 -.520E+04 -.242E+04 .187E+03 .891E-01 -.665E+00
I-J .462E-03 -.411E-02 .183E-02 .122E-05 -.997E-05 -.221E+04 -.529E+04 -.249E+04 .153E+03 .814E-01 -.667E+00
J-K .833E-03 -.362E-02 .269E-02 .133E-05 -.983E-05 -.203E+04 -.509E+04 -.237E+04 .207E+03 .891E-01 -.658E+00
K-L .116E-02 -.386E-02 .282E-02 .143E-05 -.990E-05 -.199E+04 -.512E+04 -.236E+04 .218E+03 .960E-01 -.662E+00
L-I .833E-03 -.434E-02 .202E-02 .133E-05 -.100E-04 -.215E+04 -.531E+04 -.248E+04 .167E+03 .891E-01 -.672E+00
22 CEN -.876E-03 -.146E-02 .499E-02 .763E-05 -.407E-05 -.218E+04 -.471E+04 -.227E+04 .403E+03 .573E+00 -.305E+00
I-J -.106E-02 -.165E-02 .359E-02 .381E-05 -.458E-05 -.228E+04 -.481E+04 -.233E+04 .287E+03 .286E+00 -.344E+00
J-K -.876E-03 .000E+00 .518E-02 .763E-05 .000E+00 -.194E+04 -.423E+04 .202E+04 .420E+03 .573E+00 .000E+00
K-L -.732E-03 -.132E-02 .611E-02 .107E-04 -.366E-05 -.211E+04 -.464E+04 -.221E+04 .495E+03 .802E+00 -.275E+00
L-I -.876E-03 -.293E-02 .480E-02 .763E-05 -.813E-05 -.243E+04 -.520E+04 -.251E+04 .385E+03 .573E+00 -.611E+00
23 CEN -.910E-03 .258E-03 -.882E-03 .135E-04 .531E-05 -.617E+03 -.616E+03 -.349E+03 -.160E+03 .561E+00 .221E+00
I-J -.888E-03 .315E-03 -.956E-03 .122E-04 .822E-05 .731E+03 -.862E+03 -.451E+03 -.113E+03 .505E+00 .342E+00
J-K -.921E-03 .334E-03 -.933E-03 .142E-04 .921E-05 -.732E+03 -.931E+03 -.471E+03 -.159E+03 .590E+00 .383E+00
K-L -.940E-03 .179E-03 -.779E-03 .154E-04 .126E-05 .458E+03 -.273E+03 -.207E+03 -.225E+03 .639E+00 .524E-01
L-I -.898E-03 .180E-03 -.830E-03 .128E-04 .129E-05 .498E+03 -.291E+03 -.224E+03 -.160E+03 .531E+00 .536E-01
24 CEN -.936E-03 .452E-03 -.121E-02 .165E-04 .150E-04 -.111E+04 -.169E+04 -.840E+03 -.299E+03 .970E+00 .885E+00
I-J -.819E-03 .539E-03 -.142E-02 .136E-04 .185E-04 .118E+04 -.181E+04 -.895E+03 -.264E+03 .797E+00 .109E+01
J-K -.987E-03 .633E-03 -.147E-02 .178E-04 .222E-04 -.120E+04 -.192E+04 -.933E+03 -.295E+03 .105E+01 .131E+01
K-L -.110E-02 .331E-03 -.921E-03 .206E-04 .102E-04 -.102E+04 -.153E+04 -.762E+03 -.346E+03 .121E+01 .602E+00
L-I -.883E-03 .265E-03 -.952E-03 .152E-04 .761E-05 -.102E+04 -.146E+04 -.743E+03 -.303E+03 .892E+00 .448E+00
25 CEN -.992E-03 .285E-03 -.185E-02 .149E-04 .391E-04 .141E+04 -.265E+04 -.131E+04 -.310E+03 .107E+01 .280E+01
I-J -.710E-03 .266E-03 .194E-02 .905E-05 .418E-04 .141E+04 -.269E+04 -.132E+04 -.285E+03 .648E+00 .299E+01
J-K -.110E-02 .200E-03 .246E-02 .171E-04 .515E-04 .153E+04 .289E+04 .143E+04 .338E+03 .123E+01 .369E+01
K-L -.138E-02 .310E-03 .173E-02 .229E-04 .354E-04 .141E+04 .259E+04 .129E+04 .345E+03 .164E+01 .254E+01
L-I -.882E-03 .372E-03 .122E-02 .126E-04 .263E-04 .129E+04 .240E+04 .119E+04 .281E+03 .904E+00 .189E+01
26 CEN -.161E-02 .342E-03 .483E-02 .623E-05 .559E-04 .165E+04 .302E+04 .154E+04 .443E+03 .462E+00 .415E+01
I-J -.141E-02 .312E-03 .444E-02 .197E-05 .563E-04 .161E+04 .300E+04 .152E+04 .398E+03 .146E+00 .417E+01
J-K -.161E-02 .948E-04 .495E-02 .623E-05 .585E-04 .170E+04 .312E+04 .158E+04 .452E+03 .462E+00 .434E+01
K-L -.189E-02 .385E-03 .539E-02 .124E-04 .555E-04 .172E+04 .303E+04 .156E+04 .508E+03 .916E+00 .411E+01
L-I -.161E-02 .589E-03 .471E-02 .623E-05 .533E-04 .160E+04 .291E+04 .149E+04 .434E+03 .462E+00 .395E+01
27 CEN -.122E-02 .510E-03 .473E-02 .905E-05 .582E-04 .164E+04 .320E+04 .161E+04 .377E+03 .657E+00 .423E+01
I-J -.961E-03 .431E-03 .386E-02 .902E-05 .582E-04 .151E+04 .311E+04 .154E+04 .301E+03 .655E+00 .423E+01
J-K -.122E-02 .112E-02 .492E-02 .905E-05 .582E-04 .174E+04 .339E+04 .170E+04 .400E+03 .657E+00 .423E+01
K-L .155E-02 .609E-03 .584E-02 .908E-05 .582E-04 .181E+04 .330E+04 .170E+04 .472E+03 .659E+00 .423E+01
L-I -.122E-02 .102E-03 .455E-02 .905E-05 .583E-04 .155E+04 .300E+04 .152E+04 .354E+03 .657E+00 .423E+01
28 CEN .977E-03 .345E-02 .111E-01 .273E-04 .509E-04 .148E+04 .365E+04 .179E+04 .636E+03 .158E+01 .294E+01
I-J .761E-03 .289E-02 .864E-02 .184E-04 .528E-04 .141E+04 .351E+04 .172E+04 .484E+03 .106E+01 .305E+01
J-K .977E-03 .466E-02 .110E-01 .273E-04 .466E-04 .164E+04 .396E+04 .195E+04 .635E+03 .158E+01 .269E+01
K-L .125E-02 .416E-02 .143E-01 .388E-04 .484E-04 .156E+04 .383E+04 .188E+04 .830E+03 .224E+01 .279E+01
L-I .977E-03 .223E-02 .112E-01 .273E-04 .552E-04 .131E+04 .334E+04 .163E+04 .637E+03 .158E+01 .319E+01
29 CEN .157E-02 .503E-02 .974E-02 .278E-04 .432E-04 .155E+04 .399E+04 .191E+04 .516E+03 .159E+01 .247E+01
I-J .117E-02 .462E-02 .860E-02 .211E-04 .453E-04 .152E+04 .390E+04 .187E+04 .438E+03 .121E+01 .260E+01
J-K .157E-02 .566E-02 .954E-02 .278E-04 .399E-04 .164E+04 .416E+04 .200E+04 .513E+03 .159E+01 .228E+01
K-L .207E-02 .555E-02 .112E-01 .362E-04 .405E-04 .159E+04 .411E+04 .196E+04 .615E+03 .207E+01 .232E+01
L-I .157E-02 .441E-02 .993E-02 .278E-04 .464E-04 .146E+04 .382E+04 .182E+04 .520E+03 .159E+01 .266E+01
30 CEN .218E-02 .624E-02 .691E-02 .415E-04 .158E-04 .158E+04 .428E+04 .200E+04 .359E+03 .242E+01 .923E+00
I-J .164E-02 .575E-02 .570E-02 .210E-04 .230E-04 .156E+04 .418E+04 .196E+04 .273E+03 .123E+01 .134E+01
J-K .218E-02 .754E-02 .641E-02 .415E-04 .321E-05 .177E+04 .464E+04 .219E+04 .348E+03 .242E+01 .187E+00
K-L .269E-02 .671E-02 .807E-02 .610E-04 .892E-05 .160E+04 .438E+04 .204E+04 .441E+03 .357E+01 .521E+00
L-I .218E-02 .495E-02 .741E-02 .415E-04 .348E-04 .139E+04 .393E+04 .181E+04 .369E+03 .242E+01 .203E+01
31 CEN .220E-02 .695E-02 .219E-02 .321E-04 .169E-04 .163E+04 .440E+04 .205E+04 .748E+02 .187E+01 .987E+00
I-J .195E-02 .675E-02 .156E-02 .156E-04 .121E-04 .164E+04 .437E+04 .205E+04 .456E+02 .908E+00 .707E+00
J-K .220E-02 .767E-02 .193E-02 .321E-04 .338E-04 .171E+04 .454E+04 .213E+04 .692E+02 .187E+01 .197E+01
K-L .244E-02 .714E-02 .277E-02 .474E-04 .214E-04 .163E+04 .442E+04 .206E+04 .102E+03 .276E+01 .125E+01
L-I .220E-02 .624E-02 .245E-02 .321E-04 .115E-06 .156E+04 .426E+04 .198E+04 .805E+02 .187E+01 .669E-02
32 CEN .167E-02 .626E-02 .310E-02 .609E-05 .348E-04 .158E+04 .414E+04 .194E+04 .194E+03 .351E+00 .201E+01
I-J .116E-02 .630E-02 .279E-02 .143E-05 .335E-04 .172E+04 .422E+04 .202E+04 .165E+03 .828E-01 .194E+01
J-K .159E-02 .612E-02 .341E-02 .495E-05 .399E-04 .157E+04 .408E+04 .192E+04 .210E+03 .286E+00 .231E+01
K-L .211E-02 .623E-02 .337E-02 .126E-04 .360E-04 .147E+04 .407E+04 .188E+04 .220E+03 .728E+00 .208E+01
L-I .178E-02 .648E-02 .266E-02 .770E-05 .276E-04 .161E+04 .422E+04 .198E+04 .172E+03 .445E+00 .159E+01

33 CEN -.717E-03 -.324E-02 .869E-02 .268E-04 -.215E-04 -.175E+04 -.374E+04 -.184E+04 .571E+03 .174E+01 -.140E+01
I-J -.732E-03 -.342E-02 .626E-02 .107E-04 -.226E-04 -.181E+04 -.380E+04 -.189E+04 .425E+03 .695E+00 -.147E+01
J-K -.714E-03 .000E+00 .925E-02 .304E-04 .000E+00 -.136E+04 -.296E+04 -.146E+04 .617E+03 .197E+01 .000E+00
K-L -.705E-03 -.308E-02 .109E-01 .413E-04 -.204E-04 -.170E+04 -.368E+04 -.181E+04 .703E+03 .269E+01 .133E+01
L-I -.720E-03 -.549E-02 .831E-02 .243E-04 -.364E-04 -.202E+04 -.427E+04 -.211E+04 .539E+03 .158E+01 .237E+01
34 CEN -.984E-03 .410E-03 -.110E-02 .230E-04 .102E-04 -.403E+03 -.414E+03 -.230E+03 .122E+03 .786E+00 .349E+00
I-J -.101E-02 .571E-03 -.112E-02 .185E-04 .199E-04 -.456E+03 -.538E+03 -.279E+03 -.102E+03 .633E+00 .680E+00
J-K -.976E-03 .570E-03 -.102E-02 .245E-04 .198E-04 -.449E+03 -.534E+03 -.276E+03 -.125E+03 .837E+00 .678E+00
K-L -.942E-03 .144E-03 -.107E-02 .304E-04 -.583E-05 -.317E+03 -.209E+03 -.148E+03 -.156E+03 .104E+01 .199E+00
L-I -.993E-03 .243E-03 -.118E-02 .214E-04 .129E-06 -.355E+03 -.287E+03 -.181E+03 -.119E+03 .733E+00 .441E-02
35 CEN -.113E-02 .550E-03 -.759E-03 .297E-04 .245E-04 -.726E+03 -.110E+04 -.548E+03 .186E+03 .147E+01 .122E+01
I-J -.110E-02 .619E-03 -.864E-03 .241E-04 .311E-04 -.746E+03 -.117E+04 -.575E+03 -.172E+03 .120E+01 .155E+01
J-K -.115E-02 .655E-03 -.814E-03 .312E-04 .346E-04 -.777E+03 -.121E+04 .597E+03 .197E+03 .155E+01 .172E+01
K-L -.120E-02 .439E-03 -.590E-03 .387E-04 .139E-04 -.693E+03 .989E+03 .505E+03 .208E+03 .192E+01 .690E+00
L-I -.112E-02 .440E-03 -.702E-03 .280E-04 .140E-04 -.673E+03 .981E+03 .496E+03 .175E+03 .139E+01 .696E+00
36 CEN -.143E-02 .390E-03 -.107E-02 .400E-04 .518E-04 -.101E+04 .166E+04 .879E+03 .196E+03 .258E+01 .334E+01
I-J -.124E-02 .294E-03 .945E-03 .267E-04 .579E-04 .978E+03 .169E+04 .882E+03 .170E+03 .172E+01 .374E+01
J-K -.147E-02 .656E-04 .140E-02 .432E-04 .725E-04 .111E+04 .185E+04 .974E+03 .227E+03 .279E+01 .468E+01
K-L -.172E-02 .543E-03 .127E-02 .611E-04 .421E-04 .105E+04 .161E+04 .875E+03 .236E+03 .395E+01 .272E+01
L-I -.138E-02 .729E-03 .720E-03 .367E-04 .302E-04 .900E+03 .146E+04 .781E+03 .163E+03 .237E+01 .195E+01
37 CEN -.162E-02 .358E-03 .443E-02 .345E-04 .833E-04 .113E+04 .188E+04 .100E+04 .353E+03 .227E+01 .547E+01
I-J -.189E-02 .317E-03 .386E-02 .124E-04 .850E-04 .119E+04 .191E+04 .103E+04 .319E+03 .811E+00 .558E+01
J-K -.162E-02 .123E-03 .432E-02 .345E-04 .928E-04 .115E+04 .193E+04 .102E+04 .346E+03 .227E+01 .609E+01
K-L -.114E-02 .431E-03 .545E-02 .738E-04 .804E-04 .103E+04 .183E+04 .958E+03 .413E+03 .484E+01 .528E+01
L-I -.162E-02 .593E-03 .455E-02 .345E-04 .739E-04 .111E+04 .183E+04 .985E+03 .360E+03 .227E+01 .485E+01
38 CEN -.147E-02 .409E-03 .473E-02 .220E-04 .110E-03 .119E+04 .207E+04 .106E+04 .334E+03 .149E+01 .745E+01
I-J -.155E-02 .324E-03 .381E-02 .908E-05 .107E-03 .117E+04 .204E+04 .104E+04 .280E+03 .614E+00 .726E+01
J-K -.147E-02 .933E-03 .468E-02 .220E-04 .128E-03 .123E+04 .217E+04 .110E+04 .336E+03 .149E+01 .865E+01
K-L -.136E-02 .524E-03 .596E-02 .639E-04 .114E-03 .123E+04 .210E+04 .108E+04 .407E+03 .432E+01 .772E+01
L-I -.147E-02 .115E-03 .477E-02 .220E-04 .925E-04 .115E+04 .196E+04 .102E+04 .332E+03 .149E+01 .626E+01
39 CEN .109E-02 .466E-02 .167E-01 .683E-06 .139E-03 .109E+04 .263E+04 .130E+04 .793E+03 .333E-01 .679E+01
I-J .125E-02 .369E-02 .122E-01 .388E-04 .131E-03 .896E+03 .239E+04 .115E+04 .579E+03 .189E+01 .637E+01
J-K .109E-02 .633E-02 .167E-01 .683E-06 .154E-03 .126E+04 .295E+04 .146E+04 .802E+03 .333E-01 .751E+01
K-L .869E-03 .602E-02 .229E-01 .556E-04 .151E-03 .136E+04 .297E+04 .151E+04 .109E+04 .271E+01 .737E+01
L-I .109E-02 .300E-02 .166E-01 .683E-06 .124E-03 .926E+03 .231E+04 .113E+04 .785E+03 .333E-01 .607E+01
40 CEN .331E-02 .758E-02 .134E-01 .788E-04 .116E-03 .939E+03 .302E+04 .135E+04 .639E+03 .396E+01 .582E+01
I-J .207E-02 .604E-02 .905E-02 .362E-04 .130E-03 .967E+03 .280E+04 .128E+04 .414E+03 .182E+01 .651E+01
J-K .331E-02 .944E-02 .129E-01 .788E-04 .992E-04 .113E+04 .339E+04 .154E+04 .621E+03 .396E+01 .499E+01
K-L .499E-02 .966E-02 .193E-01 .136E-03 .973E-04 .901E+03 .331E+04 .144E+04 .942E+03 .685E+01 .489E+01
L-I .331E-02 .572E-02 .139E-01 .788E-04 .132E-03 .750E+03 .264E+04 .116E+04 .657E+03 .396E+01 .666E+01
41 CEN .315E-02 .872E-02 .701E-02 .934E-04 .623E-04 .112E+04 .323E+04 .148E+04 .304E+03 .451E+01 .301E+01
I-J .269E-02 .823E-02 .578E-02 .610E-04 .737E-04 .107E+04 .314E+04 .143E+04 .240E+03 .295E+01 .356E+01
J-K .315E-02 .101E-01 .657E-02 .934E-04 .309E-04 .126E+04 .349E+04 .162E+04 .305E+03 .451E+01 .149E+01
K-L .358E-02 .919E-02 .818E-02 .124E-03 .515E-04 .117E+04 .332E+04 .153E+04 .365E+03 .600E+01 .248E+01
L-I .315E-02 .737E-02 .745E-02 .934E-04 .938E-04 .984E+03 .297E+04 .134E+04 .303E+03 .451E+01 .453E+01
42 CEN .201E-02 .856E-02 .171E-02 .103E-03 .326E-04 .135E+04 .351E+04 .165E+04 .826E+02 .541E+01 .172E+01
I-J .244E-02 .846E-02 .126E-02 .474E-04 .165E-04 .117E+04 .337E+04 .154E+04 .239E+02 .250E+01 .872E+00
J-K .201E-02 .892E-02 .218E-02 .103E-03 .931E-04 .146E+04 .373E+04 .176E+04 .124E+03 .541E+01 .491E+01
K-L .161E-02 .865E-02 .214E-02 .154E-03 .477E-04 .153E+04 .364E+04 .175E+04 .138E+03 .814E+01 .252E+01
L-I .201E-02 .819E-02 .124E-02 .103E-03 .279E-04 .124E+04 .330E+04 .154E+04 .412E+02 .541E+01 .147E+01
43 CEN .209E-02 .110E-01 .289E-02 .232E-04 .128E-03 .121E+04 .314E+04 .151E+04 .157E+03 .107E+01 .591E+01
I-J .192E-02 .103E-01 .558E-02 .221E-04 .117E-03 .124E+04 .310E+04 .151E+04 .228E+03 .102E+01 .539E+01
J-K .201E-02 .129E-01 .433E-02 .149E-05 .160E-03 .134E+04 .336E+04 .163E+04 .203E+03 .687E-01 .739E+01
K-L .226E-02 .117E-01 .233E-03 .681E-04 .139E-03 .118E+04 .317E+04 .151E+04 .872E+02 .314E+01 .642E+01
L-I .221E-02 .817E-02 .799E-03 .550E-04 .810E-04 .101E+04 .280E+04 .133E+04 .891E+02 .254E+01 .374E+01
44 CEN .688E-03 .621E-02 .140E-01 .770E-04 .839E-04 .127E+04 .261E+04 .133E+04 .686E+03 .387E+01 .421E+01
I-J .709E-03 .683E-02 .970E-02 .189E-04 .923E-04 .133E+04 .270E+04 .138E+04 .522E+03 .950E+00 .464E+01
J-K .675E-03 .000E+00 .166E-01 .112E-03 .000E+00 .849E+03 .171E+04 .906E+03 .788E+03 .563E+01 .000E+00
K-L .671E-03 .569E-02 .176E-01 .125E-03 .769E-04 .123E+04 .253E+04 .129E+04 .822E+03 .630E+01 .386E+01
L-I .698E-03 .109E-01 .120E-01 .505E-04 .147E-03 .159E+04 .328E+04 .165E+04 .608E+03 .254E+01 .740E+01
45 CEN .649E-03 .189E-03 .224E-03 .444E-04 .240E-04 .270E+03 .177E+03 .117E+03 .659E+02 .166E+01 .896E+00
I-J .792E-03 .219E-03 .847E-04 .366E-04 .415E-04 .288E+03 .216E+03 .132E+03 .577E+02 .137E+01 .155E+01
J-K .633E-03 .208E-03 .189E-04 .453E-04 .351E-04 .278E+03 .201E+03 .125E+03 .648E+02 .169E+01 .131E+01
K-L .329E-03 .121E-03 .917E-03 .618E-04 .153E-04 .231E+03 .892E+02 .838E+02 .844E+02 .231E+01 .572E+00
L-I .668E-03 .167E-03 .453E-03 .434E-04 .116E-04 .261E+03 .151E+03 .108E+03 .672E+02 .162E+01 .435E+00
46 CEN .555E-03 .172E-03 .461E-03 .676E-04 .290E-04 .327E+03 .432E+03 .213E+03 .532E+02 .234E+01 .100E+01
I-J .973E-03 .126E-03 .109E-02 .449E-04 .612E-04 .340E+03 .487E+03 .232E+03 .448E+02 .155E+01 .212E+01

J-K -.514E-03 .134E-03 .951E-03 .698E-04 .558E-04 -.347E+03 -.481E+03 -.233E+03 -.581E+02 .241E+01 .193E+01
K-L .302E-03 .265E-03 -.820E-03 .114E-03 -.371E-04 -.301E+03 -.318E+03 -.174E+03 -.705E+02 .395E+01 -.128E+01
L-I -.601E-03 .214E-03 -.794E-04 .651E-04 -.607E-06 -.305E+03 -.377E+03 -.191E+03 -.478E+02 .225E+01 -.210E-01
47 CEN -.117E-02 .642E-03 .454E-03 .102E-03 .623E-04 -.448E+03 -.690E+03 -.349E+03 -.739E+02 .430E+01 .263E+01
I-J -.135E-02 .112E-03 .145E-02 .665E-04 .833E-04 -.449E+03 -.774E+03 -.372E+03 -.289E+02 .281E+01 .352E+01
J-K -.115E-02 .251E-03 .542E-03 .106E-03 .977E-04 -.525E+03 -.868E+03 -.424E+03 -.905E+02 .446E+01 .413E+01
K-L .559E-07 .394E-02 -.578E-02 .321E-03 -.685E-04 -.439E+03 -.165E+03 -.206E+03 -.354E+03 .136E+02 -.289E+01
L-I -.119E-02 .157E-02 .362E-03 .977E-04 .255E-04 -.367E+03 -.505E+03 -.272E+03 -.566E+02 .412E+01 .108E+01
48 CEN -.931E-03 .183E-03 -.275E-02 .120E-03 .106E-03 -.453E+03 -.812E+03 -.396E+03 -.127E+03 .533E+01 .473E+01
I-J -.114E-02 .147E-03 -.225E-02 .738E-04 .110E-03 -.426E+03 -.796E+03 -.381E+03 -.135E+03 .329E+01 .489E+01
J-K -.931E-03 .666E-04 -.270E-02 .120E-03 .117E-03 -.447E+03 -.803E+03 -.391E+03 -.128E+03 .533E+01 .523E+01
K-L -.136E-05 .341E-03 -.495E-02 .321E-03 .914E-04 -.567E+03 -.883E+03 -.462E+03 -.892E+02 .143E+02 .407E+01
L-I -.931E-03 .300E-03 -.280E-02 .120E-03 .954E-04 .458E+03 -.821E+03 -.402E+03 -.125E+03 .533E+01 .424E+01
49 CEN -.826E-03 -.268E-03 -.345E-02 .165E-03 .161E-03 -.481E+03 -.821E+03 -.394E+03 -.124E+03 .725E+01 .706E+01
I-J -.136E-02 -.198E-03 -.275E-02 .639E-04 .152E-03 -.480E+03 -.818E+03 -.391E+03 -.124E+03 .280E+01 .665E+01
J-K -.826E-03 -.584E-03 -.322E-02 .165E-03 .204E-03 -.478E+03 -.818E+03 -.391E+03 -.124E+03 .725E+01 .894E+01
K-L -.146E-05 -.374E-03 -.453E-02 .322E-03 .176E-03 -.483E+03 -.826E+03 -.399E+03 -.124E+03 .141E+02 .770E+01
L-I -.826E-03 .487E-04 -.368E-02 .165E-03 .118E-03 -.484E+03 -.824E+03 -.397E+03 -.125E+03 .725E+01 .519E+01
50 CEN .539E-03 -.798E-03 -.138E-01 .156E-03 .230E-03 -.315E+03 -.744E+03 -.354E+03 -.414E+03 .502E+01 .737E+01
I-J .869E-03 -.208E-02 -.196E-01 .556E-04 .207E-03 -.278E+03 -.855E+03 -.374E+03 -.614E+03 .178E+01 .666E+01
J-K .539E-03 .776E-03 -.139E-01 .156E-03 .257E-03 -.222E+03 -.539E+03 -.260E+03 -.422E+03 .502E+01 .824E+01
K-L -.199E-05 .130E-02 -.436E-02 .322E-03 .266E-03 -.377E+03 -.561E+03 -.319E+03 -.868E+02 .103E+02 .854E+01
L-I .539E-03 .237E-02 -.137E-01 .156E-03 .202E-03 .409E+03 -.949E+03 -.447E+03 -.406E+03 .502E+01 .650E+01
51 CEN .876E-02 -.182E-01 -.465E-01 .904E-03 .760E-03 -.842E+03 -.195E+04 -.108E+04 -.651E+03 .133E+02 .112E+02
I-J .499E-02 -.790E-02 -.156E-01 .136E-03 .424E-03 -.358E+03 -.110E+04 -.528E+03 -.213E+03 -.201E+01 .625E+01
J-K .876E-02 -.275E-01 -.454E-01 .904E-03 .106E-02 -.158E+04 -.294E+04 -.182E+04 -.640E+03 .133E+02 .156E+02
K-L .146E-01 -.342E-01 -.941E-01 .251E-02 .128E-02 -.159E+04 -.325E+04 -.194E+04 -.133E+04 .369E+02 .188E+02
L-I .876E-02 .899E-02 -.476E-01 .904E-03 .460E-03 .104E+03 -.948E+03 -.346E+03 -.661E+03 .133E+02 .677E+01
52 CEN .309E-02 -.132E-01 -.648E-02 -.315E-03 .412E-03 -.880E+03 -.239E+04 -.110E+04 -.223E+03 -.117E+02 .153E+02
I-J .358E-02 -.128E-01 -.513E-02 .124E-03 .479E-03 -.732E+03 -.227E+04 -.101E+04 -.168E+03 -.462E+01 .178E+02
J-K .309E-02 -.144E-01 -.698E-02 -.315E-03 .219E-03 .976E+03 -.258E+04 -.119E+04 -.252E+03 -.117E+02 .813E+01
K-L .261E-02 -.136E-01 -.777E-02 -.497E-03 .348E-03 .102E+04 -.251E+04 -.118E+04 -.276E+03 -.185E+02 .129E+02
L-I .309E-02 -.120E-01 -.597E-02 -.315E-03 .605E-03 .783E+03 -.221E+04 .999E+03 -.194E+03 -.117E+02 .225E+02
53 CEN .149E-02 -.112E-01 .603E-03 .382E-03 -.696E-04 -.915E+03 -.223E+04 -.102E+04 .503E+01 .161E+02 .294E+01
I-J .161E-02 -.113E-01 .281E-03 .154E-03 .323E-05 -.800E+03 -.221E+04 .975E+03 .245E+02 .652E+01 .137E+00
J-K .149E-02 -.108E-01 .462E-03 .382E-03 .336E-03 .829E+03 .205E+04 .933E+03 .367E+02 .161E+02 .142E+02
K-L .137E-02 -.111E-01 .905E-03 .595E-03 .132E-03 .102E+04 .225E+04 .106E+04 .327E+02 .252E+02 .558E+01
L-I .149E-02 -.116E-01 .744E-03 .382E-03 .197E-03 .100E+04 .241E+04 .110E+04 .468E+02 .161E+02 .832E+01
54 CEN .326E-03 .998E-02 .108E-02 .214E-04 .238E-03 .114E+04 .235E+04 .124E+04 .237E+02 .112E+01 .124E+02
I-J .444E-03 .101E-01 .646E-03 .248E-04 .237E-03 .122E+04 .245E+04 .132E+04 .859E+00 .130E+01 .124E+02
J-K .139E-02 .802E-04 .562E-02 .517E-04 .309E-03 .295E+04 .275E+04 .276E+04 .332E+03 .271E+01 .162E+02
K-L .210E-03 .987E-02 .150E-02 .181E-04 .238E-03 .107E+04 .225E+04 .115E+04 .477E+02 .950E+01 .125E+02
L-I .271E-03 .105E-01 .143E-02 .199E-04 .234E-03 .135E+04 .261E+04 .144E+04 .420E+02 .104E+01 .123E+02
55 CEN .656E-03 .432E-05 .205E-01 .165E-03 .167E-04 .394E+03 .437E+03 .394E+03 .558E+03 .434E+01 .440E+00
I-J .660E-03 .432E-05 .205E-01 .165E-03 .167E-04 .406E+03 .448E+03 .406E+03 .559E+03 .411E+01 .440E+00
J-K .655E-03 .000E+00 .205E-01 .169E-03 .000E+00 .522E+03 .567E+03 .522E+03 .559E+03 .446E+01 .000E+00
K-L .653E-03 .432E-05 .205E-01 .174E-03 .167E-04 .382E+03 .426E+03 .383E+03 .558E+03 .458E+01 .440E+00
L-I .686E-03 .802E-04 .203E-01 .909E-04 .309E-03 .185E+04 .185E+04 .185E+04 .557E+03 .240E+01 .816E+01
56 CEN .158E-02 .143E-01 .129E+00 .583E-02 .202E-02 .101E+02 .159E-03 .159E-03 .129E-02 .583E-04 .202E-04
I-J .146E-01 .143E-01 .105E+00 .251E-02 .202E-02 .929E+02 .288E-05 .288E-05 .105E-02 .251E-04 .202E-04
J-K .158E-02 .286E-01 .138E+00 .583E-02 .399E-02 .101E+02 .302E-03 .302E-03 .138E-02 .583E-04 .399E-04
K-L .177E-01 .143E-01 .153E+00 .915E-02 .202E-02 .113E+03 .320E-03 .320E-03 .153E-02 .915E-04 .202E-04
L-I .158E-02 .167E-01 .119E+00 .583E-02 .505E-04 .101E+02 .158E-04 .158E-04 .119E-02 .583E-04 .505E-06
57 CEN .447E-02 .214E-01 .159E-01 .106E-02 .210E-02 .934E+03 .203E+04 .112E+04 .338E+03 .225E+02 .446E+02
I-J .261E-02 .214E-01 .181E-01 .497E-03 .210E-02 .114E+04 .215E+04 .125E+04 .383E+03 .105E+02 .446E+02
J-K .447E-02 .142E-01 .967E-02 .106E-02 .214E-03 .455E+03 .125E+04 .645E+03 .205E+03 .225E+02 .455E+01
K-L .633E-02 .214E-01 .138E-01 .162E-02 .210E-02 .732E+03 .191E+04 .100E+04 .292E+03 .344E+02 .446E+02
L-I .447E-02 .286E-01 .222E-01 .106E-02 .399E-02 .141E+04 .282E+04 .160E+04 .470E+03 .225E+02 .847E+02
58 CEN .176E-02 .157E-01 .966E-03 .734E-03 .335E-03 .707E+03 .184E+04 .821E+03 .315E+02 .239E+02 .109E+02
I-J .137E-02 .157E-01 .588E-03 .595E-03 .335E-03 .754E+03 .187E+04 .844E+03 .192E+02 .194E+02 .109E+02
J-K .176E-02 .172E-01 .550E-03 .734E-03 .883E-03 .795E+03 .203E+04 .909E+03 .179E+02 .239E+02 .288E+02
K-L .214E-02 .157E-01 .134E-02 .873E-03 .335E-03 .659E+03 .182E+04 .799E+03 .438E+02 .284E+02 .109E+02
L-I .176E-02 .142E-01 .248E-02 .734E-03 .214E-03 .618E+03 .166E+04 .733E+03 .809E+02 .239E+02 .698E+01
59 CEN .181E-03 .863E-02 .272E-02 .908E-04 .596E-03 .408E+03 .965E+03 .396E+03 .895E+02 .299E+01 .196E+02
I-J .210E-03 .863E-02 .558E-03 .181E-04 .596E-03 .365E+03 .947E+03 .379E+03 .184E+02 .597E+00 .196E+02
J-K .181E-03 .813E-04 .117E-02 .908E-04 .309E-03 .237E+02 .172E+02 .118E+02 .386E+02 .299E+01 .102E+02
K-L .572E-03 .863E-02 .488E-02 .163E-03 .596E-03 .452E+03 .982E+03 .414E+03 .161E+03 .538E+01 .196E+02

L-I -.181E-03 -.172E-01 .426E-02 .908E-04 .883E-03 .793E+03 -.191E+04 .781E+03 .140E+03 .299E+01 -.291E+02
60 CEN -.643E-03 -.406E-04 .204E-01 .200E-03 -.154E-03 .395E+03 .388E+03 .388E+03 .117E+03 .114E+01 .884E+00
I-J -.653E-03 -.406E-04 .204E-01 .174E-03 -.154E-03 .401E+03 .394E+03 .393E+03 .117E+03 .995E+00 .884E+00
J-K -.643E-03 .000E+00 .205E-01 .200E-03 .000E+00 .372E+03 .365E+03 .365E+03 .117E+03 .114E+01 .000E+00
K-L -.634E-03 -.406E-04 .204E-01 .226E-03 -.154E-03 .390E+03 .383E+03 .382E+03 .117E+03 .129E+01 .884E+00
L-I -.643E-03 .813E-04 .204E-01 .200E-03 .309E-03 .418E+03 .412E+03 .411E+03 .117E+03 .114E+01 .177E+01
61 CEN -.162E-01 .480E-02 .150E+00 .119E-01 .167E-02 .943E+02 .210E-03 .210E-03 .150E-02 .119E-03 .167E-04
I-J -.177E-01 .480E-02 .142E+00 .915E-02 .167E-02 .103E+03 .225E-03 .225E-03 .142E-02 .915E-04 .167E-04
J-K -.162E-01 .959E-02 .150E+00 .119E-01 .329E-02 .943E+02 .258E-03 .258E-03 .150E-02 .119E-03 .329E-04
K-L -.146E-01 .480E-02 .159E+00 .146E-01 .167E-02 .852E+02 .194E-03 .194E-03 .159E-02 .146E-03 .167E-04
L-I -.162E-01 .137E-05 .151E+00 .119E-01 .484E-04 .943E+02 .162E-03 .162E-03 .151E-02 .119E-03 .484E-06
62 CEN .507E-02 .987E-02 .333E-02 .220E-02 .132E-02 .363E+03 .179E+04 .847E+03 .159E+03 .105E+03 .631E+02
I-J .633E-02 .987E-02 .325E-02 .162E-02 .132E-02 .231E+02 .157E+04 .626E+03 .155E+03 .772E+02 .631E+02
J-K .507E-02 .101E-01 .753E-02 .220E-02 .641E-03 .411E+03 .186E+04 .895E+03 .359E+03 .105E+03 .306E+02
K-L .382E-02 .987E-02 .341E-02 .279E-02 .132E-02 .703E+03 .201E+04 .107E+04 .162E+03 .133E+03 .631E+02
L-I .507E-02 .959E-02 .874E-03 .220E-02 .329E-02 .315E+03 .171E+04 .799E+03 .417E+02 .105E+03 .157E+03
63 CEN .198E-02 .128E-01 .412E-02 .930E-03 .868E-03 .399E+03 .126E+04 .514E+03 .121E+03 .272E+02 .254E+02
I-J .214E-02 .128E-01 .344E-02 .873E-03 .868E-03 .381E+03 .126E+04 .507E+03 .101E+03 .255E+02 .254E+02
J-K .198E-02 .155E-01 .477E-02 .930E-03 .109E-02 .526E+03 .155E+04 .642E+03 .140E+03 .272E+02 .320E+02
K-L .181E-02 .128E-01 .480E-02 .987E-03 .868E-03 .416E+03 .127E+04 .522E+03 .140E+03 .289E+02 .254E+02
L-I .198E-02 .101E-01 .347E-02 .930E-03 .641E-03 .271E+03 .980E+03 .387E+03 .101E+03 .272E+02 .188E+02
64 CEN -.423E-03 .779E-02 .470E-02 .263E-03 .701E-03 .393E+03 .891E+03 .365E+03 .159E+03 .889E+01 .237E+02
I-J .572E-03 .779E-02 .275E-02 .163E-03 .701E-03 .410E+03 .898E+03 .371E+03 .928E+02 .552E+01 .237E+02
J-K -.423E-03 .620E-04 .529E-02 .263E-03 .307E-03 .502E+02 .258E+02 .216E+02 .179E+03 .889E+01 .104E+02
K-L .275E-03 .779E-02 .665E-02 .363E-03 .701E-03 .377E+03 .885E+03 .358E+03 .225E+03 .123E+02 .237E+02
L-I .423E-03 .155E-01 .411E-02 .263E-03 .109E-02 .737E+03 .176E+04 .708E+03 .139E+03 .889E+01 .370E+02
65 CEN .624E-03 .310E-04 .205E-01 .251E-03 .153E-03 .367E+03 .360E+03 .360E+03 .113E+03 .140E+01 .851E+00
I-J .634E-03 .310E-04 .204E-01 .226E-03 .153E-03 .372E+03 .365E+03 .365E+03 .113E+03 .125E+01 .851E+00
J-K .624E-03 .000E+00 .205E-01 .251E-03 .000E+00 .350E+03 .343E+03 .343E+03 .114E+03 .140E+01 .000E+00
K-L .615E-03 .310E-04 .205E-01 .277E-03 .153E-03 .362E+03 .355E+03 .355E+03 .114E+03 .154E+01 .851E+00
L-I .624E-03 .620E-04 .204E-01 .251E-03 .307E-03 .384E+03 .378E+03 .377E+03 .113E+03 .140E+01 .170E+01
66 CEN .168E-01 .490E-02 .169E+00 .122E-01 .136E-02 .901E+02 .217E-03 .217E-03 .169E-02 .122E-03 .136E-04
I-J .146E-01 .490E-02 .161E+00 .146E-01 .136E-02 .784E+02 .195E-03 .195E-03 .161E-02 .146E-03 .136E-04
J-K .168E-01 .980E-02 .170E+00 .122E-01 .277E-02 .901E+02 .266E-03 .266E-03 .170E-02 .122E-03 .277E-04
K-L .190E-01 .490E-02 .177E+00 .987E-02 .136E-02 .102E+03 .239E-03 .239E-03 .177E-02 .987E-04 .136E-04
L-I .168E-01 .108E-05 .168E+00 .122E-01 .481E-04 .901E+02 .168E-03 .168E-03 .168E-02 .122E-03 .481E-06
67 CEN .373E-02 .723E-02 .324E-02 .231E-02 .117E-02 .370E+03 .112E+04 .625E+03 .111E+03 .790E+02 .400E+02
I-J .382E-02 .723E-02 .400E-02 .279E-02 .117E-02 .346E+03 .110E+04 .608E+03 .137E+03 .952E+02 .400E+02
J-K .373E-02 .466E-02 .356E-02 .231E-02 .434E-03 .889E+02 .484E+03 .166E+03 .122E+03 .790E+02 .148E+02
K-L .363E-02 .723E-02 .248E-02 .184E-02 .117E-02 .393E+03 .114E+04 .642E+03 .847E+02 .628E+02 .400E+02
L-I .373E-02 .980E-02 .292E-02 .231E-02 .277E-02 .829E+03 .175E+04 .108E+04 .997E+02 .790E+02 .947E+02
68 CEN .132E-02 .561E-02 .306E-02 .967E-03 .515E-03 .572E+03 .144E+04 .737E+03 .191E+03 .603E+02 .321E+02
I-J .181E-02 .561E-02 .282E-02 .987E-03 .515E-03 .426E+03 .135E+04 .652E+03 .176E+03 .616E+02 .321E+02
J-K .132E-02 .657E-02 .503E-02 .967E-03 .597E-03 .736E+03 .172E+04 .901E+03 .314E+03 .603E+02 .372E+02
K-L .821E-03 .561E-02 .331E-02 .946E-03 .515E-03 .719E+03 .152E+04 .822E+03 .206E+03 .590E+02 .321E+02
L-I .132E-02 .466E-02 .110E-02 .967E-03 .434E-03 .408E+03 .115E+04 .573E+03 .684E+02 .603E+02 .271E+02
69 CEN .200E-03 .277E-02 .798E-02 .230E-03 .714E-04 .143E+03 .325E+03 .129E+03 .283E+03 .816E+01 .253E+01
I-J .275E-03 .277E-02 .702E-02 .363E-03 .714E-04 .151E+03 .328E+03 .132E+03 .249E+03 .128E+02 .253E+01
J-K .211E-03 .542E-04 .805E-02 .249E-03 .305E-03 .264E+02 .153E+02 .114E+02 .285E+03 .883E+01 .108E+02
K-L .125E-03 .277E-02 .893E-02 .981E-04 .714E-04 .134E+03 .322E+03 .125E+03 .316E+03 .347E+01 .253E+01
L-I .185E-03 .657E-02 .787E-02 .204E-03 .597E-03 .305E+03 .758E+03 .292E+03 .279E+03 .723E+01 .211E+02
70 CEN .604E-03 .316E-04 .205E-01 .307E-03 .178E-03 .746E+02 .733E+02 .732E+02 .238E+02 .358E+00 .207E+00
I-J .615E-03 .316E-04 .204E-01 .277E-03 .178E-03 .760E+02 .746E+02 .745E+02 .238E+02 .323E+00 .207E+00
J-K .601E-03 .000E+00 .205E-01 .313E-03 .000E+00 .707E+02 .693E+02 .693E+02 .239E+02 .365E+00 .000E+00
K-L .592E-03 .316E-04 .205E-01 .337E-03 .178E-03 .733E+02 .720E+02 .719E+02 .238E+02 .392E+00 .207E+00
L-I .605E-03 .542E-04 .204E-01 .303E-03 .305E-03 .774E+02 .761E+02 .760E+02 .238E+02 .353E+00 .355E+00
71 CEN .198E-01 .361E-02 .183E+00 .914E-02 .390E-03 .109E+03 .234E-03 .234E-03 .183E-02 .914E-04 .390E-05
I-J .190E-01 .361E-02 .176E+00 .987E-02 .390E-03 .104E+03 .226E-03 .226E-03 .176E-02 .987E-04 .390E-05
J-K .198E-01 .722E-02 .183E+00 .914E-02 .828E-03 .109E+03 .270E-03 .270E-03 .183E-02 .914E-04 .828E-05
K-L .206E-01 .361E-02 .189E+00 .840E-02 .390E-03 .113E+03 .242E-03 .242E-03 .189E-02 .840E-04 .390E-05
L-I .198E-01 .788E-06 .182E+00 .914E-02 .481E-04 .109E+03 .198E-03 .198E-03 .182E-02 .914E-04 .481E-06
72 CEN .351E-02 .579E-02 .531E-03 .169E-02 .313E-03 .147E+03 .825E+03 .403E+03 .193E+02 .614E+02 .114E+02
I-J .363E-02 .579E-02 .954E-03 .184E-02 .313E-03 .116E+03 .802E+03 .380E+03 .348E+02 .670E+02 .114E+02
J-K .351E-02 .436E-02 .959E-03 .169E-02 .203E-03 .105E+03 .469E+03 .151E+03 .349E+02 .614E+02 .740E+01
K-L .338E-02 .579E-02 .108E-03 .153E-02 .313E-03 .179E+03 .847E+03 .425E+03 .394E+01 .558E+02 .114E+02
L-I .351E-02 .722E-02 .103E-03 .169E-02 .828E-03 .399E+03 .118E+04 .655E+03 .375E+01 .614E+02 .302E+02
73 CEN .996E-04 .274E-02 .317E-02 .957E-03 .161E-03 .517E+03 .762E+03 .507E+03 .147E+03 .445E+02 .746E+01

I-J .821E-03 -.274E-02 -.357E-02 -.946E-03 .161E-03 -.267E+03 -.598E+03 -.343E+03 -.166E+03 -.440E+02 .746E+01
 J-K -.996E-04 -.113E-02 -.682E-02 -.957E-03 .118E-03 -.228E+03 -.324E+03 -.219E+03 -.317E+03 -.445E+02 .548E+01
 K-L -.102E-02 -.274E-02 -.276E-02 -.968E-03 .161E-03 -.766E+03 -.926E+03 -.671E+03 -.128E+03 -.450E+02 .746E+01
 L-I -.996E-04 -.436E-02 .488E-03 -.957E-03 .203E-03 -.805E+03 -.120E+04 -.796E+03 .227E+02 -.445E+02 .944E+01
 74 CEN -.909E-03 -.291E-02 -.384E-03 .844E-04 .585E-04 -.781E+03 -.109E+04 -.640E+03 -.299E+02 .657E+01 .456E+01
 I-J .762E-03 -.291E-02 .645E-04 .993E-04 .585E-04 -.241E+03 -.913E+03 -.360E+03 .503E+01 .774E+01 .456E+01
 J-K -.361E-03 -.586E-02 -.112E-01 .893E-04 -.399E-04 -.110E+04 -.195E+04 -.104E+04 -.874E+03 .696E+01 -.311E+01
 K-L -.258E-02 -.291E-02 -.833E-03 .694E-04 .585E-04 -.132E+04 -.137E+04 -.920E+03 -.649E+02 .541E+01 .456E+01
 L-I -.124E-02 -.113E-02 .616E-02 .814E-04 .118E-03 -.590E+03 -.572E+03 -.397E+03 .480E+03 .634E+01 .919E+01
 75 CEN .183E-03 -.221E-02 .131E-01 .350E-03 -.150E-04 -.506E+02 -.214E+03 -.631E+02 .449E+03 .120E+02 -.513E+00
 I-J -.109E-02 -.221E-02 .128E-01 .348E-03 -.150E-04 -.178E+03 -.254E+03 -.103E+03 .436E+03 .119E+02 -.513E+00
 J-K .436E-03 .000E+00 .208E-01 .351E-03 .000E+00 .434E+02 .136E+02 .136E+02 .711E+03 .120E+02 .000E+00
 K-L .146E-02 -.221E-02 .135E-01 .353E-03 -.150E-04 .765E+02 -.174E+03 -.233E+02 .462E+03 .121E+02 -.513E+00
 L-I -.236E-03 -.586E-02 .434E-03 .350E-03 -.399E-04 -.206E+03 -.590E+03 -.190E+03 .148E+02 .119E+02 -.136E+01

BENDING ELEMENT FORCES AND MOMENTS

EL.NO.	1-P1	1-P2	1-P3	1-M1	1-M2	1-M3	2-P1	2-P2	2-P3	2-M1	2-M2	2-M3
76	.681E+03	-.212E-01	.158E+03	-.845E-04	.162E-02	-.142E-03	-.681E+03	.212E-01	-.158E+03	.845E-04	-.452E+03	-.496E-01
77	.934E+03	-.927E-02	.446E+03	.432E-03	.452E+03	.429E-01	-.934E+03	.927E-02	-.446E+03	-.432E-03	-.173E+04	-.622E-01
78	.119E+04	-.184E+02	.719E+03	.241E-03	.173E+04	.776E-01	-.119E+04	.184E+02	-.719E+03	-.241E-03	-.380E+04	-.528E+02
79	.144E+04	-.183E+02	.923E+03	.688E-03	.379E+04	.528E+02	-.144E+04	.183E+02	-.923E+03	-.688E-03	-.645E+04	-.105E+03
80	.259E+02	-.176E-06	-.131E-05	-.120E-08	.257E-05	-.334E-06	-.259E+02	.176E-06	.131E-05	.120E-08	.595E-06	-.906E-07
81	-.142E+04	.858E-08	.544E-07	-.120E-08	-.595E-06	.906E-07	.142E+04	-.858E-08	-.544E-07	.120E-08	-.149E-06	.267E-07
82	-.113E+04	-.230E-08	-.131E-07	-.120E-08	.149E-06	-.267E-07	.113E+04	.230E-08	.131E-07	.120E-08	.609E-07	-.103E-07
83	-.120E+03	.218E-08	.660E-08	-.120E-08	-.609E-07	.103E-07	.120E+03	-.218E-08	-.660E-08	.120E-08	-.453E-07	.248E-07
84	.146E-01	.259E-03	.197E-01	.126E-09	.102E-07	-.109E-08	-.146E-01	-.259E-03	-.197E-01	-.126E-09	-.340E-01	.448E-03
85	.135E+05	.159E+02	.308E+02	.988E-02	.266E-01	-.965E-02	-.135E+05	-.159E+02	-.308E+02	-.988E-02	-.123E+03	.636E+02
86	.155E+05	.697E+01	.477E+02	-.315E-01	.123E+03	-.635E+02	-.155E+05	-.697E+01	-.477E+02	.315E-01	-.261E+03	.836E+02
87	.203E+05	-.214E+02	-.536E+03	-.200E-01	.260E+03	-.836E+02	-.203E+05	.214E+02	.536E+03	.200E-01	.128E+04	.220E+02
88	.200E+05	-.436E+02	.247E+04	-.475E-01	-.128E+04	-.225E+02	-.200E+05	.436E+02	-.247E+04	.475E-01	-.143E+01	-.421E+00
89	-.130E+03	.264E+01	.717E+03	-.204E-02	-.250E+01	-.158E+00	.130E+03	-.264E+01	-.717E+03	.204E-02	-.106E+04	.393E+01
90	.283E+04	.109E+01	-.109E+05	.213E+02	.129E+05	-.334E+02	-.283E+04	-.109E+01	.109E+05	-.213E+02	-.745E+04	.339E+02
91	.304E+04	-.112E+01	-.404E+04	.213E+02	.747E+04	-.324E+02	-.304E+04	.112E+01	.404E+04	-.213E+02	.263E+04	.295E+02
92	.415E+04	-.408E+02	-.573E+04	.105E+03	.216E+04	-.613E+02	-.415E+04	.408E+02	.573E+04	-.105E+03	.643E+04	.108E+00
93	.119E+05	.349E+01	.119E+04	.334E+02	-.118E+05	.158E+02	-.119E+05	-.349E+01	-.119E+04	-.334E+02	.864E+03	.165E+02
94	.215E+04	.129E+02	.446E+03	.177E+02	-.481E+04	.881E+02	-.215E+04	-.129E+02	-.446E+03	-.177E+02	.687E+03	.312E+02
95	.130E+05	-.896E+00	.194E+01	.334E+02	-.864E+03	-.165E+02	-.130E+05	.896E+00	-.194E+01	-.334E+02	.847E+03	.818E+01
96	.600E+04	-.276E+01	.109E+02	.177E+02	-.687E+03	-.312E+02	-.600E+04	.276E+01	-.109E+02	-.177E+02	.586E+03	.571E+01
97	.149E+05	-.173E+01	-.126E+03	.334E+02	-.847E+03	-.818E+01	-.149E+05	.173E+01	.126E+03	-.334E+02	.201E+04	-.787E+01
98	.104E+05	-.757E+00	-.210E+03	.177E+02	-.586E+03	-.571E+01	-.104E+05	.757E+00	.210E+03	-.177E+02	.253E+04	-.130E+01
99	.174E+05	.517E+01	.113E+04	.334E+02	-.201E+04	.787E+01	-.174E+05	-.517E+01	-.113E+04	-.334E+02	-.845E+04	.400E+02
100	.137E+05	.193E+01	.103E+04	.177E+02	-.253E+04	.130E+01	-.137E+05	-.193E+01	-.103E+04	-.177E+02	-.701E+04	.165E+02

****DEVELOPED FORCES AND MOMENTS PER FOOT OF ABUTMENT****
 FOR AXIAL THRUST TENSION IS POSITIVE
 FOR BENDING MOMENT TENSION ON THE BACKFILL SIDE IS POSITIVE